2013 PACCAR MX-13
Diagnostic Service Manual
EPA2013

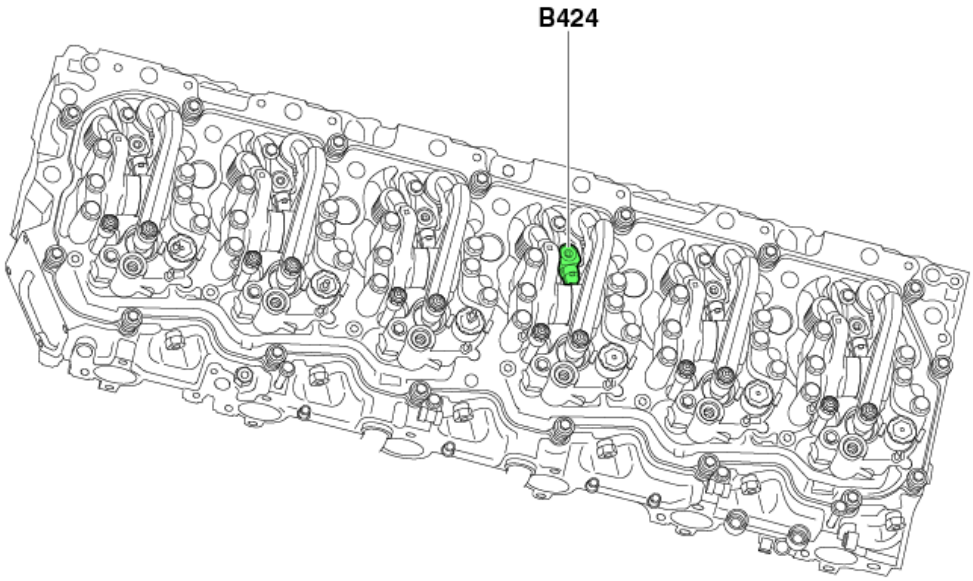
(P1224 to P1675)

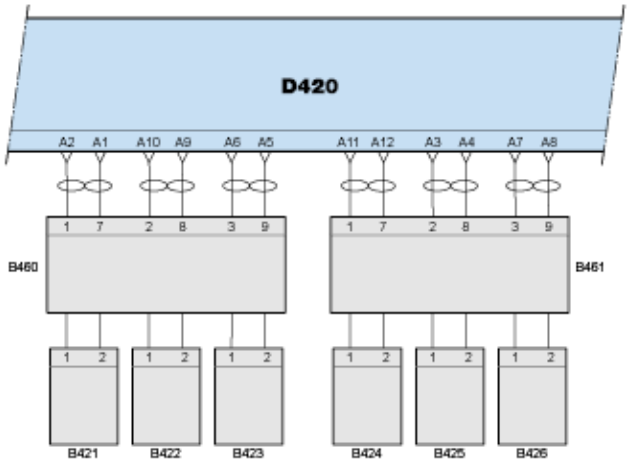
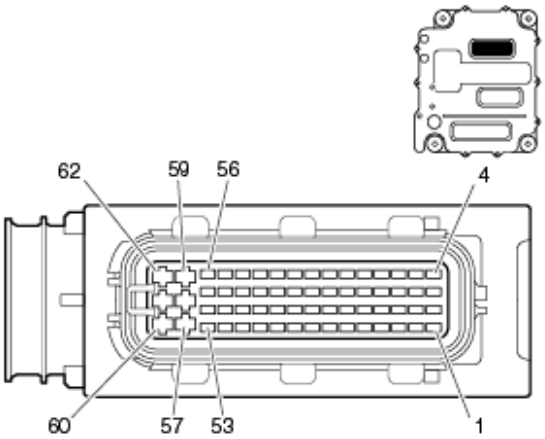
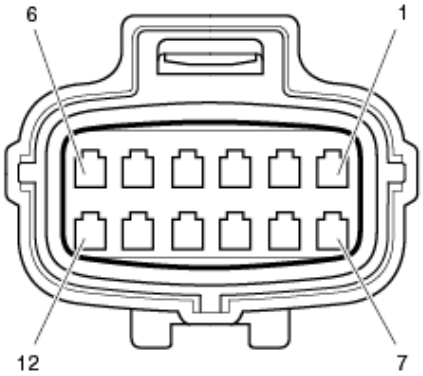


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P1224

Code number	P1224
Fault code description	Injector solenoid valve cylinder 4 - Voltage too high or short circuit to supply 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
Set condition of fault code	• If 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. • If 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

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

Disconnect connector B460
Measure on wiring harness connector B460

<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>
Component check, injector solenoid valve cylinder 4 (B424)
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.</td></tr>
</table>



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

Step 1	Step ID 1224a	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 1224b	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		

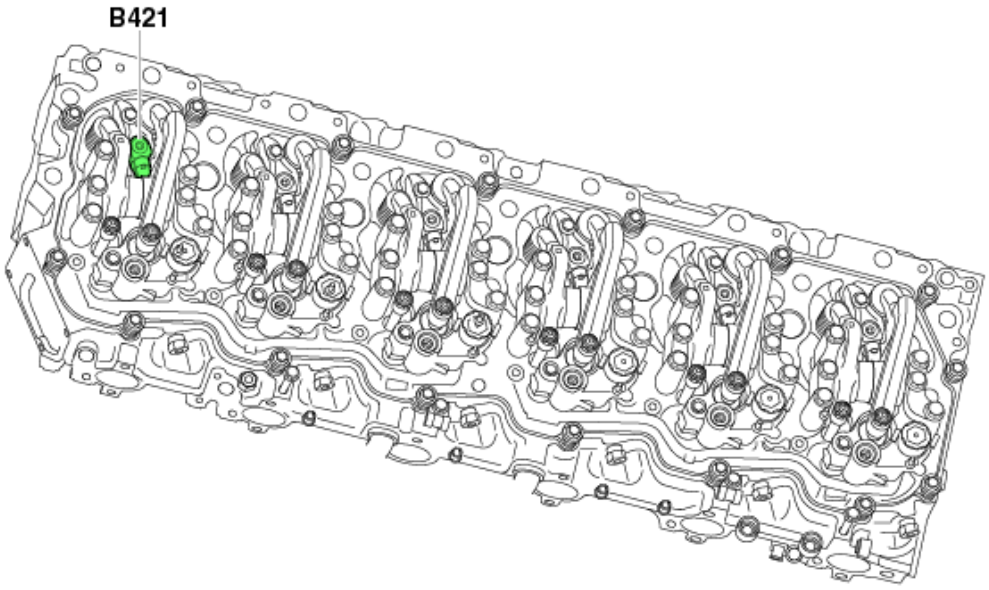
Step 3	Step ID 1224c	SRT
Repair or replace of appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 4		

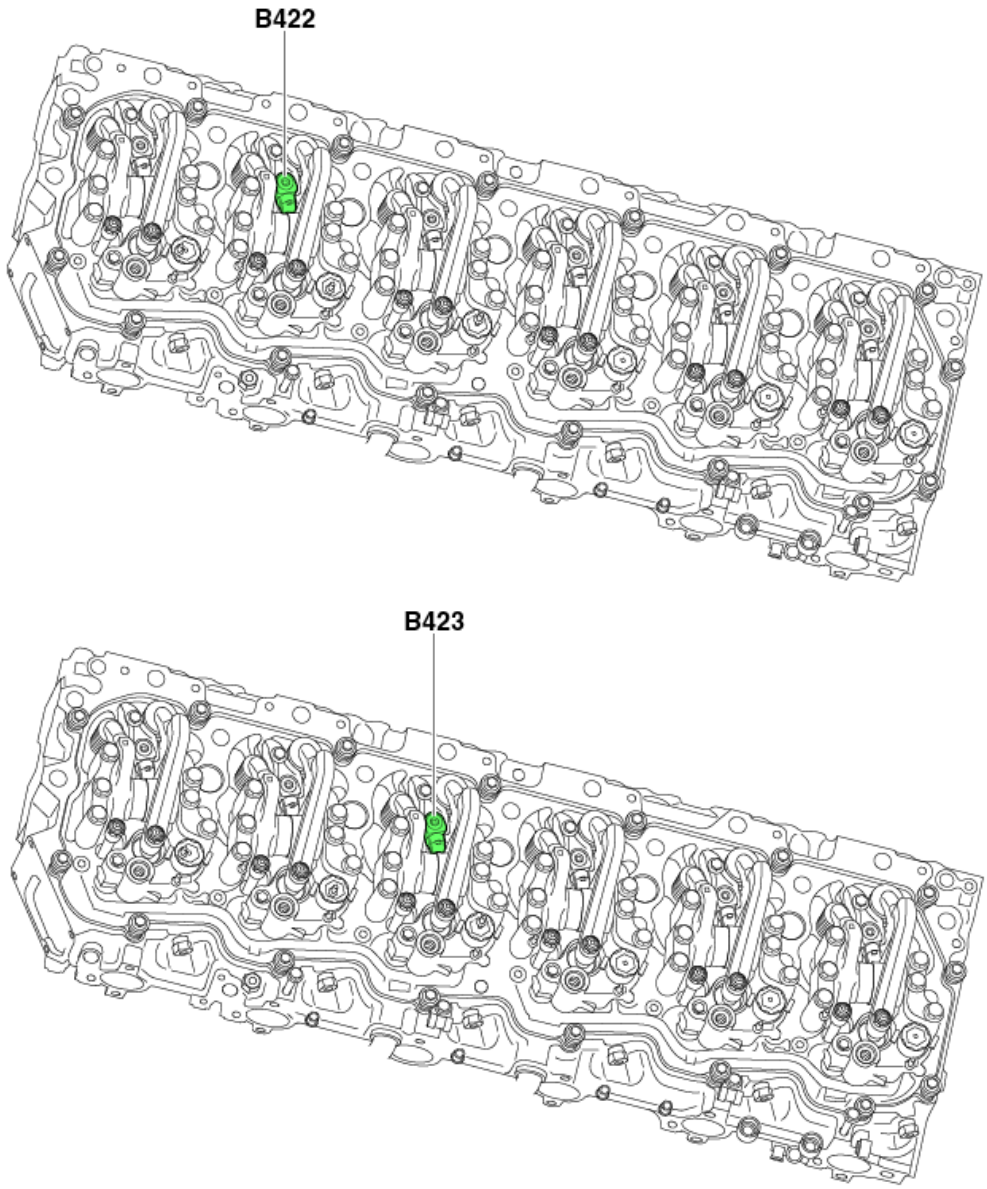
Step 4	Step ID 1224d	SRT
Replace the identified faulty component (Solenoid Valve Injector, Cylinder 4) and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 5		

Step 5	Step ID 1224e	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.		

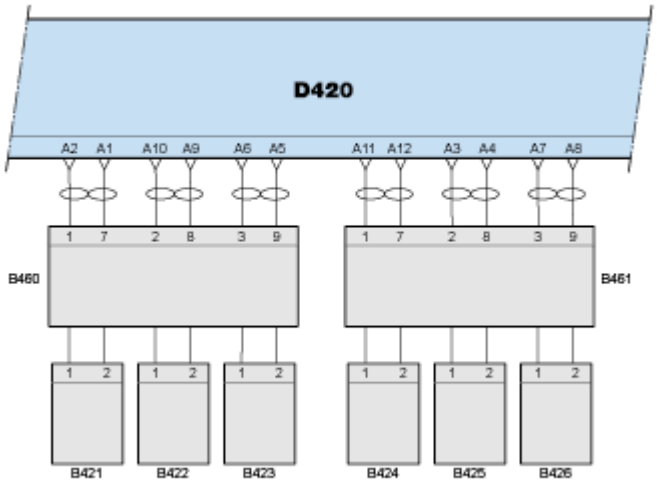
Verification Drive Cycle	With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
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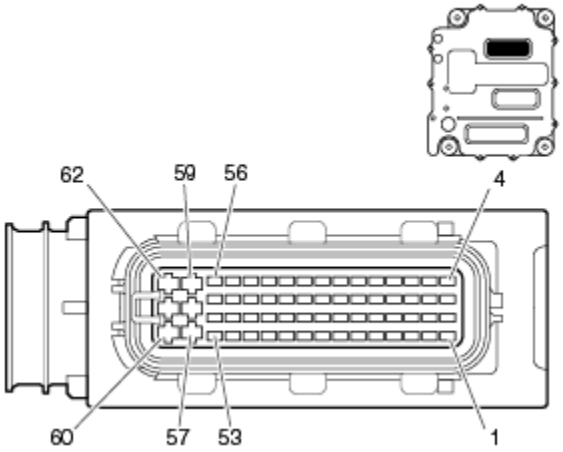
P1225

Code number	P1225
Fault code description	Injector solenoid valve cylinder 1, 2 or 3 - Voltage too low or short circuit to ground on ECU D420 pin A2 or A10 or A6
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)	

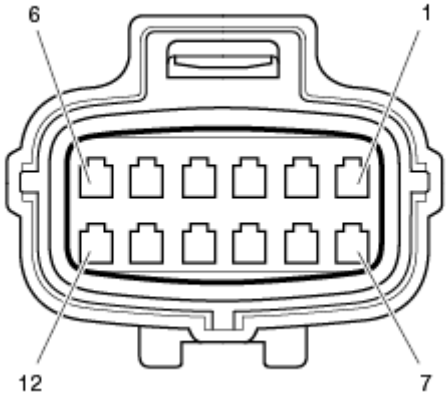
	
Diagnostic condition	Diagnostic condition is set when Power stage hardware is active in less than one second.
Set condition of fault code	• If High side voltage on the injector (before injection) compared to battery voltage is less than the threshold value 20.00% then the condition is set and • If Driver bank A High side driver voltage @ 6, 9 and/or 12 us is greater than threshold value 0.45; 0.75; 1.05V 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	• Faulty wiring • Faulty connector • Faulty injector
Additional information	This fault code will change to inactive immediately after the diagnostic runs and passes.
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 1225a	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 1225b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 3. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.		

Step 3	Step ID 1225c	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the encapsulated harness side of the connector and a battery ground: • If the circuit is open during REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Proceed to step 4. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 7.		

Step 4	Step ID 1225d	SRT
With key OFF, disconnect the connector from the injector solenoid. Turn the key ON, and measure the voltage between the signal terminal on the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 5. • If the measured voltage is below 5.0 V or above 9.0 V – Replace the pass-through harness on the engine. Proceed to the verification procedure listed at the end of this document.		

Step 5	Step ID 1225e	SRT
With key OFF, disconnect the connector from the injector solenoid and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the connector and a battery ground: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Replace the fuel injector. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Replace the pass-through harness. Proceed to the verification procedure listed at the end of		

	this document.

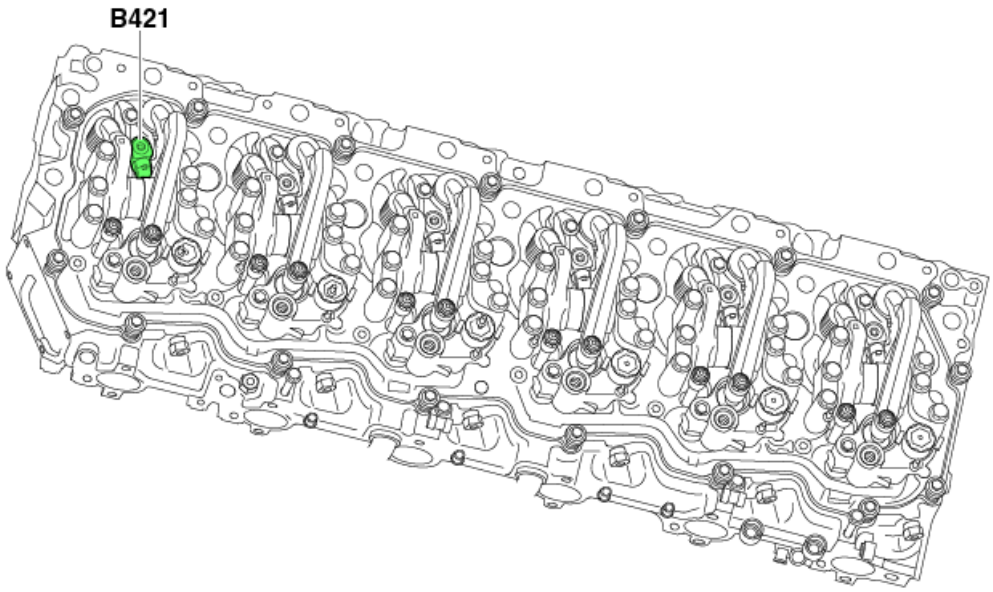
Step 6	Step ID 1225f	SRT
With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the signal pin of the PCI and the chassis ground: • If the measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 8.		

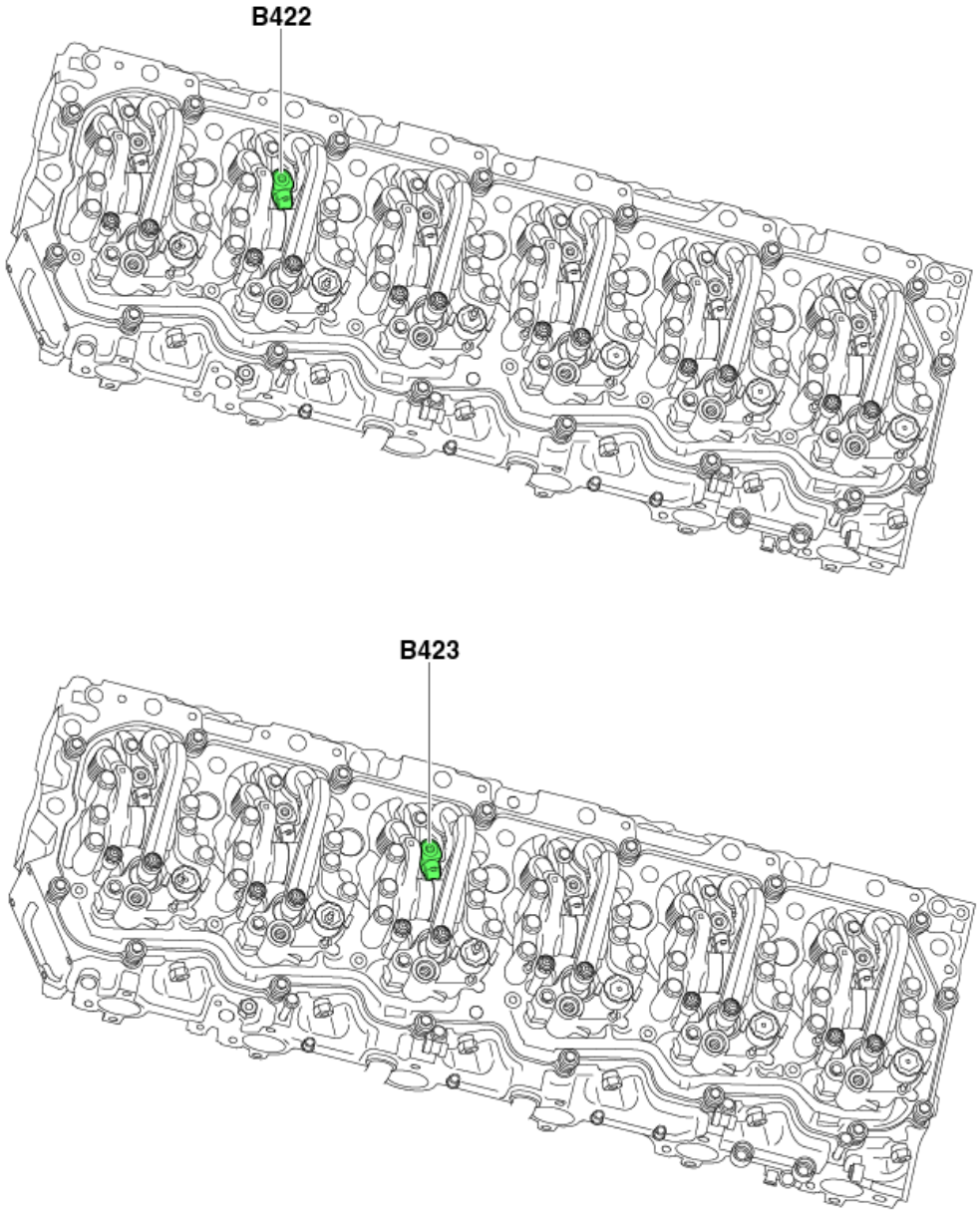
Step 7	Step ID 1225g	SRT
With key OFF, disconnect the PCI connector and perform a diode check (please refer to your multimeter operation manual for proper diode test procedure) across the ground circuit terminal on the PCI and battery ground: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 8.		

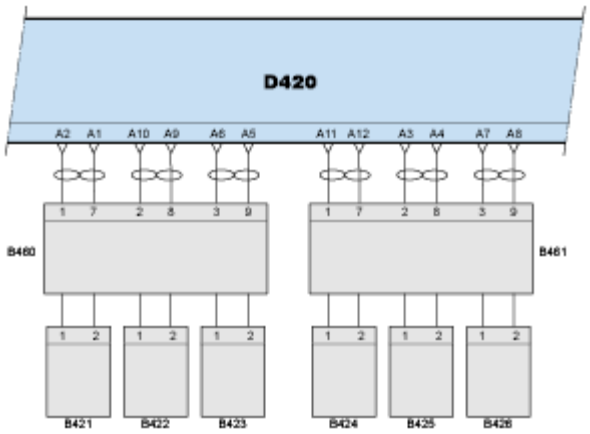
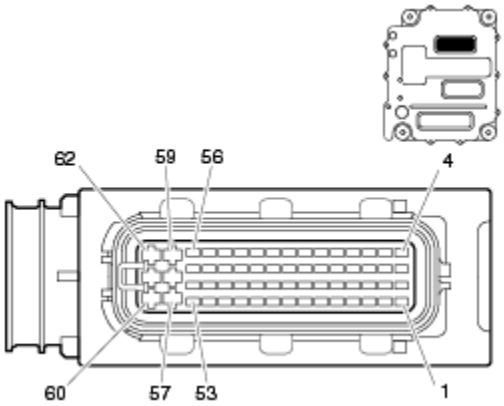
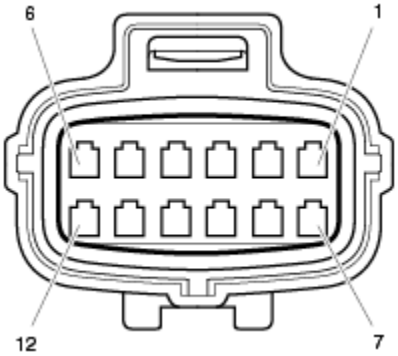
Step 8	Step ID 1225h	SRT
Possible PCI failure: Contact the Engine Support Center for further instructions on replacement of the PCI.		

Verification Drive Cycle	To validate the repair, with DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
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P1226

Code number	P1226
Fault code description	Injector solenoid valve cylinder 1, 2 or 3 - Voltage too high or short circuit to supply on ECU D420 pin A2 or A10 or A6
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	The condition is set when • High side voltage on the injector (before injection) compared to battery voltage is higher than 80%. • Driver bank A High side driver voltage at 6, 9 and/or 12 us is more than 0.45 V, 0.75 V, and 1.05 V respectively.
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	• Faulty wiring • Faulty connector • Faulty injector
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 1226a	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 1226b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 3. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.		

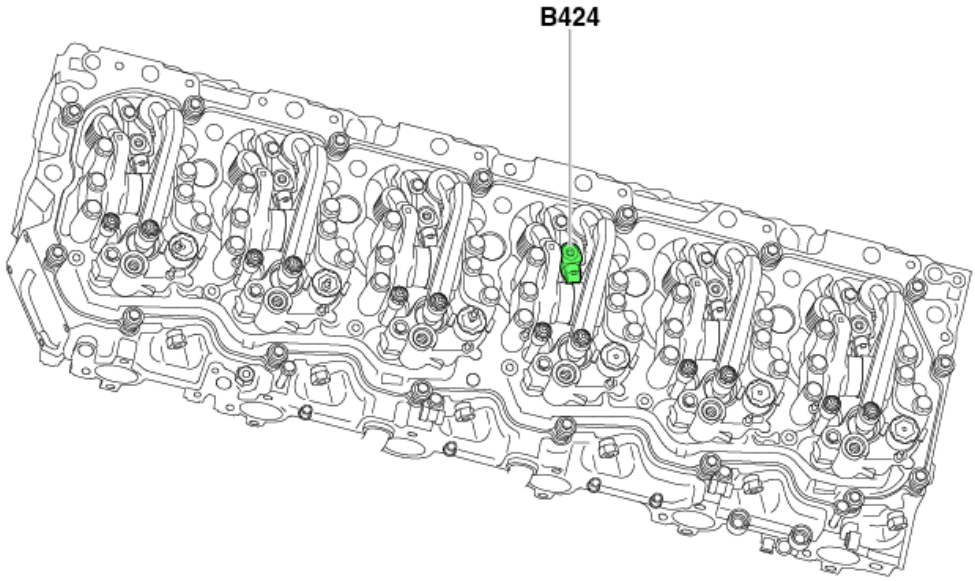
Step 3	Step ID 1226c	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the encapsulated harness side of the connector and a battery ground: • If the circuit is open during REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Proceed to step 4. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 7.		

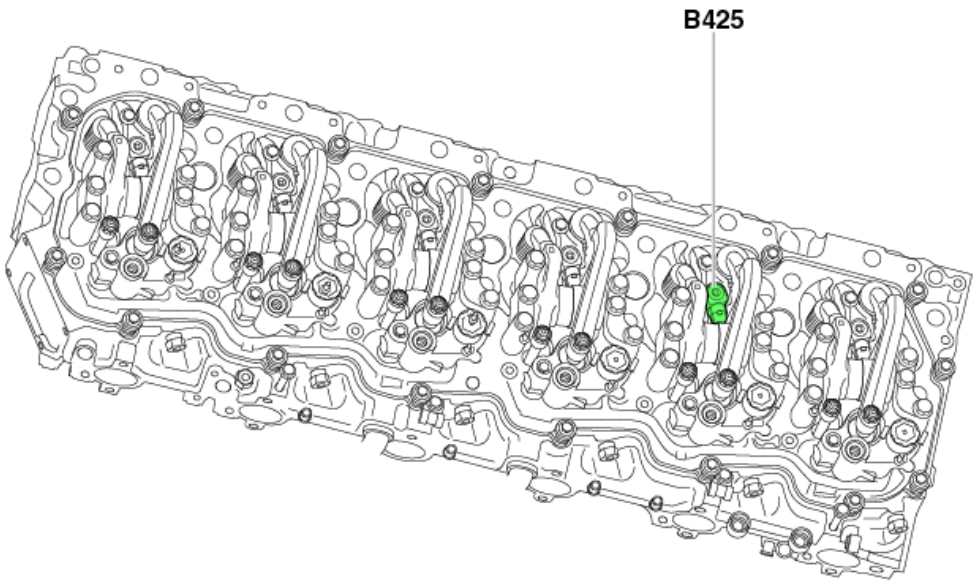
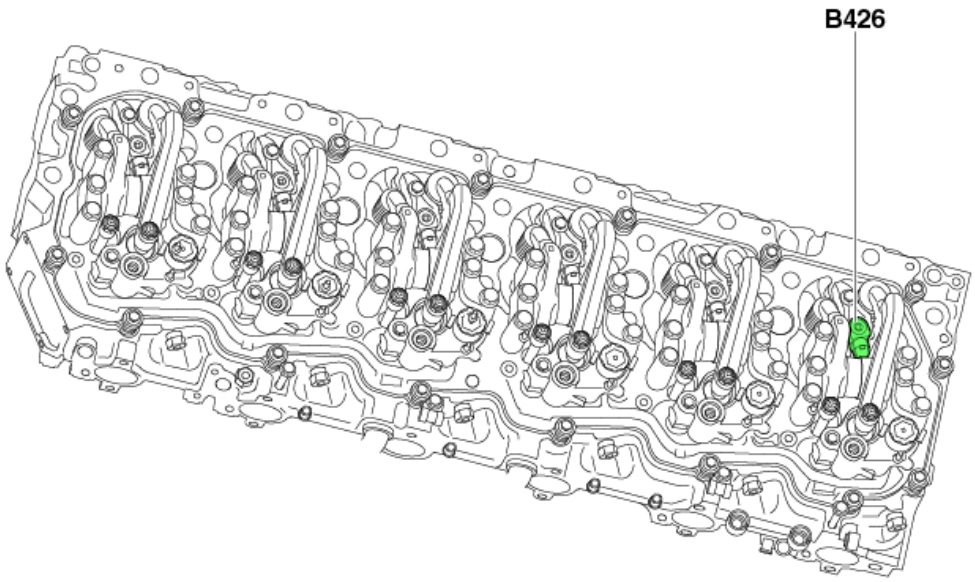
Step 4	Step ID 1226d	SRT
With key OFF, disconnect the connector from the injector solenoid. Turn the key ON, and measure the voltage between the signal terminal on the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 5. • If the measured voltage is below 5.0 V or above 9.0 V – Replace the pass-through harness on the engine. Proceed to the verification procedure listed at the end of this document.		

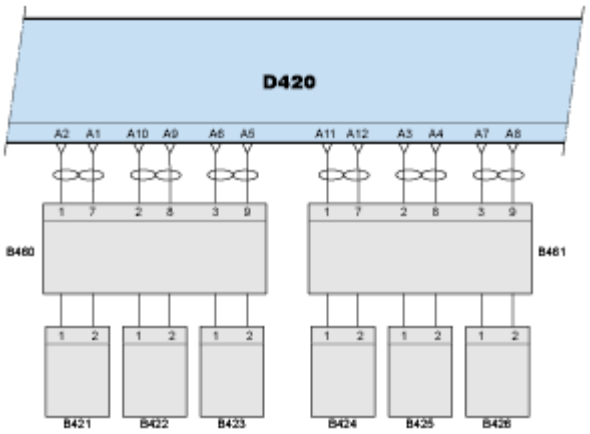
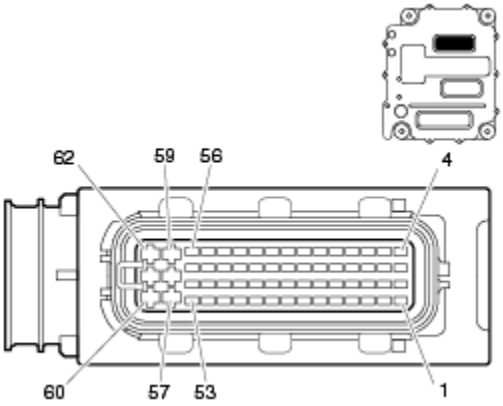
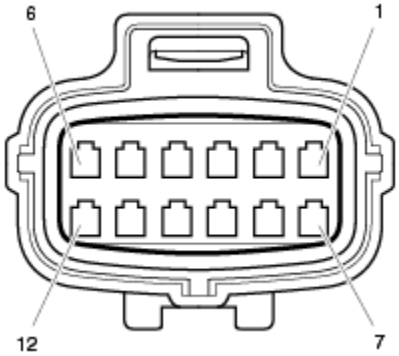
Step 5	Step ID 1226e	SRT
With key OFF, disconnect the connector from the injector solenoid and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the connector and a battery ground: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Replace the fuel injector. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Replace the pass-through harness. Proceed to the verification procedure listed at the end of		

	this document. Step 6 | Step ID 1226f | SRT With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the signal pin of the PCI and the chassis ground: • If the measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 8. Step 7 | Step ID 1226g | SRT With key OFF, disconnect the PCI connector and perform a diode check (please refer to your multimeter operation manual for proper diode test procedure) across the ground circuit terminal on the PCI and battery ground: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 8. Step 8 | Step ID 1226h | SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.
Verification Drive Cycle	To validate the repair, with DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Index

P1227

Code number	P1227
Fault code description	Injector solenoid valve cylinder 4, 5 or 6 - Voltage too low or short circuit to ground on ECU D420 pin A11 or A3 or A7
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	The condition is set when • High side voltage on the injector (before injection) compared to battery voltage is lower than 20% • Driver bank B High side driver voltage at 6, 9 and/or 12 us is more than 0.45 V, 0.75 V, and 1.05 V respectively.
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) 1 — Pin (- probe) 7 — Value ± 0.67 Ω — Additional information Resistance value at 20°C [68°F] Value maximum 0.94 Ω — Additional information 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) 2 — Pin (- probe) 8 — Value ± 0.67 Ω — Additional information Resistance value at 20°C [68°F] Value maximum 0.94 Ω — Additional information 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) 3 — Pin (- probe) 9 — Value ± 0.67 Ω — Additional information 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	• Faulty wiring • Faulty connector • Faulty injector
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 1227a	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 1227b	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 3. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.		

Step 3	Step ID 1227c	SRT
With key OFF, disconnect the pass-through connector located on the exterior of the engine and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the encapsulated harness side of the connector and a battery ground: • If the circuit is open during REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Proceed to step 4. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 7.		

Step 4	Step ID 1227d	SRT
With key OFF, disconnect the connector from the injector solenoid. Turn the key ON, and measure the voltage between the signal terminal on the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 5. • If the measured voltage is below 5.0 V or above 9.0 V – Replace the pass-through harness on the engine. Proceed to the verification procedure listed at the end of this document.		

Step 5	Step ID 1227e	SRT
With key OFF, disconnect the connector from the injector solenoid and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the connector and a battery ground: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Replace the fuel injector. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document.		

