2013 PACCAR MX-13

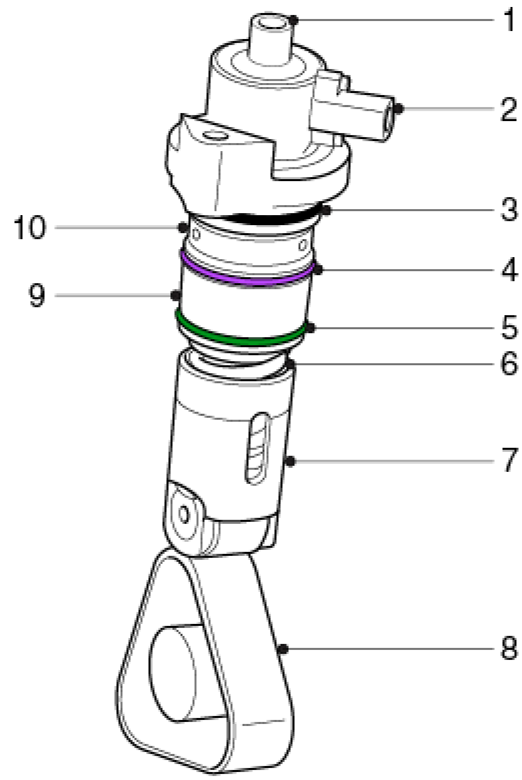
Diagnostic Service Manual

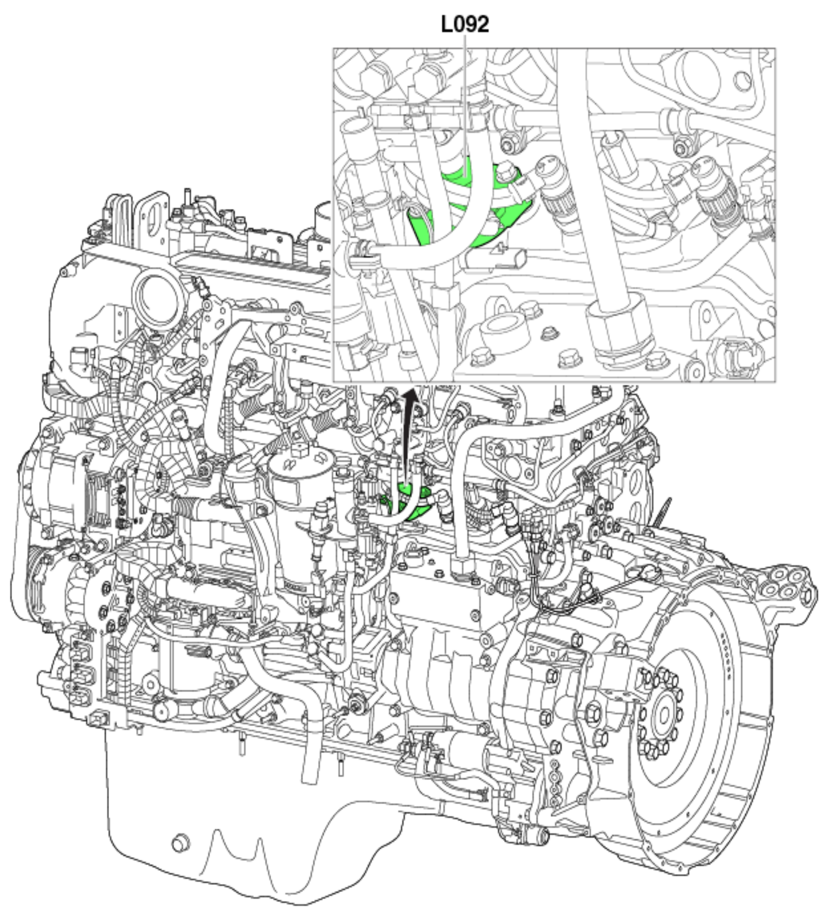
EPA2013

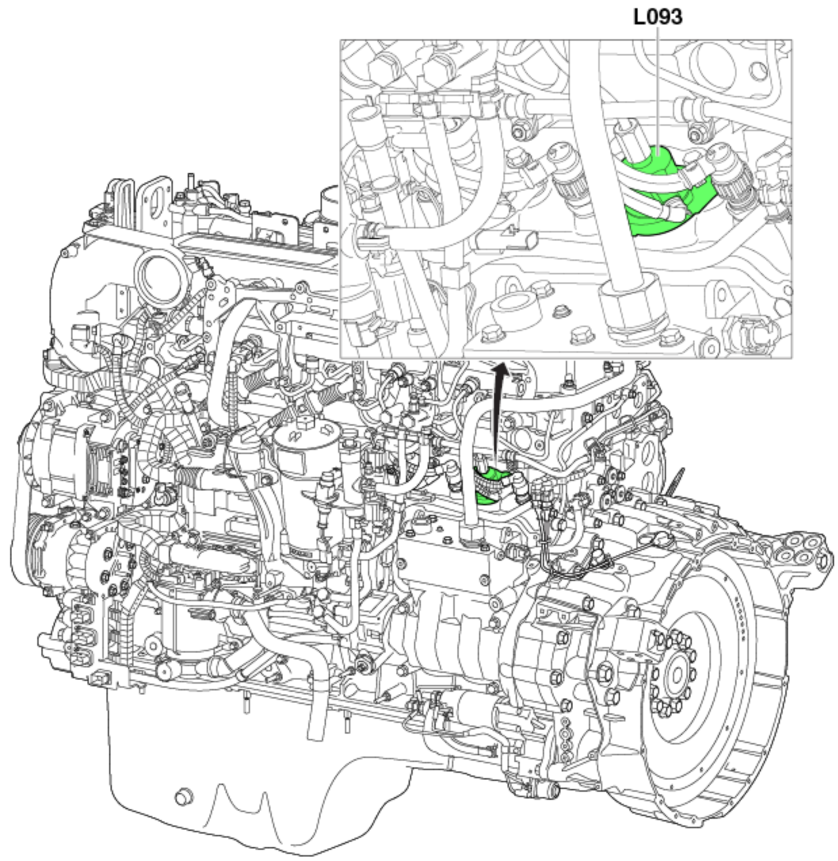
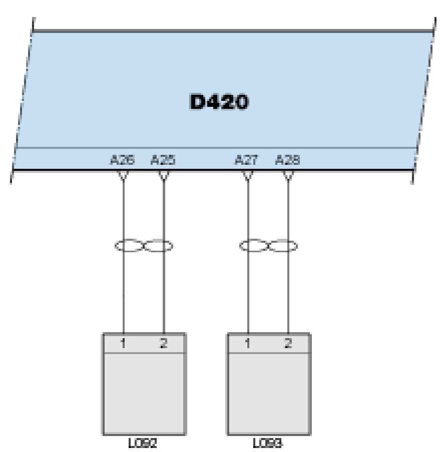
(P062A to P1223)

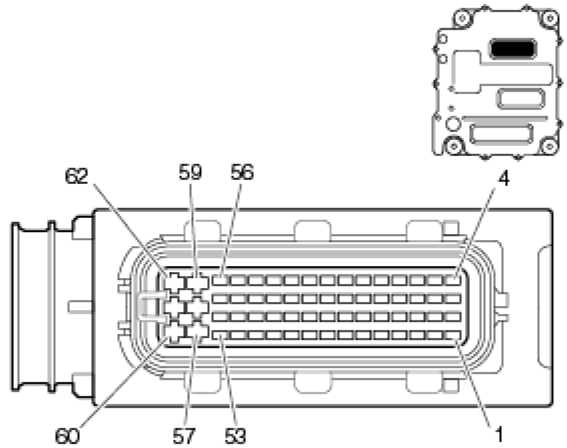
Index

P062A

Code number	P062A
Fault code description	Common rail pump unit control-Too short at a certain rail pressure “Pressure below lowest allowable pressure at commanded pressure.”
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
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
Location of component(s)	

	
Diagnostic condition	This diagnostic runs when the rail pressure control state is: Pump unit only.
Set condition of fault code	The PCI ECU (D420) detects that the common rail pump unit activation duration is lower than expected for a particular rail pressure for more than 4 seconds.
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.A front view

<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>Condition</td></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><td>Pin
(+ probe)</td><td>Pin
(- probe)</td><td>Value</td><td>Condition</td></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>

common rail pressure sensor deviation
common rail pump unit failure

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

The common rail pump units (L092 and L093) supply fuel to the common rail. The amount of fuel pumped to the rail (rail pressure) depends on the activation duration of the pump event.
The common rail pump unit control is closed-loop controlled. A comparison is made between the expected and the actual common rail pump unit activation duration.
Engine torque is reduced

</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 062A-a	SRT

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

- Signs of fuel leaks
- Fuel component parts not installed correctly
- Bent or broken fuel lines
- Electrical connections are not secure

Was there evidence of any of the above?

- No: Continue to the next step in the troubleshooting process.
- Yes: Clean, adjust, repair, or replace affected components for any issues identified.

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 2	Step ID 062A-b	SRT

DAVIE Direct: Monitor EGR and related temperature sensors

Use DAVIE to monitor the following temperatures:

- EGR Temperature
- Ambient Temperature
- Intercooler Temperature
- 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?

- No: Continue to the next step in the troubleshooting process.
- Yes: Clean adjust, repair or replace affected components for any issues identified.

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 062A-c	SRT

DAVIE Direct Test: Pressure Control Valve
Run the prescribed DAVIE Direct test to determine if the high pressure valve is 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.

- 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 4	Step ID 062A-d	SRT

Replace: Electronic Unit pump
Replace the faulty Electronic Unit Pump.

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 5	Step ID 062A-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 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.
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P062B

Code number	P062B
Fault code description	Internal ECU injector power generation-Voltage too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	Not Applicable
Location of component(s)	Not Applicable
Diagnostic condition	This diagnostic runs Continuously when the ignition is on.
Set condition of fault code	The internal ECU injector power supply voltage is too high.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Not Applicable
Technical data	Not Applicable
Possible causes	Clear the fault with DAVIE. If the fault reoccurs after ignition on, replace the ECU.
Additional information	• Numerous OBD monitors will not run anymore. • Humidity calculation and correction switched off.

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 062B-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 062B-b	SRT
Verify that there are no other fault codes in DAVIE. • If no other codes exist, proceed to step 3 • If there are other fault codes, correct them before proceeding.		

Step 3	Step ID 062B-c	SRT
With key OFF, disconnect the engine harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If 12 V is present - Proceed to step 4. • If there is a problem – Refer to Rapido for repair.		

	<table><tr><td>Step 4</td><td>Step ID 062B-d</td><td>SRT</td></tr><tr><td colspan="3">Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If 12 V is present - Proceed to step 5. • If there is a problem – Refer to Rapido for repair.</td></tr></table> <table><tr><td>Step 5</td><td>Step ID 062B-e</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>
Verification Drive Cycle	To validate 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.
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P062D

<table>
<tr><td>Code number</td><td>P062D</td></tr>
<tr><td>Fault code description</td><td>Internal ECU injector power generation – Voltage too low</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 continuously when the ignition is on.</td></tr>
<tr><td>Set condition of fault code</td><td>The internal ECU injector power supply voltage is too low.</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>Clear the fault with DAVIE. If the fault reoccurs after ignition on, replace the ECU.</td></tr>
<tr><td>Additional information</td><td>Numerous OBD monitors will not run anymore.
Humidity calculation and correction switched off.</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 062D-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual Inspection
Visually inspect the associated component connections and wiring for any of the following:
Loose, bent or broken connector
Bent, broken, corroded, or pushed back pins
Moisture or dirt inside the connector
Damage to the wire harness or insulation
ECU connections are damaged or disconnected
Batteries are not okay, contacts are not secure
Was there evidence of any of the above?
No: Continue to step 2 in the troubleshooting process.
Yes: Clean, adjust, repair, or replace affected components for any issues identified. Proceed to step 3
Use DAVIE to re-check for the presence of active faults.</td></tr>
</table></td></tr>
</table>

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

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.

<table>
<tr><td>Step 2</td><td>Step ID 062D-b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks (D420)
For all electrical checks and diagrams, refer to the Engine Service Rapido electrical schematic viewer (ESV) for detailed schematics, connector pin locations, and corresponding signal values.

Enter the Engine number
Select the ESV icon
Click the Search button
Select the “Component Code” within the Electrical Diagram Search pop-up window
In the component code box select D420 then Search.

Follow ESV through to find any electrical related problems.
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.

Supply and signal voltages.
Cable continuity (no opens or shorts).

Are measured electrical values outside of expected range or limits?

No: Continue to the next step in the troubleshooting process.
Yes: Make the appropriate repairs or component replacements. Proceed to Step 3

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 062D-c</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: Engine Controller Unit (ECU)
Replace the identified faulty component.
Contact the PACCAR Engine Support Call Center to confirm replacement of the ECU.
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 4</td><td>Step ID 062D-d</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 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.</td></tr>
</table>

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P0640

Code number	P0640
Fault code description	Grid heater relay - Voltage too high or short circuit to supply
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
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P0650

Code number	P0650
Fault code description	Malfunction Indicator Lamp (MIL) - Current too low or open circuit on ECU D420 pin B23
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
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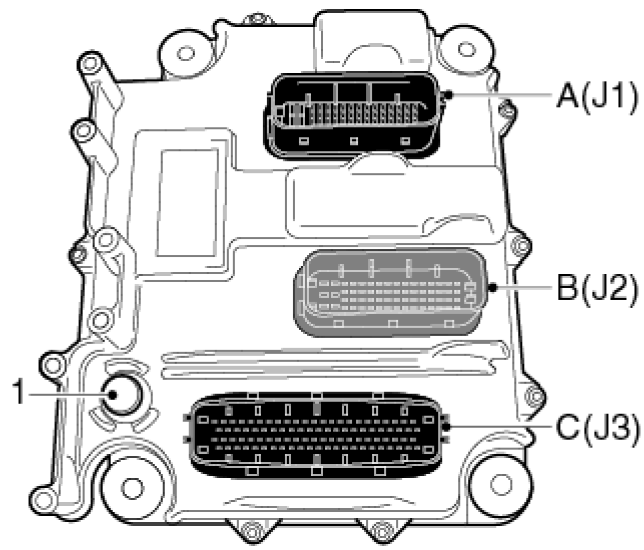
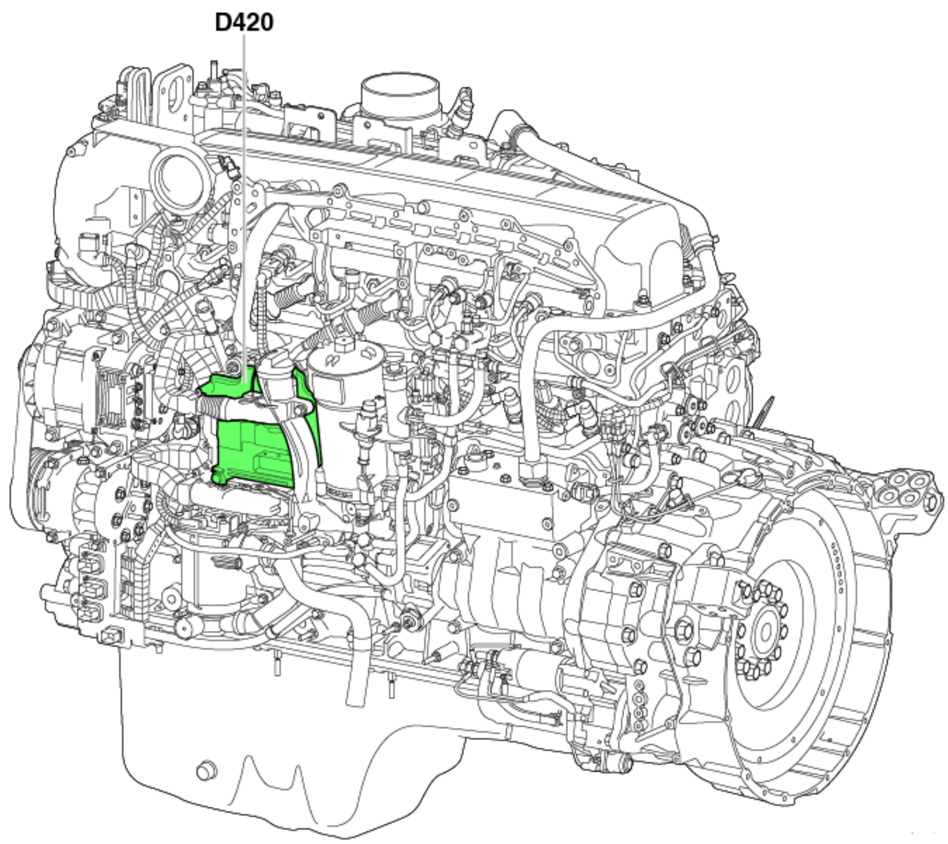
P0666

Code number	P0666
Fault code description	Internal ECU temperature – Data erratic, intermittent, or incorrect at ignition on
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 PCI ECU (D420) 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. Not programming or incorrectly programmed injector codes can result in reduced

	engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the ignition has been keyed off continuously for at least 8 hours; • 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 internal ECU temperature differs by more than 3°C [37°F] from the average of other temperature sensors 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: 1. The vehicle ignition may NOT be switched on or engine started for 8-10 consecutive hours (ideal situation would be overnight). 2. 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. 3. Start the engine and let it idle for 2 minutes. 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	Faulty ECU
Additional information	For this diagnostic, the internal PCI ECU temperature sensor reading is compared with an average of other temperature sensors on the engine after the ignition has been switched 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 0666a	SRT

Visual Inspection

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

- Loose, bent or broken connector
- Bent, broken, corroded, or pushed back pins
- Moisture or dirt inside the connector
- Damage to the wire harness or insulation
- ECU connections are damaged or disconnected
- Batteries are not okay, contacts are not secure

Was there evidence of any of the above?

- No: Continue to the step 2 in the troubleshooting process.
- Yes: Clean, adjust, repair, or replace affected components for any issues identified. Proceed to step 3

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 2	Step ID 0666b	SRT

Electrical Checks (D420)

For all electrical checks and diagrams, refer to the Engine Service Rapido electrical schematic viewer (ESV) for detailed schematics, connector pin locations, and corresponding signal values.

- Enter the Engine number
- Select the ESV icon
- Click the Search button
- Select the “Component Code” within the Electrical Diagram Search pop-up window
- In the component code box select D420 then Search.

	Follow ESV through to find any electrical related problems. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. • Supply and signal voltages. • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • 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. • 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 0666c | SRT Replace: Engine Controller Unit (ECU) Replace the identified faulty component. Contact the PACCAR Engine Support Call Center to confirm replacement of the ECU. 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 4 | Step ID 0666d | 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 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.
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P0668

Code number	P0668
Fault code description	Internal ECU temperature – Internal error
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	
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P0669

Code number	P0669
Fault code description	Internal ECU temperature – Internal error
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	
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P0691

Code number	P0691
Fault code description	Electronic controlled fan - Voltage too low or short circuit to ground on ECU D420 pin C74
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
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P0692

Code number	P0692
Fault code description	Electronic controlled fan - Voltage too high or short circuit to supply on ECU D420 pin C74
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
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P0698

Code number	P0698
Fault code description	ECU PCI 5V sensor supply – Voltage too low or short circuit to ground
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 continuously when the ignition is on.
Set condition of fault code	The internal ECU reference sensor power supply voltage is too low.
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	Broken reference sensor, internally in ECU.
Additional information	• Numerous OBD monitors will not run anymore. • Engine torque is reduced.
Diagnostic Step-by-Step	
Verification Drive Cycle	
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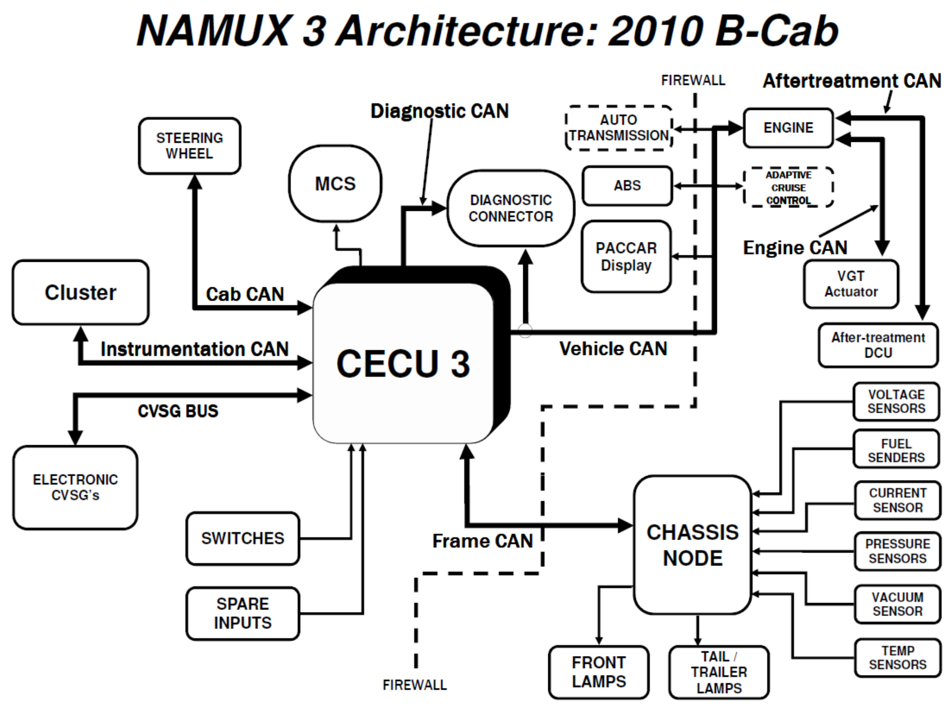
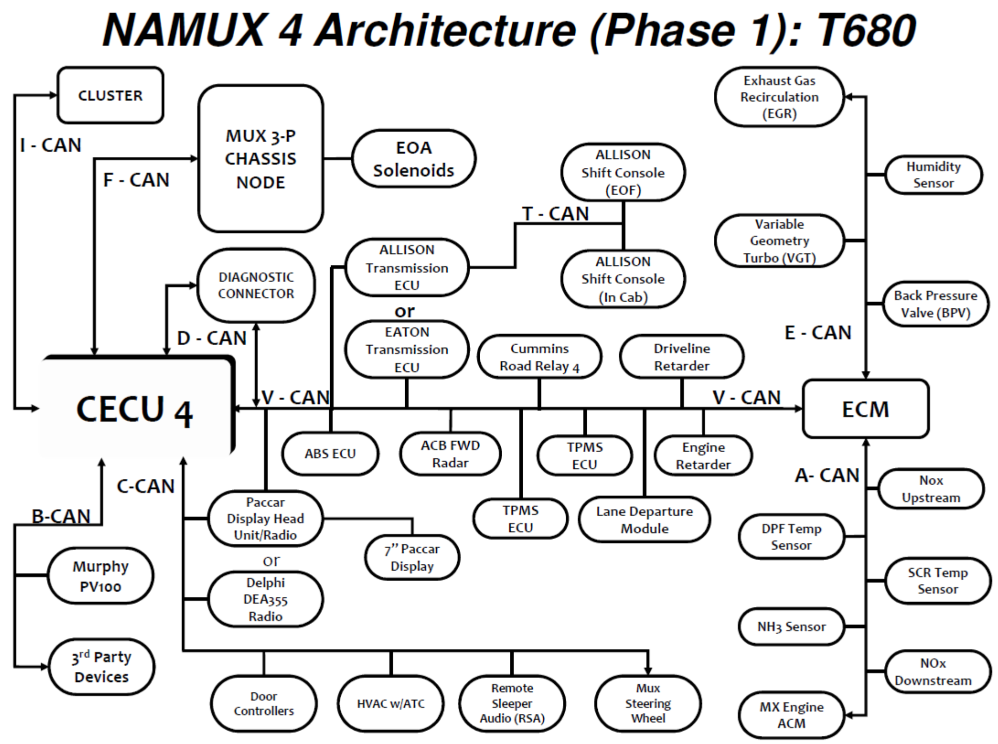
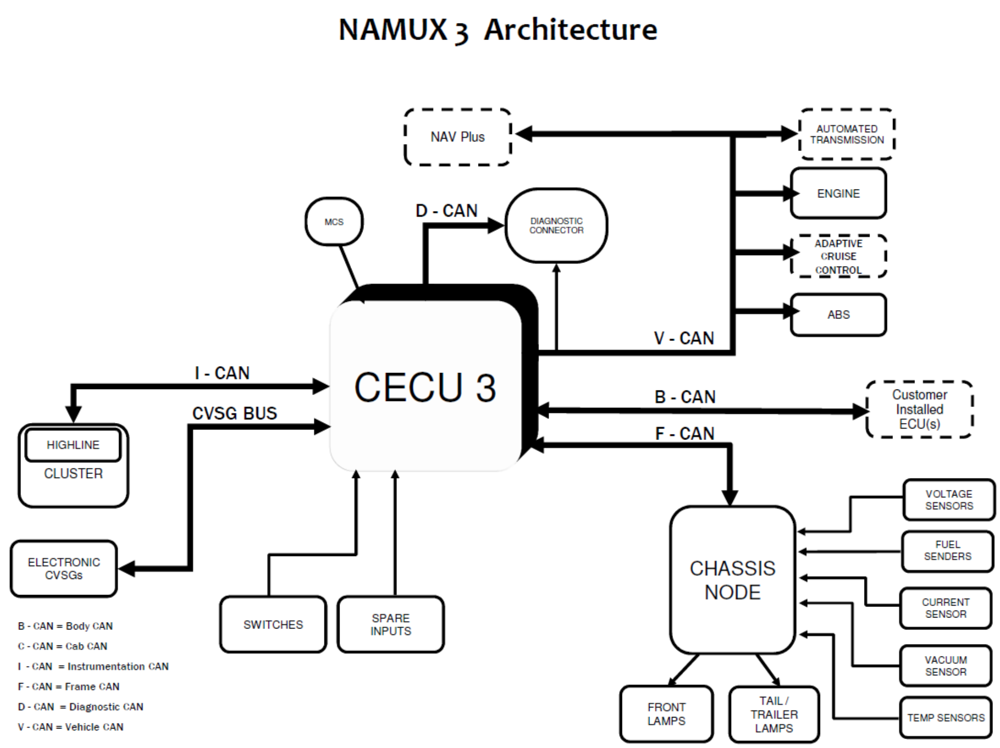
P0699

Code number	P0699
Fault code description	ECU PCI 5V sensor supply – Voltage too high or short circuit to supply
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 continuously when the ignition is on.
Set condition of fault code	The internal ECU reference sensor power supply voltage is too high.
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	Broken reference sensor, internally in ECU.
Additional information	• Numerous OBD monitors will not run anymore. • Engine torque is reduced.
Diagnostic Step-by-Step	This information not required since this is an internal PCI issue
Verification Drive Cycle	
	Back to Index

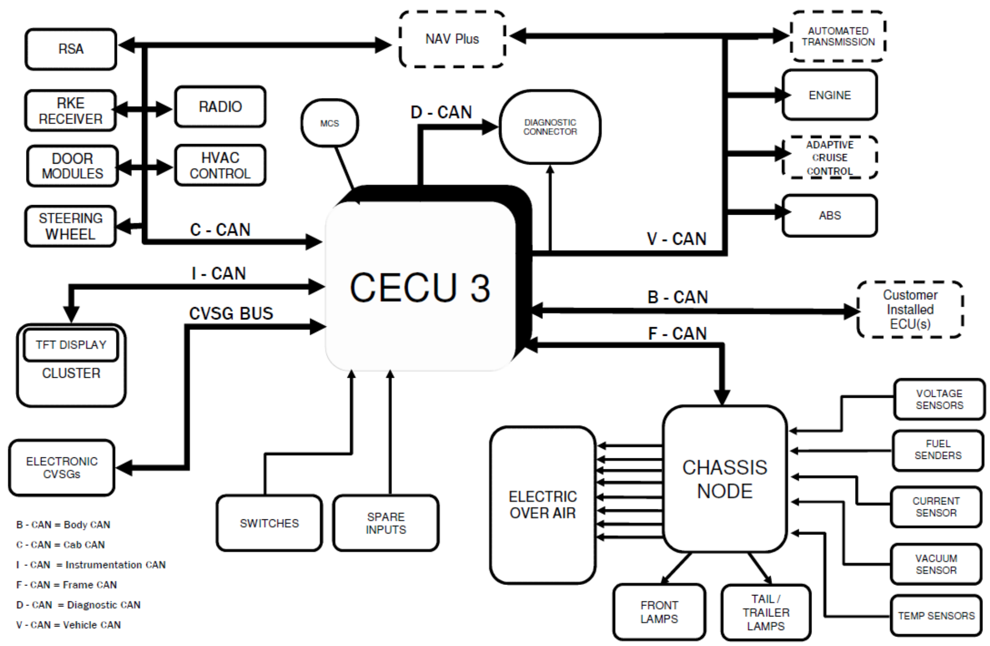
P0703

Code number	P0703
Fault code description	CAN communication - Message (EBC1) out of range - EBS brake switch from brake system
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
CLUSTER
I - CAN
F - CAN
MUX 3-P CHASSIS NODE
EOA Solenoids
DIAGNOSTIC CONNECTOR
D - CAN
CECU 4
V - CAN
ALLISON Transmission ECU
or
EATON Transmission ECU
T - CAN
ALLISON Shift Console (EOF)
ALLISON Shift Console (In Cab)
Cummins Road Relay 4
Driveline Retarder
Exhaust Gas Recirculation (EGR)
Humidity Sensor
Variable Geometry Turbo (VGT)
Back Pressure Valve (BPV)
E - CAN
ECM
ABS ECU
ACB FWD Radar
TPMS ECU
Engine Retarder
TPMS ECU
Lane Departure Module
C-CAN
B-CAN
Murphy PV100
3rd Party Devices
Paccar Display Head Unit/Radio
or
Delphi DEA355 Radio
7" Paccar Display
Door Controllers
HVAC w/ATC
Remote Sleeper Audio (RSA)
Mux Steering Wheel
A- CAN
Nox Upstream
DPF Temp Sensor
SCR Temp Sensor
NH3 Sensor
NOx Downstream
MX Engine ACM


NAMUX 3 Architecture
NAV Plus
AUTOMATED TRANSMISSION
ENGINE
ADAPTIVE CRUISE CONTROL
ABS
MCS
D - CAN
DIAGNOSTIC CONNECTOR
V - CAN
CECU 3
I - CAN
CVSG BUS
HIGHLINE CLUSTER
ELECTRONIC CVSGs
B - CAN
Customer Installed ECU(s)
F - CAN
CHASSIS NODE
VOLTAGE SENSORS
FUEL SENDERS
CURRENT SENSOR
VACUUM SENSOR
TEMP SENSORS
FRONT LAMPS
TAIL / TRAILER LAMPS
SWITCHES
SPARE INPUTS
B - CAN = Body CAN
C - CAN = Cab CAN
I - CAN = Instrumentation CAN
F - CAN = Frame CAN
D - CAN = Diagnostic CAN
V - CAN = Vehicle CAN

NAMUX 4 Architecture



Technical data	This code relates to a communication issue and not to a specific component.
Possible causes	Check the cabin ECU for fault codes
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 0703a	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 0703b	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 0703c	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:

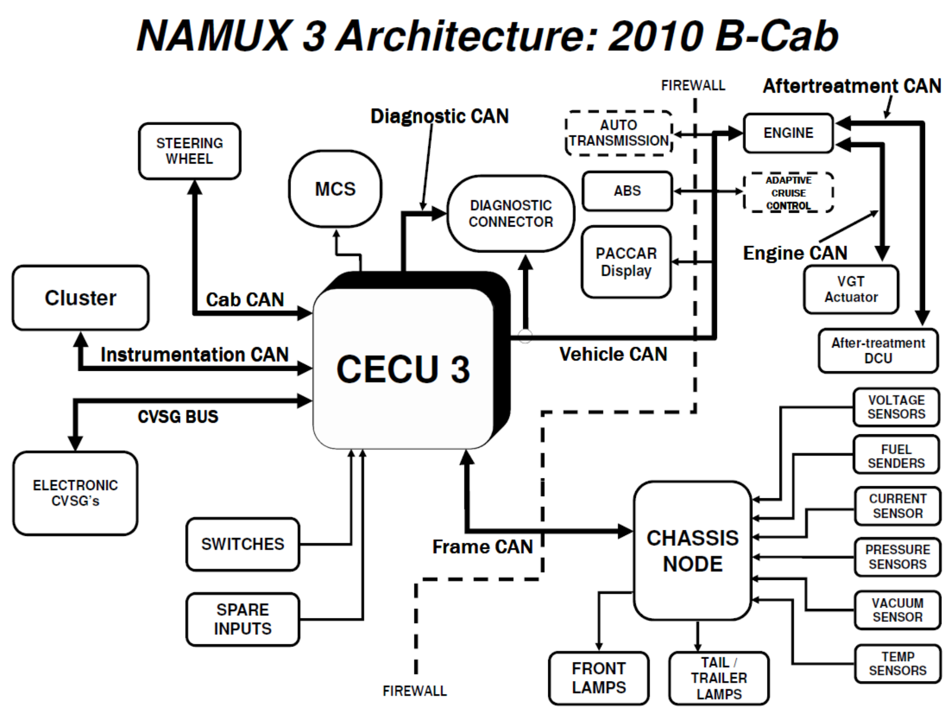
- Is DTC fault active: Proceed to step 4
- Is DTC fault inactive: Issue resolved. Clear inactive fault.

Step 4	Step ID 0703d	SRT

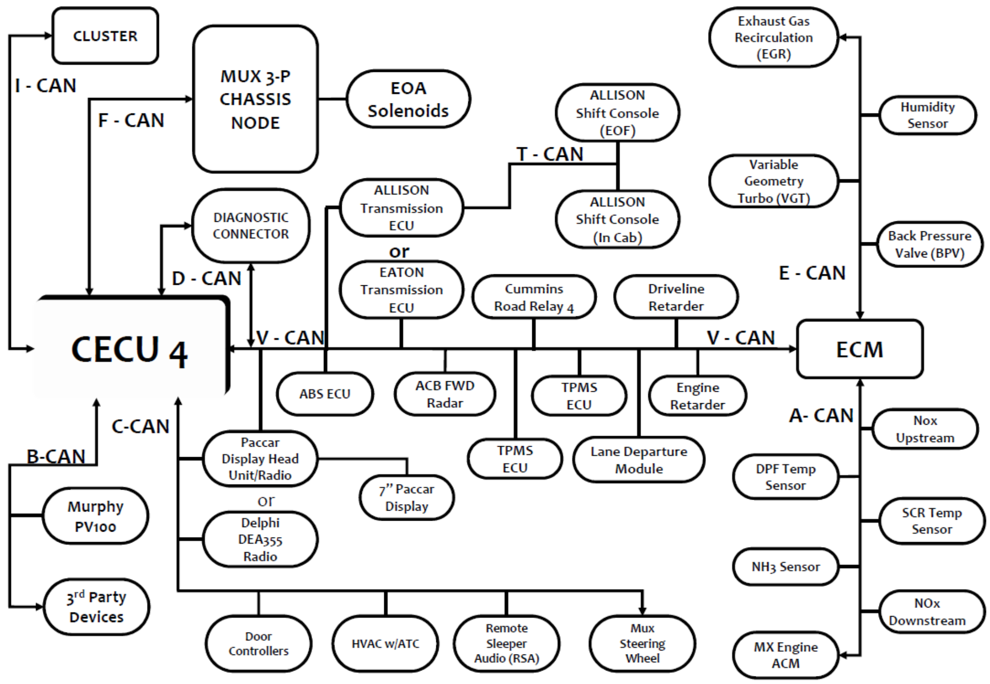
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

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 Index

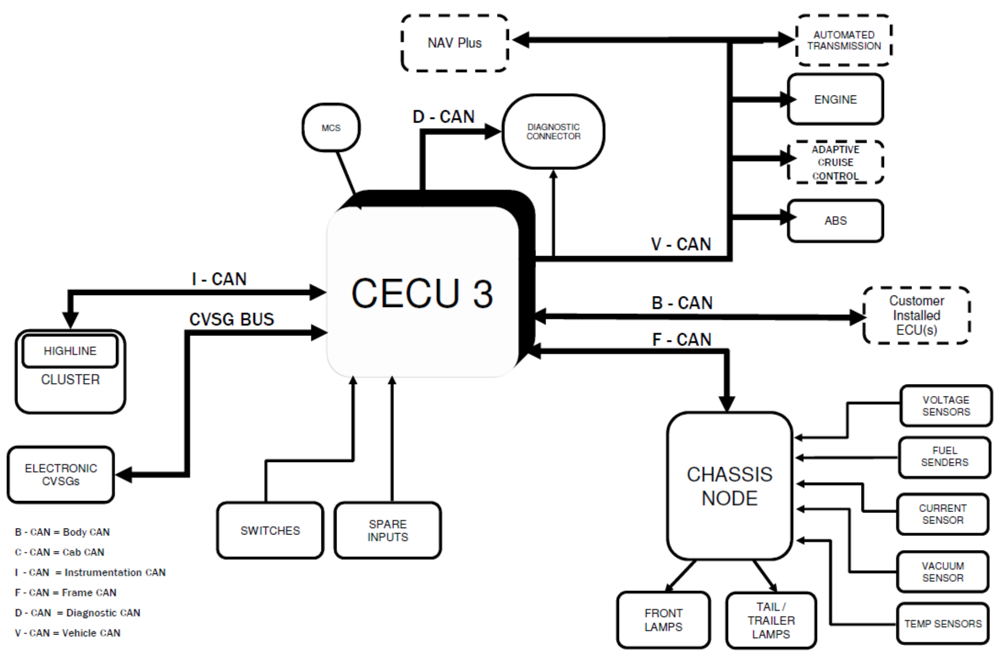
P081C

Code number	P081C
Fault code description	CAN communication - message (CCVS_VIC) out of range - park brake 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

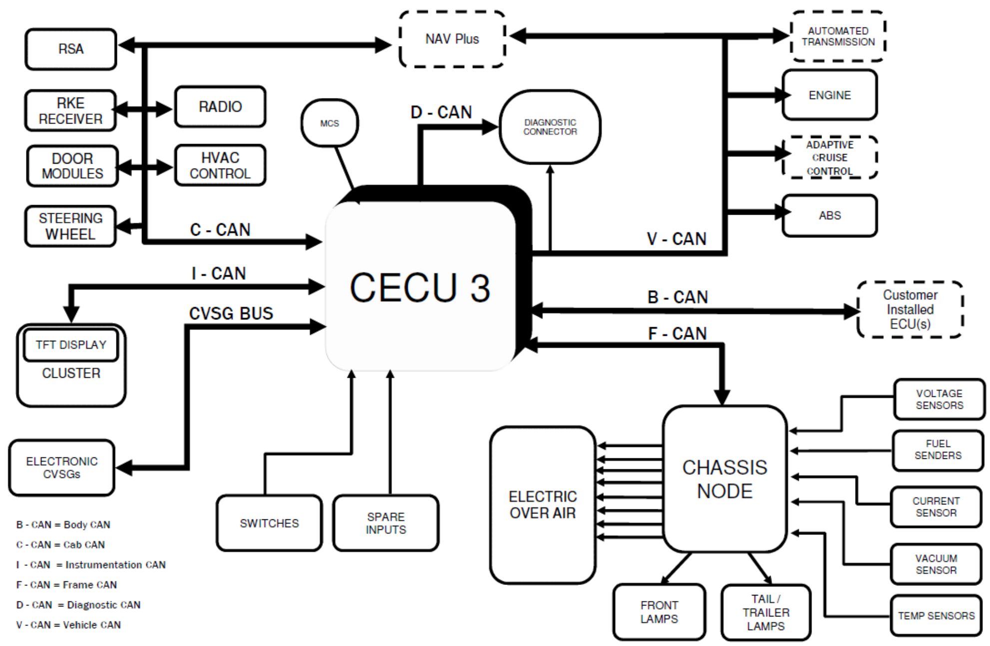


NAMUX 3 Architecture



<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 cabin ECU for faults</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.

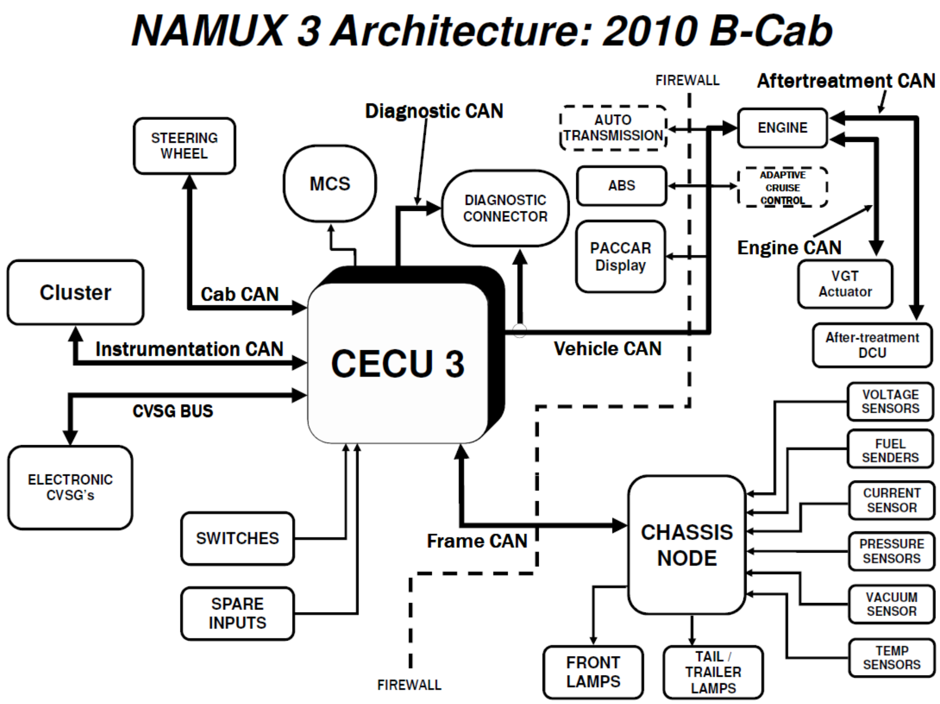
<table>
<tr><td>Step 1</td><td>Step ID 081C-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual Inspection
OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure.

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

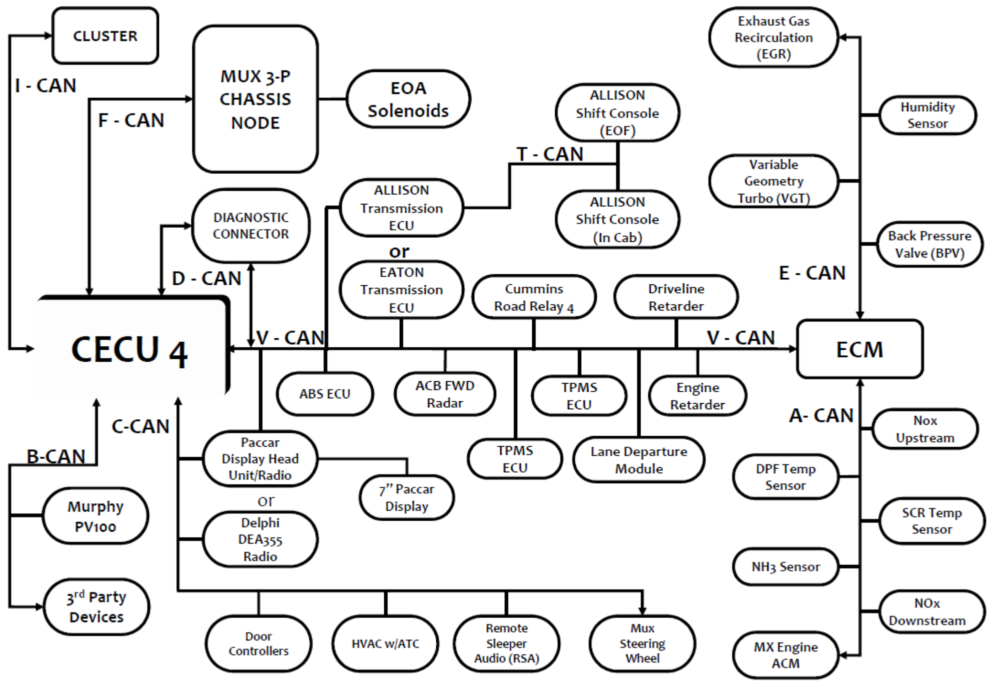
</td></tr>
</table>

	• 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 081C-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 081C-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 081C-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 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 Index

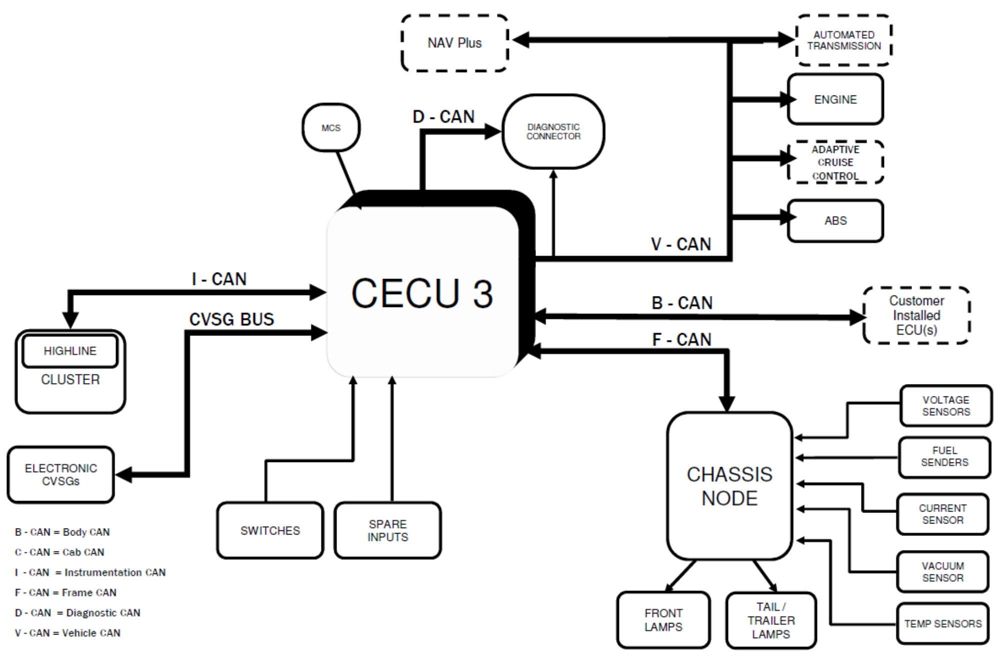
P0833

Code number	P0833
Fault code description	CAN communication - Message (CCVS) out of range - Clutch 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)	

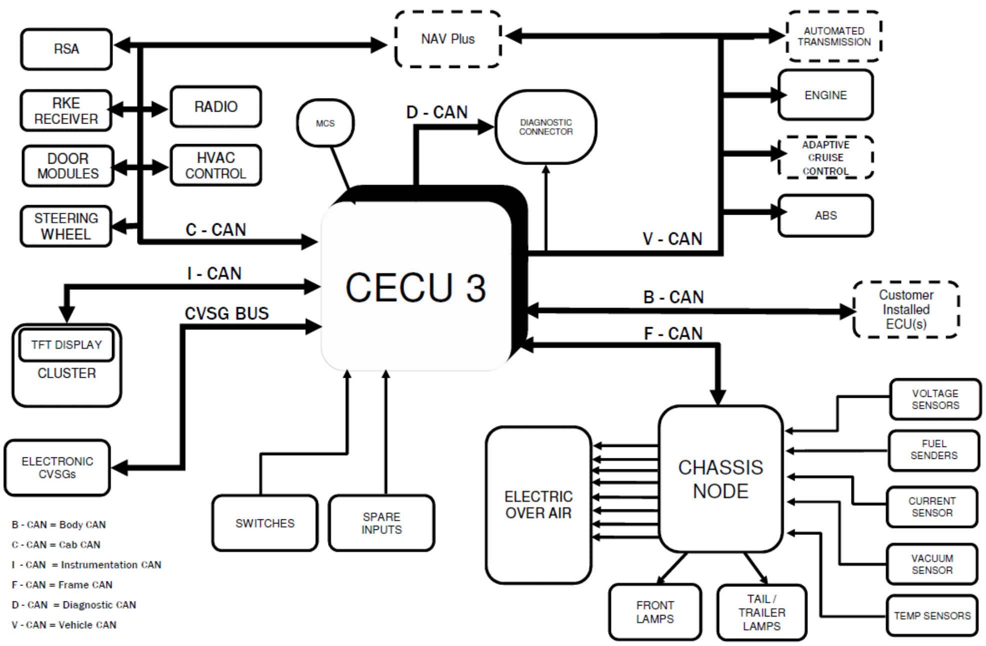
NAMUX 4 Architecture (Phase 1): T680



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 0833a	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?		

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

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

<table>
<tr><td>Step 2</td><td>Step ID 0833b</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?

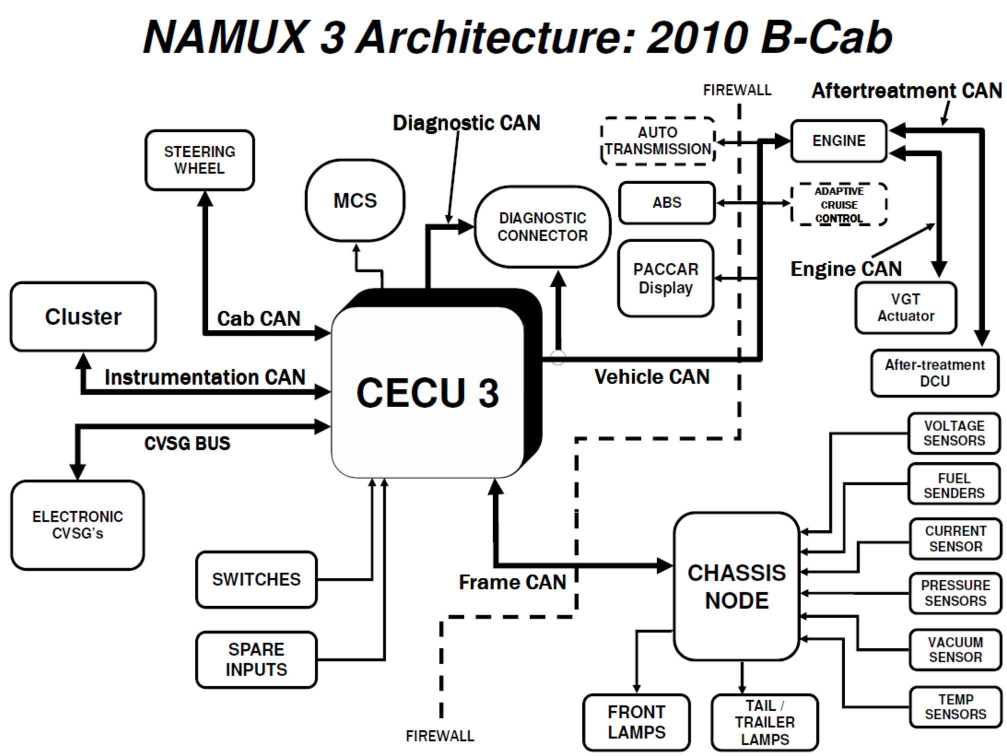
No: Proceed to step 3
Yes : Proceed to step4
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 0833c</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace component

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

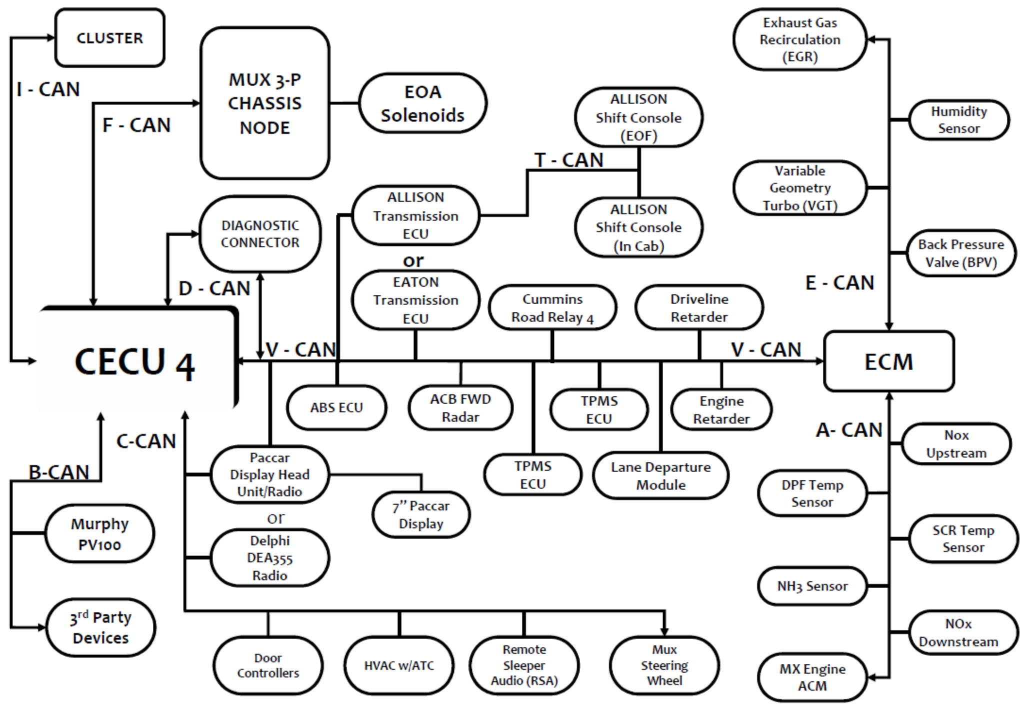
Use DAVIE to re-check for the presence of active faults:

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 0833d</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 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.</td>
</tr>
<tr>
<td></td>
<td>Back to Index</td>
</tr>
</table>

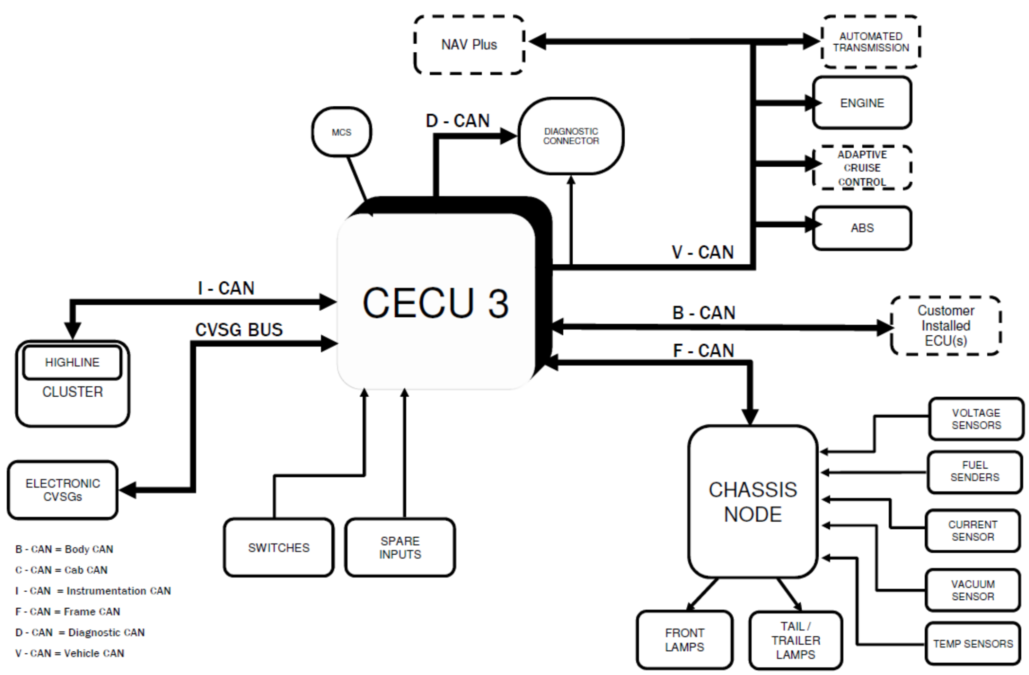
P0865

Code number	P0865
Fault code description	CAN communication - Message (PROPB_AST) rate too low 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)	

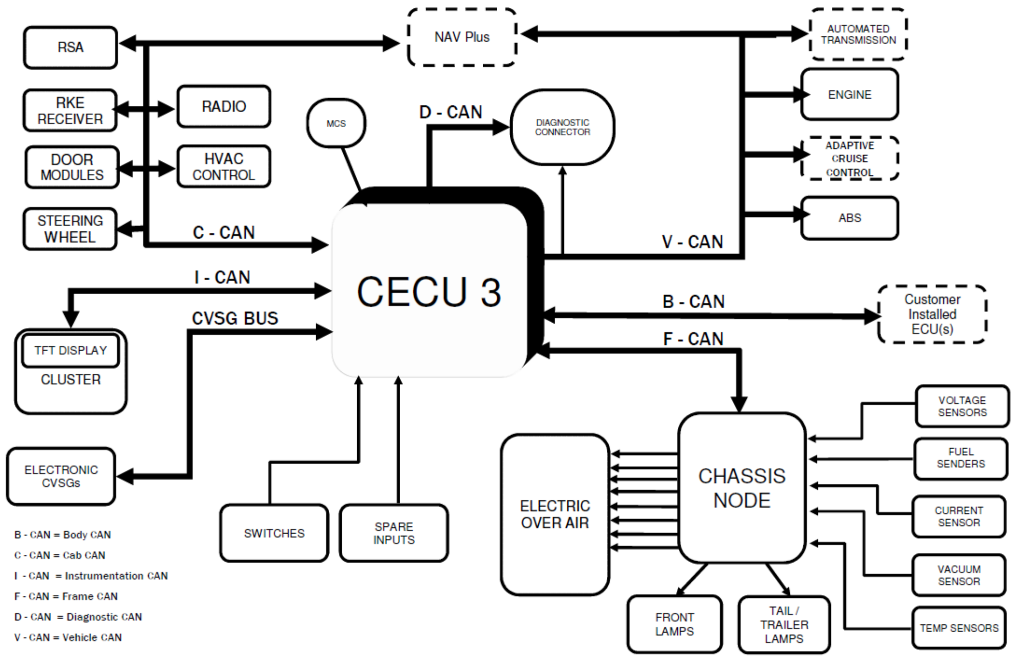
NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



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 • Open circuit, short circuit to ground, or short circuit to supply in the CAN network wiring
Additional information	No additional information available

Diagnostic Step-by-Step

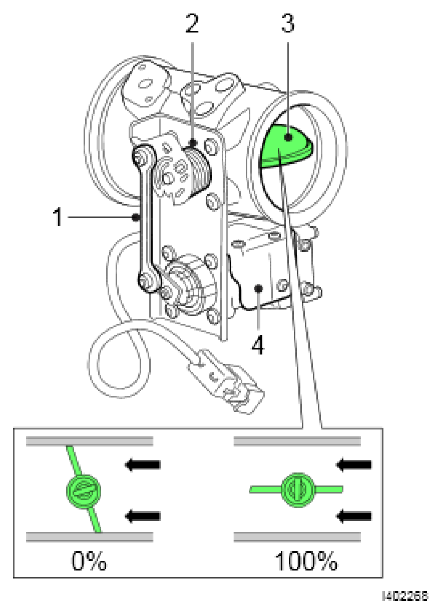
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting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

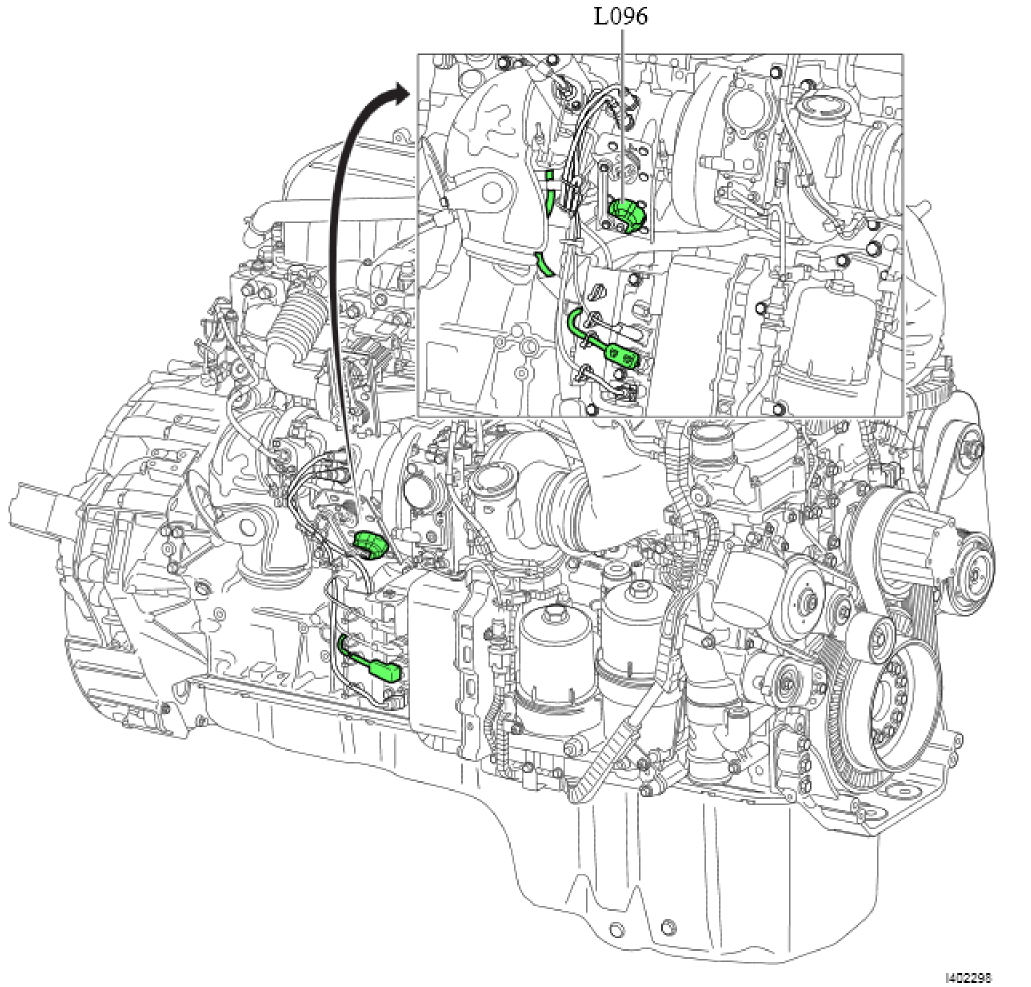
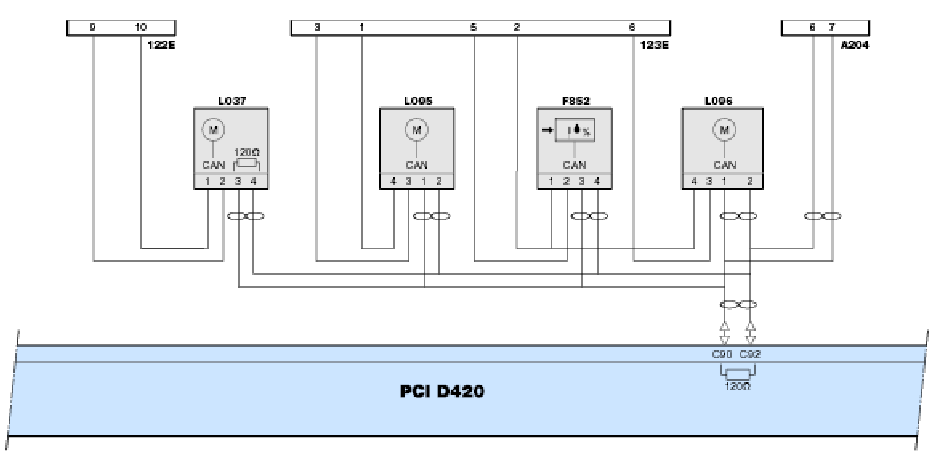
Step 1	Step ID 0865a	SRT
Visual Inspection OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic		

	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 0865b | 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 0865c | 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 0865d | 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 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 Index

P101E

Code number	P101E
Fault code description	BPV actuator position - Unable to reach target
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group - None Freeze frame type - Exhaust gas
Description of component(s)	**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 valve 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 ECU printed circuit board 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.

<table>
<tr><td>Location of component(s)</td><td>
</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 BPV valve (L096) detects a difference between the actual shaft position and the required shaft position for greater than 5 seconds.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC changes to inactive after the ignition is keyed off for at least 15 seconds and keyed on again, and the fault is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>
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</table>

122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

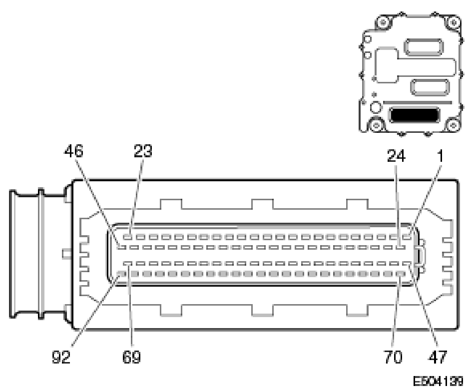
F852 humidity sensor

L037 VTG turbocharger actuator

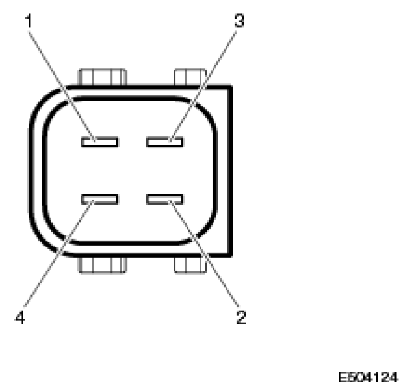
L095 EGR valve module

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, 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

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

- Measure on the front side of wiring harness connector L096

<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>Ubat</td><td>Ignition keyed on</td></tr>
<tr><td>1</td><td>2</td><td>± 60 Ω</td><td>• Ignition keyed off
• Ground cable from the battery disconnected
• DAVIE Vehicle Communication Interface (VCI) disconnected</td></tr>
</table>

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

- Bent actuator lever and/or link rod.
- Sticking or blocked BPV valve or mechanism.

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

- The position of the actuator shaft, and therefore the position of the BPV valve, is monitored. Valve position: 0% is fully closed and 100% is fully open.
- The actuator motor is switched off and the BPV valve is fully open (100% position).
- Engine torque is reduced after 10 hours of engine operation.

</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 DTC 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 Confirm DTC Status

<table>
<tr><td colspan="2">Step 1A Perform a key-cycle</td></tr>
<tr><td colspan="2">Action
1. Key the ignition off for at least 15 seconds, then key it on again.</td></tr>
<tr><td colspan="2">Is P101E active?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
</table>

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

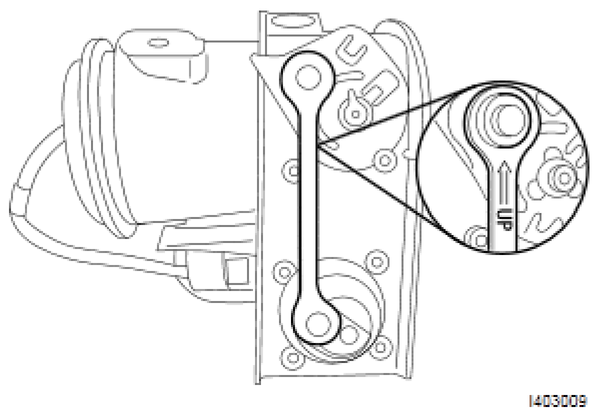
	Refer to step 3A to clear all current codes and run the corresponding repair verification cycles and rechecks, to determine if this DTC was an intermittent or random occurrence.
Go to step 2A	**If this DTC is still present, go to step 2A**

Step 2 Backpressure Valve (L096) Checks

Step 2A Visual inspection, connection rod installation, BPV valve (L096)

Action

1. Key off the ignition
2. Visually check that the connection rod of the BPV valve mechanism is installed correctly. The arrow must point upward.



