PACCAR Service Manual

| Section | Electrical System Service Manual |
|---------|-------------------------------------|
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2010 Multiplexed Electrical System Service Manual — CECU3 with Chassis Node



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Important Notes. 1 - 2

Important Notes

The simulate function within ESA is a good diagnosis tool. Safety is a concern, so many CECU outputs are not accessible for simulation such as: cruise control, engine oil pressure, park brake switch.

Simulation of gauges is also not permitted if the engine is running.

Replacing the control unit results in the odometer being reset. Take appropriate action to record the vehicle miles prior to removing the control unit.

| //// | N |
|------|---|
| | • |

CAUTION

Interrupting the communication or power supply during a control unit reflash could result in hardware damage.

ESA recognizes when a software update is required on a connected vehicle. If for some reason the user chooses not to reflash the control unit, ESA triggers a warning display. The LCD backlighting of the speedometer and outside air temperature blink for 1 minute. The warning is triggered at every key-on of the vehicle until the required update is performed. This is to alert the operator or other technicians that a vehicle reflash is required.

ESA automatically identifies what version of control unit it is connected to, and only permits software downloads that are applicable for that control unit.

Check the program menu to see if an inoperative feature is disabled. This is very important when diagnosing an inoperative gauge on a CECU equipped vehicle. The gauge may simply have been previously disabled.

Instrumentation Service Information

describing how to remove, disassemble, and reinstall instrumentation components is located on ServiceNet. Before attempting any instrumentation repairs, the technician should have a complete understanding of the procedures described in ServiceNet.

This manual contains service manual information covering vehicles equipped with software version "CECU3 with Chassis Node" (P30-1009). For vehicles with prior CECU software versions (such as: ICU (P30-1003), CECU/CECU2 (P30-1002), and CECU3 (P30-1008)) refer to a separate publication (PM819010/KM815054).

When replacing a chassis node, disconnect the batteries and do not reconnect them until node installation and all wiring connections are complete. A new chassis node and the CECU need to be powered up simultaneously during the node's first power cycle; otherwise a fault on the Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt) will indicate that the CECU is not recognizing the proper communication with the chassis node.

2 Applies To

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Electronic Service Analyst (ESA)

ESA History

Multiplexed instrumentation was introduced in 2005. This method of communication, using a single wire to transmit multiple signals to many components, has dramatically reduced the size and complexity of the wiring bundle behind the dash panel.

While some traditional diagnostic and troubleshooting methods apply to multiplexed instruments, other methods do not. Professional service technicians needed a new diagnostic software program to make troubleshooting easier and more efficient. The program is called Electronic Service Analyst (ESA). It does not replace basic electrical system troubleshooting skills; it supplements them.

ESA is flexible and allows the technician to use his own experience and expertise to help find and fix the problem. The technician reviews fault codes stored in the components, verifies whether the instrumentation is working properly, and diagnoses the root cause of the problem using troubleshooting information found in ServiceNet.

Once the software is installed on a personal computer, it's easy to use. It's available in English, Spanish, and Canadian French. Much like existing PC-based service applications, this analytic program communicates over a wireless data link adapter (DLA) to the multiplexed components. A USB Link to data link adapter is used for easy ESA connection and communication.

ESA 3 is the latest revision/update to the troubleshooting software. As more features are added to take advantage of multiplexing, ESA needs to grow in order to continue to support the technician.

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NOTE

At the time of publication "ESA 3.1" was the latest released version of the Electronic Service Analyst. If there are subsequent releases of ESA (version 3.2, 3.3, 4.0, etc.), ESA will automatically update to the most recent version.

CECU3 Multiplexing Overview

This manual provides service information covering trucks equipped with the multiplexed instrumentation system. Before attempting to make service repairs, the technician should be knowledgeable about the system design, components, operation and troubleshooting procedures for diagnosing multiplexed instrumentation problems.

How communication works in a multiplex system: Each major subsystem in the truck's electrical system is operated by a control module that sends and receives data to and from a central hub computer. The subsystem control modules are referred to as nodes. The central hub computer is called the CECU (Cab Electronic Control Unit). Since we're into the third generation now, we sometimes call it CECU3.

The CECU receives data related to controlling the various devices of the electrical system. It then makes decisions based on that input and sends information to each of the subsystem system control modules (nodes) about what that node should do with the components it controls.

In this new generation, the CECU will, as before, control most of the instrumentation and interior lighting. Additionally it will now control exterior lighting, turn stalk, and wipers functions. The node that receives information from the CECU to control the exterior lighting, turn stalk, and wipers functions is called the chassis node.

Models–Build Dates

Identifying which control unit is in the vehicle helps determine what features are present and also aids in troubleshooting.

| Control | | | Madala | Engine Emissions | Production Built |
|--------------|----------------------|------------------|---|------------------|------------------|
| Unit | Hardware Part Number | Software version | Models | Level | Dates |
| ICU | Q21-1029-X-XXX | P30-1003-XXX | PB: 357, 378, 379, 385, 386 | 1998, 2004 | 2005 - present |
| | | | KW: C500, T600, T800, W900, | | |
| | | | Off-Highway | | |
| CECU / CECU2 | Q21-1055-X-XXX / | P30-1002-XXX | PB: 365, 367, 384, 386, 388, 389 | 2007 | 2007 - present |
| | Q21-1075-X-XXX | | KW: C500, T440/T470, T660, | | |
| | | | T800, W900, Off-Highway | | |
| | | | PB: 387 | | 2008 - present |
| | | | KW : T2000 | | |
| | | | PB: 325, 330, 335, 340 | | 2009 - present |
| CECU3 | Q21-1076-X-XXX | P30-1008-XXX | PB: 325, 330, 337, 348, 387 | 2010 | 2010 - present |
| | | | KW: T170, T270, T370, T700 | | |
| CECU3 with | Q21-1076-X-XXX with | P30-1009-XXX | PB: 365, 367, 384, 386, 388, 389 | 2010 | 2010 - present |
| Chassis Node | Q21-1077-X-XXX | | KW: C500, T440/T470, T660, | | |
| | | | T800, W900, Off-Highway | | |

| İ NOTE | | | | | |
|---|--|--|--|--|--|
| This manual contains service manual | | | | | |
| information covering vehicles equipped with | | | | | |
| software version "CECU3 with Chassis Node" | | | | | |
| (P30-1009). For vehicles with prior CECU | | | | | |
| software versions (such as: ICU (P30-1003), | | | | | |
| CECU/CECU2 (P30-1002), and CECU3 | | | | | |
| (P30-1008)) refer to a separate publication | | | | | |
| (PM819010/KM815054). | | | | | |

Control Unit Identification

Control unit identification can be made using a few methods:

- Searching using the Electronic Catalog (ECAT)
- Connecting using the Electronic Service Analyst (ESA)
- Menu Control Switch (MCS), only available with Multi-Function Display.

Using ECAT or ESA are the easiest and most exact ways of determining the type of control unit in the truck.

Electronic Catalog (ECAT) Identification

ECAT provides a parts list "as built" and Bill of Materials information for each specific truck. The catalog is searchable, and contains the part number and identification of the trucks instrument panel control unit.

- ICU Part Number Q21-1029-X-XXX
- CECU Part Number Q21-1055-X-XXX
- CECU2 Part Number Q21-1075-X-XXX
- CECU3 Part Number Q21-1076-X-XXX
- Chassis Node Part Number Q21-1077-X-XXX

The blank digits (denoted by "X") in the above part numbers represent:

- "-X" is the hardware revision.
- "-XXX" is the software boot loader version.

Electronic Service Analyst (ESA) Identification

Connecting using ESA brings up a control unit information window. In this window, the sixth line item is the Control Unit Type and identifies whether the truck has an ICU or CECU. It also details the variant of the CECU.



Line item ten of this Control Unit Information window displays the current Vehicle Software Version. This details the current CECU software and programming date that is presently installed on the vehicle.



Upon connection, ESA recognizes if a software update has been issued for the control unit within the connected vehicle. If an update is required, ESA prompts the technician to perform the update operation.

MCS Identification

For vehicles equipped with the Multi-Function Display, control unit identification is possible via the Menu Control Switch (MCS). Using the MCS knob, select the "Truck Information" menu. Use this menu to look up the "CECU SW Ver." Software version P30-1002-XXX can denote either a CECU or CECU2.

- ICU Software P30-1003-XXX
- CECU Software P30-1002-XXX
- CECU2 Software P30-1002-XXX
- CECU3 Software P30-1008-XXX
- CECU3 with Chassis Node Software P30-1009-XXX

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Exploded View

Control Unit Location 3 - 2

Control Unit Location

CECU Locations

The heart of the multiplexed instrumentation system is the CECU. For Peterbilt vehicles, the

Typical CECU Locations

CECU is located behind the center of the dash, near the radio. For Kenworth vehicles, the CECU is located behind the center console.



Chassis Node Locations

For Kenworth models with a daycab, the chassis node is located below the driver side door.

Kenworth Daycab Chassis Node Location



For Kenworth models with a aerocab, the chassis node is located under the rear sleeper sill.

Kenworth Aerocab Chassis Node Location



For Kenworth models with an aerocab with crossover exhaust, the chassis node is located on the underbell crossmember.

Kenworth Aerocab with Crossover Exhaust Chassis Node Location



For Peterbilt models, the chassis node is located behind the transmission and is mounted between the frame rails.

Peterbilt Chassis Node Location



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Electronic Service Analyst (ESA)

What is ESA?

Multiplexed instrumentation was introduced in 2005. This method of communication, using a single wire to transmit multiple signals to many components, has dramatically reduced the size and complexity of the wiring bundle behind the dash panel.

While some traditional diagnostic and troubleshooting methods apply to multiplexed instruments, other methods do not. Professional service technicians needed a new diagnostic software program to make troubleshooting easier and more efficient. The program is called Electronic Service Analyst (ESA). It does not replace basic electrical system troubleshooting skills; it supplements them.

ESA is flexible and allows the technician to use his own experience and expertise to help find and fix the problem. The technician reviews fault codes stored in the components, verifies whether the instrumentation is working properly, and diagnoses the root cause of the problem using troubleshooting information found in ServiceNet.

Once the software is installed on a personal computer, it's easy to use. It's available in English, Spanish, and Canadian French. Much like existing PC-based service applications, this analytic program communicates over a data link adapter (DLA) to the multiplexed components. A USB Link to data link adapter is used for ESA connection and communication and is compatible for use with all control units.



ESA is a must-have diagnostic tool for dealerships to troubleshoot the new instrumentation. ESA eliminates much of the time consuming guesswork in some hard to diagnose cases, and significantly reduces unnecessary gauge replacement.

Why ESA?

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ESA 3 is the latest revision/update to the troubleshooting software. As more features are added to take advantage of multiplexing, ESA needs to grow in order to continue to support the technician.

NOTE

At the time of publication "ESA 3.1" was the latest released version of the Electronic Service Analyst. If there are subsequent releases of ESA (version 3.2, 3.3, 4.0, etc.), ESA will automatically update to the most recent version.

As version 3 is simply an update to the ESA software, many of the functions, navigation and screen images look and feel just as before.

This ESA update includes diagnostic coverage of new features available with the Cab Electronic Control Unit (CECU), as well as several enhancements to the program itself.

Keep in mind; although the program and software contain many new improvements, the type of control unit that is in the truck determines some of the ESA features and procedures.

CECU and ESA 3 Highlights

- Manufacturer selection available
- Five Data Link Adapter (DLA) selections
- Storage and display of up to 50 Diagnostic Trouble Codes (DTCs)
- Components grouped by type to help find what you are looking for
- · Monitor capabilities expanded
- Selective simulation permitted while module software is active
- Many new features/parameters available in the program menu
- Available backup utility to save vehicle parameters
- · Out-of-date software warning
- Diagnostics, monitoring, and simulating of most exterior lighting
- Diagnostics, monitoring, and simulating of windshield wiper and washer Pump
- Addition of Nexiq USB Link to Data Link
 Adapter selections
- · Simplified flashing menu
- · Faster software flashing times
- Can choose between compatible software versions for a particular control unit
- As-Built control unit parameters can be retrieved from ECAT (ePortal access required)
- Print preview function allows printing from most screens
- Monitoring and logging of J1939 data bus

New Features of ESA 3

This section gives a brief overview of the many enhancements made to ESA.

New Features

Most of the important additions are highlighted here. Refer to ServiceNet for ESA information and resources.

Connecting ESA

Connecting with ESA has not changed, simply connect the vehicle using the DLA and the connectors included in the ESA kit and click on the connect icon.



Once the connection is established a revised Control Unit Information pop-up window automatically appears on screen. This is to greet the user with important criteria that will help in continuing to troubleshoot a vehicle. Information such as:

- Chassis number
- Vehicle Identification Number (VIN)
- Unit of measure of the cluster
- Type of control unit
- Data bus ESA is using to connect to the Control Unit
- When the module was last flashed
- What version of software is currently loaded onto the module

| Control Unit Information | | |
|-------------------------------|-------------------------------|---------------|
| Control Unit Informatio | n - EMULATION MODE | Print Preview |
| Chassis Number | CECU 3 Emulator | |
| Vehicle Identification Number | 000000000000003 | |
| Division | Kenworth | |
| Unit of Measure | English | |
| Cluster Model | Cluster Assembly | |
| Control Unit Type | Cab Electronic Control Unit 3 | |
| Data Bus | Diagnostic CAN | |
| Hardware Version | A2C53335934 | |
| Flash Loader Version | 04.15.2009.10.43.02 | |
| Vehicle Software Version | P30-1009-003 | |
| Programming Date | 2009.02.09 | |
| | | |

Navigating ESA

The navigation icons are located at the top of the ESA screen. Selecting an icon activates that portion of the program.



The icons are:

- Connect/Disconnect: starts and stops communications with the truck via the DLA.
- Diagnose: read, review and monitor fault codes.
- Monitor: watch activity of inputs to the CECU.
- Simulate: limited activation of CECU outputs.
- Program: disable/enable components of the CECU.

Diagnose - New Features



50 Stored Codes

The Diagnosis screen now has the ability to store and display up to 50 Diagnostic Trouble Codes (DTCs) for the CECU.

Details

There is a Details columns for CECU diagnosis. Details are recorded at the first instance of the DTC. For example, if the DTC has been recorded twice, the count displays 2. The information in the details screen is also captured when that DTC was first recorded.

Selecting the magnifying glass in the details column for a DTC brings up a pop-up screen that provides the following freeze-frame information:

| Most Recent Fault Freeze Frame Hours: 120 | | |
|--|--|-------------------|
| Data Bit | Value | Units |
| Engine RPM | 0 | RPM |
| Vehicle Speed | 0 | km/h |
| Battery Voltage | 11.198 | V |
| Outside Air Temperature | -66 | °C |
| Coolant Temperature | 10 | °C |
| Fault Description | | |
| This DTC will be recorded when the control un at the outside air temperature sensor input. So causes for this are a broken wire, corroded or | nit sees an ome possib disconnec | open le ted |

- Engine RPM
- Vehicle Speed
- Battery Voltage
- Outside Air Temp
- Coolant Temp

The same criteria are recorded for every DTC first occurrence. Some of the information may not relate to your specific DTC. As seen in the example there is a very abnormal reading for the outside air temperature, which is understandable since the DTC is dealing with a fault on that circuit.

The details screen also provides a brief description of the fault along with some possible cause suggestions.

Clearing DTCs

For CECU equipped vehicles, selecting "Clear DTCs" removes all non-active faults and instantly displays only active codes.

Service Manual Link

When ESA is updated, the service manual for the Multiplexed Electrical System is also downloaded to the computer that has ESA installed. The service manual is accessed through the Help menu link at the top of every screen.



If there are any service manual revisions available, they will automatically be updated in ESA when you are prompted to check for ESA updates (approximately every 45 days). The service manual is where to find a complete DTC list along with troubleshooting charts to help the technician diagnose problems.

Monitor - New Features

To allow more viewing area when monitoring multiple components, there are auto-hide pin icons for reducing some of the sub-windows on the monitor screen. When selected to auto-hide, the sub-window reduces to a tab on the left side of the monitor screen. Simply place the cursor over the tab to bring the sub-window back up for further selection.

| EXA - EMULATION MODE - [Monitoring Components] Ele Tools Optons Window Help | _ 6 × |
|---|----------------------------------|
| ELESA 🔊 Disconnect | Monitor Simulate Program |
| Consideration Consi | Monitor EMUL Print Preview Close |
| Monitor Data View | |

To make it easier to navigate to desired features, similar components have been grouped into a menu tree structure.

Monitoring shows a representation of what the control unit sees as input signals. Comparing what the unit sees to what the actual component (gauge, telltale, etc.) is doing helps determine if there is a problem.

The enhancements made to the CECU increased the amount of monitored components using ESA.

| | ICU | CECU |
|-----------------------------------|-----|------|
| Gauges | 28 | 38 |
| Telltales | 26 | 58 |
| Editable telltales | 0 | 9 |
| Switches | 0 | 19 |
| Alarm | 0 | 7 |
| LCD | 0 | 4 |
| Knob (driver information display) | 0 | 1 |
| | | |

Monitoring Data Bus

With ESA 3 the user is now able to monitor the vehicle data bus. Select the data bus group to be monitored. A table will open that shows all Control Units communicating on the bus. If a control unit stops communicating during the monitoring session, the status will change from Active to Inactive. If needed, the user also has the capability to record messages on the data bus to be sent to your service manager for further analysis.

| | Monitor | Print Previe | w | Close | | |
|------|----------------------------------|--------------|---|-------|--|--|
| Vehi | icle CAN | | | | | |
| D | escription 🔺 | Status | ^ | | | |
| Bra | akes - System Controller | Inactive | E | | | |
| Ca | ab Controller - Primary | Active | | | | |
| En | ngine #1 | Active | ~ | | | |
| < | III III | > | | | | |
| You | are now recording to a log file. | | | | | |
| CLOG | 00:02:31 | :156 | | | | |
| | | | | | | |
| | View Logs | | | | | |
| | Close | | | | | |

Simulate - New Features

As with the monitor screen, to allow more viewing area when simulating components, there are auto-hide pin icons for reducing some of the sub-windows. When selected to auto-hide, the sub-window reduces to a tab on the left side of the screen. Simply place the cursor over the tab to bring the sub-window back up for further selection.



To make it easier to navigate to desired features, similar components have been grouped into a menu tree structure.

| 💀 Ele Tools Options | <u>Window</u> Help |
|-----------------------------------|---|
| ESA Electronic Service Analyst | Disconnect 💟 Diagnose 🔊 Monitor 🥸 Si |
| External Applications 🕴 🖗 | Monitor/Simulate Components P |
| 🟠 ESA Home | Filters ▼ Open Filter |
| ServiceNet | Delete Filter Save Filter |
| | Onit of Measure ⊙ Standard O Metric |
| | Expand All Collapse All Close All |
| | Cluster Electrical Backup Alarm Windshield Washer Pump Windshield Wiper Exterior Lighting Driving Or Fog Lamps Left High Beam Headlamps Left Turn Rear/Stop Left Turn Side Marker Lamps Right Hub Beam Headlamp Right Trailer Turn Lamps Right Turn Rear/Stop Right Turn Front Right Turn Front Right Turn Rear/Stop Right Turn Side Secondary Fog Lamps # Gauges |

Individual Output Simulation

Simulation performed with an ICU would basically shutdown the unit software so outputs could be simulated without being influenced by the other operations of the ICU. Now, with the CECU, individual outputs may be simulated while the control unit software is active. While this allows greater flexibility there is much that cannot and should not be simulated while a vehicle is operational. For instance, as a safety precaution, gauge simulation will not be permitted if there is engine rpm.

Safety Issues

While the simulate function is a good diagnosis tool, safety is a concern, so many CECU outputs are not accessible for simulation such as: cruise control, engine oil pressure, park brake switch.

Program - New Features

Similar components have been grouped into tabs to make finding your choice easier.

| Chassis Number | | | |
|--|--------|---------------------|--|
| 00002 | | Unlock Parameters | Program |
| Dash Lighting Display Drivetrain Lighting Optional Gauge Standard Gauge Telltale | | | |
| Description ^ | Locked | Value | Group |
| ABS installed | | Disabled | Drivetrain |
| Aftertreatment Regeneration Function | | Disabled | Drivetrain |
| Aftertreatment Regeneration Switch | | Disabled | Drivetrain |
| Air Filter Restriction Gauge Installed | | Disabled | Optional Gauge |
| Alarm Clock Available | | Disabled | ≺ Display |
| Allison Transmission Temperature Gauge Installed | | Disabled Enabled | Coptional Gauge |
| | | | |

Parameters

There were 14 parameters for the ICU. Parameters are like part numbers that tell the control unit what features are on the vehicle and hence what inputs/outputs need activated.

With the CECU3, the available parameters have grown to around 130. Some parameters are restricted or locked to ensure proper activation.

Disable Components Now Means No Function

With the ICU, disabling a component would turn off the diagnostics but not remove the component from operation. An ICU disabled gauge still functions, but is prevented from detecting problems and triggering DTCs.

Now with the CECU, disabling really means disabled. A disabled gauge will not function. It is removed from all signal transmissions in order to allow the other features faster communication. This is very important when diagnosing a component that is inoperative. It may simply have been previously disabled.

NOTE

Check the program menu to see if an inoperative feature is disabled.

Flash - New Features

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It may be necessary to reflash a control unit for the following:

- Replacing a control unit.
- Updating the software of a control unit.
- Obtaining additional features when available.

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NOTE

Replacing the control unit results in the odometer being reset. Take appropriate action to record the vehicle miles prior to removing the control unit.

Reflashing takes approximately only 6 minutes over the K-line if using the USB Link adapter. The control unit must stay connected and power to the unit must be maintained throughout the flashing process.

| \triangle | CAUTION |
|-------------|---|
| Interru | pting the communication or power supply |
| could r | esult in hardware damage to the unit. |

K-Line was the communication bus used for diagnostics on vehicles with: ICU software (P30-1003-XXX), CECU/CECU2 software (P30-1002-XXX), or CECU3 Software (P30-1008-XXX). Moving forward, vehicles containing "CECU3 with Chassis Node" software (P30-1009-XXX), the K-Line has been replaced with the D-CAN communication bus. Basically the only difference the technician will notice is a faster reflash time.



Compatible Software

When initiating the flashing process, the technician is required to select the appropriate software version to program into the control unit. Only compatible software versions for the vehicle unit that is connected will present in the selection menu.

| Select Ve | ehicle Software Version | 2 | K |
|-----------|---|--------------|---|
| | Select Vehicle Software Version | | |
| | Select an available software version below and click 'Flash' to continue. | | |
| | Currently installed version: | P30-1009-003 | |
| | Part Number | Release Date | ٦ |
| | P30-1009-003 | 6/16/2009 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | 1 |
| | View Release Notes | Flash Cancel | |

Details on the differences between available software versions are available through the View Release Notes button at the bottom of the Select Vehicle Software screen.

Backup Parameters

Flashing a control unit or replacing a control unit involves backing up the stored parameters of the unit. The backup saves an encrypted file onto the connected PC that is used to reload all the parameters of the control unit. These are the parameters that are enabled/disabled through the program menu. This ensures that your chassis number retains all the previously programmed functions.

Retrieving Parameters

ESA 3 has the capability to retrieve the parameter configuration from ECAT that was on the vehicle when issued from the factory. This may aid in restoring parameters in instances such as replacing a non responsive control unit. The technician must still verify the parameters are correct for any settings modified after the vehicle leaves the factory.

The as-built parameter sets can be retrieved from ECAT through the Tools drop down menu. It may also be presented as an option when flashing a blank unit or when parameters cannot be retrieved from a unit.



After selecting "Retrieve Parameters from ECAT", the user needs to enter the chassis number or numbers for the desired parameter sets to be downloaded.

| 🖬 ESA - [Control Unit Information] | | | | |
|------------------------------------|------------------------------------|------------------------------------|----------|---------------|
| 🤁 File Tools Options Window Help | | | | . 8 × |
| ESA 🔊 Disconnect | Diagnose | Monitor | Simulate | Program |
| Esa Hame | t Informatio | n | | Print Preview |
| Chassis Number | | 266952 | | |
| Vehicle Identificat | ion Number | 266952 | | |
| Division | | Kenworth | | |
| Unit of Measure | Rotriovo Paramot | ers from ECAT | | |
| Cluster Model | Net fere Paramet | ers mon Loan | | |
| Control Unit Type | Retaieve the ECAT | parameters from the PACCAR network | Jnit 3 | |
| Data Bus | Chassis Number(s) | | | |
| Hardware Version | | | | |
| Flash Loader Vers | Single: 123456 Multicle: 123456 | 74321 123654 | | |
| Vehicle Software | Range: 123456-123 | 458 | | |
| Programming Date | 6 | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Connected | | | | |

At this time, the user is required to log into ServiceNet with a valid ePortal account.



Once the login is verified, ESA will download the designated parameter sets and inform the user when the transfer is complete.



Δ

The downloaded files are stored in a secure format that prohibits tampering. ESA also prevents any user from loading parameters sets designated for one chassis number into a control unit that is assigned to another chassis number.

To restore parameters from the downloaded parameter set, the user must Initiate a Flashing from the Tools drop down menu and select Restore Parameters.



Finally, the user needs to designate the source of the parameter set to be restored.



Out-of-Date Software Warning

Let's say an update has been issued for the CECU software and a truck is connected to ESA for some troubleshooting purpose. ESA recognizes that there is a software update required and prompts the technician to perform the operation. If for some reason the user chooses not to reflash the control unit, maybe there isn't sufficient time to perform an update or maybe the Data Link Adapter isn't immediately available, ESA triggers a warning display in the vehicle. This warning blinks the LCD backlighting of the speedometer and outside air temperature for 1 minute. The warning is triggered at every key-on of the vehicle until the required update is performed. This is to alert the operator or other technicians that a vehicle reflash is required.

Administration - New Features



There are a few improvements made to the administration form that is found under the Tools pull down menu at the top of the ESA screen.

First off, any changes now performed in the administration form automatically update as soon as the user selects Apply or OK on the administration window. It is no longer necessary to shut down and restart the program to initiate administration changes. A couple of highlight improvements involve selections under the Manufacturer and Data Link Adapter (DLA) options.

| General | License and Password | External Applications Release License Internal |
|---------|----------------------|--|
| File Se | rver: | |
| Auto D | etect Proxy: | Days to Keep Session Log: 30 |
| Proxy | Settings: | http://www.proxy.na.paccar.com:8080/ |
| Langua | ige: | English - United States |
| Manufa | acturer: | No Division |
| DLA: | | CECU 3 Emulator |
| Data B | us Logging: | CECU Emulator CECU 3 Emulator ICU Emulator |
| | | NEXIQ USB-Link NEXIQ Bluetooth USB-Link NEXIQ ISO Link NEXIQ Wireless |
| | | Samtec |
| | | |
| | | |
| | | |

The manufacturer selection allows ESA presentation as either a Kenworth or Peterbilt dealer.

| Administration Form | × |
|------------------------------|---------------------------------------|
| General License and Password | External Applications Release License |
| File Server: | |
| Auto Detect Proxy: | ✓ Days to Keep Session Log: 30 30 |
| Proxy Settings: | http://www.proxy.na.paccar.com:8080/ |
| Language: | English - United States 👻 |
| Manufacturer: | Kenworth |
| DLA: | No Division Kenworth |
| Protocol: | Peterbilt Reyword Protocol 2000 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | OK Cancel Apply |

General Information

Service Resources

Service Manual Update

If there are any service manual revisions available, they will automatically be updated in ESA when you are prompted to check for ESA updates (approximately every 45 days). The service manual is accessed through the Help menu link at the top of every screen. The service manual is where to find a complete DTC list along with troubleshooting charts to help the technician diagnose problems.



Instrumentation Service Information

describing how to remove, disassemble, and reinstall instrumentation components is located on ServiceNet. Before attempting any instrumentation repairs, the technician should have a complete understanding of the procedures described in ServiceNet.

Disabled Gauges

i

With the CECU, disabling a component turns the component off completely. The disabled component is removed from all signal transmissions in order to allow the other features on the vehicle faster communication. A disabled gauge will not function or communicate with the control unit.

| NOTE | |
|------|--|
|------|--|

Check the program menu to see if an inoperative feature is disabled. This is very important when diagnosing an inoperative gauge on a CECU equipped vehicle. The gauge may simply have been previously disabled.

When a service technician installs an optional gauge in the multiplexed instrumentation system, the newly installed gauge will initially be disabled. Because the gauge is not factory-installed, the technician must program the CECU to monitor it. Until the CECU is programmed, the link between the CECU and the gauge is termed "disabled" – that is, the CECU is prevented from detecting problems, and also from logging and displaying diagnostic trouble codes (DTCs).

To program the CECU and enable gauges, select "Program". If the gauge value is "Disable", change it to "Enable".

| 10 | III Chassis Parameters | | | | | |
|----|------------------------|---------------------------------------|-----------------|--|--|--|
| с | hassis | Parameters | Program Setting | ß | | |
| | ID | Name | Range | Value | | |
| ۶. | 0 | Ammeter - Generate DTC | Enable/Disable | Disable | | |
| | 1 | Auxiliary Transmission Oil Temp - Gen | Enable/Disable | Disable | | |
| | 2 | Brake saver oil temp - Generate DTC | Enable/Disable | Disable | | |
| | 3 | Center Axle Temp - Generate DTC | Enable/Disable | Disable | | |
| C | 4 | Exhaust Temp - Generate DTC | Enable/Disable | Enable | | |
| | 5 | Front Axle Temp - Generate DTC | Enable/Disable | Disable | | |
| | 6 | Fuel Filter - Generate DTC | Enable/Disable | Disable | | |
| | 7 | General Oil Temp - Generate DTC | Enable/Disable | Disable | | |
| | | | | and the second s | | |

Once the CECU is programmed and the link to the gauge is "enabled", the CECU monitors it, diagnoses problems like "shorts" and "opens", logs DTCs for troubleshooting, and displays the DTCs on ESA's "Diagnose" screen.

Communication Diagrams

The following diagram provides an example of the communication lines and signal paths of a typical multiplexed vehicle. Determining the correct communication lines that provide a signal to the

CECU and where these circuits interconnect, help pinpoint possible trouble areas. Sometimes these connections become loose, have bent or misaligned pins, and visually inspecting them may help identify why other electrical problems may be occurring.

Communication Interface Diagram



CECU Details

The heart of the multiplexed instrumentation system is the CECU. See Control Unit Locations for illustrations depicting the physical position of the control unit.

The CECU receives data related to controlling the various devices of the electrical system. It then makes decisions based on that input and sends information to subsystem system control modules (nodes) about what that node should do with the components it controls.

CECU Connector Identification

There are 5 electrical connectors that plug into the CECU.

- Connector A 9 pins
- Connector B 24 pins
- Connector C 52 pins
- Connector D 40 pins
- Connector E 9 pins

For an illustration of the side view of a CECU showing where the harness connectors attach into the control unit, see CECU Figure. This figure identifies connector position on the control unit as well as individual connector pin locations.

CECU



For connector face views at the harness connectors that plug into the CECU, see CECU Connector Face Views Figure. These connectors all branch from the instrument panel harness that routes behind the dash.

CECU Connector Face Views



CECU Comparison Chart - (Pinout)

| Conn Pin Number | | Circuit Function |
|-----------------|----|--|
| А | 1 | CVSG power |
| | 2 | Power - battery |
| | 3 | Cab dome lamp |
| | 4 | Menu control switch power |
| | 5 | Ground |
| | 6 | Menu control switch ground |
| | 7 | Dash/panel illumination |
| | 8 | Auxiliary backlighting |
| | 9 | Power - battery |
| В | 1 | Menu control switch encode A |
| | 2 | Menu control switch encode B |
| | 3 | Menu control switch enter |
| | 4 | Courtesy lights - right door jamb switch |
| | 5 | Ignition input (Start) |
| | 6 | Dome lamp input |
| | 7 | Seat belt telltale |
| | 8 | Cruise set |
| | 9 | Cruise resume |
| | 10 | Back-up alarm mute |
| | 11 | Retarder select 1 |
| | 12 | Retarder select 2 |
| | 13 | Clutch switch |
| | 14 | Headlamps active |
| | 15 | PTO set |
| | 16 | PTO resume |
| | 17 | Engine fan override |
| | 18 | Regen enable |
| | 19 | Inhibit regen |
| | 20 | ABS off road |
| | 21 | Marker lamp (Tractor) |
| | 22 | LVD input |
| | 23 | Transfer Case Engaged |
| | 24 | Spare digital input |

| Conn | Pin Number | Circuit Function |
|------|----------------------|---------------------------------------|
| С | 1 | Power supply +5V sensors |
| | 2 | Analog return |
| | 3 | PTO oil temp |
| | 3 | Spare analog input |
| | 4 | K-line |
| | 5 | Dimmer input |
| | 6 | Air pressure transducer - primary |
| | 7 | Air pressure transducer - secondary |
| | 8 | Air pressure transducer - application |
| | 9 | Spare analog input |
| | 10 | Air filter restriction |
| | 11 | Spare analog input |
| | 12 | Spare analog input |
| | 13 | Spare analog input |
| | 14 | CVSG data |
| | 15 | CVSG return |
| | 16 | Outside air temperature |
| | 17 | Spare analog input |
| | 18 | Spare analog input |
| | 19 | Spare analog input |
| | 20 | Spare analog input |
| | 21 | Transmission oil temperature - main |
| | 22 | Spare analog input |
| | 23 | Pyrometer |
| | 24 | Brakesaver oil temperature |
| | 25 | Analog return |
| | 26 | Spare analog input |
| | 27 | Remote throttle signal |
| | 28 | Spare analog input |
| | 29 | Spare analog input |
| | 30 | Spare analog input |
| | 31 | Wiper resistor ladder |
| | 32 | Turn signal resistor ladder |
| | 33 | LVD battery voltage |
| | 34 | Spare digital input |
| | 35 | C-CAN ground |
| | 36 | |
| | 37 | |
| | 38 | |
| | 39 | P OAN high |
| | 40 | |
| | 41 | D-CAN low |
| | 42 | D-CAN ground |
| | 43 | B-CAN high |
| | 44 | B-CAN dround |
| | 40 | B-CAN ground |
| | 40 | |
| | <u></u> <u>48</u> | |
| | 40 40 | Marker Jamp (Trailer) |
| | 50 | Fuel Level Sender Select |
| | 51 | Headlamp flash |
| | 52 | Headlamp high/low |
| | 52 | |

| Conn | Pin Number | Circuit Function |
|------|------------------|---|
| D | 1 | Power - ignition |
| | 2 | Courtesy lights - left door jamb switch |
| | 3 | Power - accessory |
| | 4 | Hazard |
| | 5 | Brake switch |
| | 6 | Spare digital input |
| | 7 | Park brake active |
| | 8 | Fog lamps |
| | 9 | HVAC On Switch |
| | 10 | Cruise on/off |
| | 11 | Interaxle lock telltale |
| | 12 | Fifth wheel lock telltale |
| | 13 | Tractor ABS telltale |
| | 14 | Trailer ABS telltale |
| | 15 | Check engine telltale |
| | 16 | Stop engine telltale |
| | 17 | Windshield wiper (fast) |
| | 18 | Secondary fog lamps |
| | 19 | Editable telltale 1 |
| | | See editable telltale table |
| | 20 | Editable telltale 2 |
| | | See editable telltale table |
| | 21 | Editable telltale 3 |
| | 21 | |
| | | |
| | 22 | |
| | | See editable telltale table |
| | 23 | Spare relay chassis control |
| | 24 | Editable telltale 6 |
| | | See editable telltale table |
| | 25 | Editable telltale 7 |
| | | See editable telltale table |
| | 26 | Editable telltale 8 |
| | | See editable telltale table |
| | 27 | Editable telltale 9 |
| | - | See editable telltale table |
| | 20 | |
| | 20 20 | Dash buzzer 18 |
| | 29 30 | Dash buzzer 10 |
| | 30 | Dash buzzer 2 |
| | 30 | |
| | 32 | |
| | 24 | |
| | 25 | |
| | 30 | |
| | 27 | |
| | 30 20 | |
| | ა ბ აი | |
| | 39 | |
| | 40 | v-CAN IOW terminated |

| Conn | Pin Number | Circuit Function |
|------|------------|------------------------|
| Ш | 1 | Idle timer relay |
| | 2 | Windshield wiper relay |
| | 3 | Ignition relay (Start) |
| | 4 | Clearance lamp |
| | 5 | Ground |
| | 6 | LVD Bus 1 |
| | 7 | LVD Bus 2 |
| | 8 | Spare relay output |
| | 9 | Spare relay output |

5

Editable Telltale Application

| Editable Telltale Location | KW Cluster | PB Cluster |
|----------------------------|-------------|------------|
| Editable Telltale 1 | Position 4 | Position 2 |
| Editable Telltale 2 | Position 7 | Position 3 |
| Editable Telltale 3 | Position 8 | Position 4 |
| Editable Telltale 4 | Position 9 | Position 5 |
| Editable Telltale 5 | n/a | n/a |
| Editable Telltale 6 | Position 12 | Position 8 |
| Editable Telltale 7 | Position 13 | n/a |
| Editable Telltale 8 | Position 14 | n/a |
| Editable Telltale 9 | Position 16 | n/a |

See Cluster Components for illustration of possible telltale locations.

Chassis Node Details

The node that receives information from the CECU to control the exterior lighting and wipers functions is called the chassis node. The chassis node serves as a bidirectional conduit for both information and control.

Several sensors that in Multiplex Electrical version 1 and 2 were connected to the CECU (ICU for version 1) are now connected to the chassis node. These include:

- Ammeter
- Auxiliary Transmission Oil Temperature
- Axle Temperature, Rear
- Axle Temperature, Front
- Axle Temperature, Center / Steer
- Back Up Switch
- General Oil Temperature
- Fuel Filter Restriction
- PTO Oil Temperature
- Transfer Case Oil Temperature

The inputs, usually a variable voltage, from these sensors are fed into the chassis node where the information is them processed into data and sent to the CECU by way of the CAN (Controller Area Network) data bus. In addition to receiving and processing sensor data, the chassis node also controls the operation of relays that power several electrical subsystems. These include:

- Back Up Alarm
- Fog Lamps
- Stop Lights
- Trailer Turn Signals
- Turn Signals
- Windshield Washer

The information sent from the sensors attached to the chassis node is sent to the CECU, processed, and where appropriate returned to the chassis in the form of commands related to the outputs controlled by the chassis node.

The design and manufacture of the chassis node is such that it is delivered to the plant or dealership without configuration parameters loaded into it. Upon the first power cycle of the system the CECU downloads the appropriate configuration parameters so that the chassis node can setup its I/O correctly. Depending on the software configuration of the CECU, these parameters may be different than other trucks and unique to the specific requirements of the truck being assembled. Once the chassis node has received its configuration parameters, it stores them in flash memory permanently and does not require any additional downloads from the CECU. This is a one time event and once complete the chassis node can be removed and reinstalled without the need of a power cycle.

NOTE

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When replacing a chassis node, disconnect the batteries and do not reconnect them until the new node installation and all wiring connections are complete. A new chassis node and the CECU need to be powered up simultaneously during the node's first power cycle; otherwise a fault on the Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt) will indicate that the CECU is not recognizing the proper communication with the chassis node.

The problem occurs when the CECU and chassis node are not powered up simultaneously during the first power cycle. This may happen for a variety of reasons which include; missing chassis node, missing fuses, harnessing not connected, etc. If the CECU recognizes that the chassis node is not communicating as expected, it will trigger a fault in the Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt). Cycling the ignition will not correct this problem since the parameter file is only transmitted to the chassis node after a complete battery power cycle.

Perform a complete battery power cycle by cycling battery power directly at the batteries. Battery power should be removed from the system for at least 30 seconds during the power cycle so that all electrical devices completely discharge and are truly powered down.

Chassis Node Connector Identification

There are three 21-pin electrical connectors that plug into the Chassis Node.

- Connector A 21 pins
- Connector B 21 pins
- Connector C 21 pins

Chassis Node Figure

For an illustration of the side view of a Chassis Node showing where the harness connectors attach into the control unit, see Chassis Node Figure. This figure identifies connector position on the control unit as well as individual connector pin locations.



For connector face views at the harness connectors that plug into the Chassis Node, see Chassis Node Connector Face Views Figure.

Chassis Node Connector Face Views



Chassis Node Comparison Chart - (Pinout)

| Conn | Pin Number | Circuit Function |
|------|------------|--|
| А | 1 | Left headlamp low beam output (PWM) |
| | 2 | Power - ignition input |
| | 3 | Ground |
| | 4 | Battery power - 1 |
| | 5 | Neutral switch input |
| | 6 | Fuel level 1 input |
| | 7 | Right headlamp high beam output |
| | 8 | Backup switch input |
| | 9 | Fuel level 2 input |
| | 10 | Marker lamp relay control output |
| | 11 | Spare digital input |
| | 12 | Spare analog input |
| | 13 | Left headlamp high beam output |
| | 14 | (reserved) |
| | 15 | Spare analog input |
| | 16 | Battery power - 2 |
| | 17 | (reserved) |
| | 18 | F-CAN high |
| | 19 | Right headlamp low beam output (PWM) |
| | 20 | (reserved) |
| | 21 | F-CAN low |
| В | 1 | Battery power - 3 |
| | 2 | Right turn/stop rear output (Tractor) |
| | 3 | Power supply +5V sensors |
| | 4 | Left turn front/side output |
| | 5 | Fuel filter restriction input |
| | 6 | Transmission oil temperature - auxiliary input |
| | 7 | Right turn front/side output |
| | 8 | Spare analog input |
| | 9 | General oil temperature input |
| | 10 | Battery power - 4 |
| | 11 | Spare analog input |
| | 12 | Spare analog input |
| | 13 | Left turn/stop rear output |
| | 14 | Spare analog input |
| | 15 | Driving/fog lamps output |
| | 16 | Left turn trailer output |
| | 17 | Ammeter input |
| | 18 | Battery power - 7 |
| | 19 | Battery power - 5 |
| | 20 | Left turn front/DRL output |
| | 21 | Right turn front/DRL output |

| Conn | Pin Number | Circuit Function |
|------|------------|---|
| С | 1 | Analog return |
| | 2 | Spare output |
| | 3 | Spare output |
| | 4 | Transfer case oil temperature input |
| | 5 | Spare output |
| | 6 | Spare output |
| | 7 | PTO oil temperature input |
| | 8 | Spare output |
| | 9 | Spare output |
| | 10 | Rear axle temperature input |
| | 11 | Spare output |
| | 12 | Spare output |
| | 13 | Front axle temperature input |
| | 14 | Spare output |
| | 15 | Battery power - 8 |
| | 16 | Center/steer axle temperature input |
| | 17 | Windshield washer pump control output |
| | 18 | Secondary fog lamp relay control output |
| | 19 | Battery power - 8 |
| | 20 | Right turn trailer output |
| | 21 | Back-up alarm control output |
7 Specifications

Parameter Part Numbers. 7 - 2

Parameter Part Numbers

CECU Parameters

Parameters are used to identify to the CECU what features are present on a vehicle. The parameters can be altered by a dealer to enable, disable, or assign certain functionality to that feature. Parameter part numbers are searchable in ECAT and allow a dealer to determine what parameters were set at the factory. Also, if adding a new feature to a vehicle, the corresponding parameter needs to be programmed to the CECU and enabled.

| CECU Parameter | Parameter | Min. | Max. | Evelopetion |
|----------------|-----------------------|-------|-------|---|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-000 | ABS installed | 0 | 1 | Parameter controls DTC's related to ABS system. |
| | | | | Value 0/Disabled means ABS is not installed and DTC's are disabled |
| | | | | Value 1/Enabled means ABS is installed and DTC's are enabled. |
| Q30-1015-001 | After Treatment | 0 | 1 | Parameter is used to allow information from the engine to turn on the |
| | Regeneration | | | telltales for the high exhaust temperature (emission system temperature) |
| | Function | | | and regeneration filter. |
| | | | | Value 0/Disabled means not allow cluster to display DPF and HEST telltales |
| | | | | on cluster. |
| | | | | Value 1/Enabled means allow cluster to display DPF and HEST telltales on |
| | | | | cluster. |
| Q30-1015-002 | ATC installed | 0 | 1 | Currently has no effect on functionality. Parameter will be used to determine |
| | | | | the presence of traction control. |
| | | | | Value 0/Disabled means ATC is not installed. |
| | | | | Value 1/Enabled means ATC is installed. |
| Q30-1015-003 | Retarder Range Map | 0 | 4 | Parameter is used to define the engine brake levels. |
| | | | | Value 1 means engine brake switches have two braking levels 0%, 100%. |
| | | | | Value 2 means engine brake switches have three braking levels 0%, 50%, |
| | | | | 100%. |
| | | | | Value 3 means engine brake switches have four braking levels 0%, 33%, |
| | | | | 66%, 100%. |
| | | | | Value 4 means engine brake switches have three braking levels 0%, 33%, |
| | | | | 66%. |
| Q30-1015-004 | Clutch Switch Present | 1 | 1 | Parameter is used to determine if the clutch switch is connected to the |
| | | | | CECU. |
| | | | | Value 0/Disabled means clutch switch is not installed (it has an automatic |
| | | | | transmission or is hardwired to engine). |
| | | | | Value 1/Enabled means clutch switch is installed (it has a manual |
| | | | | transmission and is wired to the control unit). |
| Q30-1015-005 | Cruise Control Set | 0 | 1 | Parameter is used to define the cruise control set/resume switch functionality. |
| | Switch Accel or Decel | | | Value 0/Disabled means set switch is used for accelerate, and resume |
| | | | | switch is used for decelerate. |
| | | | | Value 1/Enabled means set switch is used for decelerate, and resume |
| | | | | switch is used for accelerate. |
| Q30-1015-006 | Cruise Control | 0 | 1 | Parameter is used to determine if cruise control is installed and controls the |
| | Present | | | cruise control messages to the engine. |
| | | | | Value 0/Disabled means cruise control switches are not installed. |
| | | | | Value 1/Enabled means cruise control switches are installed. |

| CECU Parameter | Parameter | Min. | Max. | E-miles et an |
|----------------|-----------------------|-------|-------|---|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-007 | Clock Alarm Available | 0 | 1 | Parameter is used to determine if the alarm clock will be displayed on the |
| | | | | Multi-Function Display. |
| | | | | Value 0/Disabled means Alarm Clock is not available in Multi-Function |
| | | | | Display. |
| | | | | Value 1/Enabled means Alarm Clock is available in Multi-Function Display |
| Q30-1015-008 | Clock Available | 0 | 1 | Parameter is used to determine if the clock will be displayed on the |
| | | | | Multi-Function Display. |
| | | | | Value 0/Disabled means Clock is not available in Multi-Function Display. |
| | | | | Value 1/Enabled means Clock available in Multi-Function Display |
| Q30-1015-009 | Diagnostics Available | 0 | 1 | Parameter is used to determine if the diagnostics will be displayed on the |
| | | | | Multi-Function Display. |
| | | | | Value 0/Disabled means Diagnostic is not available in Multi-Function Display. |
| | | | | Value 1/Enabled means Diagnostic is available in Multi-Function Display |
| Q30-1015-010 | Ignition Timer | 0 | 1 | Parameter is used to determine if the ignition timer will be displayed on |
| | Available | | | the Multi-Function Display. |
| | | | | Value 0/Disabled means Ignition Timer is not available in Multi-Function |
| | | | | Display. |
| | | | | Value 1/Enabled means Ignition Timer is available in Multi-Function Display |
| Q30-1015-011 | Languages Available | 0 | 1 | Parameter is used to determine if other languages are available on the |
| | | | | Multi-Function Display. |
| | | | | Value 0/Disabled means Language selection is not available in |
| | | | | Multi-Function Display. |
| | | | | Value 1/Enabled means Language selection is available in Multi-Function |
| | | - | | Display |
| Q30-1015-012 | RPM Detail Available | 0 | 1 | Parameter is used to determine if the RPM information will be displayed on |
| | | | | the Multi-Function Display. |
| | | | | Value 0/Disabled means RPM information is not available in Multi-Function |
| | | | | Display. |
| | | | | Value 1/Enabled means RPM information is available in Multi-Function |
| 030 1015 013 | | 0 | 1 | Display |
| Q30-1013-013 | | 0 | | displayed on the Multi-Function Display |
| | | | | Value 0/Disabled means Trip Economy is not available in Multi Eurotion |
| | | | | |
| | | | | Display. |
| 030-1015-014 | Trip Information | 0 | 1 | Parameter is used to determine if the trip information will be displayed on |
| | Available | Ū | • | the Multi-Function Display |
| | | | | Value 0/Disabled means Trin Information is not available in Multi-Function |
| | | | | Disnlav |
| | | | | Value 1/Enabled means Trin Information is available in Multi-Eurotion |
| | | | | Disnlav |
| Q30-1015-015 | Truck Information | 0 | 1 | Parameter is used to determine if the truck information will be displayed on |
| | Available | | | the Multi-Function Display. |
| | | | | Value 0/Disabled means Truck Information is not available in Multi-Function |
| | | | | Display. |
| | | | | Value 1/Enabled means Truck Information is available in Multi-Function |
| | | | | Display |