Step 6	Step ID 1227f	SRT

With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the signal pin of the PCI and the chassis ground:

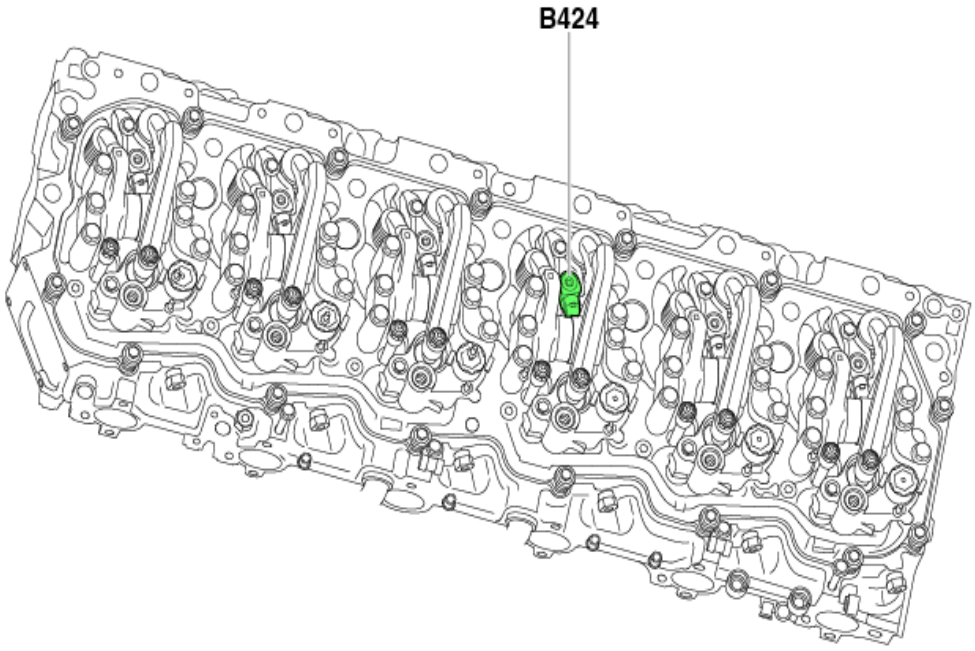
- If the measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 8.

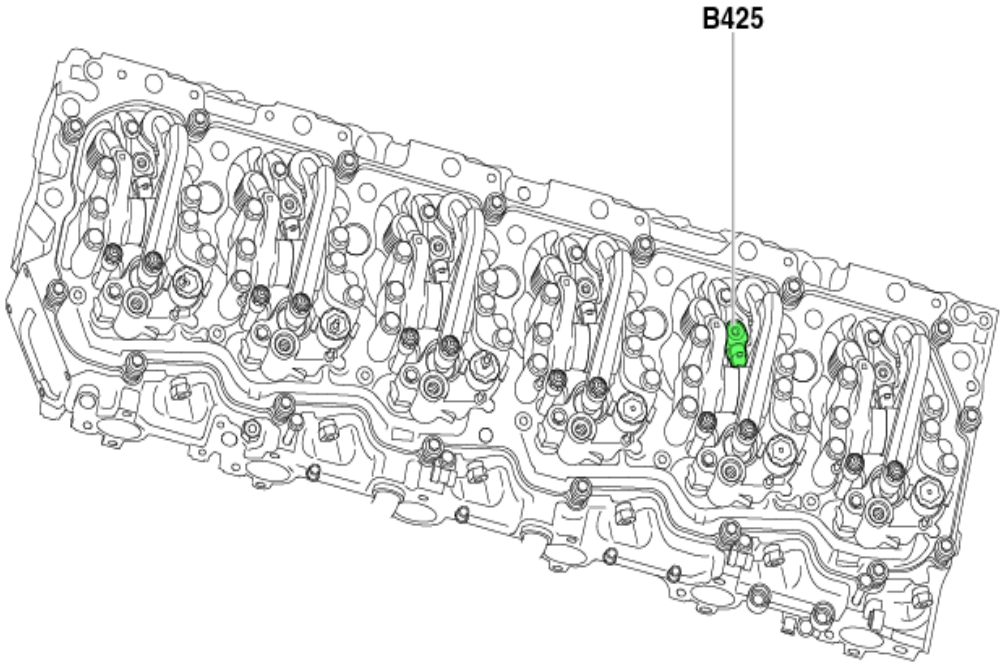
Step 7	Step ID 1227g	SRT
With key OFF, disconnect the PCI connector and perform a diode check (please refer to your multimeter operation manual for proper diode test procedure) across the ground circuit terminal on the PCI and battery ground: • If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 8.		

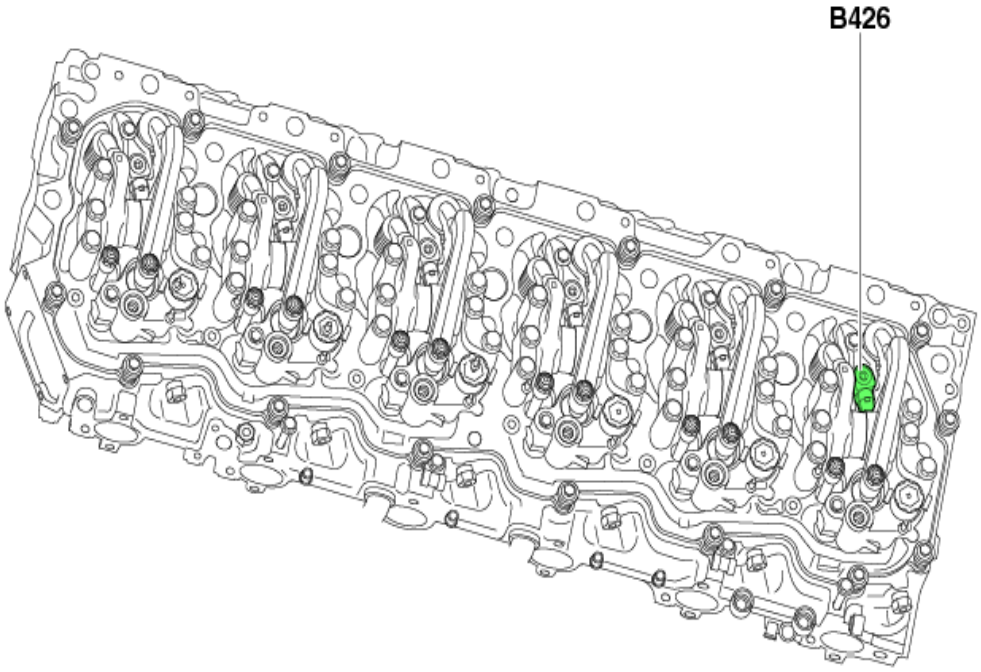
Step 8	Step ID 1227h	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		

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

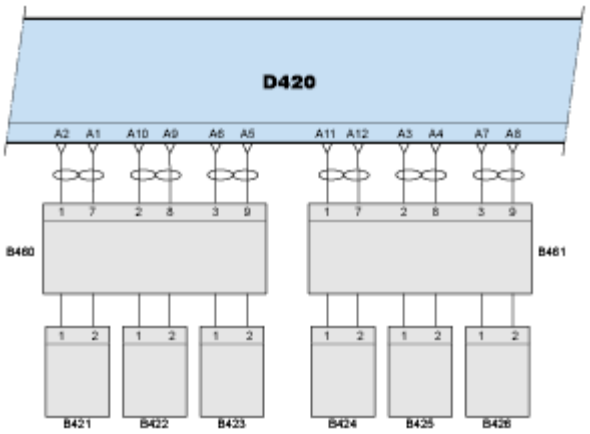
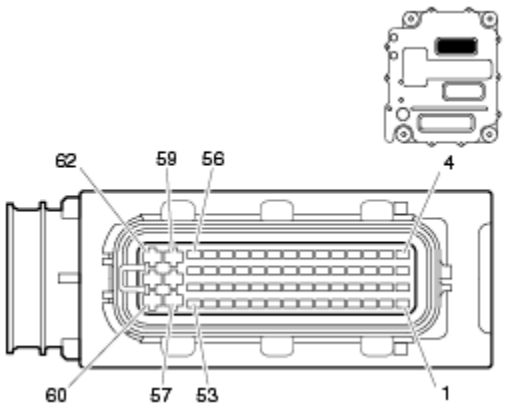
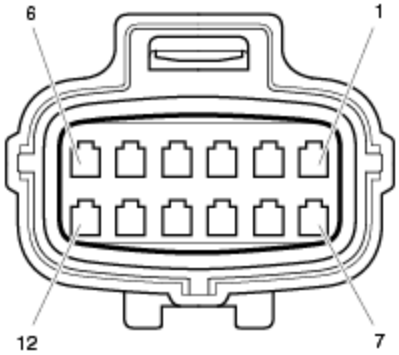
P1228

Code number	P1228
Fault code description	Injector solenoid valve cylinder 4,5 or 6 voltage too high or short circuit to supply on ECU D420 pin A11 or A3 or A7.
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 greater than 80% of threshold value. • Driver bank B High side driver voltage @ 6, 9 and/or 12 is greater than 0.45, 0.75, 1.05V.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)	  Wiring harness connector D420.A front view  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 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]

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

Faulty wiring
Faulty connector
Faulty injector

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

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


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

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

Injector needle valve high side short circuit to ground
Injector needle valve high side short circuit to battery voltage
Injector needle valve open circuit
Injector needle valve short circuit across injector

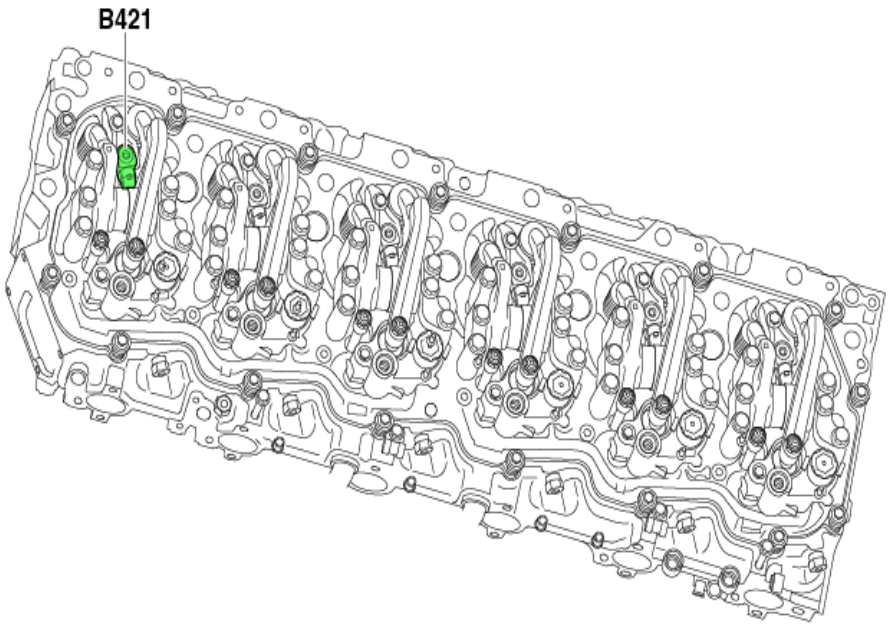
Following each step, the connector removed for testing MUST be reconnected before proceeding to the next test.
<table>
<tr><td>Step 1</td><td>Step ID 1228a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, 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 1228b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine. Turn the key ON and measure the voltage between the signal terminal on the encapsulated harness side of the connector and a battery ground:

If the measured voltage is approximately 7.0 V – Proceed to step 3.
If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.
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<table>
<tr><td>Step 3</td><td>Step ID 1228c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the pass-through connector located on the exterior of the engine and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the encapsulated harness side of the connector and a battery ground:

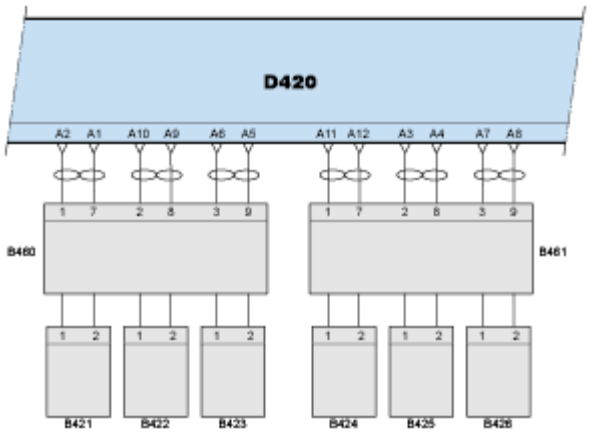
If the circuit is open during REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Proceed to step 4.
If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 7.
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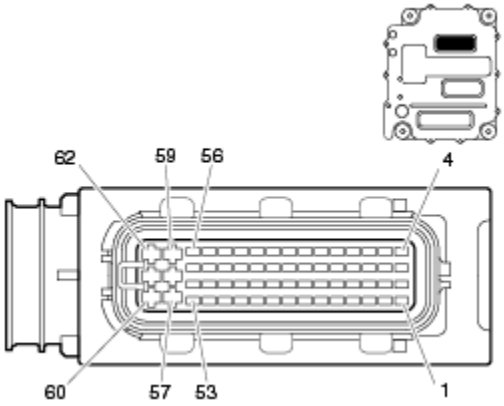
	<table><tr><td>Step 4</td><td>Step ID 1228d</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the connector from the injector solenoid. Turn the key ON, and measure the voltage between the signal terminal on the connector and a battery ground: - If the measured voltage is approximately 7.0 V – Proceed to step 5. - If the measured voltage is below 5.0 V or above 9.0 V – Replace the pass-through harness on the engine. Proceed to the verification procedure listed at the end of this document. </td></tr></table> <table><tr><td>Step 5</td><td>Step ID 1228e</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the connector from the injector solenoid and perform a diode test (please refer to your multimeter operation manual for proper diode test procedure) between the ground terminal on the connector and a battery ground: - If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during FORWARD bias test – Replace the fuel injector. Proceed to the verification procedure listed at the end of this document. - If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Replace the pass-through harness. Proceed to the verification procedure listed at the end of this document. </td></tr></table> <table><tr><td>Step 6</td><td>Step ID 1228f</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the encapsulated harness at the PCI. Turn the key ON, and measure the voltage between the signal pin of the PCI and the chassis ground: - If the measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 8. </td></tr></table> <table><tr><td>Step 7</td><td>Step ID 1228g</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the PCI connector and perform a diode check (please refer to your multimeter operation manual for proper diode test procedure) across the ground circuit terminal on the PCI and battery ground: - If the circuit is open during the REVERSE bias test and indicates 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 8. </td></tr></table> <table><tr><td>Step 8</td><td>Step ID 1228h</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 the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
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P1230

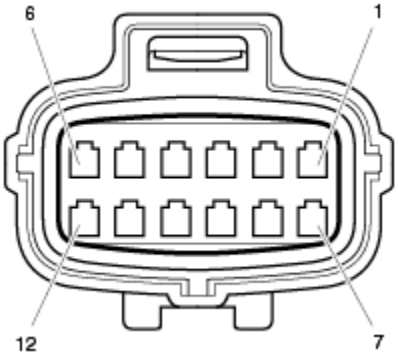
Code number	P1230
Fault code description	Injector solenoid valve cylinder 1-Short circuit between ECU D420 pin A26 and A25
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The fuel injector injects fuel into 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 is less than 2.4V 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]

Possible causes

- Faulty wiring
- Faulty connector
- Faulty injector

Additional information

No additional information available.

Diagnostic Step-by-Step

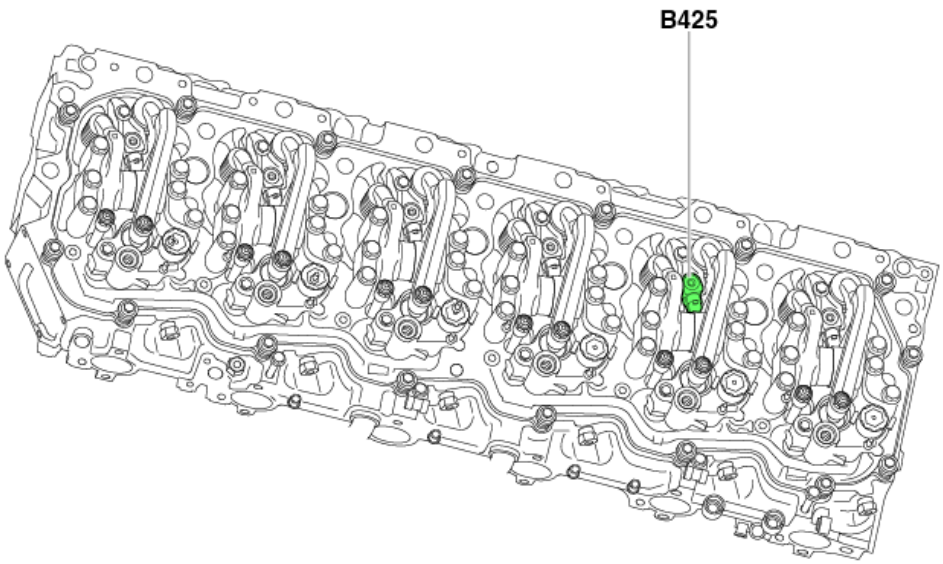
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting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

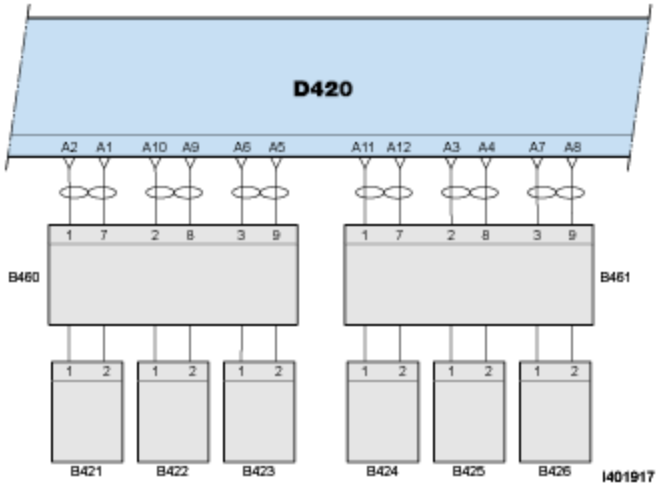
Step 1	Step ID 1230a	SRT

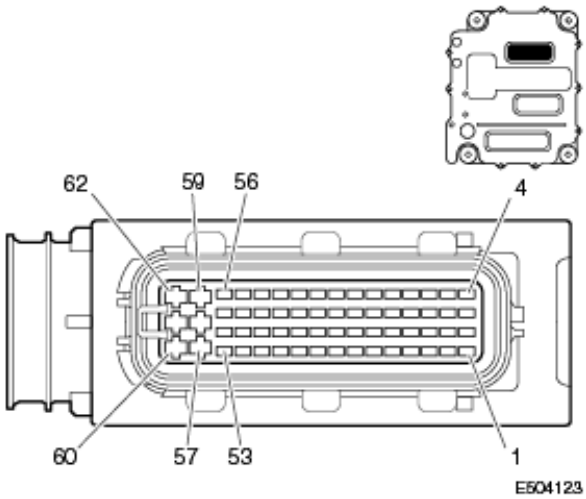
	Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.
	Step 2 | Step ID 1230b | SRT With key OFF, disconnect the pump unit connector. Turn the key ON and measure the voltage between the signal circuit terminal on the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 3. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 5.
	Step 3 | Step ID 1230c | SRT With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the pump unit. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 4.
	Step 4 | Step ID 1230d | SRT With key OFF, disconnect the encapsulated harness at the PCI and perform a diode check between the ground circuit terminal on the PCI and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 6.
	Step 5 | Step ID 1230e | SRT Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground: • If the measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is below 5.0 V or above 9.0 V - Proceed to step 6.
	Step 6 | Step ID 1230f | SRT Possible PCI failure - Contact the Engine Support Center for further instructions on replacement of the PCI.
Verification Drive Cycle	To validate the repair, with DAVIE connected and the key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
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P1234

Code number	P1234
Fault code description	Injector solenoid valve cylinder 5- Short circuit
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	No diagnostic condition available
Set condition of fault code	• High side voltage on the pump (before injection) compared to battery voltage is less than 20% and is greater than 80% of the threshold value • Current passing through the sensor resistor > 25A of the threshold value
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)





Wiring harness connector D420.A front view

D420	B425	Function
A3	1	Signal high, injector solenoid valve cylinder 5
A4	2	Signal low, injector solenoid valve cylinder 5
A7		Signal high, injector solenoid valve cylinder 6
A8		Signal low, injector solenoid valve cylinder 6
A11		Signal high, injector solenoid valve cylinder 4
A12		Signal low, injector solenoid valve cylinder 4

Technical data

Component check, injector solenoid valve cylinder 5 (B425)

Preparation

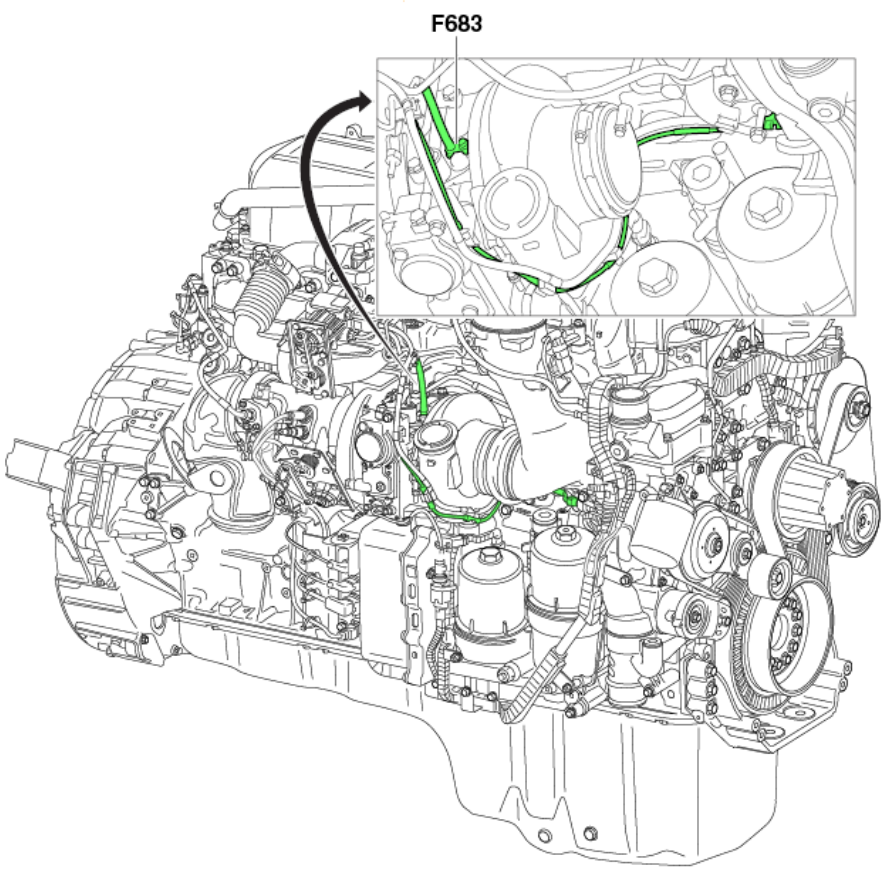
- Key off the ignition
- Disconnect connector B461
- Measure on wiring harness connector B461

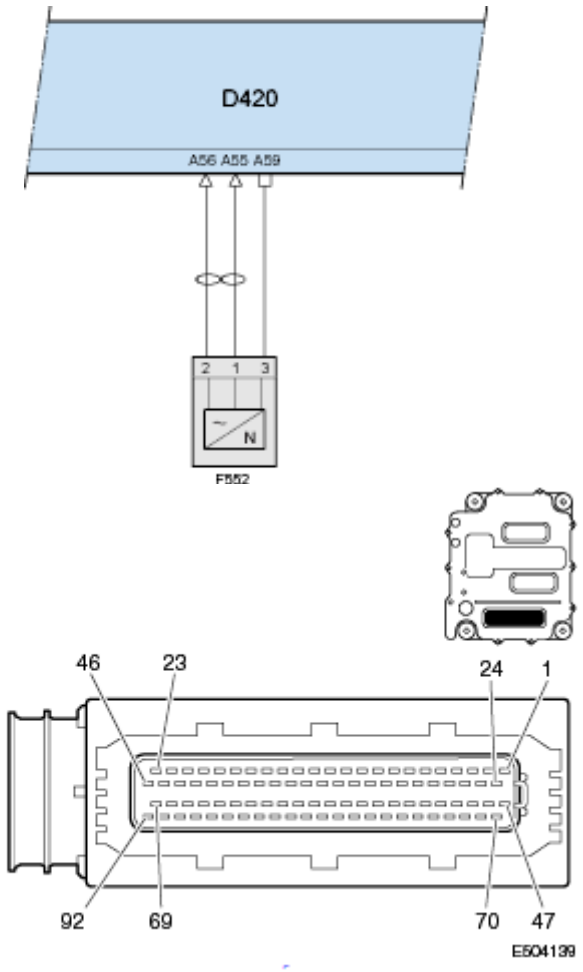
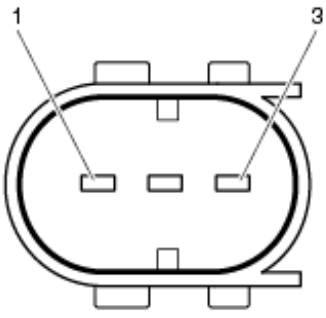
Pin (+ probe)	Pin (- probe)	Value	Additional information
2	8	± 0.67 Ω maximum 0.94 Ω	Resistance value at 20°C [68°F]

Possible causes	• Faulty wiring • Faulty connector • Faulty injector
Additional information	No additional information available
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. This pump unit circuit test procedure will address the following pump unit error types: • Short circuit across pump unit • Pump unit open circuit • Pump unit low side short circuit to ground • Pump unit low side short circuit to battery voltage **Step 1** | **Step ID 1234a** | **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 1234b** | **SRT** With key OFF, disconnect the pump unit connector. Turn the key ON and measure the voltage between the signal circuit terminal on the connector and a battery ground: • If the measured voltage is approximately 7.0 V – Proceed to step 3. • If the measured voltage is below 5.0 V or above 9.0 V – Proceed to step 5. **Step 3** | **Step ID 1234c** | **SRT** With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the pump unit. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 4.

	<table><tr><td>Step 4</td><td>Step ID 1234d</td><td>SRT</td></tr><tr><td colspan="3">Step 4 With key OFF, disconnect the encapsulated harness at the PCI and perform a diode check between the ground circuit terminal on the PCI and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV ±200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If any result other than open circuit during the REVERSE bias test and 600 mV ±200 mV during the FORWARD bias test is found - Proceed to step 6.</td></tr></table> <table><tr><td>Step 5</td><td>Step ID 1234e</td><td>SRT</td></tr><tr><td colspan="3">Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground: • If the measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. • If the measured voltage is below 5.0 V or above 9.0 V - Proceed to step 6.</td></tr></table> <table><tr><td>Step 6</td><td>Step ID 1234f</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 the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
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P1235

Code number	P1235
Fault code description	Turbo speed – Data erratic, intermittent, or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	The turbo speed is monitored on the turbine-compressor shaft. Effect on the system: • Turbo charger speed limiting • The engine torque is limited if the speed is too high. • Stalled turbo charger detection • Calculates the exhaust gas temperature before the turbine • A higher measured turbo speed results in lower calculated exhaust gas temperature before the turbine. • Diagnostic check on the boost pressure system.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 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 measured turbo speed differs too much from the expected turbo speed for more than 120 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once

	the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	 Wiring harness connector D420.A front view  Component connector F683 D420 F683 Function C87 2 Signal, turbo speed C88 1 Ground

<table>
<tr><td>Technical data</td><td>Component check, turbo speed sensor (F683)
Preparation
Key off the ignition.
Disconnect connector F683.
Measure on component connector F683.
<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>1</td><td>2</td><td>600-1000 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Interruption or short circuit to ground on pin A56 of the ECU
Interruption on pin A55 of the ECU
Faulty or soiled crankshaft sensor (F552) and/or camshaft sensor (F558)
Air gap too large between the crankshaft sensor (F552) and the flywheel
Air gap too large between the camshaft sensor (F558) and the pulse wheel
Incorrect timing gear setting
Damaged flywheel and/or pulse wheel</td></tr>
<tr><td>Additional information</td><td>The turbo speed is measured by the turbo speed sensor (F683).</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 1235a</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 1235b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks (F683)
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</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>
No - Proceed to step 4
<table>
<tr><td>Step 3</td><td>Step ID 1235c</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: Turbo Speed sensor.
Replace the identified 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 Step 4 in the troubleshooting process</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1235d</td><td>SRT</td></tr>
<tr><td colspan="3">Contact the PACCAR Engine Support Call Center
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1263

Code number	P1263
Fault code description	Increase in combustion in cylinder 1 relative to the others
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

P1266

Code number	P1266
Fault code description	Increase in combustion in cylinder 2 relative to the others
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

P1269

Code number	P1269
Fault code description	Increase in combustion in cylinder 3 relative to the others.
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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P1272

Code number	P1272
Fault code description	Increase in combustion in cylinder 4 relative to the others.
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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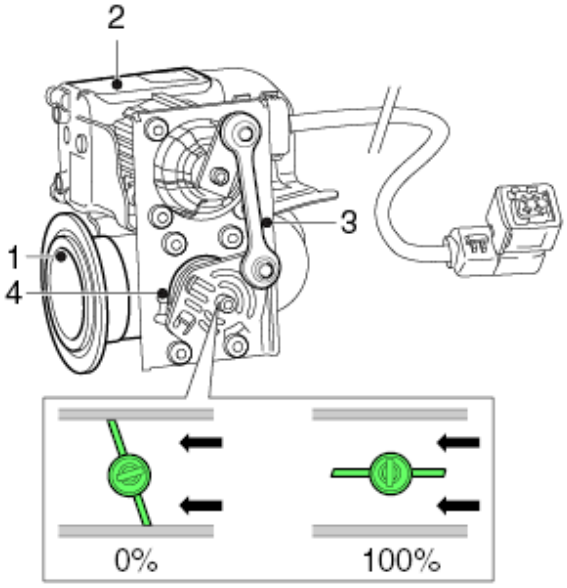
P1275

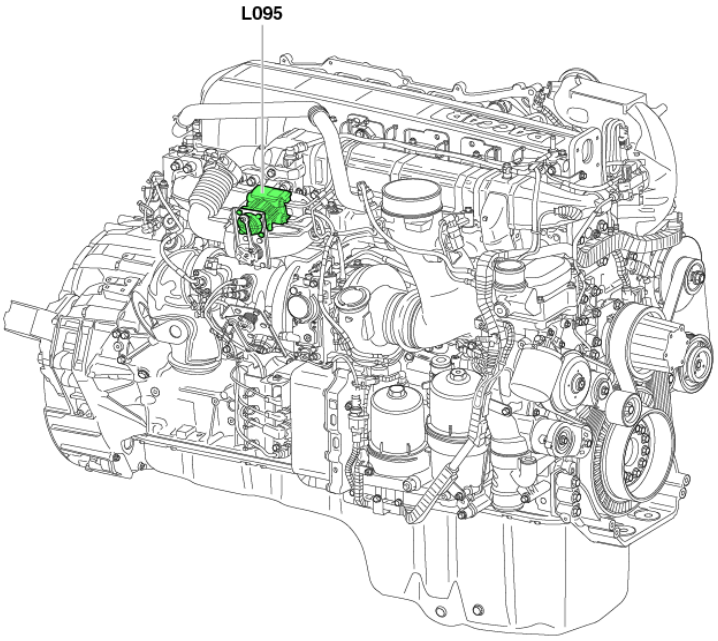
Code number	P1275
Fault code description	Cylinder 5 combustion - Torque contribution is too high
Fault code information	Please Contact the Engine Support Center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
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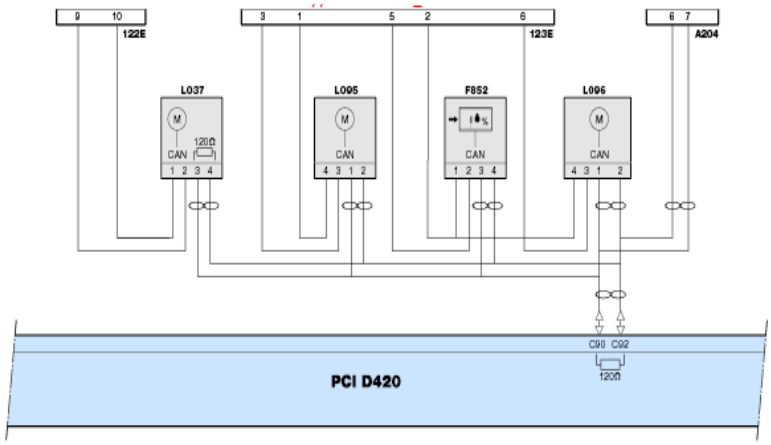
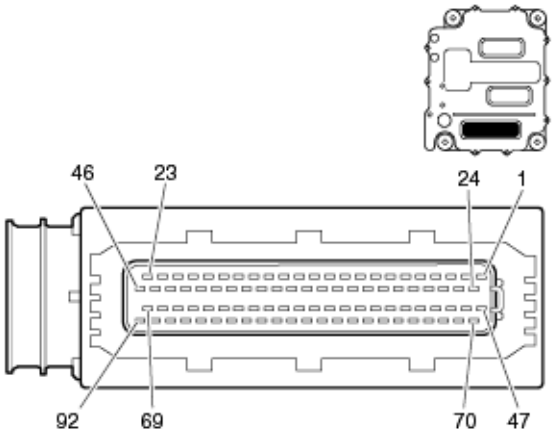
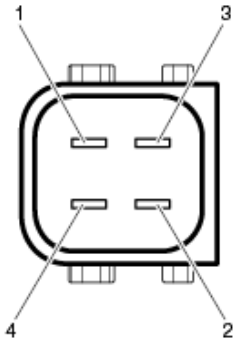
P1278

Code number	P1278
Fault code description	Cylinder 6 combustion - Torque contribution is 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	
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P127A

Code number	P127A
Fault code description	EGR Pressure difference- 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 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. • Butterfly Valve (1) • EGR valve actuator(2) • Lever(3) • Spring(4) 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 switched 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.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed is between 1050 and 1900 rpm, and; • at a steady engine load, and • The engine mode is SCR heating or SCR high efficiency mode or standard mode.
Set condition of fault code	The PCI ECU (D420) detects that the measured EGR gas mass flow is too low for the commanded EGR valve position for more than 20 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 must be conducted within the range of 15 km/h [10

	mph] to 65 km/h [40mph], for no more than 5 to 8 km [3 to 5 miles], and; • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed with a minimum speed of 80km/h [50mph] in the highest gear possible with the engine speed between 1100-1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as much as 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 L095 front view

	D420 L095 Function C90 1 E-CAN high C92 2 E-CAN low 3 Earth 4 Power supply after ignition
Technical data	Pin (+ probe) / Pin (- probe) / Value / Additional information 3 / 4 / Ubat / Ignition switched on Earth cable from the battery disconnected 1 / 2 / ± 60 Ω / Ignition switched on Vehicle Communication Interface (VCI) of DAVIE
Possible causes	• Leaking EGR system • Clogged EGR system • Fouled EGR pressure difference sensor venture • Sticking EGR valve • EGR pressure difference sensor deviation
Additional information	• The engine NOx emission is among others controlled by varying the EGR gas mass flow towards the inlet manifold of the engine. • The EGR gas mass flow is calculated using the EGR pressure difference sensor (F751) and the EGR temperature sensor (F749). • EGR gas mass flow towards the inlet manifold of the engine is controlled by the EGR valve module (L095) 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.
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 127A-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 127A-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 127A-c	SRT

DAVIE Direct Test: EGR Service
Run the prescribed DAVIE Direct test to determine if the EGR Valve has any mechanical issues by monitoring certain parameters while opening and closing the EGR Valve.