BPV connection rod installation

3. Visually check that the connection rod of the BPV valve mechanism is not damaged.

Example of a bent lever and connection rod

Is the BPV valve connection rod damaged or installed incorrectly?	
Yes	**No**
Correct the installed connection rod or replace if damaged. Refer to step 3A 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 Check the free movement of the BPV mechanism

Always set the ignition switch to OFF when working on the BPV mechanism. The valve mechanism can move when the ignition is keyed on, and touching the mechanism can result in physical injury.

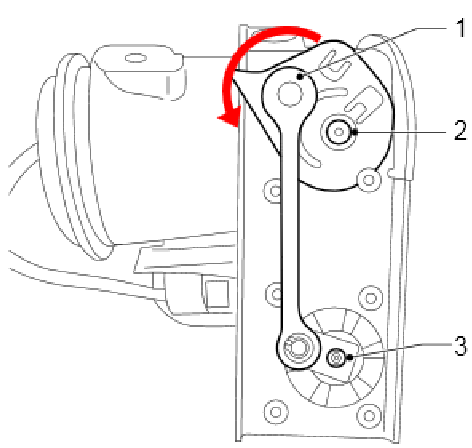
Action

1. Set the ignition switch to OFF.
2. Check for free movement of the BPV mechanism by moving the connection rod (1) by hand.

Caution: Do not use a tool to move the backpressure valve mechanism.

Movement of the backpressure valve mechanism requires the application of some force because of the presence of a return spring. During the movement, check that:

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



Backpressure valve mechanism movement	
Does the BPV mechanism move freely throughout its full range?	
Yes	**No**
	Correct any issues found, or replace the BPV (L096) if the valve mechanism does not move freely over the full travel path of the connection rod. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2C	**If this DTC is still present, go to step 2C**

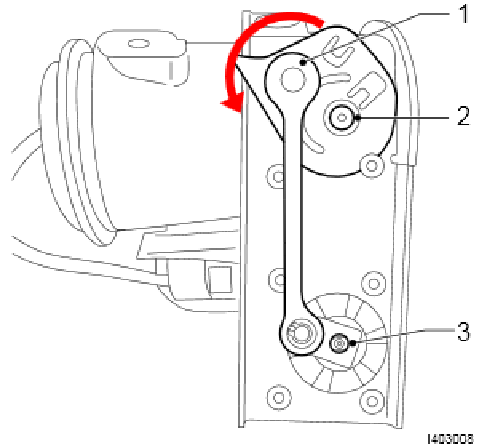
Step 2C Visual inspection, blockage, BPV valve (L096)

Always set the ignition switch to OFF when working on the BPV valve mechanism. The valve mechanism can move when the ignition is keyed on, and touching the mechanism can result in physical injury.

Action

1. Set the ignition switch to OFF.
2. Loosen the exhaust pipe between the turbocharger and flexible pipe as outlined in the maintenance procedure, “replace back pressure valve assembly” (job ID 66144).
3. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the connection rod (1).

Caution: Do not use a tool to move the backpressure valve mechanism.



Manually moving the BPV butterfly valve

Was any internal blockage found within the BPV valve?	
Yes	**No**
Correct any issues found, or replace the BPV if it was found to be damaged. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	A malfunctioning BPV valve has been detected. Replace the BPV valve. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2D	**If this DTC is still present after performing all steps in the procedure, contact the PACCAR Engine Support Center for further assistance.**

Step 2D Exchange BPV valve

Action

1. Key off the ignition.
2. Disconnect the BPV valve connector from the engine wiring harness connector.
3. If available, connect another BPV without installing it.
4. Set the ignition switch to ON, and use DAVIE to view any current DTCs.

Is P101E active?	
Yes	**No**
	A malfunctioning BPV valve has been detected. Replace the BPV valve.

	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.	

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. 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 3B	**Go to step 3B**

Step 3B DAVIE Diagnostics, Quick Check, OBD Readiness Monitors
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 P101E has been cleared.

Is the related OBD Monitor Readiness Status set to "Ready." Or, has P101E 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.

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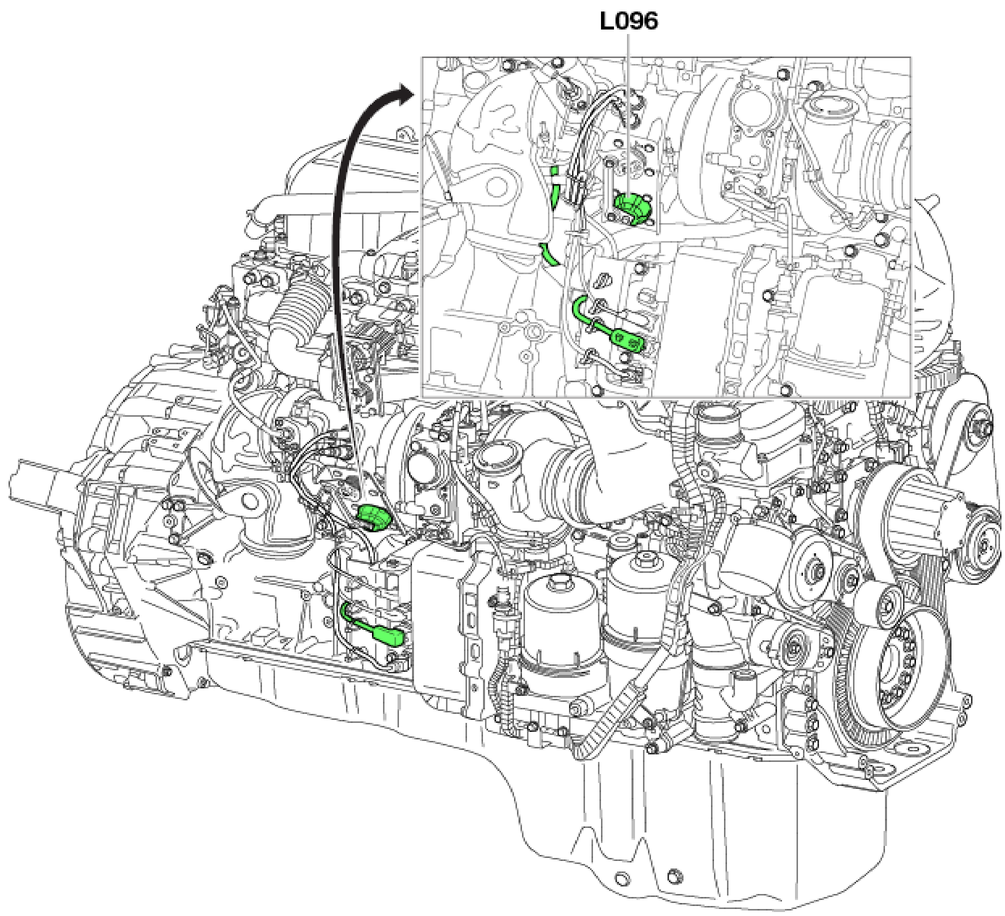
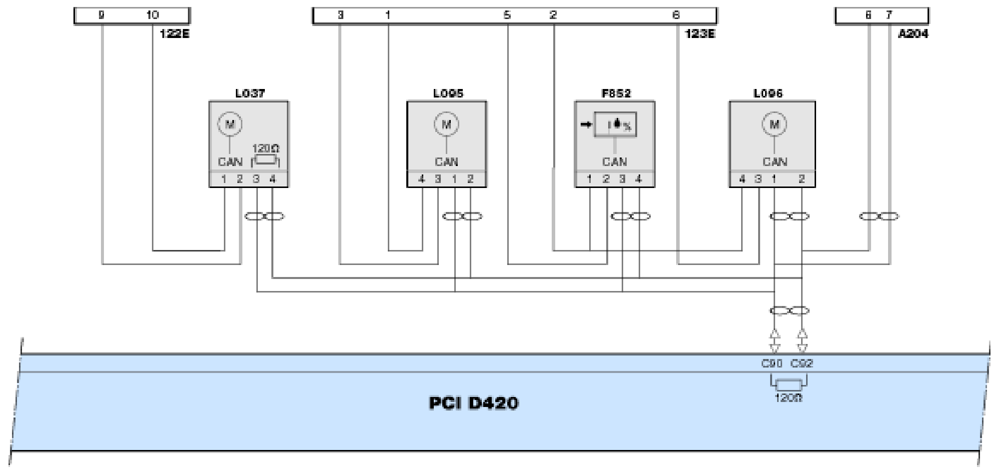
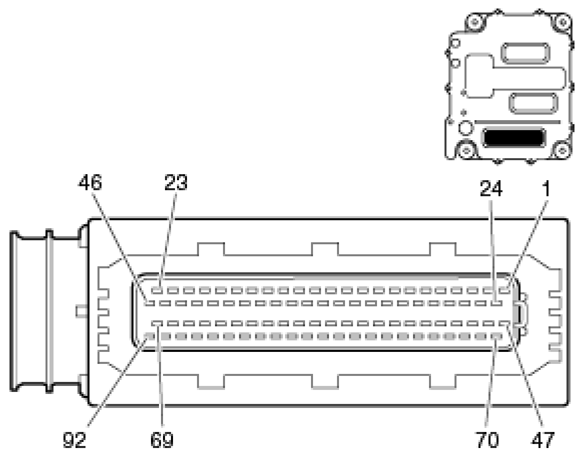
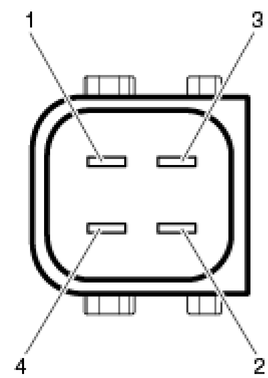
P101F

Code number	P101F
Fault code description	BPV actuator current – Data valid but too high
Fault code information	1 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 ignition is on.
Set condition of fault code	The BPV actuator (L020) detects that the measured actuator current is greater than a temperature-dependent value for more than 6 seconds.
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.

Electrical diagram(s)	Wiring harness connector D420.C front viewWiring 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. • High friction of the BPV valve bearings or mechanism in combination with a high actuator temperature.
Additional information	• The actuator motor torque is reduced with this fault active. Under certain circumstances this can result in the actuator not being able to reach the target position and P101E becoming active also. • Engine torque is reduced with this fault active.
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 101Fa | 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 101Fb	SRT

Electrical Checks (L020)

Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.

- Supply and signal voltages.
- Cable continuity (no opens or shorts).

Are measured electrical values outside of expected range or limits?

- 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 101Fc	SRT

Replace: BPV Actuator

If no problems were detected in the preceding steps, an internal problem has most likely occurred with the BPV Actuator.

Replace the identified faulty 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 4 in the troubleshooting process.

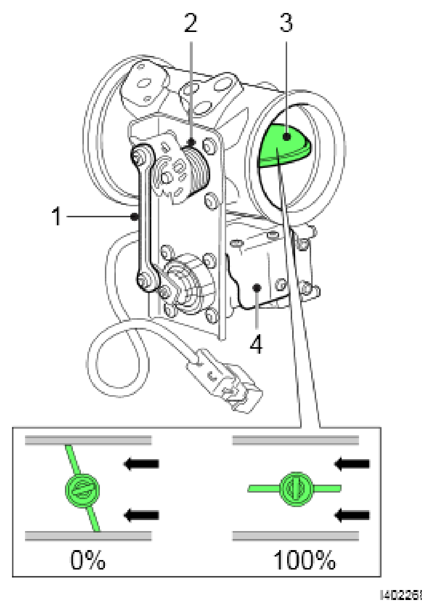
Step 4	Step ID 101Fd	SRT

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 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 Index

P1020

Code number	P1020
Fault code description	BPV actuator – Internal error
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	**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. 5 Lever 6 Spring 7 Butterfly valve 8 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 ECU printed circuit board 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

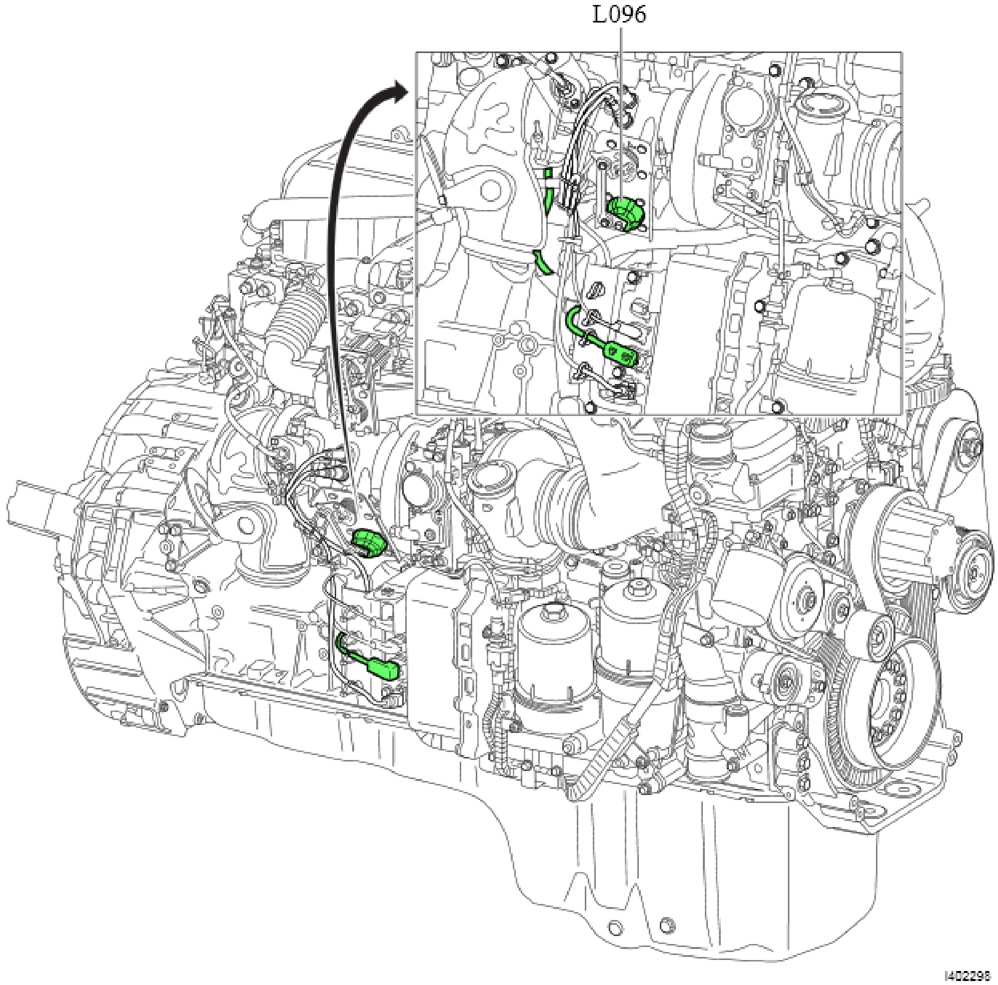
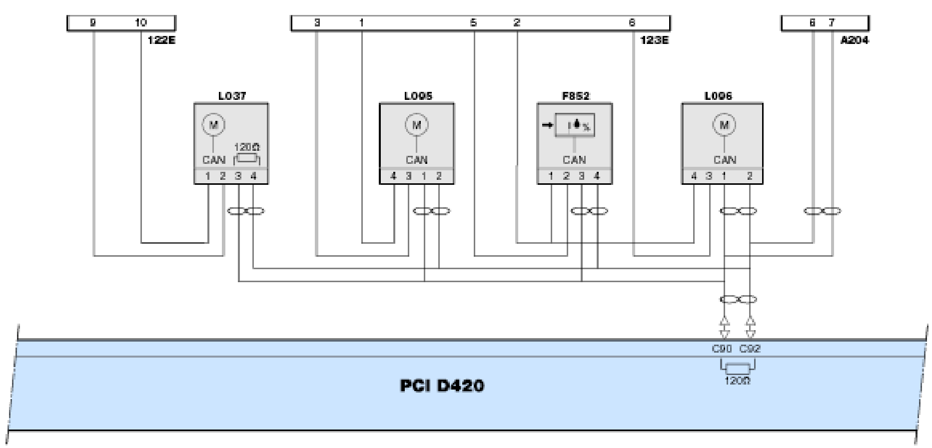
After the ignition is switched on, the valve position is 100% until the actuator is controlled by the PCI ECU.

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.

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The BPV valve (L096) detects an internal error.
Reset condition of fault code	This DTC changes to inactive after the ignition is switched off for at least 15 seconds and switched on again and the error is no longer detected.
Electrical diagram(s)	

122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

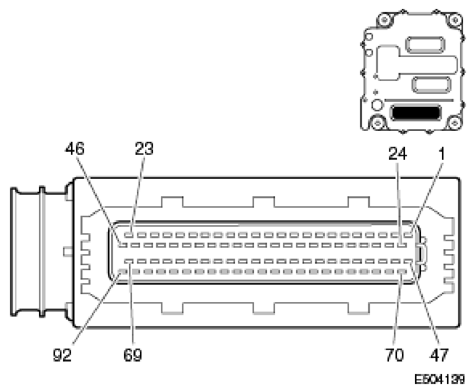
F852 humidity sensor

L037 VTG turbocharger actuator

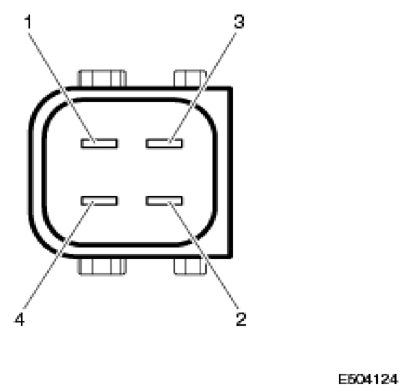
L095 EGR valve module

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, 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

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

<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>4</td><td>3</td><td>Ubat</td><td>Ignition switched on</td></tr>
<tr><td>1</td><td>2</td><td>± 60 Ω</td><td>• Ignition switched off
• Ground cable from the battery disconnected
• DAVIE Vehicle Communication Interface (VCI) disconnected</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>Faulty BPV valve actuator.</td></tr>
<tr><td>Additional information</td><td>• The actuator motor is switched off with this fault active.
• Engine torque is reduced with this fault active.</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 DTC 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.

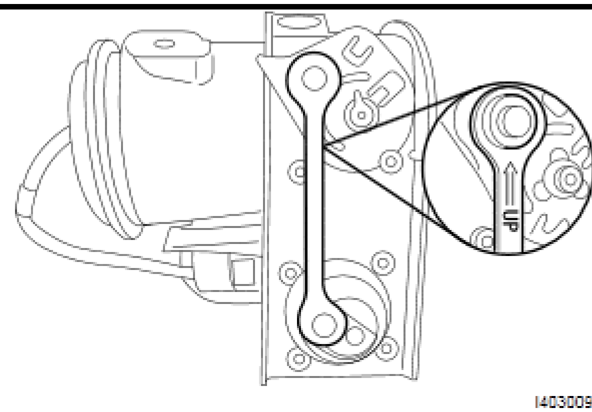
Step 1 Investigate Related DTCs
Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause of this DTC.
<table>
<tr><th>Step 1A Investigate related DTCs</th></tr>
<tr><td>Action
1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.</td></tr>
<tr><td>Are these or other related DTCs active?
P101E; P1022; P1024; P1025; P1026</td></tr>
</table>
</td></tr>
</table>

Yes	No
Go to the troubleshooting information for these DTCs before continuing with this procedure.	
	Go to step 1B

Step 1B Confirm DTC active state	
Action 1. Power-up/Electrical With the brakes set, switch on the ignition with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.	
Is P1020 active?	
Yes	**No**
	Refer to step 3A to clear all current DTCs and run the corresponding repair verification cycles and rechecks to determine if this DTC was an intermittent or random occurrence.
Go to step 2A	**If this DTC is still present, go to step 2A**

Step 2 Back Pressure Valve (L096) Checks

Step 2A Visual inspection, connection rod installation, BPV valve (L096)
Action 1. Switch off the ignition. 2. Visually check that the connection rod of the BPV valve mechanism is installed correctly. The arrow must point upward.



BPV connection rod installation

3. Visually check that the connection rod of the BPV valve mechanism is not damaged.

Example of a bent lever and connection rod

Is the BPV valve connection rod damaged or installed incorrectly?	
Yes	**No**
Correct the installed connection rod or replace if damaged. Refer to step 3A 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 Check the free movement of the BPV mechanism

Always switch off the ignition when working on the BPV mechanism. The valve mechanism can move when the ignition is switched on and touching the mechanism can result in physical injury.

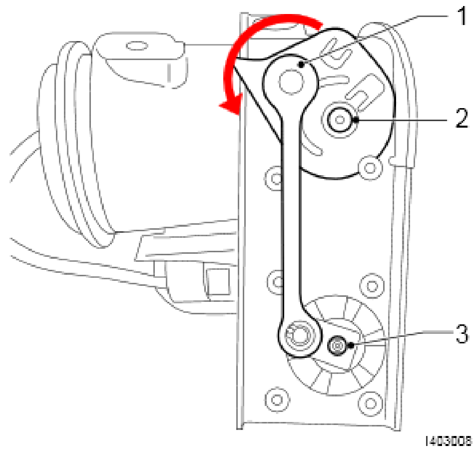
Action

1. Switch off the ignition.
2. Check for free movement of the BPV mechanism by moving the connection rod (1) by hand.

Caution: Do not use a tool to move the back pressure valve mechanism.

Movement of the back pressure valve mechanism requires the application of some force because of the presence of a return spring. During the movement, check that:

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



Back pressure valve mechanism movement

Does the BPV mechanism move freely throughout its full range?

Yes	No
	Correct any issues found if the valve mechanism does not move freely over the full travel path of the connection rod. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2C	**If this DTC is still present, go to step 2C**

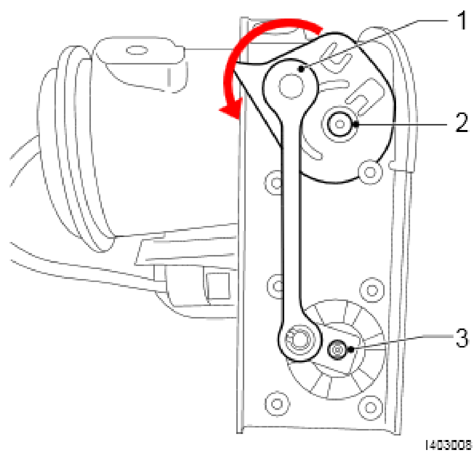
Step 2C Visual inspection, blockage, BPV valve (L096)

Always switch off the ignition when working on the BPV valve mechanism. The valve mechanism can move when the ignition is switched on and touching the mechanism can result in physical injury.

Action

1. Switch off the ignition.
2. Loosen the exhaust pipe between the BPV valve and flexible pipe as outlined in the maintenance procedure, "replace assembly back pressure valve (aftertreatment, eng.)", job code J 1435 264406 001 033.
3. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the connection rod (1).

Caution: Do not use a tool to move the back pressure valve mechanism.



Manually moving the BPV butterfly valve

Was any internal blockage found within the BPV valve?

Yes	No
Correct any issues found or replace the BPV if it was found to be damaged. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2D	**Go to step 2D**

Step 2D Replace BPV valve (L096)	
Action 1. Switch off the ignition. 2. Disconnect the BPV valve connector from the engine wiring harness connector. 3. If available, connect another BPV without installing it. 4. Switch on the ignition, and use DAVIE to view any current DTCs.	
Is P1020 active?	
Yes	**No**
	A malfunctioning BPV valve has been detected. Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue and replacement of the BPV valve. 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.	

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. Power-up/Electrical With the brakes set, switch on the ignition 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 3B	

Step 3B DAVIE Diagnostics, Quick Check, OBD Readiness Monitors	
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 P1020 has been cleared.	
Is the related OBD Monitor Readiness Status set to “Ready.” Or, has P1020 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 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.
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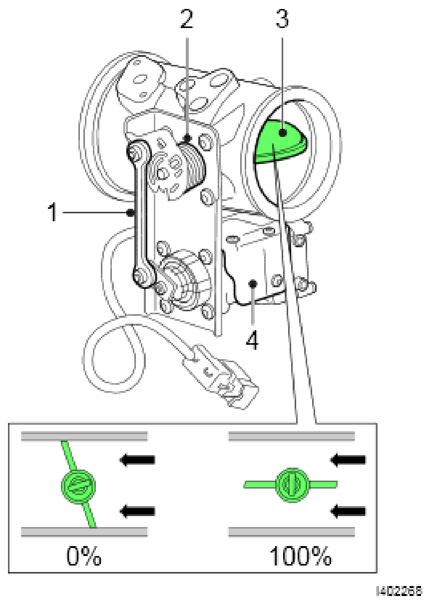
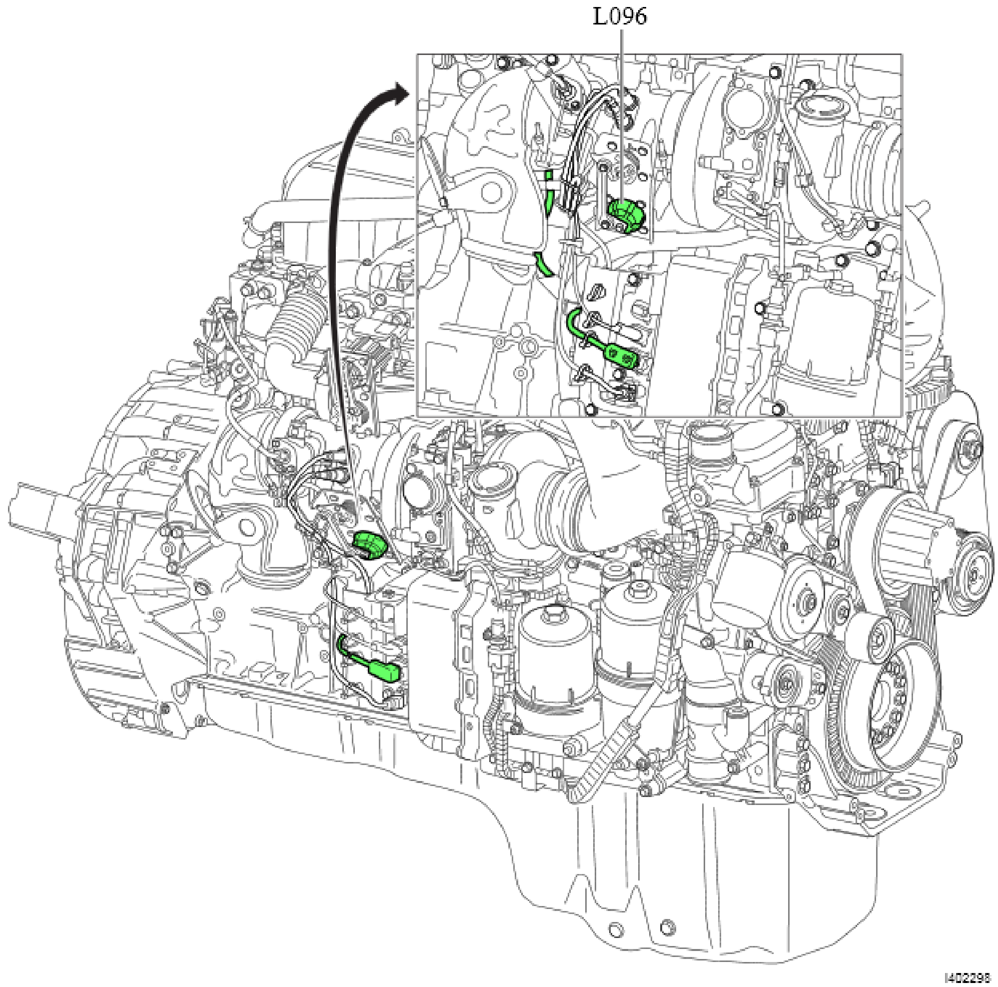
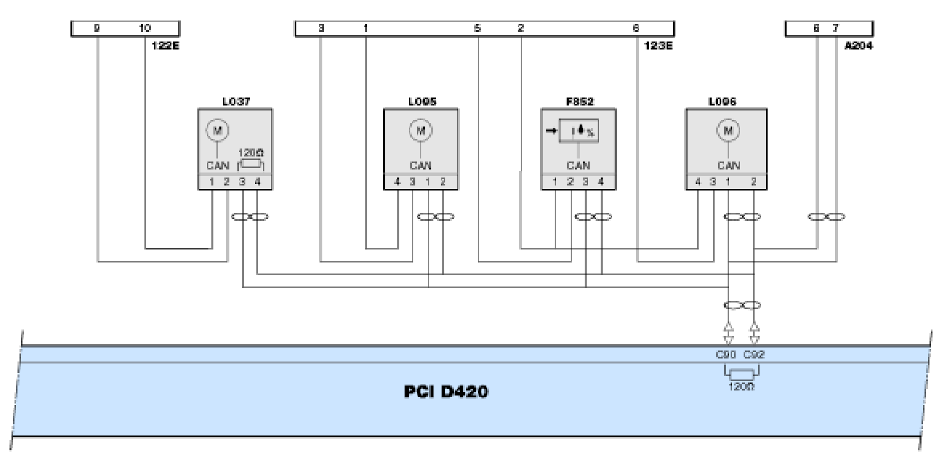
P1021

Code number	P1021
Fault code description	BPV actuator – CAN communication error
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**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. 9 Lever 10 Spring 11 Butterfly valve 12 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 valve 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 ECU printed circuit board 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.

<table>
<tr><td>Location of component(s)</td><td>
</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 BPV actuator (L020) detects that the cyclic CAN command message transmitted by the PCI ECU (D420) is missing for more than 2 seconds.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC changes to inactive as soon as the error is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>
</td></tr>
</table>

122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

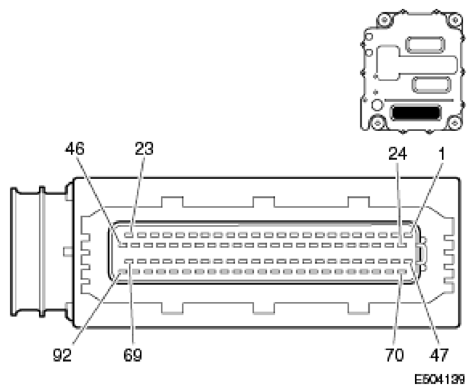
F852 humidity sensor

L037 VTG turbocharger actuator

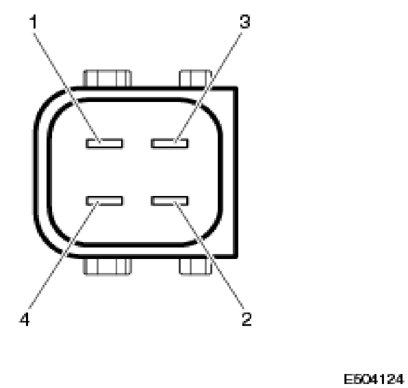
L095 EGR valve module

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, 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 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 • DAVIE Vehicle Communication Interface (VCI) disconnected

Possible causes

CAN wiring, see "General troubleshooting - CAN"

Additional information

- The BPV actuator (L020) is controlled by a cyclic CAN command message transmitted by the PCI ECU (D420) in which the operating mode and the target position are demanded.
- There is still CAN communication between the BPV actuator and PCI ECU with this fault active.
- The actuator motor is switched off and the BPV valve is fully opened (100% position) with this fault active.
- Engine torque is reduced with this fault active.

Diagnostic Step-by-Step

This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.

Step 1. Perform a key-cycle

Step 1.A Perform a key-cycle	
Action 2. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1021 active?	
Yes	**No**
Go to Error! Reference source not found.	**Go to 5.A**

Step 2. Visual inspection , BPV valve

Step 2.A Visual inspection, BPV valve connections and wiring	
Action 5. Key off the ignition. 6. Visually inspect the 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	
Is there evidence of any of the above?	
Yes	**No**
Correct any issues found.	
Go to 3.A	**Go to 5.A**

Step 3. Electrical Checks, BPV valve

Step 3.A Check the BPV valve CAN connection and power supply	
Action 1. Monitor the vehicle power supply during engine startup and operation. 2. Check the actuator CAN connection and power supply according to "Checking data, BPV valve (L096)".	
Are the CAN connection and power supply values within the specifications?	
Yes	**No**
	Repair or replace components and/or wiring as necessary.
Go to 4.A	**Go to 5.A**

Step 4. Try another BPV valve

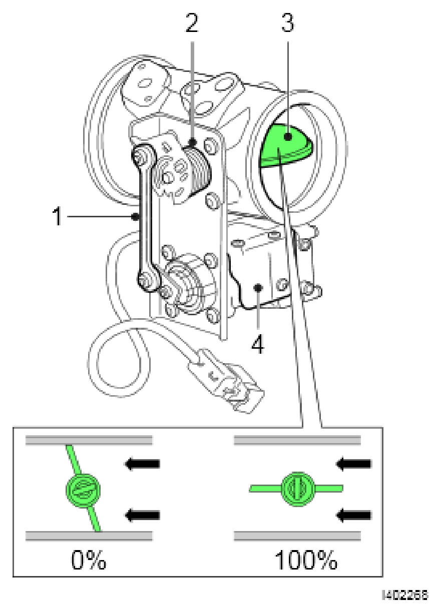
Step 4.A Try another BPV valve	
Action 3. Key off the ignition. 4. Disconnect the BPV valve connector from the engine wiring harness connector. 5. If available, connect another BPV valve without installing it.	
Is P1021 active?	
Yes	**No**
	A malfunctioning BPV valve has been detected. Replace the BPV valve. Malfunctioning of the originally installed actuator can be confirmed if DTC P1021 becomes active again when it is reconnected to the engine wiring harness connector.
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.	Go to 5.A

Step 5. Reset the DTCs

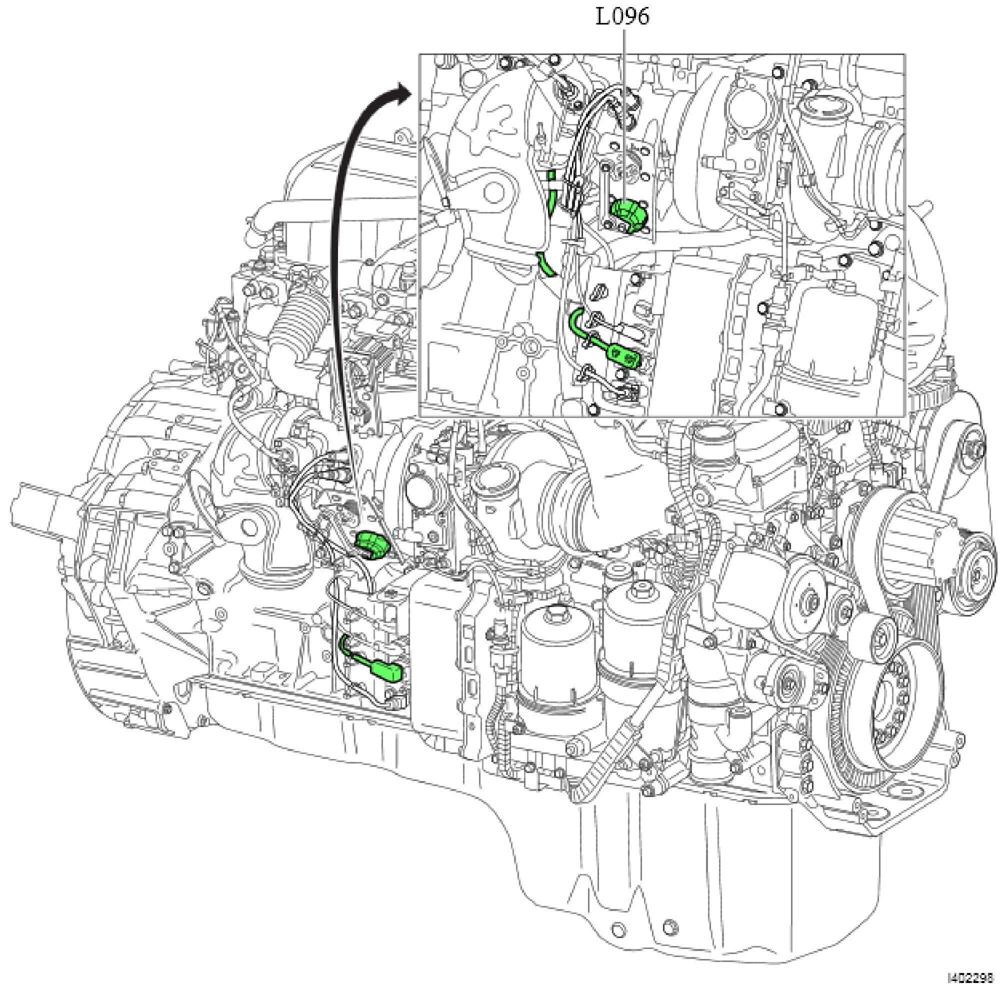
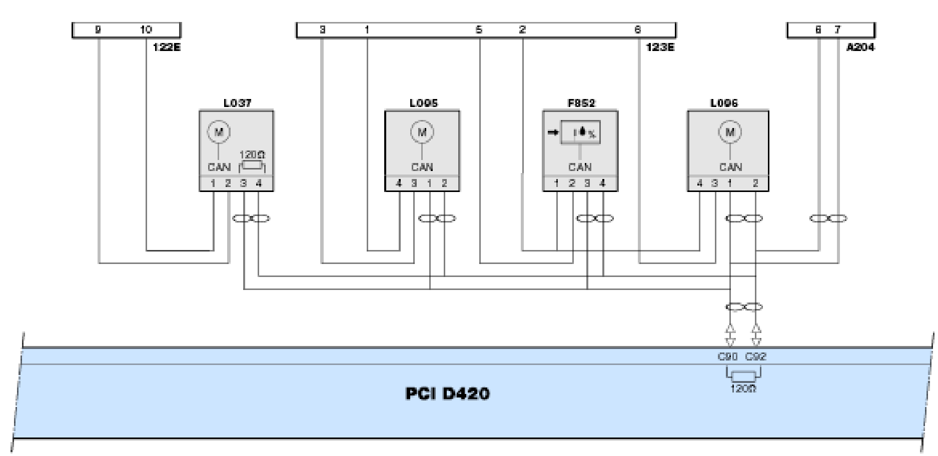
Step 5.A Reset the DTCs	
Action 1. Reset the DTCs 2. Troubleshooting active DTCs	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps.

	<table><tr><td></td><td></td></tr><tr><td>**Repair complete**</td><td>**Go to 1.A**</td></tr></table>
Verification Drive Cycle	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. **Start-up** With the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Index

P1022

Code number	P1022
Fault code description	BPV actuator – Internal short circuit detected
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	**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. 13 Lever 14 Spring 15 Butterfly valve 16 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 valve 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 ECU printed circuit board 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 ignition is on.
Set condition of fault code	The BPV valve (L096) detects that the internal actuator current is too high.
Reset condition of fault code	This DTC changes to inactive as soon as the fault is no longer detected.
Electrical diagram(s)	

122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

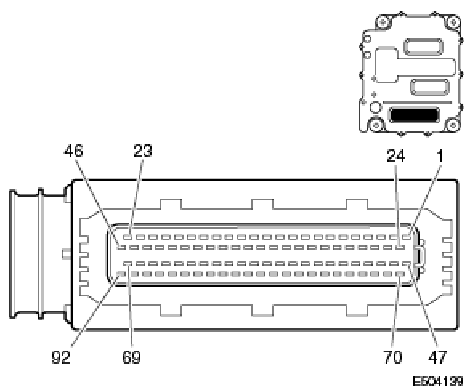
F852 humidity sensor

L037 VTG turbocharger actuator

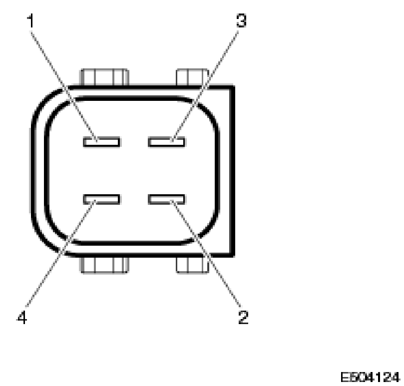
L095 EGR valve module

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, 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 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 • DAVIE Vehicle Communication Interface (VCI) disconnected

Possible causes

- High friction or sticking BPV valve bearings or mechanism.
- Blocked BPV valve.

Additional information

- The actuator current is monitored.
- The actuator motor is switched off and the BPV valve is fully opened (100% position) with this fault active.
- Engine torque is reduced after 10 hours of engine operation.

Diagnostic Step-by-Step

This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.

Step 1. Perform a key-cycle

Step 1. A Perform a key-cycle	
Action 3. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1022 active?	
Yes	**No**
Go to 2.A	**Step 2.B**

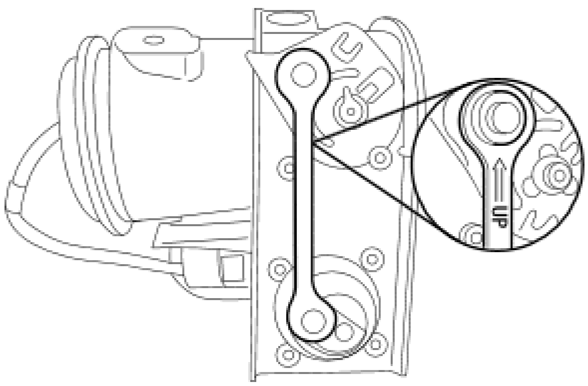
Step 2. Check the BPV valve

Step 2. A Visual inspection, BPV valve mechanism

Action

4. Key off the ignition
5. Visually check that the connection rod of the BPV valve mechanism is installed correctly. The arrow must point upward.

Correct the installed connection rod.



Is the BPV valve mechanism free of damage?

Yes	No
Go to 2.B	Go to 4.A

Step 2.B Visual inspection, BPV valve mechanism

Action

1. Key off the ignition
2. Visually check that the connection rod of the BPV valve mechanism is free of damage.

Correct valve mechanism

I402210

Example of a bent lever and connection rod

I402265

Is the BPV valve mechanism free of damage?

Yes	No
Go to 2.C	Go to 4.A

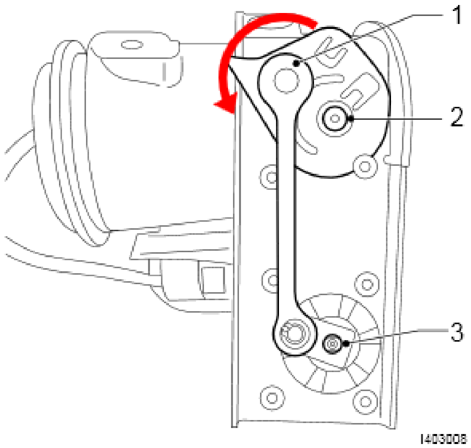
Step 2.C Check the free movement of the BPV valve mechanism

The valve mechanism can move when the ignition is keyed on. Touching the mechani can result in physical injury.

- **Always key off the ignition when working on the BPV valve mechanism**

Action

3. Key off the ignition
4. Check the free movement of the valve mechanism by moving the connection rod (1) by hand.
   The movement requires some force because of the presence of a return spring.
   Check during the movement that:
   - The resistance of the mechanism to move is uniform over the full travel path of the connection rod (1), and
   - The actuator shaft (3) and valve shaft (2) rotate over the full travel path of the connection rod (1).



Do not use a tool to move the mechanism.

Does the BPV valve mechanism move freely?

Yes	No
Go to 3.A	Go to 2.D

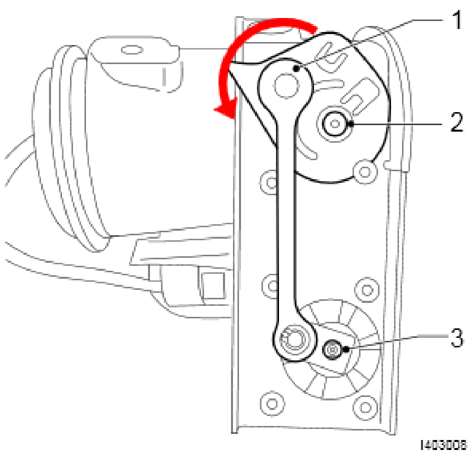
Step 2.D Check for blockage in the BPV valve housing

The valve mechanism can move when the ignition is keyed on. Touching the mechani can result in physical injury.

- **Always key off the ignition when working on the BPV valve mechanism.**
- **Maintain a safe distance if the valve is monitored with the ignition keyed on.**

Action

4. Key off the ignition
5. Loosen the exhaust pipe between the turbocharger and flexible pipe according to the job, Replace back pressure valve assembly.
6. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the connection rod (1).



Do not use a tool to move the mechanism.

Was any blockage found?

Yes	No
1. Remove blockage/clean the internal valve housing. 2. Monitor the BPV valve position with DAVIE, to check that the cleaning was effective. 3. Install the exhaust pipe between the turbocharger and flexible pipe according to the job, Replace back pressure valve assembly.	A malfunctioning BPV valve has been detected. Replace the BPV valve.
Go to 4.A	Go to 4.A

Step 3. Try another BPV valve

Step 3. A Try another BPV valve

Action

7. Key off the ignition.
8. Disconnect the BPV valve connector from the engine wiring harness connector.
9. If available, connect another BPV valve without installing it.

Is P1022 active?

Yes	**No**
	A malfunctioning BPV valve has been detected. Replace the BPV valve. Malfunctioning of the originally installed actuator can be confirmed if DTC P1022 becomes active again when it is reconnected to the engine wiring harness connector.
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.	Go to 4.A

Step 4. Reset the DTCs

Step 4.A Reset the DTCs

Action

Reset the DTCs

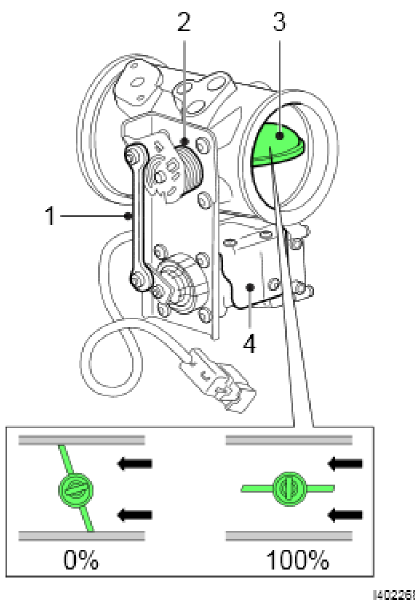
If DTCs are still present, troubleshoot the active DTCs.

DTCs reset?

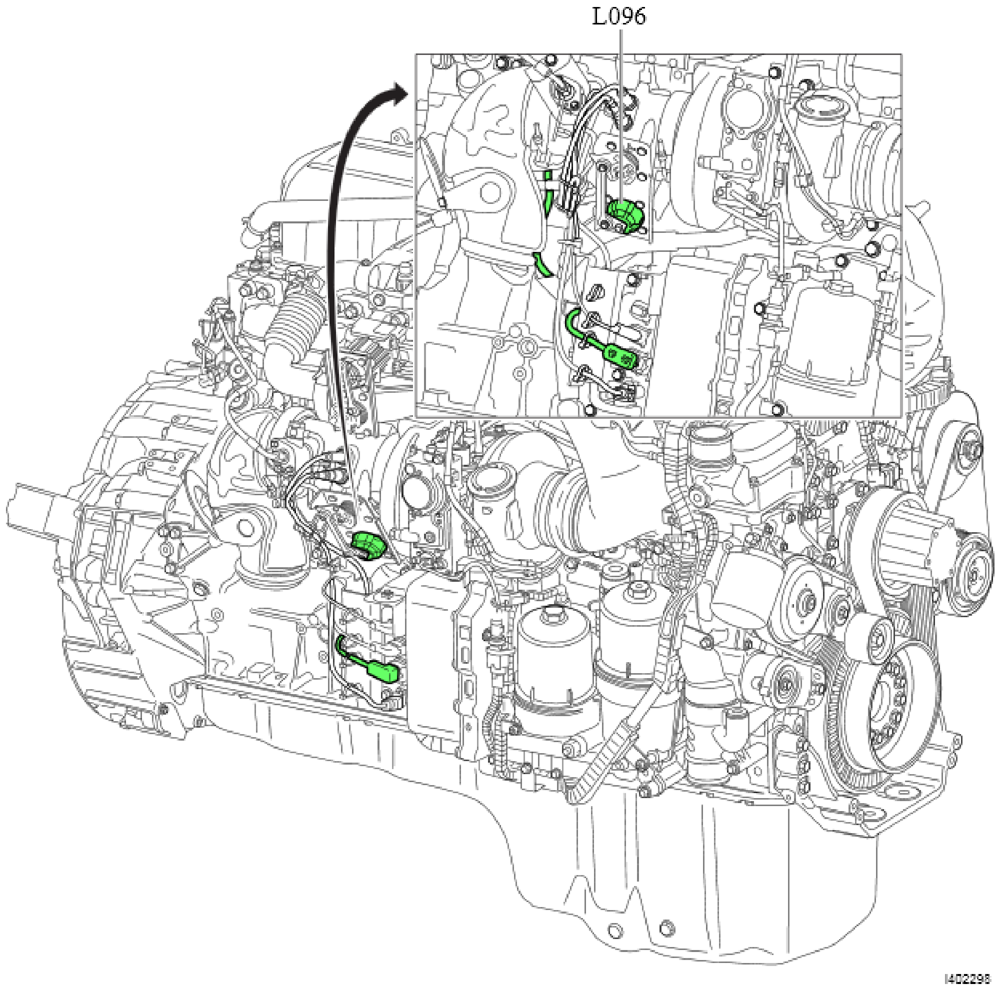
Yes	**No**
	Return to troubleshooting steps.
Repair complete	**Go to 1.A**

Verification Drive Cycle	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. **Start-up** With the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Index

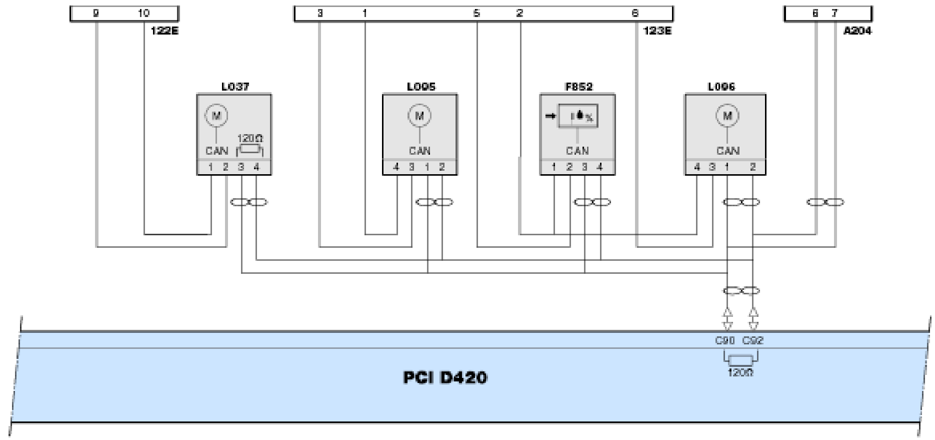
P1023

Code number	P1023
Fault code description	BPV actuator temperature - Data valid but too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Exhaust gas
Description of component(s)	**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. 17 Lever 18 Spring 19 Butterfly valve 20 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 valve 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 ECU printed circuit board 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 ignition is on.
Set conditions	The BPV valve (L096) detects that the temperature of the actuator is greater than 142°C for more than 30 seconds.
Reset conditions	This DTC changes to inactive after the ignition is keyed off for at least 15 seconds and keyed on again, and the fault is no longer detected.

Electrical diagram(s)



122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

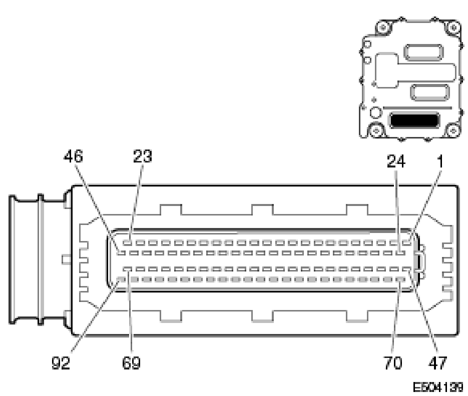
F852 humidity sensor

L037 VTG turbocharger actuator

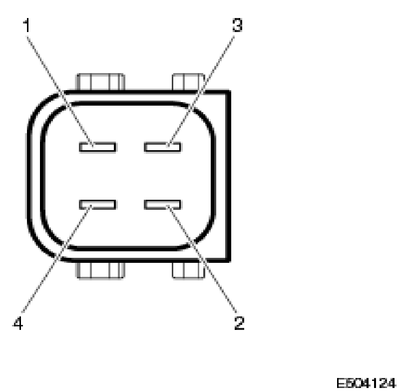
L095 EGR valve module

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, 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 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 • DAVIE Vehicle Communication Inter (VCI) disconnected

Possible causes

- The ignition is keyed on shortly after a hot engine shutdown.
- Malfunctioning cooling system
  Check the engine cooling system for:
  - Low coolant level
  - Air in cooling system
  - Blocked cooling pipes to the actuator

Additional information

- The temperature is measured on the (printed circuit board) of the actuator.
- The actuator motor is switched off and the BPV valve is fully opened (100% position) with this fault active.

	• Engine torque is reduced with this fault active.
Diagnostic Step-by-Step	This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.

Step 1. Perform a key cycle

Step 1. A Perform a key-cycle	
Action 4. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1023 active?	
Yes	**No**
Go to 3.A	**Step 2.A**

Step 2. Operate the engine at normal operating temperature

Step 2. A Check for an active P1023	
Action 1. Operate the engine at normal operating temperature.	
Is DTC P1023 active?	
Yes	**No**
Go to 3.A	**Step 5.A**

Step 3. Check the cooling system

Step 3. A Check the coolant level of the vehicle cooling system	
Action 1. Check the coolant level	
Is the coolant level correct?	
Yes	**No**
	Refill the coolant level

Go to 3.B	**Step 2.A**

Step 3. B Inspect the actuator cooling circuit
Action 1. Check the coolant supply and return pipes of the BPV actuator according to the maintenance job, <u>Check/clean all coolant pipes</u>.
Does the actuator cooling work sufficiently?

Yes	**No**
	Clean/replace the contaminated or damaged coolant pipe.
Go to 4.A	**Step 2.A**

Step 4. Try another BPV valve

Step 4. A Try another BPV valve
Action 10. Key off the ignition. 11. Disconnect the BPV valve connector from the engine wiring harness connector. 12. If available, connect another BPV valve without installing it.
Is P1023 active?

Yes	**No**
	A malfunctioning BPV valve has been detected. Replace the BPV valve. Malfunctioning of the origina P1022 becomes active again v harness connector.
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call	Go to 4.A

Center at 1-800-477-0251.	

Step 5. Reset the DTCs

Step 5.A Reset the DTCs	
Action Reset the DTCs If DTCs are still present, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting ste
Repair complete	**Go to 1.A**

Verification Drive Cycle

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

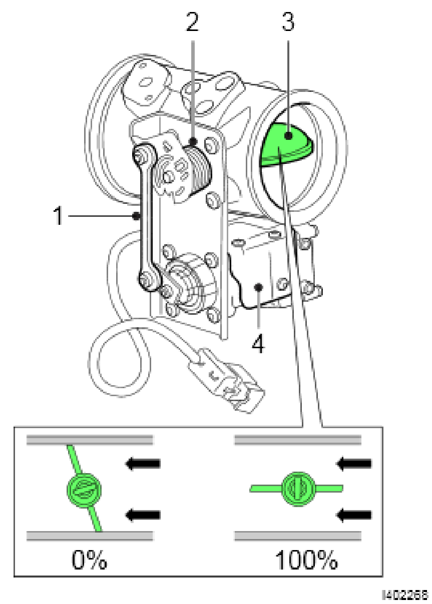
Before beginning these repair verification cycles, use the DAVIE Quick Check functi DTCs from the PCI and EAS-3 ECUs.

Start-up

With the brakes set, start the engine and allow it to run at idle for 2 minutes.

Back to Index

P1024

Code number	P1024
Fault code description	BPV actuator power supply – Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**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. 21 Lever 22 Spring 23 Butterfly valve 24 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 valve 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 ECU printed circuit board 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

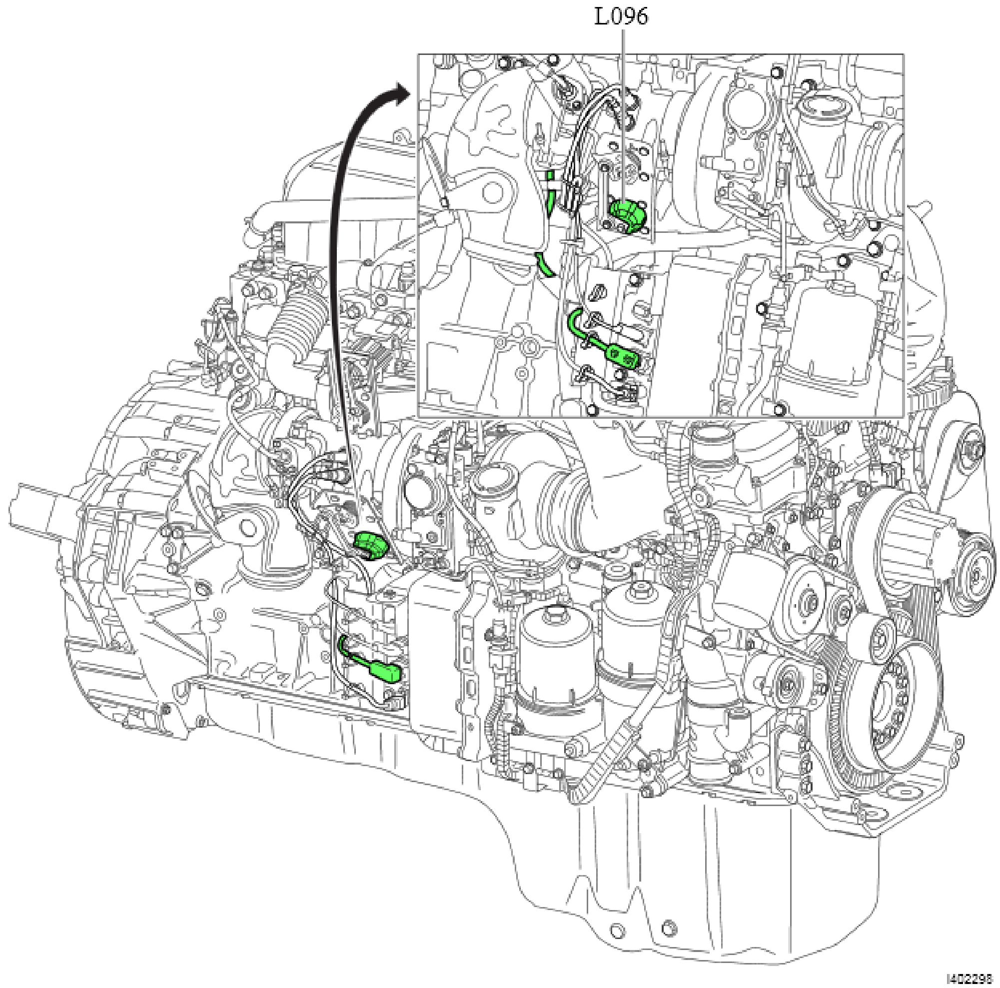
After the ignition is keyed on, the valve position is 100% until the actuator is controlled by the PCI ECU.

Unpowered and fail-safe position

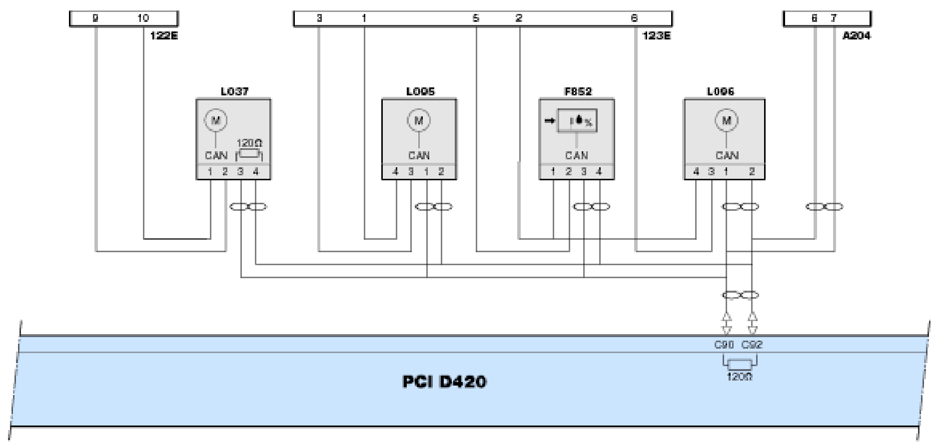
The unpowered and fail-safe positions of the valve are controlled by a spring and are fully open (100%). If a failure is detected the BPV valve moves to the fail-safe position, if possible.

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 ignition is on.
Set condition of fault code	The BPV actuator (L096) detects that the actuator power supply is less than 7.5 V or more than 35 V.
Reset condition of fault code	This DTC changes to inactive when the actuator power supply is between 8.5 V and 34 V.

Electrical diagram(s)



122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

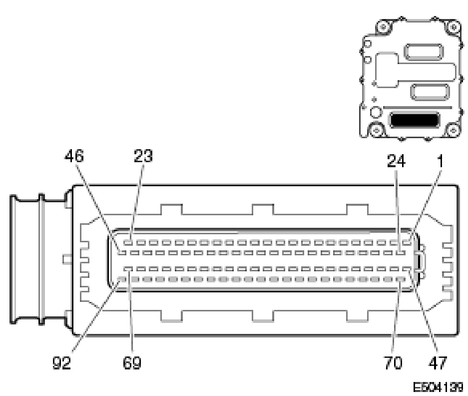
F852 humidity sensor

L037 VTG turbocharger actuator

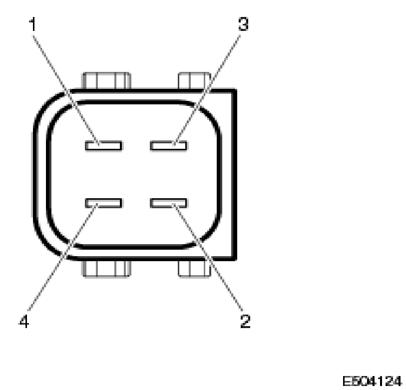
L095 EGR valve module

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

<table>
<tr><td></td><td>Handle connectors and pins with care and use matching measuring probes.</td></tr>
<tr><td>Technical data</td><td>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 L096
<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>Ubat</td><td>Ignition keyed on</td></tr>
<tr><td>1</td><td>2</td><td>~ 60 Ω</td><td>• Ignition keyed off
• Ground cable from the battery disconnected
• DAVIE Vehicle Communication Interface (VCI) disconnected</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>• Incorrect actuator power supply wiring.
• Malfunction in vehicle power supply system (battery or alternator or wiring).</td></tr>
<tr><td>Additional information</td><td>• The actuator power supply is continuously monitored.
• The actuator motor is switched off and the BPV valve is fully open (100% position) with this DTC active.
• Engine torque is reduced after 10 hours of engine operation.</td></tr>
</table>

Diagnostic Step-by-Step

This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.

Step 1. Perform a key cycle

Step 1. A Perform a key-cycle	
Action 5. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1024 active?	
Yes	**No**
Go to 2.A	**Step 5.A**

Step 2. Electrical checks, BPV valve

Step 2.A Visual inspection, BPV valve connections and wiring	
Action 1. Key the ignition off. 2. Visually inspect the 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	
Is there evidence of any of the above?	
Yes	**No**
Correct any issues found	
Go to 4.A	**Go to 2.B**

Step 2.B Check the BPV vale power supply	
Action 1. Monitor the vehicle power supply during engine startup and operation. 2. Check the actuator power supply according to, "Checking data, BPV valve (L096)."	
Is the power supply within the specifications?	
Yes	**No**
	Repair or replace components and/or wiring as necessary.
Go to 3.A	**Go to 4.A**

Step 3. Try another BPV valve

Step 4. A Try another BPV valve	
Action 13. Key off the ignition. 14. Disconnect the BPV valve connector from the engine wiring harness connector. 15. If available, connect another BPV valve without installing it.	
Is P1024 active?	
Yes	**No**
	A malfunctioning BPV valve has been detected. Replace the BPV valve. Malfunctioning of the originally installed actuator can be confirmed if DTC P1024 becomes active again when it is reconnected to the engine wiring harness connector.

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.	**Go to 4.A**

Step 4. Reset the DTCs

Step 4.A Reset the DTCs	
Action Reset the DTCs If DTCs are still present, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps.
Repair complete	**Go to 1.A**

Verification Drive Cycle

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 DTCs from the PCI and EAS-3 ECUs.

Start-up

With the brakes set, start the engine and allow it to run at idle for 2 minutes.

