2013 PACCAR MX-13
Diagnostic Service Manual
EPA2013

(P1676 to P3756)

Index

P1676

Code number	P1676
Fault code description	ECU PCI – Faulty or incorrect software
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue
Location of component(s)	This information not required since this is an internal PCI issue
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue
Technical data	This information not required since this is an internal PCI issue
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1676a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 1676b	SRT
DAVIE Direct: ECU Information Compare ECU S/W information with current configuration information available through Engine Rapido, or by contacting the PACCAR Engine Support Call Center. Is installed ECU software incorrect? • Yes - Make the appropriate updates or component replacements. Contact the PACCAR Engine Support Call Center for authorization and assistance in replacing the ECU or updating the corresponding software. • No - Proceed to step 3		

	Step 3 | Step ID 1676c | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
	Back to Choose Code Back to Index

P1677

Code number	P1677
Fault code description	ECU PCI - faulty or incorrect software
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue.
Location of component(s)	This information not required since this is an internal PCI issue.
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue.
Technical data	This information not required since this is an internal PCI issue.
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	
Verification Drive Cycle	[Verification drive cycle not specified. Please contact the Engine Support Center]
	Back to Choose Code Back to Index

P1678

Code number	P1678
Fault code description	ECU PCI - faulty or incorrect software
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue.
Location of component(s)	This information not required since this is an internal PCI issue.
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue.
Technical data	This information not required since this is an internal PCI issue.
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	
Verification Drive Cycle	[Verification drive cycle not specified. Please contact the Engine Support Center]
	Back to Choose Code Back to Index

P1679

<table>
<tr><td>Code number</td><td>P1681</td></tr>
<tr><td>Fault code description</td><td>ECU PCI – Internal Error</td></tr>
<tr><td>Fault code information</td><td>1 trip MIL
3 drive cycle recovery
Readiness group – None
Freeze frame type - Comprehensive</td></tr>
<tr><td>Description of component(s)</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Location of component(s)</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Diagnostic condition</td><td>This diagnostic runs during start-up of the PCI ECU.</td></tr>
<tr><td>Set condition of fault code</td><td>Programmed data in the ECU not correct.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC changes to inactive when the fault is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Technical data</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Possible causes</td><td>Reprogram the ECU.</td></tr>
<tr><td>Additional information</td><td>The PCI ECU does not start up.
Engine cannot be started.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3986a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1679b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
Supply and signal voltages (12V).
Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
Yes - Proceed to step 3
No - Proceed to step 4</td></tr>
</table>
</td></tr>
</table>

	<table><tr><td>Step 3</td><td>Step ID 1679c</td><td>SRT</td></tr><tr><td colspan="3">Repair or replace component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4</td></tr></table> <table><tr><td>Step 4</td><td>Step ID 1679d</td><td>SRT</td></tr><tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr></table>
Verification Drive Cycle	To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes
	Back to Choose Code Back to Index

P1681

<table>
<tr><td>Code number</td><td>P1681</td></tr>
<tr><td>Fault code description</td><td>ECU PCI – Internal Error</td></tr>
<tr><td>Fault code information</td><td>1 trip MIL
3 drive cycle recovery
Readiness group – None
Freeze frame type - Comprehensive</td></tr>
<tr><td>Description of component(s)</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Location of component(s)</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Diagnostic condition</td><td>This diagnostic runs during start-up of the PCI ECU.</td></tr>
<tr><td>Set condition of fault code</td><td>Programmed data in the ECU not correct.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC changes to inactive when the fault is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Technical data</td><td>This information not required since this is an internal PCI issue</td></tr>
<tr><td>Possible causes</td><td>Reprogram the ECU.</td></tr>
<tr><td>Additional information</td><td>The PCI ECU does not start up.
Engine cannot be started.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 1681a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1681b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
Supply and signal voltages (12V).
Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
Yes - Proceed to step 3
No - Proceed to step 4</td></tr>
</table>
</td></tr>
</table>

	Step 3 | Step ID 3986c | SRT Repair or replace component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4 Step 4 | Step ID 1681d | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

P1682

Code number	P1682
Fault code description	Oil level – Current too low or open circuit on ECU D420 pin B35
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

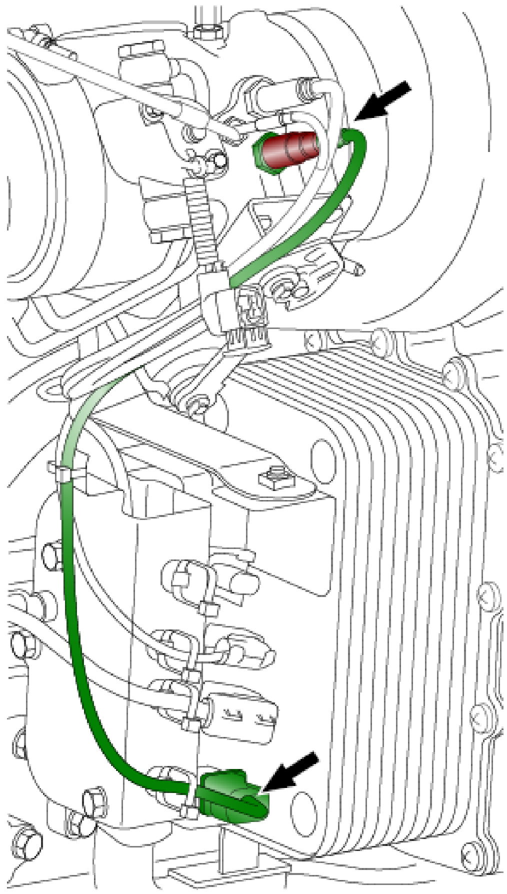
P1693

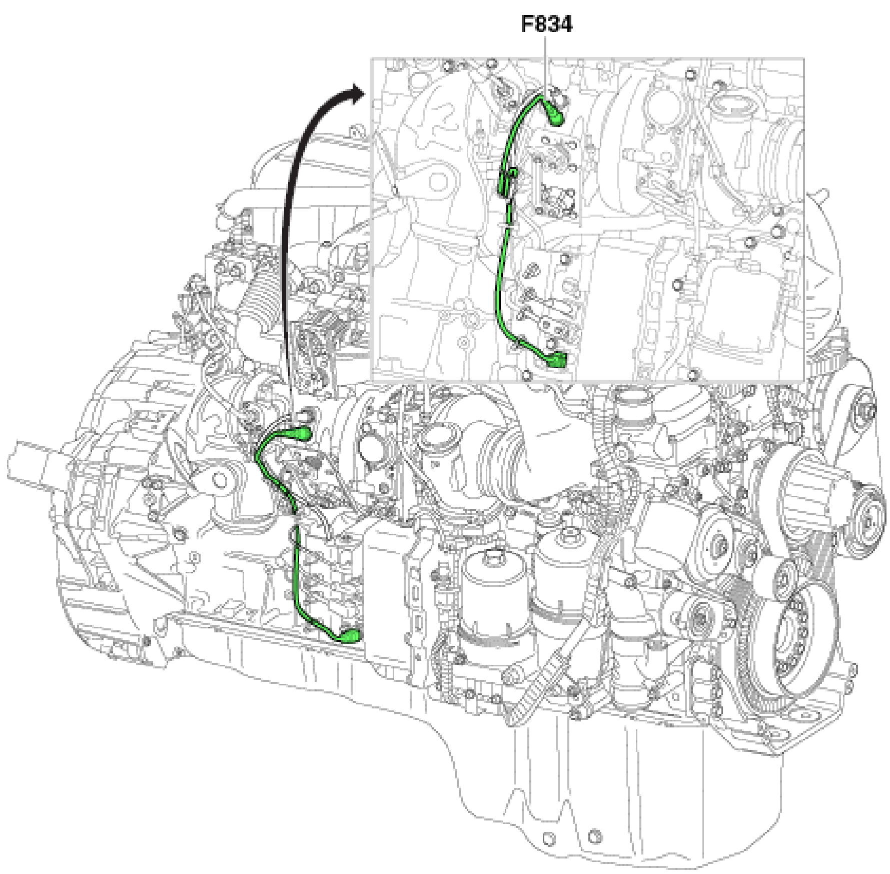
Code number	P1693
Fault code description	Cold starting aid - Voltage too high or short circuit to supply on ECU D420 pin C72 or C49
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

P1694

Code number	P1694
Fault code description	Cold starting aid - Voltage too low or short circuit to ground on ECU D420 pin C72 or C49
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

P1704

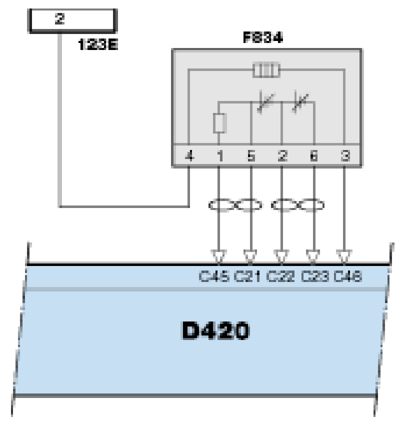
Code number	P1704
Fault code description	Lambda-Data erratic, intermittent or incorrect during over-run
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU determines the 'dew point' by calculating how much

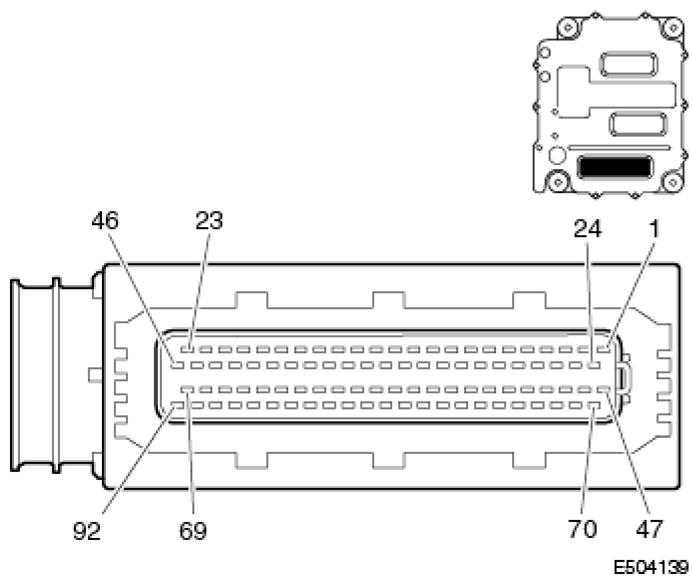
	energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed above 1200 rpm, and; • during coasting (no fuel injection), and • coolant temperature is above 50°C [122°F], and; • the lambda sensor (F834) is in the operating mode.
Set condition of fault code	• The PCI ECU (D420) detects that the measured oxygen concentration in the exhaust differs too much from the expected oxygen concentration during coasting (fuel injection cut off) for more than 2 seconds.

<table>
<tr>
<td>Reset condition of fault code</td>
<td>

- This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed to a road with a speed limit of 80km/h [50mph] in the highest gear possible with the engine speed at a minimum of 1800 rpm within the legal speed limit. Once the target rpm has been reached, leave the vehicle in gear and release the accelerator pedal and allow the vehicle to coast until the engine speed has reached 900 rpm. This test should be conducted four times within the specified operational targets. Be aware of the traffic situation.
  - For Eaton Ultrashift transmissions, idle drop can only go to 1000 rpm.
  - For Alison Autoshift transmission, this test will not be able to be conducted.

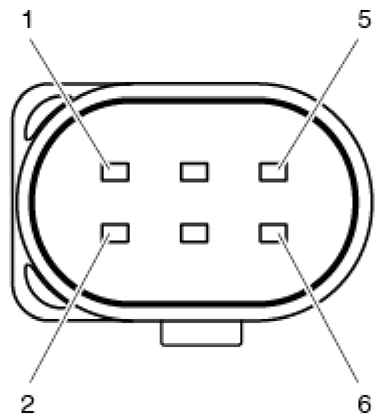
</td>
</tr>
<tr>
<td>Electrical diagram(s)</td>
<td>





Wiring harness connector D420.C front view

</td>
</tr>
</table>

	 Wiring harness connector F834 front view D420 F834 Function C21 5 Trimming resistor C22 2 Ground, sensor element C23 6 Signal, nernst sensor C45 1 Signal, pump cell current C46 3 Ground, heater element 4 Power supply, heater element
Technical data	Component check, lambda sensor (F834) Preparation • Key the ignition off • Disconnect connector F834 • Measure on component connector F834 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 3 | 2.4–4.0 Ω | Heater element resistance at 20°C [68°C] Component & circuit check, ECU (D420) Preparation • Key the ignition off • Disconnect connector F834 • Measure on the front side of wiring harness connector F834 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | Ground | Ubat | Heater element power supply with ignition keyed on
Possible causes	• Faulty fuel system • Lambda sensor deviation
Additional information	• The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834) to determine the air/fuel ratio of the combustion process.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1704a	SRT

Visual inspection - Visually inspect the associated component connections and wiring for any of the following:

- Damaged or loose connectors
- Bent, broken, corroded or loose connector pins
- Moisture or dirt in the connections
- Damage to the wire harness or insulation
- ECU connections are not damaged or disconnected
- Batteries are not okay, contacts are not tight

Was there evidence of any of the above?

- No: Issue resolved.
- Yes: Clean, adjust, repair, or replace affected components for any issues identified.

Use DAVIE to re-check for the presence of active faults. Proceed to step 3

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, continue to the step 2 in the troubleshooting process.

Step 2	Step ID 1704b	SRT

Replace the identified component.
Use DAVIE to re-check for the presence of active faults.

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, continue to the next step in the troubleshooting process.

Step 3	Step ID 1704c	SRT

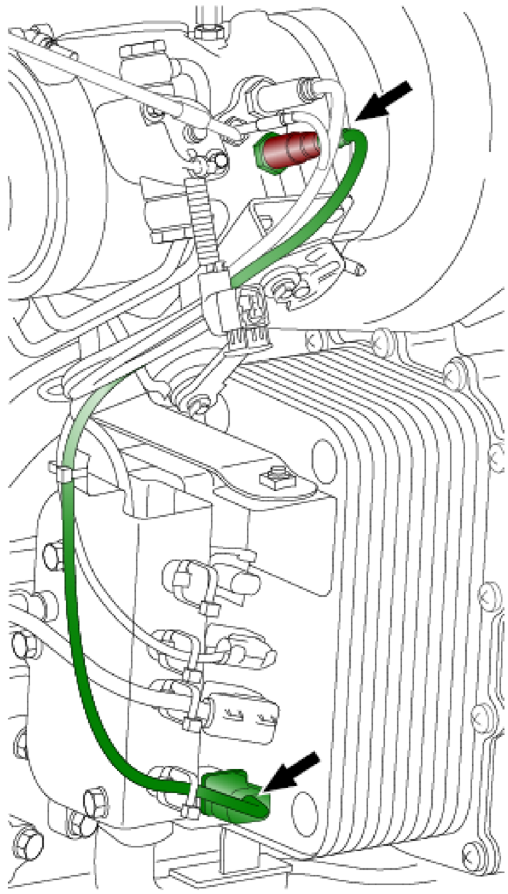
Contact the PACCAR Engine Support Call Center
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.

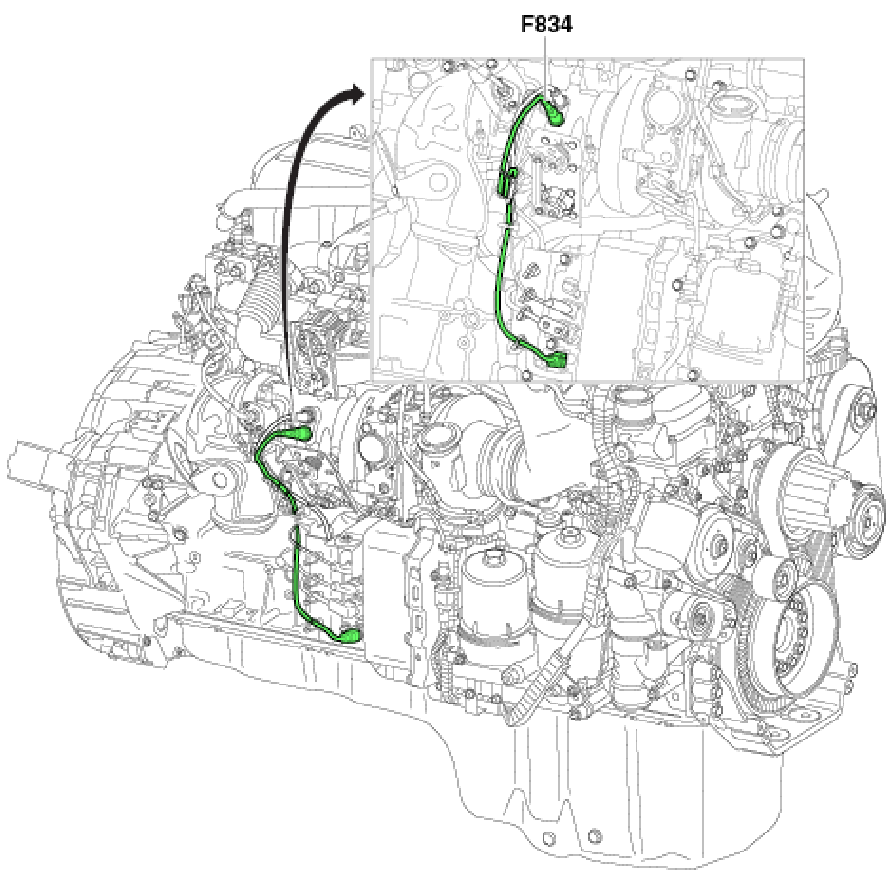
Verification Drive Cycle

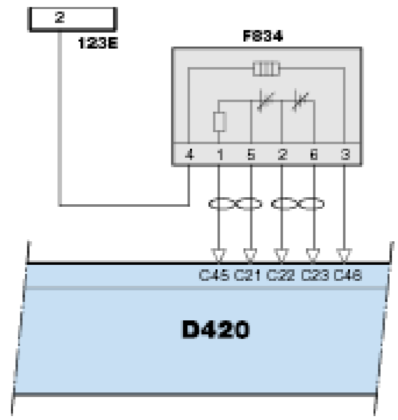
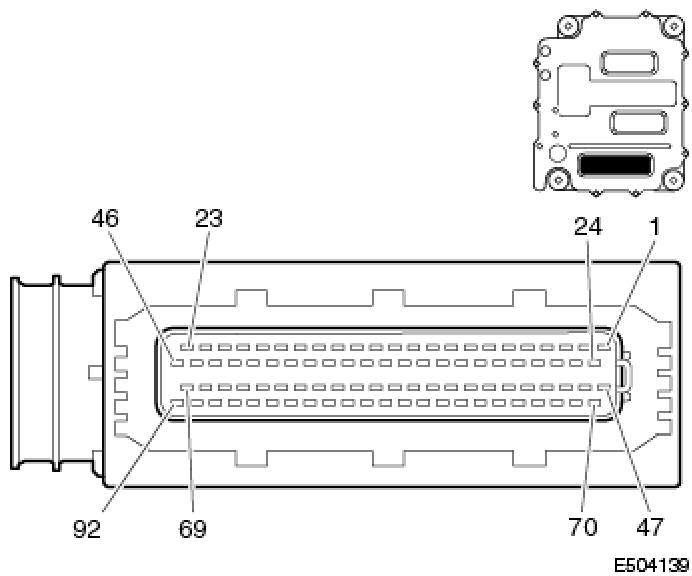
To validate the repair:
With the System Initiation cycle complete, proceed to a road with minimum speed limit of 50 mph. While remaining within the legally posted speed limit, get the truck in

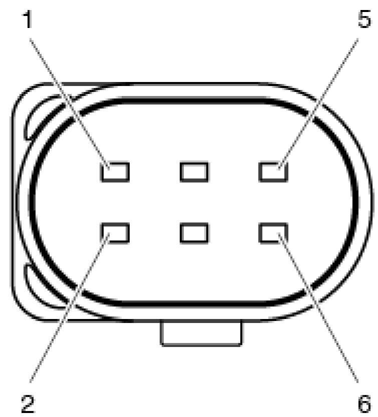
	the highest gear possible with the engine speed at a minimum of 1800 rpm. Once the target engine speed has been reached, leave the truck in gear and release the accelerator pedal, allowing the truck to coast until the engine speed has reached 900 rpm. Perform this cycle 4 times. • For Eaton Ultrashift transmissions, idle drop can only go to 1000 rpm • For Alison Autoshift transmission, this test will not be able to be conducted
	Back to Choose Code Back to Index

P1705

Code number	P1705
Fault code description	Lambda response rate – too low
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU determines the 'dew point' by calculating how much

	energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed between 1200 and 2100 rpm, and; • coolant temperature is above 50°C [122°F], and; • the lambda sensor (F834) is in the operating mode. • the engine mode is DOC heating or DPF regeneration or SCR heating or SCR high efficiency or standard or protection.
Set condition of fault code	• The PCI ECU (D420) detects that the measured oxygen concentration in the exhaust differs too much from the expected oxygen concentration.

Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high load to low load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph], for no more than 5 to 8 km [3 to 5 miles].
Electrical diagram(s)	  Wiring harness connector D420.C front view

<table>
<tr>
<td></td>
<td>


Wiring harness connector F834 front view

<table>
<tr><td>D420</td><td>F834</td><td>Function</td></tr>
<tr><td>C21</td><td>5</td><td>Trimming resistor</td></tr>
<tr><td>C22</td><td>2</td><td>Ground, sensor element</td></tr>
<tr><td>C23</td><td>6</td><td>Signal, nernst sensor</td></tr>
<tr><td>C45</td><td>1</td><td>Signal, pump cell current</td></tr>
<tr><td>C46</td><td>3</td><td>Ground, heater element</td></tr>
<tr><td></td><td>4</td><td>Power supply, heater element</td></tr>
</table>
</td>
</tr>
<tr>
<td>Technical data</td>
<td>
Component check, lambda sensor (F834)
Preparation

Key the ignition off
Disconnect connector F834
Measure on component connector F834

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>3</td><td>2.4–4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr>
</table>

Component & circuit check, ECU (D420)
Preparation

Key the ignition off
Disconnect connector F834
Measure on the front side of wiring harness connector F834

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>Lambda sensor deviation</td>
</tr>
<tr>
<td>Additional information</td>
<td>The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834) to determine the air/fuel ratio of the combustion process.</td>
</tr>
</table>

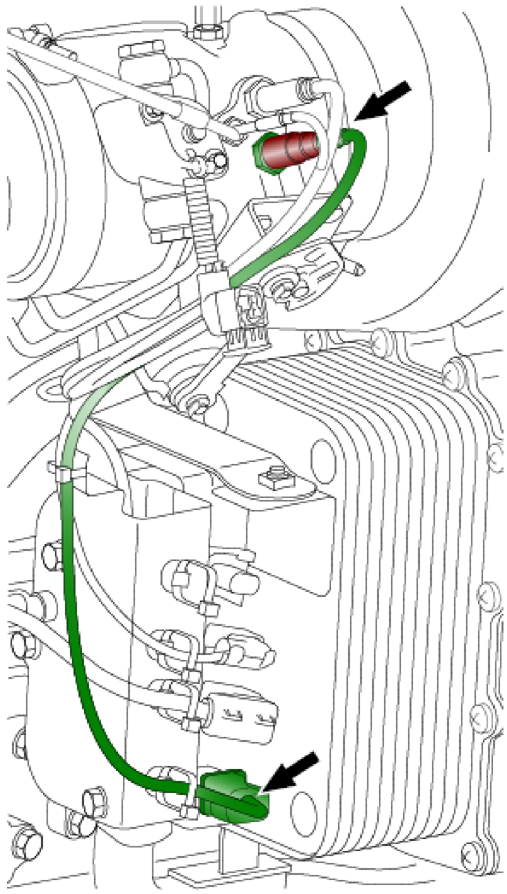
<table>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

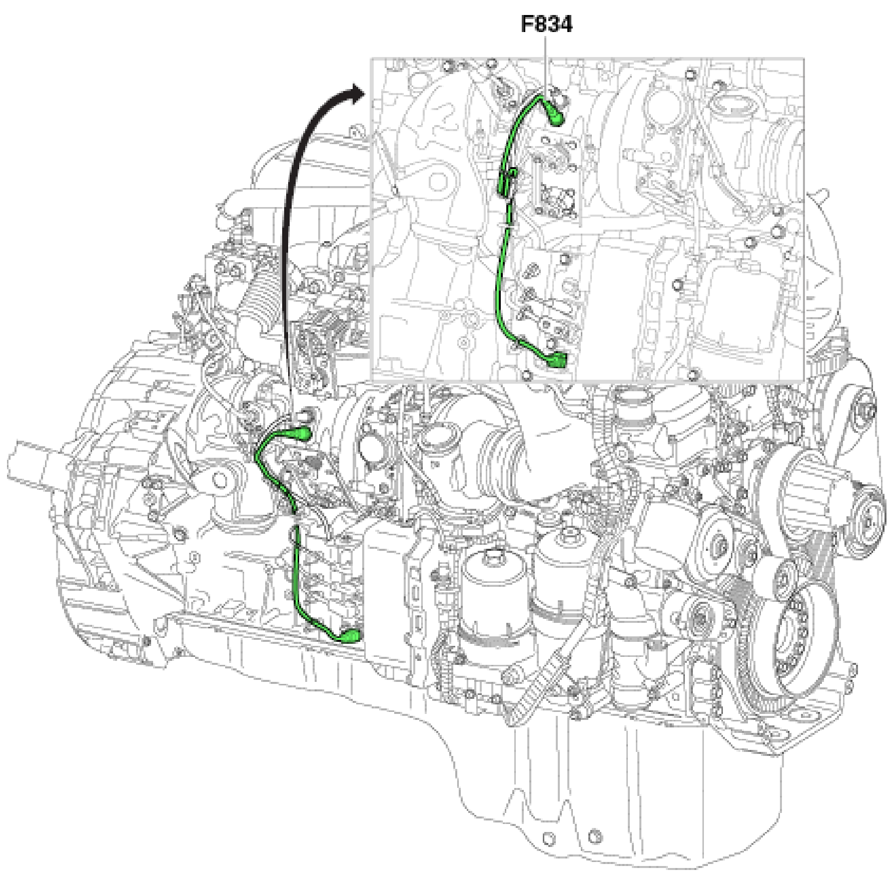
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

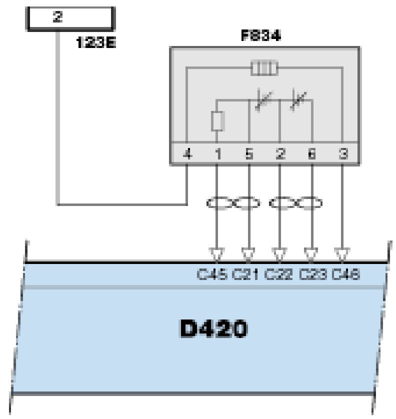
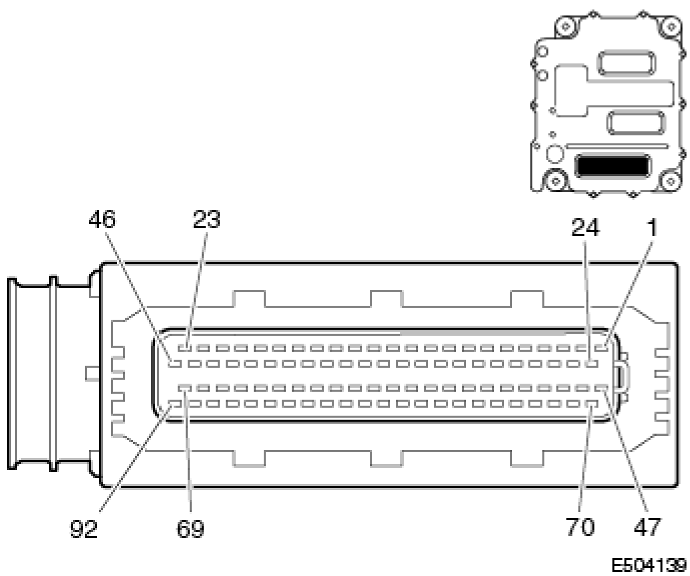
<table>
<tr><td>Step 1</td><td>Step ID 1705a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1705b</td><td>SRT</td></tr>
<tr><td colspan="3">Replace the identified component.
Use DAVIE to re-check for the presence of active faults.

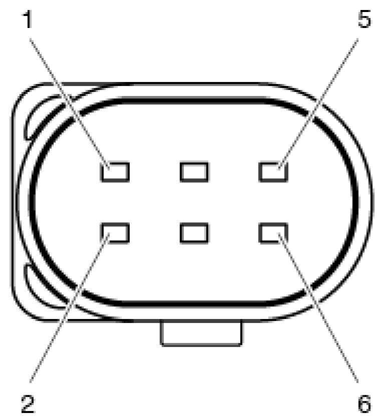
If this related fault is no longer active, then this issue has been resolved.
If this related fault is still active, continue to the next step in the troubleshooting process.
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 1705c</td><td>SRT</td></tr>
<tr><td colspan="3">Contact the PACCAR Engine Support Call Center
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P1706

Code number	P1706
Fault code description	Lambda response rate – Too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU determines the 'dew point' by calculating how much

	energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • Engine speed between 1200 and 2100 rpm, and; • Coolant temperature is above 50°C [122°F], and; • The lambda sensor (F834) is in the operating mode. • The engine mode is DOC heating or DPF regeneration or SCR heating or SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that the measured oxygen concentration in the exhaust

	differs too much from the expected oxygen concentration.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].
Electrical diagram(s)	Wiring harness connector D420.C front view

<table>
<tr><td></td><td>


Wiring harness connector F834 front view

<table>
<tr><td>D420</td><td>F834</td><td>Function</td></tr>
<tr><td>C21</td><td>5</td><td>Trimming resistor</td></tr>
<tr><td>C22</td><td>2</td><td>Ground, sensor element</td></tr>
<tr><td>C23</td><td>6</td><td>Signal, nernst sensor</td></tr>
<tr><td>C45</td><td>1</td><td>Signal, pump cell current</td></tr>
<tr><td>C46</td><td>3</td><td>Ground, heater element</td></tr>
<tr><td></td><td>4</td><td>Power supply, heater element</td></tr>
</table>
</td></tr>
<tr><td>Technical data</td><td>
Component check, lambda sensor (F834)
Preparation

Key the ignition off
Disconnect connector F834
Measure on component connector F834

<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>4</td><td>3</td><td>2.4–4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr>
</table>

Component & circuit check, ECU (D420)
Preparation

Key the ignition off
Disconnect connector F834
Measure on the front side of wiring harness connector F834

<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>Lambda sensor deviation</td></tr>
<tr><td>Additional information</td><td>The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834), to determine the air/fuel ratio of the combustion process.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.</td></tr>
</table>

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

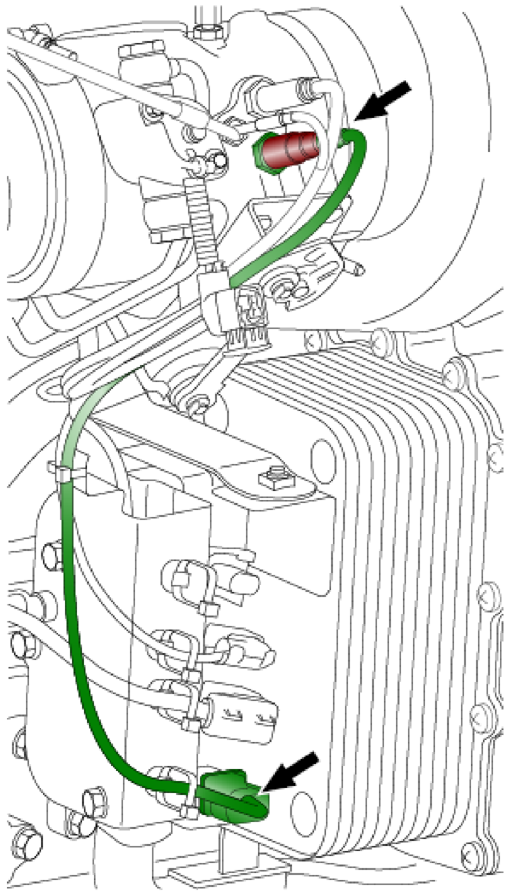
Step 1	Step ID 1706a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

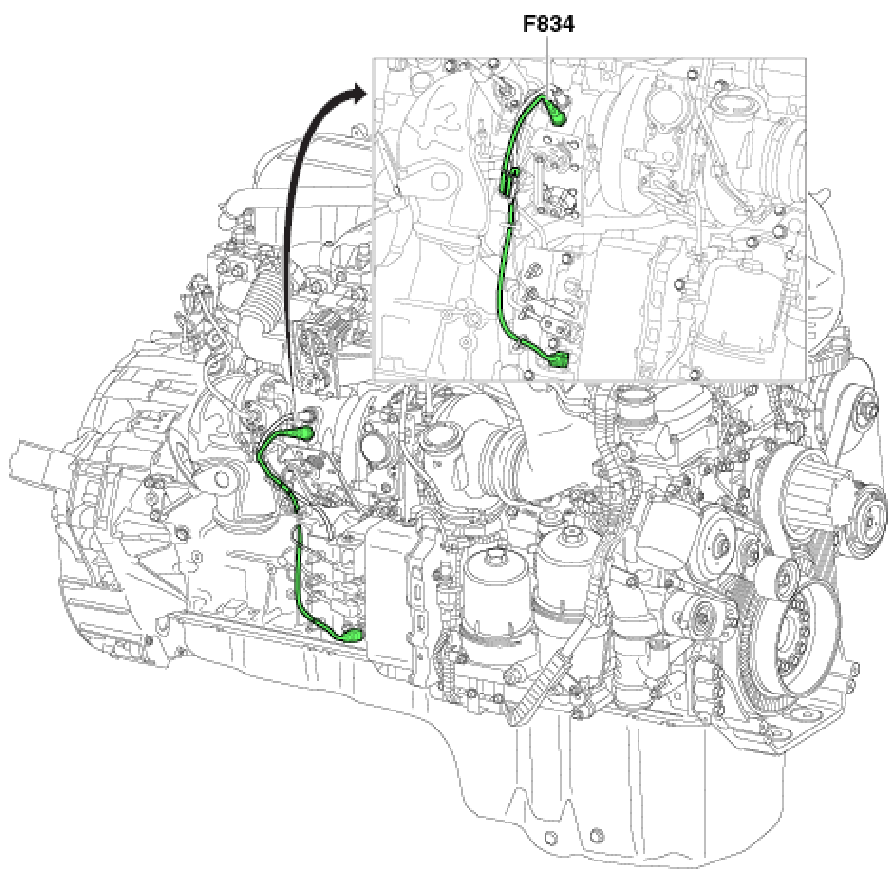
Step 2	Step ID 1706b	SRT
Replace: Lambda sensor Replace the identified component. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active. Proceed to step 3.		

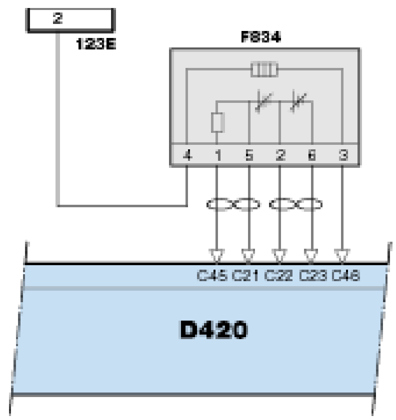
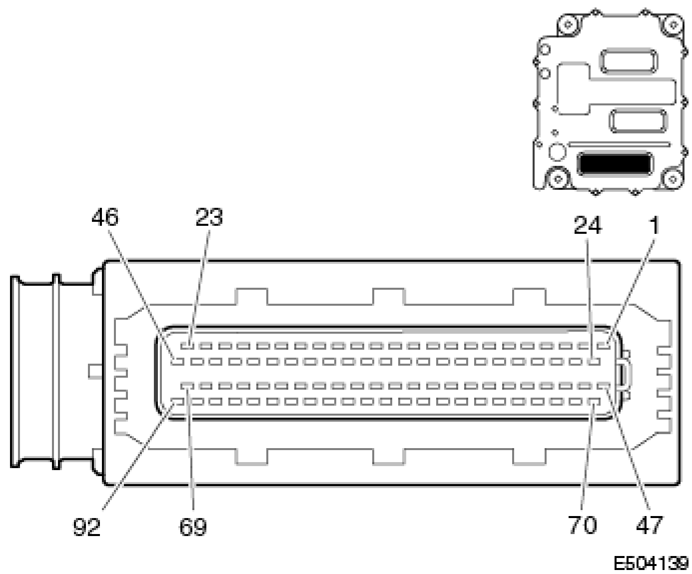
Step 3	Step ID 1706c	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

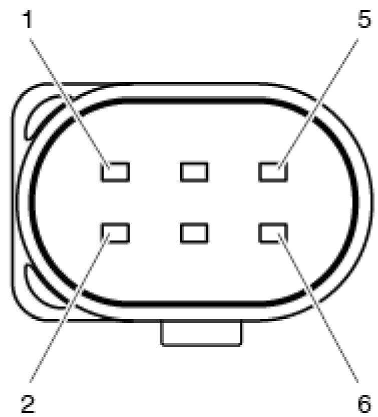
Verification Drive Cycle	To validate the repair, perform with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
	Back to Choose Code Back to Index

P1707

Code number	P1707
Fault code description	Lambda – Too low compared with engine out NOx sensor O2 signal
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU determines the 'dew point' by calculating how much

	energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the engine speed is between 950 and 2000 rpm, and; • when coolant temperature is above 50°C [122°F], and; • the lambda sensor (F834) is in operating mode; • the NOx sensor before catalyst (F844) is in operating mode; • the engine mode is SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that the oxygen concentration measured by the lambda

	sensor is lower than the oxygen concentration measured by the NOx sensor before catalyst for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.C front view



Wiring harness connector F834 front view

D420	F834	Function
C21	5	Trimming resistor
C22	2	Ground, sensor element
C23	6	Signal, nernst sensor
C45	1	Signal, pump cell current
C46	3	Ground, heater element
	4	Power supply, heater element

Technical data

Component check, lambda sensor (F834)
Preparation

- Key the ignition off
- Disconnect connector F834
- Measure on component connector F834

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	3	2.4–4.0 Ω	Heater element resistance at 20°C [68°C]

Component & circuit check, ECU (D420)
Preparation

- Key the ignition off
- Disconnect connector F834
- Measure on the front side of wiring harness connector F834

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	Ground	Ubat	Heater element power supply with ignition keyed on

Possible causes

- Lambda sensor deviation
- NOx sensor before catalyst deviation

Additional information

- The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834), to determine the air/fuel ratio of the combustion process.
- The oxygen concentration in the exhaust, measured by the lambda sensor, is compared with the oxygen concentration measured by the NOx sensor before catalyst (F844).

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1707a	SRT
Test Drive to Confirm Fault Perform the following pre-check steps to confirm this fault before continuing troubleshooting: • Clear the existing active faults • Take the truck for a 30 minute test drive Are the faults still active • No – Issue Resolved • Yes - Proceed to step 2		

Step 2	Step ID 1707b	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 3.		

Step 3	Step ID 1707c	SRT
Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4		

Step 4	Step ID 1707d	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

Verification Drive Cycle

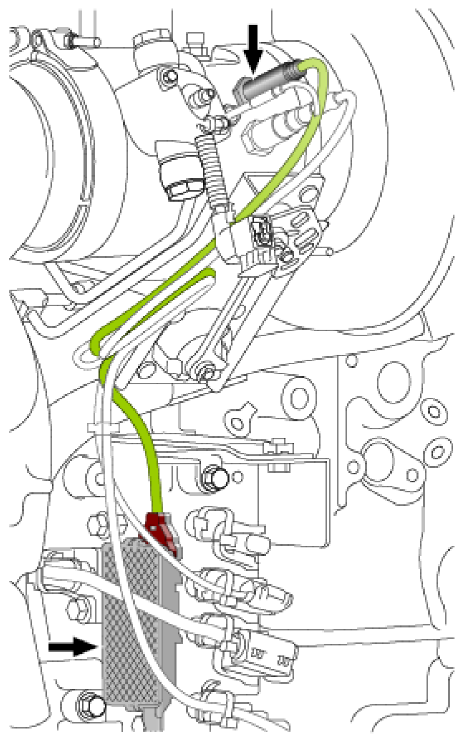
To validate the repair:

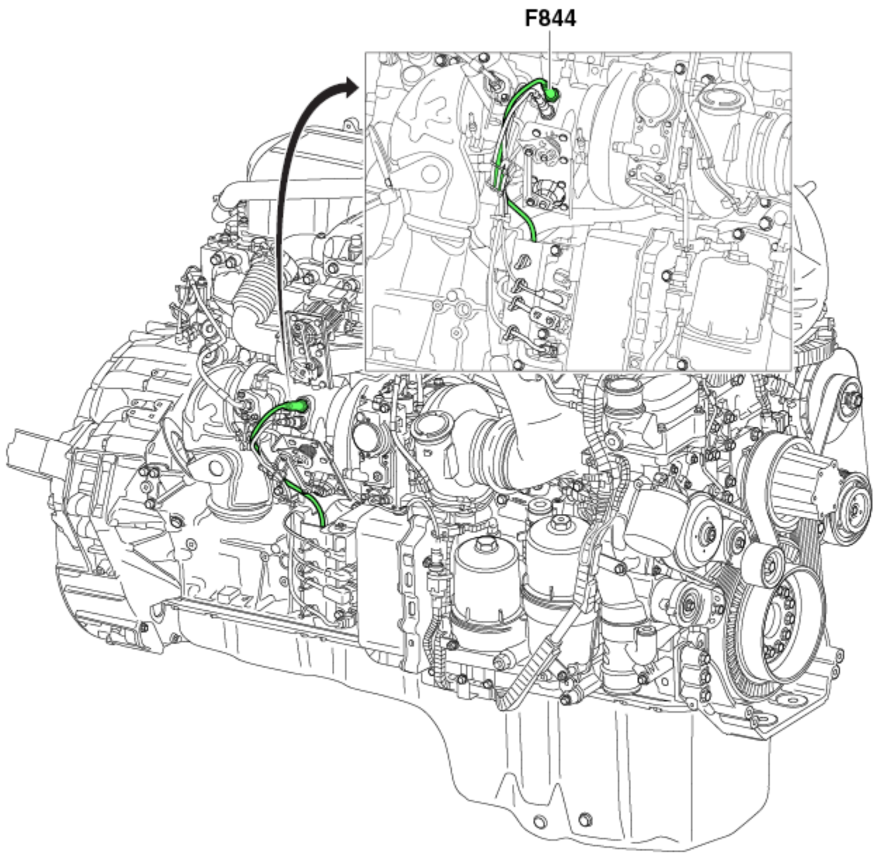
- This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.

- With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5

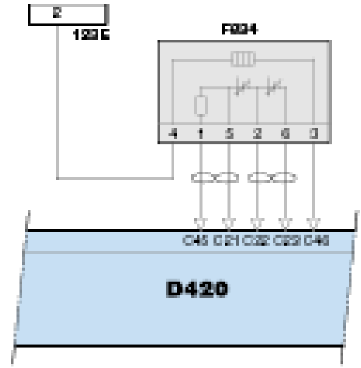
	miles is unachievable.
	Back to Choose Code Back to Index

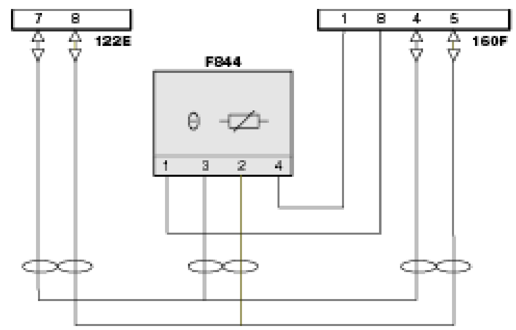
P1708

Code number	P1708
Fault code description	Lambda – Too high compared with engine out NOx sensor O2 signal
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Exhaust gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. The NOx sensor before catalyst consists of: • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  Sensor heating control • The first stage starts when the ignition is keyed on. • The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor. • The second stage starts after the 'dew point' message is received from the PCI ECU • The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. • If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F].

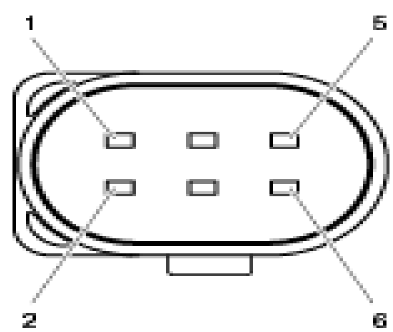
	Effect on the system: • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system • Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the engine speed is between 950 and 2000 rpm, and; • when coolant temperature is above 50°C [122°F], and; • the lambda sensor (F834) is in operating mode; • the NOx sensor before catalyst (F844) is in operating mode; • the engine mode is SCR high efficiency or standard or protection
Set condition of fault code	The PCI ECU (D420) detects that the measured oxygen concentration in the exhaust is too low while coasting (fuel injection cut off) for more than 21 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

122E 12-pin interface connector
160F 8-pin interface connector
F844 NOx sensor before catalytic convertor

F844	122E	160F	Function
3	7	4	A-CAN high
2	8	5	A-CAN low
1		8	Power supply after ignition
4		1	Ground

Technical data

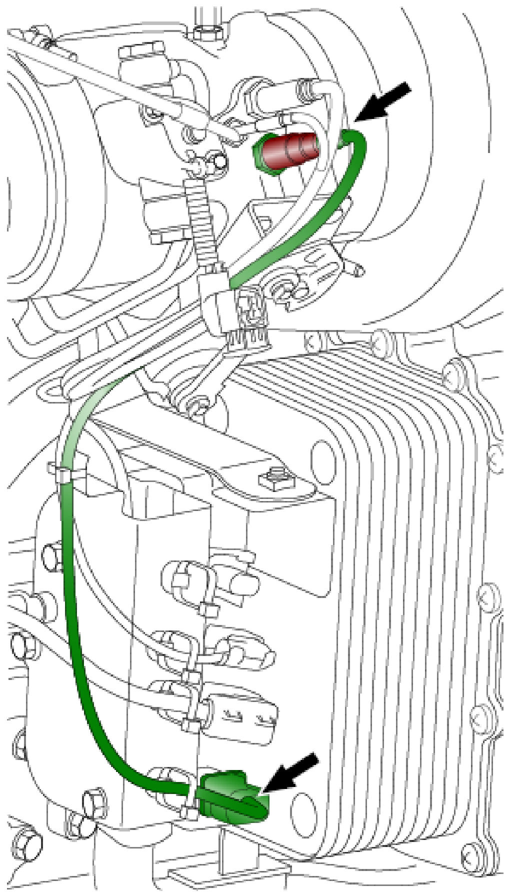
Component & wiring check, NOx sensor before catalyst (F844)
Preparation

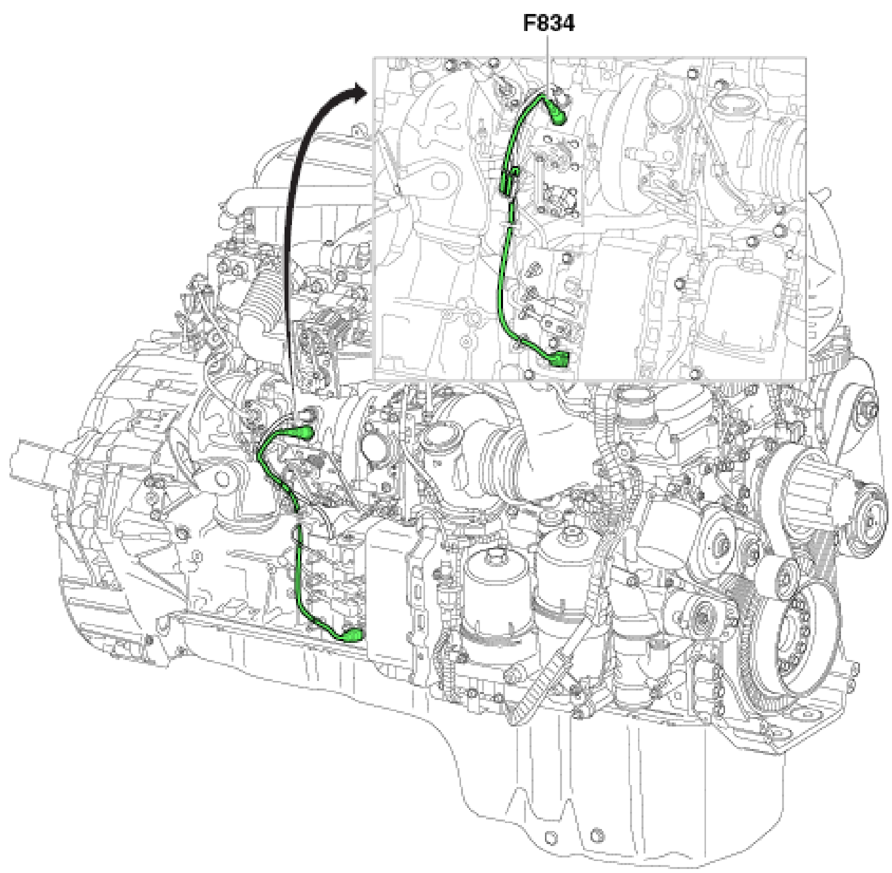
- Ignition keyed off
- Disconnect connector F844.

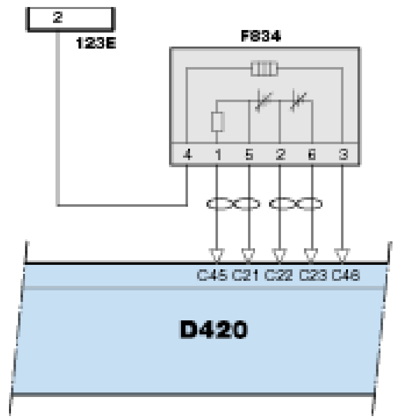
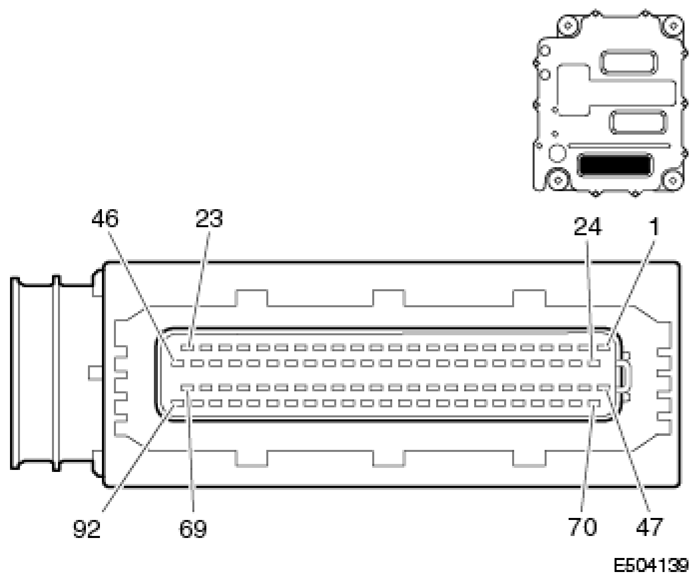
<table>
<tr>
<td></td>
<td>
Measure on the front side of wiring harness connector F844.
<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>1</td><td>Ubat</td><td>Key on the ignition</td></tr>
<tr><td>1</td><td>Battery negative pole</td><td>>0.5 V</td><td>Key on the ignition and switch on all consumers</td></tr>
<tr><td>2</td><td>3</td><td>± 60 Ω</td><td>Key off the ignition
Disconnect the ground cable from the battery.
Disconnect the vehicle communication interface (VCI) of DAVIE.</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>Lambda sensor deviation
NOx sensor before catalyst deviation</td>
</tr>
<tr>
<td>Additional information</td>
<td>The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834), to determine the air/fuel ratio of the combustion process.
The oxygen concentration in the exhaust, measured by the lambda sensor, is compared with the oxygen concentration measured by the NOx sensor before catalyst (F844).</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step ID 1708a</td><td>SRT</td></tr>
<tr><td colspan="3">Test Drive to Confirm Fault
Perform the following pre-check steps to confirm this fault before continuing troubleshooting:
Clear the existing active faults
Take the truck for a 30 minute test drive
Are the faults still active
No – Issue Resolved
Yes - Proceed to step 2</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1708b</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 3.</td></tr>
</table>
</td>
</tr>
</table>

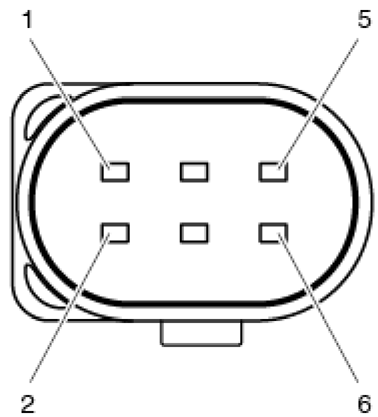
<table>
<tr>
<td></td>
<td>
<table>
<tr><td>Step 3</td><td>Step ID 1708c</td><td>SRT</td></tr>
<tr><td colspan="3">Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults.
• Fault inactive – issue resolve
• Fault active - Proceed to step 4</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1708d</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td>
</tr>
<tr>
<td>Verification Drive Cycle</td>
<td>To validate the repair:
This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.</td>
</tr>
<tr>
<td></td>
<td>Back to Choose Code
Back to Index</td>
</tr>
</table>

P1709

Code number	P1709
Fault code description	Lambda - Data valid but too low, during overrun
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C

	[1382°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • while coasting (no fuel injection), and; • when coolant temperature is above 50°C [122°F], and; • the lambda sensor (F834) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the measured oxygen concentration in the exhaust is too low while coasting (fuel injection cut off) for more than 21 seconds.

Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	Wiring harness connector D420.C front view

<table>
<tr><td></td><td>

Wiring harness connector F834 front view
<table>
<tr><td>D420</td><td>F834</td><td>Function</td></tr>
<tr><td>C21</td><td>5</td><td>Trimming resistor</td></tr>
<tr><td>C22</td><td>2</td><td>Ground, sensor element</td></tr>
<tr><td>C23</td><td>6</td><td>Signal, nernst sensor</td></tr>
<tr><td>C45</td><td>1</td><td>Signal, pump cell current</td></tr>
<tr><td>C46</td><td>3</td><td>Ground, heater element</td></tr>
<tr><td></td><td>4</td><td>Power supply, heater element</td></tr>
</table></td></tr>
<tr><td>Technical data</td><td>Component check, lambda sensor (F834)
Preparation
Key the ignition off
Disconnect connector F834
Measure on component connector F834
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>4</td><td>3</td><td>2.4–4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr>
</table>
Component & circuit check, ECU (D420)
Preparation
Key the ignition off
Disconnect connector F834
Measure on the front side of wiring harness connector F834
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Lambda sensor deviation</td></tr>
<tr><td>Additional information</td><td>The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834), to determine the air/fuel ratio of the combustion process. Typically, low air/fuel ratio indicates low oxygen concentration in the exhaust system. When no combustion takes place, the oxygen concentration must be almost equal to the ambient air concentration (approximately 20%) after some time</td></tr>
</table>

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1709a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 1709b	SRT
Replace: Lambda sensor Replace the identified component. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step in the troubleshooting process.		

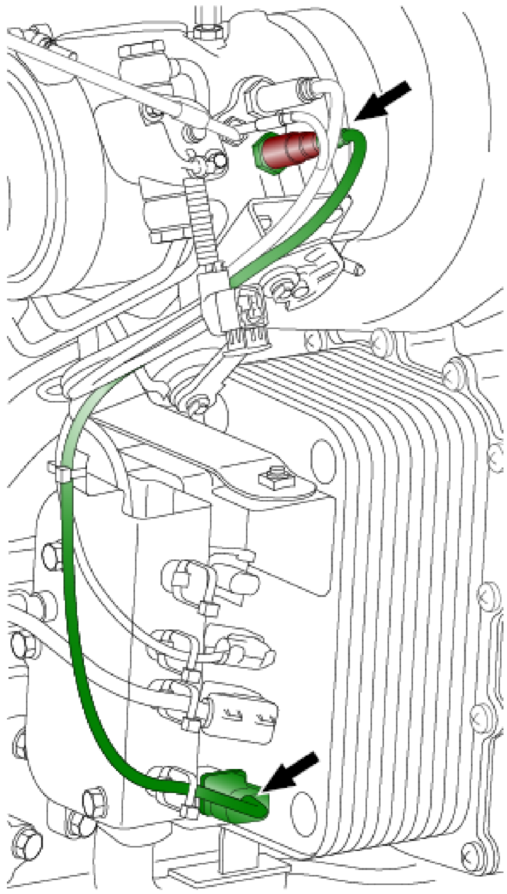
Step 3	Step ID 1709c	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

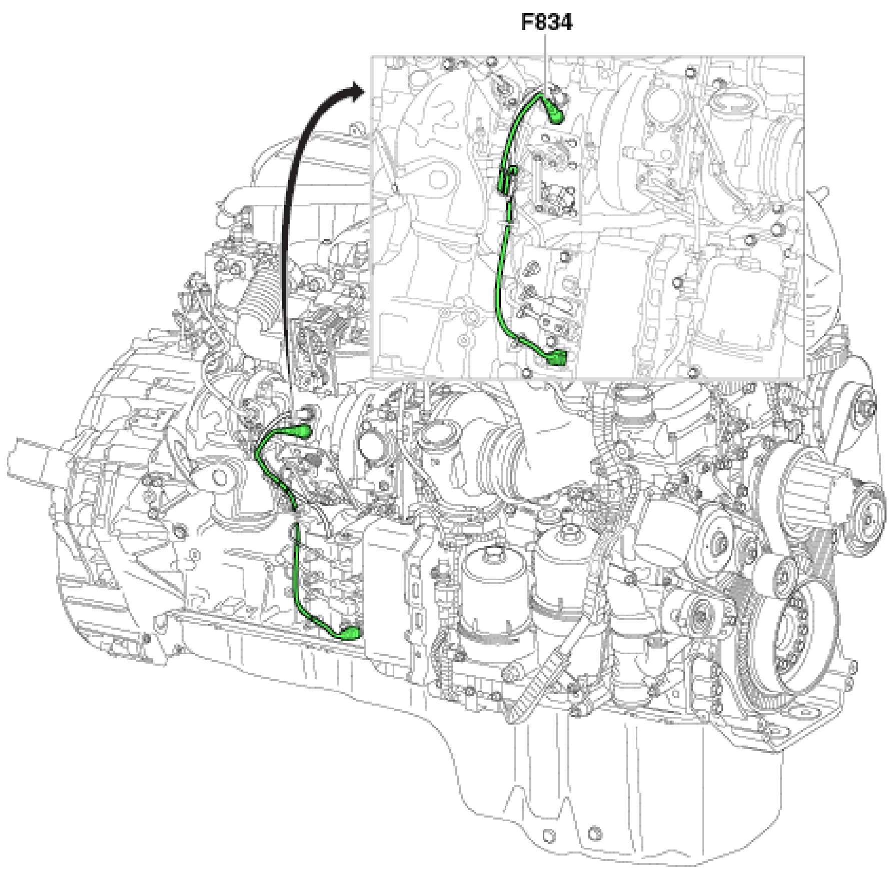
Verification Drive Cycle

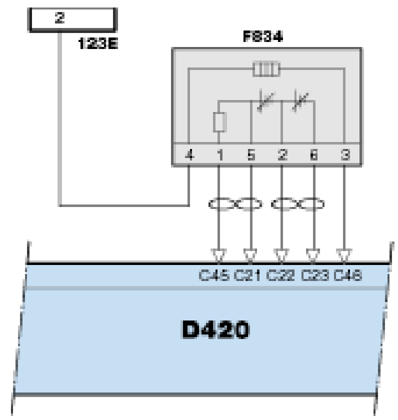
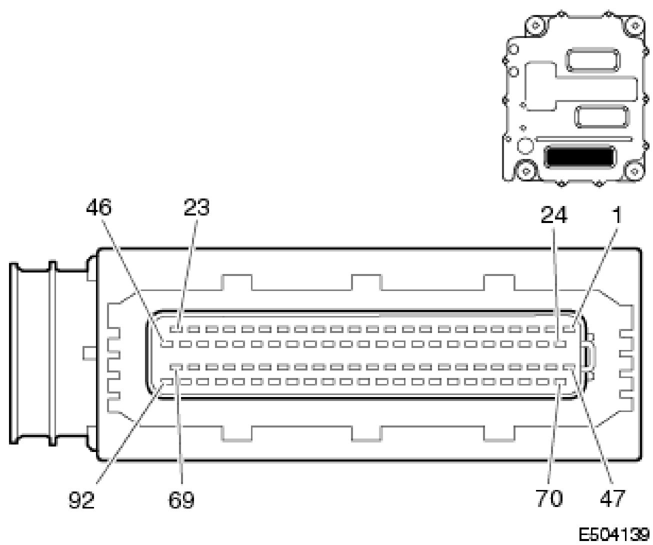
To validate the repair:
This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

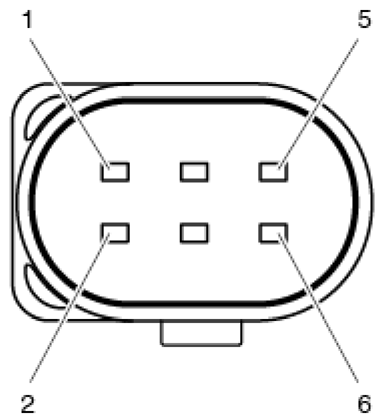
Back to Choose Code
Back to Index

P170A

Code number	P170A
Fault code description	Lambda Data valid but too low, most severe
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU determines the 'dew point' by calculating how much

	energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the engine speed is between 950 and 2000 rpm, and; • When the engine is running at a steady load, and; • When coolant temperature is above 50°C [122°F], and; • The engine mode is SCR high efficiency or standard or protection; • The lambda sensor (F834) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the air/fuel ratio is too low for more than 40

	seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.C front view



Wiring harness connector F834 front view

D420	F834	Function
C21	5	Trimming resistor
C22	2	Ground, sensor element
C23	6	Signal, nernst sensor
C45	1	Signal, pump cell current
C46	3	Ground, heater element
	4	Power supply, heater element

Technical data

Component check, lambda sensor (F834)

Preparation

- Key the ignition off
- Disconnect connector F834
- Measure on component connector F834

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	3	2.4–4.0 Ω	Heater element resistance at 20°C [68°C]

Component & circuit check, ECU (D420)

Preparation

- Key the ignition off
- Disconnect connector F834
- Measure on the front side of wiring harness connector F834

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	Ground	Ubat	Heater element power supply with ignition keyed on

Possible causes

- Faulty fuel system
- Faulty inlet air system
- Lambda sensor deviation

Additional information

The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834), to determine the air/fuel ratio of the combustion process. Typically, low air/fuel ratio indicates low oxygen concentration in the exhaust system.

Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

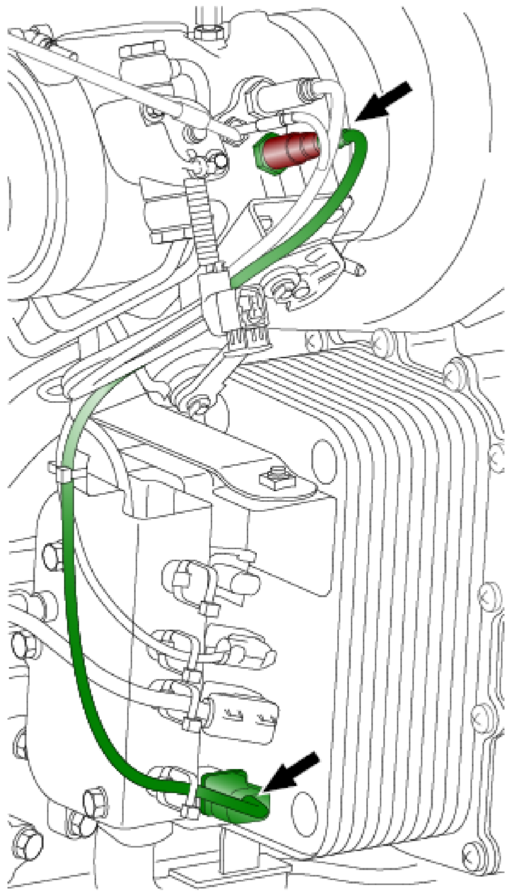
Step 1	Step ID 170A-a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

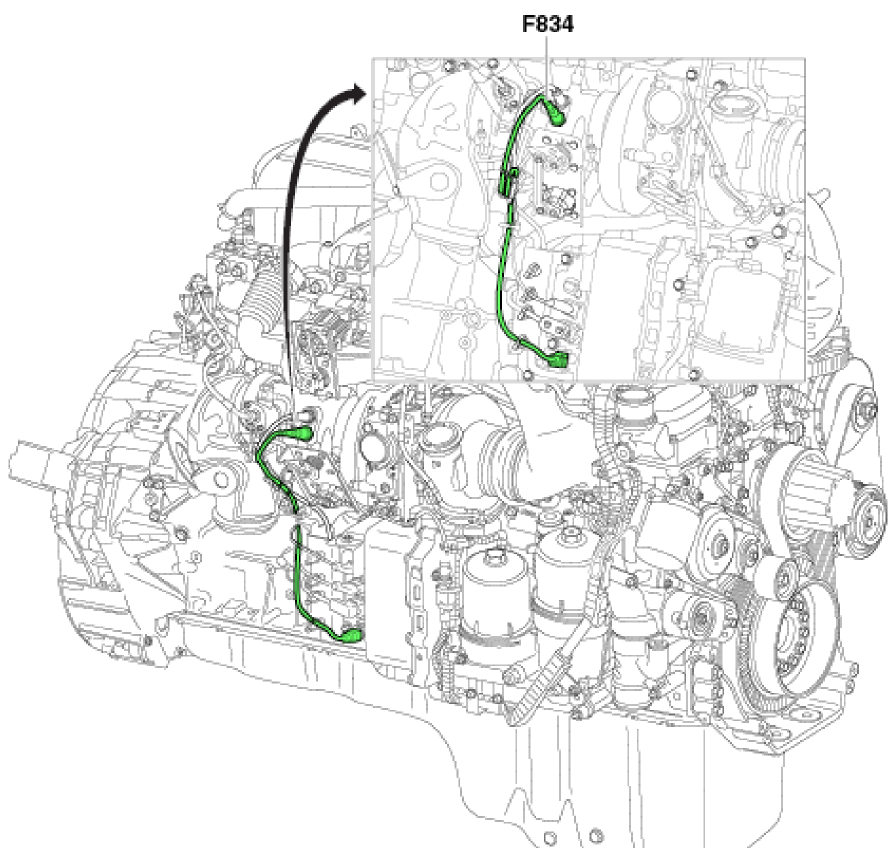
Step 2	Step ID 170A-b	SRT
Replace: Lambda sensor Replace the identified component. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active. Proceed to step 3		

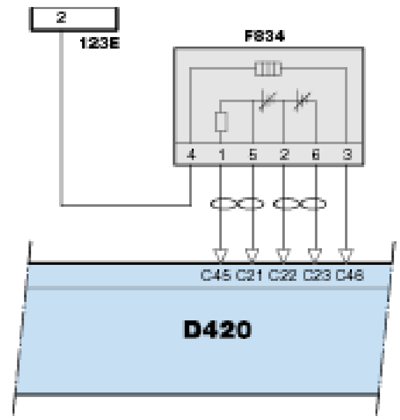
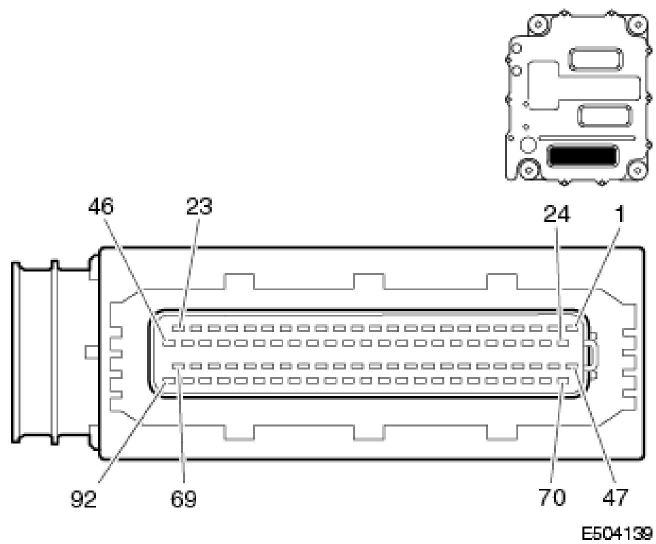
Step 3	Step ID 170A-c	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

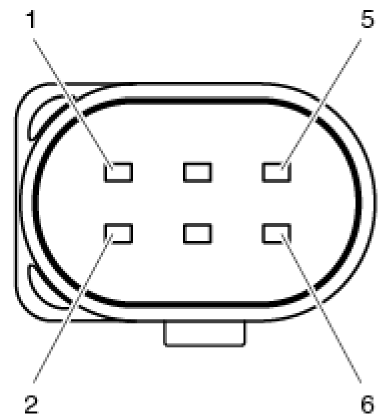
Verification Drive Cycle	To validate the repair, perform with the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

P170B

Code number	P170B
Fault code description	Lambda - Data valid but too high, most severe
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU determines the 'dew point' by calculating how much

	energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the engine speed is between 950 and 2000 rpm, and; • when the engine is running at a steady load, and; • when coolant temperature is above 50°C [122°F], and; • the engine mode is SCR high efficiency or standard or protection; • the lambda sensor (F834) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the air/fuel ratio is too high for more than 40 seconds.

Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.C front view

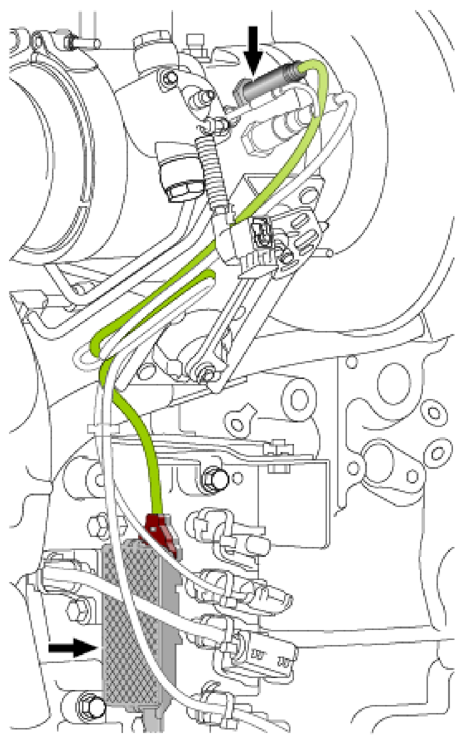
	 Wiring harness connector F834 front view D420 F834 Function C21 5 Trimming resistor C22 2 Ground, sensor element C23 6 Signal, nernst sensor C45 1 Signal, pump cell current C46 3 Ground, heater element 4 Power supply, heater element
Technical data	Component check, lambda sensor (F834) Preparation • Key the ignition off • Disconnect connector F834 • Measure on component connector F834 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 3 | 2.4–4.0 Ω | Heater element resistance at 20°C [68°C] Component & circuit check, ECU (D420) Preparation • Key the ignition off • Disconnect connector F834 • Measure on the front side of wiring harness connector F834 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | Ground | Ubat | Heater element power supply with ignition keyed on
Possible causes	• Leaking exhaust system • Faulty fuel system • Lambda sensor deviation
Additional information	The PCI ECU uses the oxygen concentration in the exhaust, measured by the lambda sensor (F834), to determine the air/fuel ratio of the combustion process. Typically, high value air/fuel ratio indicates high oxygen concentration in the exhaust system.

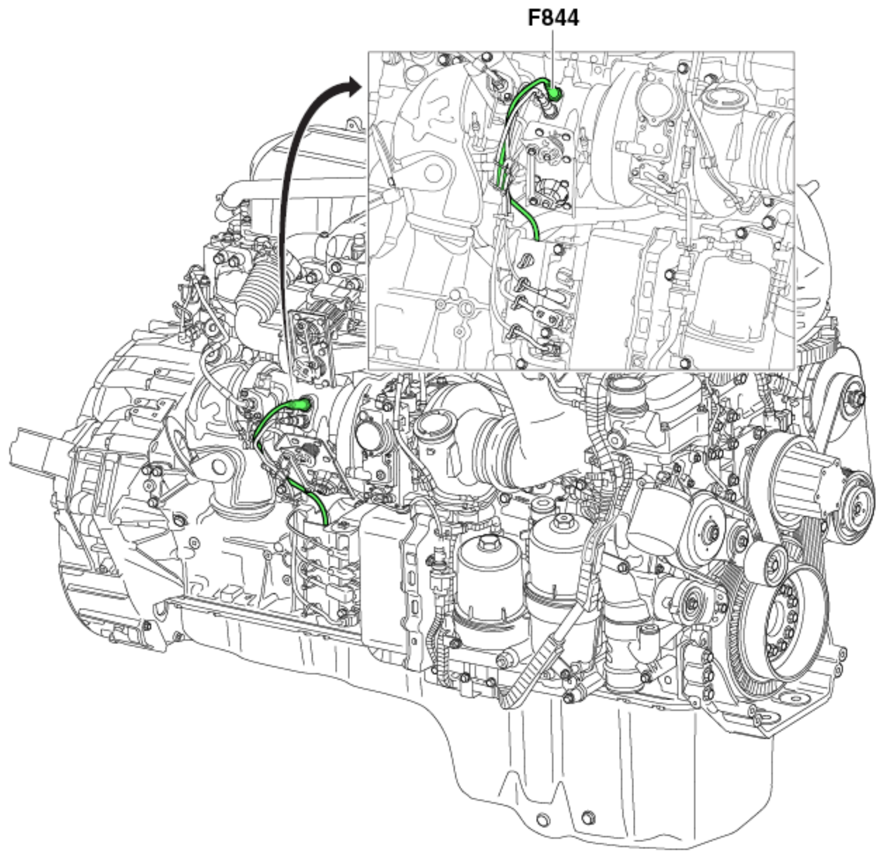
<table>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

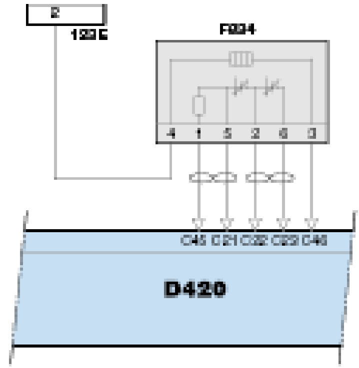
<table>
<tr><td>Step 1</td><td>Step ID 170B-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 170B-b</td><td>SRT</td></tr>
<tr><td colspan="3">Check for Lambda sensor broken or not installed correctly.
Replace the identified component or install it correctly
Use DAVIE to re-check for the presence of active faults.
If this related fault is no longer active, then this issue has been resolved.
If this related fault is still active, proceed to step 3.</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 170B-c</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>This DTC changes to inactive when the fault is no longer detected.
To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

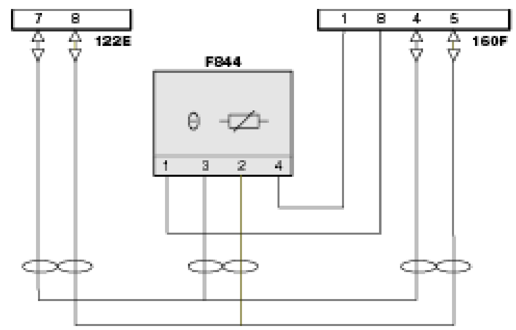
P170C

Code number	P170C
Fault code description	NOx sensor before catalyst response - Data erratic, intermittent, or incorrect during overrun
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. The NOx sensor before catalyst consists of: • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  Sensor heating control • The first stage starts when the ignition is keyed on. • The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor. • The second stage starts after the 'dew point' message is received from the PCI ECU • The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. • If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately

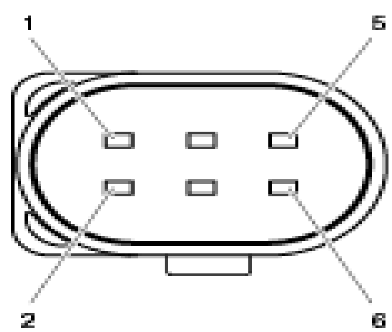
	100°C [212°F]. Effect on the system: • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system • Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • Engine speed above 1200 rpm, and; • During coasting (no fuel injection), and • Coolant temperature is above 50°C [122°F], and; • The NOx sensor before catalyst (F844) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the measured engine NOx emissions differ too much from the expected engine NOx emissions after 3 seconds during coasting (fuel injection cutoff).
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed to a road with a speed limit of 80 km/h [50mph] in the highest gear possible with the engine speed at a minimum of 1800 rpm within the legal speed limit. Once the target rpm has been reached, leave the vehicle in gear, release the accelerator pedal, and allow the vehicle to coast until the engine speed reaches 900 rpm. This test should be conducted four times within the specified operational targets. Be aware of the traffic situation. • For Eaton Ultrashift transmissions, idle drop can only go to 1000 rpm. • For Alison Autoshift transmission, this test cannot be conducted.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

122E 12-pin interface connector
160F 8-pin interface connector
F844 NOx sensor before catalytic convertor

F844	122E	160F	Function
3	7	4	A-CAN high
2	8	5	A-CAN low
1		8	Power supply after ignition
4		1	Ground

Technical data

Component & wiring check, NOx sensor before catalyst (F844)
Preparation

- Ignition keyed off
- Disconnect connector F844.

- Measure on the front side of wiring harness connector F844.

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	Key on the ignition
1	Battery negative pole	>0.5 V	Key on the ignition and switch on all consumers
2	3	± 60 Ω	• Key off the ignition • Disconnect the ground cable from the battery. • Disconnect the vehicle communication interface (VCI) of DAVIE.

Possible causes

- Faulty fuel system
- NOx sensor before catalyst deviation

Additional information

- The measured engine NOx emission is compared with the expected engine NOx emissions during coasting (fuel injection cutoff).
- The engine NOx emissions are measured by the NOx sensor before catalyst (F844).

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 170C-a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 170C-b	SRT
The NOx Sensor, Before Catalyst is broken or incorrectly installed. Replace the identified component or install it correctly Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, proceed to step 3.		

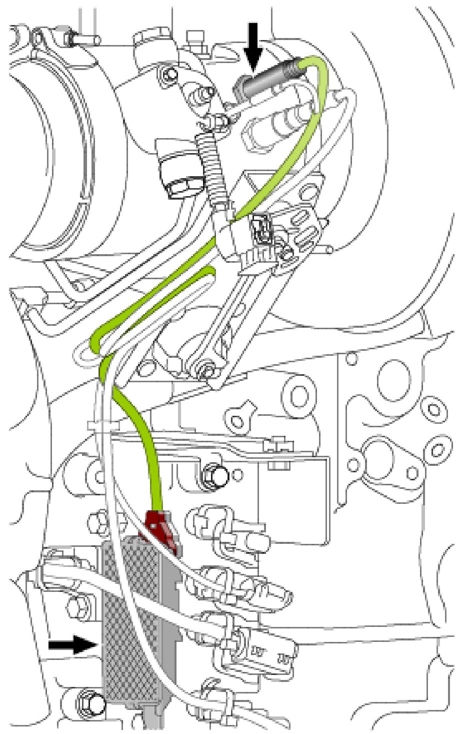
Step 3	Step ID 170C-c	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

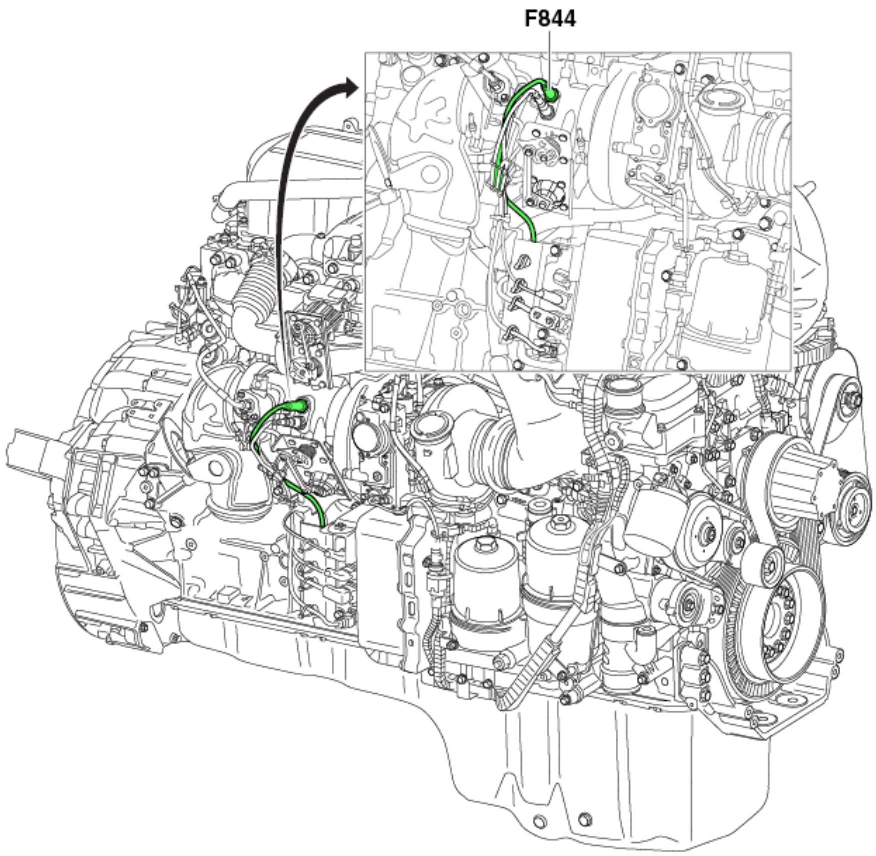
Verification Drive Cycle

This DTC changes to inactive when the fault is no longer detected.
To validate the repair, drive the vehicle until the coolant temperature is at least 70°C

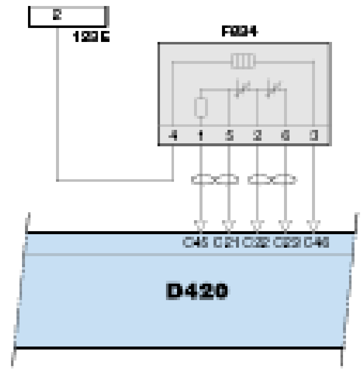
	[158°F]. Once the minimum target temperature has been reached, proceed to a road with a speed limit of 80 km/h [50mph] in the highest gear possible with the engine speed at a minimum of 1800 rpm within the legal speed limit. Once the target rpm has been reached, leave the vehicle in gear, release the accelerator pedal, and allow the vehicle to coast until the engine speed reaches 900 rpm. This test should be conducted four times within the specified operational targets.
	Back to Choose Code Back to Index

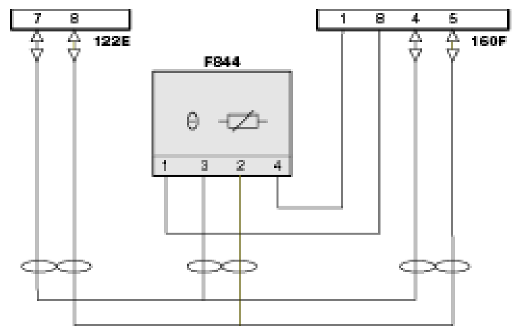
P170D

Code number	P170D
Fault code description	NOx sensor before catalyst response - Incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. The NOx sensor before catalyst consists of: • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  Sensor heating control • The first stage starts when the ignition is keyed on. • The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor. • The second stage starts after the 'dew point' message is received from the PCI ECU • The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. • If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F].

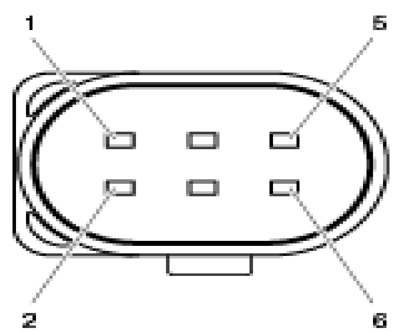
	Effect on the system: • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system • Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs when: • engine is running at a steady load and speed between 1200 and 1700 rpm, and; • coolant temperature is above 50°C [122°F], and; • the engine mode is DOC heating or DPF regeneration or SCR heating or SCR high efficiency or standard or protection, and; • the NOx sensor before catalyst (F844) is in the operating mode
Set condition of fault code	The PCI ECU (D420) detects that measured engine NOx emissions differ too much from the expected engine NOx emissions during transient operation of the engine (expected increase of NOx emissions).
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

122E 12-pin interface connector
160F 8-pin interface connector
F844 NOx sensor before catalytic convertor

F844	122E	160F	Function
3	7	4	A-CAN high
2	8	5	A-CAN low
1		8	Power supply after ignition
4		1	Ground

Technical data

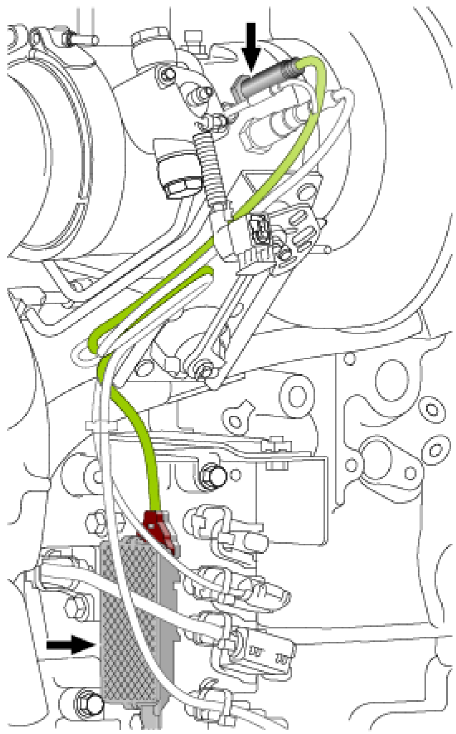
Component & wiring check, NOx sensor before catalyst (F844)
Preparation

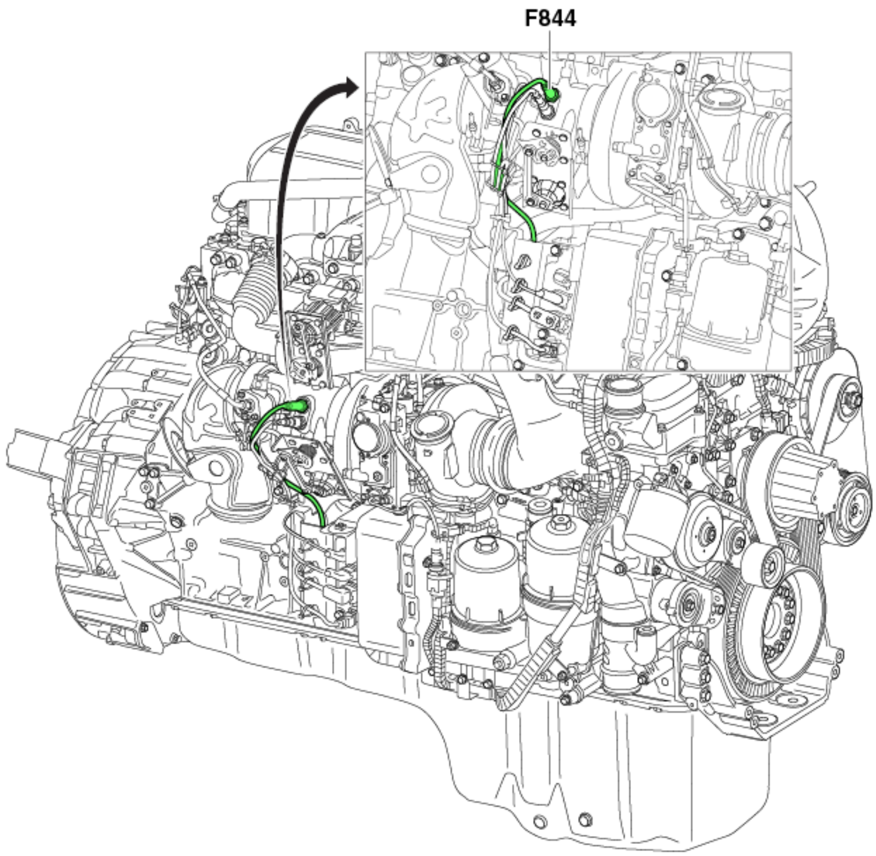
- Ignition keyed off
- Disconnect connector F844.

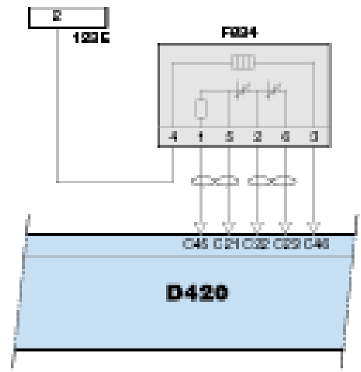
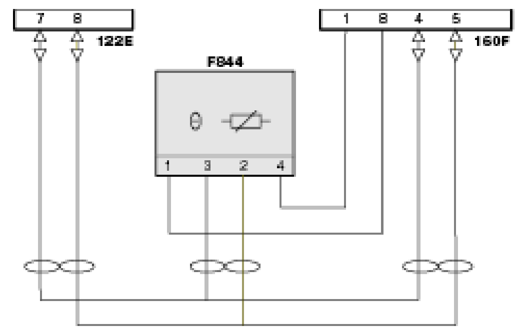
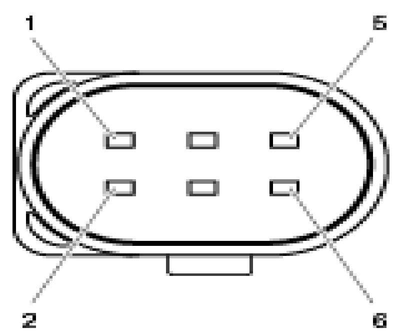
<table>
<tr><td></td><td>
Measure on the front side of wiring harness connector F844.
<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>1</td><td>Ubat</td><td>Key on the ignition</td></tr>
<tr><td>1</td><td>Battery negative pole</td><td>>0.5 V</td><td>Key on the ignition and switch on all consumers</td></tr>
<tr><td>2</td><td>3</td><td>± 60 Ω</td><td>Key off the ignition
Disconnect the ground cable from the battery.
Disconnect the vehicle communication interface (VCI) of DAVIE.</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>NOx sensor before catalyst deviation.</td></tr>
<tr><td>Additional information</td><td>The measured engine NOx emissions are compared with the expected engine NOx emissions during transient operation of the engine.
The engine NOx emissions are measured by the NOx sensor before catalyst (F844).</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step ID 170D-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 170D-b</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace ’NOx Sensor, Before Catalyst’ and use DAVIE to re-check for the presence of active faults.
Fault inactive – issue resolve
Fault active – Proceed to step 3</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 170D-c</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load</td></tr>
</table>

	to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].
	Back to Choose Code Back to Index

P170E

Code number	P170E
Fault code description	NOx sensor before catalyst response - Incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust Gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. The NOx sensor before catalyst consists of: • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  Sensor heating control • The first stage starts when the ignition is keyed on. • The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor. • The second stage starts after the 'dew point' message is received from the PCI ECU • The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. • If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F].

	Effect on the system: • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system • Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine is running at a steady load and speed between 1200 and 1700 rpm, and; • coolant temperature is above 50°C [122°F], and; • the engine mode is DOC heating or DPF regeneration or SCR heating or SCR high efficiency or standard or protection, and; • the NOx sensor before catalyst (F844) is in the operating mode
Set condition of fault code	The PCI ECU (D420) detects that measured engine NOx emissions differ too much from the expected engine NOx emissions during transient operation of the engine (expected decrease of NOx emissions).
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].

Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector F834 front view 122E 12-pin interface connector 160F 8-pin interface connector F844 NOx sensor before catalytic convertor F844 122E 160F Function 3 7 4 A-CAN high 2 8 5 A-CAN low 1 8 Power supply after ignition 4 1 Ground
Technical data	Component & wiring check, NOx sensor before catalyst (F844) Preparation • Ignition keyed off • Disconnect connector F844.

<table>
<tr><td></td><td>

- Measure on the front side of wiring harness connector F844.