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

- No: 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 127A-d	SRT

Visual Inspection: EGR Pressure Difference Sensor and Lines
Remove the EGR Pressure Difference sensor and inspect tip of the sensor for any of the following:

- Damaged
- Excessive build-up of deposits

Visually inspect the Pressure Difference lines for any of the following

- Damage
- Kinks or restrictions

Was there evidence of any of the above?

- No: 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.

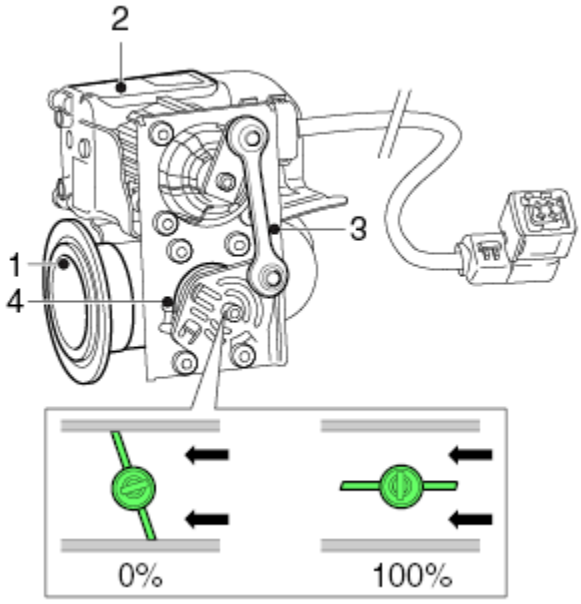
- If this related fault is no longer active, and then this issue has been resolved.

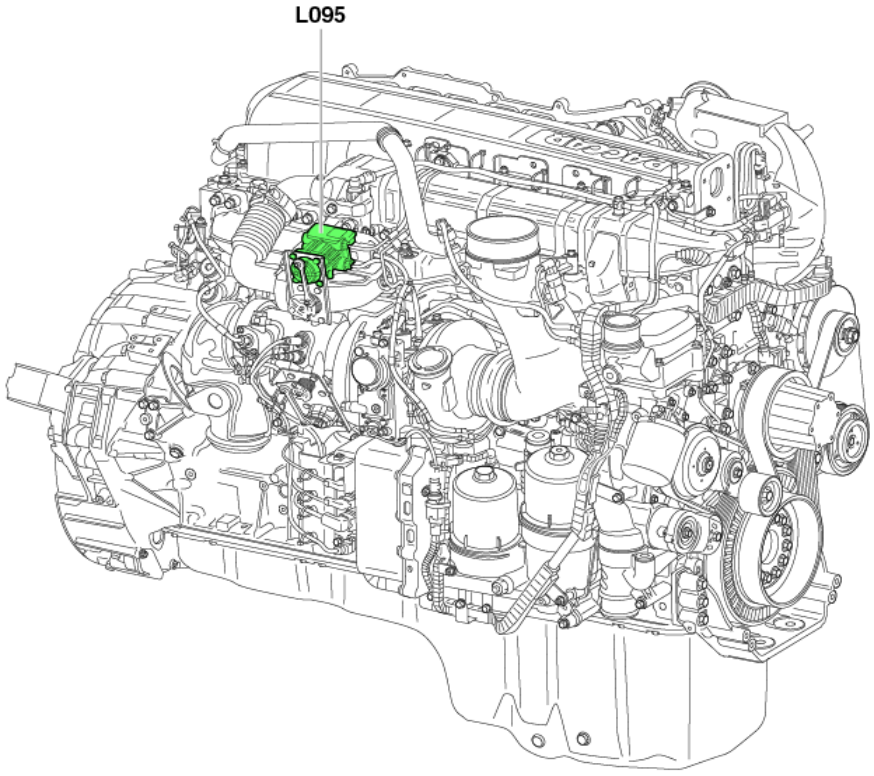
<table>
<tr><td></td><td>
If this related fault is still active, continue to the next step in the troubleshooting Process.
<table>
<tr><td>Step 5</td><td>Step ID 127A-e</td><td>SRT</td></tr>
<tr><td colspan="3">Replace: EGR Pressure Difference sensor
If no problems were detected in the preceding steps, an internal problem has most likely
Occurred with the EGR Pressure Difference sensor.
Replace the identified faulty component.

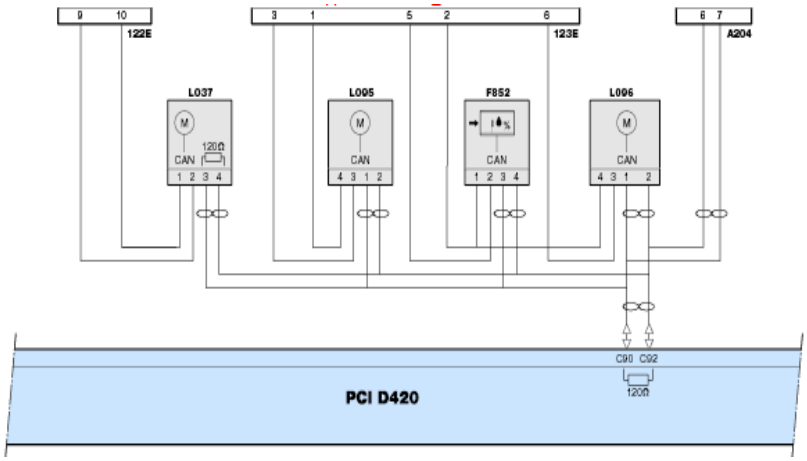
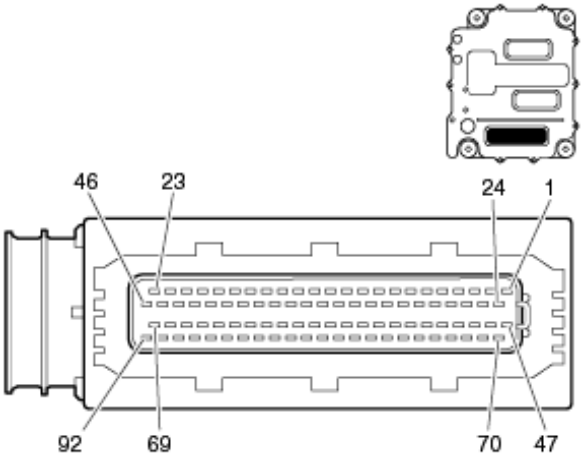
Use DAVIE to re-check for the presence of active faults.
If this related fault is no longer active, and then this issue has been resolved.
If this related fault is still active, continue to the next step in the troubleshooting Process</td></tr>
</table>
<table>
<tr><td>Step 6</td><td>Step ID 127A-f</td><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>Transient:
To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON.
With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.

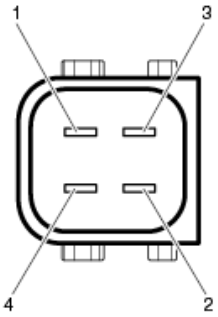
Steady state:
To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several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

P127B

Code number	P127B
Fault code description	EGR Pressure difference- 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 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. Connection points: • Butterfly Valve (1) • EGR valve actuator(2) • Lever(3) • Spring(4) 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 switched 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.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • engine speed is between 1050 and 1900 rpm, and; • at a steady engine load, and • The engine mode is SCR heating or SCR high efficiency mode or standard mode.
Set condition of fault code	The PCI ECU (D420) detects that the measured EGR gas mass flow is too low for the commanded EGR valve position for more than 20 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 must be conducted within the range of 15 km/h [10 mph] to 65 km/h [40mph], for no more than 5 to 8 km [3 to 5 miles] • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed with a minimum speed of 80km/h [50mph] in the highest gear possible with the engine speed between 1100-1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as much as 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 L095 front view

Disconnected

D420	L095	Function
C90	1	E-CAN high
C92	2	E-CAN low
C23	3	Earth

Technical data

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

Possible causes

- Fouled EGR pressure difference sensor venture
- Sticking EGR valve
- EGR pressure difference sensor deviation

Additional information

- The engine NOx emission is, among others, controlled by varying the EGR gas mass flow toward the inlet manifold of the engine.
- The EGR gas mass flow is calculated using the EGR pressure difference sensor (F751) and the EGR temperature sensor (F749).
- EGR gas mass flow toward the inlet manifold of the engine is controlled by the EGR valve module (L095)

The EGR valve position does not just 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.

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 127B-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 127B-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 127B-b	SRT
DAVIE Direct Test: EGR Service Run the prescribed DAVIE Direct test to determine if the EGR Valve has any mechanical issues by Monitoring certain parameters while opening and closing the EGR Valve. Does the test fail to complete or result in a failed state? • No: 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, and 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 127B-c	SRT

Visual Inspection: EGR Pressure Difference Sensor and Lines
Remove the EGR Pressure Difference sensor and inspect tip of the sensor for any of the following:

- Damaged
- Excessive build-up of deposits

Visually inspect the Pressure Difference lines for any of the following

- Damage
- Kinks or restrictions

Was there evidence of any of the above?

- No: 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, and 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 127B-d	SRT

Replace: EGR Pressure Difference sensor
If no problems were detected in the preceding steps, an internal problem has most likely
Occurred with the EGR Pressure Difference sensor.
Replace the identified faulty component.
Use DAVIE to re-check for the presence of active faults.

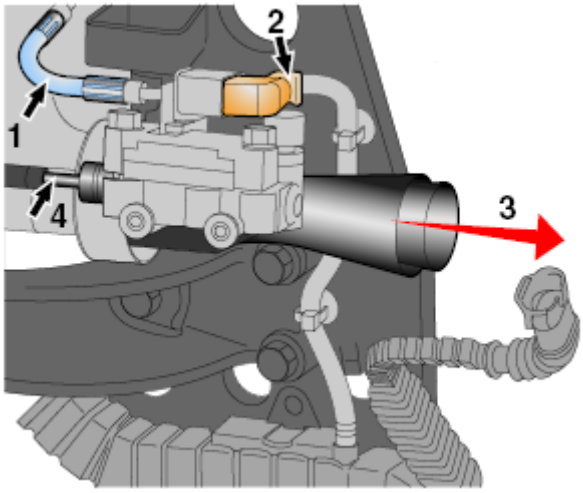
- If this related fault is no longer active, and then this issue has been resolved.
- If this related fault is still active, continue to the next step in the troubleshooting Process

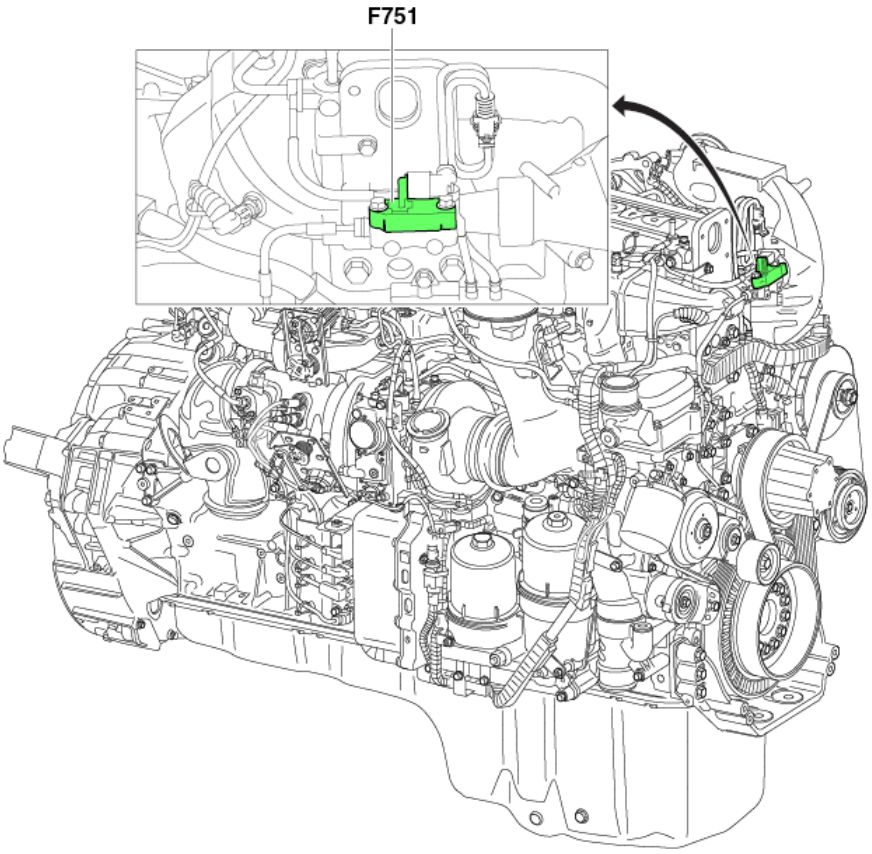
Step 6	Step ID 127B-e	SRT

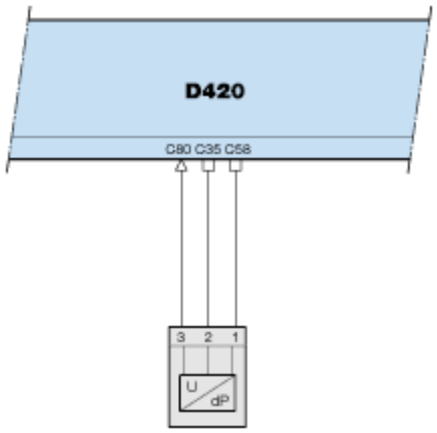
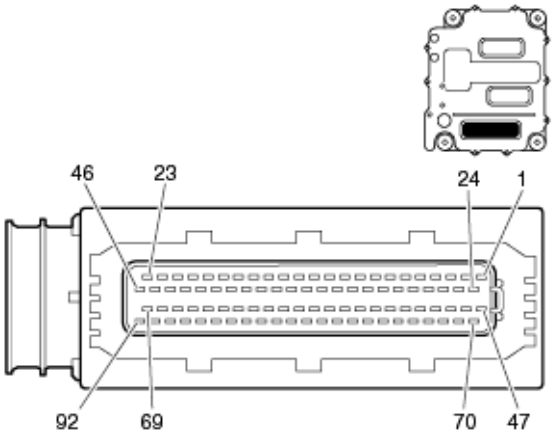
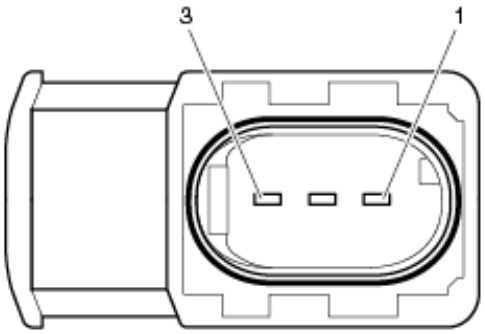
For further assistance in diagnosing this issue or for confirmation prior to the replacement of Suspect components; contact the PACCAR Engine Support Call Center at 1-800-477-0251.

Verification Drive Cycle	Transient: To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable. Steady state: To validate the repair, with the System Initiation cycle complete, under moderate engine load (A/C and Fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed until reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.
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P127C

Code number	P127C
Fault code description	EGR pressure difference – 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)	EGR pressure difference sensor (F751) The sensor measures the EGR gas pressure before and after a venturi in the EGR pipe between the EGR cooler and the engine intake pipe. The sensor operating temperature is limited to 125°C [257°F]. To prevent overheating, the sensor is cooled by the engine cooling system.  1 Coolant out 2 Electrical connection 3 EGR gas flow direction 4 Coolant in EGR flow The EGR pressure difference sensor contains two internal pressure sensors with electronics. One pressure sensor measures before the venturi and the other after the venturi. The electronics in the EGR pressure difference sensor converts this to one differential pressure signal. The PCI ECU uses the signal to calculate the EGR flow. Effect on the system: • Calculates EGR gas flow

Location of component(s)	
Diagnostic condition	• Engine speed is between 1050 and 1900 rpm, and; • EGR valve position is more than 25%, and; • Pressure difference between boost pressure and pressure before turbine is more than 0.25 bar [3.6 PSI], and; • The engine mode is SCR heating or SCR high efficiency mode or standard mode.
Set condition of fault code	The PCI ECU (D420) detects that the measured EGR gas mass flow differs too much from the expected EGR gas mass flow for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.

Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector F751 front view D400 Central box F751 Sensor, EGR pressure difference D420 F751 Function C35 2 Ground C58 1 Power supply C80 3 Signal, EGR pressure difference
Technical data	Component & wiring check, ECU (D420) Preparation • Key off the ignition. • Disconnect connector F751 • Measure on the front side of wiring harness connector F751

	Pin (+ probe) 1 / Pin (- probe) 2 / Value 5V / Additional information Ignition keyed on
Possible causes	• Contaminated EGR pressure difference sensor venturi • EGR pressure difference sensor deviation • EGR temperature sensor deviation • Boost temperature sensor deviation
Additional information	• The engine NOx emission is, among others, controlled by varying the EGR gas mass flow toward the inlet manifold of the engine. • The EGR gas mass flow is calculated using the EGR pressure difference sensor (F751), EGR temperature sensor (F749), and boost temperature sensor (F804). • EGR gas mass flow toward the inlet manifold of the engine is controlled by the EGR valve module (L095) The EGR valve position does not just 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.
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 127C-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 127C-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 127C-c	SRT

Ancillary Test: Air Side Pressure:
Perform the prescribed testing to determine whether there are any leaks in the Air system.
Does the test fail to complete or result in a failed state?

- No - Continue to the next step 4 in the troubleshooting process.
- Yes - Make the appropriate repairs or component replacements.

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

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, continue to the next step 4 in the troubleshooting process.

Step 4	Step ID 127C-d	SRT

Remove the venturi pressure tubes and inspect for any of the following:

- Damage
- lockage

Was there evidence of any of the above?

- 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 5 in the troubleshooting process.

Step 5	Step ID 127C-e	SRT

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 6 in the troubleshooting process.

Step 6	Step ID 127C-f	SRT

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

Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
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P1280

Code number	P1280
Fault code description	AMF CAN sensor flow out of range
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	
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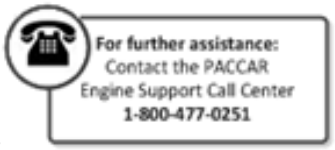
P1281

Code number	P1281
Fault code description	AMF CAN sensor reduced accuracy
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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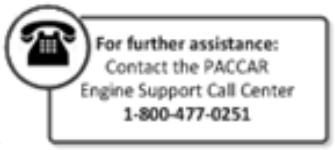
P1284

Code number	P1284
Fault code description	AMF CAN sensor medium temperature out of range
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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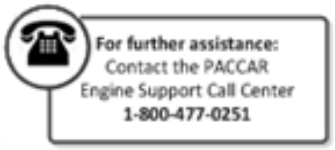
P1285

Code number	P1285
Fault code description	AMF CAN sensor checksum 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	
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Verification Drive Cycle	
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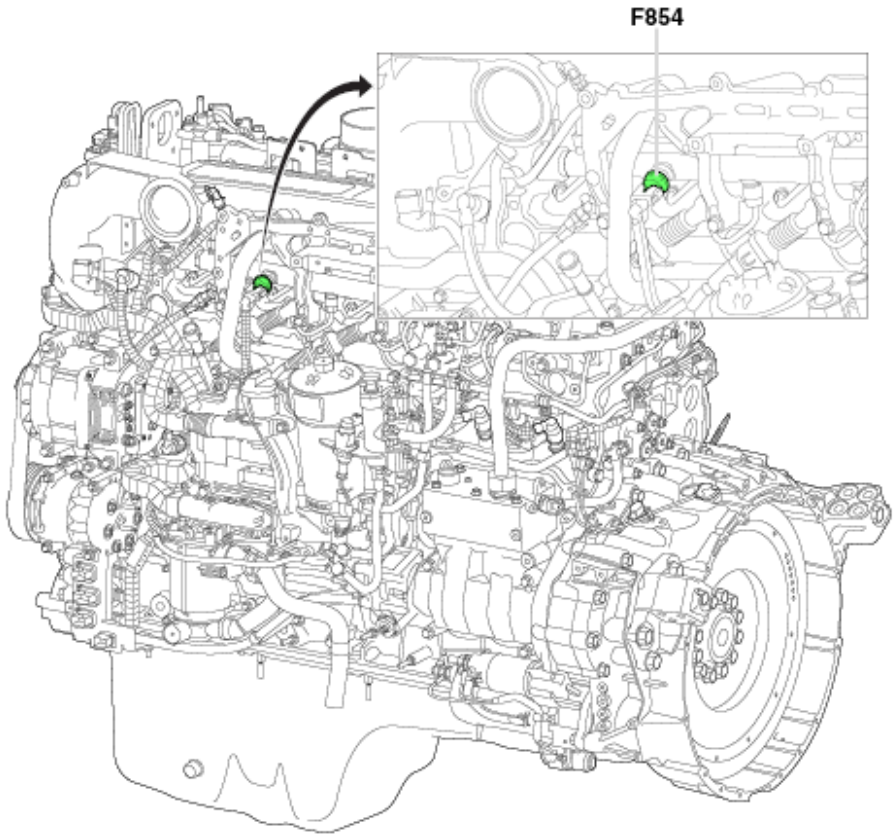
P1286

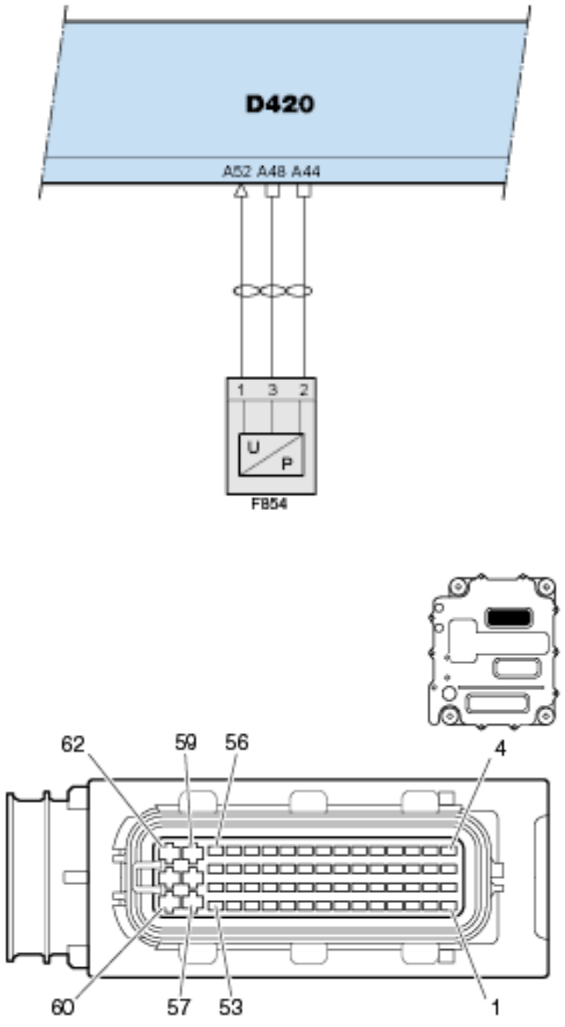
Code number	P1286
Fault code description	AMF CAN sensor defective
Fault code information	Please Contact the Engine Support Center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
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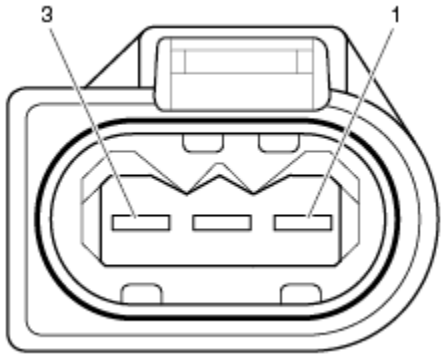
P1288

Code number	P1288
Fault code description	AMF CAN sensor supply voltage out of range
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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P128E

Code number	P128E
Fault code description	Engine rail pressure control - Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel System Freeze frame type - Fuel
Description of component(s)	The rail pressure is measured in the common rail. The rail pressure sensor is part of the common rail and is not interchangeable as a separate part. Effect on the system: • Feedback on the rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the rail pressure demands determined by the ECU and the rail pressure feedback measured by the common rail pressure sensor.
Location of component(s)	
Diagnostic condition	This diagnostic runs when the rail pressure operating state is: Dumping
Set condition of fault code	The PCI ECU (D420) detects that the measured rail pressure is more than 1000 bar higher than the commanded rail pressure 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: • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the

	range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles], and; • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn on as many engine power consumers as possible to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	 Wiring harness connector D420.A front view

	 Wiring harness connector F854 front view D420 PCI ECU F854 engine rail pressure sensor D420 F854 Function A44 2 Ground A48 3 Power supply A52 1 Signal, common rail pressure
Technical data	Component & wiring check, ECU (D420) Preparation Key off the ignition. Disconnect connector F854 Measure on the front side of wiring harness connector F854 Pin (+ probe) / Pin (- probe) / Value / Additional information 3 / 2 / 5V / Ignition keyed on
Possible causes	• Blocked common rail pressure release valve return pipe. • Malfunction on common rail pressure release valve.
Additional information	• The rail pressure is closed-loop controlled. A comparison is made between the rail pressure commanded by the ECU and the rail pressure feedback measured by the common rail pressure sensor. • The common rail pressure release valve (L094) is used to decrease the rail pressure rapidly (dumping) during normal operation. • The rail pressure is measured in the common rail by the common rail pressure sensor (F854).
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

<table>
<tr>
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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.

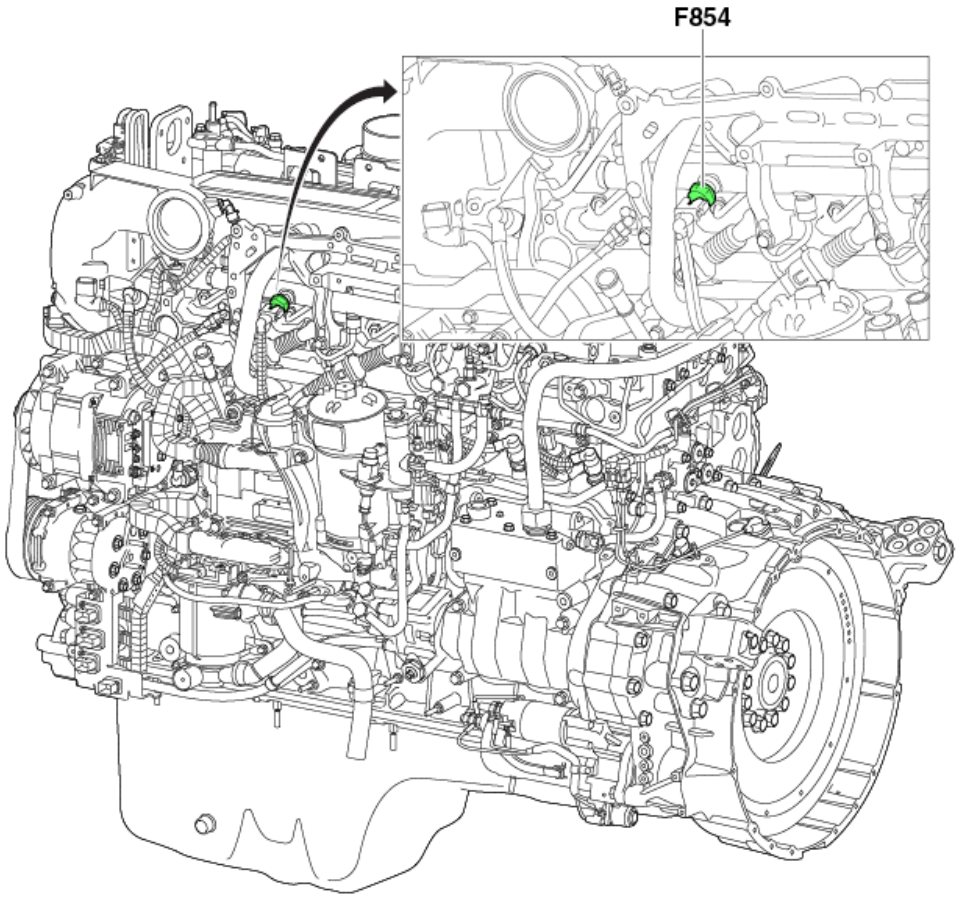
<table>
<tr><td>Step 1</td><td>Step ID 128E-a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

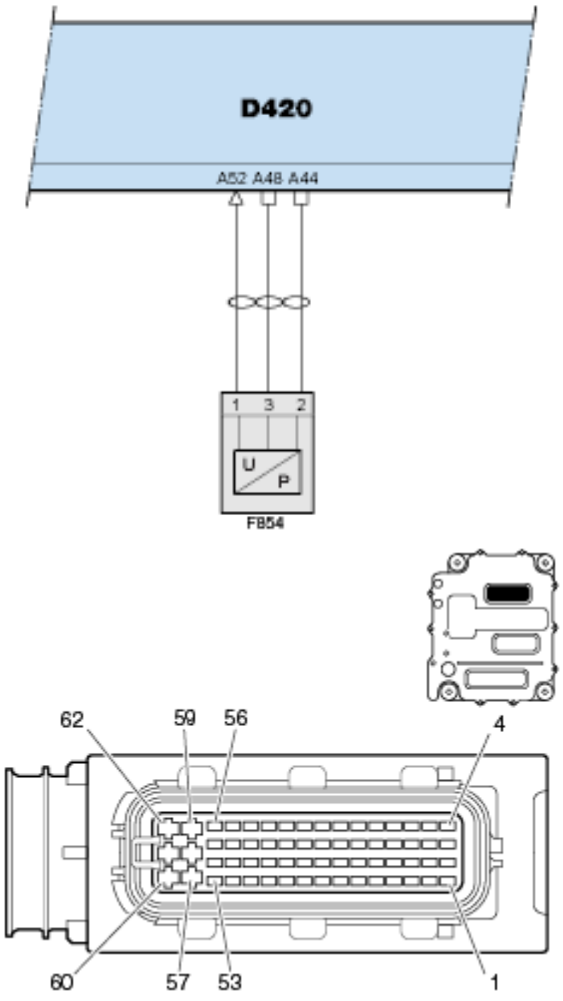
<table>
<tr><td>Step 2</td><td>Step ID 128E-b</td><td>SRT</td></tr>
<tr><td colspan="3">Run the prescribed DAVIE Direct test to determine if the electronic unit pumps are working correctly.
Does the test fail to complete or result in a failed state?
• Yes - Proceed to step 3
• No - Proceed to step 4</td></tr>
</table>

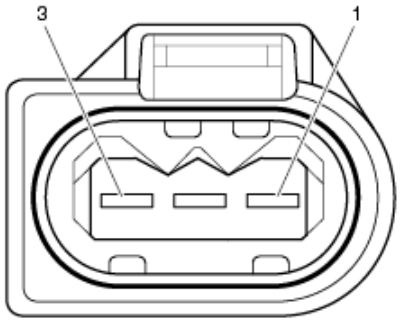
<table>
<tr><td>Step 3</td><td>Step ID 128E-c</td><td>SRT</td></tr>
<tr><td colspan="3">Make repairs or replacements of appropriate component and use DAVIE to re-check for the presence of active faults.
• Fault inactive – issue resolved
• Fault active - Proceed to step 4</td></tr>
</table>

<table>
<tr><td>Step 4</td><td>Step ID 128E-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 Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td>
</tr>
<tr>
<td>Verification Drive Cycle</td>
<td>To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.</td>
</tr>
<tr>
<td></td>
<td>Back to Index</td>
</tr>
</table>

P128F

Code number	P128F
Fault code description	Engine rail pressure control - Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel 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: Dumping
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure is more than 200 bar lower than the commanded rail pressure for more than 1 second.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair: • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the

	minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to low-load transitions. This activity should be conducted within the range of 15 km/h [10 mph] to 65 km/h [40 mph] for no more than 5 to 8 km [3 to 5 miles], and; • Drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100-1500 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 as possible to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	 Wiring harness connector D420.A front view



Wiring harness connector F854 front view

D420 PCI ECU
F854 engine rail pressure sensor

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

Technical data

Component & wiring check, ECU (D420)
Preparation

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

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

Possible causes

No possible causes available.