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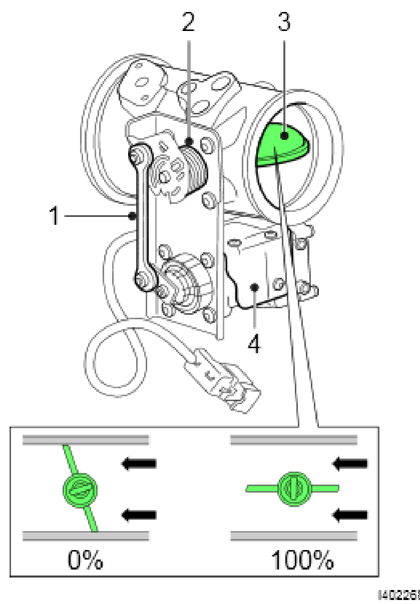
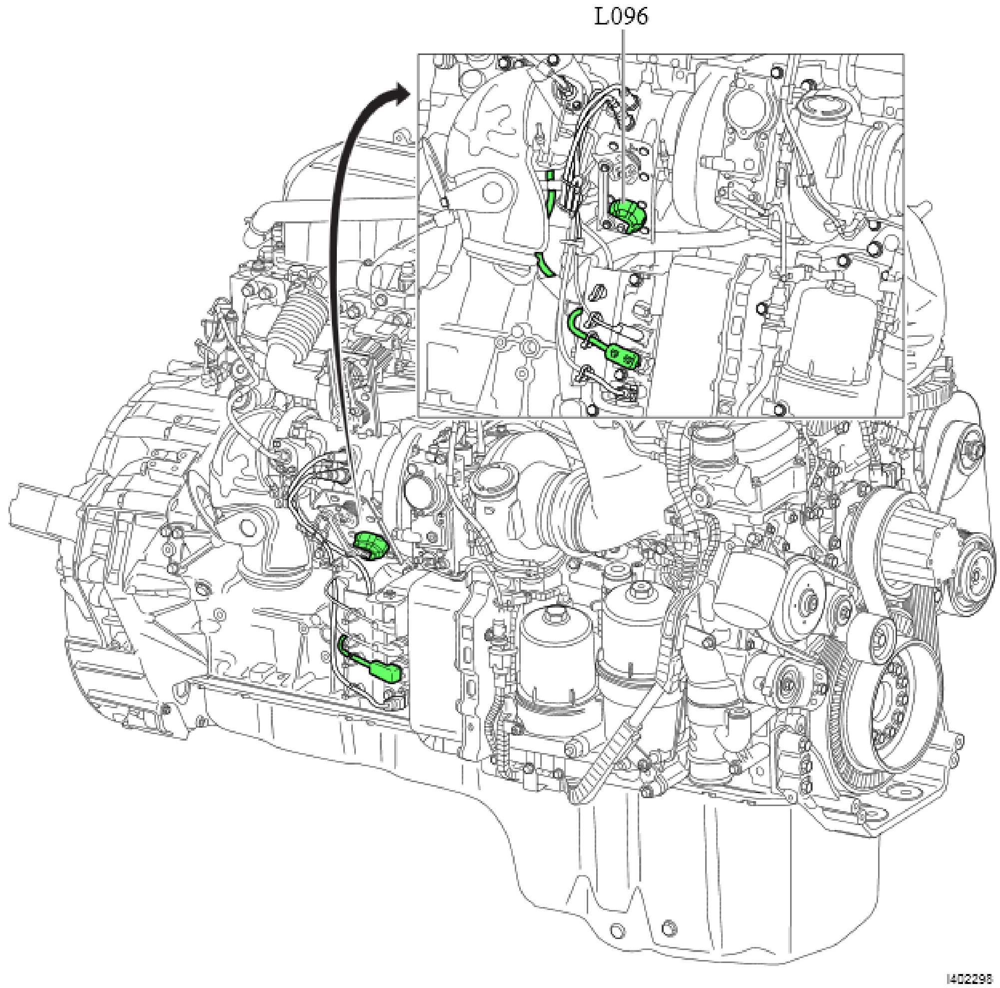
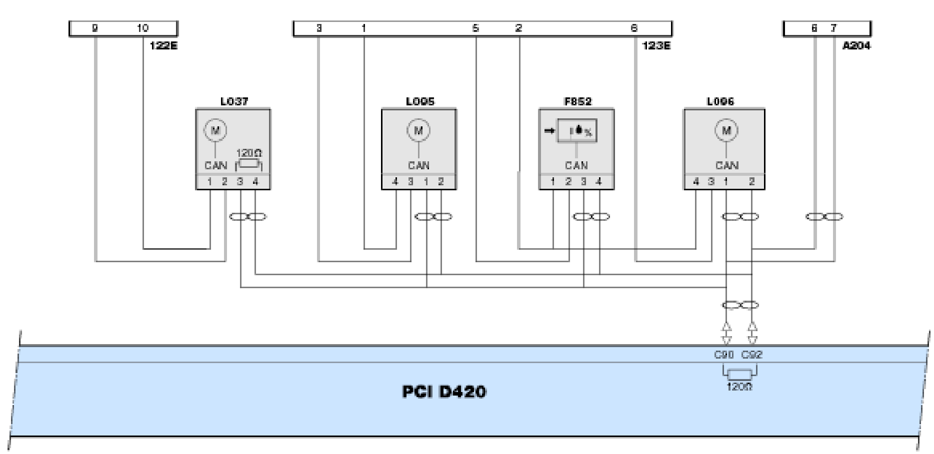
P1025

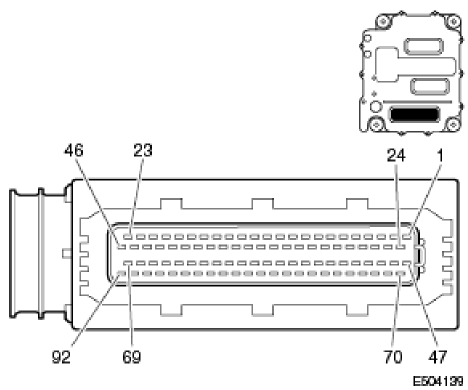
Code number	P1025
Fault code description	BPV actuator position - Malfunction on sensor
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**Back pressure valve (BPV) actuator (L096)** The BPV actuator consists 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. 25 Lever 26 Spring 27 Butterfly valve 28 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 valve 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 ECU printed circuit board 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.

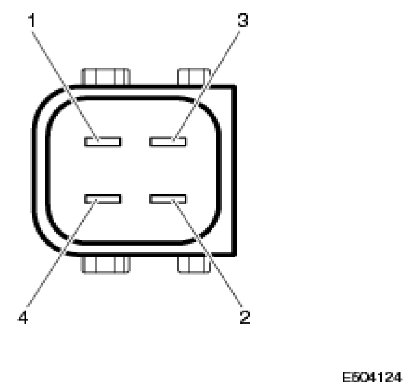
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The BPV valve (L096) detects a failure or deviation on the internal position sensor.
Reset condition of fault code	This DTC changes to inactive after the ignition is keyed off for at least 15 seconds and keyed on again and the error is no longer detected.
Electrical diagram(s)	

	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, 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 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 • DAVIE Vehicle Communication Interface (VCI) disconnected

Possible causes

- Bent actuator lever and/or connection rod.
- Incorrectly installed connection rod.

Additional information

- The position of the BPV valve is monitored by a shaft position sensor in the actuator.
- The actuator motor is switched off and the BPV valve is fully opened (100% position) with this DTC active.
- Engine torque is reduced with this DTC active.

Diagnostic Step-by-Step

This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.

Step 1. Perform a key cycle

Step 1. A Perform a key-cycle	
Action 6. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1025 active?	
Yes	**No**
Go to 2.A	**Step 2.B**

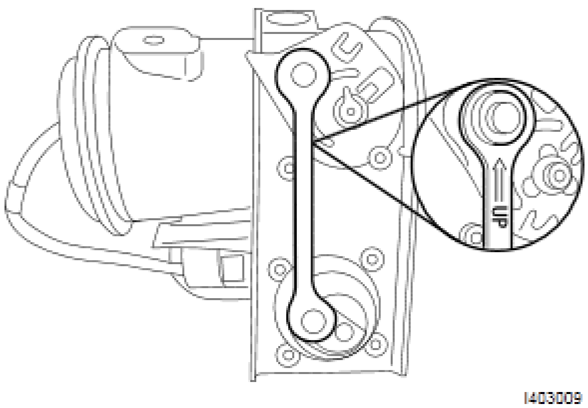
	Step 2. Check the BPV valve

Step 2. A Visual inspection, BPV valve mechanism

Action

6. Key off the ignition
7. Visually check that the connection rod of the BPV valve mechanism is installed correctly. The arrow must point upward.

Correct the installed connection rod.



Is the BPV valve mechanism free of damage?

Yes	**No**
Go to 2.B	**Go to 4.A**

Step 2.B Visual inspection, BPV valve mechanism

Action

3. Key off the ignition
4. Visually check that the connection rod of the BPV valve mechanism is free of damage.

Correct valve mechanism

I402210

Example of a bent lever and connection rod

I402265

Is the BPV valve mechanism free of damage?

Yes	No
Go to 2.C	Go to 4.A

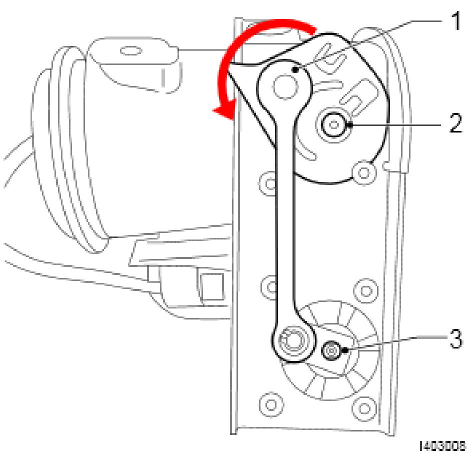
Step 2.C Check the free movement of the BPV valve mechanism

The valve mechanism can move when the ignition is keyed on. Touching the mec can result in physical injury.

- **Always key off the ignition when working on the BPV valve mechanism**

Action

5. Key off the ignition
6. Check the free movement of the valve mechanism by moving the connection rod (1) by hand.
   The movement requires some force because of the presence of a return spring. Check during the movement that:
   - The resistance of the mechanism to move is uniform over the full travel path of the connection rod (1), and
   - The actuator shaft (3) and valve shaft (2) rotate over the full travel path of the connection rod (1).



Do not use a tool to move the mechanism.

Does the BPV valve mechanism move freely?	
Yes	**No**
Go to 3.A	**Go to 2.D**

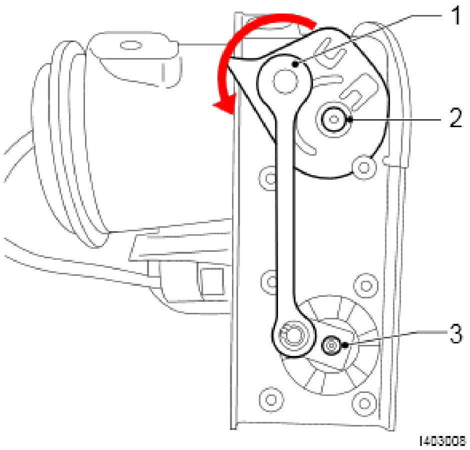
Step 2.D Check for blockage in the BPV valve housing

The valve mechanism can move when the ignition is keyed on. Touching the mec can result in physical injury.

- **Always key off the ignition when working on the BPV valve mechanism.**
- **Maintain a safe distance if the valve is monitored with the ignition keyec**

Action

7. Key off the ignition
8. Loosen the exhaust pipe between the turbocharger and flexible pipe according to the job, Replace back pressure valve assembly.
9. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the connection rod (1).



Do not use a tool to move the mechanism.

Was any blockage found?

Yes	No
4. Remove blockage/clean the internal valve housing. 5. Monitor the BPV valve position with DAVIE, to check that the cleaning was effective. 6. Install the exhaust pipe between the turbocharger and flexible pipe according to the job, Replace back pressure valve assembly.	A malfunctioning BPV valve has been detected. Replace the BPV valve.
Go to 4.A	**Go to 4.A**

Step 3. Try another BPV valve

Step 4. A Try another BPV valve	
Action 16. Key off the ignition. 17. Disconnect the BPV valve connector from the engine wiring harness connector. 18. If available, connect another BPV valve without installing it.	
Is P1024 active?	
Yes	**No**
	A malfunctioning BPV valve has been detected. Replace the BPV valve. ⓘ Malfunctioning of the originally installed actuator can be confirmed if DTC P1024 becomes active again when it is reconnected to the engine wiring harness connector.
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.	**Go to 4.A**

Step 4. Reset the DTCs

Step 4.A Reset the DTCs
Action Reset the DTCs If DTCs are still present, troubleshoot the active DTCs.

<table>
<tr>
<td></td>
<td>
<table>
<tr><td colspan="2">DTCs reset?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td></td><td>Return to troubleshooting steps.</td></tr>
<tr><td>Repair complete</td><td>Go to 1.A</td></tr>
</table>
</td>
</tr>
<tr>
<td>Verification Drive Cycle</td>
<td>Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active.

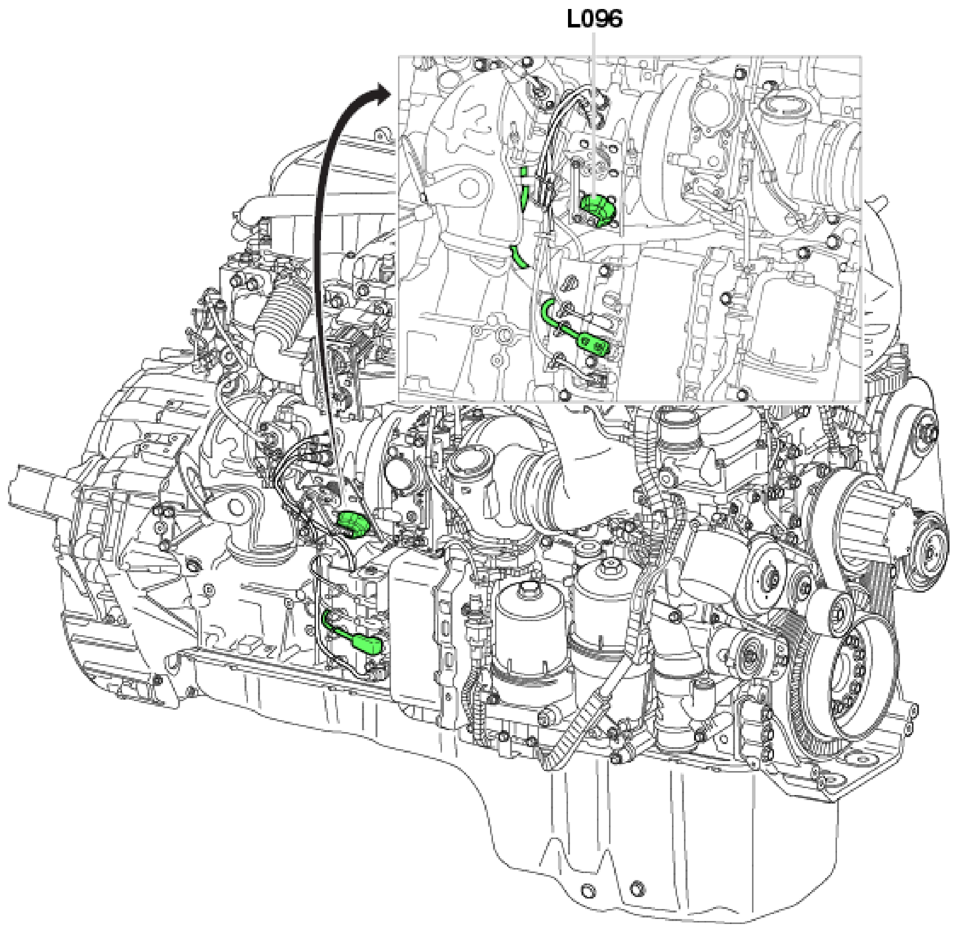
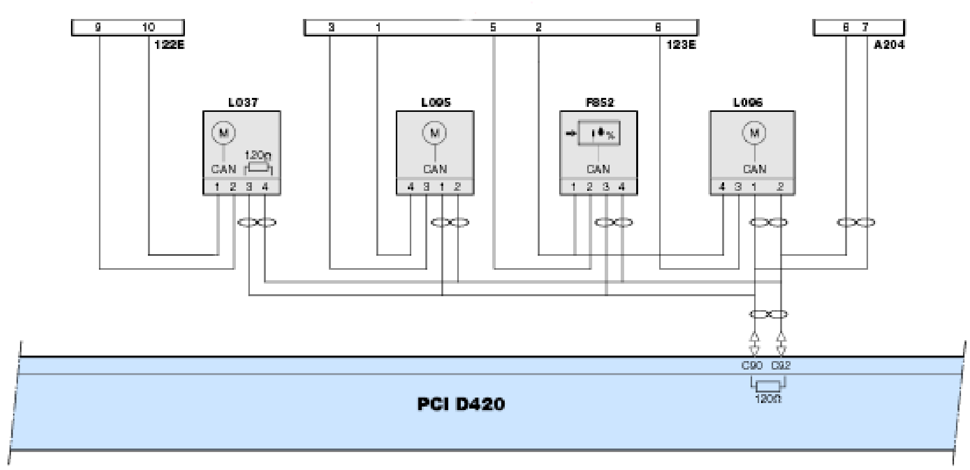
Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

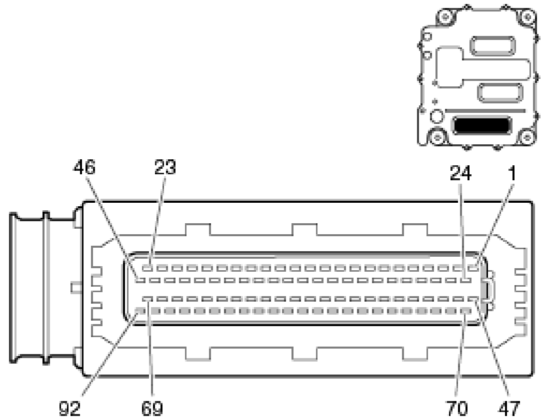
Start-up

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

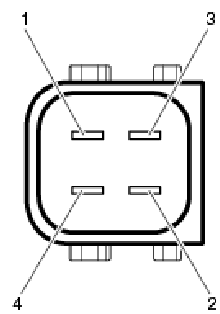
P1026

Code number	P1026
Fault code description	BPV actuator - Out of calibration
Fault code information	1 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. 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 ignition is on.
Set condition of fault code	The BPV actuator (L096) detects that the open (100%) position is out of range.
Reset condition of fault code	This DTC changes to inactive after the ignition is keyed off for at least 15 seconds and keyed on again and the error is no longer detected.
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

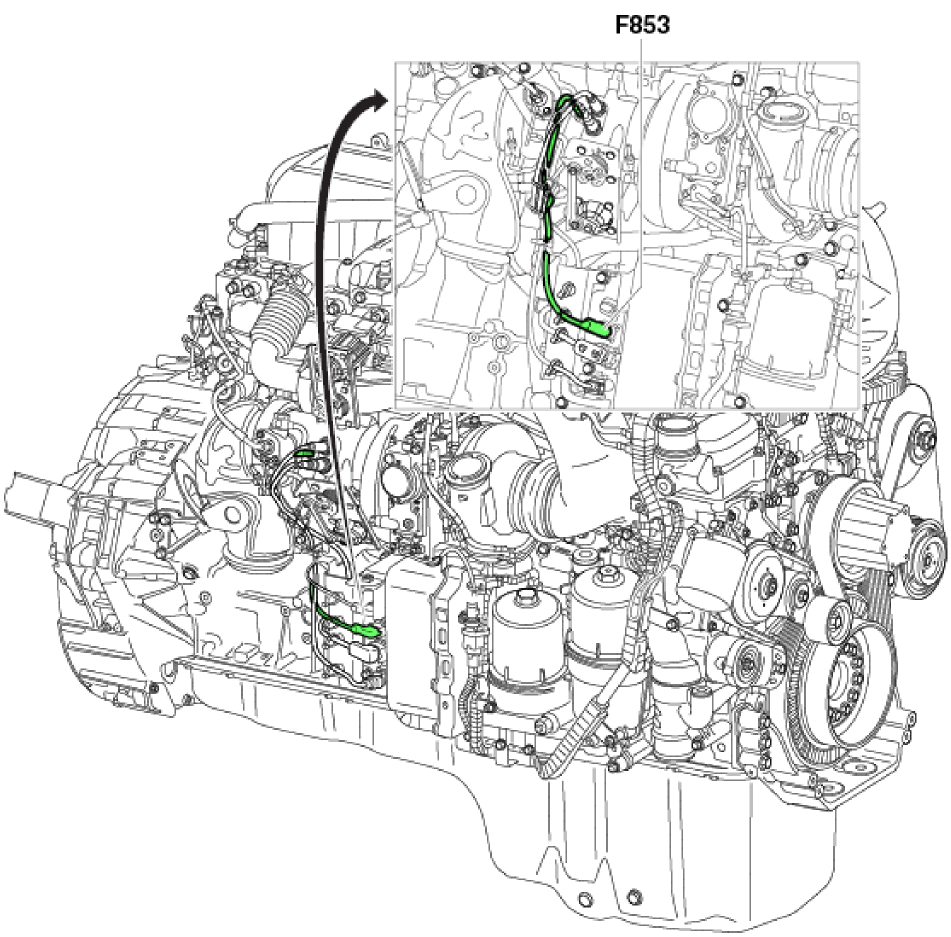
<table>
<tr><td></td><td>Ground cable from battery disconnected
Vehicle Communication Interface (VCI) of DAVIE disconnected</td></tr>
<tr><td>Possible causes</td><td></td></tr>
<tr><td>Additional information</td><td>The open (100%) position of the BPV valve is checked by the actuator and compared with an ex-factory stored value.
The actuator motor is switched off and the BPV valve is fully opened (100% position) with this DTC active.
Engine torque is reduced with this DTC active.</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 1026a</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 1026b</td><td>SRT</td></tr>
<tr><td colspan="3">ECU Information
Use the DAVIE Direct selection, “ECU Information” to display ECU S/W information. Compare this information with current configuration information available through Engine Rapido, or by contacting the PACCAR Engine Support Call Center.
Is the installed ECU software incorrect?
No: Continue to the next step in the troubleshooting process.
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.
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 1026c</td><td>SRT</td></tr>
<tr><td colspan="3">DAVIE Direct Monitor: BPV
Use DAVIE to select and monitor BPV Position and BPV Actuator to determine if the back pressure valve is working properly.</td></tr>
</table>
</td></tr>
</table>

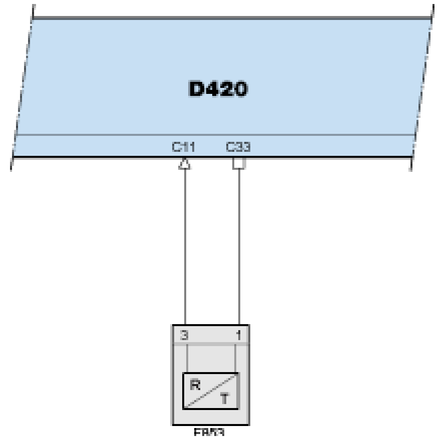
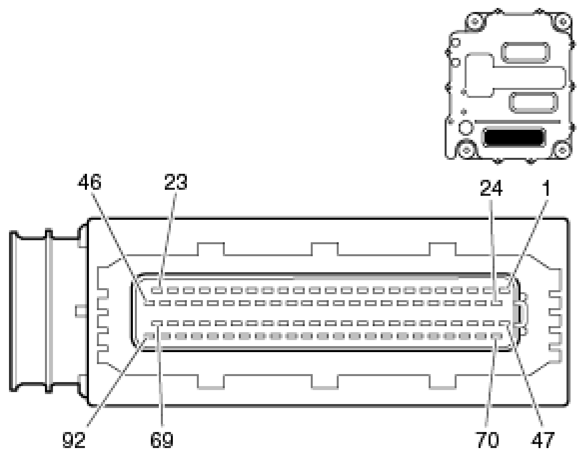
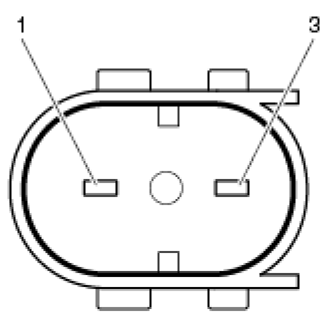
	Do the monitored values appear incorrect? • No: Continue to the next step in the troubleshooting process. • Yes: Clean adjust, repair or replace affected components for any issues identified. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, proceed to step 4 Step 4 | Step ID 1026d | SRT Replace: BPV Actuator If no problems were detected in the preceding steps, an internal problem has most likely occurred with the BPV Actuator. Replace the identified faulty 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 5 Step 5 | Step ID 1026e | 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 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 Index

P1029

Code number	P1029
Fault code description	BPV Position sensor fault
Fault code information	1 trip MIL 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	
Verification Drive Cycle	
	Back to Index

P102A

Code number	P102A
Fault code description	Temperature after BPV - Voltage too high or short circuit to supply on ECU D420 pin C11
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
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	Diagnostic condition information is not available.
Set condition of fault code	When Sensor output voltage is greater than 4.343V.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic

Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector F853 front view D420 PCI ECU F853 temperature sensor after BPV D420 F853 Function C11 3 Signal, temperature after BPV C33 1 Ground
Technical data	Component check, temperature sensor after BPV (F853) Preparation • Key off the ignition

- Disconnect connector F853
- Measure on component connector F853

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	3	197.6–204.6 Ω	Resistance value at 0°C [34°F]
		217.1–224.15 Ω	Resistance value at 25°C [77°F]
		349.5–356.1 Ω	Resistance value at 200°C [392°F]
		622.5–634.1 Ω	Resistance value at 600°C [1112°F]

Component & circuit check, ECU (D420)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	1	5V	Ignition keyed on

Possible causes

No possible causes 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 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 102Aa	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 102Ab	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).		

<table>
<tr>
<td></td>
<td>
<table>
<tr><td>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 102Ac</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace After BPV Temperature sensor 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 102Ad</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 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 Index</td>
</tr>
</table>

P102B

Code number	P102B
Fault code description	Temperature after BPV - Voltage too low or short circuit to ground on ECU D420 pin C11
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	
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P102C

Code number	P102C
Fault code description	Broken Turbine fault
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 Index

P102D

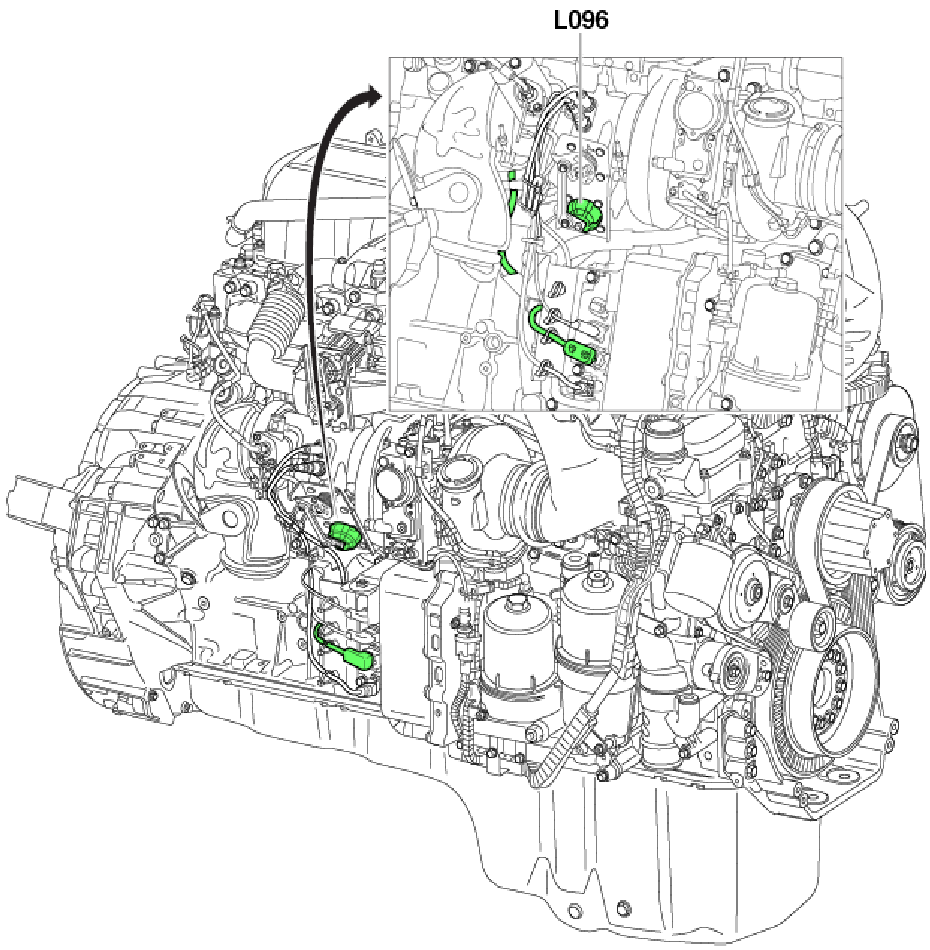
Code number	P102D
Fault code description	AMF CAN sensor burn off timeout fault
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

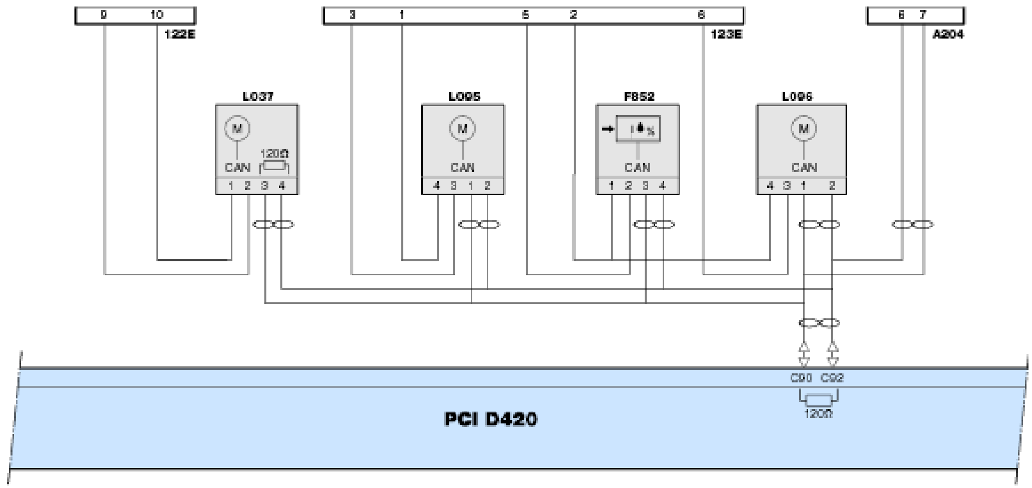
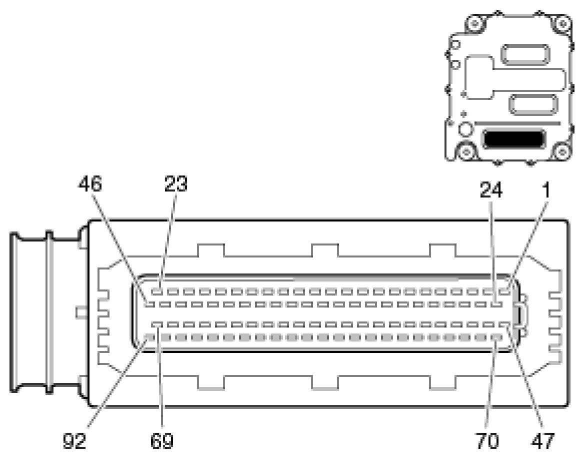
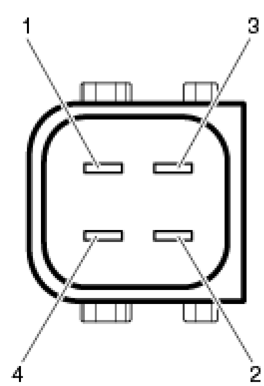
P102E

Code number	P102E
Fault code description	AMF PCB temperature out of range at power up
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 Index

P102F

Code number	P102F
Fault code description	BPV actuator temperature – Data erratic , intermittent or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
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: • when the ignition is switched on (NO engine start), and; • the difference between the coolant temperature and ambient temperature is less than 15°C [59°F], and; • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the actuator temperature from the BPV actuator (L096) differs by more than 3°C [37°F] from the average of other temperature sensors 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. This DTC changes to inactive when the fault is no longer detected.
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

<table>
<tr><td></td><td>F852 humidity sensor
L037 VTG turbocharger actuator
L095 EGR valve module
L096 BPV valve

<table>
<tr><td>D420</td><td>L096</td><td>Function</td></tr>
<tr><td>C90</td><td>1</td><td>E-CAN high</td></tr>
<tr><td>C92</td><td>2</td><td>E-CAN low</td></tr>
<tr><td></td><td>3</td><td>Ground</td></tr>
<tr><td></td><td>4</td><td>Power supply after ignition</td></tr>
</table></td></tr>
<tr><td>Technical data</td><td>Component & wiring check, BPV valve (L096)
Preparation
Key off the ignition.
Disconnect connector L096
Measure on the front side of wiring harness connector L096
<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>Ubat</td><td>ignition keyed on</td></tr>
<tr><td>1</td><td>2</td><td>± 60 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 BPV actuator (L096)</td></tr>
<tr><td>Additional information</td><td>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.
The temperature is measured on the (printed circuit board) of the actuator.
For this diagnostic, the received actuator temperature from the BPV actuator (L020) is compared with an average of other temperature sensors on the engine after the ignition has been keyed off for at least 8 hours.</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 102F-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</td></tr>
</table></td></tr>
</table>

	diagnostic procedure. Proceed to step 2. **Step 2** | Step ID 102F-b | 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 3 • No - Proceed to step 4 **Step 3** | Step ID 102F-c | SRT Replace: BPV Actuator If no problems were detected in the preceding steps, an internal problem has most likely occurred with the BPV Actuator. Replace the identified faulty 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 4** | Step ID 102F-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 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
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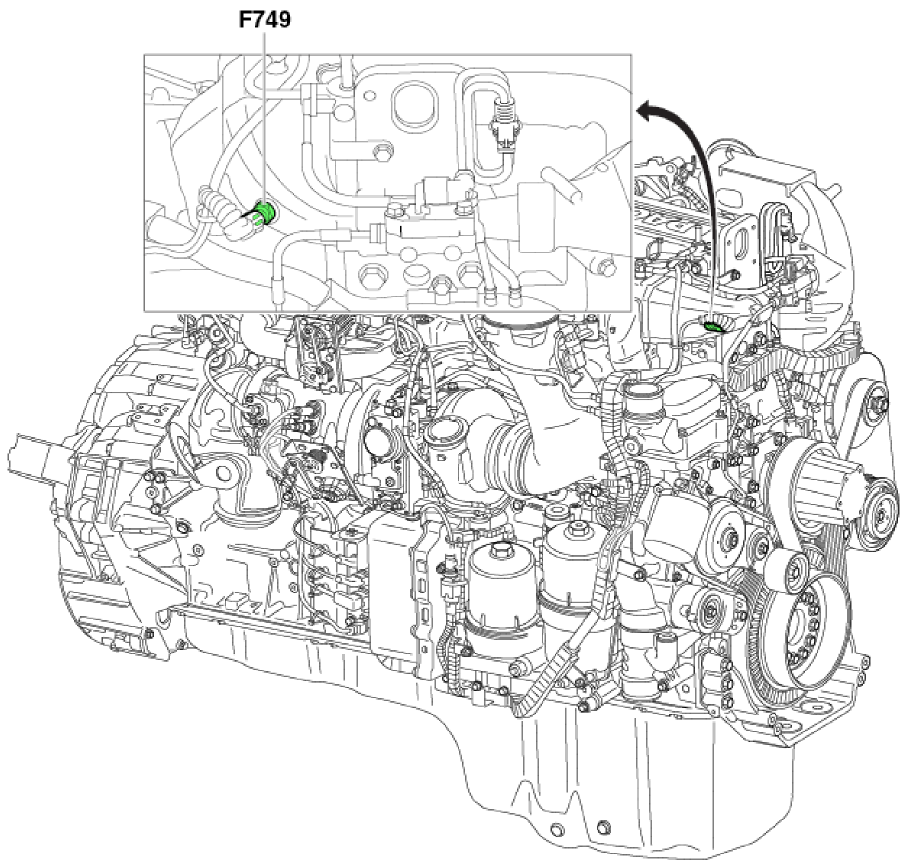
P1030

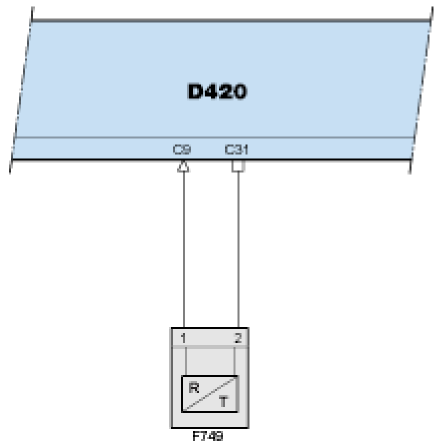
Code number	P1030
Fault code description	EGR Temperature-Data erratic, intermittent or incorrect at ignition on.
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
Description of component(s)	The EGR gas flow temperature is measured after the EGR 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: • when the ignition has been keyed off continuously for at least 8 hours; • 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 EGR temperature sensor differs by more than 3°C [37°F] from the average of other temperature sensor readings on/off 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:

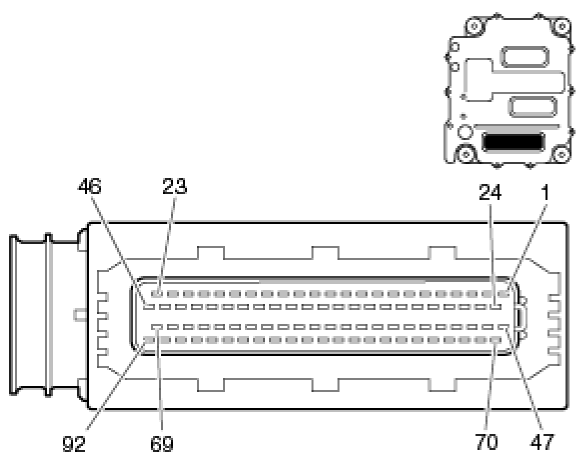
<table>
<tr><td></td><td>

- 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.

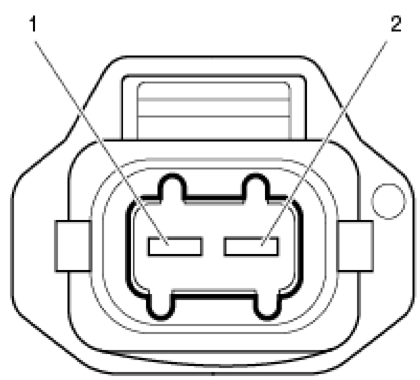
This DTC changes to inactive when the fault is no longer detected.
</td></tr>
<tr><td>

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





Wiring harness connector D420.A front view



Wiring harness connector F749 front view
</td></tr>
</table>

	D420 F749 Function C9 1 Signal, EGR temperature C31 2 Ground
Technical data	Component check, EGR temperature sensor (F749) Preparation • Key off the ignition • Disconnect connector F749 • Measure on 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
Possible causes	EGR temperature sensor deviation
Additional information	For this diagnostic, the EGR temperature sensor (F749) reading 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 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 1030a / 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 damaged or disconnected
- Batteries are not okay, contacts are not tight
- Signs of exhaust or coolant leaks on the EGR
- Improper coolant level
- Broken or missing clamps on any air component part

Was there evidence of any of the above?

- No**:** Continue to the next step in the troubleshooting process.
- Yes**:** Clean, adjust, repair, or replace affected components for any issues identified.

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 2	Step ID 1030b	SRT

DAVIE Direct: Monitor EGR and related temperature sensors

Use DAVIE to monitor the following temperatures:

- EGR Temperature
- Ambient Temperature
- Intercooler Temperature
- 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?

- No: Continue to the next step in the troubleshooting process.
- Yes: Clean adjust, repair or replace affected components for any issues identified.

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 1030c	SRT

Ancillary Test: Air Side Pressure Test

Perform the prescribed testing to identify any potential leaks in the 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.

- 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.

<table>
<tr><td></td><td>
<table>
<tr><td>Step 4</td><td>Step ID 1030d</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: EGR Temperature sensor
Replace the identified smart 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 in the troubleshooting process.</td></tr>
</table>
<table>
<tr><td>Step 5</td><td>Step ID 1030e</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 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.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1032

<table>
<tr><td>Code number</td><td>P1032</td></tr>
<tr><td>Fault code description</td><td>Vehicle speed - Data erratic, intermittent, or incorrect at ignition on</td></tr>
<tr><td>Fault code information</td><td>3 drive cycle recovery
Readiness group – None
Freeze frame type – Generic</td></tr>
<tr><td>Description of component(s)</td><td>Not required</td></tr>
<tr><td>Location of component(s)</td><td>Not required</td></tr>
<tr><td>Diagnostic condition</td><td>This diagnostic runs once after the ignition is on.</td></tr>
<tr><td>Set condition of fault code</td><td>The PCI ECU (D420) detects that the measured vehicle speed is unlikely when the ignition is keyed on.</td></tr>
<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, key off the ignition for at least 15 seconds, key it on again, then monitor vehicle speed signal with DAVIE at vehicle standstill.</td></tr>
<tr><td>Electrical diagram(s)</td><td>Not required</td></tr>
<tr><td>Technical data</td><td>Not required</td></tr>
<tr><td>Possible causes</td><td>Faulty vehicle speed signal</td></tr>
<tr><td>Additional information</td><td>No additional information found.</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 1032a</td><td>SRT</td></tr>
<tr><td colspan="3">Clear the fault codes

Clear the fault codes.
Turn the key switch ON.

Is fault code P1032 inactive?

Yes – Repair complete
No –Proceed to step 2
</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1032b</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 verify the repair:</td></tr>
</table>

	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.
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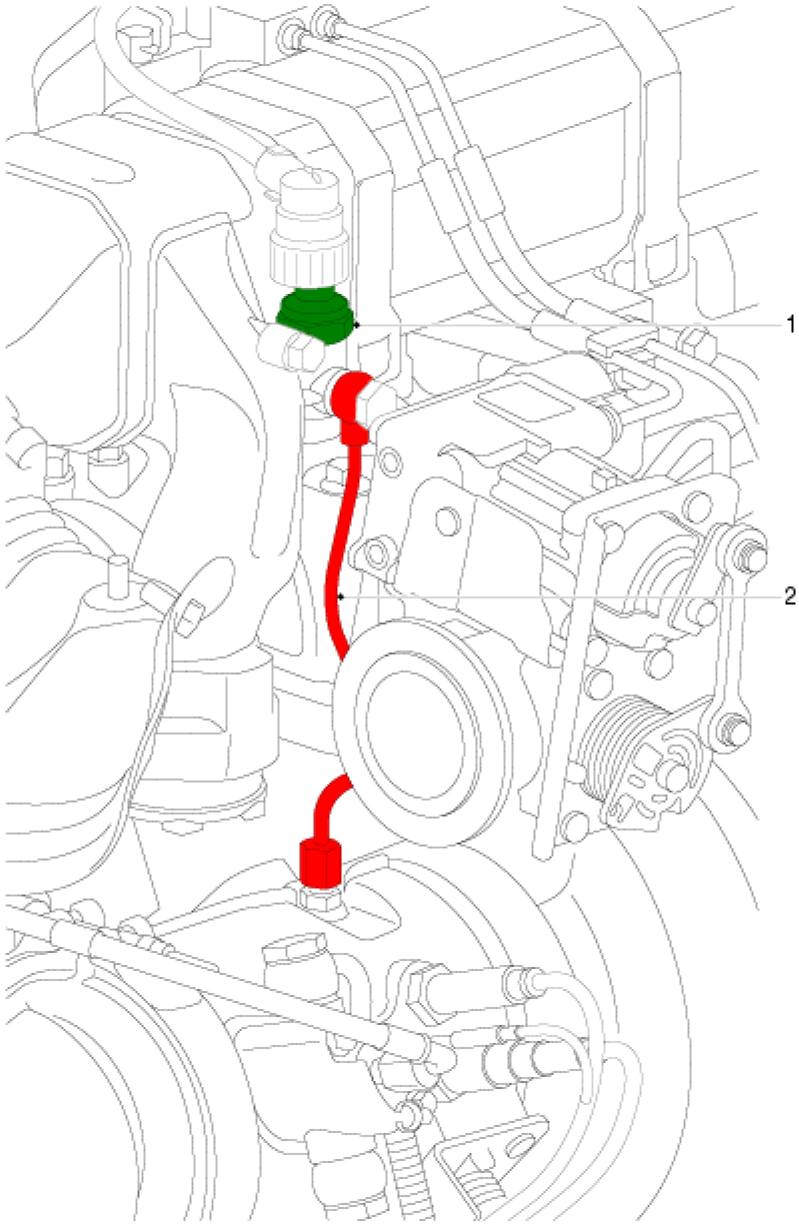
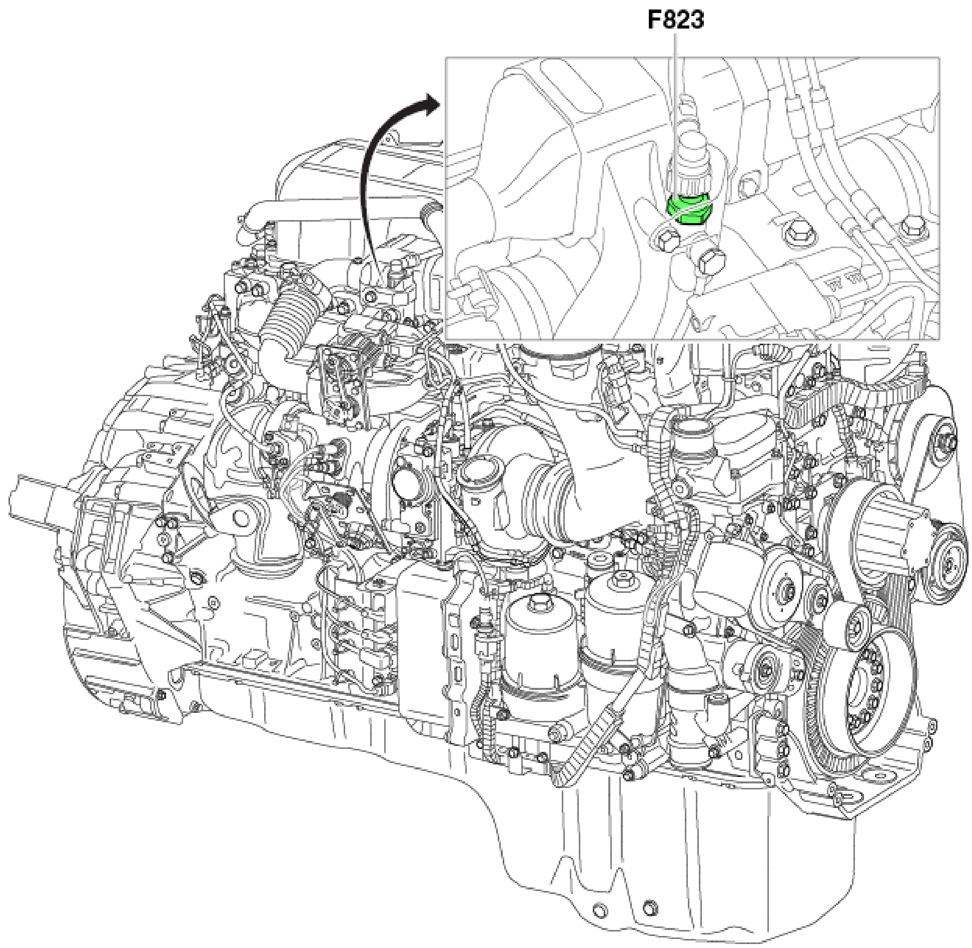
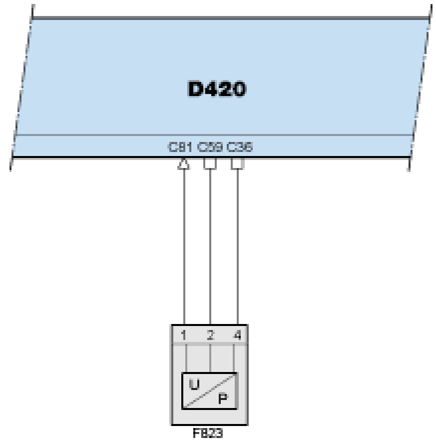
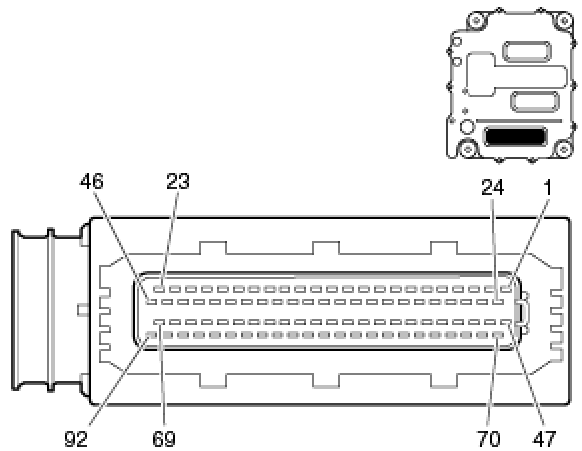
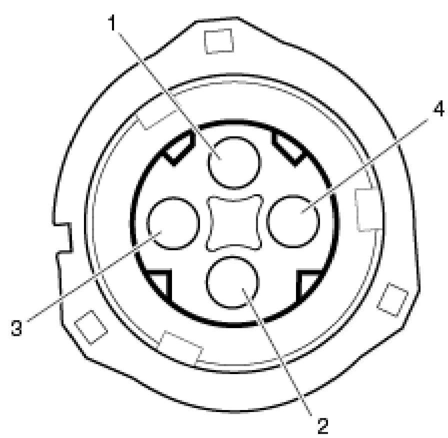
P1039

Code number	P1039
Fault code description	Pressure after BPV – Data valid but too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
Description of component(s)	Description, Pressure Sensor After BPV (F823)  The exhaust gas pressure after the BPV valve is measured by the sensor (1) via a steel tube (2). Effect on the system: • Correction of the NOx sensor before the catalyst signal. A higher measured exhaust gas pressure after the BPV valve results in lower calculated NOx emissions by the engine.

	• Calculates the exhaust gas temperature before the turbine • Lower measured exhaust gas pressure after the BPV valve results in higher calculated exhaust gas temperature before the turbine.
Location of component(s)	
Diagnostic condition	• The diagnostic runs if all the conditions mentioned in this chapter are met. • The air pressure sensor after BPV is fitted. • EGR and BPV are controlled normally. • No faults present on the pressure sensor after BPV, ambient pressure sensor, pressure sensor before turbine. • Exhaust gas flow rate > 250 g/s. • Time since engine start > 60 seconds.
Set condition of fault code	The DTC is set if the pressure after BPV corrected for the ambient pressure is higher than the threshold which is based on the exhaust gas mass flow.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.

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




Wiring harness connector D420.C front view


Wiring harness connector F823 front view
</td></tr>
<tr><td>Technical data</td><td>Component & wiring check, ECU (D420)
Preparation
Key off the ignition.
Disconnect connector F823
Measure on the front side of wiring harness connector F823</td></tr>
</table>

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

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

Possible causes	None
Additional information	Part of the component check for OBD functionality.

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 1039a	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 1039b	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 3 • No - Proceed to step 4		

Step 3	Step ID 1039c	SRT
Visual inspection: DOC Inlet Remove the DOC inlet and visually inspect for any of the following: • Signs of damage • Soot plugging; 50% or more of the cells in the catalyst being plugged Was there evidence of any of the above? • No: Continue to the Step 4 in the troubleshooting process. • Yes: Clean, adjust, repair, or replace affected components for any issues identified. Proceed to step 5		

	If soot plugging was found, perform a manual cleaning of the DPF or perform a stationary regeneration. 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 4 | Step ID 1039d | SRT Visual inspection: After BPV Pressure sensor Remove the After BPV Pressure sensor and visually inspect the senor tip for any of the following: • Signs of damage • Excessive build-up on the sensor tip Was there evidence of any of the above? • No: Continue to the next step in the troubleshooting process. • Yes: Clean, adjust, repair, or replace affected components for any issues identified. Proceed to step 5 If soot plugging was found, perform a manual cleaning of the DPF or perform a stationary regeneration. 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 5 | Step ID 1039e | 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 6 | Step ID 1039f | 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 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.
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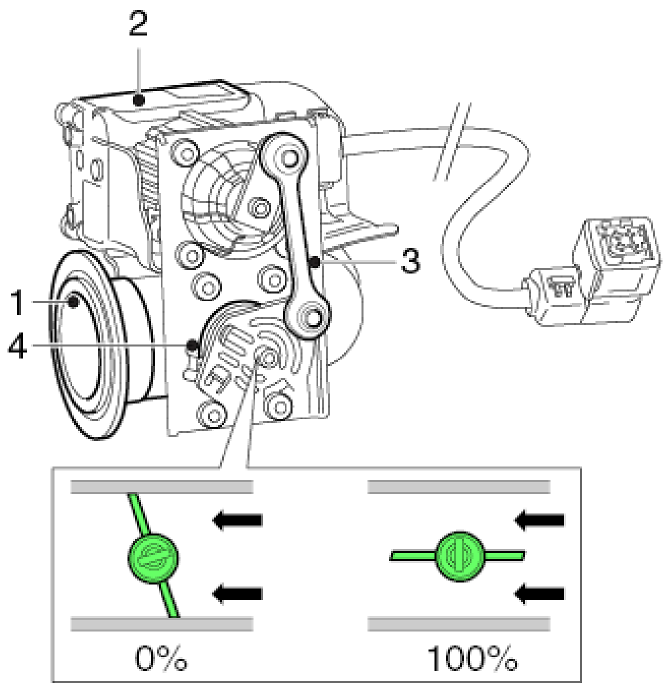
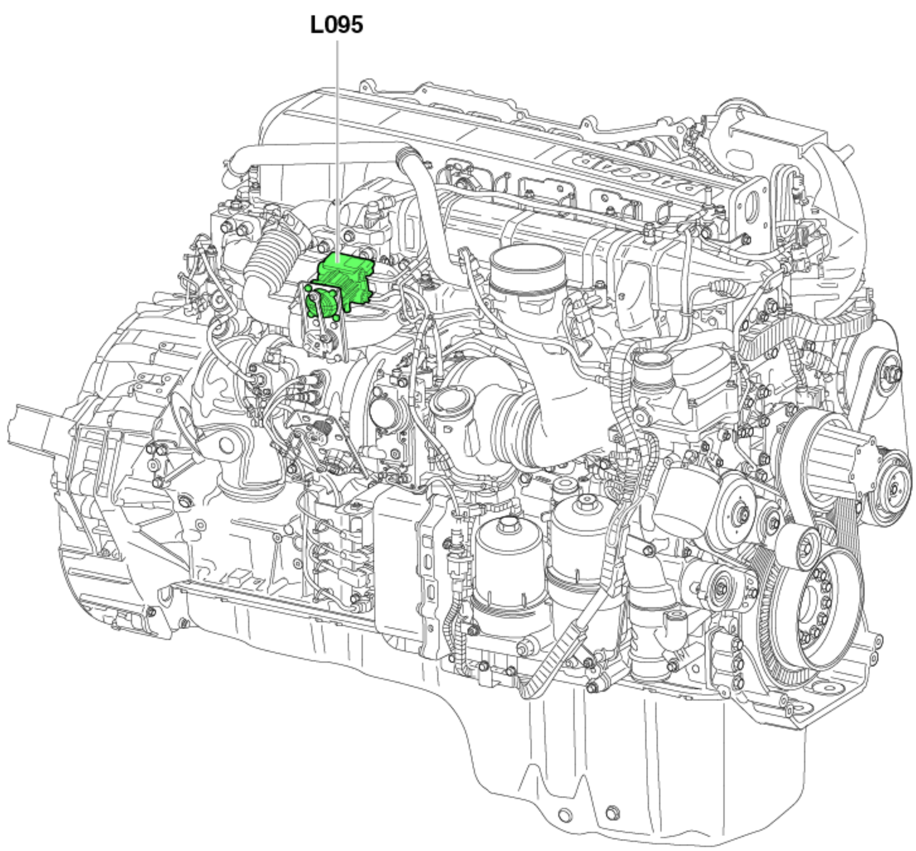
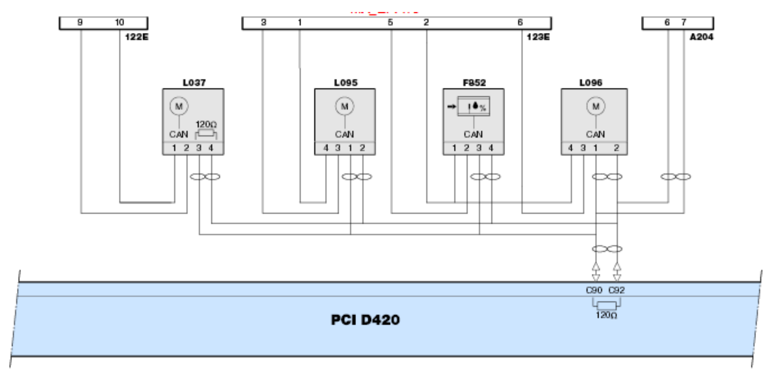
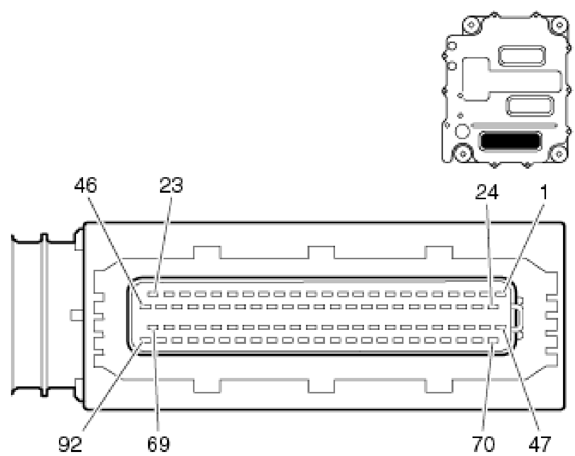
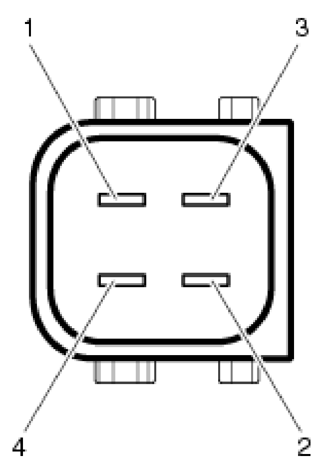
P103C

Code number	P103C
Fault code description	EGR control – unable to reach target
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
Description of component(s)	 1 Butterfly valve 2 EGR valve actuator 3 Lever 4 Spring 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 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
Location of component(s)	

Diagnostic condition	This diagnostic runs: • when the engine is running at a steady load, and; • coolant temperature is above 50°C [122°F]
Set condition of fault code	The PCI ECU (D420) detects that the demanded NOx conversion is limited by the EGR system limits for more than 300 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 L095 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 L095 Function C90 1 E-CAN high C92 2 E-CAN low 3 Ground 4 Power supply after ignition
Technical data	Component & 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 / 1. Ignition keyed off 2. Ground cable from the battery disconnected 3. Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	• Leaking EGR system • Clogged EGR system • Clogged EGR pressure difference sensor venturi • NOx before catalyst sensor deviation.
Additional information	The engine NOx emission is, among others, controlled by varying the EGR flow toward the inlet manifold of the engine.
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 103C-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 103C-b	SRT

Check for any Internal or external exhaust leakage in the EGR system.
Is leakage present?

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

Step 3	Step ID 103C-c	SRT

Check for clogged/restrictions in the lines connected to the EGR pressure differential sensor.

- Yes: - Clean the clogged/restrictions in the lines.

  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 4
- No: - Proceed to step 4

Step 4	Step ID 103C-d	SRT

Check for Clogged EGR system or in the EGR cooler.
Is EGR system or EGR cooler is clogged?

- Yes: - Clean the EGR cooler.

  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 5
- No: - Proceed to step 5

Step 5	Step ID 103C-e	SRT

Check 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, Proceed to step 6

Step 6	Step ID 103C-f	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 : Drive the vehicle 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.
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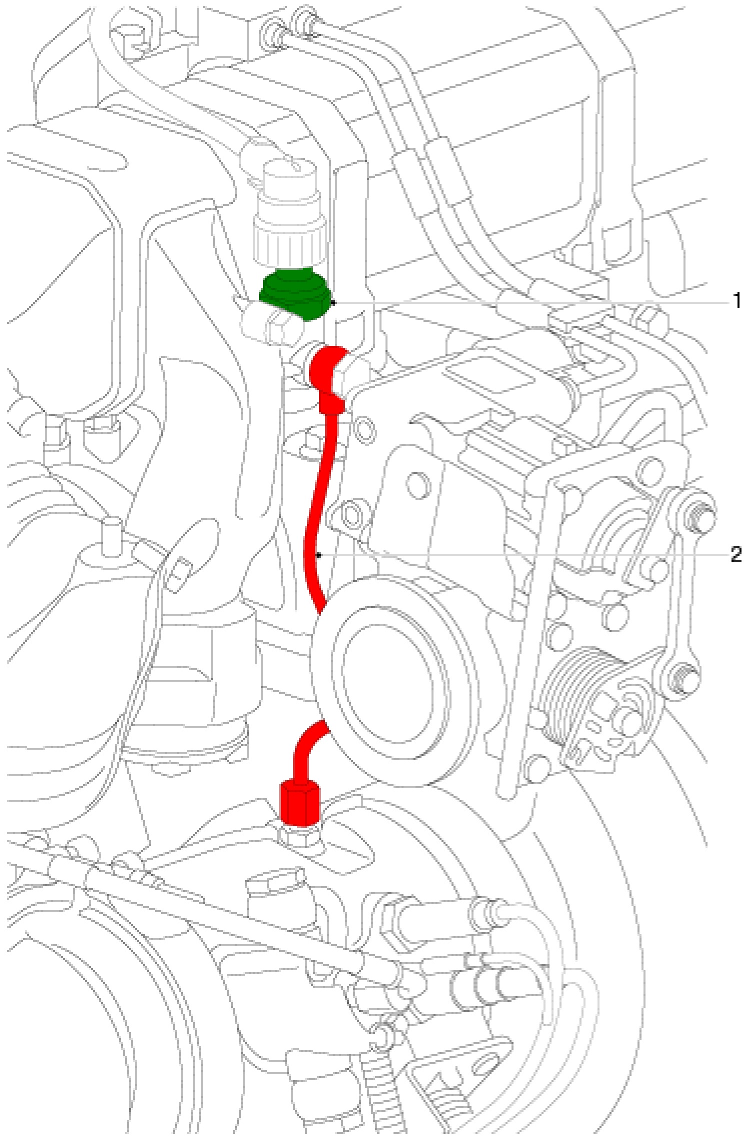
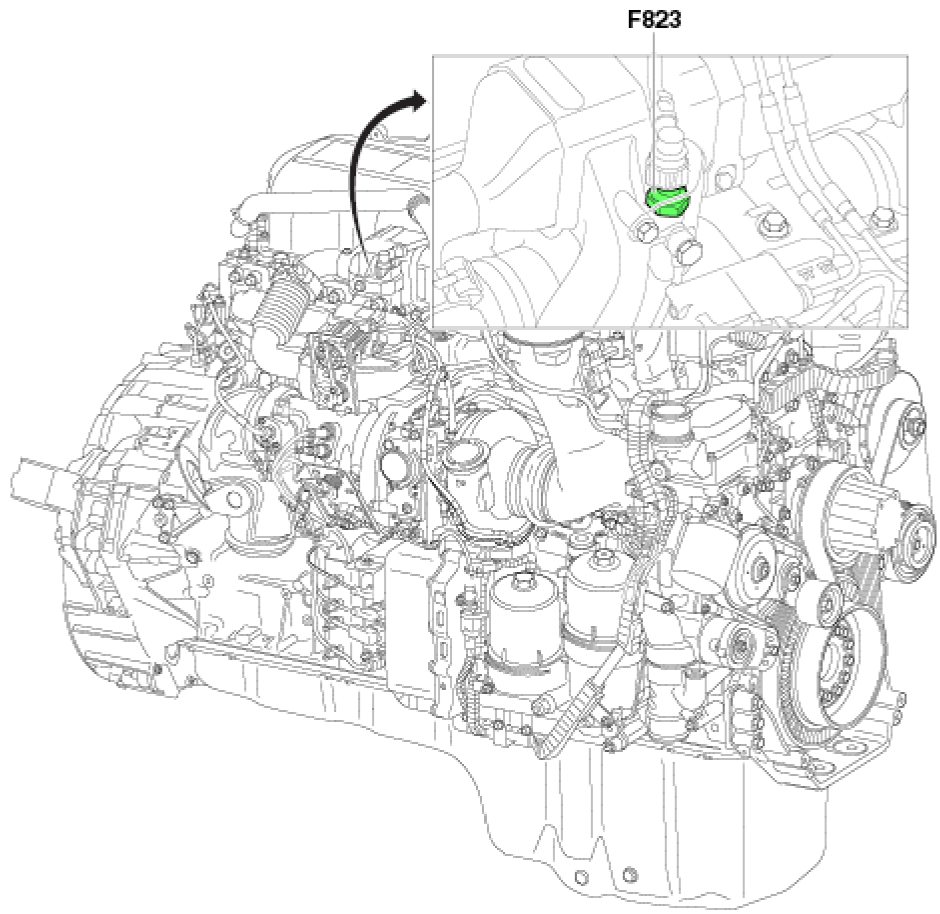
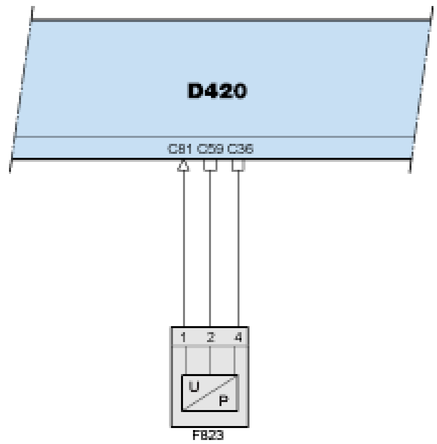
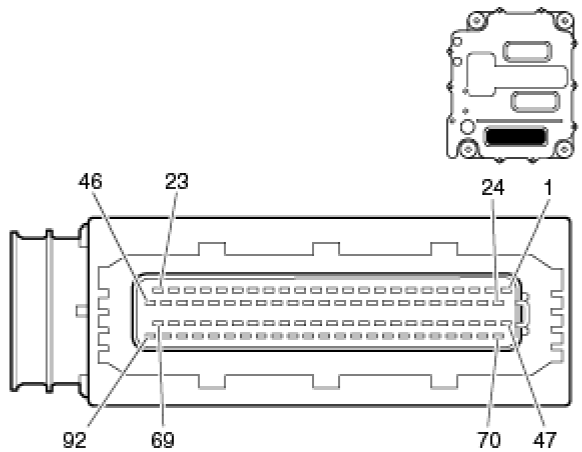
P1040

Code number	P1040
Fault code description	Pressure after BPV - Data valid but too low
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
Description of component(s)	The exhaust gas pressure after the BPV valve is measured by the sensor (1) via a steel tube (2).  Effect on the system: • Correction of the NOx sensor before the catalyst signal • A higher measured exhaust gas pressure after the BPV valve results in lower calculated NOx emissions by the engine. • Calculates the exhaust gas temperature before the turbine Lower measured exhaust gas pressure after the BPV valve results in higher calculated exhaust gas temperature before the turbine.

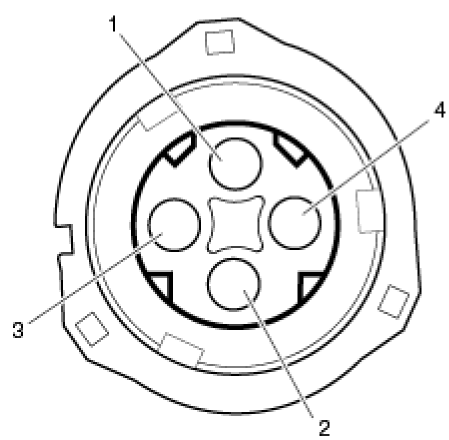
Location of component(s)	
Diagnostic condition	• The diagnostic runs if all the conditions mentioned in this chapter are met. • The air pressure sensor after BPV is fitted. • EGR and BPV are controlled normally. • No faults present on the pressure sensor after BPV, ambient pressure sensor, pressure sensor before turbine. • Exhaust gas flow rate > 250 g/s. • Time since engine start > 60 seconds.
Set condition of fault code	The DTC is set if the pressure after BPV corrected for the ambient pressure is lower than the threshold which is based on the exhaust gas mass flow.
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



Wiring harness connector F823 front view

D420	F751	Function
C36	4	Ground
C59	2	Power supply
C81	1	Signal, pressure after BPV

Technical data

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.