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	Key on the ignition
1	Battery negative pole	>0.5 V	Key on the ignition and switch on all consumers
2	3	± 60 Ω	• Key off the ignition • Disconnect the ground cable from the battery. • Disconnect the vehicle communication interface (VCI) of DAVIE.

</td></tr>
<tr><td>Possible causes</td><td>

- NOx sensor before catalyst deviation

</td></tr>
<tr><td>Additional information</td><td>

- The measured engine NOx emissions are compared with the expected engine NOx emissions during transient operation of the engine.
- The engine NOx emissions are measured by the NOx sensor before catalyst (F844).

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 170Ea	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

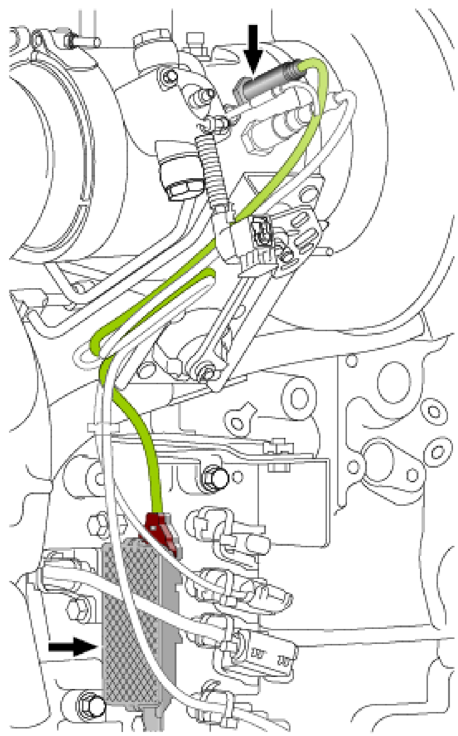
Step 2	Step ID 170Eb	SRT
Replace: NOx Sensor, Before Catalyst Replace the identified component. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the Step 3 in the troubleshooting process.		

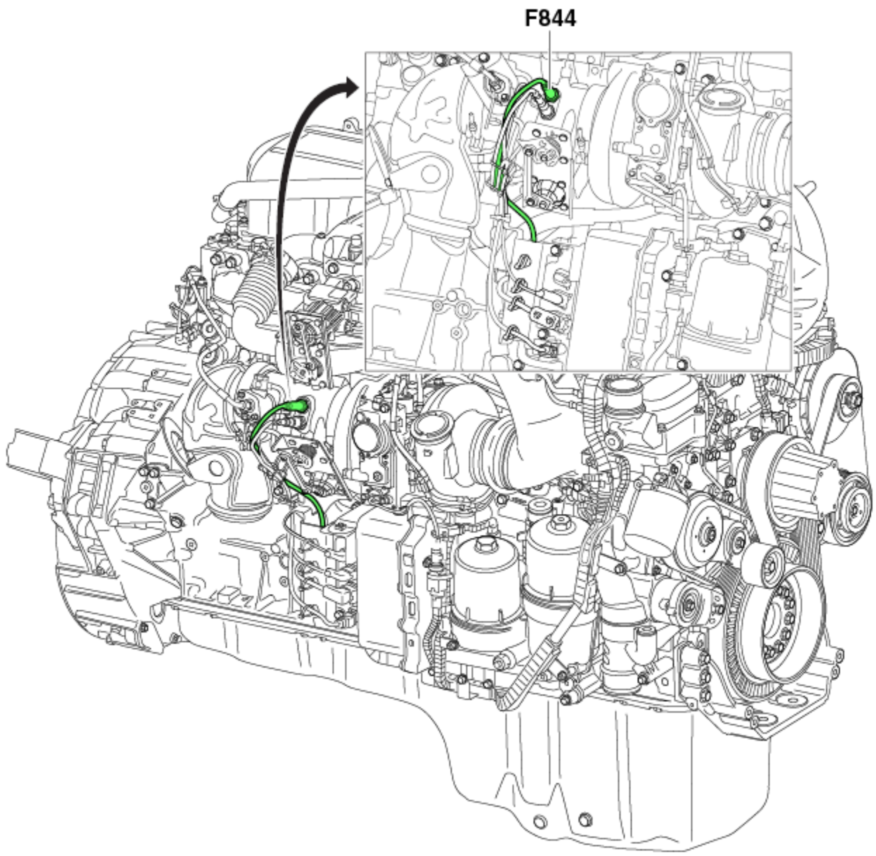
Step 3	Step ID 170Ec	SRT
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call		

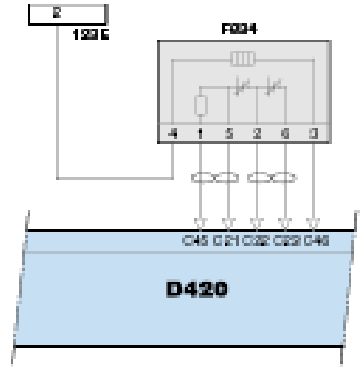
</td></tr>
</table>

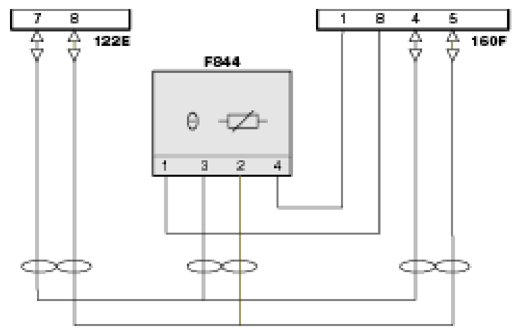
	Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair: This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

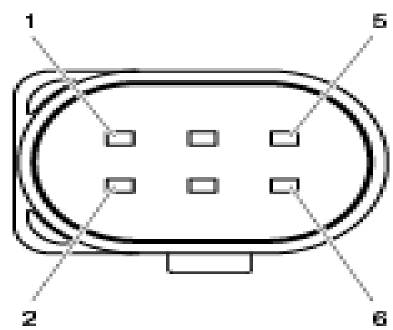
P170F

Code number	P170F
Fault code description	NOX before catalyst – Data valid but too high during overrun (deceleration)
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. The NOx sensor before catalyst consists of: • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  Sensor heating control • The first stage starts when the ignition is keyed on. • The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor. • The second stage starts after the 'dew point' message is received from the PCI ECU • The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. • If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F].

	Effect on the system: • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system • Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • While coasting (no fuel injection), and; • When coolant temperature is above 50°C [122°F], and; • The NOx sensor before catalyst (F844) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the measured engine NOx emissions are too high for a fuel injection cutout situation for more than 21 seconds.
Reset condition of fault code	• This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed to a road with a speed limit of 80 km/h [50mph] in the highest gear possible with the engine speed at a minimum of 1800 rpm within the legal speed limit. Once the target rpm has been reached, leave the vehicle in gear, release the accelerator pedal, and allow the vehicle to coast until the engine speed reaches 900 rpm. This test should be conducted four times within the specified operational targets. Be aware of the traffic situation. • For Eaton Ultrashift transmissions, idle drop can only go to 1000 rpm. • For Alison Autoshift transmission, this test cannot be conducted.

<table>
<tr>
<td>Electrical diagram(s)</td>
<td>




Wiring harness connector D420.C front view


Wiring harness connector F834 front view

122E 12-pin interface connector
160F 8-pin interface connector
F844 NOx sensor before catalytic convertor

<table>
<tr><td>F844</td><td>122E</td><td>160F</td><td>Function</td></tr>
<tr><td>3</td><td>7</td><td>4</td><td>A-CAN high</td></tr>
<tr><td>2</td><td>8</td><td>5</td><td>A-CAN low</td></tr>
<tr><td>1</td><td></td><td>8</td><td>Power supply after ignition</td></tr>
<tr><td>4</td><td></td><td>1</td><td>Ground</td></tr>
</table>
</td>
</tr>
<tr>
<td>Technical data</td>
<td>Component & wiring check, NOx sensor before catalyst (F844)
Preparation

Ignition keyed off
Disconnect connector F844.

</td>
</tr>
</table>

<table>
<tr><td></td><td>

- Measure on the front side of wiring harness connector F844.

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	Key on the ignition
1	Battery negative pole	>0.5 V	Key on the ignition and switch on all consumers
2	3	± 60 Ω	• Key off the ignition • Disconnect the ground cable from the battery. • Disconnect the vehicle communication interface (VCI) of DAVIE.

</td></tr>
<tr><td>Possible causes</td><td>NOx sensor before catalyst deviation</td></tr>
<tr><td>Additional information</td><td>

- The measured engine NOx emissions are compared with the expected engine NOx emissions while coasting (fuel injection cutout).
- The engine NOx emissions are measured by the NOx sensor before catalyst (F844).

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 170F-a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 170F-b	SRT
Repair or replace ’NOx Sensor, Before Catalyst’ and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active – Proceed to step 3		

Step 3	Step ID 170F-c	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

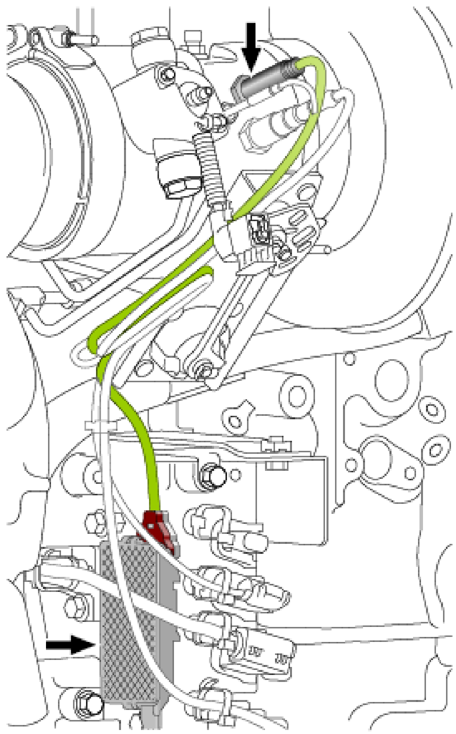
</td></tr>
<tr><td>Verification Drive Cycle</td><td>

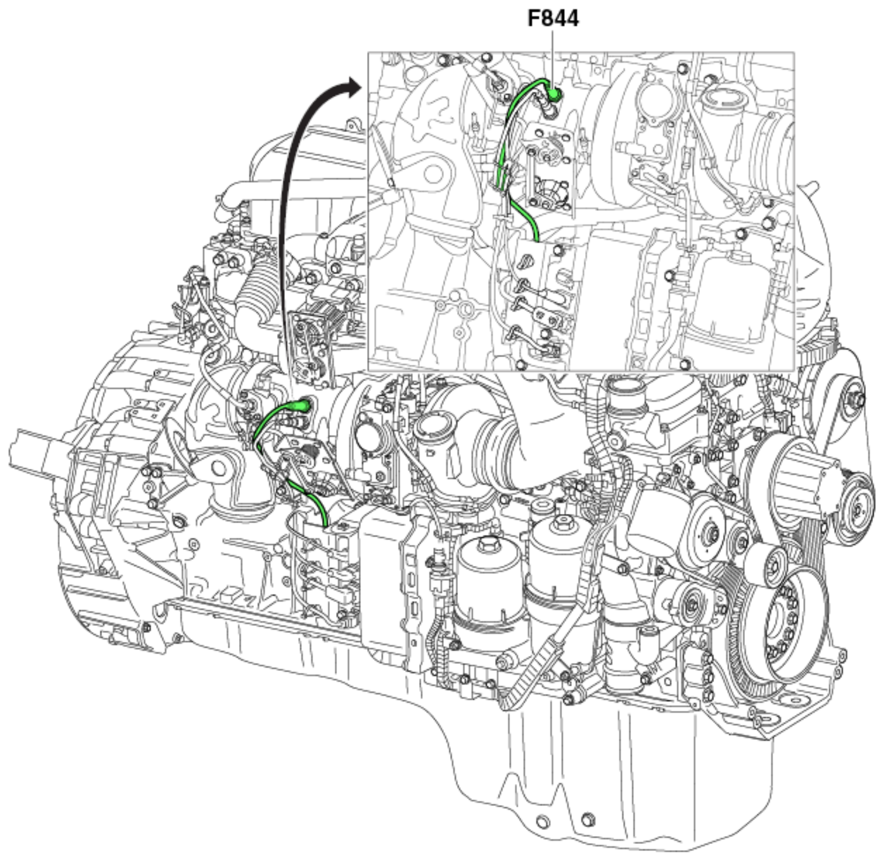
- To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed to a road with a speed limit of 80 km/h [50mph] in the highest gear

</td></tr>
</table>

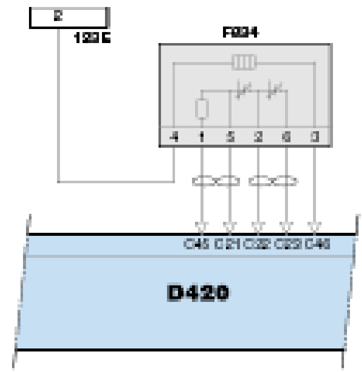
	possible with the engine speed at a minimum of 1800 rpm within the legal speed limit. Once the target rpm has been reached, leave the vehicle in gear, release the accelerator pedal, and allow the vehicle to coast until the engine speed reaches 900 rpm. This test should be conducted four times within the specified operational targets. Be aware of the traffic situation. • For Eaton Ultrashift transmissions, idle drop can only go to 1000 rpm. • For Alison Autoshift transmission, this test cannot be conducted.
	Back to Choose Code Back to Index

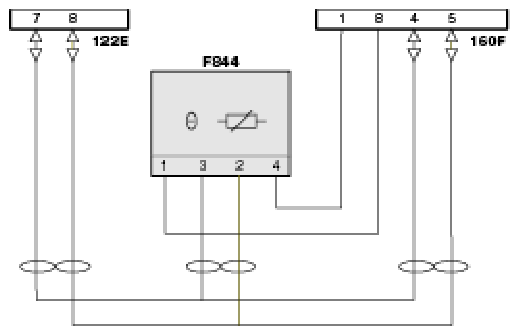
P1710

Code number	P1710
Fault code description	NOx before catalyst – Data valid but too low
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. The NOx sensor before catalyst consists of: • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  Sensor heating control • The first stage starts when the ignition is keyed on. • The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor. • The second stage starts after the 'dew point' message is received from the PCI ECU • The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. • If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F].

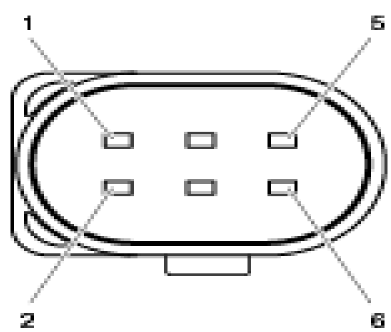
	Effect on the system: • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system • Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the engine is running at a steady load and its speed is between 1050 and 1850 rpm, and; • when coolant temperature is above 50°C [122°F], and; • the engine mode is SCR high efficiency or standard or protection, and; • the NOx sensor before catalyst (F844) is in operating mode;
Set condition of fault code	The PCI ECU (D420) detects that measured engine NOx emissions are lower than the expected engine NOx emissions for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

122E 12-pin interface connector
160F 8-pin interface connector
F844 NOx sensor before catalytic convertor

F844	122E	160F	Function
3	7	4	A-CAN high
2	8	5	A-CAN low
1		8	Power supply after ignition
4		1	Ground

Technical data

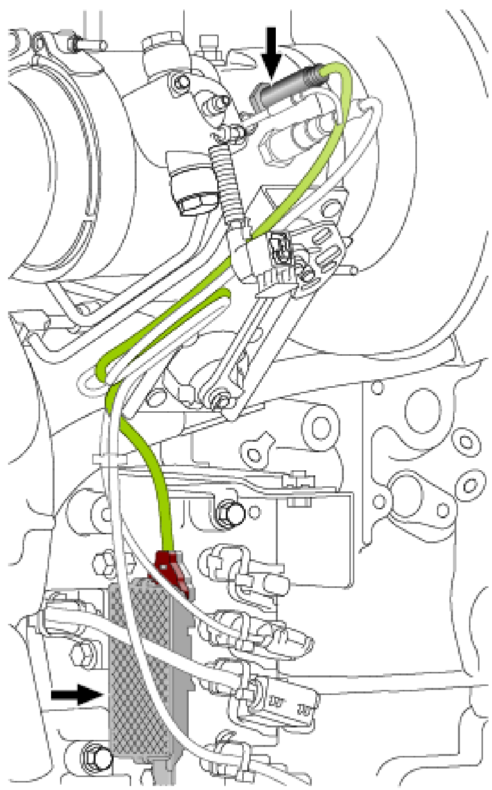
Component & wiring check, NOx sensor before catalyst (F844)
Preparation

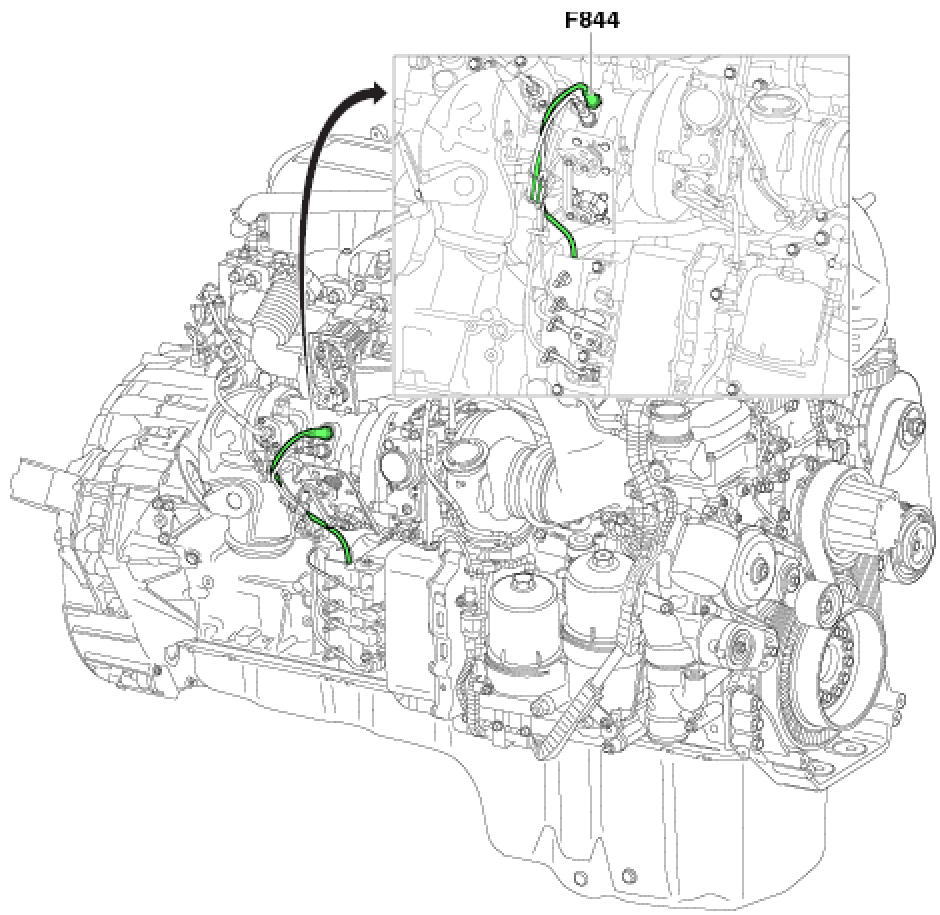
- Ignition keyed off
- Disconnect connector F844.

<table>
<tr><td></td><td>
Measure on the front side of wiring harness connector F844.
<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>1</td><td>Ubat</td><td>Key on the ignition</td></tr>
<tr><td>1</td><td>Battery negative pole</td><td>>0.5 V</td><td>Key on the ignition and switch on all consumers</td></tr>
<tr><td>2</td><td>3</td><td>± 60 Ω</td><td>Key off the ignition
Disconnect the ground cable from the battery.
Disconnect the vehicle communication interface (VCI) of DAVIE.</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>
Clogged EGR pressure difference sensor venturi
Humidity sensor deviation
NOx sensor before catalyst deviation
</td></tr>
<tr><td>Additional information</td><td>
The measured engine NOx emission is compared with the expected engine NOx emission.
The engine NOx emissions are measured by the NOx sensor before catalyst (F844).
</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step 1710a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step 1710b</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: NOx Sensor, Before Catalyst
Replace the identified component.
Use DAVIE to re-check for the presence of active faults.
If this related fault is no longer active, then this issue has been resolved.
If this related fault is still active, continue to the Step 3.</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step 1710c</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
</table>

Verification Drive Cycle	To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
	Back to Index

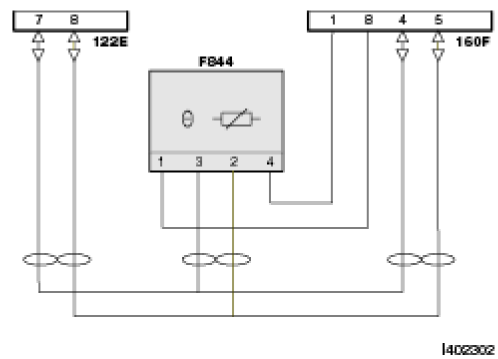
P1711

Code number	P1711
Fault code description	NOx before catalyst – Data valid but too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Exhaust gas sensors Freeze frame type – Exhaust gas
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. **The NOx sensor before catalyst consists of:** • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  **Sensor heating control** • The first stage starts when the ignition is keyed on. The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor.

	• The second stage starts after the 'dew point' message is received from the PCI ECU The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F]. **Effect on the system:** • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the engine is running at a steady load and its speed is between 1050 and 1850 rpm, and; • when coolant temperature is above 50°C [122°F], and; • the engine mode is SCR high efficiency or standard or protection, and; • the NOx sensor before catalyst (F844) is in the operating mode
Set condition of fault	The PCI ECU (D420) detects that the measured engine NOx emissions are higher than the

code	expected engine NOx emissions for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible

Electrical diagram(s)

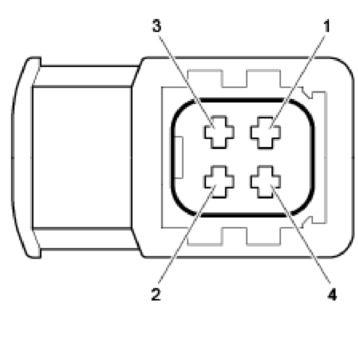


F844 NOx sensor before catalytic convertor

122E 12-pin interface connector

160F 8-pin interface connector

F844	122E	160F	Function
3	7	4	A-CAN high
2	8	5	A-CAN low
1		8	Power supply after ignition
4		1	Ground



Wiring harness connector F844 front view

Handle connectors and pins with care and use matching measuring probes.

Technical data

Component and wiring checks, NOx sensor before catalyst (F844)

Component check, NOx sensor before catalyst (F844)

This type of component check cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the corresponding wiring check

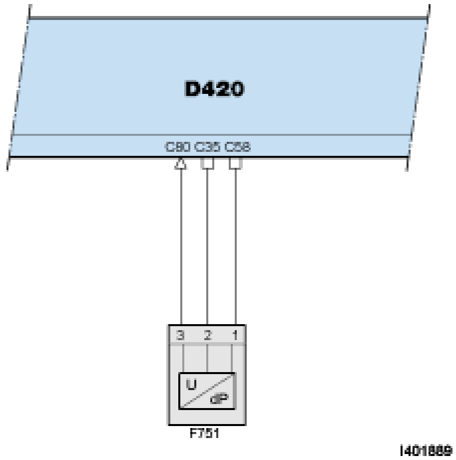
Wiring check, NOx sensor before catalyst (F844)

Preparation

- Key off the ignition
- Disconnect connector F844
- Measure on the front side of wiring harness connector F844

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	4	Ubat	Key on the ignition
4	Battery negative pole	< 0.5 V	Key on the ignition and switch on all consumers
2	3	± 60 Ω	Key off the ignition Disconnect the ground cable from the battery. Disconnect the vehicle communication interface (V of DAVIE.

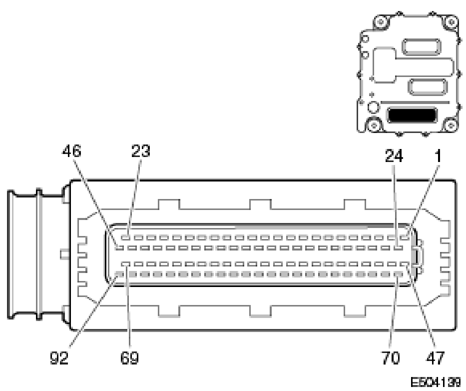
Component and wiring checks, EGR pressure difference sensor (F751)



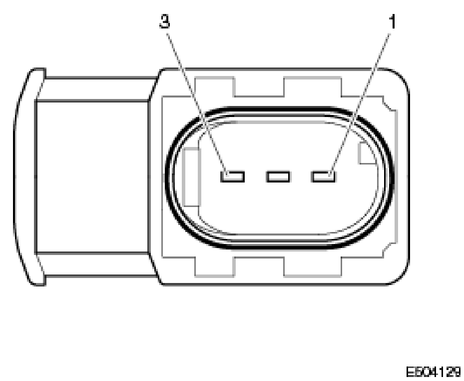
D420 PCI ECU

F751 EGR pressure difference

D420	F751	Function
C35	2	Ground
C58	1	Power supply
C80	3	Signal, EGR pressure



Wiring harness connector D420.C front view



Wiring harness connector F751 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, EGR pressure difference sensor (F751)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Perform the wiring check

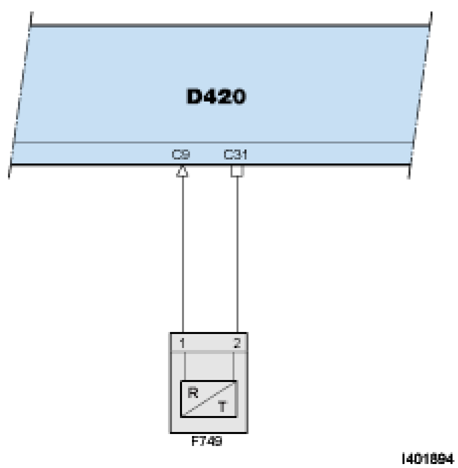
- Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F751
- Measure on the front side of wiring harness connector F751

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

Component and wiring checks, EGR temperature sensor (F749)

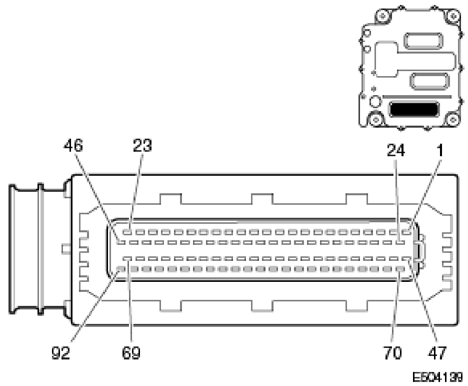


D420 PCI ECU

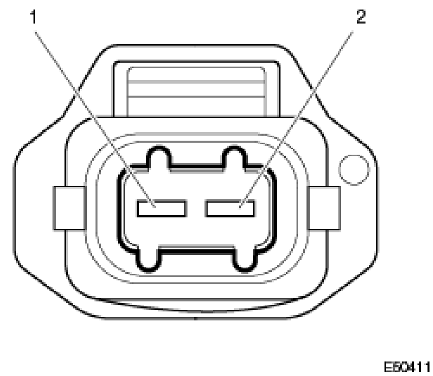
F749 EGR temperature sensor

D420	F749	Function

C9	1	Signal, EGR temperature
C31	2	Ground



Wiring harness connector D420.C front view



Wiring harness connector F749 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, EGR temperature sensor (F749)

Preparation

- Key off the ignition
- Disconnect connector F749
- Measure on the component connector F749

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	97.7–100.3 Ω	Resistance value at 0°C [32°F]
		107.4–108.2 Ω	Resistance value at 20°C [68°F]
		137.5–139.1 Ω	Resistance value at 100°C [212°F]
		167.3–169.7 Ω	Resistance value at 180°C [356°F]
		192.5–195.5 Ω	Resistance value at 250°C [482°F]

Component & circuit check, ECU (D420)

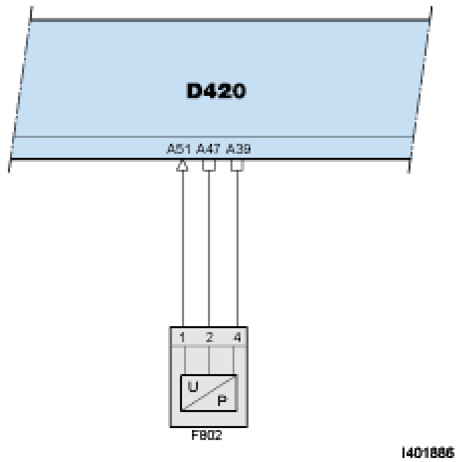
Preparation

- Key off the ignition
- Disconnect connector F749

- Measure on the front side of wiring harness connector F749

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

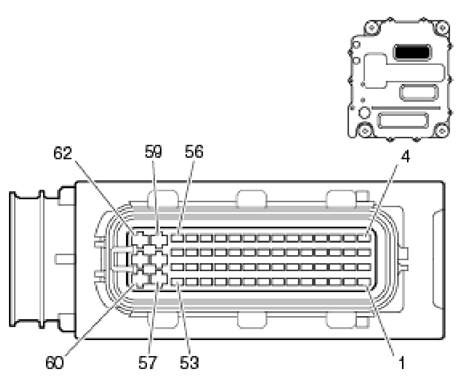
Component and wiring checks, Boost pressure sensor (F802)



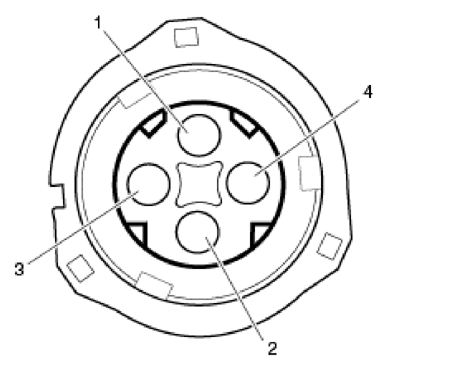
D420 PCI ECU

F802 Boost pressure sensor

D420	F802	Function
A39	4	Ground
A47	2	Power supply
A51	1	Signal, boost pressure



Wiring harness connector D420.A front view



Wiring harness connector F802 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, boost pressure sensor (F802)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

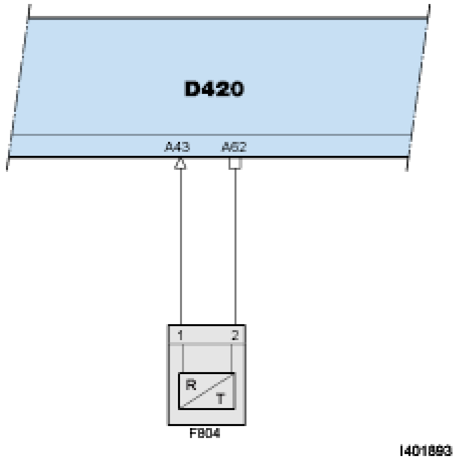
- Monitor/test the component with DAVIE
- Perform the wiring check
- Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F802
- Measure on the front side of wiring harness connector F802

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

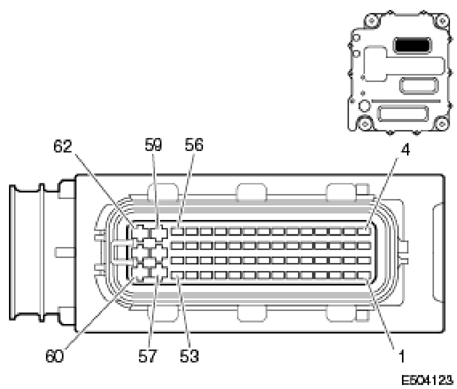
Component and wiring checks, Boost temperature senor (F804)



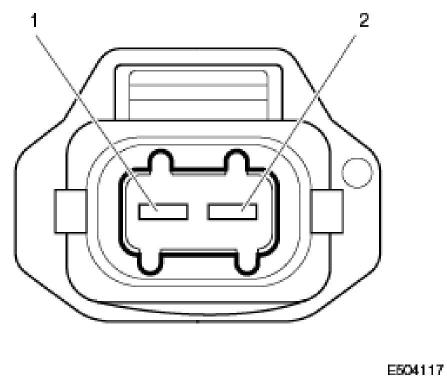
D420 PCI ECU

F804 Boost temperature sensor

D420	F804	Function
A43	1	Signal, boost temperature
A62	2	Ground



Wiring harness connector D420.A front view



Wiring harness connector F804 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, fuel temperature sensor (F804)

Preparation

- Key off the ignition
- Disconnect connector F804
- Measure on the component connector F804

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5248–5732 Ω	Resistance value at 0°C [32°F]
		2334–2505 Ω	Resistance value at 20°C [68°F]
		1133–1198 Ω	Resistance value at 40°C [104°F]
		593–619 Ω	Resistance value at 60°C [140°F]
		331–341 Ω	Resistance value at 80°C [176°F]
		195–199 Ω	Resistance value at 100°C [212°F]

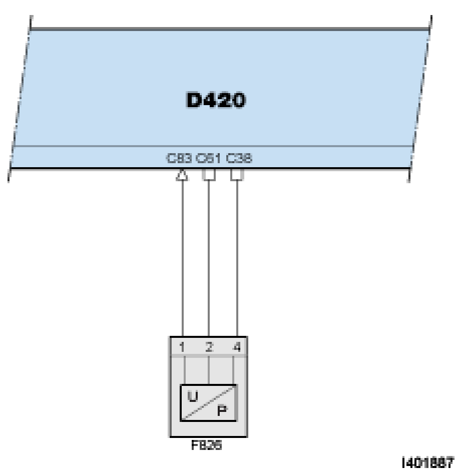
Component & circuit check, ECU (D420)

Preparation

- Ignition keyed off
- Disconnect connector F804
- Measure on the front side of wiring harness connector F804

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

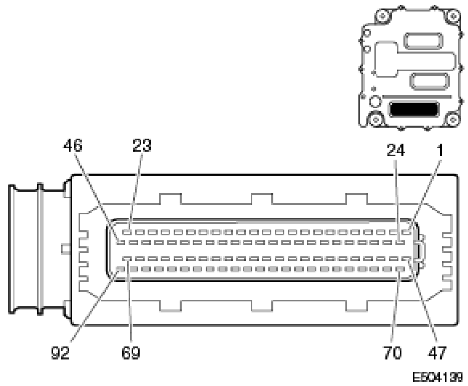
Component and wiring checks, Before turbine pressure sensor (F826)



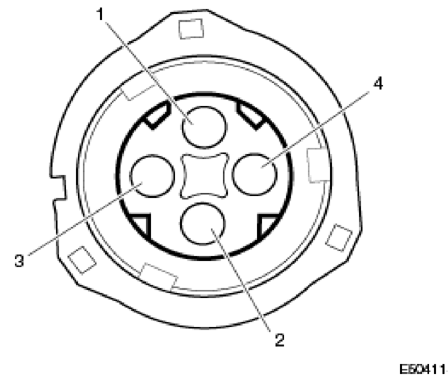
D420 PCI ECU

F826 pressure sensor before turbine

D420	F826	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine



Wiring harness connector D420.C front view



Wiring harness connector F826 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, pressure sensor after BPV (F826)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check

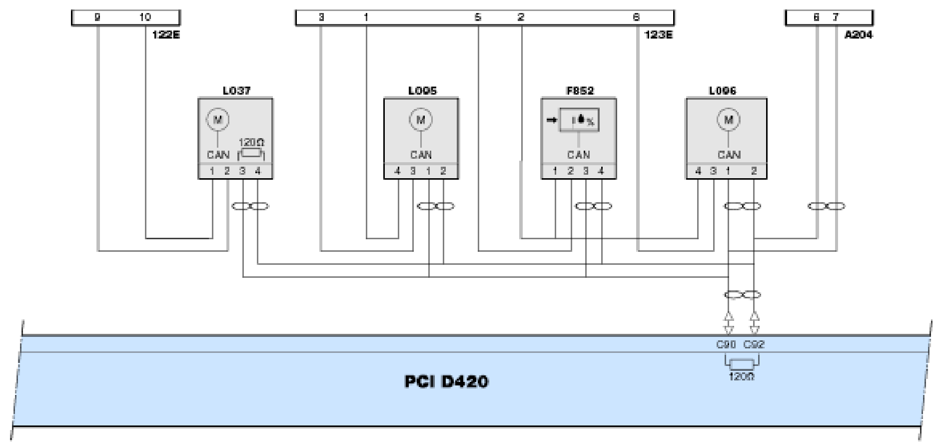
Component & wiring check, ECU (D420)

Preparation

- Key of the ignition
- Disconnect connector F826
- Measure on the front side of wiring harness connector F826

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

Component and wiring checks, EGR valve module (L095)



122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

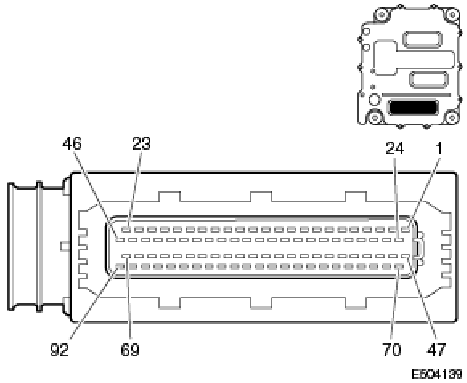
F852 humidity sensor

L037 VTG turbocharger actuator

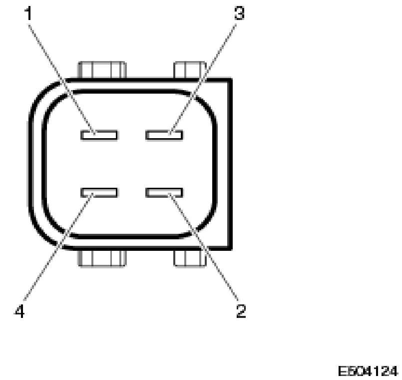
L095 EGR valve module

L096 BPV valve

D420	L095	Function
C90	1	E-CAN high
C92	2	E-CAN low
	3	Ground
	4	Power supply after ignition



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, EGR valve module (L095)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check

Wiring check, EGR valve module (L095)

Preparation

- Key off the ignition
- Disconnect connector L095
- Measure on the front side of wiring harness connector L095

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	4	Ubat	Ignition keyed on
1	2	± 60 Ω	• Ignition keyed off • Ground cable from the battery disconnected • DAVIE Vehicle Communication Interface (VCI) disconnected

Possible causes

- Diesel fuel used is not in accordance with EN590
- Leakage in inlet air system

	• Clogged EGR pressure difference sensor venturi • Humidity sensor deviation • NOx sensor before catalyst deviation
Additional information	• The measured engine NOx emissions are compared with the expected engine NOx emissions. • The engine NOx emissions are measured by the NOx sensor before catalyst (F844).
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.** ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly. ▪ Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors. ▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes. ▪ It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. **Step 1. Investigate Related Trouble Codes** Before troubleshooting this code, take notice of any other active or inactive trouble codes. One or multiple other codes could have been the cause for this code. **Step 1.A Investigate related trouble codes** **Action** 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.

Are these or any other related codes active?	
EGR	P0405; P0406; P0407; P0408; P040B; P040C; P040D; P0486; P102D; P1030; P127A; P127B; P127C; P1280; P1281; P1284; P1285; P1286; P1288; P1400; P1409; P1458; P1480; P1481; P1482; P1483; P1484; P1485; P1486; P1487; P1488; P1489; P1490; P1494; P1496; P1572; P1717; P1718; P171B; P171C; P2457
VGT	P0046; P0049; P102C; P103F; P104E; P104F; P1111; P1235; P1350; P1351; P1352; P1354; P1356; P1580; P1581; P1727; P2563; P2579; P2580; P2581
NOx sensor, before catalyst	P3863; P3864; P3865; P3866; P3867; P3868; P3869; P3870; P3871; P3873; P3877; P3881

Yes	**No**
Stop troubleshooting P1711 and refer to the troubleshooting information for these trouble codes.	**Error! Reference source not found.**

Step 2. EGR System Checks

Step 2. A Visual Inspection: EGR Pressure Difference sensor (F751)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
    - Damaged or loose connectors
    - Bent, broken, corroded or loose connector pins
    - Moisture or dirt in the connections
    - Damage to the wire harness or insulation
    - ECU connections are damaged or disconnected
    - Battery not fully charged, contacts not tight
    - Signs of exhaust or coolant leaks on the EGR
    - Broken or missing clamps on any air system component
    - Improper seal between the sensor and mounting block
    - Improper seal at pipe fittings

Was there evidence of any of the above?

Yes	No
Correct any issues found. If the Lambda sensor (F834) is found to be damaged or broken, replace it. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step **Error! Reference source not found.**	**Error! Reference source not found.**

Step 2.B Electrical checks, EGR pressure difference sensor (F751)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.B.1 Supply voltage

Action

1. Confirm the supply voltage level as outlined in the checking data, component check, EGR pressure difference sensor (F751).

Are measured values within expected range?

Yes	No
Go to step 2.C	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.C.

Step 2. C Visual inspection, EGR temperature sensor (F749)

Action

2. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections

- Damage to the wire harness or insulation
- ECU connections damaged or disconnected
- Batteries are not okay, contacts are not tight
- Signs of exhaust or coolant leaks on the EGR
- Sensor damaged

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.D	2.D

Step 2.D Electrical checks, EGR pressure temperature sensor (F749)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.D.1 Resistance checks

Action

1. Confirm the sensor resistance as outlined in the corresponding checking data, component check, EGR temperature sensor (F749).

Are measured values within expected range?

Yes	No
Go to step 2.D.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.D.2

2.D.2 Supply voltage

Action

1. Confirm the supply voltage to the EGR temperature sensor (F749) as outlined in the corresponding checking data, component & circuit check, ECU (D420).

Are measured values within expected range?

Yes	No
Go to step 2.E	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.E

Step 2. E Visual inspection, Boost pressure sensor (F802)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Soot buildup on the sensor orifice or around the sensor port

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.F	2.F

Step 2.F Electrical checks, boost pressure sensor (F802)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.F.1 Supply voltage

Action

1. Confirm the supply voltage to the boost pressure sensor (F801) as outlined in the corresponding checking data, component & wiring check, ECU (D420).

Are measured values within expected range?	
Yes	**No**
Go to step 2.G	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.G.

Step 2. G Visual inspection, boost temperature sensor (F804)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
    - Damaged or loose connectors
    - Bent, broken, corroded or loose connector pins
    - Moisture or dirt in the connections
    - Damage to the wire harness or insulation
    - Loose or broken clamps on the air system
    - ECU connections are not damaged or disconnected
    - Batteries are not okay, contacts are not tight
    - Soot buildup on the sensor orifice or around the sensor port

Was there evidence of any of the above?	
Yes	**No**
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.H	2.H

Step 2.H Electrical checks, boost temperature sensor (F804)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.H.1 Resistance checks

Action

1. Confirm the resistance values as outlined in the corresponding checking data, component check, boost temperature sensor (F804).

Are measured values within expected range?

Yes	**No**
Go to step 2.G.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.G.2.

2.H.2 Supply voltage

Action

1. Confirm the supply voltage to the boost temperature sensor (F804) as outlined in the corresponding checking data, component & circuit check, ECU (D420).

Are measured values within expected range?

Yes	**No**
Go to step 2.I	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.I.

Step 2. I Visual inspection, before-turbine pressure sensor (F826)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - Batteries are not okay, contacts are not tight
   - Loose or broken clamps on the air system
   - Visible signs of exhaust leaks on the EGR
   - Related sensor not installed correctly

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.J	2.J

Step 2.J Electrical checks, before-turbine pressure sensor (F826)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.J.1 Supply voltage

Action

1. Confirm the supply voltage to the before turbine pressure sensor (F826) as outlined in the corresponding checking data, component & wiring check, ECU (D420).

Are measured values within expected range?

Yes	No
Go to step 3.A	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 3.A.

Step 3. Intake and Exhaust Leak Check

Step 3.A Special test, Intake/Exhaust Leak	
Action 1. Refer to the identified procedure to inspect the exhaust system for leaks.	
Were any leaks in the intake or exhaust system detected?	
Yes	**No**
Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.A	4.A

Step 4. Check for EGR Restrictions

Step 4.A Visual inspection, EGR valve module (L095)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - ECU connections are not damaged or disconnected
   - Batteries are not okay, contacts are not tight
   - EGR Module not installed correctly
   - Signs of damage to the EGR valve and module

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the EGR valve if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.B	4.B

Step 4.B Electrical checks, EGR valve module (L095)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

4.B.1 Resistance checks

Action

1. Confirm the resistance values as outlined in the corresponding checking data, wiring check, EGR valve module (L095).

Are measured values within expected range?

Yes	No
Go to step 4.B.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.B.2.

4.B.2 Supply voltage

Action

1. Confirm supply voltage to the EGR valve module (L095) as outlined in the corresponding checking data, wiring check, EGR valve module (L095).

Are measured values within expected range?

Yes	No
Go to step 4.C	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.C.

Step 4.C Visual inspection, EGR cooler

Action

1. Visually inspect the associated component connections and the coolant reservoir for the following:
   - Signs of exhaust or coolant leaks on the EGR
   - Low coolant level

Was there evidence of any of the above?

Yes	No
Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.D	4.D

Step 4.D Special test, EGR cooler internal leak	
Action 1. Perform the prescribed test to determine if there is a coolant leak affecting EGR performance.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found, or replace the EGR cooler if found damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.E	4.E

Step 4.E DAVIE Performance test, EGR service	
Action 1. Run the prescribed DAVIE performance test to determine if the EGR Valve has any mechanical issues by monitoring related parameters while opening and closing the EGR Valve.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found, or replace the EGR valve actuator if found to be damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	5.A

If this code is still present, proceed to Step 5.A	

Step 5. Turbocharger (VGT) Actuator Checks

Step 5.A Visual inspection, VGT	
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors? • Bent, broken, corroded or loose connector pins? • Moisture or dirt in the connections? • Damage to the wire harness or insulation? • ECU connections are not damaged or disconnected? • Batteries are not okay, contacts are not tight? • Broken or missing clamps around the Turbo? • Incorrect parts are installed? • Turbo or Turbo Actuator not properly installed? • Alternator is damaged or functioning outside of manufacturer's specifications?	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 5.B	5.B

Step 5.B DAVIE Performance test, Turbocharger (VGT) Actuator Effort	
Action 1. Run the prescribed DAVIE performance test to determine correct operation of the VGT actuator.	
Does this test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 6.A	6.A

Step 6. NOx Sensor Before Catalyst Checks

Step 6.A Visual inspection, NOx sensor before catalyst (F844)	
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected • Batteries are not okay, contacts are not tight • The NOx Sensor, before catalyst is broken or incorrectly installed • The correct parts are not installed • Broken or missing clamp around the Turbo and BPV	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found, or replace the EGR valve if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 6.B	6.B

Step 6.B Electrical checks, NOx sensor before catalyst (F844)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

6.B.1 Resistance checks

Action

1. Confirm the resistance values as outlined in the corresponding checking data, wiring check, NOx sensor before catalyst (F844).

Are measured values within expected range?

Yes	No
Go to step 6.B.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 6.B.2.

6.B.2 Supply voltage

Action

1. Confirm supply and signal voltage values as outlined in the corresponding checking data, wiring check, NOx sensor before catalyst (F844).

Are measured values within expected range?

Yes	No
Go to step 8.A	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 8.A.

Step 7. Repair Verification

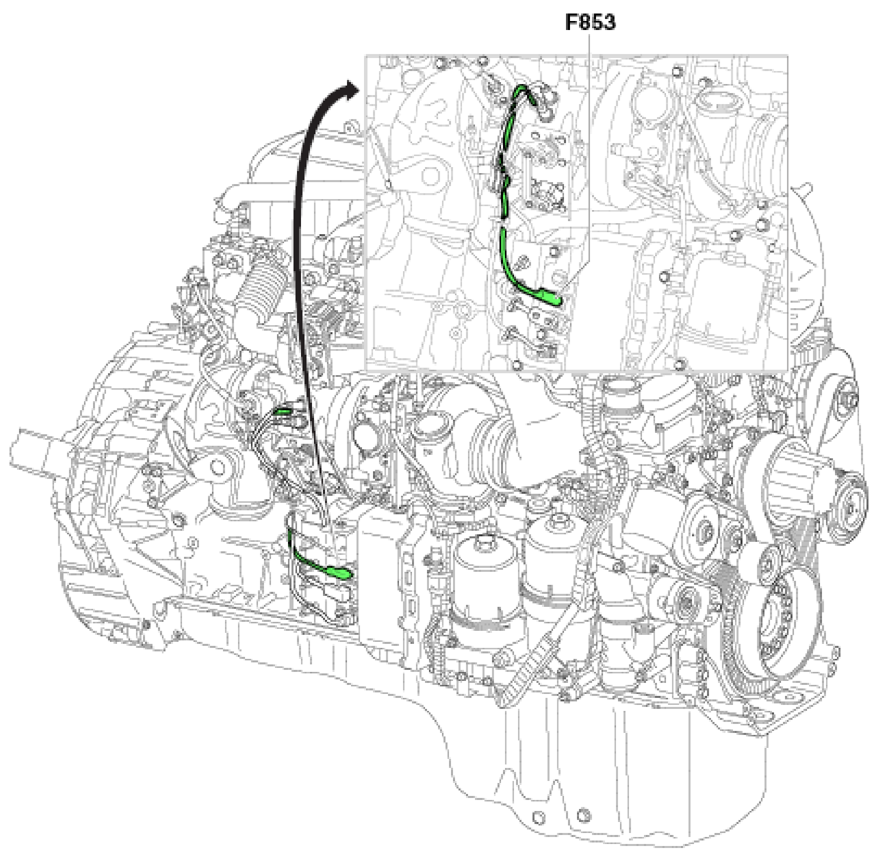
Step 7.A Repair Verification Cycles
Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active. ℹ Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
Action 1. Steady State This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

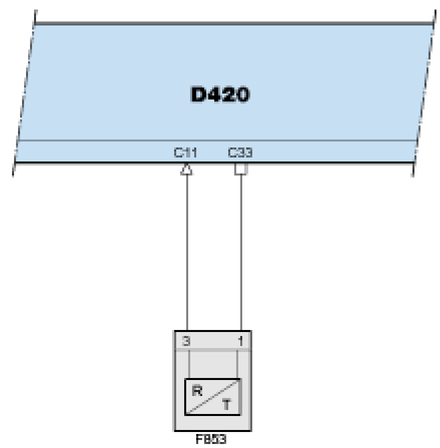
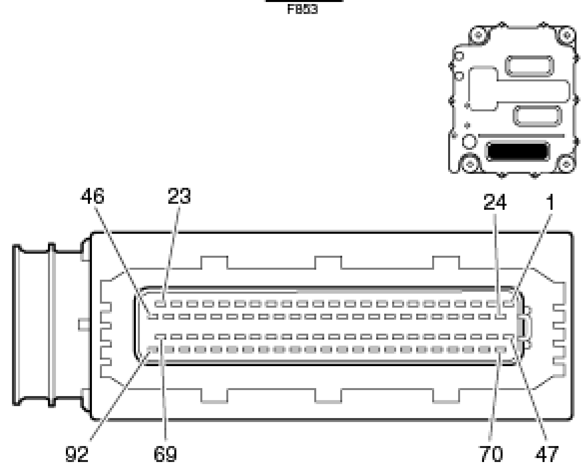
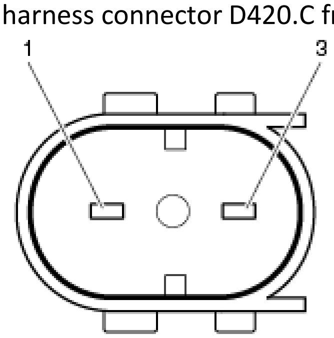
Step 8. Contacting PACCAR Engine Support Center

Step 8.A Contact PACCAR Engine Support Center
Action 1. For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.

Back to Index

P1717

Code number	P1717
Fault code description	Temperature after BPV - Data erratic, intermittent, or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The exhaust gas temperature after BPV is measured after the back pressure valve (BPV). Effect on the system: • Calculates the NOx composition for correction of the NOx emissions by the engine Higher measured temperature after BPV results in a higher calculated NO2 emission by the engine. • Calculate temperature before turbine Higher measured temperature after BPV results in higher calculated exhaust gas temperature before the turbine.
Location of component(s)	
Diagnostic condition	This diagnostic runs when: • when the engine is running at a steady load, and; • when coolant temperature is above 50°C [122°F], and; • the engine mode is SCR high efficiency or standard or protection, and; • the fuel dosing valve (EAS) is disabled.
Set condition of fault code	The PCI ECU (D420) detects that the temperature after BPV differs by more than 421°C [790°F] from the temperature before DOC (EAS) for more than 50 seconds.

Reset condition of fault code	• This DTC changes to inactive when the fault is no longer detected. To validate the repair: • Key the ignition off for at least 15 seconds, then key it on again. Then start the engine and let it idle for 2 minutes, and; • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector F853 front view

<table>
<tr><td></td><td>
D420 PCI ECU
F853 temperature sensor after BPV
<table>
<tr><td>D420</td><td>F853</td><td>Function</td></tr>
<tr><td>C11</td><td>3</td><td>Signal, temperature after BPV</td></tr>
<tr><td>C33</td><td>1</td><td>Ground</td></tr>
</table>
</td></tr>
<tr><td>Technical data</td><td>
Component check, temperature sensor after BPV (F853)
Preparation

Key off the ignition
Disconnect connector F853
Measure on component connector F853

<table>
<tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>1</td><td>3</td><td>197.6–204.6 Ω</td><td>Resistance value at 0°C [34°F]</td></tr>
<tr><td></td><td></td><td>217.1–224.15 Ω</td><td>Resistance value at 25°C [77°F]</td></tr>
<tr><td></td><td></td><td>349.5–356.1 Ω</td><td>Resistance value at 200°C [392°F]</td></tr>
<tr><td></td><td></td><td>622.5–634.1 Ω</td><td>Resistance value at 600°C [1112°F]</td></tr>
</table>
Component & circuit check, ECU (D420)
Preparation

Key off the ignition
Disconnect connector F853
Measure on the front side of wiring harness connector F853

<table>
<tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>3</td><td>1</td><td>5V</td><td>Ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>

More than expected loss of heat between the engine exhaust and after treatment system inlet (e.g., damaged exhaust pipe insulation)
Temperature after BPV sensor deviation
Temperature before DOC sensor deviation

</td></tr>
<tr><td>Additional information</td><td>

The temperature after BPV is compared with the temperature before DOC (EAS).
The temperature after BPV is measured by the temperature after BPV sensor (F853).
The temperature before DOC is measured by the ECU DOC-DPF temperature sensors (D418).

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be

</td></tr>
</table>

	the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1717a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 1717b	SRT
DAVIE Direct: Monitor EGR and Post BPV temperature sensors Use DAVIE to monitor the following temperatures: • EGR Temperature • Post BPV Temperature Idle the engine for a minimum of 10 minutes to allow temperatures to stabilize. While monitoring, temperature values from sensor to sensor should not vary more than ±30°F. Do any monitored values vary by more than ±30°F? • Yes - Proceed to step 3 • No - Proceed to step 4		

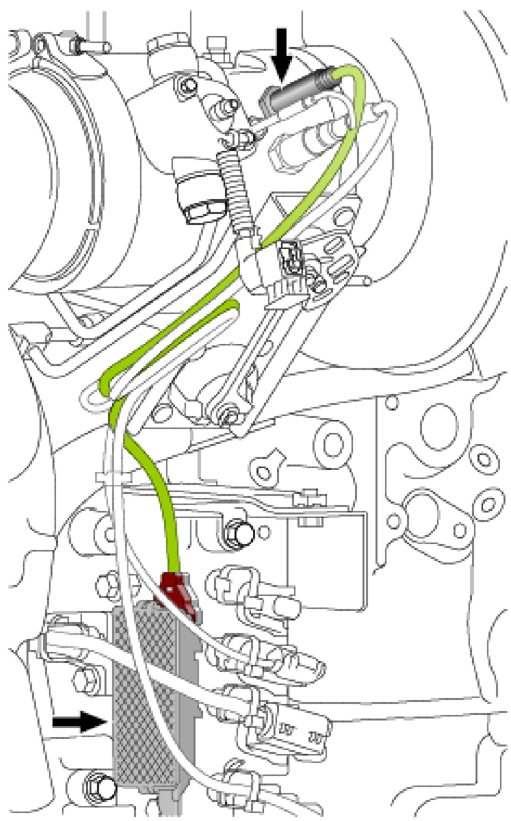
Step 3	Step ID 1482c	SRT
Repairs or replacement of appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4		

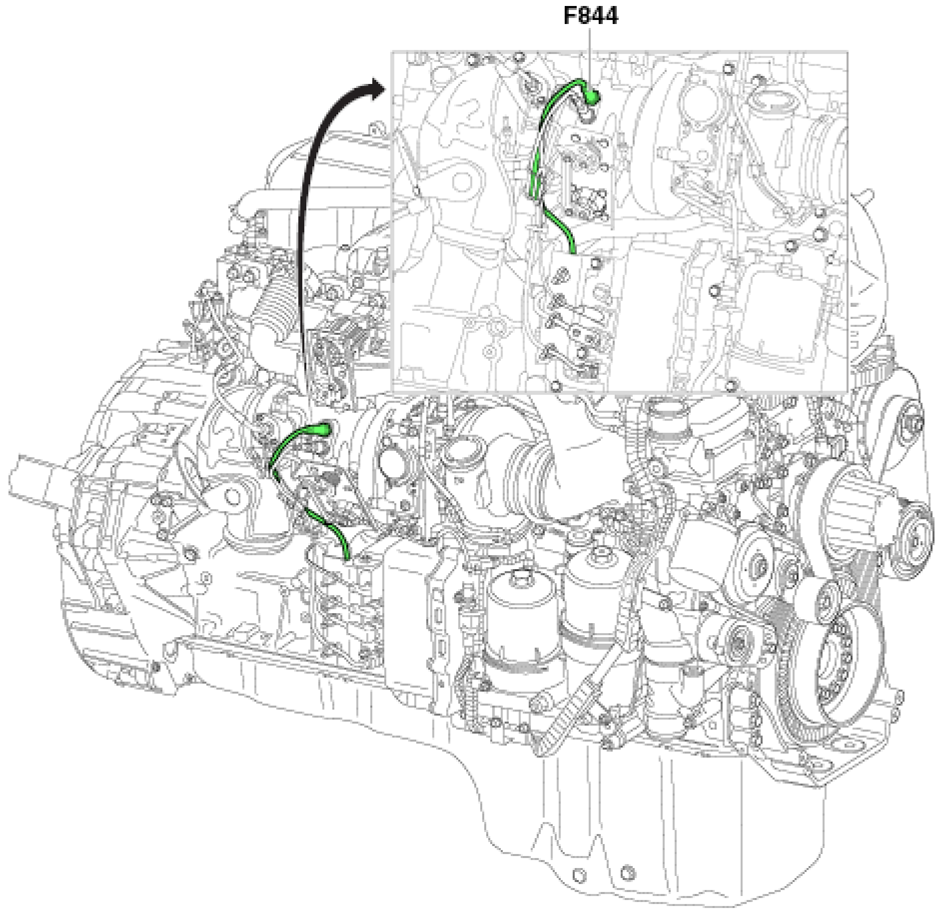
Step 4	Step ID 1482d	SRT
Replace: Post BPV Temperature sensor If no problems were detected in the preceding steps, an internal problem has most likely occurred with the post BPV temperature sensor. Replace the identified smart sensor and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 5		

Step 5	Step ID 1482e	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

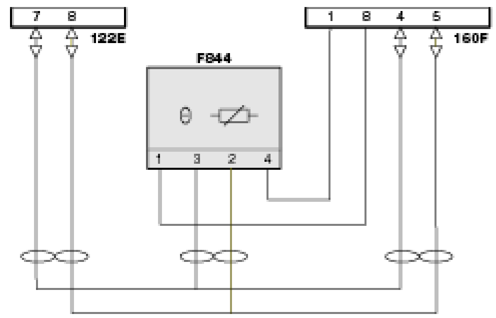
Verification Drive Cycle	To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes. This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Index

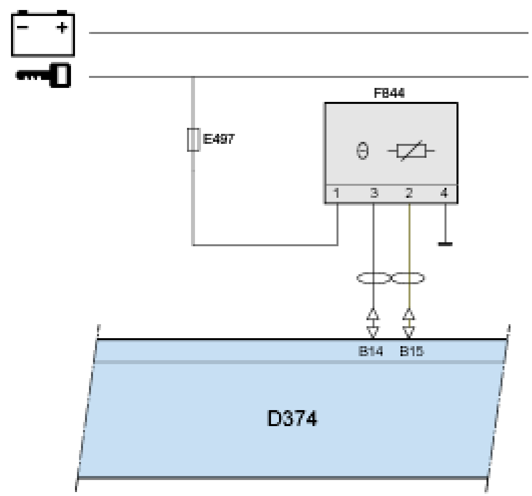
P1718

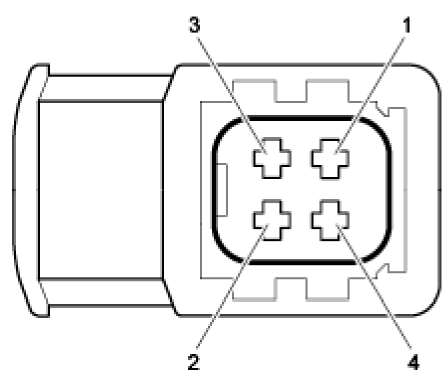
Code number	P1718
Fault code description	EGR mass flow - Data valid but too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – EGR Freeze frame type - EGR
Description of component(s)	The NOx concentration emitted by the engine is measured in the exhaust gases after the BPV valve. **The NOx sensor before catalyst consists of:** • Electronic control unit This unit communicates with the PCI ECU and EAS-3 ECU via A-CAN • Sensor element The sensor element contains an internal heater. The sensor cannot be separated from the electronic control unit.  **Sensor heating control** • The first stage starts when the ignition is keyed on. The sensor is heated to approximately 100°C [212°F], and any condensate evaporates from the sensor.

	• The second stage starts after the 'dew point' message is received from the PCI ECU The sensor is heated to its operating temperature of approximately 800°C [1472°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' message is not/no longer received, the sensor temperature stays at/drops to the standby temperature of approximately 100°C [212°F]. **Effect on the system:** • Controls the engine NOx emission. • Determines the DEF dosing amount by the EAS-3 system Higher measured engine NOx emission results in higher DEF dosing amount.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the engine speed is between 1000 and 1900 rpm, and; • when the engine is running at a steady load, and; • the engine mode is SCR high-efficiency mode or standard mode, and; • the NOx sensor before catalyst (F844) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the EGR mass flow is too high for more than 90 seconds.
Reset condition of fault	This DTC changes to inactive when the fault is no longer detected.

code	
Electrical diagram(s)	**NOx Sensor Before Catalyst (F844)**







Wiring harness connector F844 front view

122E 12-pin interface connector
160F 8-pin interface connector
F844 NOx sensor before catalytic convertor

F844	122E	160F	Function
3	7	4	A-CAN high
2	8	5	A-CAN low
1		8	Power supply after ignition
4		1	Ground

Technical data

Component and wiring checks, NOx sensor before catalyst (F844)

Component check, NOx sensor before catalyst (F844)

This type of component check cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the corresponding wiring check

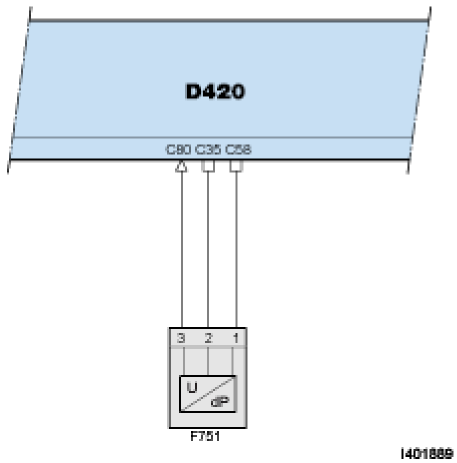
Wiring check, NOx sensor before catalyst (F844)

Preparation

- Key off the ignition
- Disconnect connector F844
- Measure on the front side of wiring harness connector F844

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	4	Ubat	Key on the ignition
4	Battery negative pole	< 0.5 V	Key on the ignition and switch on all consumers
2	3	± 60 Ω	Key off the ignition Disconnect the ground cable from the battery. Disconnect the vehicle communication interface (VCI) of DAVIE.

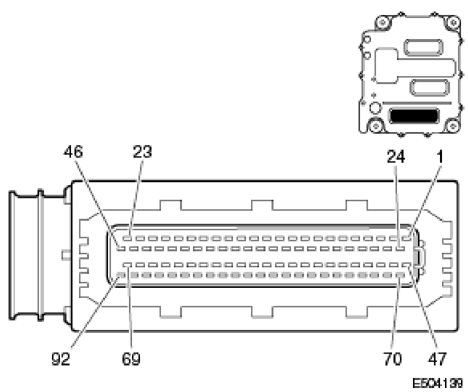
Component and wiring checks, EGR pressure difference sensor (F751)



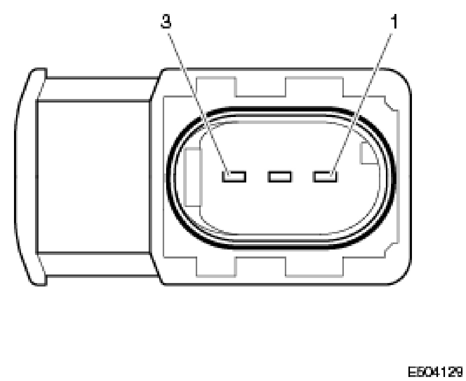
D420 PCI ECU

F751 EGR pressure difference

D420	F751	Function
C35	2	Ground
C58	1	Power supply
C80	3	Signal, EGR pressure



Wiring harness connector D420.C front view



Wiring harness connector F751 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, EGR pressure difference sensor (F751)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

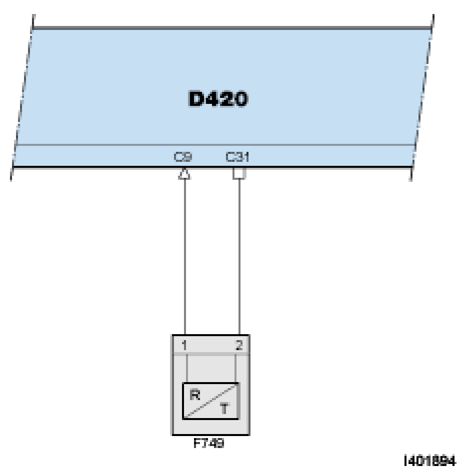
- Perform the wiring check
- Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F751
- Measure on the front side of wiring harness connector F751

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

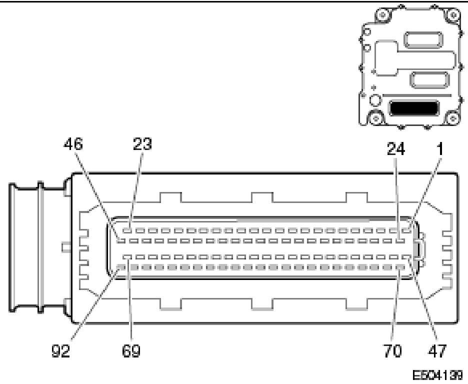
Component and wiring checks, EGR temperature sensor (F749)



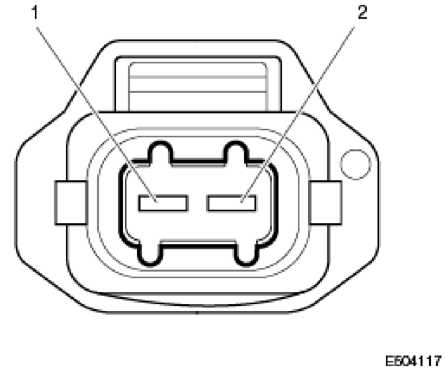
D420 PCI ECU

F749 EGR temperature sensor

D420	F749	Function
C9	1	Signal, EGR temperature
C31	2	Ground



Wiring harness connector D420.C front view



Wiring harness connector F749 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, EGR temperature sensor (F749)

Preparation

- Key off the ignition
- Disconnect connector F749
- Measure on the component connector F749

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	97.7–100.3 Ω	Resistance value at 0°C [32°F]
		107.4–108.2 Ω	Resistance value at 20°C [68°F]
		137.5–139.1 Ω	Resistance value at 100°C [212°F]
		167.3–169.7 Ω	Resistance value at 180°C [356°F]
		192.5–195.5 Ω	Resistance value at 250°C [482°F]

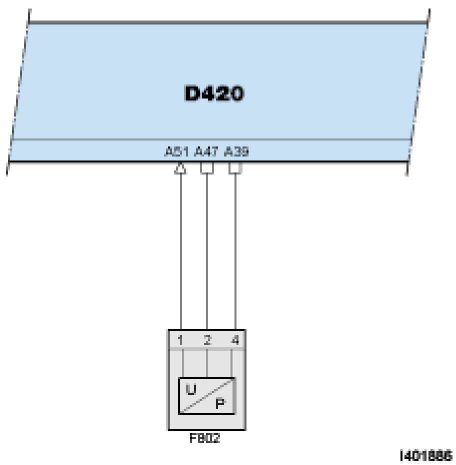
Component & circuit check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F749
- Measure on the front side of wiring harness connector F749

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

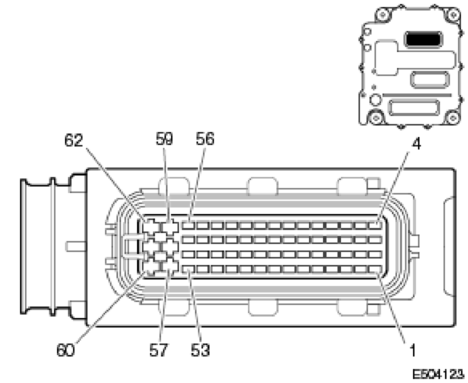
Component and wiring checks, Boost pressure sensor (F802)



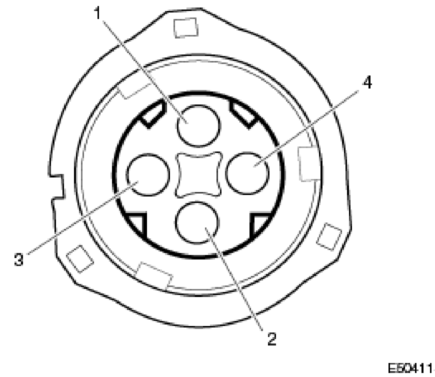
D420 PCI ECU

F802 Boost pressure sensor

D420	F802	Function
A39	4	Ground
A47	2	Power supply
A51	1	Signal, boost pressure



Wiring harness connector D420.A front view



Wiring harness connector F802 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, boost pressure sensor (F802)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

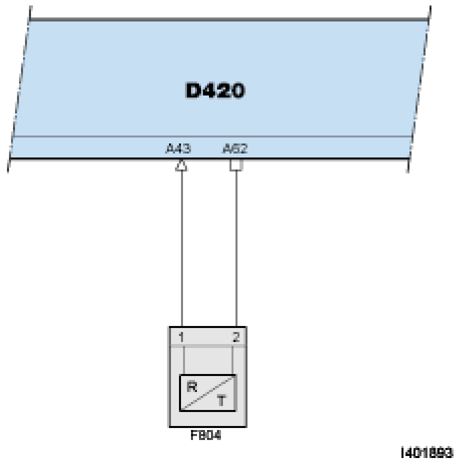
- Monitor/test the component with DAVIE
- Perform the wiring check
- Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F802
- Measure on the front side of wiring harness connector F802

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

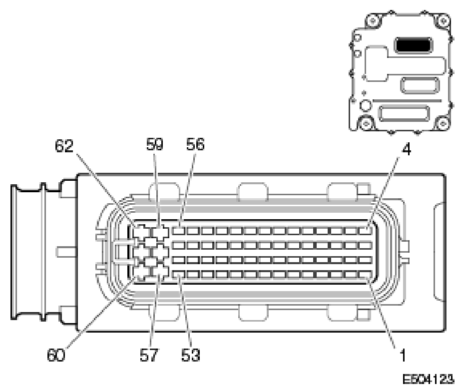
Component and wiring checks, Boost temperature senor (F804)



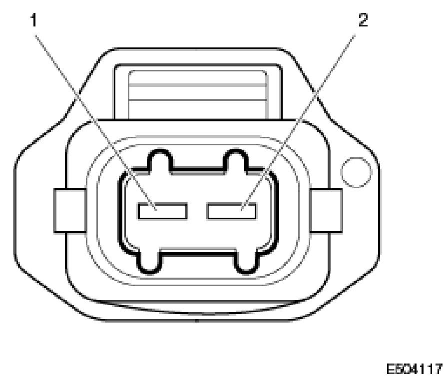
D420 PCI ECU

F804 Boost temperature sensor

D420	F804	Function
A43	1	Signal, boost temperature
A62	2	Ground



Wiring harness connector D420.A front view



Wiring harness connector F804 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, fuel temperature sensor (F804)

Preparation

- Key off the ignition
- Disconnect connector F804
- Measure on the component connector F804

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5248–5732 Ω	Resistance value at 0°C [32°F]
		2334–2505 Ω	Resistance value at 20°C [68°F]
		1133–1198 Ω	Resistance value at 40°C [104°F]
		593–619 Ω	Resistance value at 60°C [140°F]
		331–341 Ω	Resistance value at 80°C [176°F]
		195–199 Ω	Resistance value at 100°C [212°F]

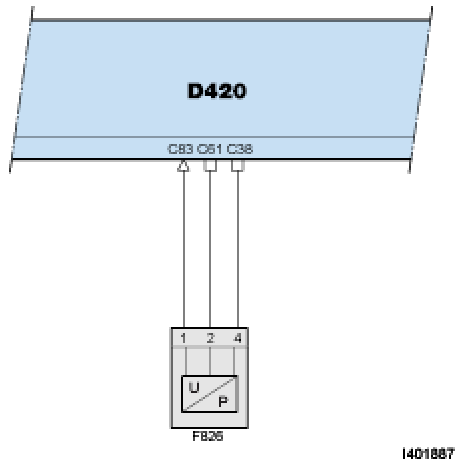
Component & circuit check, ECU (D420)

Preparation

- Ignition keyed off
- Disconnect connector F804
- Measure on the front side of wiring harness connector F804

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

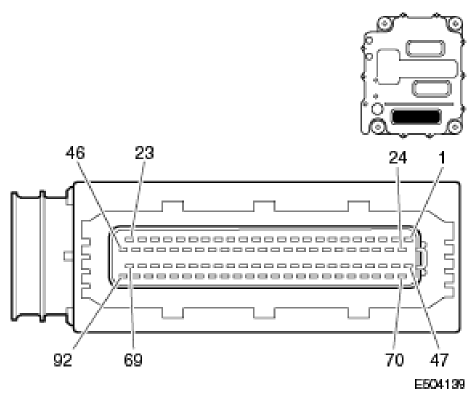
Component and wiring checks, Before turbine pressure sensor (F826)



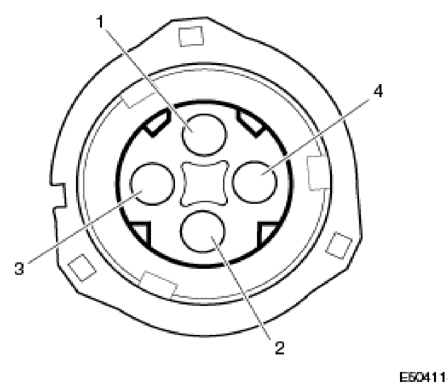
D420 PCI ECU

F826 pressure sensor before turbine

D420	F826	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine



Wiring harness connector D420.C front view



Wiring harness connector F826 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, pressure sensor after BPV (F826)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check

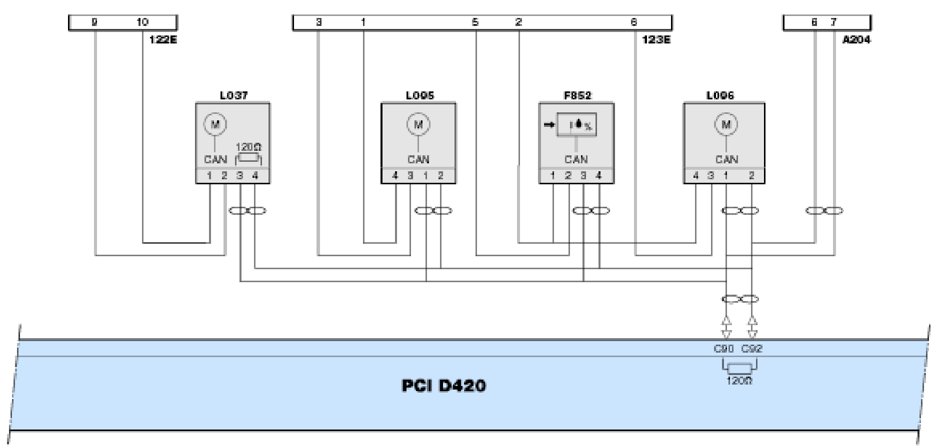
Component & wiring check, ECU (D420)

Preparation

- Key of the ignition
- Disconnect connector F826
- Measure on the front side of wiring harness connector F826

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

Component and wiring checks, EGR valve module (L095)



122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

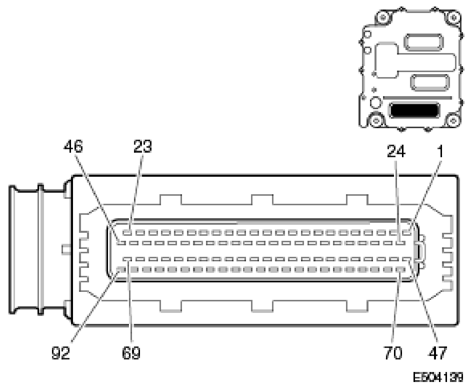
F852 humidity sensor

L037 VTG turbocharger actuator

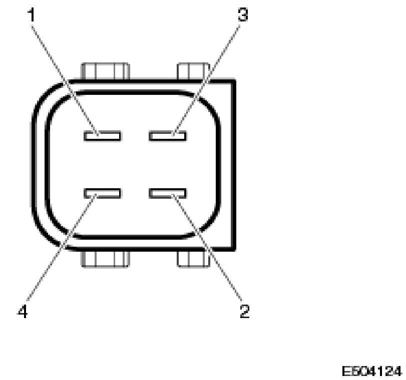
L095 EGR valve module

L096 BPV valve

D420	L095	Function
C90	1	E-CAN high
C92	2	E-CAN low
	3	Ground
	4	Power supply after ignition



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

Handle connectors and pins with care and use matching measuring probes.

Component check, EGR valve module (L095)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check

Wiring check, EGR valve module (L095)

Preparation

- Key off the ignition
- Disconnect connector L095
- Measure on the front side of wiring harness connector L095

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	4	Ubat	Ignition keyed on
1	2	± 60 Ω	• Ignition keyed off • Ground cable from the battery disconnected

<table>
<tr><td></td><td><table><tr><td></td><td></td><td></td><td>• DAVIE Vehicle Communication Interface (VCI) disconnected</td></tr></table></td></tr>
<tr><td>Possible causes</td><td>• EGR valve failure
• NOx sensor before catalyst deviation</td></tr>
<tr><td>Additional information</td><td>• The engine NOx emission is, among others, controlled by varying the EGR flow toward the inlet manifold of the engine.
• The engine NOx emissions are measured by the NOx sensor before catalyst (F844).</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly.
▪ Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors.
▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
▪ It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1. Investigate Related Trouble Codes

Before troubleshooting this code, take notice of any other active or inactive trouble codes. One or multiple other codes could have been the cause for this code.

<table><tr><td>Step 1.A Investigate related trouble codes</td></tr><tr><td>Action
1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.</td></tr></table></td></tr>
</table>

Are these or any other related codes active?

EGR	P0405; P0406; P0407; P0408; P040B; P040C; P040D; P0486; P102D; P1030; P127A; P127B; P127C; P1280; P1281; P1284; P1285; P1286; P1288; P1400; P1409; P1458; P1480; P1481; P1482; P1483; P1484; P1485; P1486; P1487; P1488; P1489; P1490; P1494; P1496; P1572; P1717; P1718; P171B; P171C; P2457
VGT	P0046; P0049; P102C; P103F; P104E; P104F; P1111; P1235; P1350; P1351; P1352; P1354; P1356; P1580; P1581; P1727; P2563; P2579; P2580; P2581
NOx sensor, before catalyst	P3863; P3864; P3865; P3866; P3867; P3868; P3869; P3870; P3871; P3873; P3877; P3881

Yes	No
Stop troubleshooting P1711 and refer to the troubleshooting information for these trouble codes.	2.A

Step 2. EGR System Checks

Step 2. A Visual Inspection: EGR Pressure Difference sensor (F751)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - ECU connections are damaged or disconnected
   - Battery not fully charged, contacts not tight
   - Signs of exhaust or coolant leaks on the EGR
   - Broken or missing clamps on any air system component
   - Improper seal between the sensor and mounting block
   - Improper seal at pipe fittings

Was there evidence of any of the above?

Yes	No
Correct any issues found. If the Lambda sensor (F834) is found to be damaged or broken, replace it. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.B	2.B

Step 2.B Electrical checks, EGR pressure difference sensor (F751)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.B.1 Supply voltage

Action

1. Confirm the supply voltage level as outlined in the checking data, component check, EGR pressure difference sensor (F751).

Are measured values within expected range?

Yes	No
Go to step 2.C	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.C.

Step 2. C Visual inspection, EGR temperature sensor (F749)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins

- Moisture or dirt in the connections
- Damage to the wire harness or insulation
- ECU connections damaged or disconnected
- Batteries are not okay, contacts are not tight
- Signs of exhaust or coolant leaks on the EGR
- Sensor damaged

Was there evidence of any of the above?

Yes	**No**
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.D	2.D

Step 2.D Electrical checks, EGR pressure temperature sensor (F749)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.D.1 Resistance checks

Action

1. Confirm the sensor resistance as outlined in the corresponding checking data, component check, EGR temperature sensor (F749).

Are measured values within expected range?

Yes	**No**
Go to step 2.D.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step

	2.D.2

2.D.2 Supply voltage

Action

1. Confirm the supply voltage to the EGR temperature sensor (F749) as outlined in the corresponding checking data, component & circuit check, ECU (D420).

Are measured values within expected range?

Yes	**No**
Go to step 2.E	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.E

Step 2. E Visual inspection, Boost pressure sensor (F802)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Soot buildup on the sensor orifice or around the sensor port

Was there evidence of any of the above?

Yes	**No**
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	2.F

If this code is still present, proceed to Step 2.F	

Step 2.F Electrical checks, boost pressure sensor (F802)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.F.1 Supply voltage

Action

1. Confirm the supply voltage to the boost pressure sensor (F801) as outlined in the corresponding checking data, component & wiring check, ECU (D420).

Are measured values within expected range?

Yes	No
Go to step 2.G	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.G.

Step 2. G Visual inspection, boost temperature sensor (F804)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
    - Damaged or loose connectors
    - Bent, broken, corroded or loose connector pins
    - Moisture or dirt in the connections
    - Damage to the wire harness or insulation
    - Loose or broken clamps on the air system
    - ECU connections are not damaged or disconnected
    - Batteries are not okay, contacts are not tight
    - Soot buildup on the sensor orifice or around the sensor port

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.H	2.H

Step 2.H Electrical checks, boost temperature sensor (F804)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

2.H.1 Resistance checks

Action

1. Confirm the resistance values as outlined in the corresponding checking data, component check, boost temperature sensor (F804).

Are measured values within expected range?

Yes	No
Go to step 2.G.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.G.2.

2.H.2 Supply voltage

Action

1. Confirm the supply voltage to the boost temperature sensor (F804) as outlined in the corresponding checking data, component & circuit check, ECU (D420).

Are measured values within expected range?

Yes	No

Go to step 2.I	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.I.

Step 2. I Visual inspection, before-turbine pressure sensor (F826)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - Batteries are not okay, contacts are not tight
   - Loose or broken clamps on the air system
   - Visible signs of exhaust leaks on the EGR
   - Related sensor not installed correctly

Was there evidence of any of the above?

Yes	**No**
Correct any issues found, or replace the sensor if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.J	2.J

Step 2.J Electrical checks, before-turbine pressure sensor (F826)	
ⓘ Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
2.J.1 Supply voltage	
Action 2. Confirm the supply voltage to the before turbine pressure sensor (F826) as outlined in the corresponding checking data, component & wiring check, ECU (D420).	
Are measured values within expected range?	
Yes	**No**
Go to step 3.A	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 3.A.

Step 3. Intake and Exhaust Leak Check

Step 3.A Special test, Intake/Exhaust Leak	
Action 1. Refer to the identified procedure to inspect the exhaust system for leaks.	
Were any leaks in the intake or exhaust system detected?	
Yes	**No**
Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.A	4.A

Step 4. Check for EGR Restrictions

Step 4.A Visual inspection, EGR valve module (L095)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - ECU connections are not damaged or disconnected
   - Batteries are not okay, contacts are not tight
   - EGR Module not installed correctly
   - Signs of damage to the EGR valve and module

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the EGR valve if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.B	4.B

Step 4.B Electrical checks, EGR valve module (L095)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

4.B.1 Resistance checks

Action

1. Confirm the resistance values as outlined in the corresponding checking data, wiring check, EGR valve module (L095).

Are measured values within expected range?

Yes	No

Go to step 4.B.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 2.B.2.

4.B.2 Supply voltage

Action

1. Confirm supply voltage to the EGR valve module (L095) as outlined in the corresponding checking data, wiring check, EGR valve module (L095).

Are measured values within expected range?

Yes	**No**
Go to step 4.C	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.C.

Step 4.C Visual inspection, EGR cooler

Action

1. Visually inspect the associated component connections and the coolant reservoir for the following:
   - Signs of exhaust or coolant leaks on the EGR
   - Low coolant level

Was there evidence of any of the above?

Yes	**No**

Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.D	4.D

Step 4.D Special test, EGR cooler internal leak	
Action 1. Perform the prescribed test to determine if there is a coolant leak affecting EGR performance.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found, or replace the EGR cooler if found damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 4.E	4.E

Step 4.E DAVIE Performance test, EGR service	
Action 1. Run the prescribed DAVIE performance test to determine if the EGR Valve has any mechanical issues by monitoring related parameters while opening and closing the EGR Valve.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found, or replace the EGR valve actuator if found to be damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 5.A	5.A

Step 5. Turbocharger (VGT) Actuator Checks

Step 5.A Visual inspection, VGT

Action

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors?
   - Bent, broken, corroded or loose connector pins?
   - Moisture or dirt in the connections?
   - Damage to the wire harness or insulation?
   - ECU connections are not damaged or disconnected?
   - Batteries are not okay, contacts are not tight?
   - Broken or missing clamps around the Turbo?
   - Incorrect parts are installed?
   - Turbo or Turbo Actuator not properly installed?
   - Alternator is damaged or functioning outside of manufacturer's specifications?

Was there evidence of any of the above?

Yes	No
Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 5.B	5.B

Step 5.B DAVIE Performance test, Turbocharger (VGT) Actuator Effort

Action

1. Run the prescribed DAVIE performance test to determine correct operation of the VGT actuator.

Does this test fail to complete or result in a failed state?

Yes	No

Correct any issues found. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 6.A	6.A

Step 6. NOx Sensor Before Catalyst Checks

Step 6.A Visual inspection, NOx sensor before catalyst (F844)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
    - Damaged or loose connectors
    - Bent, broken, corroded or loose connector pins
    - Moisture or dirt in the connections
    - Damage to the wire harness or insulation
    - ECU connections are damaged or disconnected
    - Batteries are not okay, contacts are not tight
    - The NOx Sensor, before catalyst is broken or incorrectly installed
    - The correct parts are not installed
    - Broken or missing clamp around the Turbo and BPV

Was there evidence of any of the above?

Yes	No
Correct any issues found, or replace the EGR valve if damaged. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 6.B	6.B

Step 6.B Electrical checks, NOx sensor before catalyst (F844)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

6.B.1 Resistance checks

Action

1. Confirm the resistance values as outlined in the corresponding checking data, wiring check, NOx sensor before catalyst (F844).

Are measured values within expected range?

Yes	**No**
Go to step 6.B.2	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 6.B.2.

6.B.2 Supply voltage

Action

1. Confirm supply and signal voltage values as outlined in the corresponding checking data, wiring check, NOx sensor before catalyst (F844).

Are measured values within expected range?

Yes	**No**
Go to step 8.A	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 7.A to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, proceed to Step 8.A.

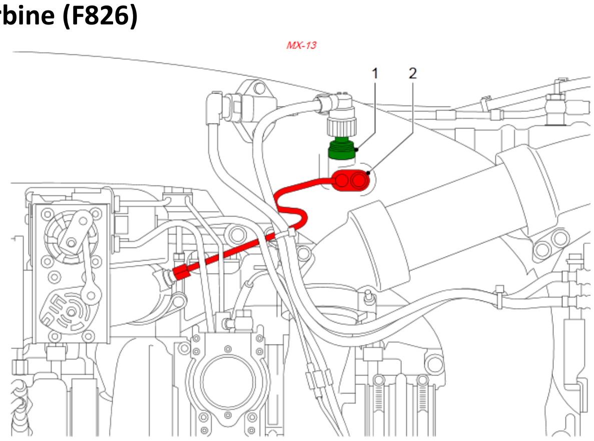
Step 7. Repair Verification

Step 7.A Repair Verification Cycles

Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active.

	Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs. **Action** 1. Steady State This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable. **Step 8. Contacting PACCAR Engine Support Center** **Step 8.A Contact PACCAR Engine Support Center** **Action** 1. For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
	Back to Index

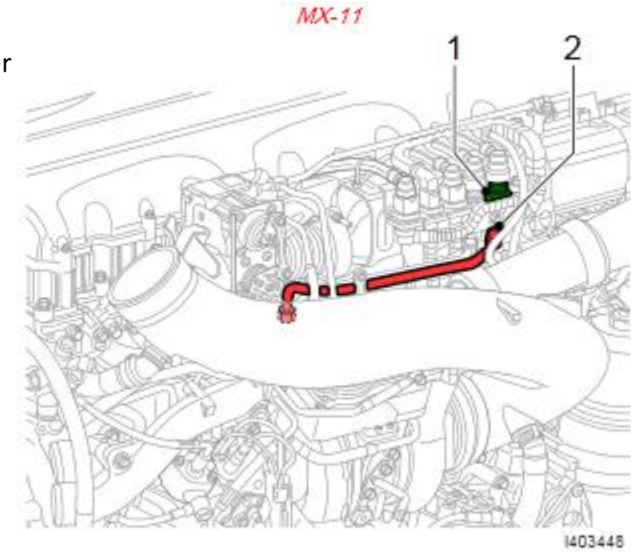
P1719

Code number	P1719
Fault code description	EGR mass flow - Data valid but too low
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – EGR Freeze frame type – EGR
Description of component(s)	**Description, boost pressure sensor (F802)** The boost pressure is measured in the inlet manifold near cylinder 1. **Effect on the system:** • Determines the smoke limit A higher measured boost pressure increase results in higher torque for the same smoke level • Determines soot emissions A higher measured boost pressure results in lower calculated soot emission by the engine. • Determines NOx emissions A higher measured boost pressure results in higher calculated NOx emission by the engine. • Calculates exhaust gas mass flow used for DEF dosing estimation by the EAS-3 system A higher measured boost pressure results in higher calculated exhaust gas mass flow. • Calculates the temperature after the compressor (VTG turbo charger) A higher measured boost pressure results in higher calculated temperature after the compressor. • Calculates the temperature before the turbine. A higher measured boost pressure results in lower calculated exhaust gas temperature before the turbine. **Description, pressure sensor before turbine (F826)** The exhaust gas pressure before the turbine is measured with sensor (1) via a steel tube (2) before the EGR valve. 