Additional information

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

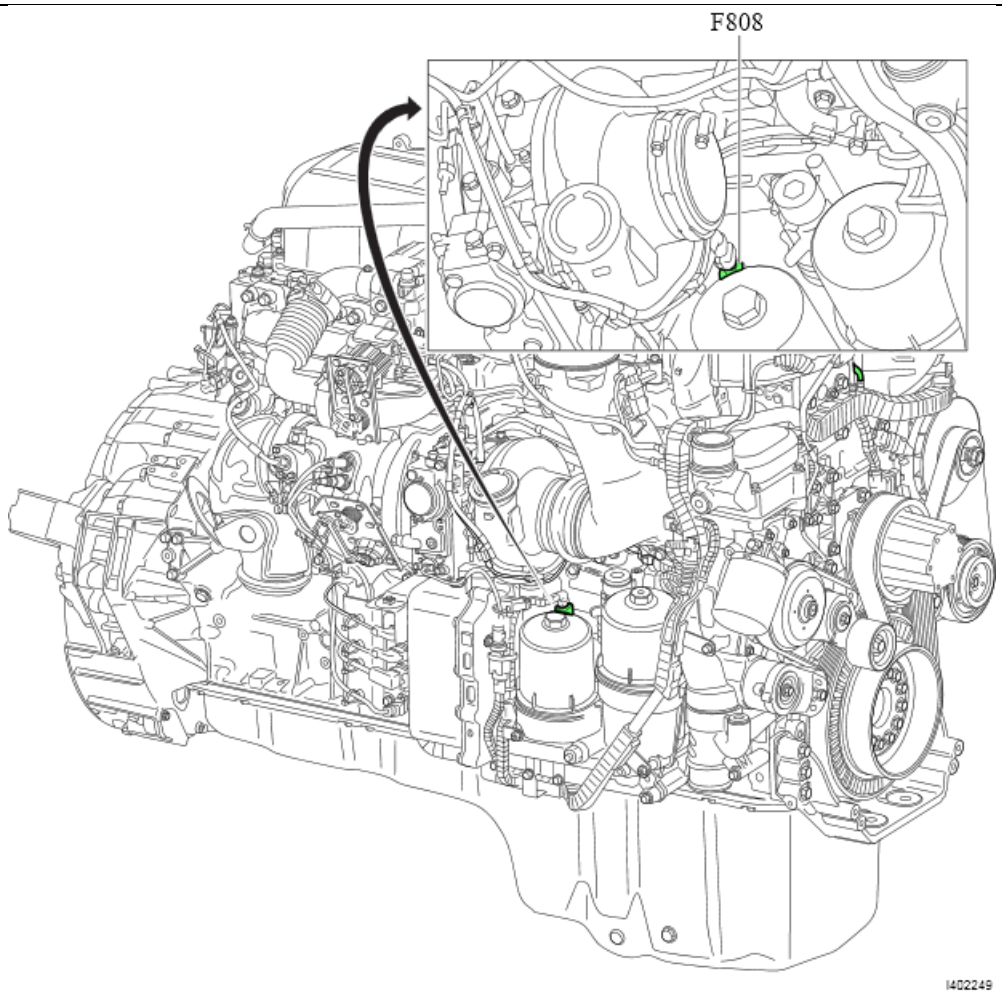
Diagnostic Step-by-Step

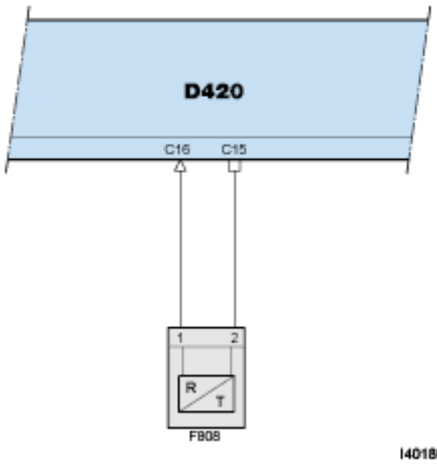
Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting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

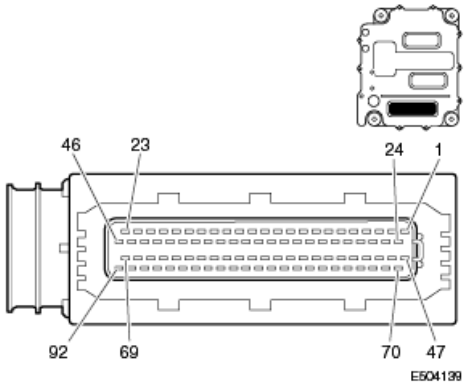
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Verification Drive Cycle	To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.
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P1298

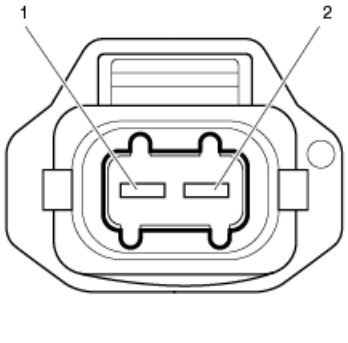
Code number	P1298
Fault code description	Engine oil temperature - Data valid but too high, moderately severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Engine Protection
Description of Component(s)	**Oil temperature sensor (F808)** The oil temperature is measured in the oil module before the oil cooler. **Effect on the system:** • Limitation of the engine torque when the oil temperature is too high.
Location of component(s)	
Diagnostic condition	This diagnostic runs continuously after ignition is keyed on.
Set condition of fault code	The PCI ECU (D420) detects that measured oil temperature is higher than 125°C [257°F]

	for more than 60 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)	 D420 PCI ECU F808 Oil temperature sensor

D420	F808	Function
C15	2	Ground
C16	1	Signal, oil temperature



Wiring harness connector D420.C front view



Wiring harness connector F808 front view

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

Technical data

Component check, oil temperature sensor (F808)

Preparation

- Key off the ignition
- Disconnect connector F808
- Measure on the component connector F808

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	14936–15961 Ω	Resistance value at -20°C [-4°F]
		5727–6056 Ω	Resistance value at 0°C [32°F]
		2439–2557 Ω	Resistance value at 20°C [68°F]
		1151–1197 Ω	Resistance value at 40°C [104°F]
		585–604 Ω	Resistance value at 60°C [140°F]
		318–327 Ω	Resistance value at 80°C [176°F]
		185–188 Ω	Resistance value at 100°C [212°F]
		111–114 Ω	Resistance value at 120°C [248°F]

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F808
- Measure on the front side of wiring harness connector F808

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

Possible causes	• Oil temperature sensor (F808) deviation • Possibility of oil being dirty or low
Additional information	• The oil temperature is monitored by the oil temperature sensor (F808). • The yellow warning is activated on the driver's display.
Diagnostic Step-by-Step	 **The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.**  ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly. ▪ Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors. ▪ 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? P0197; P0198	
Yes	**No**
Possible issue with oil level sensor. Refer to the troubleshooting information for these codes before continuing with this procedure.	
	Go to step 2.A

Step 2. Oil temperature sensor (F808) Checks

Step 2. A Visual inspection, oil temperature sensor (F808)	
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 are not fully charged, contacts are not tight • Signs of oil leaks • Engine oil level is low • Oil temperature sensor (F808) broken or not installed correctly	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the oil temperature sensor (F808) 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, oil temperature	
Action 1. Ensure that the truck engine has been off and resting for a period of at least 15 minutes. 2. Connect DAVIE. 3. Start the engine, then use DAVIE to monitor the engine oil temperature. Expected range is from ambient temperature conditions (at cold start) to approximately 392°F, depending on ambient temperatures, running conditions, and run time.	
Are measured values within expected range?	
Yes	**No**
	Correct any issues found.

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

Step 2.C Electrical checks, resistance, oil temperature sensor (F808)



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

Action

1. Confirm the sensor resistance as outlined in the corresponding checking data, "Component check, oil temperature sensor (F808)."

Are measured values within expected range?

Yes	**No**
	Correct any issues found, or replace the oil temperature sensor if measured values indicate a sensor error. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.
Go to step 2.D	**If this code is still present, go to Step 2.D.**

Step 2.D Electrical checks, supply voltage, oil temperature sensor (F808)



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

Action

1. Confirm the supply voltage level as outlined in the corresponding checking data, "Component check, oil temperature sensor (F808)."

Are measured values within expected range?

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. 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 P1298 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.

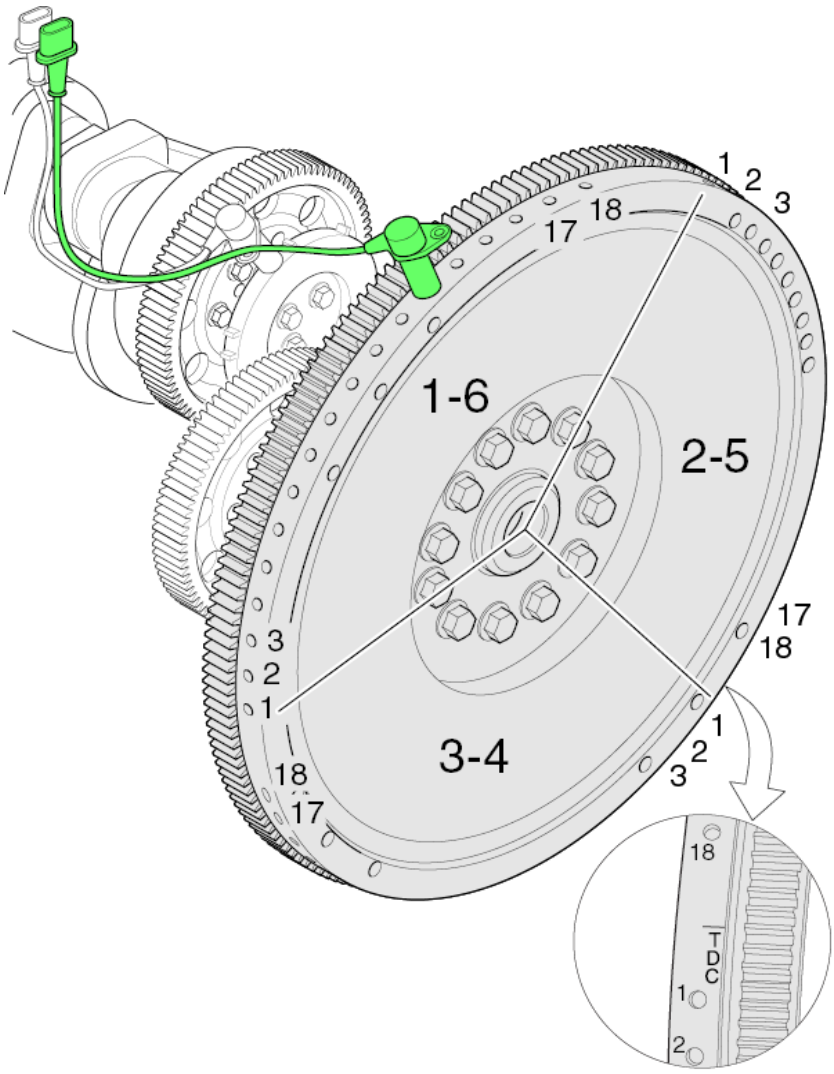


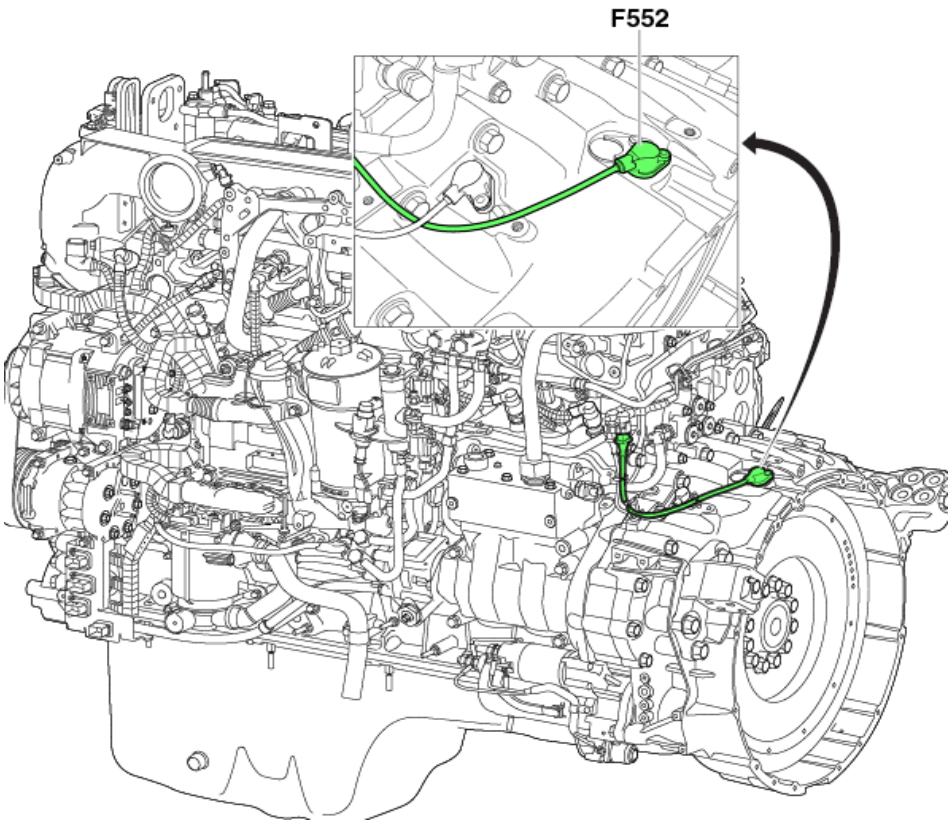
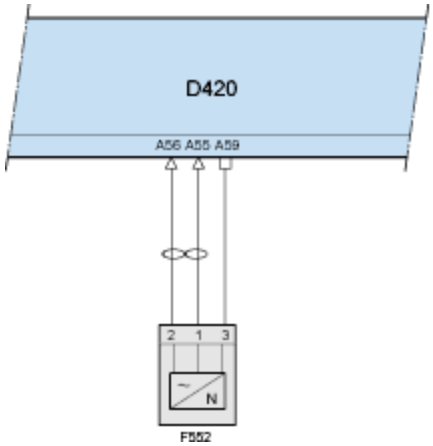
Contacting the PACCAR Engine Support Center

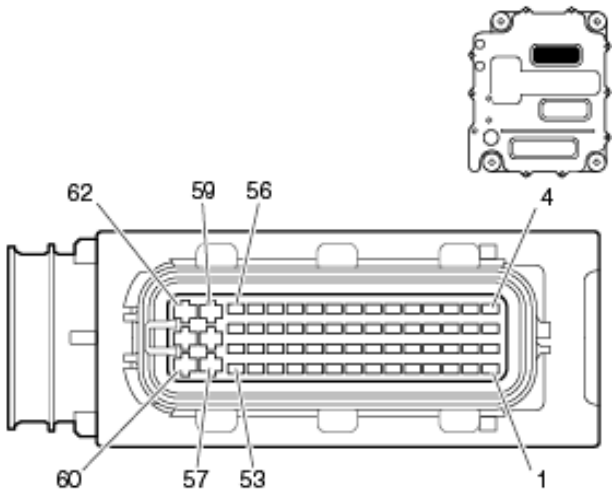
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

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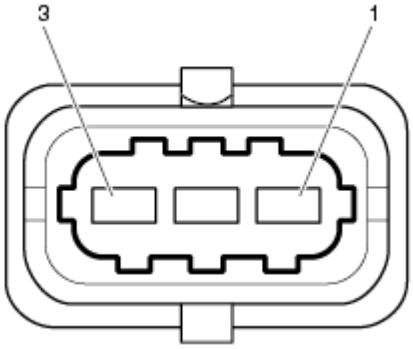
P1335

Code number	P1335
Fault code description	Crankshaft speed signal-Disturbed or no signal during engine start.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 Effect on the system: • registration of crankshaft speed • registration of crankshaft position • synchronization during starting (together with camshaft signal) • diagnostic checks on cylinder misfire and cylinder contribution • monitoring correct alignment between the crankshaft and the camshaft • back up for camshaft signal (F558)

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when engine is started.
Set condition of fault code	The PCI ECU (D420) detects that one or more holes in the flywheel are not detected within one crankshaft revolution.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key the ignition off for at least 15 seconds, key on again. Then start the engine and let it idle for 2 minutes.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Component connector F552

D420 PCI ECU
F552 crankshaft sensor

D420	F552	Function
A55	1	Ground
A56	2	Signal, crankshaft speed
A59	3	Shield

Technical data

Component check, crankshaft sensor (F552)

Preparation

- Key off the ignition.
- Disconnect connector F552
- Measure on component connector F552.

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	774–964 Ω	Resistance value at 20°C [68°F]
		± 1.5 V	Effective AC voltage (VAC) when engine starting.
		± 4.9 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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

Faulty crankshaft sensor signal
Check the effective AC voltage (VAC) generated by the sensor.
Damaged flywheel
Faulty crankshaft sensor

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

Crankshaft sensor (F552) is used to determine the crankshaft speed and position.
It is possible that the camshaft sensor (F558) is used as backup to run the engine.
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 1335a</td><td>SRT</td></tr>
<tr><td colspan="3">Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure.
Proceed to step 2.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step ID 1335b</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the crankshaft sensor from the engine harness and start the engine:

If the engine starts – Proceed to step 3.
If the engine does NOT start – Proceed to the step-by-step diagnostic for code P0016.

</td></tr>
</table>
<table>
<tr><td>Step 3</td><td>Step ID 1335c</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the crankshaft sensor. Measure the resistance between the signal and ground pins of the crankshaft sensor.
Resistance values change with temperature.

If the resistance is acceptable – Proceed to step 4.
If the resistance is NOT acceptable – Replace the sensor and reconnect the harness. Proceed to the verification procedure listed at the end of this document.

</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1335d</td><td>SRT</td></tr>
<tr><td colspan="3">With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all wires associated with the sensor:

If the continuity is acceptable – Proceed to step 5.

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

- If the continuity is NOT acceptable – Replace engine harness. Reconnect the harness, then proceed to the verification procedure listed at the end of this document.

Step 5	Step ID 1335e	SRT
Inspect the connection pins of the engine harness, crankshaft sensor, and PCI: • If the pins are acceptable – Proceed to step 6. • If the pins are NOT acceptable – Replace the engine harness. Reconnect the harness, then proceed to the verification procedure listed at the end of this document.		

Step 6	Step ID 1335f	SRT
With key OFF, reconnect all the harnesses. Turn the key on and reprogram the PCI: • If the code is still active – Proceed to step 7. • If no code is present – Proceed to the verification procedure listed at the end of this document.		

Step 7	Step ID 1335g	SRT
With key OFF, disconnect the crankshaft sensor from the engine harness. Crank the engine and use an AC voltmeter to check the voltage between the signal and ground pins of the crankshaft sensor: • If the voltage is acceptable – Proceed to step 9. • If the voltage is NOT acceptable – Proceed to step 8.		

Step 8	Step ID 1335h	SRT
With key OFF, remove the sensor and check for debris or damage: • If debris is found – Clean the sensor, reinstall, and repeat step 8. • If damage is found – Replace the sensor and repeat step 8. • If no debris or damage is found – Proceed to step 9.		

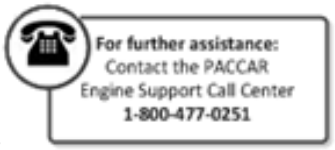
Step 9	Step ID 1335i	SRT
Inspect the flywheel for damage through sensor pass-through: • If NO damage is found – Proceed to step 10. • If damage is found – Replace the flywheel (see Engine Rapido for information on flywheel replacement), then proceed to the verification procedure listed at the end of this document.		

Step 10	Step ID 1335j	SRT
Verify correct timing of crankshaft and camshaft gears: • If correct – Proceed to step 11. • If not correct – Check engine timing (see engine Rapido for instructions on timing the engine). Proceed to the verification procedure listed at the end of this document. If P1335 is still active - Proceed to step 11.		

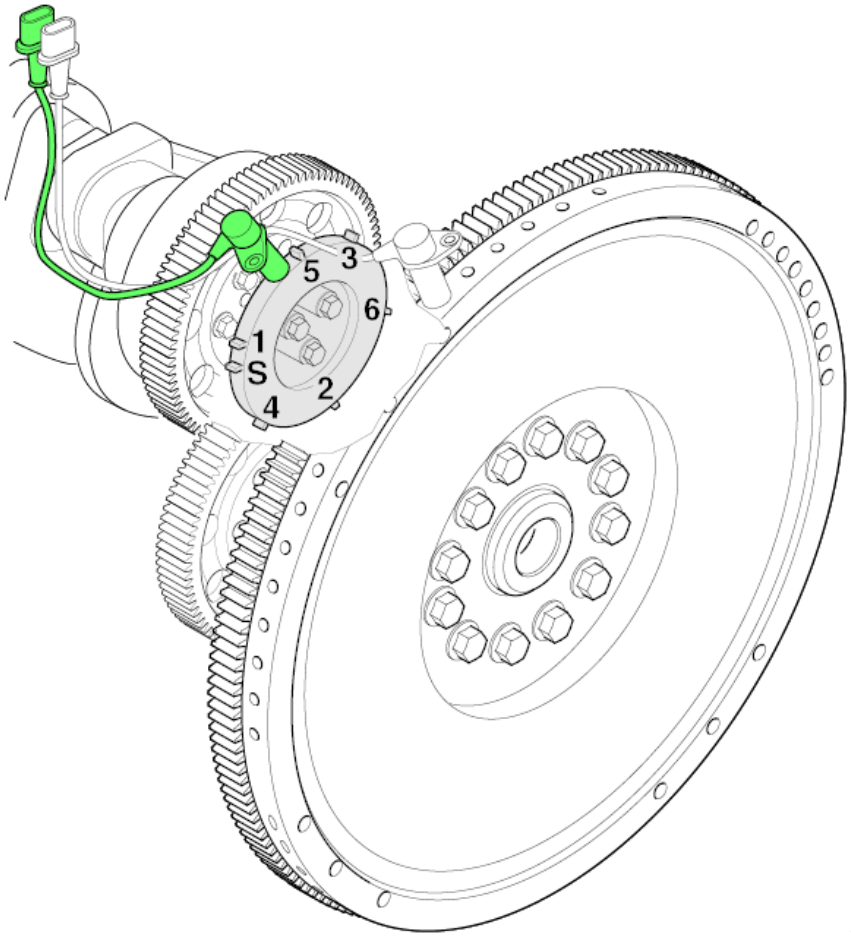
Step 11	Step ID 1335k	SRT
Verify correct timing of crankshaft and camshaft gears: • If correct – Proceed to step 7.		

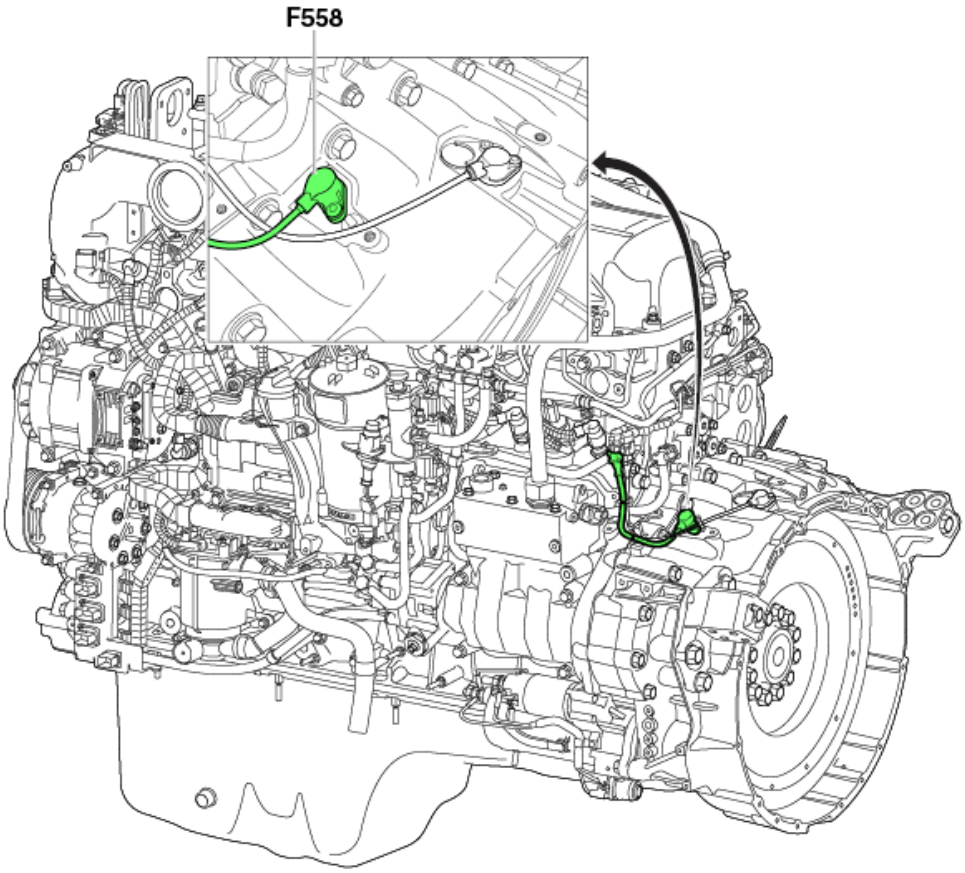
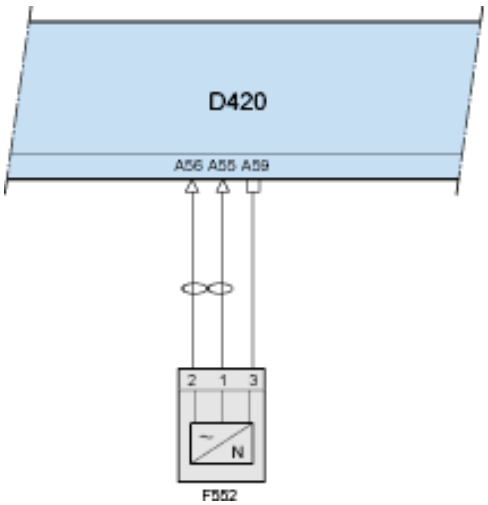
	• If not correct – Check engine timing (see engine Rapido for instructions on timing the engine). Proceed to the verification procedure listed at the end of this document. If P0017 is still active – Proceed to step 7.
Verification Drive Cycle	Possible PCI failure; to validate the repair, contact the Engine Support Center for further instructions on replacement of the PCI.
	Back to Index

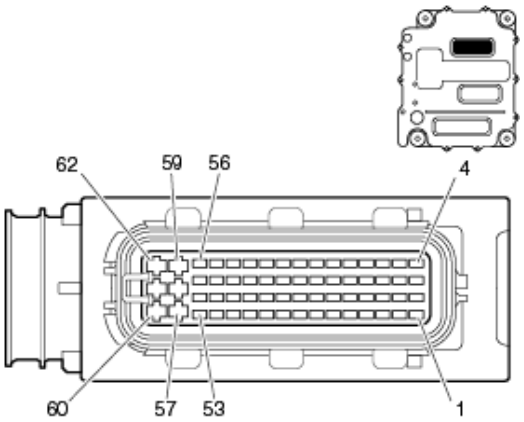
P1336

Code number	P1336
Fault code description	High frequency corruption of crank signal during start 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

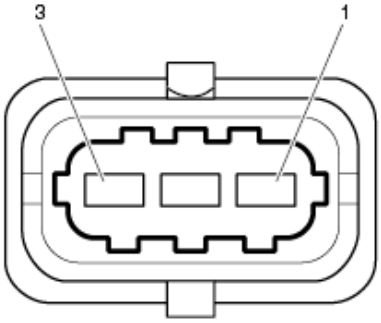
P1340

Code number	P1340
Fault code description	Camshaft speed signal - Disturbed or no signal during engine start
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 Effect on the system: • Cylinder detection • Synchronization during starting (together with crankshaft signal) • Monitors correct alignment between the crankshaft and the camshaft • Backs up crankshaft signal (F552)

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is started.
Set condition of fault code	The PCI ECU (D420) detects that one or more teeth of the camshaft sensor tone wheel are not detected within one crankshaft revolution.
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 2 minutes.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector F558 front view

D420 PCI ECU
F558 camshaft sensor

D420	F558	Function
A53	1	Signal, camshaft speed
A54	2	Ground
A57	3	Shield

Technical data

Component check, camshaft sensor (F558)

- Preparation
- Key off the ignition
- Disconnect connector F558
- Measure on component connector F558

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	774–964 Ω	Resistance value at 20°C [68°F]
1	2	± 0.5 V	Effective AC voltage (VAC) when engine starting.
1	2	± 2.3 V	Effective AC voltage (VAC) when engine idling.
1	2	± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

Possible causes

- Faulty camshaft sensor signal
- Check the effective AC voltage (VAC) generated by the sensor.

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

- Faulty camshaft sensor

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

- Camshaft sensor (F558) is used to determine the position of the engine (cylinder detection).
- 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.

Step 1	Step ID 1340a	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 1340b	SRT
With key OFF, disconnect the crankshaft sensor from the engine harness and start the engine: • If the engine starts – Proceed to step 3. • If the engine does NOT start – Proceed to the step-by-step diagnostic for code P0017.		

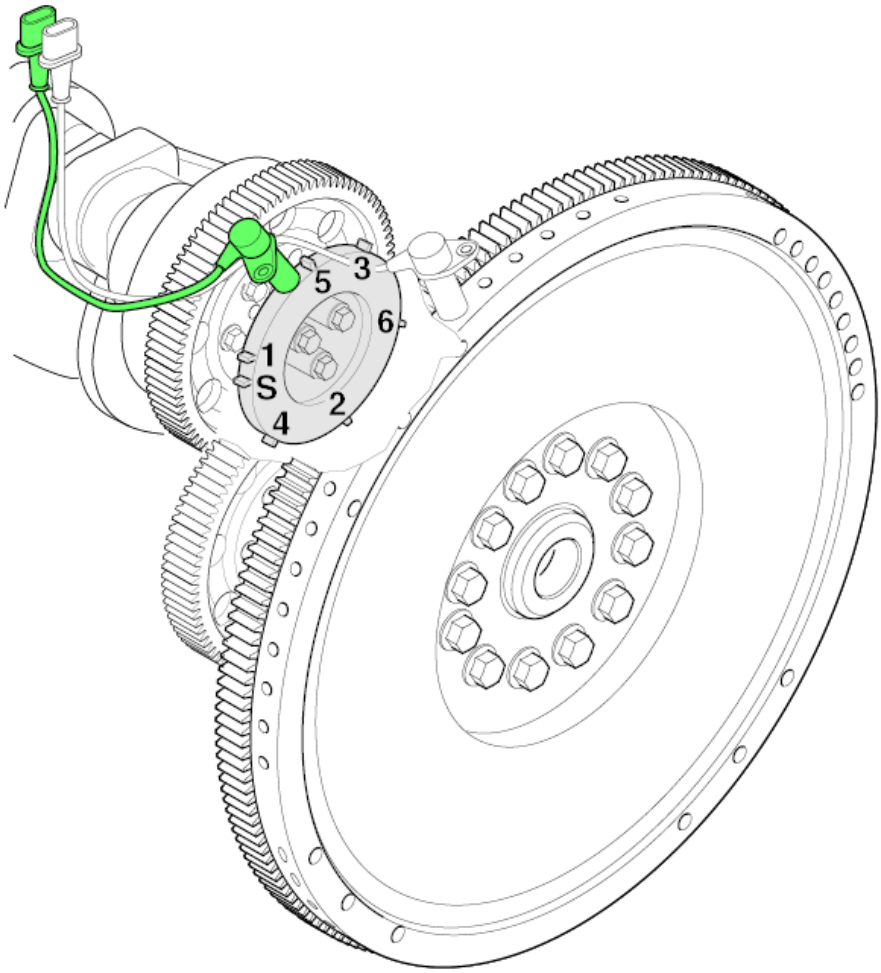
Step 3	Step ID 1340c	SRT
With key OFF, disconnect the crankshaft sensor. Measure the resistance between the signal and ground pins of the crankshaft sensor. • If the resistance is acceptable – Proceed to step 4. • If the resistance is NOT acceptable – Replace the sensor and reconnect the harness. Proceed to the verification procedure listed at the end of this document.		

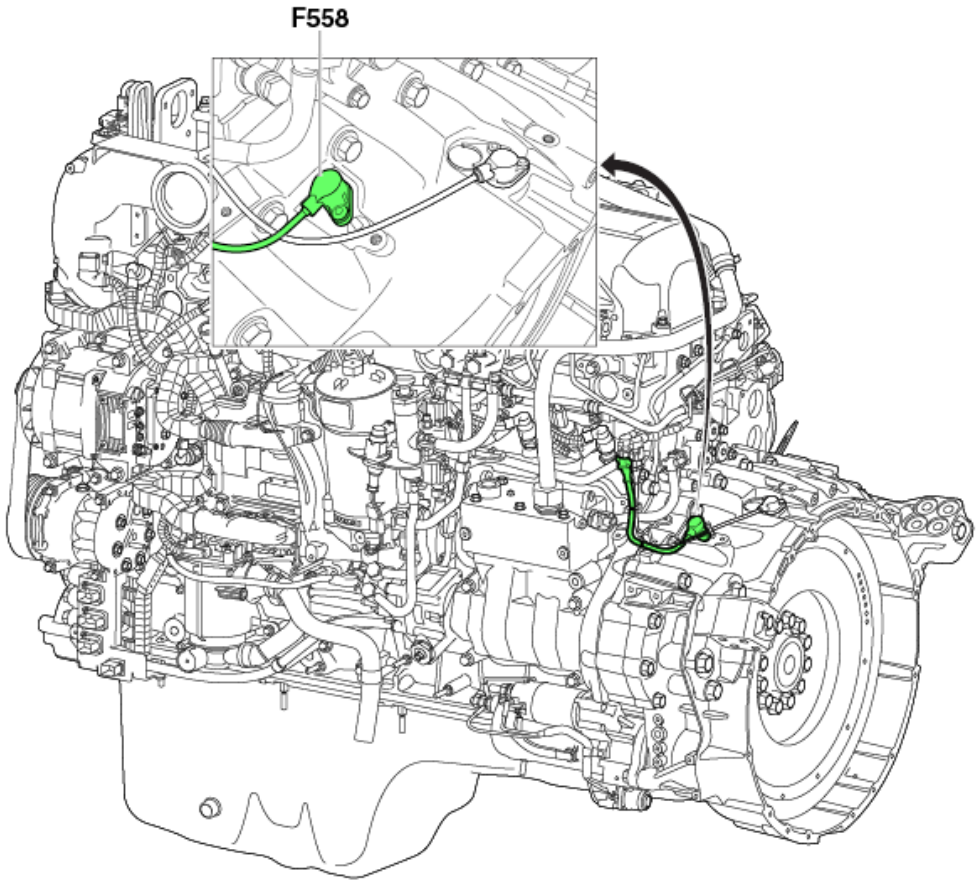
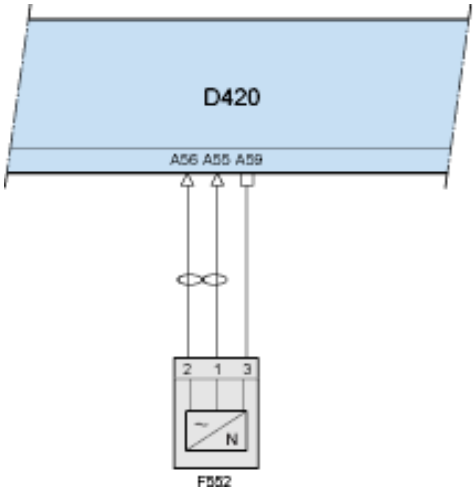
Step 4	Step ID 1340d	SRT
With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all wires associated with the sensor: • If the continuity is acceptable – Proceed to step 5. • If the continuity is NOT acceptable – Replace the engine harness and reconnect. Proceed to the verification procedure listed at the end of this document.		