7

| CECU Parameter | Parameter | Min. | Max. | F undamentary |
|----------------|------------------------|-------|-------|---|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-016 | Multi-Function | 0 | 1 | Parameter is used to control the scrolling in Multi-Function Display. |
| | Display Menus | | | Value 0/Disabled means that the menu will stop when it reaches the top or |
| | Wraparound | | | the bottom of the list when scrolling. |
| | | | | Value 1/Enabled means that the menu will wrap around when it reaches the |
| | | | | top or the bottom of the list when scrolling. |
| Q30-1015-017 | Dome Lamp | 0 | 1 | Parameter is used to determine if the dome lamps are controlled by the |
| | Controlled By Door | | | (driver/passenger) door. |
| | | | | Value 0/Disabled means the door does not control the dome lamps. |
| | | | | Value 1/Enabled means the door does control the dome lamps. |
| Q30-1015-018 | Dome Lamp Delay | 0 | 1 | Parameter is used to determine if the dome lamp delays turning off after |
| | Present | | | the door is closed. |
| | | | | Value 0/Disabled means there is no delay before the dome lamp turns off. |
| | | | | Value 1/Enabled means there is a delay before the dome lamp turns off. |
| Q30-1015-019 | Dome Lamp Dimming | 0 | 1 | Parameter is used to determine if the dome lamp dims out slowly after the |
| | Present | | | door is closed. |
| | | | | Value 0/Disabled means dome lamp turns off quickly after the door is closed |
| | | | | and delay if enabled. |
| | | | | Value 1/Enabled means dome lamp dims out slowly after the door is closed |
| 000 4045 000 | Air Eilten Destriction | 0 | 4 | and delay if enabled. |
| Q30-1015-020 | Air Fliter Restriction | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Gauge Installed | | | the air niter restriction gauge. |
| | | | | Value U/Disabled means Air Flitter Restriction Gauge is not installed. |
| 030 1015 021 | Allicon Transmission | 0 | 1 | Value 1/Enabled means Air Filter Restriction Gauge is installed. |
| Q30-1013-021 | Temperature Gauge | 0 | ' | Allison transmission temperature gauge |
| | Installed | | | Value 0/Disabled means Allison Transmission Temperature Gauge is not |
| | inotalieu | | | installed |
| | | | | Value 1/Enabled means Allison Transmission Temperature Gauge is |
| | | | | installed |
| Q30-1015-022 | Ammeter Gauge | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Installed | | | the ammeter gauge. |
| | | | | Value 0/Disabled means Ammeter Gauge is not installed. |
| | | | | Value 1/Enabled means Ammeter Gauge is installed. |
| Q30-1015-023 | Auxiliary | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Transmission | | | auxiliary transmission temperature gauge. |
| | Temperature Gauge | | | Value 0/Disabled means Auxiliary Transmission Temperature is not installed. |
| | Installed | | | Value 1/Enabled means Auxiliary Transmission Temperature is installed. |
| Q30-1015-024 | Axle Temperature | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Front Gauge Installed | | | front axle temperature gauge if installed. |
| | | | | Value 0/Disabled means Axle Temperature Front Gauge is not installed. |
| | | | | Value 1/Enabled means Axle Temperature Front Gauge is installed. |
| Q30-1015-025 | Axle Temperature | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Rear Gauge Installed | | | rear axle temperature gauge. |
| | | | | Value 0/Disabled means Axle Temperature Rear Gauge is not installed. |
| | | | | Value 1/Enabled means Axle Temperature Rear Gauge is installed. |

| CECU Parameter | Parameter | Min. | Max. | E-miles et an |
|----------------|-------------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-026 | Axle Temperature | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Center/Steer Gauge | | | the center axle temperature gauge. |
| | Installed | | | Value 0/Disabled means Axle Temperature Center/Steer Gauge is not |
| | | | | installed. |
| | | | | Value 1/Enabled means Axle Temperature Center/Steer Gauge is installed. |
| Q30-1015-027 | Brake Applied | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Pressure Gauge | | | brake application pressure gauge. |
| | Installed | | | Value 0/Disabled means Brake Applied Pressure Gauge is not installed. |
| | | | | Value 1/Enabled means Brake Applied Pressure Gauge is installed. |
| Q30-1015-028 | Brakesaver Oil | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Temperature Gauge | | | brakesaver oil temperature gauge. |
| | Installed | | | Valve 0/Disabled means Brakesaver Oil Temperature Gauge is not installed. |
| | | | | Valve 1/Enable means Brakesaver Oil Temperature Gauge is installed. |
| Q30-1015-029 | Engine Coolant | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Temperature Gauge | | | engine coolant temperature gauge. |
| | Installed | | | Value 0/Disabled means Engine Coolant Temperature Gauge is not installed. |
| | | | | Value 1/Enabled means Engine Coolant Temperature Gauge is installed. |
| Q30-1015-030 | Engine Manifold | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Pressure (Turbo | | | the manifold pressure gauge. |
| | Boost) Gauge | | | Value 0/Disabled means Manifold Pressure Gauge is not installed. |
| | Installed | | | Value 1/Enabled means Manifold Pressure Gauge is installed. |
| Q30-1015-031 | Engine Oil Pressure | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Gauge Installed | | | engine oil pressure gauge. |
| | | | | Value 0/Disabled means Engine Oil Pressure Gauge is not installed. |
| | | | | Value 1/Enabled means Engine Oil Pressure Gauge is installed. |
| Q30-1015-032 | Engine Oil | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Temperature Gauge | | | the engine oil temperature gauge. |
| | Installed | | | Value 0/Disabled means Engine Oil Temperature Gauge is not installed. |
| | | | | Value 1/Enabled means Engine Oil Temperature Gauge is installed. |
| Q30-1015-033 | Exhaust Temperature | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Gauge (Pyrometer) | | | exhaust temperature gauge. |
| | Installed | | | Valve 0/Disabled means Exhaust Temperature Gauge is not installed. |
| | | | | Valve 1/Enable means Exhaust Temperature Gauge is installed. |
| Q30-1015-034 | Fuel Delivery | 0 | 1 | Valve 0/Disabled means Fuel Delivery Pressure Gauge is not installed. |
| | Pressure Gauge | | | Valve 1/Enable means Fuel Delivery Pressure Gauge is installed. |
| | Installed | | | |
| Q30-1015-035 | Fuel Filter Restriction | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Gauge Installed | | | fuel restriction gauge. |
| | | | | Value 0/Disabled means Fuel Filter Restriction Gauge is not installed. |
| | | | | Value 1/Enabled means Fuel Filter Restriction Gauge is installed. |
| Q30-1015-036 | General Oil | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Temperature Gauge | | | the general oil temperature gauge. |
| | Installed | | | Value 0/Disabled means General Oil Temperature Gauge is not installed. |
| | | | | Value 1/Enabled means General Oil Temperature Gauge is installed. |
| Q30-1015-037 | Primary Air Pressure | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Gauge Installed | | | primary air pressure gauge. |
| | | | | Value 0/Disabled means Primary Air Pressure Gauge is not installed. |
| | | | | Value 1/Enabled means Primary Air Pressure Gauge is installed. |

| CECU Parameter | Parameter | Min. | Max. | Evaluation |
|----------------|----------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-038 | Primary Fuel Level | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Gauge Installed | | | the primary fuel level gauge. |
| | | | | Value 0/Disabled means Primary Fuel Level Gauge is not installed. |
| | | | | Value 1/Enabled means Primary Fuel Level Gauge is installed. |
| Q30-1015-039 | PTO Oil Temperature | 0 | 1 | Valve 0/Disabled means gauge is not installed. |
| | Gauge Installed | | | Valve 1/Enable means gauge is installed. |
| Q30-1015-040 | Secondary Air | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Pressure Gauge | | | the secondary air pressure gauge. |
| | Installed | | | Value 0/Disabled means Secondary Air Pressure Gauge is not installed. |
| | | | | Value 1/Enabled means Secondary Air Pressure Gauge is installed. |
| Q30-1015-041 | Secondary Fuel Level | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Gauge Installed | | | secondary fuel level gauge. |
| | | | | Value 0/Disabled means Secondary Fuel Level Gauge is not installed. |
| | | | | Value 1/Enabled means Secondary Fuel Level Gauge is installed. |
| Q30-1015-042 | Transfer Case Oil | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of the |
| | Temperature Gauge | | | transfer case oil temperature gauge. |
| | Installed | | | Value 0/Disabled means Transfer Case Oil Temperature Gauge is not |
| | | | | installed. |
| | | | | Value 1/Enabled means Transfer Case Oil Temperature Gauge is installed. |
| Q30-1015-043 | Transmission | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Temperature Gauge | | | the transmission temperature gauge. |
| | Installed | | | Value 0/Disabled means Transmission Temperature Gauge is not installed. |
| | | | | Value 1/Enabled means Transmission Temperature Gauge is installed. |
| Q30-1015-044 | Voltmeter Gauge | 0 | 1 | Parameter controls the functionality (output on CVSG bus and DTC's) of |
| | Installed | | | the voltmeter gauge. |
| | | | | Value 0/Disabled means Voltmeter Gauge is not installed. |
| | | | | Value 1/Enabled means Voltmeter Gauge is installed. |
| Q30-1015-045 | Engine Retarder | 0 | 1 | Parameter is used to determine if the engine brake switch is installed. |
| | Present | | | Value 0/Disabled means engine brake switches are not installed. |
| | | | | Value 1/Enabled means engine brake switches are installed. |
| Q30-1015-046 | Engine Make | 0 | 2 | Parameter is used to determine what type of engine is installed. |
| | | | | Value 0 means the truck is equipped with CAT engine. |
| | | | | Value 1 means the truck is equipped with CUMMINS engine. |
| | | | | Value 2 means the truck is equipped with PACCAR engine. |
| Q30-1015-047 | Engine Fan Override | 0 | 1 | Parameter is used to determine if the fan override switch is installed. |
| | Present | | | Value 0/Disabled means engine fan override switch is not installed. |
| | | | | Value 1/Enabled means engine fan override switch is installed. |
| Q30-1015-048 | Gear Display Present | 0 | 1 | Parameter is used to determine the presence of gear display on the |
| | | | | Multi-Function Display. |
| | | | | Value 0/Disabled means Gear Display functionality is not available in |
| | | | | Multi-Function Display. |
| | | | | Value 1/Enabled means Gear Display functionality is available in |
| | | | | Multi-Function Display. |
| Q30-1015-050 | Headlamp Warning | 0 | 1 | Parameter controls "headlamp-left-on"-warning. |
| | Present | | | Value 0/Disabled means an alarm will not sound when the lights are on, the |
| | | | | key is off and the driver door is open. |
| | | | | Value 1/Enabled means an alarm will sound when the lights are on, key is |
| | | | | off and the driver door is open. |

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| CECU Parameter | Parameter | Min. | Max. | |
|----------------|-----------------------|-------|-------|---|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-051 | Change Distance | 0 | 1 | Parameter controls whether or not the operator can change the units in |
| | Units | | | the cluster. |
| | | | | Value 0/Disabled means the operator cannot change the units in the cluster. |
| | | | | Value 1/Enabled means the operator can change the units in the cluster. |
| Q30-1015-052 | Cluster Backlight Day | 0 | 255 | Parameter is used to set the intensity of the backlighting for the cluster when |
| | Value | | | the lights are not on. |
| | | | | Value 0 means minimum illumination. |
| | | | | Value 255 means maximum illumination. |
| Q30-1015-053 | CVSG Backlight Day | 0 | 127 | Parameter is used to set the intensity of the backlighting for the gauges |
| | Value | | | when the lights are not on. |
| | | | | Value 0 means minimum illumination. |
| | | | | Value 127 means maximum illumination. |
| Q30-1015-054 | Dash Backlight Day | 0 | 255 | Parameter is used to set the intensity of the backlighting for the entire dash |
| | Value | | | when the lights are not on. |
| | | | | Value 0 means minimum illumination. |
| | | | | Value 255 means maximum illumination. |
| Q30-1015-055 | Dash Dim With Dome | 0 | 1 | Parameter is used to determine if the dash backlighting should dim if the |
| | Light | | | dome light is on. |
| | | | | Value 0/Disabled means the functionality is disabled. |
| | | | | Value 1/Enabled means the functionality is enabled. |
| Q30-1015-056 | Dot-Matrix Backlight | 0 | 255 | Parameter is used to set the intensity of the backlighting for the |
| | Day Value | | | Multi-Function Display when the lights are not on. |
| | | | | Value 0 means minimum illumination. |
| | | | | Value 255 means maximum illumination. |
| Q30-1015-057 | Cluster LCD Backlight | 0 | 255 | Parameter is used to set the intensity of the backlighting for the Liquid Crystal |
| | Day Value | | | Display in the Tachometer and Speedometer when the lights are not on. |
| | | | | Value 0 means minimum illumination. |
| | | | | Value 255 means maximum illumination. |
| Q30-1015-058 | Transfer Case | 0 | 1 | Parameter is used to determine which type of transfer case temperature |
| | Temperature Sensor | | | sensor is installed for the transfer case temperature gauge. This determines |
| | Туре | | | the input range. |
| | | | | Value 0 means Transfer Case Temperature Sensor Type = Delphi. |
| | | | | Value 1 means Transfer Case Temperature Sensor Type = Siemens (or |
| | | | | Continental). |
| Q30-1015-059 | Park Brake Symbol In | 0 | 1 | Parameter is used to determine if the park brake symbol is available on the |
| | Indication Bar | | | indicator bar located on the RH side of the Multi-Function Display. |
| | | | | Value 0/Disabled means park brake symbol will not be displayed. |
| | | | | Value 1/Enabled means park brake symbol will be displayed. |
| Q30-1015-060 | PTO Control Present | 0 | 1 | Parameter is used to determine the presence of PTO controls. (For |
| | | | | CUMMINS engine, default value is 1 - Cruise Control PTO idle bump). |
| | | | | Value 0/Disabled means PTO Control functionality is disabled. |
| | | | | Value 1/Enabled means PTO Control functionality is enabled. |

| CECU Parameter | Parameter | Min. | Max. | F undamentary |
|----------------|---------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-061 | Cruise Control Set | 0 | 2 | Parameter is used to control how the Cruise Control Set Speed is displayed |
| | Speed Display | | | to the operator. |
| | | | | Value 0/Disabled means the Cruise Control Set Speed is not shown to the |
| | | | | displayed. |
| | | | | Value 1/Main Highline means the Cruise Control Set Speed is displayed in |
| | | | | the Main Highline for 3 seconds after release of the set or resume switch. |
| | | | | Value 2/Highline Side Bar means the Cruise Control Set Speed is displayed |
| | | | | in the right side bar of the Multi-Function Display while the Cruise Control |
| | | | | is engaged. |
| Q30-1015-062 | After Treatment | 0 | 1 | Parameter is used to determine if the Diesel Particulate Filter (DPF) |
| | Regeneration Switch | | | aftertreatment regeneration force or inhibit switches are installed. |
| | | | | Value 0/Disabled means After Treatment Regeneration Switch is not |
| | | | | installed. |
| | | | | Value 1/Enabled means After Treatment Regeneration Switch is installed. |
| Q30-1015-063 | Remote PTO Present | 0 | 1 | Parameter is used to determine if the remote PTO switches are installed |
| | | | | (PACCAR engines only). |
| | | | | Value 0/Disabled means Remote PTO switches are not installed. |
| | | | | Value 1/Enabled means Remote PTO switches are wired to CECU and |
| | | | | functionality is enabled. |
| Q30-1015-064 | RPM Sweet Spot | 0 | 3000 | Parameter is used to set the high limit for RPM sweet spot bargraph |
| | High Limit | | | displayed on the Multi-Function Display. |
| Q30-1015-065 | RPM Sweet Spot Low | 0 | 3000 | Parameter is used to set the low limit for RPM sweet spot bargraph displayed |
| | Limit | | | on the Multi-Function Display. |
| Q30-1015-066 | Transmission Make | 0 | 4 | Parameter is used to determine the type/make of transmission. |
| | | | | Value 0 means the truck is equipped with Manual transmission. |
| | | | | Value 1 means the truck is equipped with Autoshift transmission. |
| | | | | Value 2 means the truck is equipped with Ultrashift transmission. |
| | | | | Value 3 means the truck is equipped with Freedomline transmission. |
| | | | | Value 4 means the truck is equipped with Allison transmission. |
| Q30-1015-067 | Brake Applied | 0 | 1 | Parameter is used to determine if the brake application pressure sensor is |
| | Pressure Sensor | | | installed. This parameter will effect the functionality of the brake applied |
| | Installed | | | gauge and cruise control. |
| | | | | Value 0/Disabled means brake application pressure sensor is not installed. |
| | | | | Brake applied gauge will not function and CECU will not send brake info |
| | | | | on databus. |
| | | | | Value 1/Enabled means brake application pressure sensor is installed. Brake |
| | | | | applied gauge will be enabled (If "Brake Applied Pressure Gauge Installed" |
| | | | | parameter is also enabled) and CECU will send brake info on databus. |
| Q30-1015-068 | Dome Light | 0 | 1 | Parameter is used to determine if the dome lamps are controlled by the LVD. |
| | Controlled By Low | | | Value 0/Disabled means the dome lamps are not controlled by the LVD. |
| | Voltage Disconnect | | | Value 1/Enabled means the dome lamps are controlled by the LVD. |
| Q30-1015-070 | Alarm Bell Symbol | 0 | 2 | Parameter is used to determine the status of the alarm bell symbol in the |
| | | | | Multi-Function Display. |
| | | | | Value 0 means the alarm bell symbol is off. |
| | | | | Value 1 means the alarm bell symbol is on solid. |
| | | | | Value 2 means the alarm bell symbol is animated. |

| CECU Parameter | Parameter | Min. | Max. | |
|----------------|-------------------------|-------|--------|---|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-071 | Ignition Timer | 5 | 90 | Parameter is used to determine the maximum time the idle timer can be set |
| | Maximum Time | | | to. The value can be set in one minute increments. |
| | | | | Value 5 means five minutes. |
| | | | | Value 90 means ninety minutes. |
| Q30-1015-072 | Voltage Trim Multiplier | 0 | 999999 | Parameter is used to trim or calibrate the voltmeter. This value is the |
| | | | | "multiplier" portion of the trim and has a range between 0 and 999999. See |
| | | | | "Voltmeter Trim Procedure" following this chart, for steps to determine the |
| | | | | correct value. |
| Q30-1015-073 | Voltage Trim Offset | 0 | 10000 | Parameter is used to trim or calibrate the voltmeter. This value is the "offset" |
| | | | | portion of the trim and has a range between 0 and 10000. See "Voltmeter |
| | | | | Trim Procedure" following this chart, for steps to determine the correct value. |
| Q30-1015-074 | Low Voltage | 0 | 1 | Parameter is used to determine if a low voltage disconnect system is |
| | Disconnect Installed | | | installed. Value 0/Disabled means a LVD system is not installed. Value |
| | | | | 1/Enabled means a LVD system is installed. |
| Q30-1015-075 | Engine Fan With Park | 0 | 1 | Parameter is used to determine if the engine fan will turn on whenever the |
| | Brake Installed | | | park brakes are turned on. |
| | | | | Value 0/Disabled means the engine fan will not come on when the park brakes are on. |
| | | | | Value 1/Enabled means the engine fan will come on when the park brakes |
| | | | | are on. |
| Q30-1015-076 | Primary Air Pressure | 0 | 1 | Parameter is used to determine if the primary air pressure is broadcast on |
| | on V-CAN | | | the V-CAN. |
| | | | | Value 0/Disabled means the primary air pressure is not broadcast on the |
| | | | | V-CAN. |
| | | | | Value 1/Enabled means the primary air pressure is broadcast on the V-CAN. |
| Q30-1015-077 | Secondary Air | 0 | 1 | Parameter is used to determine if the secondary air pressure is broadcast |
| | Pressure on V-CAN | | | on the V-CAN. |
| | | | | Value 0/Disabled means the secondary air pressure is not broadcast on |
| | | | | the V-CAN. |
| | | | | Value 1/Enabled means the secondary air pressure is broadcast on the |
| | | | | V-CAN. |
| Q30-1015-078 | Voltage on V-CAN | 0 | 1 | Parameter is used to determine if voltage is broadcast on the V-CAN. |
| | | | | Value 0/Disabled means voltage is not broadcast on the V-CAN. |
| | | | | Value 1/Enable means voltage is broadcast on the V-CAN. |
| Q30-1015-079 | Primary Fuel Level on | 0 | 1 | Parameter is used to determine if the primary fuel level is broadcast on |
| | V-CAN | | | the V-CAN. |
| | | | | Value 0/Disabled means the primary fuel level is not broadcast on the |
| | | | | V-CAN. |
| | | | | Value 1/Enable means the primary fuel level is broadcast on the V-CAN. |
| Q30-1015-082 | Smart Wheel Installed | 0 | 1 | Parameter is used to determine if a smart wheel is installed. This parameter |
| | | | | enables the cluster retarder lamp. This lamp is only enabled when the truck |
| | | | | is equipped with a multiplex steering wheel. |
| | | | | Value 0/Disabled means a smart wheel is not installed. |
| | | | | Value 1/Enable means a smart wheel is installed. |
| Q30-1015-083 | Governed Speed | 0 | 1 | Parameter controls if the Governed speed limit transmitted by the Engine on |
| | Limit Available | | | V-CAN is displayed on the "Engine Info" MFD screen. |
| | | | | Value 0/Disabled means the Governed Speed Limit is not Displayed |
| | | | | Value 1/Enable means the Governed Speed Limit is displayed, if the Engine |
| | | | | is transmitting it. |

PACCAR

| CECU Parameter | Parameter | Min. | Max. | E-miles atten |
|----------------|-----------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-084 | Remote Accelerator | 0 | 1 | Parameter controls fault logging for Remote Accelerator input (C27 of |
| | Sensor Installed | | | CECU). Also controls transmission of Remote Accelerator information on |
| | | | | V-CAN. |
| | | | | Value 0/Disabled means that no DTCs will be logged if that input is in a |
| | | | | failure state (open, short) and "Not Available" is transmitted on V-CAN |
| | | | | Value 1/Enable means that DTCs will be logged if that input is in a failure |
| | | | | state (open, short). The remote accelerator values on V-CAN are populated |
| 020 1015 095 | Avia Tomporatura | 0 | 1 | with valid data (or "Error" if a fault is occurring on the input). |
| Q30-1015-065 | Axie Temperature | U | 1 | |
| | Steel Gauge Installed | | | Value 0/Disabled means that no DTCs will be logged if that input is in a |
| | | | | failure state (open, short) and the gauge needle will not move if connected |
| | | | | to the CVSG bus. |
| | | | | Value 1/Enable means that DTCs will be logged if that input is in failure |
| | | | | state (open, short) and the gauge needle will move when connected to the |
| | | | | CVSG bus. |
| Q30-1015-086 | Fleet ID Available | 0 | 1 | Parameter controls whether the Fleet ID is visible in the Truck Information |
| | | | | screen in the MFD. |
| | | | | Value 0/Disabled means the Fleet ID is not visible in the Truck Information |
| | | | | screen. |
| | | | | Value 1/Enable means the Fleet ID is enabled in the Truck Information |
| | | | | screen. This requires the Fleet ID to be programmed by ESA, otherwise |
| 000 4045 007 | | | | it will not be visible. |
| Q30-1015-087 | Starter Stuck | 0 | 1 | Parameter controls whether the CECU will detect if the starter solehold |
| | Detection Enabled | | | IS SLUCK. |
| | | | | value or Disable means the operator will not be warned when the starter |
| | | | | Value 1/Enabled means the operator will be warned when the key is not in |
| | | | | START but the starter is still engaged |
| Q30-1015-088 | Diesel Emissions | 0 | 1 | Parameter controls fault logging and gauge needle if the DEF gauge is |
| | Fluid Gauge Installed | | | installed. |
| | - | | | Value 0/Disabled means that no faults will be logged and the gauge needle |
| | | | | will not move if the gauge is installed. |
| | | | | Value 1/Enable means that DTCs will be logged if the DEF information from |
| | | | | the aftertreatment system is not available and the gauge needle will respond |
| | | | | to DEF level changes. |
| Q30-1015-089 | DRL Enabled | 0 | 1 | Parameter controls the DRL functionality of the exterior lighting. |
| | | | | Value 0/Disable means the headlamp switch and high beam switch control |
| | | | | the headlamps. When they are turned off, the headlamps will turn off. |
| | | | | Value 1/Enabled means the low beams (at 50% power) or integrated turn |
| 020 1015 000 | DDL Inhibit Switch | 0 | 2 | signal will be on at all times when the headlamp or highbeam switch is not on. |
| Q30-1015-090 | | U | 2 | Value 0/Nene means that the DRL Inhibit Input is not shear of by the CECI. |
| | Type | | | Value 0/None means that the DRL million input is not observed by the CECO. |
| | | | | active |
| | | | | Value 2=Canadian (10 sec max) means that the DDL will be disabled when |
| | | | | the switch is active for a maximum of 10 seconds. After 10 seconds the |
| | | | | DRI will turn back on and a DTC will be active as long as the DRI switch |
| | | | | is still active. |



| CECU Parameter | Parameter | Min. | Max. | Euclas attac |
|----------------|---------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-091 | Brightness Sensor | 0 | 1 | Parameter controls whether faults are logged on the Brightness Sensor |
| | Installed | | | Analog input. It controls whether the dash dims. |
| | | | | Value 0/Disabled means no DTCs are logged and the dash dimming will |
| | | | | not automatically vary. |
| | | | | Value 1/Enabled means DTCs will be logged if the analog input is in a fault |
| | | | | condition (open, short) and the dash dimming will automatically vary. |
| Q30-1015-092 | Fog Lamps Installed | 0 | 1 | Parameter controls the fog lamp outputs of the Chassis Node. |
| | | | | Value 0/Disabled means the fog lamp output is not driven. If fog lamps are |
| | | | | installed, they will never be lit. |
| | | | | Value 1/Enabled means the fog lamp output will output faults (open, short). |
| Q30-1015-093 | Lights With Wipers | 0 | 1 | Parameter controls whether the menu item is available for Lights with |
| | Enable | | | Wipers. When enabled by the operator through the MFD, the low beam |
| | | | | headlamps will turn on whenever the wipers are active (INI, LOW, or HI). |
| | | | | Value 0/Disabled means the headlamps will not turn on when the wipers |
| | | | | are active. |
| | | | | Value 1/Enabled means the headlamps will turn on when the wipers are |
| 020 1015 004 | | 0 | 40 | active. |
| Q30-1015-094 | пеац Lamp туре | 0 | 40 | |
| | | | | |
| | | | | Value 1/Dual means Dual Sealed Beam |
| | | | | Value 2-9/reserved means reserved |
| | | | | Value 10/PB means Replaceable Bulb |
| | | | | Value 11-19/reserved means reserved |
| | | | | Value 20/Integral means Integral Beam Pod |
| | | | | Value 21-39/reserved means reserved |
| | | | | Value 40/Integral means Integral Beam Pod HID |
| Q30-1015-095 | Starter RPM | 0 | 1 | Parameter controls whether the Starter will be disabled when the engine is |
| | Protection Enable | | | running. |
| | | | | Value 0/Disabled means the engine RPM will be ignored when allowing |
| | | | | the starter to engage. |
| | | | | Value 1/Enabled means the engine RPM must be below 500 rpm for the |
| 020 1015 006 | Startar In Coar | 0 | 1 | starter to engage. |
| Q30-1013-090 | Protection Enable | 0 | 1 | transmission state |
| | | | | Value 0/Disabled means the starter will be enabled regardless of the |
| | | | | transmission state |
| | | | | Value 1/Enabled means the starter will be disabled if the transmission is not |
| | | | | in neutral (optional for manual transmissions) |
| | | | | |
| | | | | |
| 030-1015-097 | Starter Overcrank | 0 | 1 | Parameter controls whether the starter will be disabled due to overvee |
| Q00-1010-08/ | | 0 | | Value 0/Disabled means the starter will not be disabled due to overluse. |
| | | | | Value 1/Epobled moone the starter will he disabled if the starter is successed |
| | | | | (cranking for 90s without sufficient cooldown) |

| CECU Parameter | Parameter | Min. | Max. | Euclose Alan |
|----------------|-----------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-099 | PACCAR Lighting | 0 | 5 | Parameter controls the Lighting Model |
| | Model | | | Value 0 = No Exterior Lighting |
| | | | | Value 1 = KW BCAB |
| | | | | Value 2 = PB BCAB |
| | | | | Value 3 = KW NGP |
| | | | | Value 4 = PB |
| | | | | Value 5 = KW ECE Russian Homologation |
| Q30-1015-100 | Fog Lamps | 0 | 1 | Parameter controls the secondary fog lamp outputs of the Chassis Node. |
| | Secondary Installed | | | Value 0/Disabled means the fog lamp output is not driven. If fog lamps are |
| | | | | installed, they will never be lit. |
| | | | | Value 1/Enabled means the fog lamp output will detect output faults (open, |
| | | | | short). |
| Q30-1015-101 | Trailer Detect Enable | 0 | 1 | Parameter controls the Trailer Detect functionality. |
| | | | | Value 0/Disabled means there is no addition diagnostics of the trailer |
| | | | | connection. |
| | | | | value 1/Enabled means there is additional diagnostics of the trailer. The |
| | | | | intermittently disconnecting while in motion |
| Q30-1015-102 | Turn Lamps Front | 0 | 1 | Parameter controls the outputs for the front side turn lamps. |
| | Side Installed | | | Value 0/Disabled means with the hardware installed, the lamps will work. |
| | | | | but the diagnostics will not (except short circuits) |
| | | | | Value 1/Enabled means the outputs and diagnostics are enabled (mostly for |
| | | | | the fender lamps for T660s). If it is enabled with no hardware installed, you |
| | | | | will get constant open circuit errors. |
| Q30-1015-103 | Turn Lamps Trailer | 0 | 1 | Parameter controls the outputs for the trailer outputs |
| | Installed | | | 0/Disabled means with the hardware installed, the lamps will work, but the |
| | | | | diagnostics will not (except short circuits) |
| | | | | Value 1/Enabled means outputs and diagnostics are enabled. If it is enabled |
| 000 4045 404 | | | | with no hardware installed, you will get constant open circuit errors. |
| Q30-1015-104 | OAT Source | 0 | 1 | Parameter controls the signal used to populate the LCD in the Tachometer, |
| | | | | as well as all other CECO realures that use temperature as part of the |
| | | | | algorithm. |
| | | | | |
| | | | | Value 1/Engine means that the 11030 V/CAN input from the Engine will |
| | | | | be used |
| | | | | |
| | | | | CAUTION |
| | | | | Modifying the sensor or its location can impact vehicle |
| | | | | performance, emissions, and/or reliability. |
| Q30-1015-104 | DRL Enabled | 0 | 1 | Parameter controls the DRL functionality of the exterior lighting. |
| | | | | Value 0/Disable means the headlamp switch and high beam switch control |
| | | | | the headlamps. When they are turned off, the headlamps will turn off. |
| | | | | Value 1/Enabled means the low beams (at 50% power) or integrated turn |
| | | | | signal will be on at all times when the headlamp or highbeam switch is not on. |

| CECU Parameter | Parameter | Min. | Max. | |
|----------------|------------------------|-------|-------|--|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-105 | Backup Alarm Mute | 0 | 1 | Parameter controls the backup alarm mute functionality. |
| | Enabled | | | Value 0/Disabled means the backup alarm will never be muted. |
| | | | | Value 1/Enabled means the external backup alarm speaker will be muted |
| | | | | when the dash switch is activated by the operator. |
| Q30-1015-106 | Pre Trip Lighting Test | 0 | 1 | Parameter controls the availability of the Pre Trip Lighting Test. |
| | Enabled | | | Value 0/Disabled means the menu item in the settings menu is not available |
| | | | | and the Pre Trip sequence will never be executed. |
| | | | | Value 1/Enabled means the menu item is available in the settings menu. |
| | | | | When the operator enables it, the pre trip lighting sequence will be initiated. |
| Q30-1015-107 | Pre Trip Test | 10s | 30s | Parameter controls the interval of the pre trip lighting test. This is how long it |
| | Sequence Interval | | | stays in any one mode before transition to the next test mode. |
| Q30-1015-108 | Enable Gateway | 0 | 1 | Parameter controls the gateway functionality. This must be enabled for the |
| | | | | following Gateway parameters to take effect. |
| | | | | Value 0/Disabled means no Gateway of messages will occur. |
| | | | | Value 1/Enabled means the settings of the following gateway parameters |
| | | | | will be observed. |
| Q30-1015-109 | Enable Router | 0 | 1 | Parameter controls the router functionality. This must be enabled for the |
| | | | | following Router parameters to take effect. |
| | | | | Value 0/Disabled means no Routing of messages will occur. |
| | | | | Value 1/Enabled means the settings of the following router parameters will |
| | | | | be observed. |
| Q30-1015-110 | Gateway Engine | 0 | 64 | Parameter controls the settings for this individual message. Add the |
| | CCVS message | | | numbers together for multiple destinations. |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination |
| | | | | channels |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN |
| Q30-1015-111 | Gateway Engine DM1 | 0 | 64 | Parameter controls the settings for this individual message. Add the |
| | message | | | numbers together for multiple destinations. |
| | meeeage | | | Value 0/OFF means this PGN will not be transmitted on any destination |
| | | | | channels |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN |
| | | | | Value 2/CCAN means this PCN will be transmitted on CCAN |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN |
| | | | | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN |

| CECU Parameter | Parameter | Min. | Max. | | |
|----------------|--------------------|-------|-------|---|--|
| Part Number | Description | Value | Value | Explanation | |
| Q30-1015-112 | Gateway Engine | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | EEC1 message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-113 | Gateway Engine | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | EEC2 message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-114 | Gateway Engine ET1 | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-115 | Gateway Engine IC1 | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |

| CECU Parameter | Parameter | Min. | Max. | |
|----------------|--------------------|-------|-------|---|
| Part Number | Description | Value | Value | Explanation |
| Q30-1015-116 | Gateway Engine LFE | 0 | 64 | Parameter controls the settings for this individual message. Add the |
| | message | | | numbers together for multiple destinations. |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination |
| | | | | channels |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN |
| Q30-1015-117 | Gateway | 0 | 64 | Parameter controls the settings for this individual message. Add the |
| | Transmission DM1 | | | numbers together for multiple destinations. |
| | message | | | Value 0/OFF means this PGN will not be transmitted on any destination |
| | | | | channels |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN |
| Q30-1015-118 | Gateway | 0 | 64 | Parameter controls the settings for this individual message. Add the |
| | Transmission ETC1 | | | numbers together for multiple destinations. |
| | message | | | Value 0/OFF means this PGN will not be transmitted on any destination |
| | | | | channels |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN |
| Q30-1015-119 | Gateway | 0 | 64 | Parameter controls the settings for this individual message. Add the |
| | Transmission ETC2 | | | numbers together for multiple destinations. |
| | message | | | Value 0/OFF means this PGN will not be transmitted on any destination |
| | | | | channels |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN |

| CECU Parameter | Parameter | Min. | Max. | F uclear that | |
|----------------|--------------------|-------|-------|---|--|
| Part Number | Description | Value | Value | Explanation | |
| Q30-1015-120 | Route Engine AMB | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-121 | Route Engine EFLP1 | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-122 | Route Engine FD | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-123 | Route Engine | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | HOURS message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |

| CECU Parameter | Parameter | Min. | Max. | - | |
|----------------|--------------------|-------|-------|---|--|
| Part Number | Description | Value | Value | Explanation | |
| Q30-1015-124 | Route Engine LFC | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-125 | Route Engine VD | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-126 | Route Transmission | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | TRF1 message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-127 | Transmit CECU LC | 0 | 64 | Parameter controls the settings for this individual message. Add the | |
| | message | | | numbers together for multiple destinations. | |
| | | | | Value 0/OFF means this PGN will not be transmitted on any destination | |
| | | | | channels | |
| | | | | Value 1/BCAN means this PGN will be transmitted on BCAN | |
| | | | | Value 2/CCAN means this PGN will be transmitted on CCAN | |
| | | | | Value 4/DCAN means this PGN will be transmitted on DCAN | |
| | | | | Value 8/FCAN means this PGN will be transmitted on FCAN | |
| | | | | Value 16/ICAN means this PGN will be transmitted on ICAN | |
| | | | | Value 32/VCAN means this PGN will be transmitted on VCAN | |
| Q30-1015-128 | Enable LED Front | 0 | 1 | Parameter controls the ability of the diagnostics to detect faults on this | |
| | Side Turn | | | circuit. These lamps are the rear fender lamps or other supplemental lamps. | |
| | | | | Value 0/Disabled means the LEDs will be incorrectly diagnosed as open | |
| | | | | circuits due to their electrical characteristics. | |
| | 1 | | | Value 1/Enabled means the open circuit detection is disabled. | |

| CECU Parameter | Parameter | Min. | Max. | Fundamention | |
|----------------|---------------------|-------|-------|---|--|
| Part Number | Description | Value | Value | Explanation | |
| Q30-1015-129 | Enable LED Front | 0 | 1 | Parameter controls the ability of the diagnostics to detect faults on this circuit. | |
| | Turn DRL | | | These lamps are the Integral Beam turn/DRL lamp or fender turn lamps. | |
| | | | | Value 0/Disabled means the LEDs will be incorrectly diagnosed as open | |
| | | | | circuits due to their electrical characteristics. | |
| | | | | Value 1/Enabled means the open circuit detection is disabled. | |
| Q30-1015-130 | Enable LED Rear | 0 | 1 | Parameter controls the ability of the diagnostics to detect faults on this | |
| | Stop Turn | | | circuit. These lamps are the tractor brake/tail lamps. | |
| | | | | Value 0/Disabled means the LEDs will be incorrectly diagnosed as open | |
| | | | | circuits due to their electrical characteristics. | |
| | | | | Value 1/Enabled means the open circuit detection is disabled. | |
| Q30-1015-131 | Multiplex ABS Off | 0 | 1 | Parameter is used to determine if the ABS Off Road Switch is connected | |
| | Road Switch | | | to the CECU. | |
| | | | | Value 0/Disabled means ABS Offroad Switch is not installed. | |
| | | | | Value 1/Enabled means ABS Offroad Switch is installed. | |
| | | | | This parameter is required for the ABS Off Road switch to communicate | |
| | | | | with the ABS ECU via J1939 V-CAN. | |
| Q30-1015-132 | Engine Fan on with | 0 | 1 | Parameter is used to determine if the engine fan will turn on whenever the | |
| | AC and Park Brake | | | park brakes and the air conditioning are on. | |
| | | | | Value 0/Disabled means the engine fan will not come on when the park | |
| | | | | brakes and air conditioning are on. | |
| | | | | Value 1/Enabled means the engine fan will come on when the park brakes | |
| | | | | and air conditioning are on. | |
| Q30-1015-133 | Brake Lamps on with | 0 | 1 | Parameter is used to determine if the tractor and trailer brake lamps will turn | |
| | Engine Retarder | | | on when the engine retarder is engaged. | |
| | | | | Value 0/Disabled means the tractor and trailer brake lamps will not turn on | |
| | | | | when the engine retarder is engaged. | |
| | | | | Value 1/Enabled means the tractor and trailer brake lamps will turn on when | |
| | | | | the engine retarder is engaged. | |
| Q30-1015-134 | CECU LVD Enable | 0 | 1 | Parameter is used to determine if the CECU is controlling the Low Voltage | |
| | | | | Disconnect (LVD). | |
| | | | | Value 0/Disabled means the CECU is not controlling LVD functionality. | |
| | | | | Value 1/Enabled means the CECU is controlling LVD Functionality. | |
| Q30-1015-135 | Operator Control of | 0 | 1 | Parameter is used to determine if the operator can control the Low Voltage | |
| | LVD Voltage Level | | | Disconnect (LVD) shutoff voltage. | |
| | | | | Value 0/Disabled means the operator is not controlling the LVD shutoff | |
| | | | | voltage. | |
| | | | | Value 1/Enabled means the operator is controlling the LVD shutoff voltage. | |
| Q30-1015-136 | Enable Snow Plow | 0 | 1 | Parameter is used to determine if the Chassis Node Primary Fog Lamp | |
| | Lamps | | | output is being used for Snow Plow Lamps. | |
| | | | | Value 0/Disabled means the Primary Fog Lamp output on the Chassis Node | |
| | | | | is not being used for Snow Plow Lamps (and will turn off when the high | |
| | | | | beams are turned on). | |
| | | | | Value 1/Enabled means the Primary Fog Lamp output on the Chassis Node | |
| | | | | is being used for Snow Plow Lamps (and will not turn off when the high | |
| | | | | beams are turned on). | |

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| CECU Parameter | Parameter | Min. | Max. | | |
|----------------|--------------------------------|-------|-------|--|--|
| Part Number | Description | Value | Value | Explanation | |
| Q30-1015-137 | Advanced ABS | 0 | 1 | Parameter is used to determine if Advanced ABS is installed. | |
| | Installed | | | Value 0/Disabled means Advanced ABS is disabled. | |
| | | | | Value 1/Enabled means Advanced ABS is enabled. | |
| | | | | This parameter is required for trucks with Bendix Advanced Cruise with | |
| | | | | Braking (ACB) | |
| Q30-1015-138 | Water In Fuel Warning | 0 | 1 | Parameter is used to determine if the Water In Fuel warning pop-up | |
| | Enabled | | | message is enabled. | |
| | | | | Value 0/Disabled means the Water In Fuel Pop-up warning message will not | |
| | | | | display when the appropriate condition exists. | |
| | | | | Value 1/Enabled means the Water In Fuel Pop-up warning message will | |
| | | | | display when the appropriate condition exists. | |
| Q30-1015-139 | Variable Speed Fan | 5 | 50 | Parameter is used to set the vehicle speed cut off for the Variable Speed Fan. | |
| | Cutoff Vehicle Speed | | | Value 5 means below 5 MPH the CECU sends the value of Variable Fan | |
| | | | | Low Speed Value (Q30-1015-140) for the Engine Fan and above 5 MPH the | |
| | | | | CECU sends the value of 100% for the Engine Fan when the appropriate | |
| | | | | conditions exist. | |
| | | | | Value 50 means below 50 MPH the CECU sends the value of Variable Fan | |
| | | | | Low Speed Value (Q30-1015-140) for the Engine Fan and above 50 MPH | |
| | | | | the CECU sends the value of 100% for the Engine Fan when the appropriate | |
| | | | | conditions exist. | |
| Q30-1015-140 | Variable Speed Fan | 0 | 100 | Parameter is used to set the Variable Speed Fan speed for the Engine Fan. | |
| | Low Value | | | Value 0 means 0% Engine Fan. | |
| | | | | Value 100 means 100% Engine Fan. | |
| Q30-1015-141 | Variable Speed Fan | 0 | 1 | Parameter is used to determine if the Variable Speed Fan is installed. | |
| | Enable | | | Value 0/Disabled means Variable Speed Fan is not installed. | |
| | | | | Value 1/Enabled means the Variable Speed Fan is installed. | |
| | | | | This parameter is required for the Borg Warner Cool Logic Fans. | |
| Q30-1008-501 | Editable Telltale 1 | | | Used by ESA to select the Icon displayed in monitor and simulate modes. | |
| | Icon ID | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing. | |
| Q30-1008-517 | Editable Telltale 3 | | | Used by ESA to select the Icon displayed in monitor and simulate modes. | |
| 000 4000 540 | | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing. | |
| Q30-1008-518 | Editable Telltale 2 | | | Used by ESA to select the Icon displayed in monitor and simulate modes. | |
| 020 1009 510 | Icon ID Editable Telltale 4 | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing. | |
| Q30-1006-519 | | | | Deep pet effect on violate functions. Refer to Q20 1008 drawing | |
| 030-1008-520 | Editable Telltale 5 | | | Used by ESA to select the Icon displayed in monitor and simulate modes | |
| | | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing | |
| Q30-1008-522 | Editable Telltale 6 | | | Used by ESA to select the Icon displayed in monitor and simulate modes. | |
| | Icon ID | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing. | |
| Q30-1008-524 | Editable Telltale 8 | | | Used by ESA to select the Icon displayed in monitor and simulate modes. | |
| | Icon ID | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing. | |
| Q30-1008-526 | Editable Telltale 9 | | | Used by ESA to select the Icon displayed in monitor and simulate modes. | |
| | Icon ID | | | Does not effect any vehicle functions. Refer to Q30-1008 drawing. | |

Voltmeter Trim Offset Value

Voltmeter Trim Multiplier Value

Voltmeter Trim Procedure

Use the following steps when determining the appropriate parameter values for the Voltage Trim Multiplier and Voltage Trim Offset.

- 1. Turn ignition key to the ON position.
- Make sure the Voltmeter Trim Offset and Voltmeter Trim Multiplier parameters are set to the default values. Using ESA, select 'Parameters' from the main menu screen, then select 'Standard Gauges', then scroll down to view the Voltmeter Trim Offset and Voltmeter Trim Multiplier. If the values for these parameters are not set at the default values, use ESA to reset the values as follows:
 - a. Default Voltmeter Trim Offset = 5,000
 - b. Default Voltmeter Trim Multiplier = 100,000

NOTE

To correctly calibrate the voltmeter, both the Voltmeter Trim Offset and Voltmeter Trim Multiplier parameters must be reset to their default values before performing this procedure.

- 3. Measure the voltage at the batteries. Record the value on the worksheet as "Measured Battery Voltage Engine Off".
- 4. Note the displayed voltage using ESA or with the Voltmeter CVSG. Record the value on the worksheet as "Displayed Battery Voltage Engine Off".
- 5. Start the Engine.

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- 6. Measure the voltage at the batteries (same place as in step 3). Record the value on the worksheet as "Measured Battery Voltage Engine Running".
- 7. Note the displayed voltage using ESA or with the Voltmeter CVSG. Record the value on the worksheet as "Displayed Battery Voltage Engine Running".
- 8. Perform the calculations on the worksheet to determine the appropriate values for the Voltage Trim Multiplier and Voltage Trim Offset.
- 9. Use ESA to set the parameter values to the calculated values.