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

- Disconnect connector F823
- Measure on the front side of wiring harness connector F823

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

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

- Leaking pressure sensor after BPV system
- Faulty pressure sensor after BPV
- NOx before catalyst sensor deviation.

</td></tr>
<tr><td>Additional information</td><td>Part of the component check for OBD functionality.</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 1040a</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 1040b</td><td>SRT</td></tr>
<tr><td colspan="3">

Turn the key switch ON and use the DAVIE to Check for Fault Codes present on system.
Is other fault codes are active?

- Yes – Proceed with the appropriate fault code resolution
- No – Proceed to step 3

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

<table>
<tr><td>Step 3</td><td>Step 1040c</td><td>SRT</td></tr>
<tr><td colspan="3">

Check for any leakage in the BPV system.
Is leakage present?

- Yes: - 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 4
- No: - Proceed to step 4

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

<table>
<tr><td>Step 4</td><td>Step 1040d</td><td>SRT</td></tr>
</table>

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

	Repair or replace the BPV Position Actuator. 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 5 Step 5 | Step ID 1040e | SRT Check 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, Proceed to step 6 Step 6 | Step 1040f | 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, 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.
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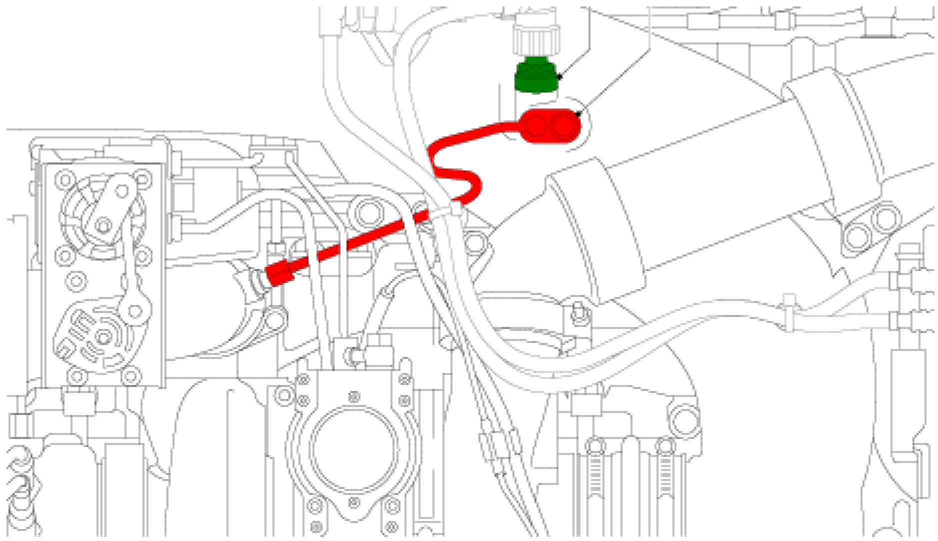
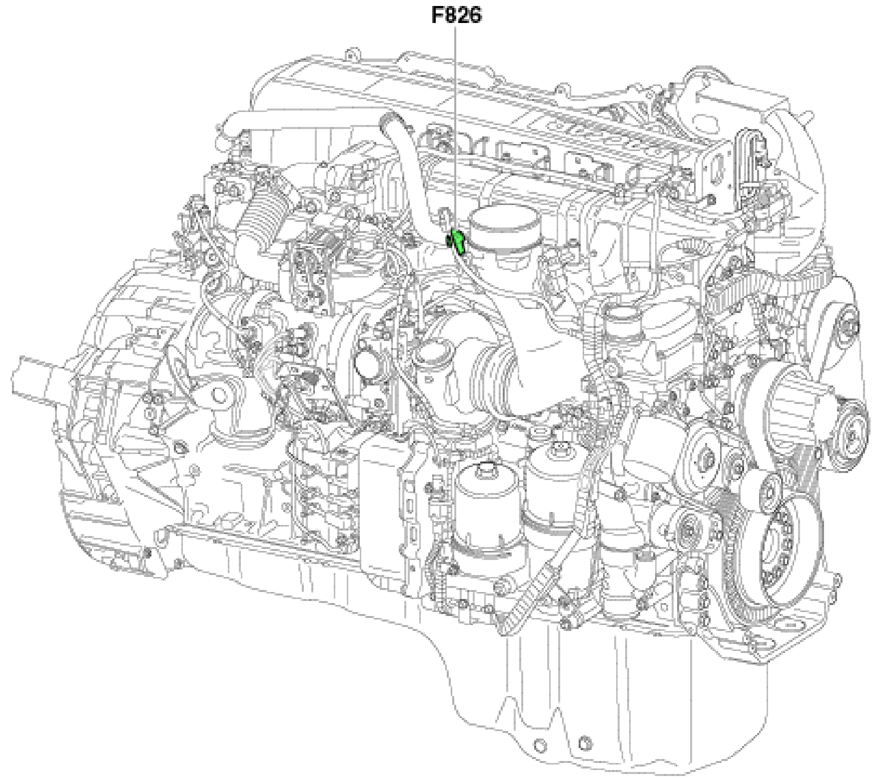
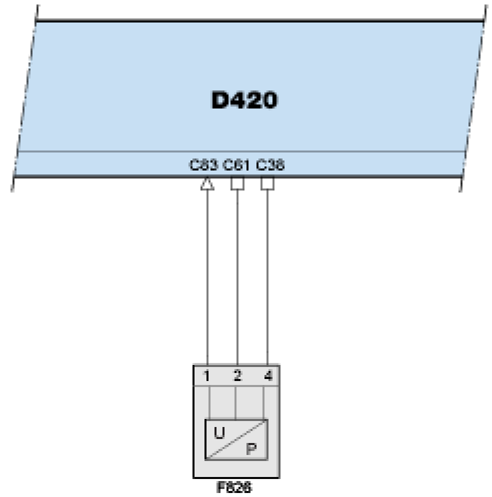
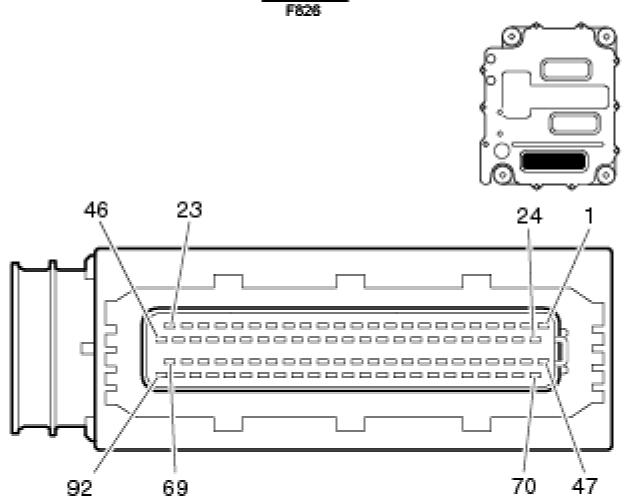
P1042

Code number	P1042
Fault code description	VTG turbocharger control – Unable to reach target
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
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

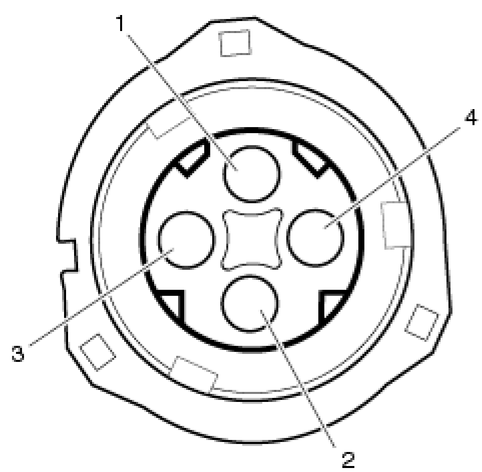
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed is between 1050 and 1850 rpm, and • the engine mode is SCR high efficiency or standard.
Set condition of fault code	• The PCI ECU (D420) detects that the VTG turbocharger control is limited by the exhaust gas pressure before turbine for more than 300 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	F829	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine

Technical data	Pin (+probe) / Pin (-probe) / Value / Additional information 2 / 4 / 5V / Ignition keyed on
Possible causes	• Leaking exhaust system • Leaking pressure sensor before turbine tube • Pressure sensor before turbine deviation
Additional information	• The VTG turbocharger control depends, among other factors, on the exhaust gas pressure before turbine. • The VTG turbocharger is controlled by the VTG turbocharger actuator (L037). • The exhaust gas 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 1042a	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 1042b	SRT

Visual Inspection: Pressure sensor before turbo (P3)
Visually inspect the identified component for any of the following:
Damaged or blockage

1. If evidence for above is not found then proceed with Step 3
2. If evidence of above is found then:
   - Clean, adjust, repair, or replace affected components for any issues identified.
   - 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

Step 3	Step 1042c	SRT

Ancillary Test: Air Side Pressure
Perform the prescribed test to determine if there are any leaks in the air system.
Test failed to complete or result in a failed state

1. If the above test fails to complete then proceed with Step 4

	2. If the above test clears then: • 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 4. Step 4 | Step 1042d | SRT Replace: Pressure sensor before turbo (P3) 1. Replace the identified faulty component. 2. 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. Step 5 | Step 1042e | 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 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.
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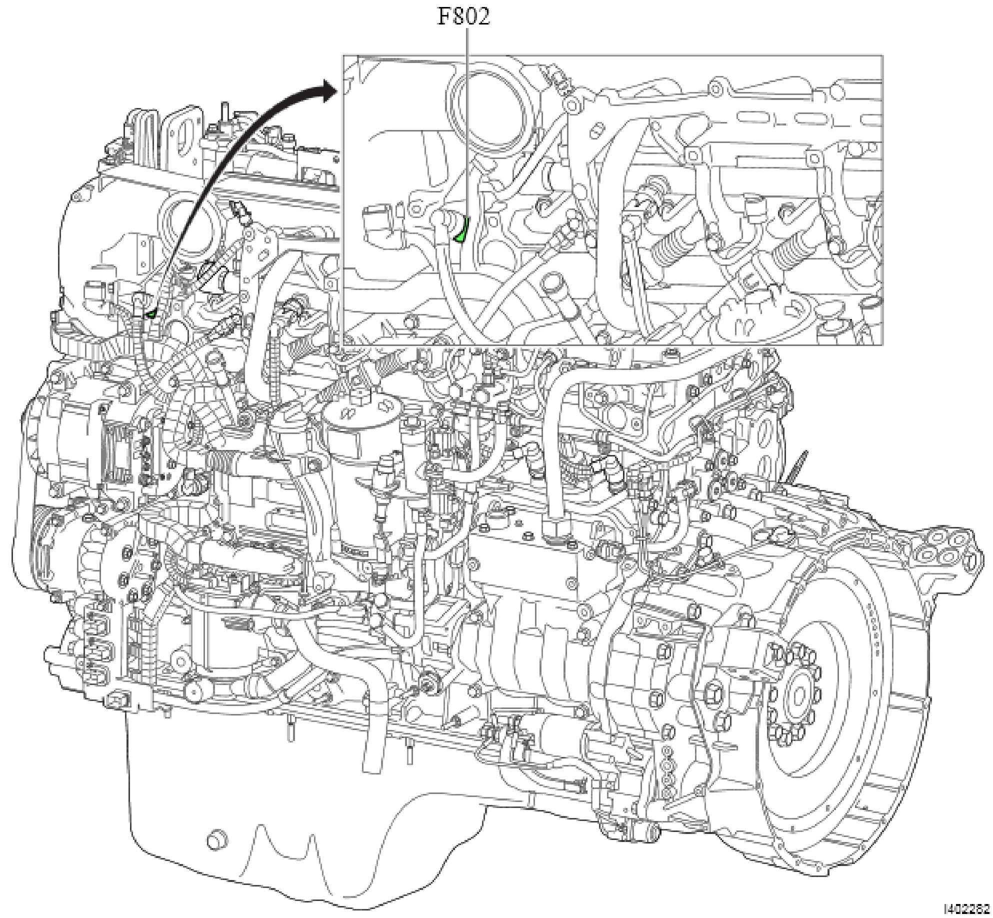
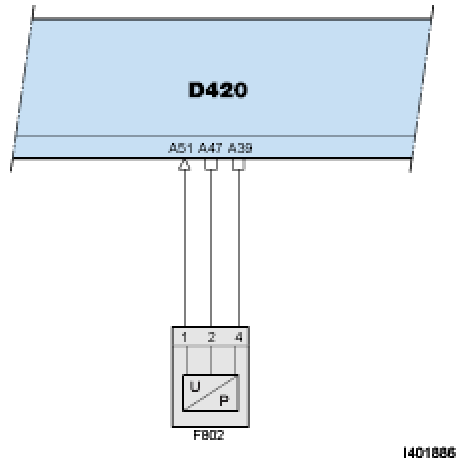
P104B

Code number	P104B
Fault code description	Boost pressure – Data valid but too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Crankcase
Description of component(s)	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.

Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the engine is running at a steady load, and; • When coolant temperature is above 50°C [122°F], and; • When ambient temperature is between -15 and 40°C [5 and 104°F], and; • The engine mode is SCR high efficiency or standard.
Set condition of fault code	The PCI ECU (D420) detects that the measured boost pressure is more than 0.5 bar [7.3 psi] higher than the expected boost pressure 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, 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.

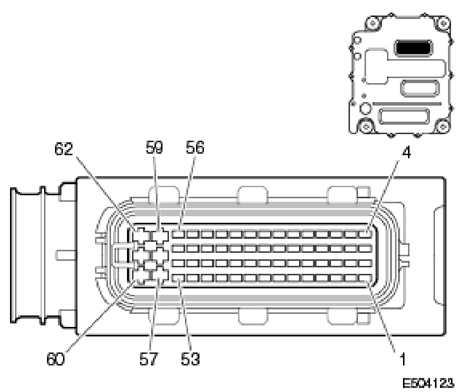
Electrical diagram(s)



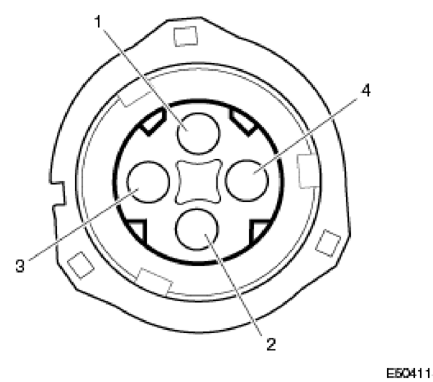
D420 PCI ECU

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.

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 **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

Possible causes	• Boost pressure sensor deviation • Turbocharger failure
Additional information	• The measured boost pressure is compared with an expected boost pressure. • The boost pressure is measured by the boost pressure sensor (F802).
Diagnostic Step-by-Step	**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? • P0107; P0108 • Any turbocharger related codes	
Yes	**No**
Refer to the troubleshooting information for these codes before continuing with this procedure.	
	Go to step 2.A

Step 2. Intake Manifold (Boost) Pressure Sensor (F802) Checks

Step 2. A 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 • Batteries not fully charged or contacts are not tight • Boost pressure sensor (F802) damaged or not installed correctly	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the boost pressure sensor (F802) is found to be damaged or broken, replace it. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to Step 2.B	**Go to step 2.B**

Step 2.B Pressure testing, intake and exhaust elements	
Action 1. Perform the steps outlined in the procedure, "pressure testing (intake/exhaust elem.)," job ID 84123, to determine whether there are any leaks in the intake air system.	
Was there evidence of a leak in the air system?	
Yes	**No**
Correct any issues found.	

Refer to step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.C.	**Go to step 2.C**

Step 2.C DAVIE Monitor, inlet air pressure in inlet manifold	
Action 1. Connect DAVIE. 2. Start the truck, and allow it to run at idle. 3. Use DAVIE to monitor the inlet air pressure in the inlet manifold: a. Confirm that the air pressure sensor supply voltage is within the referenced range. b. Compare the monitored signal values for inlet air pressure in inlet manifold (relative) to the ambient pressure. With the engine running at idle, the inlet manifold pressure should be slightly above the ambient pressure. 4. Turn on A/C and fan to ON, to create a load on the engine. 5. Increase the engine RPMs, and then use DAVIE to confirm there is a corresponding increase in the intake air pressure in the inlet manifold. The expected increase can be as much as two to three times the ambient pressure, depending on actual engine loads and turbocharger operation.	
Are monitored values within expected range at idle and higher engine RPMs?	
Yes	**No**
	Replace the boost pressure sensor (F802). Refer 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.	**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	**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 P104B 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.

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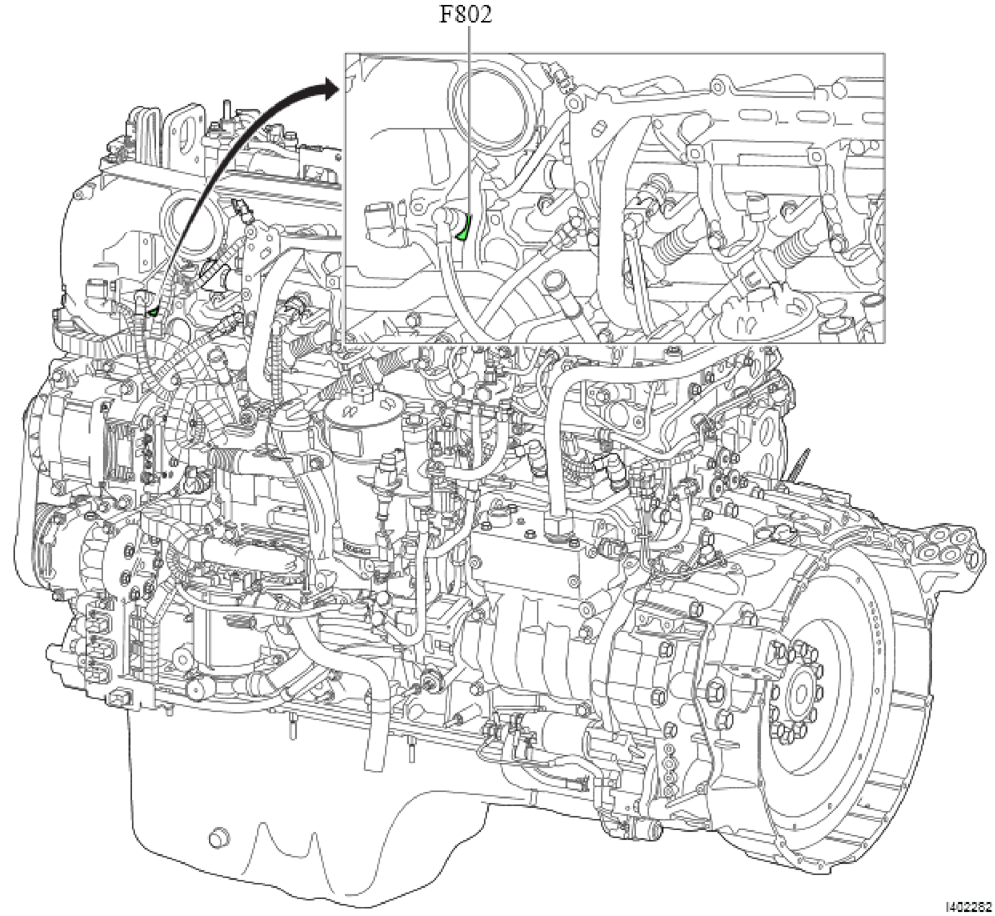
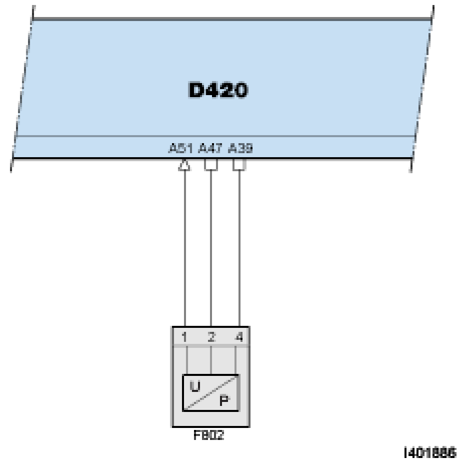
P104C

Code number	P104C
Fault code description	Boost pressure – Data valid but too low
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Crankcase
Description of component(s)	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.

Location of component(s)	
Diagnostic condition	This diagnostic runs: • When the engine is running at a steady load, and; • When coolant temperature is above 50°C [122°F], and; • When ambient temperature is between -15 and 40°C [5 and 104°F], and; • The engine mode is SCR high efficiency or standard.
Set condition of fault code	The PCI ECU (D420) detects that the measured boost pressure is more than 0.5 bar [7.3 psi] lower than the expected boost pressure 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, 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.

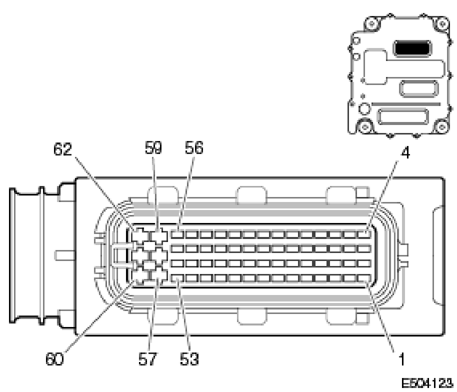
Electrical diagram(s)	



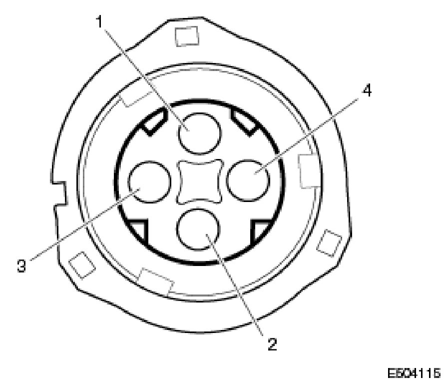
D420 PCI ECU

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.

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 **Component & wiring check, ECU (D420)** **Preparation** • Key off the ignition • Disconnect connector F802 • Measure on the front side of wiring harness connector F802
Possible causes	• Leaking inlet air system • Boost pressure sensor deviation • Turbocharger failure
Additional information	• The measured boost pressure is compared with an expected boost pressure. • The boost pressure is measured by the boost pressure sensor (F802).
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.

Measurement table (Technical data, F802):

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

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? • P0107; P0108 • Any turbocharger related codes	
Yes	**No**
Refer to the troubleshooting information for these codes before continuing with this procedure.	
	Go to step 2.A

Step 2. Intake Manifold (Boost) Pressure Sensor (F802) Checks

Step 2. A 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 • Batteries not fully charged or contacts are not tight • Boost pressure sensor (F802) damaged or not installed correctly	
Was there evidence of any of the above?	
Yes	**No**

Correct any issues found. If the boost pressure sensor (F802) is found to be damaged or broken, replace it. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to Step 2.B	**Go to step 2.B**

Step 2.B Pressure testing, intake and exhaust elements	
Action 1. Perform the steps outlined in the procedure, "pressure testing (intake/exhaust elem.)," job ID 84123, to determine whether there are any leaks in the intake air system.	
Was there evidence of a leak in the air system?	
Yes	**No**
Correct any issues found. Refer to step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.C.	**Go to step 2.C**

Step 2.C DAVIE Monitor, inlet air pressure in inlet manifold	

Action
1. Connect DAVIE.
2. Start the truck, and allow it to run at idle.
3. Use DAVIE to monitor the inlet air pressure in the inlet manifold:
  a. Confirm that the air pressure sensor supply voltage is within the referenced range.
  b. Compare the monitored signal values for inlet air pressure in inlet manifold (relative) to the ambient pressure. With the engine running at idle, the inlet manifold pressure should be slightly above the ambient pressure.
4. Turn on A/C and fan to ON, to create a load on the engine.
5. Increase the engine RPMs, and then use DAVIE to confirm there is a corresponding increase in the intake air pressure in the inlet manifold. The expected increase can be as much as two to three times the ambient pressure, depending on actual engine loads and turbocharger operation.	

Are monitored values within expected range at idle and higher engine RPMs?	
Yes	**No**
	Replace the boost pressure sensor (F802). Refer 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.	**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	**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 P104C 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.
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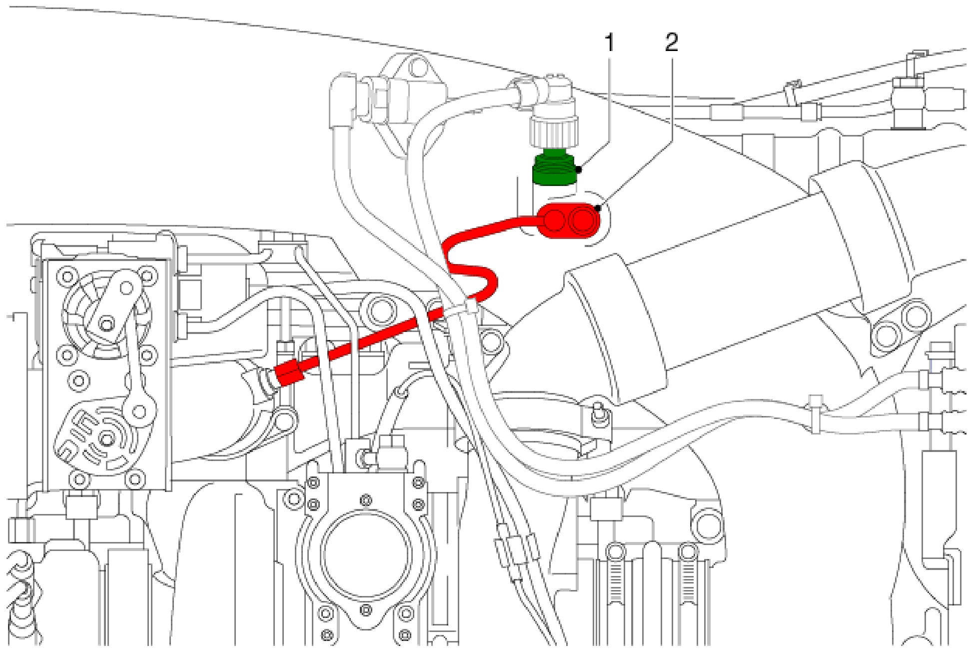
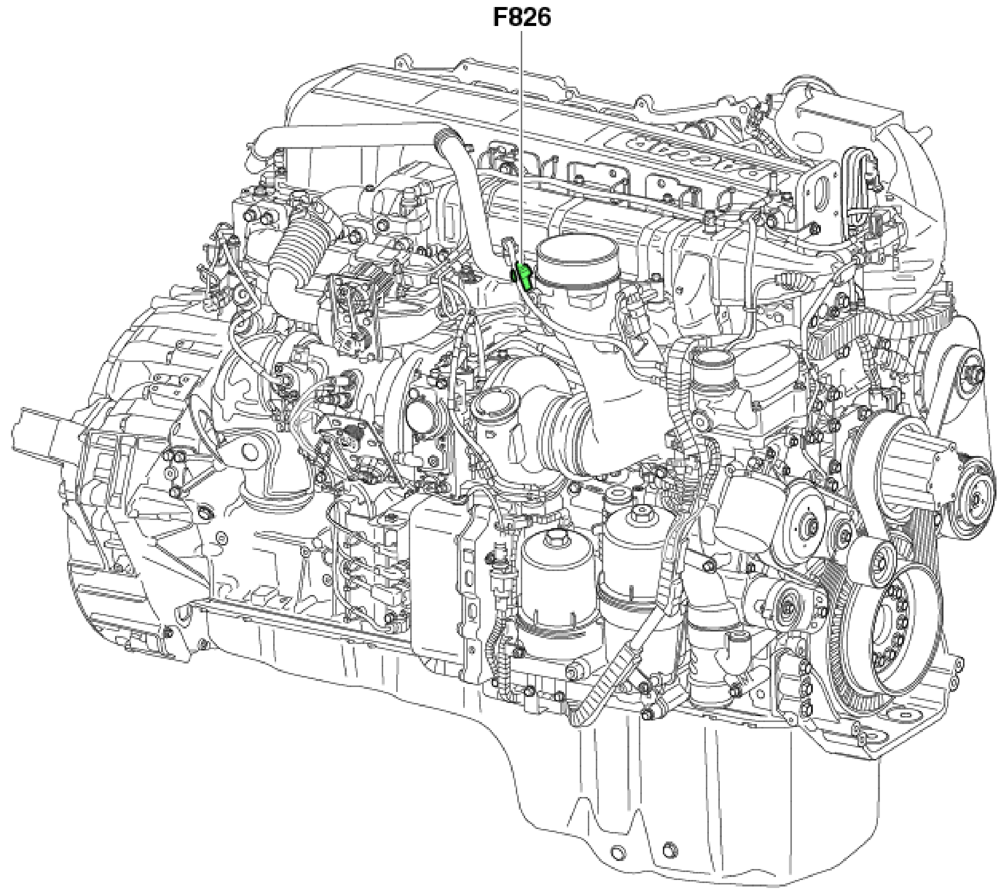
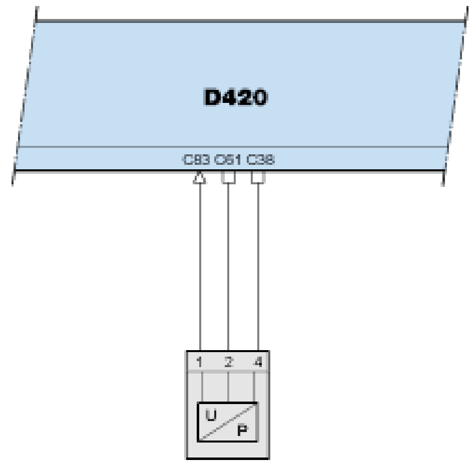
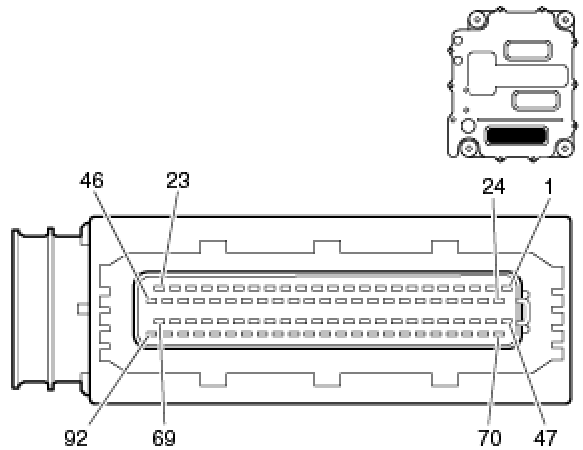
P104D

Code number	P104D
Fault code description	Pressure before turbine – Data valid but too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group - None Freeze frame type - Generic
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.

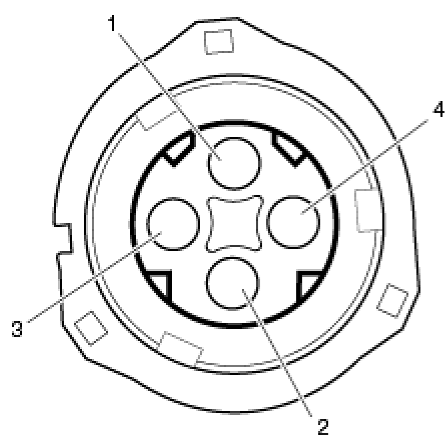
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed 1000 and 1700 rpm, and; • when the engine is running at a steady load, and; • when coolant temperature is above 50°C [122°F], and; • The engine mode is SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that the measured pressure before turbine is higher than the expected pressure before turbine 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, 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	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	5V	Ignition keyed on

Possible causes

- Blocked exhaust system
- Restricted pressure sensor before turbine tube
- Pressure sensor before turbine deviation

Additional information

- The measured pressure before turbine is compared with an expected pressure before turbine.
- 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 104Da	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 104Db	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?

- No: Continue to the next step3 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 in the troubleshooting process.

Step 3	Step 104Dc	SRT

DAVIE Direct Monitor: Before Turbine Pressure
Use DAVIE to monitor the Before Turbine Pressure, to determine if the Before Turbine Pressure
Sensor (P3) is reading correctly.
Does the monitored value appear incorrect?

- No: Continue to the next step4 in the troubleshooting process.
- Yes: Clean adjust, repair or replace affected components for any issues identified.

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 4	Step 104Dd	SRT

Visual Inspection: Pressure Sensor Before Turbo (P3)
Visually inspect the identified component for any of the following:
Damaged or blockage
Was there evidence of any of the above?

- No: Continue to the next step5 in the troubleshooting process.
- Yes: Clean, adjust, repair, or replace affected components for any issues identified.

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 5	Step 104De	SRT

Replace: Pressure sensor before turbo (P3)
Replace the identified faulty component.
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 next step in the troubleshooting process.

Step 6	Step 104Df	SRT

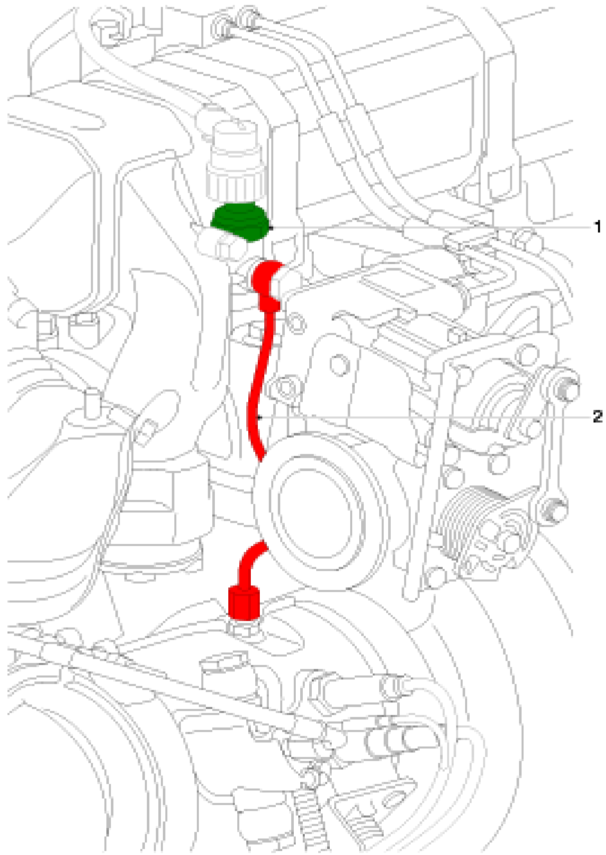
Contact the PACCAR Engine Support Call Center
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.

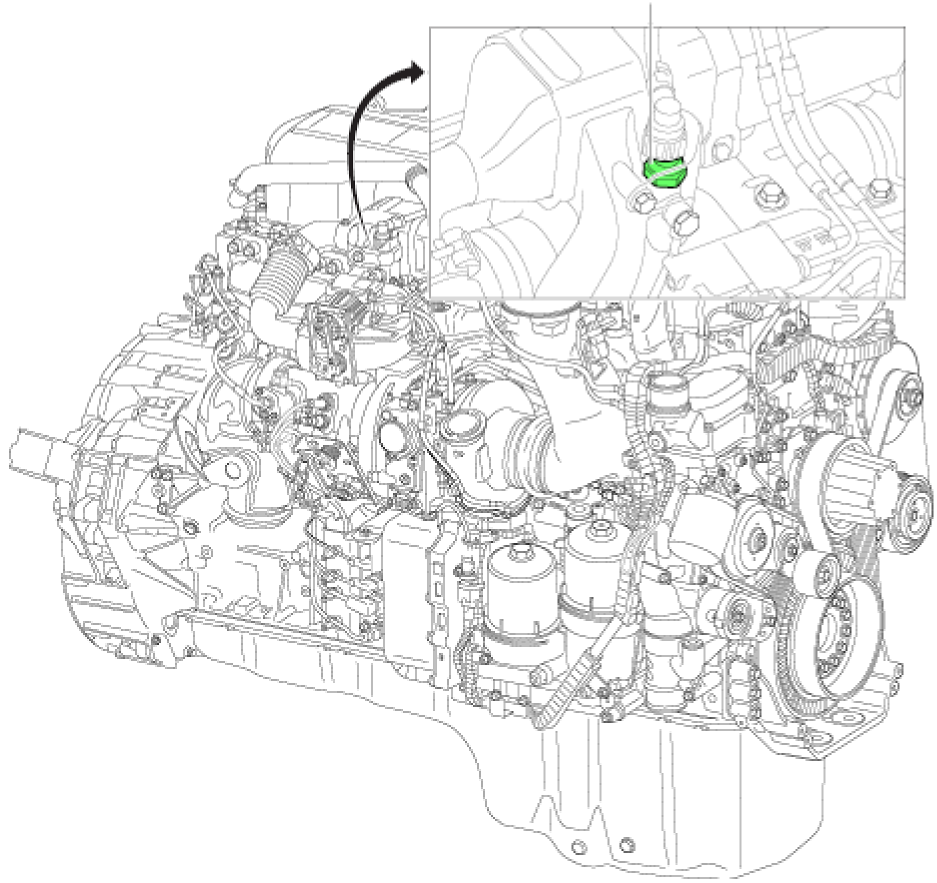
Verification Drive Cycle

To validate repair:

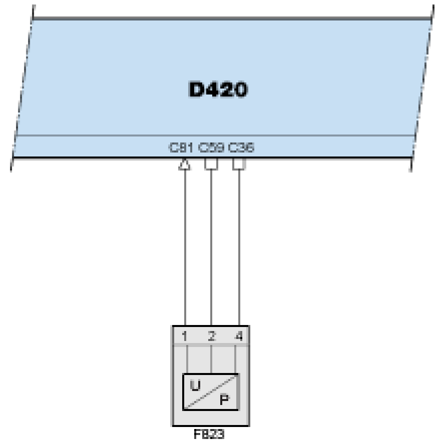
This cycle is best performed on a level grade road (least amount of incline possible) an under load using a trailer. If a loaded trailer is unavailable, produce engine load by turr the A/C and fan to ON.
With the System Initiation cycle complete, proceed to a road with a minimum speed li of 50 mph, then 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.

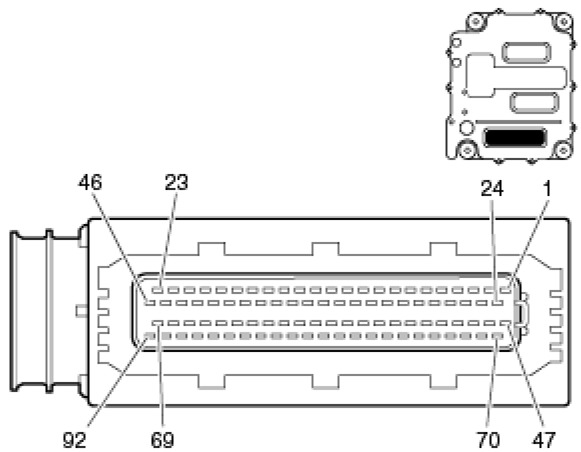
P1050

Code number	P1050
Fault code description	Pressure after BPV – Data erratic, intermittent, or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group - None Freeze frame type - Generic
Description of component(s)	 The exhaust gas pressure after the BPV valve is measured by the sensor (1) via a steel tube (2). Effect on the system: • Correction of the NOx sensor before the catalyst signal A higher measured exhaust gas pressure after the BPV valve results in lower calculated NOx emissions by the engine. • Calculates the exhaust gas temperature before the turbine Lower measured exhaust gas pressure after the BPV valve results in higher calculated exhaust gas temperature before the turbine.

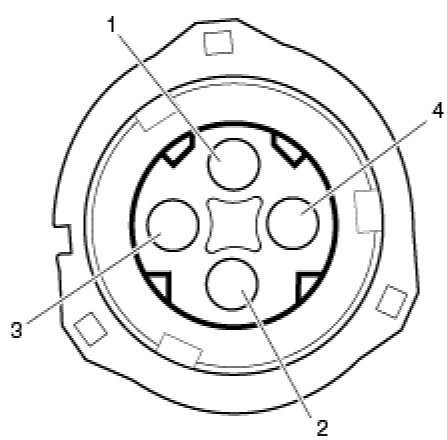
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed is between 1000 and 1700 rpm, and; • engine is running at a steady load, and; • coolant temperature is above 50°C [122°F], and; • the engine mode is SCR high efficiency or standard.
Set condition of fault code	The PCI ECU (D420) detects that measured pressure after BPV differs too much from the expected pressure after BPV 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, 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 F823 front view

D420	F823	Function
C36	4	Ground
C59	2	Power supply
C81	1	Signal, pressure after BPV

Technical data

Component & wiring check, ECU (D420)

<table>
<tr><td></td><td>Preparation
Key off the ignition.
Disconnect connector F823
Measure on the front side of wiring harness connector F823
<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>Leakage in the exhaust system between engine and DPF filter inlet.
Blockage in the exhaust system between engine and DPF filter inlet.
Pressure sensor after BPV deviation
DPF pressure sensor deviation</td></tr>
<tr><td>Additional information</td><td>The measured pressure after BPV is compared with an expected pressure after BPV. For the calculation of the expected value, the DPF pressure sensor (F837) and ambient pressure are used, among others.
The pressure after BPV is measured by the pressure sensor after BPV (F823)</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 1050a</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 1050b</td><td>SRT</td></tr><tr><td colspan="3">DAVIE Direct: Monitor related sensors
Use DAVIE to monitor and record values for the following:
After BPV Pressure
After Turbo Pressure
BPV Position Actuator
Are all recorded values within OEM specifications?
No: Continue to the next step3 in the troubleshooting process.
Yes: Clean adjust, repair or replace affected components for any issues identified.
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.</td></tr></table></td></tr>
</table>

	• If this related fault is still active, continue to the next step in the troubleshooting process.
	Step 3 | Step 1050c | SRT Visual inspection: After BPV Pressure sensor Remove the After BPV Pressure sensor and visually inspect the senor tip for any of the following: • Signs of damage • Excessive build-up on the sensor tip Was there evidence of any of the above? • No: Continue to the next step 4 in the troubleshooting process. • Yes: Clean, adjust, repair, or replace affected components for any issues identified. If soot plugging was found, perform a manual cleaning of the DPF or perform a stationary regeneration. 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 4 | Step 1050d | SRT Replace: After BPV Pressure 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 5 | Step 1050e | 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 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.
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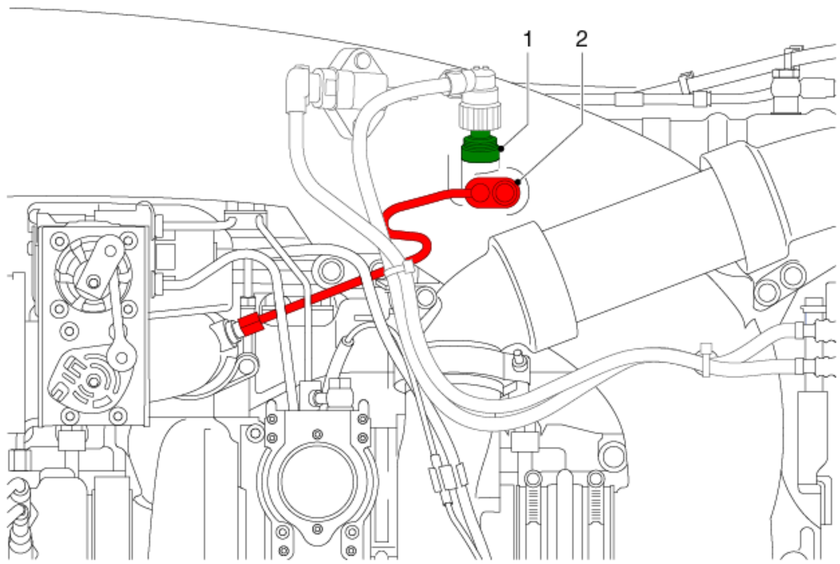
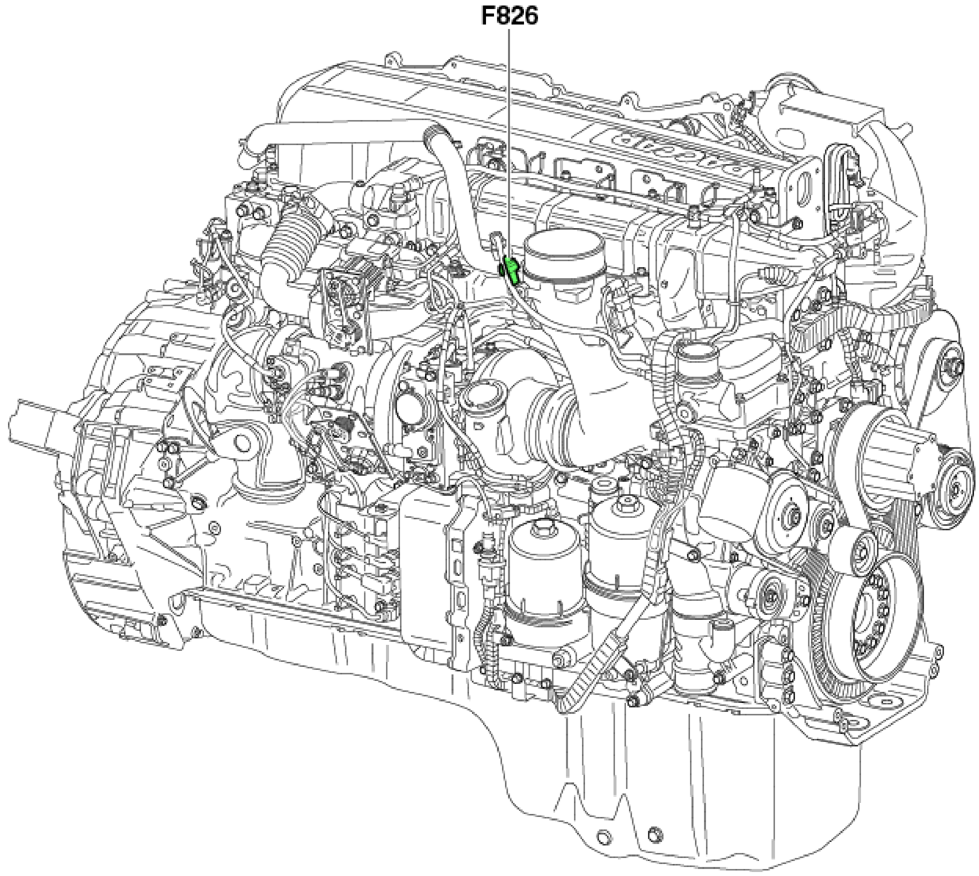
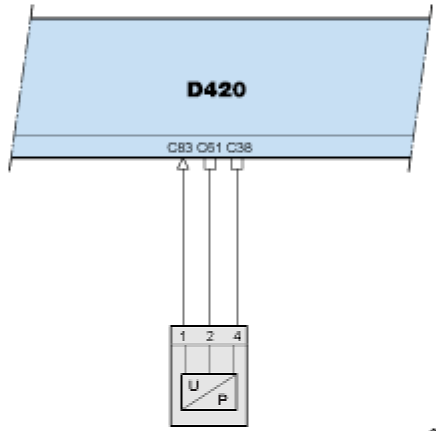
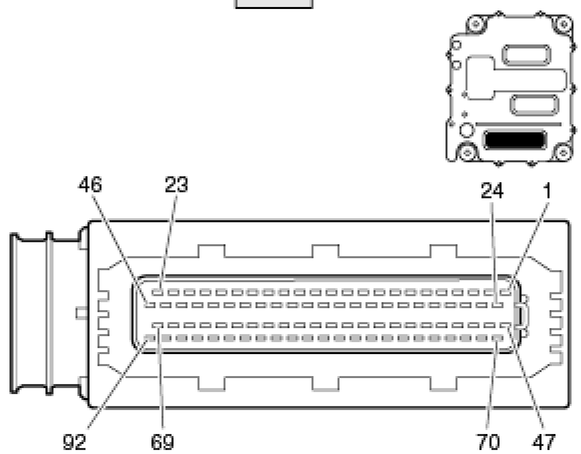
P1057

Code number	P1057
Fault code description	Pressure before turbine – Data valid but too low
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
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.

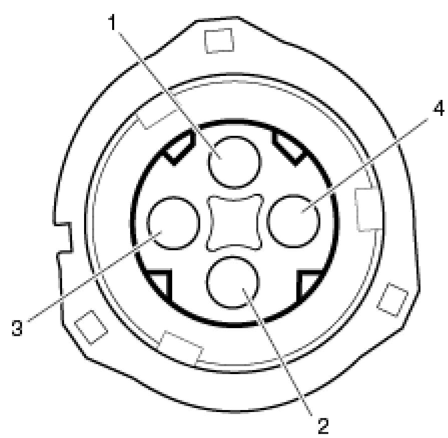
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed is between 1000 and 1700 rpm, and; • engine is running at a steady load, and; • coolant temperature is above 50°C [122°F], and; • the engine mode is SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that measured pressure before turbine is lower than the expected pressure before turbine 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, 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	F829	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine

Technical data

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

<table>
<tr><td>Possible causes</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>Additional information</td><td>The measured pressure before turbine is compared with an expected pressure before turbine.
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 1057a</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 1057b</td><td>SRT</td></tr>
<tr><td colspan="3">Ancillary Test: Air Side Pressure Check - 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?
No: Continue to the next step in the troubleshooting process, Proceed to step 3.
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 in the troubleshooting process.
Verify if code is cleared using Verification Drive Cycle procedure.</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step 1057c</td><td>SRT</td></tr>
<tr><td colspan="3">DAVIE Direct Monitor: Before Turbine Pressure - Use DAVIE to monitor the Before</td></tr>
</table>
</td></tr>
</table>

	Turbine Pressure, to determine if the Before Turbine Pressure Sensor (P3) is reading correctly. Check if the monitored value appears incorrect? • No: Continue to the next step 4 in the troubleshooting process. • Yes: Clean adjust, repair or replace affected components for any issues identified. 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. Verify if code is cleared using Verification Drive Cycle procedure. Step 4 | Step 1057d | SRT Visual Inspection: Pressure Sensor Before Turbo (P3) Visually inspect the identified component for any Damaged or blockage Was there evidence of any of the Damaged or blockage? • No: Continue to the next step 5 in the troubleshooting process. • Yes: Clean, adjust, repair, or replace affected components for any issues identified. 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. Verify if code is cleared using Verification Drive Cycle procedure. Step 5 | Step 1057e | SRT Replace: Pressure sensor before turbo (P3) Replace the identified faulty 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. Verify if code is cleared using Verification Drive Cycle procedure. Step 6 | Step 1057f | 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 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.
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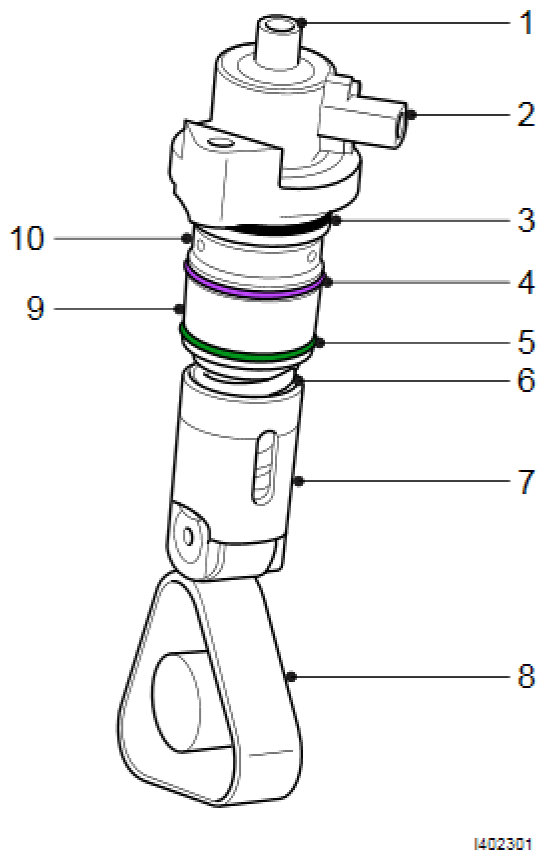
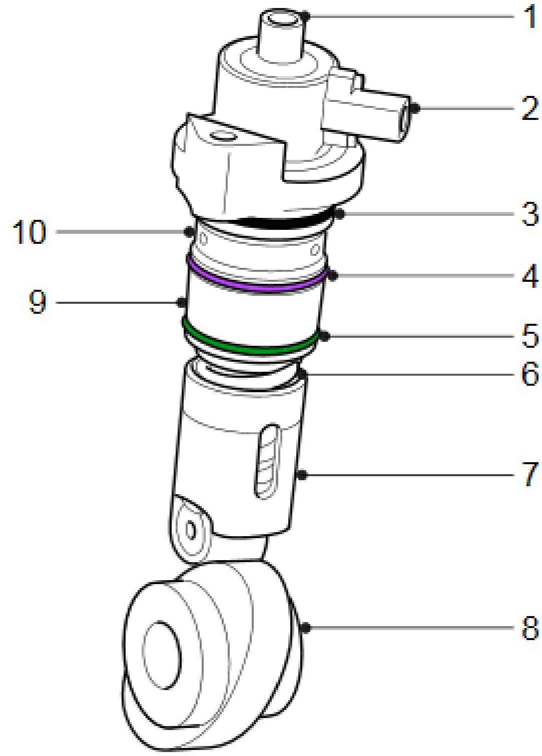
P1086

Code number	P1086
Fault code description	Engine rail pressure rise – Too slow
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	**Common rail pressure sensor (F854)** 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. **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

Operation

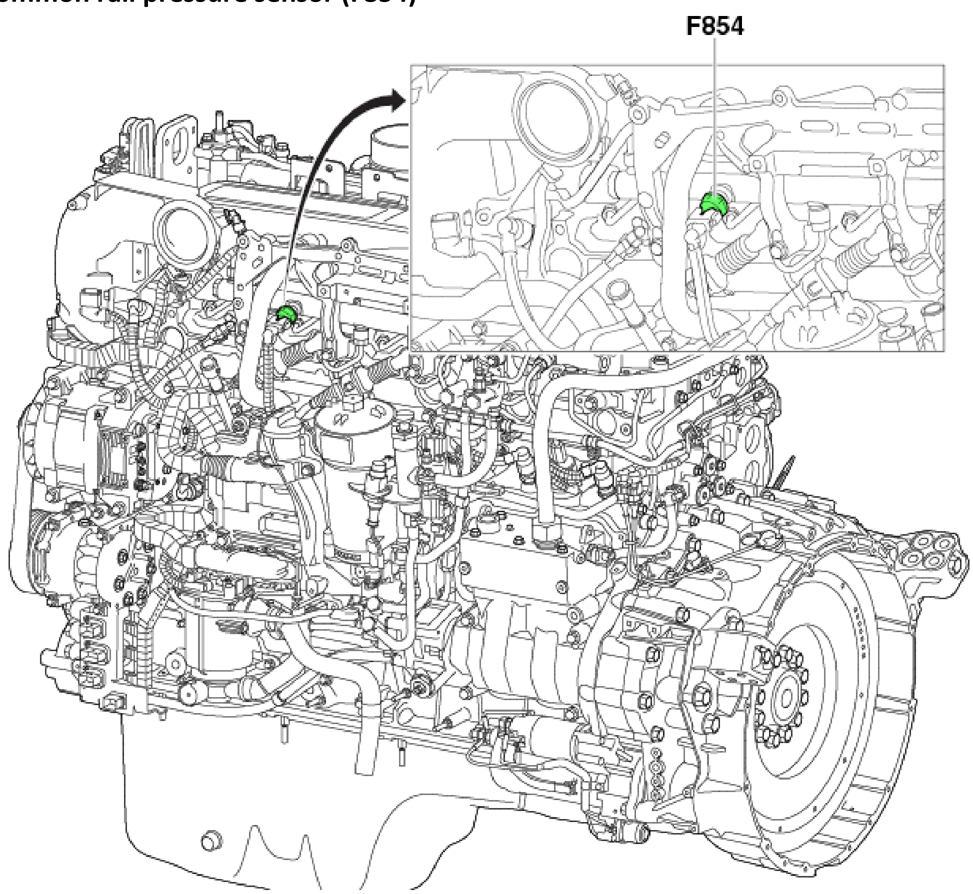
The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three pumping events for every two crankshaft revolutions.

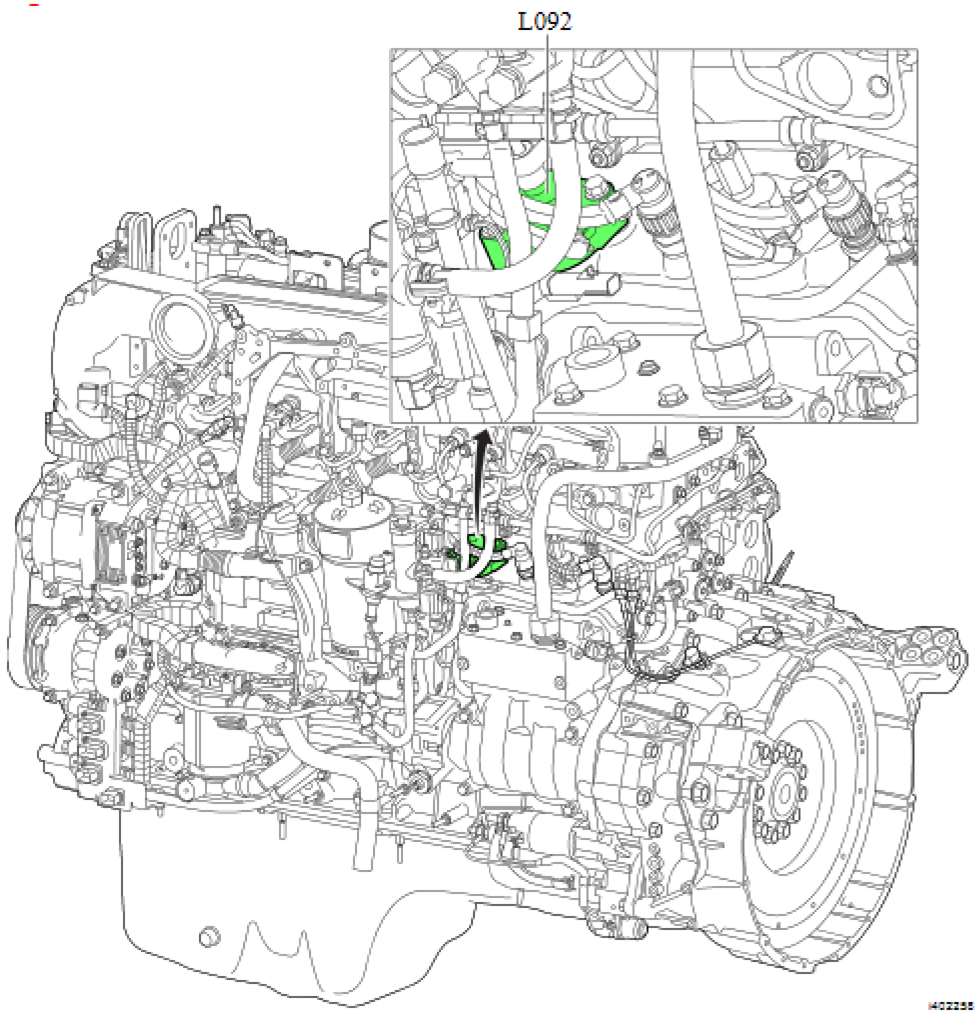
Fuel from the fuel gallery can enter the pumping plunger area via an internal valve. A pumping event starts when the plunger travels up, the PCI ECU activates the solenoid briefly and the internal valve closes the opening to the fuel gallery. The internal valve is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the outlet bore of the pump unit.

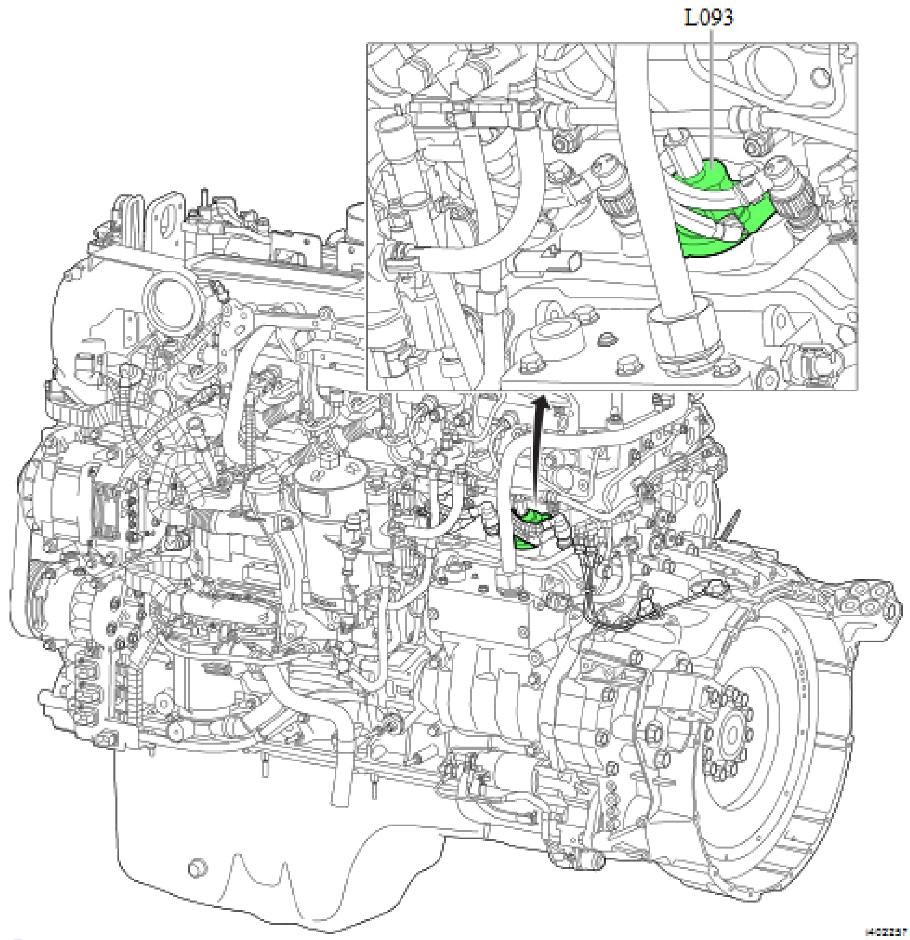
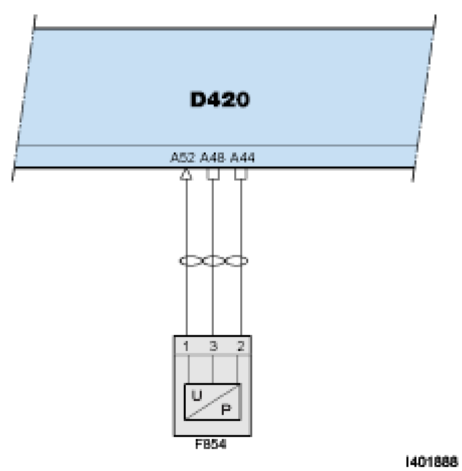
The pumping event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downwards again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents 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 pressure sensor (F854)** 

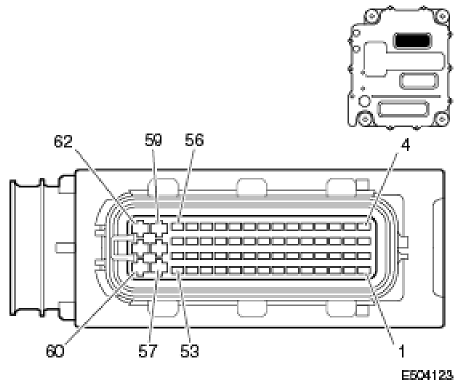
	Common rail pump unit 1 (L092) *MX_EPA13, MX-13* 

	Common rail pump unit 2 (L093) *MX_EPA13, MX-13* 
Diagnostic condition	This diagnostic runs when the rail pressure operating state is: Filling rail (during starting)
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure is below 150 bar [2176 psi] for more than 5 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	**Checking data, common rail pressure sensor (F854)** 

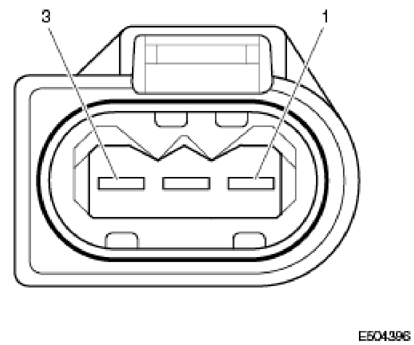
D420 PCI ECU

F854 engine rail pressure sensor

D420	F854	Function
A44	2	Ground
A48	3	Power supply
A52	1	Signal, common rail pressure



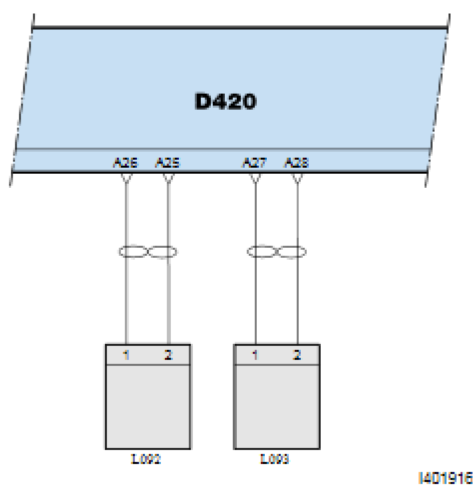
Wiring harness connector D420.A front view



Wiring harness connector F854 front view

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

Checking data, common rail pump unit (L092-L093)



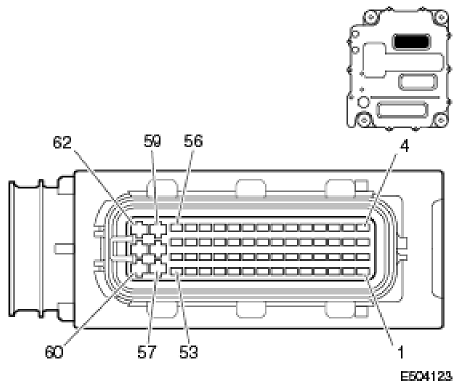
D420 PCI ECU

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 pressure sensor (F854)

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

- Monitor/test the component with DAVIE.
- Perform the wiring check (see below).

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

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.

- Fuel gelling at very low ambient temperatures.

- Restriction in the fuel supply or low performance of the fuel lift pump.

- An external or internal leakage on the high-pressure fuel system components.

Additional information

This DTC may be a result of P3834. If P3834 is active or inactive, troubleshoot P3834 first.

- The rail pressure is closed-loop controlled. A comparison is made between the requested and actual rail pressure measured by the common rail pressure sensor.
- The actual rail pressure is measured in the common rail by the common rail pressure sensor (F854)

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? P0263, P0266, P0269, P0272, P0275, P0278, P0301, P0302, P0303, P0304, P0305, P0306	
Yes	**No**
Refer to the troubleshooting information for these codes before continuing with this procedure.	
	Go to step 2.A

Step 2. Fuel System Checks

Step 2.A Visual inspection, connections and wiring, common rail pressure sensor (F854)

Action 1. Visually inspect the associated component connections and wiring for any of the following: • Fuel gelling (thickening or crystallization of fuel in the fuel filter) • Damaged or loose connector • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connection • Damage to the wire harness or insulation • Sensor is damaged • Signs of external fuel leaks • Any damaged, bent, or broken fuel lines • Related fuel components not installed correctly	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.B	**Go to step 2.B**

Step 2.B Visual inspection, connections and wiring, common rail pump unit 1 and 2 (L092, L093)	
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connector • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connection • Damage to the wire harness or insulation • Sensor is damaged • Signs of external fuel leaks • Any damaged, bent, or broken fuel lines • Related fuel components not installed correctly	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found.	

Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.C	**Go to step 2.C**

Step 2.C Rapido Maintenance: Check fuel supply, low pressure (Job ID: 68720)	
Action 1. Check the low pressure fuel supply by performing the maintenance procedure, "check fuel system low pressure (Fuel system), job ID 68720."	
Do any of the tests result in a failed state based on the criteria provided?	
Yes	**No**
Correct any issues found. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.D	**Go to step 2.D**

Step 2.D Electrical checks, resistance, common rail pump units 1 and 2 (L092 and 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. Check the resistance level as outlined in the corresponding checking data, "Component check, common rail pump unit 1 pump (L092)" and "Component check, common rail pump unit 2 pump (L093)"	
Are measured values within expected range?	
Yes	**No**
	Correct any issues found, or replace the common rail unit pump if measured values indicate an error. Refer to Step 3.A to perform the corresponding repair verification cycles

	and rechecks.
Got to Step 2.E	**If this code is still present, go to Step 2.E**

Step 2.E Rapido Maintenance: Check Fuel System High Pressure (Job ID: M038143)	
Action 1. Check the high pressure valve process associated with this procedure, refer to the job "Check Fuel System High Pressure (Fuel system), Job ID 73760."	
Do any of the tests result in a failed state based on the criteria provided?	
Yes	**No**
Correct any issues found. Refer 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. If the fuel system has been serviced, perform the following steps:
   a. Bleed the fuel system associated with this procedure, refer to the job "Bleed (fuel system), Job ID 67132."
   b. Operate the engine for 2 minutes to clear entrained air.
   c. Clear the DTCs.
2. 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 3.B	**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 P1086 been cleared?	
Yes	**No**
Problem resolved. Clear all DTCs. 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.

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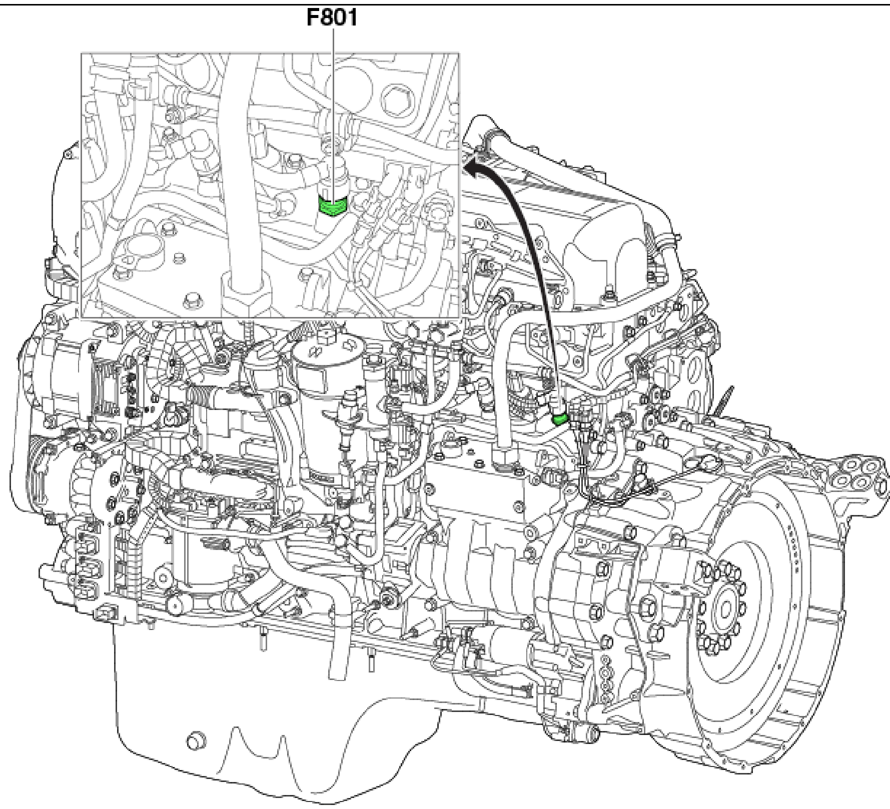
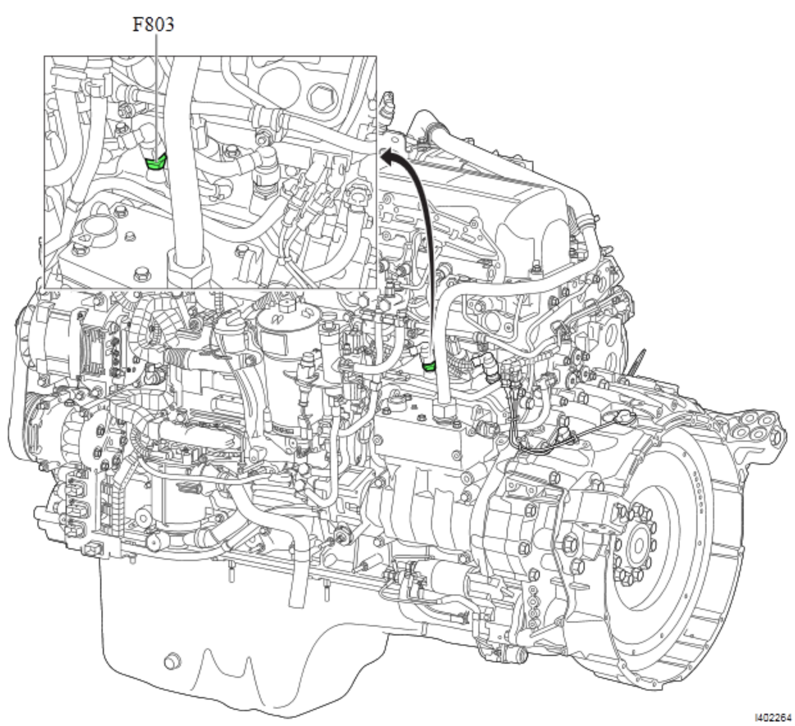
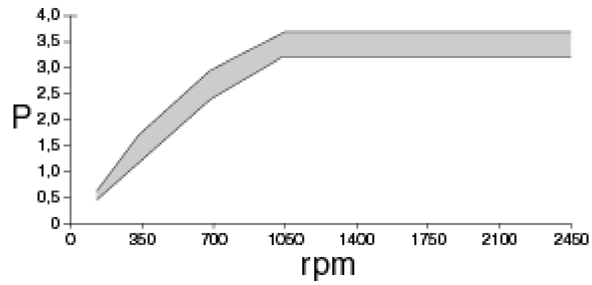
P1087

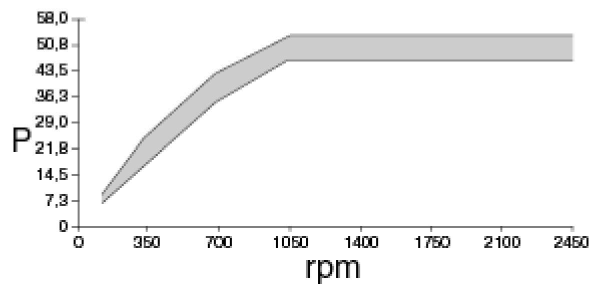
Code number	P1087
Fault code description	Fuel pressure - Data valid but too low, moderately severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	**Fuel pressure sensor (F801)** The low-pressure fuel pressure is measured 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. **Fuel temperature sensor (F803)** The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). limitation of the engine torque when the fuel temperature is too high.
Location of component(s)	**Fuel pressure sensor (F801)**

	 **Fuel temperature sensor (F803)** 
Diagnostic condition	This diagnostic runs when the engine is running for more than 200 seconds.

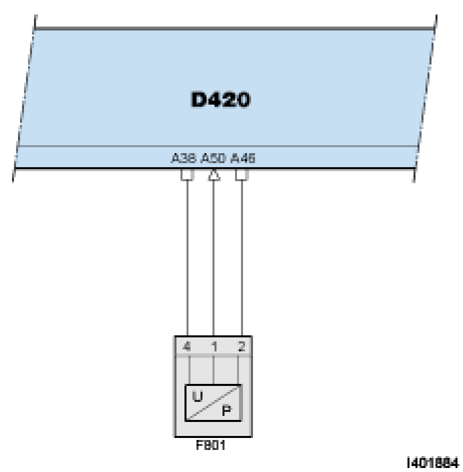
<table>
<tr><td>Set condition of fault code</td><td>The PCI ECU (D420) detects that the fuel pressure is too low (gray area of the graph) for more than 50 seconds.



P = Fuel pressure in bar; rpm = engine speed

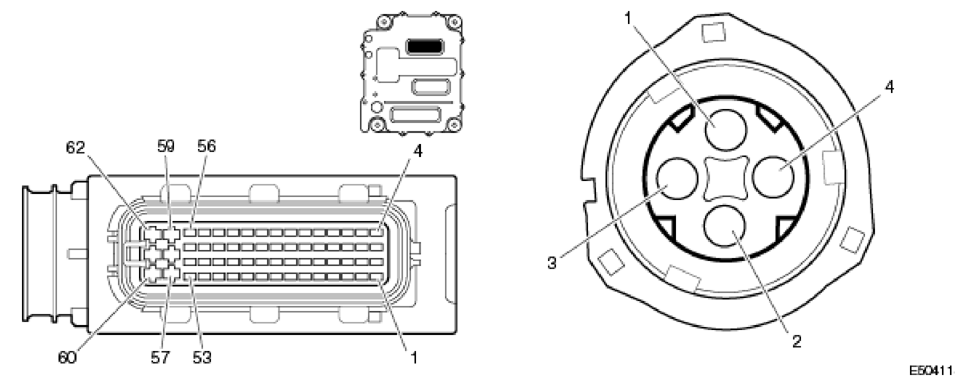


P = Fuel pressure in psi; rpm = engine speed</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC changes to inactive when the fault is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>Checking data, fuel pressure sensor (F801)



<table>
<tr><th>D420</th><th>F801</th><th>Function</th></tr>
<tr><td>A38</td><td>4</td><td>Ground</td></tr>
<tr><td>A50</td><td>1</td><td>Signal, fuel pressure</td></tr>
</table></td></tr>
</table>

A46	2	Power supply

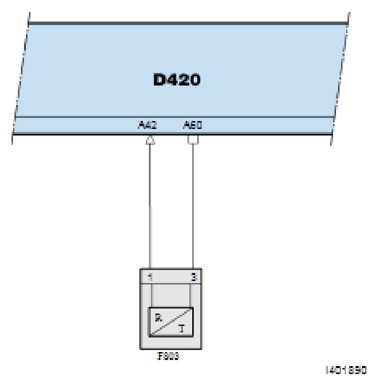


Wiring harness connector D420.A front view

Wiring harness connector F801 front view

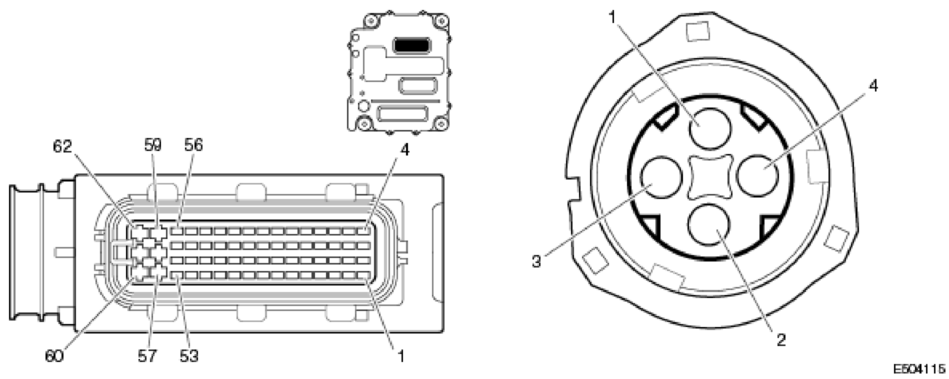
Handle connectors and pins with care and use matching measuring probes.

Checking data, fuel temperature sensor (F803)



D420 PCI ECU
F803 fuel temperature sensor

D420	F803	Function
A42	1	Signal, fuel pressure
A60	3	Ground



	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	see below

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

- Switch off the ignition.
- Disconnect connector F801.
- Measure on the front side of wiring harness connector F801.

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

Component check, fuel temperature sensor (F803)

Preparation

- Switch off the ignition.
- Disconnect connector F803.
- Measure on component connector F803.

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	3	5633–6120 Ω	Resistance value at 0°C [34°F]
		2411–2573 Ω	Resistance value at 20°C [68°F]
		1128–1213 Ω	Resistance value at 40°C [104°F]
		568–619 Ω	Resistance value at 60°C [140°F]
		306–337 Ω	Resistance value at 80°C [176°F]
		176–196 Ω	Resistance value at 100°C [212°F]

Component & wiring check, ECU (D420)

Preparation

- Switch off the ignition.
- Disconnect connector F803.
- Measure on the front side of wiring harness connector F803.

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	3	5V	Ignition switched on

Possible causes

- Faulty fuel pressure control valve
- Restriction in the fuel supply or low performance of the fuel lift pump.

Additional information

The low-pressure fuel pressure is measured by the fuel pressure sensor (F801).

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? P2541; P2542	
Yes	**No**
Refer to the troubleshooting information for these DTCs before continuing with this procedure.	
	Go to step 2A

Step 2 Fuel System, Low Pressure Checks

Step 2A Visual inspection, connections and wiring, fuel pressure (F801) and fuel temperature (F803) sensors	
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 • Battery not fully charged or contacts not tight • Fuel pressure sensor (F801) broken or not installed correctly • Fuel temperature sensor (F803) broken or not installed correctly	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. Refer to step 3A 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 DAVIE Monitor, fuel pressure	
Action 1. Ensure the ignition switch has been set to off. 2. Disconnect and remove the fuel temperature sensor (F803). 3. Install a pressure gauge at the fuel temperature sensor (F803) port. 4. Set the ignition switch to on. 5. Note the fuel pressure readings at 650 rpm and at 2100 rpm. 6. Use DAVIE to monitor the fuel pressure values at the same engine speeds. 7. Compare the monitored pressure values. The expected results should be within the following pressure ranges:	

Engine speed	**Fuel pressure**
650 rpm	108 to 122 psi
2100 rpm	128 to 142 psi

Are the compared fuel pressure values within the expected range?	
Yes	**No**
	Possible obstruction or leakage in the fuel supply.
Go to step 2C	**Go to step 2C**

Step 2C Visual inspection, low pressure circuit
Action 1. Inspect the low pressure side of the fuel system for any of the following:

*For additional information related to some of these check points, see "replace fuel filter element (Fuel system), job ID 66433."

- Low fuel level in fuel tank
- Fuel filter is damaged or needs replacement*
- Air in fuel system*
- Fuel leaks
- Damaged or kinked fuel lines
- Dirt or debris in the priming pump sieve (E073)
- Damage to the fuel lift pump o-ring
- Fuel system is not primed*
- Fuel control valve located at the left-rear of the engine block is open
- Damage to the power steering pump o-ring

A damaged o-ring on the power steering pump could lead to an overheating condition for the power steering pump, which can be transmitted via thermal conduction to the fuel pump.

Did these checks identify any failing conditions?	
Yes	**No**
Correct any issues found. • If the fuel lift pump o-ring has failed, change the o-ring and inspect the fuel pump integrity. If the fuel lift pump is failing, replace it. • If the power steering pump o-ring is damaged, replace the o-ring. 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 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 3B	**Go to step 3B**

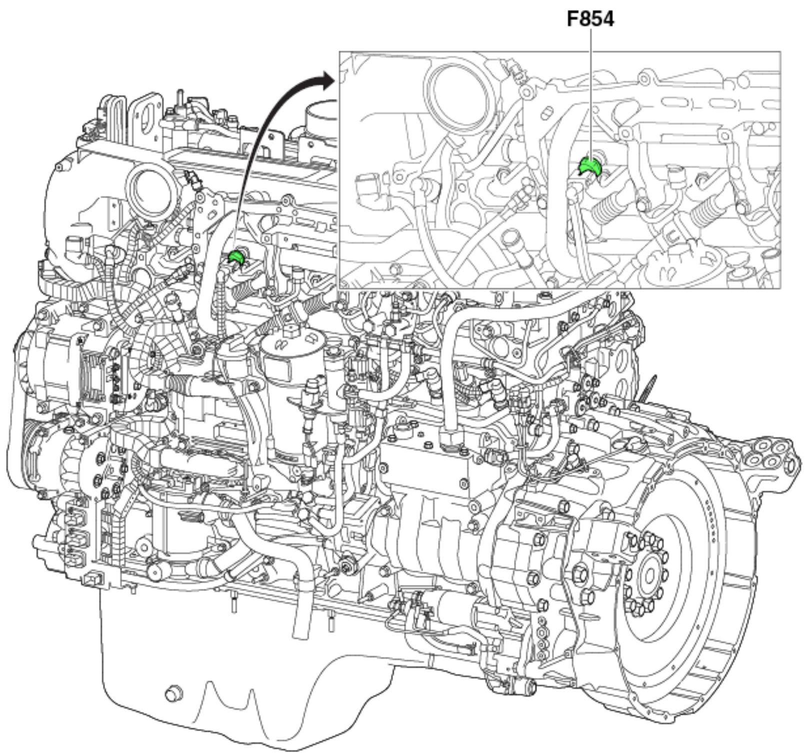
Step 3B DAVIE Diagnostics, Quick Check, OBD Readiness Monitors	
Action Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC. 1. Confirm that the corresponding OBD Monitor Readiness Status value is displayed as “Ready.” A status of 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 P1087 has been cleared.	
Is the related OBD Monitor Readiness Status set to “Ready.” Or, has P1087 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.
	Back to Index	

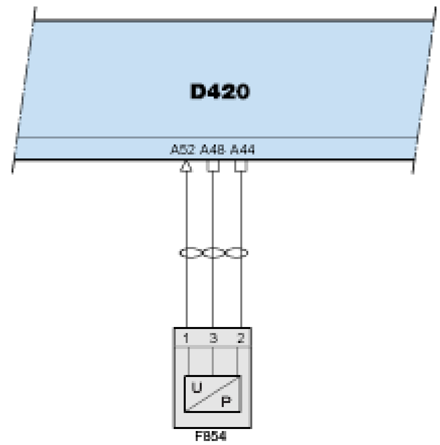
P1088

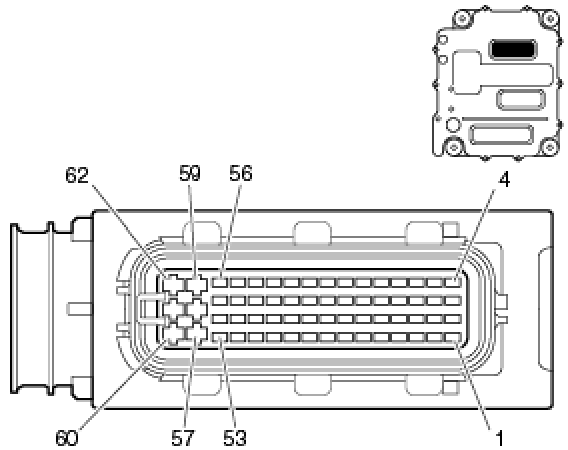
Code number	P1088
Fault code description	Engine rail pressure - Data valid but too high
Fault code information	Please contact Engine support center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	This diagnostic runs when the rail pressure operating state is: Release valve only
Set condition of fault code	The PCI ECU (D420) detects that the measured rail pressure is more than 2840 bar [41191 psi].
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	
Technical data	
Possible causes	• Common rail pressure release valve failure (stuck in the closed position) • Multiple injectors stuck in the closed position.
Additional information	• This DTC becomes active in combination with other fuel system related DTCs. Troubleshoot these faults first. • The rail pressure is measured in the common rail by the common rail pressure sensor (F854). • When this DTC is active: ○ the engine torque is reduced ○ the engine runs in protection mode ○ the engine runs in rail pressure control state: Release valve only ○ the maximum rail pressure is limited to 1300 bar
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

P1089

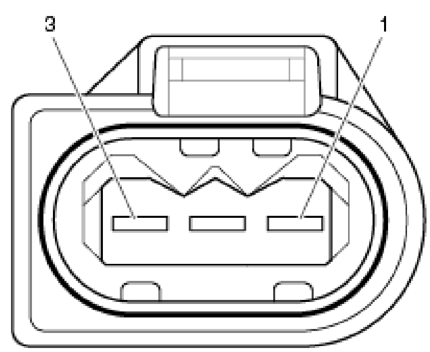
Code number	P1089
Fault code description	Engine rail pressure - Data valid but too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	The rail pressure is measured in the common rail. The rail pressure sensor is part 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 rail pressure operating state is: Pump unit only or Rail discharge
Set condition of fault code	The PCI ECU (D420) detects that the measured rail pressure is more than 2840 bar [41191 psi].
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 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

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

Key off the ignition.
Disconnect connector F854
Measure on the front side of wiring harness connector F854

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></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>No possible causes information available.</td></tr>
<tr><td>Additional information</td><td>

The rail pressure is measured in the common rail by the common rail pressure sensor (F854).
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 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 1089a</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 1089b</td><td>SRT</td></tr>
<tr><td colspan="3">DAVIE Direct Test: High Pressure Fuel Pump Unit test
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: Proceed to step4
Yes: Proceed to step 3
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 1089c</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.

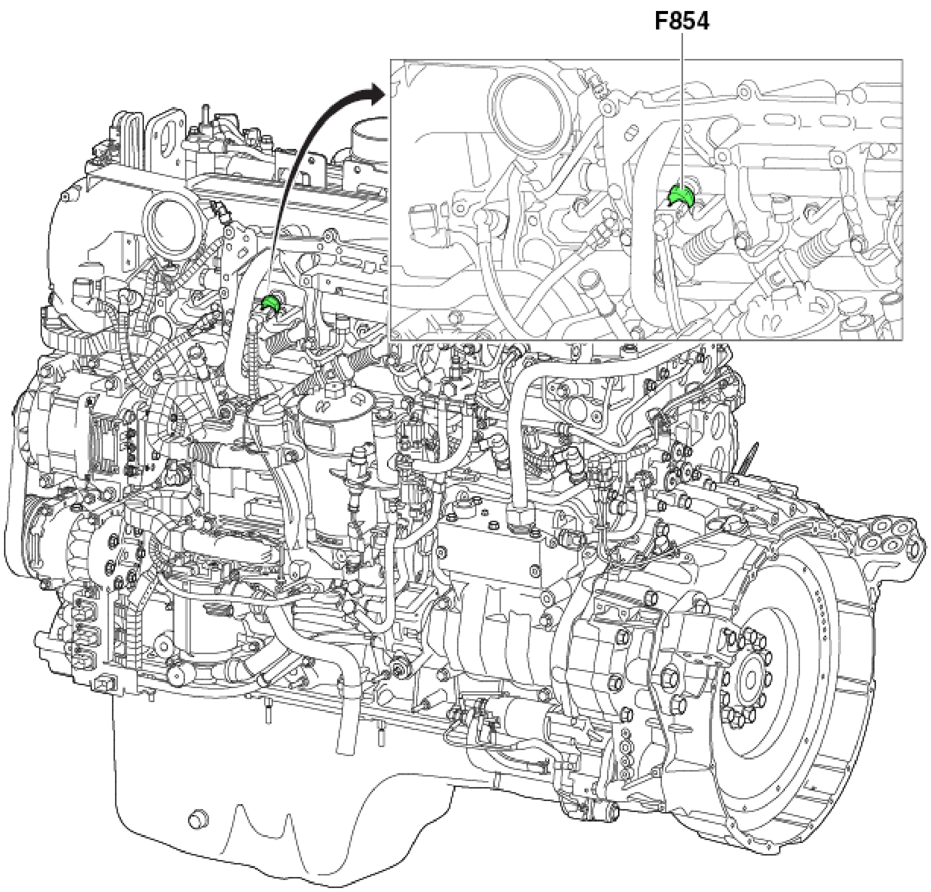
Fault inactive – issue resolve
Fault active - Proceed to step 4
</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1089d</td><td>SRT</td></tr>
<tr><td colspan="3">DAVIE Direct Test: Pressure Control Valve
Run the prescribed DAVIE Direct test to determine if the high pressure valve is working correctly.
Does the test fail to complete or result in a failed state?</td></tr>
</table>
</td></tr>
</table>

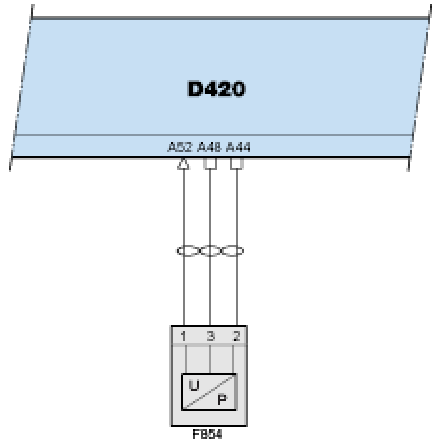
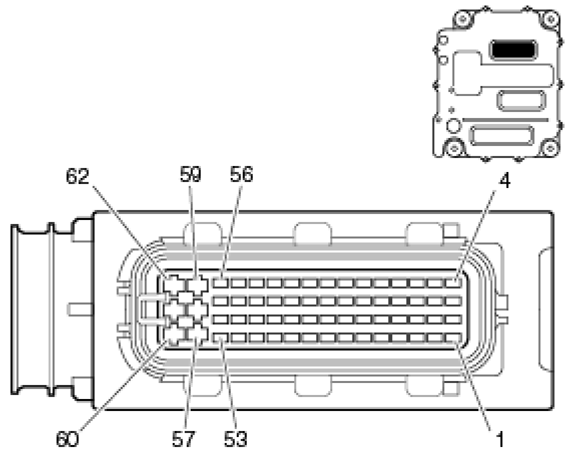
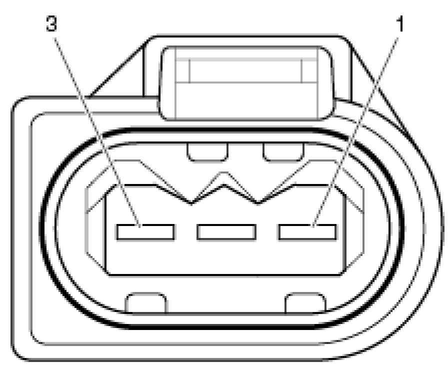
	• No: Proceed to step 6 • Yes: Proceed to step 5 **Step 5** | Step ID 1089e | SRT Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 6 **Step 6** | Step ID 1089f | SRT Replace: Electronic Unit pump Replace the faulty Electronic Unit Pump. Use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • If this related fault is still active, proceed to step 7 **Step 7** | Step ID 1089g | SRT Replace: High Pressure Valve (Common Rail) Replace the Common Rail assembly, which includes the High Pressure Valve. NOTE: The entire Common Rail must be replaced. The High Pressure Valve is a non-serviceable part and cannot be replaced or repaired separately. Contact the PACCAR Engine Support Call Center to confirm replacement of the Common Rail assembly. Use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • If this related fault is still active, proceed to step 8 **Step 8** | Step ID 1089h | 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 repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Index

P1090

Code number	P1090
Fault code description	Detects when rail pressure goes over threshold (APV) in the absence of rail pressure sensor fault
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 Index

P1091

Code number	P1091
Fault code description	Engine rail pressure control - Data erratic, intermittent, or incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type – Generic
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: • during fuel injection cutoff event, and; • engine speed is between 1200 and 1600 rpm, and; • rail pressure operating state is: Release valve, and; • this test is carried out after 30 minutes of engine running time when the conditions are met. It is repeated three times (total 90 minutes) before an

	evaluation is made.
Set condition of fault code	The PCI ECU (D420) detects that the controlled common rail pressure release valve current differs too much from the expected current.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
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 pump unit failure
- Common rail pressure release valve failure
- Common rail pressure sensor deviation

Additional information

For this diagnostic, the high-pressure fuel system components are checked using an autonomous test. During this test, the rail pressure is controlled by the common rail pressure release valve (L094) during a fuel cutoff event. The PCI ECU controls the common rail pressure release valve current to keep the rail pressure at 1500 bar. This is compared with the common rail pressure sensor (F854) reading.

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.

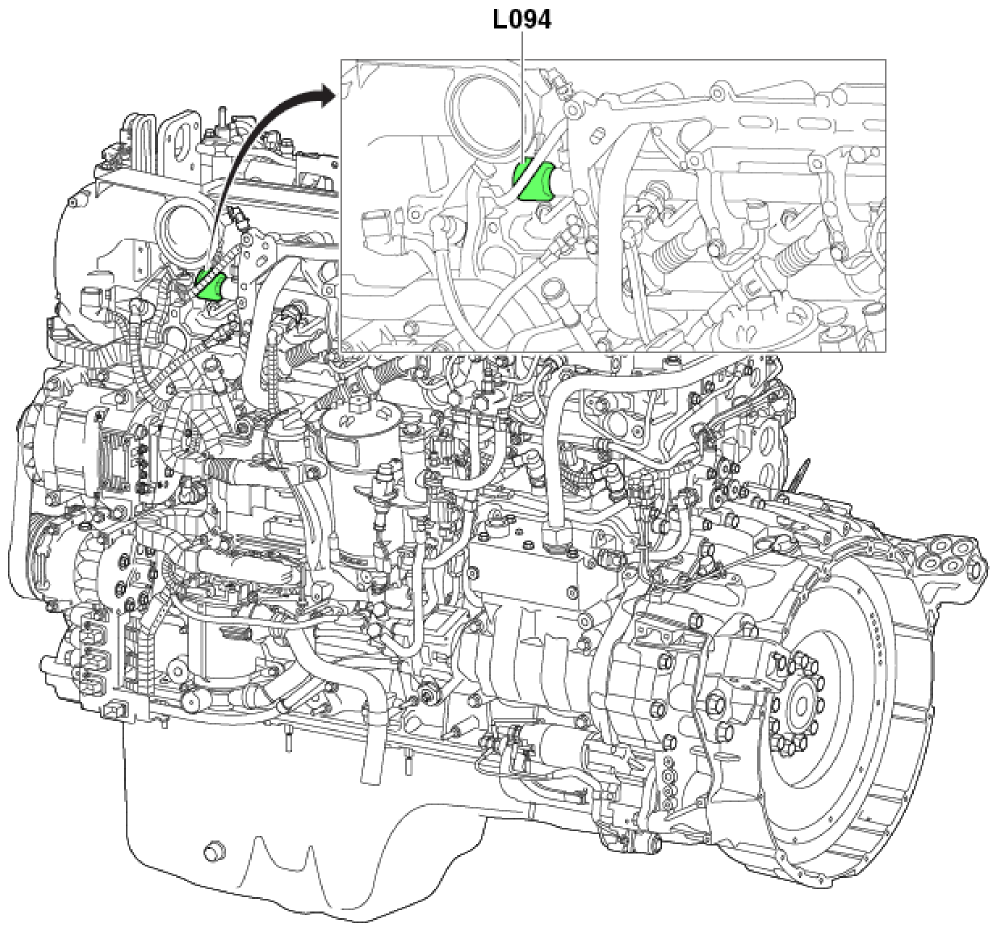
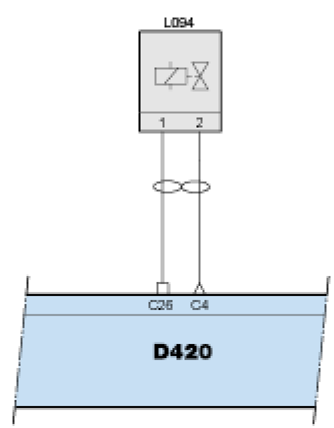
Step 1	Step ID 1091a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

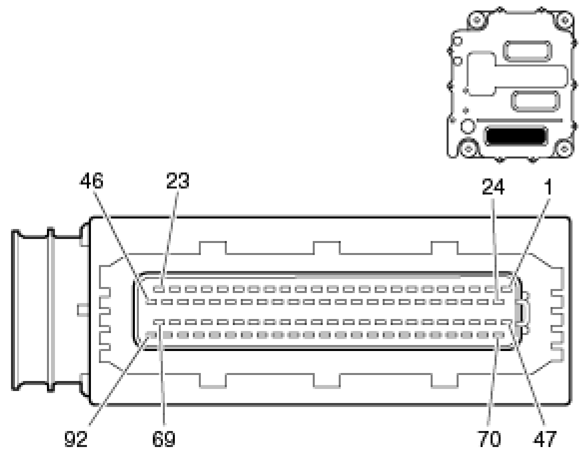
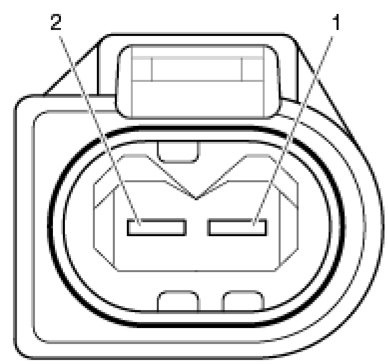
Step 2	Step ID 1091b	SRT
Run DAVIE Direct test (Pressure Control Valve) to determine if the high pressure valve is working correctly. Does the test fail to complete or result in a failed state? • No: Proceed to step 3. • Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults.		

<table>
<tr><td></td><td>
Fault inactive – issue resolved
Fault active - Proceed to step 3
<table>
<tr><td>Step 3</td><td>Step ID 1091c</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace High Pressure Valve (Common Rail) 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 1091d</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 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 Index</td></tr>
</table>

P109C

Code number	P109C
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 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	There is no Diagnostic condition information.
Set condition of fault code	This condition is set when High Pressure Common Rail Fuel Pressure Relief Valve current feedback is less 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 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
Technical data	Component check, common rail pressure release valve (L094) Preparation • Key off the ignition • Disconnect connector L094 • Measure on component connector L094 Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / 1.57–1.93 Ω / at 20°C [68°F]
Possible causes	No Possible causes available
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

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

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 109Ca</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 109Cb</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).

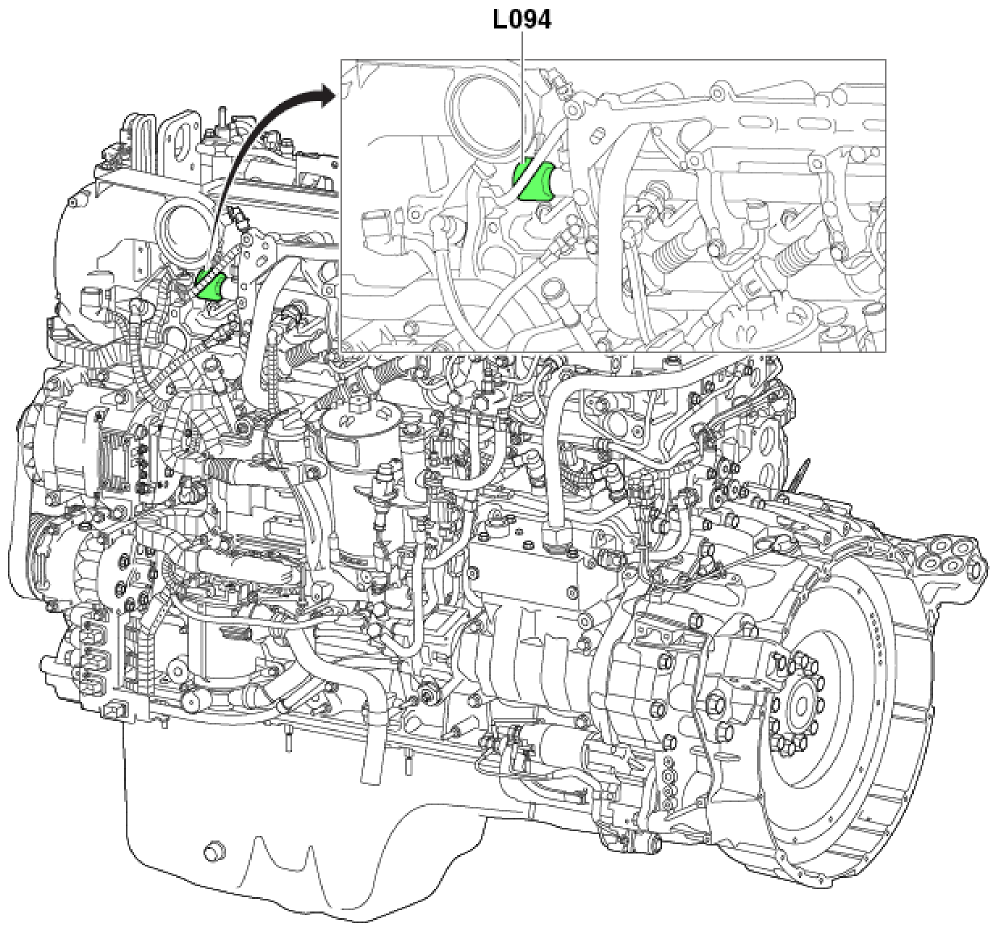
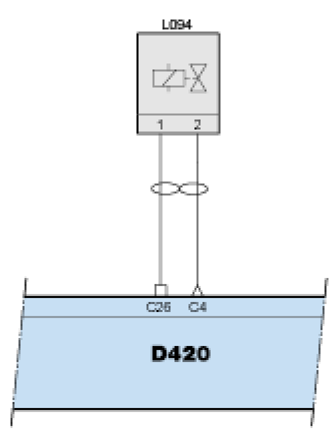
Are measured electrical values outside of expected range or limits?

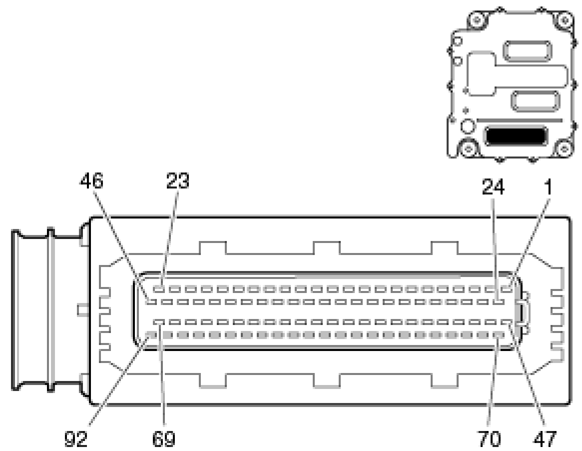
Yes - Proceed to step 3
No - Proceed to step 4
</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 109Cc</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace Common Rail assembly and use DAVIE to re-check for the presence of active faults.

Fault inactive – issue resolve
Fault active - Proceed to step 4
</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 109Cd</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 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 Index</td>
</tr>
</table>

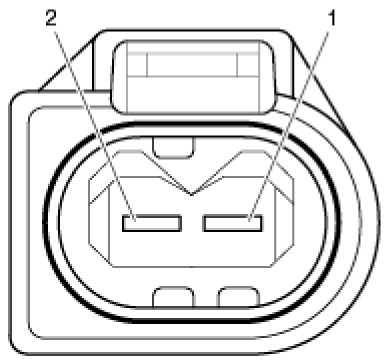
P109D

Code number	P109D
Fault code description	Common rail pressure release valve - Current too high on ECU D420 pin C4
Fault code information	1 trip MIL 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 when the ignition is on with the engine off, after 10 seconds of ignition ON
Set condition of fault code	If High Pressure Common Rail Fuel Pressure Relief Valve current feedback is greater than the threshold value of 2.3A then the condition is set.
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 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

Technical data

Component check, common rail pressure release valve (L094)

Preparation

- Key off the ignition
- Disconnect connector L094
- Measure on component connector L094

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	1.57–1.93 Ω	at 20°C [68°F]

Possible causes

No possible causes available.

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 discon006Eecting 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 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 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 Rapid.

Step 1	Step ID 109Da	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 109Db	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. • 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 109Dc	SRT
Repair or replace appropriate component 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 109Dd	SRT
Replace: High Pressure Valve (Common Rail) Contact the PACCAR Engine Support Call Center to confirm replacement of the Common Rail assembly. Replace the Common Rail assembly, which includes the High Pressure Valve. 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 109De	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 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.
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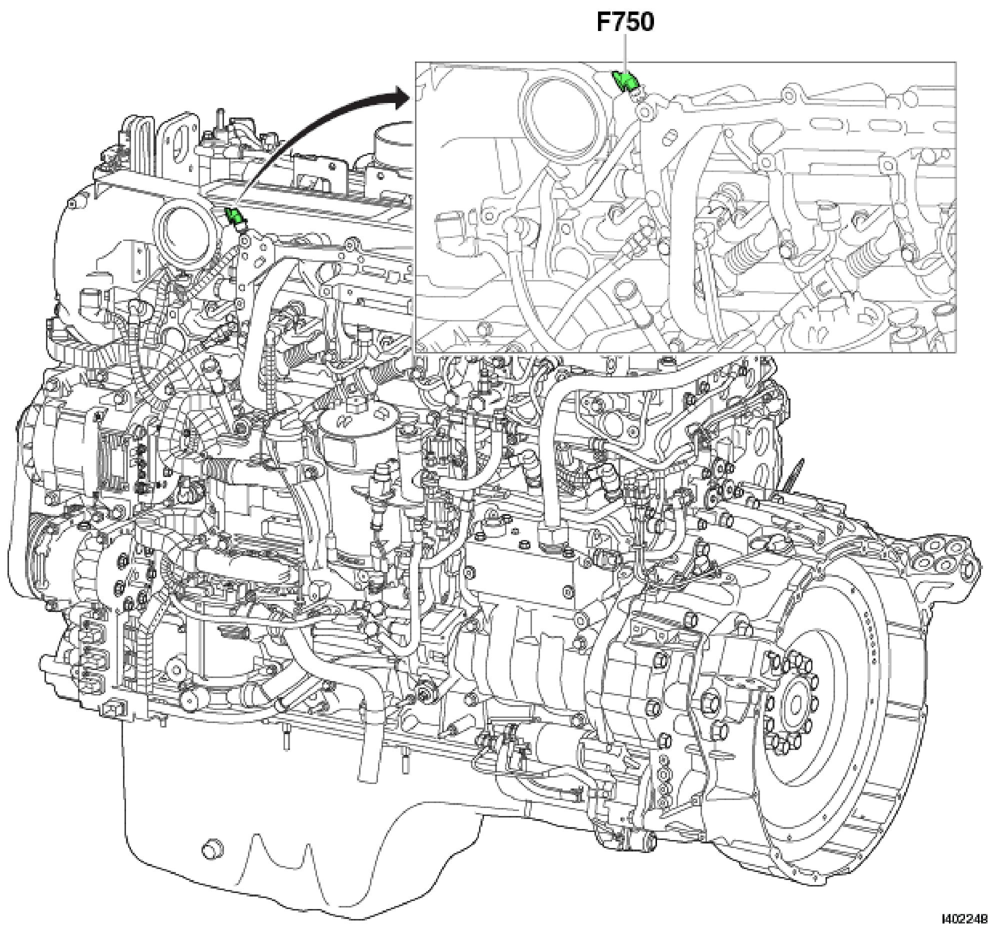
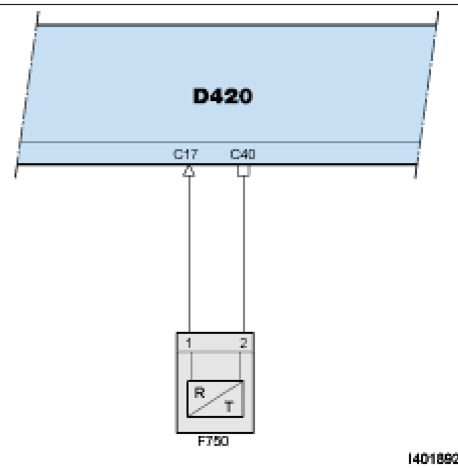
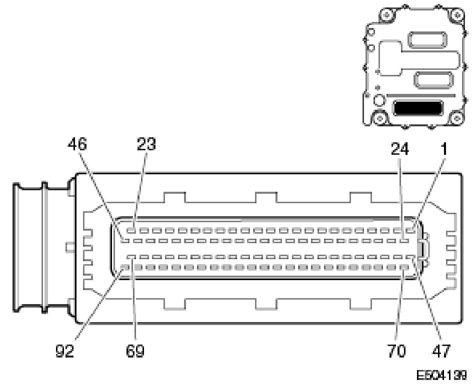
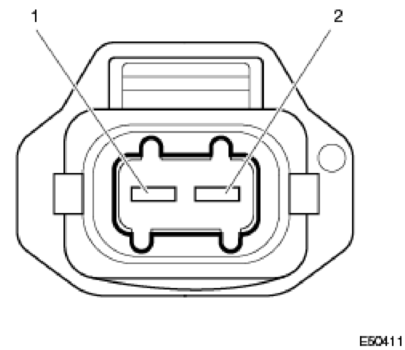
P1110

Code number	P1110
Fault code description	Intercooler efficiency - Too low
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – Boost Freeze frame type – Boost
Description of component(s)	The intercooler outlet temperature is measured before the EGR mixer. **Effect on the system** • Monitors intercooler performance
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 150 seconds after an engine start, and; • engine is running at steady speed and load, and; • coolant temperature is above 65°C [149°F], and;

	• vehicle speed is more than 25 km/h [15.5 mph]
Set condition of fault code	The PCI ECU (D420) detects that cooling capacity of the intercooler 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)	 D420 PCI ECU F750 Intercooler temperature sensor **D420** / **F750** / **Function**: C17 / 1 / Signal, intercooler temperature; C31 / 2 / Ground

D420	F750	Function
C17	1	Signal, intercooler temperature
C31	2	Ground

	 Wiring harness connector D420.C front view  Wiring harness connector F750 front view Handle connectors and pins with care and use matching measuring probes.
Technical data	**Component check, intercooler temperature sensor (F750)**

Preparation

- Key off the ignition
- Disconnect connector F750
- Measure on the component connector F750

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

- Key off the ignition

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

Disconnect connector F750
Measure on the front side of wiring harness connector F750

<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>5V</td><td>Ignition keyed on</td></tr>
</table>
</td>
</tr>
<tr>
<td>Possible causes</td>
<td>

Contaminated or blocked intercooler
Fan not working correctly
Intercooler temperature sensor deviation
Ambient air temperature sensor deviation
Coolant temperature sensor deviation
EGR temperature sensor deviation
Pre-compressor air temperature sensor deviation
Boost (intake manifold) air temperature sensor deviation
Ambient air pressure sensor deviation
Boost air pressure sensor deviation
Use of a winterfront at temperatures above 40°F (4°C)
Use of an aftermarket winterfront that has excessive airflow restriction through the intercooler.

</td>
</tr>
<tr>
<td>Additional information</td>
<td>
The cooling efficiency of the intercooler is monitored.

This diagnostics consists of two parts:

The temperature across the intercooler drop is monitored by comparing the calculated temperature before the intercooler with the measured temperature after the intercooler.
The measured temperature after the intercooler is compared with the ambient temperature.

The temperature after the intercooler is measured by the intercooler temperature sensor (F750).
</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.</td>
</tr>
</table>

- 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? Ambient air temp sensor: P0072; P0073; P009A Coolant temperature sensor: P0115; P0117; P0118; P1115; P2181; P2183 Post-intercooler air temperature sensor: P0095; P0097; P0098; P0127; P1127 EGR (venturi) temperature sensor: P040B; P040C; P040D, or related EGR codes Pre-compressor air temperature sensor: P2199; U1071 Boost air temperature sensor: P0110; P0112; P0113; P1128; P1573 Ambient air pressure sensor: P2226; P2228; P2229 Boost air pressure sensor: P0069; P0107; P0108; P104B; P104C	
Yes	**No**
Refer to the troubleshooting information for these codes before continuing with this procedure.	
	Go to step 2.A

Step 2. Intercooler (F750) Checks

Step 2. A Visual inspection, intercooler (F750)	
Action 1. Visually inspect the intercooler (charge air cooler) and associated components for any of the following: • Loose or broken clamps on the air system • Dirt or debris build-up (blockage) at the front of the intercooler • Air system parts are removed or damaged • Hump hoses are folded over or have holes • Damage to or incorrect installation of any of the following sensors: o Coolant temperature sensor (F566) o Post-intercooler temperature sensor (F750) o Pre-compressor air (after BPV) temperature sensor (F853) o EGR (venturi) temperature sensor (F749) o Boost air temperature sensor (F804) o Boost air pressure sensor (F802)	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If a sensor is found to be damaged or broken, replace it. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to Step 2.B.	**Go to step 2.B**

Step 2.B DAVIE monitor, intercooler temperature and related sensors	
Action 1. Use DAVIE to select and monitor the following temperature and pressure values for comparison: • Coolant temperature (turbo control) • Post-intercooler air temperature(turbo control) • Pre-compressor air temperature(turbo control) • EGR temperature (EGR control) • Boost air pressure (turbo control) For initial temperature readings, monitor with the ignition key to ON and the engine to OFF. Start the engine and allow it to idle for a minimum of 10 minutes to allow the temperature sensors to stabilize. While monitoring, no temperature should vary by a value of more than 50°F for a period of more than 5 seconds.	
Do any monitored values vary by more than 50°F (24°C) for more than 5 seconds?	
Yes	**No**
Correct any issues found, or replace the related sensor if measured values indicate a sensor error. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.C.	**Go to step 2.C**

Step 2.C Pressure testing, intake and exhaust elements	
Action 1. Perform the steps outlined in the procedure, "pressure testing (intake/exhaust elem.)," job ID 84123, to determine whether there are any leaks in the intake air system.	
Was there evidence of a leak in the air system?	
Yes	**No**

Correct any issues found. Refer 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.	**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	**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 P1110 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.

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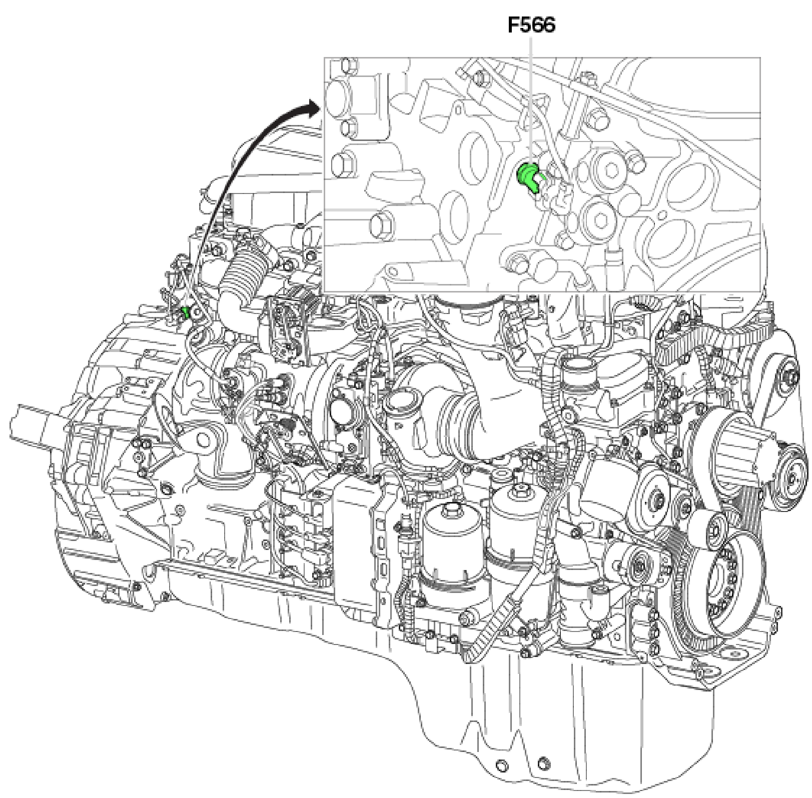
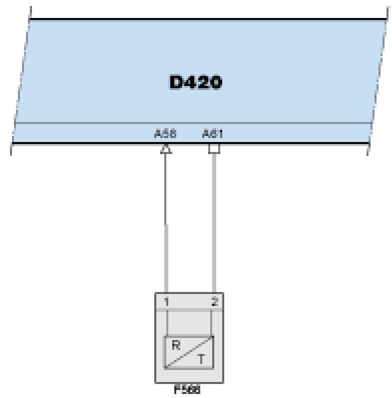
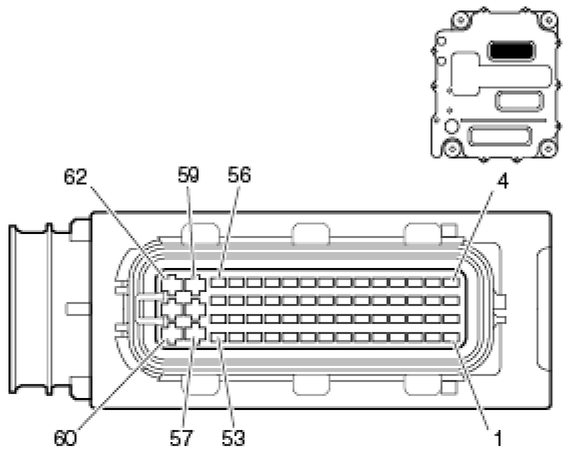
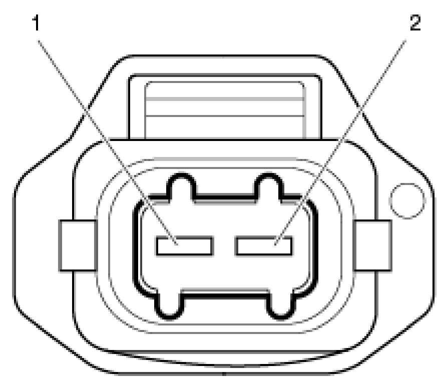
P1115

Code number	P1115
Fault code description	Coolant temperature - Data valid but too high, moderately severe
Fault code information	1 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 continuously when the ignition is keyed on and when the engine is running.
Set condition of fault code	The PCI ECU (D420) detects that the measured coolant temperature is more than 110°C [230°F] for more than 10 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.A front view  Wiring harness connector F566 front view D420 PCI ECU F566 coolant temperature sensor D420 F556 Function A58 1 Signal, coolant temperature A61 2 Ground
Technical data	Component check, coolant temperature sensor (F566) Preparation • Key off the ignition

<table>
<tr><td></td><td>
Disconnect connector F566
Measure on component connector F566
<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>14936–15961 Ω</td><td>Resistance value at -20°C [-4°F]</td></tr>
<tr><td></td><td></td><td>5727–6056 Ω</td><td>Resistance value at 0°C [32°F]</td></tr>
<tr><td></td><td></td><td>2439–2557 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>1151–1197 Ω</td><td>Resistance value at 40°C [104°F]</td></tr>
<tr><td></td><td></td><td>585–604 Ω</td><td>Resistance value at 60°C [140°F]</td></tr>
<tr><td></td><td></td><td>318–327 Ω</td><td>Resistance value at 80°C [176°F]</td></tr>
<tr><td></td><td></td><td>185–188 Ω</td><td>Resistance value at 100°C [212°F]</td></tr>
<tr><td></td><td></td><td>111–114 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
Component & circuit check, ECU (D420)
Preparation
Key off the ignition
Disconnect connector F566
Measure on the front side of wiring harness connector F566
<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>5V</td><td>Ignition keyed on</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>
Coolant level too low
Contaminated radiator
Faulty engine cooling fan
Blocked thermostat
Coolant temperature sensor deviation
</td></tr>
<tr><td>Additional information</td><td>The engine coolant temperature is monitored by the coolant temperature sensor (F566).</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 1115a</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 1115b</td><td>SRT</td></tr>
</table>
</td></tr>
</table>

Ancillary Test: Coolant Leak
Perform the prescribed testing to determine correct operation of the associated engine or aftertreatment system.
Does the test fail to complete or result in a failed state?

- No – Proceed to step 4
- Yes – Proceed to Step 3

Step 3	Step ID 1115c	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 4

Step 4	Step ID 1115d	SRT

Remove and inspect the thermostat to verify it is not stuck in the open or closed position.
Was the thermostat stuck in the open or closed position?

- No – Proceed to step 6
- Yes – Proceed to step 5

Step 5	Step ID 1115e	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 6

Step 6	Step ID 1115f	SRT

Replace the identified faulty Coolant temperature sensor and use DAVIE to re-check for the presence of active faults.

- Fault inactive – issue resolved
- Fault active - Proceed to step 7

Step 7	Step ID 1115g	SRT

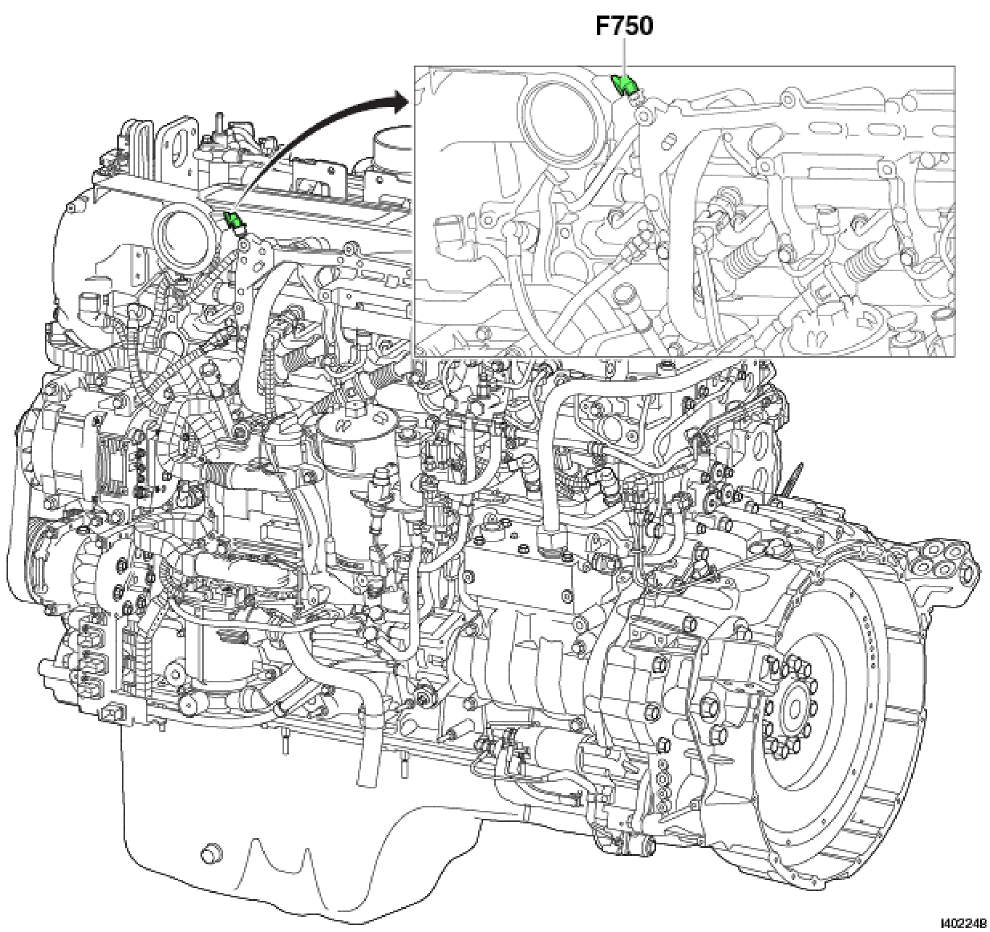
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

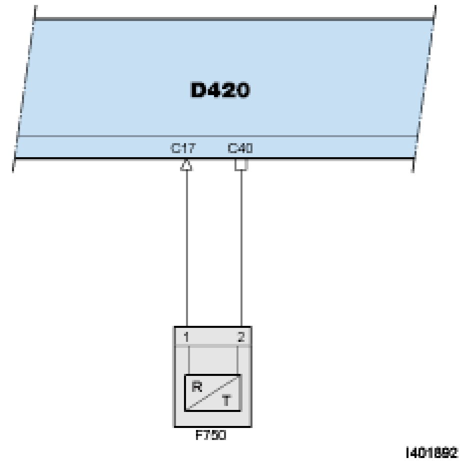
Verification Drive Cycle	To validate repair: This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed 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 Index

P1122

Code number	P1122
Fault code description	Sticking cruise fault
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 Index

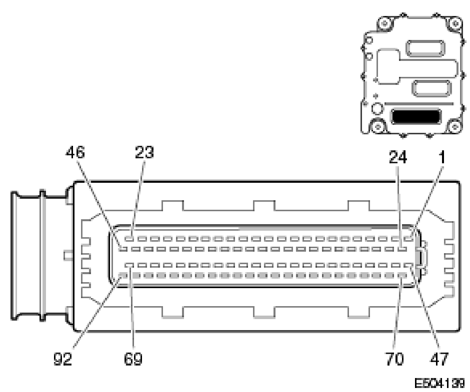
P1127

Code number	P1127
Fault code description	Intercooler temperature - Data valid but too high, moderately severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Boost
Description of component(s)	The intercooler outlet temperature is measured before the EGR mixer. **Effect on the system** • Monitors intercooler performance
Location of component(s)	
Diagnostic condition	This diagnostic runs 300 seconds after the engine is started.
Set condition of fault code	The PCI ECU (D420) detects that the intercooler outlet temperature is more than 95°C

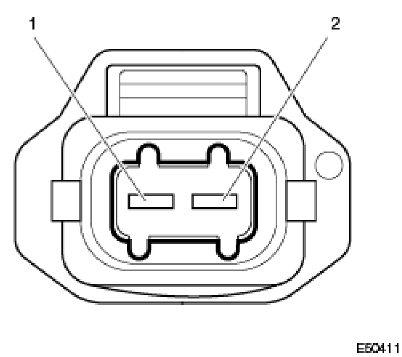
<table>
<tr><td></td><td>[203°F] for more than 60 seconds.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC changes to inactive when the fault is no longer detected.</td></tr>
<tr><td>Electrical diagram(s)</td><td>


D420 PCI ECU
F750 Intercooler temperature sensor

<table>
<tr><th>D420</th><th>F750</th><th>Function</th></tr>
<tr><td>C17</td><td>1</td><td>Signal, intercooler temperature</td></tr>
<tr><td>C31</td><td>2</td><td>Ground</td></tr>
</table>



Wiring harness connector D420.C front view



Wiring harness connector F750 front view

Handle connectors and pins with care and use matching measuring probes.
</td></tr>
<tr><td>Technical data</td><td>Component check, intercooler temperature sensor (F750)

Preparation
Key off the ignition
Disconnect connector F750</td></tr>
</table>

	• Measure on the component connector F750 **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** • Key off the ignition • Disconnect connector F750 • Measure on the front side of wiring harness connector F750 **Pin (+ probe)** | **Pin (- probe)** | **Value** | **Additional information** 1 | 2 | 5V | Ignition keyed on
Possible causes	• Restricted air flow through the intercooler/radiator • Faulty engine cooling fan • Intercooler temperature sensor deviation
Additional information	The intercooler outlet temperature is measured before the EGR mixer by the intercooler temperature sensor (F750).
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 DTC 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? Ambient air temp sensor: P0072; P0073; P009A Coolant temperature sensor: P0115; P0117; P0118; P1115; P2181; P2183 Post-intercooler air temperature sensor: P0095; P0097; P0098; P0127 EGR (venturi) temperature sensor: P040B; P040C; P040D, or related EGR DTCs Pre-compressor air temperature sensor: P2199; U1071 Boost air temperature sensor: P0110; P0112; P0113; P1128; P1573	
Yes	**No**
Refer to the troubleshooting information for these DTCs before continuing with this procedure.	
	Go to step 2A

Step 2 Intercooler (F750) Checks

Step 2A Visual inspection, intercooler (F750)
Action 1. Visually inspect the intercooler (charge air cooler) and associated components for any of the following: • Loose or broken clamps on the air system • Dirt or debris build-up (blockage) at the front of the intercooler • Air system parts are removed or damaged

- Hump hoses are folded over or have holes
- Damage to or incorrect installation of the Coolant temperature sensor (F566)
- Damage to or incorrect installation of the Post-intercooler temperature sensor (F750)
- Damage to or incorrect installation of the Pre-compressor air (after BPV) temperature sensor (F853)
- Damage to or incorrect installation of the EGR (venturi) temperature sensor (F749)
- Damage to or incorrect installation of the Boost air temperature sensor (F804)
- Damage to or incorrect installation of the Boost air pressure sensor (F802)

Was there evidence of any of the above?

Yes	No
Correct any issues found. If a sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2B	**step 2B**

Step 2B Electrical checks, resistance, intercooler temperature sensor (F750)

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

Action

1. Confirm the sensor resistance values as outlined in the corresponding checking data, "Component check, intercooler temperature sensor (F750).

Are measured values within expected range?

Yes	No
	Correct any issues found, or replace the intercooler temperature sensor (F750) if measured values indicate a sensor error. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.

Go to step 2C	**If this DTC is still present, go to step 2C**

Step 2C Electrical checks, supply voltage, intercooler temperature sensor (F750)	
i Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Confirm the sensor supply voltage as outlined in the corresponding checking data, "Component check, intercooler temperature sensor (F750).	
Are measured values within expected range?	
Yes	**No**
	Correct any issues found. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2D	**If this DTC is still present, go to step 2D**

Step 2D DAVIE monitor, intercooler temperature and related sensors	
Action 1. Use DAVIE to select and monitor the following temperature and pressure values for comparison: • Coolant temperature (turbo control) • Post-intercooler air temperature(turbo control) • Pre-compressor air temperature(turbo control) • EGR temperature (EGR control) • Boost air pressure (turbo control) For initial temperature readings, monitor with the ignition key to ON and the engine to OFF. Start the engine and allow it to idle for a minimum of 10 minutes to allow the temperature sensors to stabilize. While monitoring, no temperature should vary by a value of more than 50°F for a period of more than 5 seconds.	
Do any monitored values vary by more than 50°F (24°C) for more than 5 seconds?	
Yes	**No**

Correct any issues found, or replace the related sensor if measured values indicate a sensor error. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2E	**Go to step 2E**

Step 2E Special test, intake/exhaust leak	
Action 1. Perform this test using the Intake/Exhaust Leak Test Kit (#1903034) to determine whether there are any leaks in the intake air system.	
Was there evidence of a leak in the air system?	
Yes	**No**
Correct any issues found. 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	**Go to step 3B**

Step 3B 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 P1127 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.

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.