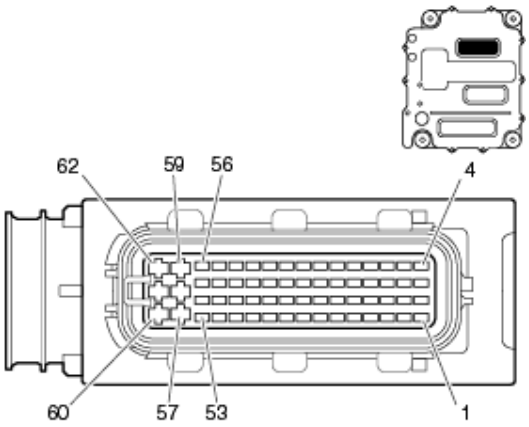
</td></tr>
</table>

	<table><tr><td>Step 5</td><td>Step ID 1340e</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, inspect the connecting pins of the engine harness, sensor harness, and PCI: • If the pins are acceptable – Proceed to step 6. • If the pins are NOT acceptable – Replace the engine harness and reconnect. Proceed to the verification procedure listed at the end of this document.</td></tr></table> <table><tr><td>Step 6</td><td>Step ID 1340f</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, reconnect all the harnesses. Turn the key on and reprogram the PCI: • If the code is still active – Proceed to step 7. • If no code is present – Proceed to the verification procedure listed at the end of this document.</td></tr></table> <table><tr><td>Step 7</td><td>Step ID 1340g</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the crankshaft sensor from the engine harness. Crank the engine and use an AC voltmeter to check the voltage between the signal and ground pins of the crankshaft sensor: • If the voltage is acceptable – Proceed to step 9. • If the voltage is NOT acceptable – Proceed to step 8.</td></tr></table> <table><tr><td>Step 8</td><td>Step ID 1340h</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, remove the sensor and check for debris or damage: • If debris is found – Clean the sensor, reinstall, and repeat step 8. • If damage is found – Replace the sensor and repeat step 8. • If no debris or damage is found – Proceed to step 9.</td></tr></table> <table><tr><td>Step 9</td><td>Step ID 1340i</td><td>SRT</td></tr><tr><td colspan="3">Inspect the flywheel for damage through sensor pass-through: • If NO damage is found – Proceed to step 10. • If damage is found – Replace the flywheel (see Engine Rapido for information on flywheel replacement), then proceed to the verification procedure listed at the end of this document.</td></tr></table> <table><tr><td>Step 10</td><td>Step ID 1340j</td><td>SRT</td></tr><tr><td colspan="3">Verify correct timing of crankshaft and camshaft gears: • If correct – Proceed to step 11. • If not correct – Check engine timing (see engine Rapido for instructions on timing the engine). Proceed to the verification procedure listed at the end of this document. If P1340 is still active - Proceed to step 11.</td></tr></table> <table><tr><td>Step 11</td><td>Step ID 1340k</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 the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Index

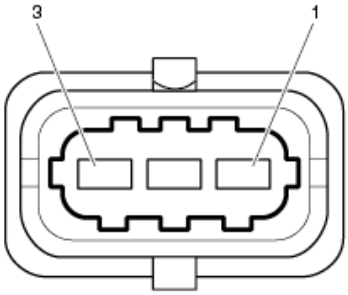
P1341

Code number	P1341
Fault code description	Camshaft speed signal – Out of range during engine start
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 Effect on the system: • Cylinder detection • Synchronization during starting (together with crankshaft signal) • Monitors correct alignment between the crankshaft and the camshaft • Backs up crankshaft signal (F552)

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the engine is started.
Set condition of fault code	The PCI ECU (D420) detects that the camshaft sensor signal is disturbed or intermittent.
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 2 minutes.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector F558 front view

D420	F558	Function
A53	1	Signal, camshaft speed
A54	2	Ground
A57	3	Shield

Technical data

Component check, camshaft sensor (F558)

Preparation

- Key off the ignition
- Disconnect connector F558
- Measure on component connector F558

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	774–964 Ω	Resistance value at 20°C [68°F]
1	2	± 0.5 V	Effective AC voltage (VAC) when engine starting.
1	2	± 2.3 V	Effective AC voltage (VAC) when engine idling.
1	2	± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

Possible causes

- Faulty camshaft sensor signal
- Check the effective AC voltage (VAC) generated by the sensor.
- Faulty camshaft sensor

Additional information

- Camshaft sensor (F558) is used to determine the position of the engine (cylinder detection).
- Engine torque is reduced.

Diagnostic Step-by-Step

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

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

Step 1	Step ID 1341a	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 1341b	SRT
With key OFF, disconnect the crankshaft sensor from the engine harness and start the engine: • If the engine starts – Proceed to step 3. • If the engine does NOT start – Proceed to the step-by-step diagnostic for code P0017.		

Step 3	Step ID 1341c	SRT
With key OFF, disconnect the crankshaft sensor. Measure the resistance between the signal and ground pins of the crankshaft sensor. Resistance values change with temperature. • If the resistance is acceptable – Proceed to step 4. • If the resistance is NOT acceptable – Replace the sensor and reconnect the harness. Proceed to the verification procedure listed at the end of this document.		

Step 4	Step ID 1341d	SRT
With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all wires associated with the sensor: • If the continuity is acceptable – Proceed to step 5. • If the continuity is NOT acceptable – Replace the engine harness and reconnect. Proceed to the verification procedure listed at the end of this document.		

Step 5	Step ID 1341e	SRT
With key OFF, inspect the connecting pins of the engine harness, sensor harness, and PCI: • If the pins are acceptable – Proceed to step 6.		

	• If the pins are NOT acceptable – Replace the engine harness and reconnect. Proceed to the verification procedure listed at the end of this document.

Step 6	Step ID 1341f	SRT
With key OFF, reconnect all the harnesses. Turn the key on and reprogram the PCI: • If the code is still active – Proceed to step 7. • If no code is present – Proceed to the verification procedure listed at the end of this document.		

Step 7	Step ID 1341g	SRT
With key OFF, disconnect the crankshaft sensor from the engine harness. Crank the engine and use an AC voltmeter to check the voltage between the signal and ground pins of the crankshaft sensor: • If the voltage is acceptable – Proceed to step 9. • If the voltage is NOT acceptable – Proceed to step 8.		

Step 8	Step ID 1341h	SRT
With key OFF, remove the sensor and check for debris or damage: • If debris is found – Clean the sensor, reinstall, and repeat step 8. • If damage is found – Replace the sensor and repeat step 8. • If no debris or damage is found – Proceed to step 9.		

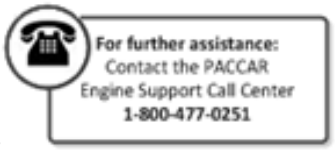
Step 9	Step ID 1341i	SRT
Inspect the flywheel for damage through sensor pass-through: • If NO damage is found – Proceed to step 10. • If damage is found – Replace the flywheel (see Engine Rapido for information on flywheel replacement), then proceed to the verification procedure listed at the end of this document.		

Step 10	Step ID 1341j	SRT
Verify correct timing of crankshaft and camshaft gears: • If correct – Proceed to step 11. • If not correct – Check engine timing (see engine Rapido for instructions on timing the engine). Proceed to the verification procedure listed at the end of this document. If P1340 is still active - Proceed to step 11.		

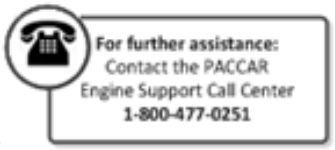
Step 11	Step ID 1341k	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		

Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
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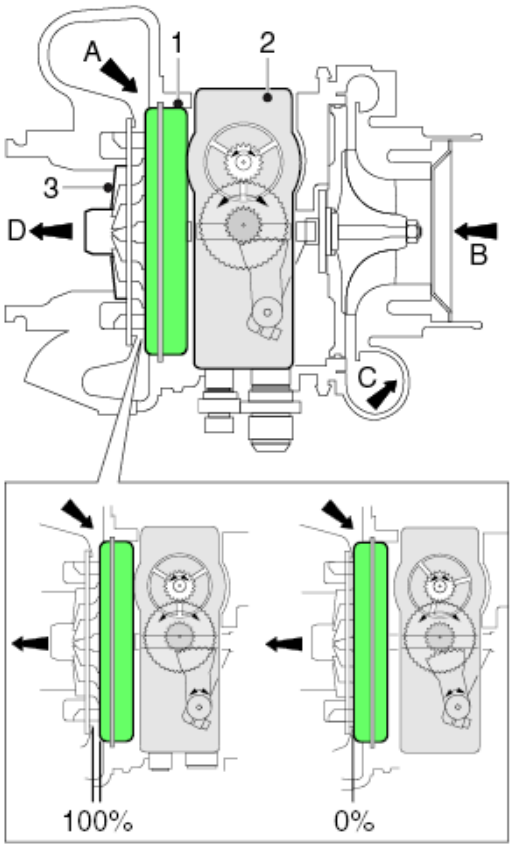
P1350

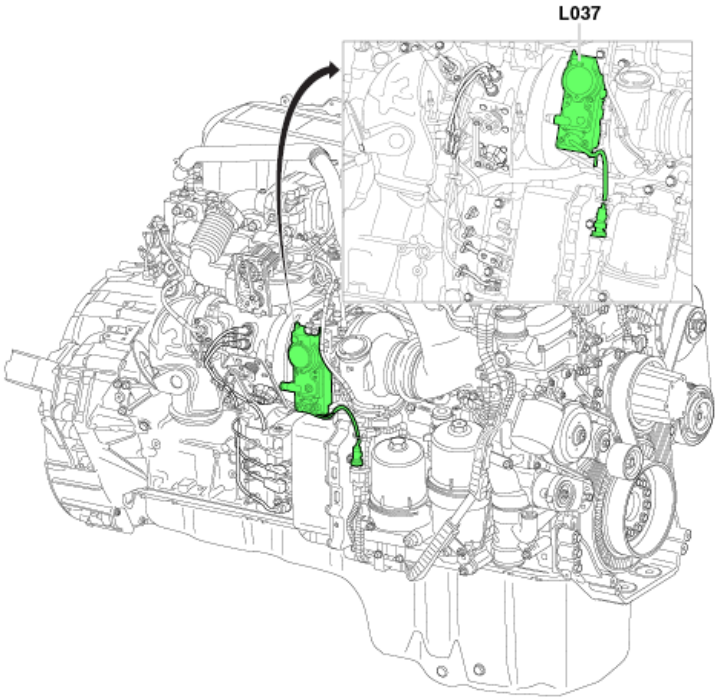
Code number	P1350
Fault code description	VGT status invalid fault detected
Fault code information	Please Contact the Engine Support Center 
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

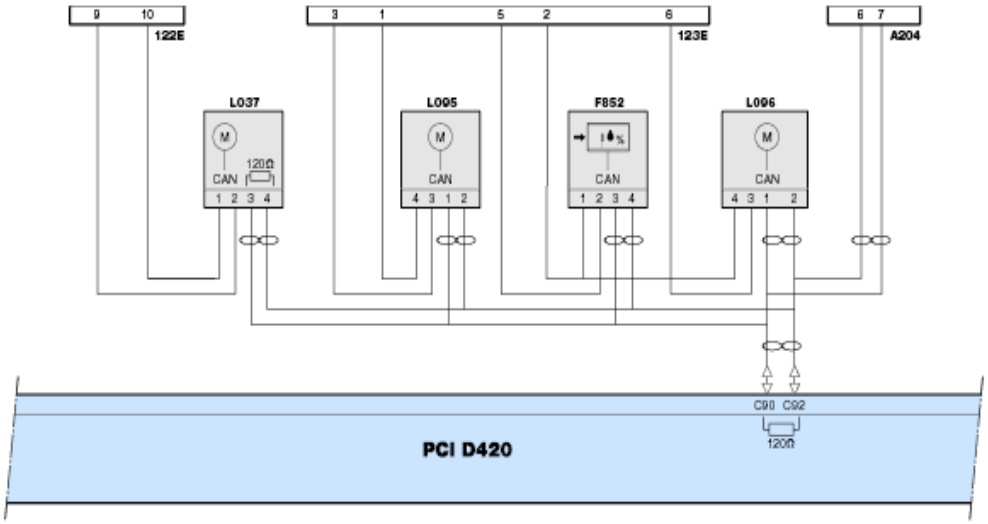
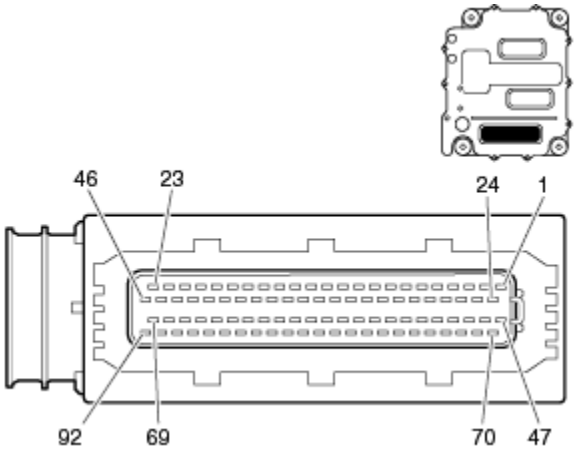
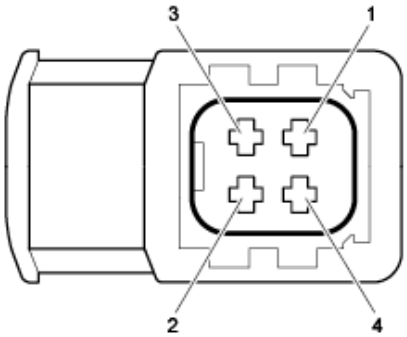
P1351

Code number	P1351
Fault code description	VGT data unreliable fault detected
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

P1352

Code number	P1352
Fault code description	VTG turbo charger actuator learning – fault detected
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	The main task of the VTG turbo charger actuator is to control the turbo charger nozzle ring position. The gas flow guidance into the turbine rotor is controlled by the position of the turbo charger nozzle ring.  The main components of the VTG turbo charger actuator are: • ECU • Electromotor The electromotor rotates the output shaft via internal gears. • Output shaft The nozzle ring mechanism is moved via a sector gear by rotating the output shaft • Output shaft position sensor The position of the actuator output shaft is monitored with an internal sensor and a reference magnet (reference point). • Temperature sensor The temperature of the printed circuit board of the ECU is monitored.

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

Diagnostic condition	This diagnostic runs once after the ignition is keyed on.
Set condition of fault code	The VTG turbo charger actuator (L037) cannot reach the end-stops during the learn sweep after the ignition is keyed on.
Reset condition of fault code	This DTC will change to inactive after the ignition is keyed off and on again and the diagnostic runs and passes.
Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector L037

	D420 L037 Function C90 3 E-CAN high C92 4 E-CAN low 1 Power supply after ignition 2 Ground
Technical data	Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / Ubat / Ignition keyed on 3 / 4 / ± 120 Ω / • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	• After an actuator was installed: VTG turbo charger actuator initialization procedure was not executed or was executed incorrectly. • Sticking turbo charger nozzle ring (bend vanes) Check the turbo charger nozzle ring mechanism: 1. Remove the actuator. Check the sector gear travel. 2. Check the actuator output gear for damage 3. Check the actuator output gear for adequate rotation (minimum of one complete rotation). 4. Initialize the turbo actuator after installation.
Additional information	• The position and effort to move the VTG turbo charger nozzle ring are monitored by the actuator. • After the ignition is keyed on, a learn sweep is performed by the actuator. During this sweep the VTG turbo charger nozzle ring is fully opened and fully closed to check the end positions. • The actuator can only control the nozzle ring in a limited span 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 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 1352a	SRT
Perform the turbocharger actuator effort test in DAVIE. Use the Engine Support Center to assist with interpreting this test. Does the actuator travel meet the required specifications? • Yes – Proceed to step 2.		

- No – Proceed to step 3.

Step 2	Step ID 1352b	SRT
Perform the verification procedure. Do the fault codes recur? • Yes – Proceed to step 3. • No – Complete repair.		

Step 3	Step ID 1352c	SRT
Use the sector span tool to check the range of travel for the turbo sector gear. Follow the job instructions 'Replace VTG turbocharger actuator' in Engine Rapido. Is the turbo sector gear able to reach both span zones (regardless of the effort needed to move it)? • Yes – Proceed to step 4. • No – Turbo will need to be replaced.		

Step 4	Step ID 1352d	SRT
Check turbo sector gear teeth. Have damaged turbo sector gear teeth been found? • Yes – Contact the Engine Support Center for further instruction on replacement of the turbo (VTG). • No – Proceed to step 5.		

Step 5	Step ID 1352e	SRT
Check the actuator output gear for damage. Is the actuator output gear damaged? • Yes – Contact the Engine Support Center for further instruction on replacement of the actuator. • No – Proceed to step 6		

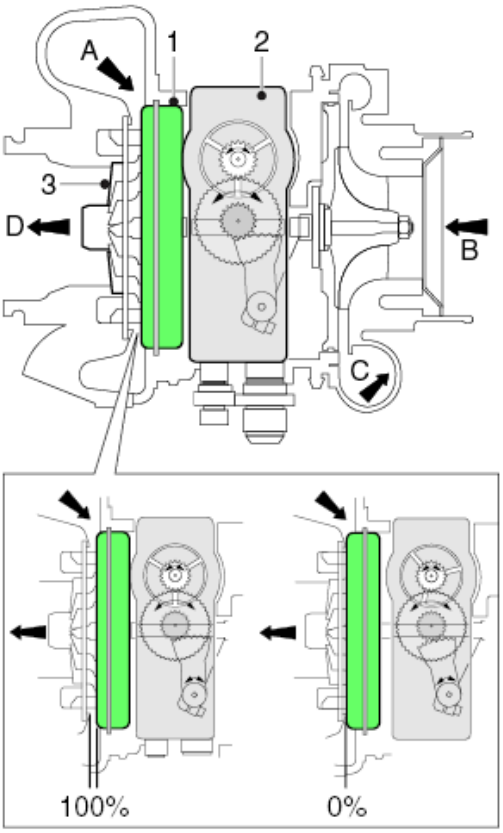
Step 6	Step ID 1352f	SRT
Check the actuator output gear for adequate rotation (minimum of one complete rotation). Is the actuator output rotation adequate? • Yes – Proceed to step 7. • No – Contact the Engine Support Center for further instruction on replacement of the actuator.		

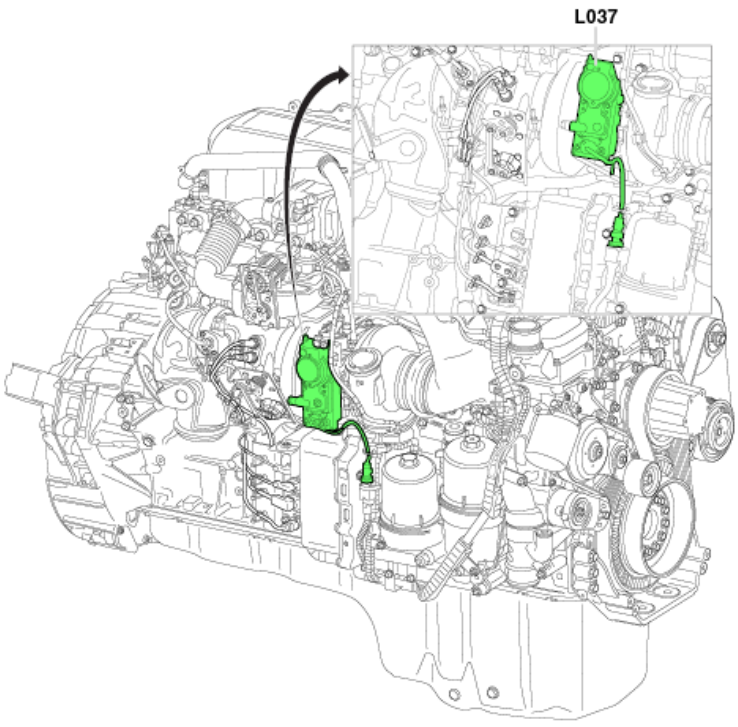
Step 7	Step ID 1352g	SRT
Perform the turbo (VGT) actuator replacement test with DAVIE. Has the fault status changed to inactive? • Yes – Proceed to verification procedure. • No – Proceed to step 8.		

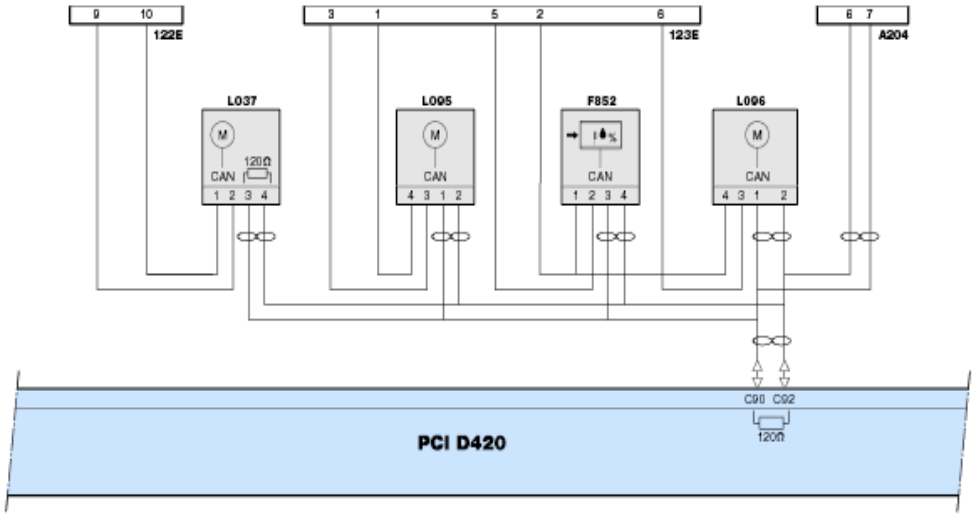
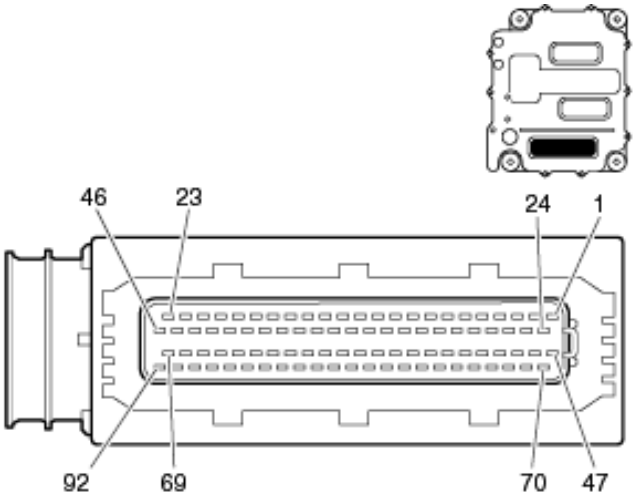
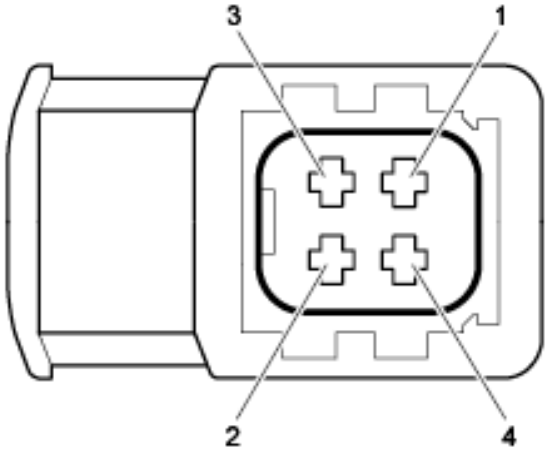
Step 8	Step ID 0017h	SRT
Contact the Engine Support Center for further instructions.		

Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
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P1354

Code number	P1354
Fault code description	VTG turbo charger actuator power supply – Data valid but too low, least severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	The main task of the VTG turbo charger actuator is to control the turbo charger nozzle ring position. The gas flow guidance into the turbine rotor is controlled by the position of the turbo charger nozzle ring.  The main components of the VTG turbo charger actuator are: • ECU • Electromotor The electromotor rotates the output shaft via internal gears. • Output shaft The nozzle ring mechanism is moved via a sector gear by rotating the output shaft • Output shaft position sensor The position of the actuator output shaft is monitored with an internal sensor and a reference magnet (reference point). • Temperature sensor The temperature of the printed circuit board of the ECU is monitored.

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

Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The VTG turbo charger actuator (L037) detects that the actuator power supply is less than 10 volts for more than 4 minutes.
Reset condition of fault code	This DTC will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector L037

	D420 L037 Function C90 3 E-CAN high C92 4 E-CAN low 1 Power supply after ignition 2 Ground
Technical data	Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / Ubat / Ignition keyed on 3 / 4 / ± 120 Ω / • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	• Bad actuator power supply wiring. • Malfunction in vehicle power supply system (battery or alternator or wiring).
Additional information	The power supply of the actuator is continuously monitored.
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 1354a	SRT
With key ON, gently bend, twist, and pull the connections, and do so in between connections in the harness to the actuator (L037) to replicate the fault and/or change the fault status. • If the actuator power resets (audible clicks) – An intermittent open circuit is detected. Repair or replace the wiring. Proceed to the verification procedure listed at the end of this document. • If the actuator power does not reset – Proceed to step 2		

Step 2	Step ID 1354b	SRT
With key OFF, disconnect the actuator (L037) from the harness and inspect the connectors and harness for: 1. Corroded or dirty pins 2. Damaged pins 3. Pushed back or expanded pins 4. Loose connector 5. Moisture in or on the connector		

6. Connector shell damaged
7. Missing or damaged connector seals
8. Wire insulation damage

Dirty or damaged pins/connector?

- Yes – A dirty or damaged connection has been detected. Clean, repair, or replace the damaged connection or harness, if possible - Proceed to the verification procedure listed at the end of this document.
- No – Proceed to step 3

Step 3	Step ID 1354c	SRT
With the connector disconnected. Turn the key ON. Check the voltage between the ground terminal and the supply terminal circuit at the connector harness. (Refer to the OEM manual for the system voltage.) • If the voltage found meets the specifications – Proceed to step 5. • If the voltage found does NOT meet the specifications – Proceed to step 4.		

Step 4	Step ID 1354d	SRT
With key OFF, check the actuator ground by measuring the resistance between the ground terminal of the actuator connector and the ground terminal of the engine battery: • If the measured resistance is greater than 10 ohms – Repair or replace ground wiring. Proceed to the verification procedure listed at the end of this document. • If the measured resistance is less than 10 ohms – Proceed to step 5		

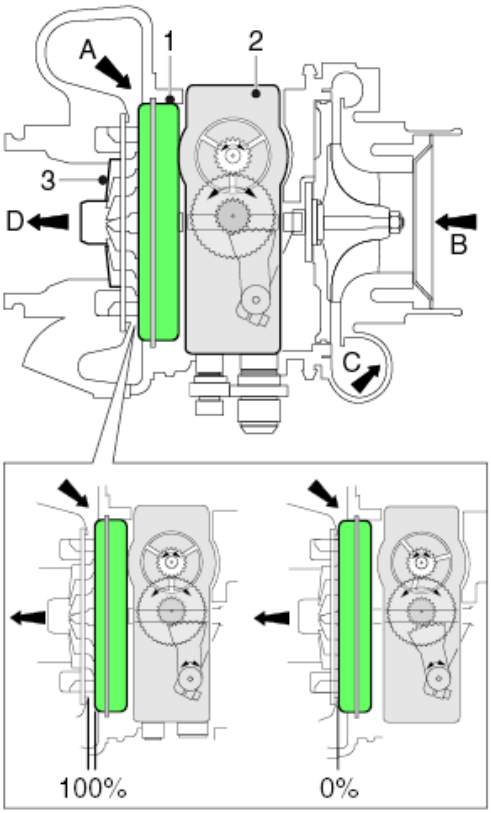
Step 5	Step ID 1354e	SRT
Check the resistance between the power pin and the ground pin of the actuator. • If the resistance measured is less than 100 ohms – Proceed to step 7 • If the resistance measured is greater than 100 ohms – Proceed to step 6		

Step 6	Step ID 1354f	SRT
Check the system voltage during cranking. (Refer to the OEM manual for the system voltage.) • If the voltage is within the specifications – Proceed to step 7 • If the voltage is NOT within the specifications – Check the battery		

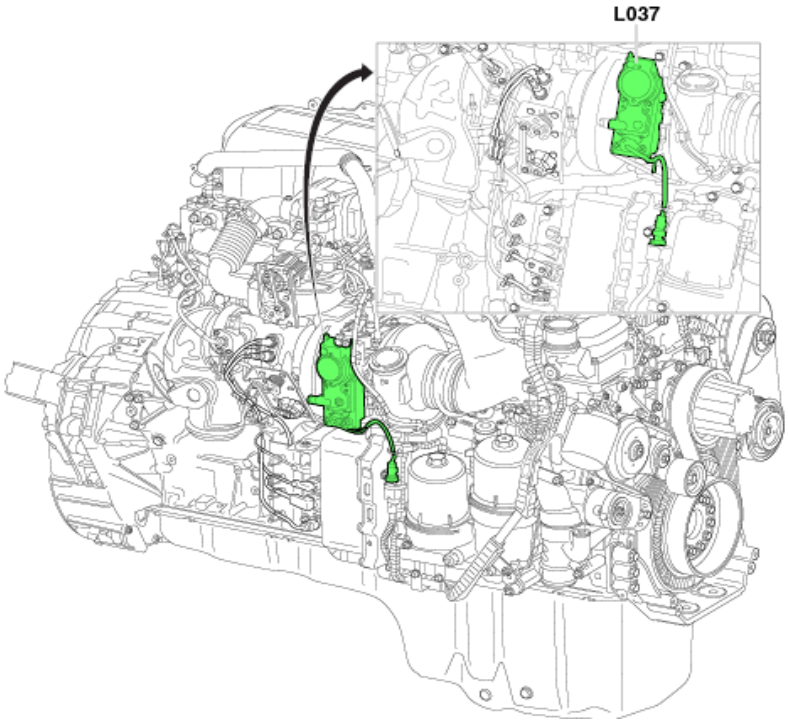
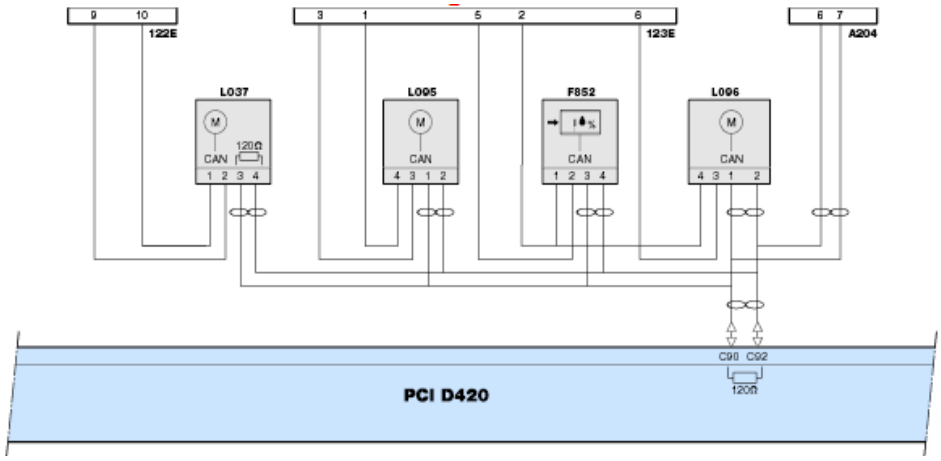
Step 7	Step ID 1354g	SRT
Possible actuator failure - Replace the actuator. Refer to Rapido for replacement instructions.		