Voltmeter Trim Values Worksheet

Vehicle Voltage

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| | Value | Work | sheet | | | | |
|---------|----------------|----------|------------|------------------|---|-----|------|
| | Value | Entry | | | | | |
| | Magain | I | | ^ | | | |
| SIEP 3 | : weasu | ed BAT I | voltage | Engine | | | A |
| | | | -) / - 14 | F actoria | | | |
| SIEP 6 | : Measur | ed BALI | voitage | Engine | | | В |
| Running | 9 | | | | | | |
| STEP 4 | · Display | ed BATT | Voltage | Engine | | | С |
| Off | Diopidy | 00 0/ 11 | vonago | Engino | | | 0 |
| STEP 7 | · Display | ed BATT | Voltage | Engine | | D | |
| Running | . Diopiay т | | voltage | Engine | | | D |
| | | | | | | | |
| En | Entry Entry | | | | | Res | sult |
| В | | - | | А | = | | Е |
| D | | - | | С | = | | F |
| Е | | + | | F | = | | G |
| С | | х | | G | = | | Н |
| Α | | - | | Н | = | | |
| I | | х | 1,0 | 000 | = | | J |
| J | | + | 5,0 | 000 | = | | K |
| G | | х | 100 | .000 | = | | L |

How It Works

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Functional Description

Cab Electronic Control Unit (CECU)

The heart of the multiplexed instrumentation system is the CECU. For Peterbilt vehicles, the

Typical CECU Locations

CECU is located behind the center of the dash, near the radio. For Kenworth vehicles, the CECU is located behind the center console. See Control Unit Locations for illustrations depicting the physical position of the control unit.



Vehicle component inputs are sent to the CECU through the J1939 data bus or conventional wiring. The CECU interprets the various inputs and monitors/controls the functions for each input through the CECU software. Output signals from the CECU provide data for the gauges, warning lamps, audible alarms, and displays inside the cluster.

The CECU receives data related to controlling the various devices of the electrical system. It then makes decisions based on that input and sends information to subsystem system control modules (nodes) about what that node should do with the components it controls.

The node that receives information from the CECU to control the exterior lighting and wipers functions is called the chassis node. Sensor signals are processed into data and sent by the chassis node to the CECU by way of the CAN (Controller Area Network) data bus. The chassis node serves as a bidirectional conduit for both information and control. In addition to receiving and processing sensor data, the chassis node also controls the operation of relays that power several electrical subsystems.

\triangle

WARNING

Do not cut, tap or disconnect green/yellow twisted pair wires. Cutting, tapping or disconnecting these wires may cause disruption of component communication on the databus, resulting in the delay and/or miscommunication of warnings to the operator increasing the risk of an accident involving death, personal injury and/or property damage.

When used in conjunction with the Electronic Service Analyst (ESA) diagnostic software tool, the technician can review fault codes stored in the CECU, verify whether the instrumentation is working properly and diagnose the root cause of the problem more easily.

8

Chassis Node

The node that receives information from the CECU to control the exterior lighting and wipers functions is called the chassis node. The chassis node serves as a bidirectional conduit for both information and control.

Several sensors that in Multiplex Electrical version 1 and 2 were connected to the CECU (ICU for version 1) are now connected to the chassis node. These include:

- Ammeter
- Auxiliary Transmission Oil Temperature
- Axle Temperature, Rear
- Axle Temperature, Front
- Axle Temperature, Center / Steer
- Back Up Switch
- General Oil Temperature
- Fuel Filter Restriction
- PTO Oil Temperature
- Transfer Case Oil Temperature

The inputs, usually a variable voltage, from these sensors are fed into the chassis node where the information is them processed into data and sent to the CECU by way of the CAN (Controller Area Network) data bus. In addition to receiving and processing sensor data, the chassis node also controls the operation of relays that power several electrical subsystems. These include:

- Back Up Alarm
- Fog Lamps
- Stop Lights
- Trailer Turn Signals
- Turn Signals
- Windshield Washer

The information sent from the sensors attached to the chassis node is sent to the CECU, processed, and where appropriate returned to the chassis in the form of commands related to the outputs controlled by the chassis node.

The design and manufacture of the chassis node is such that it is delivered to the plant or dealership without configuration parameters loaded into it. Upon the first power cycle of the system the CECU downloads the appropriate configuration parameters so that the chassis node can setup its I/O correctly. Depending on the software configuration of the CECU, these parameters may be different than other trucks and unique to the specific requirements of the truck being assembled. Once the chassis node has received its configuration parameters, it stores them in flash memory permanently and does not require any additional downloads from the CECU. This is a one time event and once complete the chassis node can be removed and reinstalled without the need of a power cycle.

NOTE

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When replacing a chassis node, disconnect the batteries and do not reconnect them until the new node installation and all wiring connections are complete. A new chassis node and the CECU need to be powered up simultaneously during the node's first power cycle; otherwise a fault on the Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt) will indicate that the CECU is not recognizing the proper communication with the chassis node.

The problem occurs when the CECU and chassis node are not powered up simultaneously during the first power cycle. This may happen for a variety of reasons which include; missing chassis node, missing fuses, harnessing not connected, etc. If the CECU recognizes that the chassis node is not communicating as expected, it will trigger a fault in the Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt). Cycling the ignition will not correct this problem since the parameter file is only transmitted to the chassis node after a complete battery power cycle.

Perform a complete battery power cycle by cycling battery power directly at the batteries. Battery power should be removed from the system for at least 30 seconds during the power cycle so that all electrical devices completely discharge and are truly powered down.

CECU Architecture

The software programming of the control unit can be grouped into three main types:

- Run Time (RT) which acts as the operating system where all communication takes place.
- Programmable Logic Controller (PLC) Code manufacturer specific programmed code and software that is developed, accessible and editable.
- Vendor Module blocks of code that are developed for specific manufacturers to allow other features to be implemented more efficiently.

To better understand how Electronic Service Analyst (ESA) functions and why there are current limitations on some of the multiplexed features, by explaining what ESA can see. Currently ESA can look at all information that is communicated between the RT and PLC Code portions of the programming. Any signals, be they inputs, outputs, or dataline signals, sent between the RT and PLC Code are visible to ESA. These are the signals that may be monitored and simulated using ESA.

Limitations with the ESA program are found in the communications that go to the pre-developed Vendor Modules. Currently this information is not available for ESA to look at. That is why some features that have Vendor Module programming, such as the odometer and the message display, are not available to monitor and/or simulate through ESA.



CECU3 (P30-1009-XXX) Communication Diagram

| i | NOTE |
|--|--|
| It is possible for via the J1939 optional custome appropriate refer installed ECU. | the CECU to receive signals communications line from er installed ECUs. Refer to the ence literature for any customer |
| | |

PACCAR

Cluster Components

The heart of the multiplexed instrumentation system is the CECU. For Peterbilt vehicles, the CECU is located behind the center of the dash, near the radio. For Kenworth vehicles, the CECU is located behind the center console. See Control Unit Locations for illustrations depicting the physical position of the control unit.

Central Instrument Cluster

The central instrument cluster is the instrumentation in the dash panel that is located directly in front of the driver. The instrumentation parts in this area include:

- Speedometer (including odometer and trip meter)
- Tachometer (including engine hour meter and outside temperature display)
- Kenworth multi-function display (if equipped)
- Peterbilt driver information display (if equipped)
- Pre-installed warning lights (telltale symbols)

Some models have a one-piece integrated cluster while the instrument cluster on other models consists of separate parts.

The Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt), if equipped, is located at the top of the instrument cluster, displays vehicle information and warnings through a constant monitoring of the vehicle systems. The various functions may be accessed by navigating through menu screens using the menu control switch (rotational knob).

The central instrument cluster receives input data from the CECU via the I-CAN data bus. When the ignition key is first turned ON, the cluster performs a calibration power on self-test that can be used to troubleshoot the main instrumentation parts.

Power On Self-Test for Central Instrument Cluster

When the ignition key is first turned, the following calibration tests will be performed in the central instrument cluster parts.

- The speedometer and tachometer gauge pointers move from pointing at zero, counter-clockwise to their mechanical limit (approximately -8°), remain there for 1 second and return to pointing at zero.
- At the same time, all non-direct telltales (which are controlled by the CECU) are switched on together, and then switched off together.
- A warning sound sequence is also activated five times without a break.
- In Peterbilt models, the Driver Information Display will sequentially display warning icons. Then the display will show the last screen that was displayed before the ignition was turned off.
- In Kenworth models equipped with Multi-Function Display, the display will show the last screen that was displayed before the ignition was turned off.

NOTE

Before replacing the CECU or any gauges, check the wiring and fuses, and perform the diagnostic tests (Diagnostic Trouble Codes) using ESA to verify that you are not replacing a good component.

i

Editable Telltale Lights

The central instrument cluster includes pre-installed warning light symbols (telltales). There are two types of telltales, direct and indirect.

Direct telltales are totally controlled by the device that is issuing the warning. See Direct Wire Telltales for more information.

Indirect telltales are controlled by the CECU. Indirect telltales are turned ON and OFF during the Power On Self-Test at ignition. For these telltales, the CECU receives inputs directly from the source wiring or from the J1939 bus. If any of the indirect telltales do not turn on during the Power On Self-Test, it means that the LED in the cluster is broken and the cluster needs replaced because the individual LEDs are not serviceable.

In some Peterbilt models equipped with a one-piece cluster, the Icon Tray slides into the bottom of the cluster. In certain Peterbilt models, some telltales may be incorporated in the Driver Information Display. These telltales will be sequenced through during the Power On Self-Test.

In Kenworth models equipped with a one piece central cluster, there are two telltale decals/trays that plug into the sides of the cluster. In Kenworth models, there may be up to four telltales included in the Speedometer and Tachometer. Incorporating the telltale icons onto removable pieces adds flexibility. This permits customizing the telltales according to the features on each chassis. In Kenworth trucks, the cluster is shipped with a set of decals that meet 95% of the requirements for all chassis shipped. For the remaining 5%, the decals are replaced with a set of custom build trays. It is possible to remove the decals and replace them with a set of trays that can be purchased from Paccar Parts. This information is currently provided in the Body Builder Manual.

The icon content of the decal has been changing with the progressive EPA and FMVSS requirements. Thus, depending on the engine year and some other factors, decals from similar vehicles may contain different telltales.

Cluster and Telltales



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Location of Editable Telltale Lights



Editable Telltale Application

| Telltale Number | CECU Pin | KW Cluster | PB Cluster |
|-----------------|----------|-------------|------------|
| 1 | 19 | Position 4 | Position 2 |
| 2 | 20 | Position 7 | Position 3 |
| 3 | 21 | Position 8 | Position 4 |
| 4 | 22 | Position 9 | Position 5 |
| 5 | n/a | Position 10 | Position 7 |
| 6 | 24 | Position 12 | Position 8 |
| 7 | 25 | Position 13 | n/a |
| 8 | 26 | Position 14 | n/a |
| 9 | 27 | Position 16 | n/a |

Commercial Vehicle Smart Gauges (CVSG)

The right and left instrument panel gauges used with the multiplexed instrumentation are commonly referred to as Commercial Vehicle Smart Gauges (CVSG). Like the central instrument cluster, the 2-inch gauges also receive input data directly from the CECU. CVSG's are electronic and mechanical. The electronic CVSG's receive digital data from the CECU via the CVSG data bus. The mechanical gauges (i.e. suspension air pressure, etc.) are driven directly by air pressure. Both types of gauges receive input signals from the CECU via a 4-wire "daisy chained" jumper harness that links one gauge to another.

Kenworth CVSG



Peterbilt CVSG



Power On Self-Test

When the ignition key is first turned ON, all the electronic 2-inch gauges will perform a calibration "power on self-test."

• Ignition key turned ON.

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- The gauge pointers move from pointing at zero, counterclockwise to their mechanical limit (approx. -5°), remain there for 1 second and return to pointing at zero.
- At the same time, all LED indicators are switched on together, and then switched off together.

NOTE

The mechanical CVSG do not perform a power on self-test

CVSG Gauge Information

The 2-inch electronic gauges receive their power from the CECU. Backlighting for the 2-inch electronic gauges is sent from the CECU to the gauges via the data link (Blue wire). The data link (blue wire) is also used to deliver information between the CECU and the 2-inch gauges. The 2-inch gauges are "series" (daisy-chained) connected using 4-way jumper harnesses linking the gauges together.

- Yellow = Power wire (9-16 volts)
- Green = Ground wire (Return)
- Blue = Data link
- Brown = Backlighting (used for mechanical gauges only)

Service Information and CVSG characteristics that service technicians should be aware of:

- There are two generations of CVSGs. The first is the white CVSG where the plastic housing and nut are made with white plastic. The second is the black CVSG where the plastic housing and nut are black. Use a white nut on a white CVSG and a black nut on a black CVSG. Otherwise, both generations work exactly the same and can be intermixed on the truck.
- Specialty CVSG gauges (such as the clock, PTO hour meter, and transmission display) are stand-alone gauges and are independent of the CECU.
- Optional mechanical gauge (such as air suspension) needles are driven mechanically by air pressure. There is no red warning lamp and the backlighting is through the brown wire from the CECU (a PWM input). The 4-way jumper harness is still used to pass all 4 circuits through the gauge to the next gauge in the chain.
- If the headlamps are on and the dimmer is turned to bright, you can scan the panel and tell which electronic gauges are wired and functioning correctly.
- If part of the panel has gauges backlit while some of the 2-inch gauges are not backlit, the jumper harness wire between the gauges is probably not connected properly.

- If the red indicator lamp is on but the gauge is operational, it indicates the value is out of normal range.
- If a 2-inch electronic gauge has a short or open in the sensor wiring, the gauge needle moves 5° below the first tick mark (approximately one needle thickness).
- The Diesel Exhaust Fluid (DEF) CVSG is unique in that the telltale will flash for extreme low fluid level.
- If a 2-inch electronic gauge has power (yellow wire) and ground (green wire) but is not receiving data (blue wire), after 30 seconds of waiting for data, the red indicator lamp at the 6 o'clock position of the gauge will begin to blink. This indicates there is an open or short in the blue wire between the gauge and the CECU. Since the 2-inch gauges are "series" (daisy-chain) connected, any other gauges downstream from the gauge that has lost connection will also begin to blink their warning lights.

8 - 13

Direct Wire Telltales

Direct Wire Telltales are warning lights that are not controlled by the software in the CECU (not part of Multiplex system). The type of warning light (direct wire, vs multiplexed) is determined by either regulations, or space available in the Cluster. Currently, the direct wire warning lights are made with LEDs plus some protective circuitry. All direct telltales require 12V at their positive terminal and Ground at their negative terminal to light.

The operation of the MIL and Wait to Start can be observed at ignition during the bulb check function

(engine turns them on and off at ignition). If they are not working then, unplug the Cluster and apply 12V to their connectors per the following table.

For the Direct Wire Telltale in the gauge modules listed in the following table, the telltale function can be tested by unplugging the gauge from the harness and applying voltage to the connector pairs that belong to that warning light. If the LED lights up after applying voltage to them, the problem is either the wiring (in the rest of the system), or the controlling device.

| Direct Telltale | Location | Related to | Functionality | Troubleshooting |
|-----------------|--------------------------|-------------------------|------------------------------------|---------------------------------|
| MIL (2010) | Kenworth and Peterbilt | 2010 Engines | Directly controlled by engine bulb | Cluster connector (Telltale 11) |
| | clusters after 2010, T7. | | check at ignition. | Pin 13 = 12V |
| | | | | Pin 14 = GND |
| Wait-To-Start | Kenworth and Peterbilt | 2010 Engines | Directly controlled by engine bulb | Cluster connector (Telltale 2) |
| (2010) | clusters after 2010, T7. | | check at ignition. | Pin 8 = 12V |
| | This lamp was driven by | | | Pin 10 = GND |
| | the CECU before 2010. | | | |
| Refrigerator | Kenworth cluster. | New interior | Light should be ON when the | Cluster connector |
| | | refrigerator | refrigerator is turned ON (switch | Pin 1 = 12V |
| | | | located in the sleeper). | Pin 2 = GND |
| Lane Departure | Kenworth Direct | Lane departure | Refer to lane departure manual. | Pin 2 = 12V |
| | wire telltale gauge | system | | Pin 6 = GND |
| | Q43-1128-001. | | | |
| Service | Kenworth Direct | Allison 1000/2000 | Refer to transmission manual. | Pin 2 = 12V |
| Transmission | wire telltale gauge | | | Pin 6 = GND |
| | Q43-1127-001. | | | |
| Range Inhibit | Kenworth Direct | Allison 1000/2000 | Refer to transmission manual. | Pin 4 = 12V |
| | wire telltale gauge | | | Pin 8 = GND |
| | Q43-1127-001. | | | |
| Overspeed | Kenworth Direct | Cummins engine | ON when the shutdown valve | Pin 1 = 12V |
| Shutdown | wire telltale gauge | overspeed | is closed and with some test | Pin 5 = GND |
| | Q43-1127-001. | shutdown | conditions. Refer to EAOS | |
| | | | Supplement. | |
| Cab Status | Kenworth Direct | Cab power status | Always ON when power applied | Pin 3 = 12V |
| | wire telltale gauge | indicator in firetrucks | to the cab. | Pin 7 = GND |
| | Q43-1127-001. | with cab power | | |
| | | shutdown switch | | |

Direct Telltale

Instruments and Controls Operation

Before attempting to repair any instrumentation problems, the technician should have a complete understanding of how the instruments and controls operate.

Air Filter Restriction Pressure - The Air Filter Restriction Pressure gauge indicates the condition of the engine air cleaner and is measured by inches of water (H₂O). A clean filter should register 7 in. H₂O (may vary with system design) and a filter whose life is over registers approximately 25 in. H₂O.

Air Starter Pressure - The Air Starter Pressure Gauge indicates the amount of air pressure in the air start reservoir.

Ammeter - The Ammeter monitors the vehicle's electrical system and makes sure the system is in balance and operating normally. If not, it may be drawing power from the alternator (positive reading) or from the batteries (negative reading). Under normal conditions the ammeter will read nearly "zero."

Axle, Drive Oil Temperature - The Drive Axle Oil Temperature gauges (front, rear, and center) indicate the temperature of the lubricant in the vehicle's axles.

Axle, Pusher Air Pressure, #1, #2, #3 - The Pusher Axle Air Pressure gauges indicate the air pressure in each of the pusher axles suspension air bags.

Axle, Tag Air Pressure - The Tag Axle Air Pressure gauge indicates the amount of air pressure in the tag axle suspension air bags.

Brake, Application Air Pressure - The Brake Application Air Pressure gauge indicates how much air pressure is being applied from the foot brake valve or trailer brake hand valve to the air brakes.

BrakeSaver Application Air Pressure (Export vehicles only) - The BrakeSaver Application Air Pressure gauge indicates the amount of air pressure applied to the BrakeSaver hand control valve.

BrakeSaver Oil Temperature (Export vehicles only) - The BrakeSaver Oil Temperature gauge

indicates the temperature in the BrakeSaver. If the oil temperature exceeds the maximum limits, a red warning lamp in the gauge turns on.

Engine Coolant Temperature - The Engine Coolant Temperature gauge indicates the temperature of the engine coolant. If the coolant temperature exceeds the maximum limits, a red warning lamp in the gauge illuminates and an audible warning sounds. If the coolant temperature continues to rise, the Check Engine and/or Stop Engine lights illuminate. Under normal operating conditions the water temperature gauge should register between 165 and 205°F (74 and 90°C). Under certain conditions, somewhat higher temperatures may be acceptable. The maximum allowable temperature is 220°F (104°C) with the cooling system pressurized, except for certain engines.

Engine, Oil Pressure - If the oil pressure drops below the minimum pressure a red warning light in the gauge illuminates, the Stop Engine light illuminates and an audible alarm tone sounds.

Engine Oil Temperature - The Engine Oil Temperature gauge indicates the engine oil temperature. If the oil temperature exceeds the maximum limits, a red warning light in the gauge illuminates.

Engine Pyrometer (Export vehicles only) -

The Engine Pyrometer gauge indicates engine exhaust gas temperature. Since it responds almost immediately to changes in exhaust gas temperature, the pyrometer is an excellent indicator of engine output. Monitor it in conjunction with the tachometer and manifold pressure gauge.

Fuel Filter Restriction Pressure - This gauge tells you the condition of the fuel filter by indicating the restriction from the fuel filter to the fuel pump. The restriction is measured by inches of mercury (in-Hg).

Fuel Level, Primary/Secondary (if equipped) - The Primary Fuel gauge and Secondary Fuel gauge (if equipped) indicate the approximate amount of fuel in each fuel tank. In addition to indicating empty and full, the gauge(s) also indicate the fuel level in graduated increments. When the fuel level for each tank is below 1/4 full, a red warning light in the gauge illuminates. **General Air Pressure #1, #2** - The General Air Pressure gauge(s) are used for customer installed component applications.

General Oil Temperature - The General Oil Temperature gauge(s) are used for customer installed component applications.

Manifold Pressure (Boost) - The Manifold Pressure (Boost) gauge indicates the power the engine is putting out by showing the amount of turbo boost. If the pressure indicated by the manifold pressure gauge goes down, there may be something wrong with the engine.

Primary and Secondary Air Pressure Gauge

- The Primary Air Pressure gauge indicates pressure in the rear braking system. The Secondary gauge indicates pressure in the front braking system. Each gauge indicates the amount of air pressure in each system in pounds per square inch (psi). On vehicles equipped with metric air pressure gauges, the gauge faceplate includes a kPa (major) scale and psi (minor) scale. If the pressure in either or both circuits falls below 65 psi, a red warning light in the gauge illuminates and an audible alarm tone sounds when the engine is running.

Speedometer - The Speedometer indicates the vehicle speed in miles per hour (mph) and in kilometers per hour (km/h). For KW vehicles, the speedometer also includes several warning and indicator lamps.

Suspension Load Air Pressure, #1, #2 - The Suspension Load Air Pressure gauge indicates the amount of air pressure in the air suspension air bags. When the vehicle is equipped with a second Suspension Load Air pressure gauge, the #1 gauge indicates the air pressure in the driver's side air bags. The #2 gauge indicates the air pressure in the passenger's side air bags.

Tachometer - The Tachometer measures the engine speed in revolutions per minute (rpm). For KW vehicles, the speedometer also includes several warning and indicator lamps.

Tractor Brake Application Air Pressure - The Tractor Brake Application Air Pressure gauge indicates the amount of air pressure applied to the tractor brakes.

Trailer Brake Application Air Pressure - The Trailer Brake Application Air Pressure gauge indicates the amount of air pressure applied to the trailer brakes during brake foot valve and/or hand brake control valve applications.

Trailer Reservoir Air Pressure - The Trailer Reservoir Air Pressure gauge indicates the amount of air pressure in the trailer brake reservoir.

Transfer Case Oil Temperature - The Transfer Case Oil Temperature gauge indicates the temperature of the oil in the transfer case. If the oil temperature exceeds maximum limits, a red warning light in the gauge illuminates.

Transmission Oil Temperature, Auxiliary - The Auxiliary Transmission Oil Temperature gauge indicates the temperature of the oil in the auxiliary transmission.

Transmission Oil Temperature, Main - The Main Transmission Oil Temperature Gauge indicates the temperature of the oil in the transmission.

Transmission Retarder Oil Temperature -

The Transmission Retarder Oil Temperature gauge indicates the temperature of the oil in the transmission retarder.

Voltmeter - The Voltmeter displays the battery voltage. Normally, it shows 12 to 14V (volts). A red warning light in the gauge illuminates when an out of range condition exists.
Instrumentation Troubleshooting Procedures

The troubleshooting procedures in this manual have been designed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic service tool. While ESA can help the technician diagnose an instrumentation problem quickly and easily, it is not intended to substitute a technician's knowledge and experience for applying basic electrical troubleshooting skills (i.e., performing voltage, open circuit, resistance checks, etc.) when required. The troubleshooting procedures in this manual incorporate the use of the ESA diagnostic service tool and certain electrical checks the technician must be able to perform in order to correctly diagnose the problem.

Gauge Input Sources

| Standard / Optional Input Source | Input Source | Sensor* |
|--|------------------|---------|
| Air Filter Restriction Pressure | Sensor | Active |
| Air Starter Pressure | Mechanical | |
| Ammeter | Sensor | Active |
| Auxiliary Transmission Oil | 0 | Dession |
| Temperature | Sensor | Passive |
| Brake Application Pressure | Sensor | Active |
| Brake Saver Application Air Pressure | Mechanical | Passive |
| Drive Axle Oil Temperature | Sensor | Passive |
| Diesel Exhaust Fluid | V-CAN (J1939) | |
| Engine Coolant Temperature | V-CAN (J1939) | Passive |
| Engine Oil Pressure | V-CAN (J1939) | |
| Engine Oil Temperature | V-CAN (J1939) | |
| Fuel Filter Restriction Pressure | Sensor | |
| Fuel Level | Sensor | Active |
| General Air Pressure | Mechanical | Passive |
| General Oil Temperature | Sensor | |
| Main Transmission Oil Temperature | Sensor | Passive |
| Manifold Pressure (Boost) | V-CAN (J1939) | Passive |
| Primary & Secondary Air Pressure | Sensor | |
| Pusher Axle Air Pressure | Mechanical | Active |
| Speedometer | V-CAN (J1939) | Passive |
| Suspension Load Air Pressure | Mechanical | |
| Tachometer | V-CAN (J1939) | |
| Tag Axle Air Pressure | Mechanical | |
| Trailer Brake Application Air Pressure | Mechanical | |
| Trailer Reservoir Air Pressure | Mechanical | |
| Transfer Case Oil Temperature | Mechanical | |
| Voltmeter | Internal Voltage | |

* Sensor Types:

- Active Sensor Has 3 wires and requires an electrical power source to operate. Output is a linear voltage.
- Passive Sensor- Has 2 wires and does not require an electrical power source to operate. Generate their output via the energy being sensed (for example: temperature).

Display Diagnostic Codes

This section describes the Multi-Function Display (Kenworth) or Driver Information Display (Peterbilt) text in the Diagnostic Screen and the DTC that triggered it. In the following table, the "xx" represents any two digit Failure Mode Indicator (FMI).

The Source column identifies the system/controller that the DTC relates to. Only CECU related codes have troubleshooting procedures in this publication. Refer to the following for all non-CECU related codes.

- Engine see engine service tool and engine service manual.
- Transmission see transmission service tool and transmission service manual.
- ABS see ABS service tool and ABS service manual.
- DPF see engine service tool and engine service manual.

| Display Text | Source | DTC |
|---------------------------------|--------|-------|
| EGR Valve Leakage | Engine | 27xx |
| Secondary Fuel Level | Engine | 38xx |
| Intercooler Coolant Temperature | Engine | 52xx |
| Two Speed Axle Switch | Engine | 69xx |
| Park Brake Switch | Engine | 70xx |
| Max Vehicle Speed Limit | Engine | 74xx |
| Exhaust Trap Inlet Pressure | Engine | 81xx |
| Vehicle Speed Sensor | Engine | 84xx |
| Throttle Position | Engine | 91xx |
| AUX Torque Switch | Engine | 93xx |
| Fuel Delivery Pressure | Engine | 94xx |
| Fuel Filter Restriction | Engine | 95xx |
| Fuel Tank Level | Engine | 96xx |
| Water In Fuel | Engine | 97xx |
| Engine Oil Level | Engine | 98xx |
| Engine Oil Filter | Engine | 99xx |
| Engine Oil Pressure | Engine | 100xx |
| Crankcase Pressure | Engine | 101xx |
| Boost Pressure | Engine | 102xx |
| Turbo Speed | Engine | 103xx |
| Intake Manifold Air Temp | Engine | 105xx |
| Intake Manifold Pressure | Engine | 106xx |
| Barometric Pressure | Engine | 108xx |
| Engine Coolant Temperature | Engine | 110xx |
| Low Coolant Level | Engine | 111xx |
| Water Pump | Engine | 112xx |
| Engine Droop | Engine | 113xx |
| Inlet Air Mass Flow Rate | Engine | 132xx |
| Fuel Rail Pressure | Engine | 157xx |
| Switched Power | Engine | 158xx |

| Display Text | Source | DTC |
|-------------------------------|--------|-------|
| Rated Engine Power | Engine | 166xx |
| Alternator Potential | Engine | 167xx |
| Battery | Engine | 168xx |
| Ambient Air Temperature | Engine | 171xx |
| Air Inlet Temperature | Engine | 172xx |
| Exhaust Gas Temperature | Engine | 173xx |
| Fuel Temp | Engine | 174xx |
| Engine Oil Temperature | Engine | 175xx |
| Engine Fuel Rate | Engine | 183xx |
| Engine Speed | Engine | 190xx |
| Trans Output Speed | Engine | 191xx |
| Trip Fuel | Engine | 231xx |
| Total Distance Traveled | Engine | 245xx |
| Clock Real Time | Engine | 251xx |
| EGR Delta Pressure | Engine | 411xx |
| EGR Temp | Engine | 412xx |
| OEM AUX Temperature | Engine | 441xx |
| Engine Percent Torque | Engine | 513xx |
| Retarder Torque | Engine | 520xx |
| Gear Out of Range | Engine | 524xx |
| Reference Retarder | Engine | 556xx |
| Throttle Switch | Engine | 558xx |
| Torque Converter Lockup | Engine | 573xx |
| Engine Idle Timer Override | Engine | 592xx |
| Idle Shutdown Occurrence | Engine | 593xx |
| Engine Idle Shutdown Alert | Engine | 594xx |
| Cruise Enable Switch | Engine | 596xx |
| Brake Switch | Engine | 597xx |
| Clutch Switch | Engine | 598xx |
| Cruise Set Switch | Engine | 599xx |
| Cruise Decel Switch | Engine | 600xx |
| Cruise Resume Switch | Engine | 601xx |
| Cruise Accel Switch | Engine | 602xx |
| Brake Pedal Switch 2 | Engine | 603xx |
| J1708 Data Link Error | Engine | 608xx |
| System Diagnostic Code 1 | Engine | 611xx |
| System Diagnostic Code 2 | Engine | 612xx |
| System Diagnostic Code 3 | Engine | 615xx |
| 5V Supply 1 | Engine | 620xx |
| Red Stop Lamp Status | Engine | 623xx |
| Amber Stop Lamp Status | Engine | 624xx |
| Intake Air Heater | Engine | 626xx |
| ECU Power Loss | Engine | 627xx |
| ECU Warning | Engine | 629xx |
| Engine Software Error | Engine | 630xx |
| Engine Software Error | Engine | 631xx |
| Fuel Shutoff Valve | Engine | 632xx |
| Fuel Control Valve | Engine | 633xx |
| Timing Actuator | Engine | 635xx |
| Engine Speed Signal | Engine | 637xx |
| J1939 Datatlink | Engine | 639xx |
| AUX Dual Output Shutdown | Engine | 640xx |
| Turbo Actuator | Engine | 641xx |
| Engine External Speed Command | Engine | 644xx |
| Fan Clutch Driver | Engine | 647xx |
| BPV Diag SLMP Data | Engine | 649xx |



| Display Text | Source | DTC |
|---------------------------------|--------|--------|
| Injector Spill Valve 1 | Engine | 651xx |
| Injector Spill Valve 2 | Engine | 652xx |
| Injector Spill Valve 3 | Engine | 653xx |
| Injector Spill Valve 4 | Engine | 654xx |
| Injector Spill Valve 5 | Engine | 655xx |
| Injector Spill Valve 6 | Engine | 656xx |
| Injector Spill Valve 7 | Engine | 657xx |
| Injector Spill Valve 8 | Engine | 658xx |
| Injector Spill Valve 9 | Engine | 659xx |
| Injector Spill Valve 10 | Engine | 660xx |
| Injector Spill Valve 11 | Engine | 661xx |
| Injector Spill Valve 12 | Engine | 662xx |
| Starter Solenoid | Engine | 677xx |
| 8V Supply | Engine | 678xx |
| AUX PWM Driver | Engine | 697xx |
| AUX I/O Circuit 1 | Engine | 701xx |
| AUX I/O Circuit 2 | Engine | 702xx |
| AUX I/O Circuit 3 | Engine | 703xx |
| AUX I/O Circuit 4 | Engine | 704xx |
| AUX I/O Circuit 5 | Engine | 705xx |
| AUX I/O Circuit 6 | Engine | 706xx |
| AUX I/O Circuit 7 | Engine | 707xx |
| Speed Sensor 2 | Engine | 723xx |
| Inlet Air Heater | Engine | 729xx |
| A/C Comp Clutch Switch | Engine | 876xx |
| Front Axle Speed | Engine | 904xx |
| PWM Output | Engine | 923xx |
| Auxiliary Output 2 | Engine | 925xx |
| Auxiliary Output 3 | Engine | 926xx |
| Fuel Pump Actuator | Engine | 931xx |
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| Remote Accel | Engine | 974xx |
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| PTO Set Speed Switch | Engine | 979xx |
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| Fuel Injection Pump Calibration | Engine | 1076xx |
| Fuel Injection Pump Control | Engine | 1077xx |
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| 5V Supply 2 | Engine | 1080xx |
| Engine Retarder Torque | Engine | 1085xx |
| Air Supply Pressure Input | Engine | 1087xx |
| Engine Warning State | Engine | 1107xx |
| Engine Near Shutdown | Engine | 1109xx |
| Engine Brake Output | Engine | 1112xx |
| | Engine | 1121XX |
| Post Intercooler Temp | Engine | 1131xx |

| Display Text | Source | DTC |
|-----------------------------|--------|--------|
| ECU Temp | Engine | 1136xx |
| Turbo Inlet Temperature | Engine | 1172xx |
| Turbo Wastegate Actuator | Engine | 1188xx |
| Anti-Theft | Engine | 1195xx |
| Anti-Theft | Engine | 1196xx |
| Exhaust Gas Pressure | Engine | 1209xx |
| Water Pump Temp | Engine | 1212xx |
| Fault CAN Bus 2 | Engine | 1231xx |
| Engine Shutdown Switch | Engine | 1237xx |
| High Fuel Leakage | Engine | 1239xx |
| Fuel Control Valve | Engine | 1244xx |
| Timing Actuator | Engine | 1245xx |
| Oil Burn Valve | Engine | 1265xx |
| Idle Shutdown | Engine | 1267xx |
| Starter Solenoid | Engine | 1321xx |
| Fuel Rail 1 | Engine | 1347xx |
| Fuel Rail 2 | Engine | 1348xx |
| Injector Rail | Engine | 1349xx |
| Change Engine Oil | Engine | 1378xx |
| Engine Oil Level | Engine | 1380xx |
| Fuel Filter | Engine | 1382xx |
| AUX Temp 1 | Engine | 1385xx |
| AUX Pressure | Engine | 1388xx |
| Pressure Relief Valve | Engine | 1442xx |
| ECU Power Relay | Engine | 1485xx |
| Injector Boost Voltage | Engine | 1542xx |
| Engine Derated | Engine | 1569xx |
| Cruise Speed Out of Range | Engine | 1588xx |
| Cruise Speed Out of Range | Engine | 1590xx |
| Cruise Pause Switch | Engine | 1633xx |
| Intake Air Temperature | Engine | 1636xx |
| Fan Speed | Engine | 1639xx |
| Auto Start Failed | Engine | 1664xx |
| Demand Retarder | Engine | 1/15xx |
| Retarder Selection | Engine | 1716XX |
| Catalyst Tank Level | Engine | 1761xx |
| Maximum Retarder Speed | Engine | 1780xx |
| YC Engine Control | Engine | 1817XX |
| YC Brake Control | Engine | 1819XX |
| Accel Pedal Position | Engine | 2623XX |
| | Engine | 2629XX |
| Auxiliary Output 4 | Engine | 2040XX |
| | Engine | 2047XX |
| EGR Mass Flow | Engine | 2039XX |
| Turbo 1 Output | Engine | 2709XX |
| | Engine | 2790XX |
| | Engine | 279122 |
| Engine Injector Calibration | Engine | 279322 |
| | Engine | 28131 |
| Trans Crank Enable | Engine | 201322 |
| Intake Valve Oil Pressure | Fngine | 294822 |
| Intake Valve Oil Pressure | Engine | 204022 |
| Intake Valve Actuator 1 | Fngine | 295022 |
| Intake Valve Actuator 2 | Fngine | 295122 |
| Intake Valve Actuator 3 | Engine | 205177 |
| Intake valve ACLUAIOI 3 | ⊏ngine | ZYJZXX |

| Display Text | Source | DTC |
|---------------------------------------|--------|-----------|
| Intake Valve Actuator 4 | Engine | 2953xx |
| Intake Valve Actuator 5 | Engine | 2954xx |
| Intake Valve Actuator 6 | Engine | 2955xx |
| Coolant Driver | Engine | 2988xx |
| Catalyst Missing | Engine | 3050xx |
| EGR Plugged | Engine | 3058xx |
| J1939 DPF Monitor | Engine | 3064xx |
| Exhaust Gas Temp 1 | Engine | 3241xx |
| Particulate Trap Inlet Temp 1 | Engine | 3242xx |
| Exhaust Gas Temp 3 | Engine | 3245xx |
| Particulate Trap Outlet Temp | Engine | 3246xx |
| Exhaust Gas Temp 2 | Engine | 3249xx |
| Particulate Trap 1 Pressure | Engine | 3251xx |
| Particulate Trap 2 Temp | Engine | 3258xx |
| Particulate Trap 2 Inlet Temp | Engine | 3276xx |
| Particulate Trap 2 Outlet Temp | Engine | 3280xx |
| Particulate Trap 2 Pressure | Engine | 3285xx |
| Catalyst Dosing Unit | Engine | 3361xx |
| DPF Fuel Pressure Actuator 1 | Engine | 3471xx |
| DPF Air Pressure Actuator 1 | Engine | 3472xx |
| DPF Ignition Failure | Engine | 3473xx |
| DPF Ignition Loss | Engine | 3474xx |
| DPF Fuel Pressure Control | Engine | 3479xx |
| DPF Fuel Pressure Voltage | Engine | 3480xx |
| Regen Fuel Rate | Engine | 3481xx |
| DPF Fuel Enable Actuator | Engine | 3482xx |
| DPF Ignition Current | Engine | 3484yy |
| | Engine | 3486yy |
| DPF Air Pressure Control | Engine | 348777 |
| | Engine | 3/10/1 XX |
| | Engine | 3490 |
| Sensor Supply Voltage 1 | Engine | 3509xx |
| Sensor Supply Voltage 2 | Engine | 3510xx |
| Sensor Supply Voltage 3 | Engine | 3511xx |
| Sensor Supply Voltage 4 | Engine | 3512xx |
| Sensor Supply Voltage 5 | Engine | 3513xx |
| Regen Manually Disabled | Engine | 3530xx |
| Ambient Air Density | Engine | 3555xx |
| DPF Fuel Injector 1 No Response | Engine | 3556xx |
| ECH Power Output | Engine | 3598xx |
| Engine Injector 1 Actuator 2 | Engine | 3659xx |
| Engine Injector 2 Actuator 2 | Engine | 3660xx |
| Engine Injector 3 Actuator 2 | Engine | 3661xx |
| Engine Injector 4 Actuator 2 | Engine | 3662vv |
| Engine Injector 5 Actuator 2 | Engine | 366377 |
| Engine Injector 6 Actuator 2 | Engine | 3664vv |
| Particulate Tran Regen Inhibit Switch | Engine | 369577 |
| Particulate Tran Regen Force Switch | Engine | 360622 |
| Active Regen Switched Off | Engine | 3703vv |
| Particulate Tran Regen Inhibited | Engine | 3711vv |
| Particulate Trap Soot Load Porcont | Engine | 3710vv |
| Part Tran 1 Pegen Not Available | Engino | 3750vv |
| DPE Secondary Air Diff Processo | Engine | 3830 |
| DE Soondary Air Mass Flow | Engine | 2020/XX |
| NOV Limit Excood Dup to Quality | Engine | 2032XX |
| NOX Limit Exceed Due to Quality | Engine | 403433 |
| | | 403033 |

| Display Text | Source | DTC |
|-----------------------------------|--------------|-----------|
| NOx Limit Exceed Due to Quality | Engine | 4094xx |
| NOx Limit Exceed Due to Quantity | Engine | 4096xx |
| DPF Fuel Drain Voltage | Engine | 4097xx |
| Aftertreatment DEF Tank Low Level | Engine | 5245xx |
| Indicator | 0 | |
| Aftertreatment SCR Operator | Engine | 5246xx |
| Inducement Severity | go | 0_10/01 |
| Electronic Trans Control 1 | Engine | 61442xx |
| Electronic Trans Control 2 | Engine | 61445xx |
| SWD Derate Lamp Data | Engine | 65519xx |
| EXT PWM PCAC | Engine | 65520xx |
| J1939CM DPF State | Engine | 65521xx |
| J1939CM DPF Shutdown | Engine | 65522xx |
| EXT PWM Back Pressure | Engine | 65523xx |
| J1939CM DPE Post Filter | Engine | 65524xx |
| J1939CM DPF Fail WO Engine | Engine | 65525xx |
| J1939CM DPF Fail And Engine | Engine | 65526xx |
| J1939CM DPF Lamp Data | Engine | 65527xx |
| Fuel Injector 246 HI | Engine | 65528xx |
| Fuel Injector 135 HI | Engine | 65529xx |
| Fuel Injector 4 Lamp Data | Engine | 65530xx |
| Fuel Injector 2 Lamp Data | Engine | 65531xx |
| Fuel Injector 6 Lamp Data | Engine | 65532xx |
| Fuel Injector 3 Lamp Data | Engine | 65533xx |
| Fuel Injector 5 Lamp Data | Engine | 65534xx |
| Fuel Injector 1 Lamp Data | Engine | 65535xx |
| CGI Mass Flow Rate | Engine | 520192xx |
| CGI Gas Temp | Engine | 520193xx |
| CGI Actuator Shaft Position | Engine | 520194xx |
| CGI Diff Pressure | Engine | 520196xx |
| CGI Absolute Pressure | Engine | 520197xx |
| Connect Service Tool | Engine | Any Other |
| Connect Service Tool | Transmission | Any Other |
| Diff Lock Solenoid | ABS | 564xx |
| ASR Offroad Switch | ABS | 576xx |
| System Diagnostic Code 4 | ABS | 614xx |
| System Voltage | ABS | 627xx |
| FCU Fault | ABS | 629xx |
| ECU Fault | ABS | 630xx |
| .11939 | ABS | 639xx |
| SA FFT Wheel Speed Sensor | ABS | 789xx |
| SA RIGHT Wheel Speed Sensor | ABS | 790xx |
| DA LEET Wheel Speed Sensor | ABS | 791xx |
| DA RIGHT Wheel Speed Sensor | ABS | 792xx |
| AA LEFT Wheel Speed Sensor | ABS | 793xx |
| AA RIGHT Wheel Speed Sensor | ABS | 794xx |
| SA LEFT PMV | ABS | 795xx |
| SA RIGHT PMV | ABS | 796xx |
| DA LEFT PMV | ARS | 797xx |
| | ARS | 798xx |
| AA I FET PMV | ABS | 799xx |
| AA RIGHT PMV | ABS | 800xx |
| Retarder Relay | ARS | 801xx |
| Relay Diagonal 1 | ABS | 802xx |
| TCV DA Solenoid | ABS | 806xx |
| | | 00077 |



| Display Text | Source | DTC |
|-----------------------------------|--------|-----------|
| TCV SA Solenoid | ABS | 807xx |
| Wheel Speed Sensor Reversed | ABS | 810xx |
| ABS Lamp Fault | ABS | 811xx |
| Stop Lamp Switch | ABS | 1045xx |
| Trailer PMV | ABS | 1056xx |
| SUSP Pressure Sensor | ABS | 1059xx |
| Pressure Sensor | ABS | 1067xx |
| Pressure Sensor Secondary Circuit | ABS | 1068xx |
| Tires Size Out Of Range | ABS | 1069xx |
| SAS Signal | ABS | 1807xx |
| YRS Sensor | ABS | 1808xx |
| LAS Sensor | ABS | 1809xx |
| Connect Service Tool | ABS | Any Other |
| Fuel Filter Restriction | CECU | 16xx |
| Wait Starter Cooldown Enforced | CECU | 1675xx |
| High Beam Lamp(s) Fault | CECU | 2348xx |
| Low Beam Lamp(s) Fault | CECU | 2350xx |
| Left Front Lamp(s) Fault | CECU | 2368xx |
| Right Front Lamp(s) Fault | CECU | 2370xx |
| Left Rear Lamp(s) Fault | CECU | 2372xx |
| Right Rear Lamp(s) Fault | CECU | 2374xx |
| Marker Lamp(s) Fault | CECU | 2378xx |
| Clearance Lamp(s) Fault | CECU | 2382xx |
| Primary Fog Lamps Fault | CECU | 2388xx |
| Secondary Fog Lamps Fault | CECU | 2390xx |
| Left Trailer Lamp(s) Fault | CECU | 2396xx |
| Right Trailer Lamp(s) Fault | CECU | 2398xx |
| Current Sensor Fault | CECU | 2579xx |
| Main Light Switch Fault | CECU | 2872xx |
| Sec. Light Switch Fault | CECU | 2873xx |
| High Beam Switch Fault | CECU | 2874xx |
| Hazard Switch Fault | CECU | 2875xx |
| Turn Lamp Switch Fault | CECU | 2876xx |
| Vehicle Speed Message Missing | CECU | 8409 |
| Accel Pedal Message Missing | CECU | 9109 |
| App. Air Pressure Sensor Open | CECU | 11603 |
| App. Air Pressure Sensor Short | CECU | 11604 |
| Pri. Air Pressure Sensor Open | CECU | 11703 |
| Pri. Air Pressure Sensor Short | CECU | 11704 |
| Sec. Air Pressure Sensor Open | CECU | 11803 |
| Sec. Air Pressure Sensor Short | CECU | 11804 |
| Ignition Power Circuit Fault | CECU | 15802 |
| Ignition Power Circuit Fault | CECU | 15803 |
| Ignition Power Circuit Fault | CECU | 15804 |
| Control Unit Over Voltage | CECU | 16800 |
| Control Unit Under Voltage | CECU | 16801 |
| Outside Temp Sensor Open | CECU | 17103 |
| Outside Temp Sensor Short | CECU | 17104 |
| Instant Economy Message Missing | CECU | 18409 |
| Engine Speed Message Missing | CECU | 19009 |
| Odometer Offset Recalculated | CECU | 24510 |
| Engine Hours Message Missing | CECU | 24709 |
| Total PTO Hours Message Missing | CECU | 24809 |
| Gauge Bus Power Open Circuit | CECU | 67805 |
| Gauge Bus Power Short Circuit | CECU | 67806 |
| Pri. Fuel Level Sensor Open | CECU | 82903 |

| Display Text | Source | DTC |
|----------------------------------|--------|-----------|
| Pri. Fuel Level Sensor Short | CECU | 82904 |
| Vehicle Distance Message Missing | CECU | 91709 |
| Total PTO Fuel Message Missing | CECU | 102809 |
| Instrument Bus Comm Failure | CECU | 123109 |
| ABS J1939 Failure | CECU | 148109 |
| Trans. J1939 Failure | CECU | 148209 |
| Engine J1939 Failure | CECU | 148309 |
| Dash Dimmer Switch Open | CECU | 149106 |
| Dash Dimmer Switch Short | CECU | 149206 |
| Connect Service Tool | CECU | Any Other |
| Exhaust Trap Inlet Pressure | DPF | 81xx |
| Vehicle Speed Sensor | DPF | 84xx |
| Fuel Delivery Pressure | DPF | 94xx |
| Boost Pressure | DPF | 102xx |
| Barometric Pressure | DPF | 108xx |
| Switched Power | DPF | 158xx |
| Engine Fuel Rate | DPF | 183xx |
| Engine Speed | DPF | 190xx |
| Total Distance Traveled | DPF | 245xx |
| Engine Percent Torque | DPF | 513xx |
| J1939 Datalink | DPF | 639xx |
| AUX I/O Circuit 1 | DPF | 701xx |
| AUX I/O Circuit 2 | DPF | 702xx |
| AUX I/O Circuit 3 | DPF | 703xx |
| AUX I/O Circuit 4 | DPF | 704xx |
| AUX I/O Circuit 5 | DPF | 705xx |
| AUX I/O Circuit 6 | DPF | 706xx |
| AUX I/O Circuit 7 | DPF | 707xx |
| Air Supply Pressure Input | DPF | 1087xx |
| Exhaust Gas Temp 1 | DPF | 3241xx |
| Exhaust Gas Temp 3 | DPF | 3245xx |
| Exhaust Gas Temp 2 | DPF | 3249xx |
| Particulate Trap 1 Pressure | DPF | 3251xx |
| Catalyst Dosing Unit | DPF | 3361xx |
| DPF Fuel Pressure Actuator 1 | DPF | 3471xx |
| DPF Air Pressure Actuator 1 | DPF | 3472xx |
| DPF Purge Air Pressure | DPF | 3486xx |
| Part Trap 1 Regen Not Available | DPF | 3750xx |
| Connect Service Tool | DPF | Any Other |

Б

12 Troubleshooting

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DIAGNOSTIC TROUBLE CODES

Introduction

ESA is a PC-based diagnostic tool that detects fault codes and helps troubleshoot the new multiplexed electrical system. ESA communicates over a data-link adapter (DLA) to the vehicle CECU.

| FSA | wil | ŀ |
|-----|--------|----|
| LOA | VV I I | •• |

- Verify instrumentation functionality
- Read fault codes from components
- Diagnose the problem using information on ServiceNet

The following chart provides a listing of possible CECU diagnostic trouble codes (DTCs) and links to their corresponding troubleshooting procedures.