Effect on the system:

- Control of the VTG turbo charger
- Control of the EGR flow
- Control of the BPV valve
- Control of the engine brake
- Calculates the exhaust gas temperature before the turbine

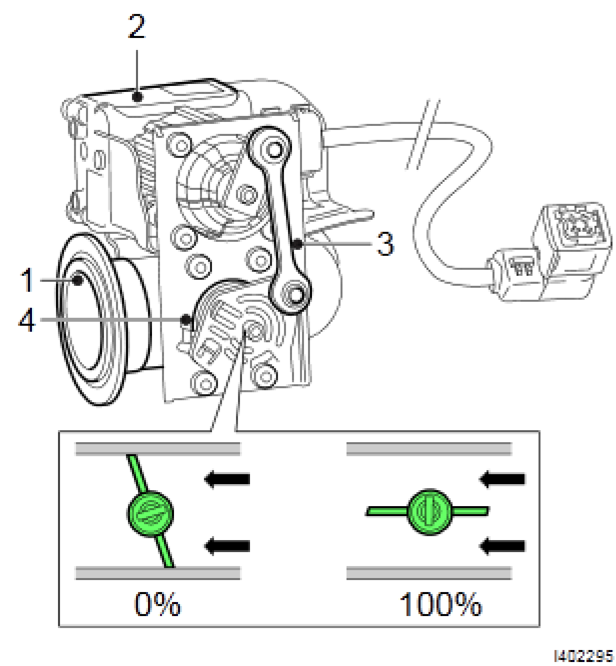
Lower measured exhaust gas pressure before turbine results in higher calculated exhaust gas temperature before the turbine.



Description, EGR valve module (L095)

The EGR module consists of an actuator and an EGR valve.
The main task of the EGR valve is to control the EGR flow to the inlet manifold.

The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back mainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.



1 Butterfly valve
2 EGR valve actuator
3 Lever

4 Spring

The main components of the EGR valve actuator are:

- ECU
- Electromotor
  The electromotor rotates the output shaft via internal gears.
- output shaft
  The butterfly is moved via a lever by rotating the output shaft
- electromotor position sensor
  The position of the electromotor is monitored.
- output shaft position sensor
  The position of the output shaft is monitored.
- temperature sensor
  The temperature of the printed circuit board of the ECU is monitored.

Control

The EGR valve actuator is a smart actuator that communicates with the PCI ECU via E-CAN. The actuator ECU is controlled by the PCI ECU but has its own diagnostics on the following actuator inputs and outputs:

- power supply voltage
- electromotor position
- electromotor current
- output shaft position
- ECU printed circuit board temperature
- ECU hardware and software

After the ignition is keyed on, the valve position is 0% until the PCI ECU commands the actuator.

Unpowered and fail-safe position

The unpowered and the fail-safe positions of the valve are controlled by a spring and are fully closed (0%). If a failure is detected the EGR valve moves to the fail-safe position, if possible.

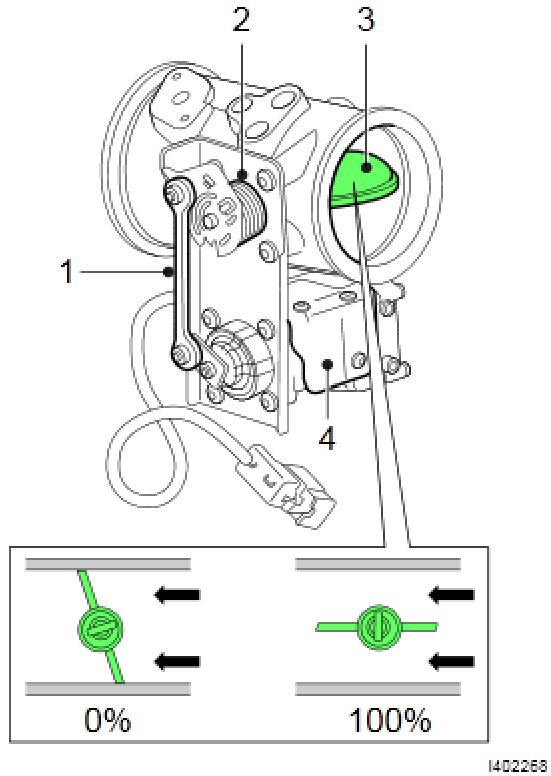
Effect on the system:

- Controlling the EGR gas flow to the inlet manifold.
  A higher opening percentage results in a higher amount of EGR flow at the same pressure difference between the pressure before turbine and the boost pressure

Description, back pressure valve (BPV) actuator (L096)

The BPV actuator consists of an actuator and a BPV valve.

The main task of the BPV valve is to create back pressure in the engine exhaust system and control exhaust gas mass flow.



1 Lever
2 Spring
3 Butterfly valve
4 BPV actuator

The main components of the BPV actuator are:

- ECU
- Electromotor
  The electromotor rotates the output shaft via internal gears.
- output shaft
  The butterfly is moved via a lever by rotating the output shaft
- electromotor position sensor
  The position of the electromotor is monitored.
- output shaft position sensor
  The position of the output shaft is monitored.
- temperature sensor
  The temperature of the printed circuit board of the ECU is monitored.

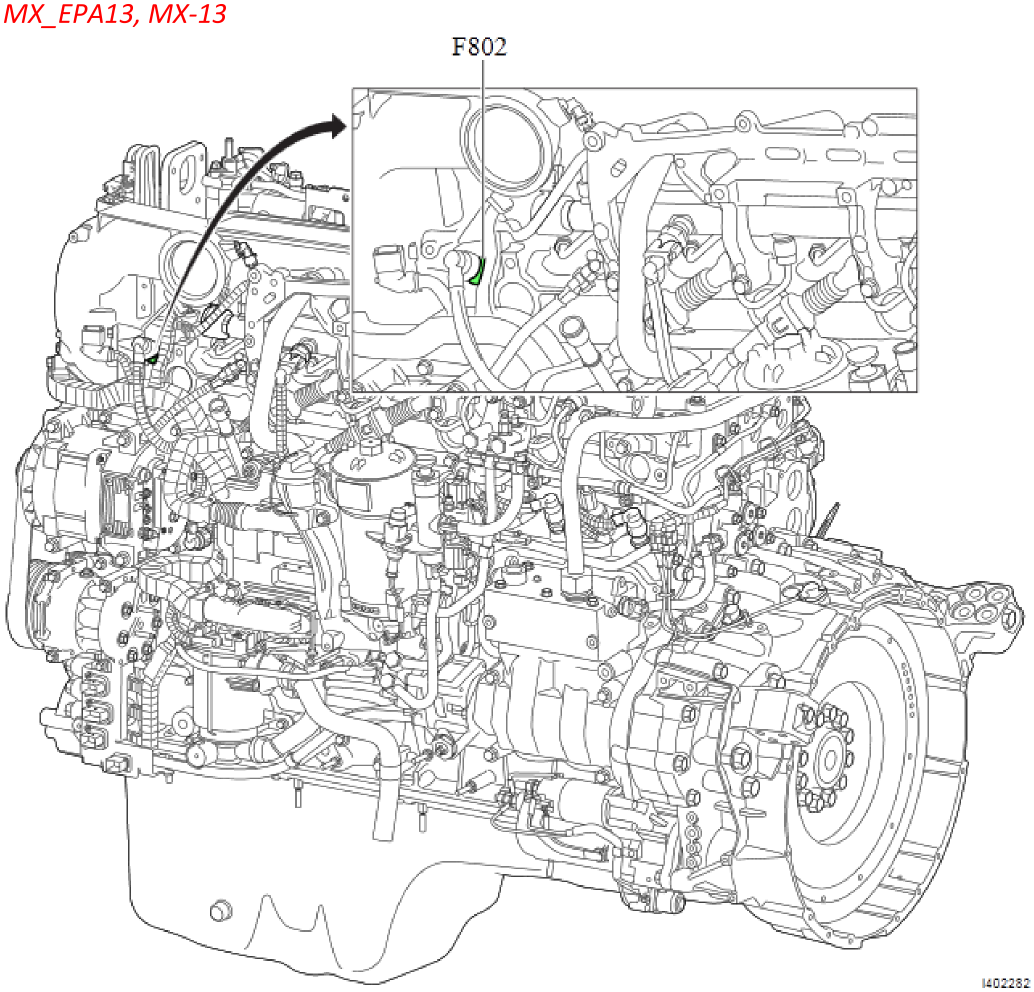
Control

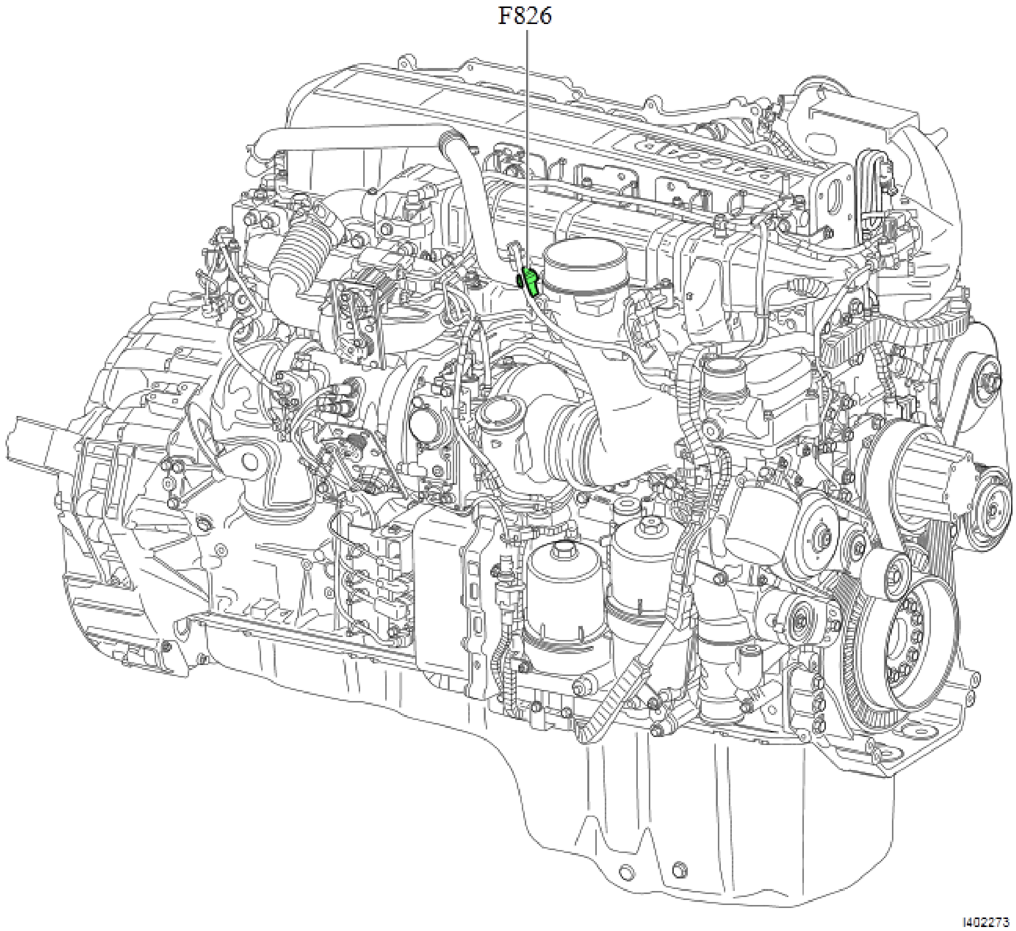
The BPV actuator is a smart actuator that communicates with the PCI ECU via E-CAN. The actuator ECU is controlled by the PCI ECU but has its own diagnostics on the following actuator inputs and outputs:

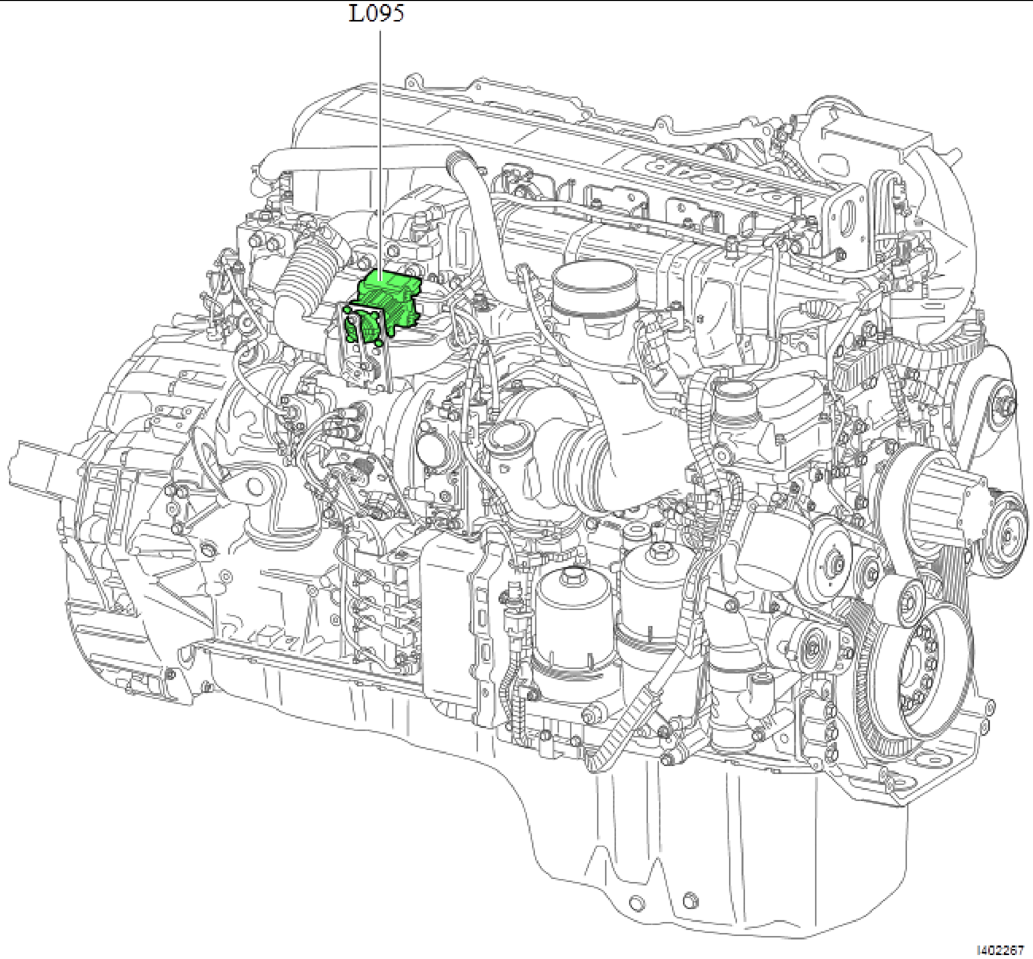
- power supply voltage
- electromotor position
- electromotor current
- output shaft position
- ECU printed circuit board temperature
- ECU hardware and software

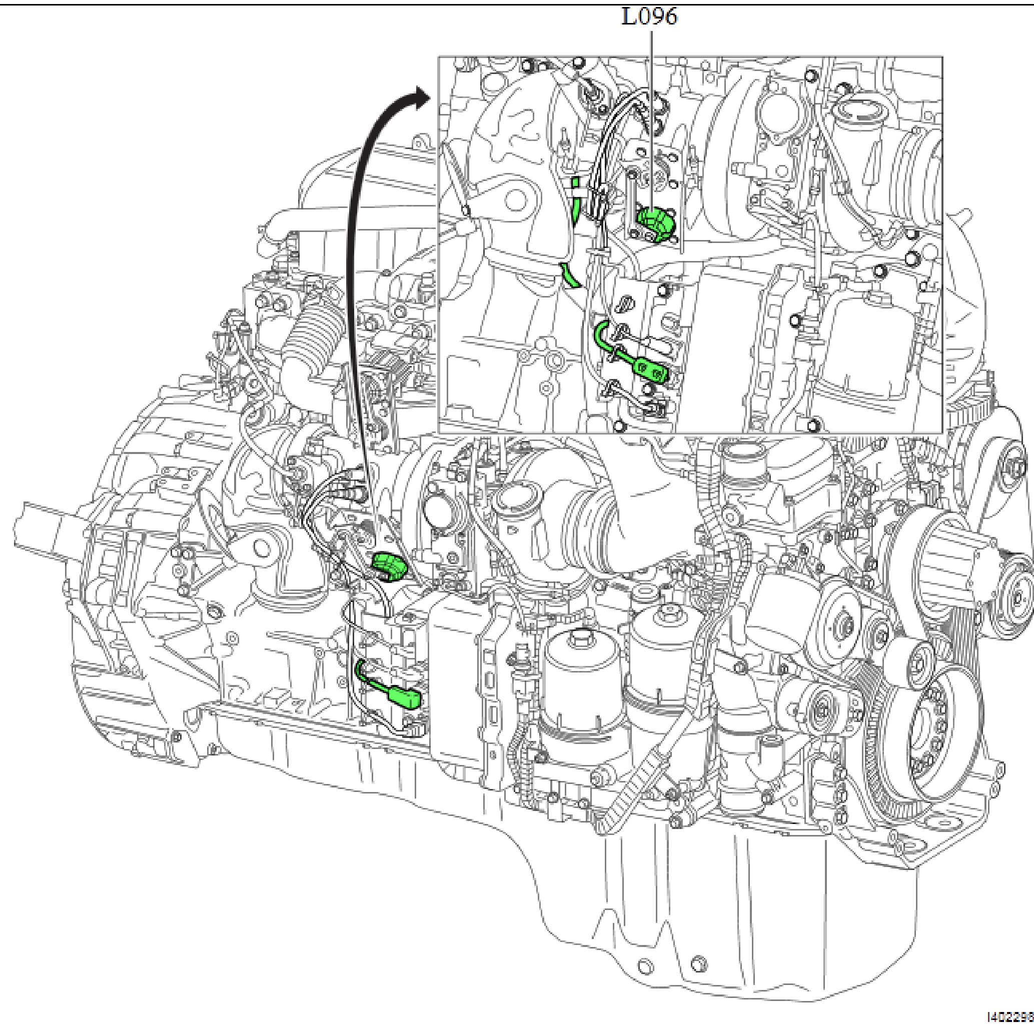
<table>
<tr>
<td></td>
<td>After the ignition is keyed on, the valve position is 100% until the actuator is controlled by the PCI ECU.

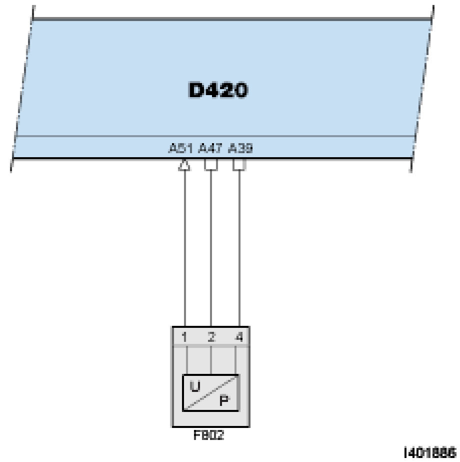
Unpowered and fail-safe position
The unpowered and fail-safe positions of the valve are controlled by a spring and are fully open (100%). If a failure is detected the BPV valve moves to the fail-safe position, if possible.

Effect on the system:
• Creating heat in the exhaust system to heat up the EAS system.
A lower opening percentage results in a higher back pressure and more heat.
• Decreasing the exhaust gas flow in the exhaust system to heat up the EAS system.
A lower opening percentage results in a lower exhaust gas flow in the exhaust system and more heat.
• Altering the pressure drop across the turbine rotor for VTG turbo control.
• Creating back pressure to create EGR gas flow.
• Creating back pressure to create engine braking.</td>
</tr>
<tr>
<td>Location of component(s)</td>
<td>Boost pressure sensor (F802)
MX_EPA13, MX-13

</td>
</tr>
</table>

	Pressure sensor before turbine (F826) *MX_EPA13, MX-13*  **EGR valve module (L095)** *MX_EPA13, MX-13*

	 **BPV valve (L096)** *MX_EPA13, MX-13*

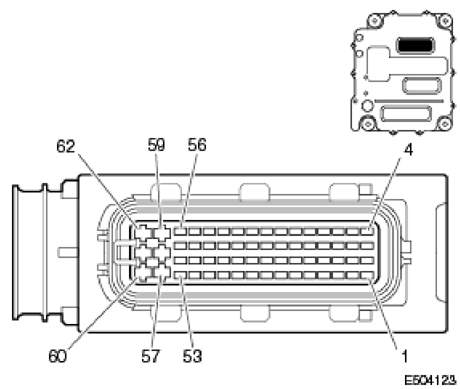
	
Diagnostic condition	This diagnostic runs: • when the engine speed is between 1000 and 1900 rpm, and; • when the engine is running at a steady load, and; • the engine mode is SCR high-efficiency mode, standard mode, and; • the NOx sensor before catalyst (F844) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the EGR mass flow is too low for more than 90 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	**Boost pressure sensor (F802)**



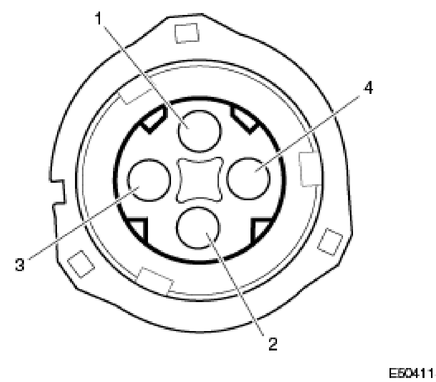
D420 PCI ECU

F802 Boost pressure sensor

D420	F802	Function
A39	4	Ground
A47	2	Power supply
A51	1	Signal, boost pressure



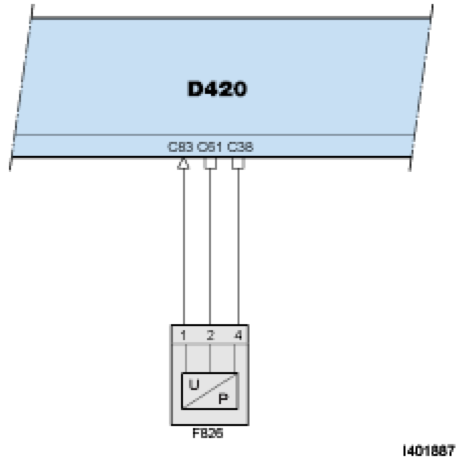
Wiring harness connector D420.A front view



Wiring harness connector F802 front view

Handle connectors and pins with care and use matching measuring probes.

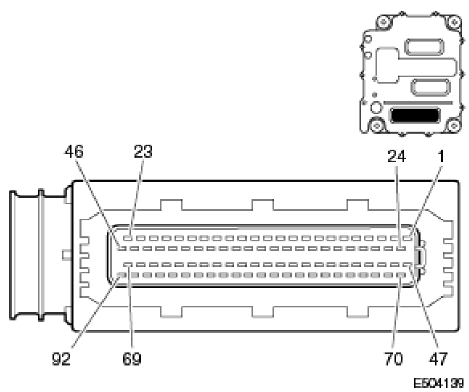
Before turbine pressure sensor (F826)



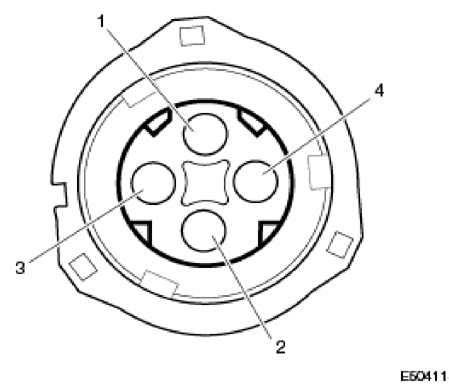
D420 PCI ECU

F826 pressure sensor before turbine

D420	F826	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine



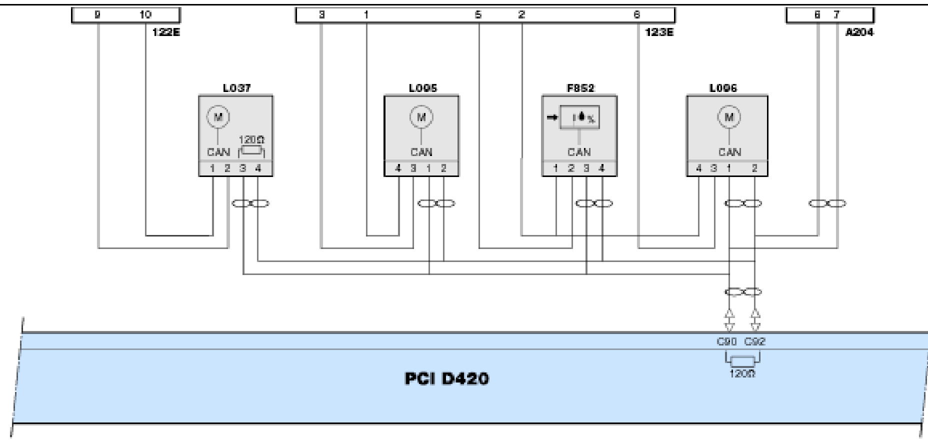
Wiring harness connector D420.C front view



Wiring harness connector F826 front view

Handle connectors and pins with care and use matching measuring probes.

EGR valve module (L095)



122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

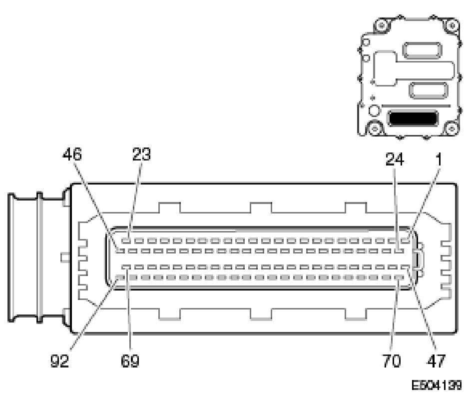
F852 humidity sensor

L037 VTG turbocharger actuator

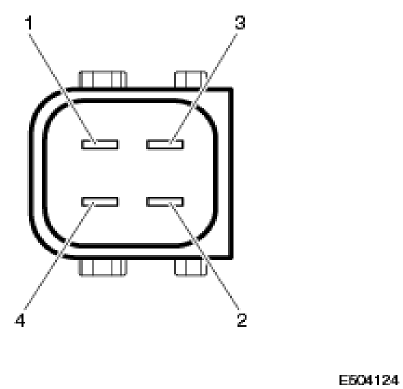
L095 EGR valve module

L096 BPV valve

D420	L095	Function
C90	1	E-CAN high
C92	2	E-CAN low
	3	Ground
	4	Power supply after ignition



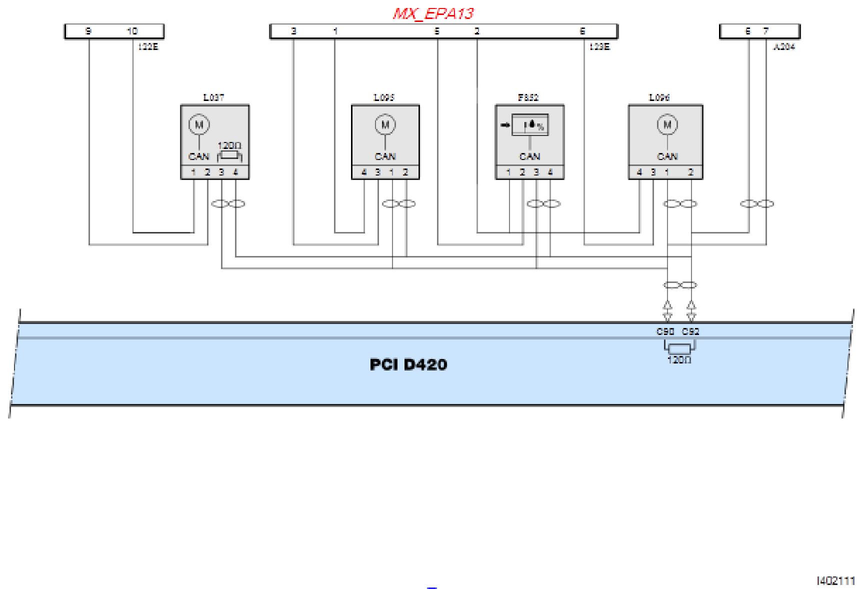
Wiring harness connector D420.C front view



Wiring harness connector L095 front view

Handle connectors and pins with care and use matching measuring probes.

Checking data, BPV valve (L096)



122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

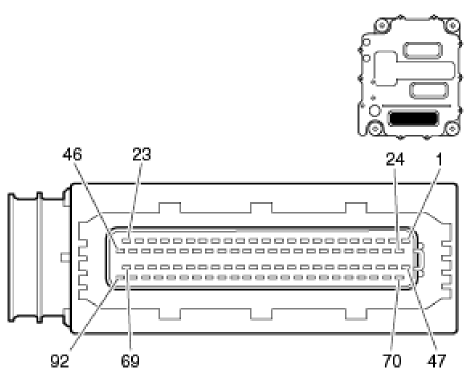
F852 humidity sensor

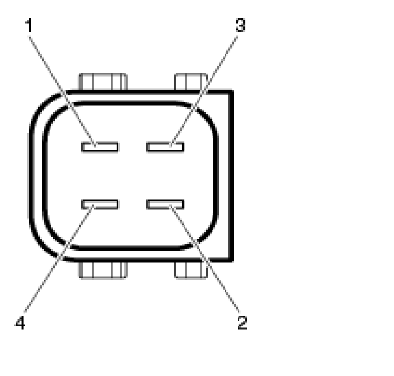
L037 VTG turbocharger actuator

L095 EGR valve module

L096 BPV valve

D420	L096	Function
C90	1	E-CAN high
C92	2	E-CAN low
	3	Ground
	4	Power supply after ignition





Wiring harness connector D420.C front view **Wiring harness connector L096 front view**

Handle connectors and pins with care and use matching measuring probes.

Technical data

Component check, boost pressure sensor (F802)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check as follows:

Wiring check, boost pressure sensor (F802) - ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F802
- Measure on the front side of wiring harness connector F802

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

Component check, before turbine pressure sensor (F826)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the corresponding wiring check as follows:

Wiring check, before turbine pressure sensor (F826) - ECU (D420)

Preparation

- Key of the ignition
- Disconnect connector F826
- Measure on the front side of wiring harness connector F826

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

Component check, EGR valve module (L095)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check

Wiring check, EGR valve module (L095)

Preparation

- Key off the ignition
- Disconnect connector L095
- Measure on the front side of wiring harness connector L095

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	4	Ubat	Ignition keyed on
1	2	± 60 Ω	• Ignition keyed off • Ground cable from the battery disconnected • DAVIE Vehicle Communication Interface (VCI) disconnected

Component check, BPV valve (L096)

This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:

- Monitor/test the component with DAVIE
- Perform the wiring check

Wiring check, BPV valve (L096)

Preparation

- Key off the ignition
- Disconnect connector L096
- Measure on the front side of wiring harness connector L095

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	3	Ubat	Ignition keyed on
1	2	± 60 Ω	• Ignition keyed off • Ground cable from the battery disconnected • DAVIE Vehicle Communication Interface (VCI) disconnected

Possible causes	• Restricted air flow through intercooler/radiator. This can be caused by: ○ A fouled bug screen ○ A fouled intercooler ○ The use of a winter front at temperatures above 4°C [40°F] ○ The use of an aftermarket winter front with excessive airflow restriction through the intercooler/radiator. • Leaking EGR system • Clogged EGR system (contaminated EGR cooler, contaminated EGR pressure difference sensor venturi) • Sticking EGR valve • NOx sensor before catalyst deviation
Additional information	• The engine NOx emission is, among others, controlled by varying the EGR flow toward the inlet manifold of the engine. • The engine NOx emissions are measured by the NOx sensor before catalyst (F844).
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.** ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly. ▪ Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. ▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes. ▪ It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. **Step 1 Investigate Related DTCs** Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC. **Step 1A Investigate related DTCs**

ⓘ	Troubleshoot P1719 if the DTC is active or inactive and has occurred within the previous 5,000 miles or 30 days.

Action

1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.

Are these or any other related DTCs active?

EGR	P0405; P0406; P127A; P127C; P1480; P1486; P1487; P1488; P1489; P1490
VGT	P0046; P0049; P102C; P104E; P1235; P1350; P1351; P1354; P1580; P1581; P1727; P2563; P2579; P2580; P2581
BPV	P101E; P101F; P1026; P1722
Pressure sensor before turbine	P1042; P104D; P1057; P1723; P1724
NOx sensor, before catalyst	P103C; P171B; P171C; P3863; P3864; P3865; P3866; P3867; P3868; P3869; P3870; P3871; P3873; P3877; P3881
Intercooler Efficiency	P0069; P0095; P0097; P0098; P0107; P0108; P0102; P0103; P0127; P1010; P1027; P1028; P1573

Yes	No
Stop troubleshooting P1719 and refer to the troubleshooting information for these DTCs.	
	Go to step 2A

Step 2 Intercooler Checks

Step 2A Visual inspection, airflow to intercooler

Action

1. Visually inspect for airflow restrictions to the intercooler, including any of the following:
   - Improper use of a winterfront at temperatures above 4 °C [40 °F]
   - Use of an aftermarket winterfront with excessive restriction through the intercooler.
   - A contaminated intercooler

Was there evidence of any of the above?

Yes	No
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Visual inspection, engine fan	
Action 1. Visually inspect the engine fan for any of the of the following: • improper operation • damage to the fan blades	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 3A	**Go to step 3A**

Step 3 Pressure Sensor Before Turbine Checks

Step 3A Visual inspection, connections and wiring, pressure sensor before turbine (F826)
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected

- Batteries not fully charged or contacts are not tight
- Soot build-up on sensor pressure port
- Damage to the pressure line to the sensor
- Restrictions or blockages in pressure lines to the sensor

Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 3B	**Go to step 3B**

Step 3B Electrical checks, supply voltage, pressure sensor before turbine (F826)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Confirm the supply voltage level as outlined in the corresponding checking data, "Component check, pressure sensor before turbine (F826)."

Are measured values within expected range?	
Yes	**No**
	Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 4A	**If this DTC is still present, go to step 4A**

Step 4 Boost Pressure Sensor Checks

Step 4A Visual inspection, connections and wiring, boost pressure sensor (F802)

Action

1. Visually inspect the associated component connections and wiring for any of the

following:

- Damaged or loose connectors
- Bent, broken, corroded or loose connector pins
- Moisture or dirt in the connections
- Damage to the wire harness or insulation
- The correct parts are not installed
- ECU connections are damaged or disconnected

Was there evidence of any of the above?

Yes	No
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 4B	**Go to step 4B**

Step 4B Electrical checks, supply voltage, boost pressure sensor (F802)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Confirm the supply voltage level as outlined in the corresponding checking data, "Component check, boost pressure sensor (F802)."

Are measured values within expected range?

Yes	No
	Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 4C	**If this DTC is still present, go to step 4C**

Step 4C Special check, boost pressure sensor (F802) and pressure sensor before turbine (F826)

Action

1. Use DAVIE to monitor the following values with the ignition switch set to ON and the engine NOT running:
   - Ambient pressure
   - Exhaust gas pressure before turbine
   - Exhaust gas pressure before turbine (absolute)
   - Inlet air pressure before compressor
   - Inlet air pressure in inlet manifold (absolute)
   - Inlet air pressure in inlet manifold (relative)

   Expected results:
   - The exhaust gas pressure before turbine (absolute) must be equal to the ambient pressure.
   - The exhaust gas pressure before turbine must be equal 0 psi [0 kPa].
   - The inlet air pressure in the inlet manifold (absolute) must be equal to the ambient pressure.
   - The inlet air pressure in the inlet manifold (relative) must be equal 0 psi [0 kPa].

Do the exhaust gas pressure before the turbine and inlet air pressure in inlet manifold agree within 1 psi (16 kPa) of the other values?

Yes	No
	Correct any issues found, or replace the corresponding sensor if measured values indicate a sensor error. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 5A	**If this DTC is still present, go to step 5A**

Step 5 Exhaust System Checks

Step 5A Visual inspection, exhaust leaks, turbocharger

Action

1. Visually inspect the exhaust system between the cylinder head and the turbocharger turbine for the presence of leaks.

Soot accumulation observed at the exhaust manifold sliding connections is not to be considered an exhaust leak. For additional information, refer to the topic, "Exhaust manifold leakage" located under Power source\Inlet & Exhaust.

Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 5B	**Go to step 5B**

Step 5B Visual inspection, EGR leaks	
Action 1. Visually inspect the EGR system for exhaust leaks.	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 5C	**Go to step 5C**

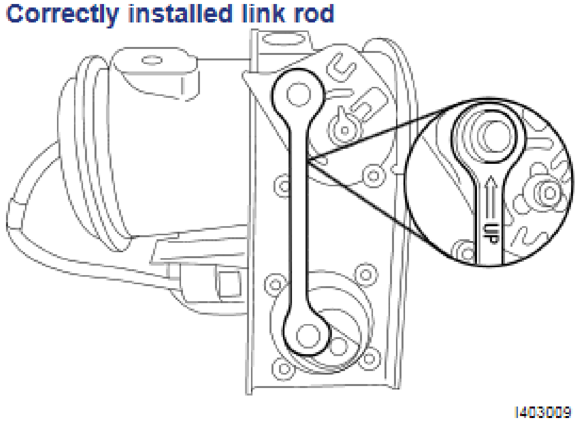
Step 5C Pressure testing, exhaust	
Action 1. Check for exhaust leaks as outlined in the maintenance procedure "pressure testing (Inlet/exhaust elem.)," (job code: J 1409 000000 053 000).	
Was there evidence of any exhaust leaks?	
Yes	**No**

Correct any issues found. Go to step 6A before reconnecting the flexible exhaust pipe.	
Go to step 6A	**Go to step 6A**

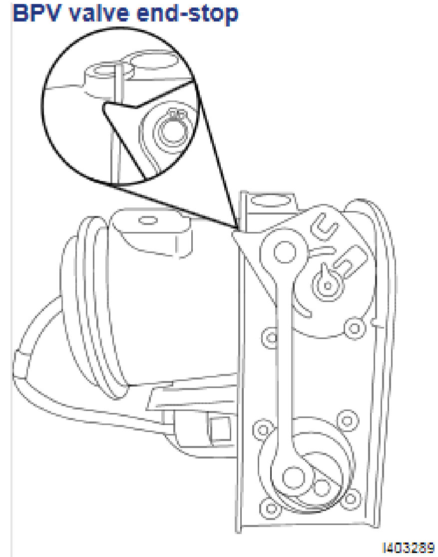
Step 6 BPV Check

Step 6A Visual inspection, BPV mechanism	
Action 1. Switch OFF the ignition. 2. Visually check that the link rod of the BPV mechanism is installed correctly. The arrow must point upward. 3. Visually check that the contact area of the BPV end-stop is clean and free of damage.	

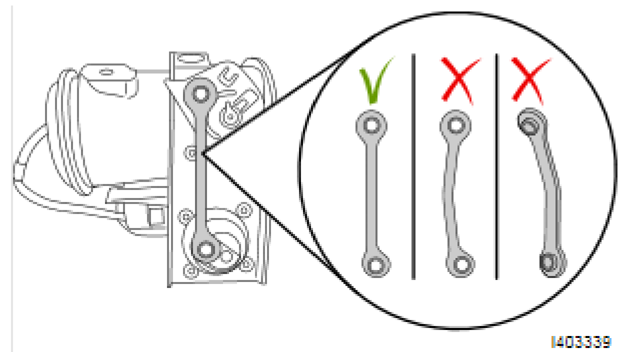
Correctly installed link rod



BPV valve end-stop



Is the link rod correctly installed and the BPV end-stop clean and free of damage?	
Yes	**No**
	Install the link rod correctly, clean the BPV end-stop, or if damage is found replace the BPV. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 6B	**If this DTC is still present, go to step 6B**

Step 6B Visual inspection, link rod, BPV actuator (L096)	
Action 1. Switch OFF the ignition. 2. Visually check that the link rod of the BPV mechanism is free of damage.  	
Is the link rod free of damage?	
Yes	**No**
	Replace the BPV. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 6C	**If this DTC is still present, go to step 6C**

Step 6C Visual inspection, movement of the BPV mechanism
Always switch the ignition OFF when working on the BPV mechanism. • **The valve mechanism can move when the ignition switched ON. Touching the mechanism can result in physical injury.** • **Maintain a safe distance if the valve is monitored with the ignition keyed on.**

Action

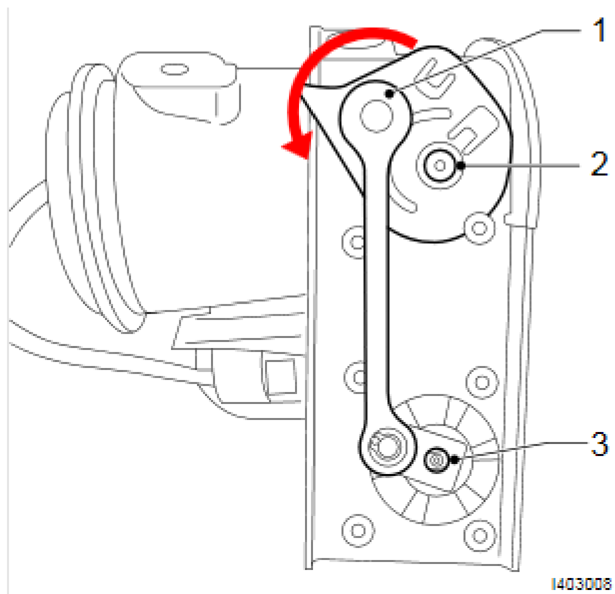
1. Switch ON the ignition.
2. Check for free movement of the BPV mechanism by manually moving the link rod (1).

The movement requires some force because of the presence of a return spring.

Do not use a tool to move the mechanism.

During the movement check that:

- the resistance of the mechanism to move is uniform over the full travel path of the link rod (1), and
- the actuator shaft (3) and valve shaft (2) rotate over the full travel path of the link rod (1).



Does the BPV mechanism move freely over the full travel path of the link rod?

Yes	No
	Possible blockage/soot accumulation in the valve housing. Correct any issues found, or replace the BPV if damaged. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 6D	**If this DTC is still present, go to step 6D**

Step 6D Visual inspection, blockage in the BPV housing

Always switch the ignition OFF when working on the BPV mechanism.

- **The valve mechanism can move when the ignition switched ON. Touching the mechanism can result in physical injury.**
- **Maintain a safe distance if the valve is monitored with the ignition keyed on.**

Action

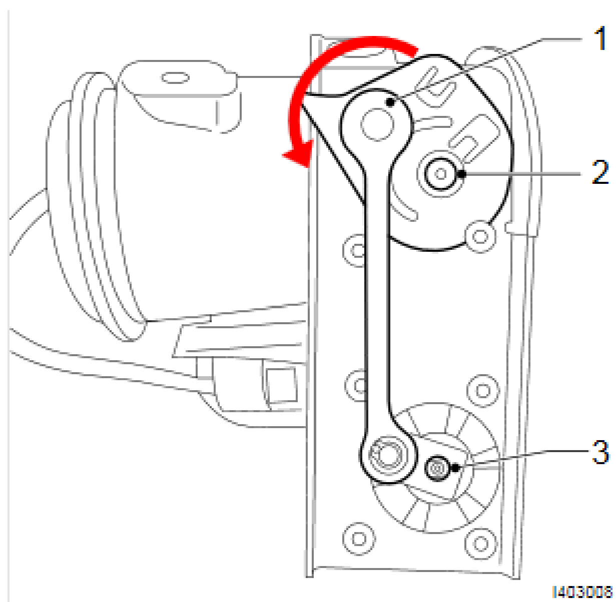
1. Switch OFF the ignition.

   Loosen the exhaust pipe between turbocharger and flexible pipe as outlined in the maintenance procedure "replace assembly Back Pressure Valve (Aftertreatment, eng.)," (job code: J 1435 264406 001 033).

2. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the link rod (1).

The movement requires some force because of the presence of a return spring.

Do not use a tool to move the mechanism.



Is there evidence of internal blockage or excessive soot accumulation around the butterfly valve and housing?

Yes	No

1. Remove blockage/clean the internal valve housing. 2. Monitor the BPV position with DAVIE to check that the cleaning was effective. 3. Install the exhaust pipe between turbocharger and flexible pipe as outlined in the maintenance procedure, "replace assembly Back Pressure Valve (Aftertreatment, eng.)" (job code: J 1435 264406 001 033) Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	A malfunctioning BPV has been detected. Replace the BPV. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
If this DTC is still present, go to step 6E	**Go to step 6E**

Step 6E Visual inspection, BPV butterfly valve blade

Action

1. Switch OFF the ignition
2. With the flexible exhaust pipe after the back pressure valve removed, inspect the BPV butterfly valve blade for the following:
   - The blade should be riveted to the shaft
   - The valve should open and close fully when the valve mechanism is operated

Was the butterfly valve plate secure on the shaft and does the valve open and close fully?

Yes	No
	Replace the BPV actuator. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 6F	**If this DTC is still present, go to step 6F**

Step 6F Visual inspection, connections and wiring, BPV actuator (L096)

Action	

1. Visually inspect the associated component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - The correct parts are not installed
   - ECU connections are damaged or disconnected

Was there evidence of any of the above?	
Yes	**No**
Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 6G	**Go to step 6G**

Step 6G Electrical checks, supply voltage, BPV actuator (L096)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Monitor the vehicle power supply during engine startup and operation.
2. Check the actuator power supply as outlined in, "Checking data BPV actuator (L096)."

Are measured values within expected range?	
Yes	**No**

	Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 7A	**If this DTC is still present, go to step 7A**

Step 7 EGR Valve Module Checks

Step 7A Visual inspection, EGR valve module (L095)

Action

1. Switch OFF the ignition
2. Visually inspect the link rod of the EGR valve mechanism for any of the following:
   - Incorrect installation
   - Damage to the valve lever and link rod

Correct EGR valve mechanism

I402210

Example of a bent lever and link rod

Is the EGR valve mechanism installed correctly and free of damage?

Yes	**No**
	Replace the EGR valve module. Refer to step 10A to perform the corresponding repair verification cycles.
Go to step 7B	**If this DTC is still present, go to step 7B**

Step 7B Visual inspection, movement of the EGR valve mechanism

Always switch the ignition OFF when working on the EGR valve mechanism.

- **The EGR valve mechanism can move when the ignition switched ON. Touching the mechanism can result in physical injury.**
- **Maintain a safe distance if the EGR valve is monitored with the ignition keyed on.**

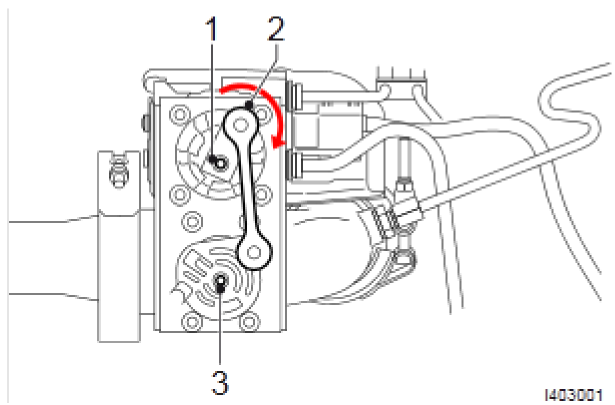
Action

1. Switch OFF the ignition.
   The EGR valve mechanism cannot be moved if the ignition is keyed on.
2. Check for free movement of the valve mechanism by manually moving the actuator lever (2).

> The movement requires some force because of the presence of a return spring.
>
> Do not use a tool to move the mechanism.

Check during the movement that:

- the movement resistance of the mechanism is equal over the full travel path of the actuator lever (2), and
- The actuator shaft (1) and valve shaft (3) rotate over the full travel path of the actuator lever (2).



Does the EGR valve mechanism move freely over the full travel path of the actuator lever?

Yes	No
	Possible blockage/soot accumulation in the valve housing or a sticking valve.
Go to step 7E	**If the EGR valve cannot be moved out of its closed position at all: Go to step 7C** **If the EGR valve mechanism has excessive resistance or has limited travel: Go to step 7D**

Step 7C Check for sticking EGR valve mechanism

Always switch OFF the ignition when working on the EGR valve mechanism.

- **The valve mechanism can move when the ignition is switched on. Touching the mechanism can result in physical injury.**
- **Maintain a safe distance if the valve is monitored with the ignition keyed on.**

Not observing these instructions can seriously damage the EGR valve module:

- **Do not use any tool other than that indicated to move the mechanism**
- **Do not use a hammer or an extension to move the spanner**
- **Only rotate the actuator lever in the correct direction**
- **Do not rotate the actuator lever further than the maximum opening position**

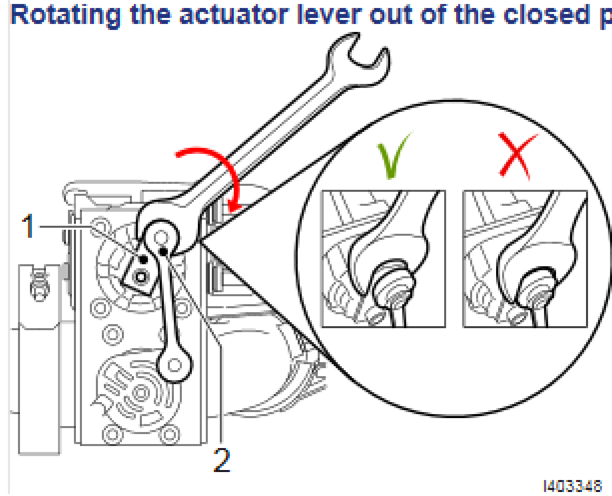
Action

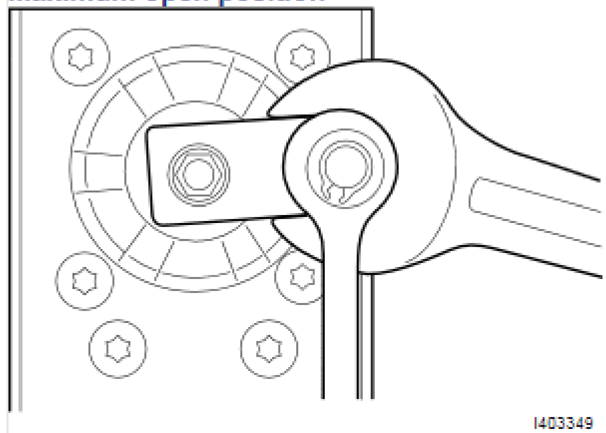
1. Switch OFF the ignition.
   The EGR valve mechanism cannot be moved if the ignition is keyed on.
2. Place a 13/16 inch open end wrench on the actuator lever (1).
   Do not put a wrench on the link rod (2).

   Use a wrench with a length no greater than 12 inches.
3. Rotate the actuator lever with the wrench by hand in the direction shown (clockwise), out of the closed position. Use only moderate force to rotate the actuator lever.
4. Rotate the actuator lever carefully to the maximum open position and remove the wrench.

   The EGR valve must rotate itself back into the closed position.
5. Check for free movement of the valve mechanism by manually moving the actuator lever.

Rotating the actuator lever out of the closed position





Does the EGR valve mechanism move freely over the full travel path?	
Yes	**No**
	A malfunctioning EGR valve module has been detected. Replace the EGR valve module. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
If this DTC is still present, go to step 7D	**Go to step 7F**

Step 7D Visual inspection, blockage, EGR valve housing

Always switch OFF the ignition when working on the EGR valve mechanism.

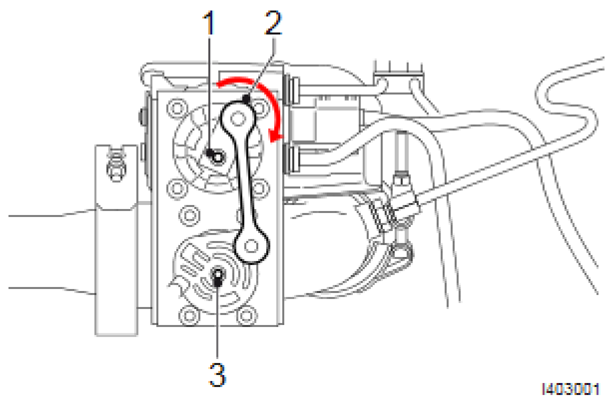
- **The valve mechanism can move when the ignition is switched on. Touching the mechanism can result in physical injury.**
- **Maintain a safe distance if the valve is monitored with the ignition keyed on.**

Action

1. Switch OFF the ignition.
   The EGR valve mechanism cannot be moved if the ignition is keyed on.
2. Remove the flexible EGR pipe as outlined in the maintenance procedure, "replace flexible EGR pipe from control valve to cooler (EGR system)" (job code: J 1435 264406 001 033).
3. Visually inspect the EGR to determine if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing.
   Open the valve by moving the actuator lever/connecting rod (2).

The movement requires some force because of the presence of a return spring.

Do not use a tool to move the mechanism.



Was an internal blockage or excessive soot accumulation around the butterfly valve and housing found?

Yes	No
1. Remove blockage/clean the internal valve housing. 2. Monitor the EGR valve position with DAVIE to check that the cleaning was effective. 3. Reinstall the flexible EGR pipe as outlined in the maintenance procedure, “replace flexible EGR pipe from control valve to cooler (EGR system)” (job code: J 1435 264406 001 033). Refer to step 10A to perform the corresponding repair verification cycles and rechecks	A malfunctioning EGR valve module has been detected. Replace the EGR valve module. Refer to step 10A to perform the corresponding repair verification cycles and rechecks
If this DTC is still present, go to step 7E	**If this DTC is still present, go to step 7E**

Step 7E Visual inspection, connections and wiring, EGR valve module (L095)

Action

1. Visually inspect the associated component connections and wiring for any of the following:

- Damaged or loose connectors
- Bent, broken, corroded or loose connector pins
- Moisture or dirt in the connections
- Damage to the wire harness or insulation
- The correct parts are not installed
- ECU connections are damaged or disconnected

Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 7F	**Go to step 7F**

Step 7F Electrical checks, supply voltage, EGR valve module (L095)	
Action 1. Monitor the vehicle power supply during engine startup and operation. 2. Check the EGR valve module supply voltage as outlined in, “checking data EGR valve module (L095)”	
Are measured values within expected range?	
Yes	**No**
	Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.
Go to step 8A	**If this DTC is still present, go to step 8A**

Step 8 DAVIE Tests

Step 8A DAVIE test, EGR Service

ABORTING A DAVIE-INITIATED DIAGNOSTIC TEST IS NOT RECOMMENDED. **However, if aborting a test is required, a key cycle must be performed to reset the engine ECM.** **Failure to reset the engine ECM in this instance could result in personal injury or damage to the vehicle.**	
Action 1. Use DAVIE to run the EGR Service test.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
Go to step 8B	**If this DTC is still present, go to step 8B**

Step 8B DAVIE test, BPV Service	
ABORTING A DAVIE-INITIATED DIAGNOSTIC TEST IS NOT RECOMMENDED. **However, if aborting a test is required, a key cycle must be performed to reset the engine ECM.** **Failure to reset the engine ECM in this instance could result in personal injury or damage to the vehicle.**	
Action 1. Use DAVIE to run the BPV Service test.	
Does the test fail to complete or result in a failed state?	
Yes	**No**

Correct any issues found. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
Go to step 9A	**If this DTC is still present, go to step 9A**

Step 9 EGR Cooler Checks

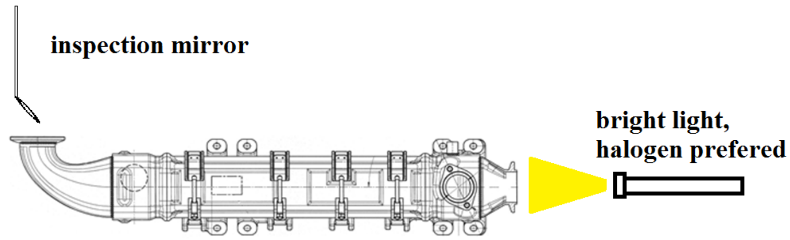
Step 9A Evaluating freeze frame data for signs of EGR cooler fouling	
Action 1. Examine the P1719 freeze frame data from the DAVIE log. Note the values for the following parameters: • Boost air pressure (absolute) • Before turbine pressure target (absolute) • EGR valve position 2. If the EGR valve position is 80% or greater: • Calculate the difference between the Before turbine pressure target (absolute) and Boost air pressure (absolute)	
Is the EGR valve positon greater than 80% AND is Before turbine pressure target (absolute) - Boost air pressure (absolute) greater than 6 psi (41 kPa)?	
Yes	**No**
The EGR cooler may be fouled.	
Go to step 9B	**If all steps have been completed and this DTC is still present, contact PACCAR Engine Support Center for further assistance.**

Step 9B Visual inspection, fouling, EGR cooler
Build-up of soot and other deposits can block the exhaust gas passages in the EGR cooler. If the blockage is greater than 25%, the flow of EGR through the cooler into the intake manifold may be reduced and corresponding engine out NOx levels may exceed the normal operating levels. DTC P1719 is set when measured engine output NOx emissions exceed the modeled engine out NOx emissions by 150% over 90 seconds.
Action

1. Visually inspect the EGR gas inlet side of the EGR cooler for signs of fouling using either of the following recommended methods:

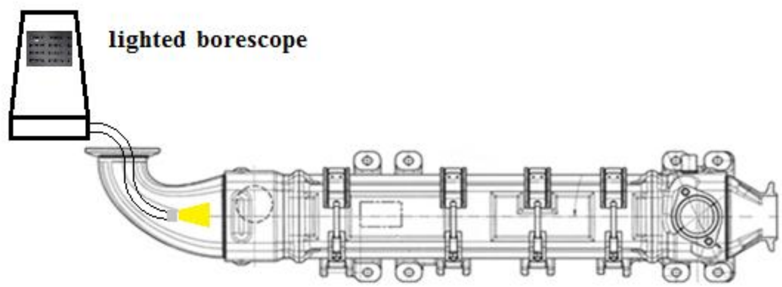
    - Inspection using a light and mirror

      Use an inspection mirror inserted into the EGR cooler gas inlet end of the EGR cooler in combination with a bright light shining through the EGR cooler from the gas outlet end.



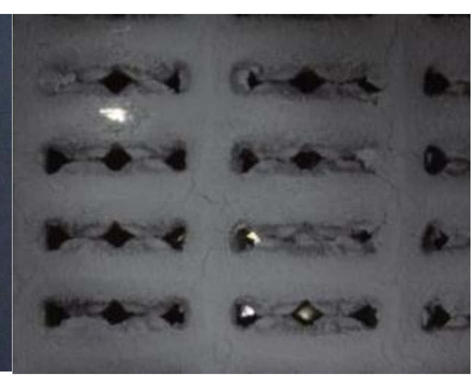
    - Inspection using a borescope

      Use an illuminated borescope inserted into the EGR cooler gas inlet end of the EGR cooler. Record pictures if possible.



2. Determine the extent of EGR cooler fouling. Estimate if the open area of the gas passages are blocked greater than 25%.

EGR cooler visual inspection example



EGR cooler fouling < 25%
EGR Cooler OK

EGR cooler fouling >25%
EGR Cooler requires cleaning

Is the EGR cooler fouling greater than 25%?	
Yes	**No**
Clean EGR cooler (EGR system) as outlined in the maintenance procedure "clean EGR cooler (EGR system)," job code: J 1419 318900 012 000. Refer to step 10A to perform the corresponding repair verification cycles and rechecks.	
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 10 Repair Verification

Step 10A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active.

Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1000-1500 rpm, and set the cruise control.
   Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

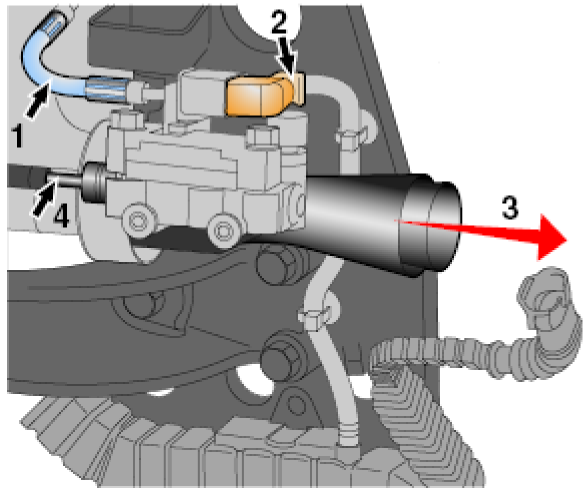
Were the identified repair verification cycles able to be completed?	
Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.

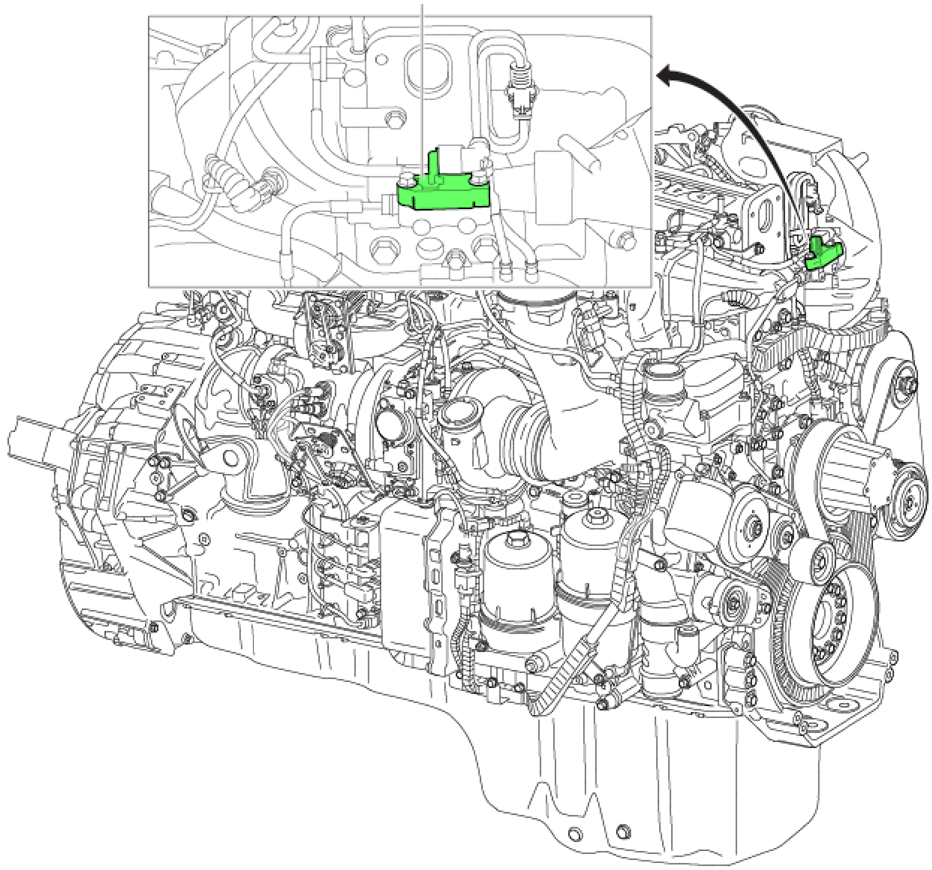
Go to step 10B	

Step 10B DAVIE Diagnostics, Quick Check	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.	
Has P1719 been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.

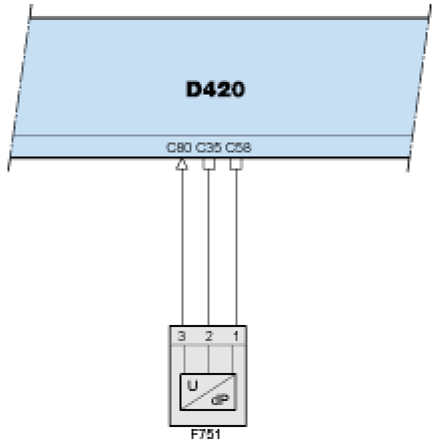
Back to Index

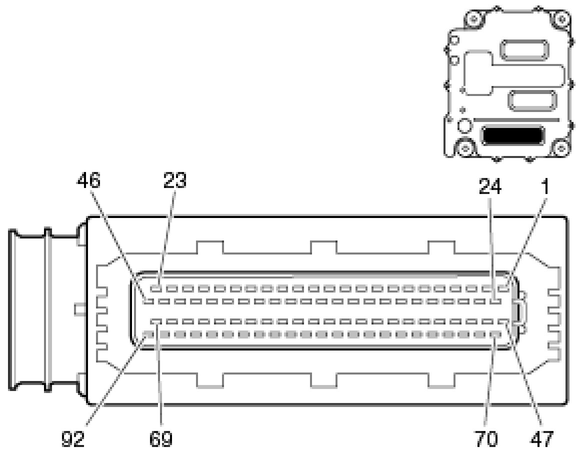
P171B

Code number	P171B
Fault code description	EGR flow response - Decrease too slow
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – EGR
Description of component(s)	The sensor measures the EGR gas pressure before and after a venturi in the EGR pipe between the EGR cooler and the engine intake pipe. The sensor operating temperature is limited to 125°C [257°F]. To prevent overheating, the sensor is cooled by the engine cooling system.  1 Coolant out 2 Electrical connection 3 EGR gas flow direction 4 Coolant in EGR flow The EGR pressure difference sensor contains two internal pressure sensors with electronics. One pressure sensor measures before the venturi and the other after the venturi. The electronics in the EGR pressure difference sensor converts this to one differential pressure signal. The PCI ECU uses the signal to calculate the EGR flow. Effect on the system: Calculates EGR gas flow

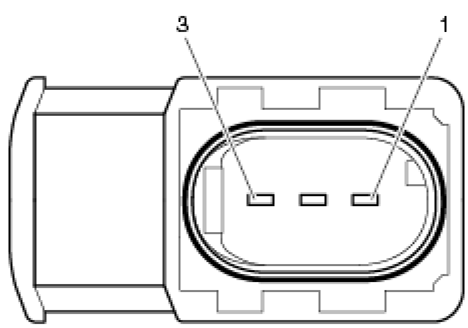
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed is more than 1000 rpm, and; • The engine mode is DPF regeneration or SCR heating or SCR high efficiency or standard.
Set condition of fault code	The PCI ECU (D420) detects that the EGR mass flow decrease is too slow during changes in the commanded EGR mass flow from a high to low rate.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F751 front view

D400 central box
F751 sensor, EGR pressure difference

D420	F751	Function
C35	2	Ground
C58	1	Power supply
C80	3	Signal, EGR pressure difference

Technical data

Component & wiring check, ECU (D420)
Preparation

<table>
<tr><td></td><td>

Key off the ignition.
Disconnect connector F751
Measure on the front side of wiring harness connector F751

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>5 V</td><td>Ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>

Clogged EGR system
Clogged EGR pressure difference sensor venturi.
Sticking EGR valve

</td></tr>
<tr><td>Additional information</td><td>

The engine NOx emission is, among others, controlled by varying the EGR flow toward the inlet manifold of the engine.
For this diagnostic, the EGR pressure difference sensor (F751) is used to measure the EGR mass flow during changes in the commanded EGR mass flow from a higher to lower flow rate.

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 171B-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 171B-b</td><td>SRT</td></tr>
<tr><td colspan="3">Use DAVIE to monitor the following temperatures:

EGR Temperature
EGR Pressure Difference
EGR Position

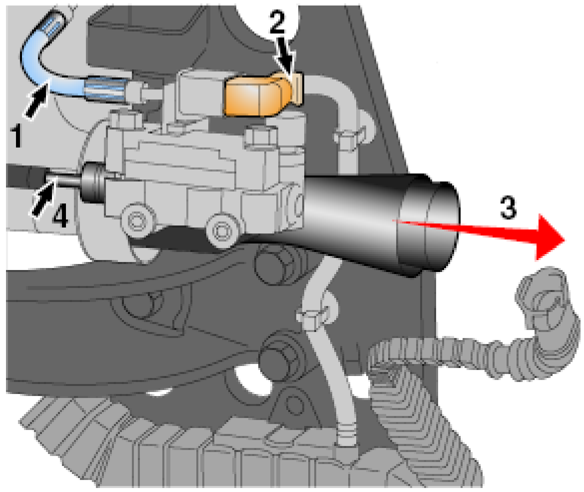
Are the values monitored for each of the items above within specifications?

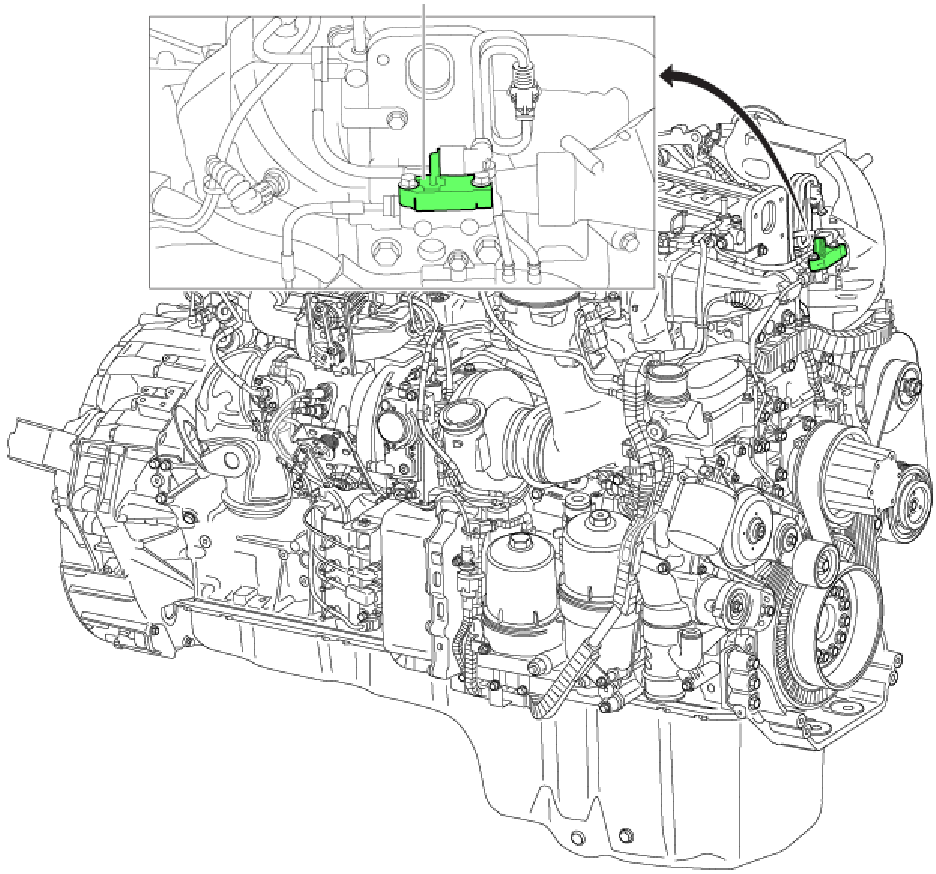
No: Continue to step 3
Yes: Proceed to step 4

</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 171B-c</td><td>SRT</td></tr>
<tr><td colspan="3">Run the prescribed DAVIE Direct test to determine if there is an internal problem with the EGR
Valve Sensor.
Does the test fail to complete or result in a failed state?</td></tr>
</table>
</td></tr>
</table>

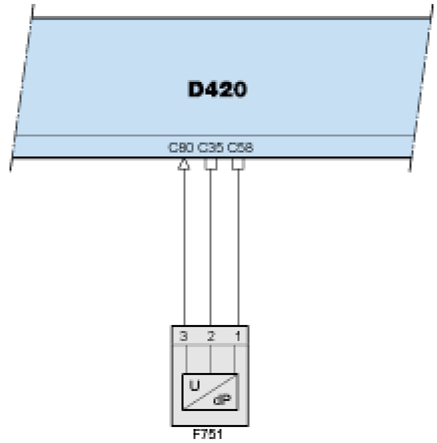
	• No: Issue resolved • Yes: Continue to step 4 Step 4 | Step ID 171B-d | SRT If no problems were detected in the preceding steps, an internal problem has most likely occurred with the post BPV temperature sensor. Replace the identified smart sensor. Is the fault still active? • Yes: Proceed to step 5 • No: Issue resolved Step 5 | Step ID 171B-e | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
	Back to Choose Code Back to Index

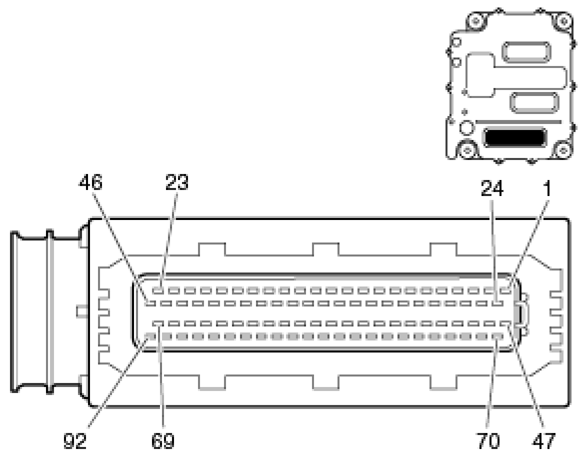
P171C

Code number	P171C
Fault code description	EGR flow response - Increase too slow
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Egr
Description of component(s)	The sensor measures the EGR gas pressure before and after a venturi in the EGR pipe between the EGR cooler and the engine intake pipe. The sensor operating temperature is limited to 125°C [257°F]. To prevent overheating, the sensor is cooled by the engine cooling system.  1 Coolant out 2 Electrical connection 3 EGR gas flow direction 4 Coolant in EGR flow The EGR pressure difference sensor contains two internal pressure sensors with electronics. One pressure sensor measures before the venturi and the other after the venturi. The electronics in the EGR pressure difference sensor converts this to one differential pressure signal. The PCI ECU uses the signal to calculate the EGR flow. Effect on the system: Calculates EGR gas flow

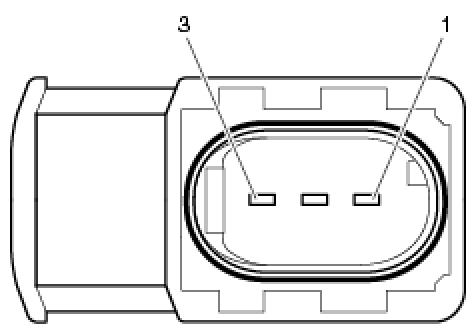
Location of component(s)	
Diagnostic condition	This diagnostic runs: • Engine speed is between 1000 and 1450 rpm, and; • The engine mode is DPF regeneration or SCR heating or SCR high efficiency or standard.
Set condition of fault code	The PCI ECU (D420) detects that the EGR mass flow increase is too slow during changes in the commanded EGR mass flow from a low to high rate.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F751 front view

D400 central box
F751 sensor, EGR pressure difference

D420	F751	Function
C35	2	Ground
C58	1	Power supply
C80	3	Signal, EGR pressure difference

Technical data

Component & wiring check, ECU (D420)
Preparation

	• Key off the ignition. • Disconnect connector F751 • Measure on the front side of wiring harness connector F751 Pin (+ probe) | Pin (- probe) | Value | Additional information 1 | 2 | 5 V | Ignition keyed on
Possible causes	• Leaking EGR system • Clogged EGR system • Clogged EGR pressure difference sensor venturi • Sticking EGR valve
Additional information	• The engine NOx emission is, among others, controlled by varying the EGR flow toward the inlet manifold of the engine. • For this diagnostic, the EGR pressure difference sensor (F751) is used to measure the EGR mass flow during changes in the commanded EGR mass flow from a lower to higher flow rate.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. **Step 1** | Step ID 171C-a | SRT Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2. **Step 2** | Step ID 171C-b | SRT Test: EGR Service Determine if the EGR Valve has any mechanical issues by monitoring certain parameters while opening and closing the EGR Valve. Does the test fail to complete or result in a failed state? • No: Proceed to Step 3 • Yes: Proceed to step 8. **Step 3** | Step ID 171C-c | SRT Ancillary Test: Air Side Pressure Perform the prescribed testing to determine whether there are any leaks in the Air system.

Does the test fail to complete or result in a failed state?

- No: Proceed to Step 4.
- Yes: Proceed to Step 8

Step 4	Step ID 171C-d	SRT

Ancillary Test: Coolant Leak

Perform the prescribed testing to determine if there is a coolant leak affecting the EGR.

Does the test fail to complete or result in a failed state?

- No: Proceed to Step 5
- Yes: Proceed to Step 8

Step 5	Step ID 171C-e	SRT

Visual Inspection: EGR Pressure Difference Sensor and Lines

Remove the EGR Pressure Difference sensor and inspect tip of the sensor for any of the following:

- Damaged
- Excessive build-up of deposits

Visually inspect the Pressure Difference lines for any of the following

- Damage
- Kinks or restrictions

Was there evidence of any of the above?

- No: Proceed to step 6
- Yes: Proceed to step 8.

Step 6	Step ID 171C-f	SRT

Visual Inspection: NOx Sensor Before Catalyst

Remove the before catalyst NOx sensor and inspect tip for any of the following:

- Damage
- Excessive build-up of deposits

Was there evidence of any of the above?

- No: Proceed to step 7
- Yes: Proceed to Step 8

Step 7	Step ID 171C-g	SRT

DAVIE Direct: Monitor EGR and Related Temperature Sensors

Using DAVIE Monitor, select and observe the following values to confirm they are within recommended specifications:

- EGR Temperature
- EGR Pressure
- EGR Position
- After Intercooler Temperature
- Coolant Temperature
- Boost Temperature
- Boost Pressure
- Before Turbine Pressure
- After Turbine Pressure

Do any of the monitored values appear incorrect?

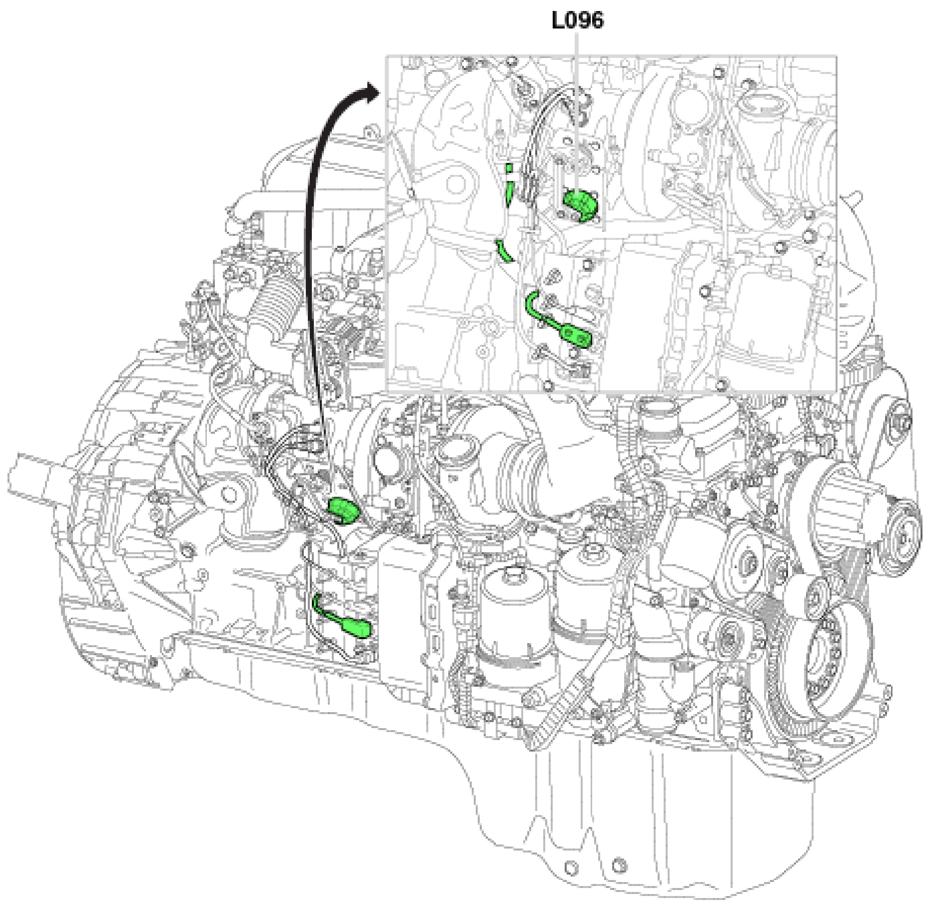
	• No: Issue Resolved • Yes: Proceed to step 8. **Step 8** | Step ID 171C-h | SRT Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 9 **Step 9** | Step ID 171C-i | SRT Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
	Back to Choose Code Back to Index

P171E

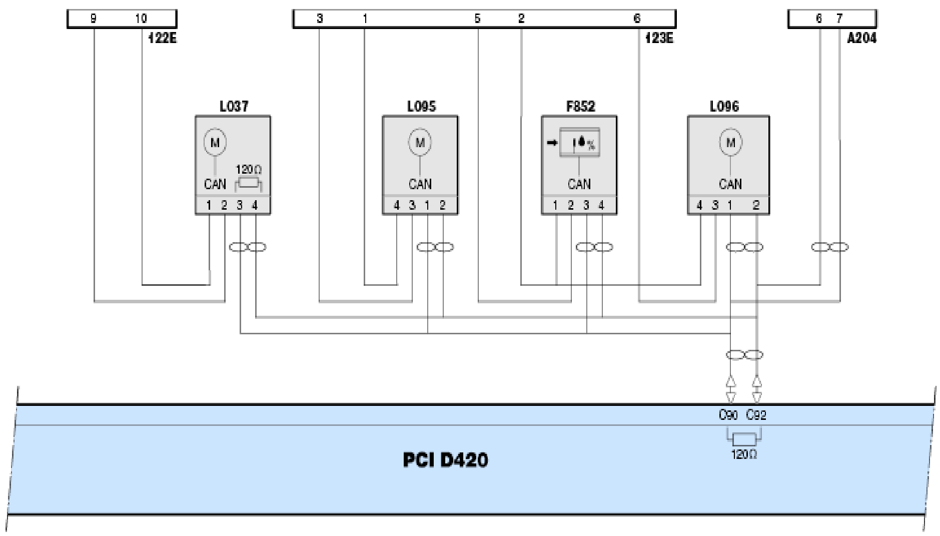
Code number	P171E
Fault code description	Air management control, air mass flow - Data valid but too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Boost Freeze frame type – Boost
Description of component(s)	Please Contact the Engine Support Center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

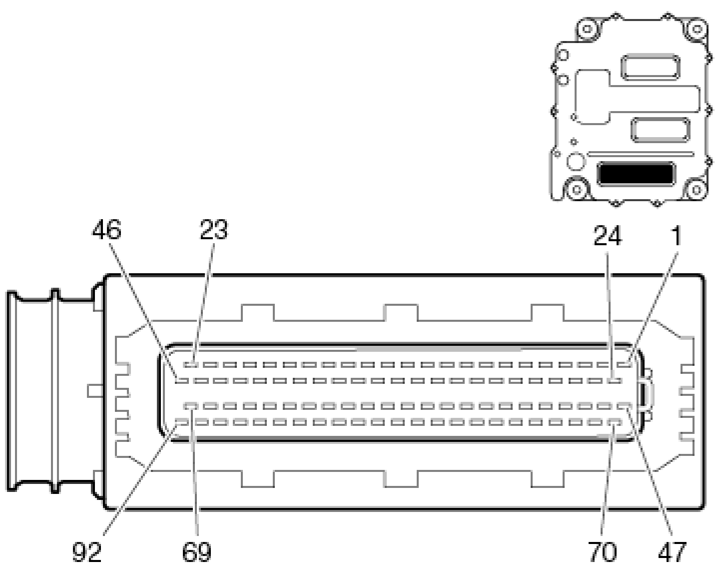
P1722

Code number	P1722
Fault code description	BPV valve control-Data erratic, intermittent or incorrect.
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The BPV actuator consists of an actuator and a BPV valve. The main task of the BPV valve is to create back pressure in the engine exhaust system and control exhaust gas mass flow. • Lever • Spring • Butterfly valve • BPV actuator The main components of the BPV actuator are: • ECU • Electromotor The electromotor rotates the output shaft via internal gears. • output shaft The butterfly is moved via a lever by rotating the output shaft • electromotor position sensor The position of the electromotor is monitored. • output shaft position sensor The position of the output shaft is monitored. • temperature sensor The temperature of the printed circuit board of the ECU is monitored. Control The BPV actuator is a smart actuator that communicates with the PCI ECU via E-CAN. The actuator ECU is controlled by the PCI ECU but has its own diagnostics on the following actuator inputs and outputs: • power supply voltage • electromotor position • electromotor current • output shaft position • ECU printed circuit board temperature • ECU hardware and software After the ignition is keyed on, the valve position is 100% until the actuator is controlled by the PCI ECU. Unpowered and fail-safe position The unpowered and fail-safe positions of the valve are controlled by a spring and are fully open (100%). If a failure is detected the BPV valve moves to the fail-safe position, if possible. Effect on the system: • Creating heat in the exhaust system to heat up the EAS system. A lower opening percentage results in a higher back pressure and more heat.

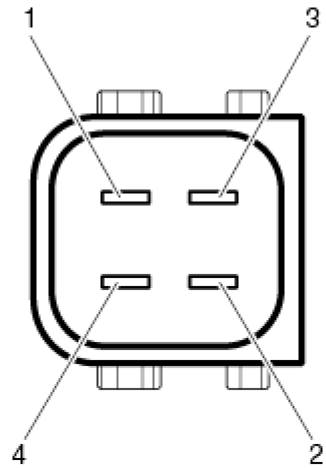
	• Decreasing the exhaust gas flow in the exhaust system to heat up the EAS system. A lower opening percentage results in a lower exhaust gas flow in the exhaust system and more heat. • Altering the pressure drop across the turbine rotor for VTG turbo control. • Creating back pressure to create EGR gas flow. • Creating back pressure to create engine braking.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is running.
Set condition of fault code	The PCI ECU (D420) detects that the actual BPV valve position measured by the BPV actuator differs too much from the commanded position (by the PCI ECU) for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.

Electrical diagram(s)





Wiring harness connector D420.C front view

	 Wiring harness connector L096 front view 122E 12-pin interface connector 123E 7-pin interface connector A204 electronic fan interface connector D420 PCI ECU F852 humidity sensor L037 VTG turbocharger actuator L095 EGR valve module L096 BPV valve D420 L096 Function C90 1 E-CAN high C92 2 E-CAN low 3 Ground 4 Power supply after ignition
Technical data	Component & wiring check, BPV valve (L096) Preparation • Key off the ignition. • Disconnect connector L096 • Measure on the front side of wiring harness connector L096 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 3 | Ubat | ignition keyed on 1 | 2 | ± 60 Ω | • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	Sticking or blocked BPV valve or mechanism.
Additional information	The BPV valve is supposed to create back pressure in the engine exhaust system and control exhaust gas mass flow. During normal engine control, the BPV valve position is commanded by the PCI ECU. The actual control of the valve is carried out by the BPV actuator (L020), a smart actuator that communicates with the PCI ECU via E-CAN. The actuator provides feedback to the PCI ECU about the valve position.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1722a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 1722b	SRT
DAVIE Direct Test: BPV Actuator Run the prescribed DAVIE Direct test to determine correct operation of the BPV Actuator. Does the test fail to complete or result in a failed state? • No: Proceed to step 5. • Yes: Proceed to step 4.		

Step 3	Step ID 1722c	SRT
Visual Inspection: BPV Remove the exhaust pipe from the BPV outlet. Visually inspect the inside of the back pressure valve for any blockage that would restrict valve movement. Was there evidence of any blockage? • No: Issue resolved. • Yes: Proceed to step 4.		

Step 4	Step ID 1722d	SRT
Reframe this sentence as Repair or replace appropriate component and use Davie to recheck for the presence of active faults • Fault inactive – Issue resolved. • Fault active - Proceed to step 5.		

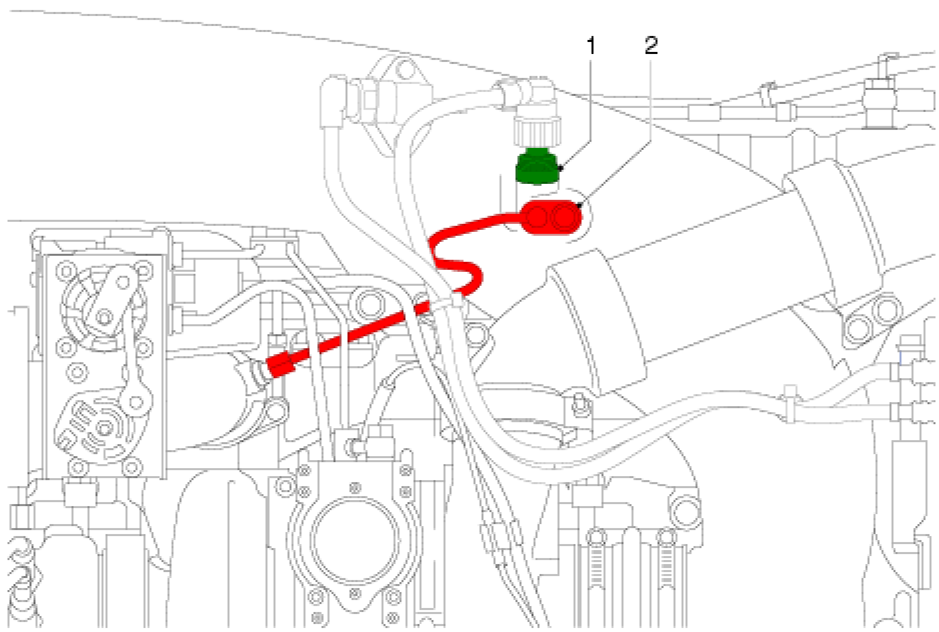
Step 5	Step ID 1722e	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

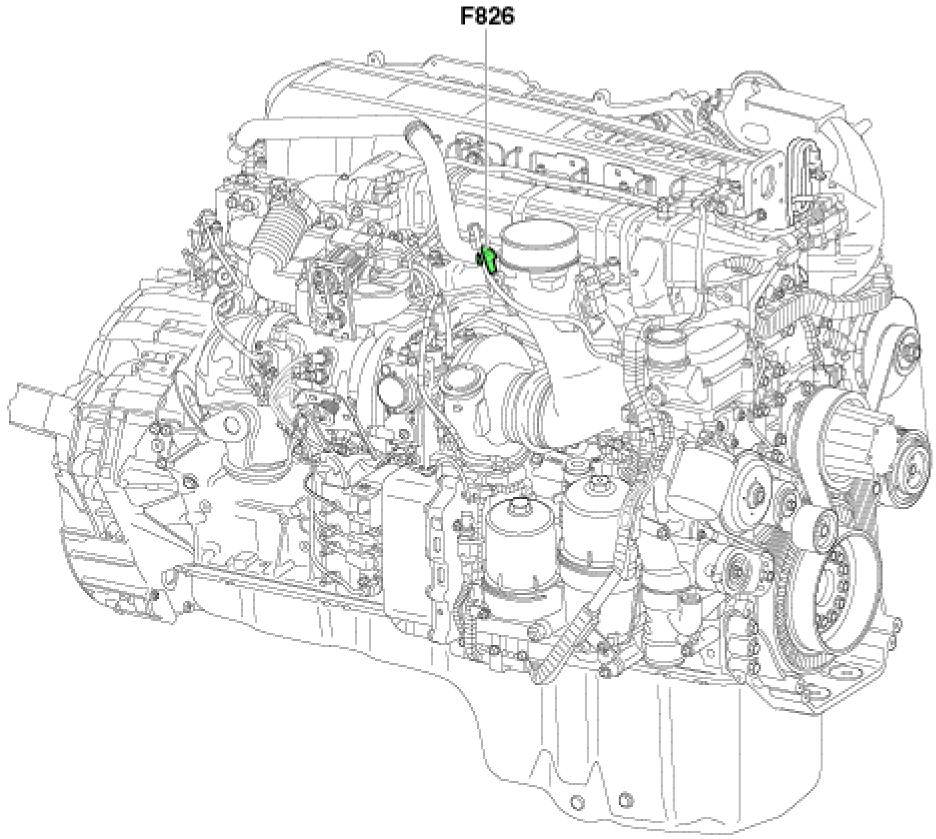
Verification Drive Cycle

To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable,

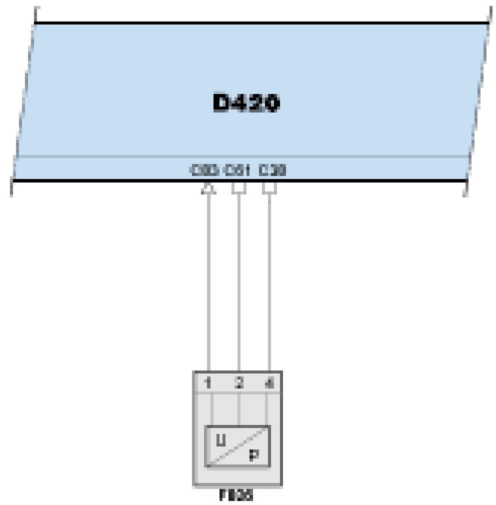
	produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

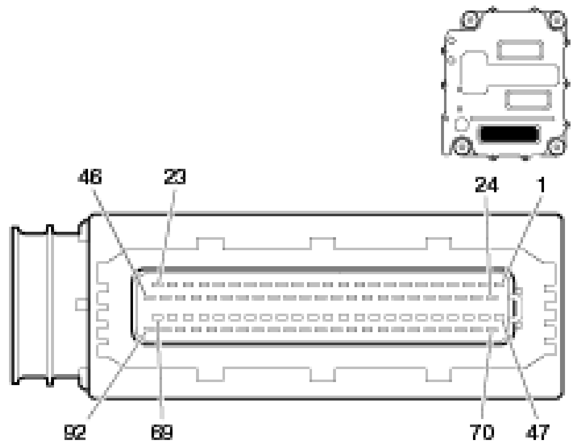
P1723

Code number	P1723
Fault code description	Pressure before turbine-Data valid but too high.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Boost
Description of component(s)	The exhaust gas pressure before the turbine is measured with sensor (1) via a steel tube (2) before the EGR valve. Effect on the system: • Control of the VTG turbo charger • Control of the EGR flow • Control of the BPV valve • Control of the engine brake • Calculates the exhaust gas temperature before the turbine Lower measured exhaust gas pressure before turbine results in higher calculated exhaust gas temperature before the turbine. 