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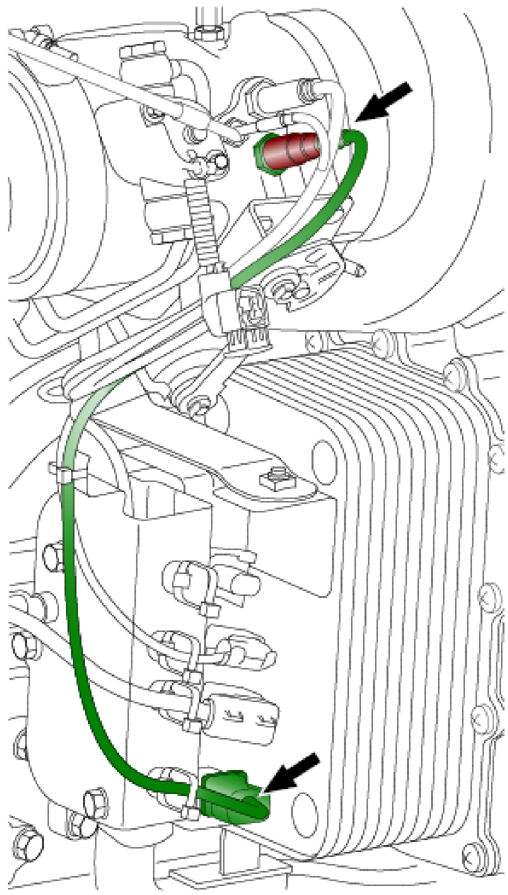
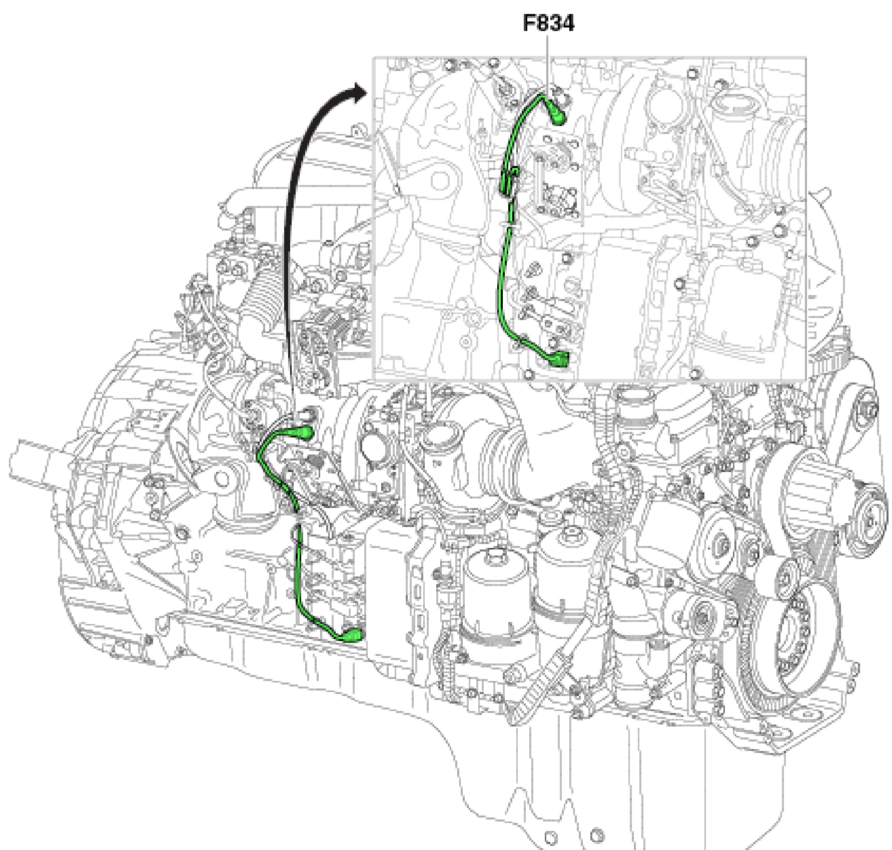
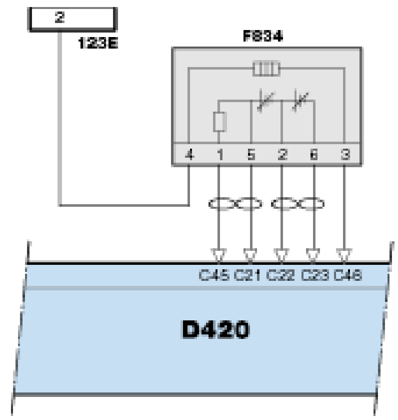
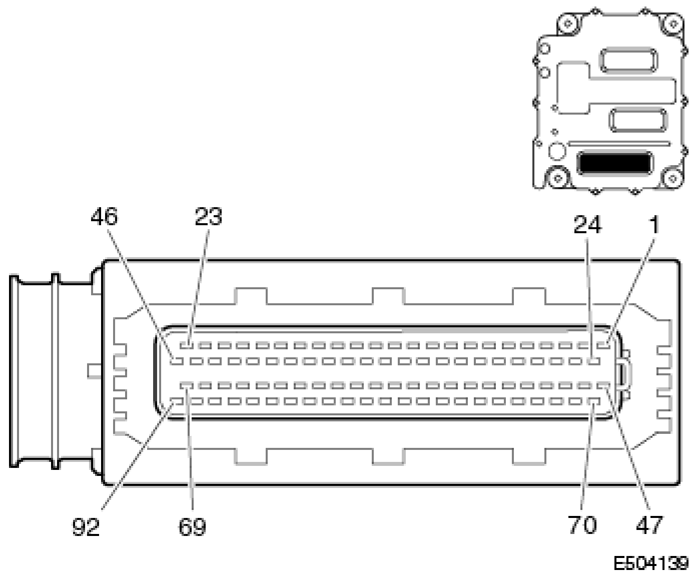
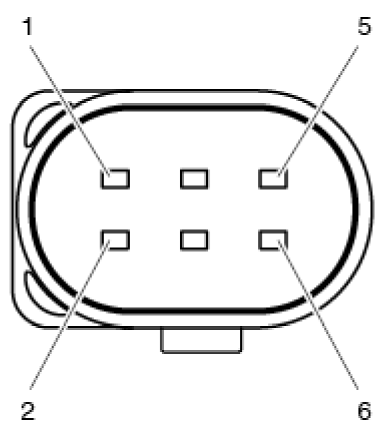
P1128

Code number	P1128
Fault code description	Air temp too high.
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 Index

P1133

Code number	P1133
Fault code description	Lambda sensor heater – Voltage too high or short circuit to supply on ECU D420 pin C46
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	Need to consider all active/inactive faults: one or multiple faults may have triggered this fault • 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	This diagnostic starts five minutes after the engine starts. The diagnostic runs continuously.
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

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 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 1133a	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.		

	<table><tr><td>Step 2</td><td>Step ID 1133b</td><td>SRT</td></tr><tr><td colspan="3">With the key OFF, disconnect the lambda sensor. Turn the key ON and navigate through DAVIE to read errors: - If fault is inactive – Proceed to step 3. - If fault is active – Proceed to step 4. </td></tr></table><table><tr><td>Step 3</td><td>Step ID 1133c</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the harness from the lambda sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the lambda sensor circuit on the engine harness: - If the voltage is acceptable – Replace the lambda sensor and reconnect the harness and verify the fault as per verification drive cycle. - If the voltage is not acceptable – Proceed to step 4 </td></tr></table><table><tr><td>Step 4</td><td>Step ID 1133d</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the engine harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: - If fault is inactive – Replace the engine harness and verify the fault as per verification drive cycle. - If fault is active – Proceed to step 5. </td></tr></table><table><tr><td>Step 5</td><td>Step ID 1133e</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>
Verification Drive Cycle	To validate repair, drive the vehicle 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.
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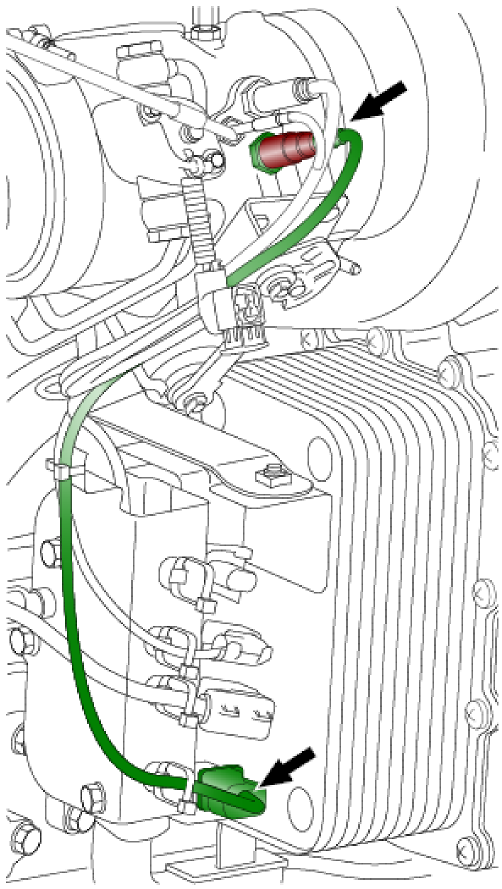
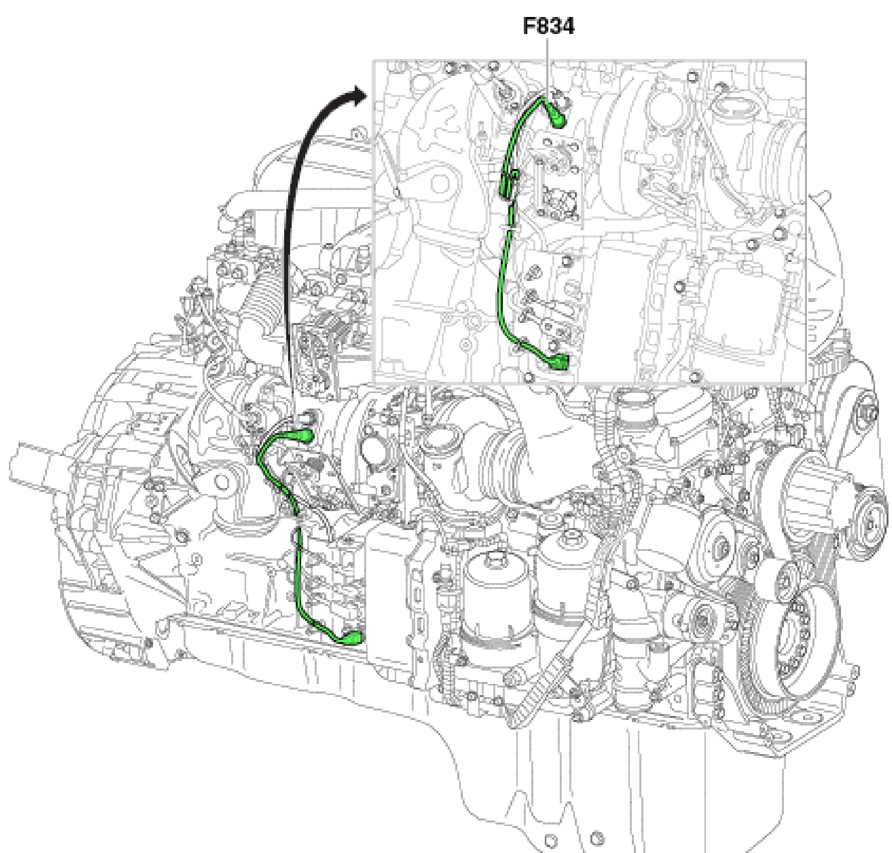
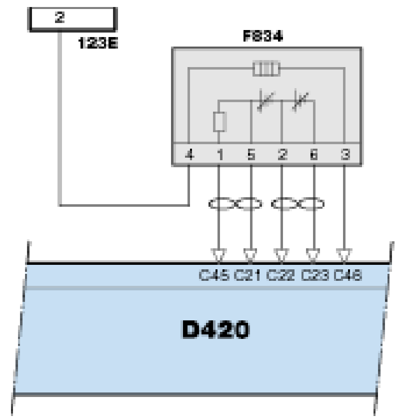
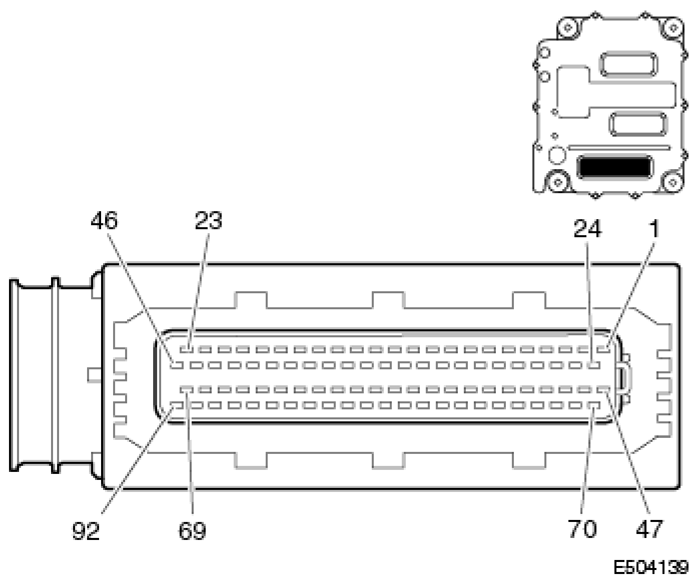
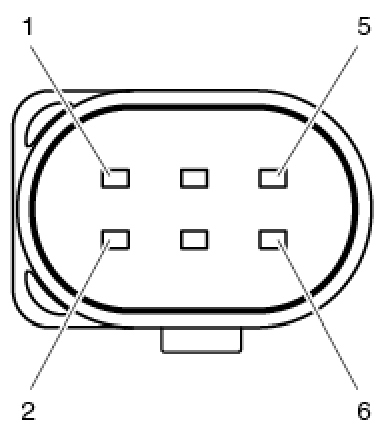
P1134

Code number	P1134
Fault code description	Lambda sensor heater – Voltage too low or short circuit to ground on ECU D420 pin C46
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	Need to consider all active/inactive faults: one or multiple faults may have triggered this fault • 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.

<table>
<tr><td>Set condition of fault code</td><td>This diagnostic starts five minutes after the engine starts. The diagnostic runs continuously</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.C front view


Wiring harness connector F834 front view
D420 F834 Function
C21 5 Trimming resistor
</td></tr>
</table>

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

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 1134a</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>
</td></tr>
</table>

Step 2	Step ID 1134b	SRT
With the key OFF, disconnect the lambda sensor. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Proceed to step 3. • If fault is active – Proceed to step 4.		

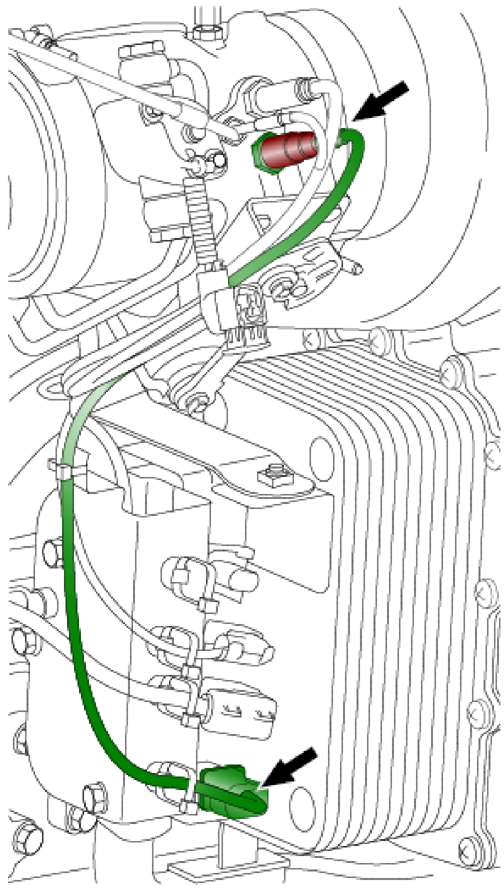
Step 3	Step ID 1134c	SRT
With key OFF, disconnect the harness from the lambda sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the lambda sensor circuit on the engine harness: • If the voltage is acceptable – Replace the lambda sensor and reconnect the harness and verify the fault as per verification drive cycle. • If the voltage is not acceptable – Proceed to step 4		

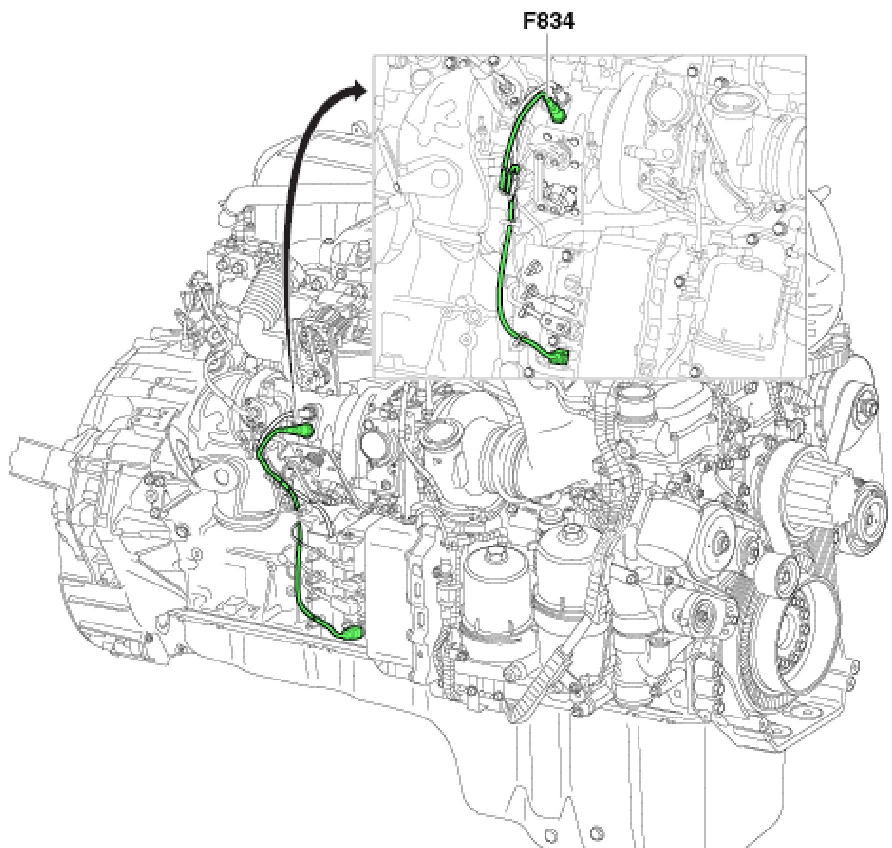
Step 4	Step ID 1134d	SRT
With key OFF, disconnect the engine harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Replace the engine harness and verify the fault as per verification drive cycle. • If fault is active – Proceed to step 5.		

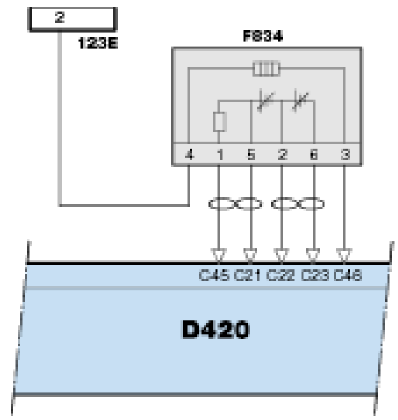
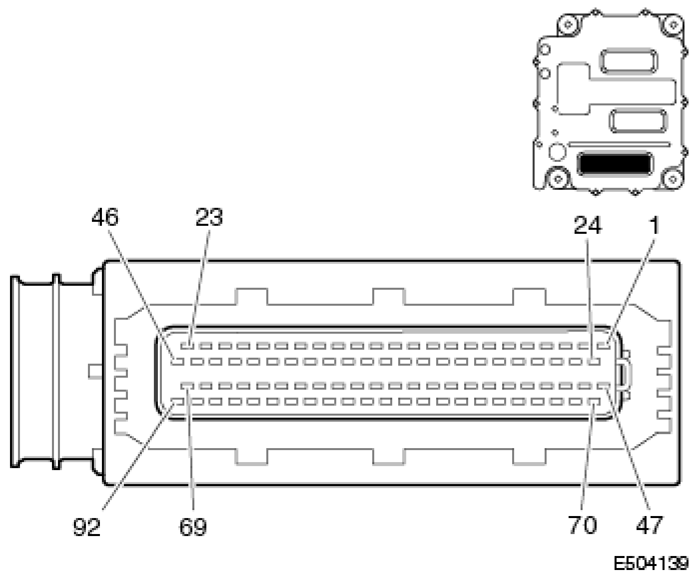
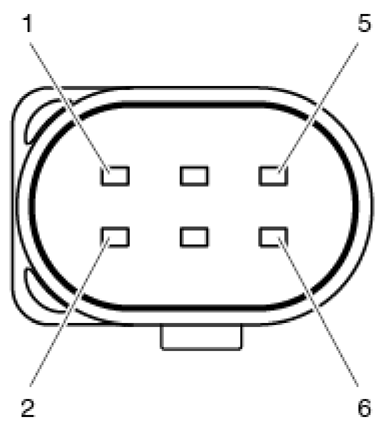
Step 5	Step ID 1134e	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

Verification Drive Cycle	To validate the repair: Drive the vehicle 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

P1135

Code number	P1135
Fault code description	Lambda sensor heater – Voltage too low or short circuit to supply on ECU D420 pin C46
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	Need to consider all active/inactive faults: one or multiple faults may have triggered this fault • 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	This diagnostic starts five minutes after the engine starts. The diagnostic runs continuously
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 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 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 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 1135a	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 1135b | SRT With the key OFF, disconnect the lambda sensor. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Proceed to step 3. • If fault is active – Proceed to step 4. **Step 3** | Step ID 1135c | SRT With key OFF, disconnect the harness from the lambda sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the lambda sensor circuit on the engine harness: • If the voltage is acceptable – Replace the lambda sensor and reconnect the harness and verify the fault as per verification drive cycle. • If the voltage is not acceptable – Proceed to step 4 **Step 4** | Step ID 1135d | SRT With key OFF, disconnect the engine harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Replace the engine harness and verify the fault as per verification drive cycle. • If fault is active – Proceed to step 5. **Step 5** | Step ID 1135e | 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: Drive the vehicle 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.
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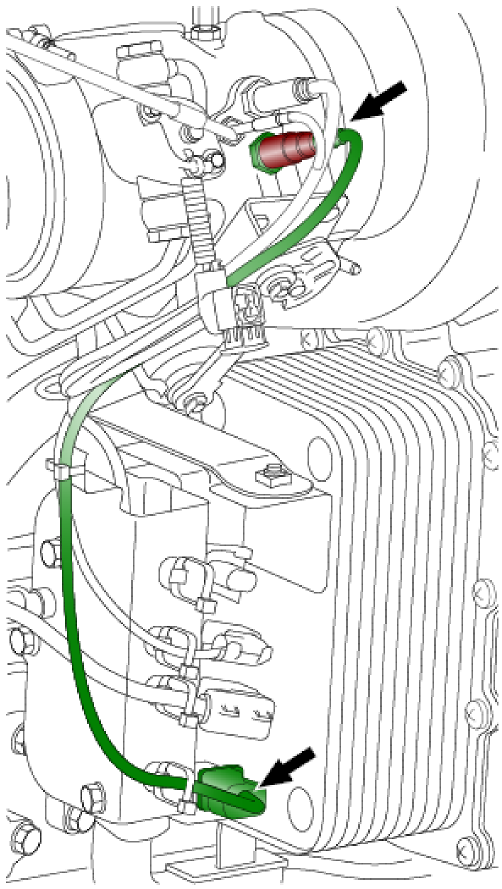
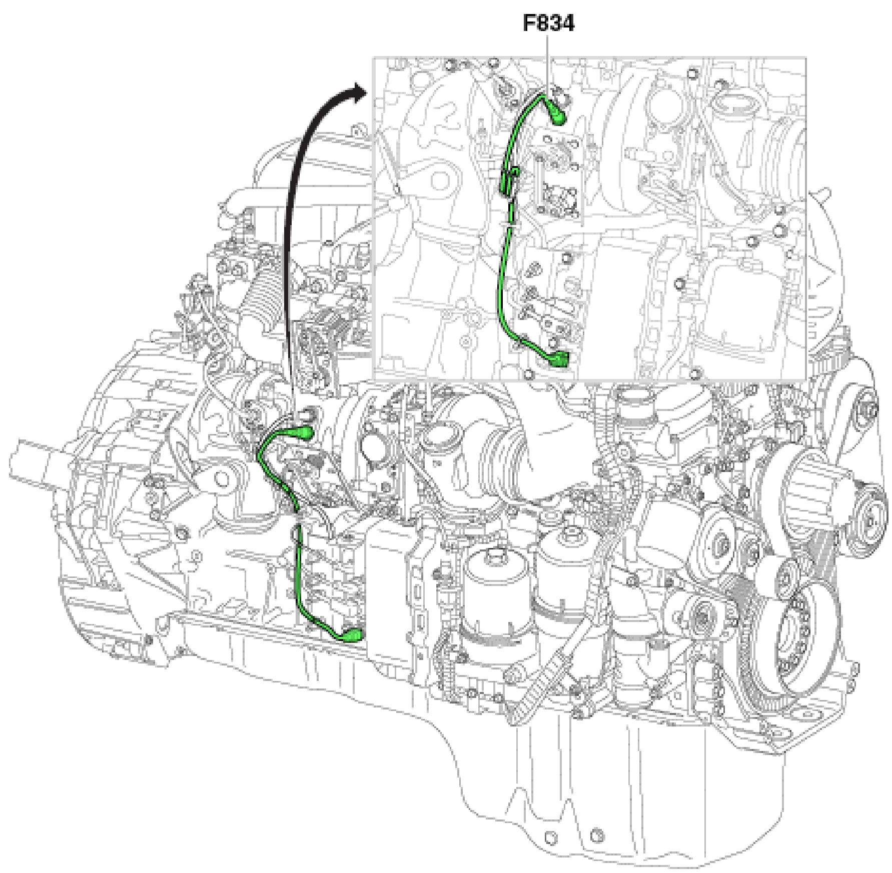
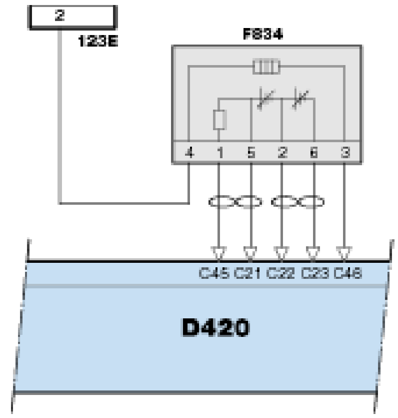
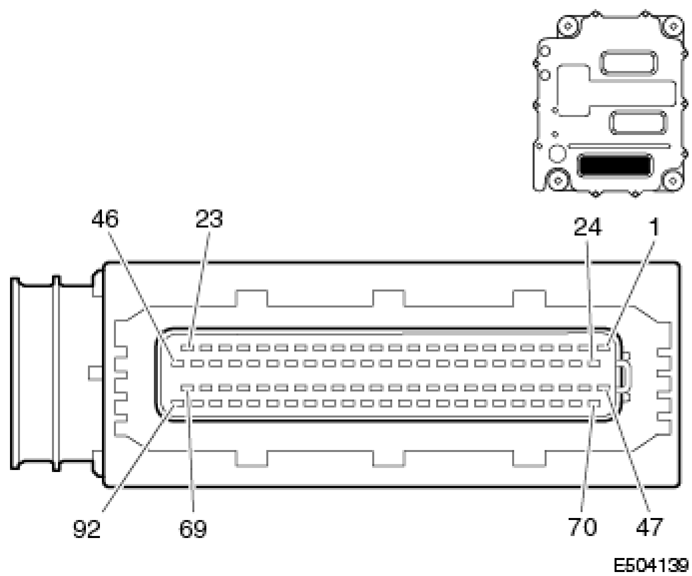
P1136

Code number	P1136
Fault code description	Lambda sensor heater – Voltage too low or short circuit to ground on ECU D420 pin C46
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

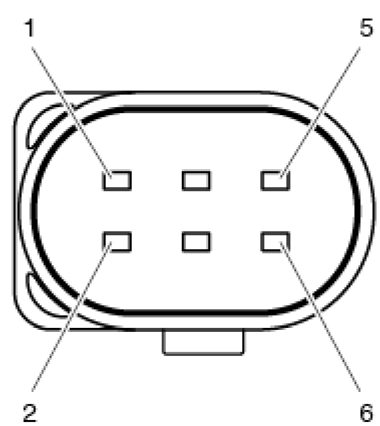
	[1382°F]. The PCI ECU determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect 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	The diagnostic runs after the engine run 5 min and Lambda value is more the 1.3
Set condition of fault code	This diagnostic starts five minutes after the engine starts. The diagnostic runs continuously.
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

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 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 1136a	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 1136b	SRT
With the key OFF, disconnect the lambda sensor. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Proceed to step 3.		

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

If fault is active – Proceed to step 4.

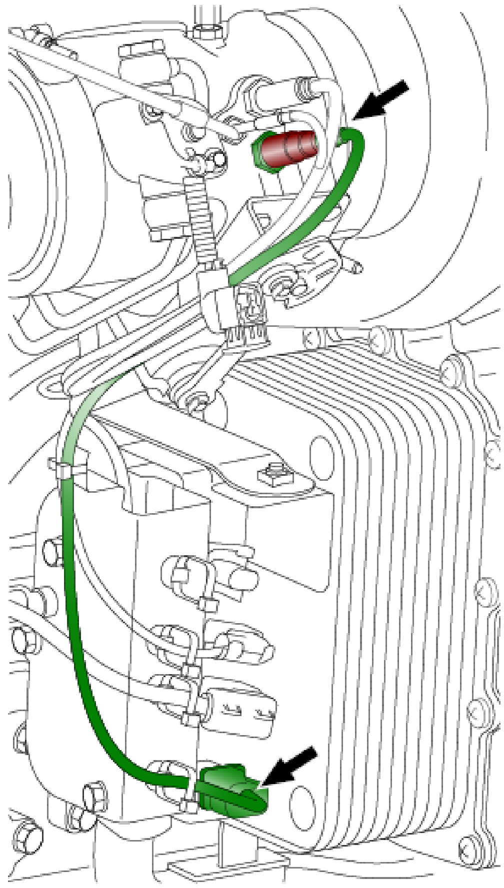
<table>
<tr><td>Step 3</td><td>Step ID 1136c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the harness from the lambda sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the lambda sensor circuit on the engine harness:
If the voltage is acceptable – Replace the lambda sensor and reconnect the harness and verify the fault as per verification drive cycle.
If the voltage is not acceptable – Proceed to step 4</td></tr>
</table>

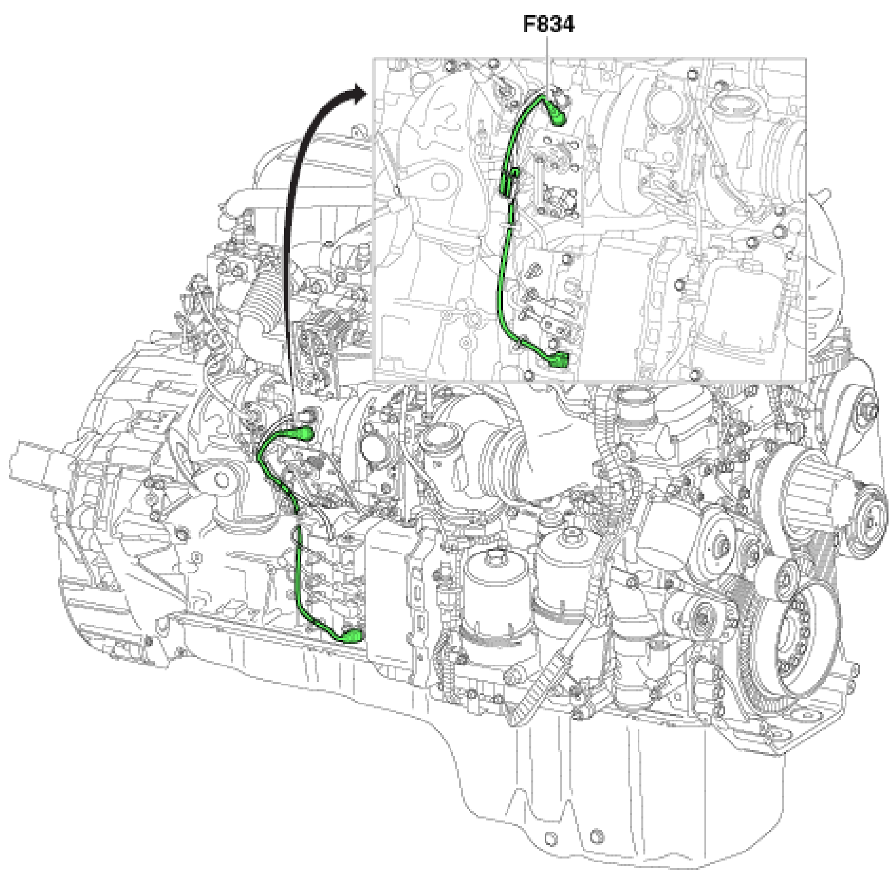
<table>
<tr><td>Step 4</td><td>Step ID 1136d</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the engine harness from the PCI. Turn the key ON and navigate through DAVIE to read errors:
If fault is inactive – Replace the engine harness and verify the fault as per verification drive cycle.
If fault is active – Proceed to step 5.</td></tr>
</table>

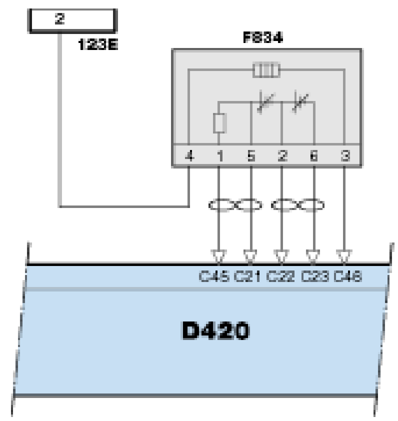
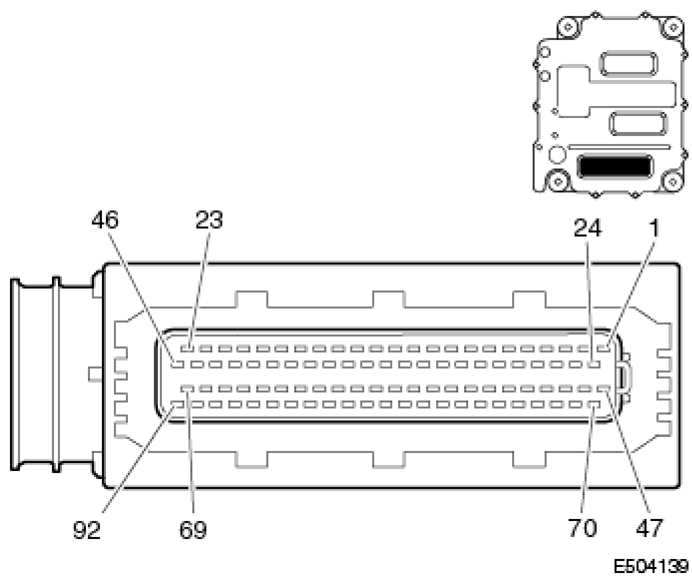
<table>
<tr><td>Step 5</td><td>Step ID 1136e</td><td>SRT</td></tr>
<tr><td colspan="3">Contact the PACCAR Engine Support Call Center
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>

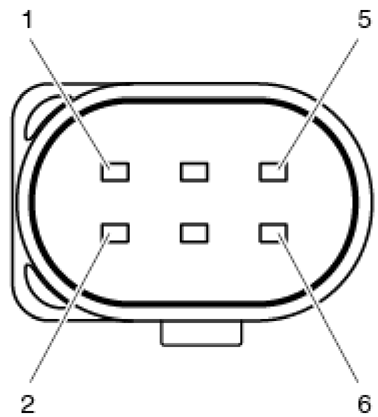
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate repair:
This cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
With the System Initiation 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 Index</td></tr>
</table>

P1137

Code number	P1137
Fault code description	Lambda sensor heater power supply - Incorrect
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	This diagnostic runs continuously when the engine is running.
Set condition of fault code	The PCI ECU (D420) detects that the power supply to control the lambda sensor heater is less than 9V 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, 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

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

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</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>Power supply to the PCI ECU.
Check the PCI power supply.</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 sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F].</td></tr>
</table>

Diagnostic Step-by-Step	

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 1137a	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 1137b	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 3 • No - Proceed to step 4		

Step 3	Step ID 1137c	SRT
Repair or replace appropriate component 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 1137d	SRT
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		

Step 5	Step ID 1137e	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: • 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.
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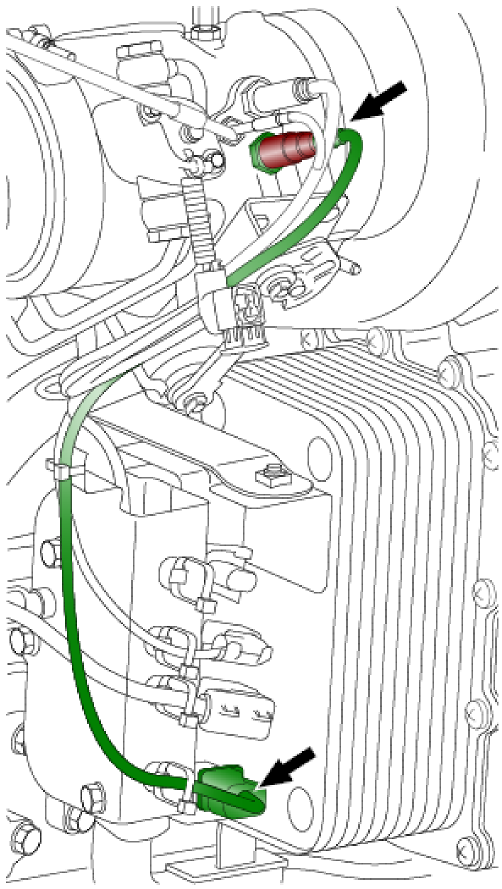
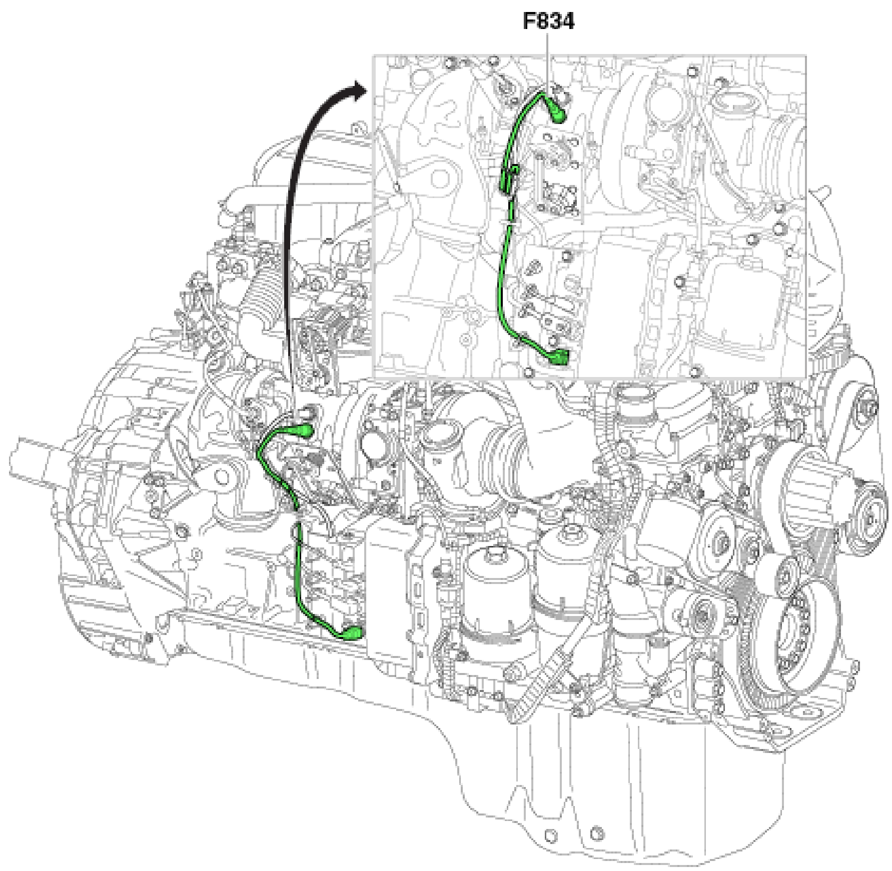
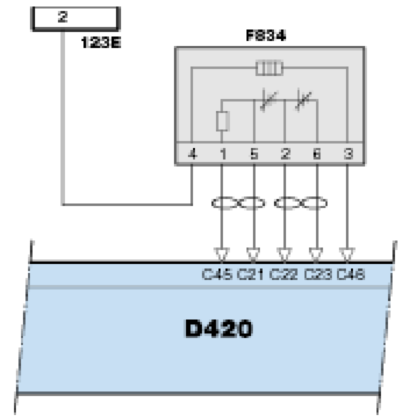
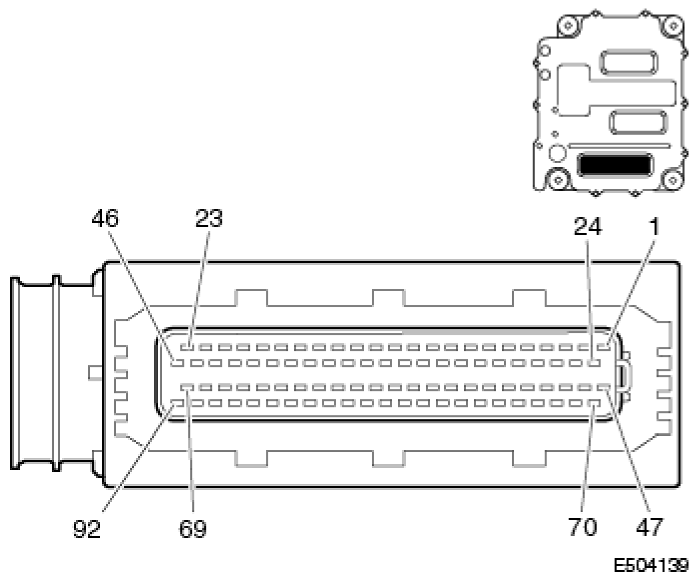
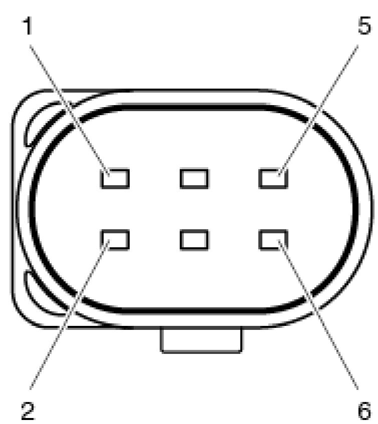
P1138

Code number	P1138
Fault code description	Lambda Sensor heater – Voltage too low or short circuit to ground on ECU D420 pin C46
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	Need to consider all active/inactive faults: one or multiple faults may have triggered this fault • 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.

<table>
<tr><td>Set condition of fault code</td><td>The PCI-2 ECU detects that the time it takes to control the temperature is too long.</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.C front view


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

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

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 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 1138a</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</td></tr>
</table>
</td></tr>
</table>

	procedure. Proceed to step 2. **Step 2** | Step ID 1138b | SRT With the key OFF, disconnect the lambda sensor. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Proceed to step 3. • If fault is active – Proceed to step 4. **Step 3** | Step ID 1138c | SRT With key OFF, disconnect the harness from the lambda sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the lambda sensor circuit on the engine harness: • If the voltage is acceptable – Replace the lambda sensor and reconnect the harness and verify the fault as per verification drive cycle. • If the voltage is not acceptable – Proceed to step 4 **Step 4** | Step ID 1138d | SRT With key OFF, disconnect the engine harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If fault is inactive – Replace the engine harness and verify the fault as per verification drive cycle. • If fault is active – Proceed to step 5. **Step 5** | Step ID 1138e | 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: Drive the vehicle 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.
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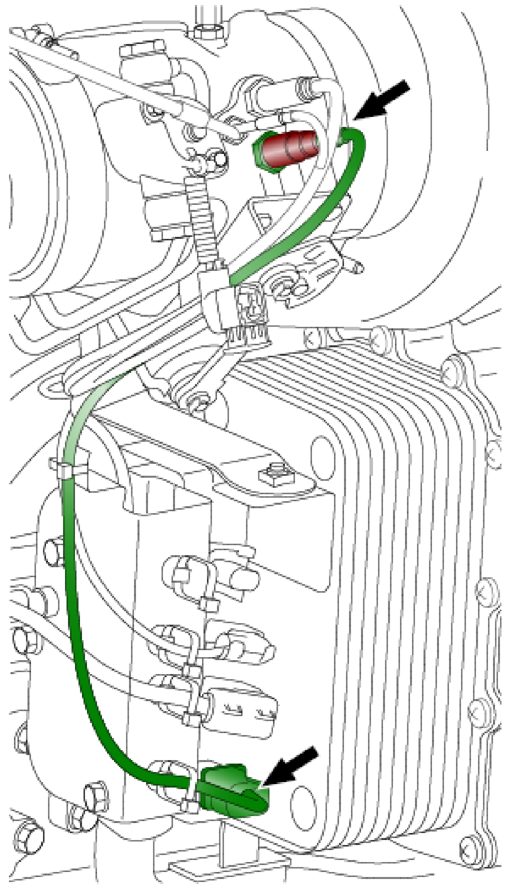
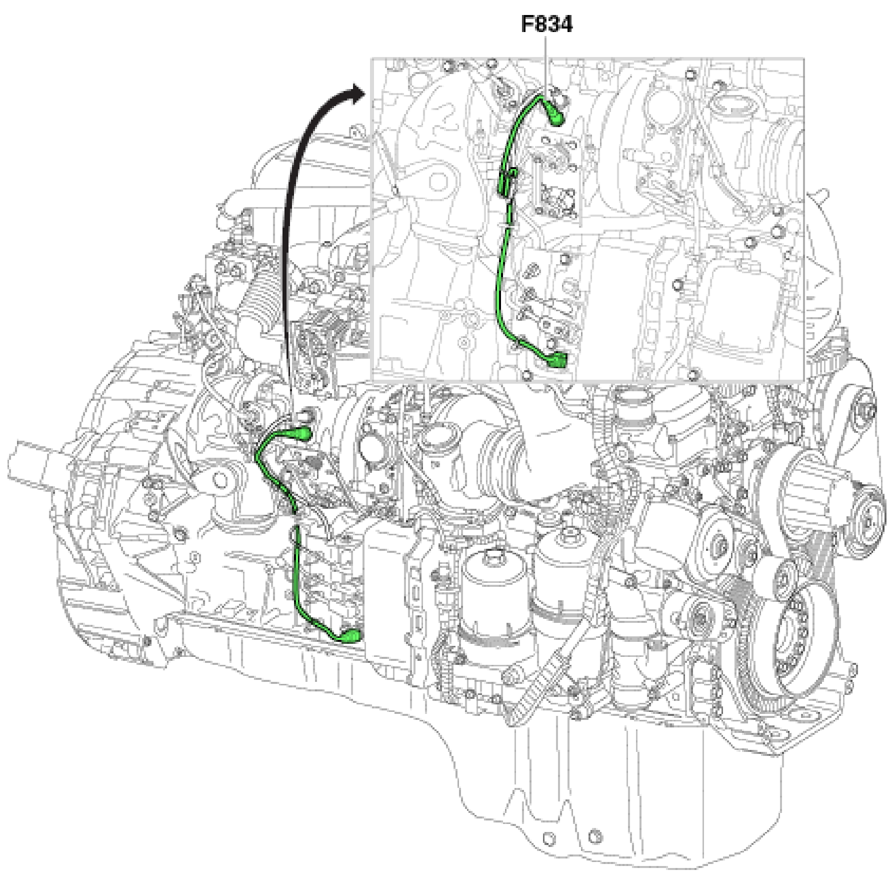
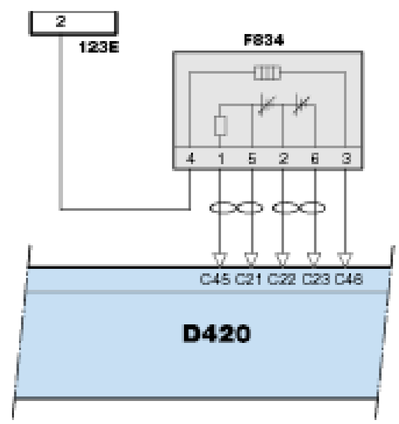
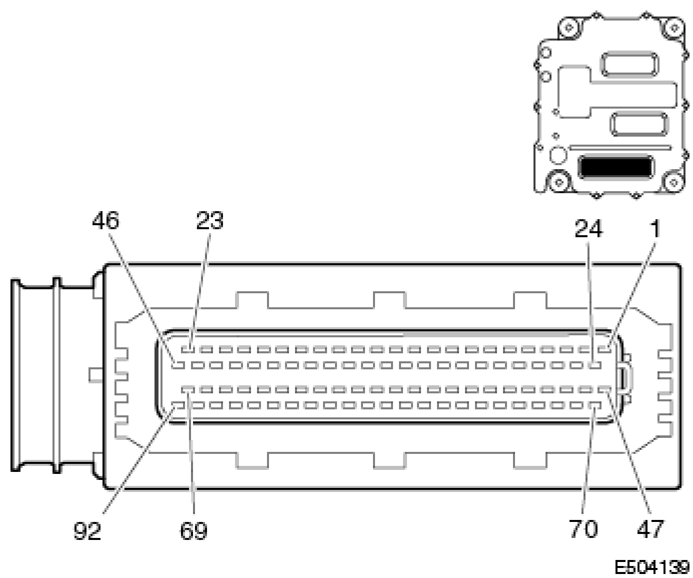
P1139

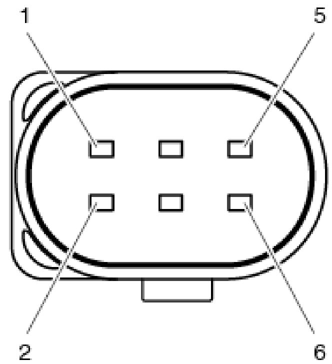
Code number	P1139
Fault code description	Lambda heater calibration test fault
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

P113A

Code number	P113A
Fault code description	Lambda sensor temperature – Unable to reach target temperature
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group - EGS heater 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 lambda sensor (F834) is in the operating mode.
Set condition of fault code	The PCI ECU (D420) detects that the temperature of the lambda sensor: • is not within the expected values within 25 seconds, or; • exceeds a safe maximum value
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 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 lambda sensor

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 sensor has an integrated heater to maintain a sensor operating temperature of approximately

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 113A-a | SRT Test Drive to Confirm Fault Perform the following pre-check steps to confirm this fault before continuing troubleshooting: • Use DAVIE to clear the existing active faults • Take the truck for a 30 minute test drive 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 2 | Step ID 113A-b | 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 113A-c | SRT Replace Lambda sensor 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 113A-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 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.
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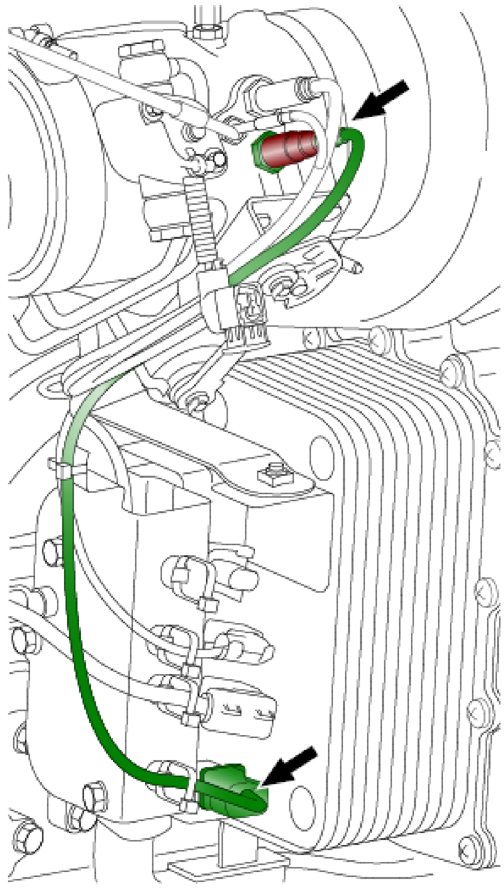
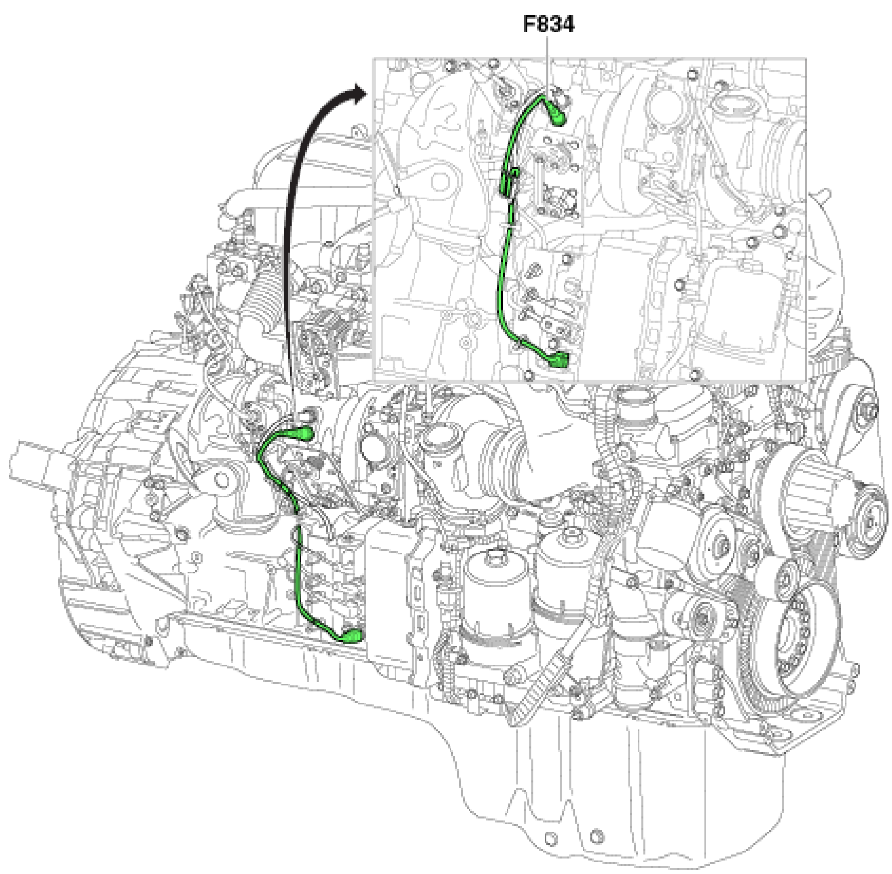
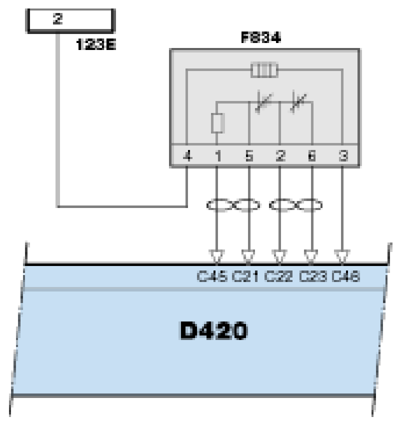
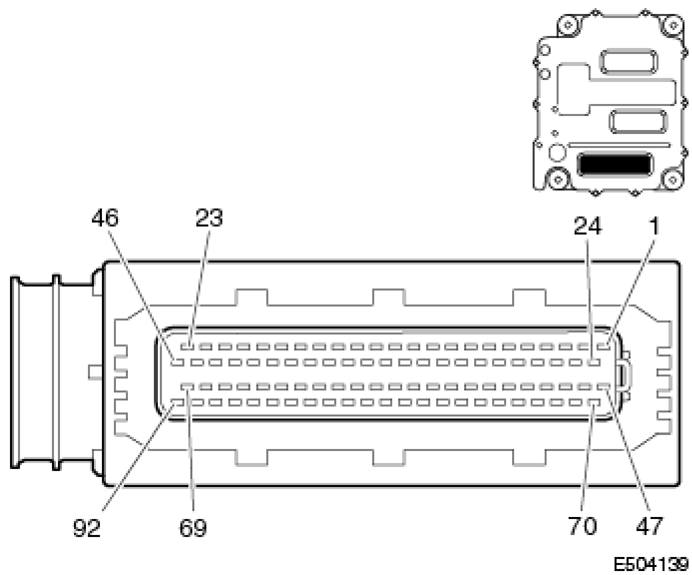
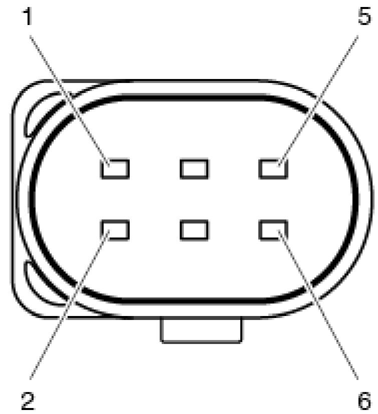
P113B

Code number	P113B
Fault code description	Lambda sensor controller - Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group - EGS heater 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 continuously when the engine is running.
Set condition of fault code	The PCI ECU (D420) detects that the lambda sensor heater controller inside the PCI ECU is malfunctioning.
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 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 lambda sensor
- ECU connections are damaged or disconnected

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 sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F].

<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 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 113B-a</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:
Use DAVIE to clear the existing active faults
Take the truck for a 30 minute test drive
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 2</td><td>Step ID 113B-b</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>
<table>
<tr><td>Step 3</td><td>Step ID 113B-c</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 4</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 113B-d</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 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</td></tr>
</table>

	cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
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P1158

Code number	P1158
Fault code description	Wheel speed, front axle, left - Data erratic, intermittent or incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The wheel speed sensor is a type of tachometer, consisting of a toothed ring and electrical pickup. It is a sender device used for reading the speed of a vehicle's wheel rotation.
Location of component(s)	The type of axle determines the sensor mounting location: • Steering axle sensors are typically installed in the steering knuckle or in a bolted-on bracket. • Drive axle sensors are typically mounted on a block, attached to the axle housing or in a bolted-on bracket.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The ECU detects that the speed of the left-front axle wheel speed sensor is > 160 km/h [99 mph].
Reset condition of fault code	This DTC changes to inactive when a normal wheel speed is detected.
Electrical diagram(s)	Refer to the OEM technical data for additional information.
Technical data	Refer to the OEM technical data for additional information.
Possible causes	Wheel speed sensor defect.
Additional information	The vehicle was driven excessively fast or the wheel speed sensor is malfunctioning.
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 Wheel Speed Sensor Checks

Step 1A Visual inspection, connections and wiring, wheel speed sensor, front axle left	
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 not fully charged, contacts are not tight • The related sensor is not installed correctly or it is damaged • The installed wheel and tire size is incorrect	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2A	**Go to step 2A**

Step 2 OEM Troubleshooting

Step 2A OEM troubleshooting	
Action 1. Refer to the OEM technical data for related troubleshooting information.	
Was an issue identified using the OEM troubleshooting?	
Yes	**No**
Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the	Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.

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.	

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. Overrun

   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

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, OBD Readiness Monitors

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 P1158 has been cleared.

Is the related OBD Monitor Readiness Status set to "Ready." Or, has P1158 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.

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P1159

Code number	P1159
Fault code description	Wheel speed , front axle , right – Data erratic , intermittent or incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The wheel speed sensor is a type of tachometer, consisting of a toothed ring and electrical pickup. It is a sender device used for reading the speed of a vehicle's wheel rotation.
Location of component(s)	The type of axle determines the sensor mounting location: • Steering axle sensors are typically installed in the steering knuckle or in a bolted-on bracket. • Drive axle sensors are typically mounted on a block, attached to the axle housing or in a bolted-on bracket.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The ECU detects that the speed of the right-front axle wheel speed sensor is > 160 km/h [99 mph].
Reset condition of fault code	This DTC changes to inactive when a normal wheel speed is detected.
Electrical diagram(s)	Refer to the OEM technical data for additional information.
Technical data	Refer to the OEM technical data for additional information.
Possible causes	Wheel speed sensor defect.
Additional information	The vehicle was driven excessively fast or the wheel speed sensor is malfunctioning.
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 Wheel Speed Sensor Checks

Step 1A Visual inspection, connections and wiring, wheel speed sensor, front axle, right	
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 not fully charged, contacts are not tight • The related sensor is not installed correctly or it is damaged • The installed wheel and tire size is incorrect	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2A	**Go to step 2A**

Step 2 OEM Troubleshooting

Step 2A OEM troubleshooting	
Action 1. Refer to the OEM technical data for related troubleshooting information.	
Was an issue identified using the OEM troubleshooting?	
Yes	**No**
Correct any issues found. If the wheel speed sensor is found to be damaged or	Contact the PACCAR Engine Support Center for further assistance in

broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	diagnosing this issue.
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. Overrun 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	
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, OBD Readiness Monitors

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 P1159 has been cleared.

Is the related OBD Monitor Readiness Status set to "Ready." Or, has P1159 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.

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P1160

Code number	P1160
Fault code description	Wheel speed, rear axle, left – Data erratic, intermittent or incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The wheel speed sensor is a type of tachometer, consisting of a toothed ring and electrical pickup. It is a sender device used for reading the speed of a vehicle's wheel rotation.
Location of component(s)	The type of axle determines the sensor mounting location: • Steering axle sensors are typically installed in the steering knuckle or in a bolted-on bracket. • Drive axle sensors are typically mounted on a block, attached to the axle housing or in a bolted-on bracket.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The ECU detects that the speed of the left-rear axle wheel speed sensor is > 160 km/h [99 mph].
Reset condition of fault code	This DTC changes to inactive when a normal wheel speed is detected.
Electrical diagram(s)	Refer to the OEM technical data for additional information.
Technical data	Refer to the OEM technical data for additional information.
Possible causes	Wheel speed sensor defect.
Additional information	The vehicle was driven excessively fast or the wheel speed sensor is malfunctioning.
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 Wheel Speed Sensor Checks

Step 1A Visual inspection, connections and wiring, wheel speed sensor, rear axle, left	
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 not fully charged, contacts are not tight • The related sensor is not installed correctly or it is damaged • The installed wheel and tire size is incorrect	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2A	**Go to step 2A**

Step 2 OEM Troubleshooting

Step 2A OEM troubleshooting	
Action 1. Refer to the OEM technical data for related troubleshooting information.	
Was an issue identified using the OEM troubleshooting?	
Yes	**No**

Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.
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. Overrun 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	
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, OBD Readiness Monitors

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 P1160 has been cleared.

Is the related OBD Monitor Readiness Status set to “Ready.” Or, has P1160 been cleared?

Yes	No

<table>
<tr>
<td></td>
<td>
<table>
<tr>
<td>Problem resolved. No further actions.</td>
<td>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.</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>

P1161

Code number	P1161
Fault code description	Wheel speed, rear axle, right – Data erratic, intermittent or incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The wheel speed sensor is a type of tachometer, consisting of a toothed ring and electrical pickup. It is a sender device used for reading the speed of a vehicle's wheel rotation.
Location of component(s)	The type of axle determines the sensor mounting location: • Steering axle sensors are typically installed in the steering knuckle or in a bolted-on bracket. • Drive axle sensors are typically mounted on a block, attached to the axle housing or in a bolted-on bracket.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The ECU detects that the speed of the right-rear axle wheel speed sensor is > 160 km/h [99 mph].
Reset condition of fault code	This DTC changes to inactive when a normal wheel speed is detected.
Electrical diagram(s)	Refer to the OEM technical data for additional information.
Technical data	Refer to the OEM technical data for additional information.
Possible causes	Wheel speed sensor defect.
Additional information	The vehicle was driven excessively fast or the wheel speed sensor is malfunctioning.
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 Wheel Speed Sensor Checks

Step 1A Visual inspection, connections and wiring, wheel speed sensor, rear axle, right	
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 not fully charged, contacts are not tight • The related sensor is not installed correctly or it is damaged • The installed wheel and tire size is incorrect	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	
If this DTC is still present, go to step 2A	**Go to step 2A**

Step 2 OEM Troubleshooting

Step 2A OEM troubleshooting	
Action 1. Refer to the OEM technical data for related troubleshooting information.	
Was an issue identified using the OEM troubleshooting?	
Yes	**No**

Correct any issues found. If the wheel speed sensor is found to be damaged or broken, replace it. Refer to step 3A to perform the corresponding repair verification cycles and rechecks.	Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.
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. Overrun 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	
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, OBD Readiness Monitors

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 P1161 has been cleared.