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|------|---------------|-------------------------|----------------------------------|--|
| | Node | | | |
| 1603 | Chassis Node | Fuel Filter Restriction | Open in fuel filter restriction | This DTC will be recorded when the control unit sees an |
| | | | circuit | open or short to ground at the fuel filter restriction sensor |
| | | | | input. Some possible causes for this are a broken wire, |
| | | | | corroded or disconnected connector, or sensor failure. The |
| | | | | wiring for this sensor runs from the chassis node through |
| | | | | the chassis harness and sender extension harness to the |
| | | | | sensor on the fuel filter. |
| 1604 | Chassis Node | Fuel Filter Restriction | Short in fuel filter restriction | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to +5V at the fuel filter restriction sensor input. Some |
| | | | | possible causes for this are a pinched wire, water in a |
| | | | | connector, or sensor failure. The wiring for this sensor runs |
| | | | | from the chassis node through the chassis harness and |
| | | | | sender extension harness to the sensor on the fuel filter. |
| 7703 | Chassis Node | Rear Drive Oil Temp | Open in rear drive axle oil | This DTC will be recorded when the control unit sees an |
| | | | temp circuit | open at the rear drive axle oil temperature sensor input. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and rear axle harness to the sensor on the rear |
| | | | | drive axle. |
| 7704 | Chassis Node | Rear Drive Oil Temp | Short in rear drive axle oil | This DTC will be recorded when the control unit sees a |
| | | | temp circuit | short to ground at the rear drive axle oil temperature sensor |
| | | | | input. Some possible causes for this are a pinched wire, |
| | | | | water in a connector, or sensor failure. The wiring for this |
| | | | | sensor runs from the chassis node through the chassis |
| | | | | harness and rear axle harness to the sensor on the rear |
| | | | | drive axle. |
| 7803 | Chassis Node | Center/Steer axle Oil | Open in Center/Steer axle | This DTC will be recorded when the control unit sees an |
| | | Temp | oil temp circuit | open at the center drive axle oil temperature sensor input. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and rear axle harness to the sensor on the center |
| | | | | drive axle. |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|--------------------------|---------------------------------|--|
| | Node | | | |
| 7804 | Chassis Node | Center Drive axle Oil | Short in center drive axle oil | This DTC will be recorded when the control unit sees a |
| | | Temp | temp circuit | short to ground at the center drive axle oil temperature |
| | | | | sensor input. Some possible causes for this are a pinched |
| | | | | wire, water in a connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and rear axle harness to the sensor on the center |
| | | | | drive axle. |
| 8409 | CECU | Wheel-Based Vehicle | Wheel Based Vehicle Speed | This DTC will be recorded when the control unit does |
| | | Speed Message | Message missing | not see the Wheel Based Vehicle Speed message from |
| | | | | the engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty wiring to the engine |
| | | | | controller, incorrect engine programming or a faulty engine |
| | | | | controller. The data bus wiring runs from the control unit |
| | | | | located behind the cup holder through the IP harness to the |
| | | | | engine harness. |
| 9003 | Chassis Node | PTO Oil Temp | Open in PTO oil temp circuit | This DTC will be recorded when the control unit sees an |
| | | | | open at the PTO oil temperature sensor input. Some |
| | | | | possible causes for this are a broken wire, corroded or |
| | | | | disconnected connector, or sensor failure. |
| 9004 | Chassis Node | PTO Oil Temp | Short in PTO oil temp circuit | This DTC will be recorded when the control unit sees a |
| | | | | short to ground at the PTO oil temperature sensor input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or sensor failure. |
| 9109 | CECU | Accelerator Pedal | Accelerator Pedal Position | This DTC will be recorded when the control unit does not |
| | | Position Message | Message missing | see the Accelerator Pedal Position Speed message from |
| | | Ū | 0 0 | the engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty data link wiring to |
| | | | | the engine controller incorrect engine programming or a |
| | | | | faulty engine controller. The data bus wiring runs from the |
| | | | | control unit located behind the cup holder through the IP |
| | | | | harness to the engine harness |
| 10703 | CECU | Air Filter Restriction | Open in air filter restriction | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the air filter restriction sensor input. Some possible |
| | | | | causes for this are a broken wire, corroded or disconnected |
| | | | | connector or sensor failure. The wiring for this sensor runs |
| | | | | from the control unit located behind the cup holder through |
| | | | | the IP harness to the sensor on the air junction block |
| 10704 | CECU | Air Filter Restriction | Short in air filter restriction | This DTC will be recorded when the control unit sees a |
| | 0200 | | circuit | short to +5V at the air filter restriction sensor input. Some |
| | | | | possible causes for this are a pinched wire water in a |
| | | | | connector or sensor failure. The wiring for this sensor runs |
| | | | | from the control unit located behind the cup holder through |
| | | | | the IP harness to the senser on the air junction block |
| 11603 | CECU | Application Air Pressure | Open in application air | This DTC will be recorded when the control unit sees an |
| 11000 | OLOU | | | open or short to ground at the tractor brake application |
| | | | | air pressure sensor input. Some possible causes for this |
| | | | | an pressure sensor input. Some possible causes for this |
| | | | | are a broken wire, confided of disconnected connector, |
| | | | | or sensor ranure. The winning for this sensor runs from the |
| | | | | control unit located benind the cup holder through the IP |
| 1 | 1 | 1 | 1 | inarness to the sensor on the air junction block |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|--------------------------|---------------------------------|---|
| | Node | | | |
| 11604 | CECU | Application Air Pressure | Short in application air | This DTC will be recorded when the control unit sees a |
| | | | pressure circuit | short to +5V at the tractor brake application air pressure |
| | | | | sensor input. Some possible causes for this are a pinched |
| | | | | wire, water in a connector, or sensor failure. The wiring |
| | | | | for this sensor runs from the control unit located behind |
| | | | | the cup holder through the IP harness to the sensor on |
| | | | | the air junction block. |
| 11703 | CECU | Primary Air Pressure | Open in primary air pressure | This DTC will be recorded when the control unit sees an |
| | | | circuit | open or short to ground at the primary air pressure sensor |
| | | | | input. Some possible causes for this are a broken wire, |
| | | | | corroded or disconnected connector, or sensor failure. The |
| | | | | wiring for this sensor runs from the control unit located |
| | | | | behind the cup holder through the IP harness to the sensor |
| | | | | on the air junction block. |
| 11704 | CECU | Primary Air Pressure | Short in primary air pressure | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to +5V at the primary air pressure sensor input. Some |
| | | | | possible causes for this are a pinched wire, water in a |
| | | | | connector, or sensor failure. The wiring for this sensor runs |
| | | | | from the control unit located behind the cup holder through |
| | | | | the IP harness to the sensor on the air junction block. |
| 11803 | CECU | Secondary Air Pressure | Open in secondary air | This DTC will be recorded when the control unit sees an |
| | | | pressure circuit | open or short to ground at the secondary air pressure |
| | | | | sensor input. Some possible causes for this are a broken |
| | | | | wire, corroded or disconnected connector, or sensor failure. |
| | | | | The wiring for this sensor runs from the control unit located |
| | | | | behind the cup holder through the IP harness to the sensor |
| | | | | on the air junction block. |
| 11804 | CECU | Secondary Air Pressure | Short in secondary air | This DTC will be recorded when the control unit sees a |
| | | | pressure circuit | short to +5V at the secondary air pressure sensor input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the control unit located behind the cup holder |
| | | | | through the IP harness to the sensor on the air junction |
| | | | | block. |
| 15802 | CECU | Ignition Power | Ignition Power is in an | This DTC will be recorded when the control unit sees |
| | | | indeterminate state | between 33% and 66% of battery voltage on the ignition |
| | | | | pin. A possible cause for this is faulty ignition sense wiring. |
| | | | | The ignition sense wire comes from the power distribution |
| | | | | box to the control unit behind the cup holder. This sense |
| | | | | wire is also used for other control units such as the door |
| | | | | modules and cluster. The wiring to those control units may |
| | | | | be the issue. |
| 15803 | CECU | Ignition Power | 12V is on control unit ignition | This DTC will be recorded when the control unit sees 12V |
| | | | pin but not on cluster ignition | on control unit ignition pin but not on cluster ignition pin. |
| | | | pin | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector. Ignition power is supplied to |
| | | | | the cluster from the power distribution box near the drivers |
| | | | | left foot through the IP harness to the cluster |

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| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|----------------------|-----------------------------|---|
| | Node | | | |
| 15804 | CECU | Ignition Power | 12V is on cluster ignition | This DTC will be recorded when the control unit sees 12V |
| | | | pin but not on control unit | on cluster ignition pin but not on control unit ignition pin. |
| | | | ignition pin | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector. Ignition power is supplied to |
| | | | | the control unit from the power distribution box near the |
| | | | | drivers left foot through the IP harness to the control unit |
| | | | | behind the cup holder. |
| 16800 | CECU | Control Unit Battery | Over voltage | The control unit continually monitors the voltage it is |
| | | Voltage | | supplied. If the voltage is above 15 volts the system will |
| | | | | record this fault. Some possible causes for this fault are |
| | | | | faulty alternator, or jump starting with to high of voltage. |
| | | | | Power is supplied from the power distribution box near the |
| | | | | drivers left foot through the IP harness to the control unit |
| | | | | behind the cup holder. |
| 16801 | CECU | Control Unit Battery | Under voltage for more than | The control unit continually monitors the voltage it is |
| | | Voltage | 10 minutes | supplied. If the voltage is below 10 volts for 10 minutes |
| | | | | the system will record this fault. Some possible causes for |
| | | | | this fault are low batteries, too much system load, faulty |
| | | | | alternator, or corroded connectors. Power is supplied for |
| | | | | the power distribution box near the drivers left foot through |
| | | | | the IP harness to the control unit behind the cup holder. |
| 17102 | CECU | Outside Air Temp | Outside air temp message | This DTC will be recorded when the CAN signal for the |
| | | | from engine error | outside air temperature sensor from the engine is in the |
| | | | | invalid range. Some possible causes for this are broken |
| | | | | wire or sensor failure. |
| | | | | |
| | | | | CAUTION |
| | | | | Modifying the sensor or its location can |
| | | | | impact vehicle performance, emissions, |
| | | | | and/or reliability. |
| 17103 | CECU | Outside Air Temp | Open in outside air temp | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the outside air temperature sensor input. Some |
| | | | | possible causes for this are a broken wire, corroded or |
| | | | | disconnected connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the control unit located behind the |
| | | | | cup holder through the IP harness and left hand mirror |
| | | | | harness to the sensor on the mirror. |
| 17104 | CECU | Outside Air Temp | Short in outside air temp | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to ground at the outside air temperature sensor input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the control unit located behind the cup holder |
| | | | | through the IP harness and left hand mirror harness to the |
| | | | | sensor on the mirror. |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|-----------------------|-------------------------------|---|
| | Node | | | |
| 17131 | CECU | Outside Air Temp | Outside air temp message | This DTC will be recorded when the control unit does not |
| | | | from engine missing | receive an ambient air condition message from the engine. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, no terminating resistors, no |
| | | | | power to the Engine system or Engine ECU failure. |
| | | | | |
| | | | | |
| | | | | Modifying the sensor or its location can |
| | | | | impact venicle performance, emissions, |
| | | | | and/or reliability. |
| 17303 | CECU | Exhaust Temp | Open in exhaust temp circuit | This DTC will be recorded when the control unit sees an |
| | | | | open at the exhaust temp sensor input. Some possible |
| | | | | causes for this are a broken wire, corroded or disconnected |
| | | | | connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the control unit located behind the cup holder |
| | | | | through the IP harness and engine harness to the sensor |
| | | | | on exhaust pipe just behind turbo. |
| 17304 | CECU | Exhaust Temp | Short in exhaust temp circuit | This DTC will be recorded when the control unit sees a |
| | | | | short to ground at the exhaust temp sensor input. Some |
| | | | | possible causes for this are a pinched wire, water in a |
| | | | | connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the control unit located behind the cup holder |
| | | | | through the IP harness and engine harness to the sensor |
| | | | | on exhaust pipe just behind turbo. |
| 17703 | CECU | Transmission Oil Temp | Open in transmission oil | This DTC will be recorded when the control unit sees an |
| | | | temp circuit | open at the transmission oil temperature sensor input. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, or sensor failure. The wiring |
| | | | | for this sensor runs from the control unit located behind |
| | | | | the cup holder through the IP harness, engine harness. |
| | | | | chassis harness and transmission harness to the sensor |
| | | | | on transmission |
| 17704 | CECU | Transmission Oil Temp | Short in transmission oil | This DTC will be recorded when the control unit sees |
| | | | temp circuit | a short to ground at the transmission oil temperature |
| | | | | sensor input. Some possible causes for this are a pinched |
| | | | | wire water in a connector or sensor failure. The wiring |
| | | | | for this sensor runs from the control unit located behind |
| | | | | the cup holder through the IP harness, engine harness |
| | | | | chassis harness and transmission harness to the sensor |
| | | | | on transmission |
| 18409 | CECU | Instantaneous Fuel | Instantaneous Fuel | This DTC will be recorded when the control unit does |
| 10100 | 0200 | | Economy message missing | not see the Instantaneous Fuel Economy message from |
| | | Economy message | Leonomy message missing | the engine or when the message has timed out. Some |
| | | | | no engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty withing to the engine |
| | | | | deta hug wiring nung from the control with located to him different |
| | | | | uata bus willing runs from the control unit located bening the |
| 1 | 1 | 1 | 1 | rcup holder through the IP harness to the engine harness. |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|--------------------------|---------------------------|--|
| | Node | | | |
| 19009 | CECU | Engine Speed Message | Engine Speed message | This DTC will be recorded when the control unit does |
| | | | missing | not see the Engine Speed message from the engine, or |
| | | | | when the message has timed out. Some possible causes |
| | | | | for this include faulty wiring to the engine controller or a |
| | | | | faulty/misconfigured engine controller. The data bus wiring |
| | | | | runs from the control unit located behind the cup holder |
| | | | | through the IP harness to the engine harness. |
| 23731 | CECU | Engine VIN | MX Engine and CECU3 VIN | This DTC will be recorded when the VIN of the MX Engine |
| | | Valid for 2010 emissions | mismatch | does not match the VIN of the CECU3. This could be |
| | | compliant engines | | caused by swapping Engine controllers or CECU3's without |
| | | CECU3 | | correctly reprogramming them. |
| 24510 | CECU | Offset of Odometer | Odometer offset has been | The instrumentation system continually calculates the |
| | | | recalculated | odometer reading using information from the engine |
| | | | | ECU. It stores the offset between the engine ECU and |
| | | | | instrumentation system. This offset is recalculated if the |
| | | | | engine ECU or the control unit are replaced. This DTC will |
| | | | | appear when the offset is recalculated. |
| 24709 | CECU | Engine Total Hours of | Engine Total Hours of | This DTC will be recorded when the control unit does not |
| | | Operation | Operation message | see the Engine Total Hours of Operation message from |
| | | | | the engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty data bus wiring to |
| | | | | the engine controller or a faulty/misconfigured engine |
| | | | | controller. The data bus wiring runs from the control unit |
| | | | | located behind the cup holder through the IP harness to the |
| | | | | engine harness. |
| 24809 | CECU | Total Power Takeoff | Total Power Takeoff Hours | This DTC will be recorded when the control unit does |
| | | Hours | message | not see the Total Power Takeoff Hours message from |
| | | | | the engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty data bus wiring to |
| | | | | the engine controller or a faulty/misconfigured engine |
| | | | | controller. The data bus wiring runs from the control unit |
| | | | | located behind the cup holder through the IP harness to the |
| | | | | engine harness. |
| 44103 | Chassis Node | General Temp | Open in general oil temp | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the general oil temperature sensor input. Some |
| | | | | possible causes for this are a broken wire, corroded or |
| | | | | disconnected connector, or sensor failure. The wiring |
| | | | | for this sensor runs from the chassis node through the |
| | | | | chassis and IP harnesses to a connector behind the right |
| | | | | hand gauge panel. The sensor can be used to monitor |
| | | | | many different components, follow extension harnesses to |
| | | | | determine sensor location. |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|------------------------|-----------------------------|---|
| | Node | | | |
| 44104 | Chassis Node | General Temp | Short in general oil temp | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to ground at the general temperature sensor input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the chassis node through the chassis and IP |
| | | | | harnesses to a connector behind the right hand gauge |
| | | | | panel. The sensor can be used to monitor many different |
| | | | | components, follow extension harnesses to determine |
| | | | | sensor location. |
| 44203 | Chassis Node | Aux Transmission Temp | Open in aux transmission | This DTC will be recorded when the control unit sees an |
| | | | temp circuit | open at the auxiliary transmission oil temperature sensor |
| | | | | input. Some possible causes for this are a broken wire, |
| | | | | corroded or disconnected connector, or sensor failure. The |
| | | | | wiring for this sensor runs from the control unit located |
| | | | | behind the cup holder through the IP harness, chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | auxiliary transmission. |
| 44204 | Chassis Node | Aux Transmission Temp | Short in aux transmission | This DTC will be recorded when the control unit sees a |
| | | | temp circuit | short to ground at the auxiliary transmission oil temperature |
| | | | | sensor input. Some possible causes for this are a pinched |
| | | | | wire, water in a connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | auxiliary transmission. |
| 57803 | Chassis Node | Forward Drive Oil Temp | Open in forward drive axle | This DTC will be recorded when the control unit sees an |
| | | | oil temp circuit | open at the forward drive axle oil temperature sensor input. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | the forward drive axle. |
| 57804 | Chassis Node | Forward Drive Oil Temp | Short in forward drive axle | This DTC will be recorded when the control unit sees a |
| | | | oil temp circuit | short to ground at the forward drive axle oil temperature |
| | | | | sensor input. Some possible causes for this are a pinched |
| | | | | wire, water in a connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | the forward drive axle. |
| 67805 | CECU | CVSG / MCS Supply | CVSG / MCS supply Open | This DTC will be recorded when the control unit sees an |
| | | | Load | open load on the power supply to the CVSG bus and the |
| | | | | Menu Control Switch. A possible cause of this failure is a |
| | | | | broken wire leading to the 2" gauges. A common symptom |
| | | | | of this fault is that none of the 2" gauges are working. |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|-------|---------------|-------------------------|-------------------------------|---|
| | Node | | | |
| 67806 | CECU | CVSG / MCS Supply | CVSG / MCS supply Shorted | This DTC will be recorded when the sees a short to ground |
| | | | to ground | on the CVSG supply. Some possible causes for this are a |
| | | | | pinched wire, water in a connector, bent pins on a CVSG |
| | | | | or a failed CVSG. The wiring for CVSG runs from the |
| | | | | control unit located behind the cup holder through the IP |
| | | | | harness to two connectors on each side of the cluster. |
| | | | | CVSG jumpers are used to link the remaining gauges. A |
| | | | | common symptom of this fault is that none of the 2" gauges |
| | | | | are working. |
| 80404 | CECU | ABS Mode | "Tractor ABS Not Installed" | This DTC will be recorded when the control unit "ABS |
| | | | Input is shorted and ABS | Installed" parameter is disabled and it is receiving |
| | | | system is present. | messages from an ABS system on V-CAN. If the vehicle |
| | | | | is to be equipped with ABS enable the "ABS Installed" |
| | | | | parameter. If the vehicle is not to be equipped with ABS |
| | | | | remove the ABS control unit. |
| 82903 | Chassis Node | Primary Fuel | Open in primary fuel level | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the primary fuel level sensor input. Some possible |
| | | | | causes for this are a broken wire, corroded or disconnected |
| | | | | connector, or sensor failure. The wiring for this sensor runs |
| | | | | from the chassis node through the chassis harness and |
| | | | | sensor extension harness to the sensor on fuel tank. |
| 82904 | Chassis Node | Primary Fuel | Short in primary fuel level | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to ground at the primary fuel level sensor input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the chassis node through the chassis harness |
| | | | | and sensor extension harness to the sensor on fuel tank. |
| 83003 | Chassis Node | Secondary Fuel | Open in secondary fuel level | This DTC will be recorded when the control unit sees |
| | | | circuit | an open at the secondary fuel level sensor input. Some |
| | | | | possible causes for this are a broken wire, corroded or |
| | | | | disconnected connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | fuel tank. |
| 83004 | Chassis Node | Secondary Fuel | Short in secondary fuel level | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to ground at the secondary fuel level sensor input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or sensor failure. The wiring for this sensor |
| | | | | runs from the chassis node through the chassis harness |
| | | | | and sensor extension harness to the sensor on fuel tank. |
| 91709 | CECU | High Resolution Vehicle | High Resolution Vehicle | This DTC will be recorded when the control unit does not |
| | | Distance Message | Distance message missing | see the High Resolution Vehicle Distance message from |
| | | | | the engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty data bus wiring to |
| | | | | the engine controller or a faulty engine controller. The data |
| | | | | bus wiring runs from the control unit located behind the cup |
| | | | | holder through the IP harness to the engine harness |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|--------|---------------|------------------------|-------------------------------|---|
| | Node | | | |
| 102809 | CECU | Total Engine PTO Fuel | Total Engine PTO Fuel Used | This DTC will be recorded when the control unit does |
| | | Used Message | Message missing | not see the Total Engine PTO Fuel Used message from |
| | | | | the engine, or when the message has timed out. Some |
| | | | | possible causes for this include faulty data bus wiring to |
| | | | | the engine controller or a faulty/misconfigured engine |
| | | | | controller. The data bus wiring runs from the control unit |
| | | | | located behind the cup holder through the IP harness to the |
| | | | | engine harness. |
| 123109 | CECU | I-CAN | Control Unit cannot read | This DTC will be recorded when the control unit cannot read |
| | | | messages from Cluster on | messages from the cluster. Some possible causes for this |
| | | | I-CAN | are a broken wire, corroded or disconnected connector, no |
| | | | | power to the cluster or cluster failure. The wiring for I-CAN |
| | | | | is a twisted pair that runs from the control unit located |
| | | | | behind the cup holder through the IP harness to the cluster. |
| 138703 | CECU | Brake Saver Oil Temp | Open in brake saver oil temp | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the brake saver oil temperature sensor input. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, or sensor failure. The wiring |
| | | | | for this sensor runs from the control unit located behind |
| | | | | the cup holder through the IP harness, firewall jumper and |
| | | | | sensor extension harness to the sensor on brake saver. |
| 138704 | CECU | Brake Saver Oil Temp | Short in brake saver oil temp | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to ground at the brake saver oil temperature sensor |
| | | | | input. Some possible causes for this are a pinched wire, |
| | | | | water in a connector, or sensor failure. The wiring for this |
| | | | | sensor runs from the control unit located behind the cup |
| | | | | holder through the IP harness, firewall jumper and sensor |
| | | | | extension harness to the sensor on brake saver. |
| 138803 | Chassis Node | Transfer Case Oil Temp | Open in transfer case oil | This DTC will be recorded when the control unit sees an |
| | | | temp circuit | open at the transfer case oil temperature sensor input. |
| | | | | Some possible causes for this are a broken wire, corroded |
| | | | | or disconnected connector, or sensor failure. The wiring for |
| | | | | this sensor runs from the chassis node through the chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | transfer case. |
| 138804 | Chassis Node | Transfer Case Oil Temp | Short in transfer case oil | This DTC will be recorded when the control unit sees a |
| | | | temp circuit | short to ground at the transfer case oil temperature sensor |
| | | | | input. Some possible causes for this are a pinched wire, |
| | | | | water in a connector, or sensor failure. The wiring for this |
| | | | | sensor runs from the chassis node through the chassis |
| | | | | harness and sensor extension harness to the sensor on |
| | | | | transfer case. |
| 148109 | CECU | V-CAN | Control unit cannot read | This DTC will be recorded when the control unit cannot |
| | | | messages from ABS on | read messages from the ABS system. Some possible |
| | | | V-CAN | causes for this are a broken wire, corroded or disconnected |
| | | | | connector, no terminating resistors, no power to the ABS |
| | | | | system or ABS ECU failure. |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|--------|---------------|--------------------------|-----------------------------|--|
| | Node | | | |
| 148209 | CECU | V-CAN | Control Unit cannot | This DTC will be recorded when the control unit cannot |
| | | | read messages from | read messages from the transmission ECU. Some possible |
| | | | Transmission on V-CAN | causes for this are a broken wire, corroded or disconnected |
| | | | | connector, no terminating resistors, no power to the |
| | | | | Transmission or Transmission ECU failure. |
| 148309 | CECU | V-CAN | Control Unit cannot read | This DTC will be recorded when the control unit cannot |
| | | | messages from Engine on | read messages from the engine ECU. Some possible |
| | | | V-CAN | causes for this are a broken wire, corroded or disconnected |
| | | | | connector, no terminating resistors, no power to the engine |
| | | | | or engine ECU failure. |
| 148703 | CECU | Dash Light Dimmer | Open in dash dimmer input | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the dash light dimmer control input. Some possible |
| | | | | causes for this are a broken wire, corroded or disconnected |
| | | | | connector, or dimmer control failure. The wiring for this |
| | | | | control runs from the control unit located behind the cup |
| | | | | holder through the IP harness to the control on the dash. |
| 148704 | CECU | Dash Light Dimmer | Short in dash dimmer input | This DTC will be recorded when the control unit sees a |
| | | | circuit | short to ground at the dash light dimmer control input. |
| | | | | Some possible causes for this are a pinched wire, water in |
| | | | | a connector, or dimmer control failure. The wiring for this |
| | | | | control runs from the control unit located behind the cup |
| | | | | holder through the IP harness to the control on the dash. |
| 149106 | CECU | Dash Light Dimmer | Short in dash dimmer output | This DTC will be recorded when the sees a short to ground |
| | | | #1 circuit | on the #1 dimmer output. Some possible causes for this |
| | | | | are a pinched wire, water in a connector, or dimmed |
| | | | | component failure. This output controls dimming to the left |
| | | | | and right spare backlighting. |
| 149206 | CECU | Dash Light Dimmer | Short in dash dimmer output | This DTC will be recorded when the sees a short to ground |
| | | | #2 circuit | on the #2 dimmer output. Some possible causes for this |
| | | | | are a pinched wire, water in a connector, or dimmed |
| | | | | component failure. This output controls dimming to much |
| | | | | of the instrument illumination and backlighting. |
| 167502 | CECU | Starter Motor Cooldown | Diesel Exhaust Fluid Level | This DTC will be recorded when the allowed cranking time |
| | | Enforce | Message Error | has been reached and the starter is disabled. This DTC will |
| | | | | go away and the starter will be re-enabled after 15 minutes. |
| 176102 | CECU | Diesel Exhaust Fluid | Diesel Exhaust Fluid Level | This DTC will be recorded when the control unit receives |
| | | | Message Error | an invalid range on the diesel exhaust fluid level message |
| | | | | from the engine ECU or does not receive the message in |
| | | | | a timely manner. |
| 2348xx | Chassis Node | Exterior Lighting - High | High Beam Output Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Beam | | there is a problem with one of the High Beam circuits. This |
| | | | | could be caused by failed bulbs, wiring harness issues, or |
| | | | | corroded connectors. |
| | | | | Left high beam output from Pin 13 of the Chassis Node |
| | | | | connector A. |
| | | | | Right high heam output from Pin 7 of the Chassis Node |
| | | | | connector Δ |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|--------|---------------|---------------------------|--------------------------|---|
| | Node | | | |
| 2350xx | Chassis Node | Exterior Lighting - Low | Low Beam Output Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Beam | | there is a problem with one of the Low Beam circuits. This |
| | | | | could be caused by failed bulbs, wiring harness issues, or |
| | | | | corroded connectors. |
| | | | | Left low beam output from Pin 1 of the Chassis Node |
| | | | | connector A. |
| | | | | Right low beam output from Pin 19 of the Chassis Node |
| | | | | connector A. |
| 2368xx | Chassis Node | Exterior Lighting - Left | Left Front Turn Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Front Turn | | there is a problem with one of the Left Front Turn circuit. |
| | | | | This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Left front turn output from Pin 4 of the Chassis Node |
| | | | | connector B. |
| 2370xx | Chassis Node | Exterior Lighting - Right | Right Front Turn Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Front Turn | | there is a problem with one of the Right Front Turn circuit. |
| | | | | This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Right front turn output from Pin 7 of the Chassis Node |
| | | | | connector B. |
| 2372xx | Chassis Node | Exterior Lighting - | Tractor/Truck Left Rear | This set of DTCs (xx = anything) will be recorded when |
| | | Tractor/Truck Left Rear | Turn/Stop Fault | there is a problem with one of the Left Rear Turn/Stop |
| | | Turn/Stop | | circuit. This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Tractor/Truck left rear turn/stop output from Pin 13 of the |
| | | | | Chassis Node connector B. |
| 2374xx | Chassis Node | Exterior Lighting - | Tractor/Truck Right Rear | This set of DTCs (xx = anything) will be recorded when |
| | | Tractor/Truck Right | Turn/Stop Fault | there is a problem with one of the Right Rear Turn/Stop |
| | | Rear Turn/Stop | | circuit. This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Tractor/Truck right rear turn/stop output from Pin 2 of the |
| | | | | Chassis Node connector B. |
| 2378xx | Chassis Node | Exterior Lighting - | Marker Lamp Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Marker Lamp | | there is a problem with one of the Marker Lamp circuit. This |
| | | | | could be caused by failed bulbs, wiring harness issues, or |
| | | | | corroded connectors. |
| | | | | Marker lamp relay control output from Pin 10 of the Chassis |
| | | | | Node connector A. |
| 2382xx | CECU | Exterior Lighting - | Clearance Lamp Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Clearance Lamp | | there is a problem with one of the Clearance Lamp circuit. |
| | | | | This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| 2388xx | Chassis Node | Exterior Lighting - Fog | Fog Lamp Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Lamp | | there is a problem with one of the Fog Lamp circuit. This |
| | | | | could be caused by failed bulbs, wiring harness issues, or |
| | | | | corroded connectors. |
| | | | | Fog lamps output from Pin 15 of the Chassis Node |
| | | | | connector B |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|--------|---------------|---------------------------|------------------------------|---|
| | Node | | | |
| 2390xx | Chassis Node | Exterior Lighting - | Secondary Fog Lamp Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Secondary Fog Lamp | | there is a problem with one of the Secondary Fog Lamp |
| | | | | circuit. This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Secondary fog lamp relay control output from Pin 18 of the |
| | | | | Chassis Node connector C. |
| 2396xx | Chassis Node | Exterior Lighting - Left | Left Turn Trailer Lamp Fault | This set of DTCs (xx = anything) will be recorded when |
| | | Turn Trailer Lamp | | there is a problem with one of the Left Turn Trailer Lamp |
| | | | | circuit. This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Left turn trailer output from Pin 16 of the Chassis Node |
| | | | | connector B. |
| 2398xx | Chassis Node | Exterior Lighting - Right | Right Turn Trailer Lamp | This set of DTCs (xx = anything) will be recorded when |
| | | Turn Trailer Lamp | Fault | there is a problem with one of the Right Turn Trailer Lamp |
| | | | | circuit. This could be caused by failed bulbs, wiring harness |
| | | | | issues, or corroded connectors. |
| | | | | Right turn trailer output from Pin 20 of the Chassis Node |
| | | | | connector C. |
| 257903 | CECU | Battery Current | Open in ammeter sensor | This DTC will be recorded when the control unit sees an |
| | | | circuit | open at the ammeter sensor input. Some possible causes |
| | | | | for this are a broken wire, corroded or disconnected |
| | | | | connector, or sensor failure. The wiring for this sensor runs |
| | | | | from the control unit located behind the cup holder through |
| | | | | the IP harness, engine harness and ammeter extension |
| | | | | harness to the sensor on the jumper from main cab breaker |
| | | | | to the batteries. |
| 257904 | CECU | Battery Current | Short in ammeter sensor | This DTC will be recorded when the control unit sees |
| | | | circuit | a short at the ammeter sensor input. Some possible |
| | | | | causes for this are pinched wire, water in a connector, or |
| | | | | sensor failure. The wiring for this sensor runs from the |
| | | | | control unit located behind the cup holder through the IP |
| | | | | harness, engine harness and ammeter extension harness |
| | | | | to the sensor on the jumper from main cab breaker to the |
| | | | | batteries. |
| 286307 | CECU | Wiper Switch | Wiper Switch Out of Range | This DTC will be recorded when the wiper switch is not |
| | | | | providing a valid value (outside the ranges defined). This |
| | | | | could be caused by a fault in the turn stalk or a wiring |
| | | | | harness issue. |
| | | | | For trucks equipped with a Turn Stalk Module (TSM), |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues. |
| 286612 | CECU | Washer Switch | Washer Active for over 15s | This DTC will be recorded when the washer request has |
| | | | | been active for over 15s. |
| | | | | For trucks equipped with a Turn Stalk Module (TSM). |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues |

| DTC | CECU3/Chassis | Item / System | Description | Detailed Description |
|--------|---------------|----------------------|-------------------------------|---|
| | Node | | | |
| 287204 | CECU | Flash to Pass Switch | Short in Flash to Pass Switch | This DTC will be recorded when the control unit sees the |
| | | | | flash to pass switch TRUE for over 10 seconds. |
| | | | | For trucks equipped with a Turn Stalk Module (TSM), |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues. |
| 287304 | CECU | Marker Lamp Flash | Short in Marker Lamp Flash | This DTC will be recorded when the control unit sees the |
| | | Switch | Switch | marker lamp flash switch TRUE for over 10 seconds. |
| | | | | For trucks equipped with a Turn Stalk Module (TSM), |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues. |
| 287404 | CECU | High Beam Toggle | Short in High Beam Toggle | This DTC will be recorded when the control unit sees the |
| | | Switch | Switch | high beam toggle switch TRUE for over 10 seconds. |
| | | | | For trucks equipped with a Turn Stalk Module (TSM), |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues. |
| 287604 | CECU | Turn Signal Switch | Short in Turn Signal Switch | This DTC will be recorded when the control unit sees the |
| | | | | turn stalk input of a short circuit value (< 253Ω). |
| | | | | For trucks equipped with a Turn Stalk Module (TSM), |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues. |
| 287607 | CECU | Turn Signal Switch | Out of Range - Turn Signal | This DTC will be recorded when the control unit sees the |
| | | | Switch | turn stalk input in an invalid range (253 Ω < Input < 270 Ω |
| | | | | OR 580Ω < Input < 685Ω). |
| | | | | For trucks equipped with a Turn Stalk Module (TSM), |
| | | | | refer to the Turn Signal Stalk/Turn Stalk Module Electrical |
| | | | | Service Manual (KM815060) for TSM description and |
| | | | | troubleshooting of any suspect TSM related issues. |
| 524502 | CECU | Diesel Exhaust Fluid | Diesel Exhaust Fluid Telltale | This DTC will be recorded when the control unit receives an |
| | | | Message Error | invalid range on the diesel exhaust fluid telltale message |
| | | | | from the engine ECU or does not receive the message in |
| | | | | a timely manner. |
| 524602 | CECU | Diesel Exhaust Fluid | Diesel Exhaust Fluid | This DTC will be recorded when the control unit sees |
| | | | Inducement Severity Error | a invalid value from the J1939 network for Operator |
| | | | 1 | Inducement Severity. |

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TROUBLESHOOTING PROCEDURES

Introduction

This section provides troubleshooting procedures for Diagnostic Trouble Codes (DTCs) and symptoms that result when faults occur in the multiplexed electrical system.

The following procedures have been developed to assist the technician in diagnosing multiplexed problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.

DTC148109, DTC148209, DTC148309 and DTC176102 V-CAN (J1939)

Symptom: One or more of the following gauges inoperative. All other non-V-CAN gauges are operational.

- Engine Oil Pressure Gauge
- Engine Oil Temperature Gauge
- Engine Coolant Temperature Gauge

Tachometer

li

- Speedometer
- Diesel Exhaust Fluid Gauge

V-CAN Databus gauges receive their data from the J1939 data link via the engine ECU, which receives its data from various sensors on the engine and transmission.

| NOT | E |
|-----|---|
| | |

In case of a PX-6 engine, the calculated value (instead of measured value) is broadcast by the engine



| Step | Check | Result | Next Step | |
|------|---------------------------|-----------------------------------|--|--|
| 1 | Turn ignition key ON. | | Go to Step 2. | |
| | Start ESA, then select | | | |
| | "Connect" to establish | | | |
| | communication to the | | | |
| | vehicle. | | | |
| 2 | Select "Monitor". From | Gauge graphic(s) on screen | Go to Step 3. | |
| | the "Components" | display reasonable readings | | |
| | window, select all of | Gauge graphic(s) on screen do not | Go to Step 4. | |
| | the failed functions then | display reasonable readings | | |
| | select "Open". | | | |
| 3 | Select "Simulate". | Vehicle gauge(s) do not move. Go | Perform the following checks: | |
| | Drag the "Value" bar | to Step 3-1. | | |
| | until the pointers on | Vehicle gauge reading(s) are in | | |
| | the gauge images | the same range as the ESA gauge | Use the "Program" feature in ESA to make sure that | |
| | are approximately | image(s). Go to Step 3-7. | the parameter for the inoperative gauge is enabled. | |
| | mid-scale. Observe | | An inoperative gauge may simply have its CECU | |
| | vehicle gauge | | parameter set to disabled. | |
| | movement. | | 1. Check CVSG data link wiring: Observe Gauge position in the wiring | |
| | | | daisy chain. | |
| | | | a If gauge is mounted between two other functioning gauges CVSG | |
| | | | data link wiring is OK. Go to Sten 3-5 | |
| | | | b. If gauge is last gauge is deiny shein or followed by other | |
| | | | non-functional gauges, go to Step 3-2. | |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 | |
| | | | of the 52 Pin CECU connector C. | |
| | | | Check continuity between Pin 3 on gauge harness connector and Pin 15 of the 52 Pin CECU connector C. | |
| | | | 4 Repair daisy chain jumper harness as necessary | |
| | | | Once continuity on both wires exists, perform "Simulate" test again. | |
| | | | a If gauge functions properly during "Simulate" test repair is complete | |
| | | | Return truck to service | |
| | | | h If gourge doop not function during "Simulate" toot install Toot CECU | |
| | | | and perform "Simulate" test again. | |
| | | | i. If gauge functions properly test is complete. Install new CECU | |
| | | | permanently. Re-test and return truck to service. | |
| | | | ii If gauge does not function properly during "Simulate" test | |
| | | | replace gauge. | |
| | | | 6. Once gauge is replaced | |
| | | | a. Verify gauge functionality. | |
| | | | b. Return truck to service. | |
| | | | 7. Is this a recheck after Step 4? | |
| | | | a. Yes. Return truck to service | |
| | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to | |
| | | | Step 4. | |

| Step | Check | Result | Next Step | |
|------|--------------------------|-------------------------------|---|--|
| 4 | Select "Diagnose" to | DTC 148309 displayed – CECU | Indicates the problem could be an open or short in the wiring from the CECU | |
| | view "Active" diagnostic | cannot read messages from | to the Engine ECU. In addition, J1939 components such as Terminating | |
| | trouble codes. | Engine on V-CAN. | Resistors may be missing or damaged. Data from the Engine ECU may be | |
| | | | missing or corrupting the J1939 data stream. Go to J1939 Lite Diagnostic | |
| | | | Procedure. Correct faults found in J1939 Diagnostics section and return to | |
| | | | Step 2 above. | |
| | | DTC 148109 displayed – CECU | Indicates the problem could be an open or short in the wiring from the CECU to | |
| | | cannot read messages from ABS | the ABS ECU. In addition, J1939 components such as Terminating Resistors | |
| | | on V-CAN. | may be missing or damaged. Data from the ABS ECU may be missing or | |
| | | | corrupting the J1939 data stream. Go to J1939 Lite Diagnostic Procedure. | |
| | | | Correct faults found in J1939 Diagnostics section and return to Step 2 above. | |
| | | DTC 148209 displayed – CECU | Indicates the problem could be an open or short in the wiring from the CECU | |
| | | cannot read messages from | to the Transmission ECU. In addition, J1939 components such as Terminating | |
| | | Transmission on V-CAN. | Resistors may be missing or damaged. Data from the Transmission ECU may | |
| | | | be missing or corrupting the J1939 data stream. Go to J1939 Lite Diagnostic | |
| | | | Procedure. Correct faults found in J 1939 Diagnostics section and return to | |
| | | "Inactive" DTCs or No DTCs | Step 2 above. | |
| | | displayed | Indicates the problem could be caused by foulty data from Engine ECU | |
| | | | 1. Indicates the problem could be caused by faulty data from Engine ECO. | |
| | | | a. Connect Engine OE Diagnostic Tool to determine if engine is | |
| | | | transmitting engine data when the engine is running. | |
| | | | i. If data from the Engine ECU is not displayed in the OE | |
| | | | Diagnostic Tool check for: | |
| | | | (1) Missing signal from engine mounted sensor or Vehicle | |
| | | | Speed sensor. | |
| | | | (a) Faulty sensor | |
| | | | (b) Faulty engine sensor wiring supplied by Engine OE | |
| | | | (c) Faulty vehicle speed sensor wining on chassis of engine | |
| | | | (2) Missing signal from Engine ECU | |
| | | | (2) Missing signal from Engine ECU. | |
| | | | (a) Faulty Engine ECU software | |
| | | | (b) i auty Engine ECO software | |
| | | | II. If data from the Engine ECU is displayed on the OE Diagnostic | |
| | | | 1001: Check to insure Engine data has been transmitted over | |
| | | | Diagnostical Correct found in 14020 Diagnostics costion | |
| | | | and rature to Stop 2 OP | |
| | | | Connect test Engine ECLI to determine if original ECLI has | |
| | | | failed Go to Stop 2 | |
| | | | 2 Indicates the problem sould be intermittent in patient. Dressed with | |
| | | | Indicates the problem could be intermittent in nature. Proceed with diagnosis of inactive codes while leaking for loose connectors, terminale | |
| | | | or bare wiring that might make accessional contact with motel parts or | |
| | | | or bare writing that might make occasional contact with metal parts or other wires. Technicians may need to manipulate connectors to find | |
| | | | intermittent connections. Co to 11030 Diagnostics. Correct faulte found | |
| | | | in J1939 Diagnostics section and return to Step 2 above. | |

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Primary Air Pressure Gauge Inoperative

DTC11703 and DTC11704

Symptom: Primary air pressure gauge inoperative. All other gauges are operational.