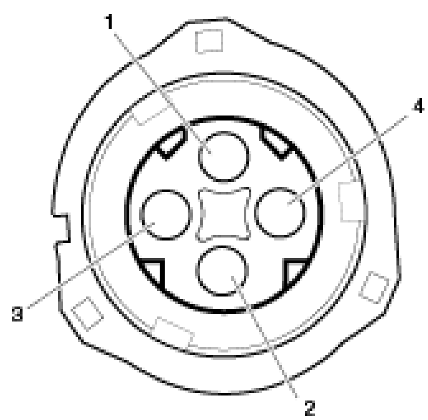
Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the engine speed is between 1000 and 1900 rpm, and; • When the engine is running at a steady load, and; • The engine mode is SCR heating or SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that measured pressure before turbine is higher than the requested pressure before turbine for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F826 front view

D420 PCI ECU
F826 pressure sensor before turbine

D374	F829	Function
C38	4	Ground
C61	2	Power supply

	C83 1 Signal, pressure before turbine

Technical data

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Disconnect connector F826
- Measure on the front side of wiring harness connector F826

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5 V	Ignition keyed on

Possible causes

- Pressure sensor before turbine deviation
- Restriction in exhaust system

Additional information

- The PCI ECU uses the pressure before turbine for, among other things, controlling the VTG turbocharger, EGR valve position, BPV valve position and engine braking.
- The pressure before turbine is measured by the pressure sensor before turbine (F826).

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

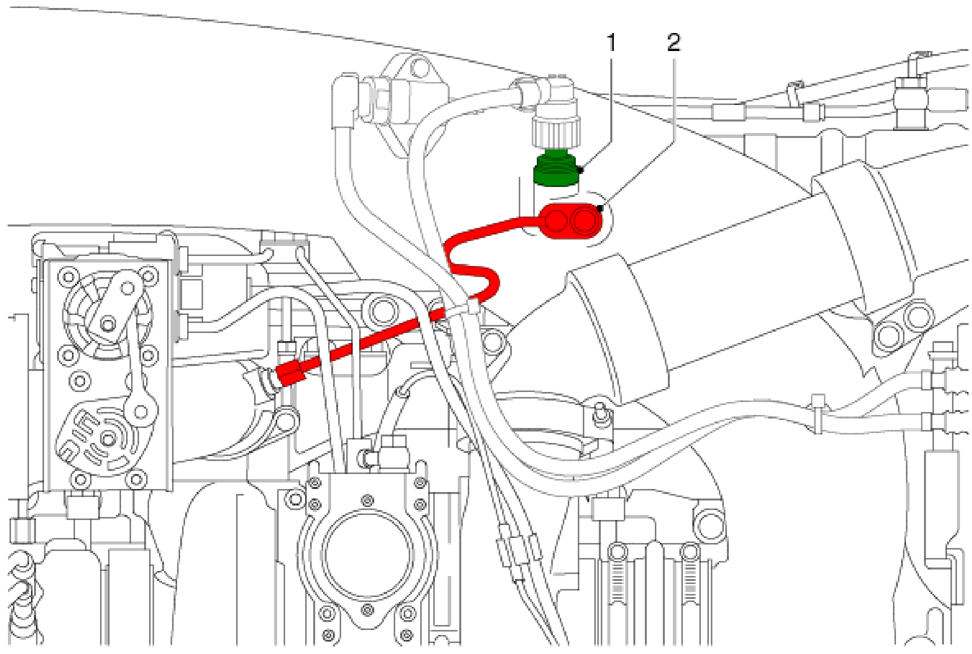
Step 1	Step ID 1723a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

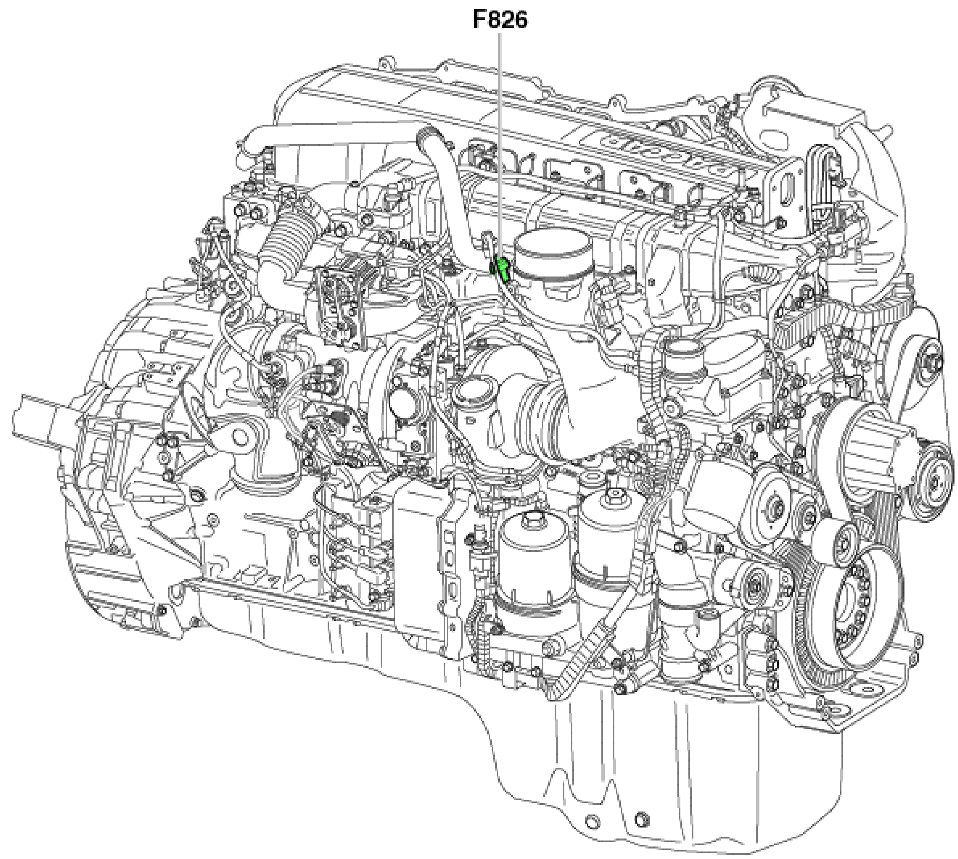
Step 2	Step ID 1723b	SRT
Visual Inspection: Pressure Sensor Before Turbo (P3) Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Moisture or dirt accumulation Was there evidence of any of the above? • No: Continue to the step 3 in the troubleshooting process. • Yes: Proceed to step 6.		

Step 3	Step ID 1723c	SRT
Ancillary Test: Air Side Pressure Perform the prescribed testing to determine if there is an air leak that could be		

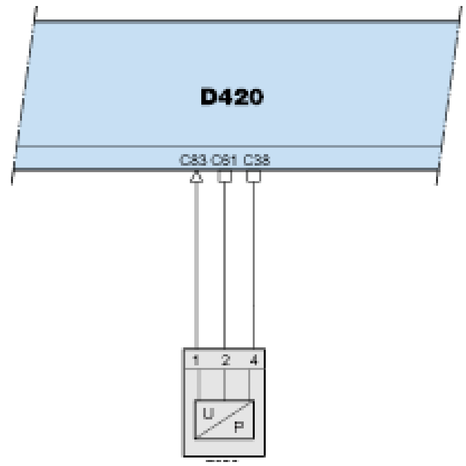
	causing this fault. Does the test fail to complete or result in a failed state? • No: Proceed to step 7 • Yes: Proceed to step 6. **Step 4** | Step ID 1723d | SRT Run the prescribed DAVIE Direct test to determine correct operation of the turbocharger. Does the test fail to complete or result in a failed state? • No: Proceed to step 7. • Yes: Proceed to step 6. **Step 5** | Step ID 1723e | SRT DAVIE Direct Test: Turbo Actuator Effort Run the prescribed DAVIE Direct test to determine correct operation of the turbo actuator. Does the test fail to complete or result in a failed state? • No: Proceed to step 7. • Yes: Proceed to step 6. **Step 6** | Step ID 1723f | SRT Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – Issue resolve • Fault active - Proceed to step 7 **Step 7** | Step ID 1723g | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

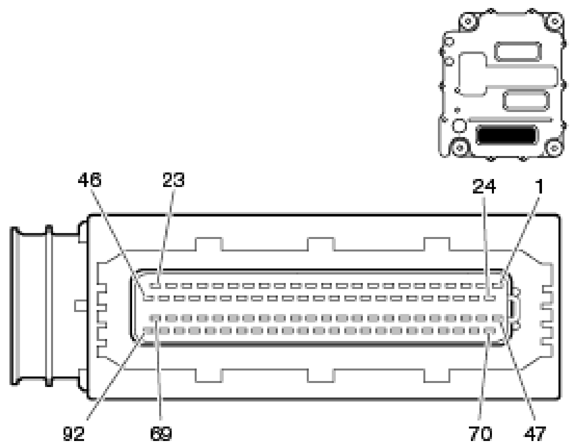
P1724

Code number	P1724
Fault code description	Pressure before turbine – Data valid but too low
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	The exhaust gas pressure before the turbine is measured with sensor (1) via a steel tube (2) before the EGR valve.  Effect on the system: • Control of the VTG turbo charger • Control of the EGR flow • Control of the BPV valve • Control of the engine brake • Calculates the exhaust gas temperature before the turbine Lower measured exhaust gas pressure before turbine results in higher calculated exhaust gas temperature before the turbine.

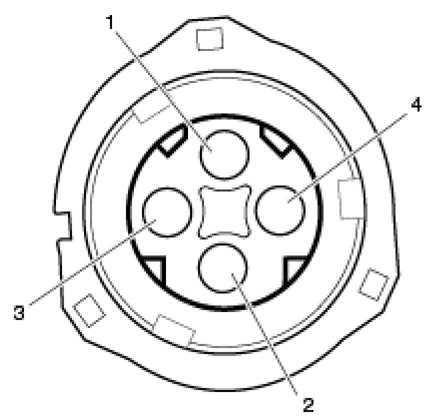
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed 1000 and 1900 rpm, and; • when the engine is running at a steady load, and; • the engine mode is SCR heating or SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that measured pressure before turbine is lower than the requested pressure before turbine for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.

Electrical diagram(s)





Wiring harness connector D420.A front view



Wiring harness connector F826 front view

D420	PCI ECU
F826	pressure sensor before turbine

D420	F826	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine

Technical data

Component & wiring check, ECU (D420)

<table>
<tr><td></td><td>Preparation
Key off the ignition.
Disconnect connector F826
Measure on the front side of wiring harness connector F826
<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>2</td><td>4</td><td>5V</td><td>Ignition keyed on</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Leaking exhaust system
Leaking pressure sensor before turbine tube
Pressure sensor before turbine deviation</td></tr>
<tr><td>Additional information</td><td>The PCI ECU uses the pressure before turbine for, among other things, controlling the VTG turbocharger, EGR valve position, BPV valve position and engine braking.
The pressure before turbine is measured by the pressure sensor before turbine (F826).</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step ID 1724a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure.
Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1724b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
Supply and signal voltages (12V).
Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
Yes - Proceed to step 3
No - Proceed to step 7</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 1724c</td><td>SRT</td></tr>
<tr><td colspan="3">Ancillary Test: Air Side Pressure</td></tr>
</table></td></tr>
</table>

	Perform the prescribed testing to determine if there is an air leak that could be causing this fault. Does the test fail to complete or result in a failed state? • No: Proceed to step 4 • Yes: Proceed to step 6

Step 4	Step ID 1724d	SRT
DAVIE Direct Test: EGR and Turbo Condition Run the prescribed DAVIE Direct test to determine correct operation of the turbocharger. Does the test fail to complete or result in a failed state? • No: Proceed to step 5 • Yes: Proceed to step 6		

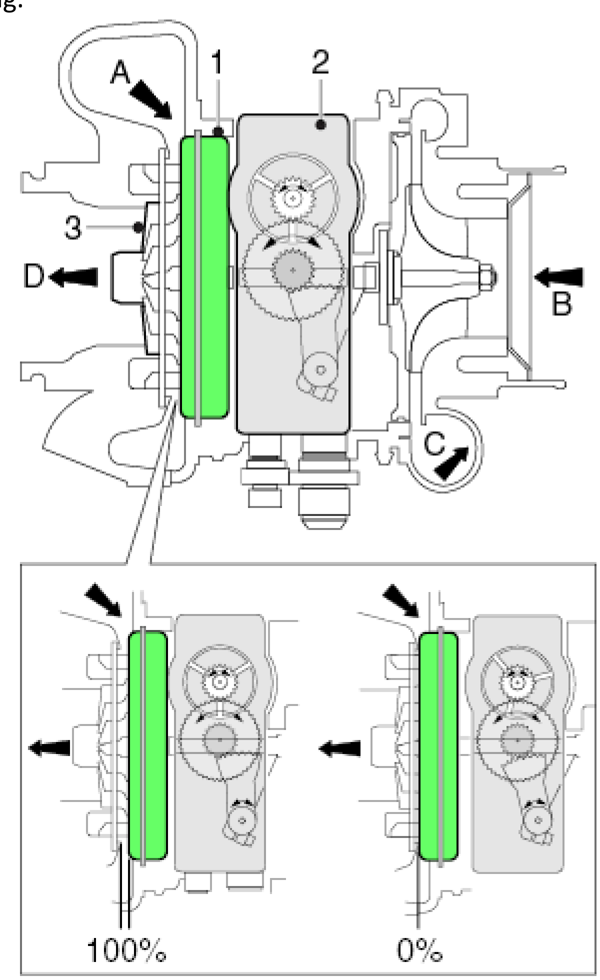
Step 5	Step ID 1724e	SRT
5. DAVIE Direct Test: Turbo Actuator Effort Run the prescribed DAVIE Direct test to determine correct operation of the turbo actuator. Does the test fail to complete or result in a failed state? • No: Proceed to Step 7 • Yes: Proceed to step 6		

Step 6	Step ID 1724f	SRT
6. Replace: Turbo Speed sensor Replace the identified faulty component. Use DAVIE to check for the presence of active faults. • No: Issue resolved • Yes: Proceed to step 7		

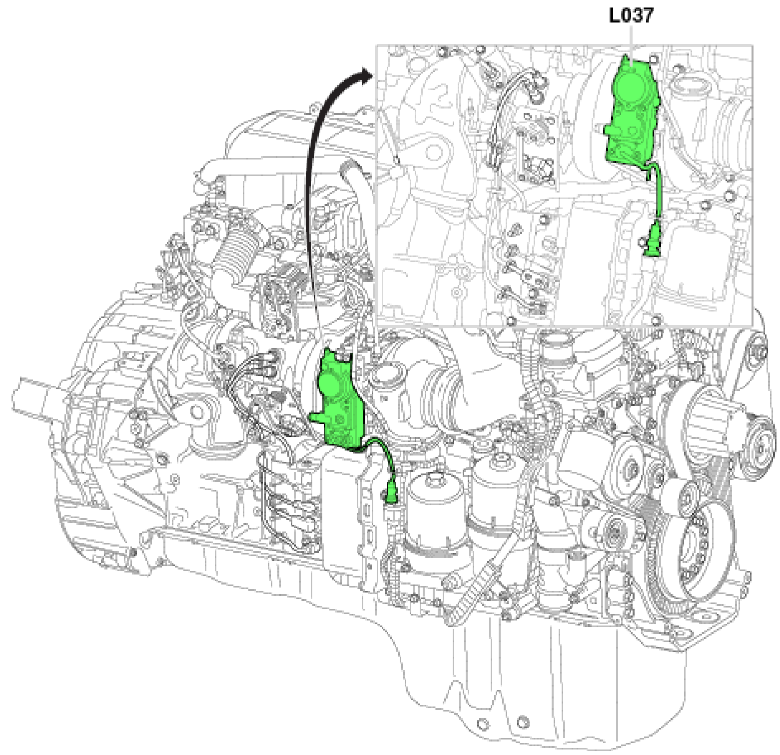
Step 7	Step ID 1724g	SRT
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

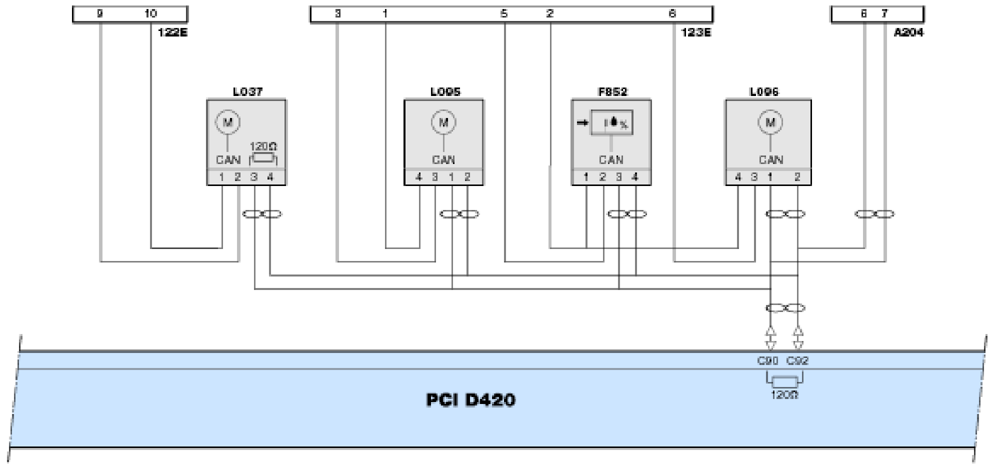
P1727

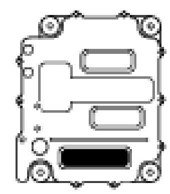
Code number	P1727
Fault code description	VTG turbocharger control - Data erratic, intermittent or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	The main task of the VTG turbo charger actuator is to control the turbo charger nozzle ring position. The gas flow guidance into the turbine rotor is controlled by the position of the turbo charger nozzle ring.  The main components of the VTG turbo charger actuator are: • ECU • Electromotor The electromotor rotates the output shaft via internal gears. • output shaft The nozzle ring mechanism is moved via a sector gear by rotating the output shaft • output shaft position sensor The position of the actuator output shaft is monitored with an internal sensor and a reference magnet (reference point). • temperature sensor The temperature of the printed circuit board of the ECU is monitored.

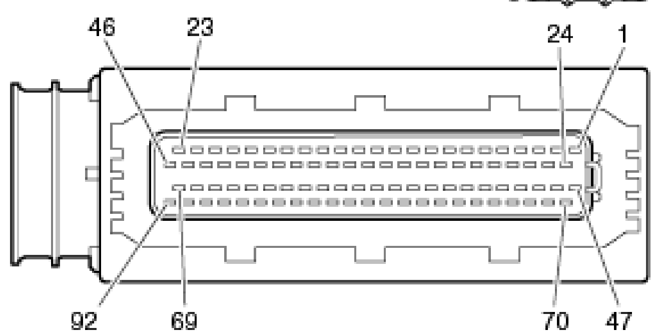
	Control The VTG turbo charger actuator is a smart actuator that communicates with the PCI ECU via E-CAN. The actuator ECU is controlled by the PCI ECU but has its own diagnostics on the following actuator inputs and outputs: • Power supply voltage • Electromotor current The effort to move the nozzle ring is monitored. • Output shaft position The mechanical end positions of the nozzle ring mechanism are monitored. • ECU printed circuit board temperature • ECU hardware and software Learn sweep After the ignition is keyed on, a learn sweep is performed by the actuator. During this sweep the VTG turbo charger nozzle ring is fully opened and fully closed to check the mechanical end positions of the nozzle ring mechanism. Unpowered and fail-safe position The unpowered and fail-safe position of the actuator is 80%. If a failure is detected the VTG actuator moves to the fail-safe position, if possible. Effect of actuator on the system: • Controlling the VTG turbo charger In general, a lower opening percentage results in a higher turbo speed and therefore in a higher boost pressure. The controlled opening percentage also depends on other conditions, such as the required EGR flow (pressure before turbine). • Controlling the pressure before turbine to generate EGR flow and back pressure during engine braking.

Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the engine is running, and; • The engine mode is SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that the actual VTG turbocharger nozzle ring position measured by the VTG turbocharger actuator differs too much from the commanded position (by the PCI ECU) for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.

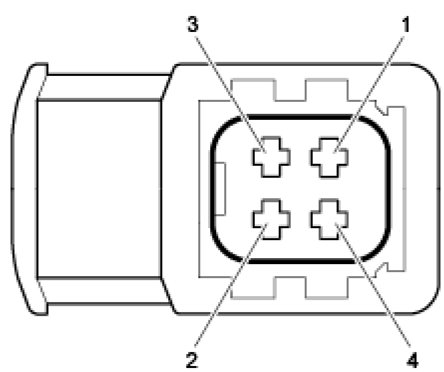
Electrical diagram(s)







Wiring harness connector D420.C front view



Component connector L037

D420	L037	Function
C90	3	E-CAN high
C92	4	E-CAN low
	1	Power supply after ignition
	2	Ground

Technical Data

Pin (+ Probe)	Pin (- probe)	Value	Additional information

	1 2 Ubat Ignition keyed on 3 4 ± 120 Ω • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI)of DAVIE disconnected
Possible causes	Faulty actuator or turbo charger nozzle ring mechanism. Check the actuator and turbocharger nozzle ring mechanism. 1. Remove the actuator. Check the sector gear travel. 2. Check the actuator output gear for damage. 3. Check the actuator output gear for adequate rotation (minimum of one complete rotation). 4. Re-initialize the turbo actuator after installation.
Additional information	In order to create a requested boost pressure and exhaust gas pressure, the exhaust gas flow guidance into the turbine rotor is controlled by the position of the turbocharger nozzle ring. During normal engine control, the turbocharger nozzle ring position is commanded by the PCI ECU. The actual control of the nozzle ring is carried out by the VTG turbocharger actuator (L037), a smart actuator that communicates with the PCI ECU via E-CAN. The actuator provides feedback to the PCI ECU about the nozzle ring position.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1727a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

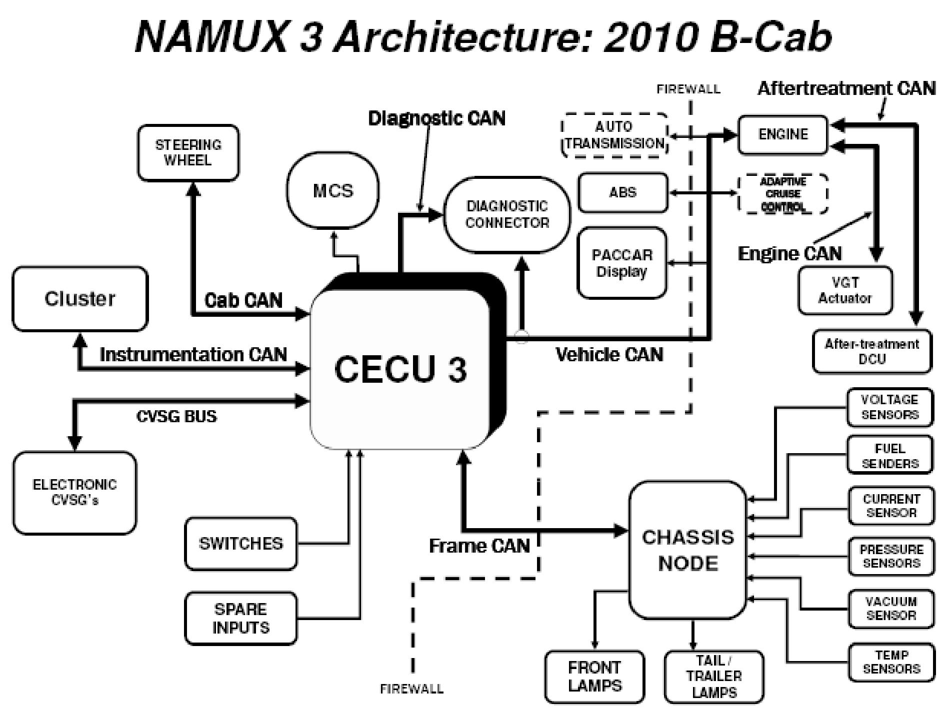
Step 2	Step ID 1727b	SRT
Ancillary Test: Turbo Actuator Span Perform the prescribed testing to manually check the turbo sector gear range of motion. Does the test fail to complete or result in a failed state? • The test does not fail to complete or result in a failed state, Skip to Step 5 in this troubleshooting process, to recalibrate the turbocharger actuator. • The test does fail to complete or result in a failed state, Continue to Step 3		

	in this troubleshooting process, to replace the turbocharger. **Step 3** | Step ID 1727c | SRT Replace: Turbocharger Contact the PACCAR Engine Support Call Center (1-800-477-0251) to confirm replacing the turbocharger. • Replace the turbocharger as confirmed. • Continue to the next step in this troubleshooting process and perform the DAVIE Direct Test: Turbocharger Actuator (VGT) Replacement to initialize the new turbocharger actuator **Step 4** | Step ID 1727d | SRT DAVIE Direct Test: Turbocharger Actuator (VGT) Replacement Run the prescribed DAVIE Direct test to re-calibrate the turbocharger actuator. Re-install the Turbo Actuator. Start the engine and verify if the fault has gone inactive. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 5 in the troubleshooting Process. **Step 5** | Step ID 1727e | SRT Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, starts the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

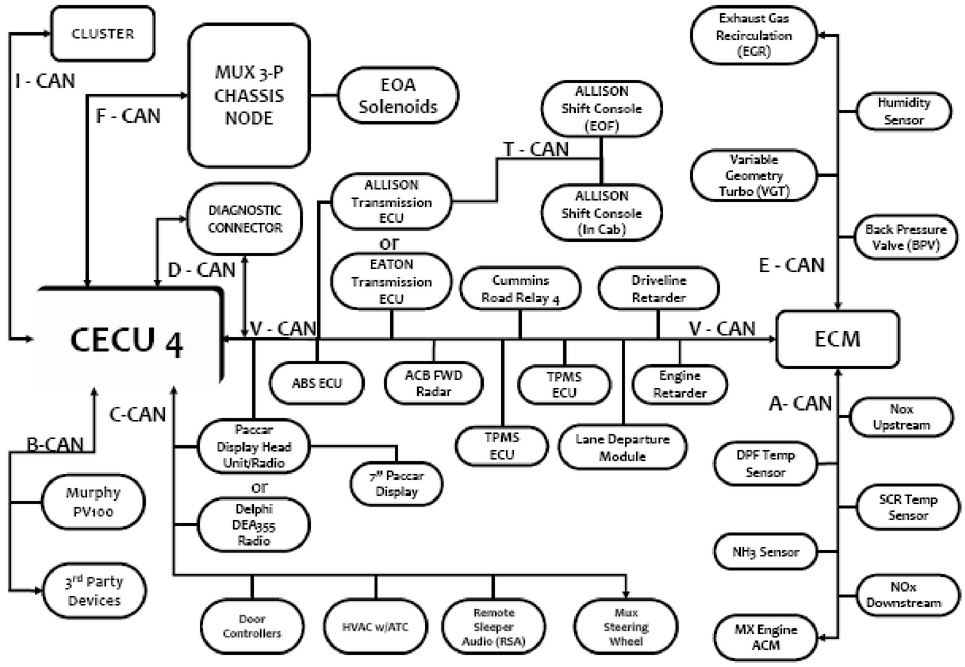
P1751

Code number	P1751
Fault code description	Malfunction Indicator Lamp (MIL) – Voltage too high or short circuit to supply on ECU D420 pin B23
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	If voltage is across the MIL circuit is zero volt.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	• Faulty wiring • Faulty connector
Additional information	Not available/required for this code
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	Not available/required for this code
	Back to Choose Code Back to Index

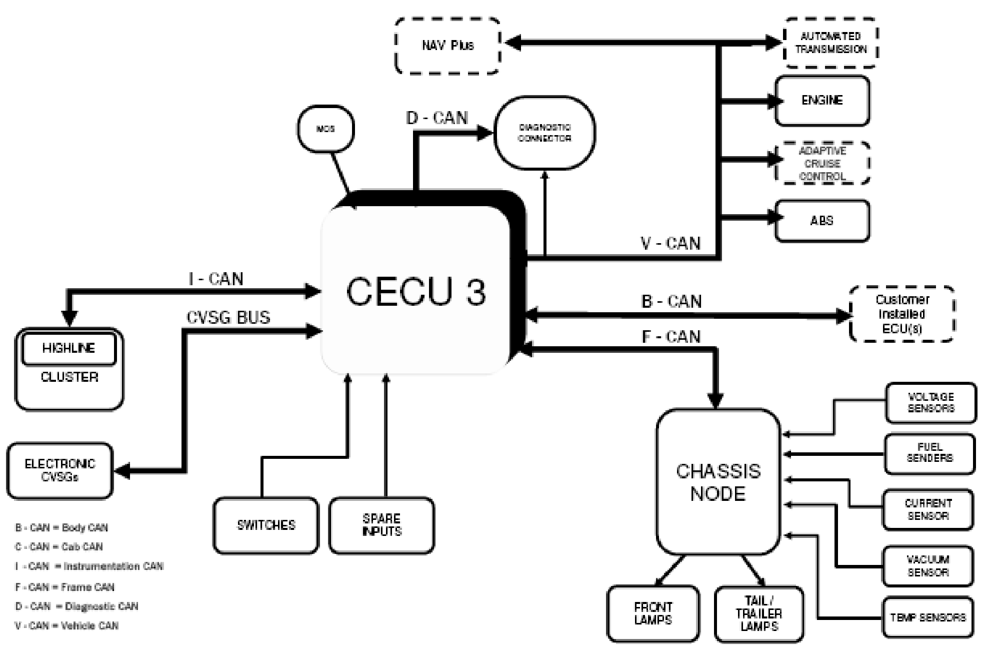
P1863

Code number	P1863
Fault code description	CAN communication - Message (PROPB_AST) out of range – Maneuvering Mode from transmission
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	This code relates to a communication issue and not to a specific component.
Location of component(s)	This code relates to a communication issue and not to a specific component.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.
Electrical diagram(s)	

NAMUX 4 Architecture (Phase 1): T680

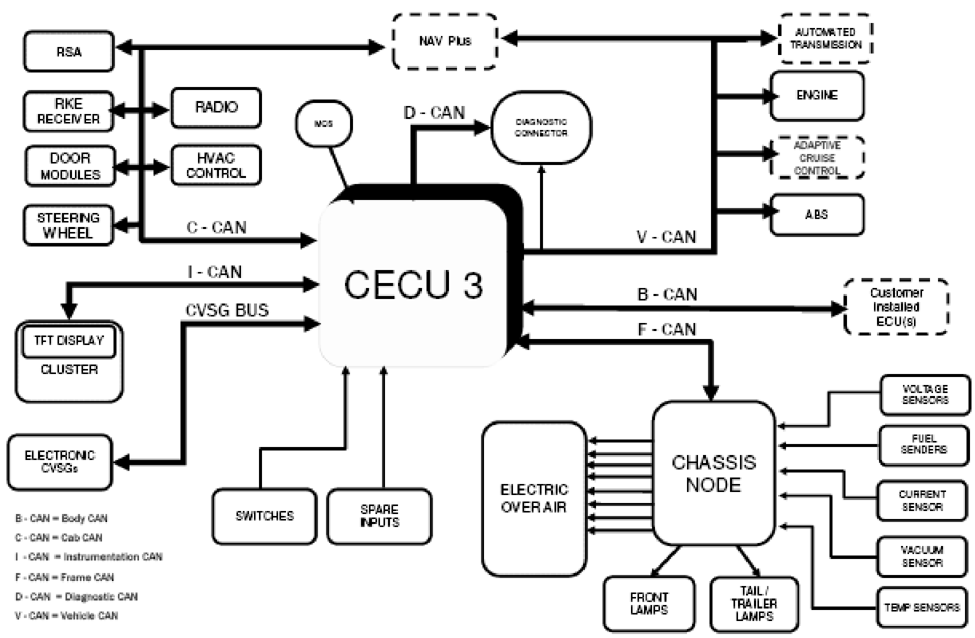


NAMUX 3 Architecture



<table>
<tr><td></td><td>

NAMUX 4 Architecture



</td></tr>
<tr><td>Technical data</td><td>This code relates to a communication issue and not to a specific component.</td></tr>
<tr><td>Possible causes</td><td>Check the gearbox ECU for fault codes</td></tr>
<tr><td>Additional information</td><td>No additional information available</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 1863a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual Inspection
OFF the ignition key, disconnect the connector from component and ECU.
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure.

Was there evidence of any of the above?</td></tr>
</table>

</td></tr>
</table>

- No: Proceed to step 2.
- Yes: Make the appropriate repairs or component replacements.

Use DAVIE to re-check for the presence of active faults.

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, Proceed to step 2

Step 2	Step ID 1863b	SRT

Data check

- Lookup the technical data of the specific system
- Perform the checking data test of the specific component

Is test pass?

- No: Proceed to step 3
- Yes : Proceed to step4

Step 3	Step ID 1863c	SRT

Repair or replace component

- Repair or replace the component, also check for electrical connection and wiring harness.
- Reconnect the connector
- ON the ignition key

Use DAVIE to re-check for the presence of active faults:

- Is DTC fault active: Proceed to step 4
- Is DTC fault inactive: Issue resolved. Clear inactive fault.

Step 4	Step ID 1863d	SRT

For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

Verification Drive Cycle	To verify the repair: With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. With the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

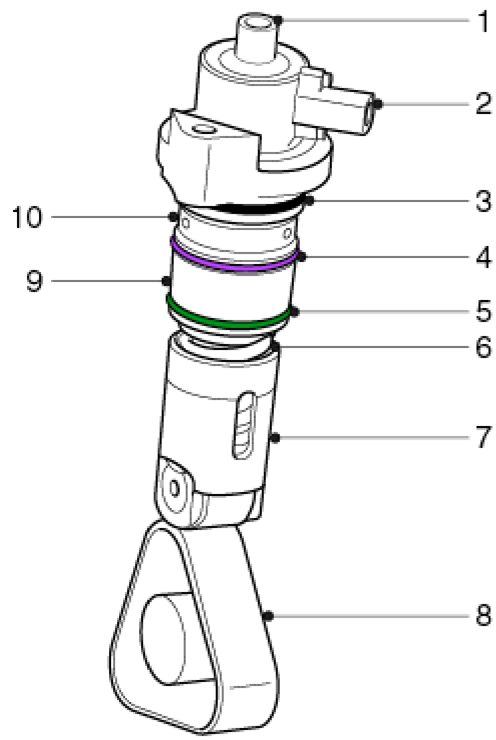
P2104

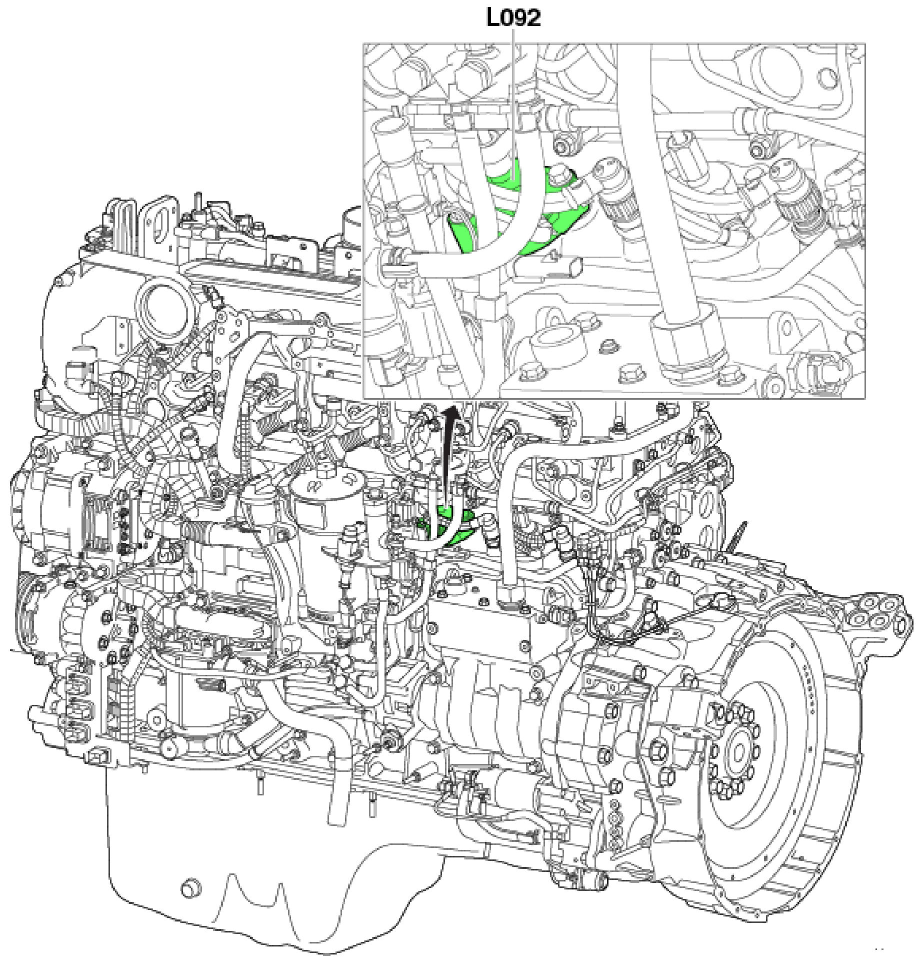
Code number	P2104
Fault code description	Engine protection system - Warning active
Fault code information	1 trip Check Engine lamp 3 drive cycle recovery Readiness Group - None Freeze frame type – Engine protection
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	Not available/required for this code
Set condition of fault code	This DTC becomes active if the DTC from which it originates has been active for a certain period of time.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	This DTC is activated through the occurrence of another active DTC
Additional information	This DTC only activates a warning to the driver. This DTC is part of the engine protection system and can become active simultaneously with an active DTC related to: • Low oil pressure • High coolant temperature • High oil temperature • High intercooler temperature • Low coolant level • Low/high PCI ECU power supply • High aftertreatment system temperatures
Diagnostic Step-by-Step	**Step 1. Investigate Related Trouble Codes** **Step 1.A Investigate related trouble codes** This diagnostic trouble code is activated by the presence of one or more other related trouble codes.

<table>
<tr><td></td><td>
<table>
<tr><td colspan="2">Action
1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.</td></tr>
<tr><td colspan="2">Are these or any other related codes active?
P0217; P0A1F; P1115; P1127; P1298; P1524; P1560; P2560; P3003</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>Refer to the troubleshooting information for these codes.</td><td>Contact the PACCAR Engine Support Center for further assistance.</td></tr>
</table>

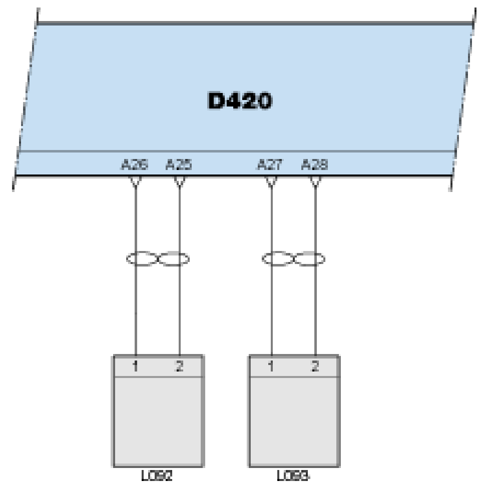
i For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

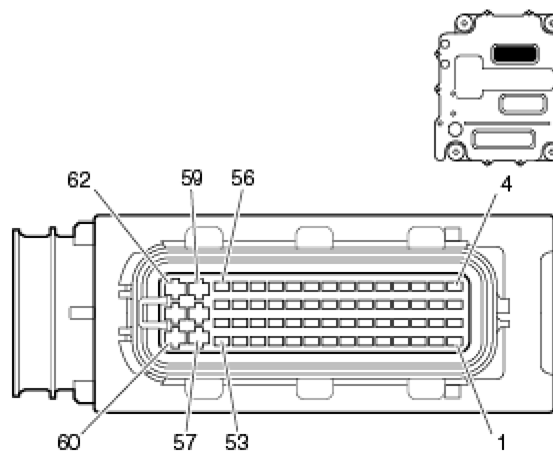
P2147

Code number	P2147
Fault code description	Common rail pump unit 1 – Voltage too low or short circuit to ground on ECU D420 pin A26
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	DESCRIPTION, COMMON RAIL PUMP UNIT 1 AND 2 (L092, L093) Common rail pump units 1 and 2 supply fuel to the common rail.  1 Outlet port 2 Solenoid connector 3 Sealing ring fuel supply gallery - outside 4 Sealing ring fuel supply gallery - fuel return gallery 5 Sealing ring fuel return gallery - crankcase 6 Spring 7 Roller lifter 8 Common rail pump unit cam 9 Fuel return port 10 Fuel supply port Effect on the system: Rail pressure control: The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the power stage hardware is active
Set condition of fault code	• High side voltage on the injector (before injection) compared to battery voltage is less than 20.00% of the threshold value • Driver bank C High side driver voltage @ 6, 9 and/or 12 us is greater than 0.45; 0.75; 1.05 V of the threshold value
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)





Wiring harness connector D420.A front view

D420 PCI ECU
L092 Common rail pump unit 1
L093 Common rail pump unit 2

D420	L092	L093	Function
A25	2		Signal low, common rail pump unit 1
A26	1		Signal high, common rail pump unit 1
A27		1	Signal high, common rail pump unit 2
A28		2	Signal low, common rail pump unit 2

Technical data

Component check, common rail pump unit 1 (L092)

Preparation

- Key off the ignition
- Disconnect connector L092
- Measure on component connector L092

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, common rail pump unit 2 (L093)

Preparation

- Key off the ignition
- Disconnect connector L093
- Measure on component connector L093

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes

- Faulty wiring
- Faulty connector
- Faulty solenoid valve

Additional information

No additional information available.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

This pump unit circuit test procedure will address the following pump unit error types:

- Short circuit across pump unit
- Pump unit open circuit
- Pump unit low side short circuit to ground
- Pump unit low side short circuit to battery voltage

Step 1	Step ID 2147a	SRT

Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.

Step 2	Step ID 2147b	SRT

With key OFF, disconnect the pump unit connector. Turn the key ON and measure the voltage between the signal circuit terminal on the connector and a battery ground:

- Measured voltage is approximately 7.0 V – Proceed to step 3.
- Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 5.

Step 3	Step ID 2147c	SRT

With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure:

- If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the pump unit. Proceed to the verification procedure listed at the end of this document.
- If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 4.

Step 4	Step ID 2147d	SRT

With key OFF, disconnect the encapsulated harness at the PMC and perform a diode check between the ground circuit terminal on the PMC and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure:

- If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 6.

Step 5	Step ID 2147e	SRT

Disconnect the encapsulated harness from the PMC. Turn the key ON and measure the voltage between the signal circuit terminal on the PMC and battery ground:

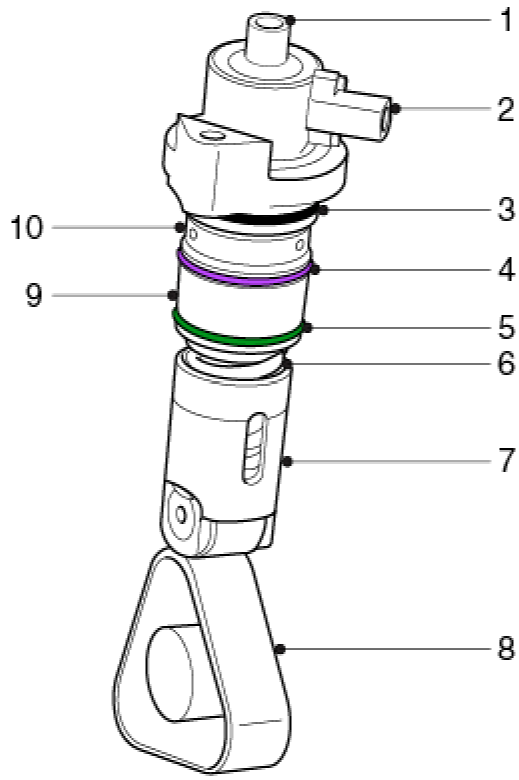
- Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.

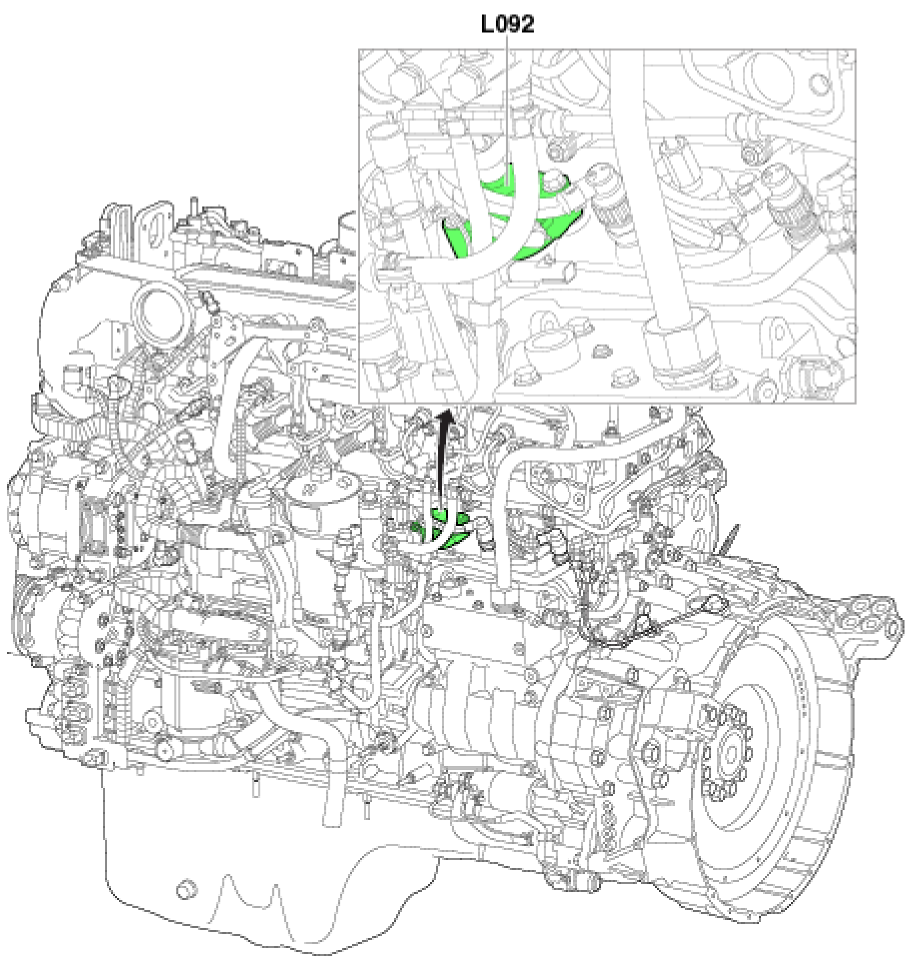
Step 6	Step ID 2147f	SRT

Possible PMC failure – Contact the Engine Support Center for further instructions on replacement of the PMC

Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P2148

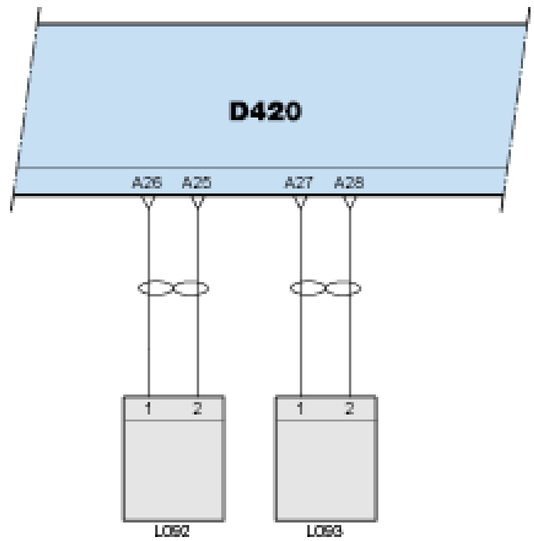
Code number	P2148
Fault code description	Common rail pump unit 1 – Voltage too high or short circuit to supply on ECU D420 pin A26
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	Common rail pump units 1 and 2 supply fuel to the common rail.  1 Outlet port 2 Solenoid connector 3 Sealing ring fuel supply gallery - outside 4 Sealing ring fuel supply gallery – fuel return gallery 5 Sealing ring fuel return gallery - crankcase 6 Spring 7 Roller lifter 8 Common rail pump unit cam 9 Fuel return port 10 Fuel supply port Operation The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three pump events every two crankshaft revolutions. Fuel from the fuel gallery can enter the pump plunger area via an internal valve. A pump event starts when the plunger travels up, the PCI ECU activates the solenoid briefly, and the internal valve closes the opening to the fuel gallery. The internal valve

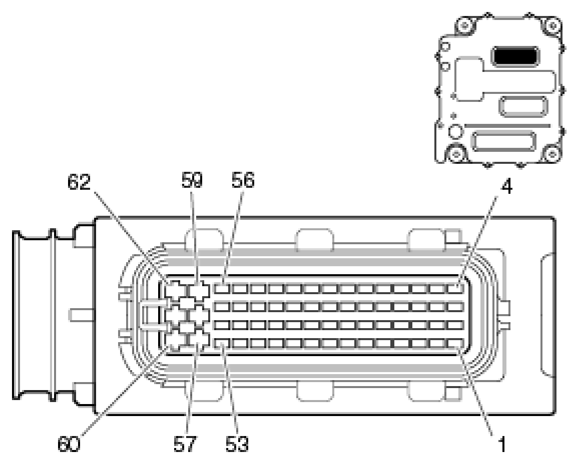
	is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the outlet bore of the pump unit. The pump event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downward again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents fuel from flowing back from the rail to the plunger area. Control The amount of fuel pumped to the rail depends on the duration of the pump event. The earlier the solenoid is activated by the PCI ECU in the up stroke of the pump plunger, the more (mg/stroke) fuel is pumped to the rail. Effect on the system: Rail pressure control: The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.
Location of component(s)	
Diagnostic condition	The diagnostic runs when power stage hardware is active
Set condition of fault code	The condition is set:

<table>
<tr><td></td><td>

- High side voltage on the injector (before injection) compared to battery voltage is greater than 80% of threshold value
- Driver bank C High side driver voltage @ 6, 9 and/or 12 us is greater than threshold value 0.45; 0.75; 1.05 V

</td></tr>
<tr><td>Reset condition of fault code</td><td>This fault code will change to inactive immediately after the diagnostic runs and passes.</td></tr>
<tr><td>Electrical diagram(s)</td><td>





Wiring harness connector D420.A front view

D420 PCI ECU
L092 common rail pump unit 1
L093 common rail pump unit 2

<table>
<tr><td>D420</td><td>L092</td><td>L093</td><td>Function</td></tr>
<tr><td>A25</td><td>2</td><td></td><td>Signal low, common rail pump unit 1</td></tr>
<tr><td>A26</td><td>1</td><td></td><td>Signal high, common rail pump unit 1</td></tr>
<tr><td>A27</td><td></td><td>1</td><td>Signal high, common rail pump unit 2</td></tr>
<tr><td>A28</td><td></td><td>2</td><td>Signal low, common rail pump unit 2</td></tr>
</table>

</td></tr>
<tr><td>Technical data</td><td>Component check, common rail pump unit 1 (L092)
Preparation</td></tr>
</table>

<table>
<tr>
<td></td>
<td>

Key off the ignition
Disconnect connector L092
Measure on component connector L092

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>

Component check, common rail pump unit 2 (L093)
Preparation

Key off the ignition
Disconnect connector L093
Measure on component connector L093

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>

Faulty wiring
Faulty connector
Faulty solenoid valve

</td>
</tr>
<tr>
<td>Additional information</td>
<td>No additional information available.</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 2148a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

<table>
<tr><td>Step 2</td><td>Step ID 2148b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pump unit connector. Turn the key ON and measure the voltage between the signal circuit terminal on the connector and a battery ground:

Measured voltage is approximately 7.0 V – Proceed to step 3.
Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 5.

</td></tr>
</table>
</td>
</tr>
</table>

Step 3	Step ID 2148c	SRT
With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the pump unit. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 4.		

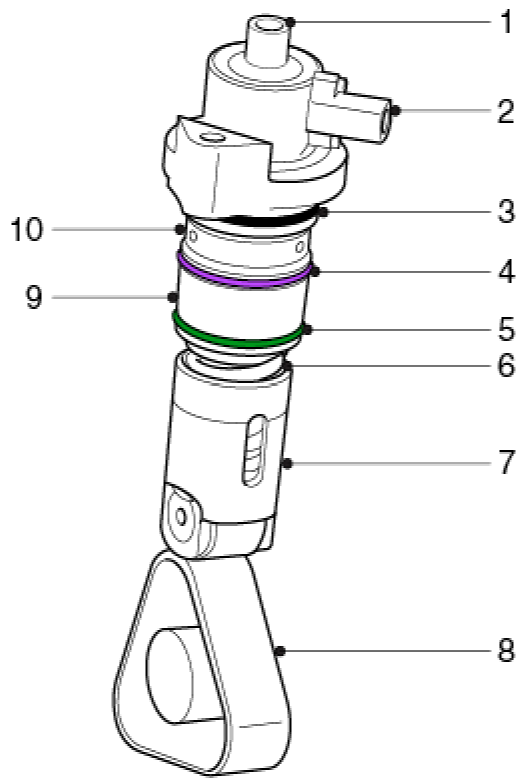
Step 4	Step ID 2148d	SRT
With key OFF, disconnect the encapsulated harness at the PCI and perform a diode check between the ground circuit terminal on the PCI and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 6.		

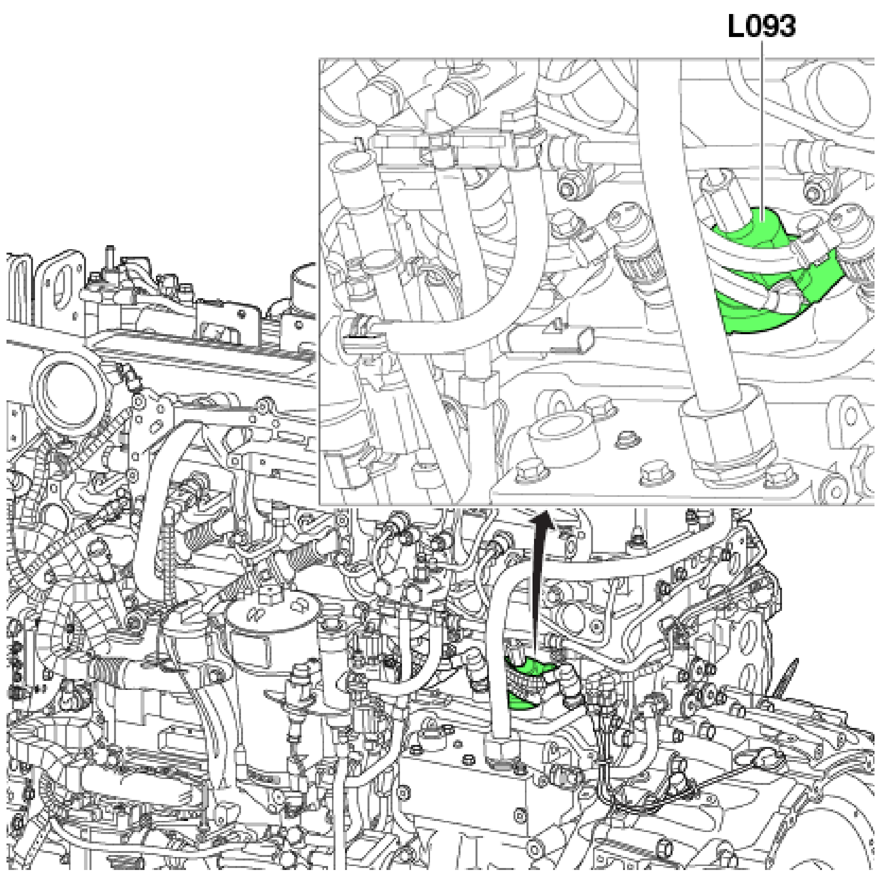
Step 5	Step ID 2148e	SRT
Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground: • Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.		

Step 6	Step ID 2148f	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		

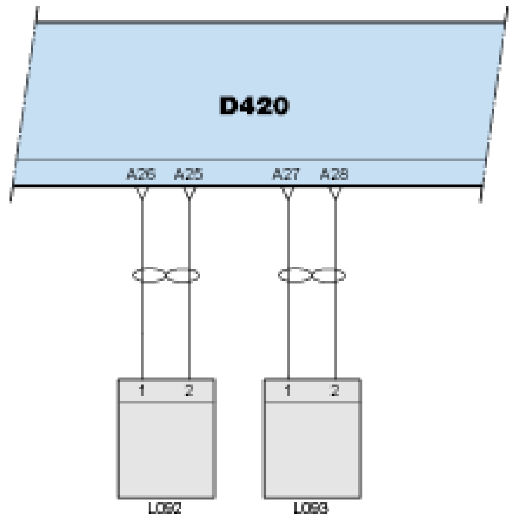
Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

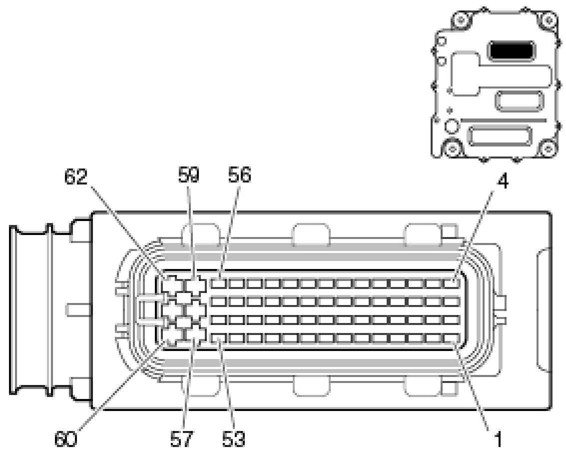
P2150

Code number	P2150
Fault code description	Common rail pump unit 1 – Voltage too low or short circuit to ground on ECU D420 pin A27
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	Common rail pump units 1 and 2 supply fuel to the common rail.  1 Outlet port 2 Solenoid connector 3 Sealing ring fuel supply gallery - outside 4 Sealing ring fuel supply gallery – fuel return gallery 5 Sealing ring fuel return gallery - crankcase 6 Spring 7 Roller lifter 8 Common rail pump unit cam 9 Fuel return port 10 Fuel supply port Operation The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three pump events every two crankshaft revolutions. Fuel from the fuel gallery can enter the pump plunger area via an internal valve. A pump event starts when the plunger travels up, the PCI ECU activates the solenoid briefly, and the internal valve closes the opening to the fuel gallery. The internal valve is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the

	outlet bore of the pump unit. The pump event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downward again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents fuel from flowing back from the rail to the plunger area. Control The amount of fuel pumped to the rail depends on the duration of the pump event. The earlier the solenoid is activated by the PCI ECU in the up stroke of the pump plunger, the more (mg/stroke) fuel is pumped to the rail. Effect on the system: Rail pressure control: The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.
Location of component(s)	
Diagnostic condition	The diagnostic runs when power stage hardware is active
Set condition of fault code	The condition is set: • High side voltage on the injector (before injection) compared to battery voltage is less than 20% of threshold value • river bank D High side driver voltage @ 6, 9 and/or 12 us is greater than threshold value 0.45; 0.75; 1.05 V

<table>
<tr><td>Reset condition of fault code</td><td>This fault code will change to inactive immediately after the diagnostic runs and passes.</td></tr>
<tr><td>Electrical diagram(s)</td><td>





Wiring harness connector D420.A front view

<table>
<tr><td>D420</td><td>PCI ECU</td></tr>
<tr><td>L092</td><td>common rail pump unit 1</td></tr>
<tr><td>L093</td><td>common rail pump unit 2</td></tr>
</table>

<table>
<tr><td>D420</td><td>L092</td><td>L093</td><td>Function</td></tr>
<tr><td>A25</td><td>2</td><td></td><td>Signal low, common rail pump unit 1</td></tr>
<tr><td>A26</td><td>1</td><td></td><td>Signal high, common rail pump unit 1</td></tr>
<tr><td>A27</td><td></td><td>1</td><td>Signal high, common rail pump unit 2</td></tr>
<tr><td>A28</td><td></td><td>2</td><td>Signal low, common rail pump unit 2</td></tr>
</table>

</td></tr>
<tr><td>Technical data</td><td>

Component check, common rail pump unit 1 (L092)
Preparation

- Key off the ignition
- Disconnect connector L092
- Measure on component connector L092

<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>1</td><td>2</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
Component check, common rail pump unit 2 (L093)
Preparation

Key off the ignition
Disconnect connector L093
Measure on component connector L093

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>

Faulty wiring
Faulty connector
Faulty solenoid valve

</td></tr>
<tr><td>Additional information</td><td>No additional information available.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

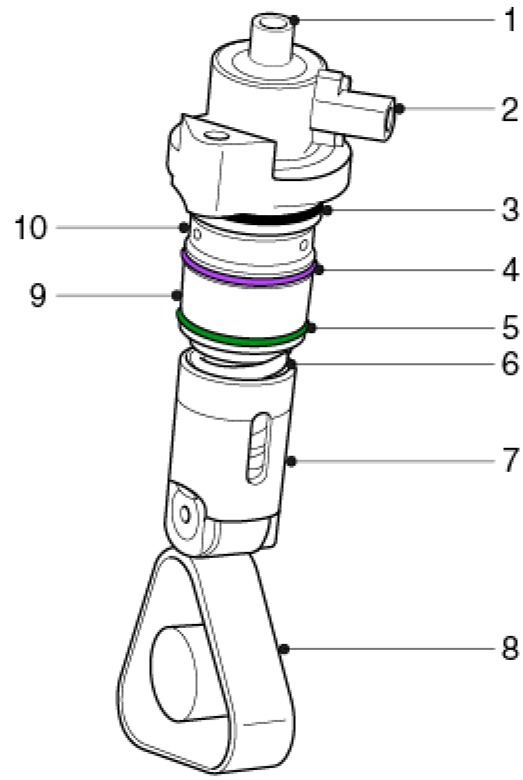
This pump unit circuit test procedure will address the following pump unit error types:

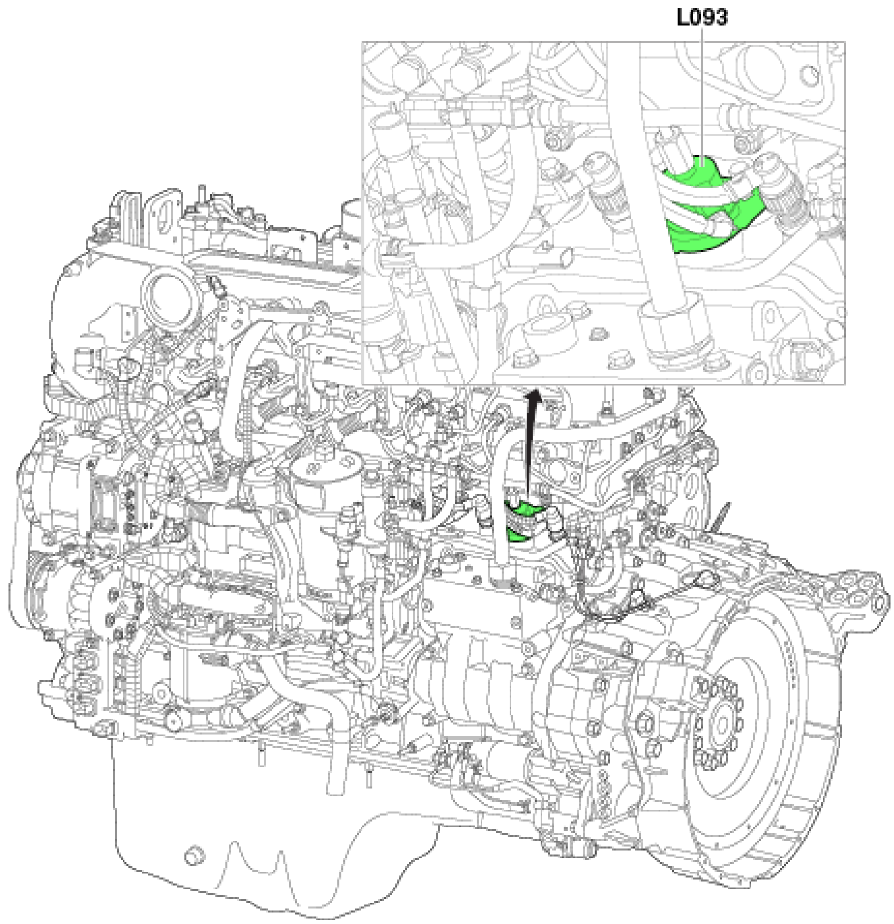
Short circuit across pump unit
Pump unit open circuit
Pump unit low side short circuit to ground
Pump unit low side short circuit to battery voltage

Following each step, the connector removed for testing MUST be reconnected before proceeding to the next test.
<table>
<tr><td>Step 1</td><td>Step ID 2150a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure.
Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 2150b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pump unit connector. Turn the key ON and measure the voltage between the signal circuit terminal on the connector and a battery ground:</td></tr>
</table>
</td></tr>
</table>

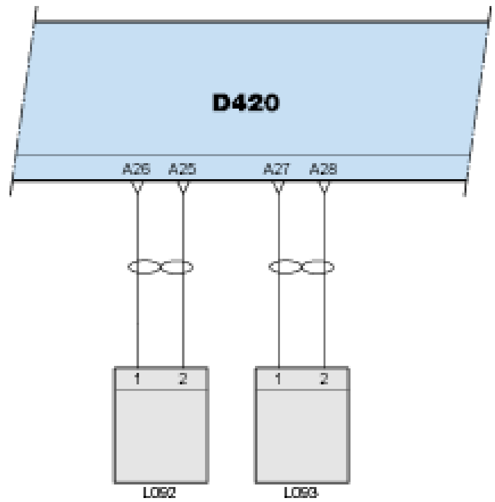
	• Measured voltage is approximately 7.0 V – Proceed to step 3. • Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 5.
	Step 3 | Step ID 2150c | SRT With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the pump unit. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 4.
	Step 4 | Step ID 2150d | SRT With key OFF, disconnect the encapsulated harness at the PCI and perform a diode check between the ground circuit terminal on the PCI and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 6.
	Step 5 | Step ID 2150e | SRT Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground: • Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.
	Step 6 | Step ID 2150f | SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.
Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

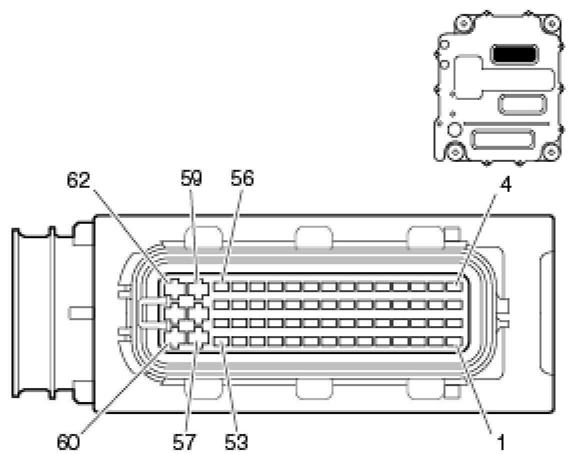
P2151

Code number	P2151
Fault code description	Common rail pump unit 2 – Voltage too high or short circuit to supply on ECU D420 pin A27
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	Common rail pump units 1 and 2 supply fuel to the common rail.  1 Outlet port 2 Solenoid connector 3 Sealing ring fuel supply gallery - outside 4 Sealing ring fuel supply gallery – fuel return gallery 5 Sealing ring fuel return gallery - crankcase 6 Spring 7 Roller lifter 8 Common rail pump unit cam 9 Fuel return port 10 Fuel supply port

Location of component(s)	
Diagnostic condition	Diagnostic condition runs when power stage hardware is active
Set condition of fault code	• High side voltage on the injector (before injection) compared to battery voltage is greater than 80% of the threshold value • Driver bank D High side driver voltage @ 6, 9 and/or 12 us is greater than 0.45;0.75; 1.05V
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)





Wiring harness connector D420.A front view

D420	PCI ECU
L092	common rail pump unit
L093	common rail pump unit 2

D420	L092	L093	Function
A25	2		Signal low, common rail pump unit 1
A26	1		Signal high, common rail pump unit 1
A27		1	Signal high, common rail pump unit 2
		2	Signal low, common rail pump unit 2

Technical data

Component check, common rail pump unit 1 (L092)

Preparation

- Key off the ignition
- Disconnect connector L092
- Measure on component connector L092

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	± 0.67 Ω	Resistance value at 20°C [68°F]

	maximum 0.94 Ω Resistance value at 120°C [248°F] Component check, common rail pump unit 2 (L093) Preparation • Key off the ignition • Disconnect connector L093 • Measure on component connector L093

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes	• Faulty wiring • Faulty connector • Faulty sensor
Additional information	No additional information available
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2151a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2151b	SRT
With key OFF, disconnect the pump unit connector. Turn the key ON and measure the voltage between the signal circuit terminal on the connector and a battery ground: • Measured voltage is approximately 7.0 V – Proceed to step 3. • Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 5.		

Step 3	Step ID 2151c	SRT

With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure:

- If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the pump unit. Proceed to the verification procedure listed at the end of this document.
- If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 4

Step 4	Step ID 2151d	SRT

With key OFF, disconnect the encapsulated harness at the PCI and perform a diode check between the ground circuit terminal on the PCI and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure:

- If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 6.

Step 5	Step ID 2151e	SRT

Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground:

- Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.

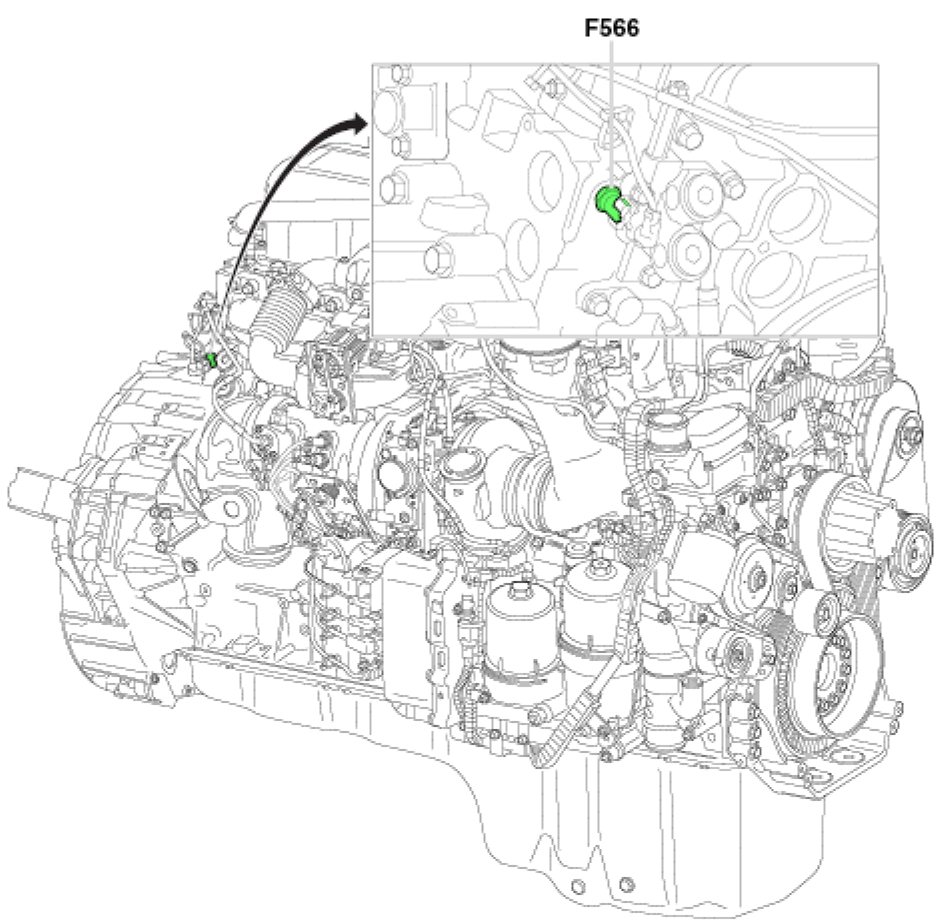
Step 6	Step ID 2151f	SRT

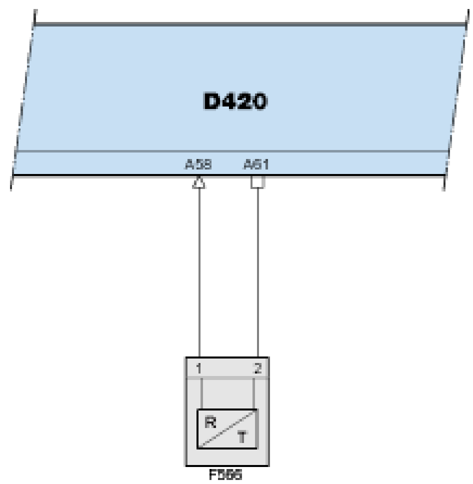
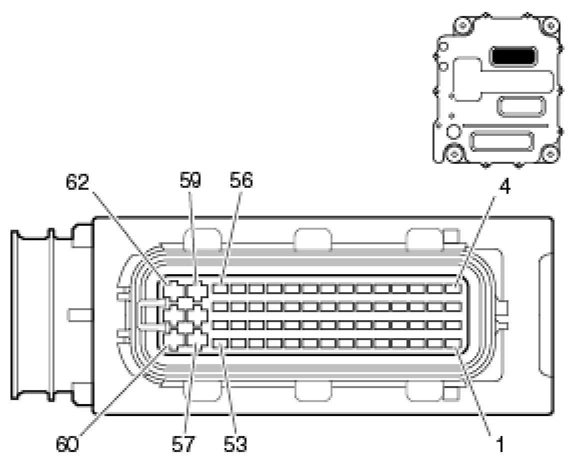
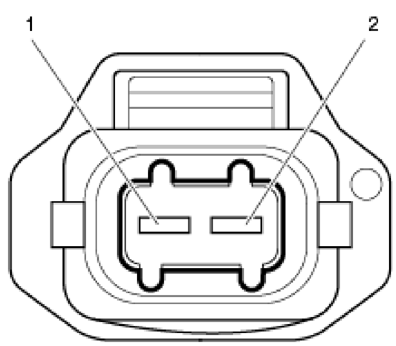
Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.

Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.

Back to Choose Code
Back to Index

P2181

Code number	P2181
Fault code description	Coolant temperature – Does not match engine operation conditions
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Cooling
Description of component(s)	The coolant temperature is measured in the coolant return gallery at the right rear end of the cylinder block. Effect on the system: • Calculates the quantity of fuel to inject and the injection timing • Displays the coolant temperature to the driver • Displays warnings to the driver concerning high coolant temperature • Limits the engine torque when the coolant temperature is too high • Limits the maximum engine speed when the engine is cold • Enables condition for severity of (OBD) diagnostic checks • Fast idle speed control • Cold start aid
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 150 seconds after an engine start; • When ambient temperature is between -8 and 40°C [17 and 104°F];

	• When the engine mode is DOC heating or DPF regeneration or SCR heating or SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that the measured coolant temperature differs by more than 10°C [50°F] from the expected coolant temperature for more than 30 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F] in normal driving conditions. This activity can be best conducted with a loaded vehicle/trailer.
Electrical diagram(s)	  Wiring harness connector D420.A front view  Wiring harness connector F566 front view

	D420 PCI ECU F566 Coolant temperature sensor D420 F566 Function A58 1 Signal, coolant temperature A61 2 Ground
Technical data	Component check, coolant temperature sensor (F566) Preparation • Key off the ignition • Disconnect connector F566 • Measure on component connector F566 Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / 14936–15961 Ω / Resistance value at -20°C [-4°F] 5727–6056 Ω / Resistance value at 0°C [32°F] 2439–2557 Ω / Resistance value at 20°C [68°F] 1151–1197 Ω / Resistance value at 40°C [104°F] 585–604 Ω / Resistance value at 60°C [140°F] 318–327 Ω / Resistance value at 80°C [176°F] 185–188 Ω / Resistance value at 100°C [212°F] 111–114 Ω / Resistance value at 120°C [248°F] Component & circuit check, ECU (D420) Preparation • Key off the ignition • Disconnect connector F566 • Measure on the front side of wiring harness connector F566 Pin (+ Probe) / Pin (- Probe) / Value / Additional Information 1 / 2 / 5V / Ignition Keyed on
Possible causes	• Blocked open thermostat • Excessive heat drawn from the cooling system • Coolant temperature sensor deviation
Additional information	The engine coolant temperature is monitored by the coolant temperature sensor (F566).
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2181a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2181b	SRT
Ancillary Test: Coolant Leak Perform the prescribed testing to determine correct operation of the associated engine or after treatment system. Does the test fail to complete or result in a failed state? • No: Continue to the step 3 in the troubleshooting process. • Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 3 in the troubleshooting		

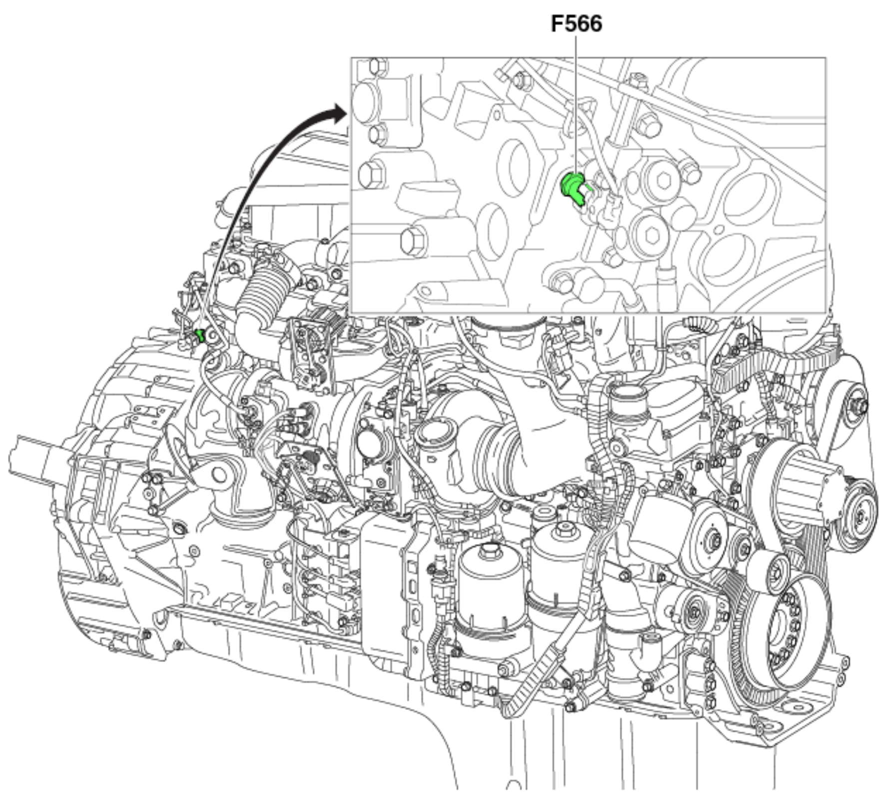
Step 3	Step ID 2181c	SRT
Visual inspection: Thermostat Remove and inspect the thermostat to verify it is not stuck in the open or closed position. This issue may also be the result of an excessive heat draw, such as the use of a heated trailer. Was the thermostat stuck in the open or closed position? • No: Continue to the step 4 in the troubleshooting process. • Yes: Clean, adjust, repair, or replace affected components for any issues identified. Use DAVIE to check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 4 in the troubleshooting process.		

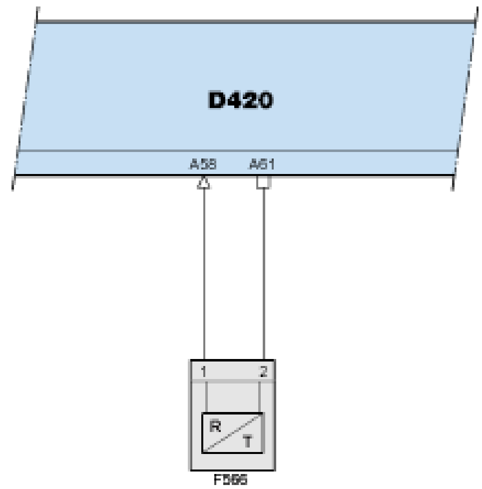
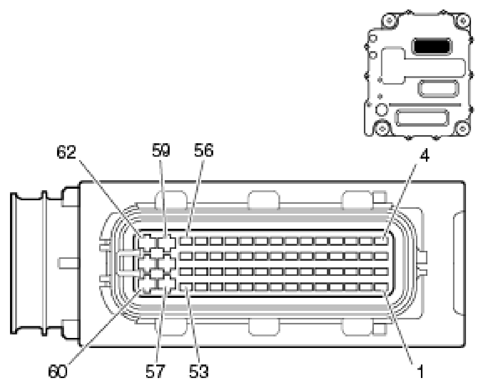
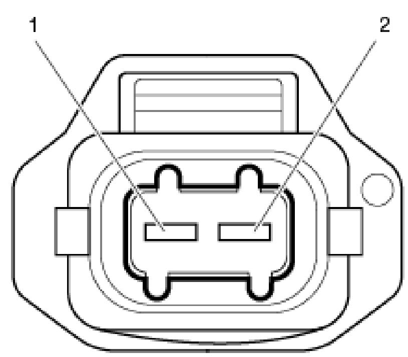
Step 4	Step ID 2181d	SRT
Replace the identified faulty sensor. Use DAVIE to check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 5 in the troubleshooting process.		

Step 5	Step ID 2181e	SRT
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

P2183

Code number	P2183
Fault code description	Coolant temperature - Data erratic
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Cooling
Description of component(s)	The coolant temperature is measured in the coolant return gallery at the right rear end of the cylinder block. Effect on the system: • Calculates the quantity of fuel to inject and the injection timing • Displays the coolant temperature to the driver • Displays warnings to the driver concerning high coolant temperature • Limits the engine torque when the coolant temperature is too high • Limits the maximum engine speed when the engine is cold • Enables condition for severity of (OBD) diagnostic checks • Fast idle speed control • Cold start aid
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 150 seconds after an engine start, and; • When ambient temperature is above -8°C [17°F], and; • When the calculated coolant temperature is below 65°C [149°F] or above 85°C [185°F], and; • The engine mode is DOC heating or DPF regeneration or SCR heating or SCR

	high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that the measured coolant temperature differs by more than 20°C [68°F] from the expected coolant temperature for more than 45 seconds. A short circuit to battery or open circuit is detected for 10 consecutive seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F] in normal driving conditions. This activity can be best conducted with a loaded vehicle/trailer.
Electrical diagram(s)	  Wiring Harness Connector D420.A front view  Wiring harness connector F566 front view D420 PCI ECU

	F566 Coolant temperature sensor. D420 F566 Function A58 1 Signal, coolant temperature A61 2 Ground
Technical data	Handle connectors and pins with care and use matching measuring probes Component check, coolant temperature sensor (F566) Preparation • Key off the ignition • Disconnect connector F566 • Measure on component connector F566 Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / 14936–15961 Ω / Resistance value at -20°C [-4°F] 5727–6056 Ω / Resistance value at 0°C [32°F] 2439–2557 Ω / Resistance value at 20°C [68°F] 1151–1197 Ω / Resistance value at 40°C [104°F] 585–604 Ω / Resistance value at 60°C [140°F] 318–327 Ω / Resistance value at 80°C [176°F] 185–188 Ω / Resistance value at 100°C [212°F] 111–114 Ω / Resistance value at 120°C [248°F] Component & circuit check, ECU (D420) Preparation • Key off the ignition • Disconnect connector F566 • Measure on the front side of wiring harness connector F566 Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / 5V / Ignition keyed on
Possible causes	• Faulty thermostat • Excessive heat drawn from the cooling system • Coolant temperature sensor deviation
Additional information	The engine coolant temperature is monitored by the coolant temperature sensor (F566).
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be

the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2183a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2183b	SRT
Ancillary Test: Coolant Leak Perform the prescribed testing to determine correct operation of the associated engine or after treatment system. Does the test fail to complete or result in a failed state? • No: Continue to the next step 3 in the troubleshooting process. • Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step 3 in the troubleshooting process.		

Step 3	Step ID 2183c	SRT
Visual inspection: Thermostat Remove and inspect the thermostat to verify it is not stuck in the open or closed position. This issue may also be the result of an excessive heat draw, such as the use of a heated trailer. Was the thermostat stuck in the open or closed position? • No: Continue to the next step 4 in the troubleshooting process. • Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step 4 in the troubleshooting process.		

Step 4	Step ID 2183d	SRT
Replace: Coolant temperature sensor Replace the identified faulty sensor. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step 4 in the troubleshooting process.		

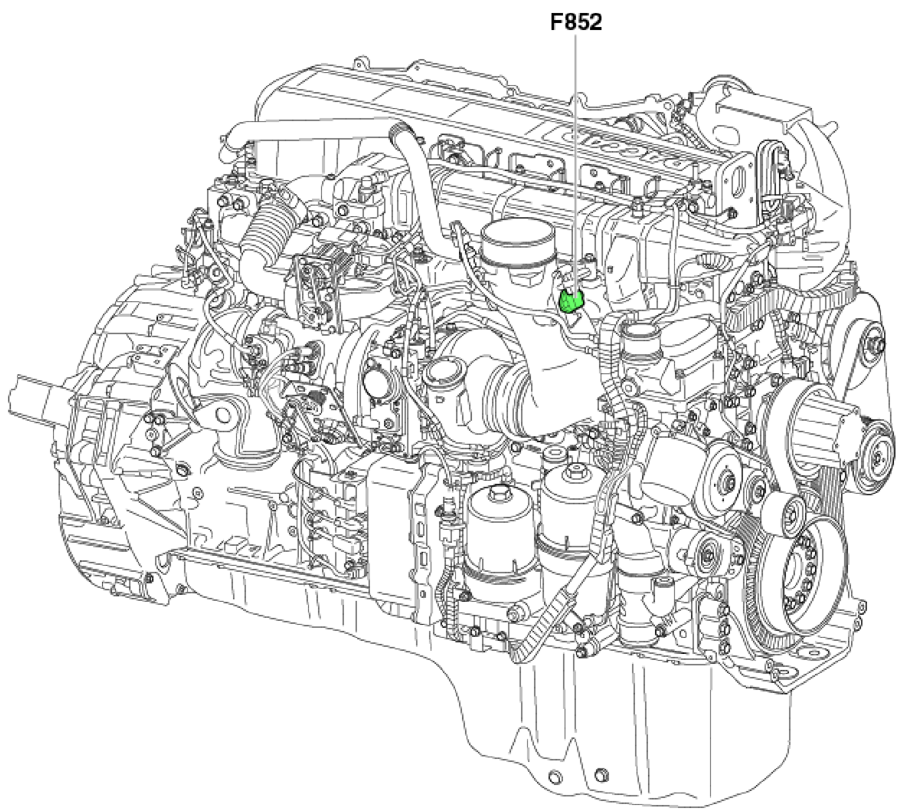
Step 5	Step ID 2183e	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at		

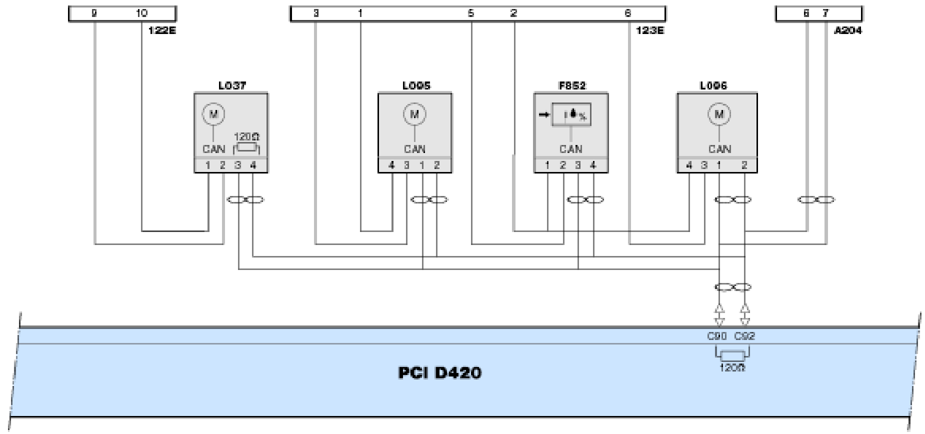
	1-800-477-0251.
Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

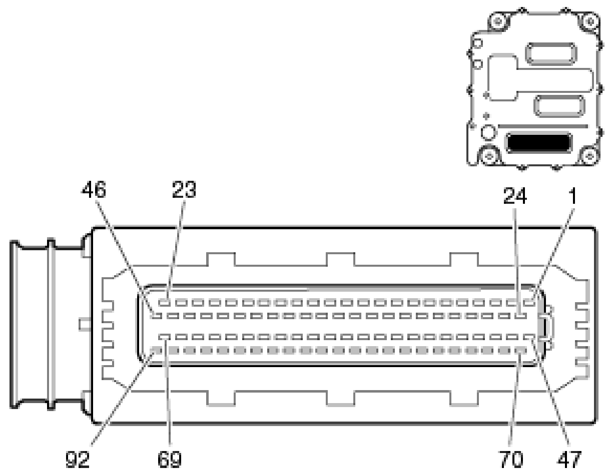
P2199

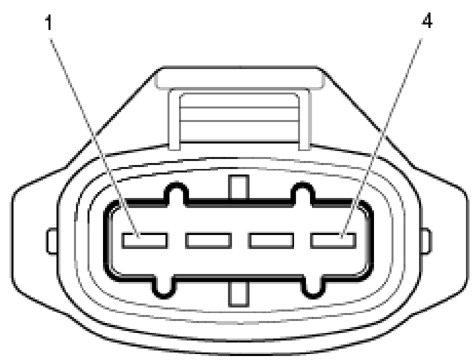
<table>
<tr><td>Code number</td><td>P2199</td></tr>
<tr><td>Fault code description</td><td>Temperature before turbo (humidity sensor) - Data erratic, intermittent, or incorrect at ignition on</td></tr>
<tr><td>Fault code information</td><td>2 trip MIL
3 drive cycle recovery
Readiness group – None
Freeze frame type – Comprehensive</td></tr>
<tr><td>Description of component(s)</td><td>The humidity sensor is a smart sensor that communicates with the PCI ECU via E-CAN. The sensor measures the following three properties of the drawn in precompressor (VTG turbo charger) air in the inlet air pipe:
Relative humidity
Pressure
Temperature
Relative humidity
The relative humidity refers to the moisture content percentage of the air compared with the saturated moisture level at the same temperature and pressure.