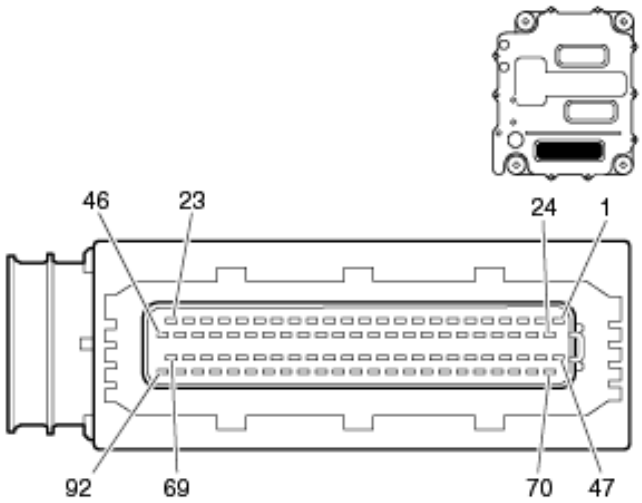
Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.
	Back to Index

P1356

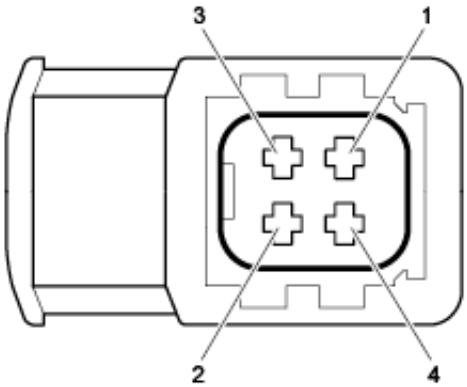
Code number	P1356
Fault code description	VTG turbo charger actuator temperature – Data valid but too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	 1 Nozzle ring 2 VTG actuator 3 Turbine rotor A Exhaust gas flow to turbine rotor B Inlet air C Boost air outlet D Exhaust gas outlet The main task of the VTG turbo charger actuator is to control the turbo charger nozzle ring position. The gas flow guidance into the turbine rotor is controlled by the position of the turbo charger nozzle ring. The main components of the VTG turbo charger actuator are: • ECU • Electromotor The electromotor rotates the output shaft via internal gears. • Output shaft The nozzle ring mechanism is moved via a sector gear by rotating the output

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

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The VTG turbo charger actuator (L037) detects that the temperature of the actuator is more than 125°C for more than five minutes.
Reset condition of fault code	This DTC will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	



Wiring harness connector D420.C front view



Wiring harness connector L037

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

Technical data

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

Component check, VTG turbocharger actuator (L037)

Preparation

- Key off the ignition.
- Disconnect connector L037
- Measure on component L037

Pin (+ probe)	Pin (- probe)	Value	Additional information
3	4	± 120 Ω	

Wiring check, VTG turbocharger actuator (L037)

Preparation

- Key off the ignition.
- Disconnect connector L037
- Measure on component connector L037

	Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / Ubat / Ignition keyed on 3 / 4 / ± 120 Ω / Ignition keyed off Ground cable from the battery disconnected Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	Malfunctioning cooling system • Check the engine cooling system for: • Low coolant level • Air in cooling system • Blocked cooling system
Additional information	The temperature is measured on the printed circuit board of the actuator.
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 1356a | 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 1356b | SRT Visual Inspection: Coolant Visually inspect the cooling system for any of the following: • Coolant temperature (verified with an infrared thermometer) is not within manufacturer's specifications • Coolant level below the required level • Coolant lines to the turbo damaged or leaking Was there evidence of any of the above? • No: Continue to the next step 3 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 3 in the troubleshooting process

Step 3	Step 1356c	SRT
Ancillary Test: Coolant Leak test Perform the prescribed testing to check for cold leaks. Does the test fail to complete or result in a failed state? • No: Continue to the next step 4 in the troubleshooting process. • Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step 4 in the troubleshooting process.		

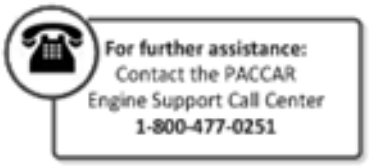
Step 4	Step 1356d	SRT
Replace: Turbocharger Actuator Replace the identified component. Continue to Step 5 in this troubleshooting process and perform the DAVIE Direct Test: Turbocharger Actuator (VGT) Replacement to initialize the new turbocharger actuator		

Step 5	Step 1356e	SRT
DAVIE Direct Test: Turbocharger Actuator (VGT) Replacement Run the prescribed DAVIE Direct test prior to reinstalling the turbocharger or turbocharger actuator. This test is run BEFORE installing or reinstalling the VGT or VGT Actuator, but requires the corresponding electrical connections be made. Following the completion of this calibration: • Complete the installation of the VGT Actuator or VGT. • Start the engine and then verify this fault has become Inactive. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step 6 in the troubleshooting process		

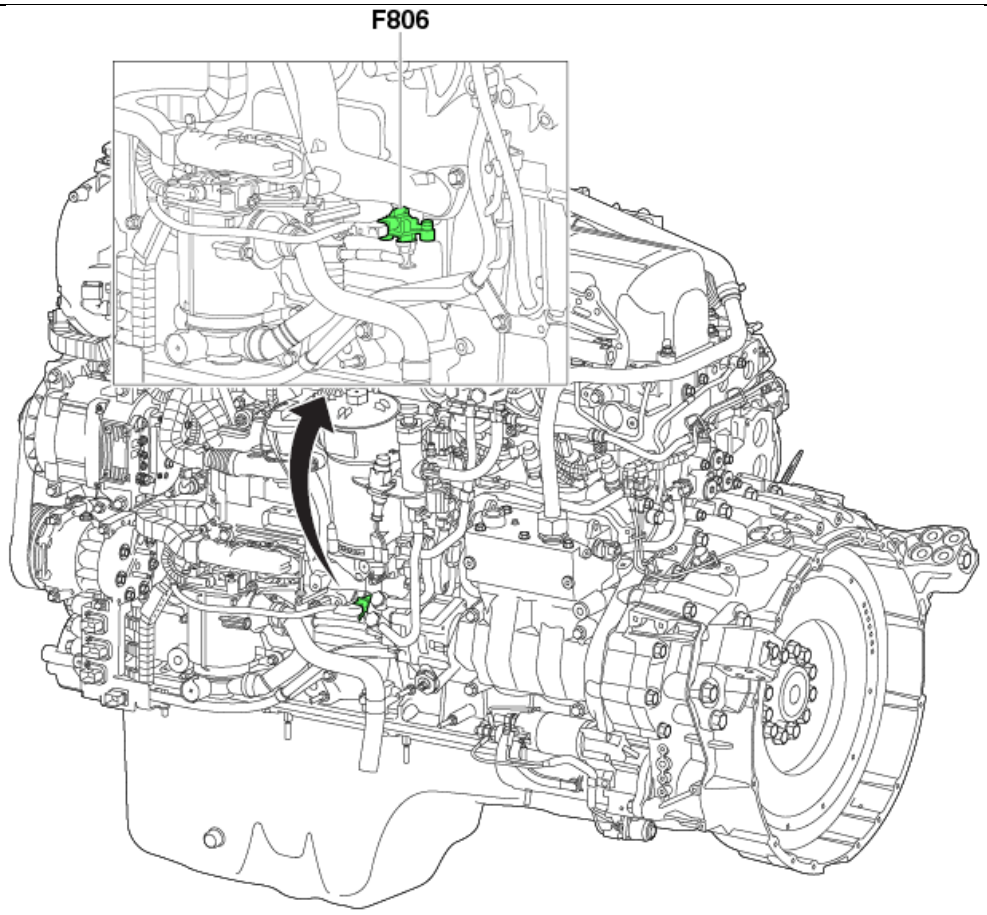
Step 6	Step 1356f	SRT
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

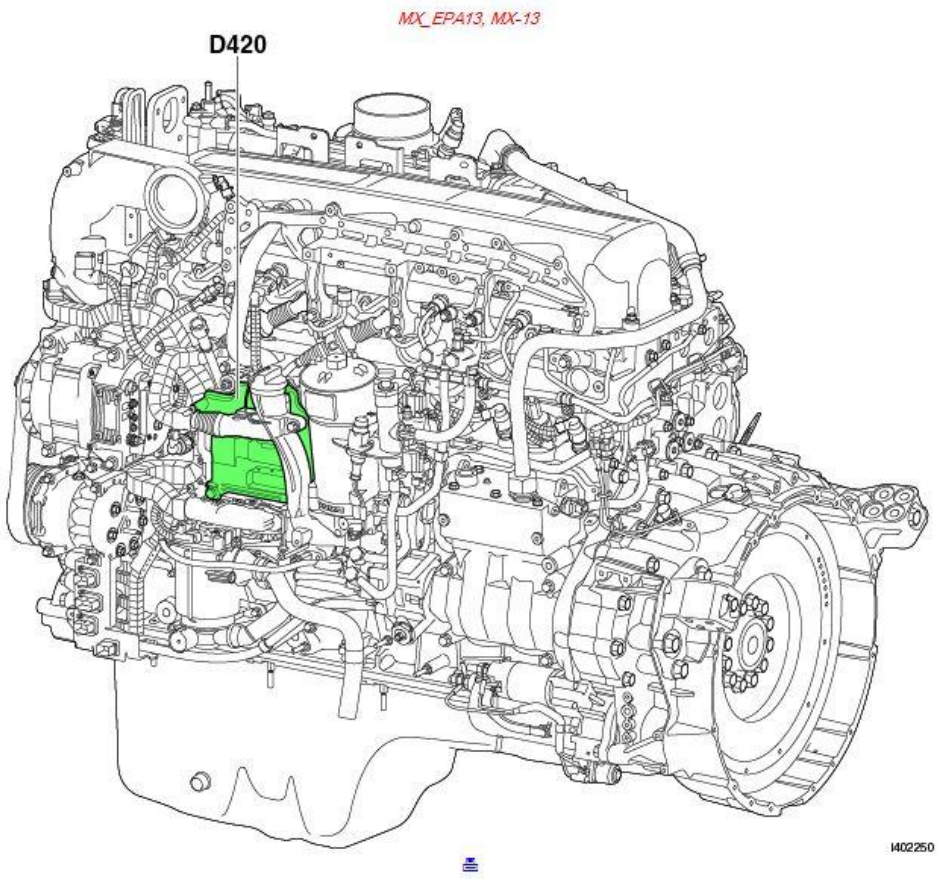
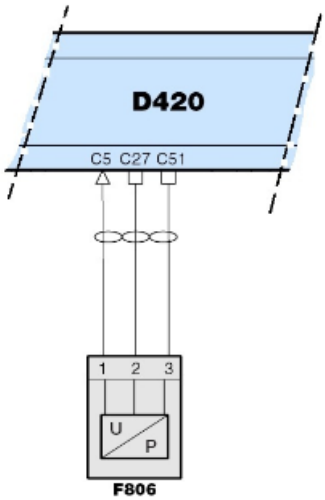
Verification Drive Cycle	To validate the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.
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P1400

Code number	P1400
Fault code description	EGR - Estimated EGR rate 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	
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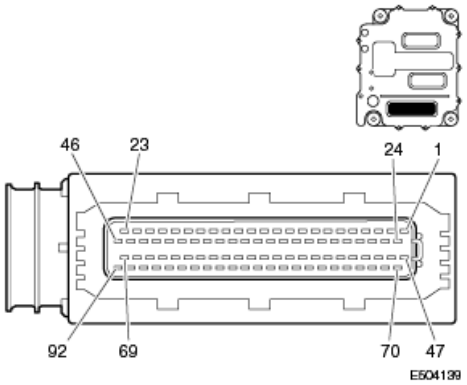
P1401

Code number	P1401
Fault code description	Crankcase ventilation pressure - Voltage too high or short circuit to supply on ECU (D420) pin (C5)
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Crankcase
Description of component(s)	The crankcase pressure is measured in the crankcase ventilation hose between the cylinder head cover and the crankcase ventilation module. The crankcase pressure sensor measures the differential pressure between the crankcase gases in the crankcase ventilation hose and ambient pressure to detect if there is air leakage into the crankcase. The crankcase pressure should be maintained 0.3 kPa [0.04 psi] below atmospheric pressure. The sensor measuring range is -4 to +5 kPa [-0.580 to +0.725 psi]. **Effect on the system** • Pressure in the crankcase may not be maintained sufficiently below atmospheric pressure • Leakage of crankcase gasses into the atmosphere
Location of component(s)	

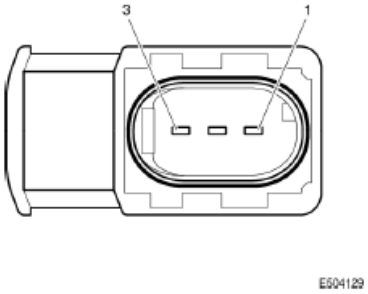
	
Diagnostic condition	This diagnostic runs continuously.
Set condition of fault code	The PCI ECU (D420) detects that the measured sensor voltage is greater than 4.802 V.
Reset condition of fault code	This DTC changes to inactive when the fault is not detected for three drive cycles.
Electrical diagram(s)	 D420 PCI ECU

F806 crankcase pressure sensor

D420	F806	Function
C5	1	Signal, crankcase pressure
C27	2	Ground
C51	3	5V power supply



Wiring harness connector D420.C front view



Wiring harness connector F806 front view

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

Technical data

Component check, crankcase pressure sensor (F806)

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

Component & wiring check, ECU (D420)

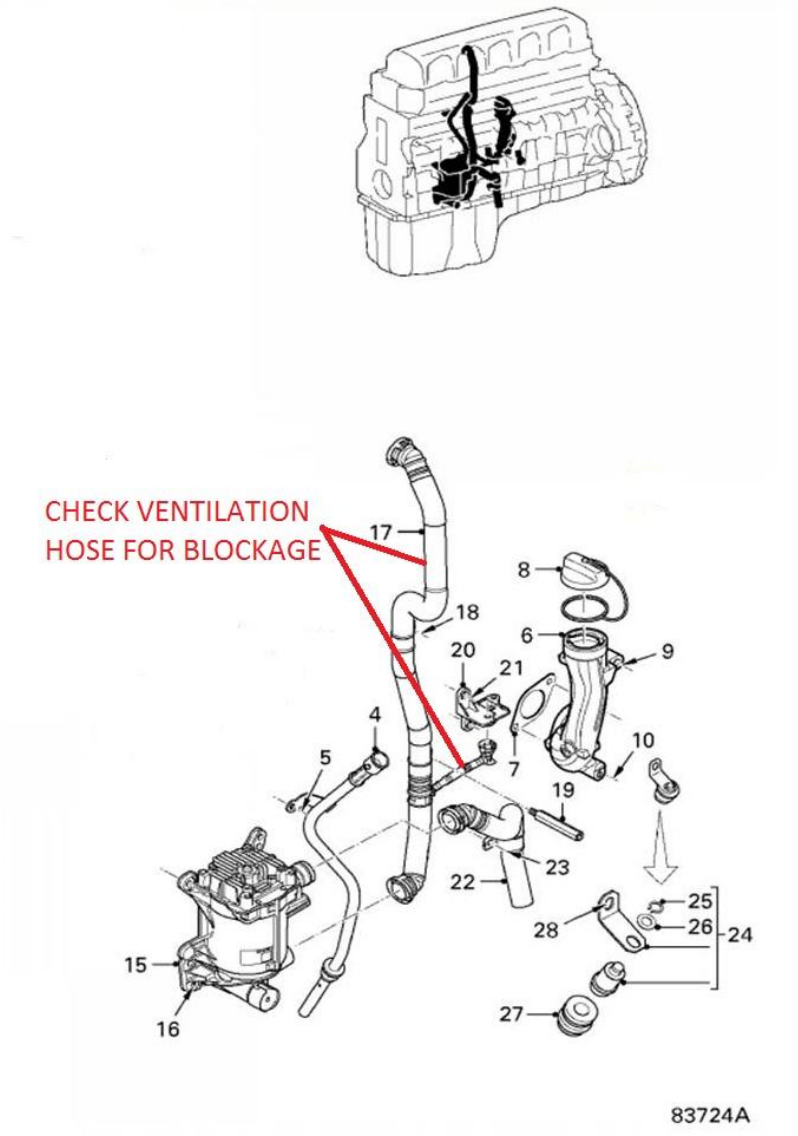
Preparation

- Key off the ignition
- Disconnect connector F806
- Measure on the front side of wiring harness connector F806

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

Possible causes

- Electrical short circuit
- Excessive oil, sludge or debris in crankcase ventilation hose
- Boiling water condensate accumulated in the crankcase engine oil
- Defective crankcase pressure sensor
- Defective crankcase ventilation module
- Excessive blow-by of combustion gasses into the crankcase

	• Excessive blow-by of compressed air from the engine air compressor into the crankcase
Additional information	
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.**

- This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly.
- Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
- It is necessary to exit the 'Active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors.
- This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided.

Step 1. Investigate Related Trouble Codes

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

Step P1401_1.A	Investigate related trouble codes	SRT:

Are these or any other related faults active?

P1403; P1404; P1408

Yes Trouble shooting DTC P1401 should be done before trouble shooting the related DTC faults. Continue with step 2.A

No Step 2.A

Step 2. Crankcase Pressure Sensor (F806) Checks

Step P1401_2.A	Visual Inspection: crankcase pressure sensor (F806)	SRT:

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

- Damaged or loose connectors
- Connector tab not locked
- Bent, broken, damaged or loose connector pins
- Moisture or dirt in the connections
- Damage to the wire harness or insulation (J3 engine harness)
- Low battery voltage or loose battery connections

Was there evidence of any of the above?

Yes Correct any issues found. If the crankcase pressure sensor (F806) is found to be damaged or broken, replace it.
Refer to Step 5.A to perform the corresponding repair verification cycles.
Use DAVIE Diagnostics to perform and Quick Check of current trouble codes.
If this code is still present, proceed to Step 2.B

No Step 2.B

Step P1401_2.B	Electrical Checks: crankcase pressure sensor (F806)	SRT:



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

2.B.1 Supply voltage

Confirm the sensor supply voltage as outlined in the corresponding component & wiring check information.

Are measured values within expected range?

Yes Step 2.C

No Correct any issues found, or replace the sensor if measured values indicate a sensor error.
Refer to Step 5.A to perform the corresponding repair verification cycles.
Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.
If this code is still present, proceed to Step 2.C

Step P1401_2.C	Visual Inspection: crankcase ventilation hose	SRT:

Visually inspect the associated components, connections, and engine for any of the following:

- Crankcase ventilation hose between cylinder head cover and crankcase ventilation module is kinked, pinched, blocked or damaged.
- Crankcase ventilation hose to the crankcase pressure sensor is kinked, pinched, blocked or damaged.
- Excessive oil, sludge, or debris in crankcase ventilation hose or crankcase ventilation module inlet.

Was there evidence of any of the above?

Yes Correct any issues found. If the crankcase pressure sensor (F806) is found to be damaged or broken, replace it.
Refer to Step 5.A to perform the corresponding repair verification cycles.
Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.
If this code is still present, proceed to Step 3.A

No Step 3.A

Step 3. Sensor Performance Check

Step P1401_3.A	Performance Test: crankcase pressure sensor (F806)	SRT:

Vent the crankcase to the atmosphere by opening the oil fill cap. Leave the oil fill cap off.
Use DAVIE to connect to the engine PCI ECU, and clear all current fault codes.
With the brakes set, start the engine and allow it to run at idle for at least 2 minutes.
Check to see if DTC P1401 is active.

Operating the engine with the oil fill cap removed may set other DTC fault codes. Ignore other active DTC fault codes during this performance test.

Replace oil fill cap after performance test is completed and clear all DTC fault codes. Is DTC P1401 still present?

Yes Step 4.A

No The crankcase is likely over pressurized during engine operation. Potential causes are excessive blow-by or air from the air compressor is leaking into the crankcase.

Correct any issues found.

Refer to Step 5.A to perform the corresponding repair verification cycles.
Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.
If this code is still present, proceed to Step 4.A

Step 4. Component Replacement

Step P1401_4.A	Replace the crankcase pressure sensor (F806)	SRT:

If no problems were detected in the preceding steps, an internal problem has most likely occurred with the crankcase pressure sensor (F806).

Replace the crankcase pressure sensor (F806).

The crankcase pressure sensor not a serviceable part.

Refer to Step 5.A to perform the corresponding repair verification cycles.
Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.
If this code is still present, proceed to step 6.A

Step 5. Repair Verification Cycles

Perform these verification cycles following any corrective actions taken, to confirm that this trouble code is no longer present.

Step P1401_5.A	Repair Verification Cycle: Start-up	SRT:

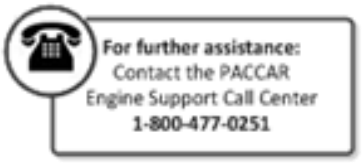
With the brakes set, start the engine and allow it to run at idle for at least 2 minutes.

Step 6. Contact PACCAR Engine Support Center

Step P1401_6.A	Contact PACCAR Engine Support Center	SRT:

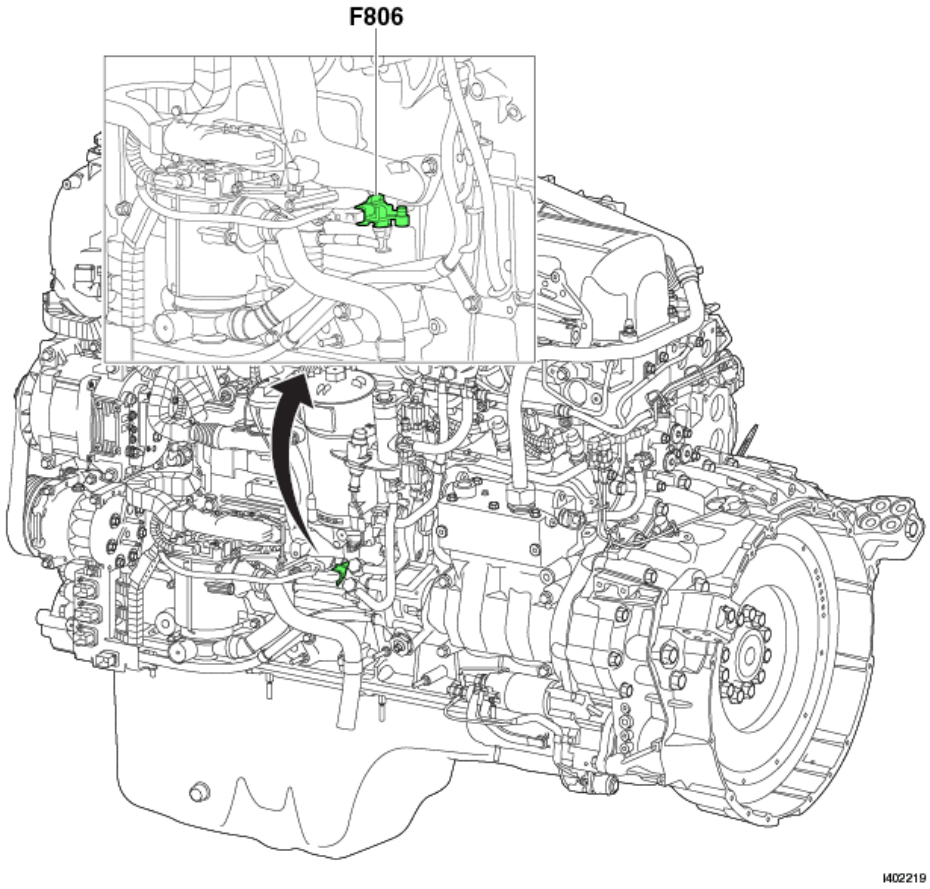
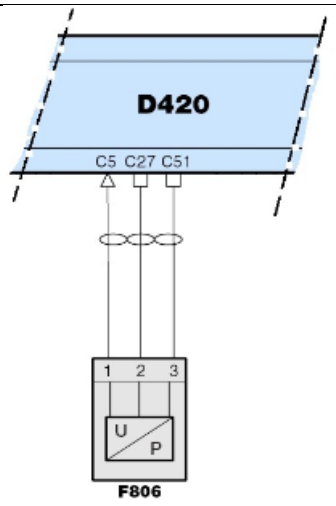
	For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
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P1402

Code number	P1402
Fault code description	Crankcase ventilation pressure – Voltage too low or short circuit to ground on ECU D420 pin C5
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

P1403

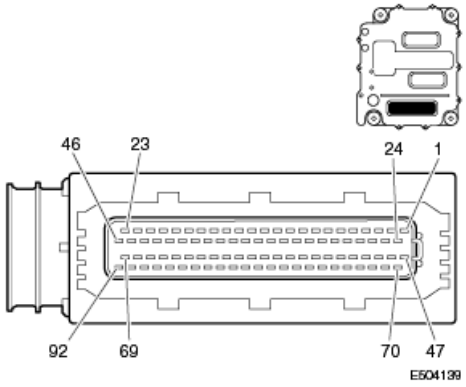
Code number	P1403
Fault code description	Crankcase ventilation pressure – Data erratic, intermittent, or incorrect at ignition on
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Crankcase
Description of component(s)	**Crankcase pressure sensor (F806)** The crankcase pressure is measured in the crankcase ventilation pipe between the cylinder head cover and the crankcase ventilation module. **Pressure difference** The sensor measures the difference between ambient pressure and the pressure in the pipe to detect if the pipe is connected correctly or leaking. The sensor measuring range is -0.04 to +0.05 bar [-0.580 to +0.725 psi]. **Effect on the system** • Limitation of the engine torque when an unlikely pressure is detected (OBD requirement)

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on (engine not running).
Set condition of fault code	The PCI ECU (D420) detects that the measured crankcase pressure differs by greater than 5 mbar [0.07 psi] from the expected pressure.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key on the ignition (NO engine startup) and wait for 10 seconds to allow the system to power up and the diagnostics to run.
Electrical diagram(s)	

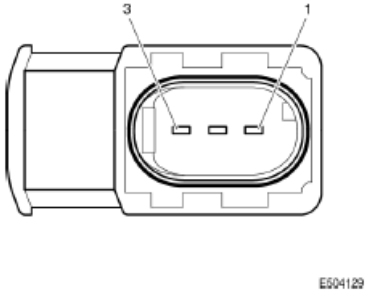
D420 PCI ECU

F806 crankcase pressure sensor

D420	F806	Function
C5	1	Signal, crankcase pressure
C27	2	Ground
C51	3	5V power supply



Wiring harness connector D420.C front view



Wiring harness connector L136 front view

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

Technical data

Component check, crankcase pressure sensor (F806)

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

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F806
- Measure on the front side of wiring harness connector F806

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

Possible causes	• Engine has been stalled twice consecutively • Crankcase pressure sensor deviation
Additional information	The crankcase pressure is monitored with the crankcase pressure sensor (F806) against ambient pressure.
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? P1401; P1402	
Yes	**No**
Possible voltage too high, too low, or short circuit.	

Refer to the troubleshooting information for these codes before continuing with this procedure.	**Go to step 2.A**

Step 2. Crankcase Pressure Sensor (F806) Checks

Step 2.A Visual inspection, connections and wiring, crankcase pressure sensor (F806)

Action

1. Key off the ignition
2. Visually inspect the connections and wiring for any of the following:
   - Damaged or loose connections
   - 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. 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 Electrical checks, supply voltage, crankcase pressure sensor (F806)

Action

1. Confirm the supply voltage as outlined in the Technical Data section, “Checking data, crankcase pressure sensor (F806)

Is the measured voltage within the expected range?	
Yes	**No**
Go to Step 2.C	**Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2.C Electrical checks, isolation of electrical short in harness, crankcase pressure sensor (F806)	
Action 1. Set the ignition key to OFF. 2. Disconnect the engine harness at the PCI ECU. 3. Disconnect the engine harness from the sensor. 4. Measure the resistance value between the ground pin and signal pin on the harness, near the crankcase pressure sensor (F806). The expected value is >100K Ω. 5. Measure the resistance value between the supply pin and signal pin on the harness, near the crankcase pressure sensor (F806). The expected value is >100K Ω. 6. Measure the resistance value between the supply pin 1 (L136) and ground pin 2 (L136) on the harness, near the crankcase pressure sensor (F806). The expected value is >100K Ω.	
Are the measured resistance values within the expected range?	
Yes	**No**
A malfunctioning crankcase pressure sensor (F806) has been detected. Replace the crankcase pressure sensor (F806). Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	A short has been detected on the harness. Correct any issues found. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.
If this code is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this	**If this code is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this**

issue.	**issue.**

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. Power up/Electrical Key ON the ignition (NO engine startup) and wait for 10 seconds to allow the system to power up and the diagnostics to run.	
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 P1403 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.



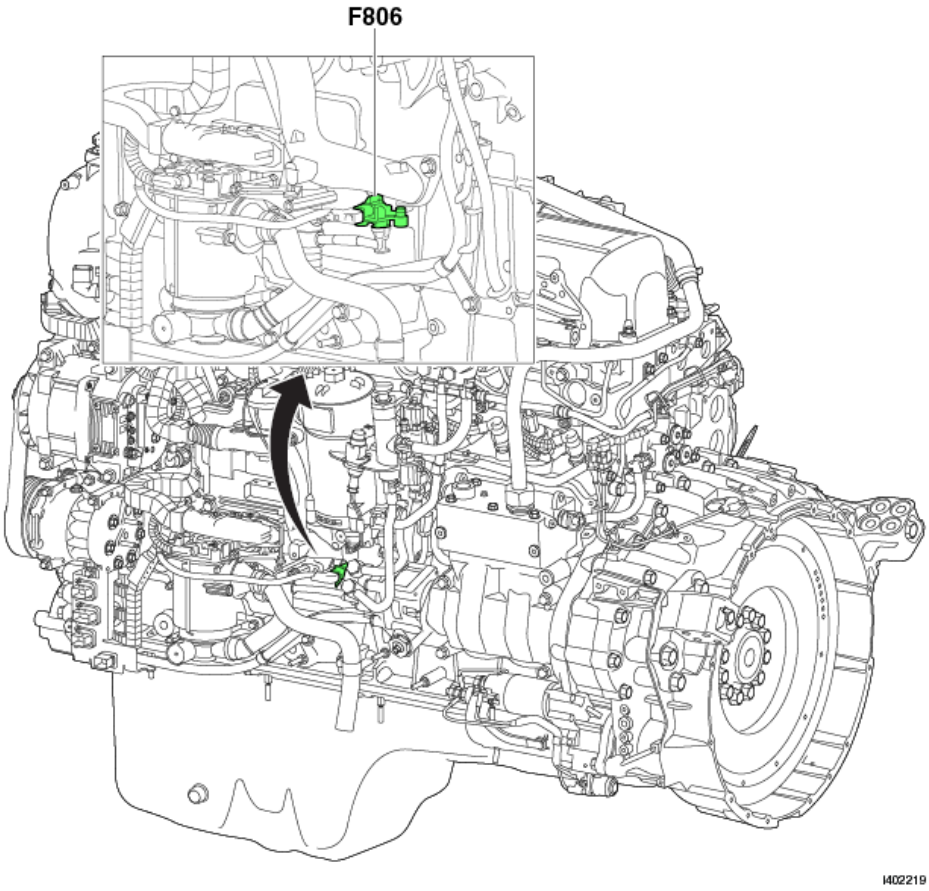
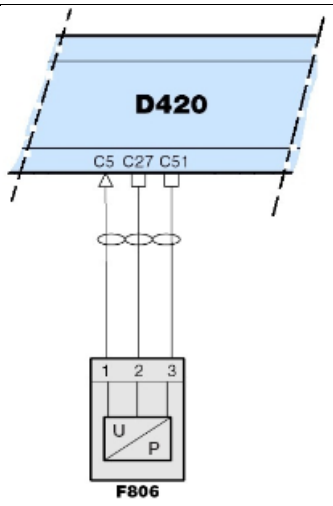
Contacting the PACCAR Engine Support Center

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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P1404

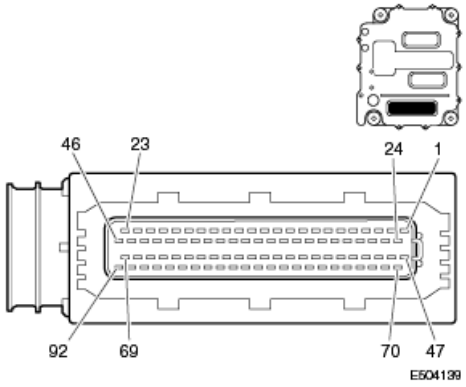
Code number	P1404
Fault code description	Crankcase ventilation pressure – Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Crankcase
Description of component(s)	**Crankcase pressure sensor (F806)** The crankcase pressure is measured in the crankcase ventilation pipe between the cylinder head cover and the crankcase ventilation module. **Pressure difference** The sensor measures the difference between ambient pressure and the pressure in the pipe to detect if the pipe is connected correctly or leaking. The sensor measuring range is -0.04 to +0.05 bar [-0.580 to +0.725 psi]. **Effect on the system** • Limitation of the engine torque when an unlikely pressure is detected (OBD requirement)

Location of component(s)	
Diagnostic condition	This diagnostic runs continuously when the ignition is on (engine not running).
Set condition of fault code	The PCI ECU (D420) detects that the measured crankcase pressure deviates greater than 10 mbar [0.15 psi] from the expected pressure.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key on the ignition (NO engine startup) and wait for 10 seconds to allow the system to power up and the diagnostics to run.
Electrical diagram(s)	

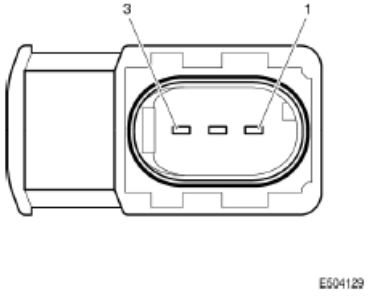
D420 PCI ECU

F806 crankcase pressure sensor

D420	F806	Function
C5	1	Signal, crankcase pressure
C27	2	Ground
C51	3	5V power supply



Wiring harness connector D420.C front view



Wiring harness connector L136 front view

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

Technical data

Component check, crankcase pressure sensor (F806)

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

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F806
- Measure on the front side of wiring harness connector F806

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

	3 | 2 | 5 V | Ignition keyed on
Possible causes	• Engine has been stalled twice consecutively • Crankcase pressure sensor deviation
Additional information	The crankcase pressure is monitored with the crankcase pressure sensor (F806) against ambient pressure.
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? P1401; P1402	
Yes	**No**
Possible voltage too high, too low, or short circuit.	
Refer to the troubleshooting information for these codes before continuing with	**Go to step 2.A**

this procedure.	