The Primary Air Pressure Gauge uses an electronic transducer (sensor) which monitors system air pressure and converts it into a voltage

output that is sent to the instrumentation system. The output voltage of the sensor is proportional to the pressure it is sensing.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step | |
|------|---------------------------|----------------------------------|---|------------------|
| 1 | Turn ignition key ON. | | Go to Step 2. | |
| | Start ESA, then select | | | |
| | "Connect" to establish | | | |
| | communication to the | | | |
| | vehicle. | | | |
| 2 | Select "Monitor". From | Gauge graphic on screen displays | Go to Step 3. | |
| | the "Components" | reasonable reading. | | |
| | window, select "Primary | Gauge graphic on screen does not | Go to Step 4. | |
| | Air Pressure", then | display reasonable reading. | | |
| | select "Open." | | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: | |
| | the "Value" bar until the | to Step 3-1. | NOTE | |
| | pointer on the gauge | | | $ \rightarrow $ |
| | image is approximately | | Use the "Program" feature in ESA to make sure that | t |
| | mid-scale. Observe | | the parameter for the inoperative gauge is enabled. | • |
| | vehicle gauge | | An inoperative gauge may simply have its CECU | וו |
| | movement. | | parameter set to disabled. | |
| | | Vehicle gauge reading is in the | 1. Check CVSG data link wiring: Observe Gauge position in the wiring | |
| | | same range as the ESA gauge | daisy chain. | |
| | | image. Go to Step 3-7. | a. If gauge is mounted between two other functioning gauges CVSC | Э |
| | | | data link wiring is OK. Go to Step 3-5 | |
| | | | b. If gauge is last gauge in daisy chain or followed by other | |
| | | | non-functional gauges, go to Step 3-2. | |
| | | | 2 Check continuity between Din 1 on gauge harness connector and Din : | 14 |
| | | | of the 52 Pin CECU connector C. | 14 |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin | 15 |
| | | | of the 52 Pin CECU connector C. | |
| | | | 4. Repair daisy chain jumper harness as necessary. | |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. | |
| | | | a. If gauge functions properly during "Simulate" test, repair is comple Return truck to service. | ete. |
| | | | b If gauge does not function during "Simulate" test install a known | |
| | | | good gauge and perform "Simulate" test again. | |
| | | | If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. | ge |
| | | | ii. If gauge does not function during "Simulate" test, install Test | t |
| | | | CECU and perform "Simulate" test again. | |
| | | | (1) If gauge functions properly test is complete. Install new | |
| | | | CECU permanently. Re-test and return truck to service. | |
| | | | (2) If gauge does not function properly during "Simulate" tes | st. |
| | | | replace gauge. | , |
| | | | 6. Once gauge is replaced | |
| | | | a Verify gauge functionality | |
| | | | vering gauge rundering. Betwee truck to complete | |
| | | | | |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? | |
| | | | a. Yes. Return truck to service. | |
| | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to | |
| | | | Step 4. | |

| Step | Check | Result | Next Step | |
|------|--------------------------|------------------------------------|---|--|
| 4 | Select "Diagnose" to | No "Active" DTCs displayed. | Indicates the problem could be a defective sensor, poor ground or no input or | |
| | view "Active" primary | | output voltage at sensor. Go to Step 5. | |
| | air pressure gauge | DTC 11703 displayed – Open in | This DTC will be recorded when the control unit sees an open or short to | |
| | diagnostic trouble | primary air pressure circuit. | ground at the primary air pressure sensor input. The fault is recorded when | |
| | codes. | | the voltage at the input is below .1 volts. | |
| | | DTC 11704 displayed – Short in | This DTC will be recorded when the control unit sees a short to +5V at the | |
| | | primary air pressure circuit. | primary air pressure sensor input. The fault is recorded when the voltage at | |
| | | | the input is above 4.9 volts. | |
| 5 | Using a digital | (Sensor Ground) - There should | 1. Check for continuity between sensor connector Pin A and ground | |
| | multimeter, check the | be continuity between the sensor | terminal. | |
| | ground, input and output | connector ground (Pin A) and | a. If there is continuity between Pin A and the ground terminal, test is | |
| | voltages at the sensor | a cab ground terminal. See | complete. Go to Step 5-2. | |
| | connector. | MultiMeter Graphic below. | b If there is no continuity between Pin A and the ground terminal: | |
| | Pin A – Ground | (Sensor Input Voltage) - Input | i. Check for continuity between concert connector Din A and Din 2 | |
| | Pin B – Input Voltage | voltage from CECU to sensor | I. Check for continuity between sensor connector PITA and PIT2 | |
| | Pin C – Output Voltage | connector (Pin B) should be +5 | | |
| | See CECU Pinout | volts. See MultiMeter Graphic | II. Check for continuity between Pin 5 of the 9 Pin CECU | |
| | for terminal details of | below. | connector A and a cab ground terminal. | |
| | the CECU electrical | (Sensor Output Voltage) - Signal | iii. Repair wiring as necessary. Go to Step 2. | |
| | connections. | output voltage at sensor connector | 2. Check input voltage at sensor connector Pin B. | |
| | | (Pin C) will vary depending on air | a. If there is voltage at Pin B, Go to Step 5-3 . | |
| | | pressure, but should be more than | b. If there is no voltage at Pin B, check for voltage on Pin 1 of the 52 | |
| | | .1 volts and less than 4.9 volts. | Pin CECU connector C. | |
| | | See Multimeter Graphic and Table | i. If there is voltage on Pin 1, check continuity between Pin 1 | |
| | | | at CECU and Pin B at sensor connector. Repair wiring as | |
| | | | necessary. Go to Step 2 . | |
| | | Do not unplug sensor | ii. If there is no voltage on Pin 1 at CECU, replace CECU. Go | |
| | | connector or penetrate | to Step 2. | |
| | | the wire insulation | 3. Check signal output voltage at sensor connector Pin C. | |
| | | to perform a sensor | a. If there is no voltage at Pin C, replace sensor. Go to Step 2. | |
| | | Slide connector seal | b. If there is voltage at Pin C, Go to Step 6 . | |
| | | back to expose | 3 1 | |
| | | terminal ends | | |
| | | test leads with needle | | |
| | | point tips to probe | V | |
| | | connector terminals. | | |
| | | | | |
| | | (PSI) (VDC) | | |
| | | 150 4 75 | | |
| | | 75 2.50 | | |
| | | 60 2.05 | | |
| | | 30 1 15 | | |
| | | 0 0.25 | V ¥ | |

| Step | Check | Result | Next | Step |
|------|--|--|--|---|
| | | i NOTE Make sure that the system you are testing has some pressure to measure. | Connector Seal Pin A Pin B Place MultiMeter Probe On Pin C | |
| 6 | Select "Diagnose" to view primary air pressure gauge DTCs. Next, unplug the primary air pressure sensor connector at sensor. See CECU Pinout for terminal details of the CECU electrical connections. | DTC 11703 – Open in primary air pressure circuit is displayed as "Active." | Check resistance between Pin C a If there is less than 5K ohms b Check wiring for short free repair and go to Step 2. Remove the 52 Pin CECL between Pin 6 of the 52 terminal. If less than 5K b. If there is more than 20K ohm Check wiring for open free repair and go to Step 2. Remove the "C" connect resistance between Pin 6 Remove the "C" connect resistance between Pin 6 If resistance between Pin 6 If and go to Step 2. | nd ground terminal. retween Pin C and the ground terminal, com sensor to CECU. If short found, U connector C and measure resistance Pin CECU connector C and ground ohms replace CECU and go to Step 2 . Is between Pin C and ground terminal, com sensor to CECU. If open found, tor from the CECU and measure 6 of the 52 Pin CECU connector C more than 20K ohms, replace CECU |
| 7 | Select "Diagnose" to view primary air pressure gauge DTCs. Next, unplug the primary air pressure sensor connector at sensor. See CECU Pinout for terminal details of the CECU electrical connections. | DTC 11704 - Short in primary air pressure circuit is displayed as "Active". | 1. If the fault is still "Active" after unpl have confirmed there is a short. There is a short between the sense typical power wires to inspect are I any power source in the main cab Description Power Supply Sensor +5V Dash Illumination 1 CVSG Power Each power supply ends at the following Description CVSG gauge power CVSG lighting Primary air pressure transducer Secondary air pressure transducer Application air pressure transducer Air filter restriction For future expansion Through the Engine Harness Connector For the Ammeter sensor Check for pinched or chaffed sensor an wiring as necessary.Go to Step 2. | lugging the sensor connector, you his sensor wire starts at pin 6 of the is at pin C on the sensor connector. or wire and a power source wire. Some isted below (you may need to verify harness): CECU Pin Connector C, Pin 1 Connector A, Pin 7 Connector A, Pin 7 Connector A, Pin 1 g connectors: Pin 4 2 B B B B C C A 28 A d power wiring. Repair or replace |
| | | DTC 11704 - Short in primary air pressure circuit is now displayed as "Inactive." | If DTC 11704 changes to "Inactive" after have confirmed the problem is a short to 1. Replace sensor. Go to Step 2 . | unplugging the sensor connector, you +5V in the sensor itself, not the wiring. |

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Secondary Air Pressure Gauge Inoperative

DTC11803 and DTC11804

Symptom: Secondary air pressure gauge inoperative. All other gauges are operational.

The Secondary Air Pressure Gauge uses an electronic transducer (sensor) which monitors system air pressure and converts it into a voltage

output that is sent to the instrumentation system. The output voltage of the sensor is proportional to the pressure it is sensing.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Secondary Air | display reasonable reading. | |
| | Pressure," then select | | |
| | "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | NOTE |
| | pointer on the gauge | | |
| | image is approximately | | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | Vehicle gauge reading is in the | 1. Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | same range as the ESA gauge | daisy chain. |
| | | image. Go to Step 3-7. | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5. |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2. |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 of the 52 Pin CECL connector C |
| | | | Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known good gauge and perform "Simulate" test again. |
| | | | i. If gauge functions properly test is complete. Install new gauge |
| | | | ii If gauge does not function during "Simulate" test install Test |
| | | | CECU and perform "Simulate" test again. |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test, replace gauge. |
| | | | 6. Once gauge is replaced |
| | | | a. Verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a Yes Return truck to service |
| | | | |

| Step | Check | Result | Next Step | |
|------|--------------------------|------------------------------------|---|--|
| | | | No, Gauge and CVSG data link wiring is not the problem. Go to Step 4. | |
| 4 | Select "Diagnose" to | No "Active" DTCs displayed. | Indicates the problem could be a defective sensor, poor ground or no input or | |
| | view Active Secondary | DTC 11803 displayed – Open in | This DTC will be recorded when the control unit sees an open or short to | |
| | diagnostia traubla | secondary air pressure circuit | ground at the secondary air pressure sensor input. The fault is recorded who | |
| | | | the voltage at the input is below .1 volts. | |
| | | DTC 11804 displayed – Short in | This DTC will be recorded when the control unit sees a short to +5V at the | |
| | | secondary air pressure circuit. | secondary air pressure sensor input. The fault is recorded when the voltage at | |
| | | | the input is above 4.9 volts. | |
| 5 | Using a digital | (Sensor Ground) - There should | 1. Check for continuity between sensor connector Pin A and ground | |
| | multimeter, check the | be continuity between the sensor | terminal. | |
| | ground, input and output | connector ground (Pin A) and | a. If there is continuity between Pin A and the ground terminal, test is | |
| | voltages at the sensor | a cab ground terminal. See | complete. Go to Step 5-2. | |
| | connector. | MultiMeter Graphic below. | b. If there is no continuity between Pin A and the ground terminal: | |
| | Pin A – Ground | (Sensor Input Voltage) - Input | i. Check for continuity between sensor connector Pin A and Pin 2 | |
| | Pin B – Input Voltage | connector (Pin B) should be +5 | of the 52 Pin CECU connector C. | |
| | Pin C – Output Voltage | volts See MultiMeter Graphic | ii. Check for continuity between Pin 5 of the 9 Pin CECU | |
| | See CECU Pinout | below. | connector A and a cab ground terminal. | |
| | | (Sensor Output Voltage) - Signal | iii. Repair wiring as necessary. Go to Step 2. | |
| | | output voltage at sensor connector | 2. Check input voltage at sensor connector Pin B. | |
| | | (Pin C) will vary depending on air | a. If there is voltage at Pin B. Go to Step 5-3 . | |
| | | pressure, but should be more than | b. If there is no voltage at Pin B, check for voltage on Pin 1 of the 52 | |
| | | .1 volts and less than 4.9 volts. | Pin CECU connector C. | |
| | | See MultiMeter Graphic and Table | i. If there is voltage on Pin 1, check continuity between Pin 1 | |
| | | below. | at CECU and Pin B at sensor connector. Repair wiring as | |
| | | | necessary. Go to Step 2. | |
| | | Do not unplug sensor | ii. If there is no voltage on Pin 1 at CECU, replace CECU. Go | |
| | | connector or penetrate | to Step 2. | |
| | | the wire insulation | 3. Check signal output voltage at sensor connector Pin C. | |
| | | to perform a sensor | a. If there is no voltage at Pin C, replace sensor. Go to Step 2. | |
| | | Slide connector seal | b. If there is voltage at Pin C, Go to Step 6 . | |
| | | back to expose | 3 1 | |
| | | terminal ends. Use | | |
| | | test leads with needle | | |
| | | point tips to probe | V | |
| | | connector terminals. | | |
| | | Air Pressure Output Voltage | | |
| | | (PSI) (VDC) | | |
| | | 150 4.75 | | |
| | | 75 2.50 | | |
| | | 60 2.05 | | |
| | | 30 1.15 | | |
| | | 0 0.25 | Ļ | |

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| Step | Check | Result | t Next Step | |
|------|---|---|--|---|
| | | i NOTE Make sure that the | Connector Seal Pin A Dia B | |
| | | system you are testing has some pressure to measure. | PIN B Place MultiMeter Probe On Pin C | |
| 6 | Select "Diagnose" to view secondary air pressure gauge DTCs. Next, unplug the secondary air pressure sensor connector at sensor. See CECU Pinout for terminal details of the CECU electrical connections. | DTC 11803 – Open in secondary air pressure circuit is displayed as "Active." | Check resistance between Pin C a If there is less than 5K ohms b Check wiring for short fr repair and go to Step 2. Remove the 52 Pin CEC between Pin 7 of the 52 terminal. If less than 5K If there is more than 20K ohm Check wiring for open fr repair and go to Step 2. Remove the "C" connec resistance between Pin and ground terminal. If resistance If resistance | Ind ground terminal. Detween Pin C and the ground terminal, om sensor to CECU. If short found, U connector C and measure resistance Pin CECU connector C and ground ohms replace CECU and go to Step 2 . Its between Pin C and ground terminal, om sensor to CECU. If open found, tor from the CECU and measure 7 of the 52 Pin CECU connector C more than 20K ohms, replace CECU |
| 7 | Select "Diagnose" to view secondary air pressure gauge DTCs. Next, unplug the secondary air pressure sensor connector at sensor. See CECU Pinout for terminal details of the CECU electrical connections. | DTC 11804 - Short in secondary air pressure circuit is displayed as "Active". | and go to Step 2 . 1. If the fault is still "Active" after unp have confirmed there is a short. There is a short between the sense typical power wires to inspect are any power source in the main cab Description Power Supply Sensor +5V Dash Illumination 1 CVSG Power Each power supply ends at the following Description CVSG gauge power CVSG lighting Primary air pressure transducer Secondary air pressure transducer Air filter restriction For future expansion Through the Engine Harness Connector For the Ammeter sensor Check for pinched or chaffed sensor any wiring as necessary Go to Step 2 | lugging the sensor connector, you his sensor wire starts at pin 7 of the ds at pin C on the sensor connector. or wire and a power source wire. Some listed below (you may need to verify harness): <u>CECU Pin</u> <u>Connector C, Pin 1</u> <u>Connector A, Pin 7</u> <u>Connector A, Pin 1</u> g connectors: <u>Pin</u> <u>4</u> <u>2</u> <u>B</u> <u>B</u> <u>B</u> <u>C</u> <u>A</u> <u>2</u> <u>A</u> <u>A</u> d power wiring. Repair or replace |
| | | DTC 11804 - Short in secondary air pressure circuit is now displayed as "Inactive." | If DTC 11804 changes to "Inactive" after have confirmed the problem is a short to 1. Replace sensor. Go to Step 2 . | r unplugging the sensor connector, you +5V in the sensor itself, not the wiring. |

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Application Air Pressure Gauge Inoperative

DTC11603 and DTC11604

Symptom: Application air pressure gauge inoperative. All other gauges are operational.

The Application Air Pressure Gauge uses an electronic transducer (sensor) which monitors system air pressure and converts it into a voltage

output that is sent to the instrumentation system. The output voltage of the sensor is proportional to the pressure it is sensing.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|--|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Application Air | display reasonable reading. | |
| | Pressure", then select | | |
| | "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | | |
| | image is approximately | | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | Vehicle gauge reading is in the | 1. Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | same range as the ESA gauge | daisy chain. |
| | | image. Go to Step 3-7 . | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5 . |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2 . |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | i. If gauge functions properly test is complete. Install new gauge |
| | | | ii If gauge does not function during "Simulate" test install Test |
| | | | CECU and perform "Simulate" test again. |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test, replace gauge. |
| | | | 6. Once gauge is replaced |
| | | | a. Verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a. Yes. Return truck to service. |
| | | 1 | 1 |

| Step | Check | Result | Next Step | |
|------|--|------------------------------------|---|--|
| | | | No, Gauge and CVSG data link wiring is not the problem. Go to Step 4. | |
| 4 | Select "Diagnose" to view "Active" Application | No "Active" DTCs displayed. | Indicates the problem could be a defective sensor, poor ground or no input or output voltage at sensor. Go to Step 5 . | |
| | air pressure gauge | DTC 11603 displayed – Open in | This DTC will be recorded when the control unit sees an open or short to | |
| | diagnostic trouble | application air pressure circuit. | ground at the secondary air pressure sensor input. The fault is recorded wh | |
| | codes. | | the voltage at the input is below .1 volts. | |
| | | DTC 11604 displayed – Short in | This DTC will be recorded when the control unit sees a short to +5V at the | |
| | | application air pressure circuit. | secondary air pressure sensor input. The fault is recorded when the voltage at | |
| | | | the input is above 4.9 volts. | |
| 5 | Using a digital | (Sensor Ground) - There should | 1. Check for continuity between sensor connector Pin A and ground | |
| | multimeter, check the | be continuity between the sensor | terminal. | |
| | ground, input and output | connector ground (Pin A) and | a If there is continuity between $Pin A$ and the around terminal test is | |
| | voltages at the sensor | a cab ground terminal. See | complete Go to Step 5-2 | |
| | connector. | MultiMeter Graphic below. | b If there is no continuity between Din A and the ground terminal: | |
| | Pin A – Ground | (Sensor Input Voltage) - Input | b. In there is no continuity between Fin A and the ground terminal. | |
| | Pin B – Input Voltage | voltage from CECU to sensor | Check for continuity between sensor connector Pin A and Pin 2 of the 52 Pin CECU connector C | |
| | Pin C – Output Voltage | connector (Pin B) should be +5 | ii Chack for continuity between Din 5 of the 0 Din CECU | |
| | See CECU Pinout | volts. See MultiMeter Graphic | II. Check for continuity between Pin 5 of the 9 Pin CECO | |
| | for terminal details of | below. | | |
| | the CECU electrical | (Sensor Output Voltage) - Signal | III. Repair wiring as necessary. Go to Step 2. | |
| | connections. | Output voltage at sensor connector | 2. Check input voltage at sensor connector Pin B. | |
| | | air pressure, but should be more | a. If there is voltage at Pin B, Go to Step 5-3 . | |
| | | than 0 volts and less than 5 volts | b. If there is no voltage at Pin B, check for voltage on Pin 1 of the 52 | |
| | | See MultiMeter Graphic and Table | Pin CECU connector C. | |
| | | below | i. If there is voltage on Pin 1, check continuity between Pin 1 | |
| | | | at CECU and Pin B at sensor connector. Repair wiring as | |
| | | | necessary. Go to Step 2. | |
| | | Do not unplug sensor | ii. If there is no voltage on Pin 1 at CECU, replace CECU. Go | |
| | | connector or penetrate | to Step 2. | |
| | | to porform a consor | 3. Check signal output voltage at sensor connector Pin C. | |
| | | output voltage check | a. If there is no voltage at Pin C, replace sensor. Go to Step 2. | |
| | | Slide connector seal | b. If there is voltage at Pin C, Go to Step 6. | |
| | | back to expose | 3 1 | |
| | | terminal ends. Use | | |
| | | test leads with needle | | |
| | | point tips to probe | | |
| | | connector terminals. | | |
| | | Air Pressure Output Voltage | | |
| | | (PSI) (VDC) | | |
| | | 150 4.75 | | |
| | | 75 2.50 | | |
| | | 60 2.05 | | |
| | | 30 1.15 | | |
| | | 0 0.25 | Ļ | |

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| Step | Check | Result | Next | Step |
|------|---|---|--|---|
| | | i NOT Make sure that the system you are testing has some pressure to measure. | Connector Seal Pin A Pin B Place MultiMeter Probe On Pin C | |
| 6 | Select "Diagnose" to view application air pressure gauge DTCs. Next, unplug the application air pressure sensor connector at sensor. See CECU Pinout for terminal details of the CECU electrical connections. | DTC 11603 – Open in application air pressure circuit is displayed as "Active." | Check resistance between Pin C a If there is less than 5K ohms b Check wiring for short fr repair and go to Step 2. Remove the "C" connec resistance between Pin and ground terminal. If I go to Step 2. If there is more than 20K ohm Check wiring for open fr repair and go to Step 2. Remove the "C" connec resistance between Pin and ground terminal. If I go to Step 2. | Ind ground terminal. Detween Pin C and the ground terminal, om sensor to CECU. If short found, tor from the CECU and measure 8 of the 52 Pin CECU connector C less than 5K ohms replace CECU and Its between Pin C and ground terminal, om sensor to CECU. If open found, tor from the CECU and measure 8 of the 52 Pin CECU connector C more than 20K ohms, replace CECU |
| 7 | Select "Diagnose" to view application air pressure gauge DTCs. Next, unplug the application air pressure sensor connector at sensor. See CECU Pinout for terminal details of the CECU electrical connections. | DTC 11604 - Short in application air pressure circuit is displayed as "Active". | If the fault is still "Active" after unp have confirmed there is a short. T 52 Pin CECU connector C and end There is a short between the sense typical power wires to inspect are any power source in the main cab Description Power Supply Sensor +5V Dash Illumination 1 CVSG Power Each power supply ends at the followin Description CVSG gauge power CVSG lighting Primary air pressure transducer Secondary air pressure transducer Application air pressure transducer Application air pressure transducer For future expansion Through the Engine Harness Connector For the Ammeter sensor Check for pinched or chaffed sensor ar | lugging the sensor connector, you his sensor wire starts at pin 8 of the ds at pin C on the sensor connector. or wire and a power source wire. Some listed below (you may need to verify harness): <u>CECU Pin</u> <u>Connector C, Pin 1</u> <u>Connector A, Pin 7</u> <u>Connector A, Pin 1</u> <u>g connectors:</u> <u>Pin</u> <u>4</u> <u>2</u> <u>B</u> <u>B</u> <u>B</u> <u>B</u> <u>C</u> <u>A</u> <u>28</u> <u>A</u> d power wiring. Repair or replace |
| | | DTC 11604 - Short in application air pressure circuit is now displayed as "Inactive." | If DTC 11604 changes to "Inactive" after have confirmed the problem is a short to 1. Replace sensor. Go to Step 2 . | r unplugging the sensor connector, you +5V in the sensor itself, not the wiring. |

Air Filter Restriction Pressure Gauge Inoperative

DTC10703 and DTC10704

Symptom: Air filter restriction gauge inoperative. All other gauges are operational.

The Air Filter Restriction Gauge uses an electronic transducer (sensor) to monitor vacuum pressure and converts it into a voltage output that is sent to

the instrumentation system. The output voltage of the sensor is proportional to the vacuum it is sensing.



| Step | Check | Result | | Next Step |
|------|----------------------------|----------------------------------|-----|---|
| 1 | Turn ignition key ON. | | Go | to Step 2. |
| | Start ESA, then select | | | |
| | "Connect" to establish | | | |
| | communication to the | | | |
| | vehicle. | | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go | to Step 3. |
| | the "Components" | reasonable reading. | | |
| | window, select "Air Filter | Gauge graphic on screen does not | Go | to Step 4. |
| | RestrictionPressure." | display reasonable reading. | | |
| | then select "Open." | | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Per | form the following checks: |
| | the "Value" bar until the | to Step 3-1. | | |
| | pointer on the gauge | | | NOTE |
| | image is approximately | | U | se the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | | th | e parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | A | n inoperative gauge may simply have its CECU |
| | movement. | | pa | arameter set to disabled. |
| | | Vehicle gauge reading is in the | 1. | Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | same range as the ESA gauge | | daisv chain. |
| | | image. Go to Step 3-7. | | a If gauge is mounted between two other functioning gauges CVSC |
| | | | | data link wiring is OK. Go to Sten 3-5 |
| | | | | b If some is lost some in deiny shein on fellowed by other |
| | | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | | non-runctional gauges, go to Step 3-2. |
| | | | 2. | Check continuity between Pin 1 on gauge harness connector and Pin 14 of the 52 Pin CECU connector C. |
| | | | 3. | Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | | of the 52 Pin CECU connector C. |
| | | | 4. | Repair daisy chain jumper harness as necessary. |
| | | | 5. | Once continuity on both wires exists, perform "Simulate" test again. |
| | | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | | Return truck to service. |
| | | | | b. If gauge does not function during "Simulate" test, install a known good gauge and perform "Simulate" test again. |
| | | | | |
| | | | | permanently. Re-test and return truck to service. |
| | | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | | CECU and perform "Simulate" test again. |
| | | | | (1) If gauge functions properly test is complete. Install new |
| | | | | CECU permanently. Re-test and return truck to service. |
| | | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | | replace gauge. |
| | | | 6. | Once gauge is replaced |
| | | | | a. Verify gauge functionality. |
| | | | | b. Return truck to service. |
| | | | 7. | Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | | a. Yes. Return truck to service. |
| | | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to |
| | | | | Step 4. |

| Step | Check | Result | Next Step |
|------|--------------------------|------------------------------------|--|
| 4 | Select "Diagnose" to | No "Active" DTCs displayed. | Indicates the problem could be a defective sensor, poor ground or no input or |
| | view "Active" air filter | | output voltage at sensor. Go to Step 5. |
| | restriction gauge | DTC 10703 displayed – Open in | This DTC will be recorded when the control unit sees an open or short to |
| | diagnostic trouble | air filter restriction circuit. | ground at the secondary air pressure sensor input. The fault is recorded when |
| | codes. | | the voltage at the input is below .1 volts. |
| | | DTC 10704 displayed – Short in | This DTC will be recorded when the control unit sees a short to +5V at the |
| | | air filter restriction circuit. | secondary air pressure sensor input. The fault is recorded when the voltage at |
| | | | the input is above 4.9 volts. |
| 5 | Llsing a digital | (Sensor Ground) - There should | 1 Check for continuity between sensor connector Pin A and ground |
| 5 | multimeter check the | be continuity between the sensor | terminal |
| | around input and output | connector ground (Pin A) and the | |
| | | firewall ground stud | a. If there is continuity between Pin A and the ground terminal, test is |
| | | | complete. Go to Step 5-2. |
| | connector. | (Sensor Input Voltage) - Input | b. If there is no continuity between Pin A and the ground terminal: |
| | Pin A – Ground | voltage from CECU to sensor | i. Check for continuity between sensor connector Pin A and Pin 2 |
| | Pin B – Output Voltage | connector (Pin C) should be +5 | of the 52 Pin CECU connector C. |
| | Pin C – Input Voltage | volts. See Table below. | ii. Check for continuity between Pin 5 of the 9 Pin CECU |
| | See CECU Pinout | (Sensor Output Voltage) - Signal | connector A and a cab ground terminal. |
| | for terminal details of | output voltage at sensor connector | iii Bonair wiring as necessary. Go to Ston 2 |
| | the CECU electrical | (Pin B) will vary depending on | in. Repair winnig as necessary. Go to Step 2. |
| | connections. | strength of vacuum, but should be | 2. Check input voltage at sensor connector Pin C. |
| | | more than .1 volts and less than | a. If there is voltage at Pin C, Go to Step 5-3 . |
| | | 4.9 volts. See Table below. | b. If there is no voltage at Pin C, check for voltage on Pin 1 of the 52 |
| | | I NOTE | Pin CECU connector C. |
| | | | i. If there is voltage on Pin 1, check continuity between Pin 1 |
| | | connector or penetrate | at CECU and Pin C at sensor connector. Repair wiring as |
| | | the wire insulation | necessary. Go to Step 2. |
| | | to porform a sonsor | ii If there is no voltage on Pin 1 at CECU replace CECU Go |
| | | output voltage shock | to Step 2 |
| | | Slide connector cool | 2. Charle simple stant stant at some som som stan Die D |
| | | Silde connector sear | 5. Check signal output voltage at sensor connector Fill B. |
| | | terminal onde | a. If there is no voltage at Pin B, replace sensor. Go to Step 2. |
| | | terrinial ends. Use | b. If there is voltage at Pin B, Go to Step 6 . |
| | | noint ting to probe | 1 |
| | | connector terminals | |
| | | connector terminals. | |
| | | Pressure Output Voltage | |
| | | (PSI) (VDC) | |
| | | 0 0.5 | |
| | | -1.5 4.5 | |
| | | I NOTE | |
| | | Maka avea that the | |
| | | | |
| | | system you are testing | |
| | | has some pressure to | - 1 Ρίο Δ |
| | | measure. | |
| | | | 2. Place MultiMeter Probe On Pln B |
| 1 | | 1 | 13 Pin C |

| Step | Check | Result | Next | Step |
|------|-----------------------------|--------------------------------------|---|---|
| 6 | Select "Diagnose" to | DTC 10703 – Open in air filter | 1. Check resistance between Pin B a | ind ground terminal. |
| | view air filter restriction | restriction circuit is displayed as | a. If there is less than 5K ohms b | petween Pin B and the ground terminal, |
| | gauge DTCs. | "Active." | i. Check wiring for short fr | om sensor to CECU. If short found, |
| | Next, unplug the air | | repair and go to Step 2. | |
| | filter restriction sensor | | ii Remove the "C" connec | tor from the CECU and measure |
| | connector at sensor. | | resistance between Pin | 10 of the 52 Pin CECU connector C |
| | See CECU Pinout | | and ground terminal. If I | ess than 5K ohms replace CECU and |
| | for terminal details of | | and ground terminal. In | |
| | the CECU electrical | | go to otop 2. | a between Dir D and mound to mind. |
| | connections. | | b. If there is more than 20K onm | is between Pin B and ground terminal, |
| | | | i. Check wiring for open fr | om sensor to CECU. If open found, |
| | | | repair and go to Step 2. | |
| | | | ii. Remove the "C" connec | tor from the CECU and measure |
| | | | resistance between Pin | 10 of the 52 Pin CECU connector C |
| | | | and ground terminal. If | more than 20K ohms, replace CECU |
| | | | and go to Step 2. | |
| 7 | Select "Diagnose" to | DTC 10704 - Short in air filter | 1. If the fault is still "Active" after unp | lugging the sensor connector, you |
| | view air filter restriction | restriction circuit is displayed as | have confirmed there is a short. T | his sensor wire starts at pin 10 of the |
| | gauge DTCs. | "Active." | 52 Pin CECU connector C and en | ds at pin B on the sensor connector. |
| | Next, unplug the air | | There is a short between the sense | or wire and a power source wire. Some |
| | filter restriction sensor | | typical power wires to inspect are | listed below (you may need to verify |
| | connector at sensor. | | any power source in the main cab | harness): |
| | See CECU Pinout | | Description | CECU Pin |
| | for terminal details of | | Power Supply Sensor +5V | Connector C, Pin 1 |
| | the CECU electrical | | Dash Illumination 1 | Connector A, Pin 7 |
| | connections. | | CVSG Power | |
| | | | Each power supply ends at the followin | g connectors. |
| | | | CVSG gauge power | 4 |
| | | | CVSG lighting | 2 |
| | | | Primary air pressure transducer | B |
| | | | Secondary air pressure | В |
| | | | Application air pressure transducer | В |
| | | | Air filter restriction | С |
| | | | For future expansion | A |
| | | | Through the Engine Harness | 28 |
| | | | Connector | |
| | | | For the Ammeter sensor | Α |
| | | | Check for pinched or chaffed sensor ar | nd power wiring. Repair or replace |
| | | | wiring as necessary.Go to Step 2. | |
| | | DIC 10/04 - Short in air filter | ו טוע 11/04 changes to "Inactive" afte | r unplugging the sensor connector, you |
| | | restriction circuit is now displayed | have confirmed the problem is a short to | +5V in the sensor itself, not the wiring. |
| | | as "Inactive." | 1. Replace sensor. Go to Step 2. | |

Fuel Filter Restriction Pressure Gauge Inoperative

DTC1603 and DTC1604

Symptom: Fuel filter restriction gauge inoperative. All other gauges are operational.

The Fuel Filter Restriction Gauge uses an electronic transducer (sensor) to monitor vacuum pressure and converts it into a voltage output that

is sent to the instrumentation system. The output voltage of the sensor is proportional to the vacuum it is sensing.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select "Fuel | Gauge graphic on screen does not | Go to Step 4. |
| | Filter Restriction | display reasonable reading. | |
| | Pressure," then select | | |
| | "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | | |
| | image is approximately | | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | Vehicle gauge reading is in the | 1. Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | same range as the ESA gauge | daisy chain. |
| | | image. Go to Step 3-7. | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5. |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2. |
| | | | 2 Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 of the 52 Pin CECL connector C |
| | | | Repair daisy chain jumper harness as necessary. |
| | | | 5 Once continuity on both wires exists perform "Simulate" test again |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | permanently. Re-test and return truck to service. |
| | | | If gauge does not function during "Simulate" test, install Test CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | replace gauge. |
| | | | 6. Once gauge is replaced |
| | | | a. Verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a. Yes. Return truck to service. |

| Step | Check | Result | Next Step |
|--------|--------------------------|------------------------------------|--|
| | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to |
| | | | Step 4. |
| 4 | Select "Diagnose" | No "Active" DTCs displayed. | Indicates the problem could be a defective sensor, poor ground or no input or |
| | to view "Active" fuel | | output voltage at sensor. Go to Step 5. |
| | filter restriction gauge | DTC 1603 displayed – Open in | This DTC will be recorded when the control unit sees an open or short to |
| | diagnostic trouble | application air pressure circuit. | ground at the secondary air pressure sensor input. The fault is recorded when |
| | codes. | DTO 4004 disclosus du Obart in | the voltage at the input is below .1 volts. |
| | | DTC 1604 displayed – Short In | This DTC will be recorded when the control unit sees a short to +5V at the |
| | | application air pressure circuit. | the input is above 4.0 volte |
| | | | |
| Э | multimeter, check the | be continuity between the sensor | terminal. |
| | ground, input and output | connector ground (Pin A) and the | a If there is continuity between Pin A and the ground terminal test is |
| | voltages at the sensor | firewall ground stud. | complete. Go to Step 5-2. |
| | connector. | (Sensor Input Voltage) - Input | b If there is no continuity between Pin A and the ground terminal: |
| | Pin A – Ground | voltage from Chassis Node to | i Check for continuity between sensor connector Din A and Din 1 |
| | Pin B – Input Voltage | sensor connector (Pin B) should | of the Chassis Node connector C |
| | Pin C – Output Voltage | be +5 volts. See Table below. | ii Check for continuity between Pin 3 of the Chassis Node |
| | See Chassis Node | (Sensor Output Voltage) - Signal | connector A and a cab ground terminal. |
| | Pinout for terminal | output voltage at sensor connector | iii Renair wiring as necessary. Go to Sten 2 |
| | details of the Chassis | (Pin C) will vary depending on | 2 Check input voltage at sonser connector Pin P |
| | Node electrical | strength of vacuum, but should be | 2. Check input voltage at sensor connector Fin B. |
| | connections. | more than .1 volts and less than | a. If there is voltage at Pin B, Go to Step 5-3 . |
| | | 4.9 VOILS. See Table below. | b. If there is no voltage at PIN B, check for voltage on PIN 3 of the Chassis Node connector P. |
| | | | i litthere is unlight on Dir 2, shask continuity between Dir 2 of |
| | | | If there is voltage on Pin 3, check continuity between Pin 3 of the Chassis Node connector R and Rin R at concert connector. |
| | | Do not unplug sensor | Renair wiring as necessary. Go to Sten 2 |
| | | the wire insulation | ii If there is no voltage on Din 3 of the Chaseis Node connector |
| | | to perform a sensor | B replace Chassis Node Go to Step 2 |
| | | output voltage check | 3 Check signal output voltage at sensor connector Pin C |
| | | Slide connector seal | a. If there is no voltage at Din C replace sensor. Go to Stan 2 |
| | | back to expose | a. If there is voltage at Pin C. Co to Step C. |
| | | terminal ends. Use | |
| | | test leads with needle | |
| | | point tips to probe | 0.0 vdc |
| | | connector terminals. | |
| | | Pressure Output Voltage | |
| | | (PSI) (VDC) | |
| | | 0 0.5 | |
| | | -1.5 4.5 | |
| | | I NOTE | |
| | | Make sure that the | |
| | | system you are testing | |
| | | has some pressure to | ↓ |
| | | measure. | 1 Connector Seal |
| | | | 2 Pin Δ |
| | | | 2. Din P |
| | | | 4 - Diago MultiMotor Drobo On Din C |
| 12 - 3 | 8 | P | PM819003/KM815056 (09/16/2011) |

| Step | Check | Result | Next Step |
|------|------------------------------|--------------------------------------|--|
| 6 | Select "Diagnose" to | DTC 1603 – Open in fuel filter | 1. Check resistance between Pin C and ground terminal. |
| | view fuel filter restriction | restriction circuit is displayed as | a. If there is less than 5K ohms between Pin C and the ground termina |
| | gauge DTCs. | "Active." | i. Check wiring for short from sensor to Chassis Node. If short |
| | Next, unplug the fuel | | found, repair and go to Step 2 . |
| | filter restriction sensor | | ii Remove the "B" connector from the Chassis Node and measur |
| | connector at sensor. | | resistance between Pin 5 of the Chassis Node connector B |
| | See Chassis Node | | and ground terminal. If less than 5K ohms replace Chassis |
| | Pinout for terminal | | Node and go to Step 2 |
| | details of the Chassis | | he letters is more than 20K alma between Din C and ground termine |
| | Node electrical | | b. In there is more than 20K onlins between Pin C and ground termina |
| | connections. | | i. Check wiring for open from sensor to Chassis Node. If open |
| | | | found, repair and go to Step 2 . |
| | | | ii. Remove the "B" connector from the Chassis Node and measure |
| | | | resistance between Pin 5 of the Chassis Node connector B |
| | | | and ground terminal. If more than 20K ohms, replace Chassis |
| | | | Node and go to Step 2 . |
| 7 | Select "Diagnose" to | DTC 1604 - Short in fuel filter | 1. If the fault is still "Active" after unplugging the sensor connector, you |
| | view fuel filter restriction | restriction circuit is displayed as | have confirmed there is a short. This sensor wire starts at Pin 5 of the |
| | gauge DTCs. | "Active." | Chassis Node connector B and ends at pin C on the sensor connector. |
| | Next, unplug the fuel | | There is a short between the sensor wire and a power source wire. Som |
| | filter restriction sensor | | typical power wires to inspect are listed below (you may need to verify |
| | connector at sensor. | | any power source in the main cab harness): |
| | See Chassis Node | | Description CECU Pin |
| | Pinout for terminal | | Power Supply Sensor +5V Connector C, Pin 1 |
| | details of the Chassis | | CVSC Dewor |
| | Node electrical | | Each power supply ends at the following connectors: |
| | connections. | | Description Pin |
| | See CECU Pinout | | CVSG gauge power 4 |
| | for terminal details of | | CVSG lighting 2 |
| | the CECU electrical | | Primary air pressure transducer B |
| | connections. | | Secondary air pressure B |
| | | | Application air pressure transducer B |
| | | | Air filter restriction C |
| | | | For future expansion A |
| | | | Through the Engine Harness 28 |
| | | | Connector |
| | | | For the Ammeter sensor A |
| | | | Check for pinched or chaπed sensor and power wiring. Repair or replace |
| | | DTC 1604 Short in fuel filter | WIRING as necessary. Go to Step 2. |
| | | restriction circuit is now displayed | In Dire root changes to mactive aner unplugging the sensor connector, you |
| | | restriction circuit is now displayed | have confirmed the problem is a short in the sensor itself, not the wiring. |
| | | as mactive. | 1. Replace sensor. Go to Step 2. |

Ammeter Gauge Inoperative

DTC257903 and DTC257904

Symptom: Ammeter gauge inoperative. All other gauges are operational.

The Ammeter Gauge uses a contactless sensor using Hall Effect. The sensor is positioned on the

cab feed wire inside the battery box, or for firewall mounted circuit breakers, near the firewall.



Check

Turn ignition key ON.

vehicle.

"Open."

Start ESA, then select "Connect" to establish communication to the

Select "Monitor." From

Select "Simulate". Drag the "Value" bar until the

pointer on the gauge image is approximately

mid-scale. Observe

vehicle gauge

movement.

the "Components"

window, select "Ammeter," then select

Step

1

2

3

| e Manual | | 12 | | | | |
|--|--------------------------------------|---|--|--|--|--|
| Result | 1 | Next Step | | | | |
| | Go t | o Step 2. | | | | |
| Gauge graphic on screen displays reasonable reading. | Go t | o Step 3. | | | | |
| Gauge graphic on screen does not display reasonable reading. | Joes not Go to Step 4 . g. | | | | | |
| Vehicle gauge does not move. Go | Perfo | Perform the following checks: | | | | |
| to Step 3-1. | i | I NOTE | | | | |
| | Us the An pa | e the "Program" feature in ESA to make sure that e parameter for the inoperative gauge is enabled. inoperative gauge may simply have its CECU rameter set to disabled. | | | | |
| Vehicle gauge reading is in the same range as the ESA gauge | 1. | Check CVSG data link wiring: Observe Gauge position in the wiring daisy chain. | | | | |
| image. Go to Step 3-7. | | a. If gauge is mounted between two other functioning gauges CVSG data link wiring is OK. Go to Step 3-5 . | | | | |
| | | If gauge is last gauge in daisy chain or followed by other non-functional gauges, go to Step 3-2. | | | | |
| | 2. | Check continuity between Pin 1 on gauge harness connector and Pin 14 of the 52 Pin CECU connector C. | | | | |
| | 3. | Check continuity between Pin 3 on gauge harness connector and Pin 15 of the 52 Pin CECU connector C. | | | | |
| | 4. | Repair daisy chain jumper harness as necessary. | | | | |
| | 5. | Once continuity on both wires exists, perform "Simulate" test again. | | | | |
| | | a. If gauge functions properly during "Simulate" test, repair is complete Return truck to service. | | | | |
| | | If gauge does not function during "Simulate" test, install a known good gauge and perform "Simulate" test again. | | | | |
| | | | | | | |

| | 4. | Rep | air daisy chain jumper harness as necessary. |
|--|----|-------|---|
| | 5. | Onc | e continuity on both wires exists, perform "Simulate" test again. |
| | | a. | If gauge functions properly during "Simulate" test, repair is complete |
| | | | Return truck to service. |
| | | b. | If gauge does not function during "Simulate" test, install a known good gauge and perform "Simulate" test again. |
| | | | i. If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. |
| | | | ii. If gauge does not function during "Simulate" test, install Test CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | replace gauge. |
| | 6. | Onc | e gauge is replaced |
| | | a. | Verify gauge functionality. |
| | | b. | Return truck to service. |
| | 7. | Is th | is a recheck after Step 5, Step 6 or Step 7? |
| | | a. | Yes. Return truck to service. |
| | | b. | No, Gauge and CVSG data link wiring is not the problem. Go to Step 4 . |

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| Step | Check | Result | | | Next Step |
|--------|--------------------------|-------------------------|---------------|--------|---|
| 4 | Select "Diagnose" to | No "Active" DTCs disp | olayed. | Indica | cates the problem could be a defective sensor, poor ground or no input of |
| | view "Active" ammeter | | | outpu | put voltage at sensor. Go to Step 5. |
| | diagnostic trouble | DTC 257903 displaye | d - Open in | This [| s DTC will be recorded when the control unit sees an open or short to |
| | codes. | ammeter sensor circu | it. | groun | und at the secondary air pressure sensor input. The fault is recorded who |
| | | | | the vo | voltage at the input is below .1 volts. |
| | | DTC 257904 displaye | d - Short in | This [| s DTC will be recorded when the control unit sees a short to +5V at the |
| | | ammeter sensor circu | it. | secor | ondary air pressure sensor input. The fault is recorded when the voltage |
| | | | | the in | input is above 4.9 volts. |
| 5 | Using a digital | (Sensor Ground) - Th | ere should | 1. (| Check for continuity between sensor connector Pin B and ground |
| | multimeter, check the | be continuity between | the sensor | t | terminal. |
| | ground, input and output | connector ground (Pir | n B) and the | á | a. If there is continuity between Pin B and the ground terminal, test i |
| | voltages at the sensor | firewall ground stud. | | | complete. Go to Step 5-2. |
| | connector. | (Sensor Input Voltage | e) - Input | ł | b. If there is no continuity between Pin B and the ground terminal |
| | Pin A – Input Voltage | voltage from CECU to | o sensor | | i. Check for continuity between terminal B and Pin 9 of the 52 |
| | Pin B – Ground | connector (Pin A) sho | ould be +5 | | Pin CECU connector C. |
| | Pin C – Output Voltage | volts. | | | ii Check for continuity between Pin 5 of the 9 Pin CECU |
| | See CECU Pinout | (Sensor Output Voltag | ge) - Signal | | connector A and a cab ground terminal |
| | for terminal details of | output voltage at sens | or connector | | iii Pongir wiring as necessary. Go to Ston 5 1 |
| | the CECU electrical | (Pin C) will vary deper | nding on the | | Check insult veltage at eargest connector Din A |
| | connections. | amperage, but should | be more | 2. (| Check input voltage at sensor connector Pin A. |
| | | than U voits and less t | inan 5 voits. | á | a. If there is voltage at Pin A, Go to Step 5-3 . |
| | | | | ł | b. If there is no voltage at Pin A, check for voltage on Pin 1 of the 52 |
| | | | NOTE | | Pin CECU connector C. |
| | | Do not unplug | sensor | | i. If there is voltage on Pin 1, check continuity between Pin 1 |
| | | connector or pe | enetrate | | at CECU and Pin A at sensor connector. Repair wiring as |
| | | the wire ins | sulation | | necessary. Go to Step 5-2. |
| | | to perform a | sensor | | ii. If there is no voltage on Pin 1 at CECU, replace CECU. Go |
| | | output voltage | check. | | to Step 2. |
| | | Slide connecto | or seal | 3. (| Check signal output voltage at sensor connector Pin C. |
| | | DACK to | expose | á | a. If there is no voltage at Pin C, replace sensor. Go to Step 2. |
| | | terminal ends. | Use | ł | b. If there is voltage at Pin C, check for voltage on Pin 9 of the 52 Pi |
| | | noint tine to | neeule | | CECU connector C. |
| | | connector term | inals | | i. If voltage is present on Pin 9 at CECU connector, replace |
| | | | 111015. | | CECU. Go to Step 2. |
| | | Average Out | tput Voltage | | ii. If there is no voltage on Pin 9 at CECU connector, Go to Step |
| | | Range | (VDC) | | 1 |
| | | 120 | 4.5 | | |
| | | 60 | 3.5 | | |
| | | 0 | 2.5 | | |
| | | -60 | 1.5 | | |
| | | -120 | 0.5 | 1 | |
| | | | | / | |
| | | | | / | |
| | | | | 3 | |
| | | | | | |
| | | | | | ₩ ₩ |
| | | | | 1. I | Place MultiMeter Probe On Pin C |
| | | | | 2. I | Pin B |
| | | | | 3. 1 | Pin A |
| 40 | | I | | | |
| 12 - 4 | 12 | | - F | 7AC | CCAR PM819003/KM815056 (09/16/201 |

| Step | Check | Result | Next Step |
|------|-------------------------|------------------------------------|--|
| 6 | Select "Diagnose" to | DTC 257903 – Open in ammeter | 1. Using a jumper wire, jump across sensor harness connector Pins B |
| | view ammeter gauge | sensor circuit is displayed as | and C. |
| | DTCs. | "Active." | 2 |
| | Next, unplug the | | |
| | ammeter connector | | |
| | at sensor. | | |
| | See CECU Pinout | | |
| | for terminal details of | | |
| | the CECU electrical | | |
| | connections. | | |
| | | | |
| | | | 1. Pin B |
| | | | 2. Pin C |
| | | | |
| | | | |
| | | | a If an "Active" DTC 257904 - Short in ammeter sensor circuit is now |
| | | | displayed you have confirmed there is not an open in the sensor |
| | | | output voltage wire to the CECIL The original fault (DTC 257903) |
| | | | was logged because there is an open in the ammeter sensor itself |
| | | | not the wiring Replace sensor. Go to Stan 2 |
| | | | her the wing. Replace school: Go to Gtop 1 . |
| | | | b. If DTC 25/904 is not displayed, there is an open circuit in the wire between senser connector Pin C and Pin 0 of the 52 Pin CECU |
| | | | permeeter C. Beneir wiring as personally Co to Stan 2 |
| | | | Alternate test with de Oberla for earlierite between earlierite betwee |
| | | | (sensor output voltage) and Pin 9 of the 52 Pin CECU connector C. |
| | | | 1. If there is no continuity, repair wiring as necessary. After repairs, DTC |
| | | | 257903 should now be displayed as "Inactive." |
| | | | 2. If there is continuity between sensor connector Pin C and Pin 9 of the 52 |
| | | | Pin CECU connector C, the open circuit is in the sensor itself, not in |
| | | | the wiring. Replace sensor. |
| 7 | Select "Diagnose" to | DTC 257904 - Short in ammeter | If the fault is still "Active" after unplugging the sensor connector, you have |
| | view ammeter gauge | sensor circuit is displayed as | confirmed there is a short to ground between Pin C (sensor output voltage) |
| | DTCs. | "Active." | and Pin 9 of the 52 Pin CECU connector C |
| | Next, unplug the | | 1. Check for a pinched or chaffed wire between Pin C (sensor output |
| | ammeter connector | | voltage) and Pin 9 of the 52 Pin CECU connector C. Repair wiring as |
| | at sensor. | | necessary. Go to Step 2. |
| | See CECU Pinout | DTC 257904 - Short in ammeter | If DTC 257904 changes to "Inactive" after unplugging the sensor connector, |
| | for terminal details of | sensor circuit is now displayed as | you have confirmed the problem is a short in the sensor itself, not the wiring. |
| | the CECU electrical | "Inactive." | 1. Replace sensor. Go to Step 2. |
| | connections. | | |

Pyrometer Gauge Inoperative

DTC17303 and DTC17304

Symptom: Pyrometer gauge inoperative. All other gauges are operational.

The Pyrometer Gauge uses a thermocouple sensor to measure engine exhaust gas temperature after it leaves the turbo.