Effect on the system:
Determines NOx emissions
Higher measured relative humidity results in a lower calculated NOx emission
Precompressor temperature
Effect on the system:
Determines soot emissions
Higher measured precompressor temperature results in lower calculated soot formation in the engine.
Calculates exhaust gas pressure before the turbine;
Higher measured precompressor temperature results in lower calculated exhaust gas pressure before the turbine.
Limits the maximum engine torque; for example, to limit the cylinder pressures during cold ambient conditions or driving at high altitudes.
Determines turbocharger compressor flow and thus the detection of VTG surge
Surge can typically occur at high compressor pressure ratios and low compressor mass flows.
Calculates the temperature after the turbocharger compressor
Higher measured precompressor temperature results in higher calculated temperature after the turbocharger compressor.
Precompressor pressure
Effect on the system:
Corrects pressure before turbine
Higher measured precompressor pressure results in higher calculated exhaust gas pressure before the turbine.
Determines soot emissions
Higher measured precompressor pressure results in lower calculated soot formation in the engine.</td></tr>
</table>

	• Calculates the temperature after the turbocharger compressor Lower measured precompressor pressure results in higher calculated temperature after the turbocharger compressor. • Limits the maximum engine torque when driving at high altitudes (low air density) Lower measured precompressor pressure results in higher engine torque reduction. • Detects VTG surge, the sensor is used to determine the compressor pressure ratio; surge can typically occur at high compressor pressure ratios and low compressor mass flows.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the ignition has been keyed off continuously for at least 8 hours; • when the difference between the coolant temperature and ambient temperature is less than 15°C [59°F]; • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured temperature reading of the humidity sensor differs by more than 3°C [37°F] from the average of other temperature sensor readings on the engine for more than 5 seconds (after the ignition has been keyed off for at least 8 hours).
Reset condition of fault code	The 8-hour ignition off diagnostics consists of three separate steps: • The vehicle ignition may NOT be switched on or engine started for 8-10 consecutive hours (ideal situation would be overnight). • Once the 8 to 10 consecutive hours have been reached, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run. • Start the engine and let it idle for 2 minutes.

<table>
<tr><td></td><td>This DTC changes to inactive when the fault is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>




Wiring harness connector D420.C front view


Wiring harness connector F852 front view

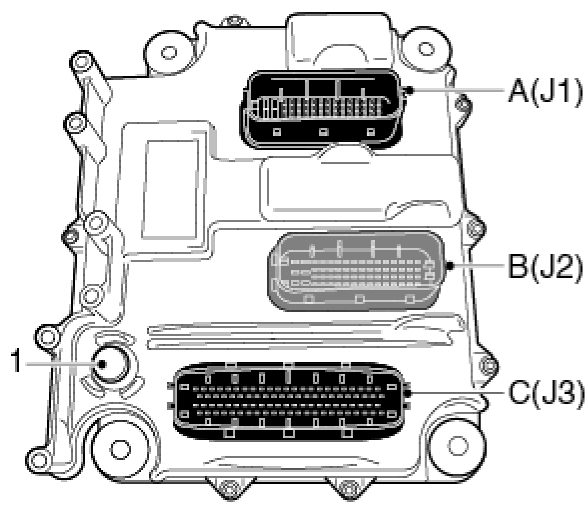
122E 12-pin interface connector
123E 7-pin interface connector
A204 electronic fan interface connector
D420 PCI ECU
F852 humidity sensor
L037 VTG turbocharger actuator
L095 EGR valve module
</td></tr>
</table>

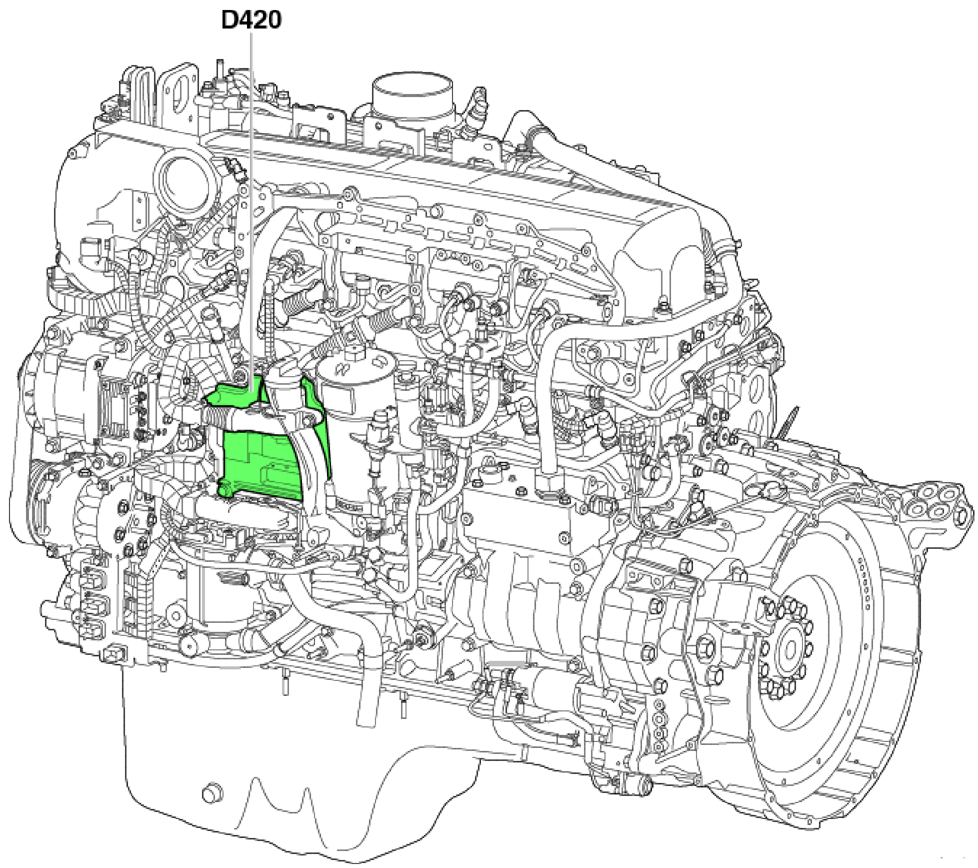
	L096 BPV valve
	D420 F852 Function
	C90 3 E-CAN high
	C92 4 E-CAN low
	  1 Power supply after ignition
	  2 Ground

Technical data	Component & wiring check, humidity sensor (F852) Preparation • Key off the ignition. • Disconnect connector F852 • Measure on the front side of wiring harness connector F852 Pin (+ probe) Pin (- probe) Value Additional information 1 2 Ubat ignition keyed on 3 4 ± 60 Ω • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	Humidity sensor deviation
Additional information	The humidity sensor (F852) is a smart sensor that communicates with the PCI ECU via E-CAN. The sensor measures the following three properties of the drawn in precompressor (VTG turbo charger) air in the inlet air pipe: • Relative humidity • Pressure • Temperature For this diagnostic, the temperature reading of the humidity sensor is compared with an average of other temperature sensors on the engine after the ignition has been keyed off for at least 8 hours.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. Step 1	Step ID 2199a	SRT Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.

	Step 2 | Step ID 2199b | SRT Ancillary Test: Air Side Pressure Perform the prescribed test to determine if there are any leaks in the air system. Does the test fail to complete or result in a failed state? • Yes - Proceed to step 3 • No - Proceed to step 4 Step 3 | Step ID 2199c | SRT Electrical Checks Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • Yes - Proceed to step 4 • No - Proceed to step 5 Step 4 | Step ID 2199d | SRT Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 5 Step 5 | Step ID 2199e | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
	Back to Choose Code Back to Index

P2226

Code number	P2226
Fault code description	Internal ECU ambient pressure - Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	Besides a microprocessor and the electronics to sense the inputs and control the outputs, two sensors can be found in the electronic control unit: • Atmospheric pressure sensor • Temperature sensor  ECU atmospheric pressure sensor • The PCI ECU has an internal atmospheric pressure sensor in the housing. Air can enter the ECU housing via the air vent (1). Effect on the system: • Reduces the maximum engine torque when driving at high altitudes (low air pressure). ECU temperature sensor • The PCI ECU has an internal temperature sensor on the printed circuit board. Effect on the system: • Monitors the temperature of the electronic control unit. Injector codes Every fuel injector is calibrated during production to compensate for any production tolerances. An injector calibration code is present on the housing and connector of the injector. These injector codes must be (re)programmed with DAVIE if one or more injectors have been replaced or fitted in another position, or if the PCI ECU is replaced.

Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the ignition is on and the engine is not running, and; • When ambient temperature is above -20°C [-4°F].
Set condition of fault code	The PCI ECU (D420) detects that the measured ambient pressure differs by more than 0.06 bar [0.87 psi] from the average readings of other pressure sensors on the engine/after treatment system for more than 5 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key the ignition off for at least 15 seconds, key it on again, then wait for at least 5 seconds. Then start the engine and let it idle for 2 minutes.
Electrical diagram(s)	This information not required since this is an internal PCI issue
Technical data	This information not required since this is an internal PCI issue
Possible causes	• Monitor the following pressure sensors with DAVIE and check for deviation: • PCI ECU internal ambient pressure sensor (D420) • humidity sensor (F852) • intake pressure (humidity sensor (F852)) • DPF pressure sensor (F837)
Additional information	• The PCI ECU has an internal ambient pressure sensor in the housing. The ambient pressure sensor is not serviceable. • For this diagnostic, the ambient pressure sensor reading is compared with the average readings from the intake pressure (humidity sensor (F852)), boost pressure sensor (F802) and DPF pressure sensor (F837).

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2226a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2226b	SRT
With key OFF, gently clean excessive dirt off the PCI ECU. When cleaning the exterior of the PCI ECU, do not use cleaning solvents or high-pressure water. Navigate through DAVIE and monitor errors. • If the ambient air pressure sensor over range error is still active – Proceed to step 3. • If the ambient air pressure sensor over range error is no longer active – Proceed to the verification procedure.		

Step 3	Step ID 2226c	SRT
With DAVIE connected and key ON, program the PCI basis software with the most recent PRS file available in Parts Rapido: Navigate through DAVIE and monitor errors. • If the ambient air pressure sensor over range error is still active – Proceed to step 4. • If the ambient air pressure sensor over range error is no longer active – Proceed to the verification procedure.		

Step 4	Step ID 2226d	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		

Verification Drive Cycle

To validate the repair, with DAVIE connected and key on, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.

Back to Choose Code
Back to Index

P2228

Code number	P2228
Fault code description	Internal ECU ambient pressure-Faulty
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –Comprehensive
Description of component(s)	Not available/required for this code.
Location of component(s)	Not available/required for this code.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The PCI ECU (D420) detects that the internal ambient pressure sensor is faulty.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	Not available/required for this code.
Technical data	Not available/required for this code.
Possible causes	Faulty ECU
Additional information	The PCI ECU has an internal ambient pressure sensor in the housing. The ambient pressure sensor is not serviceable.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2228a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2228b	SRT
Visual inspection - Visually inspect the PCI-2 ECU for dirt or road debris accumulation on the exterior of the PCI-2 ECU, especially close to the PCI-2 vent. Refer to Description of Component(s) for vent location. • If dirt or debris accumulation is found – Proceed to step 3. • If NO dirt or debris accumulation is found – Proceed to step 4.		

Step 3	Step ID 2228c	SRT

	With key OFF, gently clean excessive dirt off the PCI-2 ECU. When cleaning the exterior of the PCI-2 ECU, do not use cleaning solvents or high-pressure water. Navigate through DAVIE and monitor errors. • If the ambient air pressure sensor over range error is still active – Proceed to step 4. • If the ambient air pressure sensor over range error is no longer active – Proceed to the verification procedure. Step 4 | Step ID 2228d | SRT With DAVIE connected and key ON, program the PCI-2 basis software with the most recent PRS file available in Parts Rapido: Navigate through DAVIE and monitor errors. • If the ambient air pressure sensor over range error is still active – Proceed to step 5. • If the ambient air pressure sensor over range error is no longer active – Proceed to the verification procedure. Step 5 | Step ID 2228e | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
	Back to Choose Code Back to Index

P2229

<table>
<tr><td>Code number</td><td>P2229</td></tr>
<tr><td>Fault code description</td><td>Internal ECU ambient pressure-Faulty</td></tr>
<tr><td>Fault code information</td><td>1 trip MIL
3 drive cycle recovery
Readiness group – None
Freeze frame type –Comprehensive</td></tr>
<tr><td>Description of component(s)</td><td>The PCI ECU (D420) detects that the internal ambient pressure sensor is faulty.</td></tr>
<tr><td>Location of component(s)</td><td>The PCI ECU has an internal ambient pressure sensor in the housing. Non-Serviceable</td></tr>
<tr><td>Diagnostic condition</td><td>This diagnostic runs continuously when the ignition is on.</td></tr>
<tr><td>Set condition of fault code</td><td>The PCI ECU (D420) detects that the internal ambient pressure sensor is faulty.</td></tr>
<tr><td>Reset condition of fault code</td><td>This fault code will change to inactive immediately after the diagnostic runs and passes.</td></tr>
<tr><td>Electrical diagram(s)</td><td>Not available/required for this code.</td></tr>
<tr><td>Technical data</td><td>Not available/required for this code.</td></tr>
<tr><td>Possible causes</td><td>Faulty ECU</td></tr>
<tr><td>Additional information</td><td>The PCI ECU has an internal ambient pressure sensor in the housing. The ambient pressure sensor is not serviceable.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

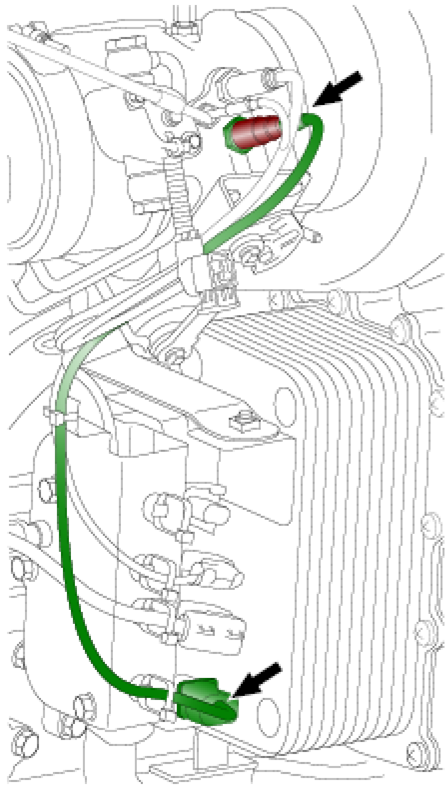
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

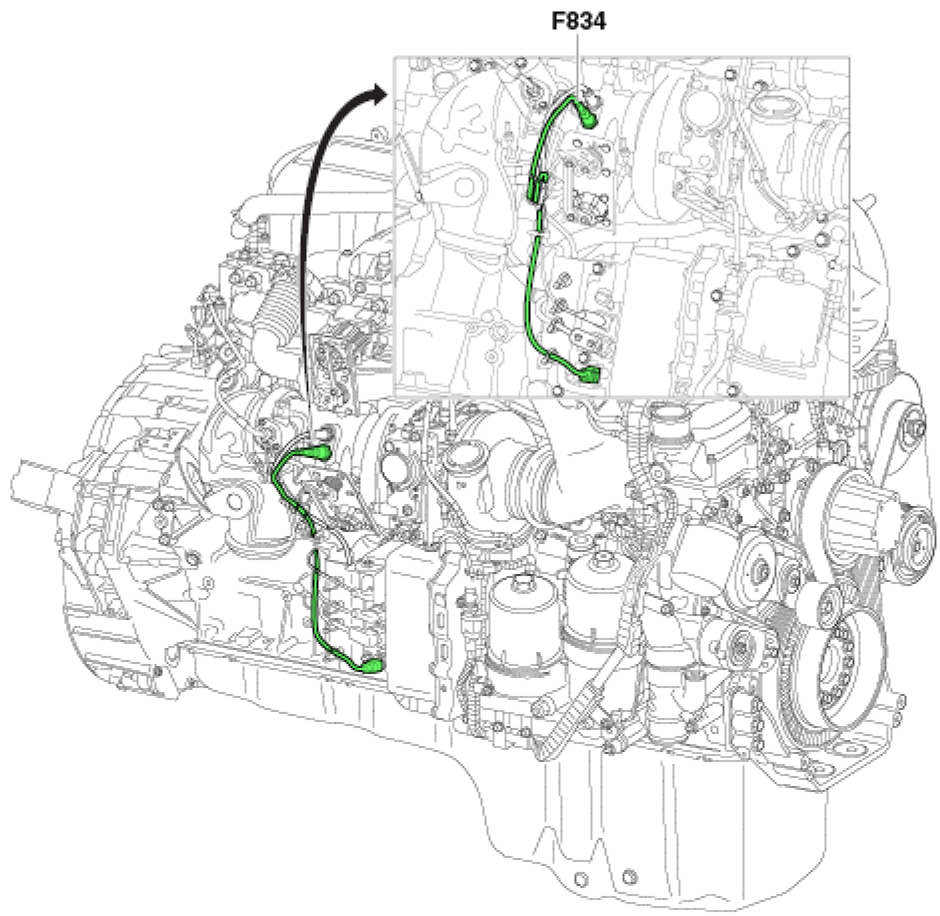
<table>
<tr><td>Step 1</td><td>Step ID 2229a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 2229b</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect the PCI-2 ECU for dirt or road debris accumulation on the exterior of the PCI-2 ECU, especially close to the PCI-2 vent. Refer to Description of Component(s) for vent location.

If dirt or debris accumulation is found – Proceed to step 3.
If NO dirt or debris accumulation is found – Proceed to step 4.
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 2229c</td><td>SRT</td></tr>
</table></td></tr>
</table>

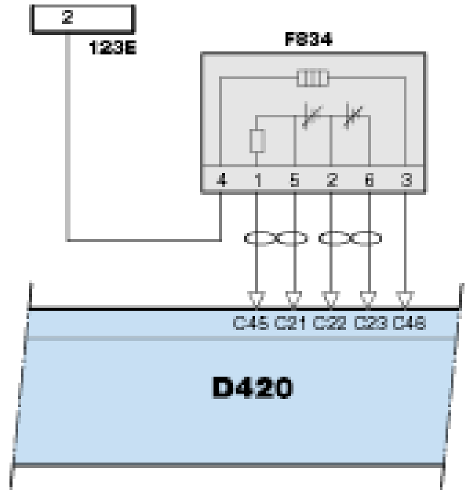
	With key OFF, gently clean excessive dirt off the PCI-2 ECU. When cleaning the exterior of the PCI-2 ECU, do not use cleaning solvents or high-pressure water. Navigate through DAVIE and monitor errors. • If the ambient air pressure sensor over range error is still active – Proceed to step 4. • If the ambient air pressure sensor over range error is no longer active – Proceed to the verification procedure. Step 4 | Step ID 2229d | SRT With DAVIE connected and key ON, program the PCI-2 basis software with the most recent PRS file available in Parts Rapido: Navigate through DAVIE and monitor errors. • If the ambient air pressure sensor over range error is still active – Proceed to step 5. • If the ambient air pressure sensor over range error is no longer active – Proceed to the verification procedure. Step 5 | Step ID 2229e | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
	Back to Choose Code Back to Index

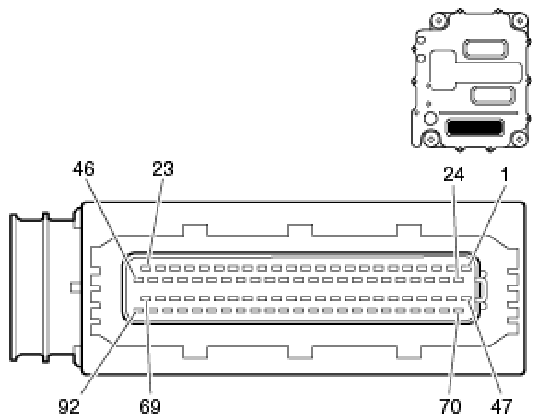
P2237

Code number	P2237
Fault code description	Lambda - Open circuit on ECU D420 pin C45
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust Gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C

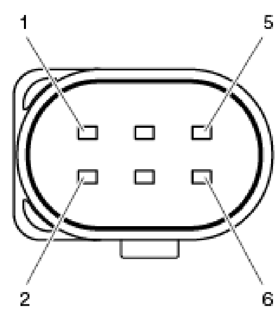
	[1382°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	If Pump current is less than 0 A for more than 0.5 sec
Set condition of fault code	This condition is set when pump current is lower or greater than 0A
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

123E 7-pin interface connector
D420 PCI ECU
F834 lambda sensor

D420	F834	Function
C21	5	Trimming resistor
C22	2	Ground, sensor element
C23	6	Signal, nernst sensor
C45	1	Signal, pump cell current
C46	3	Ground, heater element

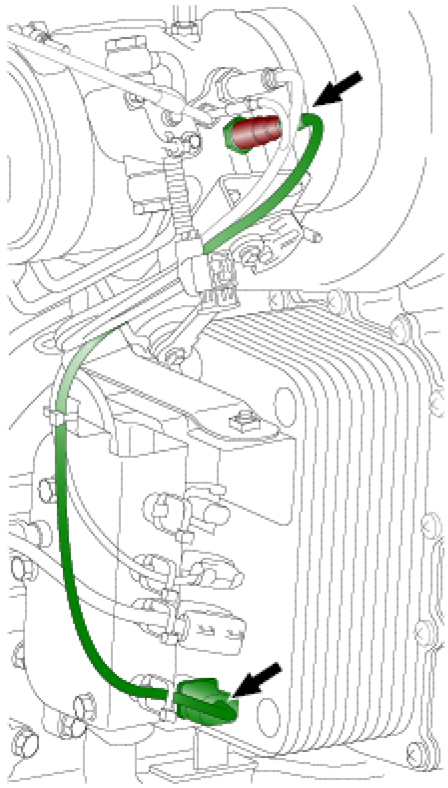
<table>
<tr><td></td><td>4 Power supply, heater element</td></tr>
<tr><td>Technical data</td><td>Component check, lambda sensor (F834)
Preparation
Key the ignition off
Disconnect connector F834
Measure on component connector F834
<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>3</td><td>2.4 -4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr>
</table>

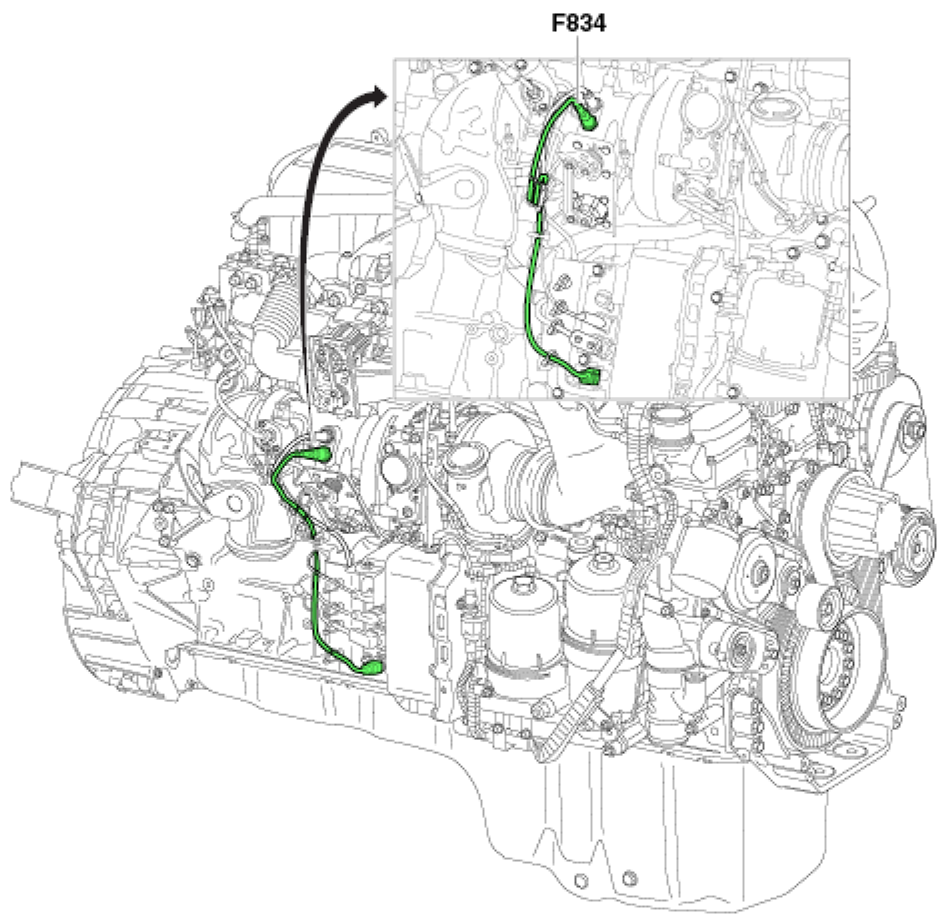
Component & circuit check, ECU (D420)
Preparation
Key the ignition off
Disconnect connector F834
Measure on the front side of wiring harness connector F834
<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Faulty wiring
Faulty connector
Faulty sensor</td></tr>
<tr><td>Additional information</td><td>No additional information available</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.\
<table>
<tr><td>Step 1</td><td>Step ID 2237a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

<table>
<tr><td>Step 2</td><td>Step ID 2237b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values</td></tr>
</table></td></tr>
</table>

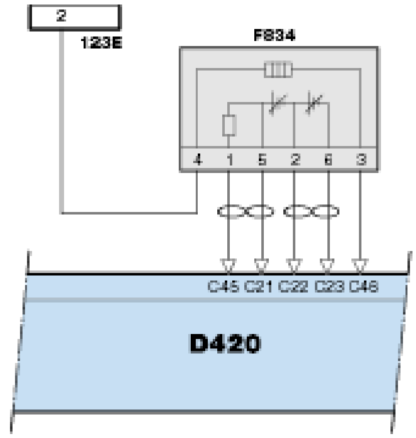
	are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • Yes - Proceed to step 3 • No - Proceed to step 4 **Step 3** | Step ID 2237c | SRT Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 4 **Step 4** | Step ID 2237d | SRT Replace the Lambda sensor and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 5 **Step 5** | Step ID 2237e | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
	Back to Choose Code Back to Index

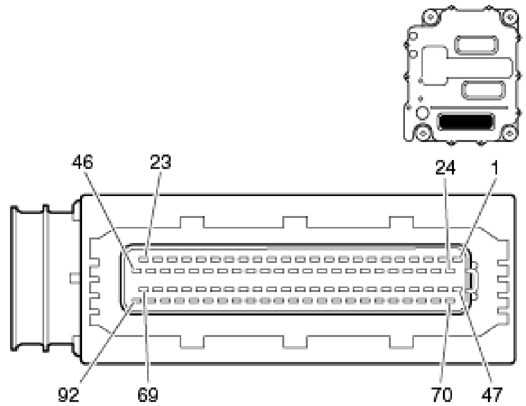
P2238

Code number	P2238
Fault code description	Lambda - Current too low on ECU D420 pin C45
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C

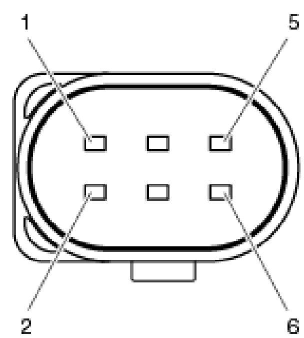
	[1382°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	If Pump current is less than -0.002 A for more than 0.5 sec
Set condition of fault code	This fault is set when pump current is less than -0.002 A for longer than 0.5 sec.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

123E 7-pin interface connector
D420 PCI ECU
F834 lambda sensor

D420	F834	Function
C21	5	Trimming resistor
C22	2	Ground, sensor element
C23	6	Signal, nernst sensor
C45	1	Signal, pump cell current
C46	3	Ground, heater element
	4	Power supply, heater element

<table>
<tr><td>Technical data</td><td>Component check, lambda sensor (F834)
Preparation
Key the ignition off
Disconnect connector F834
Measure on component connector F834
<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>3</td><td>2.4 -4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr>
</table>
Component & circuit check, ECU (D420)
Preparation
Key the ignition off
Disconnect connector F834
Measure on the front side of wiring harness connector F834
<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Faulty wiring
Faulty connector
Faulty sensor</td></tr>
<tr><td>Additional information</td><td>No additional information available</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step ID 2238a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 2238b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:</td></tr>
</table></td></tr>
</table>

<table>
<tr>
<td></td>
<td>

- Supply and signal voltages (12V).
- Cable continuity (no opens or shorts).

Are measured electrical values outside of expected range or limits?

- Yes - Proceed to step 3
- No - Proceed to step 4

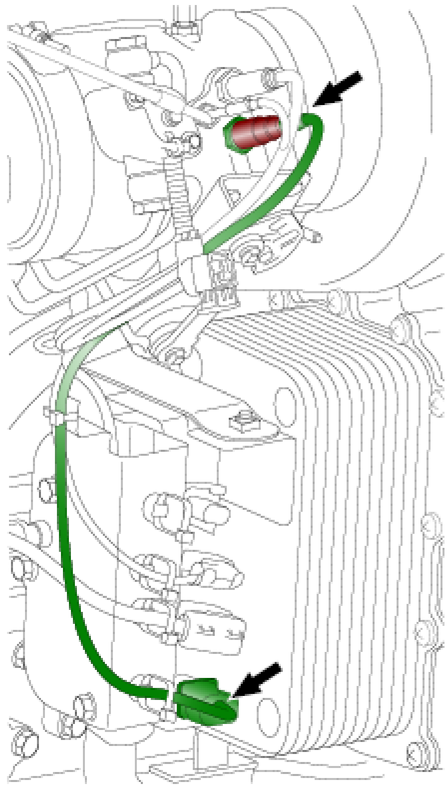
<table>
<tr><td>Step 3</td><td>Step ID 2238c</td><td>SRT</td></tr>
<tr><td colspan="3">Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults.
• Fault inactive – issue resolved
• Fault active - Proceed to step 4</td></tr>
</table>

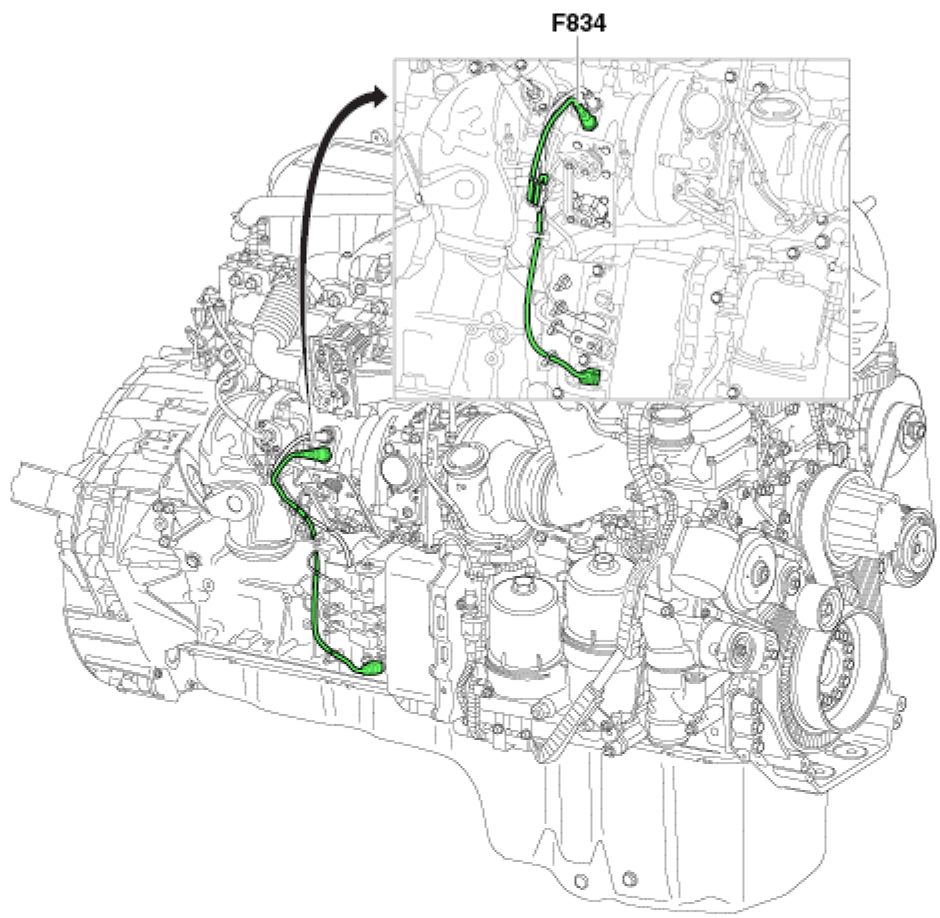
<table>
<tr><td>Step 4</td><td>Step ID 2238d</td><td>SRT</td></tr>
<tr><td colspan="3">Replace Lambda sensor and use DAVIE to re-check for the presence of active faults.
• Fault inactive – issue resolve
• Fault active - Proceed to step 5</td></tr>
</table>

<table>
<tr><td>Step 5</td><td>Step ID 2238e</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251</td></tr>
</table>

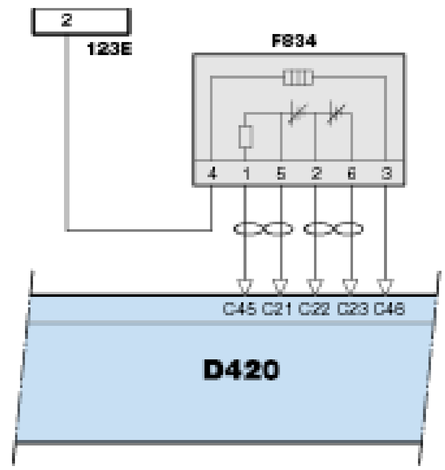
</td>
</tr>
<tr>
<td>Verification Drive Cycle</td>
<td>To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.</td>
</tr>
<tr>
<td></td>
<td>Back to Choose Code
Back to Index</td>
</tr>
</table>

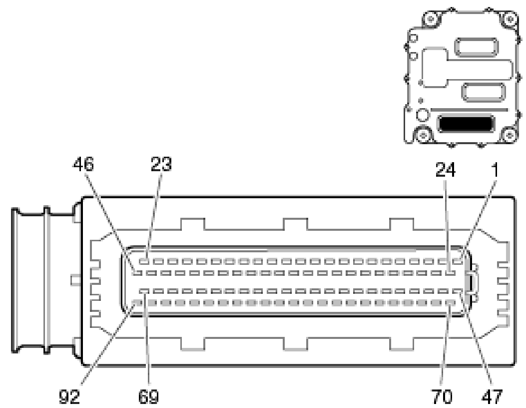
P2239

Code number	P2239
Fault code description	Lambda - Current too high on ECU D420 pin C45
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. Sensor heating control • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C

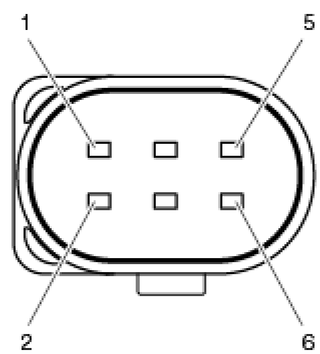
	[1382°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas.
Location of component(s)	
Diagnostic condition	If Pump current is less than 0.003 A for more than 0.5 sec
Set condition of fault code	This fault is set when pump current is greater than 0.003 A for longer than 0.5 sec.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F834 front view

123E 7-pin interface connector
D420 PCI ECU
F834 lambda sensor

D420	F834	Function
C21	5	Trimming resistor
C22	2	Ground, sensor element
C23	6	Signal, nernst sensor
C45	1	Signal, pump cell current
C46	3	Ground, heater element

<table>
<tr><td></td><td>4   Power supply, heater element</td></tr>
<tr><td>Technical data</td><td>
Component check, lambda sensor (F834)
Preparation

Key the ignition off
Disconnect connector F834
Measure on component connector F834

<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>3</td><td>2.4 -4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr>
</table>

Component & circuit check, ECU (D420)
Preparation

Key the ignition off
Disconnect connector F834
Measure on the front side of wiring harness connector F834

<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>

VTG stuck in closed position
Faulty wiring
Faulty connector
Faulty sensor

</td></tr>
<tr><td>Additional information</td><td>No additional information available.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 2239a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

<table>
<tr><td>Step 2</td><td>Step ID 2239b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
• Supply and signal voltages (12V).
• Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
• Yes - Proceed to step 3
• No - Proceed to step 4
<table>
<tr><td>Step 3</td><td>Step ID 2239c</td><td>SRT</td></tr>
<tr><td colspan="3">Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults.
• Fault inactive – issue resolved
• Fault active - Proceed to step 4</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 2239d</td><td>SRT</td></tr>
<tr><td colspan="3">Replace Lambda sensor and use DAVIE to re-check for the presence of active faults.
• Fault inactive – issue resolved
• Fault active - Proceed to step 5</td></tr>
</table>
<table>
<tr><td>Step 5</td><td>Step ID 2239e</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

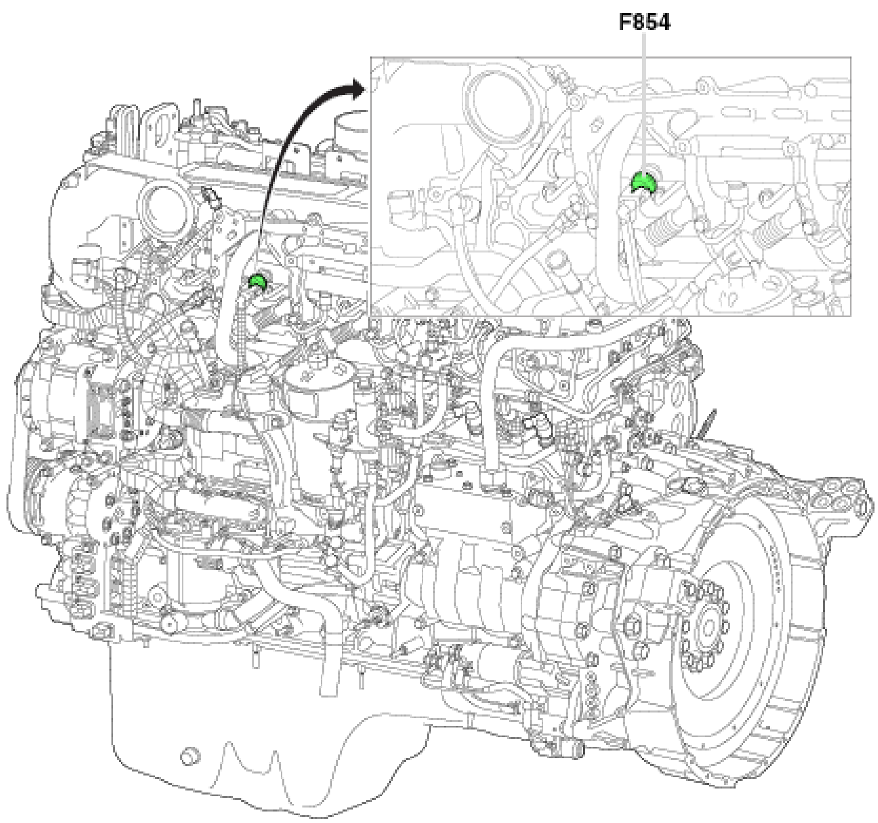
P2266

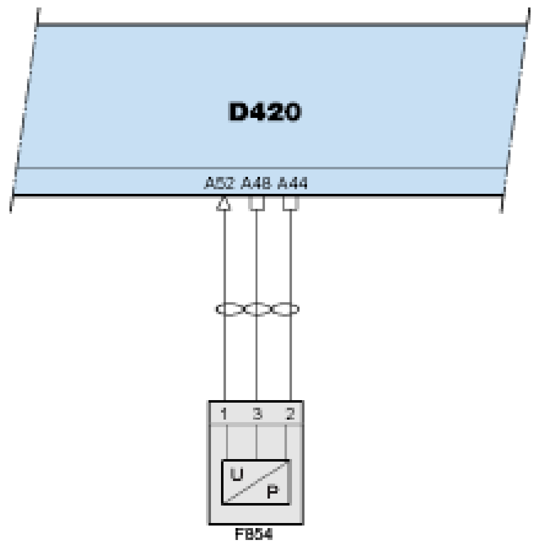
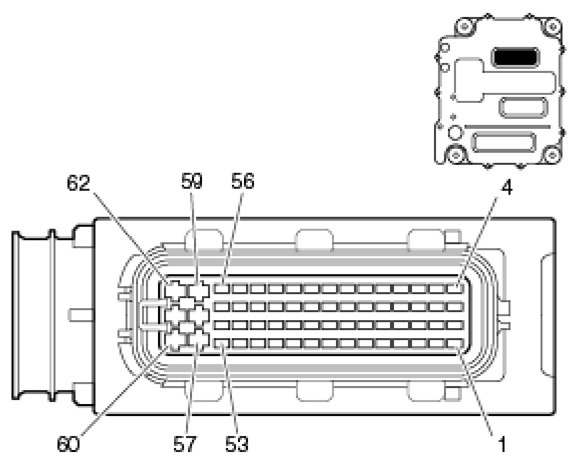
Code number	P2266
Fault code description	Water in fuel - Voltage too low or short circuit to ground on ECU D420 pin A49
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

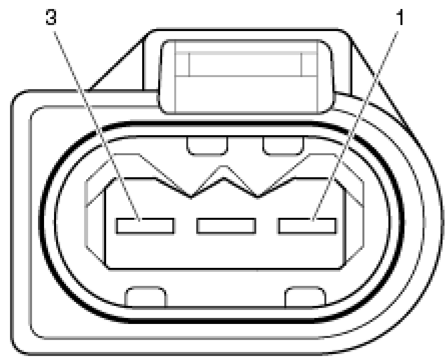
P2275

Code number	P2275
Fault code description	Water in fuel - Voltage too high or short circuit to supply on ECU D420 pin A49
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

P228C

Code number	P228C
Fault code description	Engine rail pressure control – Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel System Freeze frame type – Fuel
Description of component(s)	The rail pressure is measured in the common rail. The rail pressure sensor is part of the common rail and is not interchangeable as a separate part. Effect on the system: • Feedback on the rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the rail pressure demands determined by the ECU and the rail pressure feedback measured by the common rail pressure sensor.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the engine is running at a steady load and speed. • When the rail pressure operating state is: Pump unit only
Set condition of fault code	The PCI ECU (D420) detects that the measured rail pressure is more than 200 bar (2900 PSI) higher than the commanded rail pressure for more than 3 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the

	repair: • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles], and; • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.A front view

	 Wiring harness connector F854 front view D420 PCI ECU F854 Engine rail pressure sensor D420 F854 Function A44 2 Ground A48 3 Power supply A52 1 Signal, common rail pressure
Technical data	Component & wiring check, ECU (D420) Preparation • Key off the ignition. • Disconnect connector F854 • Measure on the front side of wiring harness connector F854 Pin (+ probe) / Pin (- probe) / Value / Additional information 3 / 2 / 5V / Ignition keyed on
Possible causes	• common rail pressure sensor deviation • common rail pump unit failure
Additional information	• The rail pressure is closed-loop controlled. A comparison is made between the rail pressure commanded by the ECU and the rail pressure feedback measured by the common rail pressure sensor. • The rail pressure is measured in the common rail by the common rail pressure sensor (F854). • Engine torque is reduced.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.

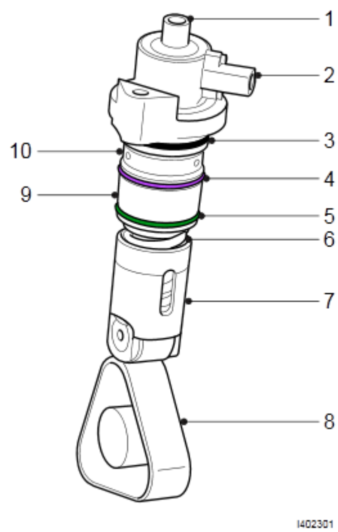
	• Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. **Step 1** | Step ID 228C-a | SRT Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2. **Step 2** | Step ID 228C-b | SRT DAVIE Direct Test: High Pressure Fuel Pump Unit Run the prescribed DAVIE Direct test to determine if the electronic unit pumps are working correctly. Does the test fail to complete or result in a failed state? • No: Processed to step 4 • Yes: Processed to step 3 **Step 3** | Step ID 228C-c | SRT Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4 **Step 4** | Step ID 228C-d | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

P228D

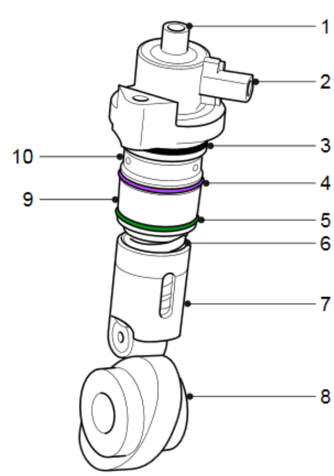
<table>
<tr><td>Code number</td><td>P228D</td></tr>
<tr><td>Fault code description</td><td>Engine rail pressure control - Incorrect</td></tr>
<tr><td>Fault code information</td><td>1 trip MIL
3 drive cycle recovery
Readiness group – Fuel System
Freeze frame type - Fuel</td></tr>
<tr><td>Description of component(s)</td><td>

Common rail pump unit 1 (L092) and unit 2 (L093)

Common rail pump units 1 and 2 supply fuel to the common rail.



1 Outlet port
2 Solenoid connector
3 Sealing ring fuel supply gallery - outside
4 Sealing ring fuel supply gallery - fuel return gallery
5 Sealing ring fuel return gallery - crankcase
6 Spring
7 Roller lifter
8 Common rail pump unit cam
9 Fuel return port
10 Fuel supply port

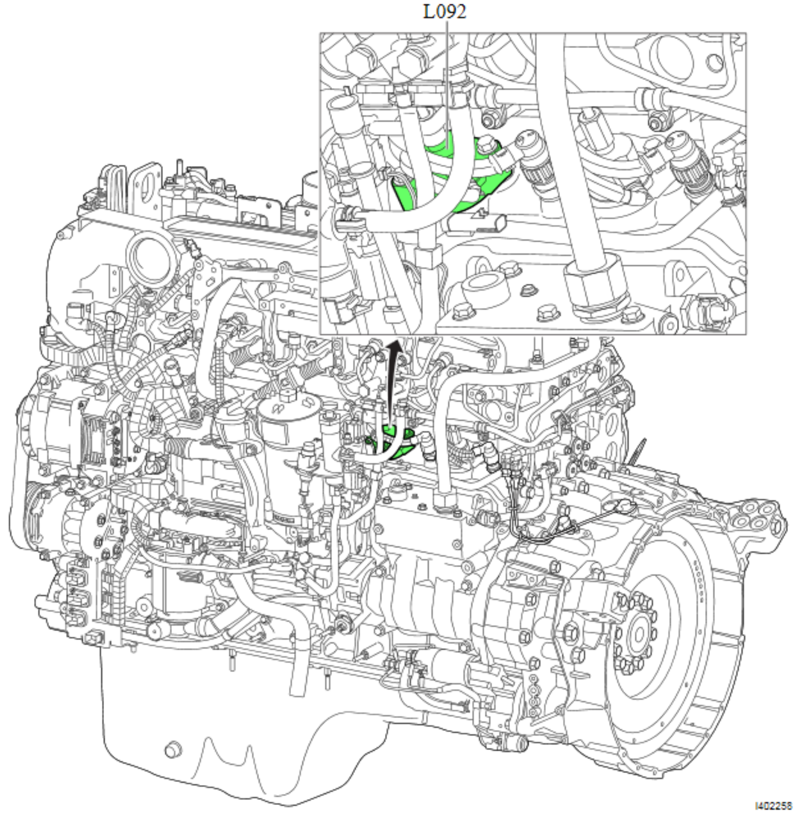


Operation

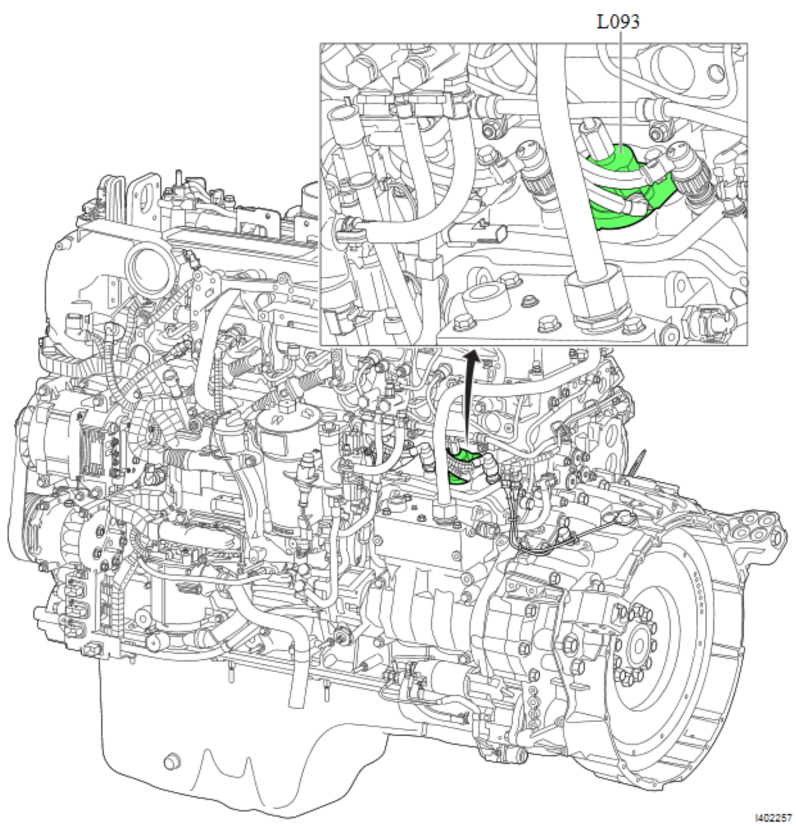
The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three

</td></tr>
</table>

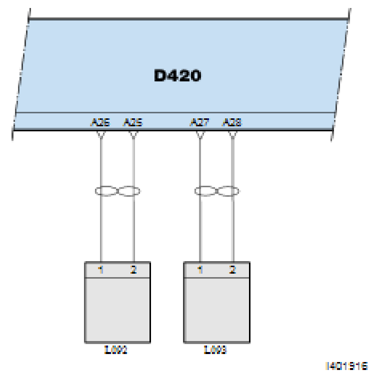
	pumping events for every two crankshaft revolutions. Fuel from the fuel gallery can enter the pumping plunger area via an internal valve. A pumping event starts when the plunger travels up, the PCI ECU activates the solenoid briefly and the internal valve closes the opening to the fuel gallery. The internal valve is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the outlet bore of the pump unit. The pumping event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downwards again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents fuel from flowing back from the rail to the plunger area. **Control** The amount of fuel pumped to the rail depends on the duration of the pumping event (pump delivery percentage). The earlier the solenoid is activated by the PCI ECU in the up stroke of the pumping plunger the more fuel (mg/stroke) is pumped to the rail. **Effect on the system** • Rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.
Location of component(s)	**Common rail pump unit 1 (L092)**



Common rail pump unit 2 (L093)



Diagnostic condition	This diagnostic runs when the rail pressure operating state is: Pump unit only.
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure is more than 200 bar lower than the commanded rail pressure for more than 3 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	**Common rail pump units 1 (L092) and unit 2 (L093)**

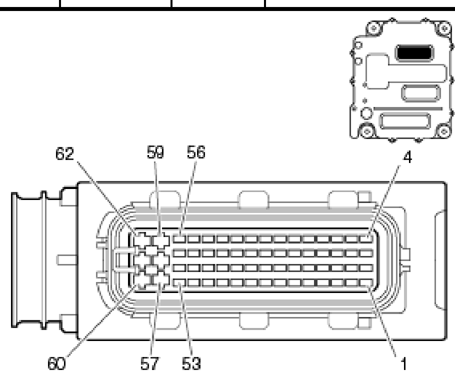


D420 PCI ECU

L092 common rail pump unit 1

L093 common rail pump unit 2

D420	L092	L093	Function
A25	2		Signal low, common rail pump unit 1
A26	1		Signal high, common rail pump unit 1
A27		1	Signal high, common rail pump unit 2
A28		2	Signal low, common rail pump unit 2



Wiring harness connector D420.A front view

Handle connectors and pins with care and use matching measuring probes.

Technical data

Component check, common rail pump unit 1 (L092)

Preparation

- Key off the ignition
- Disconnect connector L092
- Measure on component connector L092

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	±0.67 Ω	Resistance value at 20˚C [68˚F]
		maximum 0.94 Ω	Resistance value at 120˚C [248˚F]

Component check, common rail pump unit 2 (L093)

Preparation

- Key off the ignition
- Disconnect connector L093
- Measure on component connector L093

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	±0.67 Ω	Resistance value at 20˚C [68˚F]
		maximum 0.94 Ω	Resistance value at 120˚C [248˚F]

Possible causes

- Air present in the fuel system.

  If the fuel system or parts of it have been emptied during maintenance or repair, this DTC may become active temporarily after the engine is started. If the DTC stays inactive when the engine is running, no further investigation is necessary.

- Malfunction in the low pressure fuel system
- An external or internal leakage on the high-pressure fuel system components.
- Common rail pump unit failure

Additional information	• The rail pressure is closed-loop controlled. A comparison is made between the rail pressure commanded by the ECU and the rail pressure feedback measured by the common rail pressure sensor. • The actual rail pressure is measured in the common rail by the common rail pressure sensor (F854). • P0094 can also be active when this DTC is active.
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.** ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly. ▪ Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. ▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes. ▪ It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. **Step 1 Investigate Related DTCs** Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

Step 1A Investigate related DTCs	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.	
Are these or any other related codes present? P0087; P1087; P1091; P1195; P1196	
Yes	**No**
Possible restriction in the fuel supply, fuel primer pump, or rail pressure sensor. Go to the troubleshooting information for these DTCs before continuing with this procedure.	
	Go to step 2A

Step 2 Fuel System, High Pressure Rail Check

Step 2A DAVIE Monitor, rail pressure; actual vs. requested	
Action 1. Using DAVIE to monitor individual component selections for rail pressure, confirm that the actual value measures 200 bar below the requested value.	
Were the corresponding set conditions confirmed?	
Yes	**No**
	Use DAVIE to perform a Quick Check for current DTCs.
Go to step 3A	**If this DTC is still present, go to step 3A.** **If this DTC is no longer present, then this may have been an isolated occurrence. Stop troubleshooting.**

Step 3 Fuel System, Low Pressure Checks

Step 3A Visual inspection: low pressure circuit	
Action 1. Inspect the associated components or systems for any of the following: • Low fuel level in fuel tank • Damaged fuel filtration system (L097) that needs replacement • Air in fuel system • Fuel leaks • Damaged or kinked fuel lines	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Go to step 7A to perform the corresponding repair verification cycles	

and rechecks.	
If this DTC is still present, go to step 3B.	**Go to step 3B**

Step 3B Rapido maintenance: check fuel system, low pressure (job ID 68721)	
Action 1. Perform the identified maintenance job, outlined in "check fuel system low pressure (Fuel system)." The procedure outlined in "check fuel system, low pressure (Fuel system)" requires bleeding the fuel system. For the MX engine (North American markets), ensure that "bleed (Fuel system)," job ID 66537 is used when bleeding the fuel system.	
Do any of the tests result in a failed state based on the criteria provided?	
Yes	**No**
Investigate and correct any issues found. Go to step 7A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 4A	**Go to step 4A**

Step 4 Fuel System, High Pressure Checks

Step 4A Visual inspection, high pressure common rail
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Fuel leaks • A fuel line from the high pressure common rail to the injector is damaged • Bent or broken fuel lines • Common rail pressure sensor (F854) not installed correctly • Common rail pressure release valve (L094) not installed correctly

- High pressure fuel lines not installed correctly
- Common rail pump unit 1 (L092) and unit 2 (L093) are not installed correctly
- Damaged electrical components/connections

Was there evidence of any of the above?

Yes	No
Correct any issues found. Go to step 7A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 4B.	**Go to step 4B**

Step 4B Visual inspection, common rail pressure sensor (F854)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
    - Damaged or loose connectors
    - Bent, broken, corroded or loose connector pins
    - Moisture or dirt in the connections
    - Damage to the wire harness or insulation
    - The correct sensor (F854) is not installed
    - ECU connections are damaged or disconnected
    - Batteries not fully charged or contacts are not tight
    - Common rail pressure sensor (F854) broken or not installed correctly

Was there evidence of any of the above?

Yes	No
Correct any issues found. Go to step 7A to perform the corresponding repair verification cycles and rechecks.	

If this DTC is still present, go to step 4C.	**Go to step 4C**

Step 4C Electrical checks, supply voltage, common rail pressure sensor (F854)	
Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 2. Confirm the supply voltage level as outlined in the corresponding checking data, "Component Check, Common Rail Pressure Sensor (F854)."	
Are measured values within expected range?	
Yes	**No**
	Correct any issues found. Go to step 7.A to perform the corresponding repair verification cycles and rechecks.
Go to step 4D	**If this DTC is still present, go to step 4D.**

Step 4D Rapido maintenance: common rail pressure release valve (L094) leak down test	
Action 1. Refer to Rapido procedure "Check fuel system high pressure (fuel system)" to verify common rail pressure release valve does not leak.	
Does the high pressure valve pass the leak test?	
Yes	**No**
	Contact the PACCAR Engine Support Center for confirmation in replacing the failed common rail. Go to step 7A to perform the corresponding repair validation cycles and rechecks.
Go to step 5A	**If this DTC is still present, go to step 5A.**

Step 5 Common Rail Pump Unit 1 (L092) and Unit 2 (L093) Checks

Step 5A Electrical checks, resistance, common rail pump unit 1 (L092) and unit 2 (L093)	
Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Confirm the resistance as outlined in the corresponding checking data, "Component check, Common Rail Pump Unit 1 (L092) and Unit 2 (L093)."	
Are measured values within expected range?	
Yes	**No**
	Contact the PACCAR Engine Support Center for confirmation in replacing the failed electronic unit pump. Go to step 7A to perform the corresponding repair validation cycles and rechecks.
Go to step 5B	**If this code is still present, go to step 5B.**

Step 5B Special test, isolating common rail pump unit 1 (L092) and unit 2 (L093)

Action

1. Set the ignition switch to OFF.
2. Disconnect the pump unit 1 pump (L092) electrical connector.
3. Start the engine and monitor how smoothly it runs.

   A smooth running engine indicates that the unit 2 pump (L093) is functioning properly. A rough running engine indicates the unit 2 pump (L093) is not functioning properly.
4. Set the ignition switch to OFF.
5. Reconnect the unit 1 pump (L092) electrical connector.
6. Disconnect the unit 2 pump (L093) electrical connector.
7. Start the engine and monitor how smoothly it runs.

   A smooth running engine indicates that the unit 1 pump (L092) is functioning properly. A rough running engine indicates that the unit 1 pump

(L092) not functioning correctly.

Did the engine run smoothly in both instances (3 and 7)?	
Yes	**No**
	Correct any issues found, or replace the corresponding unit pump as needed. Refer to step 7A to perform the corresponding repair verification cycles and rechecks.
Go to step 6A	**If this DTC is still present, go to step 6A.**

Step 6 Injector (B421, B422, B423, B424, B425, B426) Checks

Step 6A DAVIE test: automated cylinder performance (B421, B422, B423, B424, B425, B426)	
This test requires Master Technician level access.	
Action 1. Run the prescribed DAVIE performance test to determine if there is a problem with one of the injectors.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
For any related issues found, contact the PACCAR Engine Support Center on further isolating possible issues with or replacing a failed injector. Go to step 7A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 7A.	**Go to step 7A**

Step 7 Repair Verification

Step 7A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.

Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. System Initiation
   Drive the truck under normal conditions until the coolant temperature reaches a minimum of 150°F. This cycle can be conducted with a loaded trailer or bobtail.

2. Steady State
   This cycle is best performed on a level grad road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.

   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?

Yes	No
	Investigate and correct any issues preventing these repair verification cycles and rechecks from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 7B	**Go to step 7B**

Step 7B DAVIE Diagnostics, Quick Check

Action

1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.

Has P228D been cleared?

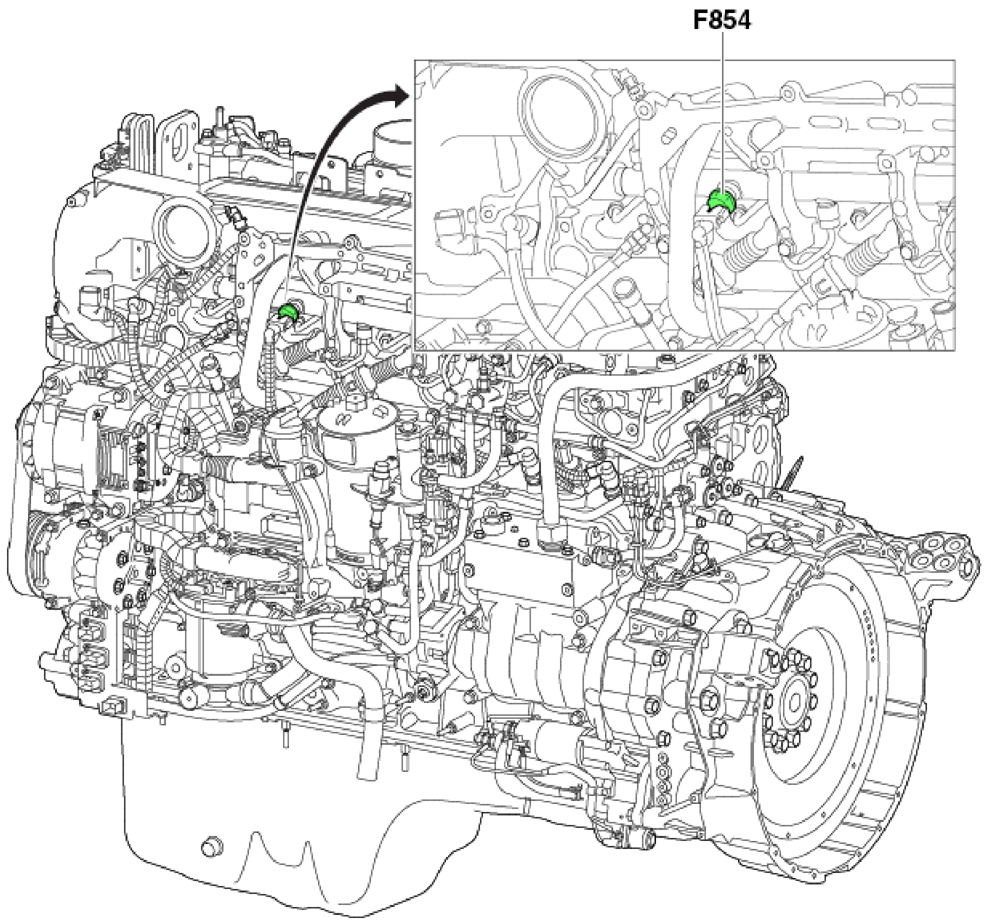
Yes	No

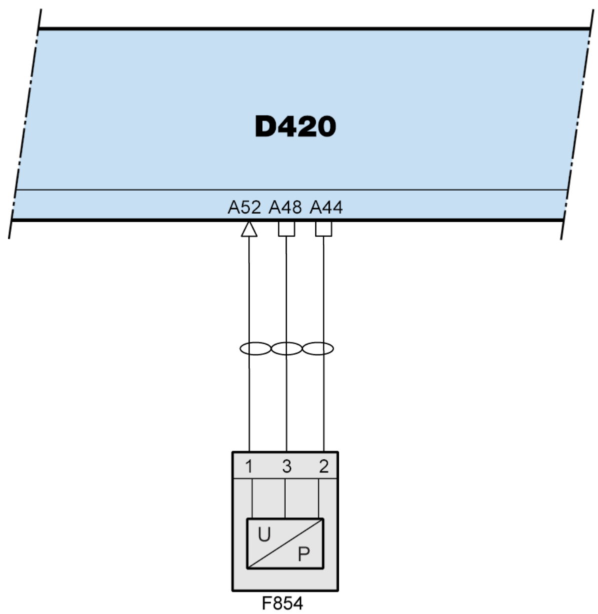
<table>
<tr>
<td></td>
<td>
<table>
<tr>
<td>Problem resolved. No further actions.</td>
<td>If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.</td>
</tr>
</table>

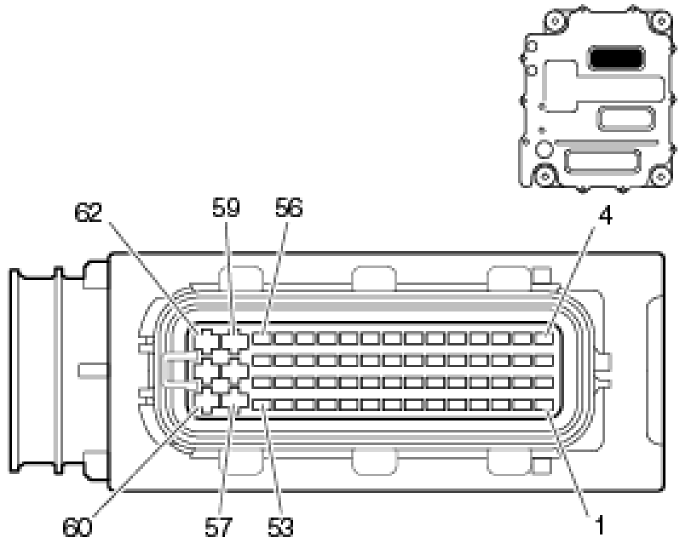
Contacting the PACCAR Engine Support Center

For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
</td>
</tr>
<tr>
<td></td>
<td>Back to Index</td>
</tr>
</table>

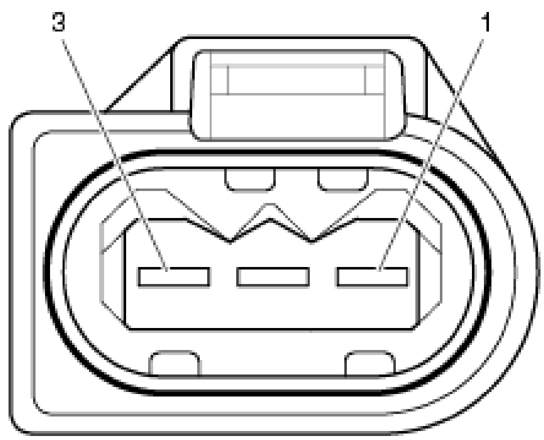
P228E

Code number	P228E
Fault code description	Engine rail pressure control - Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel System Freeze frame type - Fuel
Description of component(s)	The rail pressure is measured in the common rail. The rail pressure sensor is part of the common rail and is not interchangeable as a separate part. Effect on the system: • Feedback on the rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the rail pressure demands determined by the ECU and the rail pressure feedback measured by the common rail pressure sensor.
Location of component(s)	
Diagnostic condition	This diagnostic runs when: • Engine is running at a steady load and engine speed. • Rail pressure operating state is: Pump unit only
Set condition of fault code	The PCI ECU (D420) detects that the measured rail pressure is more than 20 bar higher than the commanded rail pressure for more than 6 seconds
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the

	repair: • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles], and; • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	

<table>
<tr>
<td></td>
<td>


Wiring harness connector D420.A front view



Wiring harness connector F854 front view

D420 PCI ECU
F854 engine rail pressure sensor

<table>
<tr><td>D420</td><td>F854</td><td>Function</td></tr>
<tr><td>A44</td><td>2</td><td>Ground</td></tr>
<tr><td>A48</td><td>3</td><td>Power supply</td></tr>
<tr><td>A52</td><td>1</td><td>Signal, common rail pressure</td></tr>
</table>
</td>
</tr>
<tr>
<td>Technical data</td>
<td>
Component & wiring check, ECU (D420)
Preparation

- Key off the ignition.
- Disconnect connector F854
- Measure on the front side of wiring harness connector F854

<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>3</td><td>2</td><td>5V</td><td>Ignition keyed on</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>

- Rail pressure sensor faulty or improper installation
</td>
</tr>
</table>

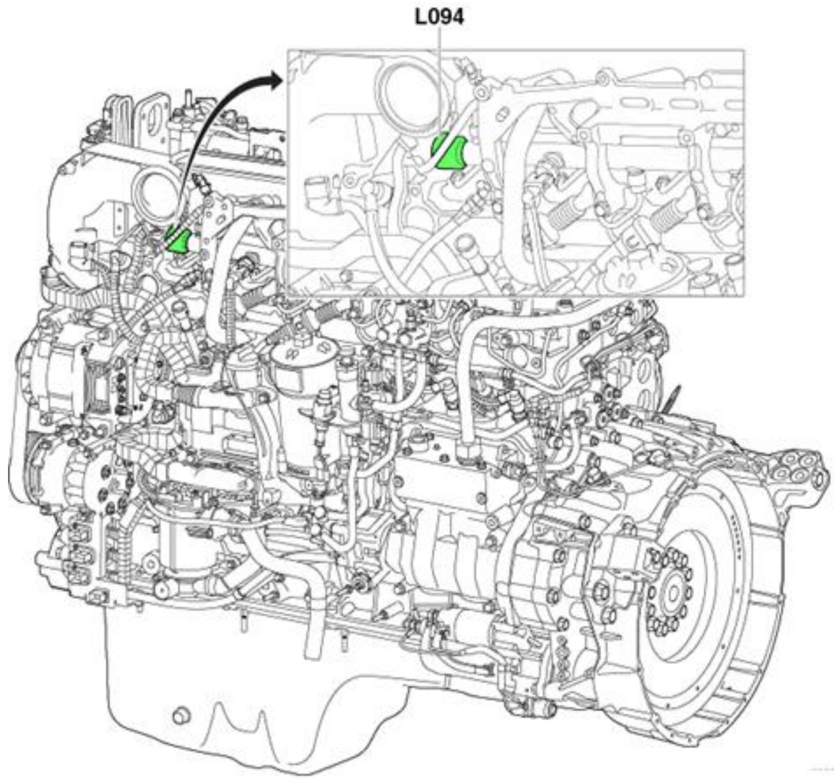
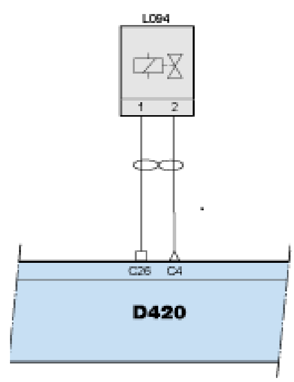
<table>
<tr><td></td><td>Loose connection or broken pin at ECU</td></tr>
<tr><td>Additional information</td><td>The rail pressure is closed-loop controlled. A comparison is made between the rail pressure commanded by the ECU and the rail pressure feedback measured by the common rail pressure sensor.
The rail pressure is measured in the common rail by the common rail pressure sensor (F854).</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step ID 228E-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 228E-b</td><td>SRT</td></tr>
<tr><td colspan="3">High Pressure Fuel Pump Unit
Run the prescribed DAVIE Direct test to determine if the electronic unit pumps are working correctly.

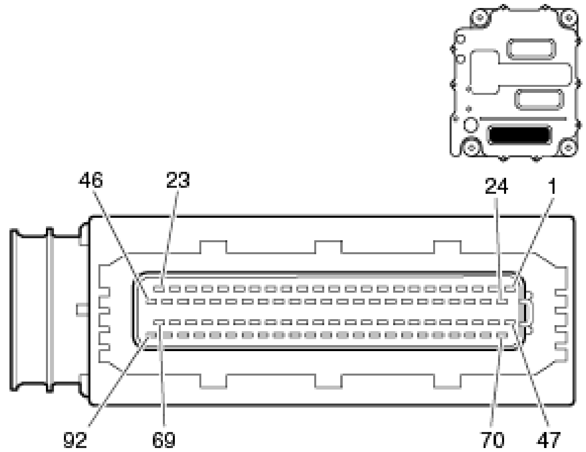
Does the test fail to complete or result in a failed state?
No: Continue to the next step in the troubleshooting process.
Yes: Make the appropriate repairs or component replacements.
Use DAVIE to re-check for the presence of active faults.
P228E inactive: Issue resolved
P228E active: Proceed to step 3.</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 228E-c</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair:
Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles], and;</td></tr>
</table>

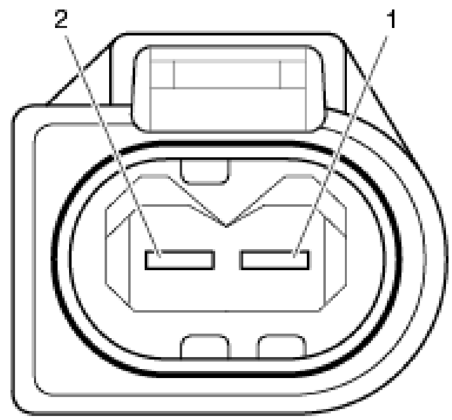
	• Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
	Back to Choose Code Back to Index

P2294

Code number	P2294
Fault code description	Common rail pressure release valve – Current too low or open circuit on ECU D420 pin C4
Fault code information	1 trip MIL + 1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	The common rail pressure release valve is used to control the rail pressure during a malfunction in the rail pressure control situation. Secondly, it has a pressure-limiting valve so that the rail pressure does not exceed 3250 ± 300 bar [47138 ± 4351 psi] in emergency situations (e.g., loss of rail pressure control). The common rail pressure release valve is part of the common rail and is not interchangeable as a separate part. Control During normal rail pressure control, the valve is controlled (duty cycle) to keep it closed. The current to keep the valve closed varies and depends on the required rail pressure. If it is not electronically controlled (e.g., faulty valve or wiring), the valve is normally closed and opens at approximately 320 ± 70 bar [4641 ± 1015 psi]. The opening pressure can vary depending on engine speed, fuel temperature, and other factors. If the valve opens, the fuel is dumped into the supply pipe of the fuel module. Learning function The current to control the common rail pressure release valve is determined by the PCI ECU and is stored in its memory. If a common rail pressure release valve is changed, the stored value in the PCI ECU must be reset with DAVIE. Effect of output signal on the system: • Controlling the rail pressure in case the normal rail pressure control is lost (for example, a failure on high-pressure fuel system components is detected). • Limits the maximum rail pressure in emergency situations

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously, 10 seconds after the ignition is on with engine off.
Set condition of fault code	The PCI ECU (D420) detects that the High Pressure Common Rail Fuel Pressure Relief Valve measured voltage is greater than 13.7volts.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	

<table>
<tr><td></td><td>

Wiring harness connector D420.C front view


Wiring harness connector L094 front view
D420 PCI ECU
L094 common rail pressure release valve

D420 L094 Function
C4 2 Signal, common rail pressure release valve
C26 1 Ground</td></tr>
<tr><td>Technical data</td><td>Component check, common rail pressure release valve (L094)
Preparation
• Key off the ignition
• Disconnect connector L094
• Measure on component connector L094
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>2</td><td>4</td><td>1.57-.93Ω</td><td>at 20°C [68°F]</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>• Improper installation or damage common rail pressure release valve.
• Loose connection or broken pin at PCI ECU</td></tr>
<tr><td>Additional information</td><td>Engine torque is reduced.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>Please perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood</td></tr>
</table>

<table>
<tr><td></td><td>
of damage to electrical components.
• This troubleshooting tree is based on the assumption that supply power and ground to the PCI is functioning properly.
• Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
• For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
• It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors.
• Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.
<table>
<tr><td>Step 1</td><td>Step ID 2294a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 2294b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
• Supply and signal voltages (12V).
• Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
• Yes - Proceed to step 3
• No - Proceed to step 4</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 2294c</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: Common Rail Pressure Release Valve (Common Rail)
Replace the Common Rail assembly, which includes the Common Rail Pressure Release Valve.
NOTE: The entire Common Rail must be replaced. The common rail pressure release valve is a non-serviceable part and cannot be replaced or repaired separately.
Re-check for the presence of active faults
• Fault inactive – issue resolved
• Fault active - Proceed to step 4</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 2294d</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, perform with the brakes set, start the engine and allow it to run at idle for 2 minutes.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P2295

Code number	P2295
Fault code description	Common rail pressure release valve - Voltage too low or short circuit to earth on ECU D420 pin C4
Fault code information	Please Contact the Engine Support Center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	[Back to Choose Code](#) [Back to Index](#)

P2296

Code number	P2296
Fault code description	Common rail pressure release valve - Voltage too high or short circuit to supply on ECU D420 pin C4
Fault code information	Please Contact the Engine Support Center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

P229A

Code number	P229A
Fault code description	HPV closed loop current control min saturation
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Fault code information	Please Contact the Engine Support Center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

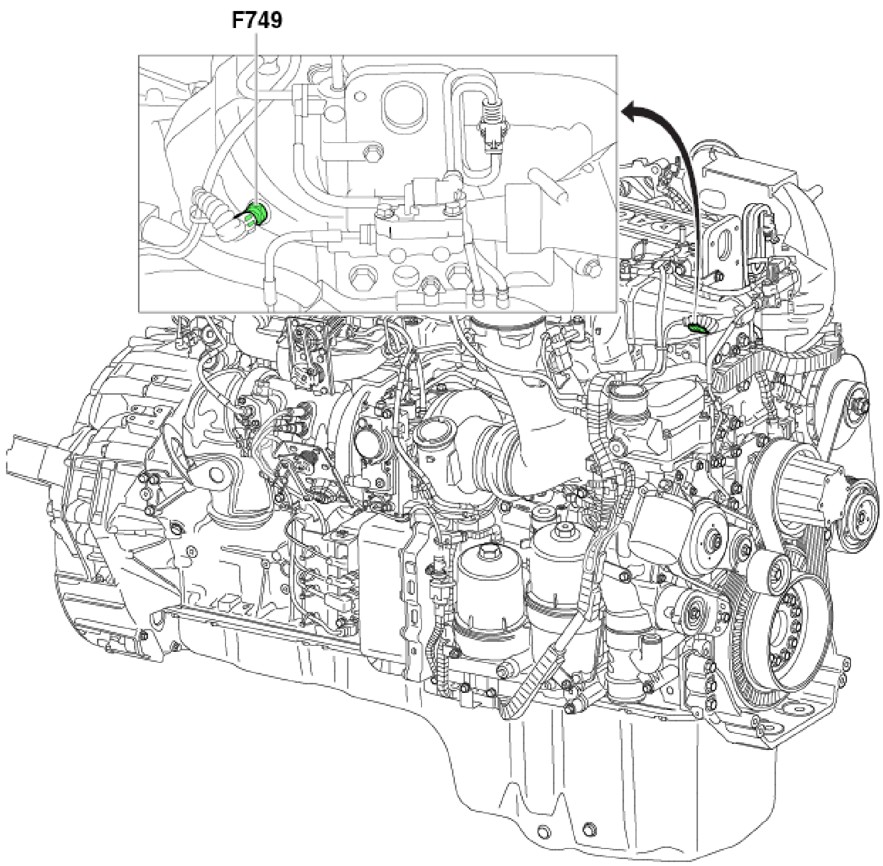
P229B

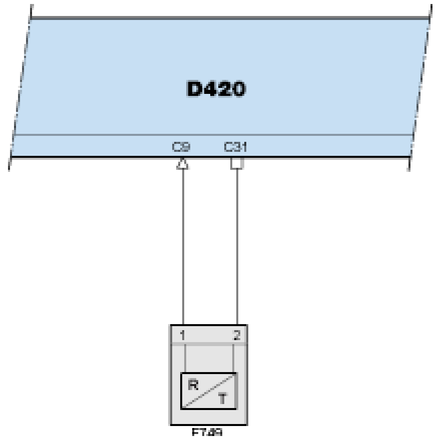
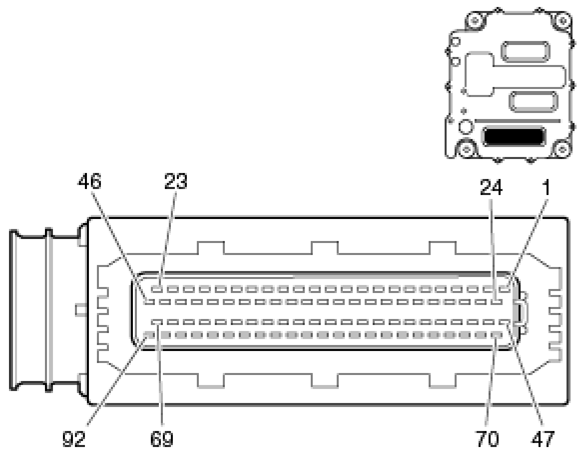
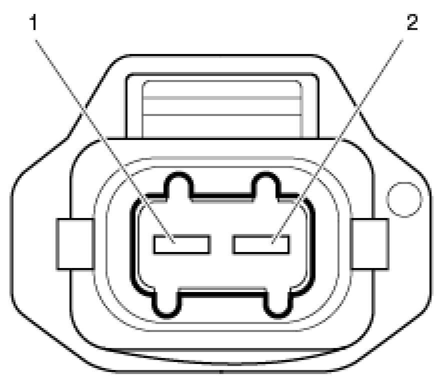
Code number	P229B
Fault code description	HPV closed loop current control max saturation
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Fault code information	Please Contact the Engine Support Center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

P229D

Code number	P229D
Fault code description	Detects if HPV current drifts too far off the open loop characteristic, during CLOSED LOOP
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

P2457

Code number	P2457
Fault code description	EGR temperature - Data valid but too high, most severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Egr
Description of component(s)	The EGR gas flow temperature is measured after the EGR cooler. Effect on the system: • Corrects EGR gas flow calculation (the temperature is an indication of the gas density) • Closes the EGR valve when the EGR temperature is too high • Monitors EGR cooler performance
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is keyed on and when the engine is running.
Set condition of fault code	The PCI ECU (D420) detects that measured coolant temperature is more than 240°C [464°F] for more than 30 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles].

Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector F749 front view D420 PCI ECU F749 EGR temperature sensor D374 F749 Function C9 1 Signal, EGR temperature C31 2 Ground
Technical data	Component check, EGR temperature sensor (F749) Preparation

<table>
<tr><td></td><td>

Key off the ignition
Disconnect connector F749
Measure on component connector F749

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>97.7–100.3 Ω</td><td>Resistance value at 0°C [32°F]</td></tr>
<tr><td></td><td></td><td>107.4–108.2 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>137.5–139.1 Ω</td><td>Resistance value at 100°C [212°F]</td></tr>
<tr><td></td><td></td><td>167.3–169.7 Ω</td><td>Resistance value at 180°C [356°F]</td></tr>
<tr><td></td><td></td><td>192.5–195.5 Ω</td><td>Resistance value at 250°C [482°F]</td></tr>
</table>
Component & circuit check, PCI (D420)
Preparation

Key off the ignition
Disconnect connector F749
Measure on the front side of wiring harness connector F749

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Condition</th></tr>
<tr><td>1</td><td>2</td><td>5V</td><td>Ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>

Coolant level too low
Reduced coolant flow, EGR cooler
EGR temperature sensor deviation

</td></tr>
<tr><td>Additional information</td><td>The EGR gas flow temperature is monitored by the EGR temperature sensor (F749).</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 2457a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 2457b</td><td>SRT</td></tr>
<tr><td colspan="3">Monitor EGR and related temperature sensors
Monitor the following temperatures:

EGR Temperature
Ambient Temperature
Intercooler Temperature

</td></tr>
</table>
</td></tr>
</table>

- Before Turbine Temperature
- Coolant Temperature

Idle the engine for a minimum of 10 minutes to allow temperatures to stabilize. While monitoring, temperature values from sensor to sensor should not vary more than ±30°F.

Do any monitored values vary by more than ±30°F?

- Yes - Proceed to step 3
- No - Proceed to step 4

Step 3	Step ID 2457c	SRT
Pressure Test: Coolant Leak Check Perform the prescribed testing to determine if there is a coolant leak affecting the EGR. Does the test fail to complete or result in a failed state? • No - issue resolved • Yes - Proceed to step 4		

Step 4	Step ID 2457d	SRT
Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 5		

Step 5	Step ID 2457e	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

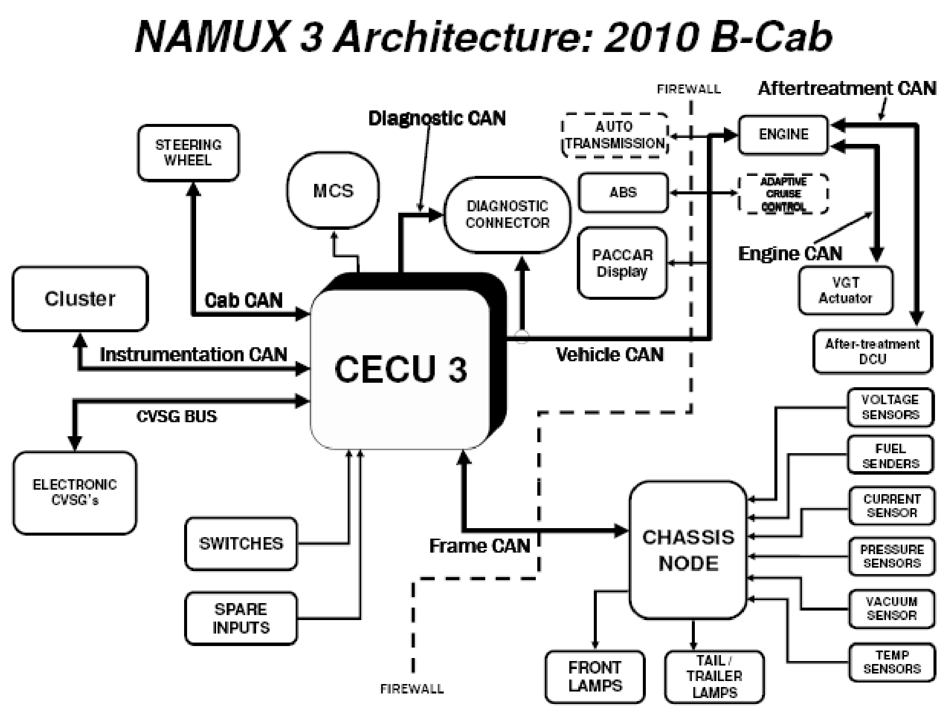
Verification Drive Cycle

To validate the repair:

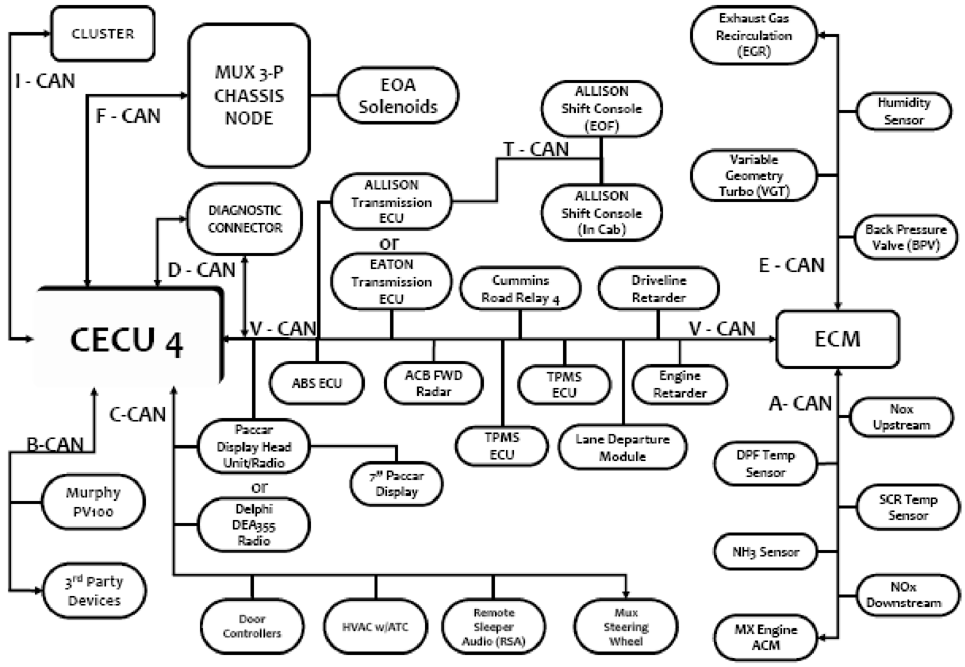
- The truck must remain off (key to OFF and the engine OFF) for 8-10 consecutive hours. Wait for this time to elapse before continuing.
- Perform the Electrical & Power-Up cycle.
- Perform the Start-Up cycle.

Back to Choose Code
Back to Index

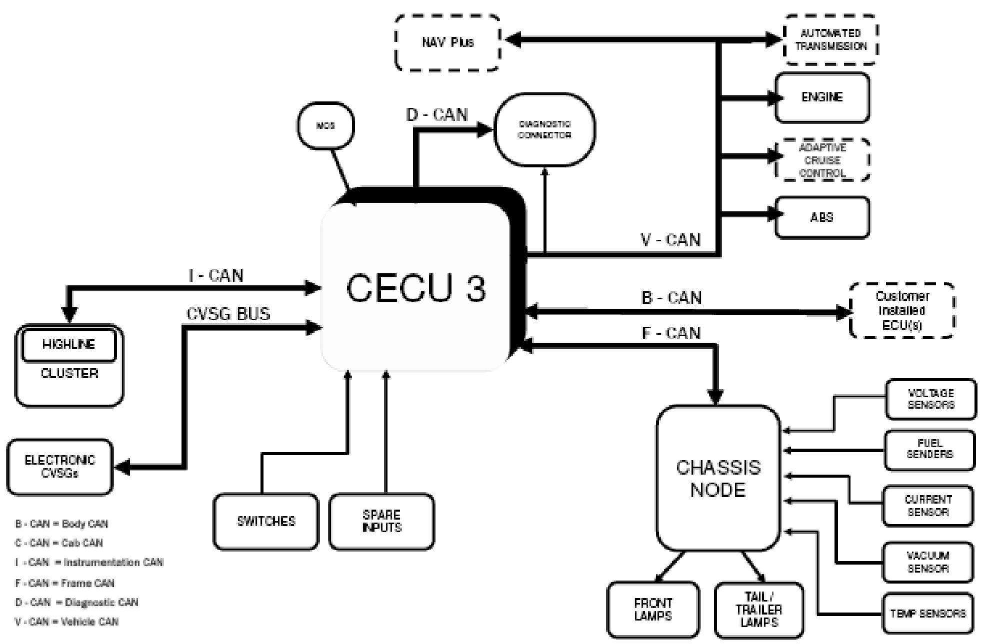
P2458

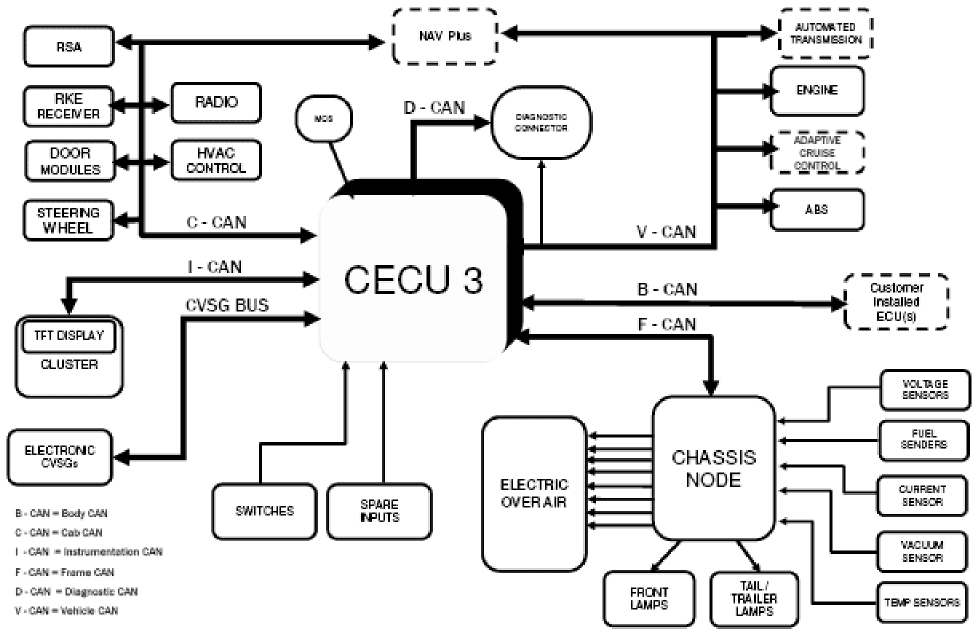
Code number	P2458
Fault code description	CAN communication - Message (CM1) out of range - DPF regeneration force switch from vehicle controller
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	This code relates to a communication issue and not to a specific component.
Location of component(s)	This code relates to a communication issue and not to a specific component.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.
Electrical diagram(s)	

NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



	NAMUX 4 Architecture 
Technical data	This code relates to a communication issue and not to a specific component.
Possible causes	Check cabin ECU for faults
Additional information	No additional information available
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2458a	SRT
Visual Inspection OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure. Was there evidence of any of the above?		