Step 2. Crankcase Pressure Sensor (F806) Checks

Step 2.A Visual inspection, connections and wiring, crankcase pressure sensor (F806)	
Action 1. Key off the ignition 2. Visually inspect the connections and wiring for any of the following: • Damaged or loose connections • 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. 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 Electrical checks, supply voltage, crankcase pressure sensor (F806)	
Action 1. Set the ignition key to OFF. 2. Disconnect the engine harness at the PCI ECU. 3. Set the ignition key to ON. 4. Measure the voltage value between the ground pin C27 (D420) and supply pin C57 (D420) on the PCI ECU. The expected value is between 4.75 to 5.25 V.	
Is the measured voltage within the expected range?	
Yes	**No**

Go to Step 2.C.	**Contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

Step 2.C Electrical checks, isolation of electrical short in harness, crankcase pressure sensor (F806)	
Action 1. Set the ignition key to OFF. 2. Disconnect the engine harness at the PCI ECU. 3. Disconnect the engine harness from the sensor. 4. Measure the resistance value between the ground pin 2 (L136) and signal pin 3 (L136) on the harness near the pressure sensor. The expected value is >100K Ω. 5. Measure the resistance value between the supply pin 1 (L136) and signal pin 3 (L136) on the harness near the pressure sensor. a. The expected value is >100K Ω. 6. Measure the resistance value between the supply pin 1 (L136) and ground pin 2 (L136) on the harness near the pressure sensor. The expected value is >100K Ω.	
Is the measured resistance within the expected range?	
Yes	**No**
A malfunctioning crankcase pressure sensor has been detected. Replace the crankcase pressure sensor (F806). Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	A short has been detected on the harness. Correct any issues found. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.
If this code is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.	**If this code is still present, contact the PACCAR Engine Support Center for further assistance in diagnosing this issue.**

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. Power up/Electrical Key ON the ignition (NO engine startup) and wait for 10 seconds to allow the system to power up and the diagnostics to run.	
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 P1403 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.

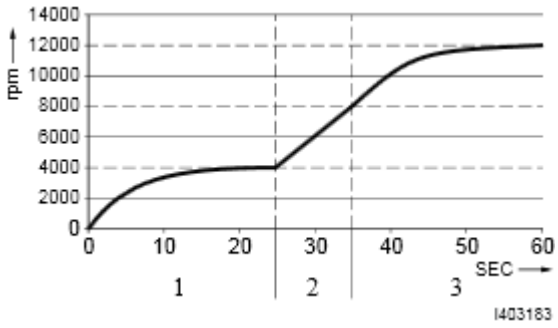


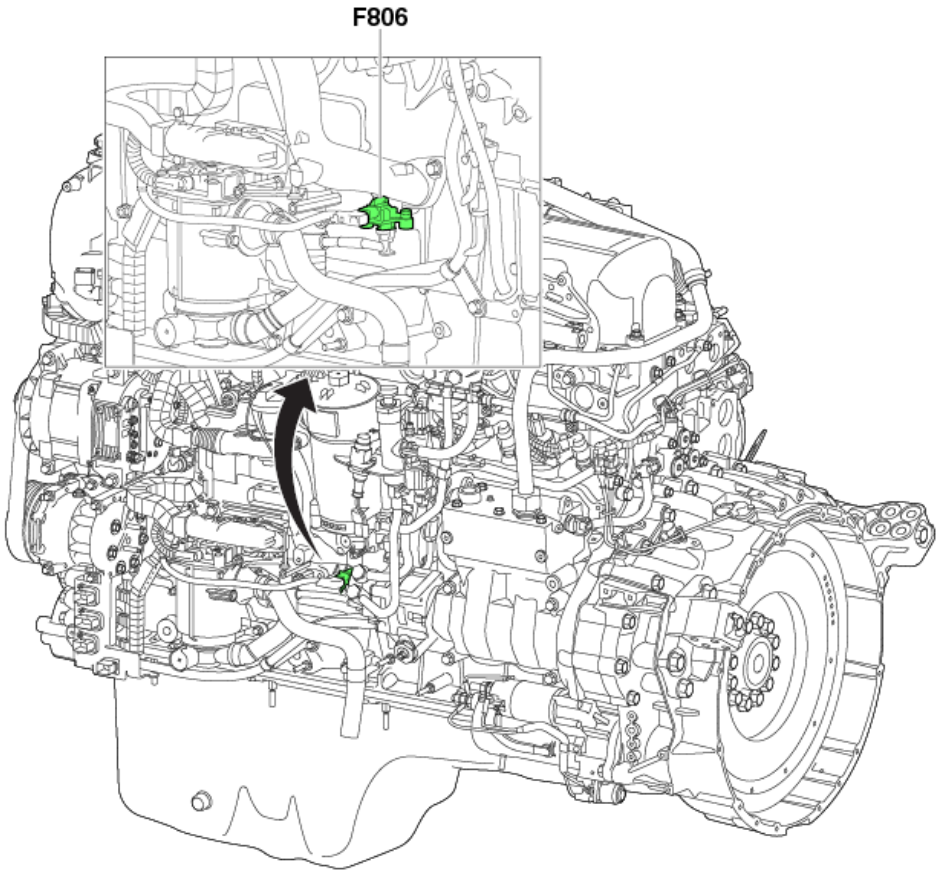
Contacting the PACCAR Engine Support Center

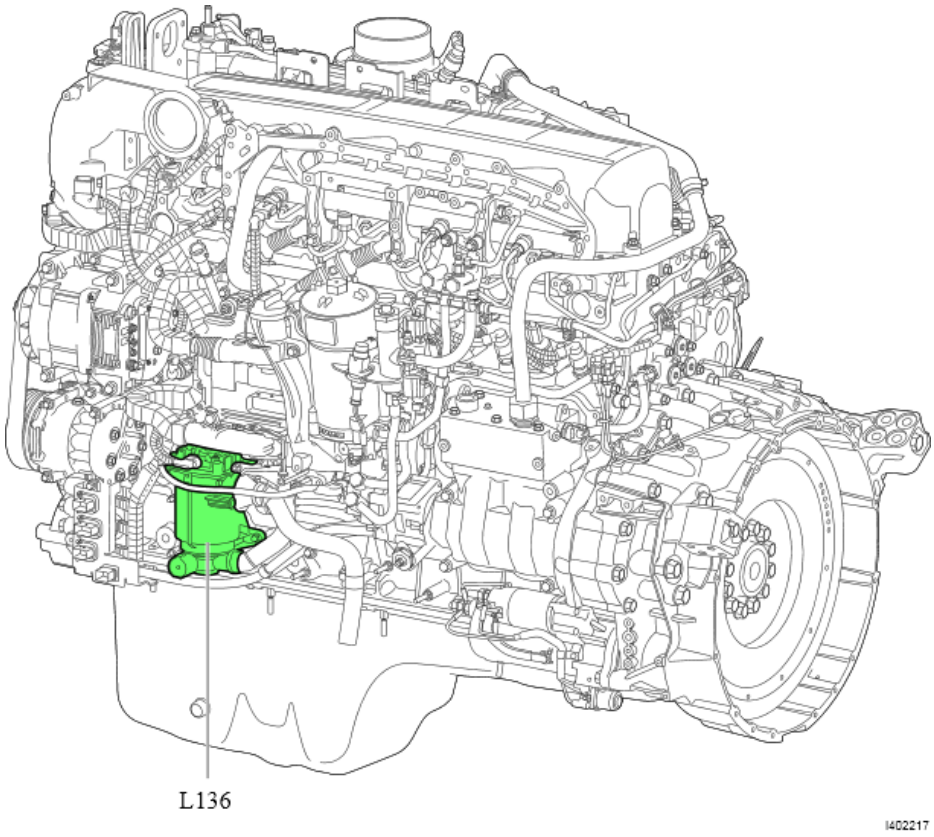
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

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P1407

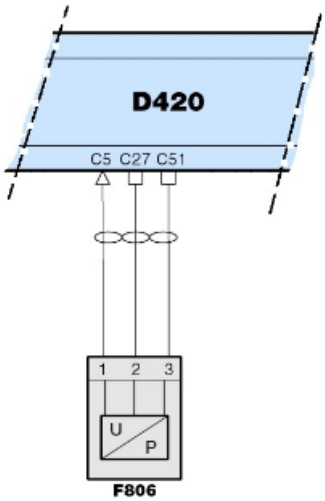
Code number	P1407
Fault code description	Crankcase ventilation pressure - Leakage detected
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Crankcase
Description of component(s)	**Crankcase pressure sensor (F806** The crankcase pressure is measured in the crankcase ventilation hose between the cylinder head cover and the crankcase ventilation module. The crankcase pressure sensor measures the differential pressure between the crankcase gases in the crankcase ventilation hose and ambient pressure to detect if there is air leakage into the crankcase. The sensor measuring range is -4 to +5 kPa [-0.580 to +0.725 psi]. **Effect on the system** • Pressure in the crankcase may not be maintained sufficiently below atmospheric pressure • Leakage of crankcase gasses into the atmosphere **Crankcase ventilation module (L136)** The crankcase ventilation module separates the heavier oil particles from the crankcase gas (blow-by gas) before it enters the environment. The main components of the crankcase ventilation module are ECU – The internal ECU communicates with the PCI ECU (D420) via pin 3 of the module. Electromotor – The electromotor drives an internal element with 98 circular discs at a rotating speed of 12,000 rpm Speed sensor – The element speed is monitored by the PCI ECU (D420) with a speed sensor on pin 4 of the module. **Control** The crankcase ventilation module is a smart actuator that communicates with the PCI ECU. The element of the crankcase ventilation module starts rotating after engine start; the PCI ECU connects pin 3 of the module to 5 V. The start-up procedure is divided into three stages. After the engine is started the rotating speed is gradually increased to: 1. 4,000 rpm in the first 25 seconds, 2. 8,000 rpm in the next 10 seconds, 3. 12,000 rpm (normal operating speed) after 35 seconds.  The PCI ECU can stop the module by

	pulling pin 3 to ground. **Diagnostics** The PCI ECU starts monitoring the element speed 1 minute after the engine has been started. A DTC is stored if the PCI ECU detects that the element speed is less than 8000 rpm for more than ten minutes. If the crankcase ventilation module detects a failure, the module pulls pin 3 to ground, resulting in a DTC stored in the PCI ECU. **Effect on the system** • Separating oil from crankcase gas
Location of component(s)	**Crankcase pressure sensor (F806)** 

	Crankcase ventilation module (L136) 
Diagnostic condition	This diagnostic runs: • 600 seconds after the engine has been started, and • Battery voltage is between 11V and 16V, and • Engine coolant temperature is above 60°C [140°F], and • Engine speed is between idle and 725 rpm, and • Engine operating is not test mode
Set condition of fault code	The PCI ECU (D420) detects that the measured crankcase pressure is greater than -0.3 kPa relative to atmospheric pressure for more than 20 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is not detected for three drive cycles.

Electrical diagram(s)

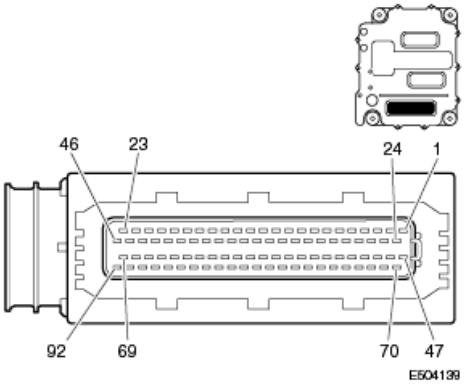
Crankcase pressure sensor (F806)



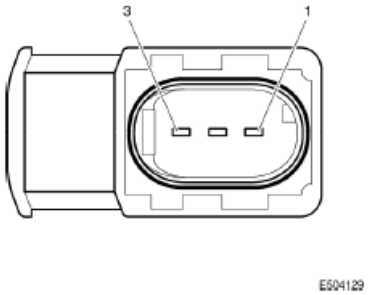
D420 PCI ECU

F806 crankcase pressure sensor

D420	F806	Function
C5	1	Signal, crankcase pressure
C27	2	Ground
C51	3	5V power supply



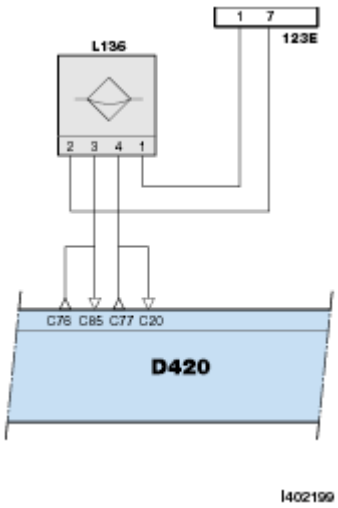
Wiring harness connector D420.C front view



Wiring harness connector F806 front view

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

Crankcase ventilation module (L136)

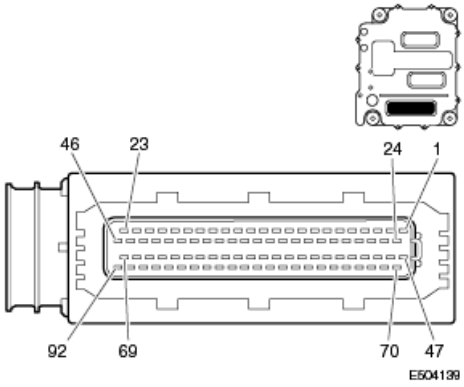


123E 7-pin interface connector

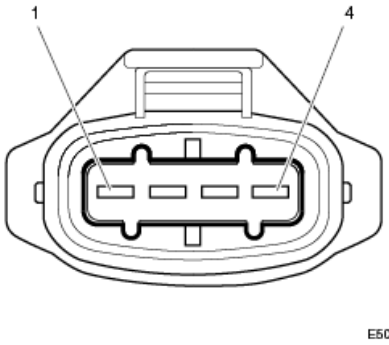
D420 PCI ECU

L136 Crankcase ventilation module

D420	L136	Function
C20	4	Signal, crankcase ventilation speed
C76	3	Signal, crankcase ventilation activation
C77	4	Signal, crankcase ventilation low speed
C85	3	Signal, crankcase ventilation diagnostic
	1	Power supply after ignition
	2	Ground



Wiring harness connector D420.C front view



Wiring harness connector L136 front view

Technical data

Component check, crankcase pressure sensor (F806)

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

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F806
- Measure on the front side of wiring harness connector F806

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

Wiring check, crankcase ventilation module (L136)

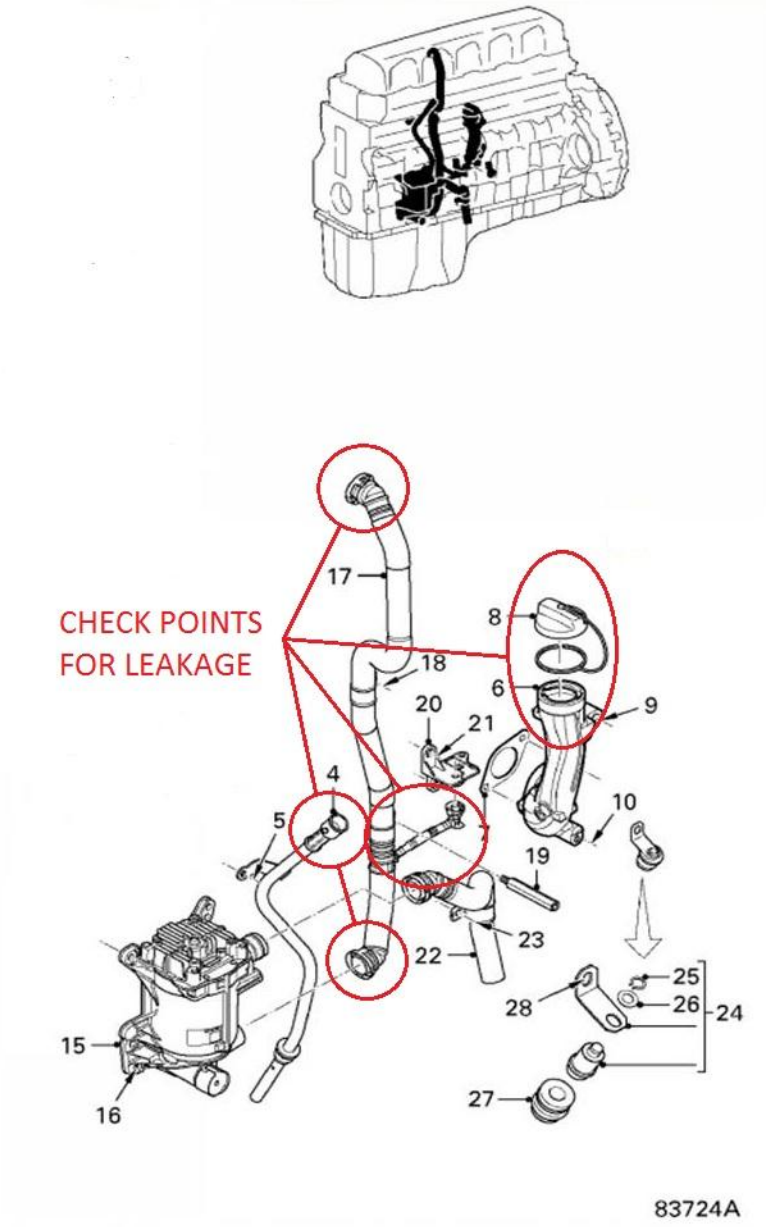
Preparation

- Key off the ignition
- Disconnect connector L136
- Measure on the front side of wiring harness connector L136

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

Possible causes

- Oil dipstick is not secured
- Oil fill cap is not secured
- Loose or leaking crankcase ventilation hose
- Loose or leaking connection at the crankcase pressure sensor
- Excessive oil, sludge or debris in crankcase ventilation hose
- Leaking cylinder head cover or crankcase leaks
- Boiling water condensate accumulated in the crankcase engine oil
- Defective crankcase pressure sensor
- Defective crankcase ventilation module
- Excessive blow-by of combustion gasses into the crankcase
- Excessive blow-by of compressed air from the engine air compressor into the crankcase

Additional information	
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. Check for DTCs** **Step 1. A Check for other active DTCs in combination with P1407** **Action** 2. Check for active DTCs in combination with P1407. 3. Check if one or more of the following DTCs are active:

P1401; P1402; P140E; P153B	
Are any of these other active DTCs present?	
Yes	**No**
• **If P1401 or P1402 are active or inactive in combination with P1407, troubleshoot P1401 or P1402 first.** • **If P140E, P153B, or both are active in combination with P1407, go to 2.A**	**Go to 2.A**

Step 2. Monitor the crankcase pressure signal

Step 2. A Monitor the crankcase pressure signal without the air compressor pumping	
Action 2. Make sure that the engine is at operating temperature. 3. Let the engine run at idle for at least 1 minute. 4. Check if the vehicle air supply system is higher than 8 bar [116 psi] to make sure that the air compressor is **NOT** pumping. 5. Read the crankcase pressure signal with DAVIE.	
Is the crankcase pressure reading lower than -7 mbar [-0.102 psi]?	
Yes	**No**
Go to 2.B	**Go to 3.A**

Step 2. B Monitor the crankcase pressure signal with the air compressor pumping
Action 1. Make sure that the engine is at operating temperature. 2. Let the engine run at idle for at least 1 minute. 3. Check if the vehicle air supply system is lower than 8 bar [116 psi] to make sure that the air compressor is pumping. This can be achieved by applying the brake pedal several times or emptying the air reservoirs. 4. Read the crankcase pressure signal with DAVIE.
Is the crankcase pressure reading lower than -7 mbar [-0.102 psi]?

Crankcase pressure reading difference = difference between step 2.A and step 2.B. Example: step 2.A reading = -8 mbar [-0.116 psi], step 2.B reading = - 2 mbar [-0.029 psi], crankcase pressure reading difference = 6 mbar [0.087 psi]

Yes	No
A too high blow-by for the pumping air compressor results in increased crankcase pressure. Replace the air compressor.	
Go to 5.A	**Go to 3.A**

Step 2. C Monitor the crankcase pressure

Action

1. Make sure that the engine is at operating temperature.
2. Remove the crankcase pressure sensor from the bracket according to the job, "Replace crankcase pressure sensor (F806)."
3. Connect the sensor to the engine wiring harness connector.
4. Key the ignition on and read the crankcase pressure signal with DAVIE.

Is the crankcase pressure reading - 2 mbar [-0.044 psi] to +2 mbar [+0.044 psi]?

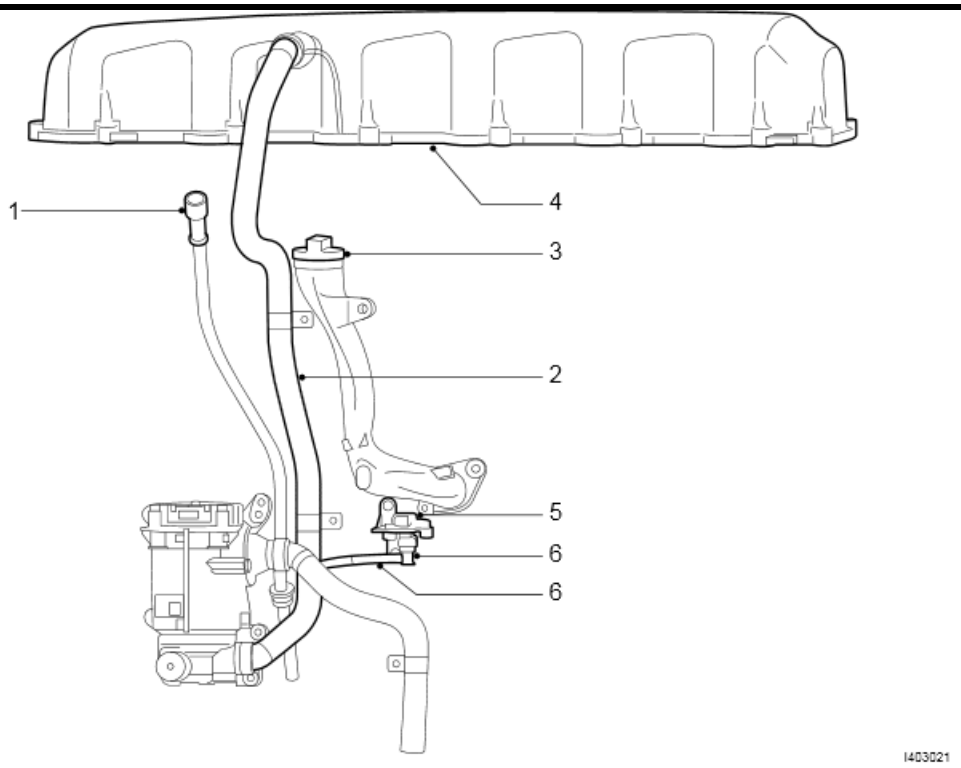
Yes	No
Fit the crankcase pressure sensor to the bracket according to the job, "Replace crankcase pressure sensor."	A malfunctioning crankcase pressure sensor has been detected. Replace the crankcase pressure sensor.
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this DTC.	**Go to 5.A**

Step 3. Check the crankcase ventilation system

Step 3.A Monitor the crankcase ventilation module rotor speed

Action

4. Disconnect the hose (2) between valve cover and crankcase ventilation module on the valve cover side.
5. Make sure that the engine is at operating temperature.
6. 3.Let the engine run at idle for at least 1 minute.
7. Read the rotor speed of the crankcase ventilation module with DAVIE.

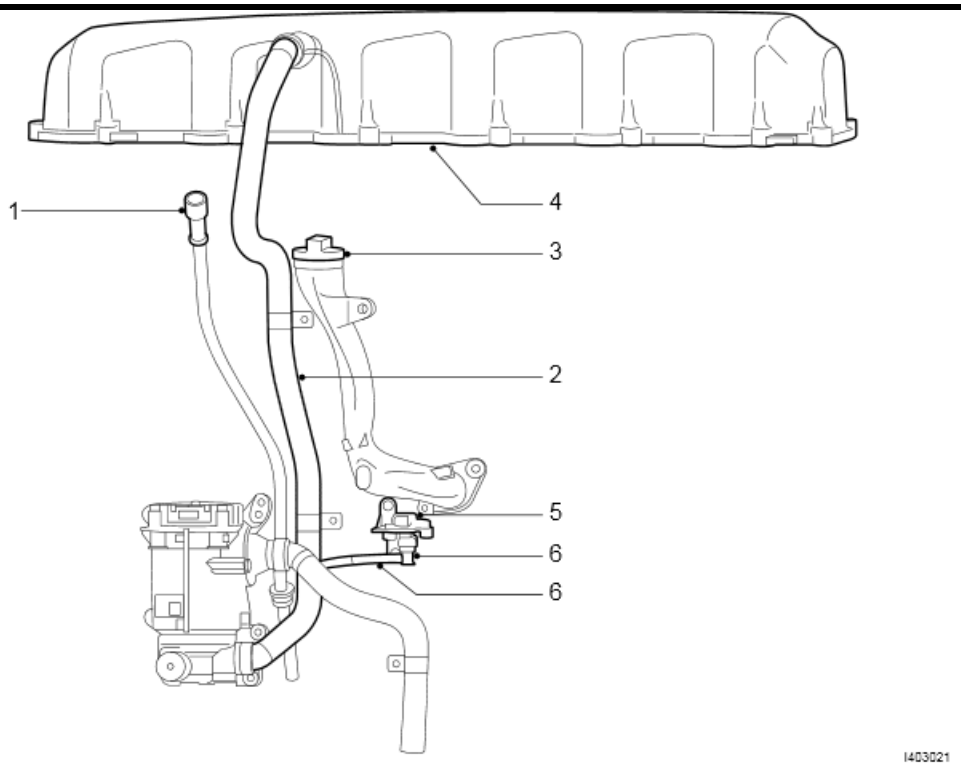


Is the rotor speed of the crankcase ventilation module greater than 11,500 rpm?	
Yes	**No**
Install the disconnected hose.	
Go to 3.B	**Go to 4.A**

Step 3.B Check the crankcase ventilation system for leakage or blockage

Action

1. Key off the ignition
2. Check for leakage on:
   - Dipstick (1)
   - Hose (2) between the valve cover and crankcase ventilation module
   - Oil filling cap (3)
   - Valve cover (4) and gasket
   - Connection between sensor (5) and sensor bracket (6)
   - Pipe (7) between sensor bracket and hose (2)
3. Check for blockage in the pipe (7) between sensor bracket and hose (2).



Is the system free from leakage or blockage?	
Yes	**No**
	Correct any issues found.
Go to 2.C	**Go to 4.A**

Step 4. Electrical checks, crankcase ventilation module

Step 4.A Visual inspection, crankcase ventilation module connections and wiring

Action

1. Key off the ignition.
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 5.A	**Go to 4.B**

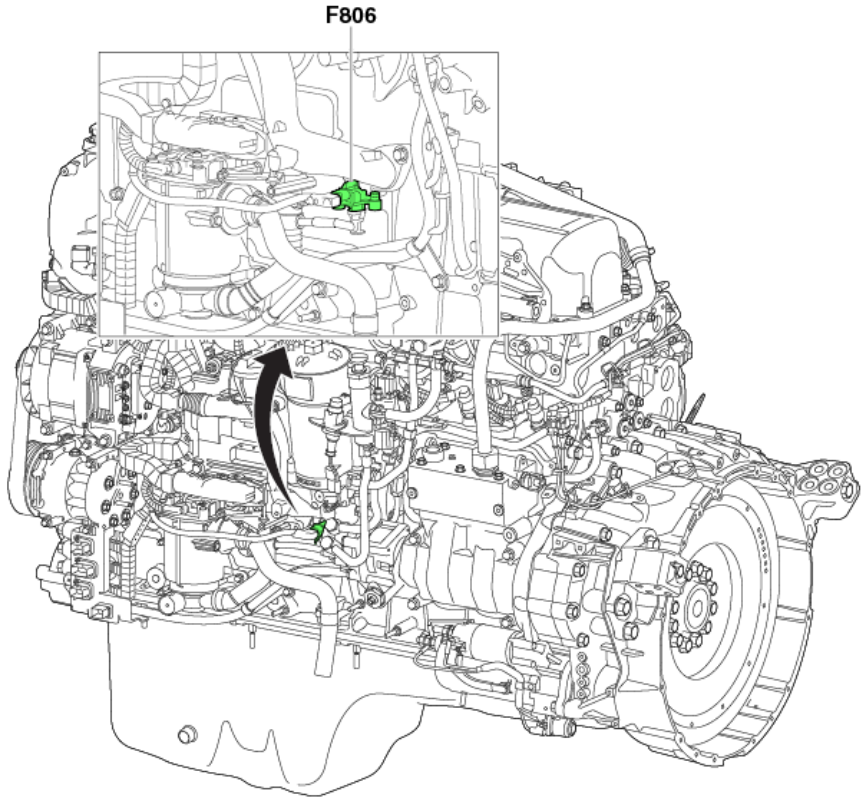
Step 4.B Check the crankcase ventilation module wiring	
Action 1. Monitor the vehicle power supply during engine startup and operation. 2. Check the crankcase ventilation module wiring according to, "Checking data, crankcase ventilation module (L136)."	
Is the crankcase ventilation module wiring within the specifications?	
Yes	**No**
A malfunctioning crankcase ventilation module has been detected. Replace the crankcase ventilation module (L136).	Repair or replace any components and/or wiring as necessary.
Go to 5.A	**Go to 5.A**

Step 5. Reset the DTCs

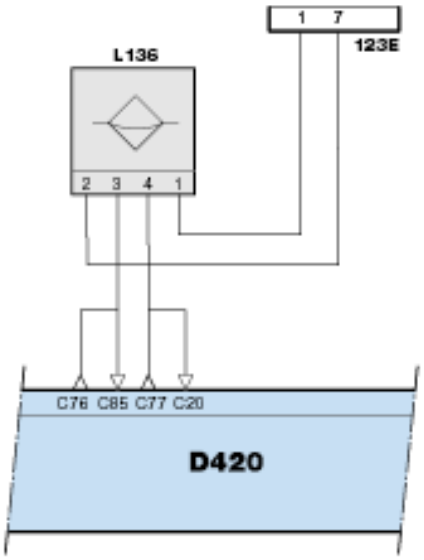
Step 5.A Reset the DTCs	
Action Reset the DTCs If DTCs are still present, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps.
Repair complete	**Go to 1.A**

Back to Index

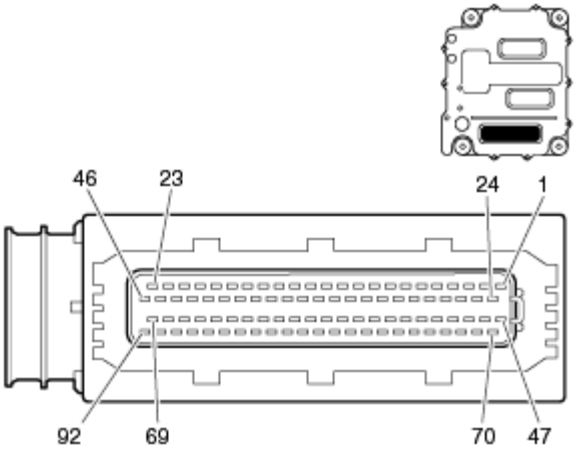
P1408

Code number	P1408
Fault code description	Crankcase ventilation pressure - Data valid but too high, moderately severe
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
Description of component(s)	The crankcase pressure is measured in the crankcase ventilation pipe between the cylinder head cover and the crankcase ventilation module. Pressure difference The sensor measures the difference between the pressure in the pipe and ambient pressure to detect if the pipe is connected correctly or leaking. The sensor measuring range is -0.04 to +0.05 bar [-0.580 to +0.725 psi]. Effect on the system: • Limitation of the engine torque when an unlikely pressure is detected (OBD requirement).
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 measured crankcase pressure is too high 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] in normal driving conditions. This activity can be best conducted with a loaded vehicle/trailer and for more than ten minutes, and; • Let it idle for 2 minutes.

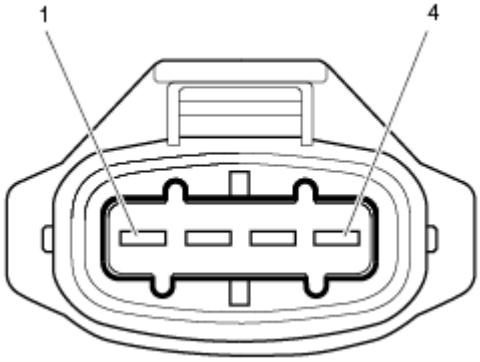
Electrical diagram(s)



Wiring harness connector D420.C front view



Wiring harness connector L090 front view



Technical data

D420	F852	Function
C20	4	Signal, crankcase ventilation speed
C76	3	Signal, crankcase ventilation activation
C77	4	Signal, crankcase ventilation low speed

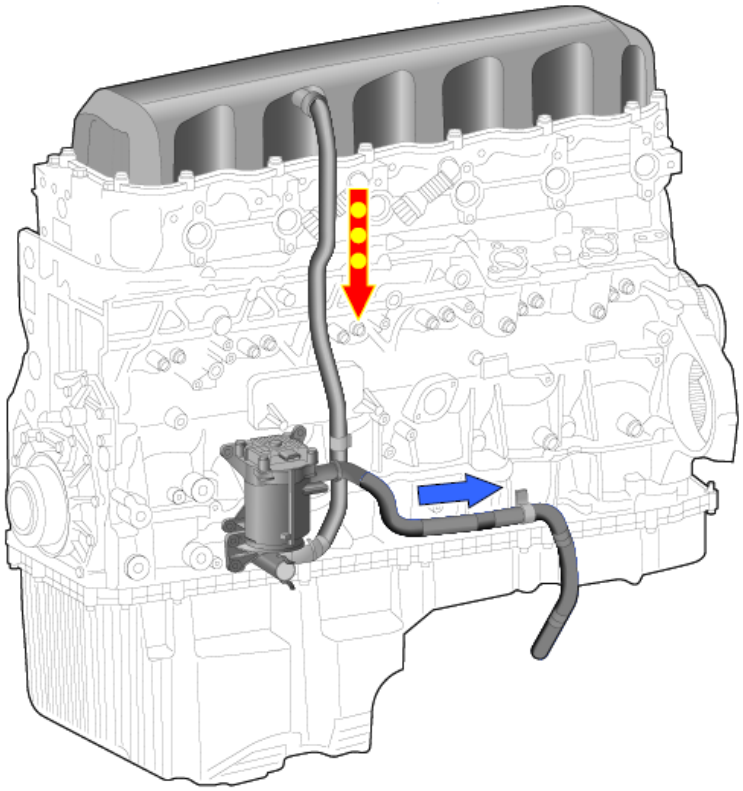
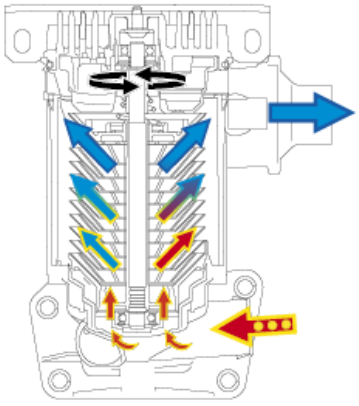
	C85 3 Signal, crankcase ventilation diagnostic 1 Power supply after ignition 2 Ground Pin (+ probe) / Pin (- probe) / Value / Additional information 1 / 2 / Ubat / Ignition keyed on
Possible causes	• Blocked or contaminated crankcase ventilation piping • Blocked or contaminated crankcase ventilation module
Additional information	The crankcase pressure is monitored with the crankcase pressure sensor (F806) against ambient pressure.
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 1408a | 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 1408b | SRT Visual Inspection: CCV Oil Port: Remove the CCV (L090) and visually inspect the oil port for any of the following: • Blockage • Damage a) If any of the above evidence not found – Proceed to step 3. b) If any of the above evidence found – 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 1408c | SRT Replace the Crankcase Ventilation Module (L090): Following component replacement, use DAVIE to re-check for the presence of active faults.