Result

Check

Step

1

2

3

4

| Start ESA, then select "Connect" to establish communication to the | | Go to Step 2. |
|---|--|--|
| Select "Monitor." From the "Components" | Gauge graphic on screen displays reasonable reading | Go to Step 3. |
| window, select "Exhaust Temperature," then select "Open." | Gauge graphic on screen does not display reasonable reading. | Go to Step 4 . |
| the "Value" bar until the pointer on the gauge image is approximately mid-scale. Observe vehicle gauge movement. | to Step 3-1 . Vehicle gauge reading is in the same range as the ESA gauge image. Go to Step 3-7 . | Check CVSG data link wiring: Observe Gauge position in the wiring daisy chain. If gauge is mounted between two other functioning gauges CVSG data link wiring is OK. go to Step 3-5. a. If gauge is last gauge in daisy chain or followed by other non-functional gauges, go to Step 3-2. b. Check continuity between Pin 1 on gauge harness connector and Pin 14 of the 52 Pin ICU connector C. Check continuity between Pin 3 on gauge harness connector and Pin 15 of the 52 Pin ICU connector C. Check continuity on both wires exists, perform "Simulate" test again. a. If gauge functions properly during "Simulate" test, install Test ICU and perform "Simulate" test again. i. If gauge functions properly test is complete. Install new ICU permanently. Re-test and return truck to service. ii. If gauge does not function properly during "Simulate" test, replace gauge. Once gauge is replaced. a. Verify gauge functionality. |
| | | b. Return truck to service. 7. Is this a recheck after Step 5, Step 6 or Step 7? a. Yes. Return truck to service. |
| | | b. No, Gauge and CVSG data link wiring is not the problem. Go to Step 4. |
| Select "Diagnose" to view "Active" ammeter diagnostic trouble | DTC 17303 displayed – Open in exhaust temp circuit. | Indicates the problem could be an open in the wiring from the ICU to the pyrometer sensor or a defective sensor. Go to Step 5 , and if necessary, Step 6 . |
| codes. | DTC 17304 displayed - Short in exhaust temp circuit. | Indicates the problem could be a short to ground in the wiring from the ICU to the pyrometer sensor or a defective sensor. Go to Step 5 , and if necessary, Step 7 . |

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Next Step

| 1 | 2 |
|---|---|
| | |

| Step | Check | Result | | | Next Step | |
|------|-------------------------|------------------------------------|------|------------------------|-----------------------------|----------------------------|
| 5 | Unplug pyrometer | (Sensor Ground) - There should | 1. | Check for continuity | between sensor connector | Pin 1 and a cab ground |
| | harness connector | be continuity between the sensor | | terminal. | | |
| | at sensor. | connector ground wire (Pin 1) and | | a. If there is contin | uity between Pin 1 and the | e ground terminal, test is |
| | Using a digital | a cab ground terminal. | | complete. Go to | o Step 5-2. | |
| | multimeter, check | (Signal) - There should be | | b. If there is no co | ntinuity between Pin 1 and | the ground terminal, |
| | continuity on ground | continuity between the sensor | | repair wiring as | necessary. Go to Step 5- | 1. |
| | and signal wire at | connector signal wire (Pin 2) and | 2. | Check for continuity | between sensor connector | Pin 2 and Pin 23 of the |
| | Bin 1 Cround | Pin 23 of the 52 Pin ICO connector | | 52 Pin ICU connecto | r C. | |
| | Pin 1 – Glound | 0. | | a. If there is contin | nuity between Pin 2 and Pi | n 23, test is complete. |
| | | | | Go to Step 6. | | |
| | for terminal details of | | | b. If there is no co | ntinuity between Pin 2 and | l Pin 23 at ICU, repair |
| | the CECU electrical | | | wiring as neces | sary. Go to Step 5-2. | |
| | connections. | | Alte | ernate test method: F | Resistance in the pyromete | r sensor (thermocouple) |
| | | | sigr | nal wire changes as ex | haust temperature increas | es/decreases. |
| | | | 1. | By unplugging the py | rometer sensor harness c | onnector and connecting |
| | | | | a resistor decade bo | x (i.e.Ametek PST2000 Te | ster), or an appropriate |
| | | | | resistor to Pins 1 and | d 2, you can simulate the s | sensor by dialing in a |
| | | | _ | known resistance. | | |
| | | | 2. | Observe vehicle gau | ge reading on dash. | |
| | | | 3. | If gauge needle move | es to approximately the sa | me temperature as in the |
| | | | | table below, the prob | em is a defective pyrome | ter sensor. See Table |
| | | | | Ter | mp | Resistance |
| | | | | °C | °F | Ohms |
| | | | | -40 | -40 | 169.7 |
| | | | | -20 | -4 | 185.1 |
| | | | | 0 | 32 | 200.5 |
| | | | | 25 | 77 | 219.6 |
| | | | | 50 | 122 | 238.5 |
| | | | | 100 | 212 | 275.9 |
| | | | | 150 | 302 | 312.7 |
| | | | | 200 | 392 | 349.0 |
| I | | | | 250 | 482 | 384.6 |
| | | | | 300 | 572 | 419.7 |
| | | | | 350 | 662 | 454.2 |
| | | | | 400 | 752 | 488.1 |
| I | | | | 450 | 842 | 521.4 |
| I | | | | 500 | 932 | 554.1 |
| I | | | | 600 | 1112 | 617.8 |
| I | | | | 700 | 1292 | 679.2 |
| I | | | | 800 | 1472 | 738.2 |
| I | | | | 900 | 1652 | 794.9 |
| | 1 | | 1 | 1000 | 1832 | 849.2 |

| Step | Check | Result | Next Step |
|------|-------------------------|----------------------------------|--|
| 6 | Select "Diagnose" | DTC 17303 - Open in exhaust | 1. Using a jumper wire, jump across sensor harness connector Pins 1 and 2. |
| | to view exhaust | temp circuit is displayed as | |
| | temperature gauge | "Active." | |
| | DTCs. | | |
| | Unplug pyrometer | | |
| | harness connector | | |
| | at sensor. | | |
| | See CECU Pinout | | |
| | for terminal details of | | |
| | the CECU electrical | | |
| | connections. | | |
| | | | |
| | | | |
| | | | 1. Pin 1 |
| | | | 2. Pin 2 |
| | | | |
| | | | |
| | | | a If an "Active" DTC 17304 - Short in exhaust temp circuit is now |
| | | | displayed you have confirmed there is not an open in the sensor |
| | | | signal wire to the ICU. The original fault (DTC 17303) was logged |
| | | | because there is an open in the pyrometer sensor itself, not the |
| | | | wiring. Replace sensor. |
| | | | b If DTC 17304 is not displayed, there is an open circuit in the signal |
| | | | wire between sensor connector Pin 2 and Pin 23 of the 52 Pin ICU |
| | | | connector C. Repair wiring as necessary. |
| | | | Alternate test method: Check for continuity between sensor connector Pin 2 |
| | | | (sensor signal) and Pin 23 of the 52 Pin ICU connector C. |
| | | | 1. If there is no continuity, repair wiring as necessary. After repairs, DTC |
| | | | 17303 should now be displayed as "Inactive." |
| | | | 2. If there is continuity between sensor connector Pin 2 and Pin 23 of the |
| | | | 52 Pin ICU connector C, the open circuit is in the sensor itself, not in |
| | | | the wiring. Replace sensor. |
| 7 | Select "Diagnose" | DIC 17304 - Short in exhaust | If the fault is still "Active" after unplugging the sensor connector, you have |
| | to view exhaust | temp circuit is displayed as | confirmed there is a short to ground between Pin 2 (sensor signal) and Pin 23 |
| | temperature gauge | Active. | or the 52 Pin ICU connector C. |
| | Novt upplus the | | 1. Check for a pinched or chatted wire between Pin 2 (sensor signal) and |
| | nvext, unplug the | | Pin 23 of the 52 Pin ICU connector C. Repair wiring as necessary. Go to |
| | connector at sensor | DTC 17304 - Short in exhaust | Step 2. |
| | See CECIL Pinout | temp circuit is now displayed as | have confirmed the problem is a short in the sensor itself, not the wiring |
| | for terminal details of | "Inactive." | 1 Replace sensor Go to Step 2 |
| | the CECU electrical | | 1. Replace serior. Or to otep 2. |
| | connections. | | |



Front Drive Axle Oil Temperature Gauge

DTC57803 and DTC57804

Symptom: Front drive axle oil temperature gauge inoperative. All other gauges are operational.

The Front Drive Axle Oil Temperature Gauge uses a thermistor sensor to measure axle oil temperature.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Front Drive Axle Oil | display reasonable reading. | |
| | Temperature," then | | |
| | select "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | <u>I</u> NOTE |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | | 1 Check CVSC data link wiring: Observe Cauge position in the wiring |
| | | | Check CVSG data link winnig. Observe Gauge position in the winnig data chain. |
| | | | |
| | | | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5. |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2 . |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a If gauge functions properly during "Simulate" test repair is complete |
| | | | Return truck to service. |
| | | | b. If aguad doos not function during "Simulate" tost install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. |
| | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | replace gauge. |
| | | | 6. Once gauge is replaced. |
| | | | a. Verify gauge functionality. |
| | | | h Return truck to service |
| | | | 7 Is this a reshock offer Step 5 Step 5 or Step 70 |
| | | | 7. IS unis a recrieck arter step 5, step 6 or step 7? |
| | | | a. Yes. Return truck to service. |

| Step | Check | Result | Next Step | |
|------|--|--|--|---|
| | | | b. No, Gauge and CVSG data link wiring is r Step 4. | not the problem. Go to |
| 4 | Select "Diagnose" to view front drive axle temperature gauge | DTC 57803 displayed - Open in axle 1 oil temp circuit. | Indicates the problem could be an open in the wiring the pyrometer sensor or a defective sensor. Go to S Step 6 . | from the Chassis Node to tep 5 , and if necessary, |
| | diagnostic trouble | DTC 57804 displayed - Short in | Indicates the problem could be a short to ground in the | ne wiring from the Chassis |
| | codes. | axle 1 oil temp circuit. | Node to the sensor or a defective sensor. Go to Ste | p 5 , and if necessary, |
| | | | Step 7. | |
| 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. Check for continuity between sensor connector | Pin A and firewall ground |
| | harness connector at | be continuity between the sensor | stud. | |
| | sensor. | connector ground wire (Pin A) and | a. If there is continuity between Pin A and the | e ground terminal, test is |
| | Using a digital | a cab ground terminal. | complete. Go to Step 5-2. | |
| | multimeter, check | (Signal) - There should be | b. If there is no continuity between Pin A and | the ground terminal, |
| | continuity on ground | continuity between the sensor | repair wiring as necessary. Go to Step 5- | 1. |
| | and signal wire at | connector signal wire (Pin B) | 2. Check for continuity between sensor connector | Pin B and Pin 13 of the |
| | sensor connector. | and Pin 13 of the Chassis Node | Chassis Node connector C. | |
| | Pin A – Ground | connector C. | a. If there is continuity between Pin B and Pi | n 13, test is complete. |
| | Pin B - Signal | | Go to Step 6 | |
| | See Chassis Node | | b. If there is no continuity between Pin B and | Pin 13 at Chassis Node, |
| | Pinout for terminal details of the Chassis | | repair wiring as necessary. Go to Step 5-2 | 2. |
| | Node electrical | | Alternate test method: Resistance in the oil temper | rature sensor (thermistor) |
| | connections. | | signal wire changes as oil temperature increases/de | creases. |
| | | | 1. By unplugging the oil temperature sensor harn | ess connector and |
| | | | connecting a resistor decade box (i.e., Ametek | PST2000 Tester), or an |
| | | | appropriate resistor to Pins A and B, you can s | imulate the sensor by |
| | | | dialing in a known resistance. | |
| | | | 2. Observe vehicle gauge reading on dash. | |
| | | | 3. If gauge needle moves to approximately the sa | me temperature as in |
| | | | the table below, the problem is a defective oil te | emperature sensor. See |
| | | | table below. | Decistance Ohme |
| | | | -40 | 100 856 |
| | | | -22 | 52 594 |
| | | | -4 | 28.582 |
| | | | 14 | 16 120 |
| | | | 32 | 9 399 |
| | | | 50 | 5,658 |
| | | | 68 | 3,000 |
| | | | 86 | 2 240 |
| | | | 104 | 1 465 |
| | | | 122 | 080 3 |
| | | | 140 | 670.0 |
| | | | 140 | 460 7 |
| | | | 138 | 400.7 |
| | | | 1/6 | 333.8 |
| | | | 194 | 241.8 |
| | | | 212 | 178.03 |
| | | | 230 | 133.08 |
| | | | 248 | 100.91 |

| Step | Check | Result | Next Step | |
|------|--|---|---|--|
| | | | 266 | 77.54 |
| | | | 284 | 60.32 |
| | | | 302 | 47.46 |
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24.58 |
| | | | 374 | 20.11 |
| | | | 392 | 16.58 |
| 6 | Select "Diagnose" to view front drive axle temperature gauge DTCs. Unplug oil temperature harness connector at sensor. See Chassis Node Pinout for terminal details of the Chassis Node electrical connections. | DTC 57803 - Open in axle 1 oil temp circuit is displayed as "Active." | Using a jumper wire, jump across sensor harnes Using a jumper wire, jump across sensor harnes Using a jumper wire, jump across sensor harnes Pin B Pin B Pin A a. If an "Active" DTC 57804 - Short in axle 1 displayed, you have confirmed there is no signal wire to the Chassis Node. The origin logged because there is an open in the oil not the wiring. Replace sensor. Go to Ste b. If DTC 57804 is not displayed, there is an wire between sensor connector Pin B and Node connector C. Repair wiring as necess Alternate test method: Check for continuity betweet (sensor signal) and Pin 13 of the Chassis Node conre If there is no continuity, repair wiring as necess 57803 should now be displayed as "Inactive." | temp circuit is now t an open in the sensor hal fault (DTC 57803) was temperature sensor itself, p 2 . open circuit in the signal Pin 13 of the Chassis issary. Go to Step 2 . en sensor connector Pin B hector C. ary. After repairs, DTC |
| | | | If there is continuity between sensor connector Chassis Node connector C the open circuit is in the wiring. Replace sensor. | Pin B and Pin 13 of the the sensor itself, not in |

| 0.1 | Observit | De sult | No. 4 Of an |
|------|------------------------|----------------------------------|--|
| Step | Check | Result | Next Step |
| 7 | Select "Diagnose" to | DTC 57804 - Short in axle 1 | If the fault is still "Active" after unplugging the sensor connector, you have |
| | view front drive axle | oil temp circuit is displayed as | confirmed there is a short to ground between Pin B (sensor signal) and Pin |
| | temperature gauge | "Active." | 13 of the Chassis Node connector C. |
| | DTCs. | | 1. Check for a pinched or chaffed wire between Pin B (sensor signal) and |
| | Next, unplug the oil | | Pin 13 of the Chassis Node connector C. Repair wiring as necessary. |
| | temperature harness | | Go to Step 2. |
| | connector at sensor. | DTC 57804 - Short in axle 1 | If DTC 57804 changes to "Inactive" after unplugging the sensor connector, you |
| | See Chassis Node | temp circuit is now displayed as | have confirmed the problem is a short in the sensor itself, not the wiring. |
| | Pinout for terminal | "Inactive." | 1. Replace sensor. Go to Step 2. |
| | details of the Chassis | | |
| | Node electrical | | |
| | connections. | | |

Rear Drive Axle Oil Temperature Gauge Inoperative

DTC7703 and DTC7704

Symptom: Rear drive axle oil temperature gauge inoperative. All other gauges are operational.

The Rear Drive Axle Oil Temperature Gauge uses a thermistor sensor to measure axle oil temperature.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Rear Drive Axle Oil | display reasonable reading. | |
| | Temperature," then | | |
| | select "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | NOIE NOIE |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7 . | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | | 4 Charle OV/CC date link without Observe Course position in the within |
| | | | 1. Check CVSG data link winng. Observe Gauge position in the winng |
| | | | |
| | | | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5 . |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2. |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a If gauge functions properly during "Simulate" test repair is complete |
| | | | Return truck to service. |
| | | | b If gauge does not function during "Simulate" test install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | i If gauge functions properly test is complete. Install new gauge |
| | | | permanently. Re-test and return truck to service. |
| | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | replace gauge. |
| | | | 6. Once gauge is replaced. |
| | | | a. Verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7 Is this a recheck after Step 5 Step 6 or Step 7? |
| | | | 2. Vos Boturn truck to convice |
| | | | a. 165. Return truck to service. |

| Image: Sec: Difference of the sensor of a defective sensor. Co to Step 5, and Theorems, Step 7. 5 Unspite of the chassis Node decircles the problem could be an open in the wiring from the Chassis Node to the sensor or a defective sensor. Co to Step 5, and Theorems, Step 7. 5 Unspite of theorem could be an open in the wiring from the Chassis Node to the sensor or a defective sensor. Co to Step 5, and Theorem 2. 5 Unspite of theorem could be an open in the wiring from the Chassis Node to the sensor or a defective sensor. Co to Step 5, and Theorem 2. 5 Unspite of theorem could be an open in the wiring from the Chassis Node to the sensor or a defective sensor. Co to Step 5, and Theorem 2. 5 Unspite of theorem could be an open in the wiring from the Chassis Node theorem 2. 6 Unspite of theorem could be an open open in the wiring from the Chassis Node identity on ground attentional. 9 Unspite of the Chassis Node identity on ground terminal, test complete. Go to Step 5.2. 9 If there is continuity between Pin A and the ground terminal, test complete. Go to Step 5.4. 9 If there is continuity between Pin B and Pin 10, test is complete. Go to Step 5.4. 9 If there is continuity between Pin B and Pin 10, test is complete. Go to Step 5.4. 9 If there is continuity between Pin B and Pin 10, test is complete. Go to Step 5.4. 9 If there is continuity between Pin B a | Step | Check | Result | Next Step | |
|--|------|------------------------|-----------------------------------|---|--------------------------------|
| Step 4. Step 4. 4 Select "Diagnose" to view rear drive add temperature gauge diagnosite toroble doces. DTC 7703 displayed - Open in gal 2 of temp creat. Indicates the problem could be an open in the wing from the Chassie Node the perature gauge diagnosite toroble sensor. 5 Unplug oil temperature sensor. (Sensor Ground) - There should be continuity between the sensor connector ground wine (Pin A) and ground wine (Pin A) and pin 10 of the Chassis Node Pin A - Ground Pin B - Signal 1. Check for continuity between Pin A and the ground terminal, complete. Co is Step 5 -1. 8 Check for continuity between the sensor connector ground wine (Pin A) and Pin 10 of the Chassis Node enclored signal wire (Pin B) and Pin 10 of the Chassis Node econector C. 1. Check for continuity between Pin A and the ground terminal, complete. Co is Step 5 -1. 8 Check for continuity between Pin A and the ground terminal, connector Signal wire (Pin B) and Pin 10 of the Chassis Node econector C. 1. The check for continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5 -2. 9 Finder Chassis Node electrical connections. 1. Step C - Annet K PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe whole gauge reading on dash. 1. Finder Ground Pin A - Ground Pin A - Ground Connections. 1. The gauge needide moves to approximatety the same temperature asi | | | | b. No, Gauge and CVSG data link wiring is r | ot the problem. Go to |
| 4 Select "Dagnos" to wew rear drive axie temperature gage diagnostic trouble codes. DIC 7704 displayed - Open in axie 2 of temp circuit. Indicates the problem could be an open in the wring from the Chassis Node DIC 7704 displayed - Short in axie 2 of temp circuit. 5 Mineckes the problem could be an open in the wring from the Chassis Node sensor. Sensor Cround) - There should be connector ground write (Pin A) and a cab ground terminal. Indicates the problem could be an open in the wring from the Chassis Node to the sensor or a defective sensor. Go to Step 5.4. 6 Mineckes the problem could be connector ground write (Pin A) and a cab ground terminal. I. Check for continuity between Pin A and the ground terminal, repair wring as necessary. Go to Step 5.1. 6 Mineckes the problem could be connector C. If there is no continuity between Pin B and Pin 10, test is complete. Go to Step 5.2. 9 Pin B - Signal See Chassis Node Pin D - Signal connector sal If there is no continuity between Pin B and Pin 10, repair wring a necessary. Co to Step 5.2. 10 Check ther continuity between Pin B and Pin 10, repair wring a necessary. Co to Step 5.2. If there is no continuity between Pin B and Pin 10, repair wring a necessary. Co to Step 5.2. 10 If the chassis Node Pinot for terminal details of the Chassis Node electrical connection a If gauge needle moves to approximately the same temperature as in the table below. If degrade of the problem is a defective oil temprerature as in the table below. | | | | Step 4. | |
| were rear drive axie temperature gauge diagnostic trouble codes. axie 2 of temp circuit. the sensor or a defective sensor. Go to Step 5, and if necessary. Step 5. 5 Unplug of temperature hamess connector at sensor. (Sensor Ground). There should be continuity between the sensor connector ground wire (Pin A) and a cab ground wire (Pin B) and Pin 10 of the Chassis Note connector signal wire at sensor connector. (Signal). There should be connective provid wire (Pin B) and Pin 10 of the Chassis Note connector signal wire (Pin B) and Pin 10 of the Chassis Note connections. If there is continuity between Pin A and the ground terminal, test. 8 Check for continuity between the sensor connector signal wire (Pin B) and Pin 10 of the Chassis Note Pin A - Ground Pin B - Signal If there is continuity between Pin B and Pin 10, test is complete. Co to Step 5. 9 Hore terminal. If there is continuity between Pin B and Pin 10, test is complete. Co to Step 5. 9 Hore terminal. If there is continuity between Pin B and Pin 10, test is complete. Co to Step 5. 9 Hore terminal. If there is a continuity between Pin B and Pin 10, test is complete. Co to Step 5. 10 Hore terminal. If there is a continuity between Pin B and Pin 10, test is complete. Co to Step 5. 11 Hore terminal. If there is a continuity between Pin B and Pin 10, repair wiring a mecessary. Go to Step 5.2. 11 Hore terminal. If there ter | 4 | Select "Diagnose" to | DTC 7703 displayed - Open in | Indicates the problem could be an open in the wiring | from the Chassis Node to |
| Imperature gauge disgnostic trouble codes DTC 7704 displayed - Short in axte 2 of lemp circuit. Indicates the problem could be a short by ground in the wiring from the Chas- sensor or a defective sensor. Go to Step 5, and if necessary. Step 7. 5 Unplug oil temperature sensor. Sensor Ground) - There should be connector ground wire (Pin A) and a cab ground terminal, a cab ground terminal, econnector signal wire (Pin B) and Pin 10 of the Chassis Node Pin A - Ground Pin B - Signal See Chassis Node Pinout for terminal details of the Chassis Node electrical connections. 1. Check for continuity between Pin A and the ground terminal, econnector C. 8 If there is continuity between Pin A and the ground terminal, end pin 10 of the Chassis Node electrical connections. 1. Check for continuity between Pin A and the ground terminal, end pin 10 of the Chassis Node electrical connections. 2. Check for continuity between Pin B and Pin 10, test is complete. Go to Step 6. 1. By unplugging the oil temperature sensor (thermist signal wire changes as oil temperature sensor thermist signal wire changes as oil temperature sensor thermist signal wire changes as oil temperature sensor the Pirator Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 8 If there is continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 8 If there is continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 8 If there is continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 9 If there is continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 1 | | view rear drive axle | axle 2 oil temp circuit. | the sensor or a defective sensor. Go to Step 5, and | if necessary, Step 6. |
| diagnostic trouble codes axite 2 of lemp circuit. Node to the sensor or a defective sensor. Go to Step 5, and if necessary. Sensor. 5 Unplug oil temperature sensor. (Sensor Ground) - There should be confinuity between the sensor connector ground wire (Pin A) and a cib ground terminal. 1. Check for continuity between Pin A and the ground terminal, commetor ground wire (Pin A) and signal wire at sensor connector signal wire (Pin B) sensor connector signal wire (Pin B) sensor connector C. a. If there is no continuity between Pin A and the ground terminal, repair wiring as necessary. Go to Step 5-2. 2. Check for continuity between Pin B and Pin 10 of th Chassis Node center C C. b. If there is no continuity between Pin B and Pin 10, test is complete. Go to Step 6. 3. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5-2. Atternate test method: Resistance in the oil temperature sensor thermist signal wire change as oil temperature sensor than connections. 4. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5-2. 4. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5-2. 4. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5-2. 4. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5-2. 4. If group needin moves to approximately the same temperature sensor. The table below. the problem is a defective oil temperature sensor. The table below. the route of the ta | | temperature gauge | DTC 7704 displayed - Short in | Indicates the problem could be a short to ground in the | ne wiring from the Chassis |
| codes. Step 7. 5 Unplug of imperature hamess connector at sensor. Sensor Ground) - There should be continuity between the sensor connector ground wire (Pin A) and and signal wire at sensor connector ing wire (Pin B) sensor connector signal See Chassis Node Pin B - Signal See Chassis Node electrical connections. Check for continuity between Pin B and Pin 10, test is complete. Go to Step 6. 6 If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 7 If there is no continuity between Pin B and Pin 10, test is complete. Go to Step 6. 8 If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 8 If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 8 If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 8 If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. 9 If any prepretim easistance in the oil temperature sensor tharmes | | diagnostic trouble | axle 2 oil temp circuit. | Node to the sensor or a defective sensor. Go to Ste | p 5 , and if necessary, |
| Jonplug oil temperature (Sensor Ground) - There should names connector a to continuity between the sensor connector ground wire (Pin A) and a signal wire at a cab ground terminal. In Check for continuity between Pin A and the ground terminal. test complete. Check (Signal) - There should be continuity between the sensor connector signal wire (Pin B) sensor connector signal wire (Pin B) as sensor connector C. If there is continuity between Pin A and the ground terminal. Check for continuity between Pin A and the ground terminal. Connector signal wire (Pin B) as sensor connector C. If there is no continuity between Pin B and Pin 10 of the Chassis Node electrical connectors. If there is no continuity between Pin B and Pin 10, test is complete. Go to Step 6.2. Alternato test method: Resistance in the oil temperature sensor thermises connector and connecting a resistor decade box (i.e., Ametek PS1200) Tester), or a appropriate resistor. By unplugging in a known resistance. Observe while gauge reading on dash. If gauge needle moves to approximately the same temperature as in the table below. Tegistan E and Pin 10, 483 (Signal P and P A A A A B, you can simulate the sensor by dialing in a known resistance. Observe while gauge reading on dash. If gauge needle moves to approximately the same temperature as in the table below. Tegistan A A B, Signal A B B A | | codes. | | Step 7. | |
| harness connector a connector ground wire (Pin A) and a cab ground terminal. a. If there is continuity between Pin A and the ground terminal, test complete. Co to Step 5-2. multimeter, check (Signal) - There should be continuity between Pin A and the ground terminal, repair wiring as necessary. Go to Step 5-1. and Pin 10 of the Chassis Node pin A - Ground Pin B - Signal connector C. See Chassis Node pinot 10 of the Chassis Node Pinou for terminal continuity between Pin B and Pin 10, test is complete. Co to Step 6. Node electrical connector C. onnector source Continuity between Pin B and Pin 10, test is complete. Co to Step 6. b. If there is no continuity between Pin B and Pin 10, test is complete. Co to Step 6. b. If there is no continuity between Pin B and Pin 10, test is complete. Co to Step 6. connections. If there is no continuity between Pin B and Pin 10, test is complete. Co to Step 6. b. If there is no continuity between Pin B and Pin 10, test is complete. Co to Step 6. If there is no continuity between Pin B and Pin 10, test is complete. Co to Step 6. connection subtriation the oil temperature sensor thermist isgnal wire changes as oil temperature sensor thermist isgnal wire changes as oil temperature sensor thermist isgnal wire changes as oil temperature sensor temperature as in the table below. connecting relatis defective oil temperature sensor filter sensor condetor oil tem | 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. Check for continuity between sensor connector | Pin A and firewall ground |
| sensor. connector ground wire (Pin A) and and signal wire at and signal wire at and signal wire (at sensor connector. Pin A - Ground Pin A - Ground details of the Chassis Node electrical connectorions. connector C. and Pin 10 of the Chassis Node prinout for terminal details of the Chassis Node electrical connector and signal wire (at be chassis Node connector C. and Pin 10 of the Chassis Node electrical connector and connector and details of the Chassis Node electrical connector A. details of the Chassis Node electrical connector of the Chassis Node electrical connector of the Chassis Node electrical connections. details of the Chassis Node electrical connections at the print encomplete. details of the Chassis Node electrical connections. details of the Chassis Node electrical connections. details of the Chassis Node electrical connections. details of the Chassis Node electrical connections at the table below, the problem is a defective oil temperature as in the table below, the problem is a defective oil temperature sensor. Se table below. details of the Chassis Node electrical connections at the table below, the problem is a defective oil temperature sensor to prove the problem is a defective oil temperature sensor to prove the problem is a defective oil temperature sensor to protent the problem is a defective oil temper | | harness connector at | be continuity between the sensor | stud. | |
| Using a digital a cab ground terminal. complete. Go to Stop 5-2. and signal wire at signal wire at sensor connector signal wire (Pi IP) and Pin 10 of the Chassis Node connector C. If there is no continuity between Pin B and Pin 10, test is complete. Go to Stop 5-1. Pin A - Ground connector C. If there is continuity between Pin B and Pin 10, test is complete. Go to Stop 5-2. Pin B - Signal connector C. If there is continuity between Pin B and Pin 10, test is complete. Go to Stop 5-2. Node electrical connections. connector C. If there is no continuity between Pin B and Pin 10, test is complete. Go to Stop 5-2. Alternate test method: Reasistance in the oil temperature sensor (thermist signal wire changes as oil temperature sensor theresson (thermist signal wire changes as oil temperature sensor thaness connector and connecting a resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. If days are defined to the problem is a defective oil temperature sensor. Se table below. If days are defined to the chass as 0. If days are defined to the chassis Node electrical connecting a resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. If days are defined to the problem is a defective oil temperature sensor. Se table below. If days are defined to the problem is a defective oil temperature sensor. Se table below. If days are defined to the chass as 0. If days are defined to the days are defined to the days are days are defined to the days as 0. | | sensor. | connector ground wire (Pin A) and | a. If there is continuity between Pin A and the | e ground terminal, test is |
| Initimeter, check (Signal) - There should be continuity between the sensor connector signal wire (Pin B) and Pin 10 of the Chassis Node Pin A - Ground b. If there is no continuity between sensor connector Pin B and Pin 10 of the Chassis Node Pin B - Signal See Chassis Node Pin B - Signal connector C. a. If there is no continuity between Pin B and Pin 10, test is complete. Go to Step 5. Node electrical connections. connector Pin B and Pin 10, test is complete. Go to Step 5.2 Alternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature increases/decreases. 1. By unplugging the oil temperature sensor tharmess connector and connections. connection are sistor decade box (i.e., Ametek PST2000 Tester), or a appropriate resistor of Pin S A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. 3. If gauge needle moves to approximately the same temperature as in the table below. Here YF Resistance Ohmes 4-0 4.11 100,856 -22 52,594 4.14 16,120 3.2 9,399 4.3 248,682 4.4 28,682 4.4 28,682 4.14 16,120 3.2 9,399 5.5 5,658 6.8 3,511 | | Using a digital | a cab ground terminal. | complete. Go to Step 5-2. | |
| continuity on ground and signal wire at sensor connector. connector signal wire (Pin B) and Pin 10 of the Chassis Node connector C. Check for continuity between sor connector Pin B and Pin 10 of th Chassis Node connector C. Pin A – Ground Pin B - Signal See Chassis Node connector C. If there is continuity between Pin B and Pin 10, test is complete. Go to Step 5. See Chassis Node connections. If there is no continuity between Pin B and Pin 10, test is complete. Go to Step 5. Node electrical connections. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5.2. Alternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature increases/dccreases. I By unplugging the oil temperature sensor harness connector and connecting a resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. I Desrve vehicle gauge reading on dash. I If gauge needle moves to approximately the same temperature as in the table below. The problem is a defective oil temperature sensor. Se table below. 40 100.856 22 52.504 43 14 16.120 33.6 35.11 440 100.856 68 2.240 14 16.120 158 486.7 164 1 | | multimeter, check | (Signal) - There should be | b. If there is no continuity between Pin A and | the ground terminal, |
| and signal wire at sensor connector signal wire (Pin B) and Pin 10 of the Chassis Node connector C. Check for continuity between Pin B and Pin 10, test is complete. Connector C. If there is continuity between Pin B and Pin 10, test is complete. Go to Step 6 If there is no continuity between Pin B and Pin 10, test is complete. Signal wire changes as of the performance of the chassis Node connector S. If there is no continuity between Pin B and Pin 10, test is complete. Signal wire changes as of the performance of the chassis Node electrical connections. If there is no continuity between Pin B and Pin 10, test is complete. Signal wire changes as of the performance sensor thermess connector and connecting a resistor decade box (i.e., Ametek PST2000 Tester), or an appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. Observe vehicle gauge reading on dash. If gauge needle moves to approximately the same temperature as in the table below. Temp *F Resistance Other 40 100,856 -22 0,5254 -4 4 28,582 -14 100,856 -22 0,5254 -4 4 28,582 -14 100,856 -22 0,5254 -4 4 28,582 -14 100,856 -22 0,5254 -4 4 28,582 -14 100,856 -22 0,5254 -4 4 28,582 -14 100,856 -22 0,5658 -68 3,511 -68 2,240 -14 1,61,20 -22 0,939 -50 5,558 -68 68 3,511 -68 2,240 -14 1,61,20 -22 0,939 -50 5,558 -68 68 3,511 -68 2,240 -14 1,465 -122 0,903 -15,558 -68 3,511 -68 -2,240 -14 -14 -14,65 -122 0,903 -15,558 -68 -15,558 -168 -158 -168 -122 -168 -178 -176 -1333.8 -194 -124 -18,18 -124 -124 -134 -124 -124 -134 -124 -124 -134 -124 -124 -134 -124 -134 -124 -124 -134 -124 -124 -134 -124 -124 -134 -124 -124 -134 -124 -124 -134 -124 -134 -134 -134 -134 -134 -134 -134 -13 | | continuity on ground | continuity between the sensor | repair wiring as necessary. Go to Step 5- | 1. |
| sensor connector. and Pin 10 of the Chassis Node connector C. Chassis Node connector C. Pin B - Signal See Chassis Node See Chassis Node If there is continuity between Pin B and Pin 10, test is complete. Go to Step 6. Indext for terminal details of the Chassis Node electrical connections. If there is no continuity between Pin B and Pin 10, repair wiring a necessary. Go to Step 5-2. Alternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature sensor thaness connector and connecting a resistor decade box (e., Ametek PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. If gauge needle moves to approximately the same temperature as in the table below, the problem is a defective oil temperature as nor. Se table below. Very *F Resistance Ohmes 440 100,856 -22 22 52,594 -4 28,582 14 16,120 32 9,399 50 6,688 68 3,511 86 2,240 104 1,465 122 960.3 140 670.9 158 486.7 164 248. | | and signal wire at | connector signal wire (Pin B) | 2. Check for continuity between sensor connector | Pin B and Pin 10 of the |
| Pin A – Ground connector C. Pin B - Signal a. If there is continuity between Pin B and Pin 10, test is complete. Go to Step 5. See Chassis Node electrical connections. b. If there is no continuity between Pin B and Pin 10, repair wiring a mecessary. Go to Step 5-2. Alternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature sensor harness connector and connecting a resistor decade box (i.e., Ameter NST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge readie moves to approximately the same temperature sensor. Set table below. ************************************ | | sensor connector. | and Pin 10 of the Chassis Node | Chassis Node connector C. | |
| Pin B - Signal Go to Step 6. See Chassis Node | | Pin A – Ground | connector C. | a. If there is continuity between Pin B and Pi | in 10, test is complete. |
| See Chassis Node Pinout for terminal details of the Chassis Node electrical connections. Alternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature sensor charness connector and connecting a resistor decade box (i.e., Ametek PST2000 Tester), or al appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. If gauge needle moves to approximately the same temperature as in the table below, the problem is a defective oil temperature sensor. Se table below. 40 100,856 -22 52,594 44 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980,3 140 104 141 6,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980,3 140 176 158 468,7 176 333,8 | | Pin B - Signal | | Go to Step 6. | |
| Proout for terminal details of the Chassis Node electrical connections. Alternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature sensor harness connector and connecting are seistor decade box (i.e., Ametek PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. If gauge needle moves to approximately the same temperature as in the table below, the problem is a defective oil temperature sensor. Se table below. 40 100,856 -22 52,594 -4 28,582 14 16,120 32 9,399 50 6,658 68 3,3511 86 2,240 104 1,465 122 990,3 140 6,70,9 158 448,7 176 333,8 194 241,8 212 178,03 230 133,08 194 241,8 213 248 100,91 248 100,91 248 100,91 248 100,91 | | See Chassis Node | | b. If there is no continuity between Pin B and | l Pin 10. repair wiring as |
| details of the Chassis Atternate test method: Resistance in the oil temperature sensor (thermist signal wire changes as oil temperature increases/decreases. 1. By unplugging the oil temperature sensor harness connector and connecting a resistor decade box (i.e., Ametek PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. If gauge needle movers to approximately the same temperature as in the table below. Yerng °F Resistance Ohms 40 100,856 -22 52,594 -40 100,856 -22 52,594 -40 100,856 -22 52,594 -44 28,592 14 16,120 32 9,399 50 5,658 68 3,511 68 2,240 104 1,465 122 980,3 14 16,120 158 468,71 168 2,240 104 1,465 122 980,3 140 16,86,71 158 468,71 | | Pinout for terminal | | necessary. Go to Step 5-2. | , 1 |
| Node electrical connections. International control control control control control control signal wire charges as oil temperature increases/decreases. 1. By unplugging the oil temperature sensor harness connector and connecting a resistor decade box (i.e., Ametek PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. If gauge needle moves to approximately the same temperature as in the table below, the problem is a defective oil temperature sensor. Se table below. 40 100,856 -22 52,594 -4 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 14,65 122 980,3 130 140 670,9 140 104 670,9 141 1,465 122 143 1,465 144 144 1,465 122 158 468,7 176 158 468,7 176 158 468,7 133,08 159 133,08 133,08 < | | details of the Chassis | | Alternate test method: Resistance in the oil temper | rature sensor (thermistor) |
| connections. Image: Connections of the outside conduction. 1. By unplugging the oil temperature sensor harness connector and connecting a resistor decade box (i.e., Ametek PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. 2. Observe vehicle gauge reading on dash. 3. If gauge needle moves to approximately the same temperature sensor. Se table below. 40 100,856 -22 52,594 -4 28,682 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980,3 140 104,455 122 980,3 141 1,465 122 980,3 134 144 140 1465 122 980,3 140 1465 122 980,3 140 1465 122 980,3 140 670,9 158 468,7 168 32,82 | | Node electrical | | signal wire changes as oil temperature increases/de | creases |
| I. by unpudging the emission matrices contraction and connecting a resistor decade box (i.e., Ametek PST2000 Tester), or a appropriate resistor to Pins A and B, you can simulate the sensor by dialing in a known resistance. I. Doserve vehicle gauge reading on dash. If gauge needle moves to approximately the same temperature as in the table below, the problem is a defective oil temperature sensor. Se table below. Temp °F Resistance Ohms 40 100,856 -22 52,594 -44 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 14,665 122 980,3 140 670,9 158 468,7 176 333.8 194 241.8 194 241.8 194 241.8 194 241.8 194 241.8 100,91 266 77,54 | | connections. | | 1 By upplugging the oil temporature sensor harn | oss connector and |
| Image: Control of the second state | | | | connecting a resistor decade box (i.e. Ametek | PST2000 Tester) or an |
| Image: Second | | | | appropriate resistor to Pins A and B, you can s | imulate the sensor by |
| Temp % Resistance Ohms 2. Observe vehicle gauge reading on dash. 3. If gauge needle moves to approximately the same temperature as in the table below, the problem is a defective oil temperature sensor. See table below. 40 100.856 -22 52.594 -4 28.582 14 16,120 32 9.399 50 5.658 68 3.511 86 2.240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 | | | | dialing in a known resistance | |
| Image: Construct and the state of the state is a second | | | | 2 Observe vehicle gauge reading on dash | |
| Image is a serie index of approximately the same temperature as in the table below, the problem is a defective oil temperature sensor. Se table below. Temp °F Resistance Ohms -40 100,856 -22 52,594 -4 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 105 5,658 114 16,120 32 9,399 50 5,658 122 980,3 104 1,465 122 980,3 140 670,9 158 468,7 176 333.8 194 241.8 212 178,03 230 133.08 248 100.91 266 77.54 | | | | 2. Observe venice gauge reading on dash. | |
| Temp °F Resistance Ohms -40 100,856 -22 52,594 -4 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 102 980,3 104 1,465 114 16,120 105 104 104 1,465 104 1,465 104 1,465 104 1,465 104 1,465 104 1,465 104 1,465 104 1,465 104 1,465 105 468,7 104 1,465 105 468,7 104 241,8 104 241,8 104 241,8 104 241,8 104 241,8 104 2448 | | | | If gauge needle moves to approximately the satisfies a defective oil to | me temperature as in |
| Temp °F Resistance Ohms -40 100,856 -22 52,594 -4 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 | | | | table below. | imperature sensor. See |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | | | | Temp °F | Resistance Ohms |
| -22 52,594 -4 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980.3 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 194 241.8 194 241.8 194 241.8 194 241.8 194 244.8 100.91 13.08 248 100.91 | | | | -40 | 100,856 |
| -4 28,582 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | -22 | 52,594 |
| 14 16,120 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | -4 | 28,582 |
| 32 9,399 50 5,658 68 3,511 86 2,240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 14 | 16,120 |
| 1 | | | | 32 | 9 399 |
| 68 3,511 68 2,240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 50 | 5 658 |
| 86 2,240 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 68 | 3 511 |
| 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 86 | 2 240 |
| 104 1,465 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 104 | 1 /65 |
| 122 980.3 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 104 | 1,405 |
| 140 670.9 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 122 | 980.3 |
| 158 468.7 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 140 | 670.9 |
| 176 333.8 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 158 | 468.7 |
| 194 241.8 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 176 | 333.8 |
| 212 178.03 230 133.08 248 100.91 266 77.54 | | | | 194 | 241.8 |
| 230 133.08 248 100.91 266 77.54 | | | | 212 | 178.03 |
| 248 100.91 266 77.54 | | | | 230 | 133.08 |
| 266 77.54 | | | | 248 | 100.91 |
| | | | | 266 | 77.54 |

| Step | Check | Result | Next Step | |
|------|------------------------|-------------------------------------|---|-----------------------------------|
| | | | 284 | 60.32 |
| | | | 302 | 47.46 |
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24.58 |
| | | | 274 | 24.56 |
| | | | 374 | 20.11 |
| 6 | Select "Diagnose" to | DTC 7703 - Open in axle 2 oil temp | 392 1 Using a jumper wire, jump across sensor harnes | 10.58 s connector Pins A and B |
| Ū | view rear drive axle | circuit is displayed as "Active " | | |
| | temperature gauge | | | |
| | DTCs. | | | |
| | Unplug oil temperature | | | |
| | harness connector at | | | |
| | sensor. | | | |
| | See Chassis Node | | | |
| | Pinout for terminal | | | |
| | details of the Chassis | | 2 | |
| | Node electrical | | | |
| | connections. | | 1. Pin B | |
| | | | 2. Pin A | |
| | | | | |
| | | | | |
| | | | a. If an "Active" DTC 7704 - Short in axle 2 | temp circuit is now |
| | | | displayed, you have confirmed there is no | t an open in the sensor |
| | | | signal wire to the Chassis Node. The origi | nal fault (DTC 7703) was |
| | | | logged because there is an open in the oil | temperature sensor itself, |
| | | | not the wiring. Replace sensor. Go to Ste | p 2. |
| | | | b. If DTC 7704 is not displayed, there is an o | open circuit in the signal |
| | | | wire between sensor connector Pin B and | Pin 10 of the Chassis |
| | | | Node connector C. Repair wiring as neces | sary. Go to Step 2. |
| | | | Alternate test method: Check for continuity betwee | en sensor connector Pin B |
| | | | (sensor signal) and Pin 10 of the Chassis Node con | nector C. |
| | | | 1. If there is no continuity, repair wiring as necess | ary. After repairs, DTC |
| | | | 7703 should now be displayed as "Inactive." | |
| | | | 2. If there is continuity between sensor connector | Pin B and Pin 10 of the |
| | | | Chassis Node connector C, the open circuit is i | n the sensor itself, not in |
| | | | the wiring. Replace sensor. | · · · · · · |
| 7 | Select "Diagnose" to | DIC //04 - Short in axle 2 oil temp | IT the fault is still "Active" after unplugging the senso | r connector, you have |
| | | circuit is displayed as "Active." | 10 of the Chassis Node connector C | sensor signar) and Pin |
| | | | 1. Chock for a pipehod or shoffed with between P | in P (concercional) and |
| | Next unnlug the oil | | Pin 10 of the Chassis Node connector C. Dans | in b (sensor signal) and |
| | temperature harness | | Go to Step 2 | in winning as necessary. |
| | connector at sensor | DTC 7704 - Short in axle 2 oil | If DTC 7704 changes to "Inactive" after unplugging t | he sensor connector vou |
| | See Chassis Node | temp circuit is now displayed as | have confirmed the problem is a short in the sensor | itself, not the wiring. |
| | Pinout for terminal | "Inactive." | 1. Replace sensor. Go to Step 2 | |
| | details of the Chassis | | | |
| | Node electrical | | | |
| | connections. | | | |

Center/Steer Axle Oil Temperature Gauge Inoperative

DTC7803 and DTC7804

Symptom: Center/Steer axle oil temperature gauge inoperative. All other gauges are operational.