- No: Proceed to step 2.
- Yes: Make the appropriate repairs or component replacements.

Use DAVIE to re-check for the presence of active faults.

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, Proceed to step 2

Step 2	Step ID 2458b	SRT

Data check

- Lookup the technical data of the specific system
- Perform the checking data test of the specific component

Is test pass?

- No: Proceed to step 3
- Yes : Proceed to step4

Step 3	Step ID 2458c	SRT

Repair or replace component

- Repair or replace the component, also check for electrical connection and wiring harness.
- Reconnect the connector
- ON the ignition key

Use DAVIE to re-check for the presence of active faults:

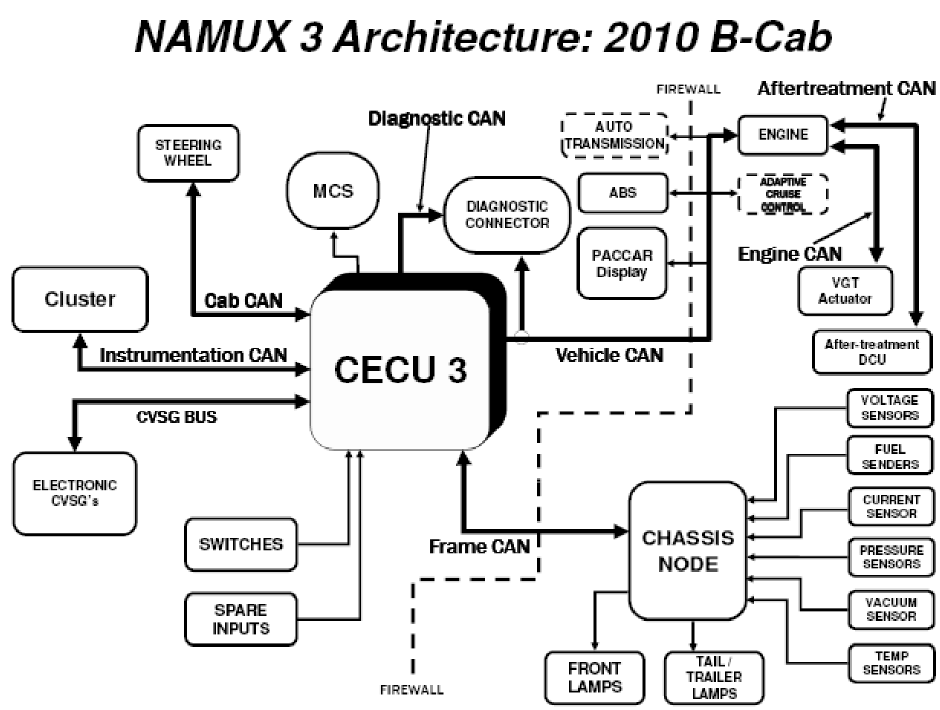
- Is DTC fault active: Proceed to step 4
- Is DTC fault inactive: Issue resolved. Clear inactive fault

Step 4	Step ID 2458d	SRT

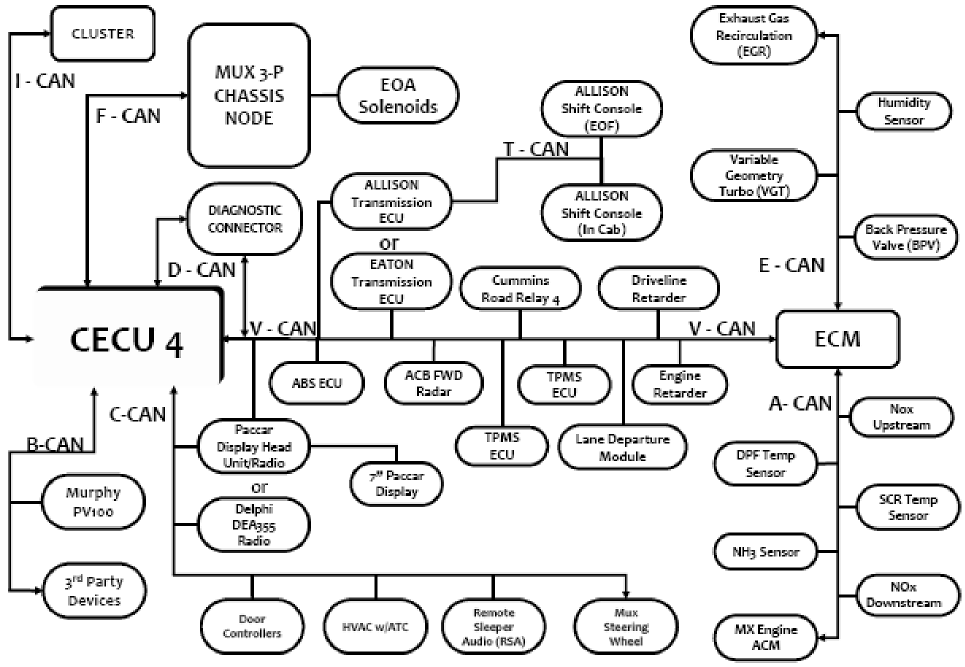
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. With the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

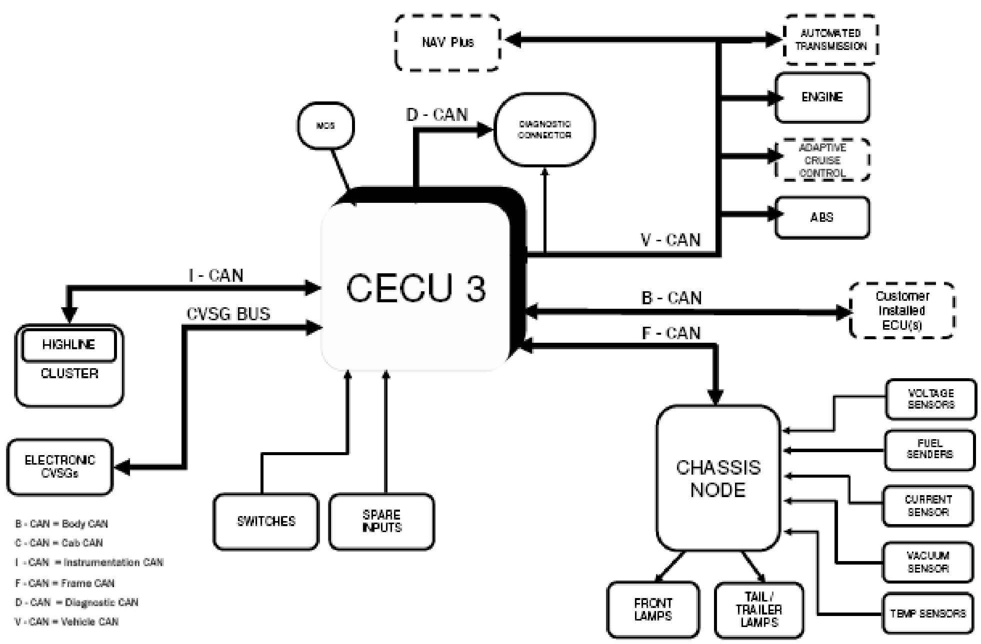
P2459

Code number	P2459
Fault code description	CAN communication - Message (CM1) out of range - DPF regeneration inhibit switch from vehicle controller
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	This code relates to a communication issue and not to a specific component.
Location of component(s)	This code relates to a communication issue and not to a specific component.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.
Electrical diagram(s)	

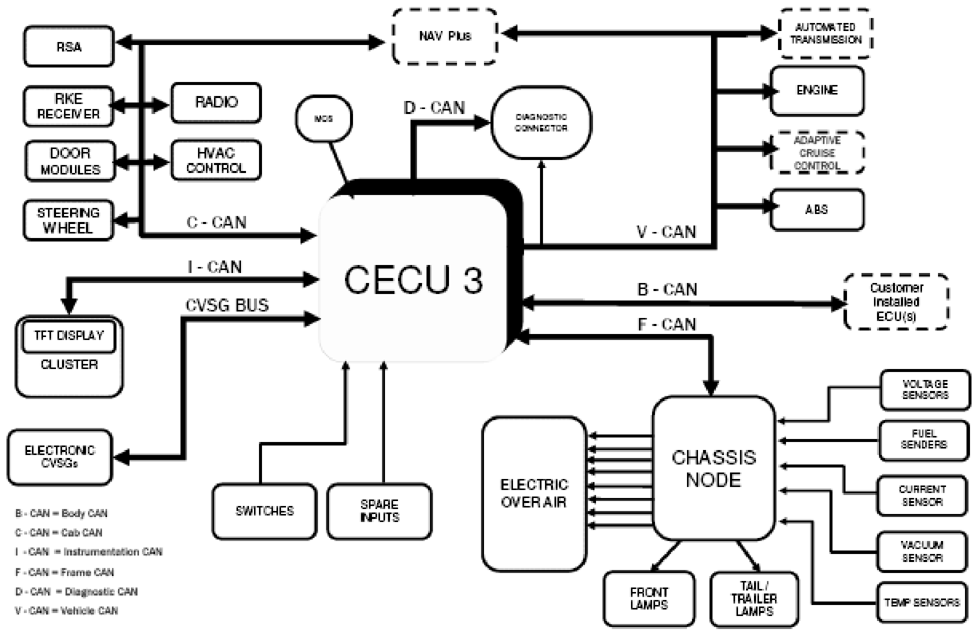
NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



NAMUX 4 Architecture



Technical data	This code relates to a communication issue and not to a specific component.
Possible causes	Check cabin ECU for faults
Additional information	No additional information available
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 2459a	SRT
Visual Inspection OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure. Was there evidence of any of the above? • No: Proceed to step 2.		

<table>
<tr><td></td><td>
Yes: Make the appropriate repairs or component replacements.
Use DAVIE to re-check for the presence of active faults.
If this related fault is no longer active, then this issue has been resolved.
If this related fault is still active, Proceed to step 2
<table>
<tr><td>Step 2</td><td>Step ID 2459b</td><td>SRT</td></tr>
<tr><td colspan="3">Data check
Lookup the technical data of the specific system
Perform the checking data test of the specific component
Is test pass?
No: Proceed to step 3
Yes : Proceed to step4</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 2459c</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace component
Repair or replace the component, also check for electrical connection and wiring harness.
Reconnect the connector
ON the ignition key
Use DAVIE to re-check for the presence of active faults:
Is DTC fault active: Proceed to step 4
Is DTC fault inactive: Issue resolved. Clear inactive fault</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 2459d</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. With the brakes set, start the engine and allow it to run at idle for 2 minutes.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P250C

Code number	P250C
Fault code description	Oil level - Voltage too low or short circuit to ground on ECU D420 pin B35
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

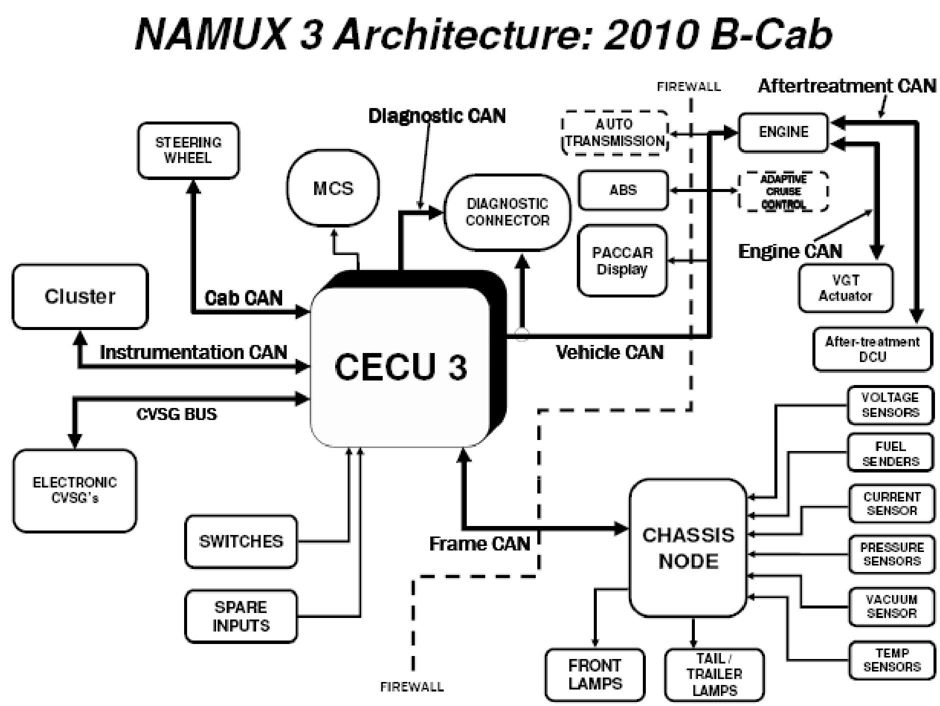
P250D

Code number	P250D
Fault code description	Oil level out of range high Voltage too high or short circuit to supply on ECU D420 pin B35
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

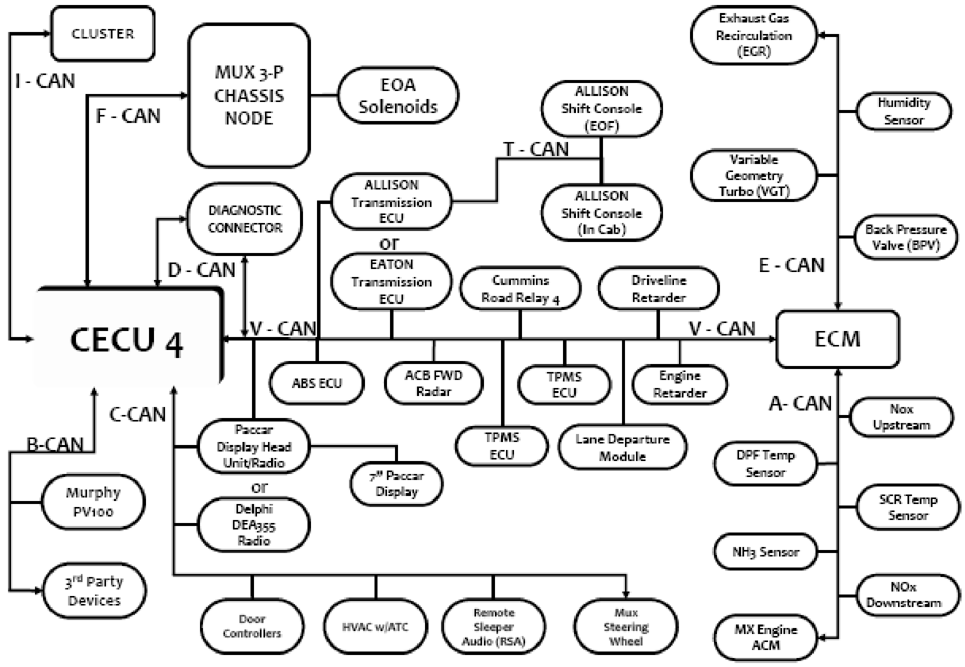
P252F

Code number	P252F
Fault code description	Oil level high warning level
Fault code information	Please Contact the Engine Support Center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Choose Code Back to Index

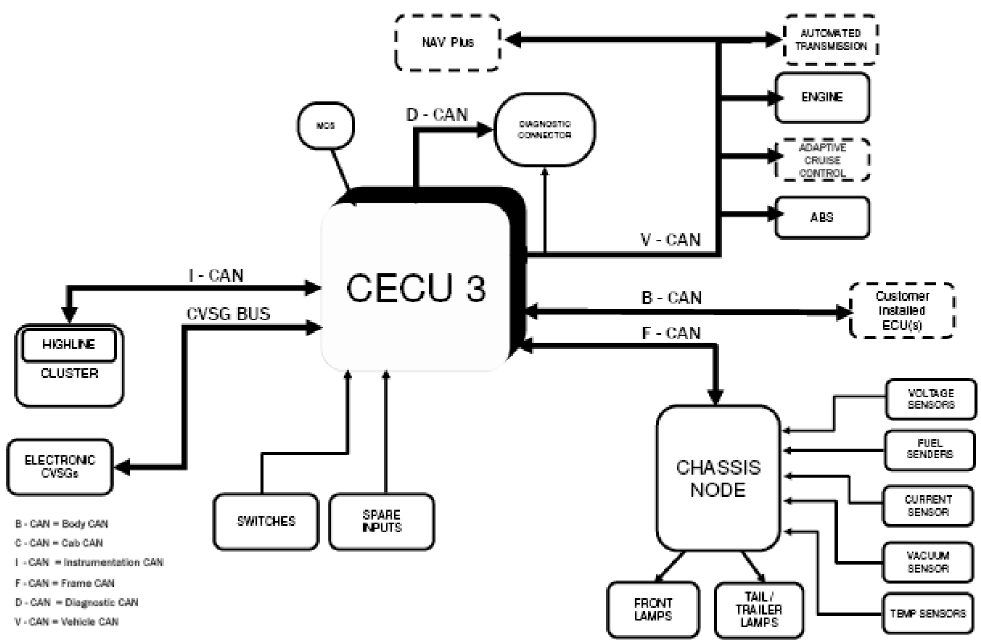
P253B

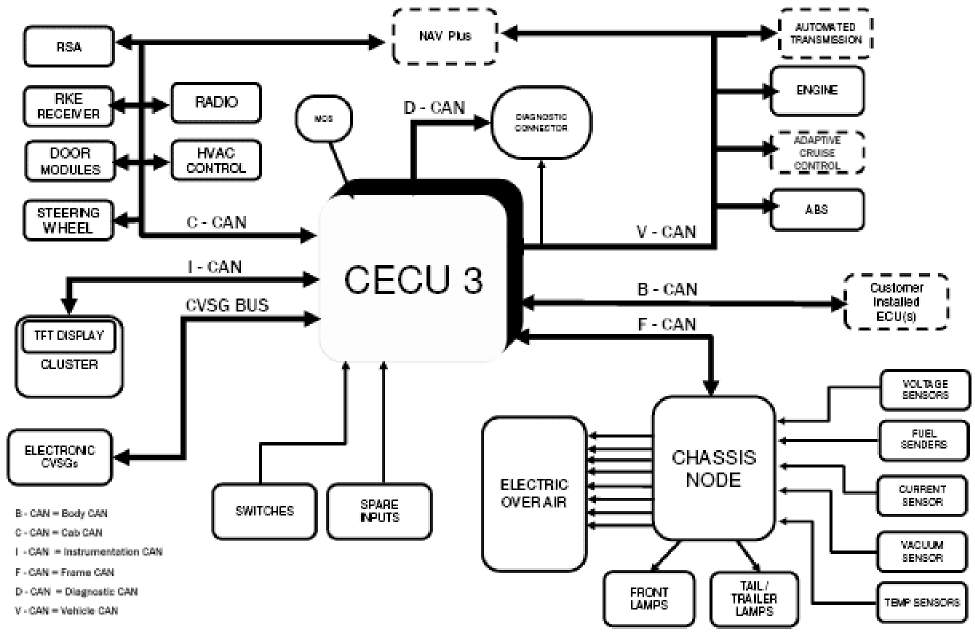
Code number	P253B
Fault code description	CAN communication - Message (PTO) out of range - Engine PTO governor set switch
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	This code relates to a communication issue and not to a specific component.
Location of component(s)	This code relates to a communication issue and not to a specific component.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.
Electrical diagram(s)	

NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



	NAMUX 4 Architecture 
Technical data	This code relates to a communication issue and not to a specific component.
Possible causes	Check cabin ECU for faults
Additional information	No additional information available
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 253B-a	SRT
Visual Inspection OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure. Was there evidence of any of the above? • No: Proceed to step 2.		

- Yes: Make the appropriate repairs or component replacements.

Use DAVIE to re-check for the presence of active faults.

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, Proceed to step 2

Step 2	Step ID 253B-b	SRT

Data check

- Lookup the technical data of the specific system
- Perform the checking data test of the specific component

Is test pass?

- No: Proceed to step 3
- Yes : Proceed to step4

Step 3	Step ID 253B-c	SRT

Repair or replace component

- Repair or replace the component, also check for electrical connection and wiring harness.
- Reconnect the connector
- ON the ignition key

Use DAVIE to re-check for the presence of active faults:

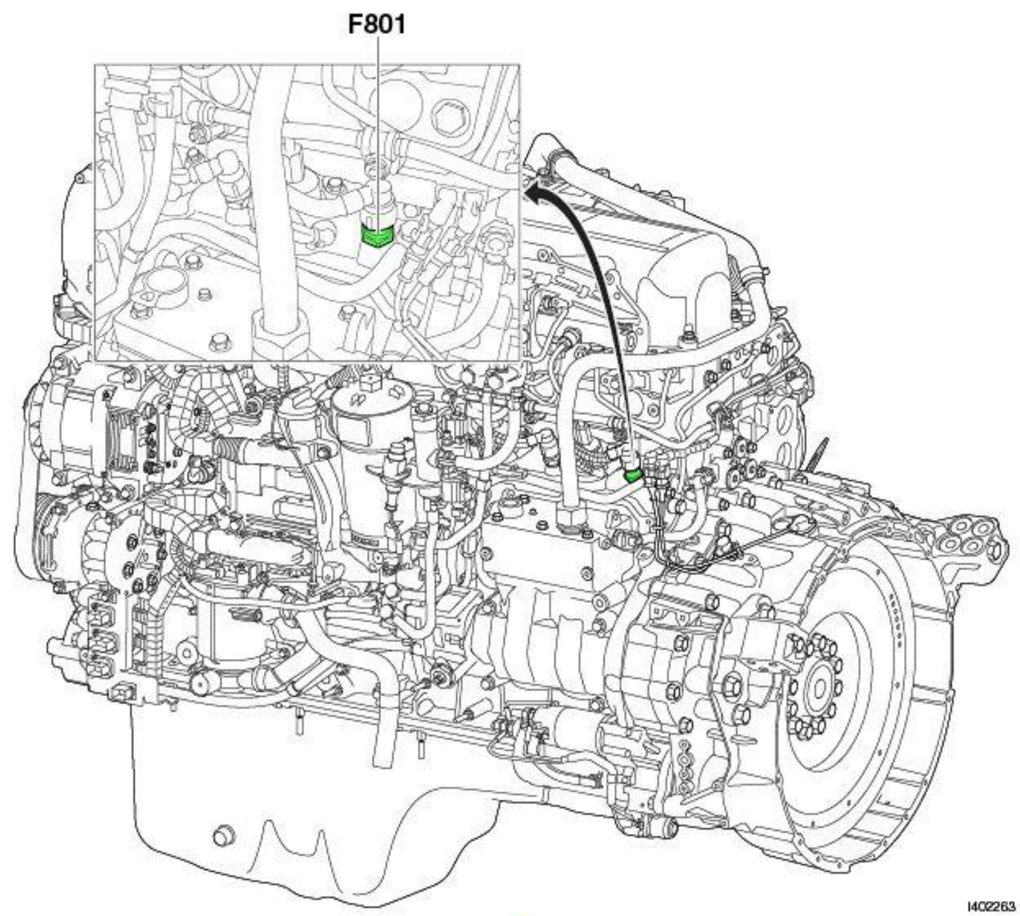
- Is DTC fault active: Proceed to step 4
- Is DTC fault inactive: Issue resolved. Clear inactive fault

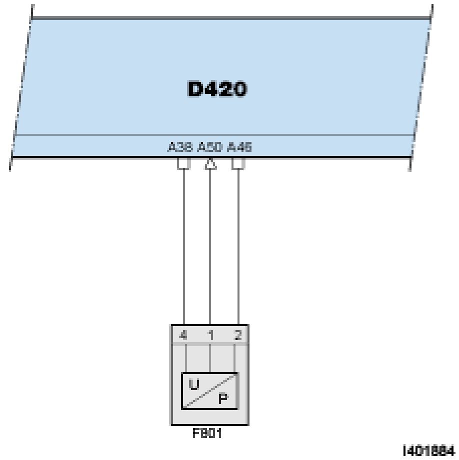
Step 4	Step ID 253B-d	SRT

For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

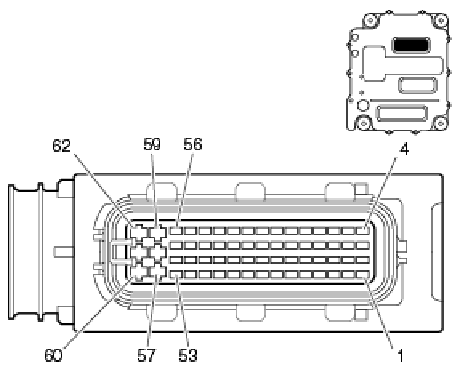
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. With the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

P2541

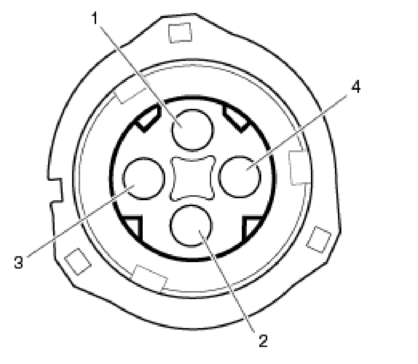
Code number	P2541
Fault code description	Fuel pressure - Voltage too low or short circuit to ground on ECU (D420) pin (A50)
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	The low-pressure fuel pressure is measured at the end of the low-pressure fuel supply gallery. Effect on the system: • Limitation of the engine torque when the fuel pressure is too low.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is running
Set condition of fault code	The PCI-2 detects sensor output voltage is too low (below 0.25 V).
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)	 D420 PCI ECU F801 Fuel pressure sensor

D420	F751	Function
A38	4	Ground
A46	2	Power supply
A50	1	Signal, fuel pressure



Wiring harness connector D420.A front view



Wiring harness connector F801 front view

Handle connectors and pins with care and use matching measuring probes.

Technical data	**Component and wiring check , fuel pressure sensor (F801)** **Component check, fuel pressure sensor (F801)** This type of component cannot be checked with a multimeter or oscilloscope. Perform

	the following to assess the component: • Monitor/test the component with DAVIE • Perform the wiring check **Component & wiring check, ECU (D420)** **Preparation** • Key off the ignition. • Disconnect connector F801 • Attach test leads to the identified connector pins, located on the front side of wiring harness connector F801 • Key on the ignition to apply power

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	4	5V	Ignition keyed on

Possible causes	• Faulty wiring • Faulty connector • Faulty sensor
Additional information	No additional information available
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.** ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly. ▪ Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors. ▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes. ▪ It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. **Step 1. Fuel Pressure Sensor (F801) Checks** **Step 1.A Visual inspection, fuel pressure sensor (F801)**

Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found, or replace the sensor if found to be damaged. Refer to step 2.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 1.B	**Go to step 1.B**

Step 1.B Electrical checks, supply voltage, fuel pressure sensor (F801)	
ℹ Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Use a multimeter to confirm the supply voltage for the fuel pressure sensor (F801) as outlined in Checking data, fuel pressure sensor (F801).	
Is the measured voltage within expected range?	
Yes	**No**
	Correct any issues found. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.
Go to step 1.C	**If this code is still present, go to step 1.C.**

Step 1.C Electrical checks, isolation of electrical short in sensor, fuel pressure sensor (F801)
ℹ Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector

pin test points.

Action

1. With ignition key set to OFF, install a jumper wire between the supply and signal terminals of the pressure sensor (F801) connector on the engine harness.
2. Set the ignition key to ON.
3. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.

If P2542 is active	If P2541 is active
Likely failed fuel pressure sensor (F801). Replace the fuel pressure sensor (F801) and reconnect the harness. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.	
If P2541 is still present after performing the above steps, contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.	**Go to step 1.D**

Step 1.D Electrical checks, isolation of electrical short in PCI, fuel pressure sensor (F801)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Set the ignition switch to OFF
2. Disconnect the engine harness from the PCI and install a jumper wire on the PCI between the supply and signal, terminals of the sensor circuit.
3. Set the ignition key to ON
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.

If P2542 is active	If P2541 is active

Possible PCI fault. Contact the PACCAR Engine Support Center for assistance in confirming this issue and replacing the harness replacing the PCI. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.	Likely short circuit in the harness. Contact the PACCAR Engine Support Center for assistance in confirming this issue and replacing the harness. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 2. Repair Verification

Step 2.A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated.

Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Start-up

   With the brakes set, start the engine and allow it to run at idle for 2 minutes.

Were the identified repair verification cycles able to be completed?

Yes	No
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 2.B	**Go to step 2.B**

Step 2.B DAVIE Diagnostics, Quick Check

Action

1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.

Has P2541 been cleared?

<table>
<tr><td></td><td>

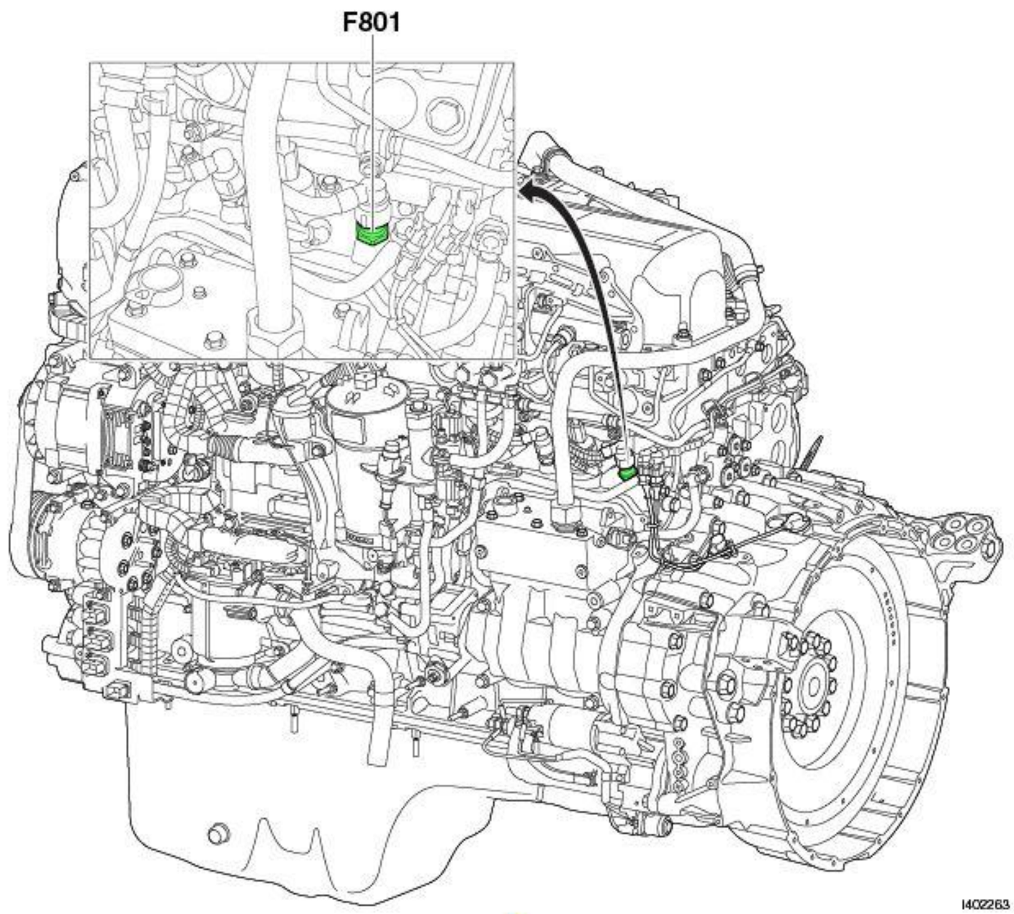
Yes	No
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

Contacting the PACCAR Engine Support Center

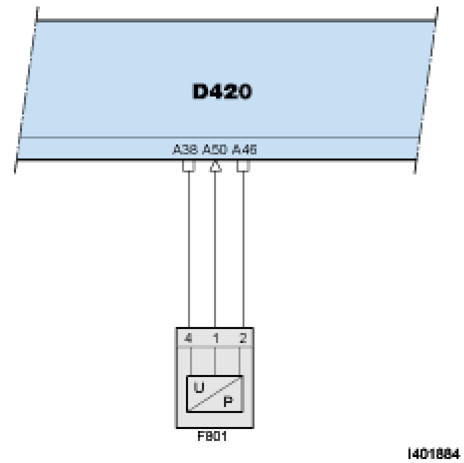
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P2542

Code number	P2542
Fault code description	Fuel pressure – Voltage too high or short circuit to supply on ECU D420 pin A50
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	The low-pressure fuel pressure is measured at the end of the low-pressure fuel supply gallery. Effect on the system: • Limitation of the engine torque when the fuel pressure is too low.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is running
Set condition of fault code	The PCI-2 detects sensor output voltage is too high (above 4.75 V).
Reset condition of fault code	To validate the repair, this fault code will change to inactive immediately after the diagnostic runs and passes.

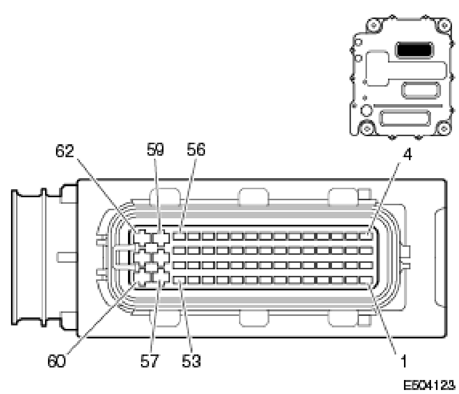
Electrical diagram(s)



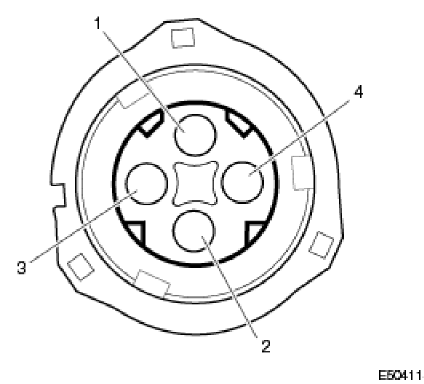
D420 PCI ECU

F801 Fuel pressure sensor

D420	F751	Function
A38	4	Ground
A46	2	Power supply
A50	1	Signal, fuel pressure



Wiring harness connector D420.A front view



Wiring harness connector F801 front view

Handle connectors and pins with care and use matching measuring probes.

<table>
<tr><td>Technical data</td><td>
Component and wiring check , fuel pressure sensor (F801)

Component check, fuel pressure sensor (F801)
This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component:
• Monitor/test the component with DAVIE
• Perform the wiring check

Component & wiring check, ECU (D420)

Preparation

• Key off the ignition.
• Disconnect connector F801
• Measure on the front side of wiring harness connector F801

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>2</td><td>4</td><td>5V</td><td>Ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>
• Faulty wiring
• Faulty connector
• Faulty sensor
</td></tr>
<tr><td>Additional information</td><td>No additional information available</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly.
▪ Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors.
▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
▪ It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.
</td></tr>
</table>

Step 1. Fuel Pressure Sensor (F801) Checks

Step 1.A Visual inspection, fuel pressure sensor (F801)	
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found, or replace the sensor if found to be damaged. Refer to step 2.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 1.B	**Go to step 1.B**

Step 1.B Electrical checks, response from disconnected sensor, fuel pressure sensor (F801)	
i — Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Set the ignition key to OFF 2. Disconnect the fuel pressure sensor (F801) from the harness. 3. Set the ignition key to ON 4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	
If P2541 is active	**If P2542 is active**
	Correct any issues found. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.
Go to step 1.C	**If this code is still present, go to step 1.D.**

Step 1.C Electrical checks, supply voltage, fuel pressure sensor (F801)	
Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Use a multimeter to confirm the supply voltage for the fuel pressure sensor (F801) as outlined in Checking data, fuel pressure sensor (F801).	
Is the measured voltage value within the expected range?	
Yes	**No**
	Investigate possible issues in the related wiring, connectors, harness, or PCI. Correct any issues found. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.
Go to step 1.D	**If this code is still present, go to step 1.D.**

Step 1.D Electrical checks, isolation of electrical short in harness, fuel pressure sensor (F801)	
Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Set the ignition switch to OFF. 2. Disconnect the engine harness from the PCI. 3. Set the ignition key to ON. 4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	
If P2541 is active	**If P2542 is active**
Contact the PACCAR Engine Support Center for assistance in confirming this issue and replacing the harness. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.	Contact the PACCAR Engine Support Center for assistance diagnosing this issue. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.**

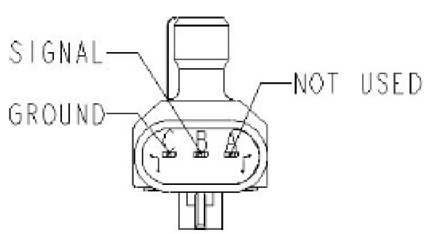
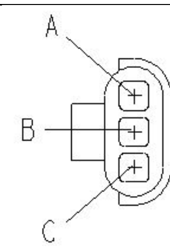
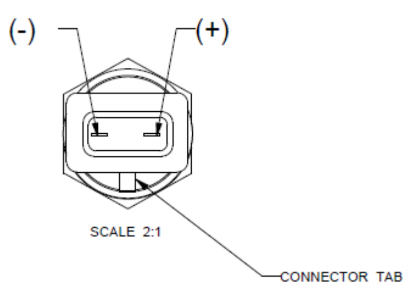
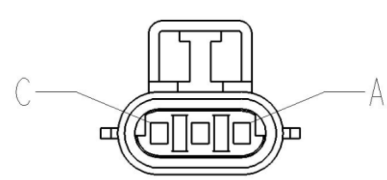
Step 2. Repair Verification

Step 2.A Repair verification cycles	
Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated. Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.	
Action 1. Start-up With the brakes set, start the engine and allow it to run at idle for 2 minutes.	
Were the identified repair verification cycles able to be completed?	
Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 2.B	**Go to step 2.B**

Step 2.B DAVIE Diagnostics, Quick Check	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.	
Has P2542 been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

	Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
	Back to Index

P2560

Code number	P2560
Fault code description	Coolant level Data valid but too low, most severe
Fault code information	1 trip, Stop Engine lamp 3 drive cycle recovery Readiness Group - None Freeze frame type – Cooling Related engine protection code – P2104
Description of component(s)	The coolant level sensor is used to measure the level of the engine coolant in the radiator top tank reservoir. The coolant level sensor is normally immersed in the coolant and returns a different signal voltage when immersed in coolant versus being out of coolant. The ECU monitors the change in the signal voltage to determine the level of the engine coolant.
Location of component(s)	The engine coolant level sensor is located in the radiator top tank or surge tank.
Diagnostic condition	This diagnostic runs continuously when the key switch is in the ON position or when the engine is running.
Set condition of fault code	The ECU detected the coolant level sensor signal voltage is between 3.25 VDC and 4.25 VDC for more than 20 seconds, indicating very low coolant level.
Reset condition of fault code	Perform a key cycle, start the engine and let it idle for 1 minute. The fault code should change to inactive immediately after passing the diagnostic run.
Electrical diagram(s)	 **Float Type, Non-Immersion Coolant Level Sensor (Behr/GenTech)**  **Float Type, Non-Immersion Coolant Level Sensor Connector**  

	Coolant Level Sensor, Contact Type	Coolant Level Sensor, Contact Type, Connector

Technical data

Coolant Level Sensor Voltage Output Ranges

2-wire, contact type sensor

Pin (+ probe)	Pin (- probe)	Level	Signal (VDC)
A	C	Normal	0.75V – 1.75V
		Low	2.00V – 3.00V
		Very Low	3.25V – 4.25V

3-wire, floating type sensor

Pin (+ probe)	Pin (- probe)	Level	Signal (VDC)
B	C	Normal	0.75V – 1.75V
		Low	2.00V – 3.00V
		Very Low	3.25V – 4.25V

Possible causes

- Unresolved P1560
- Excessive Coolant leak internally and/or externally
- Faulty sensor
- Faulty wiring

Additional information

- The OEM coolant level sensor is connected to the coolant level sensor connector (F772). See the OEM documentation for detailed information about the electrical system.
- The red warning has been activated on the driver’s display.

Diagnostic Step-by-Step

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly.
- Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
- It is necessary to exit the 'Active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1. Investigate Related Trouble Codes

Before troubleshooting this code, take notice of any other active or inactive trouble codes. One or multiple other codes could have been the cause for this code.

Step 1.A Investigate related trouble codes	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	
Are these or any other related codes active? P2558; P2559	
Yes	**No**
Possible coolant level sensor or related wiring fault. Refer to the troubleshooting information for these faults before continuing with this procedure.	
	Step 2.A

Step 2. Coolant Level Checks

Step 2. A Visual inspection, coolant level	
Action 1. Visually inspect the expansion tank reservoir for any of the following: • Coolant is below the appropriate fill level ℹ Coolant level can be lower under either of the following conditions: • if the truck is equipped with Auxiliary Power Unit or devices that require additional coolant volume • if recent cooling system service was performed without fully purging air out of the system	
Is the coolant level below the appropriate fill level?	
Yes	**No**
Possible external coolant leak.	Possible electrical problem with the sensor or wiring from the PCI ECU (D420).
Step 2.B	**Step 3.A**

Step 2.B Visual inspection, external coolant leaks

Action

1. Inspect for visible signs of a restriction or a coolant leak around the radiator and expansion tank reservoir, coolant pump, thermostat housing, coolant filter, VGT, EGR cooler, and aftertreatment system (DEF heating lines), as well as all related hoses, fittings, connections, and seals.

A suspected coolant leak originating from the coolant pump pulley shaft seal should be evaluated using the diagnosis information outlined in, Coolant leakage, coolant pump shaft seal, to determine if the leak is severe enough (a class III leak) to require replacement of the coolant pump.

Were signs of a restriction or coolant leak visible?	
Yes	**No**
Correct any issues found or replace the coolant pump if the leak matches the criteria for a class III leak. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.	Possible internal coolant leak.
If this code is still present, go to step 2.C.	**Step 2.C**

Step 2.C Special test, cooling system pressure

Action

1. Perform a basic system pressure test to determine if there may be an external leak in the cooling system.

To avoid causing damage to seals and fittings, do not apply more than 20 psi of air pressure to the cooling system.

Does the cooling system pass a basic pressure test?	
Yes	**No**
	Locate and correct the source of the leak. Fill coolant to the appropriate level. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.
Step 2.D	**If this code is still present, go to step 2.D.**

Step 2.D Special test, radiator cap pressure

Action

1. Use a standard test kit to confirm that the radiator cap functions correctly at its rated pressure level.

If the radiator cap is unable to properly regulate coolant pressure, this can effectively lower the boiling point of the liquid, leading to a possible engine overheating condition. When this happens, coolant temperature and/or system protection DTCs may also be set.

A faulty cap can also leak coolant, which typically reaches very high temperature when the vehicle is in operation. If this is the case, leaked coolant residue may be visible around the cap edges.

Does the radiator cap pass the pressure test and have the correct pressure rating for the current application?

Yes	No
	Replace the radiator cap. Fill coolant to the appropriate level. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.
Step 3.A	**If this code is still present, go to step 3.A.**

Step 3. Coolant Level Sensor Checks

Step 3. A Visual inspection, coolant level sensor (OEM)

Action

1. Visually inspect the coolant level sensor for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - ECU connections damaged or disconnected
   - Batteries are not okay, contacts are not tight
   - Signs of exhaust or coolant leaks on the EGR
   - Sensor damaged

Are any of the above conditions present?

Yes	No
Correct any issues found, or replace the coolant level sensor if found to be damaged or broken. Refer to Step 4.A to perform the corresponding repair verification cycles.	

If this code is still present, go to Step 3.B.	**Go to step 3.B**

Step 3.B Electrical checks, signal voltage, coolant level sensor (OEM)

Refer to the corresponding OEM data resources for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the coolant level is normal, the sensor is connected, and ignition key is set to ON.

   If the sensor is three wire:

   a. Measure the voltage drop across pins B and C of the coolant level sensor.

   If the sensor is a two wire:

   b. Measure the voltage drop across pins A and B of the coolant level sensor.

Is the measured voltage value within 0.75V – 1.75V?

Yes	No
	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 4.A to perform the corresponding repair verification cycles.
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	

Step 4. Repair Verification

Step 4.A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated.

Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Power-Up/Electrical
   With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.

Were the identified repair verification cycles able to be completed?

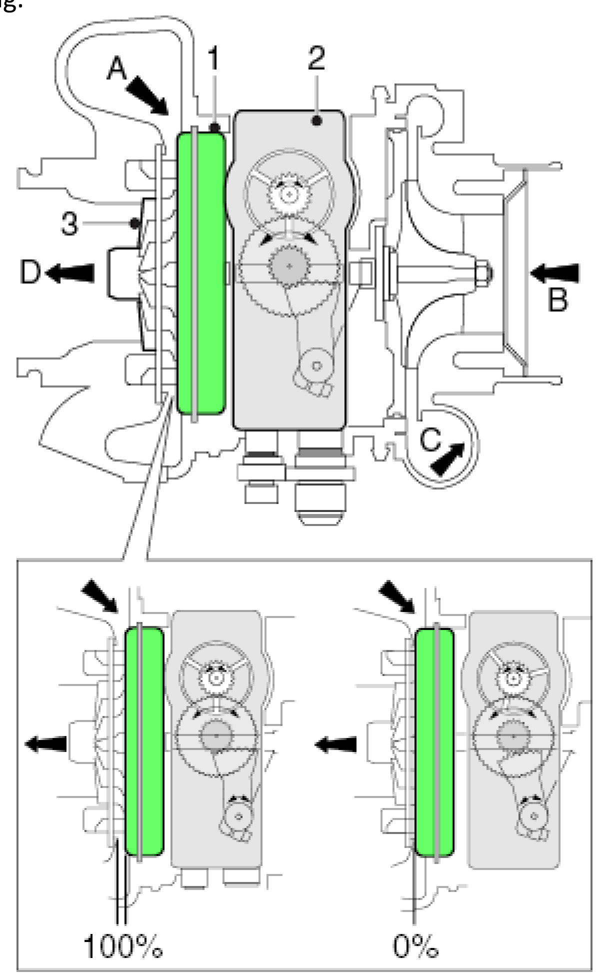
Yes	No
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 4.B	**Go to step 4.B**

Step 4.B DAVIE Diagnostics, Quick Check	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.	
Has P2560 reset?	
Yes	**No**
Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	Problem resolved. No further actions needed.

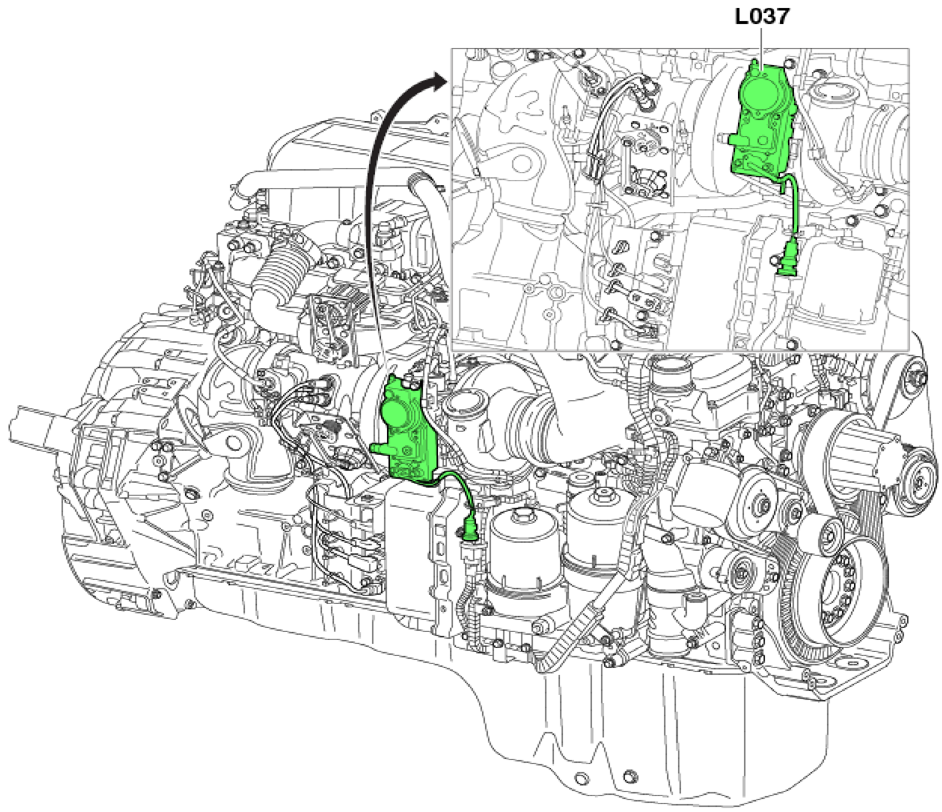
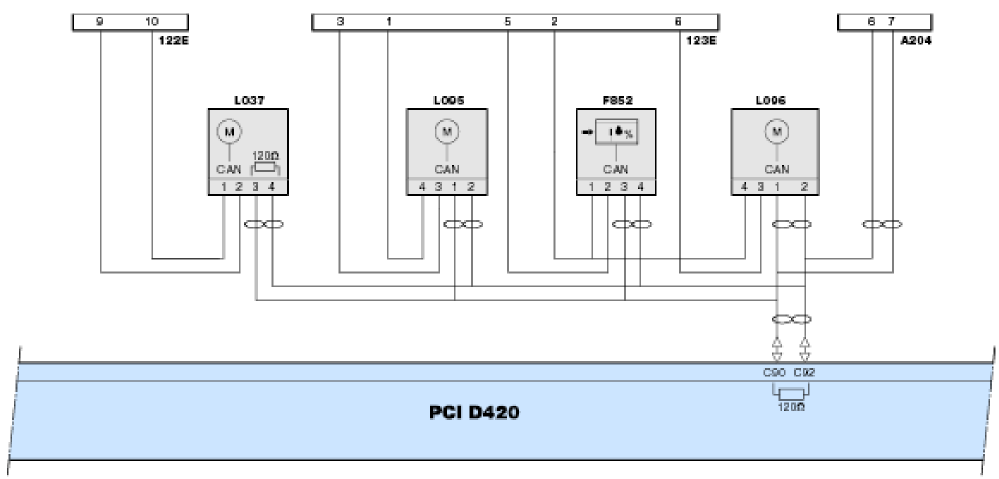
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

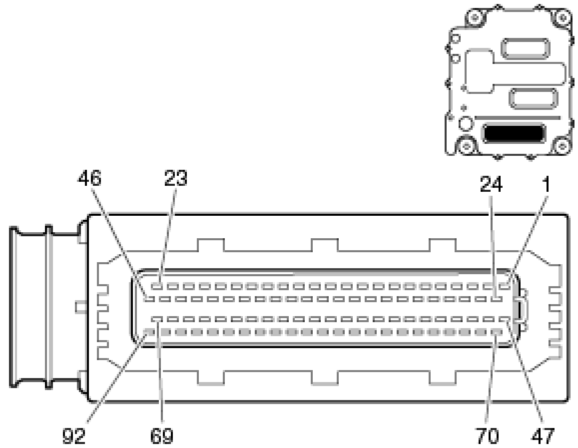
Back to Index

P2563

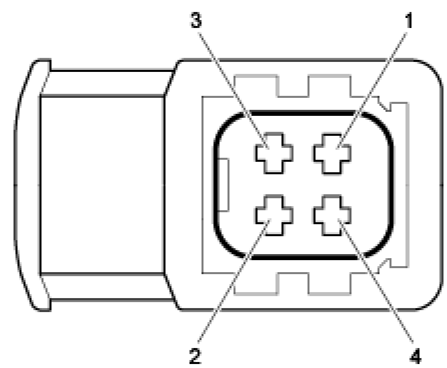
Code number	P2563
Fault code description	VTG turbo charger actuator position – No or too slow movement
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –Boost
Description of component(s)	The main task of the VTG turbo charger actuator is to control the turbo charger nozzle ring position. The gas flow guidance into the turbine rotor is controlled by the position of the turbo charger nozzle ring.  The main components of the VTG turbo charger actuator are: • ECU • Electromotor • The electromotor rotates the output shaft via internal gears. • output shaft • The nozzle ring mechanism is moved via a sector gear by rotating the output shaft • output shaft position sensor • The position of the actuator output shaft is monitored with an internal sensor and a reference magnet (reference point). • temperature sensor

	• The temperature of the printed circuit board of the ECU is monitored. Control The VTG turbo charger actuator is a smart actuator that communicates with the PCI ECU via E-CAN. The actuator ECU is controlled by the PCI ECU but has its own diagnostics on the following actuator inputs and outputs: • power supply voltage • electromotor current • The effort to move the nozzle ring is monitored. • output shaft position • The mechanical end positions of the nozzle ring mechanism are monitored. • ECU printed circuit board temperature • ECU hardware and software Learn sweep After the ignition is keyed on, a learn sweep is performed by the actuator. During this sweep the VTG turbo charger nozzle ring is fully opened and fully closed to check the mechanical end positions of the nozzle ring mechanism. Unpowered and fail-safe position The unpowered and fail-safe position of the actuator is 80%. If a failure is detected the VTG actuator moves to the fail-safe position, if possible. Effect of actuator on the system: • controlling the VTG turbo charger In general, a lower opening percentage results in a higher turbo speed and therefore in a higher boost pressure. The controlled opening percentage also depends on other conditions, such as the required EGR flow (pressure before turbine). • controlling the pressure before turbine to generate EGR flow and back pressure during engine braking.

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The VTG turbo charger actuator (L037) detects: • a difference between the required and actual actuator motor position of more than 8.9% for more than 40 seconds, with • an actuator effort of more than 38%, with • an actuator temperature of more than 5°C.
Reset condition of fault code	This DTC will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	



Wiring harness connector D420.C front view



Wiring harness connector L037

122E	12-pin interface connector
123E	7-pin interface connector
A204	electronic fan interface connector
D420	PCI ECU
F852	humidity sensor
L037	VTG turbocharger actuator
L095	EGR valve module
L096	BPV valve

D420	L037	Function
C90	3	E-CAN high
C92	4	E-CAN low
	1	Power supply after ignition
	2	Ground

Technical data

Component check, VTG turbocharger actuator (L037)
Preparation

- Key off the ignition.
- Disconnect connector L037
- Measure on component L037

<table>
<tr>
<td></td>
<td>
<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>3</td><td>4</td><td>± 120 Ω</td><td></td></tr>
</table>
Wiring check, VTG turbocharger actuator (L037)
Preparation

Key off the ignition.
Disconnect connector L037
Measure on component connector L037

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>Ubat</td><td>Ignition keyed on</td></tr>
<tr><td>3</td><td>4</td><td>± 120 Ω</td><td>Ignition keyed off
Ground cable from the battery disconnected
Vehicle Communication Interface (VCI) of DAVIE disconnected</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>Faulty actuator or turbo charger nozzle ring mechanism.
Check the actuator and the turbo charger nozzle ring mechanism:

Remove the actuator. Check the sector gear travel.
Check the actuator output gear for damage
Check the actuator output gear for adequate rotation (minimum of one complete rotation).
Re-initialize the turbo actuator after installation.

</td>
</tr>
<tr>
<td>Additional information</td>
<td>The VTG turbo charger actuator controls the actuator motor position and therefore the turbo charger nozzle ring and the effort to move the nozzle ring.</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>Please perform the troubleshooting steps below utilizing the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components.

This troubleshooting tree is based on the assumption that supply power and ground to the PCI is functioning properly.
Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

<table>
<tr><td>Step 1</td><td>Step ID 2563a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins)</td></tr>
</table>
</td>
</tr>
</table>

and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.

Step 2	Step ID 2563b	SRT

DAVIE Direct Test: Turbo Actuator Effort
Run the prescribed DAVIE Direct test to determine correct operation of the VGT Actuator.
Does the test fail to complete or result in a failed state?

- No: Continue to the next step in the troubleshooting process.
- Yes: Make the appropriate repairs or component replacements.

Use DAVIE to re-check for the presence of active faults.

- Fault inactive – issue resolved.
- Fault active – Proceed to step 3

Step 3	Step ID 2563c	SRT

Ancillary Test: Air Side Pressure
Perform the prescribed testing to determine if there are any leaks in the air system.
Does the test fail to complete or result in a failed state?

- No: Continue to the next step in the troubleshooting process.
- Yes: Make the appropriate repairs or component replacements.

Use DAVIE to re-check for the presence of active faults.

- Fault inactive – issue resolved.
- Fault active – Proceed to step 4

Step 4	Step ID 2563d	SRT

Ancillary Test: Turbo Actuator Span
Perform the prescribed testing to manually check the turbo sector gear range of motion.
Does the test fail to complete or result in a failed state?

- No: Skip to Step 6 in this troubleshooting process, to recalibrate the turbocharger actuator.
- Yes: Continue to Step 5 in this troubleshooting process, to replace the turbocharger actuator.

Step 5	Step ID 2563e	SRT

Replace: Turbocharger Actuator
If no problems were detected in the preceding steps, an internal problem has most likely occurred with the turbocharger actuator.
Replace the identified faulty component.

- Fault inactive – issue resolved.
- Fault active – Proceed to step 6

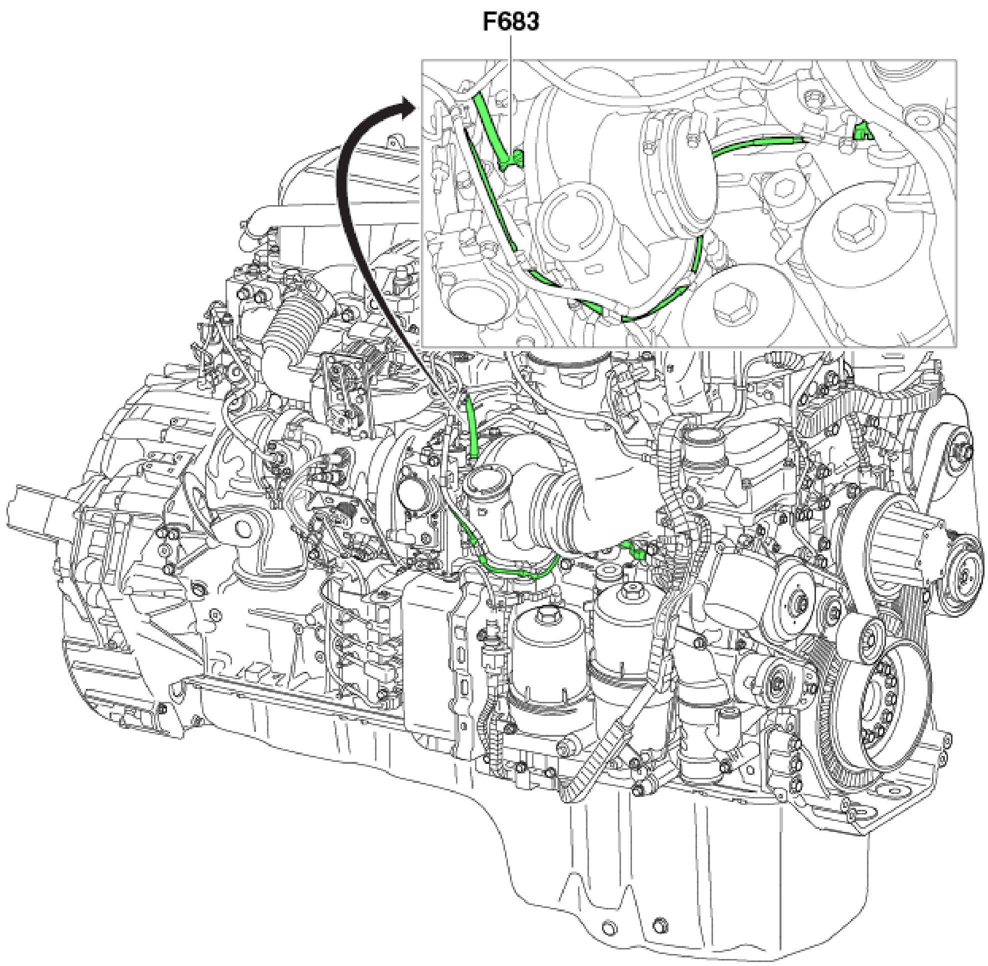
Step 6	Step ID 2563f	SRT

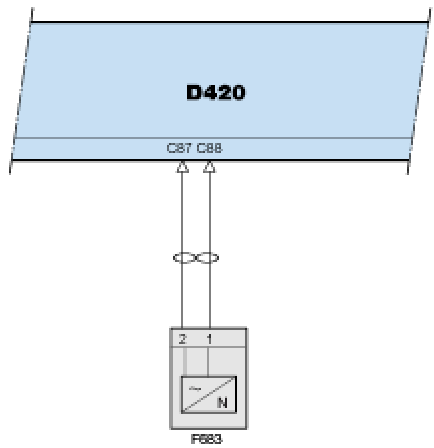
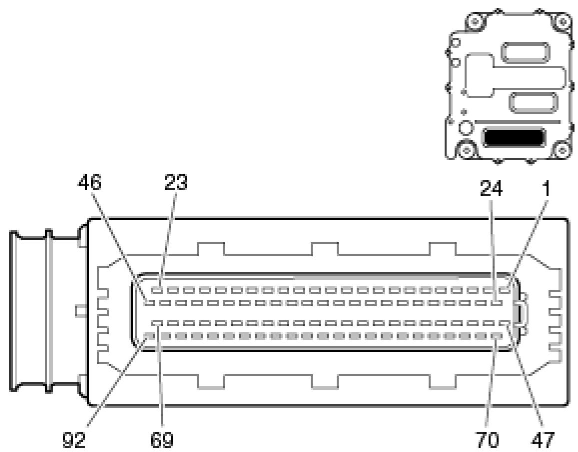
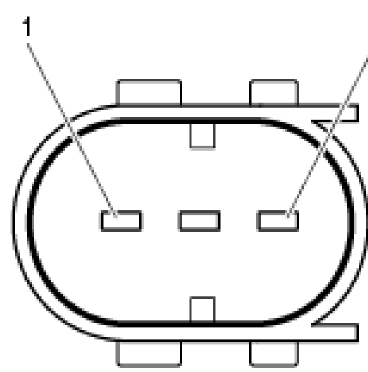
DAVIE Direct Test: Turbo Actuator (VGT) Replacement
Run the prescribed DAVIE Direct test to initialize/calibrate the turbocharger actuator.
To run the Turbocharger Actuator (VGT) Replacement, the actuator needs to be

<table>
<tr><td></td><td>electrically connected but NOT installed.
Re-install the Turbo Actuator. Start the engine and allow it to idle for a minimum of 10 minutes before verifying if the fault has gone inactive.
• Fault inactive – issue resolved.
• Fault active – Proceed to step 7

<table><tr><td>Step 7</td><td>Step ID 2563g</td><td>SRT</td></tr><tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr></table></td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P2579

Code number	P2579
Fault code description	Turbo speed - Abnormal rate of change
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –Boost
Description of component(s)	The turbo speed is monitored on the turbine-compressor shaft. Effect on the system: • Turbo charger speed limiting • The engine torque is limited if the speed is too high. • Stalled turbo charger detection • Calculates the exhaust gas temperature before the turbine • A higher measured turbo speed results in lower calculated exhaust gas temperature before the turbine. • Diagnostic check on the boost pressure system.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is running
Set condition of fault code	The PCI ECU (D420) detects that the measured turbo speed signal is changing abnormally.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the

	repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.C front view  Component connector F683 D420 PCI ECU F683 turbo speed sensor

<table>
<tr><td></td><td>

D420	F683	Function
C87	2	Signal, turbo speed
C88	1	Ground

</td></tr>
<tr><td>Technical data</td><td>
Component check, turbo speed sensor (F683)
Preparation

Key off the ignition.
Disconnect connector F683.
Measure on component connector F683.

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	600–1000 Ω	Resistance value at 20°C [68°F]

</td></tr>
<tr><td>Possible causes</td><td>

Faulty turbo speed sensor wiring
Faulty turbo speed sensor

</td></tr>
<tr><td>Additional information</td><td>

The turbo speed is measured by the turbo speed sensor (F683).
Engine torque is reduced.

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components.

This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly.
Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data in Rapido.
It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step 1	Step ID 2579a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2579b	SRT
With key OFF, disconnect the turbo speed sensor. Measure the resistance between the signal and ground pins of the turbo speed sensor. Resistance values change with temperature. • If the resistance is acceptable – Proceed to step 3 • If the resistance is NOT acceptable – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document		

Step 3	Step ID 2579c	SRT

</td></tr>
</table>

With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all the wires associated with the turbo speed sensor:

- If the continuity is acceptable – Proceed to step 4.
- If the continuity is NOT acceptable – Replace and reconnect the harness then proceed to the verification procedure listed at the end of this document.

Step 4	Step ID 2579d	SRT

With key OFF, inspect the connection pins of the harness, sensor, and PCI:

- If the pins are acceptable – Proceed to step 5.
- If the pins are NOT acceptable – Replace and reconnect the engine harness. Proceed to the verification procedure listed at the end of this document.

Step 5	Step ID 2579e	SRT

With key OFF, disconnect the turbo speed sensor and remove it from the turbo. Check for damaged housing or contact with the shaft:

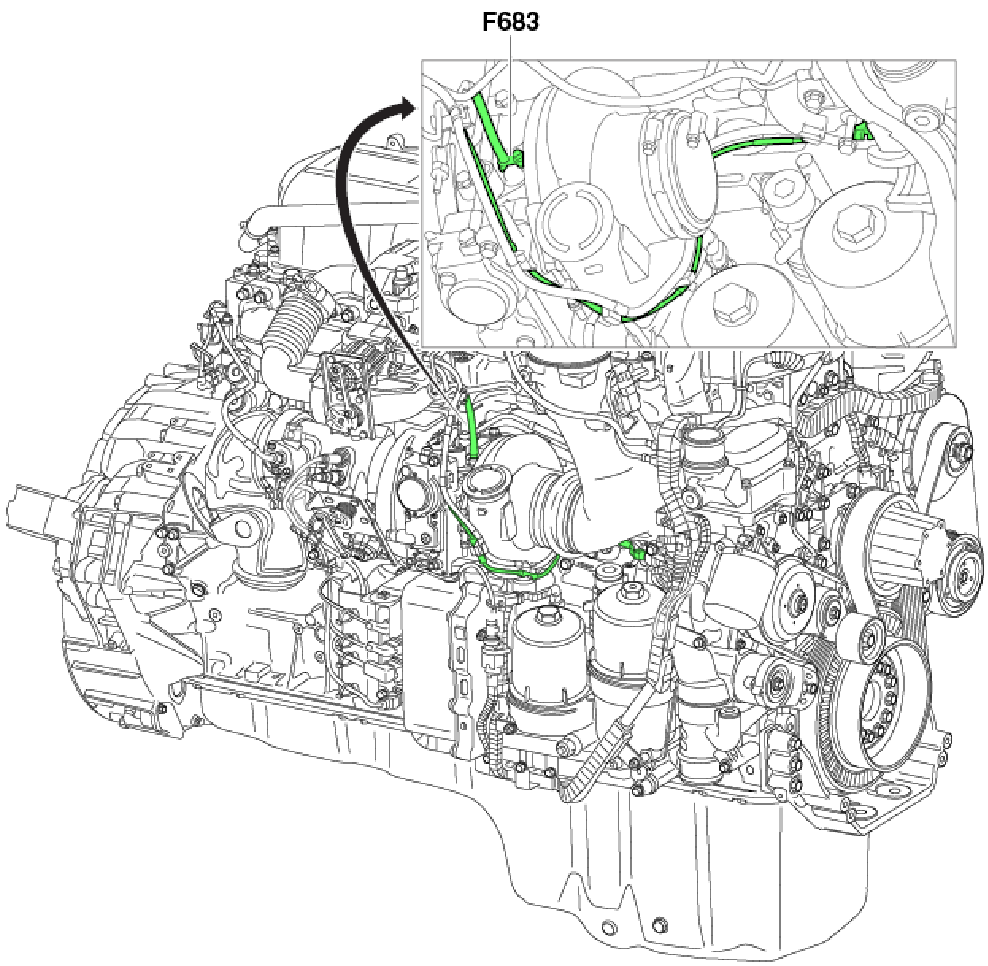
- If no damage is found – Proceed to step 6.
- If damage is found – Contact the Engine Support Center for further instructions

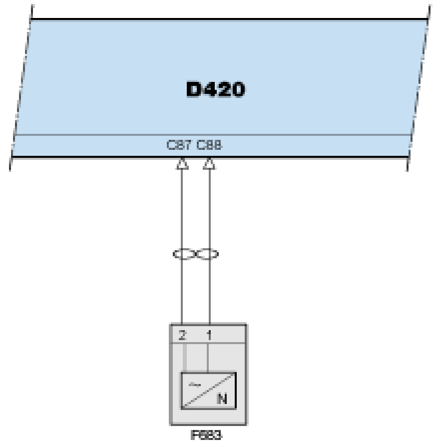
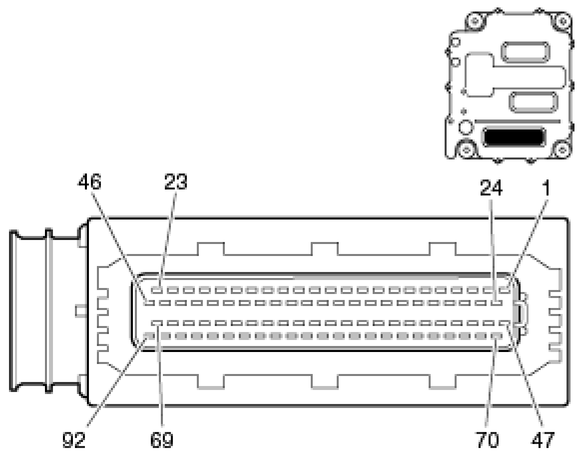
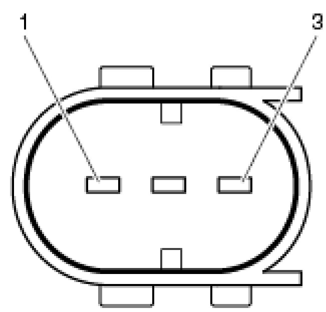
Step 6	Step ID 2579f	SRT

For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

Verification Drive Cycle	To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
	Back to Choose Code Back to Index

P2580

Code number	P2580
Fault code description	Turbo speed – Voltage too low or short circuit to ground on ECU D420 pin C87
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –Comprehensive
Description of component(s)	The turbo speed is monitored on the turbine-compressor shaft. Effect on the system: • Turbo charger speed limiting • The engine torque is limited if the speed is too high. • Stalled turbo charger detection • Calculates the exhaust gas temperature before the turbine • A higher measured turbo speed results in lower calculated exhaust gas temperature before the turbine. • Diagnostic check on the boost pressure system.
Location of component(s)	
Diagnostic condition	This diagnostic runs when: • the engine speed is above 1000 rpm, and • the engine is moderately loaded.

Set condition of fault code	The PCI ECU (D420) detects that the turbo speed is below 30,000 rpm for more than 20 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	  Wiring harness connector D420.C front view  Component connector F683 D420 PCI ECU F683 turbo speed sensor D420 F683 Function C87 2 Signal, turbo speed C88 1 Ground
Technical data	Component check, turbo speed sensor (F683) Preparation

<table>
<tr><td></td><td>

Key off the ignition.
Disconnect connector F683.
Measure on component connector F683.

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>600–1000 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>

Faulty wiring
Faulty connector
Faulty sensor

</td></tr>
<tr><td>Additional information</td><td>Engine torque is reduced.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components.

This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly.
Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data in Rapido.
It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

<table>
<tr><td>Step 1</td><td>Step ID 2580a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 2580b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the turbo speed sensor. Measure the resistance between the signal and ground pins of the turbo speed sensor.

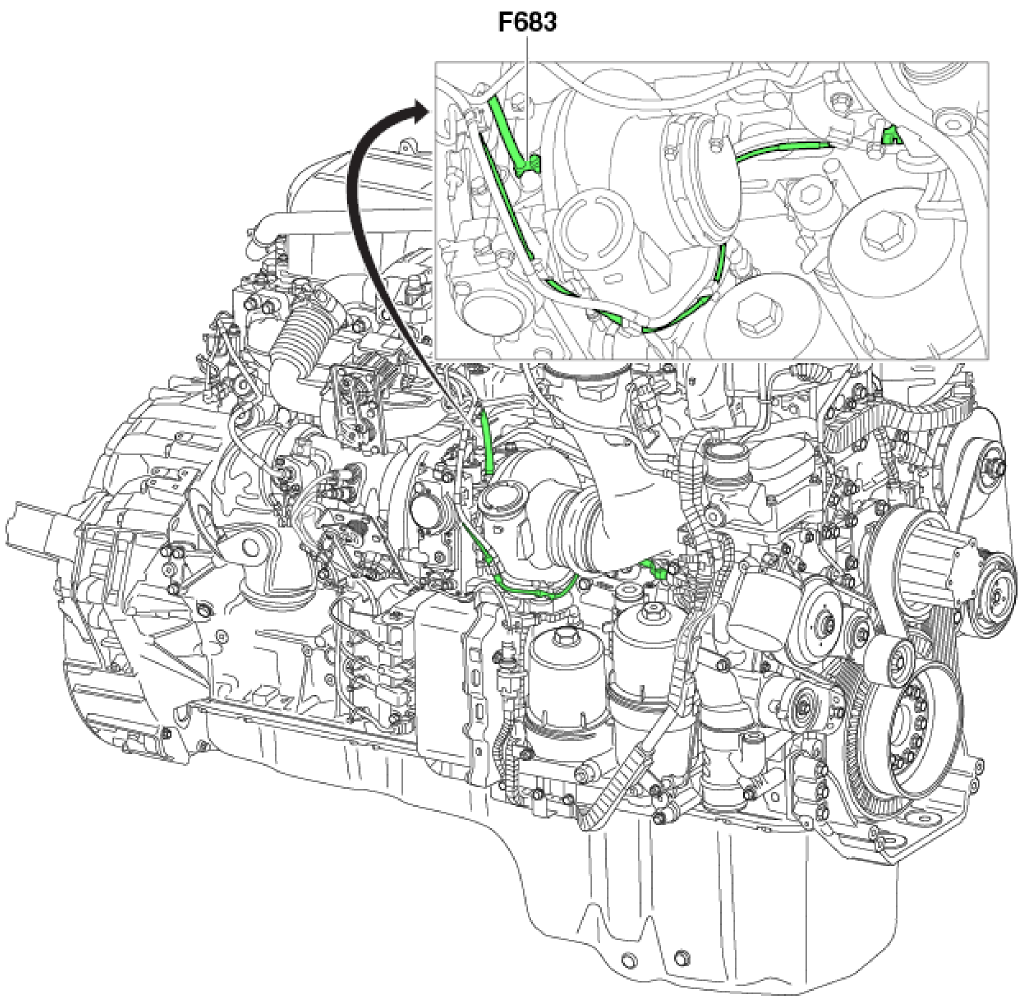
Resistance values change with temperature.

If the resistance is acceptable – Proceed to step 3
If the resistance is NOT acceptable – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 2580c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all the wires associated with the turbo speed sensor:

If the continuity is acceptable – Proceed to step 4.
If the continuity is NOT acceptable – Replace and reconnect the harness, then proceed to the verification procedure listed at the end of this document.
</td></tr>
</table>
</td></tr>
</table>

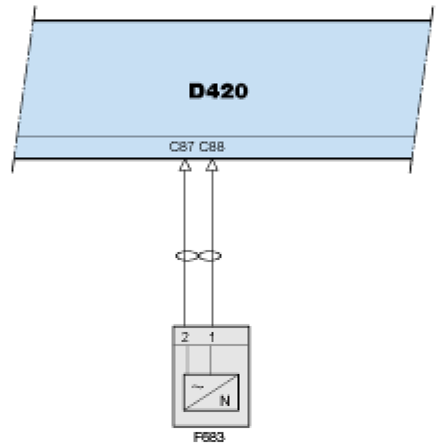
	Step 4 / Step ID 2580d / SRT With key OFF, inspect the connection pins of the harness, sensor, and PCI: • If the pins are acceptable – Proceed to step 5. • If the pins are NOT acceptable – Replace and reconnect the engine harness. Proceed to the verification procedure listed at the end of this document. Step 5 / Step ID 2580e / SRT With key OFF, disconnect the turbo speed sensor and remove it from the turbo. Check for damaged housing or contact with the shaft: • If no damage is found – Proceed to step 6. • If damage is found – Contact the Engine Support Center for further instructions Step 6 / Step ID 2580f / SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
	Back to Choose Code Back to Index

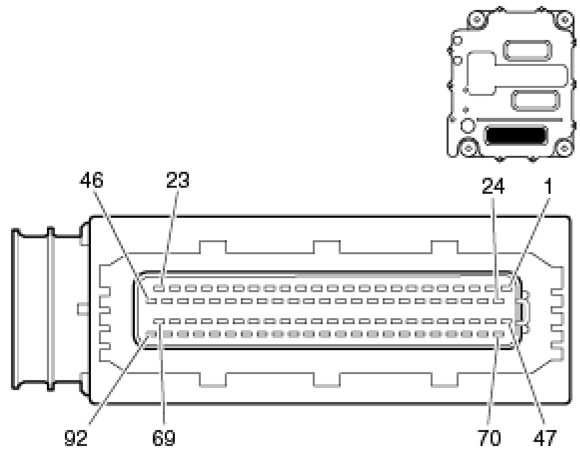
P2581

Code number	P2581
Fault code description	Turbo speed – Voltage too high or short circuit to supply on ECU D420 pin C87
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –Comprehensive
Description of component(s)	The turbo speed is monitored on the turbine-compressor shaft. Effect on the system: • Turbo charger speed limiting • The engine torque is limited if the speed is too high. • Stalled turbo charger detection • Calculates the exhaust gas temperature before the turbine • A higher measured turbo speed results in lower calculated exhaust gas temperature before the turbine. • Diagnostic check on the boost pressure system.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is running
Set condition of fault code	The PCI-2 detects a turbo speed above 129,999 rpm for more than 3 seconds.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and

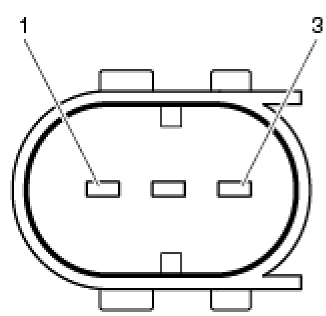
	passes.

Electrical diagram(s)





Wiring harness connector D420.C front view



Component connector F683

D420	PCI ECU
F683	turbo speed sensor

D420	F683	Function
C87	2	Signal, turbo speed

	C88 1 Ground
Technical data	Component check, turbo speed sensor (F683) Preparation • Key off the ignition. • Disconnect connector F683. • Measure on component connector F683. Pin (+ probe) | Pin (- probe) | Value | Additional information 1 | 2 | 600–1000 Ω | Resistance value at 20°C [68°F]
Possible causes	• Faulty wiring • Faulty connector • Faulty sensor
Additional information	Engine torque is reduced.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components. • This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly. • Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data in Rapido. • It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step 1	Step ID 2581a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 2581b	SRT
With key OFF, disconnect the turbo speed sensor. Measure the resistance between the signal and ground pins of the turbo speed sensor. Resistance values change with temperature. • If the resistance is acceptable – Proceed to step 3 • If the resistance is NOT acceptable – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document.		

Step 3	Step ID 2581c	SRT

	With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all the wires associated with the turbo speed sensor: • If the continuity is acceptable – Proceed to step 4. • If the continuity is NOT acceptable – Replace and reconnect the harness, then proceed to the verification procedure listed at the end of this document.

Step 4	Step ID 2581d	SRT
With key OFF, inspect the connection pins of the harness, sensor, and PCI: • If the pins are acceptable – Proceed to step 5. • If the pins are NOT acceptable – Replace and reconnect the engine harness. Proceed to the verification procedure listed at the end of this document.		

Step 5	Step ID 2581e	SRT
With key OFF, disconnect the turbo speed sensor and remove it from the turbo. Check for damaged housing or contact with the shaft: • If no damage is found – Proceed to step 6. • If damage is found – Contact the Engine Support Center for further instructions		

Step 6	Step ID 2581f	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		

Step 7	Step ID 2581g	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

Verification Drive Cycle	To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
	Back to Choose Code Back to Index

P2603

Code number	P2603
Fault code description	Coolant pump speed - Voltage too high or short circuit to supply on ECU D420 pin C64
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	Please contact the Engine Support Center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

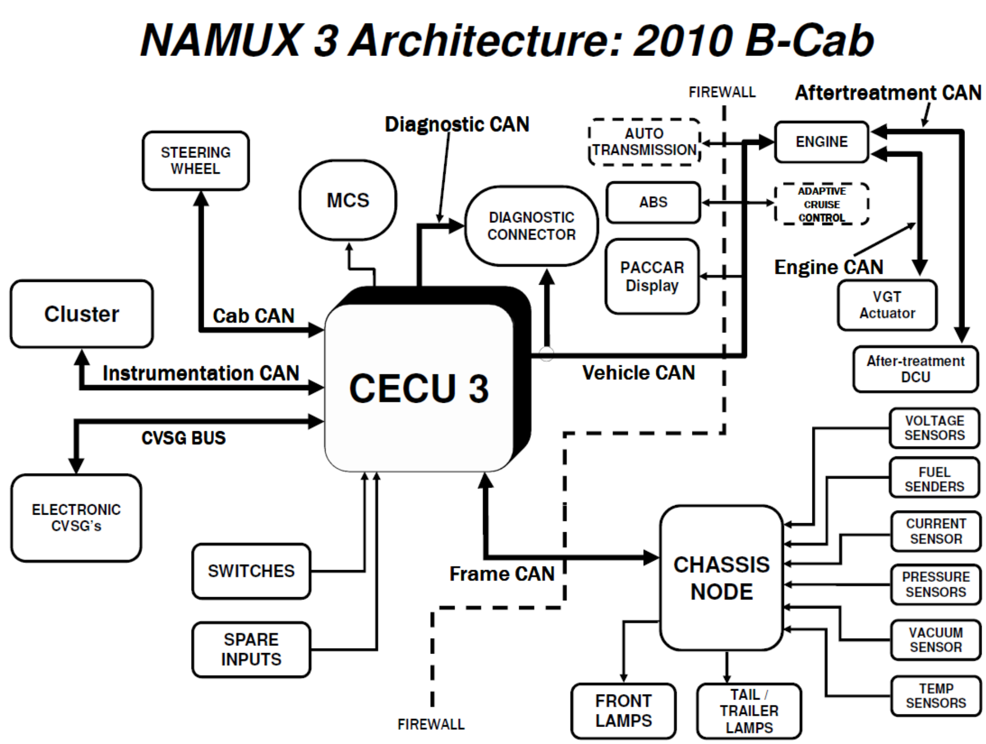
P2609

Code number	P2609
Fault code description	Grid heater relay - Current too low or open circuit
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

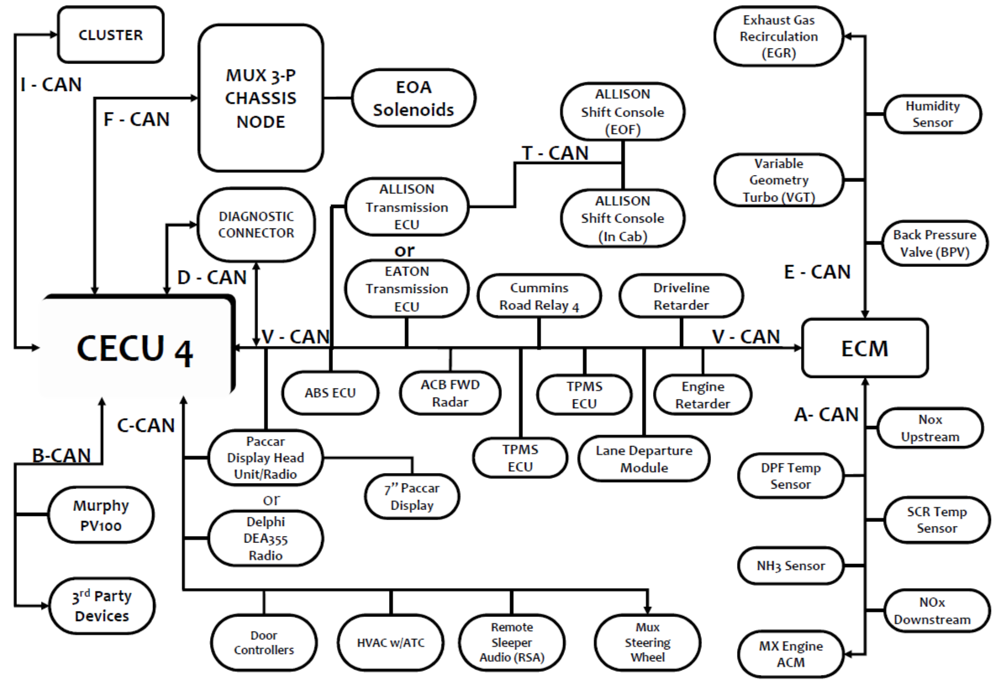
P3003

Code number	P3003
Fault code description	Battery supply low
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Engine protection
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Choose Code Back to Index

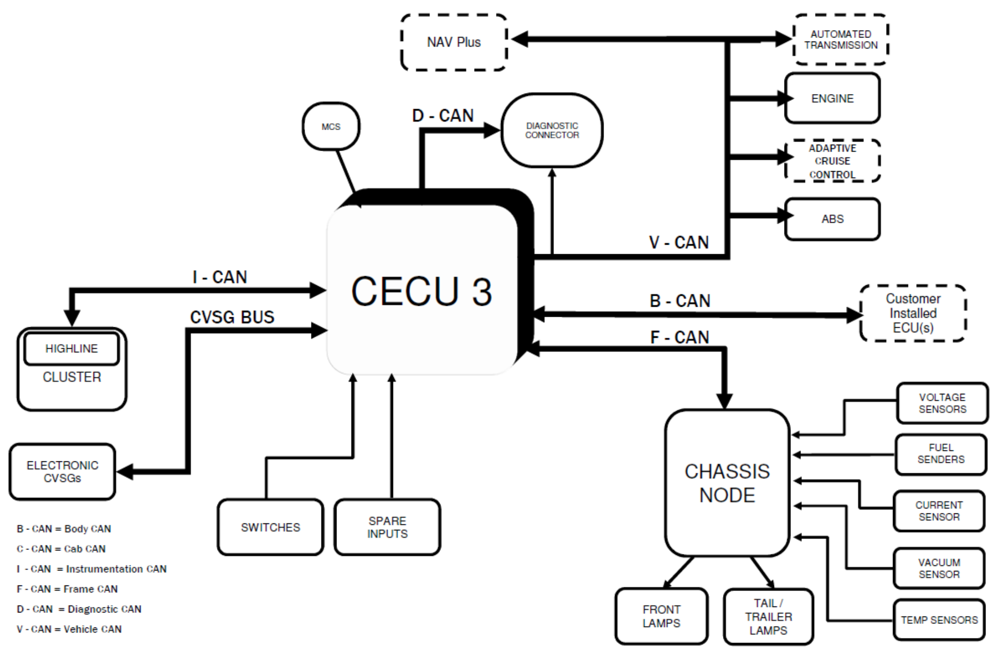
P30B3

Code number	P30B3
Fault code description	CAN communication – Message (AT1IG1) rate too low from NOx sensor before catalyst
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	This code relates to a communication issue and not to a specific component.
Location of component(s)	This code relates to a communication issue and not to a specific component.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	CAN command message (AT1IG1) is missing for more than 3 seconds.
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.
Electrical diagram(s)	

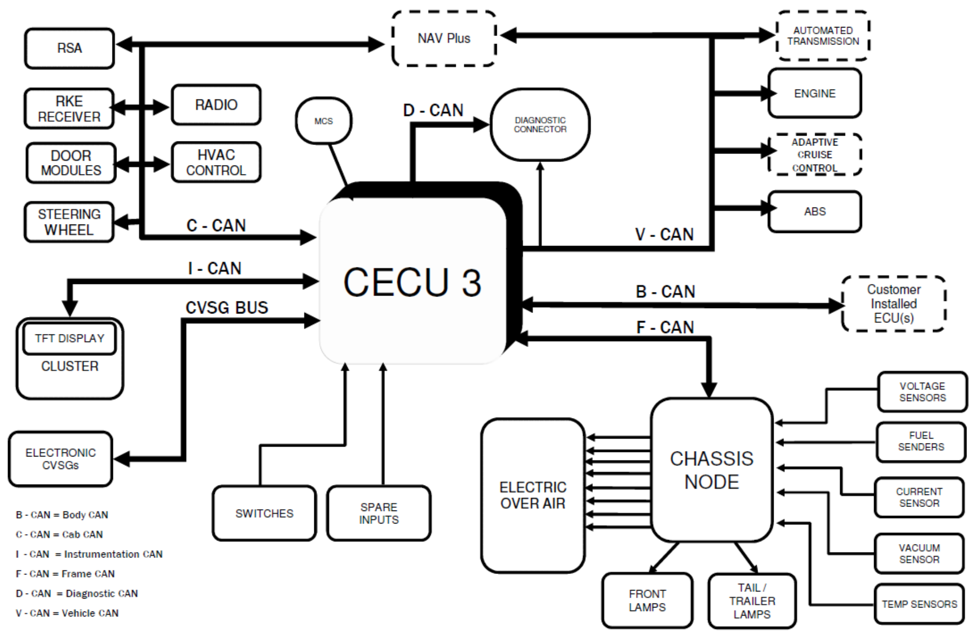
NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



NAMUX 4 Architecture



Technical data

This code relates to a communication issue and not to a specific component.

Possible causes

- Breakdown in communication in the CAN network
- Interruption, short circuit to ground, or short circuit to supply in the CAN network wiring

Additional information

No additional information available

Diagnostic Step-by-Step

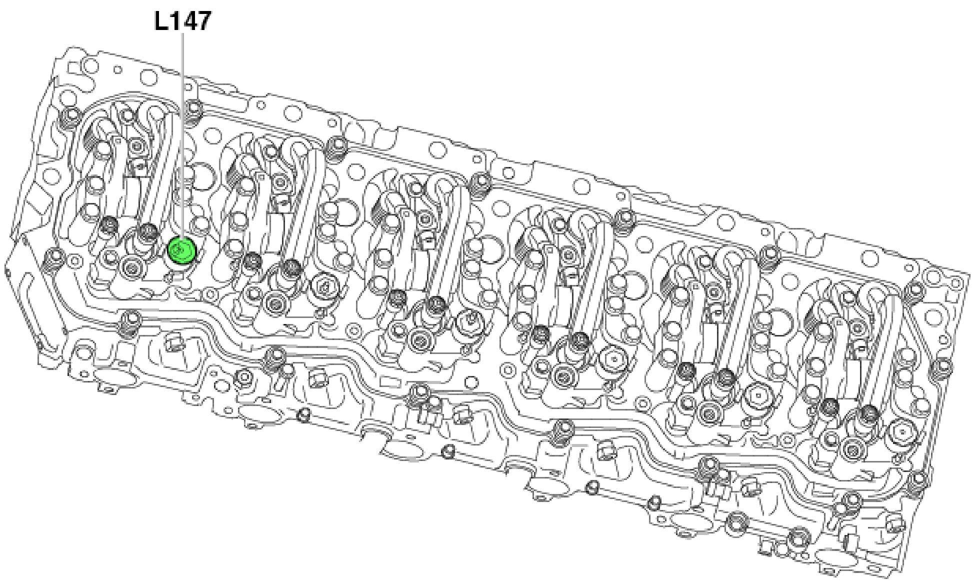
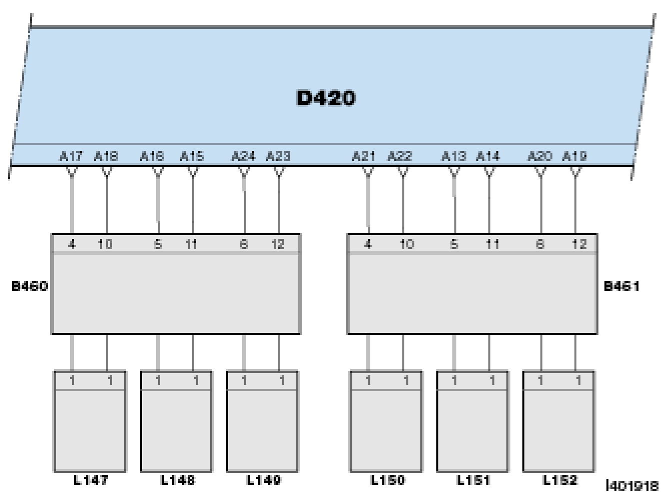
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

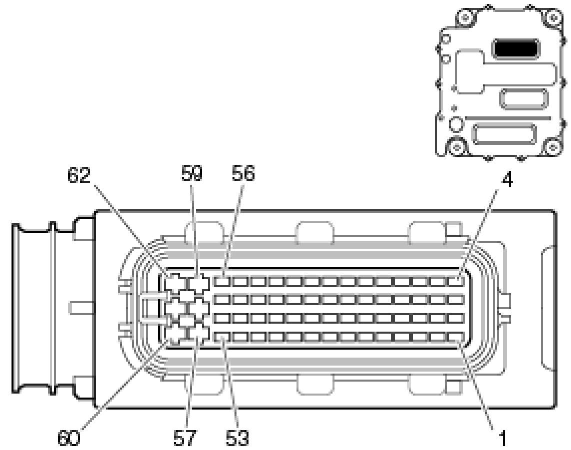
- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 30B3a	SRT
Visual Inspection OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure.		