Is the related OBD Monitor Readiness Status set to "Ready." Or, has P1161 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.
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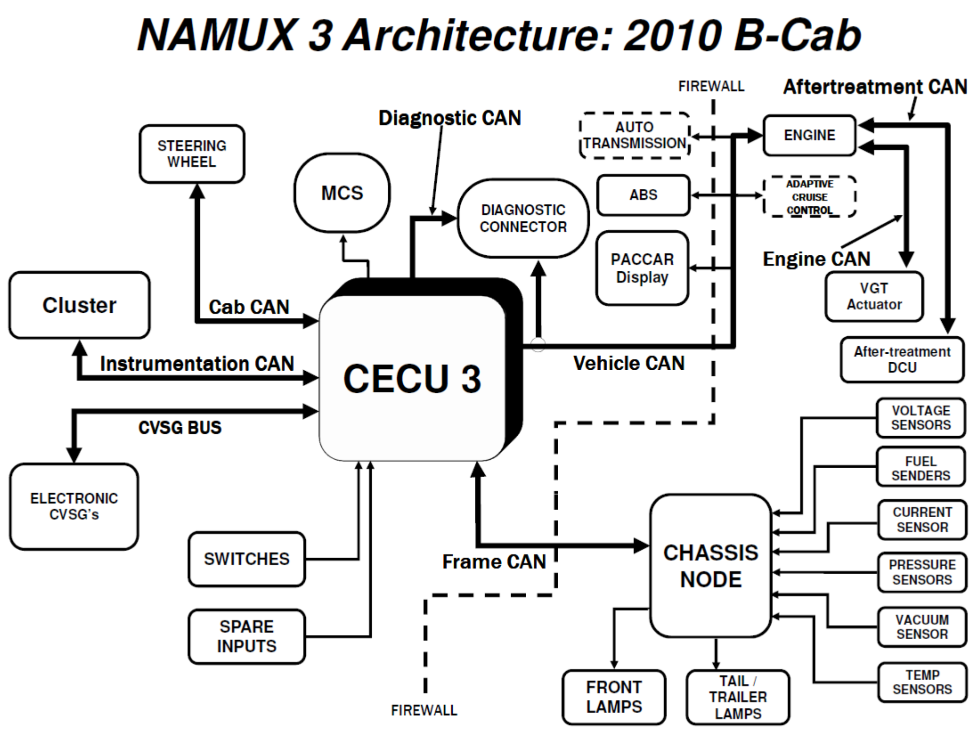
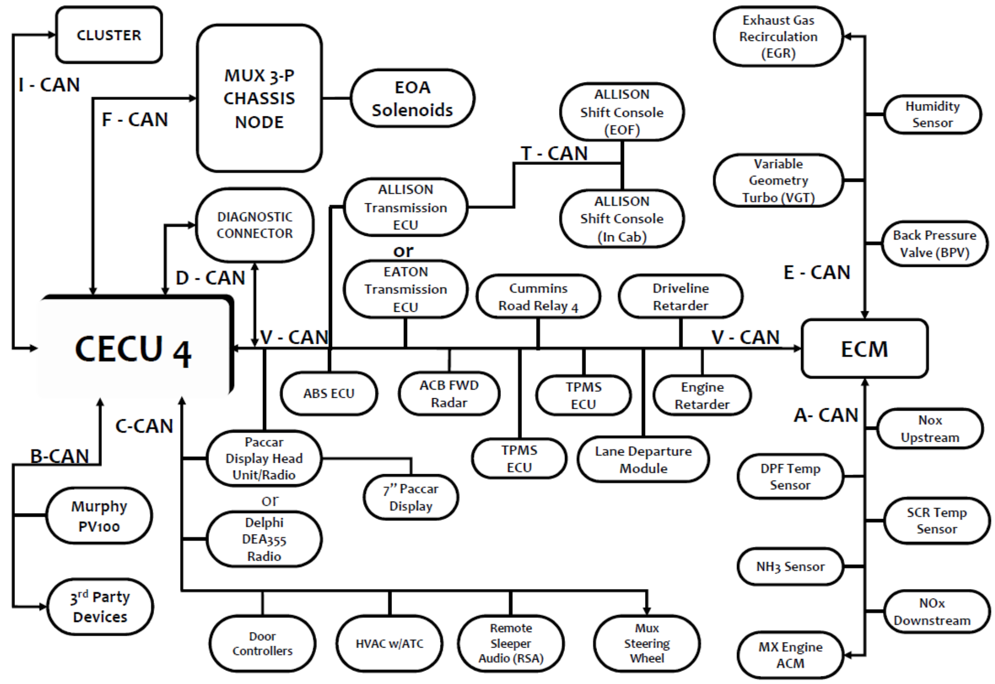
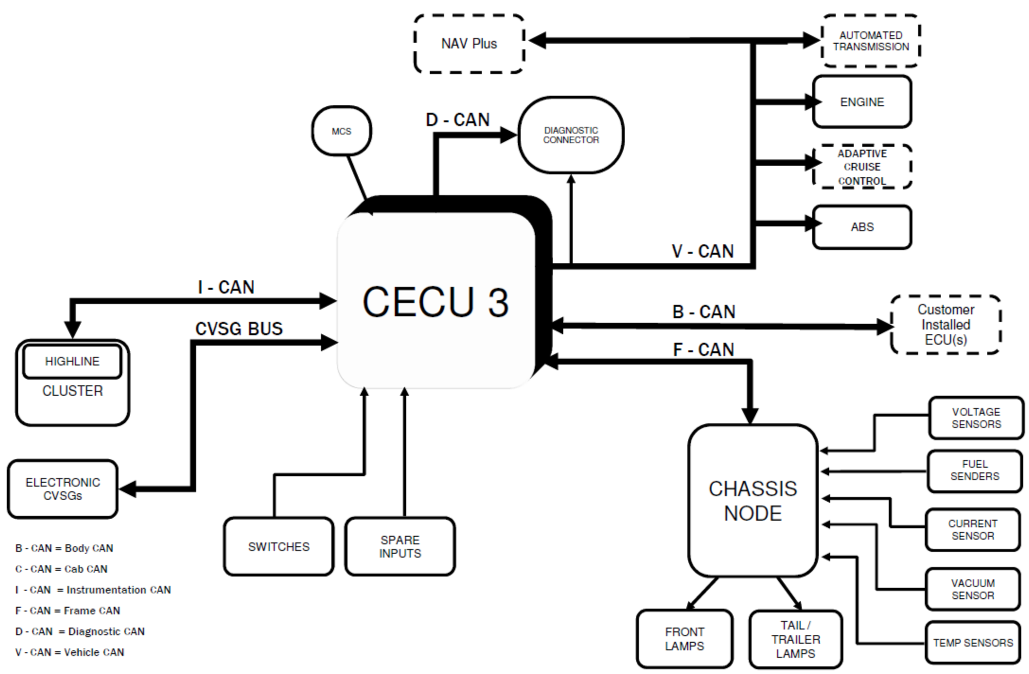
P1163

Code number	P1163
Fault code description	CAN communication - Message (TCO1) out of range - vehicle speed 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)	

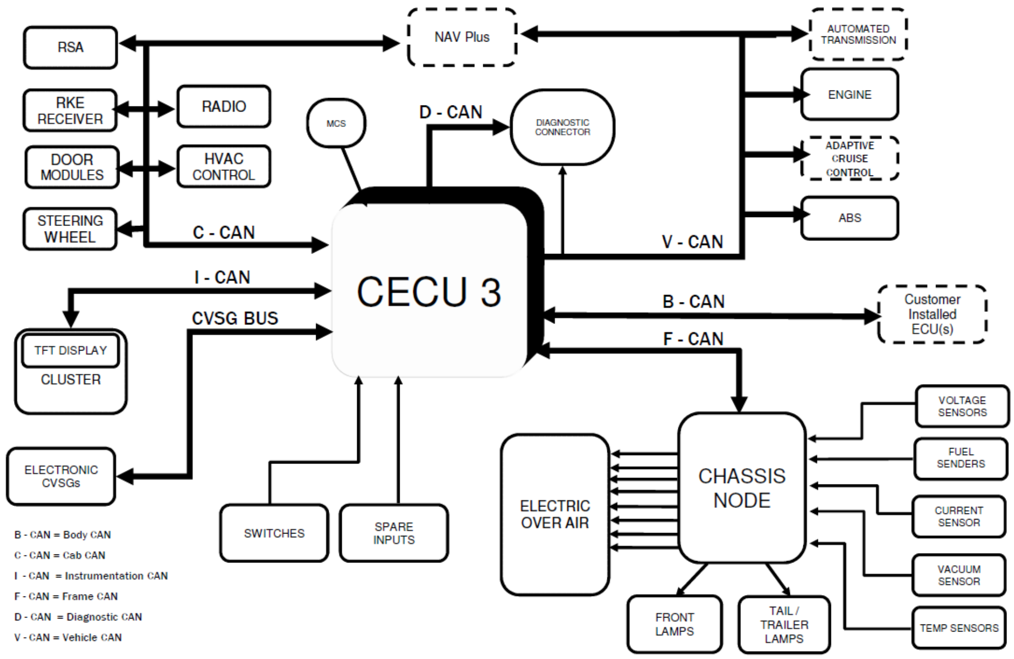
NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



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 1163a	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		

PACCAR

	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 1163b | 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 1163c | 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 1163d | 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 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.
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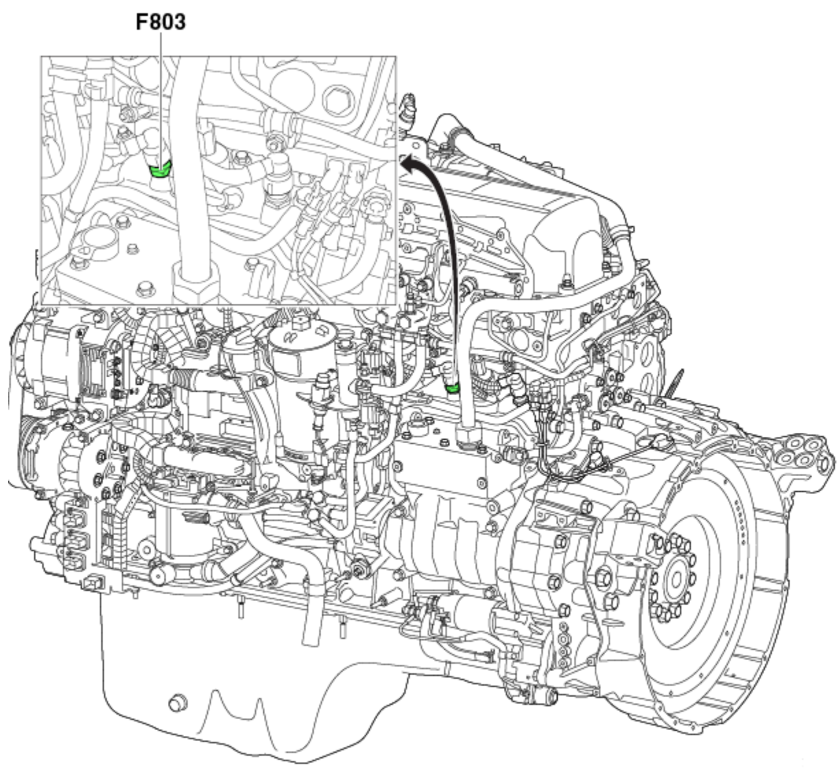
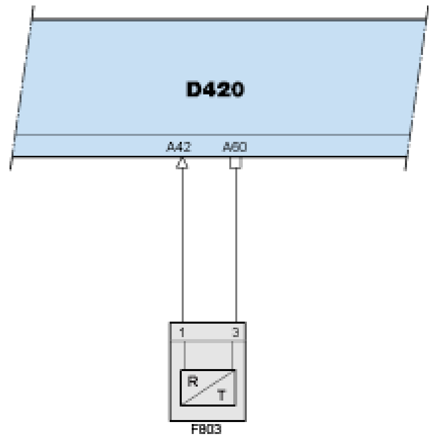
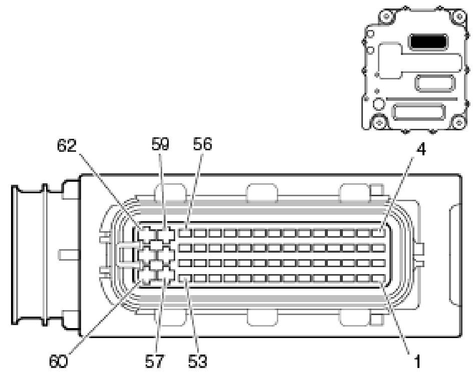
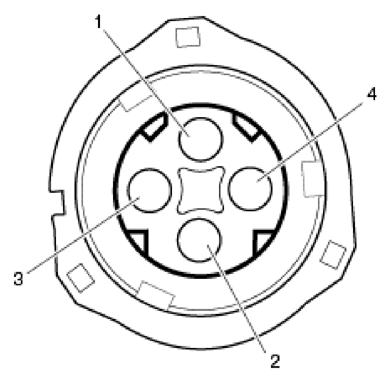
P1167

Code number	P1167
Fault code description	Fuel temperature - Data valid but too high, least severe
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: • Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). • Limitation of the engine torque when the fuel temperature is too high.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The PCI ECU (D420) detects that the fuel temperature is more than 92°C [198°F] for more than 300 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and let it idle for more than 300 seconds.

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




Wiring harness connector D420.A front view


Wiring harness connector F803 front view
D420 PCI ECU
F803 fuel temperature sensor3
<table>
<tr><td>D420</td><td>F803</td><td>Function</td></tr>
<tr><td>A42</td><td>1</td><td>Signal, fuel temperature</td></tr>
<tr><td>A60</td><td>3</td><td>Ground</td></tr>
</table>
</td></tr>
<tr><td>Technical data</td><td>Component check, fuel temperature sensor (F803)
Preparation

Key off the ignition.
Disconnect connector F803
Measure on component connector F803

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

<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>1</td><td>3</td><td>5633–6120 Ω</td><td>Resistance value at 0°C [34°F]</td></tr>
<tr><td></td><td></td><td>2411–2573 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>1128–1213 Ω</td><td>Resistance value at 40°C [104°F]</td></tr>
<tr><td></td><td></td><td>568–619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr>
<tr><td></td><td></td><td>306–337 Ω</td><td>Resistance value at 80°C [176°F]</td></tr>
<tr><td></td><td></td><td>176–196 Ω</td><td>Resistance value at 100°C [212°F]</td></tr>
</table>
Component & wiring check, ECU (D420)
Preparation

Key off the ignition.
Disconnect connector F803
Measure on the front side of wiring harness connector F803

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

Restrictions in the fuel to tank return circuit or faulty fuel pressure regulating valve.
Check the fuel pressure according to the prescribed job.
Excessive dumping of fuel from the common rail through common rail pressure release valve (L094).

</td></tr>
<tr><td>Additional information</td><td>The low-pressure fuel temperature is measured by the fuel temperature sensor (F803).</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 1167a</td><td>SRT</td></tr>
<tr><td colspan="3">Verify fuel level.
Verify that the fuel level is within normal range. Low fuel in a high ambient temperature can cause high fuel temperatures. Is fuel below the normal range and is the ambient temperature high?

Yes – Add fuel. Proceed to step 2.
No – Proceed to step 2.

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

	Step 2 | Step ID 1167b | SRT Check for fault codes Use DAVIE to find any other active fuel temperature fault codes. Are there other active fuel temperature fault codes? • Yes – Proceed to the other active fuel temperature fault codes. • No – Proceed to step 3. Step 3 | Step ID 1167c | SRT Validation • Turn the key switch ON. • Drive the truck under conditions similar to those that caused the fault code. • Use DAVIE to view the active fault codes. Is P1167 still active? • Yes – Contact the Engine Support Center (ESC). • No – The repair is complete.
Verification Drive Cycle	To validate repair, 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.
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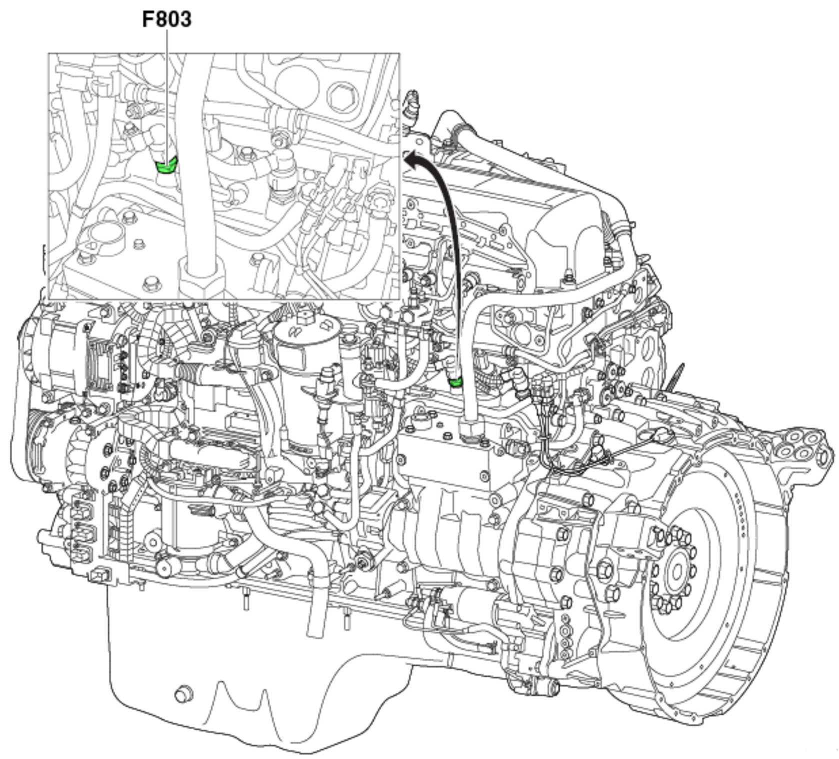
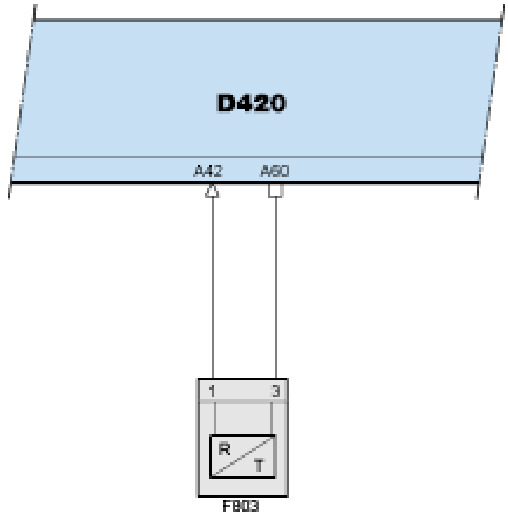
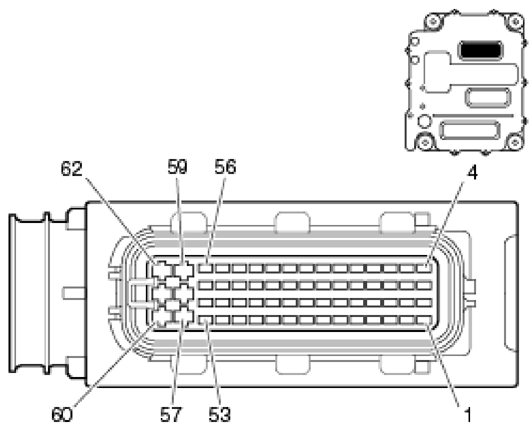
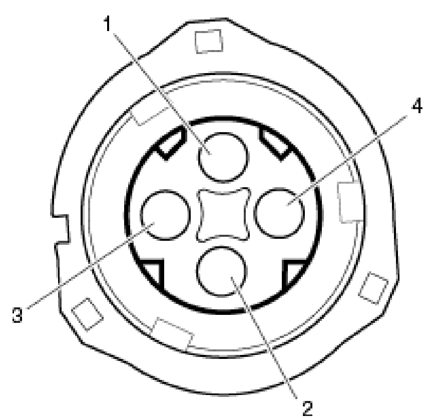
P1168

Code number	P1168
Fault code description	Fuel temperature - Data valid but too high, moderately severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: • preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). • limitation of the engine torque when the fuel temperature is too high.
Location of component(s)	
Diagnostic condition	This diagnostic runs when the engine is running for more than 200 seconds.
Set condition of fault code	The PCI ECU (D420) detects that the fuel temperature is more than 95°C [203°F] for more than 300 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and let it idle for more than 300 seconds.

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




Wiring harness connector D420.A front view


Wiring harness connector F803 front view
<table>
<tr><td>D420</td><td>F803</td><td>Function</td></tr>
<tr><td>A42</td><td>1</td><td>Signal, fuel temperature</td></tr>
<tr><td>A60</td><td>3</td><td>Ground</td></tr>
</table>
</td>
</tr>
<tr>
<td>Technical data</td>
<td>Component check, fuel temperature sensor (F803)
Preparation</td>
</tr>
</table>

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

Key off the ignition.
Disconnect connector F803
Measure on component connector F803

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>3</td><td>5633–6120 Ω</td><td>Resistance value at 0°C [34°F]</td></tr>
<tr><td>1</td><td>3</td><td>2411–2573 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td>1</td><td>3</td><td>1128–1213 Ω</td><td>Resistance value at 40°C [104°F]</td></tr>
<tr><td>1</td><td>3</td><td>568–619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr>
<tr><td>1</td><td>3</td><td>306–337 Ω</td><td>Resistance value at 80°C [176°F]</td></tr>
<tr><td>1</td><td>3</td><td>176–196 Ω</td><td>Resistance value at 100°C [212°F]</td></tr>
</table>
Component & wiring check, ECU (D420)
Preparation

Key off the ignition.
Disconnect connector F803
Measure on component connector F803

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

Restriction in the fuel to tank return circuit or faulty fuel pressure regulating valve.
Check the fuel pressure according to the prescribed job.
Excessive dumping of fuel from the common rail through the common rail pressure release valve (L094).

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

The low-pressure fuel temperature is measured by the fuel temperature sensor (F803).
Engine torque is reduced with this DTC active.

</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 1168a</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>
</td></tr>
</table>

Step 2	Step ID 1168b	SRT
Verify that the fuel level is within normal range. Low fuel in a high ambient temperature can cause high fuel temperatures. Is fuel below the normal range and is the ambient temperature high? • Yes – Add fuel. Proceed to step 3. • No – Proceed to step 3.		

Step 3	Step ID 1168c	SRT
Does the fuel pressure pass these tests? • Yes – Proceed to step 4. • No – Repair as needed. Proceed to the validation step.		

Step 4	Step ID 1168d	SRT

Troubleshooting steps
• Drive the truck under conditions similar to those that caused the fault code.
• Stop the truck.
• Use DAVIE to view the fuel temperature.
  • A passing fuel blender temperature is 100 to 125°F.
  • A failing fuel blender temperature is above 160°F.
  • A passing fuel blender bypassed fuel is 80 to 100°F.
Is the fuel blender temperature above 160°F?
• Yes – Replace the fuel blender. Proceed to step 4.
• No – Contact Engine Support Center (ESC).		

Step 5	Step ID 1168e	SRT

Troubleshooting steps
• Turn the key switch OFF.
• Disconnect the fuel temperature sensor.
• Inspect the fuel temperature sensor connector/harness interface for:
  ▪ corroded or dirty pins,
  ▪ damaged pins,
  ▪ pushed back or expanded pins,
  ▪ loose connector,
  ▪ moisture in or on the connector,
  ▪ connector shell damage,
  ▪ missing or damaged connector seals and/or
  ▪ wire insulation damage.
Has dirt or damage been found?
• Yes – Clean, repair or replace the damaged connection or harness if possible. Proceed to step 5.
• No – Proceed to step 5.		

Step 6	Step ID 1168f	SRT
Troubleshooting steps • Turn the key switch OFF. • Disconnect the fuel temperature sensor.		

- Pin the power supply leg.
    - If voltage is 4.8 V to 5.2 V – Pass. Proceed to step 6.
    - If voltage is lower than 4.8 V or higher than 5.2 V – Fail. Repair/replace harness as needed, then retest. Proceed to step 6.

Step 7	Step ID 1168g	SRT

Troubleshooting steps

- Turn the key switch OFF.
- Disconnect the fuel sensor.
- Place a jumper wire between the power supply and harness at the sensor connector.
- Pin the return leg of the circuit.
    - If voltage is 4.8 V to 5.2 V – Pass. Proceed to step 7.
    - If voltage is lower than 4.8 V or higher than 5.2 V – Fail. Repair/replace harness on signal return leg, as needed, then retest. Proceed to step 7

Step 8	Step ID 1168h	SRT

Troubleshooting steps

- Turn the key switch OFF.
- Disconnect the fuel temperature sensor.
- Pin the sensor signal pin to the chassis ground.

Does the ohmmeter indicate that there is continuity between the sensor signal pin and the chassis ground?

- Yes – Repair/replace the grounded portion of the circuit on the return leg, as needed, then retest. Proceed to step 7.
- No – Proceed to step 8.

Step 9	Step ID 1168i	SRT

Troubleshooting steps

- Turn the key switch ON.
- Drive the truck under conditions similar to those that caused the fault code.
- Use DAVIE to view the active fault codes.

Is P1168 still active?

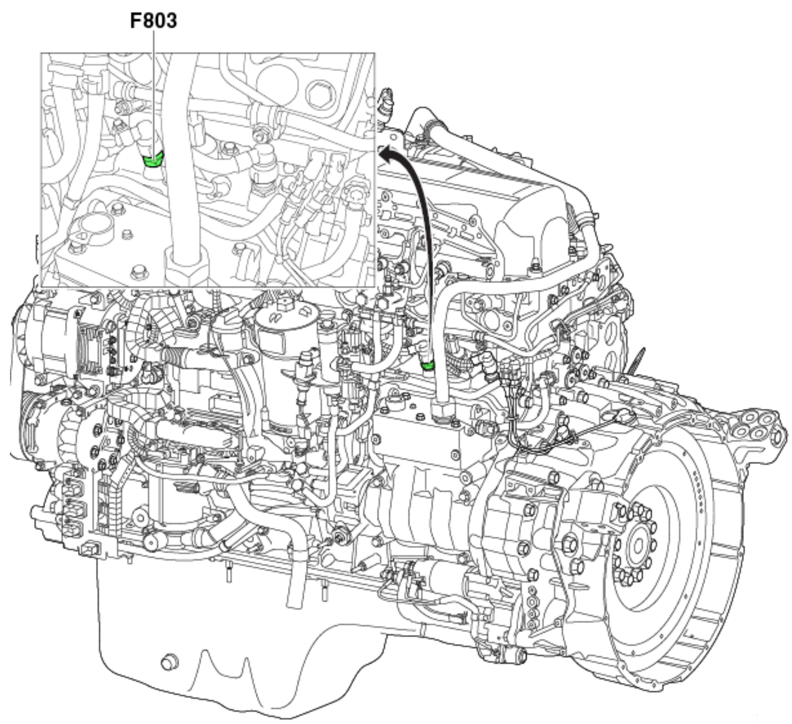
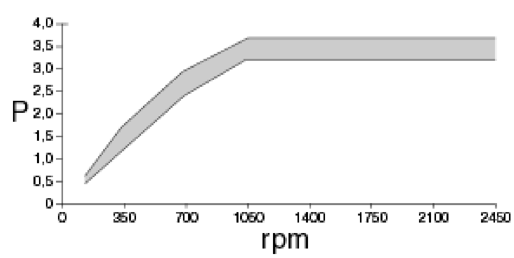
- Yes – Contact the Engine Support Center (ESC). Proceed to step 10.
- No – The repair is complete.

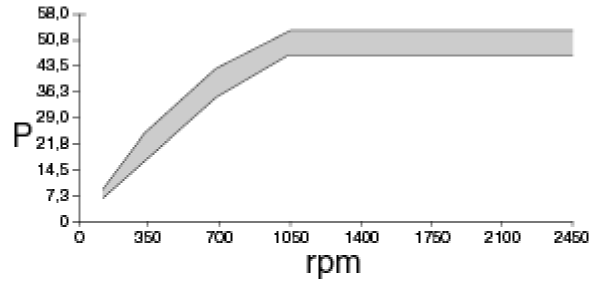
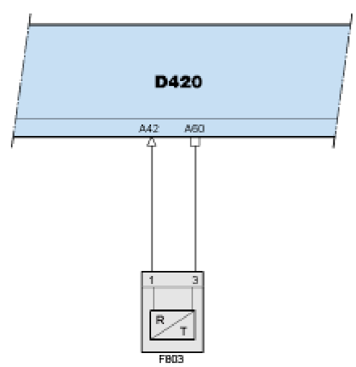
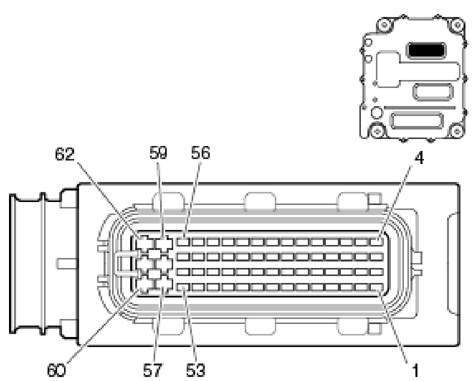
Step 10	Step ID 1168j	SRT

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.

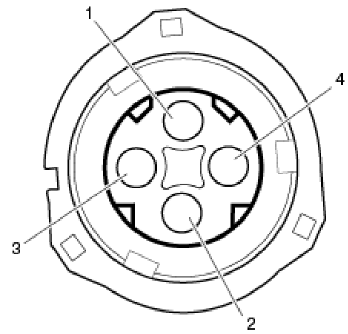
Verification Drive Cycle	To verify the repairs, drive the vehicle with the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Index

P1180

Code number	P1180
Fault code description	Fuel temperature - Data valid but too high, moderately severe
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: • Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). • Limitation of the engine torque when the fuel temperature is too high.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is running.
Set condition of fault code	 P fuel pressure in bar Rpm- Engine speed in rpm

	 P fuel pressure in psi Rpm- Engine speed in rpm The PCI ECU (D420) detects that: • fuel temperature is more than 95°C [203°F], and • fuel pressure is too low (gray area of the graph), and • ambient temperature is more than 45°C [113°F], and • fuel tank level is low
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and operate it at several engine speeds
Electrical diagram(s)	  Wiring harness connector D420.A front view

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



Wiring harness connector F803 front view

D420PCI ECU
F803fuel temperature sensor3

<table>
<tr><td>D420</td><td>F803</td><td>Function</td></tr>
<tr><td>A42</td><td>1</td><td>Signal, fuel temperature</td></tr>
<tr><td>A60</td><td>3</td><td>Ground</td></tr>
</table>

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

Component check, fuel temperature sensor (F803)
Preparation

Key off the ignition.
Disconnect connector F803
Measure on component connector F803

<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>5633–6120 Ω</td><td>Resistance value at 0°C [34°F]</td></tr>
<tr><td></td><td></td><td>2411–2573 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>1128–1213 Ω</td><td>Resistance value at 40°C [104°F]</td></tr>
<tr><td></td><td></td><td>568–619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr>
<tr><td></td><td></td><td>306–337 Ω</td><td>Resistance value at 80°C [176°F]</td></tr>
<tr><td></td><td></td><td>176–196 Ω</td><td>Resistance value at 100°C [212°F]</td></tr>
</table>

Component & wiring check, ECU (D420)
Preparation

Key off the ignition.
Disconnect connector F803
Measure on the front side of wiring harness connector F803

<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>5V</td><td>Ignition keyed on</td></tr>
</table>

</td>
</tr>
<tr>
<td>Possible causes</td>
<td>Fuel is hot due to low fuel tank level and high ambient temperatures.</td>
</tr>
<tr>
<td>Additional information</td>
<td>

The low-pressure fuel pressure is measured by the fuel pressure sensor (F801).
The low-pressure fuel temperature is measured by the fuel temperature sensor (F803).
Engine torque is reduced.

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

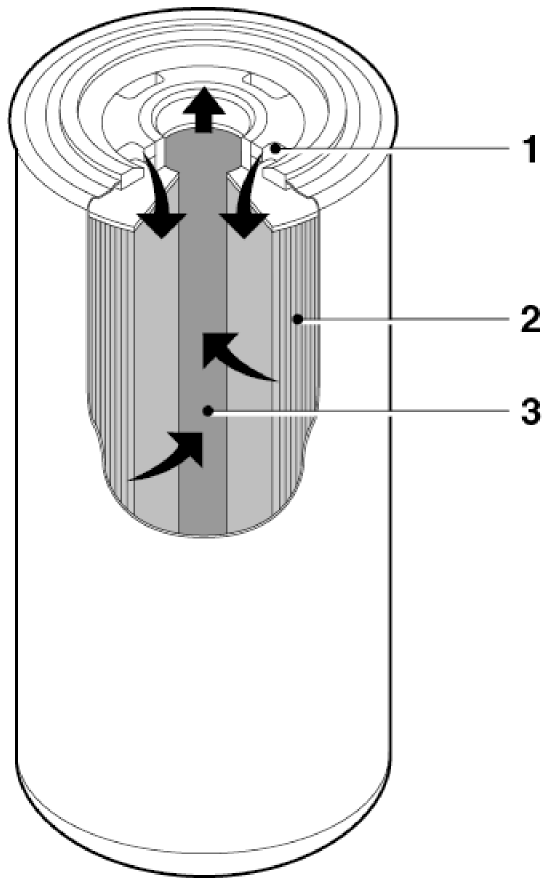
<table>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition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

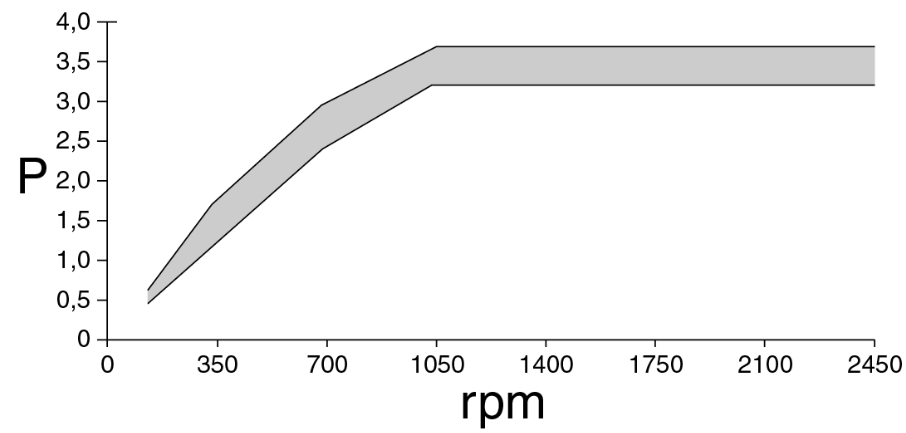
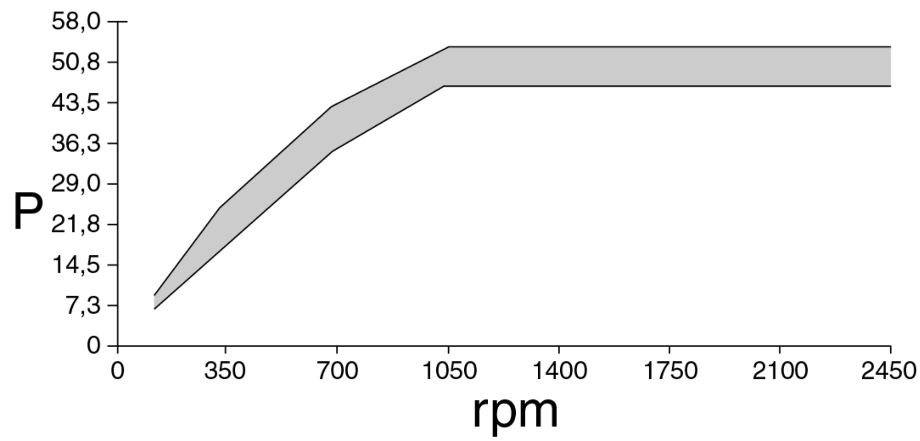
Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
For specific electrical component information and pinout locations, always refer to the technical data.
It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify 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 1180a</td><td>SRT</td></tr>
<tr><td colspan="3">Verify fuel level.
Verify that the fuel level is within normal range. Low fuel in a high ambient temperature can cause high fuel temperatures. Is fuel below 5% and is the ambient temperature high?

Yes – Add fuel. Proceed to other fault codes.
No – Proceed to other fault codes.
</td></tr>
</table>
</td>
</tr>
<tr>
<td>Verification Drive Cycle</td>
<td>To validate repair, 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.</td>
</tr>
<tr>
<td></td>
<td>Back to Index</td>
</tr>
</table>

P1191

Code number	P1191
Fault code description	Fuel filter – Clogged
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	 The fuel filter filters dirt out of the fuel. The fuel enters via connection (1) and is forced through the filter element (2). There is a central tube (3) in the filter element. The filtered fuel flows to the fuel filter holder. There is an orifice in the screw on the fuel filter holder to bleed the air out of the system (filter). Open the screw to bleed air out of the system.
Location of component(s)	Not available/required for this code
Diagnostic condition	This diagnostic runs continuously when the engine is running.
Set condition of fault code	The PCI ECU (D420) detects that: • fuel temperature is more than 95°C [203°F] and • fuel pressure is too low (gray area of the graph)

	 P Fuel pressure in bar rpm Engine speed in rpm  P Fuel pressure in psi rpm Engine speed in rpm
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and operate it at several engine speeds.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Clogged fuel filter
Additional information	• The low-pressure fuel pressure is measured by the fuel pressure sensor (F801). • The low-pressure fuel temperature is measured by the fuel temperature sensor (F803).
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 1191a	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.		

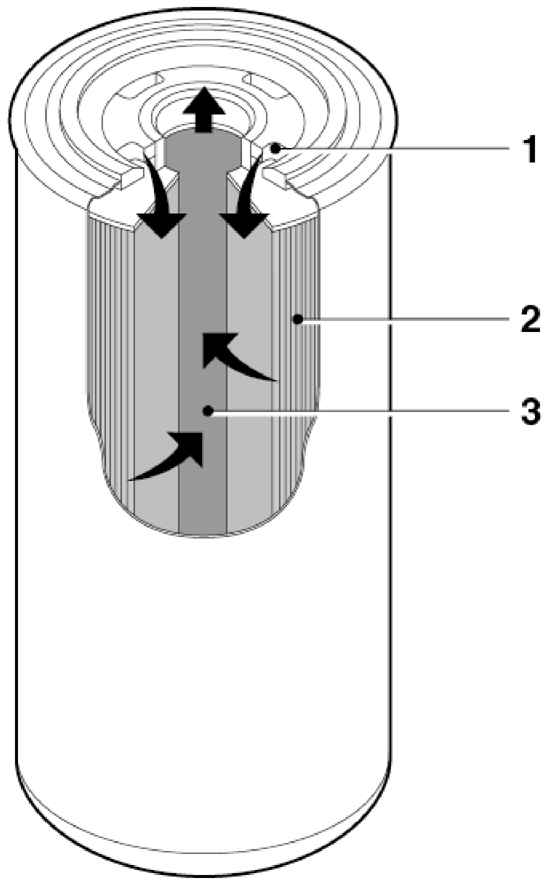
Step 2	Step ID 1191b	SRT
Check fuel supply line for leakage and blockage: Repair or replace the supply line and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active – Proceed to step 3		

Step 3	Step ID 1191c	SRT
Replace: Fuel filter Replace the identified faulty component. Use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active – Proceed to step 4		

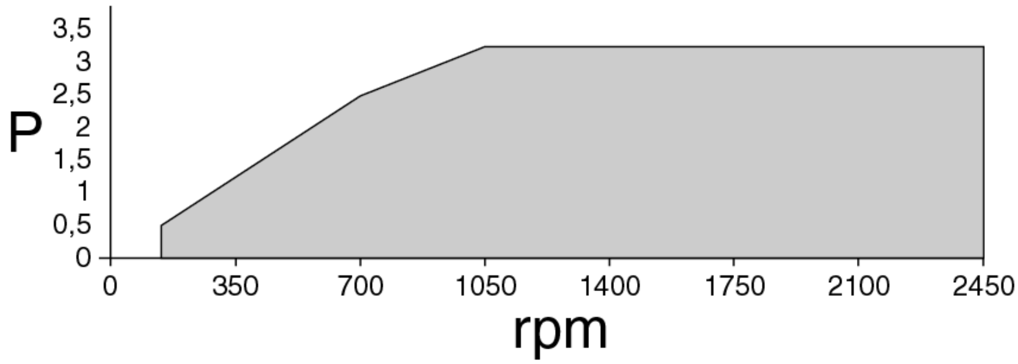
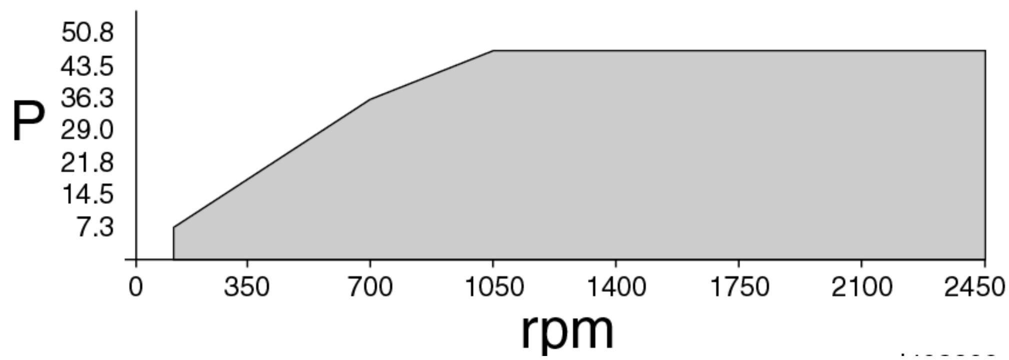
Step 4	Step ID 1191d	SRT
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

Verification Drive Cycle	To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and operate it at several engine speeds.
	Back to Index

P1194

<table>
<tr><td>Code number</td><td>P1194</td></tr>
<tr><td>Fault code description</td><td>Fuel filter - Very clogged</td></tr>
<tr><td>Fault code information</td><td>3 drive cycle recovery
Readiness group – None
Freeze frame type – Fuel</td></tr>
<tr><td>Description of component(s)</td><td>

The fuel filter filters dirt out of the fuel.
The fuel enters via connection (1) and is forced through the filter element (2). There is a central tube (3) in the filter element. The filtered fuel flows to the fuel filter holder.
There is an orifice in the screw on the fuel filter holder to bleed the air out of the system (filter).
Open the screw to bleed air out of the system.</td></tr>
<tr><td>Location of component(s)</td><td>Not available/required for this code</td></tr>
<tr><td>Diagnostic condition</td><td>This diagnostic runs continuously when the engine is running.</td></tr>
<tr><td>Set condition of fault code</td><td>The PCI ECU (D420) detects that:
• fuel temperature is more than 95°C [203°F], and
• fuel pressure is too low (gray area of the graph).</td></tr>
</table>

	 P Fuel pressure in bar rpm Engine speed in rpm  P Fuel pressure in psi rpm Engine speed in rpm
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and operate it at several engine speeds.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Very clogged fuel filter.
Additional information	• The low-pressure fuel pressure is measured by the fuel pressure sensor (F801). • The low-pressure fuel temperature is measured by the fuel temperature sensor (F803). • 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 1194a	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.		

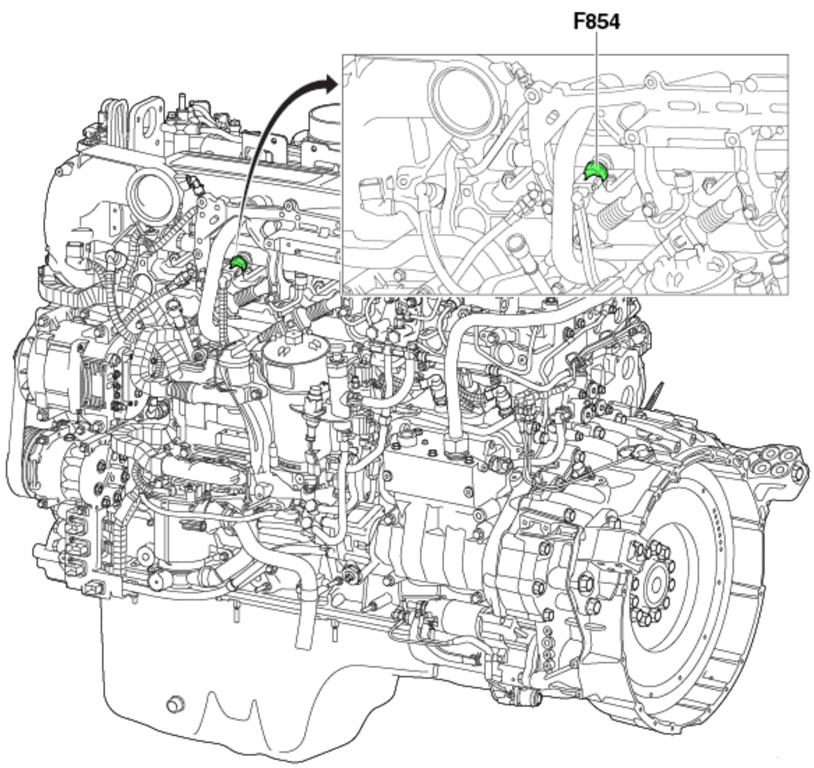
Step 2	Step ID 1194b	SRT
Check fuel supply line for leakage and blockage: Repair or replace the supply line and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active – Proceed to step 3		

Step 3	Step ID 1194c	SRT
Replace: Fuel filter Replace the identified faulty component. Use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active – Proceed to step 4		

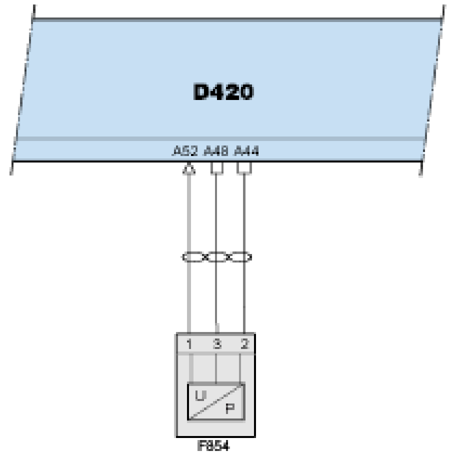
Step 4	Step ID 1194d	SRT
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

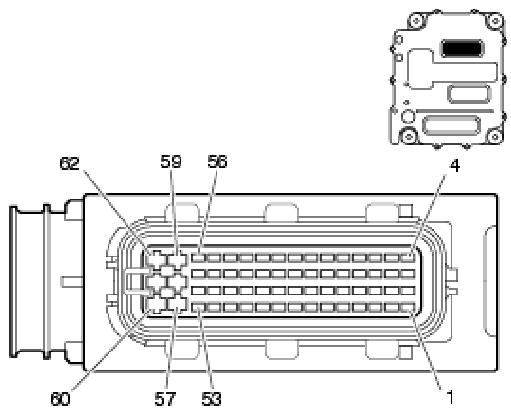
Verification Drive Cycle	To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and operate it at several engine speeds.
	Back to Index

P1195

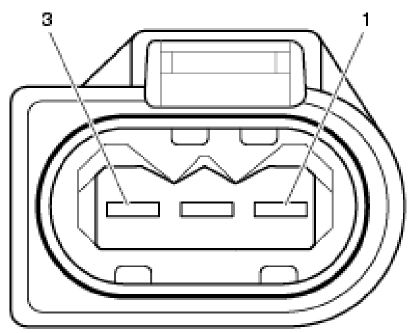
Code number	P1195
Fault code description	Engine rail pressure - Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	The rail pressure is measured in the common rail. 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 not running, and; • the ignition is keyed on after it has been off for more than 200 seconds, and; • fuel temperature is more than 0°C [32°F]
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure is more than 245 bar [3553 psi].
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 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

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

- Measure on the front side of wiring harness connector F854

<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></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>Common rail pressure sensor deviation</td></tr>
<tr><td>Additional information</td><td>

- For this diagnostic, the actual rail pressure is monitored when the engine is not running.
- The rail pressure is measured in the common rail by the common rail pressure sensor (F854).
- 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 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 1195a</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>

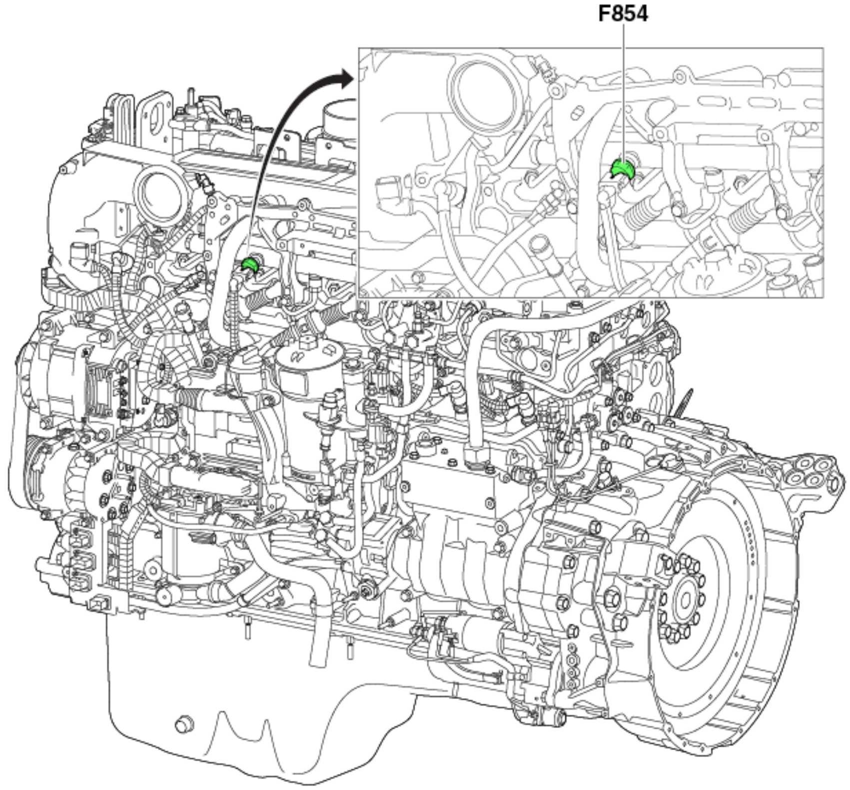
<table>
<tr><td>Step 2</td><td>Step ID 1195b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Based on the fault message provided, confirm that the following electrical values are within specified 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 1195c</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 resolve
• Fault active - Proceed to step 4</td></tr>
</table>

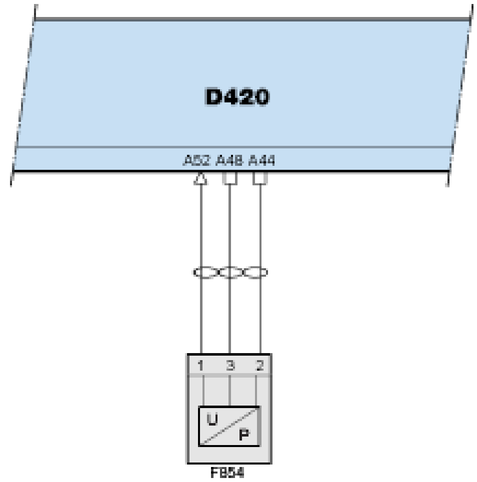
</td></tr>
</table>

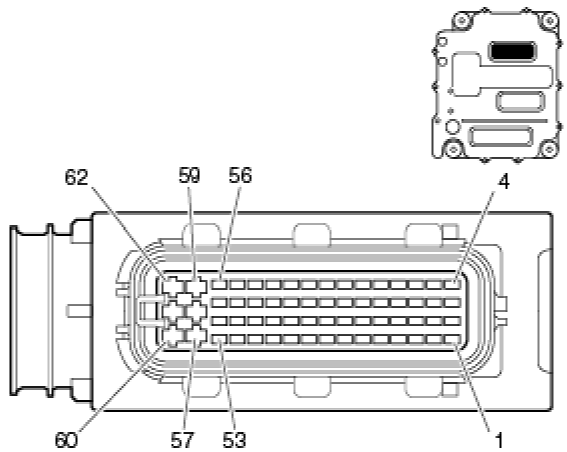
	Step 4 | Step ID 1195d | SRT Replace: Common Rail Pressure sensor (Common Rail) Replace the Common Rail assembly, which includes the Common Rail Pressure sensor. NOTE: The entire Common Rail must be replaced. The Common Rail Pressure sensor is a non-serviceable part and cannot be replaced or repaired separately. Contact the PACCAR Engine Support Call Center to confirm replacement of the Common Rail assembly. Use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • If this related fault is still active, proceed to step 5 Step 5 | Step ID 1195e | 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 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 Index

P1196

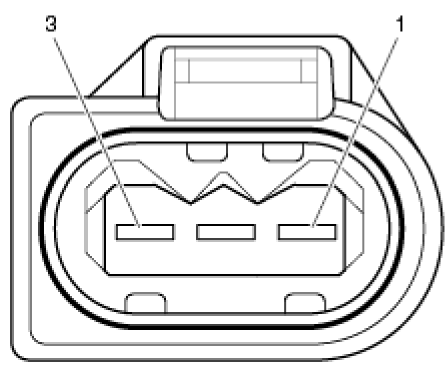
Code number	P1196
Fault code description	Engine rail pressure - Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	The rail pressure is measured in the common rail. 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 not running, and; • the ignition is keyed on after it has been off for more than 200 seconds, and; • fuel temperature is more than 0°C [32°F]
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure is more than 140 bar [2030 psi].
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 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
Possible causes	Common rail pressure sensor deviation
Additional information	• For this diagnostic, the actual rail pressure is monitored when the engine is not running. • The rail pressure is measured in the common rail by the common rail pressure sensor (F854). • Engine torque is reduced.

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	2	5V	Ignition keyed on

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.

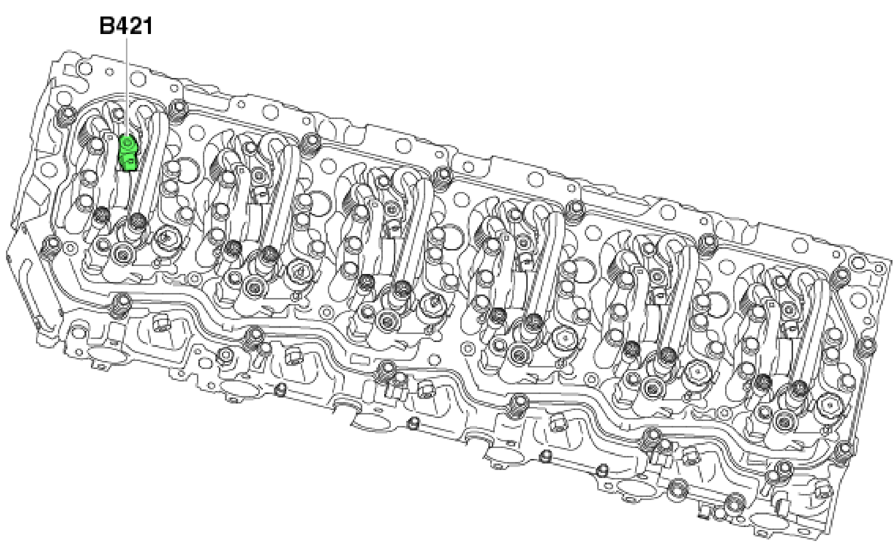
Step 1	Step ID 1196a	SRT
Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.		

Step 2	Step ID 1196b	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 3 • No - Proceed to step 4		

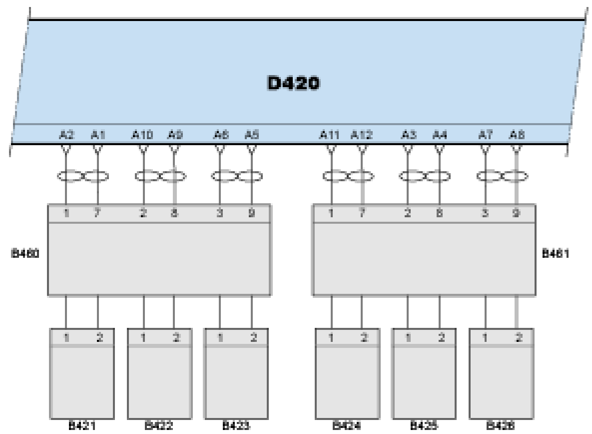
Step 3	Step ID 1196c	SRT

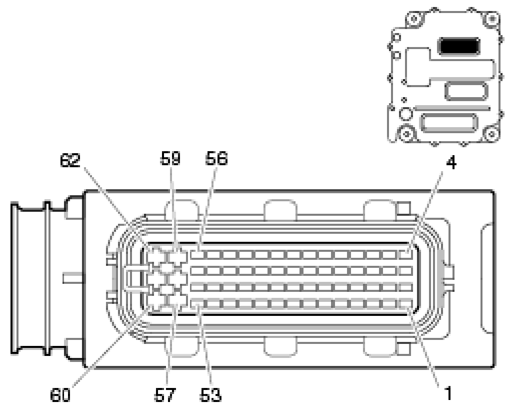
	Repair or replace Common Rail assembly, which includes the Common Rail Pressure sensor, and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4 Step 4 | Step ID 1196d | SRT For further assistance in diagnosing this issue or for 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 repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.
	Back to Index

P1201

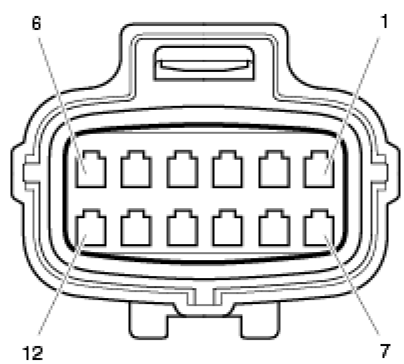
Code number	P1201
Fault code description	Injector solenoid valve cylinder 1 - Current too low or open circuit on ECU D420 pin A2
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	The diagnostic runs continuously with the ignition on.
Set condition of fault code	This condition will be set if Current in Needle control valve is less than 4.5A.
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)
Preparation

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

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 5 (B425)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 6 (B426)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

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

- Faulty sensor
- Faulty connector
- Faulty wiring

</td>
</tr>
<tr>
<td>Additional information</td>
<td>No additional information available.</td>
</tr>
<tr>
<td>Diagnostic Step-by-Step</td>
<td>

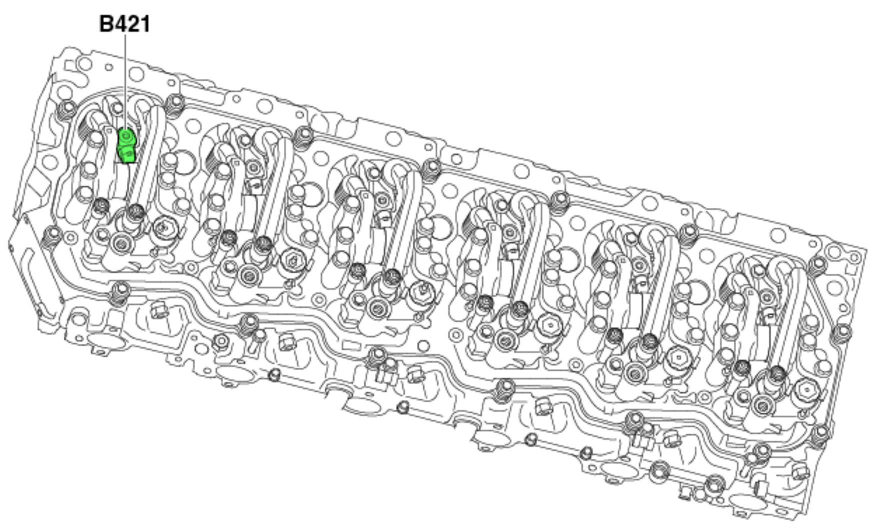
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting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

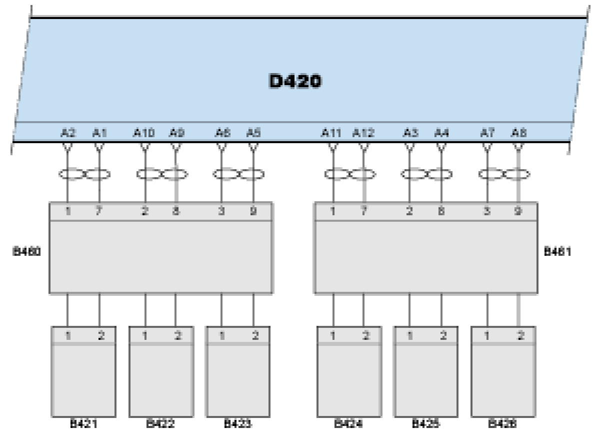
</td>
</tr>
</table>

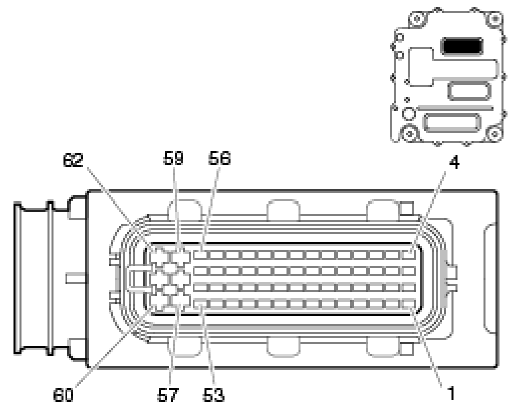
	<table><tr><td>Step 1</td><td>Step ID 1201a</td><td>SRT</td></tr><tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr></table> <table><tr><td>Step 2</td><td>Step ID 1201b</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 1201c</td><td>SRT</td></tr><tr><td colspan="3">Repair or replace ‘Solenoid Valve Injector, Cylinder 1’ 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 1201d</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 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 Index

P1202

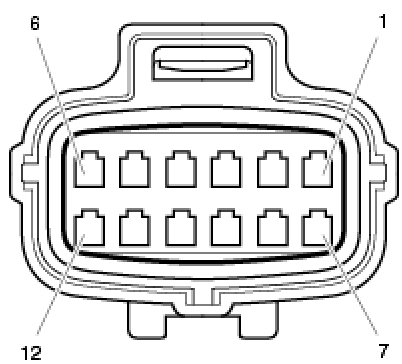
Code number	P1202
Fault code description	Injector solenoid valve cylinder 1 - Short circuit between ECU D420 pin A1 and A2
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	Diagnostic condition is set when Power stage hardware is active
Set condition of fault code	• If High side voltage on the injector (before injection) compared to battery voltage is less than the threshold value 20.00% and greater than the threshold value 80.00% then the condition is set • If Current passing through the sensor resistor is greater than the threshold value 25A then the condition is set
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 5 (B425)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 6 (B426)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes	No possible causes 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

<table>
<tr>
<td></td>
<td>
'possible causes' section.
<table>
<tr><td>Step 1</td><td>Step ID 1202a</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 1202b</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 1202c</td><td>SRT</td></tr>
<tr><td colspan="3">Repair or replace 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 1202d</td><td>SRT</td></tr>
<tr><td colspan="3">Replace the identified faulty component (Solenoid Valve Injector, Cylinder 1) 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 1202e</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 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.</td>
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<tr>
<td></td>
<td>Back to Index</td>
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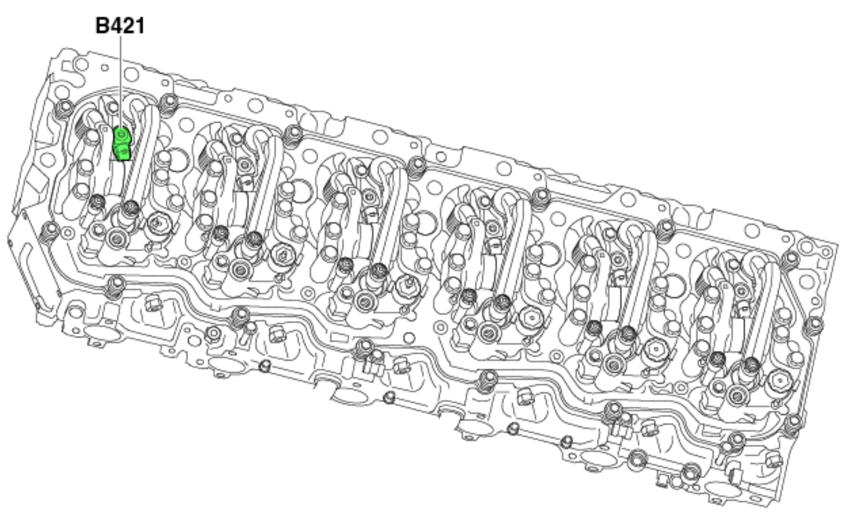
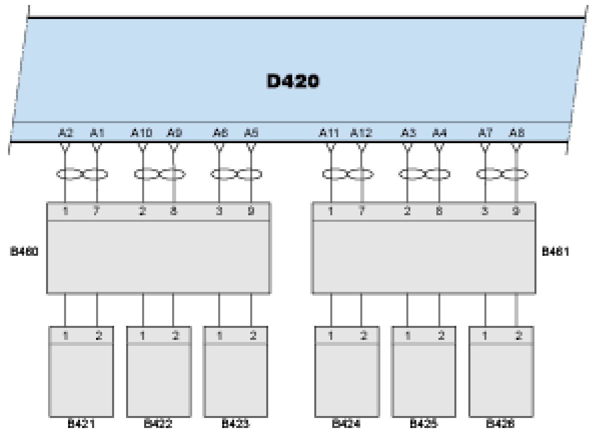
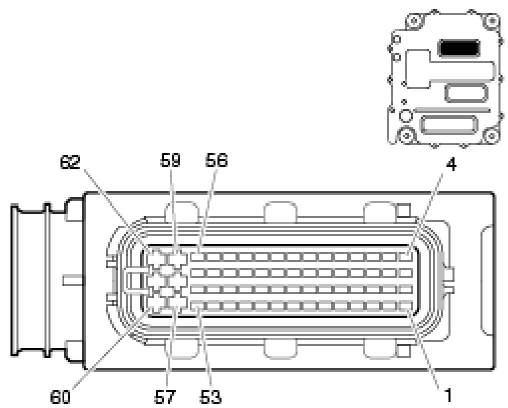
P1203

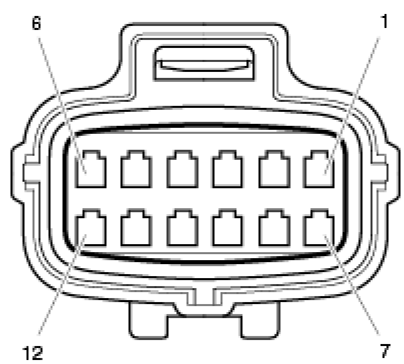
Code number	P1203
Fault code description	Injector solenoid valve cylinder 1 - Voltage too low or short circuit to ground on ECU D420 pin A2
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	Diagnostic condition is set when Power stage hardware is active
Set condition of fault code	• If High side voltage on the injector (before injection) compared to battery voltage is less than the threshold value 20.00% then the condition is set. • If Current through sense resistor on driver bank A is less than the threshold value 4.50A then the condition is set.
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)
Preparation
- Key off the ignition

<table>
<tr><td></td><td>
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>1</td><td>7</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, injector solenoid valve cylinder 5 (B425)
Preparation
Key off the ignition
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>2</td><td>8</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, injector solenoid valve cylinder 6 (B426)
Preparation
Key off the ignition
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>3</td><td>9</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>No possible causes 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 1203a</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>
</td></tr>
</table>

Step 2	Step ID 1203b	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 3
- No - Proceed to step 4

Step 3	Step ID 1203c	SRT

Repair or replace 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 1203d	SRT

Replace the identified faulty component (Solenoid Valve Injector, Cylinder 1) and use DAVIE to re-check for the presence of active faults.

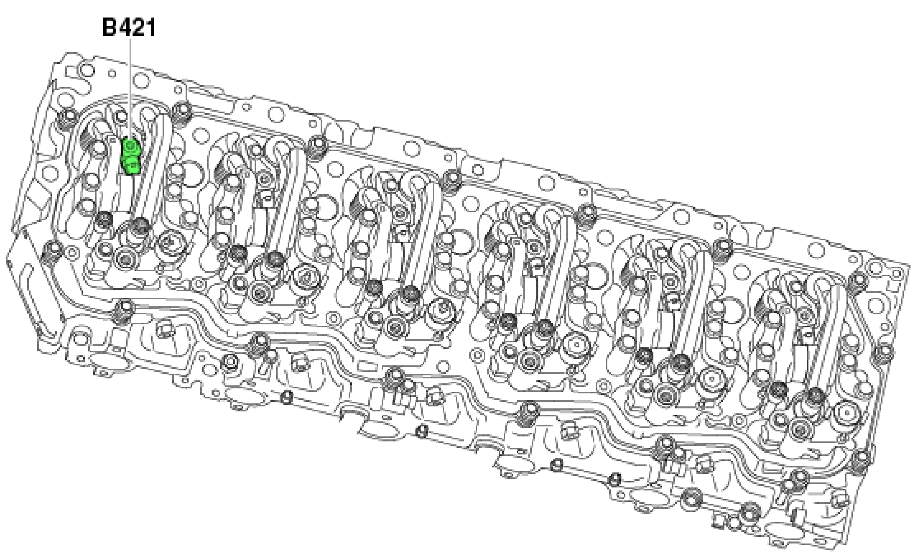
- Fault inactive – issue resolve
- Fault active - Proceed to step 5

Step 5	Step ID 1203e	SRT

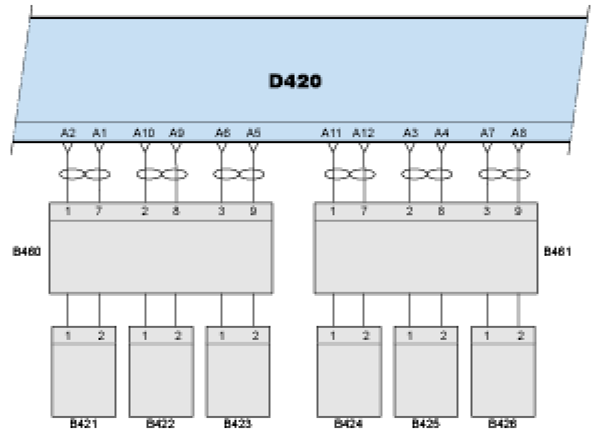
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

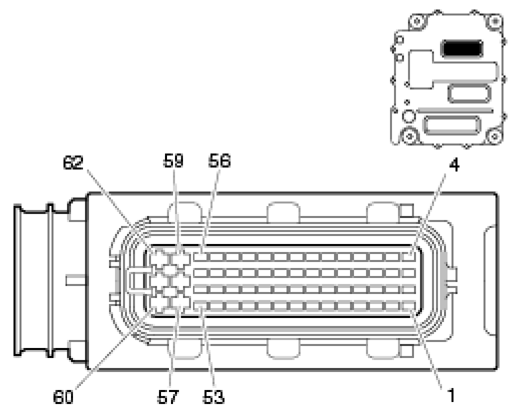
Verification Drive Cycle	To validate repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
	Back to Index

P1204

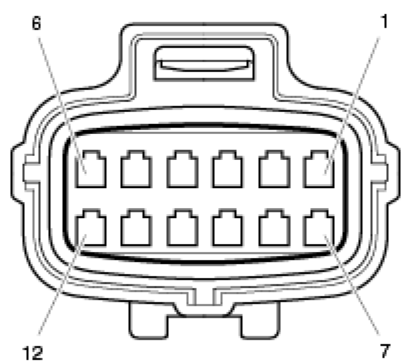
Code number	P1204
Fault code description	Injector solenoid valve cylinder 1 - Voltage too high or short circuit to supply on ECU D420 pin A2
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic runs whenever the engine is running at idle or higher RPM. This code will set If the voltage on the ground wire for the injector exceeds 9.6 volts during when the injector is commanded on while the engine is running.
Set condition of fault code	This condition is set when • High side voltage on the injector (before injection) compared to battery voltage is higher than 80% • Current through sense resistor on driver bank A is more than 25 A
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)
Preparation

	• Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 1 | 7 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 5 (B425) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 2 | 8 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 6 (B426) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 3 | 9 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F]
Possible causes	No possible causes 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 1204a | 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 1204b	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 3
- No - Proceed to step 4

Step 3	Step ID 1204c	SRT

Repairs or component replacements appropriate component ‘Solenoid Valve Injector, Cylinder 1’ and use DAVIE to re-check for the presence of active faults.