The Center/Steer Axle Oil Temperature Gauge uses a thermistor sensor to measure axle oil temperature.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|--|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Center/Steer Axle | display reasonable reading. | |
| | Oil Temperature," then | | |
| | select "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | L NOTE |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | | |
| | | | 1. Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | | daisy chain. |
| | | | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5 . |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2. |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | i. If gauge functions properly test is complete. Install new gauge |
| | | | |
| | | | II. If gauge does not function during "Simulate" test, install lest |
| | | | CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanentily. Re-test and return truck to service. |
| | | | (2) It gauge does not function property during "Simulate" test, |
| | | | replace gauge. |
| | | | 6. Once gauge is replaced. |
| | | | a. Verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a. Yes. Return truck to service. |

| 4 Select "Diagnose" to view center/steer axle temperature gauge diagnostic trouble codes. DTC 7803 displayed - Open in axle 3 oil temp circuit. Indicates the problem could be an open in the wiring from the Chassis Node the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. 5 Unplug oil temperature displayed (Sensor Ground) - There should be continuity between the sensor 1. Check for continuity between sensor connector Pin A and firewall groun stud | Step | Check | Result | Next Step | |
|--|----------|------------------------|-----------------------------------|---|--------------------------------|
| Step 4. 4 Select "Diagnose" to view center/steer axle temperature gauge diagnostic trouble codes. DTC 7803 displayed - Open in axle 3 oil temp circuit. Indicates the problem could be an open in the wiring from the Chassis Node the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. 5 Unplug oil temperature barness connector at (Sensor Ground) - There should be continuity between the sensor 1. Check for continuity between sensor connector Pin A and firewall groun stud | | | | b. No, Gauge and CVSG data link wiring is r | not the problem. Go to |
| 4 Select "Diagnose" to view center/steer axle temperature gauge diagnostic trouble codes. DTC 7803 displayed - Open in axle 3 oil temp circuit. Indicates the problem could be an open in the wiring from the Chassis Node the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. 5 Unplug oil temperature barness connector at (Sensor Ground) - There should be continuity between the sensor 1. Check for continuity between sensor connector Pin A and firewall groun stud | | | | Step 4. | |
| view center/steer axle axle 3 oil temp circuit. the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. temperature gauge DTC 7804 displayed - Short in Indicates the problem could be a short to ground in the wiring from the Chas diagnostic trouble axle 3 oil temp circuit. Node to the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. codes. DTC 7804 displayed - Short in Indicates the problem could be a short to ground in the wiring from the Chas Step 7. Step 7. 5 Unplug oil temperature (Sensor Ground) - There should 1. barness connector at be continuity between the sensor stud | 4 | Select "Diagnose" to | DTC 7803 displayed - Open in | Indicates the problem could be an open in the wiring | from the Chassis Node to |
| temperature gauge diagnostic trouble codes. DTC 7804 displayed - Short in axle 3 oil temp circuit. Indicates the problem could be a short to ground in the wiring from the Chas Node to the sensor or a defective sensor. Go to Step 5, and if necessary, Step 7. 5 Unplug oil temperature barness connector at (Sensor Ground) - There should be continuity between the sensor 1. Check for continuity between sensor connector Pin A and firewall groun stud | | view center/steer axle | axle 3 oil temp circuit. | the sensor or a defective sensor. Go to Step 5, and | if necessary, Step 6. |
| diagnostic trouble codes. axle 3 oil temp circuit. Node to the sensor or a defective sensor. Go to Step 5, and if necessary, Step 7. 5 Unplug oil temperature barness connector at (Sensor Ground) - There should be continuity between the sensor 1. Check for continuity between sensor connector Pin A and firewall groun stud | | temperature gauge | DTC 7804 displayed - Short in | Indicates the problem could be a short to ground in the | he wiring from the Chassis |
| codes. Step 7. 5 Unplug oil temperature (Sensor Ground) - There should barness connector Pin A and firewall groun barness connector at be continuity between the sensor stude 1. | | diagnostic trouble | axle 3 oil temp circuit. | Node to the sensor or a defective sensor. Go to Ste | p 5 , and if necessary, |
| 5 Unplug oil temperature (Sensor Ground) - There should 1. Check for continuity between sensor connector Pin A and firewall grou- | <u> </u> | codes. | | Step 7. | |
| L Inamess connector at the continuity between the sensor the stud | 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. Check for continuity between sensor connector | Pin A and firewall ground |
| | | harness connector at | be continuity between the sensor | stud. | |
| sensor. Connector ground wire (Pin A) and a. If there is continuity between Pin A and the ground terminal, test i | | sensor. | connector ground wire (Pin A) and | a. If there is continuity between Pin A and the | e ground terminal, test is |
| Using a digital a cab ground terminal. complete. Go to Step 5-2. | | Using a digital | a cab ground terminal. | complete. Go to Step 5-2. | |
| b. If there is no continuity between Pin A and the ground terminal, | | multimeter, check | (Signal) - There should be | b. If there is no continuity between Pin A and | d the ground terminal, |
| repair wiring as necessary. Go to Step 5-1. | | and signal wire at | connector signal wire (Pin B) | repair wiring as necessary. Go to Step 5- | 1. |
| 2. Check for continuity between sensor connector Pin B and Pin 16 of the Chassis Node | | sensor connector | and Pin 16 of the Chassis Node | 2. Check for continuity between sensor connector | Pin B and Pin 16 of the |
| Pin A – Ground Connector C | | Pin A – Ground | connector C | Chassis Node connector C. | |
| a. If there is continuity between Pin B and Pin 16, test is complete. | | Pin B - Signal | | a. If there is continuity between Pin B and Pi | in 16, test is complete. |
| Go to Step 6. | | See Chassis Node | | Go to Step 6. | |
| b. If there is no continuity between Pin B and Pin 16, repair wiring as | | Pinout for terminal | | b. If there is no continuity between Pin B and | Pin 16, repair wiring as |
| details of the Chassis | | details of the Chassis | | necessary. Go to Step 5-2. | |
| Alternate test method: Resistance in the oil temperature sensor (thermistor | | Node electrical | | Alternate test method: Resistance in the oil tempe | rature sensor (thermistor) |
| connections. signal wire changes as oil temperature increases/decreases. | | connections. | | signal wire changes as oil temperature increases/de | creases. |
| 1. By unplugging the oil temperature sensor harness connector and | | | | 1. By unplugging the oil temperature sensor harn | ess connector and |
| connecting a resistor decade box (i.e., Ametek PST2000 Tester), or an | | | | connecting a resistor decade box (i.e., Ametek | PST2000 Tester), or an |
| appropriate resistor to Pins A and B, you can simulate the sensor by | | | | appropriate resistor to Pins A and B, you can s | imulate the sensor by |
| dialing in a known resistance. | | | | dialing in a known resistance. | |
| 2. Observe vehicle gauge reading on dash. | | | | 2. Observe vehicle gauge reading on dash. | |
| 3. If gauge needle moves to approximately the same temperature as in | | | | 3. If gauge needle moves to approximately the sa | me temperature as in |
| the table below, the problem is a defective oil temperature sensor. See | | | | the table below, the problem is a defective oil te | emperature sensor. See |
| table below. | | | | table below. | |
| Temp °F Resistance Ohms | | | | Temp °F | Resistance Ohms |
| -40 100,656 | | | | -40 | 100,656 |
| -22 52,594 | | | | -22 | 52,594 |
| | | | | -4 | 28,582 |
| 14 16,120 | | | | 14 | 16,120 |
| 32 9,399 | | | | 32 | 9,399 |
| 50 5,658 | | | | 50 | 5,658 |
| 68 3,511 | | | | 68 | 3,511 |
| 86 2,240 | | | | 86 | 2,240 |
| 104 1,465 | | | | 104 | 1,465 |
| 122 980.3 | | | | 122 | 980.3 |
| 140 670.9 | | | | 140 | 670.9 |
| 158 468.7 | | | | 158 | 468.7 |
| 176 333.8 | | | | 176 | 333.8 |
| 194 241.8 | | | | 194 | 241.8 |
| 212 178.03 | | | | 212 | 178.03 |
| 230 133.08 | | | | 230 | 133.08 |
| 248 100.91 | | | | 248 | 100.91 |
| 266 77.54 | | | | 266 | 77.54 |

| Step | Check | Result | Next Step | | |
|------|------------------------|-------------------------------------|--|--------------------------------|--|
| | | | 284 | 60.32 | |
| | | | 302 | 47.46 | |
| | | | 320 | 37.75 | |
| | | | 338 | 30.32 | |
| | | | 356 | 24.58 | |
| | | | 374 | 20.11 | |
| | | | 302 | 16 58 | |
| 6 | Select "Diagnose" to | DTC 7803 - Open in axle 3 oil temp | Using a jumper wire, jump across sensor harnes | ss connector Pins A and B. | |
| | view center/steer axle | circuit is displayed as "Active." | | | |
| | temperature gauge | | 1 - Ester | | |
| | DTCs. | | | | |
| | Unplug oil temperature | | | | |
| | harness connector at | | | | |
| | sensor. | | | | |
| | See Chassis Node | | | | |
| | Pinout for terminal | | | | |
| | details of the Chassis | | 2 | | |
| | Node electrical | | | | |
| | connections. | | 1. Pin B | | |
| | | | 2. Pin A | | |
| | | | | | |
| | | | | | |
| | | | a. If an "Active" DTC 7804 - Short in axle 3 | temp circuit is now | |
| | | | displayed, you have confirmed there is not an open in the sensor | | |
| | | | signal wire to the Chassis Node. The original fault (DTC 7803) was | | |
| | | | logged because there is an open in the oil temperature sensor itself, | | |
| | | | not the wiring. Replace sensor. Go to Step 2. | | |
| | | | b. If DTC 7804 is not displayed, there is an open circuit in the signal | | |
| | | | wire between sensor connector Pin B and Pin 16 of the Chassis | | |
| | | | Node connector C. Repair wiring as necessary. Go to Step 2 . | | |
| | | | Alternate test method: Check for continuity between sensor connector Pin B | | |
| | | | (sensor signal) and Pin 16 of the Chassis Node connector C. | | |
| | | | 1. If there is no continuity, repair wiring as necessary. After repairs, DTC | | |
| | | | 7803 should now be displayed as "Inactive." | | |
| | | | 2. If there is continuity between sensor connector Pin 16 of the Chassis | | |
| | | | Node connector C, the open circuit is in the sen | sor itself, not in the wiring. | |
| 7 | Select "Diagnose" to | DTC 7804 - Short in axle 3 oil temp | Replace sensor. | r connector you have | |
| | view center/steer axle | circuit is displayed as "Active " | confirmed there is a short to around between Pin R | (sensor signal) and Pin | |
| | temperature gauge | | 16 of the Chassis Node connector C. | | |
| | DTCs. | | 1. Check for a pinched or chaffed wire between P | in B (sensor signal) and | |
| | Next, unplug the oil | | Pin 16 of the Chassis Node connector C. Repa | ir wiring as necessary. | |
| | temperature harness | | Go to Step 2. | <u> </u> | |
| | connector at sensor. | DTC 7804 - Short in axle 3 oil | If DTC 77804 changes to "Inactive" after unplugging | the sensor connector, you | |
| | See Chassis Node | temp circuit is now displayed as | have confirmed the problem is a short in the sensor | itself, not the wiring. | |
| | Pinout for terminal | "Inactive." | 1. Replace sensor. Go to Step 2. | | |
| | details of the Chassis | | | | |
| | Node electrical | | | | |
| | connections. | | | | |

DTC17703 and DTC17704

Symptom: Transmission oil temperature gauge inoperative. All other gauges are operational.

The Transmission Oil Temperature Gauge uses a thermistor sensor to measure transmission oil temperature.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|--|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Transmission Oil | display reasonable reading. | |
| | Temperature," then | | |
| | select "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | LI NOTE |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale Observe | image Go to Step 3-7 | the parameter for the inoperative gauge is enabled |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement | | parameter set to disabled |
| | movement. | | |
| | | | 1. Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | | daisy chain. |
| | | | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5 . |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2. |
| | | | 2 Check continuity between Pin 1 on gauge barness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | i If gauge functions properly test is complete. Install new gauge |
| | | | permanently. Re-test and return truck to service. |
| | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test. |
| | | | replace gauge. |
| | | | 6. Once gauge is replaced. |
| | | | a Verify gauge functionality |
| | | | b Paturn truck to service |
| | | | |
| | | | 7. IS THIS A RECHECK ATTER STEP 5, STEP 6 OF STEP 7? |
| | | | a. Yes. Return truck to service. |

| Step | Check | Result | Next Step | |
|------|-------------------------|-----------------------------------|--|----------------------------|
| | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to Step 4 | |
| 4 | Select "Diagnose" to | DTC 17703 displayed – Open in | Indicates the problem could be an open in the wiring | from the CECU to the |
| | view main transmission | transmission oil temp circuit. | sensor or a defective sensor. Go to Step 5, and if ne | ecessary, Step 6. |
| | oil temperature gauge | DTC 17704 displayed – Short in | Indicates the problem could be a short to ground in t | he wiring from the CECU |
| | diagnostic trouble | transmission oil temp circuit. | to the sensor or a defective sensor. Go to Step 5, ar | nd if necessary, Step 7. |
| | codes. | | | |
| 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. Check for continuity between sensor connector | Pin A and firewall ground |
| | harness connector at | be continuity between the sensor | stud. | |
| | sensor. | connector ground wire (Pin A) and | a. If there is continuity between Pin A and the | e ground terminal, test is |
| | Using a digital | a cab ground terminal. | complete. Go to Step 5-2. | 0 |
| | multimeter, check | (Signal) - There should be | b If there is no continuity between Pin A and | d the around terminal |
| | continuity on ground | continuity between the sensor | renair wiring as necessary. Go to Step 5- | 1 |
| | and signal wire at | connector signal wire (Pin B) | 2 Check for continuity between concer connector | Din B and Din 21 of the |
| | sensor connector. | and Pin 21 of the 52 Pin CECU | 52 Pin CECI I connector C | |
| | Pin A – Ground | connector C. | | |
| | Pin B - Signal | | a. If there is continuity between Pin B and Pi | n 21, test is complete. |
| | See CECU Pinout | | Go to Step 6. | |
| | for terminal details of | | b. If there is no continuity between Pin B and | I Pin 21 at CECU, repair |
| | the CECU electrical | | wiring as necessary. Go to Step 5-2. | |
| | connections. | | Alternate test method: Resistance in the oil temper | rature sensor (thermistor) |
| | | | signal wire changes as oil temperature increases/de | creases. |
| | | | 1. By unplugging the oil temperature sensor harn | ess connector and |
| | | | connecting a resistor decade box (i.e., Ametek | PST2000 Tester), or an |
| | | | appropriate resistor to Pins A and B, you can s | imulate the sensor by |
| | | | dialing in a known resistance. | |
| | | | 2. Observe vehicle gauge reading on dash. | |
| | | | 3. If gauge needle moves to approximately the sa | ime temperature as in |
| | | | the table below, the problem is a defective oil te | emperature sensor. See |
| | | | table below. | 1 |
| | | | Temp °F | Resistance Ohms |
| | | | -40 | 100,856 |
| | | | -22 | 52,594 |
| | | | -4 | 28,582 |
| | | | 14 | 16,120 |
| | | | 32 | 9,399 |
| | | | 50 | 5,658 |
| | | | 68 | 3,511 |
| | | | 86 | 2,240 |
| | | | 104 | 1,465 |
| | | | 122 | 980.3 |
| | | | 140 | 670.9 |
| | | | 158 | 468.7 |
| | | | 176 | 333.8 |
| | | | 194 | 241.8 |
| | | | 212 | 178 03 |
| | | | 230 | 133.08 |
| | | | 248 | 100.91 |
| | | | 266 | 77 54 |
| | | | 200 | 11.04 |

| Step | Check | Result | Next Step | |
|------|-------------------------|-----------------------------------|--|-----------------------------|
| | | | 284 | 60.32 |
| | | | 302 | 47.46 |
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24 58 |
| | | | 374 | 20.11 |
| | | | 392 | 16 58 |
| 6 | Select "Diagnose" to | DTC 17703 - Open in transmission | 1. Using a jumper wire, jump across sensor harnes | s connector Pins A and B. |
| - | view transmission | oil temp circuit is displayed as | 1 | |
| | temperature gauge | "Active." | | |
| | DTCs. | | | |
| | Unplug oil temperature | | | |
| | harness connector at | | | |
| | sensor. | | | |
| | See CECU Pinout | | | |
| | for terminal details of | | | |
| | the CECU electrical | | 2 | |
| | connections. | | | |
| | | | 1. Pin B | |
| | | | 2. Pin A | |
| | | | | |
| | | | | |
| | | | a. If an "Active" DTC 17704 - Short in transm | ission temp circuit is now |
| | | | displayed you have confirmed there is not an open in the sensor | |
| | | | signal wire to the CECU. The original fault (DTC 17703) was logged | |
| | | | because there is an open in the oil temperature sensor itself, not | |
| | | | the wiring. Go to Step 2 . | |
| | | | b. If DTC 17704 is not displayed, there is an open circuit in the signal | |
| | | | wire between sensor connector Pin B and Pin 21 of the 52 Pin | |
| | | | CECU connector C. Repair wiring as necessary. Go to Step 2. | |
| | | | Alternate test method: Check for continuity between sensor connector Pin B | |
| | | | (sensor signal) and Pin 21 of the 52 Pin CECU connector C. | |
| | | | 1. If there is no continuity, repair wiring as necessary. After repairs. DTC | |
| | | | 17703 should now be displayed as "Inactive." | |
| | | | 2. If there is continuity between sensor connector | Pin B and Pin 21 of the |
| | | | 52 Pin CECU connector C, the open circuit is ir | n the sensor itself, not in |
| | Soloot "Diagnoss" to | DTC 17704 Short in transmission | the wiring. Replace sensor. | r connector very have |
| ' | view transmission | oil temp circuit is displayed as | confirmed there is a short to ground between Dia P | (sensor signal) and Din |
| | temperature gauge | "Active " | 21 of the 52 Pin CECIJ connector C | oonsor signar and Fill |
| | DTCs | | 1 Check for a pipehod or shoffed wire between D | in D (concercional) and |
| | Next unplug the oil | | Check for a pinched or chaffed wire between P | in b (sensor signal) and |
| | temperature harness | | Go to Stop 2 | winny as necessary. |
| | connector at sensor | DTC 17704 - Short in transmission | If DTC 17704 changes to "Inactive" after unplugging | the sensor connector you |
| | See CECU Pinout | oil temp circuit is now displayed | have confirmed the problem is a short in the sensor | itself, not the wirina. |
| | for terminal details of | as "Inactive." | 1 Replace sensor Go to Step 2 | , . |
| | the CECU electrical | | | |
| | connections. | | | |
Auxiliary Transmission Oil Temperature Gauge Inoperative

DTC44203 and DTC44204

Symptom: Auxiliary transmission oil temperature gauge inoperative. All other gauges are operational.

The Auxiliary Transmission Oil Temperature Gauge uses a thermistor sensor to measure transmission oil temperature. The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select "Auxiliary | Gauge graphic on screen does not | Go to Step 4. |
| | Transmission Oil | display reasonable reading. | |
| | Temperature," then | | |
| | select "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | <u>NOIE</u> |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | | 1 Check CVSC data link wiring: Observe Cauge position in the wiring |
| | | | daisy chain |
| | | | the second is recursted between two other functioning recurses (1/00) |
| | | | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2. |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. |
| | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | (1) If gauge functions properly test is complete Install new |
| | | | CECU permanently. Re-test and return truck to service |
| | | | (2) If gauge does not function properly during "Simulate" test |
| | | | replace gauge |
| | | | 6 Onco gaugo is roplaced |
| | | | U. Once yauge is replaced. |
| | | | a. verity gauge functionality. |
| | | | D. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a. Yes. Return truck to service. |

| Step | Check | Result | Next Step |
|------|------------------------|--------------------------------|---|
| | | | No, Gauge and CVSG data link wiring is not the problem. Go to Step 4. |
| 4 | Select "Diagnose" | DTC 44203 displayed - Open in | Indicates the problem could be an open in the wiring from the Chassis Node to |
| | to view auxiliary | aux transmission temp circuit. | the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. |
| | transmission oil | DTC 44204 displayed - Short in | Indicates the problem could be a short to ground in the wiring from the Chassis |
| | temperature gauge | aux transmission temp circuit. | Node to the sensor or a defective sensor. Go to Step 5, and if necessary, |
| | diagnostic trouble | | Step 7. |
| 5 | Unplug oil temperature | (Sensor Ground) | 1. Check for continuity |
| | harness connector at | - There should | between sensor |
| | sensor. | be continuity | connector Pin A and |
| | Using a digital | between | firewall ground stud. |
| | multimeter, check | the sensor | a If there is |
| | continuity on ground | connector | continuity |
| | and signal wire at | ground wire (Pin | between Pin A |
| | sensor connector. | A) and a cab | and the ground |
| | Pin A – Ground | ground terminal. | terminal, test is |
| | Pin B - Signal | (Signal) - | complete. Go |
| | See Chassis Node | There should | to Step 5-2. |
| | Pinout for terminal | be continuity | b If there is |
| | details of the Chassis | between | no continuity |
| | Node electrical | the sensor | between Pin A |
| | connections. | connector signal | and the ground |
| | | wire (Pin B) and | terminal, repair |
| | | Pin 6 of the | wiring as |
| | | Chassis Node | necessary. Go |
| | | connector B. | to Step 5-1. |
| | | | 2. Check for continuity |
| | | | between sensor |
| | | | connector Pin B and |
| | | | Pin 6 of the Chassis |
| | | | Node connector B. |
| | | | a. If there is |
| | | | continuity |
| | | | between Pin B |
| | | | and Pin 6, test |
| | | | is complete. |
| | | | Go to Step 6. |
| | | | b. If there is |
| | | | no continuity |
| | | | between Pin |
| | | | B and Pin 6, |
| | | | repair wiring as |
| | | | necessary. Go |
| | | | to Step 5-2. |
| | | | Alternate test method: |
| | | | Resistance in the |
| | | | oil temperature |
| | | | sensor (thermistor) |
| | I | I I | |

| Step | Check | Result | Next Step | |
|------|-------|--------|-----------------------|----------------|
| | | | signal wire changes | |
| | | | as oil temperature | |
| | | | increases/decreases. | |
| | | | 1. By unplugging the | |
| | | | oil temperature | |
| | | | sensor harness | |
| | | | connector and | |
| | | | connecting a | |
| | | | resistor decade | |
| | | | box (i.e., Ametek | |
| | | | PST2000 Tester), | |
| | | | or an appropriate | |
| | | | resistor to Pins A | |
| | | | and B, you can | |
| | | | simulate the sensor | |
| | | | by dialing in a known | |
| | | | resistance. | |
| | | | 2. Observe vehicle | |
| | | | gauge reading on | |
| | | | dash. | |
| | | | 3. If gauge needle | |
| | | | moves to | |
| | | | approximately the | |
| | | | same temperature | |
| | | | as in the table | |
| | | | below, the problem | |
| | | | is a defective oil | |
| | | | temperature sensor. | |
| | | | See table below. | |
| | | | | 100.856 |
| | | | -22 | 52 594 |
| | | | 1 | 28 582 |
| | | | 14 | 16 120 |
| | | | 20 | 0 200 |
| | | | 52 | J,JJJ 5 650 |
| | | | 50 | 0,000 |
| | | | 00 | 0.040 |
| | | | 00 | 2,240 |
| | | | 104 | 1,400 |
| | | | 122 | 980.3 |
| | | | 140 | 670.9 |
| | | | 158 | 468.7 |
| | | | 176 | 333.8 |
| | | | 194 | 241.8 |
| | | | 212 | 178.03 |
| | | | 230 | 133.08 |
| | | | 248 | 100.91 |
| | | | 266 | 77.54 |
| | | | 284 | 60.32 |

PACCAR

| Step | Check | Result | Next Step | |
|------|------------------------|----------------------------------|---|----------------------------|
| | | | 302 | 47.46 |
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24.58 |
| | | | 374 | 20 11 |
| | | | 392 | 16.58 |
| 6 | Select "Diagnose" | DTC 44203 - Open in aux | Using a jumper wire, jump across sensor harnes | ss connector Pins A and B. |
| | to view auxiliary | transmission temp circuit is | | |
| | transmission | displayed as "Active." | 1 - Esta | |
| | temperature gauge | | | |
| | DTCs. | | | |
| | Unplug oil temperature | | | |
| | harness connector at | | | |
| | sensor. | | | |
| | See Chassis Node | | | |
| | Pinout for terminal | | 2 | |
| | details of the Chassis | | | |
| | Node electrical | | 1. Pin B | |
| | connections. | | 2. Pin A | |
| | | | | |
| | | | | |
| | | | a. If an "Active" DTC 44204 - Short in transm | ission temp circuit is now |
| | | | displayed, you have confirmed there is no | t an open in the sensor |
| | | | signal wire to the Chassis Node. The orig | inal fault (DTC 44203) |
| | | | was logged because there is an open in the | ne oil temperature sensor |
| | | | itself, not the wiring. Go to Step 2. | |
| | | | b. If DTC 44204 is not displayed, there is an | open circuit in the signal |
| | | | wire between sensor connector Pin B and | Pin 6 of the Chassis Node |
| | | | connector B. Repair wiring as necessary. | Go to Step 2. |
| | | | Alternate test method: Check for continuity betwee | en sensor connector Pin B |
| | | | (sensor signal) and Pin 6 of the Chassis Node conne | ector B. |
| | | | If there is no continuity, repair wiring as necess 44203 should now be displayed as "Inactive." | ary. After repairs, DTC |
| | | | 2 If there is continuity between sensor connector | Pin B and Pin 6 of the |
| | | | Chassis Node connector R the open circuit is in | n the sensor itself not in |
| | | | the wiring. Replace sensor | |
| 7 | Select "Diagnose" | DTC 44204 - Short in aux | If the fault is still "Active" after unplugging the senso | r connector, you have |
| | to view auxiliary | transmission temp circuit is | confirmed there is a short to ground between Pin B | (sensor signal) and Pin |
| | transmission | displayed as "Active." | 6 of the Chassis Node connector B. | |
| | temperature gauge | | 1. Check for a pinched or chaffed wire between P | in B (sensor signal) and |
| | DTCs. | | Pin 6 of the Chassis Node connector B. Repair | wiring as necessary. Go |
| | Next, unplug the oil | | to Step 2. | |
| | temperature harness | DTC 44204 - Short in aux | If DTC 44204 changes to "Inactive" after unplugging | the sensor connector, you |
| | connector at sensor. | transmission temp circuit is now | have confirmed the problem is a short in the sensor | itself, not the wiring. |
| | See Chassis Node | displayed as "Inactive." | 1. Replace sensor. Go to Step 2. | |
| | Pinout for terminal | | | |
| | details of the Chassis | | | |
| | Node electrical | | | |
| | connections. | | | |

Transfer Case Oil Temperature Gauge Inoperative

DTC138803 and DTC138804

Symptom: Transfer case oil temperature gauge inoperative. All other gauges are operational.

The Transfer Case Oil Temperature Gauge uses a thermistor sensor to measure the oil temperature.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|--|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select "Transfer | Gauge graphic on screen does not | Go to Step 4. |
| | Case Oil Temperature," | display reasonable reading. | |
| | then select "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | | 1. Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | | daisy chain. |
| | | | a If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. Go to Step 3-5 |
| | | | h. If gauge is last gauge in drive chain or followed by other |
| | | | b. In gauge is last gauge in taily chain or followed by other |
| | | | Check continuity between Dir 4 on source between connector and Dir 44 |
| | | | 2. Check continuity between Pin 1 on gauge namess connector and Pin 14 |
| | | | |
| | | | 3. Check continuity between Pin 3 on gauge namess connector and Pin 15 |
| | | | Repair daisy chain jumper harness as necessary. |
| | | | 5 Once continuity on both wires exists perform "Simulate" test again |
| | | | b. Choc containing on boar whee exists, perform "Cimulate" test again. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | i. If gauge functions properly test is complete. Install new gauge |
| | | | permanently. Re-test and return truck to service. |
| | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | CECU and perform "Simulate" test again. |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECU permanently. Re-test and return truck to service. |
| | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | replace gauge. |
| | | | 6. Once gauge is replaced. |
| | | | a. Verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a. Yes. Return truck to service. |
| | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to |
| | | | Step 4. |

| Step | Check | Result | | | Next Step | |
|------|------------------------|-----------------------------------|------|-----------|--|-------------------------------------|
| 4 | Select "Diagnose" to | DTC 138803 displayed - Open in | Ind | icate | s the problem could be an open in the wiring | from the Chassis Node to |
| | view transfer case oil | transfer case oil temp circuit. | the | sen | sor or a defective sensor. Go to Step 5, and | if necessary, Step 6. |
| | temperature gauge | DTC 138804 displayed - Short in | Ind | icate | is the problem could be a short to ground in the | he wiring from the Chassis |
| | diagnostic trouble | transfer case oil temp circuit. | No | de to | the sensor or a defective sensor. Go to Ste | p 5 , and if necessary, |
| | codes. | | Ste | p 7. | | |
| 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. | Ch | eck for continuity between sensor connector | Pin A and firewall ground |
| | namess connector at | connector ground wire (Pin A) and | | SIL | | |
| | Lising a digital | a cab ground terminal | | а. | If there is continuity between Pin A and th | e ground terminal, test is |
| | | (Signal) - There should be | | | complete. Go to Step 5-2. | |
| | continuity on around | continuity between the sensor | | b. | If there is no continuity between Pin A and | d the ground terminal, |
| | and signal wire at | connector signal wire (Pin B) | | | repair wiring as necessary. Go to Step 5- | 1. |
| | sensor connector. | and Pin 4 of the Chassis Node | 2. | Ch | eck for continuity between sensor connector | ^r Pin B and Pin 4 of the |
| | Pin A – Ground | connector C. | | Ch | lassis Node connector C. | |
| | Pin B - Signal | | | а. | If there is continuity between Pin B and P | in 4, test is complete . |
| | See Chassis Node | | | | Go to Step 6. | |
| | Pinout for terminal | | | b. | If there is no continuity between Pin B and | l Pin 4 at Chassis Node, |
| | details of the Chassis | | | | repair wiring as necessary. Go to Step 5- | 2. |
| | Node electrical | | Alt | erna | te test method: Resistance in the oil tempe | rature sensor (thermistor) |
| | connections. | | sigi | nal w | vire changes as oil temperature increases/de | creases. |
| | | | 1. | By | unplugging the oil temperature sensor harn | ess connector and |
| | | | | co | nnecting a resistor decade box (i.e., Ametek | PST2000 Tester), or an |
| | | | | ap | propriate resistor to Pins A and B, you can s | simulate the sensor by |
| | | | | uia Ol | | |
| | | | 2. | Oc. | serve venicle gauge reading on dash. | |
| | | | 3. | lf g | gauge needle moves to approximately the sa | ame temperature as in |
| | | | | tok | a table below, the problem is a defective oil to | emperature sensor. See |
| | | | | tar | Temp °F | Resistance Ohms |
| | | | | | -40 | 100,856 |
| | | | | | -22 | 52,594 |
| | | | | | -4 | 28,582 |
| | | | | | 14 | 16,120 |
| | | | | | 32 | 9,399 |
| | | | | | 50 | 5,658 |
| | | | | | 68 | 3,511 |
| | | | | | 86 | 2,240 |
| | | | | | 104 | 1,465 |
| | | | | | 122 | 980.3 |
| | | | | | 140 | 670.9 |
| | | | | | 158 | 468.7 |
| | | | | | 176 | 333.8 |
| | | | | | 194 | 241.8 |
| | | | | | 212 | 178.03 |
| | | | | | 230 | 133.08 |
| | | | | | 248 | 100.91 |
| | | | | | 266 | 77.54 |
| | | | | | 284 | 60.32 |
| | | | | | 302 | 47.46 |

| Step | Check | Result | Next Step | |
|------|------------------------|------------------------------------|---|-----------------------------|
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24.58 |
| | | | 374 | 20.11 |
| | | | 392 | 16.58 |
| 6 | Select "Diagnose" to | DTC 138803 - Open in transfer | 1. Using a jumper wire, jump across sensor harnes | ss connector Pins A and B. |
| | view transfer case | case oil temp circuit is displayed | 1. | |
| | temperature gauge | as "Active." | | |
| | DTCs. | | | |
| | Unplug oil temperature | | | |
| | harness connector at | | | |
| | sensor. | | | |
| | See Chassis Node | | | |
| | Pinout for terminal | | | |
| | Nede electrical | | 2 | |
| | | | | |
| | connections. | | | |
| | | | 2. Pin A | |
| | | | | |
| | | | | e |
| | | | a. If an "Active" DTC 138804 - Short in trans | rer case oil temp circuit |
| | | | sensor signal wire to the Chassis Node | The original fault (DTC |
| | | | 138803) was logged because there is an o | open in the oil temperature |
| | | | sensor itself not the wiring Go to Step 2 | |
| | | | b If DTC 138804 is not displayed there is an | open circuit in the signal |
| | | | wire between sensor connector Pin B and | Pin 4 of the Chassis Node |
| | | | connector C. Repair wiring as necessary. | Go to Step 2. |
| | | | Alternate test method: Check for continuity betwee | en sensor connector Pin B |
| | | | (sensor signal) and Pin 4 of the Chassis Node conne | ector C. |
| | | | 1. If there is no continuity, repair wiring as necess | ary. After repairs, DTC |
| | | | 130003 Should now be displayed as "inactive." | Din D and Dir 4 - fith- |
| | | | Chassis Node connector C, the open circuit is if | |
| | | | the wiring. Replace sensor | |
| 7 | Select "Diagnose" to | DTC 138804 - Short in transfer | A . If the fault is still "Active" after unplugging the ser | nsor connector, you have |
| | view transfer case oil | case oil temp circuit is displayed | confirmed there is a short to ground between Pin B | (sensor signal) and Pin |
| | temperature gauge | as "Active." | 4 of the Chassis Node connector C. | |
| | DTCs. | | 1. Check for a pinched or chaffed wire between P | in B (sensor signal) and |
| | Next, unplug the oil | | Pin 4 of the Chassis Node connector C. Repair | wiring as necessary. |
| | temperature harness | | Go to Step 2. | |
| | connector at sensor. | DTC 138804 - Short in transfer | If DTC 138804 changes to "Inactive" after unpluggin | g the sensor connector, |
| | See Chassis Node | case oil temp circuit is now | you have confirmed the problem is a short in the sen | sor itself, not the wiring. |
| | Pinout for terminal | displayed as "Inactive." | 1. Replace sensor. Go to Step 2 . | |
| | details of the Chassis | | | |
| | Node electrical | | | |
| 1 | connections. | 1 | | |

PTO Oil Temperature Gauge Inoperative

DTC9003 and DTC9004

Symptom: PTO oil temperature gauge inoperative. All other gauges are operational.

The PTO Oil Temperature Gauge uses a thermistor sensor to measure the oil temperature.



| Step | Check | Result | Next Step | | |
|------|---------------------------|----------------------------------|-----------|---|--|
| 1 | Turn ignition key ON. | | Go to | Step 2. | |
| | Start ESA, then select | | | | |
| | "Connect" to establish | | | | |
| | communication to the | | | | |
| | vehicle. | | | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to | Step 3. | |
| | the "Components" | reasonable reading. | | | |
| | window, select "PTO | Gauge graphic on screen does not | Go to | Step 4. | |
| | Oil Temperature," then | display reasonable reading. | | | |
| | select "Open." | | | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform | m the following checks: | |
| | the "Value" bar until the | to Step 3-1. | | NOTE | |
| | pointer on the gauge | Vehicle gauge reading is in the | | NOTE | |
| | image is approximately | same range as the ESA gauge | Use | e the "Program" feature in ESA to make sure that | |
| | mid-scale. Observe | image. Go to Step 3-7. | the | parameter for the inoperative gauge is enabled. | |
| | vehicle gauge | | An | inoperative gauge may simply have its CECU | |
| | movement. | | para | ameter set to disabled. | |
| | | | 1 0 | theck CVSG data link wiring: Observe Gauge position in the wiring | |
| | | | 1. O | aisy chain | |
| | | | u. | If source is resurred between two other functioning source $O(20)$ | |
| | | | a | data lielawiden is OK Os to Otan 2 | |
| | | | | data link wiring is OK. Go to Step 3-5. | |
| | | | b. | . If gauge is last gauge in daisy chain or followed by other | |
| | | | | non-functional gauges, go to Step 3-2. | |
| | | | 2. C | Check continuity between Pin 1 on gauge harness connector and Pin 14 | |
| | | | o | f the 52 Pin CECU connector C. | |
| | | | 3. C | Check continuity between Pin 3 on gauge harness connector and Pin 15 | |
| | | | of | f the 52 Pin CECU connector C. | |
| | | | 4. R | Repair daisy chain jumper harness as necessary. | |
| | | | 5. O | Once continuity on both wires exists, perform "Simulate" test again. | |
| | | | a | If gauge functions properly during "Simulate" test, repair is complete. | |
| | | | | Return truck to service. | |
| | | | b | . If gauge does not function during "Simulate" test, install a known | |
| | | | | good gauge and perform "Simulate" test again. | |
| | | | | i. If gauge functions properly test is complete. Install new gauge | |
| | | | | permanently. Re-test and return truck to service. | |
| | | | | ii If dauge does not function during "Simulate" test install Test | |
| | | | | CECU and perform "Simulate" test again | |
| | | | | (1) If gauge functions properly test is complete Install new | |
| | | | | CECU permanently Re-test and return truck to service. | |
| | | | | (2) If gauge does not function properly during "Simulate" test | |
| | | | | replace gauge. | |
| | | | 6 0 | Dince dauge is replaced | |
| | | | - - | Verify gauge functionality | |
| | | | , a | Determ track to complete | |
| | | | D. | Return truck to service. | |
| | | | 7. Is | s this a recheck after Step 5, Step 6 or Step 7? | |
| | | | a | . Yes. Return truck to service. | |
| | | | b | . No, Gauge and CVSG data link wiring is not the problem. Go to | |
| | | | | Step 4. | |

| Step | Check | Result | Next Step | |
|------|------------------------|-----------------------------------|---|--------------------------------|
| 4 | Select "Diagnose" | DTC 9003 displayed - Open in | Indicates the problem could be an open in the wiring | from the Chassis Node to |
| | to view PTO oil | PTO oil temp circuit. | the sensor or a defective sensor. Go to Step 5, and | if necessary, Step 6. |
| | temperature gauge | DTC 9004 displayed - Short in | Indicates the problem could be a short to ground in the | ne wiring from the Chassis |
| | diagnostic trouble | PTO oil temp circuit. | Node to the sensor or a defective sensor. Go to Ste | p 5 , and if necessary, |
| | codes. | | Step 7. | |
| 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. Check for continuity between sensor connector | Pin A and firewall ground |
| | harness connector at | be continuity between the sensor | stud. | |
| | sensor. | connector ground wire (Pin A) and | a. If there is continuity between Pin A and the | e ground terminal, test is |
| | Using a digital | a cab ground terminal. | complete. Go to Step 5-2. | |
| | continuity on ground | (Signal) - There should be | b. If there is no continuity between Pin A and | d the ground terminal, |
| | and signal wire at | connector signal wire (Pin B) and | repair wiring as necessary. Go to Step 5 - | 1. |
| | sensor connector | Pin 7 of Chassis Node connector | 2. Check for continuity between sensor connector | Pin B and Pin 7 of |
| | Pin A – Ground | C | Chassis Node connector C. | |
| | Pin B - Signal | | a. If there is continuity between Pin B and P | in 7, test is complete . |
| | See Chassis Node | | Go to Step 6. | |
| | Pinout for terminal | | b. If there is no continuity between Pin B and | l Pin 7, repair wiring as |
| | details of the Chassis | | necessary. Go to Step 5-2. | |
| | Node electrical | | Alternate test method: Resistance in the oil tempe | rature sensor (thermistor) |
| | connections. | | signal wire changes as oil temperature increases/de | creases. |
| | | | 1. By unplugging the oil temperature sensor harn | ess connector and |
| | | | connecting a resistor decade box (i.e., Ametek | PST2000 Tester), or an |
| | | | appropriate resistor to Pins A and B, you can s | imulate the sensor by |
| | | | dialing in a known resistance. | |
| | | | 2. Observe vehicle gauge reading on dash. | |
| | | | 3. If gauge needle moves to approximately the sa | me temperature as in |
| | | | the table below, the problem is a defective oil te | emperature sensor. See |
| | | | table below. | |
| | | | Iemp °F | 100.856 |
| | | | -22 | 52 594 |
| | | | -4 | 28 582 |
| | | | 14 | 16 120 |
| | | | 30 | 0,120 |
| | | | 50 | 5,555 |
| | | | 68 | 3,511 |
| | | | 86 | 2 240 |
| | | | 104 | 2,240 |
| | | | 109 | 020 2 |
| | | | 140 | 670.0 |
| | | | 140 | 160 7 |
| | | | 176 | 400.7 |
| | | | 104 | 000.0 0/1 Q |
| | | | 134 | 241.0 |
| | | | 212 | 170.03 |
| | | | 230 | 133.08 |
| | | | 248 | 100.91 |
| | | | 266 | (1.54 |
| | | | 284 | 60.32 |
| | | | 302 | 47.46 |

| Step | Check | Result | Next Step | |
|------|------------------------|-----------------------------------|--|-----------------------------|
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24.58 |
| | | | 374 | 20.11 |
| | | | 392 | 16.58 |
| 6 | Select "Diagnose" to | DTC 9003 - Open in PTO oil temp | 1. Using a jumper wire, jump across sensor harnes | s connector Pins A and B. |
| | view PTO temperature | circuit is displayed as "Active." | 1 | |
| | gauge DTCs. | | The second secon | |
| | Unplug oil temperature | | | |
| | harness connector at | | | |
| | sensor. | | | |
| | See Chassis Node | | | |
| | Pinout for terminal | | | |
| | details of the Chassis | | | |
| | | | 2 | |
| | connections. | | 1 Pin B | |
| | | | 2 Pin A | |
| | | | 2. 1 11 7 | |
| | | | | |
| | | | a If an "Active" DTC 9004 - Short in PTO oi | l temp circuit is now |
| | | | displayed you have confirmed there is no | t an open in the sensor |
| | | | signal wire to the Chassis Node. The origi | nal fault (DTC 9003) was |
| | | | logged because there is an open in the oil | temperature sensor itself, |
| | | | not the wiring. Go to Step 2. | |
| | | | b. If DTC 9004 is not displayed, there is an o | open circuit in the signal |
| | | | wire between sensor connector Pin B and | Pin 7 of Chassis Node |
| | | | connector C. Repair wiring as necessary. | Go to Step 2. |
| | | | Alternate test method: Check for continuity betwee | en sensor connector Pin B |
| | | | (sensor signal) and Pin 7 of Chassis Node connecto | r C. |
| | | | 1. If there is no continuity, repair wiring as necess | ary. After repairs, DTC |
| | | | 9003 should now be displayed as "Inactive." | |
| | | | 2. If there is continuity between sensor connector | Pin B and Pin 7 of |
| | | | the wiring Deplace connector C, the open circuit is i | n the sensor itself, not in |
| 7 | Select "Diagnose" | DTC 9004 - Short in PTO oil temp | A. If the fault is still "Active" after unplucating the ser | nsor connector, you have |
| | to view PTO oil | circuit is displayed as "Active." | confirmed there is a short to ground between Pin B (| (sensor signal) and Pin 7 |
| | temperature gauge | | of Chassis Node connector C. | |
| | DTCs. | | 1. Check for a pinched or chaffed wire between P | in B (sensor signal) and |
| | Next, unplug the oil | | Pin 7 of Chassis Node connector C. Repair wir | ing as necessary. Go to |
| | temperature harness | | Step 2 | - |
| | connector at sensor. | DTC 9004 - Short in PTO oil | If DTC 9004 changes to "Inactive" after unplugging t | he sensor connector, you |
| | See Chassis Node | temp circuit is now displayed as | have confirmed the problem is a short in the sensor | itself, not the wiring. |
| | Pinout for terminal | "Inactive." | 1. Replace sensor. Go to Step 2. | |
| | details of the Chassis | | | |
| | Node electrical | | | |
| | connections. | | | |

Brake Saver Oil Temperature Gauge Inoperative

DTC138703 and DTC138704

Symptom: Brake saver oil temperature gauge inoperative. All other gauges are operational.

The Brake Saver Oil Temperature Gauge uses a thermistor sensor to measure the engine retarder oil temperature.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| • | 2 |
|---|---|
| | |

| Step | Check | Result | | | Next Step |
|------|---------------------------|----------------------------------|-------|----------|---|
| 1 | Turn ignition key ON. | | Go t | o Step | 2. |
| | Start ESA, then select | | | | |
| | "Connect" to establish | | | | |
| | communication to the | | | | |
| | vehicle. | | | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go t | o Step | 3. |
| | the "Components" | reasonable reading. | | | |
| | window, select "Brake | Gauge graphic on screen does not | Go t | o Step | 4. |
| | Saver Oil Temperature," | display reasonable reading. | | | |
| | then select "Open." | | | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perf | orm the | e following checks: |
| | the "Value" bar until the | to Step 3-1. | 1. | Check | CVSG data link wiring: Observe Gauge position in the wiring |
| | pointer on the gauge | Vehicle gauge reading is in the | | daisy | chain. |
| | image is approximately | same range as the ESA gauge | | a. If | gauge is mounted between two other functioning gauges CVSG |
| | mid-scale. Observe | image. Go to Step 3-7. | | d | ata link wiring is OK. Go to Step 3-5 . |
| | venicie gauge | | | b. If | gauge is last gauge in daisy chain or followed by other |
| | movement. | | | n | on-functional gauges, go to Step 3-2. |
| | | | 2. | Check | continuity between Pin 1 on gauge harness connector and Pin |
| | | | | 14 of t | he 52 Pin ICUconnector C. |
| | | | 3. | Check | continuity between Pin 3 on gauge harness connector and Pin |
| | | | | 15 of t | he 52 Pin ICUconnector C. |
| | | | 4. | Repair | daisy chain jumper harness as necessary. |
| | | | 5. | Once | continuity on both wires exists, perform "Simulate" test again. |
| | | | | a lf | aguae functions properly during "Simulate" test repair is complete |
| | | | | R | Return truck to service. |
| | | | | b lf | gauge does not function during "Simulate" test install a known |
| | | | | g. I | ood gauge and perform "Simulate" test again. |
| | | | | i. | If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. |
| | | | | ii | If gauge does not function during "Simulate" test, install Test |
| | | | | | (1) If gauge functions properly test is complete Install new ICLL |
| | | | | | nermanently. Re-test and return truck to service |
| | | | | | (2) If gauge does not function properly during "Simulate" test. |
| | | | | | replace gauge. |
| | | | 6 | Once | gauge is replaced |
| | | | 0. | a \/ | |
| | | | | a. V | |
| | | | _ | U. H | |
| | | | 7. | is this | a recneck after Step 5, Step 6 or Step 7? |
| | | | | a. Y | es. Return truck to service. |
| | | | | b. N | lo, Gauge and CVSG data link wiring is not the problem. Go to |
| | | | | S | tep 4. |
| 4 | Select "Diagnose" to | DTC 138703 displayed - Open in | Indic | cates th | e problem could be an open in the wiring from the CECU to the |
| | view brake saver oil | brake saver oil temp circuit. | sens | sor or a | detective sensor. Go to Step 5, and if necessary, Step 6. |
| | temperature gauge | broke sever eil temp sireuit | | cates th | e problem could be a short to ground in the wiring from the CECU |
| | diagnostic trouble | Diake saver oli temp circuit. | เง เท | e sensi | or or a delective sensor. Go to Step 5, and it necessary, Step 7. |
| | codes. | | | | |

| 12 | |
|----|--|
| | |

| Step | Check | Result | Next Step | |
|------|-------------------------|-----------------------------------|--|------------------------------|
| 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. Check for continuity between sensor connect | or Pin A and firewall ground |
| | harness connector at | be continuity between the sensor | stud. | |
| | sensor. | connector ground wire (Pin A) and | a. If there is continuity between Pin A and | he ground terminal, test is |
| | Using a digital | a cab ground terminal. | complete. Go to Step 5-2. | |
| | multimeter, check | (Signal) - There should be | b. If there is no continuity between Pin A a | nd the ground terminal, |
| | continuity on ground | continuity between the sensor | repair wiring as necessary. Go to Step | 5-1. |
| | and signal wire at | and Pin 24 of the 52 Pin CECU | 2. Check for continuity between sensor connect | or Pin B and Pin 24 of the |
| | Pin A = Ground | connector C | 52 Pin CECU connector C. | |
| | Pin B - Signal | | a. If there is continuity between Pin B and | Pin 24, test is complete. |
| | See CECU Pinout | | Go to Step 6. | |
| | for terminal details of | | b. If there is no continuity between Pin B a | nd Pin 24 at CECU, repair |
| | the CECU electrical | | wiring as necessary. Go to Step 5-2. | |
| | connections. | | Alternate test method: Resistance in the oil temp | erature sensor (thermistor) |
| | | | signal wire changes as oil temperature increases/ | ecreases. |
| | | | By unplugging the oil temperature sensor has a sensor has | ness connector and |
| | | | connecting a resistor decade box (i.e., Amete | simulate the sensor by |
| | | | dialing in a known resistance | Simulate the Sensor by |
| | | | 2 Observe vehicle gauge reading on dash | |
| | | | 3 If gauge needle moves to approximately the | same temperature as in |
| | | | the table below, the problem is a defective oi | temperature sensor. See |
| | | | table below. | |
| | | | Temp °F | Resistance Ohms |
| | | | -40 | 100,856 |
| | | | -22 | 52,594 |
| | | | -4 | 28,582 |
| | | | 14 | 16,120 |
| | | | 32 | 9,399 |
| | | | 50 | 5,658 |
| | | | 68 | 3,511 |
| | | | 86 | 2,240 |
| | | | 104 | 1,465 |
| | | | 122 | 980.3 |
| | | | 140 | 670.9 |
| | | | 158 | 468.7 |
| | | | 176 | 333.8 |
| | | | 194 | 241.8 |
| | | | 212 | 178.03 |
| | | | 230 | 133.08 |
| | | | 248 | 100.91 |
| | | | 200 | (7.54 |
| | | | 284 | 00.32 |
| | | | 302 | 47.40 |
| | | | 320 | 30.22 |
| | | | 356 | 24.59 |
| | | | 374 | 24.00 |
| | | | 302 | 20.11 |
| I | l | Ι | 392 | 10.00 |

| Step | Check | Result | Next Step |
|------|-------------------------|-------------------------------------|--|
| 6 | Select "Diagnose" to | DTC 138703 - Open in brake | 1. Using a jumper wire, jump across sensor harness connector Pins A and B. |
| | view brake saver oil | saver oil temp circuit is displayed | 1 |
| | temperature gauge | as "Active." | 1 - V |
| | DTCs. | | |
| | Unplug oil temperature | | |
| | harness connector at | | |
| | sensor. | | |
| | See CECU Pinout | | |
| | for terminal details of | | |
| | the CECU electrical | | 2 |
| | connections. | | |
| | | | 1. Pin B |
| | | | 2. Pin A |
| | | | |
| | | | |
| | | | a. If an "Active" DTC 138704 - Short in brake saver oil temp circuit |
| | | | is now displayed, you have confirmed there is not an open in the |
| | | | sensor signal wire to the ICU. The original fault (DTC 138703) was |
| | | | logged because there is an open in the oil temperature sensor itself, |
| | | | not the wiring. Go to Step 2 . |
| | | | b. If DTC 138704 is not displayed, there is an open circuit in the signal |
| | | | wire between sensor connector Pin B and Pin 24 of the 52 Pin ICU |
| | | | connector C. Repair wiring as necessary. Go to Step 2. |
| | | | Alternate test method: Check for continuity between sensor connector Pin B |
| | | | (sensor signal) and Pin 24 of the 52 Pin ICU connector C. |
| | | | 1. If there is no continuity, repair wiring as necessary. After repairs, DTC |
| | | | 138703 should now be displayed as "Inactive." |
| | | | 2. If there is continuity between sensor connector Pin B and Pin 24 of the |
| | | | 52 Pin CECU connector C, the open circuit is in the sensor itself, not in |
| _ | | | the wiring. Replace sensor. |
| 7 | Select "Diagnose" to | DTC 138704 - Short in brake | If the fault is still "Active" after unplugging the sensor connector, you have |
| | view brake saver oil | saver oil temp circuit is displayed | confirmed there is a short to ground between Pin B (sensor signal) and Pin 24 |
| | | as Active. | or the 52 Pin ICU connector C. |
| | DICS. | | 1. Check for a pinched or chaffed wire between Pin B (sensor signal) and |
| | topporature borpoor | | Pin 24 of the 52 Pin ICU connector C. Repair wiring as necessary. Go to |
| | | DTC 138701 - Short in brake saver | Step 2. |
| | | oil temp circuit is now displayed | you have confirmed the problem is a short in the sensor itself not the wiring |
| | for terminal details of | as "Inactive." | 1 Donlace senser. Go to Stop 2 |
| | the CECU electrical | | 1. Replace sensor. Ou to step 2. |
| | connections | | |

General Oil Temperature Gauge Inoperative

DTC44103 and DTC44104

Symptom: General oil temperature gauge inoperative. All other gauges are operational.