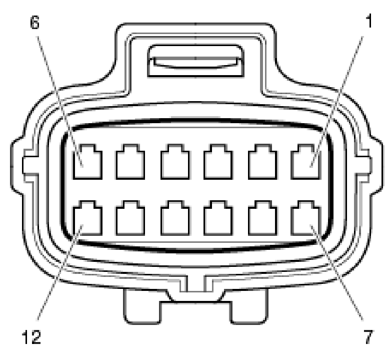
	Was there evidence of any of the above? • No: Proceed to step 2. • Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, Proceed to step 2 **Step 2** | Step ID 30B3b | SRT Data check • Lookup the technical data of the specific system • Perform the checking data test of the specific component Is test pass? • No: Proceed to step 3 • Yes : Proceed to step4 **Step 3** | Step ID 30B3c | SRT Repair or replace component • Repair or replace the component, also check for electrical connection and wiring harness. • Reconnect the connector • ON the ignition key Use DAVIE to re-check for the presence of active faults: • Is DTC fault active: Proceed to step 4 • Is DTC fault inactive: Issue resolved. Clear inactive fault. **Step 4** | Step ID 30B3d | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To verify the repair: With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. With the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Choose Code Back to Index

P3405

Code number	P3405
Fault code description	Engine brake solenoid valve Cylinder 1 - Current too low or open circuit on ECU D420 pin A17
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 Connector cylinders 1-3
B461 Connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinder 4-6

D420	B460	L150	L151	L152	Function
A13	11		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	5		1		Ground
A19	4			1	Ground
A20	10			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	12	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	6	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

<table>
<tr><td></td><td>
Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>This information will be added to the diagnostic when it becomes available.</td></tr>
<tr><td>Additional information</td><td>No additional information available.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3405a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 3405b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON, and measure the voltage between the signal terminal on the encapsulated harness and a battery ground:

If the measured voltage is approximately 3.5 V – Proceed to step 3.
If the measured voltage is 0.0 V – Proceed to step 7
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 3405c</td><td>SRT</td></tr>
</table>
</td></tr>
</table>

With key OFF, disconnect the pass-through connector and measure the resistance between the ground terminal on the encapsulated harness and a battery ground:

- Closed circuit found – Proceed to step 4.
- If open circuit or >100,000 ohms are found – Proceed to step 8

Step 4	Step ID 3405d	SRT

With key OFF, disconnect the signal connector circuit from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal connector and a battery ground:

- If the measured voltage is approximately 3.5 V – Proceed to step 5.
- If the measured voltage is 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 5	Step ID 3405e	SRT

With key OFF, disconnect the ground connector from the engine brake solenoid, and measure the resistance between the ground terminal wire and battery ground:

- Closed circuit found – Proceed to step 6.
- If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 6	Step ID 3405f	SRT

With key OFF, disconnect both connectors from the engine brake solenoid, and measure the resistance between the terminals on the solenoid (refer to your multimeter operation manual for the correct resistance test procedure).

- Closed circuit found – Proceed to step 7.
- If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 7	Step ID 3405g	SRT

With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the engine brake signal circuit terminal of the PCI and battery ground:

- If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If the measured voltage is 0.0 V – Proceed to step 9.

Step 8	Step ID 3405h	SRT

With key OFF, disconnect the encapsulated harness at the PCI, and measure the resistance across the ground terminal on the PCI and a battery ground:

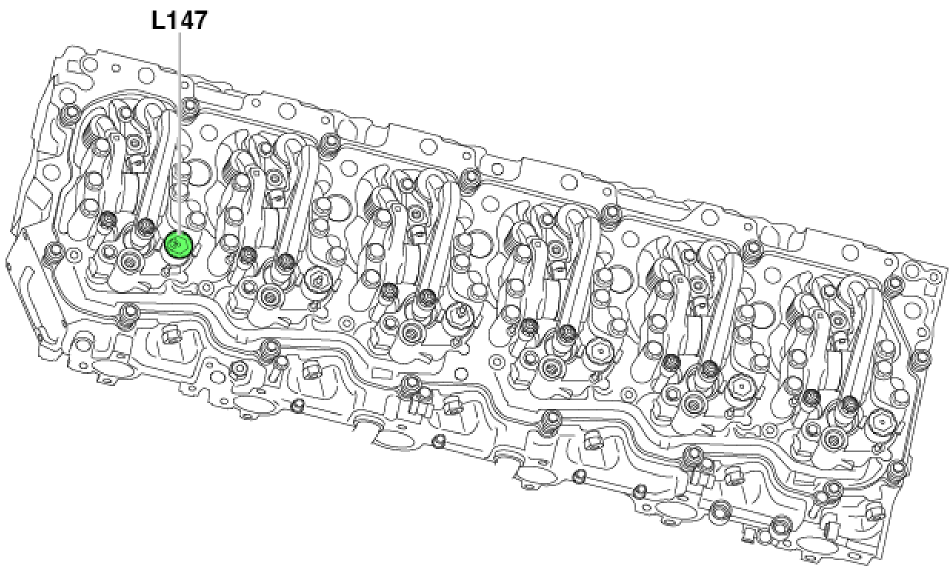
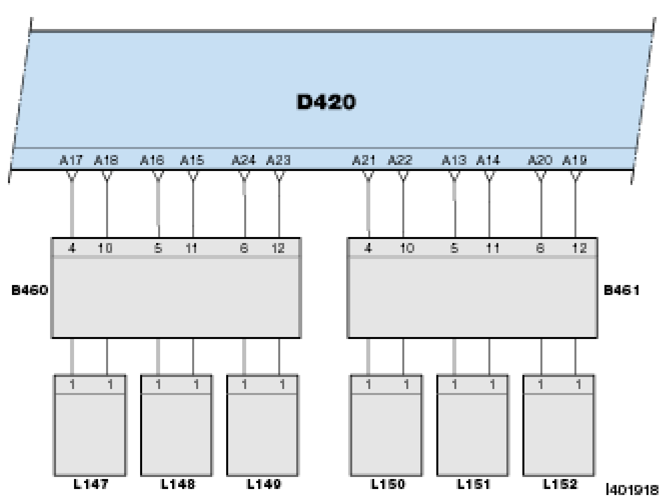
- Closed circuit found – Replace the encapsulated harness. Proceed to the listed at the end of this document.
- If open circuit or >100,000 ohms are found – Proceed to step 9

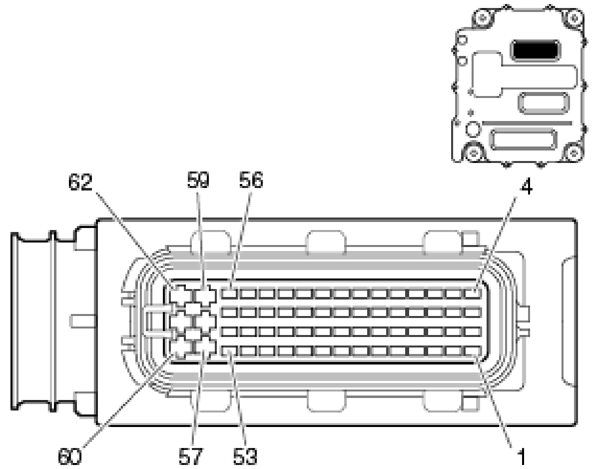
Step 9	Step ID 3405i	SRT

Possible PCI failure – Contact the Engine Support Center for further instructions on

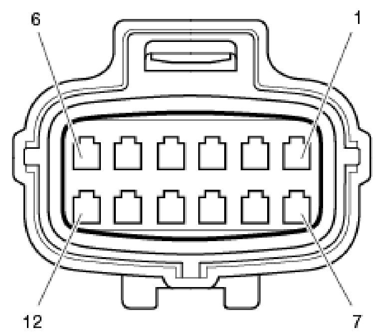
	replacing the PCI.
Verification Drive Cycle	To verify the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3407

Code number	P3407
Fault code description	Engine brake solenoid valve Cylinder 1 - Voltage too low or short circuit to ground on ECU D420 pin A17
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 Connector cylinders 1-3
B461 Connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 · B460 · L150 · L151 · L152 · Function A13 · 11 · · 1 · · Signal, MX Engine Brake solenoid valve cylinder 5 A14 · 5 · · 1 · · Ground A19 · 4 · · · 1 · Ground A20 · 10 · · · 1 · Signal, MX Engine Brake solenoid valve cylinder 6 A21 · 12 · 1 · · · Signal, MX Engine Brake solenoid valve cylinder 4 A22 · 6 · 1 · · · Ground
Technical data	Component check, MX Engine Brake solenoid valve cylinder 1 (L147) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) · Pin (- probe) · Value · Additional information 4 · 10 · ± 36.5 Ω · Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 2 (L148) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) · Pin (- probe) · Value · Additional information 5 · 11 · ± 36.5 Ω · Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) · Pin (- probe) · Value · Additional information 6 · 12 · ± 36.5 Ω · Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) · Pin (- probe) · Value · Additional information 4 · 10 · ± 36.5 Ω · Resistance value at 20°C [68°F]

<table>
<tr>
<td></td>
<td>
Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>This information will be added to the diagnostic when it becomes available.</td>
</tr>
<tr>
<td>Additional information</td>
<td>No additional information available.</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3407a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

<table>
<tr><td>Step 2</td><td>Step ID 3407b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground:

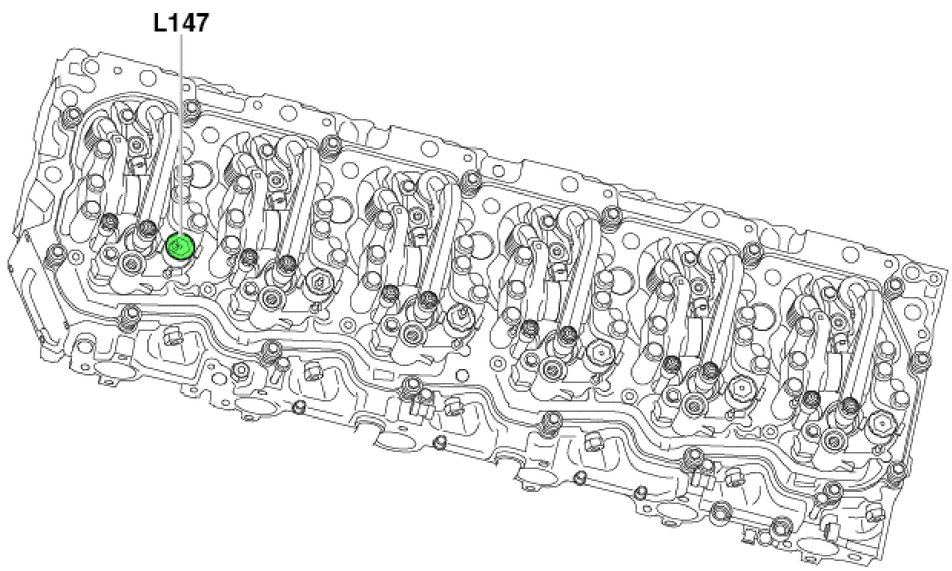
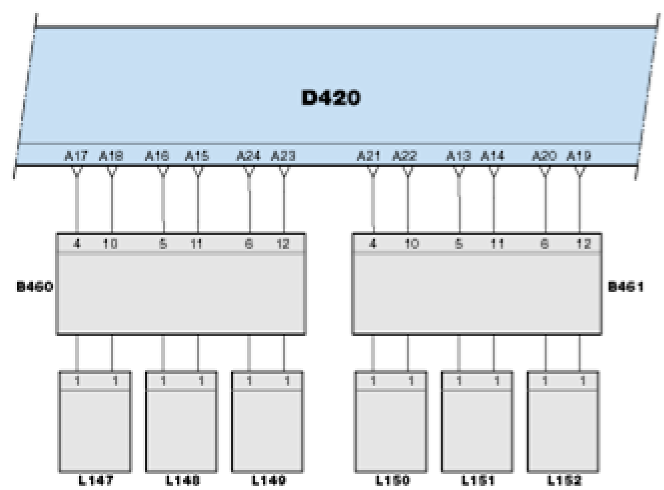
If the measured voltage is approximately 3.5 V – Proceed to step 4.
If the measured voltage is approximately above 0.0 V – Proceed to step 3.

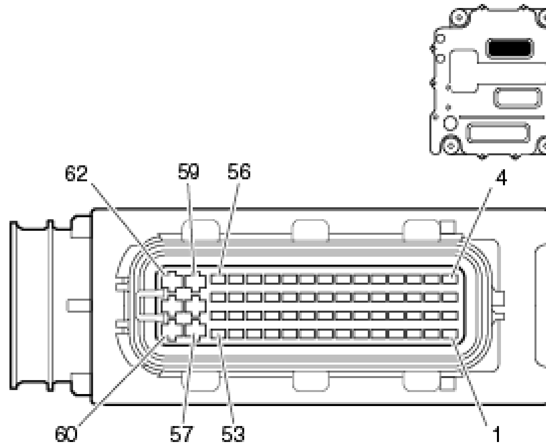
</td></tr>
</table>

<table>
<tr><td>Step 3</td><td>Step ID 3407c</td><td>SRT</td></tr>
</table>
</td>
</tr>
</table>

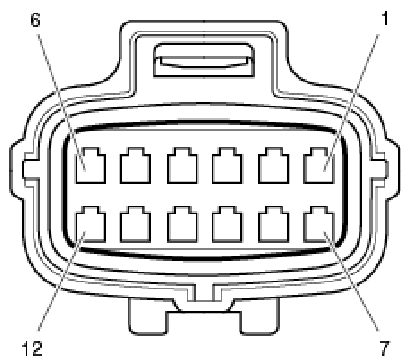
	With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Proceed to step 5.
	Step 4 | Step ID 3407d | SRT With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: • Measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.
	Step 5 | Step ID 3407e | SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.
Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3408

Code number	P3408
Fault code description	Engine brake solenoid valve Cylinder 1 - Voltage too high or short circuit to supply on ECU D420 pin A17
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 B460 L150 L151 L152 Function A13 11 1 Signal, MX Engine Brake solenoid valve cylinder 5 A14 5 1 Ground A19 4 1 Ground A20 10 1 Signal, MX Engine Brake solenoid valve cylinder 6 A21 12 1 Signal, MX Engine Brake solenoid valve cylinder 4 A22 6 1 Ground
Technical data	Component check, injector solenoid valve cylinder 1 (L147) Preparation • Key the ignition off. • Disconnect connector B460. • Measure on wiring harness connector B460. Pin (+ probe) / Pin (- probe) / Value / Condition 4 / 10 / ± 38.5 Ω / Resistance value at 20°C [68°F] Component check, injector solenoid valve cylinder 2 (L148) Preparation • Key the ignition off. • Disconnect connector B460. • Measure on wiring harness connector B460. Pin (+ probe) / Pin (- probe) / Value / Condition 5 / 11 / ± 38.5 Ω / Resistance value at 20°C [68°F] Component check, injector solenoid valve cylinder 3 (L149) Preparation • Key the ignition off. • Disconnect connector B460. • Measure on wiring harness connector B460. Pin (+ probe) / Pin (- probe) / Value / Condition 6 / 12 / ± 38.5 Ω / Resistance value at 20°C [68°F] Component check, injector solenoid valve cylinder 4 (L150) Preparation • Key the ignition off. • Disconnect connector B461. • Measure on wiring harness connector B461. Pin (+ probe) / Pin (- probe) / Value / Condition 4 / 10 / ± 38.5 Ω / Resistance value at 20°C [68°F]

<table>
<tr><td></td><td>
Component check, injector solenoid valve cylinder 5 (L151)
Preparation

Key the ignition off.
Disconnect connector B461.
Measure on wiring harness connector B461.

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Condition</th></tr>
<tr><td>5</td><td>11</td><td>± 38.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, injector solenoid valve cylinder 1 (L152)
Preparation

Key the ignition off.
Disconnect connector B461.
Measure on wiring harness connector B461.

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Condition</th></tr>
<tr><td>6</td><td>12</td><td>± 38.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>This information will be added to the diagnostic when it becomes available.</td></tr>
<tr><td>Additional information</td><td>No additional information available.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3408a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

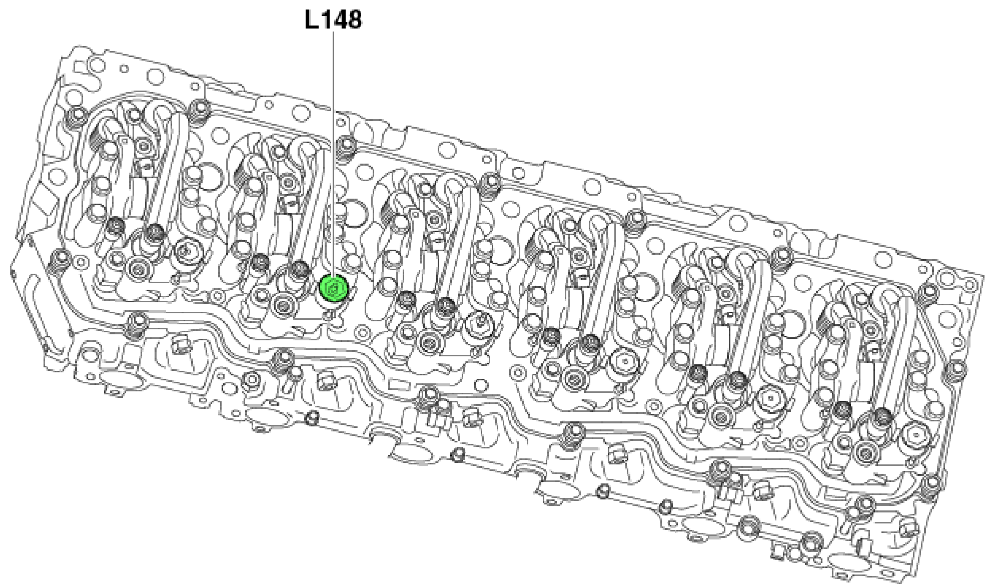
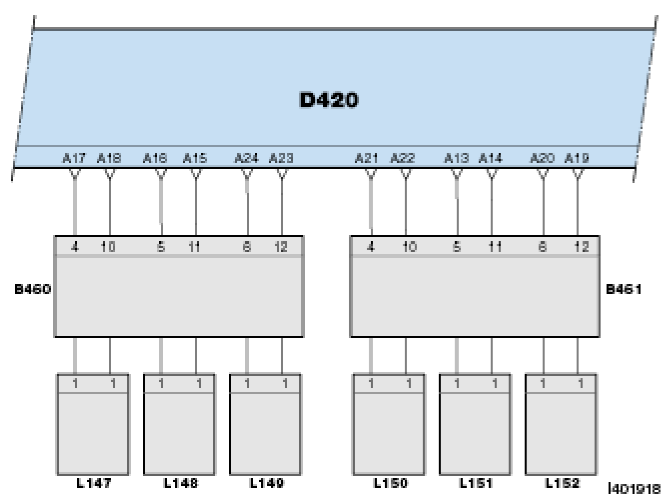
<table>
<tr><td>Step 2</td><td>Step ID 3408b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground:

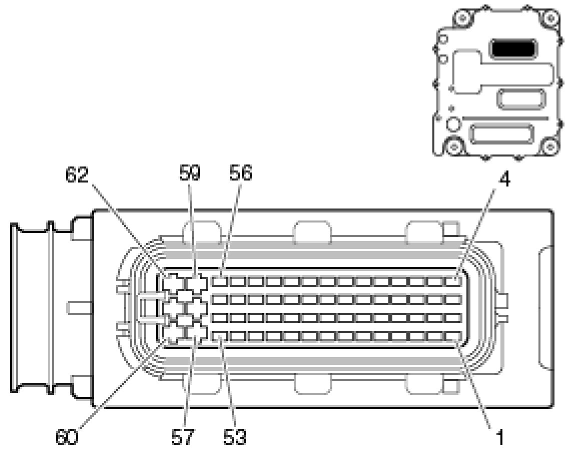
If the measured voltage is approximately 3.5 V – Proceed to step 4.
If the measured voltage is approximately 4.75 V – Proceed to step 3.

</td></tr>
</table>
</td></tr>
</table>

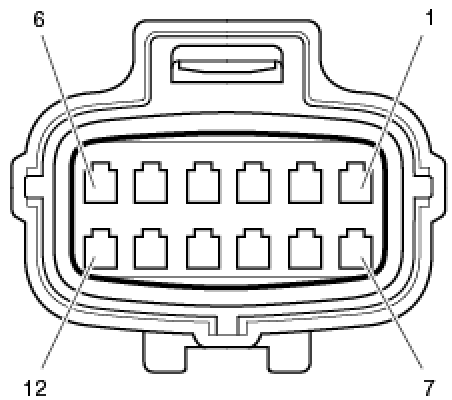
<table>
<tr><td></td><td>
<table>
<tr><td>Step 3</td><td>Step ID 3408c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground:
• If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
• If the measured voltage is approximately 4.75 V – Proceed to step 5.</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 3408d</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground:
• If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document.
• If the measured voltage is approximately 4.75 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.</td></tr>
</table>
<table>
<tr><td>Step 5</td><td>Step ID 3408e</td><td>SRT</td></tr>
<tr><td colspan="3">Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair:
With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P3413

Code number	P3413
Fault code description	Engine brake solenoid valve Cylinder 2 – current too low or open circuit on ECU D420 pin A16
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 B461 L150 L151 L152 Function A13 5 1 Signal, MX Engine Brake solenoid valve cylinder 5 A14 11 1 Ground A19 12 1 Ground A20 6 1 Signal, MX Engine Brake solenoid valve cylinder 6 A21 4 1 Signal, MX Engine Brake solenoid valve cylinder 4 A22 10 1 Ground
Technical data	Component check, MX Engine Brake solenoid valve cylinder 1 (L147) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) Pin (- probe) Value Additional information 4 10 ± 36.5 Ω Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 2 (L148) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) Pin (- probe) Value Additional information 5 11 ± 36.5 Ω Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) Pin (- probe) Value Additional information 6 12 ± 36.5 Ω Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) Pin (- probe) Value Additional information 4 10 ± 36.5 Ω Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 5 (L151) Preparation

<table>
<tr><td></td><td>

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>This information will be added to the diagnostic when it becomes available.</td></tr>
<tr><td>Additional information</td><td>No additional information available.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3413a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 3413b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON, and measure the voltage between the signal terminal on the encapsulated harness and a battery ground:

If the measured voltage is approximately 3.5 V – Proceed to step 3.
If the measured voltage is 0.0 V – Proceed to step 7.
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 3413c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector and measure the resistance between the ground terminal on the encapsulated harness and a battery ground:

Closed circuit found – Proceed to step 4.
If open circuit or >100,000 ohms are found – Proceed to step 8.
</td></tr>
</table>
</td></tr>
</table>

Step 4	Step ID 3413d	SRT

With key OFF, disconnect the signal connector circuit from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal connector and a battery ground:

- If the measured voltage is approximately 3.5 V – Proceed to step 5.
- If the measured voltage is 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 5	Step ID 3413e	SRT

With key OFF, disconnect the ground connector from the engine brake solenoid, and measure the resistance between the ground terminal wire and battery ground:

- Closed circuit found – Proceed to step 6.
- If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 6	Step ID 3413f	SRT

With key OFF, disconnect both connectors from the engine brake solenoid, and measure the resistance between the terminals on the solenoid (refer to your multimeter operation manual for the correct resistance test procedure).

- Closed circuit found – Proceed to step 7.
- If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 7	Step ID 3413g	SRT

With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the engine brake signal circuit terminal of the PCI and battery ground:

- If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If the measured voltage is 0.0 V – Proceed to step 9.

Step 8	Step ID 3413h	SRT

With key OFF, disconnect the encapsulated harness at the PCI, and measure the resistance across the ground terminal on the PCI and a battery ground:

- Closed circuit found – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If open circuit or >100,000 ohms are found – Proceed to step 9.

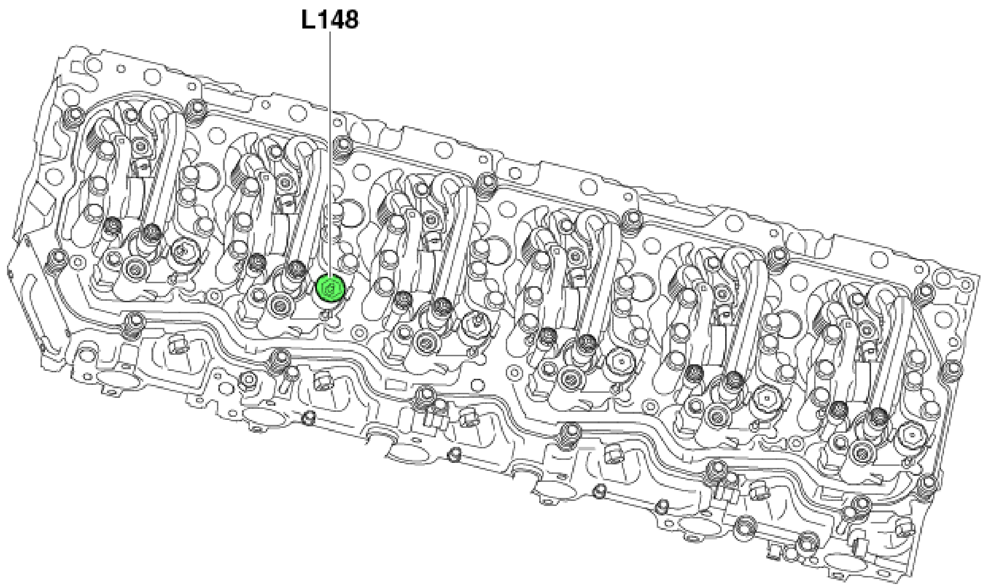
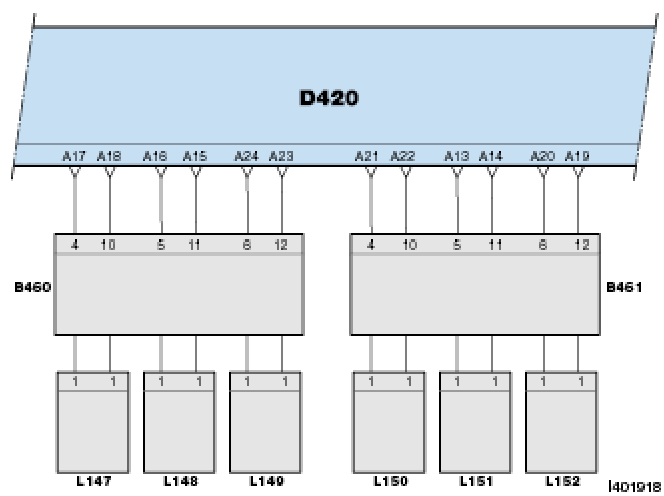
Step 9	Step ID 3413i	SRT

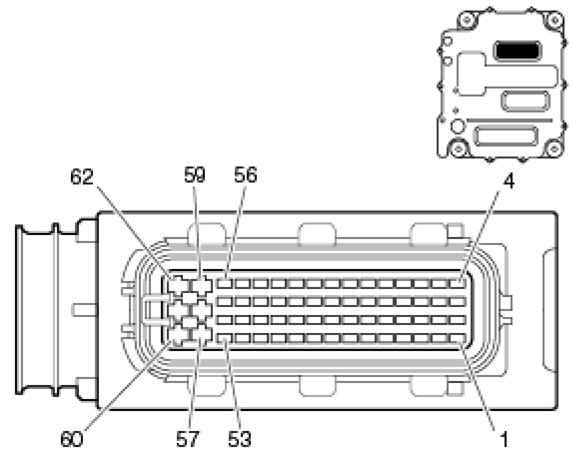
Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.

Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.

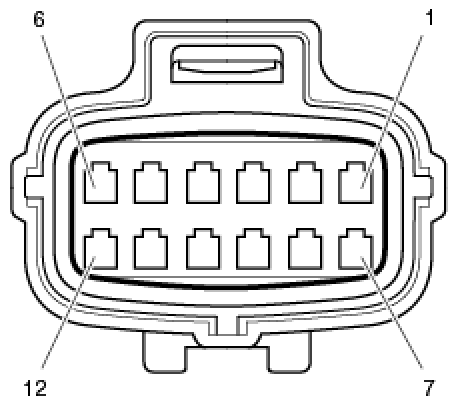
	Back to Choose Code Back to Index

P3415

Code number	P3415
Fault code description	Engine brake solenoid valve Cylinder 2 – Voltage too low or short circuit to ground on ECU D420 pin A16
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

<table>
<tr><td></td><td>MX Engine Brakes cylinder 4-6

<table>
<tr><td>D420</td><td>B461</td><td>L150</td><td>L151</td><td>L152</td><td>Function</td></tr>
<tr><td>A13</td><td>5</td><td></td><td>1</td><td></td><td>Signal, MX Engine Brake solenoid valve cylinder 5</td></tr>
<tr><td>A14</td><td>11</td><td></td><td>1</td><td></td><td>Ground</td></tr>
<tr><td>A19</td><td>12</td><td></td><td></td><td>1</td><td>Ground</td></tr>
<tr><td>A20</td><td>6</td><td></td><td></td><td>1</td><td>Signal, MX Engine Brake solenoid valve cylinder 6</td></tr>
<tr><td>A21</td><td>4</td><td>1</td><td></td><td></td><td>Signal, MX Engine Brake solenoid valve cylinder 4</td></tr>
<tr><td>A22</td><td>10</td><td>1</td><td></td><td></td><td>Ground</td></tr>
</table></td></tr>
<tr><td>Technical data</td><td>Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation
Key the ignition off
Disconnect connector B460
Measure on wiring harness connector B460
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>4</td><td>10</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation
Key the ignition off
Disconnect connector B460
Measure on wiring harness connector B460
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation
Key the ignition off
Disconnect connector B460
Measure on wiring harness connector B460
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation
Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461
<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>4</td><td>10</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation</td></tr>
</table>

<table>
<tr>
<td></td>
<td>

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

</td>
</tr>
<tr>
<td>Possible causes</td>
<td>This information will be added to the diagnostic when it becomes available.</td>
</tr>
<tr>
<td>Additional information</td>
<td>No additional information available.</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 3415a	SRT
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

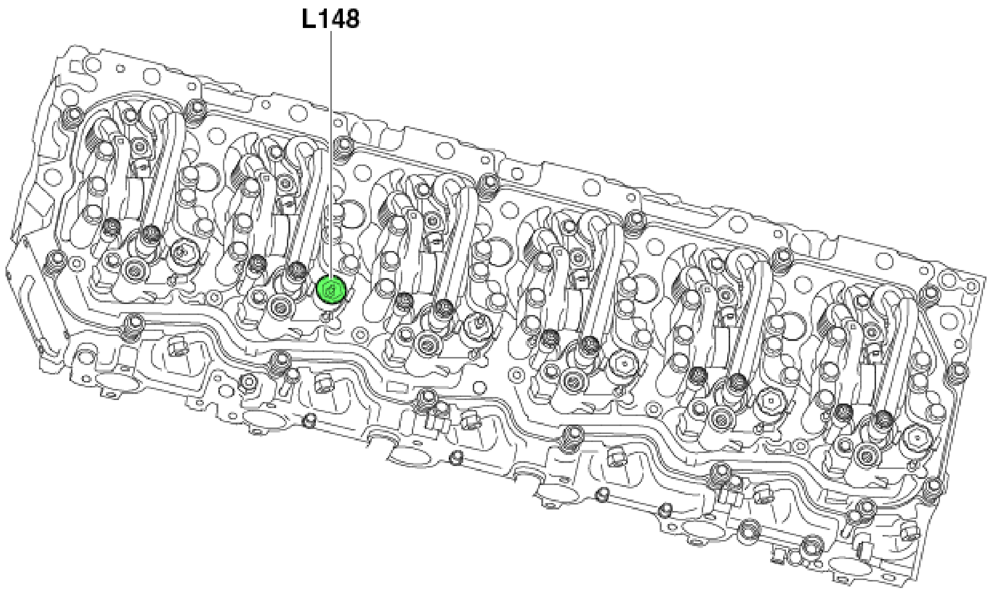
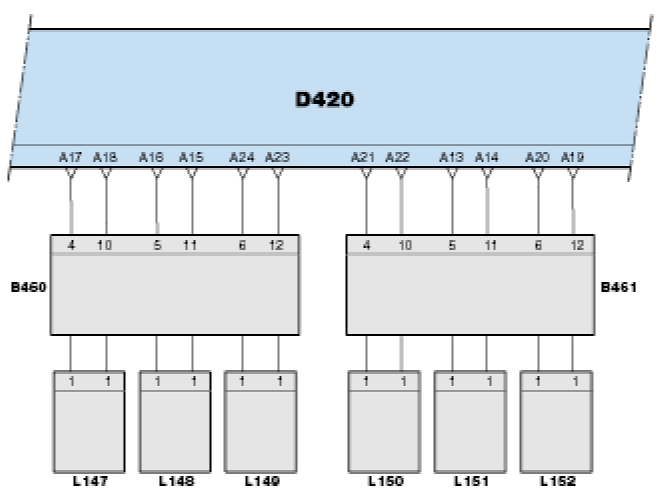
Step 2	Step ID 3415b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 4. • If the measured voltage is approximately above 0.0 V – Proceed to step 3.		

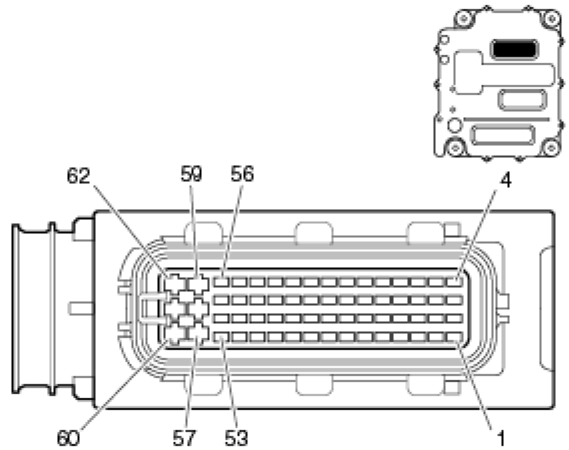
Step 3	Step ID 3415c	SRT
With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated		

</td>
</tr>
</table>

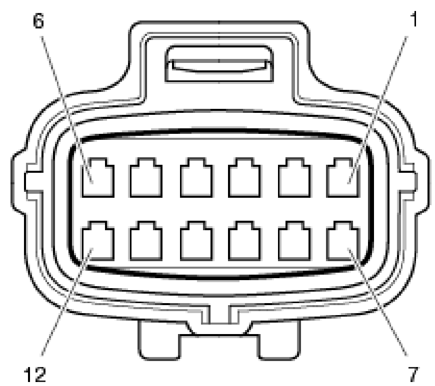
	harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Proceed to step 5. Step 4 | Step ID 3415d | SRT With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. Step 5 | Step ID 3415e | SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.
Verification Drive Cycle	With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3416

Code number	P3416
Fault code description	Engine brake solenoid valve Cylinder 2 - Voltage too high or short circuit to supply on ECU D420 pin A16
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve

cylinder 3

MX Engine Brakes cylinder 4-6

D420	B460	L150	L151	L152	Function
A13	11		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	5		1		Ground
A19	4			1	Ground
A20	10			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	12	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	6	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

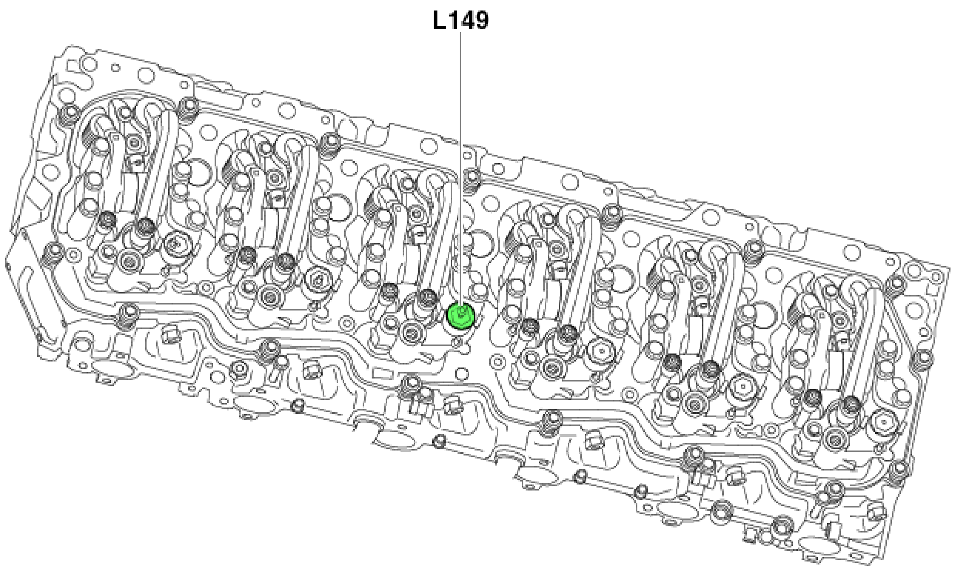
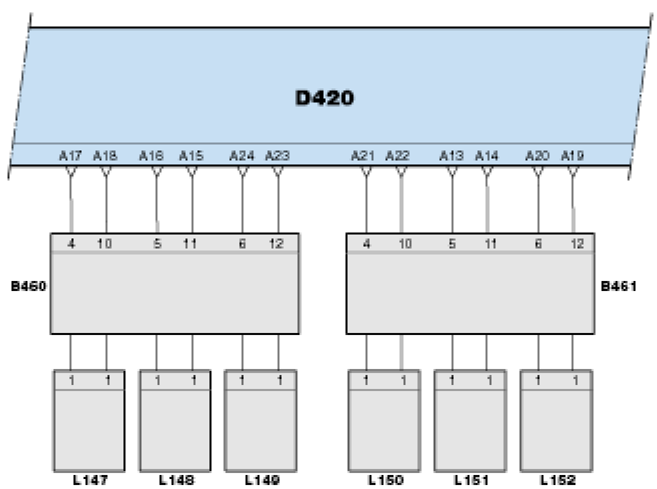
<table>
<tr><td></td><td>
Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation
Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461
<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation
Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461
<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>
Faulty wiring
Faulty connector
Faulty solenoid valve
</td></tr>
<tr><td>Additional information</td><td>This information will be added to the diagnostic when it becomes available.</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

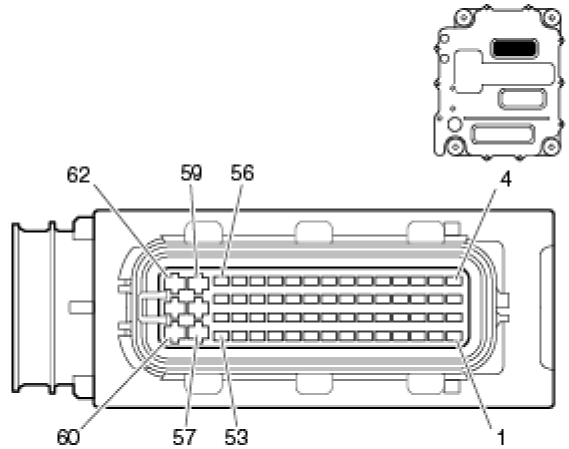
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3416a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure.
Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 3416b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground:
Measured voltage is approximately 3.5 V – Proceed to step 4.
Measured voltage is approximately 4.75 V – Proceed to step 3.
</td></tr>
</table>
</td></tr>
</table>

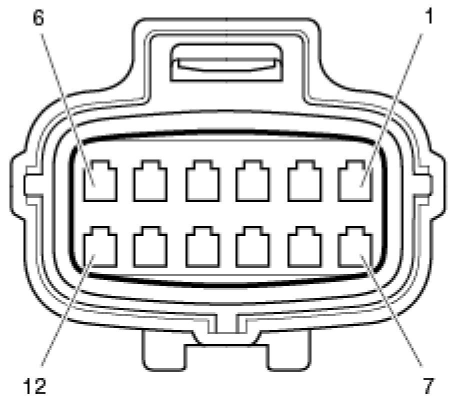
<table>
<tr><td></td><td>
<table>
<tr><td>Step 3</td><td>Step ID 3416c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON and measure the voltage between the signal terminal of the PCI and a battery ground:
Measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
Measured voltage is approximately 4.75 V – Proceed to step 5.</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 3416d</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON and measure the voltage between the signal terminal wire and a battery ground:
Measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document.
Measured voltage is approximately above 4.75 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.</td></tr>
</table>
<table>
<tr><td>Step 5</td><td>Step ID 3416e</td><td>SRT</td></tr>
<tr><td colspan="3">Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair:
With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P3421

Code number	P3421
Fault code description	Engine brake solenoid valve Cylinder 3 - Current too low or open circuit on ECU D420 pin A24
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 B460 L150 L151 L152 Function A13 11 1 Signal, MX Engine Brake solenoid valve cylinder 5 A14 5 1 Ground A19 4 1 Ground A20 10 1 Signal, MX Engine Brake solenoid valve cylinder 6 A21 12 1 Signal, MX Engine Brake solenoid valve cylinder 4 A22 6 1 Ground
Technical data	Component check, MX Engine Brake solenoid valve cylinder 1 (L147) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 4 / 10 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 2 (L148) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 5 / 11 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 6 / 12 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 4 / 10 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Possible causes

- Faulty wiring
- Faulty connector
- Faulty solenoid valve

Additional information

This information will be added to the diagnostic when it becomes available.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 3421a	SRT
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 3421b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON, and measure the voltage between the signal terminal on the encapsulated harness and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 3. • If the measured voltage is 0.0 V – Proceed to step 7.		

Step 3	Step ID 3421c	SRT

With key OFF, disconnect the pass-through connector and measure the resistance between the ground terminal on the encapsulated harness and a battery ground:

- Closed circuit found – Proceed to step 4.
- If open circuit or >100,000 ohms is found – Proceed to step 8.

Step 4	Step ID 3421d	SRT
With key OFF, disconnect the signal connector circuit from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 5. • If the measured voltage is 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

Step 5	Step ID 3421e	SRT
With key OFF, disconnect the ground connector from the engine brake solenoid, and measure the resistance between the ground terminal wire and battery ground: • Closed circuit found – Proceed to step 6. • If open circuit or >100,000 ohms is found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

Step 6	Step ID 3421f	SRT
With key OFF, disconnect both connectors from the engine brake solenoid, and measure the resistance between the terminals on the solenoid (refer to your multimeter operation manual for the correct resistance test procedure). • Closed circuit found – Proceed to step 7. • If open circuit or >100,000 ohms is found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

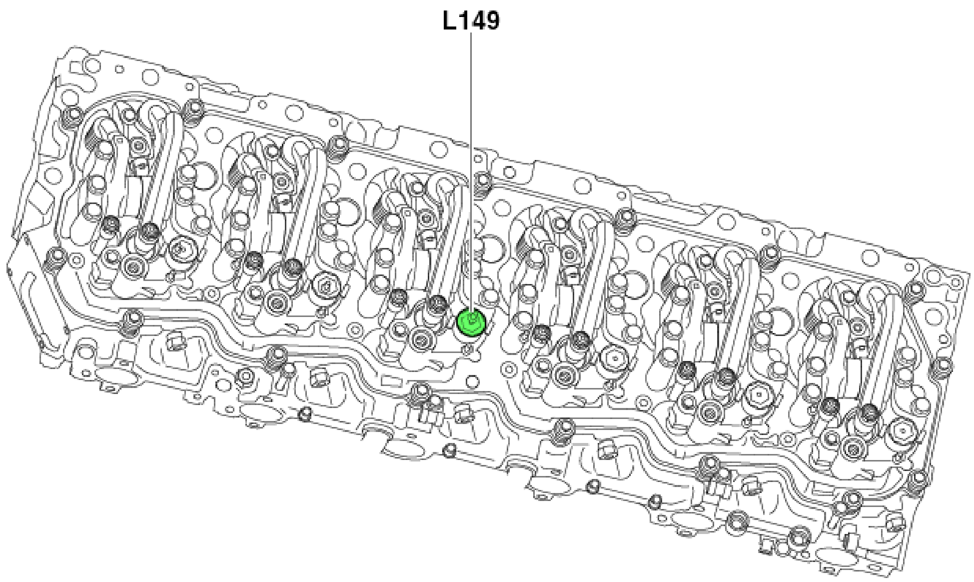
Step 7	Step ID 3421g	SRT
With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the engine brake signal circuit terminal of the PCI and battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is 0.0 V – Proceed to step 9.		

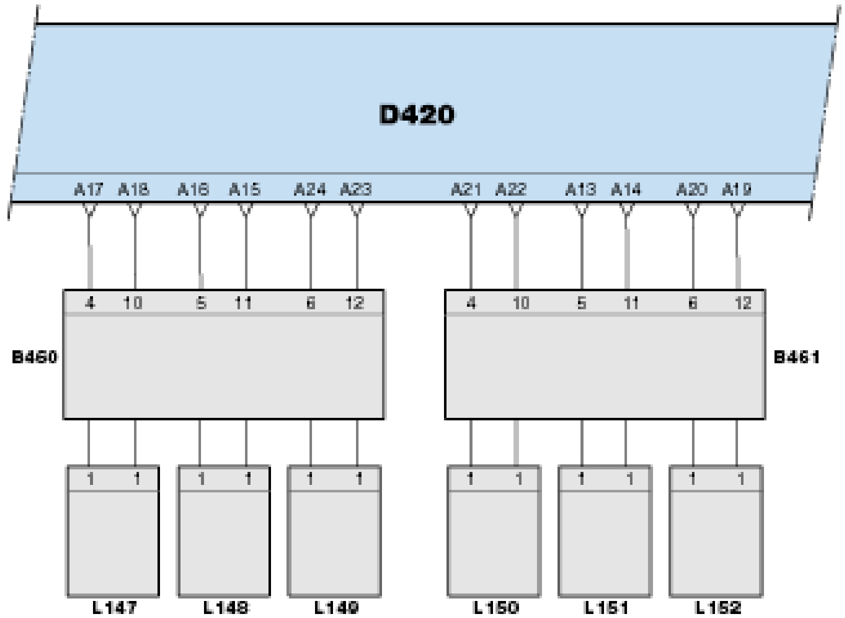
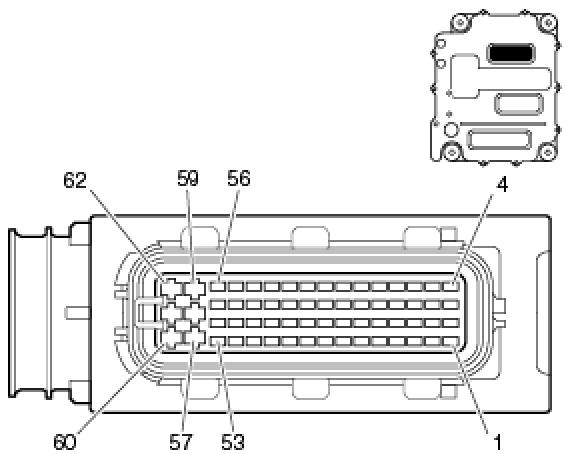
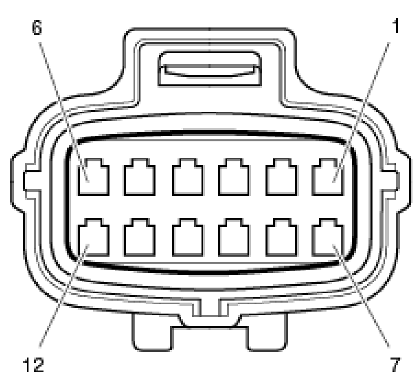
Step 8	Step ID 3421h	SRT
With key OFF, disconnect the encapsulated harness at the PCI, and measure the resistance across the ground terminal on the PCI and a battery ground: • Closed circuit found – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If open circuit or >100,000 ohms is found – Proceed to step 9.		

Step 9	Step ID 3421i	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions on		

	replacement of the PCI.
Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	[Back to Choose Code] [Back to Index]

P3423

Code number	P3423
Fault code description	Engine brake solenoid valve Cylinder 3 - Voltage too low or short circuit to ground on ECU D420 pin A24
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.

Electrical diagram(s)	  Wiring harness connector D420.A front view  Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinder 4-6

D420	B460	L150	L151	L152	Function
A13	11		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	5		1		Ground
A19	4			1	Ground
A20	10			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	12	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	6	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information

	5 11 ± 36.5 Ω Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 6 / 12 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 4 / 10 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 5 (L151) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 5 / 11 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 6 (L152) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 6 / 12 / ± 36.5 Ω / Resistance value at 20°C [68°F]
Possible causes	• Faulty wiring • Faulty connector • Faulty solenoid valve
Additional information	This information will be added to the diagnostic when it becomes available.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 3423a	SRT
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 3423b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 4. • If the measured voltage is approximately above 0.0 V – Proceed to step 3.		

Step 3	Step ID 3423c	SRT
With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Proceed to step 5.		

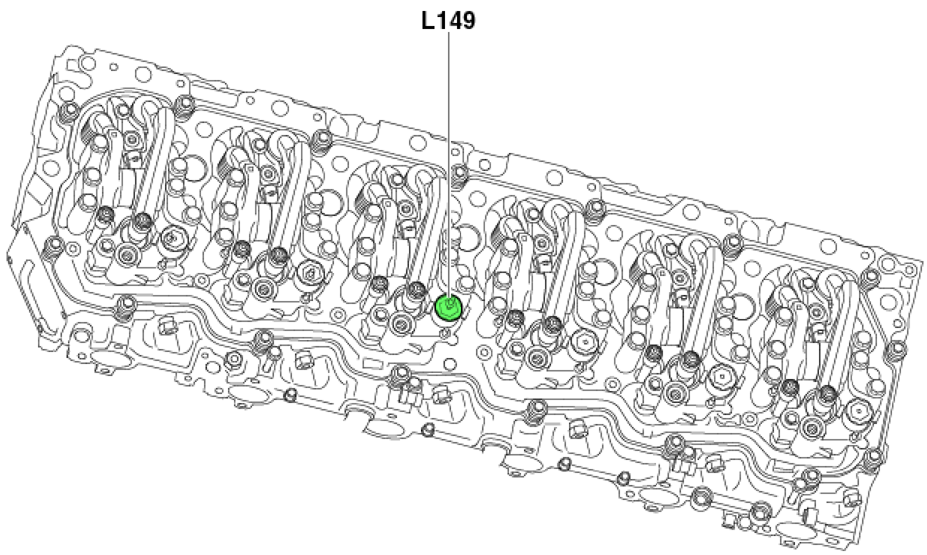
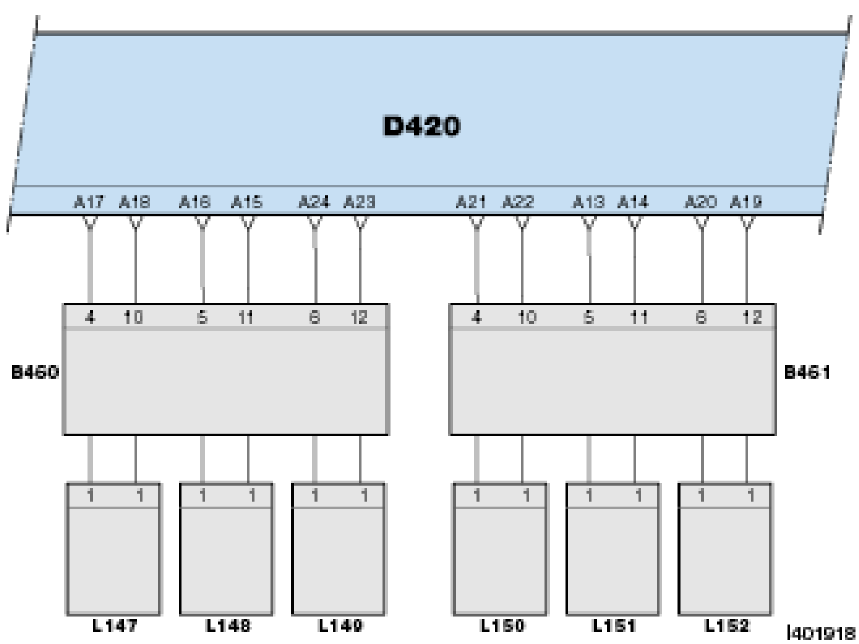
Step 4	Step ID 3423d	SRT
With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: • Measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

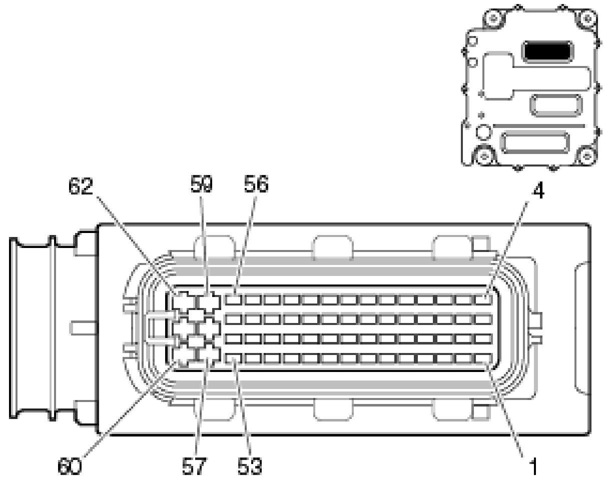
Step 5	Step ID 3423e	SRT
Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.		

Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.

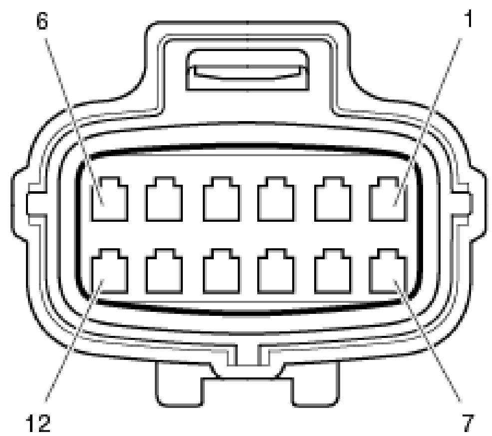
Back to Choose Code
Back to Index

P3424

Code number	P3424
Fault code description	Engine brake solenoid valve Cylinder 3 – Voltage too high or short circuit to supply on ECU D420 pin A24
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinder 4-6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Possible causes	This information will be added to the diagnostic when it becomes available.
Additional information	No additional information available.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

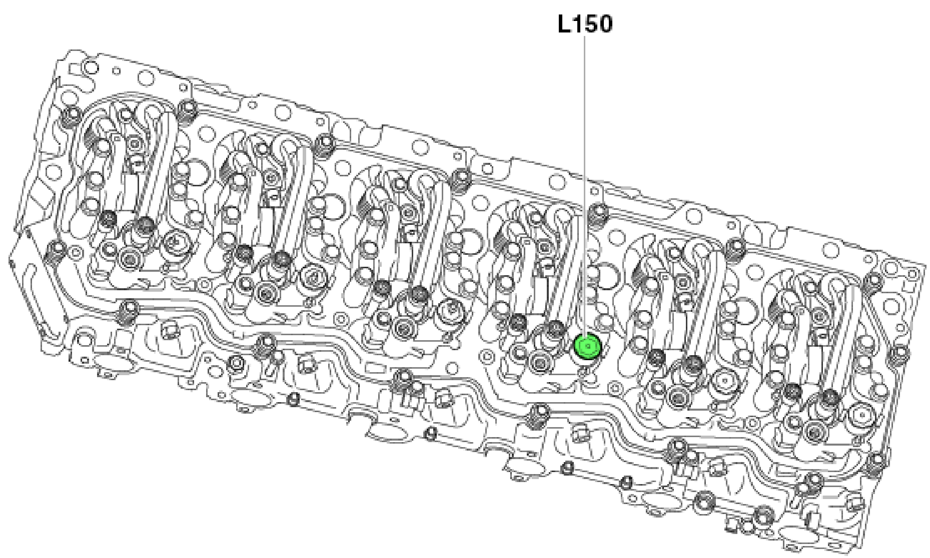
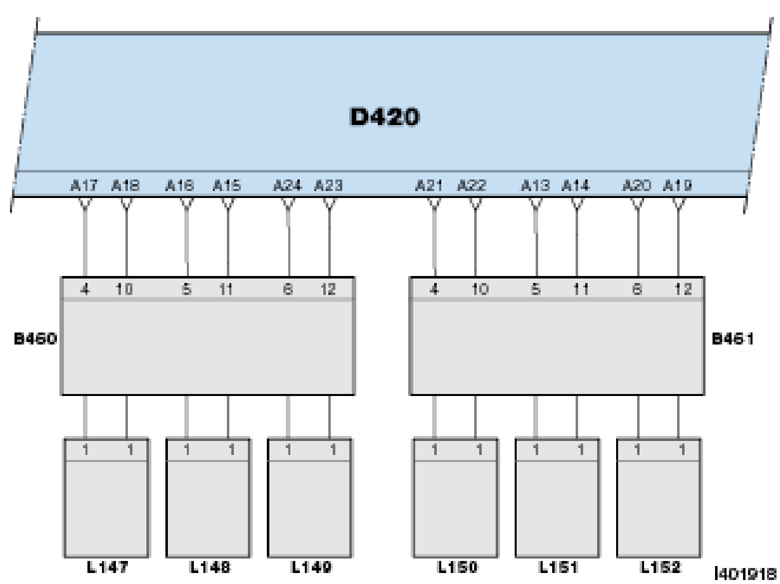
Step 1	Step ID 3424a	SRT
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

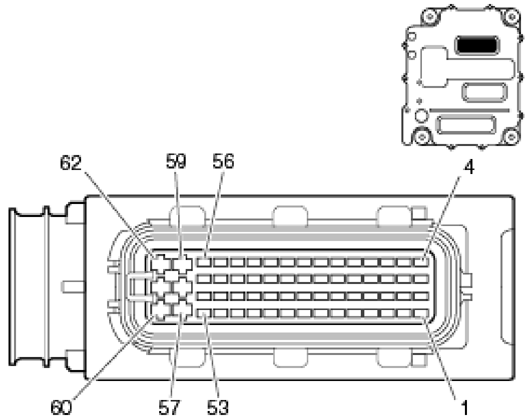
Step 2	Step ID 3424b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • Measured voltage is approximately 3.5 V – Proceed to step 4. • Measured voltage is approximately 4.75 V – Proceed to step 3.		

Step 3	Step ID 3424c	SRT
With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON and measure the voltage between the signal terminal of the PCI and a battery ground:		

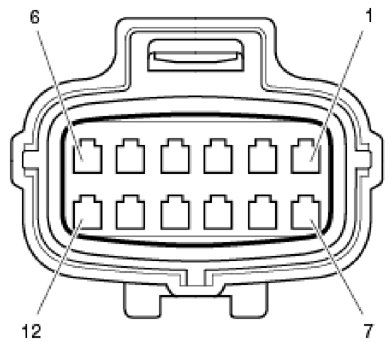
	• Measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • Measured voltage is approximately 4.75 V – Proceed to step 5. **Step 4** | Step ID 3424d | SRT With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON and measure the voltage between the signal terminal wire and a battery ground: • Measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • Measured voltage is approximately above 4.75 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. **Step 5** | Step ID 3424e | SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.
Verification Drive Cycle	To validate the repair: With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3429

Code number	P3429
Fault code description	Engine brake solenoid valve Cylinder 4 - Current too low or open circuit on ECU D420 pin A21
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available
Set condition of fault code	This information will be added to the diagnostic when it becomes available
Reset condition of fault code	This information will be added to the diagnostic when it becomes available
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6

D420	B460	L150	L151	L152	Function
A13	11		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	5		1		Ground
A19	4			1	Ground
A20	10			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	12	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	6	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

<table>
<tr>
<td></td>
<td>
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Additional information</td></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>This information will be added to the diagnostic when it becomes available</td>
</tr>
<tr>
<td>Additional information</td>
<td>This information will be added to the diagnostic when it becomes available</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3429a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

<table>
<tr><td>Step 2</td><td>Step ID 3429b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON, and measure the voltage between the signal terminal on the encapsulated harness and a battery ground:

If the measured voltage is approximately 3.5 V – Proceed to step 3.
If the measured voltage is 0.0 V – Proceed to step 7

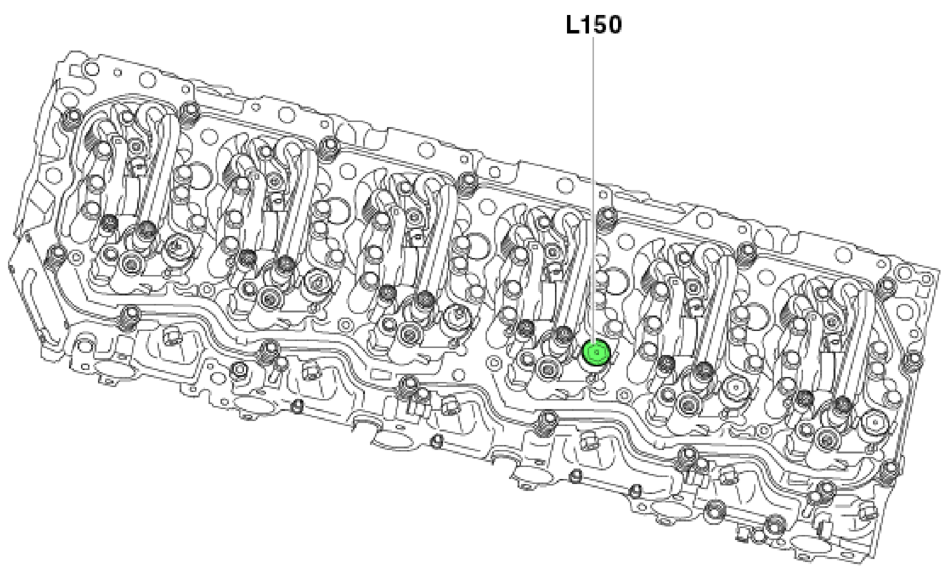
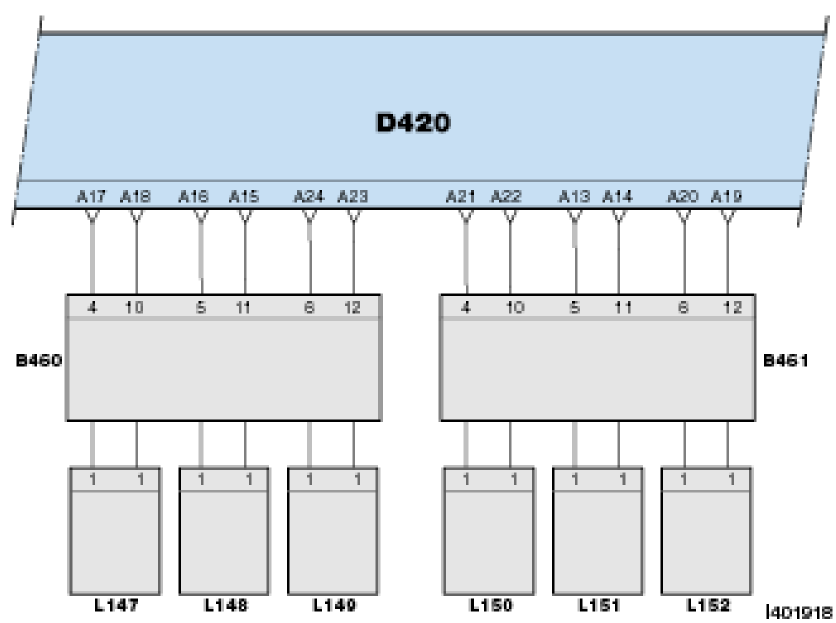
</td></tr>
</table>

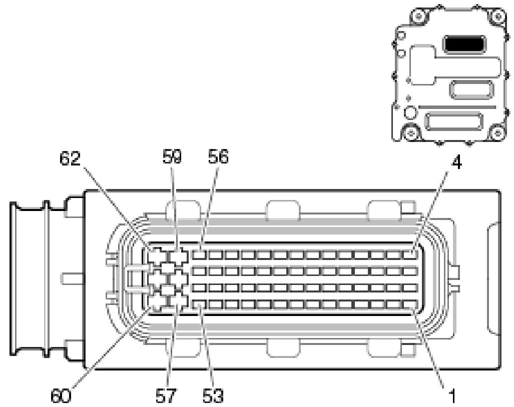
<table>
<tr><td>Step 3</td><td>Step ID 3429c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector and measure the resistance between the ground terminal on the encapsulated harness and a battery ground:</td></tr>
</table>
</td>
</tr>
</table>

	• Closed circuit found – Proceed to step 4. • If open circuit or >100,000 ohms are found – Proceed to step 8 **Step 4** | Step ID 3429d | SRT With key OFF, disconnect the signal connector circuit from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 5. • If the measured voltage is 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. **Step 5** | Step ID 3429e | SRT With key OFF, disconnect the ground connector from the engine brake solenoid, and measure the resistance between the ground terminal wire and battery ground: • Closed circuit found – Proceed to step 6. • If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. **Step 6** | Step ID 3429f | SRT With key OFF, disconnect both connectors from the engine brake solenoid, and measure the resistance between the terminals on the solenoid (refer to your multimeter operation manual for the correct resistance test procedure). • Closed circuit found – Proceed to step 7. • If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. **Step 7** | Step ID 3429g | SRT With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the engine brake signal circuit terminal of the PCI and battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is 0.0 V – Proceed to step 9. **Step 8** | Step ID 3429h | SRT With key OFF, disconnect the encapsulated harness at the PCI, and measure the resistance across the ground terminal on the PCI and a battery ground: • Closed circuit found – Replace the encapsulated harness. Proceed to the listed at the end of this document. • If open circuit or >100,000 ohms are found – Proceed to step 9 **Step 9** | Step ID 3429i | SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.
Verification Drive Cycle	To validate the repair:

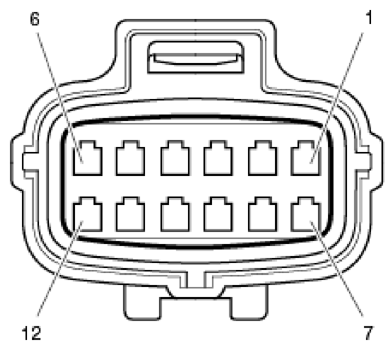
	With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3431

Code number	P3431
Fault code description	Engine brake solenoid valve Cylinder 4 - Voltage too low or short circuit to ground on ECU D420 pin A21
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive.
Description of component(s)	This information will be added to the diagnostic when it becomes available
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available
Set condition of fault code	This information will be added to the diagnostic when it becomes available
Reset condition of fault code	This information will be added to the diagnostic when it becomes available
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve

D420	B460	L147	L148	L149	Function
					cylinder 3

MX Engine Brakes cylinder 4-6

D420	B460	L150	L151	L152	Function
A13	11		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	5		1		Ground
A19	4			1	Ground
A20	10			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	12	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	6	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Possible causes	This information will be added to the diagnostic when it becomes available
Additional information	This information will be added to the diagnostic when it becomes available

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

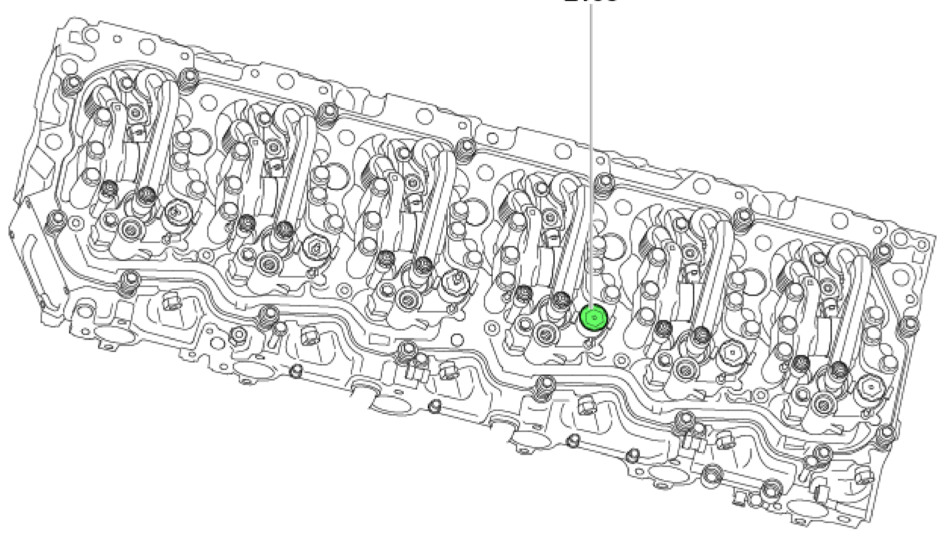
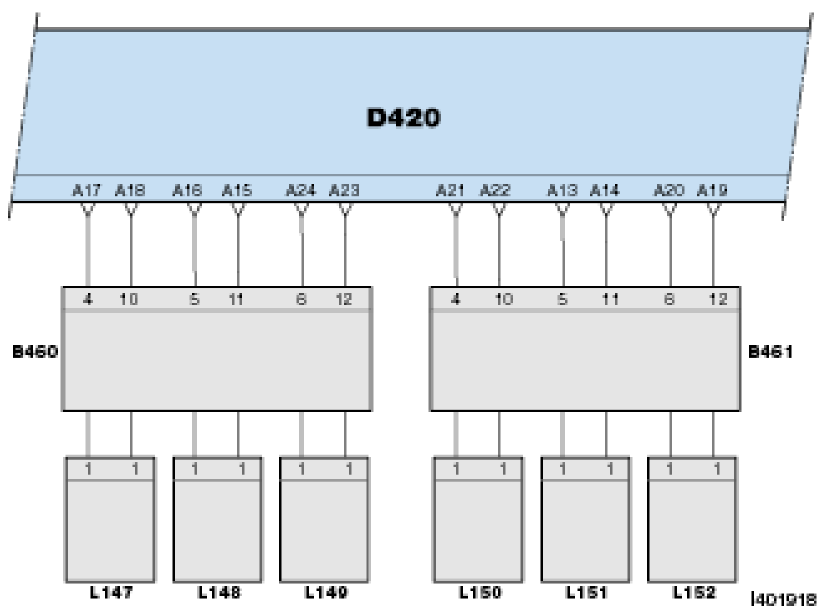
- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

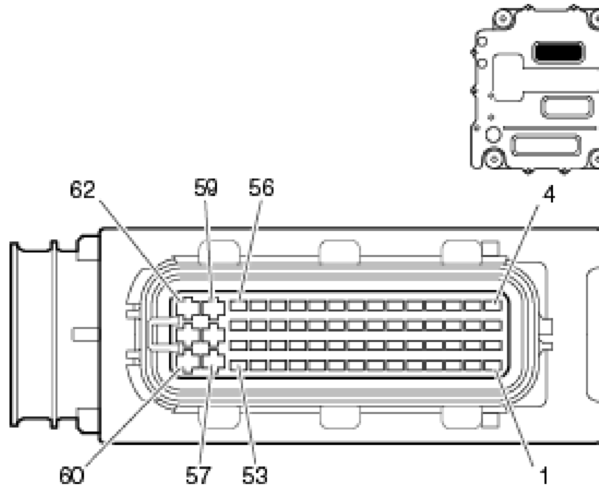
Step 1	Step ID 3431a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 3431b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 4. • If the measured voltage is approximately 0.0 V – Proceed to step 3.		

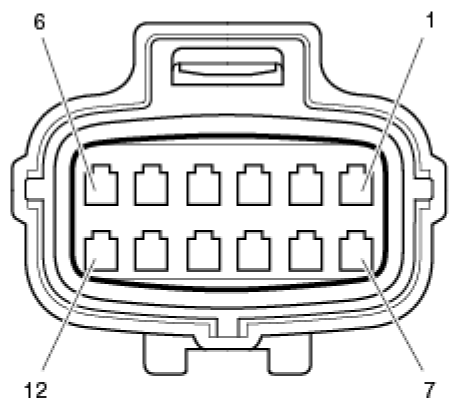
	<table><tr><td>Step 3</td><td>Step ID 3431c</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground: - If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - If the measured voltage is approximately 0.0 V – Proceed to step 5. </td></tr></table> <table><tr><td>Step 4</td><td>Step ID 3431d</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: - If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. - If the measured voltage is approximately 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document </td></tr></table> <table><tr><td>Step 5</td><td>Step ID 3431e</td><td>SRT</td></tr><tr><td colspan="3">Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.</td></tr></table>
Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3432

Code number	P3432
Fault code description	Engine brake solenoid valve Cylinder 4 – Voltage too high or short circuit to supply on ECU D420 pin A21
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground

A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinder 4-6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

<table>
<tr>
<td></td>
<td>Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td>
</tr>
<tr><td>Possible causes</td><td>This information will be added to the diagnostic when it becomes available.</td></tr>
<tr><td>Additional information</td><td>No additional information available.</td></tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td> Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

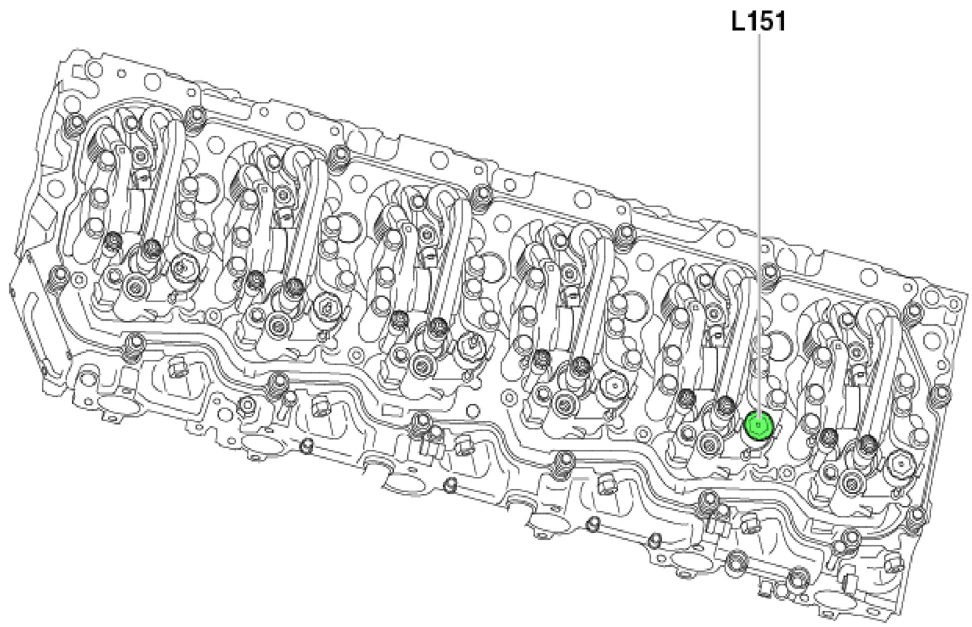
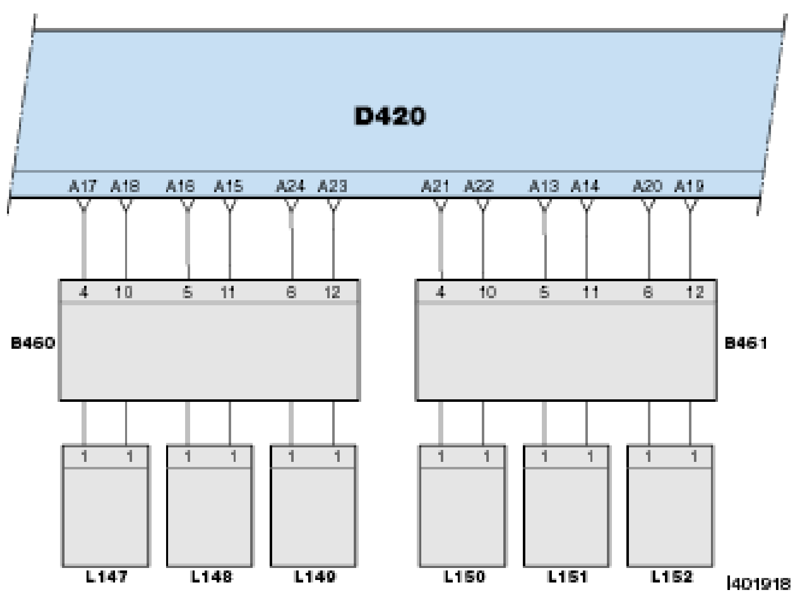
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

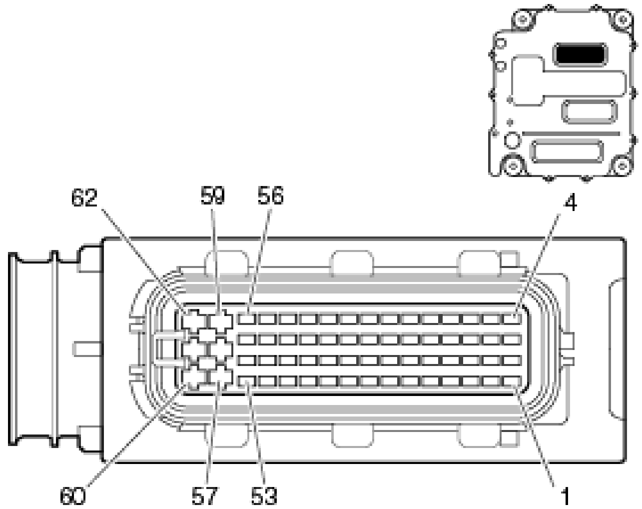
<table>
<tr><td>Step 1</td><td>Step ID 3432a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 3432b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground:

If the measured voltage is approximately 3.5 V – Proceed to step 4.
If the measured voltage is approximately 4.75 V – Proceed to step 3.
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 3432c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the</td></tr>
</table>
</td>
</tr>
</table>

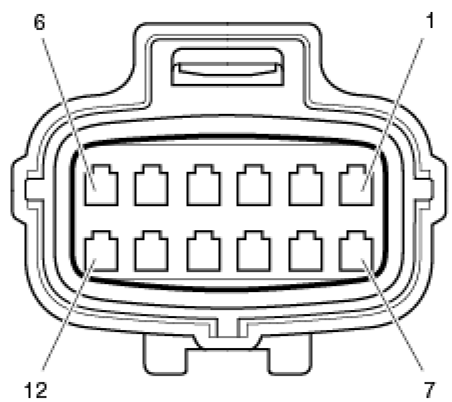
<table>
<tr><td></td><td>
key ON, and measure the voltage between the signal terminal of the PCI and a battery ground:
• If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
• If the measured voltage is approximately 4.75 V – Proceed to step 5.
<table>
<tr><td>Step 4</td><td>Step ID 3432d</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground:
• If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document.
• If the measured voltage is approximately 4.75 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.</td></tr>
</table>
<table>
<tr><td>Step 5</td><td>Step ID 3432e</td><td>SRT</td></tr>
<tr><td colspan="3">Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair:
With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P3437

Code number	P3437
Fault code description	Engine brake solenoid valve Cylinder 5 – Current too low or open circuit on ECU D420 pin A13
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinder 4-6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Possible causes	This information will be added to the diagnostic when it becomes available.
Additional information	No additional information available.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 3437a	SRT
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 3437b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON, and measure the voltage between the signal terminal on the encapsulated harness and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 3. • If the measured voltage is 0.0 V – Proceed to step 7.		

Step 3	Step ID 3437c	SRT
With key OFF, disconnect the pass-through connector and measure the resistance between the ground terminal on the encapsulated harness and a battery ground: • Closed circuit found – Proceed to step 4.		

- If open circuit or >100,000 ohms are found – Proceed to step 8.

Step 4	Step ID 3437d	SRT

With key OFF, disconnect the signal connector circuit from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal connector and a battery ground:

- If the measured voltage is approximately 3.5 V – Proceed to step 5.
- If the measured voltage is 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 5	Step ID 3437e	SRT

With key OFF, disconnect the ground connector from the engine brake solenoid, and measure the resistance between the ground terminal wire and battery ground:

- Closed circuit found – Proceed to step 6.
- If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 6	Step ID 3437f	SRT

With key OFF, disconnect both connectors from the engine brake solenoid, and measure the resistance between the terminals on the solenoid (refer to your multimeter operation manual for the correct resistance test procedure).

- Closed circuit found – Proceed to step 7.
- If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.

Step 7	Step ID 3437g	SRT

With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the engine brake signal circuit terminal of the PCI and battery ground:

- If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If the measured voltage is 0.0 V – Proceed to step 9.

Step 8	Step ID 3437h	SRT

With key OFF, disconnect the encapsulated harness at the PCI, and measure the resistance across the ground terminal on the PCI and a battery ground:

- Closed circuit found – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If open circuit or >100,000 ohms are found – Proceed to step 9.

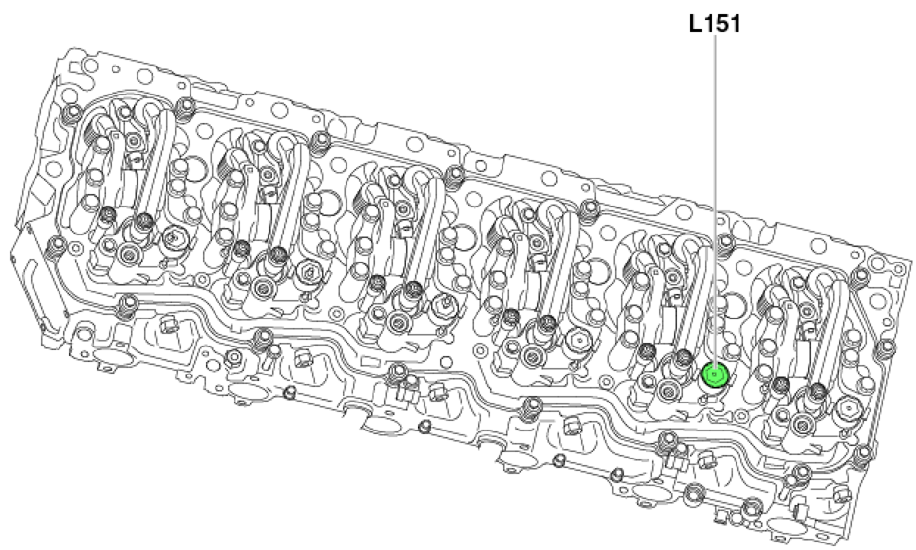
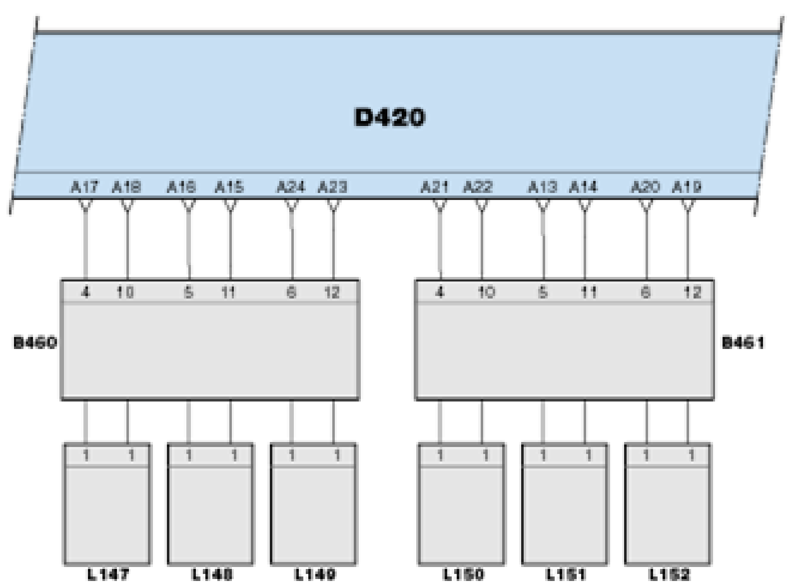
Step 9	Step ID 3437i	SRT

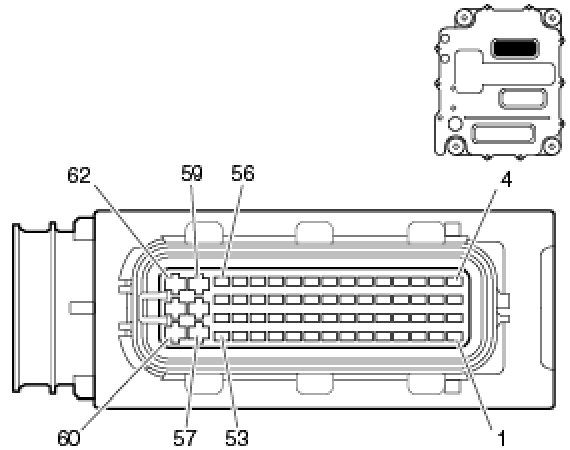
Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.

Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to

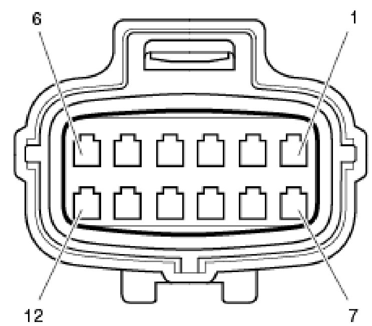
	verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3439

Code number	P3439
Fault code description	Engine brake solenoid valve Cylinder 5 - Voltage too low or short circuit to ground on ECU D420 pin A13
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available
Set condition of fault code	This information will be added to the diagnostic when it becomes available
Reset condition of fault code	This information will be added to the diagnostic when it becomes available
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 | B460 | L150 | L151 | L152 | Function A13 | 11 | | 1 | | Signal, MX Engine Brake solenoid valve cylinder 5 A14 | 5 | | 1 | | Ground A19 | 4 | | | 1 | Ground A20 | 10 | | | 1 | Signal, MX Engine Brake solenoid valve cylinder 6 A21 | 12 | 1 | | | Signal, MX Engine Brake solenoid valve cylinder 4 A22 | 6 | 1 | | | Ground
Technical data	Component check, MX Engine Brake solenoid valve cylinder 1 (L147) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 10 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 2 (L148) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) | Pin (- probe) | Value | Additional information 5 | 11 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) | Pin (- probe) | Value | Additional information 6 | 12 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 10 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

<table>
<tr><td></td><td>
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>5</td><td>11</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

Key the ignition off
Disconnect connector B461
Measure on wiring harness connector B461

<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>6</td><td>12</td><td>± 36.5 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>This information will be added to the diagnostic when it becomes available</td></tr>
<tr><td>Additional information</td><td>This information will be added to the diagnostic when it becomes available</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

<table>
<tr><td>Step 1</td><td>Step ID 3439a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure.
Proceed to step 2.</td></tr>
</table>

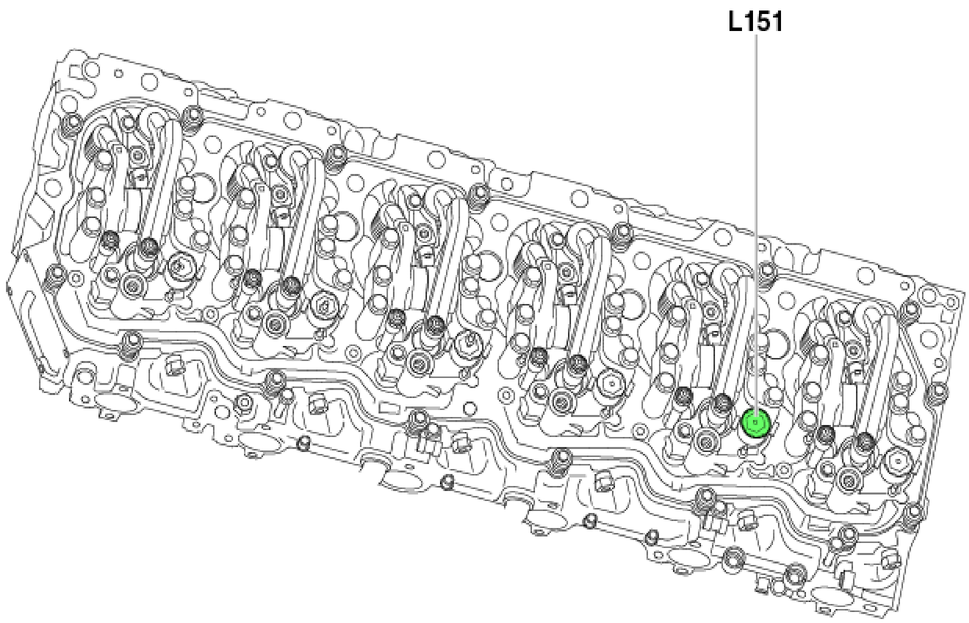
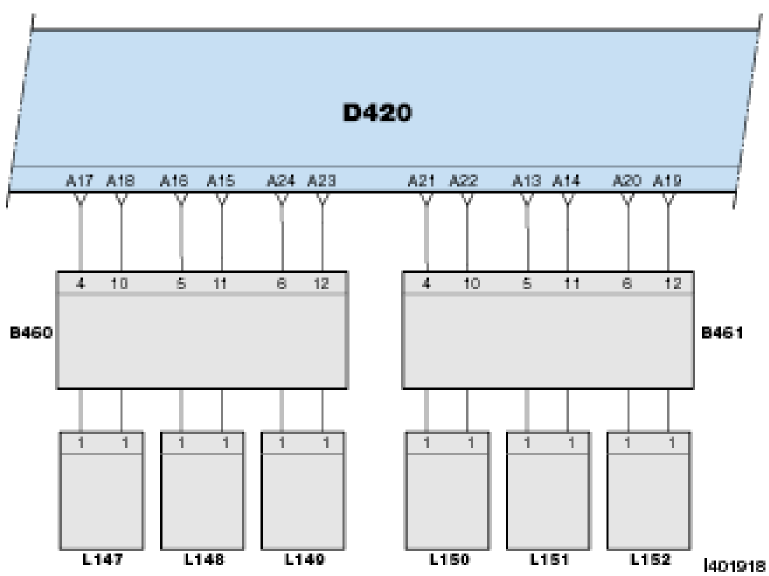
<table>
<tr><td>Step 2</td><td>Step ID 3439b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground:

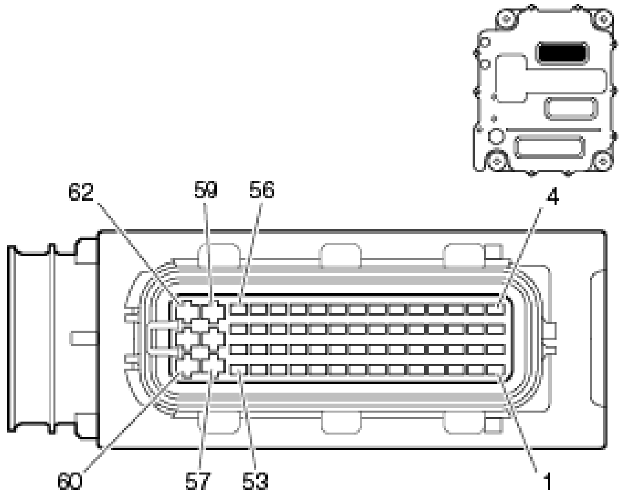
If the measured voltage is approximately 3.5 V – Proceed to step 4.
If the measured voltage is approximately above 0.0 V – Proceed to step 3.
</td></tr>
</table>

<table>
<tr><td>Step 3</td><td>Step ID 3439c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a</td></tr>
</table>
</td></tr>
</table>

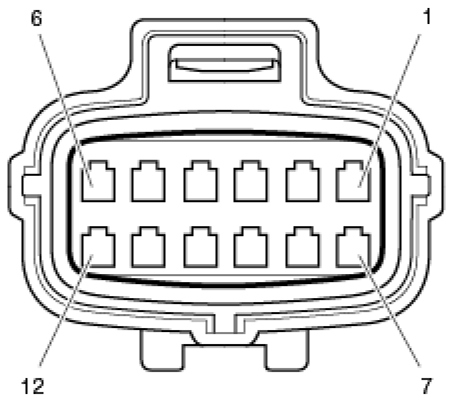
	battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Proceed to step 5. Step 4 | Step ID 3439d | SRT With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately above 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. Step 5 | Step ID 3439e | SRT Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.
Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3440

Code number	P3440
Fault code description	Engine brake solenoid valve Cylinder 5 – Voltage too high or short circuit to supply on ECU D420 pin A13
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 B461 L150 L151 L152 Function A13 5 1 Signal, MX Engine Brake solenoid valve cylinder 5 A14 11 1 Ground A19 12 1 Ground A20 6 1 Signal, MX Engine Brake solenoid valve cylinder 6 A21 4 1 Signal, MX Engine Brake solenoid valve cylinder 4 A22 10 1 Ground
Technical data	Component check, MX Engine Brake solenoid valve cylinder 1 (L147) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 4 / 10 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 2 (L148) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 5 / 11 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) / Pin (- probe) / Value / Additional information 6 / 12 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 4 / 10 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 5 (L151) Preparation

	• Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 5 / 11 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 6 (L152) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 6 / 12 / ± 36.5 Ω / Resistance value at 20°C [68°F]
Possible causes	This information will be added to the diagnostic when it becomes available.
Additional information	No additional information available.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 3440a	SRT
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 3440b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 4. • If the measured voltage is approximately 4.75 V – Proceed to step 3.		