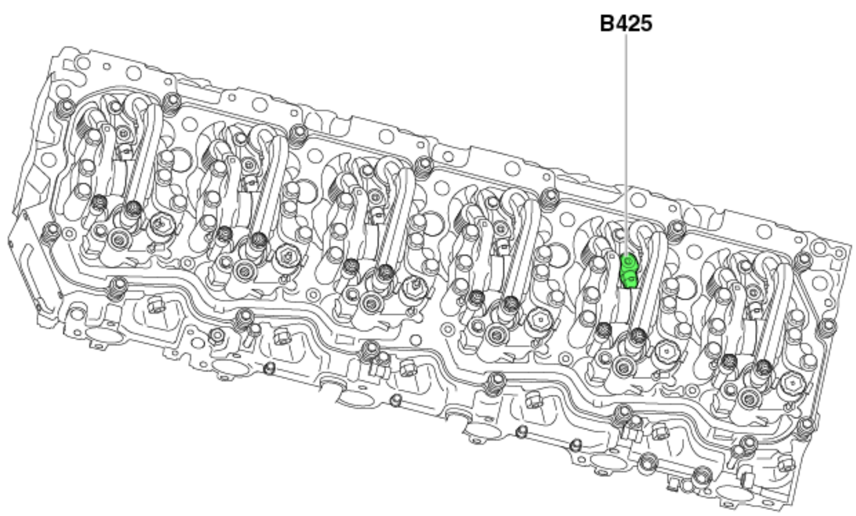
- Fault inactive – issue resolve
- Fault active - Proceed to step 4

Step 4	Step ID 1204d	SRT

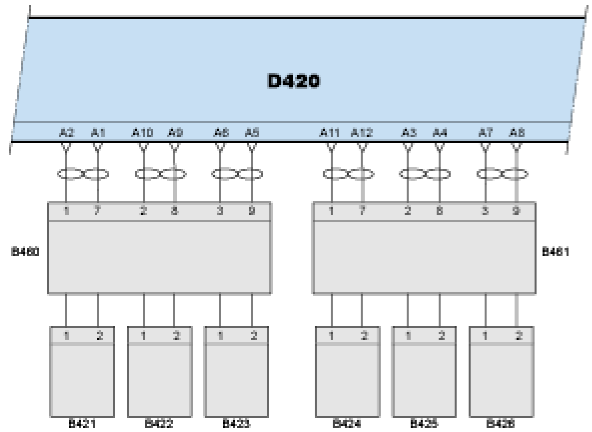
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

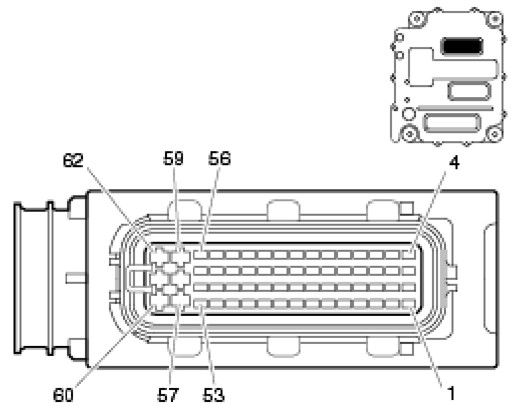
Verification Drive Cycle	To validate repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
	Back to Index

P1205

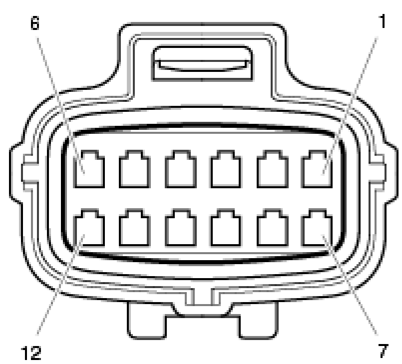
Code number	P1205
Fault code description	Injector solenoid valve cylinder 5 - Current too low or open circuit on ECU D420 pin A4
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic runs when power stage hardware is active.
Set condition of fault code	This condition is set when current in Needle control valve is less than 4.5 A.
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)

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

Key off the ignition
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>1</td><td>7</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, injector solenoid valve cylinder 5 (B425)
Preparation

Key off the ignition
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>2</td><td>8</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, injector solenoid valve cylinder 6 (B426)
Preparation

Key off the ignition
Disconnect connector B461
Measure on wiring harness connector B461

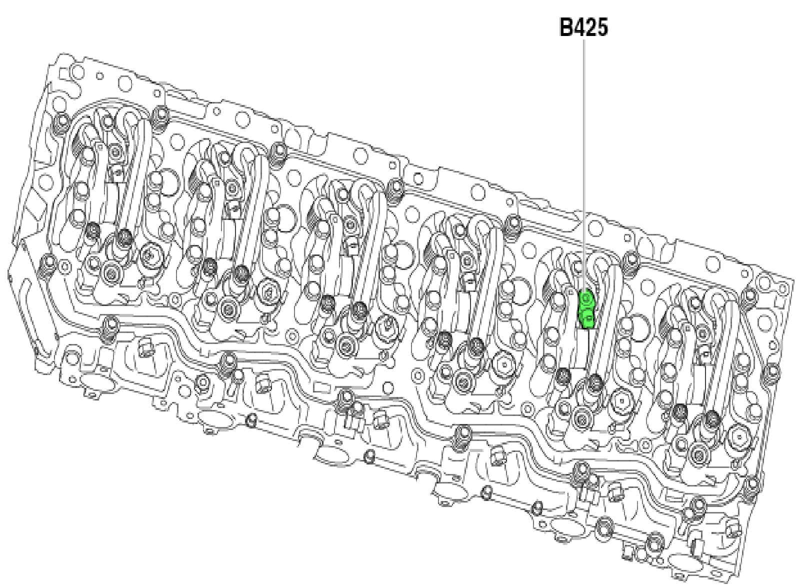
<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>3</td><td>9</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
</td></tr>
<tr><td>Possible causes</td><td>No possible causes 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.

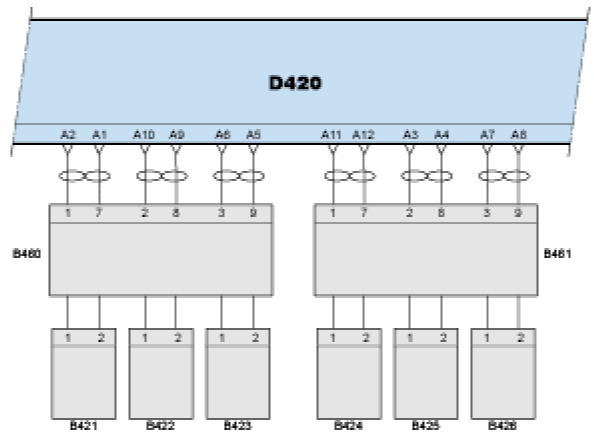
</td></tr>
</table>

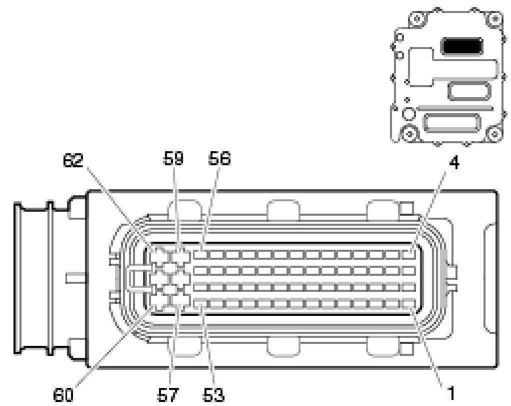
	Step 1 | Step ID 1205a | SRT Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2. **Step 2** | Step ID 1205b | SRT Electrical Checks Ensure that the ignition 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 3 • No - Proceed to step 4 **Step 3** | Step ID 1205c | SRT Repairs or component replacements appropriate component 'Solenoid Valve Injector, Cylinder 5' 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 1205d | 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 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 Index

P1206

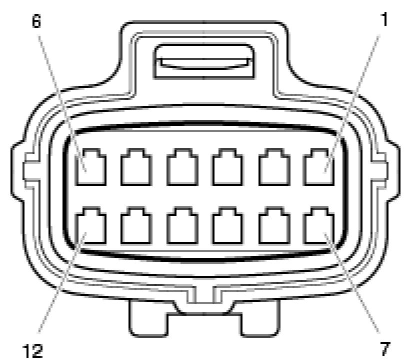
Code number	P1206
Fault code description	Injector solenoid valve cylinder 5-Short circuit between ECU D420 pin A3 and A4.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic 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 less than 20% and greater than 80.00% of threshold value • Current passing through sense resistor is greater than 25.00A 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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

D420	B460	B424	B425	B426	Function
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 5 (B425)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible cause

No possible causes 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.

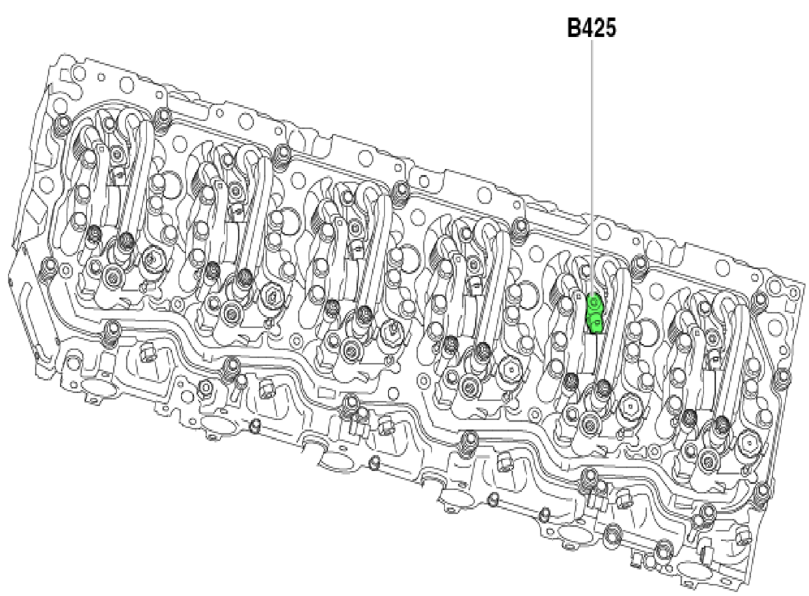
- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify 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 1206a	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.		

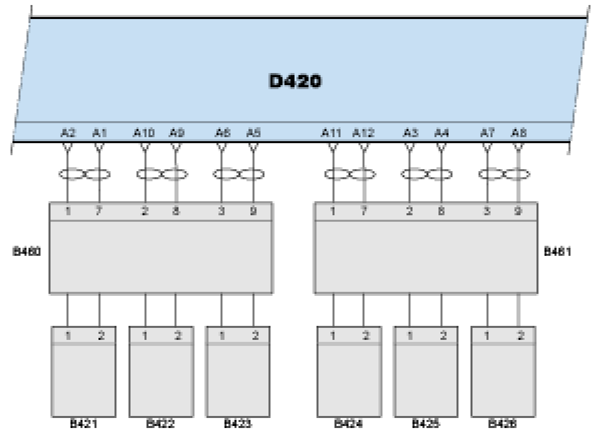
Step 2	Step ID 1206b	SRT
Follow ESV through to find any electrical related problems		

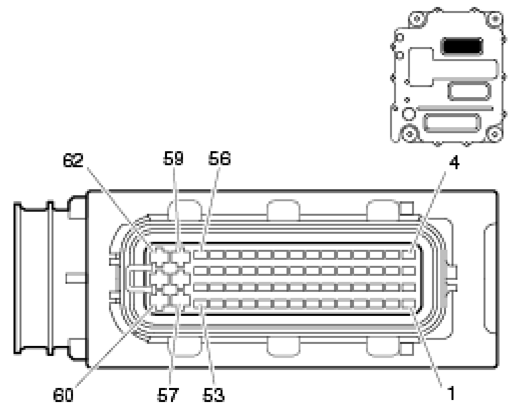
<table>
<tr>
<td></td>
<td>
<table>
<tr><td>Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
Supply and signal voltages.
Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
No: Issue resolved.
Yes: Make the appropriate repairs or component replacements. Proceed to Step 3
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 4 in the troubleshooting process.</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 1206c</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: Solenoid Valve Injector, Cylinder 5
Replace the identified faulty 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 Step 4 in the troubleshooting process</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1206d</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 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.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1207

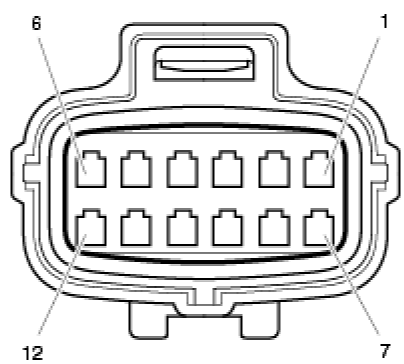
Code number	P1207
Fault code description	Injector solenoid valve cylinder 5-Voltage too low or short circuit to ground on ECU D420 pin A4.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic 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 less than 20.00% of threshold value • Current through sense resistor on driver bank B is less than 4.5A 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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 5 (B425)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes

No possible causes 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.

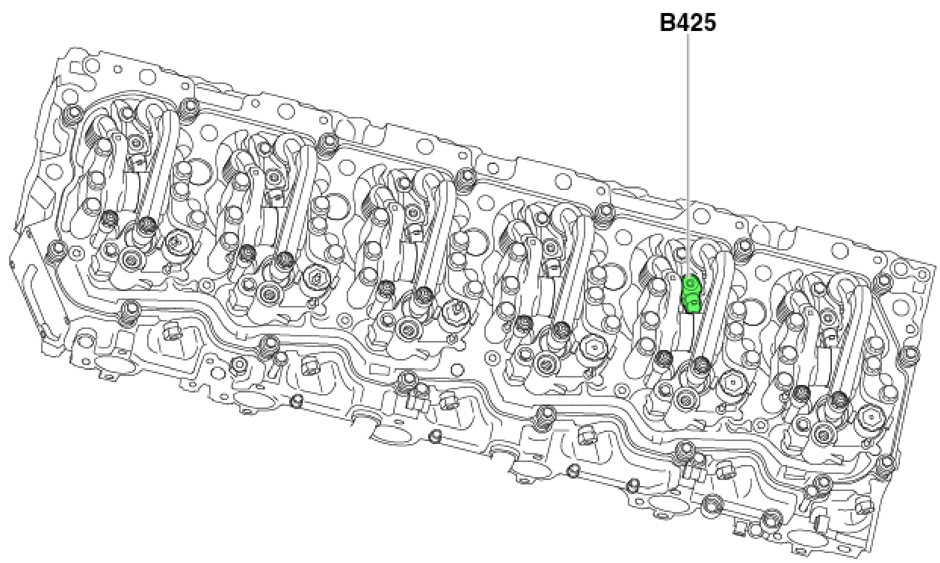
- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify 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 1207a	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.		

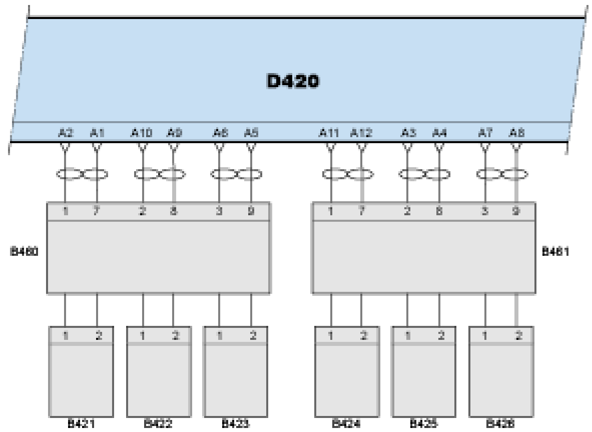
Step 2	Step ID 1207b	SRT

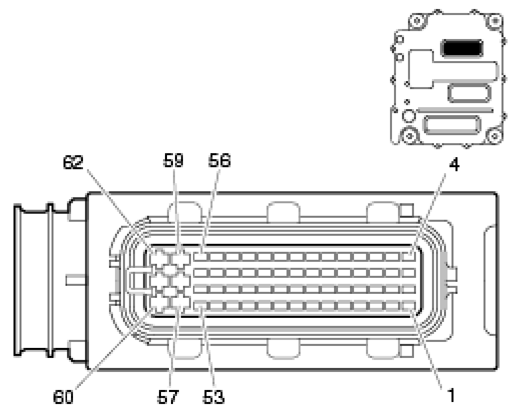
<table>
<tr><td></td><td>
Follow ESV through to find any electrical related problems
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.
• Supply and signal voltages.
• Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
• No: Issue resolved.
• Yes: Make the appropriate repairs or component replacements.
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 4 in the troubleshooting process.
<table>
<tr><td>Step 3</td><td>Step ID 1207c</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: Solenoid Valve Injector, Cylinder 5
Replace the identified faulty 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 4 in the troubleshooting process</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1207d</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 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.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1208

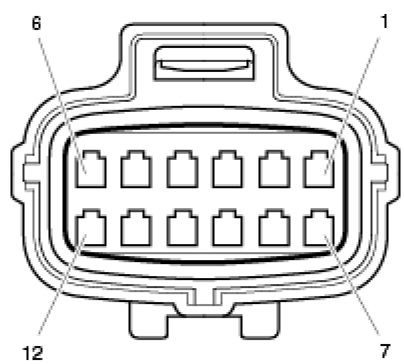
Code number	P1208
Fault code description	Injector solenoid valve cylinder 5, Voltage too high or short circuit to supply on ECU D420 pin A4
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	The diagnostic condition begins 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 greater than 80% of threshold value • Current through sense resistor on driver bank B is greater than 25A of 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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

<table>
<tr><td></td><td>
<table>
<tr><td>A2</td><td>1</td><td>1</td><td></td><td></td><td>Signal high, injector solenoid valve cylinder 1</td></tr>
<tr><td>A5</td><td>9</td><td></td><td>2</td><td></td><td>Signal low, injector solenoid valve cylinder 3</td></tr>
<tr><td>A6</td><td>3</td><td></td><td>1</td><td></td><td>Signal high, injector solenoid valve cylinder 3</td></tr>
<tr><td>A9</td><td>8</td><td></td><td></td><td>2</td><td>Signal low, injector solenoid valve cylinder 2</td></tr>
<tr><td>A10</td><td>2</td><td></td><td></td><td>1</td><td>Signal high, injector solenoid valve cylinder 2</td></tr>
</table>
<table>
<tr><th>D420</th><th>B460</th><th>B424</th><th>B425</th><th>B426</th><th>Function</th></tr>
<tr><td>A3</td><td>2</td><td></td><td>1</td><td></td><td>Signal high, injector solenoid valve cylinder 5</td></tr>
<tr><td>A4</td><td>8</td><td></td><td>2</td><td></td><td>Signal low, injector solenoid valve cylinder 5</td></tr>
<tr><td>A7</td><td>3</td><td></td><td></td><td>1</td><td>Signal high, injector solenoid valve cylinder 6</td></tr>
<tr><td>A8</td><td>9</td><td></td><td></td><td>2</td><td>Signal low, injector solenoid valve cylinder 6</td></tr>
<tr><td>A11</td><td>1</td><td>1</td><td></td><td></td><td>Signal high, injector solenoid valve cylinder 4</td></tr>
<tr><td>A12</td><td>7</td><td>2</td><td></td><td></td><td>Signal low, injector solenoid valve cylinder 4</td></tr>
</table>
</td></tr>
<tr><td>Technical data</td><td>
Component check, injector solenoid valve cylinder 5 (B425)
Preparation

Key off the ignition
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>2</td><td>8</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>No possible causes</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 1208a</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 1208b</td><td>SRT</td></tr>
</table>
</td></tr>
</table>

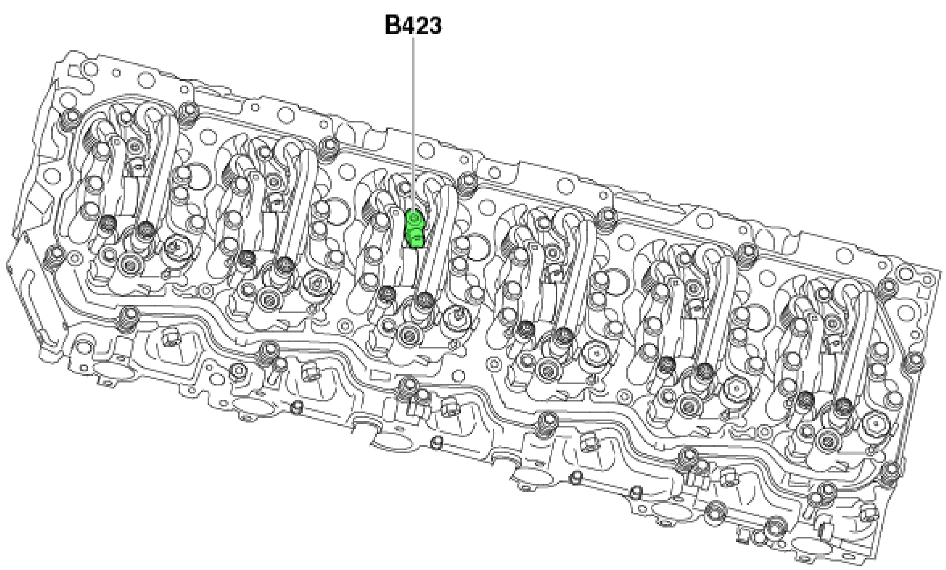
PACCAR

<table>
<tr><td></td><td>Electrical Checks (B425)
For all electrical checks and diagrams, refer to the Engine Service Rapido electrical schematic viewer (ESV) for detailed schematics, connector pin locations, and corresponding signal values.
• Enter the Engine number
• Select the ESV icon
• Click the Search button
• Select the “Component Code” within the Electrical Diagram Search pop-up window
• In the component code box select B425 then Search.

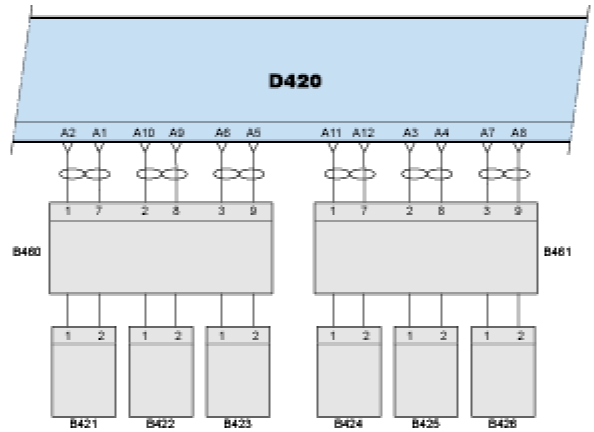
Follow ESV through to find any electrical related problems
Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits:
• Supply and signal voltages.
• Cable continuity (no opens or shorts).
Are measured electrical values outside of expected range or limits?
• No: Issue resolved
• Yes: Make the appropriate repairs or component replacements. Proceed to step 3
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 4 in the troubleshooting process.

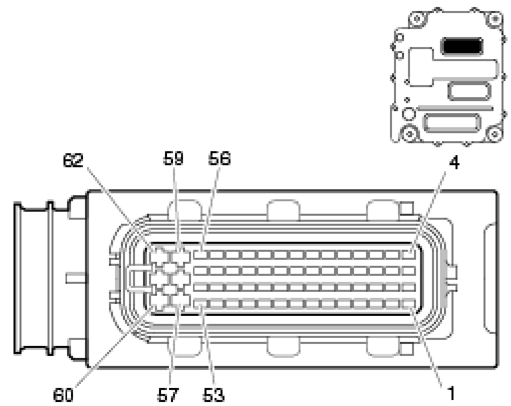
<table><tr><td>Step 3</td><td>Step ID 1208c</td><td>SRT</td></tr><tr><td colspan="3">Replace: Solenoid Valve Injector, Cylinder 5
Replace the identified faulty component.
Use DAVIE to re-check for the presence of active faults.
• If this related fault is no longer active, then this issue has been resolved.
• If this related fault is still active, continue to Step 4 in the troubleshooting process</td></tr></table>
<table><tr><td>Step 4</td><td>Step ID 1208d</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 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.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1209

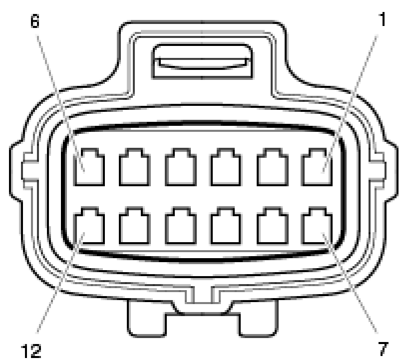
Code number	P1209
Fault code description	Injector solenoid valve cylinder 3, Current too low or open circuit on ECU D420 pin A5
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	The diagnostic condition begins when the power stage hardware is active.
Set condition of fault code	Current in Needle control valve is less than 4.50A 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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Preparation

- key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes

No possible causes

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.

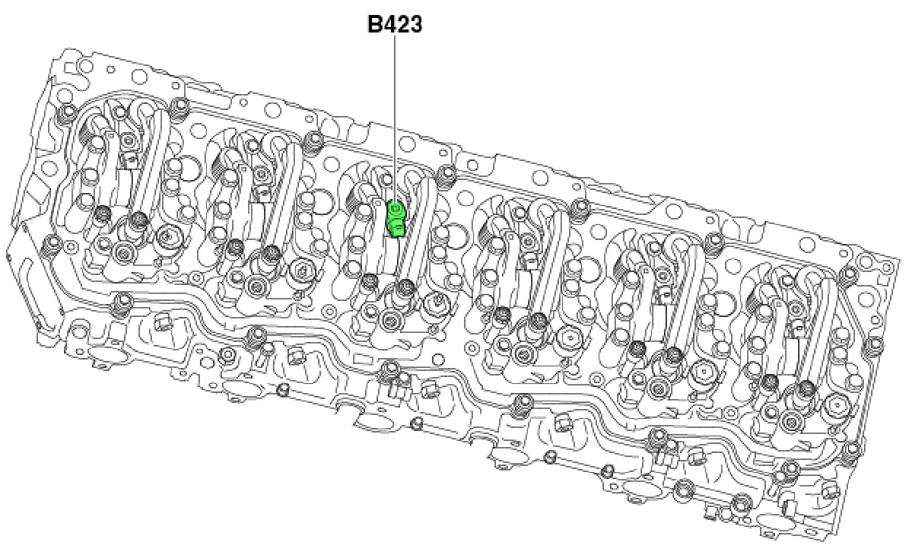
- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify 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 1209a	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.		

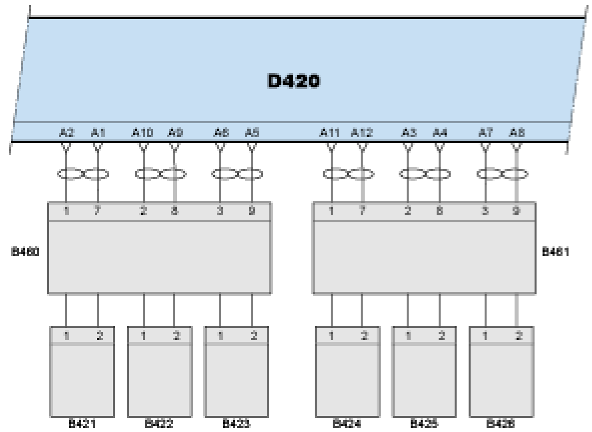
Step 2	Step ID 1209b	SRT
Electrical Checks (B423)		

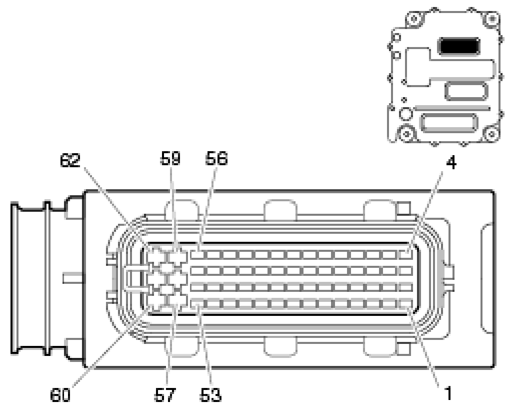
	For all electrical checks and diagrams, refer to the Engine Service Rapido electrical schematic viewer (ESV) for detailed schematics, connector pin locations, and corresponding signal values. • Enter the Engine number • Select the ESV icon • Click the Search button • Select the "Component Code" within the Electrical Diagram Search pop-up window • In the component code box select B425 then Search. Follow ESV through to find any electrical related problems Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages. • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • No: Issue Resolved. • Yes: Make the appropriate repairs or component replacements. Proceed to step 3 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 Step 4 in the troubleshooting process. Step 3 | Step ID 1209c | SRT Replace: Solenoid Valve Injector, Cylinder 3 Replace the identified faulty 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 4 in the troubleshooting process Step 4 | Step ID 1209d | 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 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 Index

P1210

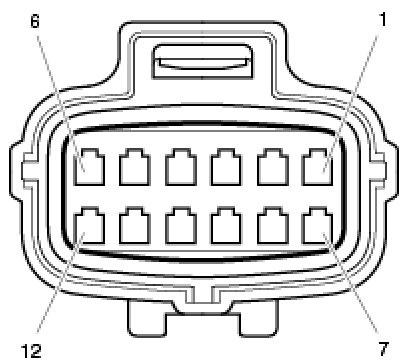
Code number	P1210
Fault code description	Injector solenoid valve cylinder 3 – Short circuit between ECU D420 pin A6 and A5
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic runs whenever the engine is running at idle or higher RPM.
Set condition of fault code	This code will set If the voltage on the ground wire for the injector below 2.4 volts or exceeds 9.6 volts during when the injector is commanded on while the engine is running.
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve

					cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460

- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 5 (B425)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 6 (B426)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes	No possible causes 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 1210a	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 1210b	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 3 • No - Proceed to step 4		

Step 3	Step ID 1210c	SRT
Repair or replace the appropriate component 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 1210d	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 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.

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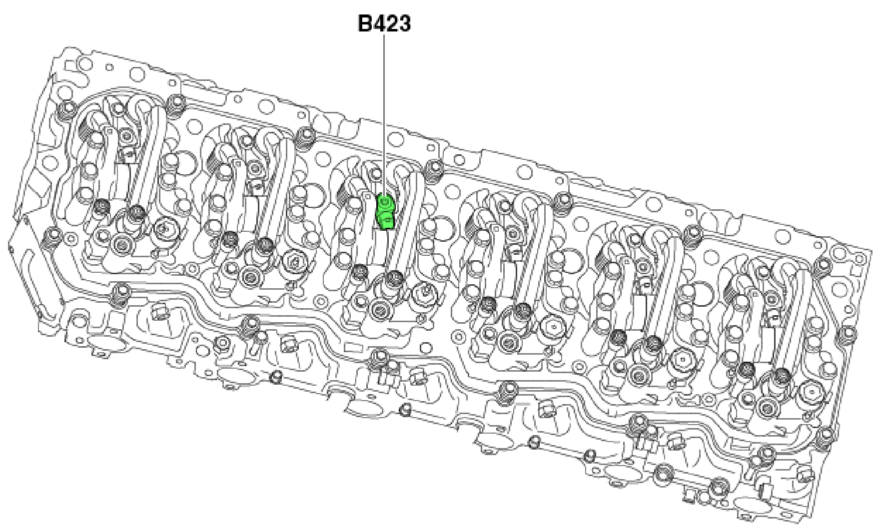
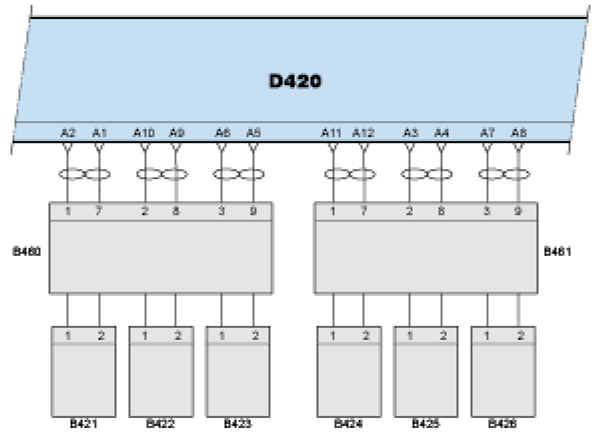
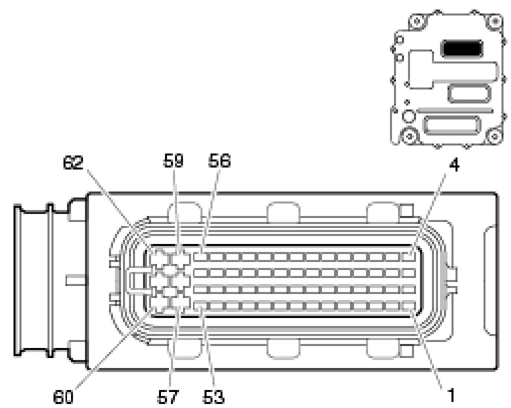
P1211

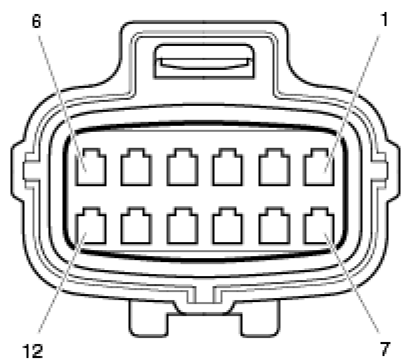
Code number	P1211
Fault code description	Injector solenoid valve cylinder 3 – Voltage too low or short circuit to ground on ECU D420 pin A5
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	This diagnostic runs whenever the engine is running at idle or higher RPM.
Set condition of fault code	This code will set If the voltage on the ground wire for the injector below 2.4 volts during when the injector is commanded on while the engine is running.
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

PACCAR

	A2	1	1			Signal high, injector solenoid valve cylinder 1
	A5	9		2		Signal low, injector solenoid valve cylinder 3
	A6	3		1		Signal high, injector solenoid valve cylinder 3
	A9	8			2	Signal low, injector solenoid valve cylinder 2
	A10	2			1	Signal high, injector solenoid valve cylinder 2
	D420	B460	B424	B425	B426	Function
	A3	2		1		Signal high, injector solenoid valve cylinder 5
	A4	8		2		Signal low, injector solenoid valve cylinder 5
	A7	3			1	Signal high, injector solenoid valve cylinder 6
	A8	9			2	Signal low, injector solenoid valve cylinder 6
	A11	1	1			Signal high, injector solenoid valve cylinder 4
	A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)

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

Key off the ignition
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>1</td><td>7</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, injector solenoid valve cylinder 5 (B425)
Preparation

Key off the ignition
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>2</td><td>8</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, injector solenoid valve cylinder 6 (B426)
Preparation

Key off the ignition
Disconnect connector B461
Measure on wiring harness connector B461

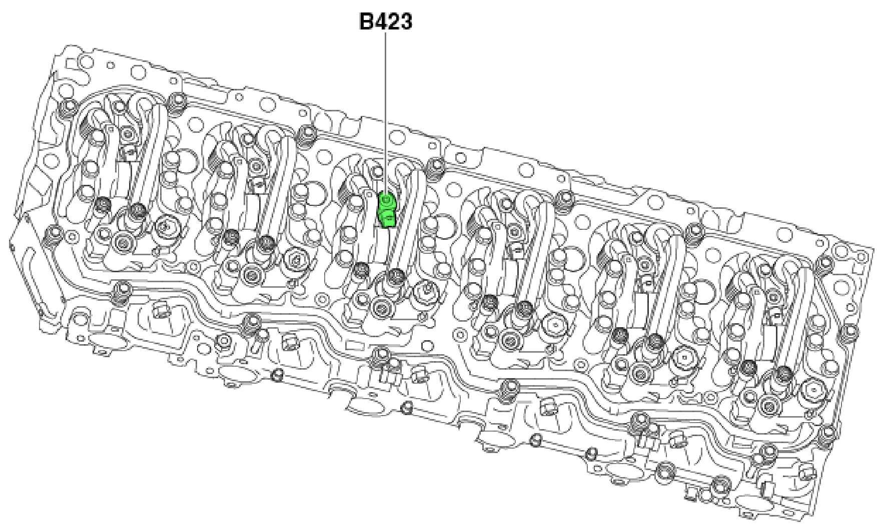
<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>3</td><td>9</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td></td><td></td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
</td>
</tr>
<tr><td>Possible causes</td><td>No possible causes 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.

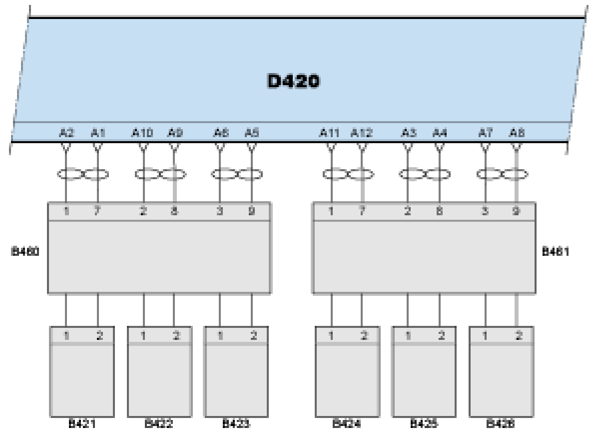
</td>
</tr>
</table>

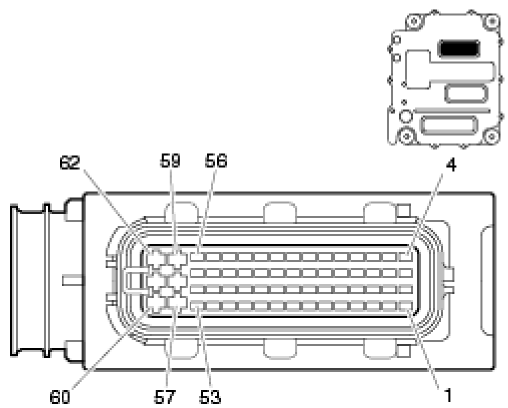
	<table><tr><td>Step 1</td><td>Step ID 1211a</td><td>SRT</td></tr><tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr></table> <table><tr><td>Step 2</td><td>Step ID 1211b</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 1211c</td><td>SRT</td></tr><tr><td colspan="3">Repair or replace the appropriate component 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 1211d</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 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 Index

P1212

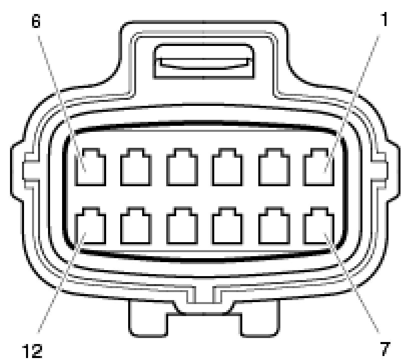
Code number	P1212
Fault code description	Injector solenoid valve cylinder 3 – Voltage too high or short circuit to supply on ECU D420 pin A5
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	Diagnostic conditions 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 80.00% of threshold value • Current through sense resistor on driver bank A is greater than 25.00% 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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

	Pin (+ probe) | Pin (- probe) | Value | Additional information 3 | 9 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 4 (B424) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 1 | 7 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 5 (B425) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 2 | 8 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 6 (B426) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) | Pin (- probe) | Value | Additional information 3 | 9 | ± 0.67 Ω | Resistance value at 20°C [68°F] | | maximum 0.94 Ω | Resistance value at 120°C [248°F]
Possible causes	No Possible causes 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 1212a	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 1212b	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 3 • No - Proceed to step 4		

Step 3	Step ID 1212c	SRT
Repairs or component replacements appropriate component “Solenoid Valve Injector, Cylinder 3 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 1212d	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 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.

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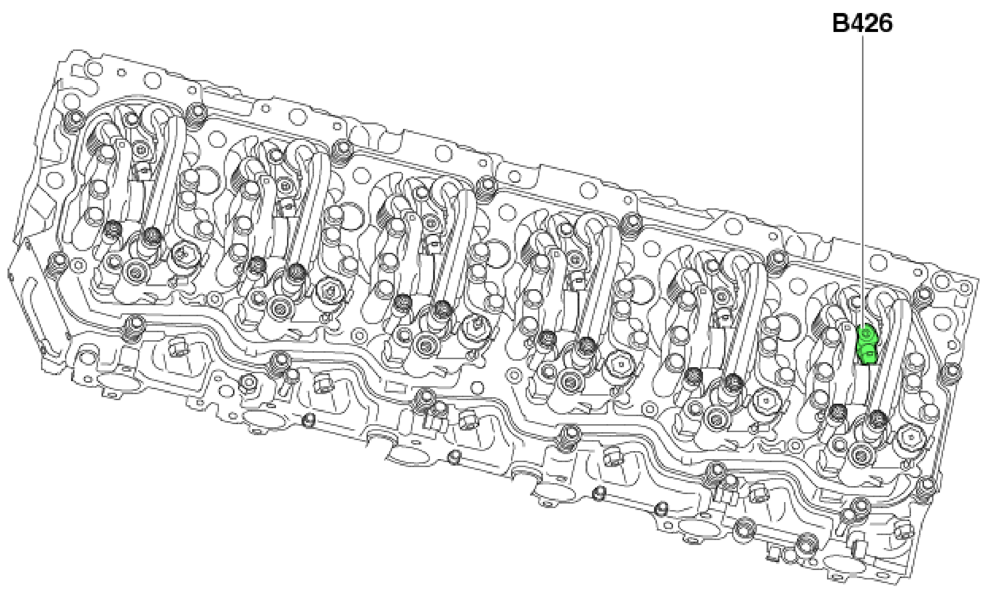
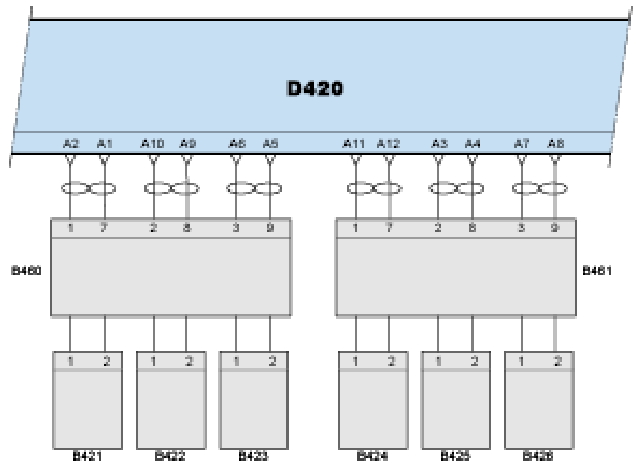
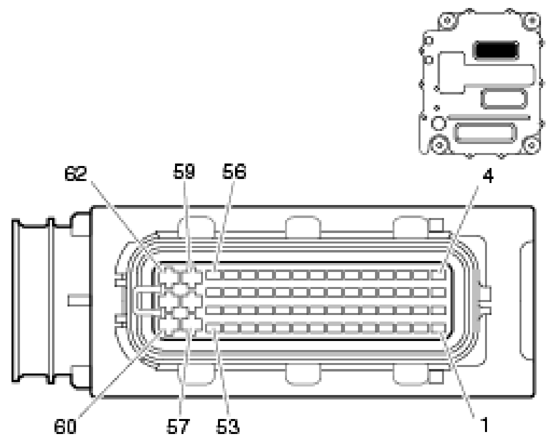
P1213

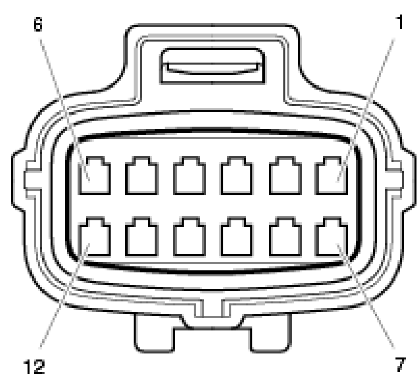
Code number	P1213
Fault code description	Injector solenoid valve cylinder 6 – Current too low or open circuit on ECU D420 pin A8
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	Diagnostic conditions runs when Power stage hardware is active
Set condition of fault code	Current in Needle control valve is less than 4.50A of 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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

	Pin (+ probe) / Pin (- probe) / Value / Additional information 3 / 9 / ± 0.67 Ω / Resistance value at 20°C [68°F] maximum 0.94 Ω / Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 4 (B424) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 7 / ± 0.67 Ω / Resistance value at 20°C [68°F] maximum 0.94 Ω / Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 5 (B425) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 2 / 8 / ± 0.67 Ω / Resistance value at 20°C [68°F] maximum 0.94 Ω / Resistance value at 120°C [248°F] Component check, injector solenoid valve cylinder 6 (B426) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 Pin (+ probe) / Pin (- probe) / Value / Additional information 3 / 9 / ± 0.67 Ω / Resistance value at 20°C [68°F] maximum 0.94 Ω / Resistance value at 120°C [248°F]
Possible causes	No possible causes 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 3	Step ID 1213c	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 1213b	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 3
- No - Proceed to step 4

Step 3	Step ID 1213c	SRT

Repairs or component replacements appropriate component “
Solenoid Valve Injector, Cylinder 6” 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 1213d	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 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.

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P1214

Code number	P1214
Fault code description	Injector Solenoid Valve Cylinder 6 – Short circuit between ECU D420 pin A7 and A8
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 Index

P1215

Code number	P1215
Fault code description	Injector Solenoid Valve Cylinder 6 – Voltage too low or Short circuit to ground on ECU D420 pin A8
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 Index

P1216

Code number	P1216
Fault code description	Injector solenoid valve cylinder 6 – Voltage too high or short circuit to supply on ECU D420 pin A8
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 Index

P1217

Code number	P1217
Fault code description	Injector solenoid valve cylinder 2 – Current too low or open circuit on ECU D420 pin A9
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 Index

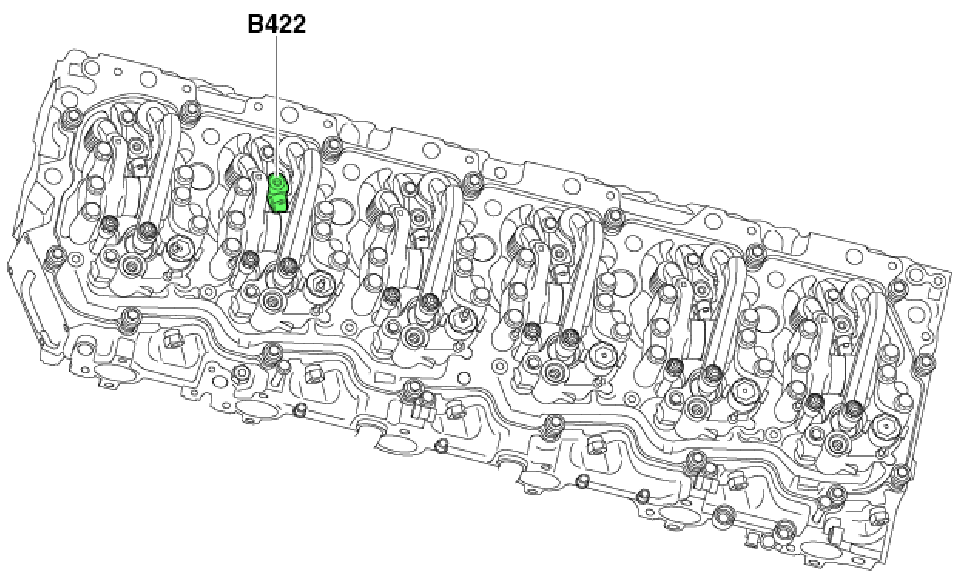
P1218

Code number	P1218
Fault code description	Injector solenoid valve cylinder 2 – Short circuit between ECU D420 pin A10 and A9
Fault code information	
Description of component(s)	 Please contact 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 Index

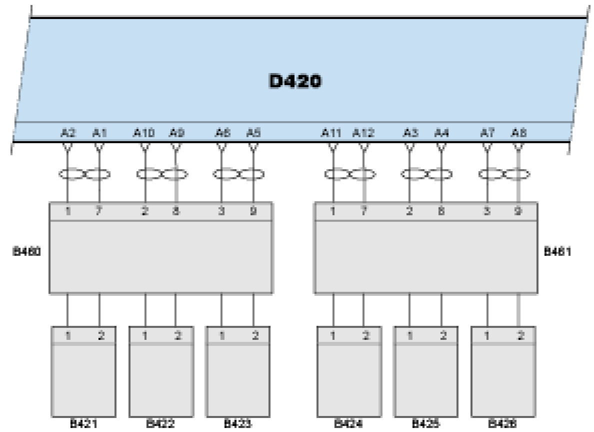
P1219

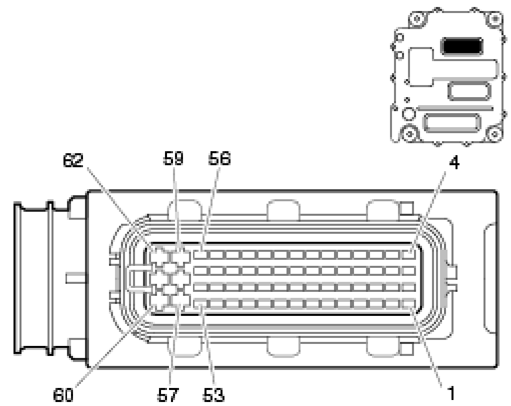
Code number	P1219
Fault code description	Injector solenoid valve cylinder 2 – Voltage too low or short circuit to ground on ECU 420 pin A9
Fault code information	
Description of component(s)	Please contact Engine support center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

P1220

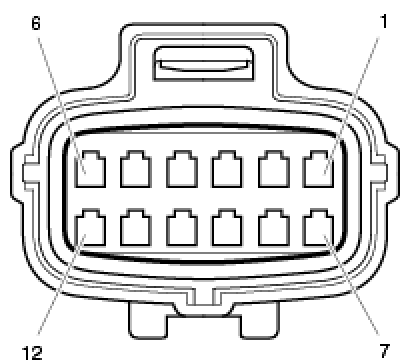
Code number	P1220
Fault code description	Injector solenoid valve cylinder 2 - Voltage too high or short circuit to supply on ECU D420 pin A9
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	Diagnostic condition is set when Power stage hardware is active in less than one second.
Set condition of fault code	• High side voltage on the injector (before injection) compared to battery voltage is greater than the threshold value 80.00% then the condition is set. • Current through sense resistor on driver bank B is greater than the threshold value 25.00A then the condition is set.
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 5 (B425)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 6 (B426)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes	No possible causes information 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 1220a | 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 1220b | 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 3 • No - Proceed to step 4 **Step 3** | Step ID 1220c | 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 1220d | SRT Replace: Solenoid Valve Injector, Cylinder 2 Replace the identified faulty 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 1220e | 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 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.
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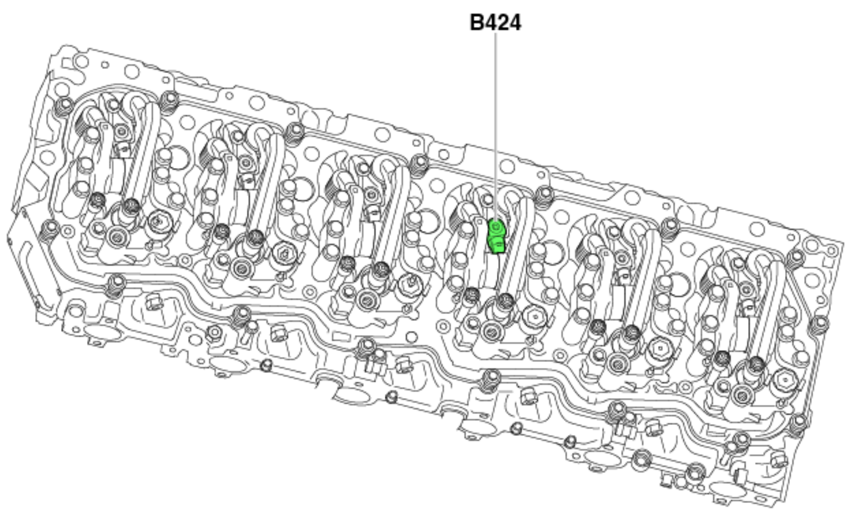
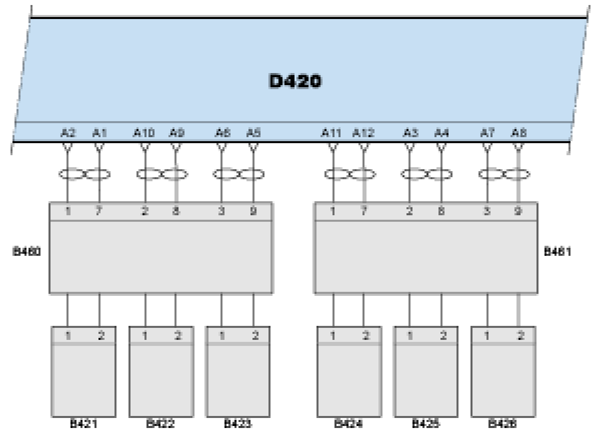
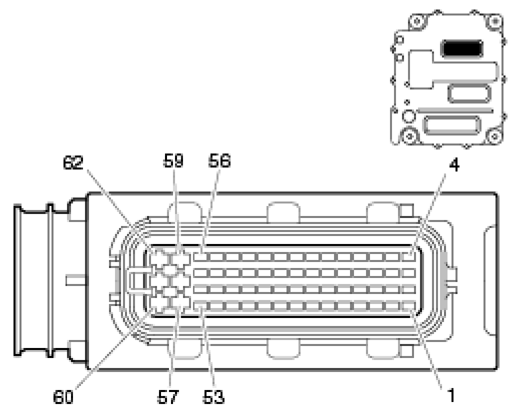
P1221

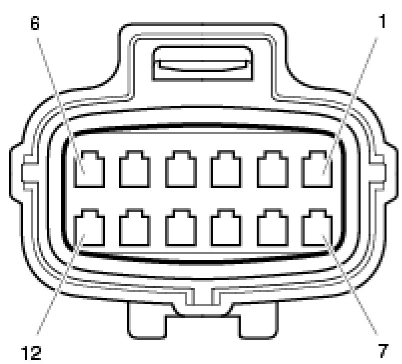
Code number	P1221
Fault code description	Injector solenoid valve cylinder 4 - Current too low or open circuit on ECU D420 pin A12
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	Diagnostic condition is set when Power stage hardware is active in less than one second
Set condition of fault code	Current in Needle control valve is less than 4.50A
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

	A2	1	1			Signal high, injector solenoid valve cylinder 1
	A5	9		2		Signal low, injector solenoid valve cylinder 3
	A6	3		1		Signal high, injector solenoid valve cylinder 3
	A9	8			2	Signal low, injector solenoid valve cylinder 2
	A10	2			1	Signal high, injector solenoid valve cylinder 2
	D420	B460	B424	B425	B426	Function
	A3	2		1		Signal high, injector solenoid valve cylinder 5
	A4	8		2		Signal low, injector solenoid valve cylinder 5
	A7	3			1	Signal high, injector solenoid valve cylinder 6
	A8	9			2	Signal low, injector solenoid valve cylinder 6
	A11	1	1			Signal high, injector solenoid valve cylinder 4
	A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation
- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)
Preparation
- Key off the ignition

- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 5 (B425)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 6 (B426)
Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes	No possible causes information 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 1221a	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 1221b	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 3
- No - Proceed to step 4

Step 3	Step ID 1221c	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 1221d	SRT

Replace: Solenoid Valve Injector, Cylinder 4

Replace the identified faulty 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 1221e	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 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.
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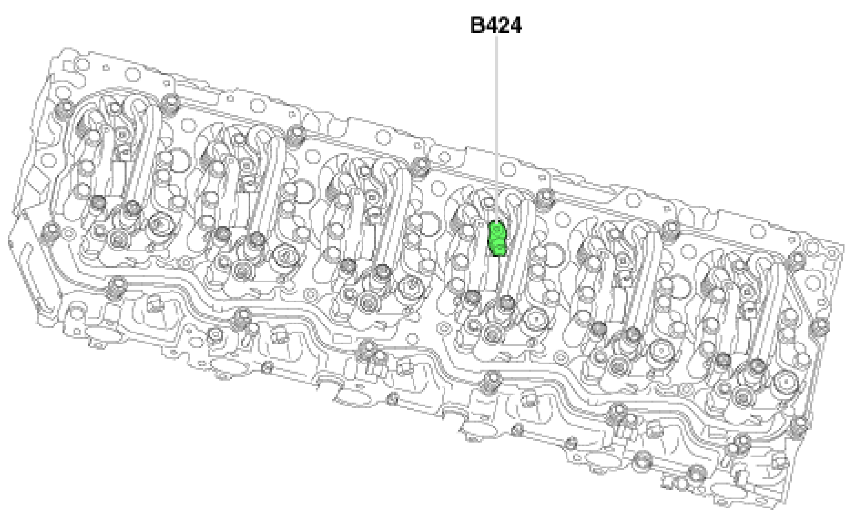
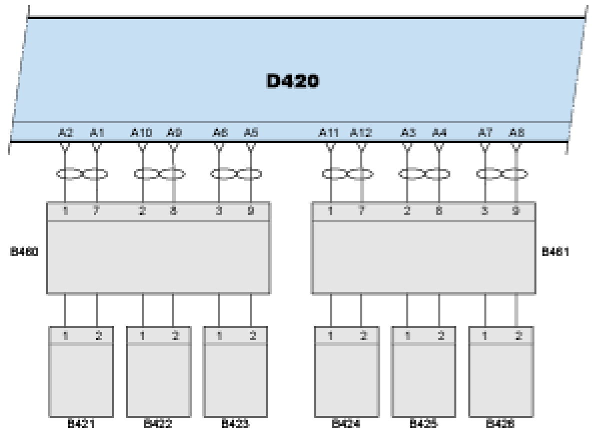
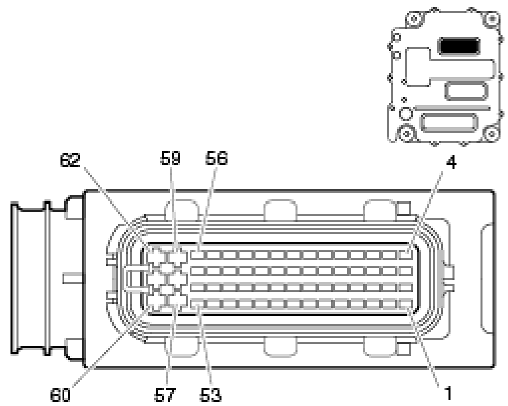
P1222

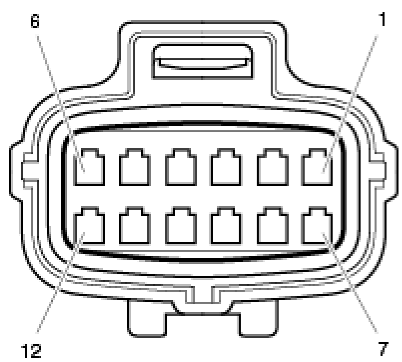
Code number	P1222
Fault code description	Injector solenoid valve cylinder 4– Short circuit between ECU D420 pin A11 and A12
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	The diagnostic runs when power stage hardware is active
Set condition of fault code	This condition is set when • High side voltage on the injector (before injection) compared to battery voltage is in between 20% to 80% of threshold value • Current through sense resistor on driver bank A is more than 25 A
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

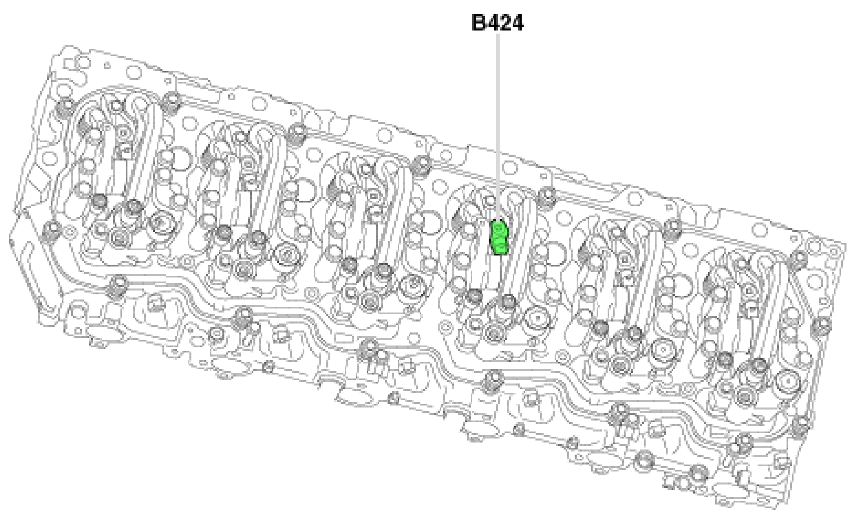
Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)

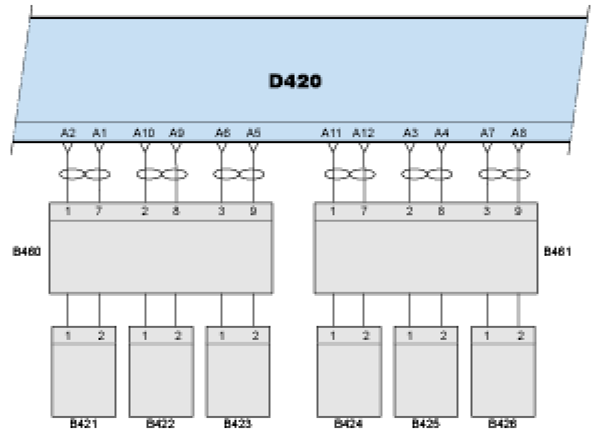
<table>
<tr><td></td><td>Preparation
Key off the ignition
Disconnect connector B461
Measure on wiring harness connector B461
<table>
<tr><th>Pin
(+ probe)</th><th>Pin
(- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>7</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [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, injector solenoid valve cylinder 5 (B425)
Preparation
Key off the ignition
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>2</td><td>8</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, injector solenoid valve cylinder 6 (B426)
Preparation
Key off the ignition
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>3</td><td>9</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>No possible causes 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.</td></tr>
</table>

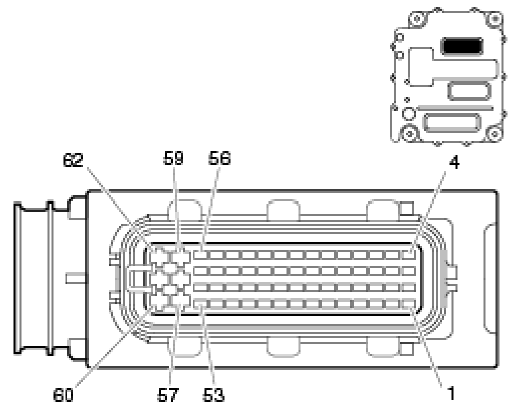
<table>
<tr><td></td><td>
<table>
<tr><td>Step 1</td><td>Step ID 1222a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1222b</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 1222c</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 1222d</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 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.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1223

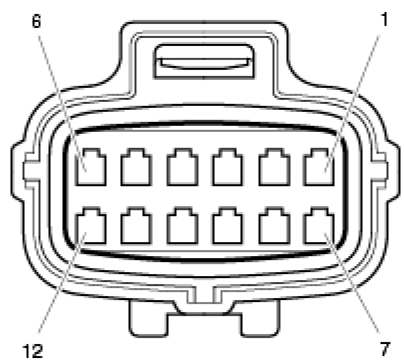
Code number	P1223
Fault code description	Injector solenoid valve cylinder 4– Voltage too low or short circuit to ground on ECU D420 pin A12
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The fuel injector injects fuel into the combustion chamber. Control The amount of fuel injected depends on the duration of the injector solenoid activation in combination with the rail pressure. The longer the solenoid is activated by the PCI ECU at the same rail pressure, the more fuel is injected. 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. Not programming or incorrectly programmed injector codes can result in reduced engine performance or a warning to the driver.
Location of component(s)	
Diagnostic condition	The diagnostic runs when power stage hardware is active
Set condition of fault code	This condition is set when • High side voltage on the injector (before injection) compared to battery voltage is less than 20% of threshold value • Current through sense resistor on driver bank B is less than 4.5 A
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



Wiring harness connector B460 & B461 front view

B460 connector cylinders 1-3
B461 connector cylinders 4-6
D420 PCI ECU
B421 solenoid valve injector cylinder 1
B422 solenoid valve injector cylinder 2
B423 solenoid valve injector cylinder 3
B424 solenoid valve injector cylinder 4
B425 solenoid valve injector cylinder 5
B426 solenoid valve injector cylinder 6

D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1

A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9		2		Signal low, injector solenoid valve cylinder 3
A6	3		1		Signal high, injector solenoid valve cylinder 3
A9	8			2	Signal low, injector solenoid valve cylinder 2
A10	2			1	Signal high, injector solenoid valve cylinder 2

D420	B460	B424	B425	B426	Function
A3	2		1		Signal high, injector solenoid valve cylinder 5
A4	8		2		Signal low, injector solenoid valve cylinder 5
A7	3			1	Signal high, injector solenoid valve cylinder 6
A8	9			2	Signal low, injector solenoid valve cylinder 6
A11	1	1			Signal high, injector solenoid valve cylinder 4
A12	7	2			Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 1 (B421)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 2 (B422)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 3 (B423)
Preparation

- Key off the ignition
- Disconnect connector B460
- Measure on wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 4 (B424)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	7	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 5 (B425)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Component check, injector solenoid valve cylinder 6 (B426)

Preparation

- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	9	± 0.67 Ω	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]

Possible causes	No possible causes 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 1223a | 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 1223b | 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 3 • No - Proceed to step 4 Step 3 | Step ID 1223c | 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 1223d | 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 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.
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