The General Oil Temperature Gauge uses a thermistor sensor to measure the oil temperature for some optional components.



| Step | Check | Result | | Next Step |
|------|---------------------------|----------------------------------|--------|--|
| 1 | Turn ignition key ON. | | Go to | Step 2. |
| | Start ESA, then select | | | |
| | "Connect" to establish | | | |
| | communication to the | | | |
| | vehicle. | | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to | Step 3. |
| | the "Components" | reasonable reading. | | |
| | window, select "General | Gauge graphic on screen does not | Go to | Step 4. |
| | Oil Temperature," then | display reasonable reading. | | |
| | select "Open." | | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perfor | rm the following checks: |
| | the "Value" bar until the | to Step 3-1. | | |
| | pointer on the gauge | Vehicle gauge reading is in the | | NOTE |
| | image is approximately | same range as the ESA gauge | Use | e the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the | parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An | inoperative gauge may simply have its CECU |
| | movement. | | par | ameter set to disabled. |
| | | | | |
| | | | 1. C | Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | | C | daisy chain. |
| | | | a | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | | data link wiring is OK. go to Step 3-5 . |
| | | | t | b. If gauge is last gauge in daisy chain or followed by other |
| | | | | non-functional gauges, go to Step 3-2. |
| | | | 2. (| Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | c | of the 52 Pin CECU connector C. |
| | | | 3. (| Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | c | of the 52 Pin CECU connector C. |
| | | | 4. F | Repair daisy chain jumper harness as necessary. |
| | | | 5 (| Once continuity on both wires exists, perform "Simulate" test again |
| | | | 0. | If gauge functions properly during "Cimulate" test repeir is complete |
| | | | 6 | a. In gauge functions property during Simulate test, repair is complete. |
| | | | | |
| | | | t | b. If gauge does not function during "Simulate" test, install a known |
| | | | | good gauge and perform "Simulate" test again. |
| | | | | i. If gauge functions properly test is complete. Install new gauge |
| | | | | permanently. Re-test and return truck to service. |
| | | | | ii. If gauge does not function during "Simulate" test, install Test |
| | | | | CECU and perform "Simulate" test again. |
| | | | | (1) If gauge functions properly test is complete. Install new |
| | | | | CECU permanently. Re-test and return truck to service. |
| | | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | | replace gauge. |
| | | | 6. 0 | Once gauge is replaced. |
| | | | a | a. Verify gauge functionality. |
| | | | | Return truck to service |
| | | | , . | a this a rashaak after Sten 5. Oton 6 or Sten 70 |
| | | | 7. 1 | IS THIS A FECHECK ATTER STEP 5, STEP 6 OF STEP 7? |
| | | | a | a. Yes. Return truck to service. |
| | | | t | b. No, Gauge and CVSG data link wiring is not the problem. Go to |
| | | | | Step 4. |

| Step | Check | Result | | | Next Step | |
|------|------------------------|-----------------------------------|------------|-------|---|--------------------------------|
| 4 | Select "Diagnose" | DTC 44103 displayed - Open in | Ind | icate | s the problem could be an open in the wiring | from the Chassis Node to |
| | to view general oil | general oil temp circuit. | the | sens | sor or a defective sensor. Go to Step 5, and | if necessary, Step 6. |
| | temperature gauge | DTC 44104 displayed - Short in | Ind | icate | s the problem could be a short to ground in the | he wiring from the Chassis |
| | diagnostic trouble | general oil temp circuit. | No | de to | the sensor or a defective sensor. Go to Ste | p 5 , and if necessary, |
| | codes. | | Ste | p 7. | | |
| 5 | Unplug oil temperature | (Sensor Ground) - There should | 1. | Ch | eck for continuity between sensor connector | Pin A and firewall ground |
| | | connector ground wire (Pin A) and | | siu | u. | |
| | Lising a digital | a cab ground terminal | | a. | If there is continuity between Pin A and th | e ground terminal, test is |
| | multimeter check | (Signal) - There should be | | | complete. Go to Step 5-2. | |
| | continuity on around | continuity between the sensor | | b. | If there is no continuity between Pin A and | d the ground terminal, |
| | and signal wire at | connector signal wire (Pin B) | | ~ | repair wining as necessary. Go to Step 5- | |
| | sensor connector. | and Pin 9 of the Chassis Node | 2. | Ch | eck for continuity between sensor connector | Pin B and Pin 9 of the |
| | Pin A – Ground | connector B. | | Cn | | |
| | Pin B - Signal | | | а. | If there is continuity between Pin B and Pi | n 9, test is complete. Go |
| | See Chassis Node | | | | | |
| | Pinout for terminal | | | D. | If there is no continuity between Pin B and | Pin 9 at Chassis Node, |
| | details of the Chassis | | | | repair wining as necessary. Go to Step 5- | Z . |
| | Node electrical | | Alt | erna | te test method: Resistance in the oil tempe | rature sensor (thermistor) |
| | connections. | | sigi | nai w | ire changes as on temperature increases/de | creases. |
| | | | 1. | Ву | unplugging the oil temperature sensor harn | ess connector and |
| | | | | 201 | propriate resistor to Pins A and R, you can s | PST2000 Tester), or an |
| | | | | dia | ling in a known resistance | simulate the sensor by |
| | | | 2 | Oh | serve vehicle gauge reading on dash | |
| | | | 3 | lfo | auge needle moves to approximately the sa | ame temperature as in |
| | | | J . | the | table below the problem is a defective oil to | emperature sensor. See |
| | | | | tab | le below. | |
| | | | | | Temp °F | Resistance Ohms |
| | | | | | -40 | 100,856 |
| | | | | | -22 | 52,594 |
| | | | | | -4 | 28,582 |
| | | | | | 14 | 16,120 |
| | | | | | 32 | 9,399 |
| | | | | | 50 | 5,658 |
| | | | | | 68 | 3,511 |
| | | | | | 86 | 2,240 |
| | | | | | 104 | 1,465 |
| | | | | | 122 | 980.3 |
| | | | | | 140 | 670.9 |
| | | | | | 158 | 468.7 |
| | | | | | 176 | 333.8 |
| | | | | | 194 | 241.8 |
| | | | | | 212 | 178.03 |
| | | | | | 230 | 133.08 |
| | | | | | 248 | 100.91 |
| | | | | | 266 | 77.54 |
| | | | | | 284 | 60.32 |
| | | | | | 302 | 47.46 |

| Step | Check | Result | Next Step | |
|------|--|--|--|--|
| | | | 320 | 37.75 |
| | | | 338 | 30.32 |
| | | | 356 | 24.58 |
| | | | 374 | 20.11 |
| | | | 392 | 16.58 |
| | to view general oil temperature gauge DTCs. Unplug oil temperature harness connector at sensor. | oil temp circuit is displayed as "Active." | | |
| | See Chassis Node Pinout for terminal details of the Chassis Node electrical connections. | | 2 1. Pin B 2. Pin A | |
| | | | a. If an "Active" DTC 44104 - Short in general displayed, you have confirmed there is no signal wire to the Chassis Node. The orig was logged because there is an open in the itself, not the wiring. Go to Step 2. b. If DTC 44104 is not displayed, there is an wire between sensor connector Pin B and connector B. Repair wiring as necessary. Alternate test method: Check for continuity betweet (sensor signal) and Pin 9 of the Chassis Node connector I. If there is no continuity, repair wiring as necessary 44103 should now be displayed as "Inactive." 2. If there is continuity between sensor connector B, the open circuit is in the wiring. Replace sensor. | al oil temp circuit is now t an open in the sensor inal fault (DTC 44103) ne oil temperature sensor open circuit in the signal Pin 9 of the Chassis Node Go to Step 2 . en sensor connector Pin B sector B. ary. After repairs, DTC Pin B and Pin 9 of the n the sensor itself, not in |
| 7 | Select "Diagnose" to view general oil temperature gauge DTCs. Next, unplug the oil temperature harness connector at sensor. See Chassis Node Pinout for terminal details of the Chassis Node electrical connections | DTC 44104 - Short in general oil temp circuit is displayed as "Active." DTC 44104 - Short in general oil temp circuit is now displayed as "Inactive." | If the fault is still "Active" after unplugging the senso confirmed there is a short to ground between Pin B 9 of the Chassis Node connector B. 1. Check for a pinched or chaffed wire between P Pin 9 of the Chassis Node connector B. Repair to Step 2. If DTC 44104 changes to "Inactive" after unplugging have confirmed the problem is a short in the sensor 1. Replace sensor. Go to Step 2. | r connector, you have (sensor signal) and Pin in B (sensor signal) and wiring as necessary. Go the sensor connector, you itself, not the wiring. |

Primary Fuel Gauge Inoperative

DTC82903 and DTC82904

Symptom: Primary fuel gauge inoperative. All other gauges are operational.

The Primary Fuel Level Gauge uses a variable resistor sensor to measure the fuel level in the tank.



| Step | Check | Result | | Next Step |
|------|---------------------------------|----------------------------------|-------|---|
| 1 | Turn ignition key ON. | | Go to | Step 2. |
| | Start ESA, then select | | | |
| | "Connect" to establish | | | |
| | communication to the | | | |
| | vehicle. | | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to | o Step 3. |
| | the "Components" | reasonable reading. | Cata | Stop 4 |
| | window, select "Primary | display reasonable reading | G0 10 | 5 Step 4. |
| | Fuel Gauge," then select | display reasonable reading. | | |
| 3 | Open. Select "Simulate" Drag | Vehicle dauge does not move. Go | Perfo | rm the following checke: |
| 5 | the "Value" bar until the | to Sten 3-1 | | |
| | pointer on the gauge | Vehicle gauge reading is in the | i | NOTE |
| | image is approximately | same range as the FSA gauge | Use | e the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the | parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An | inoperative gauge may simply have its CECU |
| | movement. | | par | ameter set to disabled. |
| | | | | |
| | | | 1. (| Check CVSG data link wiring: Observe Gauge position in the wiring |
| | | | (| daisy chain. |
| | | | á | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | | data link wiring is OK. go to Step 3-5. |
| | | | ł | b. If gauge is last gauge in daisy chain or followed by other |
| | | | | non-functional gauges, go to Step 3-2. |
| | | | 2. (| Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | 0 | of the 52 Pin CECU connector C. |
| | | | 3. (| Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | 4 | of the 52 Pin CECU connector C. Repair daisy chain jumper harness as necessary |
| | | | 5 (| Once continuity on both wires exists, perform "Simulate" test again |
| | | | 5. 0 | once continuity on both wires exists, perform Simulate itest again. |
| | | | ć | a. If gauge functions properly during "Simulate fest, repair is complete. Return truck to service. |
| | | | ł | b. If gauge does not function during "Simulate" test, install a known |
| | | | | good gauge and perform "Simulate" test again. |
| | | | | If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. |
| | | | | ii. If gauge does not function during "Simulate" test install Test |
| | | | | CECU and perform "Simulate" test again. |
| | | | | (1) If gauge functions properly test is complete. Install new |
| | | | | CECU permanently. Re-test and return truck to service. |
| | | | | (2) If gauge does not function properly during "Simulate" test, |
| | | | | replace gauge. |
| | | | 6. (| Once gauge is replaced. |
| | | | á | a. Verify gauge functionality. |
| | | | H | b. Return truck to service. |
| | | | 7. 1 | Is this a recheck after Step 5. Step 6 or Step 7? |
| | | | | a Yes Return truck to service |
| | | | | h No Gauge and CVSG data link wiring is not the problem. Go to |
| | | | | Step 4. |

| Step | Check | Result | | Next Step |
|------|--------------------------|-----------------------------------|------|--|
| 4 | Select "Diagnose" to | DTC 82903 displayed - Open in | Indi | icates the problem could be an open in the wiring from the Chassis Node to |
| | view primary fuel | primary fuel level circuit. | the | sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. |
| | gauge diagnostic trouble | DTC 82904 displayed - Short in | Indi | icates the problem could be a short to ground in the wiring from the Chassis |
| | codes. | primary fuel level circuit. | Noc | de to the sensor or a defective sensor. Go to Step 5, and if necessary, |
| - | | | Ste | эр 7. |
| 5 | Unplug fuel gauge | (Sensor Ground) - There should | 1. | Check for continuity between sensor connector Pin B and firewall ground |
| | harness connector at | be continuity between the sensor | | stud. |
| | sensor. | connector ground wire (Pin B) and | | a. If there is continuity between Pin B and the ground terminal, test is |
| | Using a digital | a cab ground terminal. | | complete. Go to Step 5-2. |
| | multimeter, check | (Signal) - There should be | | b. If there is no continuity between Pin B and the ground terminal, |
| | continuity on ground | continuity between the sensor | | repair wiring as necessary. Go to Step 5-1. |
| | and signal wire at | connector signal wire (Pin A) | 2. | Check for continuity between sensor connector Pin A and Pin 6 of the |
| | | connector A | | Chassis Node connector A. |
| | | | | a. If there is continuity between Pin A and Pin 6, test is complete. Go |
| | Pin B - Ground | | | to Step 6. |
| | See Chassis Node | | | b. If there is no continuity between Pin A and Pin 6 at Chassis Node, |
| | details of the Chassis | | | repair wiring as necessary. Go to Step 5-2. |
| | | | Alte | ernate test method: Resistance in the fuel level sensor signal wire |
| | connections | | cha | anges as the fuel level changes. |
| | | | 1. | By unplugging the fuel gauge sensor harness connector and connecting |
| | | | | a resistor decade box (i.e. Ametek PST2000 Tester), or an appropriate |
| | | | | resistor to Pins A and B, you can simulate the sensor by dialing in a |
| | | | | known resistance. |
| | | | 2. | Observe vehicle gauge reading on dash. |
| | | | 3. | If gauge needle moves to approximately the same level as in the table |
| | | | | below, the problem is a defective fuel level sensor. See Table below. |
| | | | | Fuel Level Resistance Ohms |
| | | | | Empty 240 |
| | | | | 1/4 Full 154 |
| | | | | 1/2 Full 103 |
| | | | | 3/4 Full 65 |
| | 0 + ("0' - ") | | | Full 33 |
| 6 | Select "Diagnose" to | DIC 82903 - Open in primary | 1. | Using a jumper wire, jump across sensor namess connector Pins A and B. |
| | | "Active " | | a. If an "Active" DTC 82904 - Short in primary fuel level circuit is now |
| | DICS. | Active. | | displayed, you have confirmed there is not an open in the sensor |
| | barness connector | | | signal wire to the Chassis Node. The original fault (DTC 82903) |
| | See Chassis Node | | | was logged because there is an open in the sensor itself, not the wiring. Go to Step 2 |
| | Pinout for terminal | | | winnig. Go to Glep 2 . |
| | details of the Chassis | | | u. II D I C δ2904 is not displayed, there is an open circuit in the signal |
| | Node electrical | | | connector A Repair wiring as pecessary. Go to Stop 2 |
| | connections. | | | |
| | | | | |
| | | | | |
| | | | Δltz | ernate test method: Check for continuity between sensor connector Din A |
| | | | (sei | nsor signal) and Pin 6 of the Chassis Node connector A. |
| | | | 1 | If there is no continuity, repair wiring as necessary. After repairs DTC |
| | | | | 82903 should now be displayed as "Inactive." |
| | | | I | |

| Step | Check | Result | Next Step |
|------|-------------------------|------------------------------------|--|
| | | | 2. If there is continuity between sensor connector Pin A and Pin 6 of the |
| | | | Chassis Node connector A, the open circuit is in the sensor itself, not in |
| | | | the wiring. Replace sensor. |
| 7 | Select "Diagnose" to | DTC 82904 - Short in primary | If the fault is still "Active" after unplugging the sensor connector, you have |
| | view primary fuel level | fuel level circuit is displayed as | confirmed there is a short to ground between Pin A (sensor signal) and Pin |
| | gauge DTCs. | "Active." | 6 of the Chassis Node connector A. |
| | Next, unplug the | | 1. Check for a pinched or chaffed wire between Pin A (sensor signal) and |
| | fuel gauge harness | | Pin 6 of the Chassis Node connector A, Repair wiring as necessary. Go |
| | connector at sensor. | | to Step 2. |
| | See Chassis Node | DTC 82904 - Short in primary fuel | If DTC 82904 changes to "Inactive" after unplugging the sensor connector, you |
| | Pinout for terminal | level circuit is now displayed as | have confirmed the problem is a short in the sensor itself, not the wiring. |
| | details of the Chassis | "Inactive." | 1. Replace sensor. Go to Step 2. |
| | Node electrical | | |
| | connections. | | |

Secondary Fuel Gauge Inoperative

DTC83003 and DTC83004

Symptom: Secondary fuel gauge inoperative. All other gauges are operational.

The Secondary Fuel Level Gauge uses a variable resistor sensor to measure the fuel level in the tank.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic on screen displays | Go to Step 3. |
| | the "Components" | reasonable reading. | |
| | window, select | Gauge graphic on screen does not | Go to Step 4. |
| | "Secondary Fuel | display reasonable reading. | |
| | Gauge," then select | | |
| | "Open." | | |
| 3 | Select "Simulate". Drag | Vehicle gauge does not move. Go | Perform the following checks: |
| | the "Value" bar until the | to Step 3-1. | |
| | pointer on the gauge | Vehicle gauge reading is in the | <u>I</u> NOIE |
| | image is approximately | same range as the ESA gauge | Use the "Program" feature in ESA to make sure that |
| | mid-scale. Observe | image. Go to Step 3-7. | the parameter for the inoperative gauge is enabled. |
| | vehicle gauge | | An inoperative gauge may simply have its CECU |
| | movement. | | parameter set to disabled. |
| | | | 1 Check CVSC data link wiring: Observe Cauge position in the wiring |
| | | | daisy chain |
| | | | |
| | | | a. If gauge is mounted between two other functioning gauges CVSG |
| | | | data link wiring is OK. go to Step 3-5. |
| | | | b. If gauge is last gauge in daisy chain or followed by other |
| | | | non-functional gauges, go to Step 3-2 . |
| | | | 2. Check continuity between Pin 1 on gauge harness connector and Pin 14 |
| | | | of the 52 Pin CECU connector C. |
| | | | 3. Check continuity between Pin 3 on gauge harness connector and Pin 15 |
| | | | of the 52 Pin CECU connector C. |
| | | | 4. Repair daisy chain jumper harness as necessary. |
| | | | 5. Once continuity on both wires exists, perform "Simulate" test again. |
| | | | a. If gauge functions properly during "Simulate" test, repair is complete. |
| | | | Return truck to service. |
| | | | b. If gauge does not function during "Simulate" test, install a known |
| | | | good gauge and perform "Simulate" test again. |
| | | | If gauge functions properly test is complete. Install new gauge permanently. Re-test and return truck to service. |
| | | | ii If gauge does not function during "Simulate" test install Test |
| | | | and perform "Simulate" test again |
| | | | (1) If gauge functions properly test is complete. Install new |
| | | | CECI permanently. Re-test and return truck to service |
| | | | (2) If gauge does not function properly during "Simulate" test |
| | | | (2) in gauge does not rendered property during Simulate test, |
| | | | |
| | | | o. Once gauge is replaced. |
| | | | a. verify gauge functionality. |
| | | | b. Return truck to service. |
| | | | 7. Is this a recheck after Step 5, Step 6 or Step 7? |
| | | | a. Yes. Return truck to service. |

| Step | Check | Result | Next Step |
|------|--------------------------|------------------------------------|---|
| | | | b. No, Gauge and CVSG data link wiring is not the problem. Go to |
| | | | Step 4. |
| 4 | Select "Diagnose" to | DTC 83003 displayed - Open in | Indicates the problem could be an open in the wiring from the Chassis Node to |
| | view secondary fuel | secondary fuel level circuit. | the sensor or a defective sensor. Go to Step 5, and if necessary, Step 6. |
| | gauge diagnostic trouble | DTC 83004 displayed - Short in | Indicates the problem could be a short to ground in the wiring from the Chassis |
| | codes. | secondary fuel level circuit. | Node to the sensor or a defective sensor. Go to Step 5, and if necessary, |
| | | | Step 7. |
| 5 | Unplug fuel gauge | (Sensor Ground) - There should | 1. Check for continuity between sensor connector Pin B and firewall ground |
| | namess connector at | be continuity between the sensor | stud. |
| | sensor. | connector ground wire (PIII B) and | a. If there is continuity between Pin B and the ground terminal, test is |
| | Using a digital | | complete. Go to Step 5-2. |
| | multimeter, check | (Signal) - There should be | b. If there is no continuity between Pin B and the ground terminal, |
| | and signal wire at | connector signal wire (Pin A) | repair wiring as necessary. Go to Step 5-1 . |
| | sensor connector | and Pin 9 of the Chassis Node | 2. Check for continuity between sensor connector Pin A and Pin 9 of the |
| | | connector A | Chassis Node connector A. |
| | | | a. If there is continuity between Pin A and Pin 9, test is complete. Go |
| | Fill B - Glouilu | | to Step 6. |
| | Disput for terminal | | b. If there is no continuity between Pin A and Pin 9 at Chassis Node, |
| | details of the Chassis | | repair wiring as necessary. Go to Step 5-2. |
| | | | Alternate test method: Resistance in the fuel level sensor signal wire |
| | connections | | changes as the fuel level changes. |
| | connections. | | 1. By unplugging the fuel gauge sensor harness connector and connecting |
| | | | a resistor decade box (i.e. Ametek PST2000 Tester), or an appropriate |
| | | | resistor to Pins A and B, you can simulate the sensor by dialing in a |
| | | | known resistance. |
| | | | 2. Observe vehicle gauge reading on dash. |
| | | | 3. If gauge needle moves to approximately the same level as in the table |
| | | | below, the problem is a defective fuel level sensor. See Table below. |
| | | | Fuel Level Resistance Ohms |
| | | | Empty 240 |
| | | | 1/4 Full 154 |
| | | | 1/2 Full 103 |
| | | | 3/4 Full 65 |
| | | | Full 33 |
| 6 | Select "Diagnose" to | DTC 83003 - Open in secondary | 1. Using a jumper wire, jump across sensor harness connector Pins A and B. |
| | view secondary fuel | fuel level circuit is displayed as | a. If an "Active" DTC 83004 - Short in secondary fuel level circuit is |
| | gauge DTCs. | "Active." | now displayed, you have confirmed there is not an open in the |
| | Unplug fuel gauge | | sensor signal wire to the Chassis Node. The original fault (DTC |
| | harness connector. | | 83003) was logged because there is an open in the sensor itself, not |
| | See Chassis Node | | the wiring. Go to Step 2. |
| | Pinout for terminal | | b. If DTC 83004 is not displayed, there is an open circuit in the signal |
| | details of the Chassis | | wire between sensor connector Pin A and Pin 9 of the Chassis Node |
| | | | connector A. Repair wiring as necessary. Go to Step 2 . |
| | connections. | | |
| | | | |
| | | | |
| | | | Alternate test method: Check for continuity between sensor connector Pin A |
| | | | (sensor signal) and Pin 9 of the Chassis Node connector A. |

| Step | Check | Result | Next Step |
|------|------------------------|-------------------------------------|---|
| | | | If there is no continuity, repair wiring as necessary. After repairs, DTC 83003 should now be displayed as "Inactive." If there is continuity between sensor connector Pin A and Pin 9 of the Chassis Node connector A, the open circuit is in the sensor itself, not in |
| | | | the wiring. Replace sensor. |
| 7 | Select "Diagnose" to | DTC 83004 - Short in secondary | If the fault is still "Active" after unplugging the sensor connector, you have |
| | view secondary fuel | fuel level circuit is displayed as | confirmed there is a short to ground between Pin A (sensor signal) and Pin |
| | level gauge DTCs. | "Active." | 9 of the Chassis Node connector A. |
| | Next, unplug the | | 1. Check for a pinched or chaffed wire between Pin A (sensor signal) and |
| | fuel gauge harness | | Pin 9 of the Chassis Node connector A. Repair wiring as necessary. |
| | connector at sensor. | DTC 83004 - Short in secondary | If DTC 83004 changes to "Inactive" after unplugging the sensor connector, you |
| | See Chassis Node | fuel level circuit is now displayed | have confirmed the problem is a short in the sensor itself, not the wiring. |
| | Pinout for terminal | as "Inactive." | 1. Replace sensor. Go to Step 2. |
| | details of the Chassis | | |
| | Node electrical | | |
| | connections. | | |

Engine Related DTCs

DTC8409, DTC9109, DTC17102, DTC17131, DTC18409, DTC19009, DTC24709, DTC24809, DTC91709, DTC102809, DTC524502 and DTC524602

Symptom: numerous engine related components inoperative.

The CECU obtains many of its inputs from V-CAN (J1939) datalink communications. The DTCs listed

above are all generated when an Engine Control Module databused message is not received.



| Step | Check | Result | Next Step |
|------|-------------------------|-------------------------------------|--|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Diagnose" to | Numerous Engine Control Module | Most likely, there was or is some J1939 communication failure between the |
| | view any Engine Control | message DTCs are present and | Engine Control Module and CECU. Go to J1939 Lite Diagnostic Procedure. |
| | Module diagnostic | occurred at the same time. | |
| | trouble codes. | Only a single or few Engine related | If there was J1939 communication loss, more codes would have been |
| | | DTCs are present. | recorded. Most likely these codes concern individual sensor failures or sensor |
| | | | to ECM faults. Please reference your OEM engine service information for |
| | | | specific engine electrical concerns. |

Outside Air Temperature Display Inoperative

DTC17103 and DTC17104

Symptom: Outside air temperature display inoperative or inaccurate.

The Outside Air Temperature display uses a thermistor sensor in the driver's side mirror to measure the outside air temperature.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Resu | lt | | Next Step |
|------|----------------------------|--|--------------------|---|--|
| 1 | Turn ignition key ON. | | | | Go to Step 2. |
| | Start ESA, then select | | | | |
| | "Connect" to establish | | | | |
| | communication to the | | | | |
| | vehicle. | | | | |
| 2 | Select "Monitor". From | Gauge graphic on ESA screen disp | lays correct rea | iding. This | Go to Step 3. |
| | the cluster portion of the | means the sensor to control unit is | operational. | | |
| | "Components" window, | Gauge graphic on ESA screen disp | lays an inaccura | ate reading. | Go to Step 4. |
| | select "Outside Air | | | | |
| | Temperature. | | | | |
| | [i] | NOTE | | | |
| | Monitor | | | | |
| | mode is only | | | | |
| | available if | | | | |
| | vehicle has a | | | | |
| | CECU For an | | | | |
| | ICLL an directly | | | | |
| | to Step 3 | | | | |
| 3 | Select "Simulate". From | Outside air temperature does not fu | Inction during C | Replace Gauge Cluster. | |
| | the cluster portion of the | does not function properly. | - | | |
| | "Components" window, | Outside air temperature display pro | ceeds through i | For CECU: Verify gauge is still not working | |
| | select "Cluster Test" and | as described in the Cluster Test description. This means the | | | properly. If not, install a test CECU and test |
| | observe the outside air | control unit to Gauge Cluster communication is operational. | | | again. |
| | temperature display. | | | | For ICU: Go to Step 4 |
| 4 | Select "Diagnose" | No Diagnostic trouble codes | | | Go to Step 5. |
| | to view outside air | DTC 17103 displayed. Open in out | side air tempera | ature circuit. | Go to Step 6. |
| | temperature diagnostic | Indicates the problem could be an o | open in the wirir | ng from the | |
| | trouble codes. | CECU to the sensor or a defective | sensor. | | |
| | | DTC 17104 displayed. Short in out | side air tempera | Go to Step 7. | |
| | | Indicates the problem could be a sh | ort to ground in | the wiring from | |
| | | the CECU to the sensor or a defect | ive sensor. | | |
| 5 | Unplug outside air | (Sensor Resistance) – Determine tl | ne real tempera | ture. The | 1. Measure the sensor resistance |
| | temperature harness | resistance of the sensor should ma | tch the table be | Iow. NOTE: | a. If sensor resistance is correct. Go to |
| | connector at mirror | the best way to get the real tempera | ature is to put th | ie sensor in a | Steps 5-2 and 5-3. |
| | harness to instrument | cup of crushed ice and water. | | | b. If incorrect replace sensor. |
| | panel harness | (Sensor Ground) - There should be | continuity betwe | een the sensor | 2. Check for continuity between sensor |
| | connector. | connector ground wire (Pin B) and t | he firewall grou | nd stud. | connector Pin B and the ground terminal. |
| | Using a digital | (Signal) – There should be continu | ity between the | sensor | a. If there is continuity between Pin |
| | multimeter, check the | connector signal wire (Pin A) and P | in 16 of the 52 | Pin CECU | B and the ground terminal, test is |
| | resistance of the sensor, | connector C. | _ | _ | complete. Go to Step 7. |
| | the continuity on ground | Resistance | Temp | Temp | b If there is no continuity between Pin |
| | and signal wire at sensor | Ohms | °C | °F | B and the ground terminal repair |
| | connector. | 390,000 | -40 | -40 | wiring as necessary Go to Step 5-1 |
| | Pin A – Signal | 180,000 | -28.5 | -20 | 3 Check for continuity between sensor |
| | Pin B – Ground | 91,000 | -18 | 0 | connector Pin A and Pin 16 of the 52 Pin |
| | See CECU Pinout | 47,000 | -6.5 | 20 | CECII connector C |
| | for terminal details of | 27,000 | 4 | 39 | e If there is continuity between D' |
| | the CECU electrical | 15,000 | 16 | 61 | a. If there is continuity between Pin |
| | connections. | 10,000 | 25 | 77 | A and Pin 16 of the 52 Pin CECU |

| Step | Check | Result | | | Next Step |
|------|-------------------------|------------------------------------|------------------|-----------------|---|
| | | 9,100 | 27 | 81 | connector C, test is complete. Go |
| | | 5,600 | 39 | 102 | to Step 6. |
| | | 3,900 | 48 | 118 | b. If there is no continuity between |
| | | 2,400 | 61.5 | 142 | Pin A and Pin 16 , repair wiring as |
| | | 1,800 | 69.5 | 157 | necessary. Go to Step 5-2. |
| | | 910 | 91.5 | 197 | Alternate test method: Resistance in the |
| | | | | | outside temperature sensor (thermistor) signal |
| | | | | | wire changes as the outside air temperature |
| | | | | | increases/decreases. |
| | | | | | 1. By unplugging the outside air temperature |
| | | | | | harness connector at the mirror harness |
| | | | | | to instrument panel harness connector |
| | | | | | (i.e. Amotok PST2000 Tector) or an |
| | | | | | appropriate resistor to Pins A and B you |
| | | | | | can simulate the sensor by dialing in a |
| | | | | | known resistance. |
| | | | | | a. While performing the test, observe |
| | | | | | the temperature display on the dash. |
| | | | | | b. If the display reads approximately |
| | | | | | the same temperature as in the table |
| | | | | | on the previous page, the problem is |
| | | | | | a defective sensor. |
| 6 | Select "Diagnose" | DTC 17103 – Open in outside air te | emperature circu | it is displayed | 1. Using a jumper wire, jump across sensor |
| | to view outside air | as "Active". | | | harness connector Pin A and B. |
| | lemperature DTCs. | | | | a. If an "Active" DTC 17104 – Short in |
| | temperature harness | | | | displayed, you have confirmed there |
| | connector at mirror | | | | is not an open in the sensor signal |
| | harness to instrument | | | | wire to the CECU. The original fault |
| | panel harness | | | | (DTC 17103) was logged because |
| | connector. | | | | there is an open in the sensor itself, |
| | See CECU Pinout | | | | not the wiring. Replace the sensor. |
| | for terminal details of | | | | Go to Step 2 . |
| | the CECU electrical | | | | b. If DTC 17104 is not displayed, there |
| | connections. | | | | is an open circuit in the signal wire |
| | | | | | between sensor connector Pin A |
| | | | | | and Pin 16 of the 52 Pin CECU |
| | | | | | connector C. Repair wiring as |
| | | | | | and Pin 16 of the 52 Pin CECU connector C. Repair wiring as |
| Step | Check | Result | Next Step |
|------|-------------------------|---|---|
| 7 | Select "Diagnose" | DTC 17104 – Short in outside air temperature circuit is displayed | If the fault is still "Active" after unplugging |
| | to view outside air | as "Active". | the sensor connector, you have confirmed |
| | temperature DTCs. | | there is a short to ground between Pin A |
| | Unplug outside air | | (sensor signal) and Pin 16 of the 52 Pin CECU |
| | temperature harness | | connector C. |
| | connector at mirror | | 1. Check for a pinched or chaffed wire |
| | harness to instrument | | between Pin A (sensor signal) and Pin 16 |
| | panel harness | | of the 52 Pin CECU connector C. Repair |
| | connector. | | wiring as necessary. Go to Step 2. |
| | See CECU Pinout | | |
| | for terminal details of | | |
| | the CECU electrical | | |
| | connections. | | |
| | | | |
| | | | |
| | | DTC 17104 – Short in outside air temperature circuit is now | If DTC 17104 changes to "Inactive" after |
| | | displayed as "Inactive". | unplugging the sensor connector, you have |
| | | | confirmed the problem is a short in the sensor |
| | | | itself, not the wiring. Replace the sensor. Go |
| | | | to Step 2. |

CVSG Supply Open or Shorted

DTC67805 and DTC67806

Symptom: CVSG (2" Commercial Vehicle Smart Gauges) are inoperative.

The CVSG supply is daisy chained from one gauge to another. The CECU monitors the supply

to these gauges and will issue a trouble code if the supply is either open or shorted.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|--------------------------|------------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor." From | Gauge graphic(s) on screen | The gauges do not have an active open or short in the CVSG supply. |
| | the "Components" | display reasonable readings. | Intermittent causes may include a pinched wire, loose connection, bent or |
| | window, select some of | | corroded pins on the CVSG supply circuit. |
| | the suspect functions. | Gauge graphic(s) on screen do | Go to Step 3. |
| | | not display readings. | |
| 3 | Select "Diagnose" to | DTC 67805 displayed –CECU | Go to Step 4. |
| | view "Active" diagnostic | sees an open load on the CVSG | |
| | trouble codes. | power supply circuit. | |
| | | DTC 67806 displayed – CECU has | Go to Step 5. |
| | | a short to ground on the CVSG | |
| | | power supply circuit. | |
| 4 | Test for CVSG voltage | No voltage at Pin 1 of the 9 Pin | Replace CECU and retest. |
| | supply at Pin 1 of the 9 | CECU connector A. | |
| | Pin CECU connector A. | Voltage at Pin 1 of the 9 Pin CECU | Go to Step 5. |
| | | connector A. | |
| 5 | Disconnect the 4 Pin | No continuity. | Repair and replace circuits as necessary. |
| | CVSG daisy chain | Continuity exists. | Reconnect the CVSG daisy chain. Make sure the connection is properly |
| | connector. Check | | seated and there are no bent or misaligned pins. If the gauges remain |
| | continuity between Pin | | inoperative, the First CVSG in the daisy chain is faulty. Replace as necessary. |
| | 1 of the 9 Pin CECU | | |
| | connector A and pin 4 of | | |
| | the CVSG daisy chain | | |
| | connector. | | |

Dash Dimmer Input Open or Shorted, Dash Dimmer Output Shorted

DTC148703, DTC148704, DTC149106 and DTC149206

Symptom: dash dimmer inoperative.

The Dash Dimmer input signal comes from the driver controlled dimmer rheostat. The CECU

reads the resistance of the signal to determine the dimming request and varies the voltage output to control the illumination brightness.

The following procedures have been developed to assist the technician in diagnosing multiplexed instrumentation problems using the Electronic Service Analyst (ESA) hardware/software diagnostic tool. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use ESA.



| Step | Check | Result | Next Step |
|------|---------------------------|----------------------------------|---|
| 1 | Turn ignition key ON. | | Go to Step 2. |
| | Start ESA, then select | | |
| | "Connect" to establish | | |
| | communication to the | | |
| | vehicle. | | |
| 2 | Select "Monitor". From | Graphic on screen does not | Go to Step 3. |
| | the switch portion of the | display reading. | |
| | "Components" window, | Graphic on screen displays | Go to Step 7. |
| | select "Dimmer" | reasonable reading as the Dimmer | |
| | | rheostat is operated. Dimmer | |
| | | input to the CECU is good. | |
| 3 | Select "Diagnose" to | DTC 148703 displayed – Open in | Indicates the problem could be an open in the wiring from the CECU to the |
| | view dash dimmer | dash dimmer input circuit. | rheostat or a defective rheostat. Go to Step 4. |
| | input related diagnostic | DTC 148704 displayed – Short in | Indicates the problem could be a short to ground in the wiring from the CECU |
| | trouble codes. | dash dimmer input circuit. | to the rheostat or a defective rheostat. Go to Step 6. |
| 4 | Connect a jumper wire | DTC 148703 is no longer active. | The open exists in the wiring from Pin 5 of the 52 Pin CECU connector C to |
| | from Pin 5 of the 52 | | Pin 3 of the dimmer control switch. You may confirm this by checking the |
| | Pin CECU connector C | | continuity of this circuit. Replace wiring and retest. |
| | to Pin 3 of the dimmer | | Alternate test method: Resistance at Pin 5 of the 52 Pin CECU connector |
| | control switch. | | C should vary between 390 ohms and 1390 ohms as the dimmer switch |
| | | | is operated. |
| | | | 1. Unplug of the 52 Pin CECU connector C from the control unit. Measure |
| | | | the resistance from Pin 5 of the 52 Pin CECU connector C to ground. |
| | | | a. If the resistance at Pin 5 varies between 390 ohms and 1390 ohms |
| | | | as the dimmer switch is operated, the dimmer switch and circuit to |
| | | | the CECU checks out fine. Check for a loose or bent pin at Pin 5 |
| | | | of the CECU connector. |
| | | | b. If resistance is missing or not within range at Pin 5 and circuit has |
| | | | continuity. Dimmer switch may be faulty. Go to Step 5 . |
| | Select Clear DTCs. | DTC 148703 is still active. | Dimmer control switch may be faulty. Go to Step 5. |
| 5 | Measure the resistance | The resistance varies between | The dimmer switch is operational. Check all electrical connections to make |
| | between Pin 3 and Pin 9 | 390 ohms and 1390 ohms as the | sure that there are no bent pins, corroded terminals, or broken wires. Make |
| | of the Dimmer switch. | dimmer switch is operated. | sure that all electrical connections are firmly seated. Retest vehicle. |
| | | Resistance reading is missing or | Dimmer switch is faulty, replace the switch and retest. |
| | | not within range (390 ohms to | |
| | | 1390 ohms) | |
| 6 | Unplug the Dimmer | DTC 148704 is no longer active. | The short to ground is probably the result of a faulty connection at the dimmer |
| | connector at the rheostat | | control switch or the switch itself. Repair as necessary. |
| | control switch. | DTC 148704 is still active. | Short to ground is in the circuit from Pin 5 of the 52 Pin CECU connector C to |
| | Pin 3 – Dimmer Signal | | Pin 3 of the dimmer control switch. Repair and retest. |
| | to the control unit | | |
| | Select clear DTCs. | | |
| 7 | Select "Diagnose" to | DTC 149106 displayed – Short in | Dimmer output 1 from Pin 7 of the 9 Pin CECU connector A feeds many |
| | view dash dimmer | dash dimmer output circuit 1. | instrumentation and component backlighting. |
| | output related diagnostic | DTC 149206 displayed – Short in | Dimmer output 2 from Pin 8 of the 9 Pin CECU connector A routes to only the |
| | trouble codes. | dash dimmer output circuit 2. | left and right spare backlight connectors. Check wiring for possible short to |
| | | | ground conditions and repair as necessary. |

Lite Diagnostic Procedure

J1939

Symptom: Multiple V-CAN (J1939) Databus Gauge(s) Inoperative or Automated Transmission not shifting properly

V-CAN Databus gauges receive their data from the J1939 data link via the engine ECU, which receives its data from various sensors on the engine and transmission.

The following procedures have been developed to assist the technician in diagnosing V-CAN Diagnostic Trouble Codes using typical shop diagnostic equipment. It is assumed the service technician performing instrumentation repairs is knowledgeable about how to use a Volt-Ohm Meter.

- The procedures will also determine whether the system terminating resistors meet required resistance specifications.
- Perform the tests in order and record the resistance readings for each test.
- Failure of any of the following procedures will render the J1939 data link inoperative.
- See the following illustration for the overall J1939 schematic.



Lite Terminating Resistor Test Procedure

J1939

Disconnect Resistors from blue resistor holders and test resistance (approximately 120 ohm) of each resistor across terminals as shown. If OK, then go to the next step.



Lite Short Circuit Test Procedure

J1939

Disconnect all connectors labeled with GREEN text at the component itself (i.e., engine and ABS ECU's). Leave Terminating Resistors disconnected. Insure all remaining connectors are properly latched.

- Test circuit continuity at terminals 1 and 2 labeled in RED text.
- Resistance reading should be zero or no reading indicating open circuit.
- Any resistance reading indicates an undesirable short circuit condition.



Lite Short to Chassis Ground Test Procedure

J1939

- Insure all connectors labeled with GREEN text (i.e., engine and ABS ECU's) remain disconnected. Leave Terminating Resistors disconnected. Insure all remaining connectors are properly latched.
- Test circuit continuity at terminal 2 labeled in RED text with Chassis Ground.
- Move red lead and test circuit continuity at terminal 1 labeled in RED text with Chassis Ground.
- Resistance reading should be zero or no reading indicating open circuit.
- Any resistance reading indicates an undesirable short circuit condition.



Lite Open Circuit Test Procedure

J1939

- Insure all connectors labeled with GREEN text (i.e., engine and ABS ECU's) remain disconnected.
- Reinstall the Terminating Resistors.
- Insure all remaining connectors are properly latched.
- Resistance reading should be zero or no reading indicating open circuit.

- Test circuit resistance at terminals C and D labeled in BLUE text. Circuit resistance should be approximately 60 ohm.
- Re-test at each of the disconnected connectors labeled with GREEN text (i.e., engine and ABS ECU's)
- Resistance reading of zero or no reading indicates open circuit, check for cut wires or loose connections.
- Resistance reading significantly higher than 60 ohm indicates possible corrosion at terminal connectors.



Lite Diagnostic Procedures Conclusion

J1939

- Once all of the preceding tests are completed and passed, reconnect the J1939 compatible components and test the system for functionality with appropriate ECU diagnostic tools.
 - Caterpillar has J1939 Communication test built into diagnostic screen
- If diagnostic tools will not communicate with ECU's, check for power and ground to diagnostic tool.
- Verify engine ECU parameters are programmed to communicate using J1939
- If ECU settings, vehicle J1939 wiring, and power and ground to diagnostic tool are OK and communication is still impossible, then the ECU is suspected to be malfunctioning. Either replace the ECU with a test unit or contact the ECU manufacturer for assistance.



Acronyms and Abbreviations 13 - 2

Acronyms and Abbreviations

13

| ABS | Anti-lock Brakes System |
|------|---------------------------------------|
| ATC | Automatic Traction Control |
| CAN | Controller Area Network |
| CECU | Cab Electronic Control Unit |
| CVSG | Commercial Vehicle Smart Gauges |
| DEF | Diesel Emissions Fluid |
| DID | Driver Information Display |
| DLA | Data Link Adapter |
| DPF | Diesel Particulate Filter |
| DTC | Diagnostic Trouble Code |
| DWIM | Driver Warning and Information Module |
| ECAT | Electronic Catalog |
| ECM | Engine Control Module |
| ECU | Electronic Control Unit |
| EGR | Exhaust Gas Recirculation |
| ESA | Electronic Service Analyst |
| FMI | Failure Mode Indicator |
| HEST | High Exhaust System Temperature |
| ICU | Instrumentation Control Unit |
| IP | Instrument Panel |
| KW | Kenworth |
| LCD | Liquid Crystal Display |
| LVD | Low Voltage Disconnect |
| MCS | Menu Control Switch |
| MFD | Multi-Function Display |
| OBD | On Board Diagnostics |
| PB | Peterbilt |
| PD | Power Distribution |
| PLC | Programmable Logic Controller |
| PTO | Power Take Off |
| PWM | Pulse Width Modulation |
| RT | Run Time |
| USB | Universal Serial Bus |
| VIN | Vehicle Identiofication Number |

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Α

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