Step 3	Step ID 3440c	SRT
With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground:		

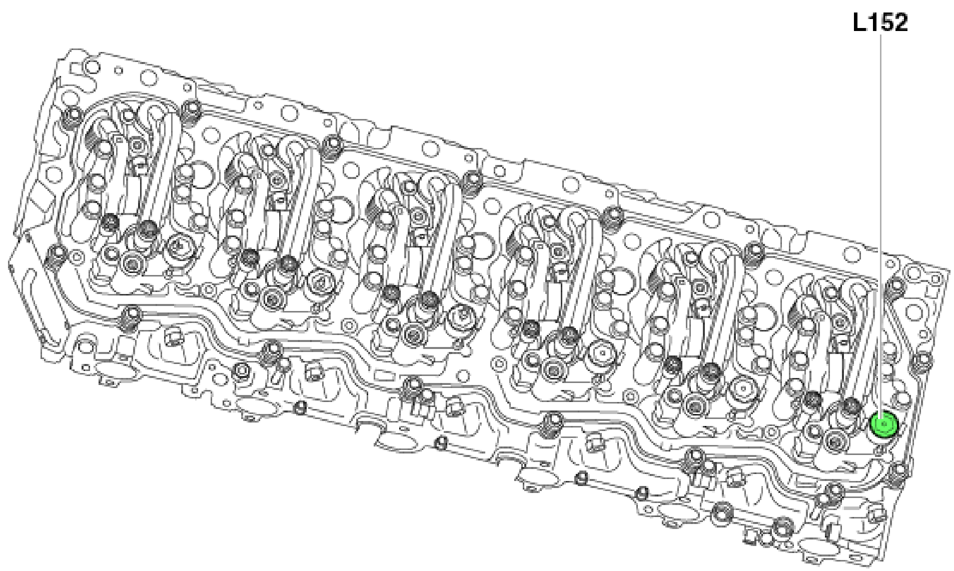
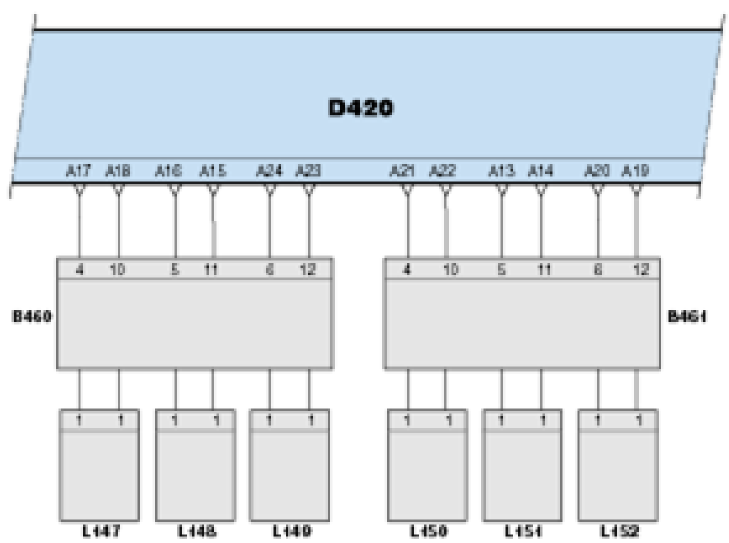
<table>
<tr><td></td><td>
<table><tr><td>

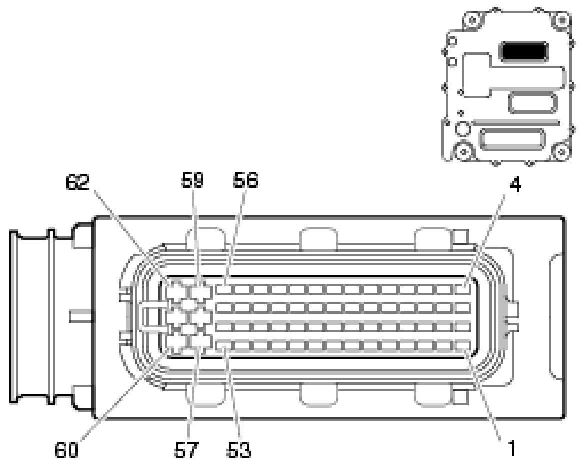
If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
If the measured voltage is approximately 4.75 V – Proceed to step 5.

</td></tr></table>
<table>
<tr><td>Step 4</td><td>Step ID 3440d</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground:

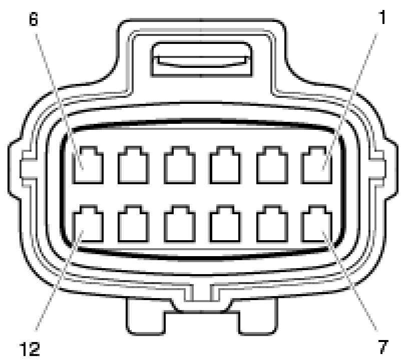
If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document.
If the measured voltage is approximately 4.75 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.
</td></tr>
</table>
<table>
<tr><td>Step 5</td><td>Step ID 3440d</td><td>SRT</td></tr>
<tr><td colspan="3">Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair:
With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.</td></tr>
<tr><td></td><td>Back to Choose Code
Back to Index</td></tr>
</table>

P3445

Code number	P3445
Fault code description	Engine brake solenoid valve Cylinder 6 - Current too low or open circuit on ECU D420 pin A20
Fault code information	This information will be added to the diagnostic when it becomes available.
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve

	cylinder 3 MX Engine Brakes cylinder 4-6
	D420 | B461 | L150 | L151 | L152 | Function

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Possible causes	This information will be added to the diagnostic when it becomes available.
Additional information	This information will be added to the diagnostic when it becomes available.

Diagnostic Step-by-Step

Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.

- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 3445a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 3445b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON, and measure the voltage between the signal terminal on the encapsulated harness and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 3. • If the measured voltage is 0.0 V – Proceed to step 7.		

Step 3	Step ID 3445c	SRT
With key OFF, disconnect the pass-through connector and measure the resistance		

	between the ground terminal on the encapsulated harness and a battery ground: • Closed circuit found – Proceed to step 4. • If open circuit or >100,000 ohms are found – Proceed to step 8.

Step 4	Step ID 3445d	SRT
With key OFF, disconnect the signal connector circuit from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 5. • If the measured voltage is 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

Step 5	Step ID 3445e	SRT
With key OFF, disconnect the ground connector from the engine brake solenoid, and measure the resistance between the ground terminal wire and battery ground: • Closed circuit found – Proceed to step 6. • If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

Step 6	Step ID 3445f	SRT
With key OFF, disconnect both connectors from the engine brake solenoid, and measure the resistance between the terminals on the solenoid (refer to your multimeter operation manual for the correct resistance test procedure). • Closed circuit found – Proceed to step 7. • If open circuit or >100,000 ohms are found – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

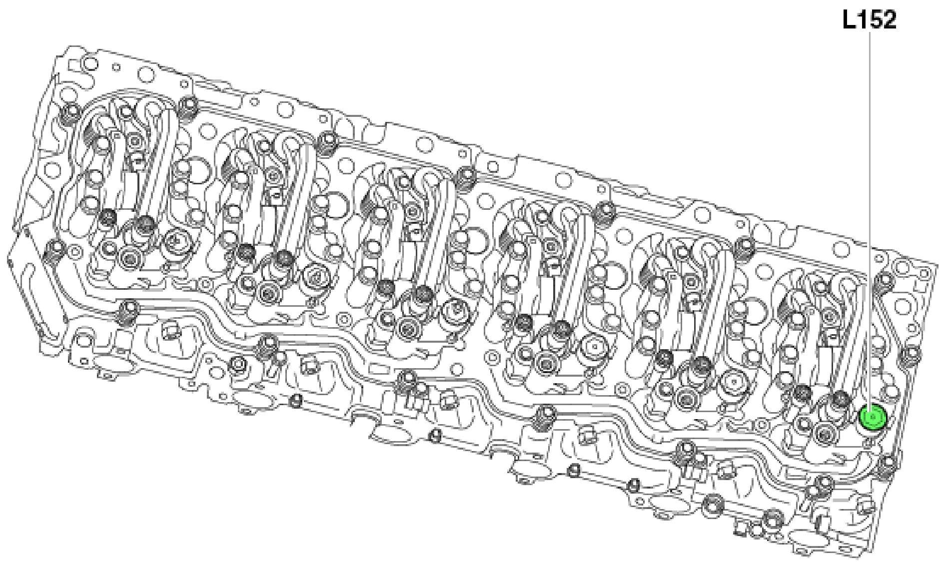
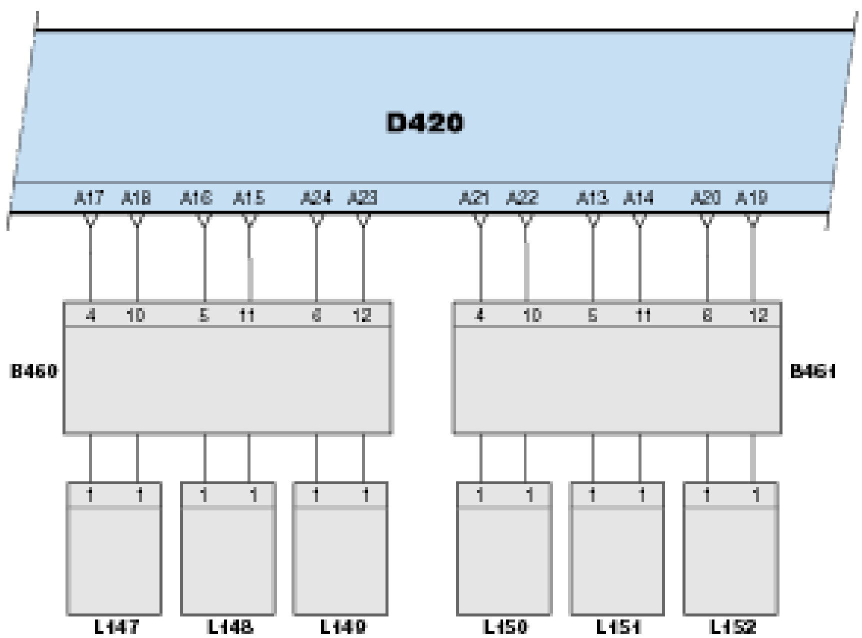
Step 7	Step ID 3445g	SRT
With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the engine brake signal circuit terminal of the PCI and battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is 0.0 V – Proceed to step 9.		

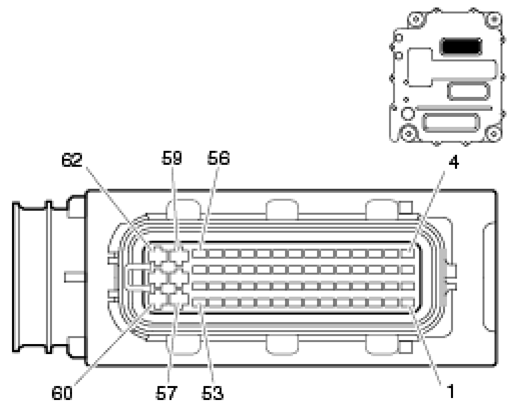
Step 8	Step ID 3445h	SRT
With key OFF, disconnect the encapsulated harness at the PCI, and measure the resistance across the ground terminal on the PCI and a battery ground: • Closed circuit found – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If open circuit or >100,000 ohms are found – Proceed to step 9.		

Step 9	Step ID 3445i	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions about replacing the PCI.		

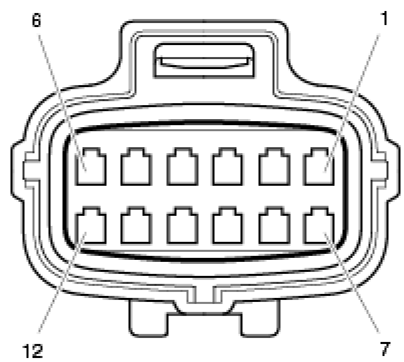
Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3447

Code number	P3447
Fault code description	Engine brake solenoid valve Cylinder 6 - Voltage too low or short circuit to ground on ECU D420 pin A20
Fault code information	This information will be added to the diagnostic when it becomes available.
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6 D420 | B461 | L150 | L151 | L152 | Function A13 | 5 | | 1 | | Signal, MX Engine Brake solenoid valve cylinder 5 A14 | 11 | | 1 | | Ground A19 | 12 | | | 1 | Ground A20 | 6 | | | 1 | Signal, MX Engine Brake solenoid valve cylinder 6 A21 | 4 | 1 | | | Signal, MX Engine Brake solenoid valve cylinder 4 A22 | 10 | 1 | | | Ground
Technical data	Component check, MX Engine Brake solenoid valve cylinder 1 (L147) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 10 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 2 (L148) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) | Pin (- probe) | Value | Additional information 5 | 11 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 3 (L149) Preparation • Key the ignition off • Disconnect connector B460 • Measure on wiring harness connector B460 Pin (+ probe) | Pin (- probe) | Value | Additional information 6 | 12 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 4 (L150) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 4 | 10 | ± 36.5 Ω | Resistance value at 20°C [68°F]

	Component check, MX Engine Brake solenoid valve cylinder 5 (L151) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 5 | 11 | ± 36.5 Ω | Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 6 (L152) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 6 | 12 | ± 36.5 Ω | Resistance value at 20°C [68°F]
Possible causes	This information will be added to the diagnostic when it becomes available.
Additional information	This information will be added to the diagnostic when it becomes available.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

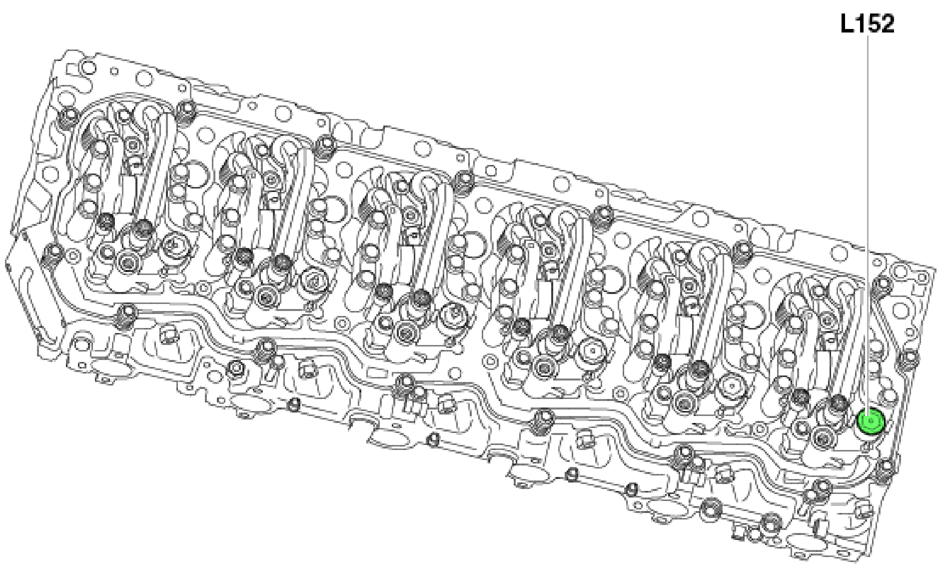
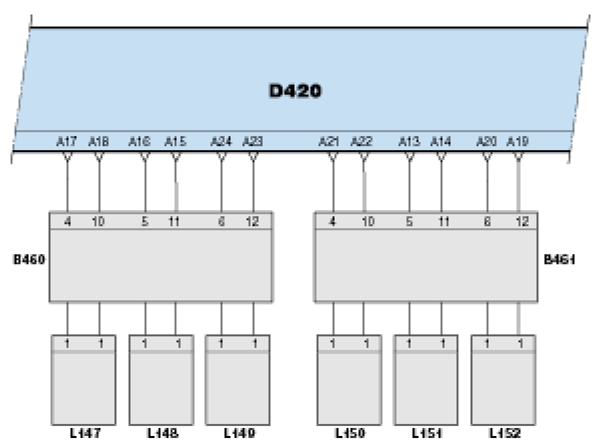
Step 1	Step ID 3447a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

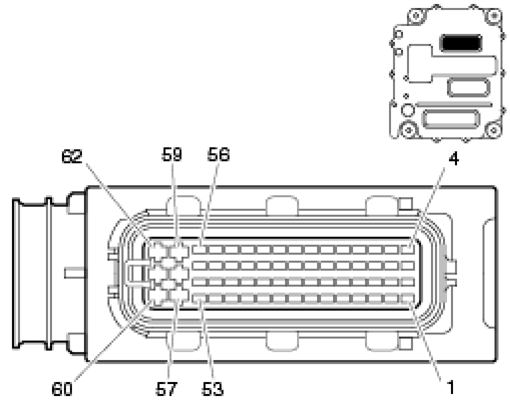
Step 2	Step ID 3447b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 4. • If the measured voltage is approximately 0.0 V – Proceed to step 3.		

Step 3	Step ID 3447c	SRT
With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the		

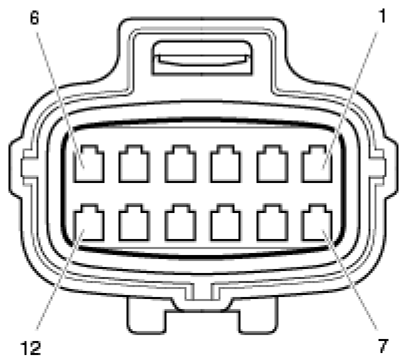
	key ON, and measure the voltage between the signal terminal of the PCI and a battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately 0.0 V – Proceed to step 5. **Step 4** | Step ID 3447d | SRT With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately 0.0 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. **Step 5** | Step ID 3447e | SRT Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI.
Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Choose Code Back to Index

P3448

Code number	P3448
Fault code description	Engine brake solenoid valve Cylinder 6 – Voltage too high or short circuit to supply on ECU D420 pin A20
Fault code information	1 red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	This information will be added to the diagnostic when it becomes available.
Location of component(s)	
Diagnostic condition	This information will be added to the diagnostic when it becomes available.
Set condition of fault code	This information will be added to the diagnostic when it becomes available.
Reset condition of fault code	This information will be added to the diagnostic when it becomes available.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
L147 MX Engine Brake solenoid valve cylinder 1
L148 MX Engine Brake solenoid valve cylinder 2
L149 MX Engine Brake solenoid valve cylinder 3
L150 MX Engine Brake solenoid valve cylinder 4
L151 MX Engine Brake solenoid valve cylinder 5
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinder 1-3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

	MX Engine Brakes cylinder 4-6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground

Technical data

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)
Preparation

- Key the ignition off
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	± 36.5 Ω	Resistance value at 20°C [68°F]

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)
Preparation

- Key the ignition off
- Disconnect connector B461
- Measure on wiring harness connector B461

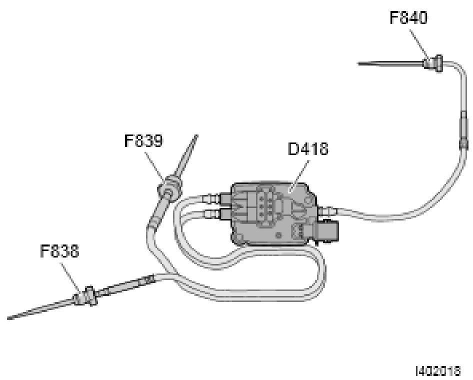
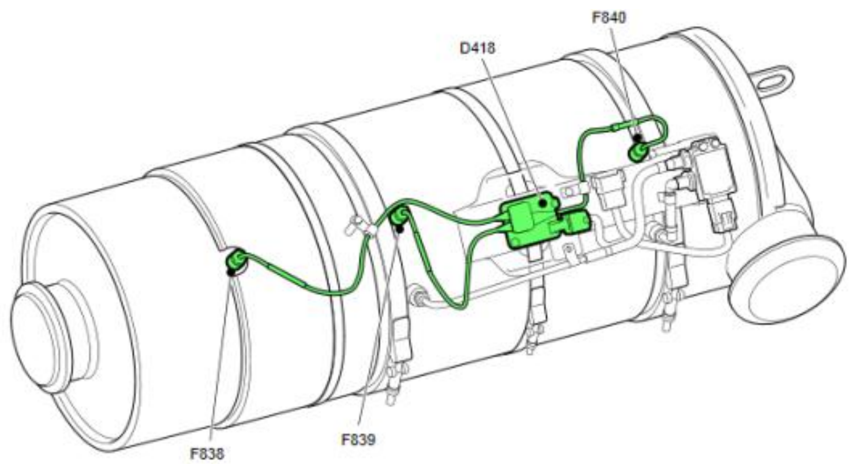
Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	± 36.5 Ω	Resistance value at 20°C [68°F]

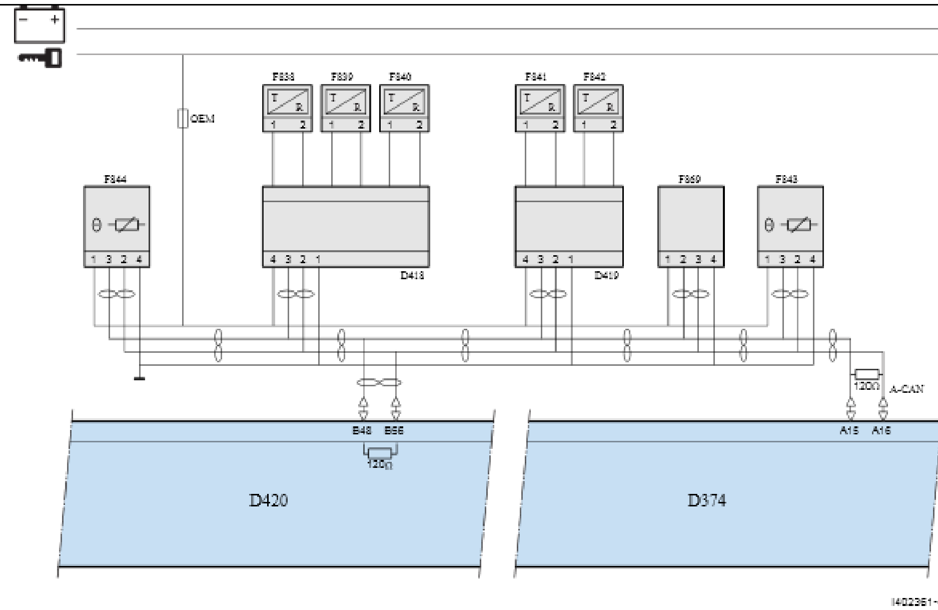
	Component check, MX Engine Brake solenoid valve cylinder 5 (L151) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 5 / 11 / ± 36.5 Ω / Resistance value at 20°C [68°F] Component check, MX Engine Brake solenoid valve cylinder 6 (L152) Preparation • Key the ignition off • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 6 / 12 / ± 36.5 Ω / Resistance value at 20°C [68°F]
Possible causes	• Faulty wiring • Faulty connector • Faulty solenoid valve
Additional information	No additional information available.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. Step 1 / Step ID 3448a / SRT Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2. Step 2 / Step ID 3448b / SRT With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to step 4. • If the measured voltage is approximately 4.75 V – Proceed to step 3.

	Step 3 | Step ID 3448c | SRT With key OFF, disconnect the encapsulated harness at the PCI connector. Turn the key ON, and measure the voltage between the signal terminal of the PCI and a battery ground: • If the measured voltage is approximately 3.5 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately 4.75 V – Proceed to step 5. Step 4 | Step ID 3448d | SRT With key OFF, disconnect the signal connector from the engine brake solenoid. Turn the key ON, and measure the voltage between the signal terminal wire and a battery ground: • If the measured voltage is approximately 3.5 V – Proceed to the verification procedure listed at the end of this document. • If the measured voltage is approximately 4.75 V – Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. Step 5 | Step ID 3448e | SRT Possible PCI failure - Contact the Engine Support Center for further instructions about replacing the PCI. Step 6 | Step ID 3448f | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair: With DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur
	Back to Choose Code Back to Index

P3750

Code number	P3750
Fault code description	Exhaust gas temperature before DOC - Voltage too high or short circuit to supply
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –NMHC
Description of component(s)	**DOC/DPF temperature sensors ECU (D418)** The exhaust gas temperature is measured at three different positions in the DOC/DPF unit. • The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418). • The DOC/DPF temperature sensors ECU (D418) transmit the temperature sensor values to the A-CAN. • The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418). • The temperature sensors are thermocouple sensors. **Exhaust gas temperature sensor before DOC (F838)** • Measure the exhaust gas temperature before the DOC. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DPF (F839). • Determines whether a regeneration can be started. • Calculates the amount of fuel that must be injected. • Determines whether the NOx sensor before the catalyst must be heated to the operating temperature. • Warning activation if the exhaust gas temperature before the DOC is too high. **Exhaust gas temperature sensor before DPF (F839)** • Measure the exhaust gas temperature before the DPF. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DOC (F838). • Determines whether a regeneration is started. • Controls the regeneration temperature. • Calculates the amount of fuel that must be injected. • Diagnoses DOC efficiency.

	• Warning activation if the exhaust gas temperature before the DPF is too high. **Exhaust gas temperature sensor after DPF (F840)** • Measure the exhaust gas temperature after the DPF. **Effect on the system:** • Protect the DPF against temperatures that are too high. • Warning activation if the exhaust gas temperature after the DPF is too high.
Location of component(s)	**DOC/DPF temperature sensors ECU (D418)**  
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	A short circuit to supply or open circuit occurs for 10 consecutive seconds.
Reset condition of fault code	This DTC changes to inactive after the diagnostic runs and passes.
Electrical diagram(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**



D374 EAS-3 ECU

D418 DOC/DPF temperature sensors ECU

D419 Catalytic convertor temperature sensors ECU

D420 PCI ECU

F838 Sensor, exhaust temperature before DOC

F839 Sensor, exhaust temperature before DPF

F840 Sensor, exhaust temperature after DPF

F841 Sensor, exhaust temperature before catalyst

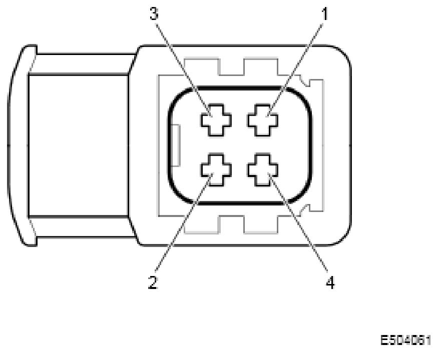
F842 Sensor, exhaust temperature after catalyst

F843 NOx sensor after catalyst

F844 NOx sensor before catalyst

F869 NH3 sensor

D374	D418	Function
A15	3	A-CAN High
A16	2	A-CAN Low
	1	Ground
	4	Power supply

	 **Wiring harness connector D418, front view**
Technical data	**Component & wiring check, DOC/DPF temperature sensors ECU (D418)**

Preparation

- Disconnect connector D418
- Ignition switched to ON
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	
1	Battery negative pole	< 0.5 V	Switch on all consumers

Component & wiring check, A-CAN

Preparation

- Ignition switched to OFF
- Disconnect connector D418
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	± 60 Ω	

Refer to the corresponding OEM service manual for more information regarding specific connector pin designations and locations specific to the vehicle.

Possible causes

- Malfunctioning DOC/DPF temperature sensors ECU (D418).
- Sensor signal wire short circuit to supply.

	• Sensor signal wire open circuit.
Additional information	• The DOC/DPF temperature sensor ECU (D418) reports a short circuit to supply or open circuit. • An active mobile DPF regeneration is disabled. • Only a stationary DPF regeneration is possible. • The sensor value is replaced by the exhaust gas temperature sensor before DPF (F839).
Diagnostic Step-by-Step	

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
- It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1 Investigate Related DTCs

Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

Step 1A Investigate related DTCs	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.	
Are these or any other related DTCs active? P3942; P3943; P3945; P3987; P3990	
Yes	**No**
Refer to the troubleshooting information for these DTCs before performing this procedure.	
	Go to step 2A

Step 2 DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2A Visual inspection, electrical connections

Action

1. Set the ignition switch to OFF.
2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following:
    - Damaged or loose connectors
    - Bent, broken, corroded, or loose connector pins
    - Moisture or dirt in the connections
    - Damage to the wire harness or insulation
    - Damage to the ECU module

Were there any signs of the above?

Yes	No
Correct any issues found. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible malfunction of the DOC/DPF temperature sensor ECU module (D418).
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Electrical checks, resistance, DOC/DPF Temperature Sensors ECU Module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Is the measured resistance value within expected range?	
Yes	**No**
	Possible problem in the harness or EAS-3 ECU.
Go to step 2C	**Go to step 2D**

Step 2C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Turn the key switch ON.
4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Are measured values within expected range?	
Yes	**No**
	Possible problem in the harness.
Go to step 2E	**Go to step 2D**

Step 2D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Refer to the OEM service manual for more information regarding connector pin designation and locations specific to the vehicle.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.

3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC):

   Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1.

   The expected value is < 10 ohms.

Is the measured resistance less than 10 ohms?

Yes	**No**
	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	**If this DTC is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect the DOC/DPF temperature sensor ECU (D418) connector.
3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.

Is the measured resistance greater than 100K ohms?

Yes	**No**
Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 3A to perform the	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness.

corresponding repair verification cycles and rechecks.	Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 3 Repair Verification

Step 3A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.

Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.

   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?

Yes	No
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 3B	

Step 3B DAVIE Diagnostics, Quick Check

Action

Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.

1. Confirm that the corresponding OBD Monitor Readiness Status value is displayed as “Ready.”

   A status of Ready indicates that the corresponding OBD monitor has run successfully and the problem has been resolved—no further action.
   If the displayed status is “Not ready,” continue to action step 2.
2. View the DTC overview display, and confirm that P3750 has been cleared.

Has P3750 been cleared?

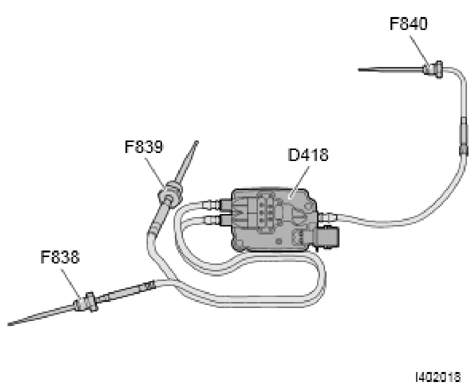
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this DTC is still present: • continue to operate the truck to extend the run time, allowing the corresponding OBD monitor sufficient time to complete • or, return to step 3A and perform this repair verification again. If this issue is still present after extending or re-running the repair verification, contact the PACCAR Engine Support Center for further assistance.

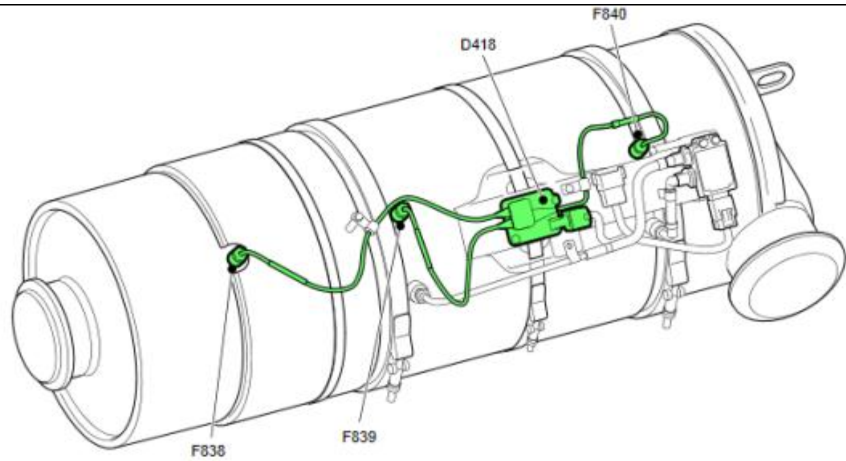
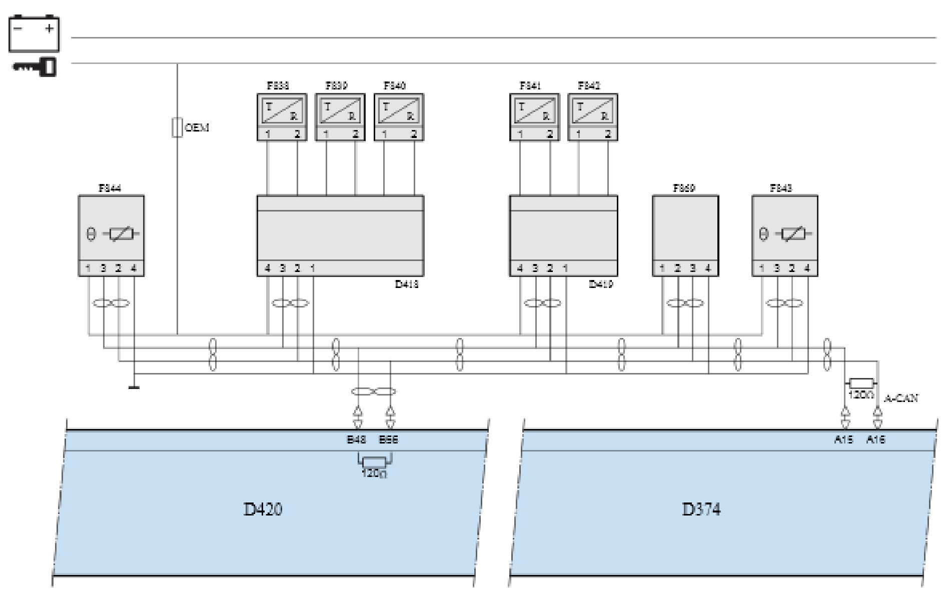
Contacting the PACCAR Engine Support Center

For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

Back to Index

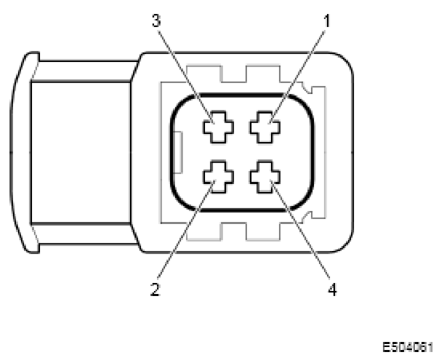
P3751

Code number	P3751
Fault code description	Exhaust gas temperature before DOC - Data valid but too low
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –NMHC
Description of component(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)** The exhaust gas temperature is measured at three different positions in the DOC/DPF unit. • The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418). • The DOC/DPF temperature sensors ECU (D418) transmits the temperature sensor values to the A-CAN. • The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418). • The temperature sensors are thermocouple sensors.
Location of component(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)** 

	
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	A short circuit to ground is detected for 10 consecutive seconds. To set this fault, the following condition(s) must be met: 1) Signal voltage is/was less than or equal to 1 VDC.
Reset condition of fault code	This DTC changes to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**  D374 EAS-3 ECU D418 DOC/DPF temperature sensors ECU D419 Catalytic convertor temperature sensors ECU

	D420 PCI ECU F838 Sensor, exhaust temperature before DOC F839 Sensor, exhaust temperature before DPF F840 Sensor, exhaust temperature after DPF F841 Sensor, exhaust temperature before catalyst F842 Sensor, exhaust temperature after catalyst F843 NOx sensor after catalyst F844 NOx sensor before catalyst F869 NH3 sensor

D374	D418	Function
A15	3	A-CAN High
A16	2	A-CAN Low
	1	Ground
	4	Power supply



Wiring harness connector D418, front view

Technical data

Component & wiring check, DOC/DPF temperature sensors ECU (D418)

Preparation

- Disconnect connector D418
- Ignition switched to ON
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	10 to 14 VDC
1	Battery negative pole	< 0.5 V	Switch on all consumers

Component & wiring check, A-CAN

Preparation

- Ignition switched to OFF
- Disconnect connector D418
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	~ 60 Ω	

Refer to the corresponding OEM service manual for more information regarding specific connector pin designations and locations specific to the vehicle.

Possible causes

- Malfunctioning DOC/DPF temperature sensors ECU (D418).
- Malfunctioning exhaust gas temperature sensor before DOC (F838)
- Open return/ground circuit in harness, connectors, or sensor.

Additional information

- The DOC/DPF temperature sensor ECU (D418) reports a short circuit to ground.
- Mobile active DPF regeneration is disabled.
- Only a stationary DPF regeneration is possible.
- The sensor value is replaced by the exhaust gas temperature sensor before DPF (F839).

Diagnostic Step-by-Step

The ignition should always be in the OFF position when connecting or disconnecting electric components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to th PMCI are functioning properly.
- Disconnecting the PMCI connectors during the troubleshooting process will result in multiple er
- Specific electrical component information and pin out locations are provided in this procedure a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
- It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, a then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete a troubleshooting steps in the sequence provided.

Step 1. Investigate Related Trouble Codes

Before troubleshooting this code, take notice of any other active or inactive trouble codes. One or multiple other codes could have been the cause for this code.

Step 1.A Investigate related trouble codes	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	
Are these or any other related codes active? P3942; P3943; P3945; P3987; P3990	
Yes	**No**
Refer to the troubleshooting information for these codes before performing this procedure.	Go to step 2.A

Step 2. DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2. A Visual inspection, electrical connections	
Action 1. Set the ignition switch to OFF. 2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • Damage to the ECU module	
Were there any signs of the above?	
Yes	**No**
Correct any issues found. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	Possible malfunction of the DOC/DPF temperature sensor ECU module (D418).
If this code is still present, go to Step 2.B	Go to step 2.B

Step 2.B Electrical checks, resistance, DOC/DPF Temperature Sensors ECU Module (D418)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Is the measured value within expected range?

Yes	No
	Possible problem in the harness or EAS-3 ECU.
Go to step 2.C	Go to step 2.D

Step 2.C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Turn the key switch ON.
4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Are measured values within expected range?

Yes	No
Possible problem with the DOC/DPF temperature sensors ECU module (D418).	Possible problem in the harness.
Go to step 2.E	Go to step 2.D

Step 2.D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)	
	Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points. Refer to the OEM service manual for more information regarding specific pinout location/designation specific to the vehicle.
Action 1. Ensure the ignition switch is set to OFF. 2. Disconnect DOC-DPF temperature sensor ECU (D418) connector. 3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC): Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1.	
Is the measured resistance less than 10 ohms?	
Yes	**No**
	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness.
Go to step 2.E	Go to step 3.A to perform the corresponding repair verification cycles and rechecks.

Step 2.E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)	
	Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.
Action 1. Ensure the ignition switch is set to OFF. 2. Disconnect DOC-DPF temperature sensor ECU (D418) connector. 3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.	
Is the measured resistance greater than 100K ohms?	
Yes	**No**

Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 3.A to perform the corresponding repair verification cycles and rechecks.	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Go to step 3.A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	

Step 3. Repair Verification

Step 3.A Repair verification cycles	
Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated. Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.	
Action 1. Steady State This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.	
Were the identified repair verification cycles able to be completed?	
Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 3.B	

Step 3.B DAVIE Diagnostics, Quick Check	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.	
Has P3751 been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

Back to Index

P3752

Code number	P3752
Fault code description	Exhaust gas temperature before DOC - Unlikely, not changing during operation
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –NMHC
Description of component(s)	**DOC/DPF temperature sensors ECU (D418)** The exhaust gas temperature is measured at three different positions in the DOC/DPF unit. • The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418). • The DOC/DPF temperature sensors ECU (D418) transmit the temperature sensor values to the A-CAN. • The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418). • The temperature sensors are thermocouple sensors. **Exhaust gas temperature sensor before DOC (F838)** • Measure the exhaust gas temperature before the DOC. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DPF (F839). • Determines whether a regeneration can be started. • Calculates the amount of fuel that must be injected. • Determines whether the NOx sensor before the catalyst must be heated to the operating temperature. • Warning activation if the exhaust gas temperature before the DOC is too high. **Exhaust gas temperature sensor before DPF (F839)** • Measure the exhaust gas temperature before the DPF. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DOC (F838). • Determines whether a regeneration is started. • Controls the regeneration temperature. • Calculates the amount of fuel that must be injected. • Diagnoses DOC efficiency. • Warning activation if the exhaust gas temperature before the DPF is too high.

<table>
<tr><td></td><td>

Exhaust gas temperature sensor after DPF (F840)

- Measure the exhaust gas temperature after the DPF.

Effect on the system:

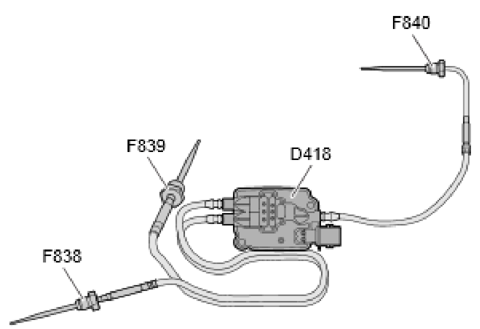
- Protect the DPF against temperatures that are too high.
- Warning activation if the exhaust gas temperature after the DPF is too high.

</td></tr>
<tr><td>

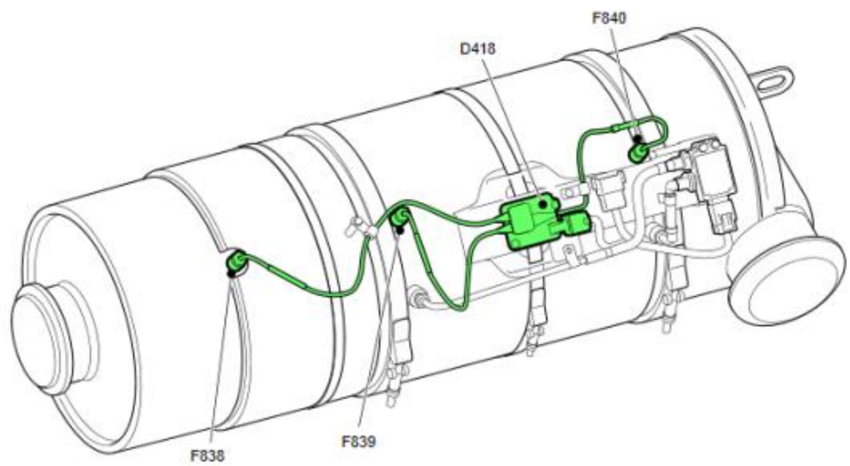
Location of component(s)

</td><td>

DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)



I402018



</td></tr>
<tr><td>

Diagnostic condition

</td><td>

This diagnostic runs continuously when the entry conditions are fulfilled:

- Ignition is keyed on and the engine is running.
- No active faults on any sensor used to calculate the engine mass flow.
- No active faults on any of the EAS-3 exhaust gas temperature sensors.
- No active faults on the DPF pressure sensor (F837).
- No CAN communication faults on the EAS-3 exhaust gas temperature sensors.
- The exhaust gas flow must be high enough.

</td></tr>
<tr><td>

Set condition of fault code

</td><td>

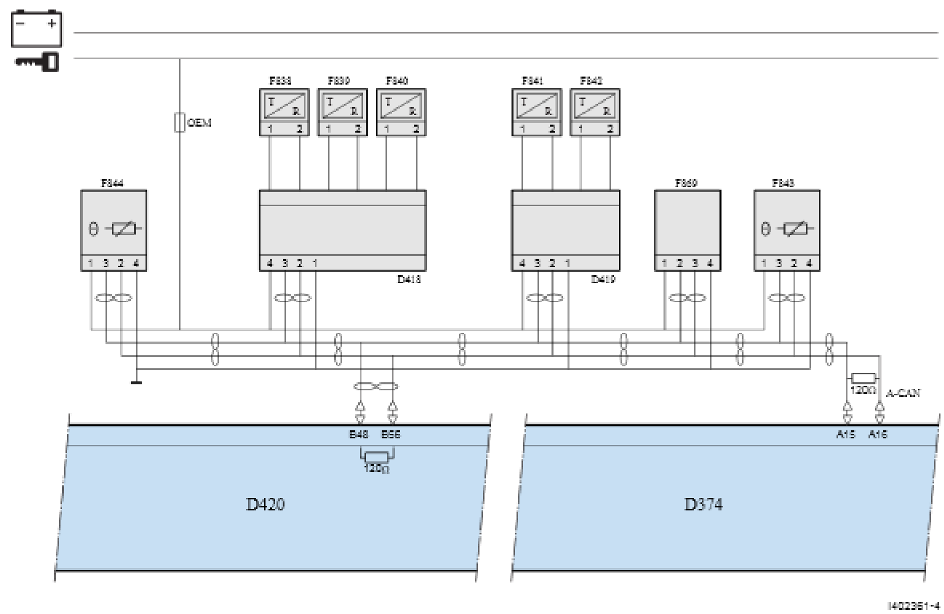
The EAS-3 ECU (D374) detects that the difference between the exhaust gas temperature sensor before DOC (F838) data and the exhaust gas temperature sensor

</td></tr>
</table>

	before DPF (F839) does not match the expected value for the present engine operating conditions.
Reset condition of fault code	This DTC changes to inactive after the diagnostic runs and passes.

Electrical diagram(s)

DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)



D374 EAS-3 ECU

D418 DOC/DPF temperature sensors ECU

D419 Catalytic convertor temperature sensors ECU

D420 PCI ECU

F838 Sensor, exhaust temperature before DOC

F839 Sensor, exhaust temperature before DPF

F840 Sensor, exhaust temperature after DPF

F841 Sensor, exhaust temperature before catalyst

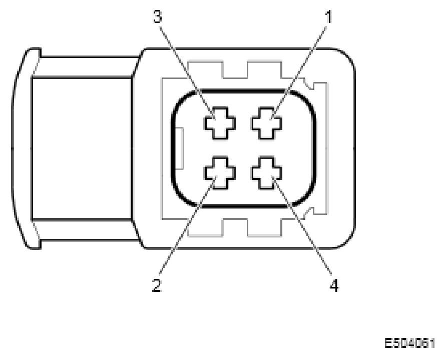
F842 Sensor, exhaust temperature after catalyst

F843 NOx sensor after catalyst

F844 NOx sensor before catalyst

F869 NH3 sensor

D374	D418	Function
A15	3	A-CAN High
A16	2	A-CAN Low
	1	Ground
	4	Power supply



Wiring harness connector D418, front view

Technical data

Component & wiring check, DOC/DPF temperature sensors ECU (D418)

Preparation

- Disconnect connector D418
- Ignition switched to ON
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	10 to 14 VDC
1	Battery negative pole	< 0.5 V	Switch on all consumers

Component & wiring check, A-CAN

Preparation

- Ignition switched to OFF
- Disconnect connector D418
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	± 60 Ω	

Refer to the corresponding OEM service manual for more information regarding specific connector pin designations and locations specific to the vehicle.

Possible causes

- Malfunctioning DOC/DPF temperature sensors ECU (D418).

<table>
<tr><td></td><td>

- Stuck in-range exhaust gas temperature sensor before DOC (F838).
- Diesel Oxidation Catalyst (DOC) face plugging.

</td></tr>
<tr><td>Additional information</td><td>

First solve other EAS temperature sensor related DTCs.

- The reading of the exhaust gas temperature sensor before DOC (F838) is not changing with changing conditions.

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly.
- Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors.
- Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
- It is necessary to use DAVIE to clear all current trouble codes from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1 Investigate Related DTCs

Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

<table>
<tr><td colspan="2">Step 1A Investigate related DTCs</td></tr>
<tr><td colspan="2">Action
1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.</td></tr>
<tr><td colspan="2">Are these or any other related DTCs active?
P3942; P3943; P3945; P3987; P3990</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>Refer to the troubleshooting information for these DTCs before performing this procedure.</td><td></td></tr>
<tr><td></td><td>Go to step 2A</td></tr>
</table>

</td></tr>
</table>

Step 2 DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2A Visual inspection, electrical connections

Action

1. Set the ignition switch to OFF.
2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded, or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - Damage to the ECU module

Were there any signs of the above?

Yes	No
Correct any issues found. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Electrical checks, resistance, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Is the measured value within expected range?

Yes	No
	Possible problem in the harness or EAS-3 ECU.

Go to step 2C	Go to step 2D

Step 2C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)	
i Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Ensure the ignition switch is set to OFF. 2. Disconnect DOC-DPF temperature sensor ECU (D418) connector. 3. Turn the key switch ON. 4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).	
Are measured values within expected range?	
Yes	**No**
Possible problem with the DOC/DPF temperature sensors ECU module (D418).	Possible problem in the harness.
Go to step 2E	**Go to step 2D**

Step 2D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)
i Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.
i Refer to the OEM service manual for more information regarding specific pinout location/designation specific to the vehicle.
Action 1. Ensure the ignition switch is set to OFF. 2. Disconnect DOC-DPF temperature sensor ECU (D418) connector. 3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC): Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1.

Is the measured resistance less than 10 ohms?	
Yes	**No**
	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	

Step 2.E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.

Is the measured resistance greater than 100K ohms?	
Yes	**No**
Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.
If this DTC is still present, go to step 3A	**If this DTC is still present, go to step 3A**

Step 3 Diesel Oxidation Catalyst (DOC) Checks

Step 3A Visual inspection, DOC

Action

1. Set the ignition switch to OFF.
2. Remove and inspect the DOC for damage, contamination, or blocking (face plugging) as outlined in “check/clean Diesel Oxidation Catalyst (DOC) (Diesel Partic. Filter)” – job ID 80043.

Were there any signs of damage, contamination, or blocking?

Yes	**No**
Correct any issues found by cleaning or replacing the DOC as necessary. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.	Refer to step 4A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 4 Repair Verification

Step 4A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated.

Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?

Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For

	additional assistance, contact the PACCAR Engine Support Center.
Go to step 4B	

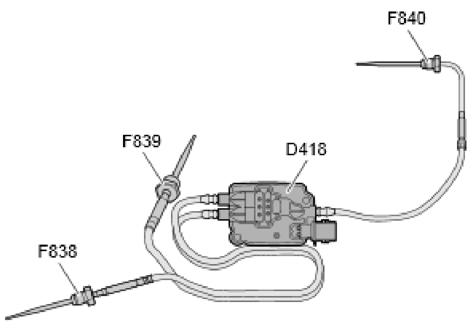
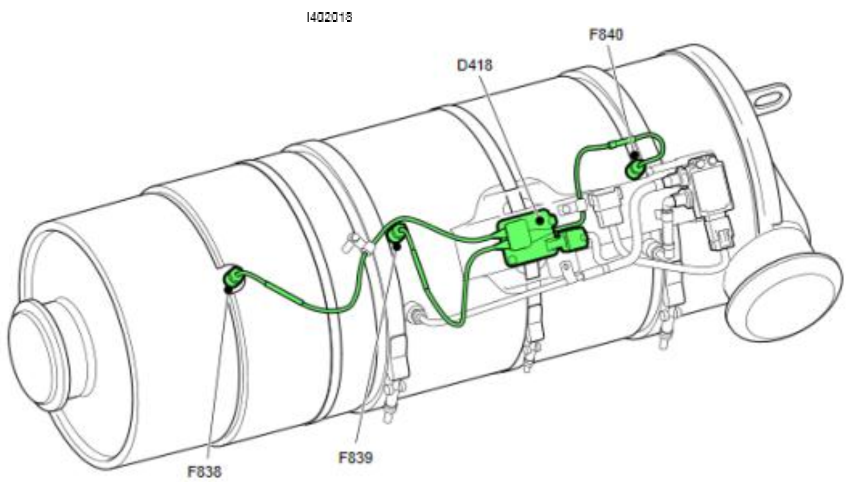
Step 4B DAVIE Diagnostics, Quick Check	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.	
Has P3752 been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

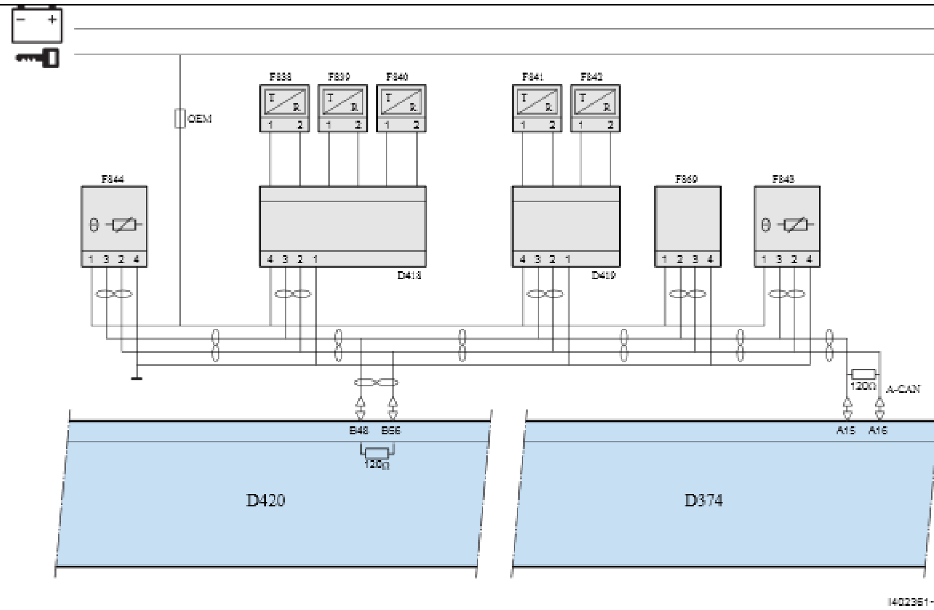
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

Back to Index

P3753

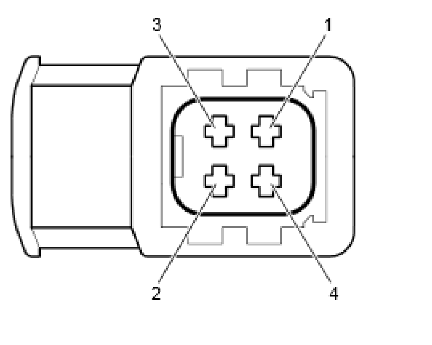
Code number	P3753
Fault code description	Exhaust gas temperature before DPF - Voltage too high or short circuit to supply
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –NMHC
Description of component(s)	**DOC/DPF temperature sensors ECU (D418)** The exhaust gas temperature is measured at three different positions in the DOC/DPF unit. • The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418). • The DOC/DPF temperature sensors ECU (D418) transmit the temperature sensor values to the A-CAN. • The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418). • The temperature sensors are thermocouple sensors. **Exhaust gas temperature sensor before DOC (F838)** • Measure the exhaust gas temperature before the DOC. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DPF (F839). • Determines whether a regeneration can be started. • Calculates the amount of fuel that must be injected. • Determines whether the NOx sensor before the catalyst must be heated to the operating temperature. • Warning activation if the exhaust gas temperature before the DOC is too high. **Exhaust gas temperature sensor before DPF (F839)** • Measure the exhaust gas temperature before the DPF. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DOC (F838). • Determines whether a regeneration is started. • Controls the regeneration temperature.

	• Calculates the amount of fuel that must be injected. • Diagnoses DOC efficiency. • Warning activation if the exhaust gas temperature before the DPF is too high. **Exhaust gas temperature sensor after DPF (F840)** • Measure the exhaust gas temperature after the DPF. **Effect on the system:** • Protect the DPF against temperatures that are too high. • Warning activation if the exhaust gas temperature after the DPF is too high.
Location of component(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**  
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	A short circuit to supply or open circuit occurs for 10 consecutive seconds.
Reset condition of fault code	This DTC changes to inactive after the diagnostic runs and passes.
Electrical diagram(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**



D374	EAS-3 ECU
D418	DOC/DPF temperature sensors ECU
D419	Catalytic convertor temperature sensors ECU
D420	PCI ECU
F838	Sensor, exhaust temperature before DOC
F839	Sensor, exhaust temperature before DPF
F840	Sensor, exhaust temperature after DPF
F841	Sensor, exhaust temperature before catalyst
F842	Sensor, exhaust temperature after catalyst
F843	NOx sensor after catalyst
F844	NOx sensor before catalyst
F869	NH3 sensor

D374	D418	Function
A15	3	A-CAN High
A16	2	A-CAN Low
	1	Ground
	4	Power supply



Wiring harness connector D418, front view

Technical data

Component and wiring check, temperature sensors DOC-DPF ECU (D418)
Preparation

- Disconnect connector D418
- Ignition switched on
- Measure on connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	
1	Battery negative pole	< 0.5 V	Switch on all consumers

Component and wiring check, A-CAN
Preparation

- Ignition switched off
- Disconnect connector D418
- Measure on connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	± 60 Ω	

Possible causes

- Malfunctioning DOC-DPF temperature sensors ECU (D418)
- Sensor signal short circuit to supply
- Sensor signal open circuit

Additional information

- The DOC-DPF temperature sensors ECU (D418) reports a short circuit to supply
- An active mobile DPF regeneration is disabled
- Only a stationary DPF regeneration is possible
- The sensor value is replaced by the exhaust temperature sensor after DPF (F840)

Diagnostic Step-by-Step

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections

in Rapido for the most up-to-date changes.

- It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1 Investigate Related DTCs

Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

Step 1A Investigate related DTCs	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.	
Are these or any other related DTCs active? P3942; P3943; P3945; P3987; P3990	
Yes	**No**
Refer to the troubleshooting information for these DTCs before performing this procedure.	
	Go to step 2A

Step 2 DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2A Visual inspection, electrical connections

Action

1. Set the ignition switch to OFF.
2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded, or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - Damage to the ECU module

Were there any signs of the above?	
Yes	**No**
Correct any issues found. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible malfunction of the DOC/DPF temperature sensor ECU module (D418).
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Electrical checks, resistance, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Is the measured resistance value within expected range?	
Yes	**No**
	Possible problem in the harness or EAS-3 ECU.
Go to step 2C	**Go to step 2D**

Step 2C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.

2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Turn the key switch ON.
4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Are measured values within expected range?	
Yes	**No**
	Possible problem in the harness.
Go to step 2E	**Go to step 2D**

Step 2D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Refer to the OEM service manual for more information regarding connector pin designation and locations specific to the vehicle.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC):

   Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1.

   The expected value is < 10 ohms.

Is the measured resistance less than 10 ohms?	
Yes	**No**

	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	**If this DTC is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect the DOC/DPF temperature sensor ECU (D418) connector.
3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.

Is the measured resistance greater than 100K ohms?

Yes	No
Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 3 Repair Verification

Step 3A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.

Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?

Yes	No
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 3B	

Step 3B DAVIE Diagnostics, Quick Check

Action

Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.

1. Confirm that the corresponding OBD Monitor Readiness Status value is displayed as "Ready."

   A status of Ready indicates that the corresponding OBD monitor has run successfully and the problem has been resolved—no further action.
   If the displayed status is "Not ready," continue to action step 2.
2. View the DTC overview display, and confirm that P3753 has been cleared.

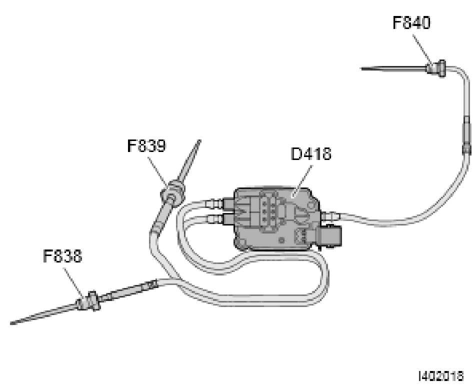
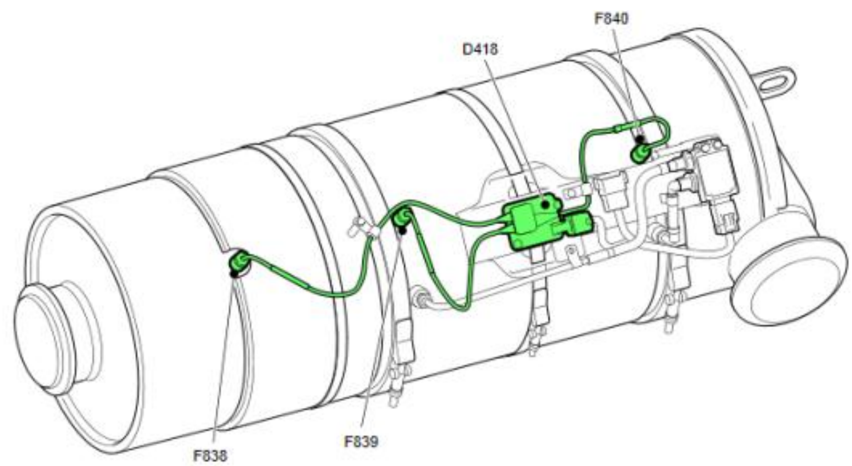
Has P3753 been cleared?

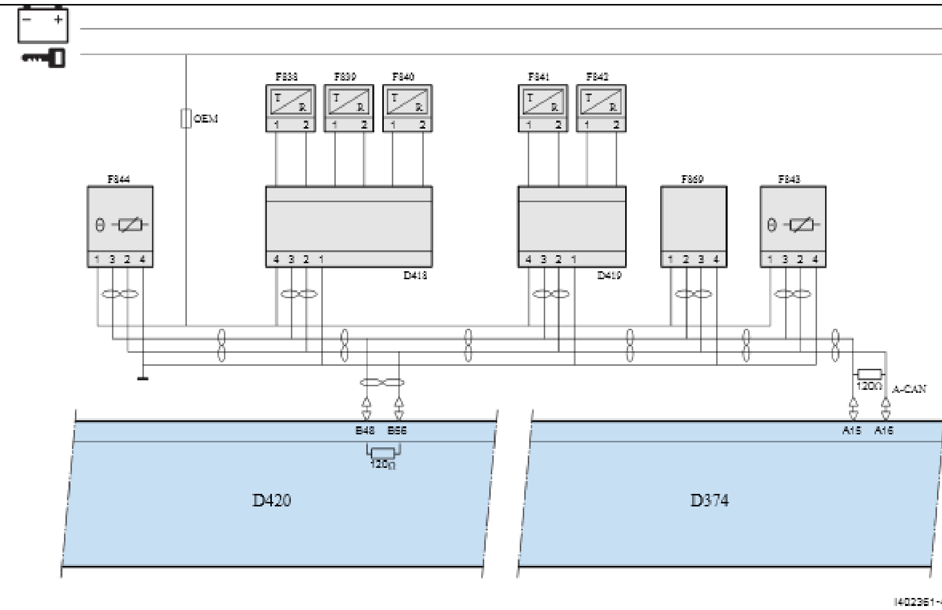
Yes	No
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure.

	If all steps have been completed and this DTC is still present: • continue to operate the truck to extend the run time, allowing the corresponding OBD monitor sufficient time to complete • or, return to step 3A and perform this repair verification again. If this issue is still present after extending or re-running the repair verification, contact the PACCAR Engine Support Center for further assistance. Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
	Back to Index

P3754

Code number	P3754
Fault code description	Exhaust gas temperature before DPF - Voltage too low or short circuit to ground
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –NMHC
Description of component(s)	**DOC/DPF temperature sensors ECU (D418)** The exhaust gas temperature is measured at three different positions in the DOC/DPF unit. • The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418). • The DOC/DPF temperature sensors ECU (D418) transmit the temperature sensor values to the A-CAN. • The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418). • The temperature sensors are thermocouple sensors. **Exhaust gas temperature sensor before DOC (F838)** • Measure the exhaust gas temperature before the DOC. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DPF (F839). • Determines whether a regeneration can be started. • Calculates the amount of fuel that must be injected. • Determines whether the NOx sensor before the catalyst must be heated to the operating temperature. • Warning activation if the exhaust gas temperature before the DOC is too high. **Exhaust gas temperature sensor before DPF (F839)** • Measure the exhaust gas temperature before the DPF. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DOC (F838). • Determines whether a regeneration is started. • Controls the regeneration temperature. • Calculates the amount of fuel that must be injected.

	• Diagnoses DOC efficiency. • Warning activation if the exhaust gas temperature before the DPF is too high. **Exhaust gas temperature sensor after DPF (F840)** • Measure the exhaust gas temperature after the DPF. **Effect on the system:** • Protect the DPF against temperatures that are too high. • Warning activation if the exhaust gas temperature after the DPF is too high.
Location of component(s)	**DOC/DPF temperature sensors ECU (D418)**  
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	A short circuit to ground is detected for 10 consecutive seconds.
Reset condition of fault code	This DTC changes to inactive after the diagnostic runs and passes.
Electrical diagram(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**



D374 EAS-3 ECU

D418 DOC/DPF temperature sensors ECU

D419 Catalytic convertor temperature sensors ECU

D420 PCI ECU

F838 Sensor, exhaust temperature before DOC

F839 Sensor, exhaust temperature before DPF

F840 Sensor, exhaust temperature after DPF

F841 Sensor, exhaust temperature before catalyst

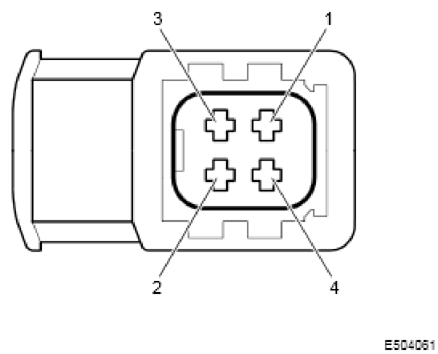
F842 Sensor, exhaust temperature after catalyst

F843 NOx sensor after catalyst

F844 NOx sensor before catalyst

F869 NH3 sensor

D374	D418	Function
A15	3	A-CAN High
A16	2	A-CAN Low
	1	Ground
	4	Power supply



Wiring harness connector D418, front view

Technical data

Component & wiring check, DOC/DPF temperature sensors ECU (D418)

Preparation

- Disconnect connector D418
- Ignition switched to ON
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	10 to 14 VDC
1	Battery negative pole	< 0.5 V	Switch on all consumers

Component & wiring check, A-CAN

Preparation

- Ignition switched to OFF
- Disconnect connector D418
- Measure on the connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	± 60 Ω	

Refer to the corresponding OEM service manual for more information regarding specific connector pin designations and locations specific to the vehicle.

Possible causes

- Malfunctioning temperature sensors DOC/DPF ECU (D418).

<table>
<tr><td></td><td>

- Sensor signal wire short circuit to ground.

</td></tr>
<tr><td>Additional information</td><td>

- The DOC/DPF temperature sensors ECU (D418) report a short circuit to ground.
- An active mobile DPF regeneration is disabled.
- Only a stationary DPF regeneration is possible.
- The sensor value is replaced by the exhaust gas temperature sensor after DPF (F840).

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
- It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1 Investigate Related DTCs

Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

<table>
<tr><td colspan="2">Step 1A Investigate related DTCs</td></tr>
<tr><td colspan="2">Action
1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.</td></tr>
<tr><td colspan="2">Are these or any other related DTCs active?
P3942; P3943; P3945; P3987; P3990</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>Refer to the troubleshooting information for these DTCs before performing this procedure.</td><td></td></tr>
<tr><td></td><td>Go to step 2A</td></tr>
</table>

</td></tr>
</table>

Step 2 DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2A Visual inspection, connections and wiring

Action

1. Set the ignition switch to OFF.
2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded, or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - Damage to the ECU module

Were there any signs of the above?

Yes	No
Correct any issues found. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible malfunction of the DOC/DPF temperature sensor ECU module (D418).
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Electrical checks, resistance, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Is the measured resistance value within expected range?	
Yes	**No**
	Possible problem in the harness or EAS-3 ECU.
Go to step 2C	**Go to step 2D**

Step 2C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Turn the key switch ON.
4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Are measured values within expected range?	
Yes	**No**
	Possible problem in the harness.
Go to step 2E	**Go to step 2D**

Step 2D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Refer to the OEM service manual for more information regarding connector pin designation and locations specific to the vehicle.

	Action 1. Ensure the ignition switch is set to OFF. 2. Disconnect DOC-DPF temperature sensor ECU (D418) connector. 3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC): Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1. The expected value is < 10 ohms.

Is the measured resistance less than 10 ohms?

Yes	**No**
	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	**If this DTC is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action 1. Ensure the ignition switch is set to OFF. 2. Disconnect the DOC/DPF temperature sensor ECU (D418) connector. 3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.	
Is the measured resistance greater than 100K ohms?	
Yes	**No**
Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 3 Repair Verification

Step 3A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.

ℹ Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?	
Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 3B	

Step 3B DAVIE Diagnostics, Quick Check

Action

Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.

1. Confirm that the corresponding OBD Monitor Readiness Status value is displayed as “Ready.”

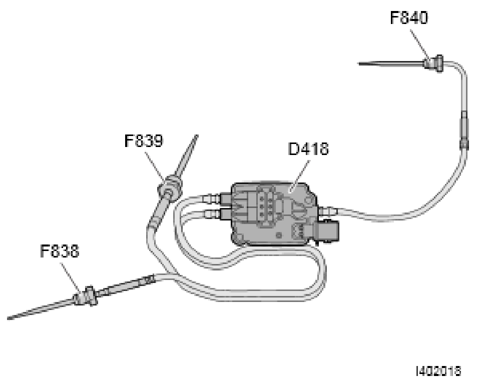
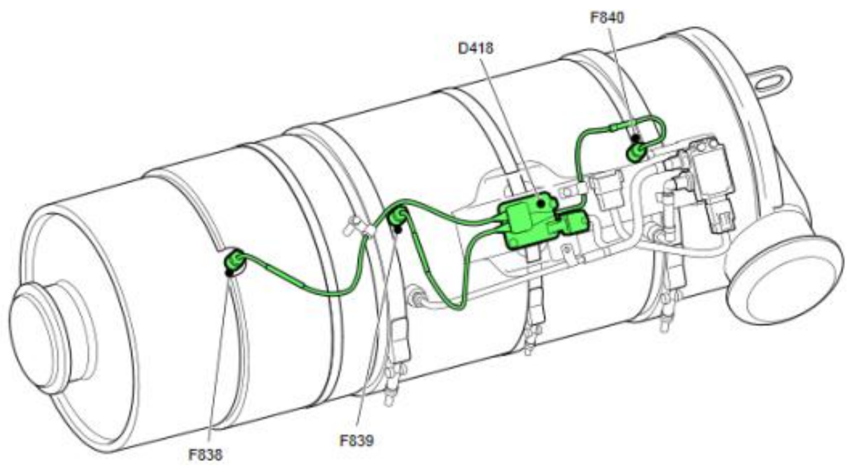
   A status of Ready indicates that the corresponding OBD monitor has run successfully and the problem has been resolved—no further action.
   If the displayed status is “Not ready,” continue to action step 2.
2. View the DTC overview display, and confirm that P3754 has been cleared.

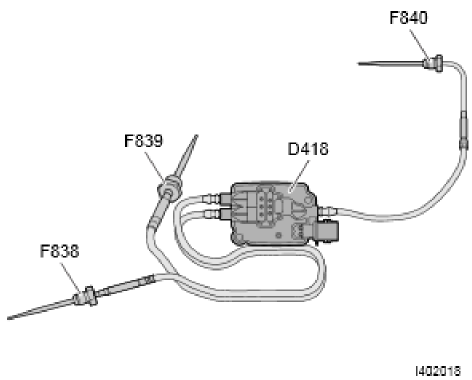
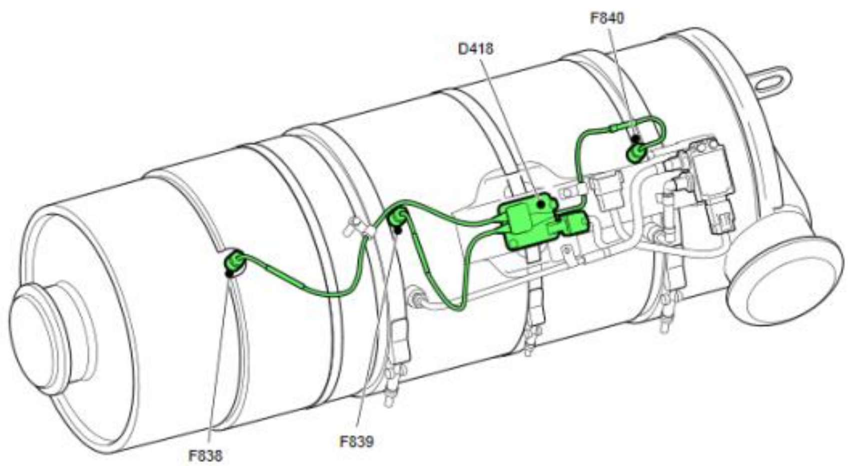
Has P3754 been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this DTC is still present: • continue to operate the truck to extend the run time, allowing the corresponding OBD monitor sufficient time to complete • or, return to step 3A and perform this repair verification again. If this issue is still present after extending or re-running the repair verification, contact the PACCAR Engine Support Center for further assistance.

		Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
		Back to Index

P3755

Code number	P3755
Fault code description	Exhaust gas temperature before DPF - Data erratic, intermittent, or incorrect, not changing during operation
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –NMHC
Description of component(s)	**DOC/DPF temperature sensors ECU (D418)** The exhaust gas temperature is measured at three different positions in the DOC/DPF unit. • The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418). • The DOC/DPF temperature sensors ECU (D418) transmit the temperature sensor values to the A-CAN. • The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418). • The temperature sensors are thermocouple sensors. **Exhaust gas temperature sensor before DOC (F838)** • Measure the exhaust gas temperature before the DOC. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DPF (F839). • Determines whether a regeneration can be started. • Calculates the amount of fuel that must be injected. • Determines whether the NOx sensor before the catalyst must be heated to the operating temperature. • Warning activation if the exhaust gas temperature before the DOC is too high. **Exhaust gas temperature sensor before DPF (F839)** • Measure the exhaust gas temperature before the DPF. **Effect on the system:** • Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DOC (F838). • Determines whether a regeneration is started. • Controls the regeneration temperature. • Calculates the amount of fuel that must be injected. • Diagnoses DOC efficiency.

	• Warning activation if the exhaust gas temperature before the DPF is too high. **Exhaust gas temperature sensor after DPF (F840)** • Measure the exhaust gas temperature after the DPF. **Effect on the system:** • Protect the DPF against temperatures that are too high. • Warning activation if the exhaust gas temperature after the DPF is too high.
Location of component(s)	**DOC/DPF temperature sensors ECU (D418)**  
Diagnostic condition	This diagnostic runs continuously when the entry conditions are fulfilled: • Ignition is keyed on and the engine is running. • No active faults on any sensor used to calculate the engine mass flow. • No active faults on any of the EAS-3 exhaust gas temperature sensors. • No active faults on the DPF pressure sensor (F837). • No CAN communication faults on the EAS-3 exhaust gas temperature sensors. • The exhaust gas flow must be high enough.

Set condition of fault code	The EAS-3 ECU (D374) detects that the temperature difference over the DOC compared with the temperature difference over the DPF does not match the expected value for the present engine operating conditions.
Reset condition of fault code	This DTC changes to inactive after the diagnostic runs and passes.
Electrical diagram(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**  
Technical data	**Component and wiring check, temperature sensors DOC-DPF ECU (D418)** **Preparation** • Disconnect connector D418 • Ignition switched on • Measure on connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	

1	Battery negative pole	< 0.5 V	Switch on all consumers

Component and wiring check, A-CAN

Preparation

- Ignition switched off
- Disconnect connector D418
- Measure on connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	± 60 Ω	

Possible causes	• Malfunctioning DOC/DPF temperature sensors ECU (D418). • Stuck in-range exhaust gas temperature sensor before DPF (F839). • Diesel Oxidation Catalyst (DOC) face plugging.
Additional information	• Active DPF regeneration is disabled. • Fuel dosing in the aftertreatment system is disabled. • First solve other EAS temperature sensor related DTCs. • The reading of the exhaust gas temperature sensor before DPF (F839) is not changing under varying conditions.
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.**

- This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
- It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1 Investigate Related DTCs

Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

Step 1A Investigate related DTCs	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.	
Are these or any other related DTCs active? P3942; P3943; P3945; P3987; P3990	
Yes	**No**
Refer to the troubleshooting information for these DTCs before performing this procedure.	
	Go to step 2A

Step 2 DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2A Visual inspection, connections and wiring

Action

1. Set the ignition switch to OFF.
2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded, or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - Damage to the ECU module

Were there any signs of the above?

Yes	No
Correct any issues found. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.	Possible malfunction of the DOC/DPF temperature sensor ECU module (D418).
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Electrical checks, resistance, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Is the measured resistance value within expected range?

Yes	No
	Possible problem in the harness or EAS-3 ECU.
Go to step 2C	**Go to step 2D**

Step 2C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Turn the key switch ON.
4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Are measured values within expected range?

Yes	No
	Possible problem in the harness.
Go to step 2E	**Go to step 2D**

Step 2D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Refer to the OEM service manual for more information regarding connector pin designation and locations specific to the vehicle.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC):

   Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1.

   The expected value is < 10 ohms.

Is the measured resistance less than 10 ohms?

Yes	No
	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	**If this DTC is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect the DOC/DPF temperature sensor ECU (D418) connector.
3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.

Is the measured resistance greater than 100K ohms?	
Yes	**No**
Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.
Go to step 3A	**If this DTC is still present, go to step 3A**

Step 3 Diesel Oxidation Catalyst (DOC) Checks

Step 3A Visual inspection, DOC	
Action 1. Set the ignition switch to OFF. 2. Remove and inspect the DOC for damage, contamination, or blocking (face plugging) as outlined in "check/clean Diesel Oxidation Catalyst (DOC) (Diesel Partic. Filter)" – job ID 80043.	
Were there any signs of damage, contamination, or blocking?	
Yes	**No**
Correct any issues found by cleaning or replacing the DOC as necessary. Refer to step 4A to perform the corresponding repair verification cycles and rechecks.	Refer to step 4A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 4 Repair Verification

Step 4A Repair verification cycles
Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.

ℹ	Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?

Yes	No
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 4B	

Step 4B DAVIE Diagnostics, Quick Check

Action

Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.

1. Confirm that the corresponding OBD Monitor Readiness Status value is displayed as “Ready.”

   A status of Ready indicates that the corresponding OBD monitor has run successfully and the problem has been resolved—no further action.
   If the displayed status is “Not ready,” continue to action step 2.
2. View the DTC overview display, and confirm that P3755 has been cleared.

Has P3755 been cleared?

Yes	No
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this DTC is still present:

		• continue to operate the truck to extend the run time, allowing the corresponding OBD monitor sufficient time to complete • or, return to step 4A and perform this repair verification again. If this issue is still present after extending or re-running the repair verification, contact the PACCAR Engine Support Center for further assistance.

Contacting the PACCAR Engine Support Center

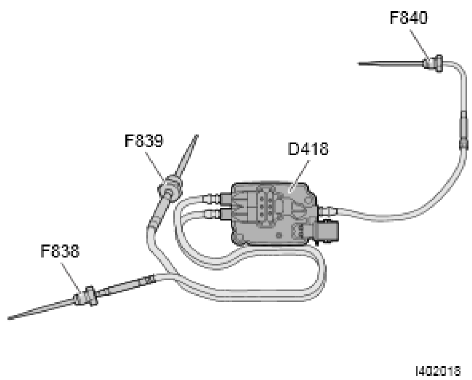
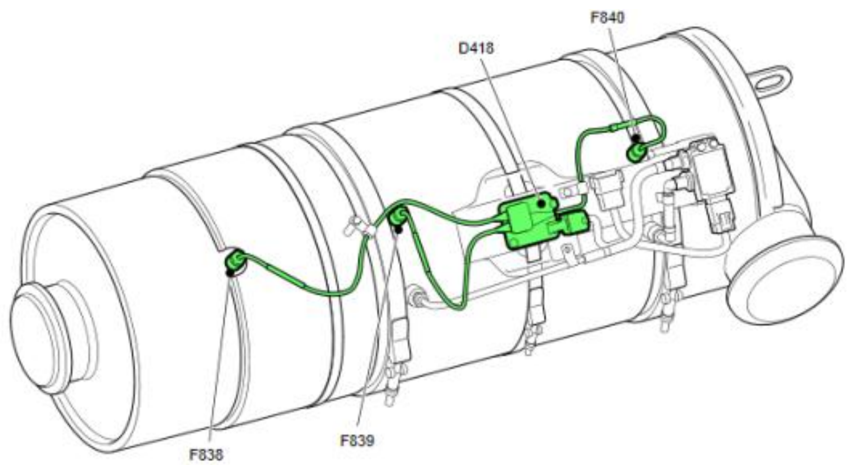
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

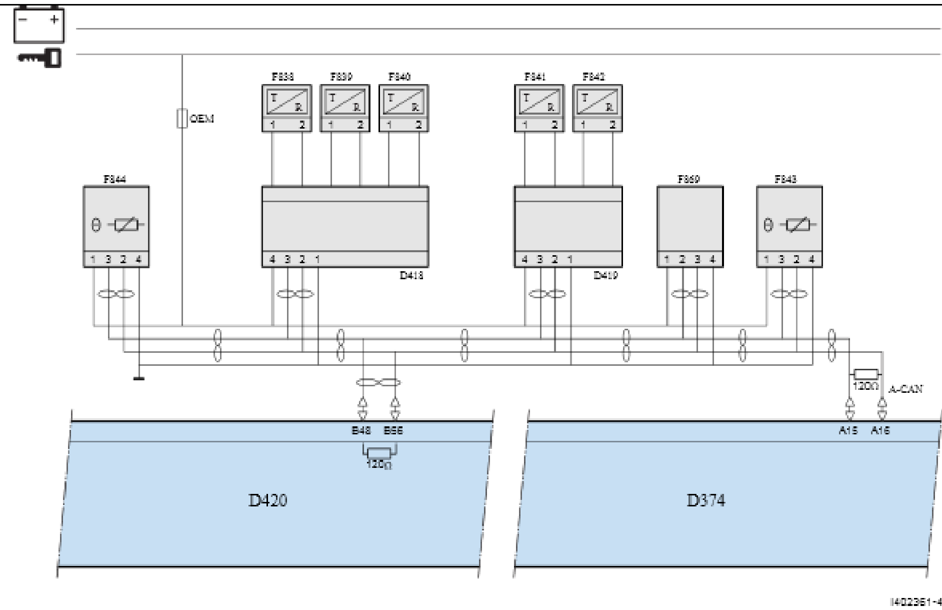
Back to Index

P3756

<table>
<tr><td>Code number</td><td>P3756</td></tr>
<tr><td>Fault code description</td><td>Exhaust gas temperature after DPF - Voltage too high or short circuit to supply</td></tr>
<tr><td>Fault code information</td><td>1 trip MIL
3 drive cycle recovery
Readiness group – None
Freeze frame type –PM filter</td></tr>
<tr><td>Description of component(s)</td><td>DOC/DPF temperature sensors ECU (D418)

The exhaust gas temperature is measured at three different positions in the DOC/DPF unit.
The temperature sensors are connected to the DOC/DPF temperature sensors ECU (D418).
The DOC/DPF temperature sensors ECU (D418) transmit the temperature sensor values to the A-CAN.
The temperature sensors cannot be disconnected or replaced separately from the DOC/DPF temperature sensors ECU (D418).
The temperature sensors are thermocouple sensors.
Exhaust gas temperature sensor before DOC (F838)
Measure the exhaust gas temperature before the DOC.
Effect on the system:
Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DPF (F839).
Determines whether a regeneration can be started.
Calculates the amount of fuel that must be injected.
Determines whether the NOx sensor before the catalyst must be heated to the operating temperature.
Warning activation if the exhaust gas temperature before the DOC is too high.
Exhaust gas temperature sensor before DPF (F839)
Measure the exhaust gas temperature before the DPF.
Effect on the system:
Calculates the temperature rise over the DOC, in combination with the signal of the exhaust gas temperature sensor before DOC (F838).
Determines whether a regeneration is started.
Controls the regeneration temperature.
Calculates the amount of fuel that must be injected.
Diagnoses DOC efficiency.</td></tr>
</table>

	• Warning activation if the exhaust gas temperature before the DPF is too high. **Exhaust gas temperature sensor after DPF (F840)** • Measure the exhaust gas temperature after the DPF. **Effect on the system:** • Protect the DPF against temperatures that are too high. • Warning activation if the exhaust gas temperature after the DPF is too high.
Location of component(s)	**DOC/DPF temperature sensors ECU (D418)**  
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	A short circuit to supply or open circuit occurs for 10 consecutive seconds.
Reset condition of fault code	This DTC changes to inactive after the diagnostic runs and passes.
Electrical diagram(s)	**DOC/DPF temperature sensors ECU (D418, with F838, F839, and F840)**



D374 EAS-3 ECU

D418 DOC/DPF temperature sensors ECU

D419 Catalytic convertor temperature sensors ECU

D420 PCI ECU

F838 Sensor, exhaust temperature before DOC

F839 Sensor, exhaust temperature before DPF

F840 Sensor, exhaust temperature after DPF

F841 Sensor, exhaust temperature before catalyst

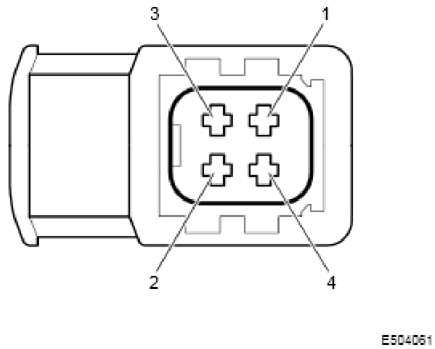
F842 Sensor, exhaust temperature after catalyst

F843 NOx sensor after catalyst

F844 NOx sensor before catalyst

F869 NH3 sensor

D374	D418	Function
A15	3	A-CAN High
A16	2	A-CAN Low
	1	Ground
	4	Power supply



Wiring harness connector D418, front view

Technical data

Component and wiring check, temperature sensors DOC-DPF ECU (D418)

Preparation

- Disconnect connector D418
- Ignition switched on
- Measure on connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	1	Ubat	
1	Battery negative pole	< 0.5 V	Switch on all consumers

Component and wiring check, A-CAN

Preparation

- Ignition switched off
- Disconnect connector D418
- Measure on connector D418

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	3	± 60 Ω	

Possible causes

- Malfunctioning DOC/DPF temperature sensors ECU (D418).

<table>
<tr><td></td><td>

- Sensor signal wire short circuit to supply.
- Sensor signal wire open circuit

</td></tr>
<tr><td>Additional information</td><td>

- The DOC/DPF temperature sensor ECU (D418) reports a short circuit to supply or open circuit.
- An active mobile DPF regeneration is disabled.
- Only a stationary DPF regeneration is possible.
- The sensor value is replaced by the exhaust gas temperature sensor before DPF (F839).

</td></tr>
<tr><td>Diagnostic Step-by-Step</td><td>

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes.
- It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1 Investigate Related DTCs

Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC.

<table>
<tr><td colspan="2">Step 1A Investigate related DTCs</td></tr>
<tr><td colspan="2">Action
1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.</td></tr>
<tr><td colspan="2">Are these or any other related DTCs active?
P3942; P3943; P3945; P3987; P3990</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>Refer to the troubleshooting information for these DTCs before performing this procedure.</td><td></td></tr>
<tr><td></td><td>Go to step 2A</td></tr>
</table>

</td></tr>
</table>

Step 2 DOC/DPF Temperature Sensors ECU Module (D418) Checks

Step 2A Visual inspection, connections and wiring	
Action 1. Set the ignition switch to OFF. 2. Visually inspect the DOC/DPF temperature sensors ECU module (D418) component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • Damage to the ECU module	
Were there any signs of the above?	
Yes	**No**
Correct any issues found. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible malfunction of the DOC/DPF temperature sensor ECU module (D418).
If this DTC is still present, go to step 2B	**Go to step 2B**

Step 2B Electrical checks, resistance, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Measuring between pins 3 and 2 on the D418 wiring harness connector, confirm the resistance value for the A-CAN connection as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF

temperature sensors ECU (D418).

Is the measured resistance value within expected range?

Yes	No
	Possible problem in the harness or EAS-3 ECU.
Go to step 2C	**Go to step 2D**

Step 2C Electrical checks, supply voltage, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Turn the key switch ON.
4. Measuring on the D418 connector, confirm the supply voltage value as outlined in the corresponding checking data, "Component & wiring check, DOC/DPF temperature sensors ECU (D418).

Are measured values within expected range?

Yes	No
	Possible problem in the harness.
Go to step 2E	**Go to step 2D**

Step 2D Electrical checks, open in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Refer to the OEM service manual for more information regarding connector pin designation and locations specific to the vehicle.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect DOC-DPF temperature sensor ECU (D418) connector.
3. Check the ground connection between DOC/DPF temperature sensors ECU (D418) connector and the Power Distribution Center (PDC) / Chassis Load Center (CLC):

   Measure the resistance of the ground wire between the engine ground stud and the DOC/DPF temperature sensor ECU (D418) connector, pin 1.

   The expected value is < 10 ohms.

Is the measured resistance less than 10 ohms?

Yes	No
	Possible open condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	**If this DTC is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2E Electrical checks, short in harness, DOC/DPF temperature sensors ECU module (D418)

Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.

Action

1. Ensure the ignition switch is set to OFF.
2. Disconnect the DOC/DPF temperature sensor ECU (D418) connector.
3. Measure the resistance between pin 1 and pin 4 of the DOC/DPF temperature sensor ECU (D418) connector.

Is the measured resistance greater than 100K Ω?

Yes	**No**
Likely issue with the DOC/DPF temperature sensor ECU module (D418). Replace this module. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Possible short condition in the harness. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue, and possible replacement of the wiring harness. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	**If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.**

Step 3 Repair Verification

Step 3A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.

i Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Steady State

   This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
   With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

Were the identified repair verification cycles able to be completed?	
Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 3B	

Step 3B DAVIE Diagnostics, Quick Check	
Action Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC. 1. Confirm that the corresponding OBD Monitor Readiness Status value is displayed as “Ready.” A status of Ready indicates that the corresponding OBD monitor has run successfully and the problem has been resolved—no further action. If the displayed status is “Not ready,” continue to action step 2. 2. View the DTC overview display, and confirm that P3756 has been cleared.	
Has P3756 been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this DTC is still present: • continue to operate the truck to extend the run time, allowing the corresponding OBD monitor sufficient time to complete • or, return to step 3A and perform this repair verification again. If this issue is still present after extending or re-running the repair verification, contact the PACCAR Engine Support Center for further assistance.

	Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
	Back to Index