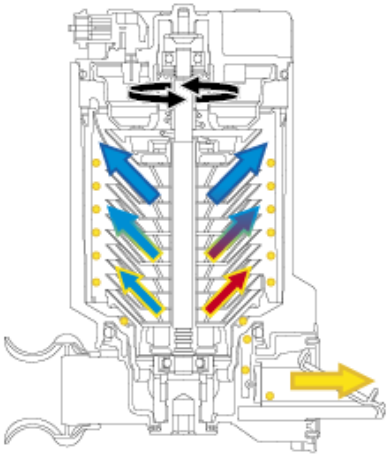
<table>
<tr><td></td><td>

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 4</td><td>Step ID 1408d</td><td>SRT</td></tr>
<tr><td colspan="3">Contact the PACCAR Engine Support Call Center:
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with the 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>

P140A

Code number	P140A
Fault code description	Crankcase ventilation rotor speed - 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 crankcase ventilation module separates the heavier oil particles from the crankcase gas (blow-by gas) before it enters the environment.  



Red arrow Crankcase gas entering module
Blue arrow Cleaned gas exiting module
Yellow arrow Separated oil back to oil sump
The main components of the crankcase ventilation module are:

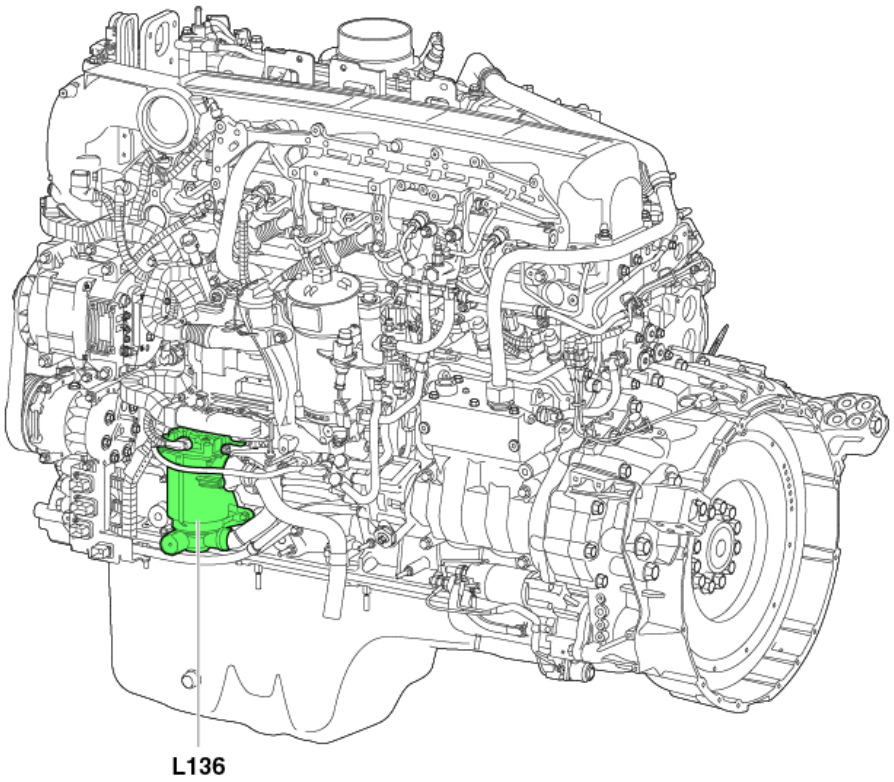
- ECU
  The internal ECU communicates with the PCI ECU (D420) via pin 3 of the module.
- Electromotor
  The electromotor drives an internal element with 98 circular discs at a rotating speed of 12,000 rpm
- Speed sensor
  The element speed is monitored by the PCI ECU (D420) with a speed sensor on pin 4 of the module.

Control
The crankcase ventilation module is a smart actuator that communicates with the PCI ECU.
The element of the crankcase ventilation module starts rotating after engine start; the PCI ECU connects pin 3 of the module to 5 V. The PCI ECU can stop the module by pulling pin 3 to ground.

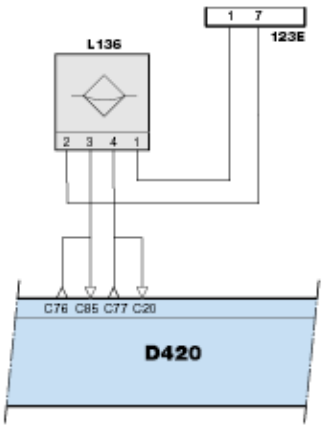
Diagnostics
The PCI ECU starts monitoring the element speed 1 minute after the engine has been started. A DTC is stored if the PCI ECU detects that the element speed is less than 8000 rpm for more than ten minutes.
If the crankcase ventilation module detects a failure, the module pulls pin 3 to ground, resulting in a DTC stored in the PCI ECU.

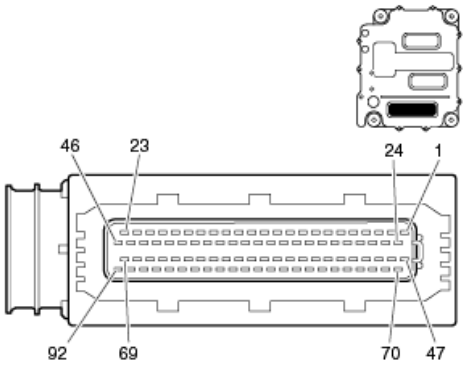
Effect on the system:

- Separating oil from crankcase gas

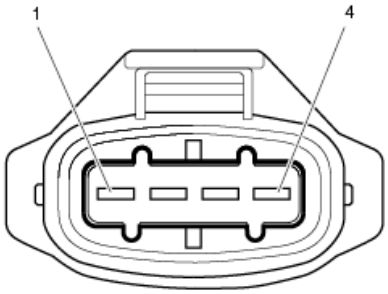
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 600 seconds after the engine has been started, and, • When coolant temperature is above 50°C [122°F].
Set condition of fault code	The PCI ECU (D420) detects that the measured rotating speed of the internal element is more than 14,000 rpm 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, 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 L090 front view

123E 7-pin interface connector
D420 PCI ECU
L136 crankcase ventilation module

D420	L136	Function
C20	4	Signal, crankcase ventilation speed
C76	3	Signal, crankcase ventilation activation
C77	4	Signal, crankcase ventilation low speed
C85	3	Signal, crankcase ventilation diagnostic
	1	Power supply after ignition
	2	Ground

Technical data

Wiring check, crankcase ventilation module (L136)
Preparation

- Key off the ignition.
- Disconnect connector L136
- Measure on the front side of wiring harness connector L136

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

Possible causes	Faulty crankcase ventilation module
Additional information	The electromotor of the crankcase ventilation module (L136) drives an internal element at 12,000 rpm to separate the heavier oil particles from the crankcase gas. The rotating speed of the internal element is monitored by the PCI ECU.
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 140A-a	SRT
Test Drive to Confirm Fault Perform the following pre-check steps to confirm any CCV related issues 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. • Fault inactive – issue resolved • Fault active - Proceed to step 2		

Step 2	Step ID 140A-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 140A-c	SRT
Electrical Checks Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? Yes - Proceed to step 4 No - Proceed to step 5		

Step 4	Step ID 140A-d	SRT
Make the appropriate repairs or component replacements and use DAVIE to re-		

	check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 5

Step 5	Step ID 140A-e	SRT
Visual Inspection: CCV Oil Port Visually inspect the oil port (blockage, damage). Was there evidence of any blockage or damage? No – Proceed to step 7 Yes – Proceed to step 6		

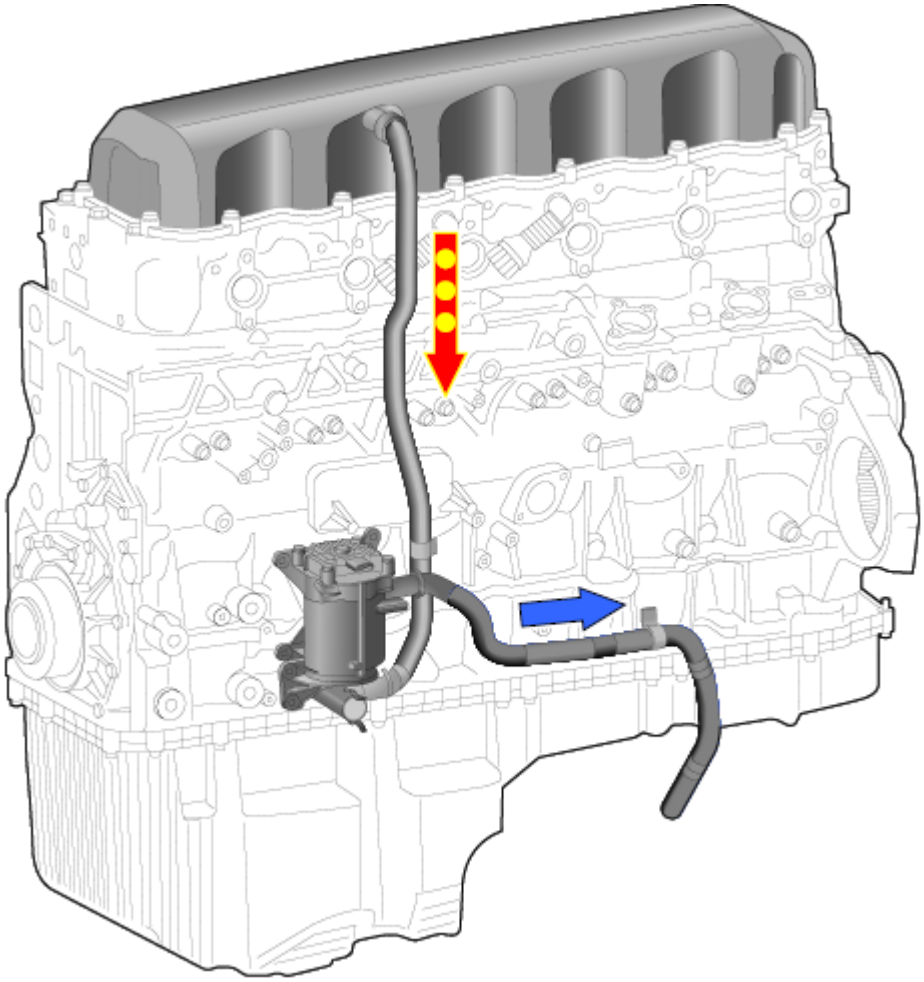
Step 6	Step ID 140A-f	SRT
Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 7		

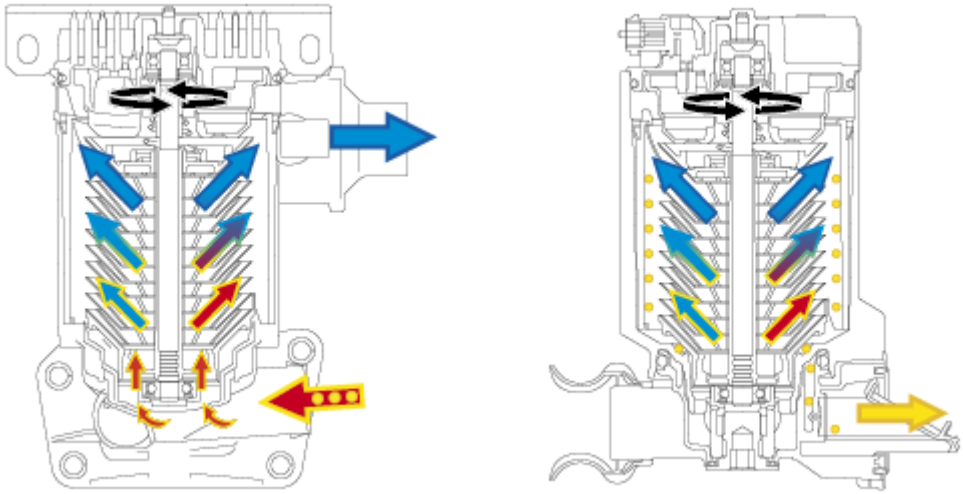
Step 7	Step ID 140A-g	SRT
Replace: Crankcase Ventilation Module If no problems were detected in the preceding steps, an internal problem has most likely occurred with the crankcase ventilation module. Replace the identified faulty component. Following component replacement, use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 8		

Step 8	Step ID 140A-h	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

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

P140E

Code number	P140E
Fault code description	Crankcase ventilation rotor speed - Data valid but too low, least severe
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Crankcase
Description of component(s)	**Description crankcase ventilation module (L136)** The crankcase ventilation module separates the heavier oil particles from the crankcase gas (blow-by gas) before it enters the environment. 



Red arrow Crankcase gas entering module

Blue arrow Cleaned gas exiting module

Yellow arrow Separated oil back to oil sump

The main components of the crankcase ventilation module are:

ECU	The internal ECU communicates with the PCI ECU (D420) via pin 3 of the module.
Electromotor	The electromotor drives an internal element with 98 circular discs at a rotating speed of 12,000 rpm
Speed sensor	The element speed is monitored by the PCI ECU (D420) with a speed sensor on pin 4 of the module.

Control

The crankcase ventilation module is a smart actuator that communicates with the PCI ECU.

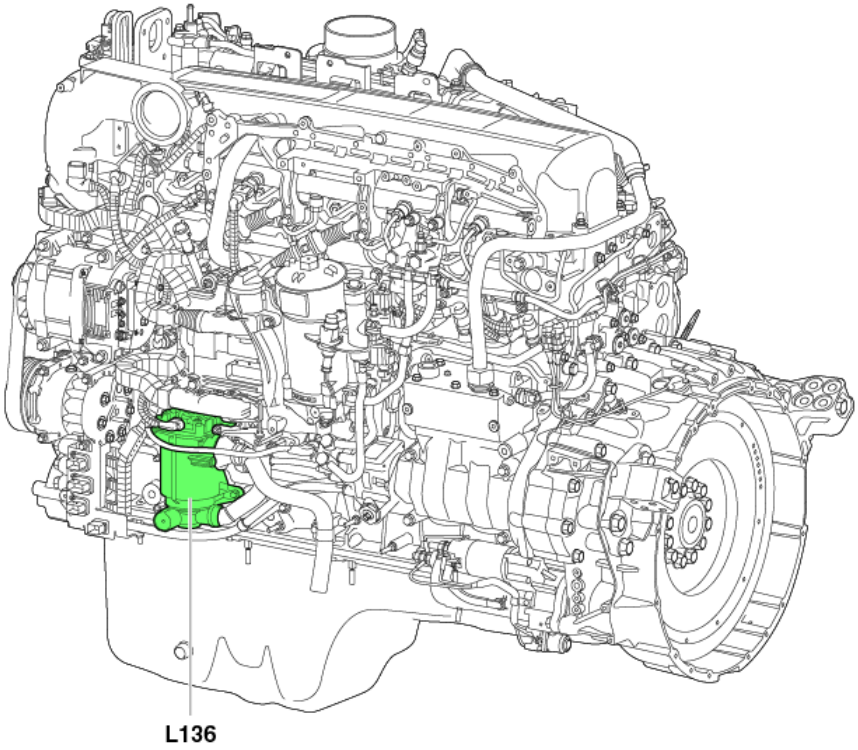
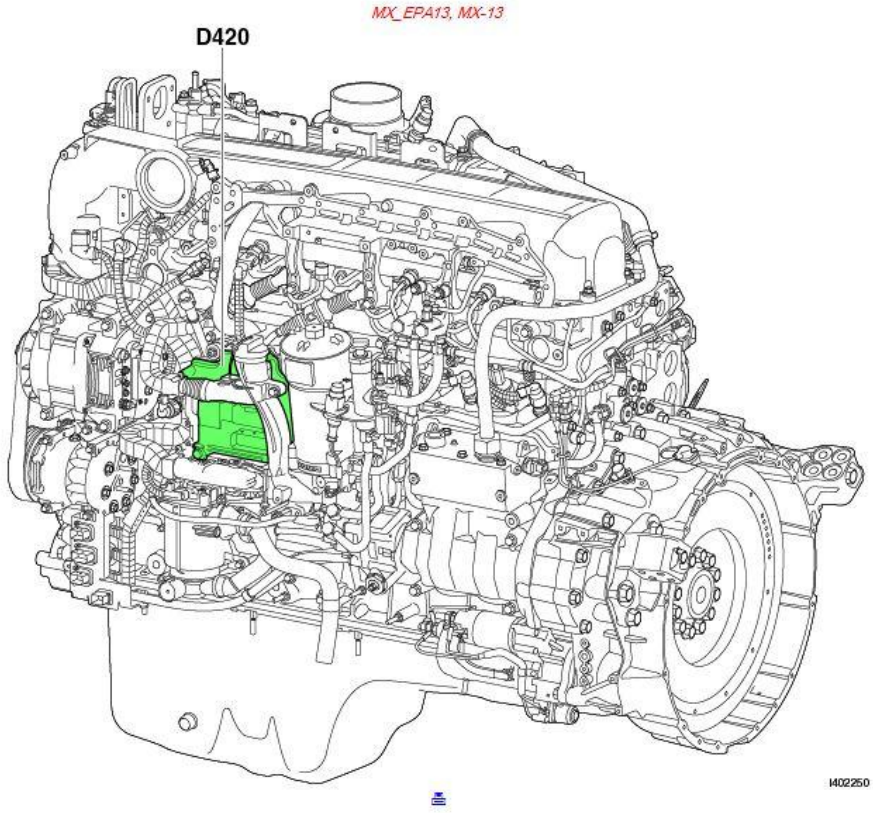
The element of the crankcase ventilation module starts rotating after engine start; the PCI ECU connects pin 3 of the module to 5 V. The PCI ECU can stop the module by pulling pin 3 to ground.

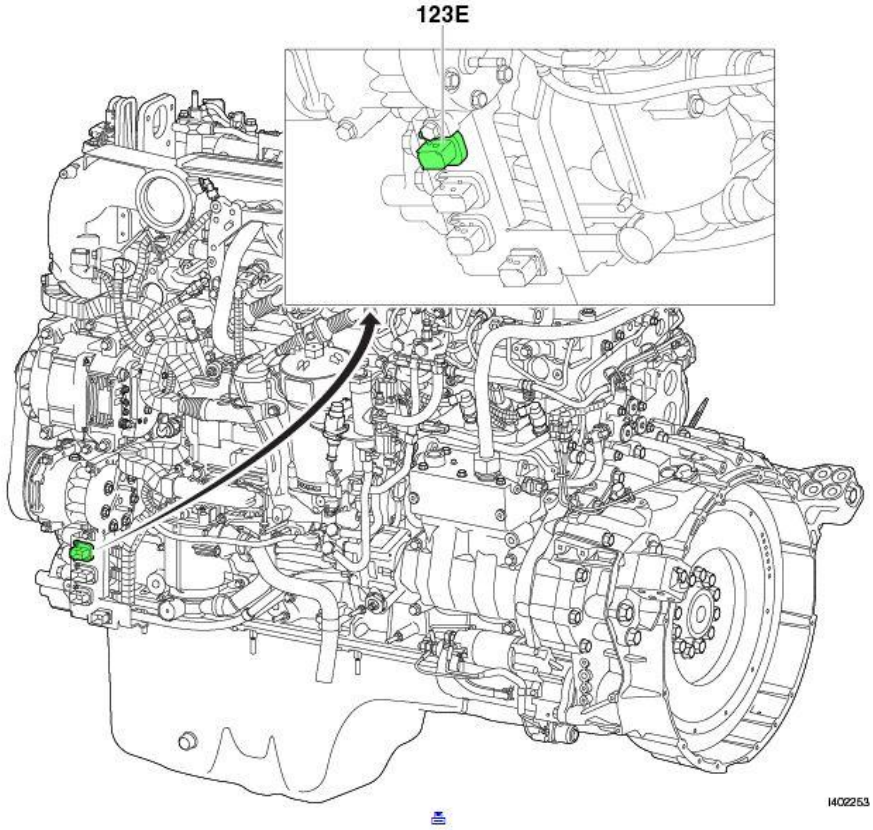
Diagnostics

The PCI ECU starts monitoring the element speed 1 minute after the engine has been started. A DTC is stored if the PCI ECU detects that the element speed is less than 8000 rpm for more than 10 seconds after the engine has run for 10 minutes.

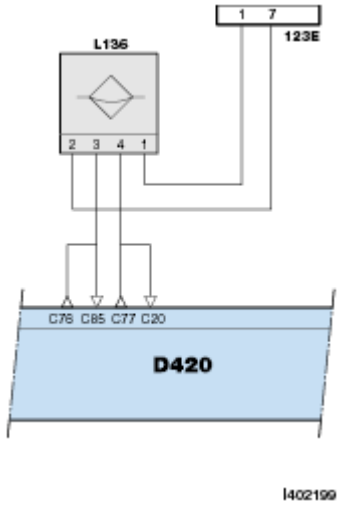
Effect on the system:

- Crankcase ventilation module is stopped
- Oil will not be separated from the crankcase gas
- Pressure in the crankcase may not be maintained sufficiently below atmospheric pressure

Location of component(s)	Crankcase ventilation module (L136)  PCI ECU (D420) 

	Connector (123E) 
Diagnostic condition	This diagnostic runs: • 600 seconds after the engine has been started, and • Battery voltage is between 11V and 16V, and • Engine coolant temperature is above 60°C [140°F], and • System state is not stationary or cranking, and • Engine operating mode is not test mode
Set condition of fault code	The PCI ECU (D420) detects that the measured rotating speed of the internal element is less than 8000 rpm 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 60°C [140°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 1100-1500 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 as possible 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. Do not monitor the MIL to check if the repair has been successful but read with DAVIE if the DTC stays inactive.
Electrical diagram(s)	**Checking data crankcase ventilation module (L136)**

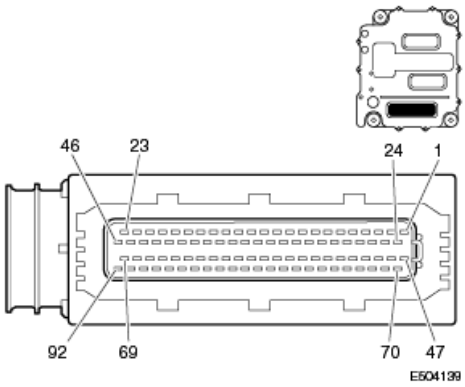


123E 7-pin interface connector

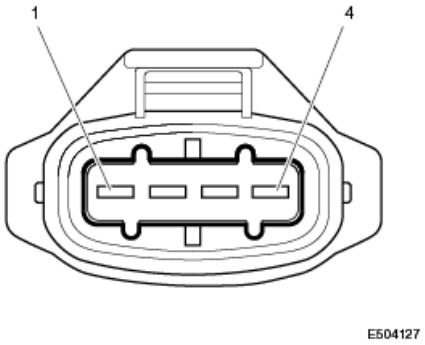
D420 PCI ECU

L136 Crankcase ventilation module

D420	L136	Function
C20	4	Signal, crankcase ventilation speed
C76	3	Signal, crankcase ventilation activation
C77	4	Signal, crankcase ventilation low speed
C85	3	Signal, crankcase ventilation diagnostic
	1	Power supply after ignition
	2	Ground



Wiring harness connector D420.C front view



Wiring harness connector L136 front view

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

Technical data

Checking data, crankcase ventilation module (L136)

Preparation

- Key off the ignition
- Disconnect connector L136
- Measure on the front side of wiring harness connector L136

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	Ubat	Ignition keyed on
3	2	0 V	Ignition key on, engine not running. Crankcase ventilation activation/diagnostic signal.
		3.8 - 5.5 V	Engine running. Crankcase ventilation activation/diagnostic signal
4	2	± 4 - 5 V	Ignition switched on. Crankcase ventilation speed signal

Possible causes

- Faulty crankcase ventilation module
- Faulty crankcase ventilation module wiring; power supply or ground wiring in the J2 or J3 engine harness

Additional information

- The electromotor of the crankcase ventilation module (L136) drives an internal element at 12,000 rpm to separate the heavier oil particles from the crankcase gas. The rotating speed of the internal element is monitored by the PCI ECU.
- P153B can also be active when this DTC is active.

Diagnostic Step-by-Step

The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.

- This troubleshooting procedure is based on the assumption that supply power and ground to the 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.

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? P153B	
Yes	**No**
P153B is the same issue, but more severe. Refer to the troubleshooting information for this code.	
	Go to step 2.A

Step 2. Crankcase Ventilation System Checks

Step 2.A Monitor the crankcase ventilation module rotor speed
Action 1. Start the engine and allow it to run until it has reached an operating

temperature of 60°C [140°F].

2. Let the engine continue running for a minimum of 60 seconds, to allow the CCV rotor time to reach full speed at this operating temperature.
3. Use DAVIE to read the crankcase ventilation module rotor speed.

Is the rotor speed of the crankcase ventilation module greater than 11,500 rpm?	
Yes	**No**
Go to step 4.A	**Go to step 3.A**

Step 3. Crankcase Ventilation Module (L136) Checks

Step 3.A Visual inspection, connections and wiring, crankcase ventilation module	
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 not tight • Blown fuse	
Is there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the fuse is blown, replace it. Refer to Step 4.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 3.B	**Go to step 3.B**

Step 3.B Electrical checks, supply voltage, crankcase ventilation module (L136)	
Action 1. Confirm the supply voltage level as outlined in the corresponding checking data, "Checking data, crankcase ventilation module (L136)."	
Are measured values within expected range?	
Yes	**No**
	Correct any issues found. Refer to step 4.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 4. Repair Verification

Step 4.A Repair verification cycles
Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated. Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
Action 1. Steady State 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 60°C [140°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 1100-1500 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 as possible 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.

	Do not rely on the MIL as an indication of a successful repair for this code. To check if the related repair has been successful, use DAVIE to confirm that P140E either remains inactive or if cleared, it does not return to an active state.
	Were the identified repair verification cycles able to be completed?
Yes	**No**
	Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
Go to step 4.B	**Go to step 4.B**

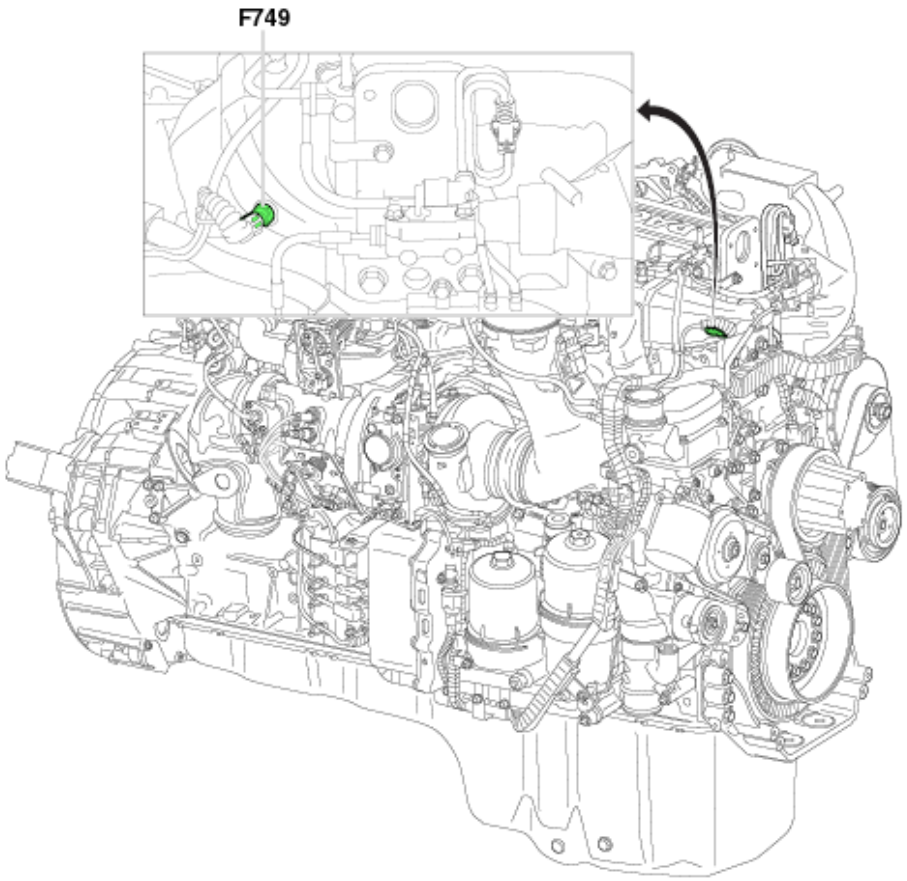
Step 4.B DAVIE Diagnostics, Quick Check	
Action 2. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.	
Has P140E been cleared?	
Yes	**No**
Problem resolved. No further actions.	Continue with the next step in 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.

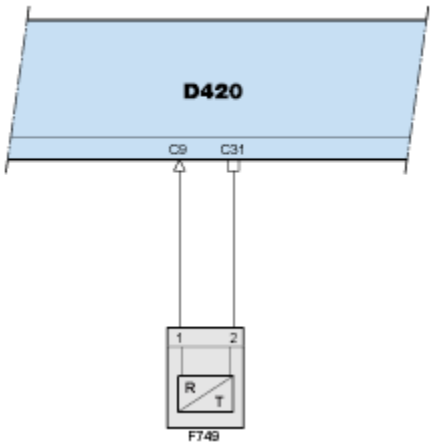
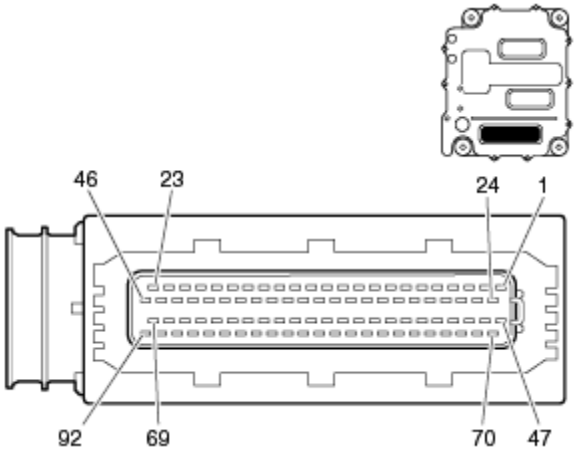
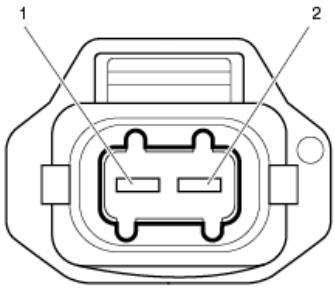
Contacting the PACCAR Engine Support Center

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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P1458

Code number	P1458
Fault code description	EGR temperature - Data erratic, intermittent, or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – EGR Freeze frame type - EGR
Description of component(s)	The EGR gas flow temperature is measured after the EGR cooler. Effect on the system: • Corrects EGR gas flow calculation (the temperature is an indication of the gas density) • Closes the EGR valve when the EGR temperature is too high • Monitors EGR cooler performance
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 150 seconds after an engine start; • when coolant temperature is above 65°C [149°F], and; • The engine mode is DOC heating or DPF regeneration or SCR heating or SCR high efficiency or standard or protection.
Set condition of fault code	The PCI ECU (D420) detects that measured EGR gas flow temperature differs too much from the expected EGR gas flow temperature for more than 40 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of

	80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.C front view  Wiring harness connector F749 front view D420 PCI ECU F749 EGR temperature sensor D420 L095 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	• Contaminated EGR cooler • Extremely high exhaust gas temperatures • EGR temperature sensor deviation
Additional information	The EGR gas flow temperature is monitored by the EGR temperature sensor (F749).
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 1458a | 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 1458b	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 engine operating temperatures to stabilize. While monitoring, temperature values from sensor to sensor should not vary more than ±30°F. Do any monitored values vary by more than ±30°F? • Yes - Proceed to step 3 • No - Proceed to step 4		

Step 3	Step ID 1458c	SRT
Clean adjust, repair or replace affected components for any issues identified and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 4		

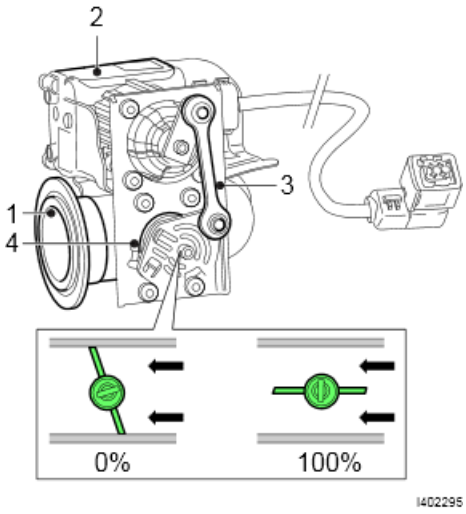
Step 4	Step ID 1458d	SRT
Electrical Checks Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • Yes - Proceed to step 5 • No - Proceed to step 6		

Step 5	Step ID 1458e	SRT
Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 6		

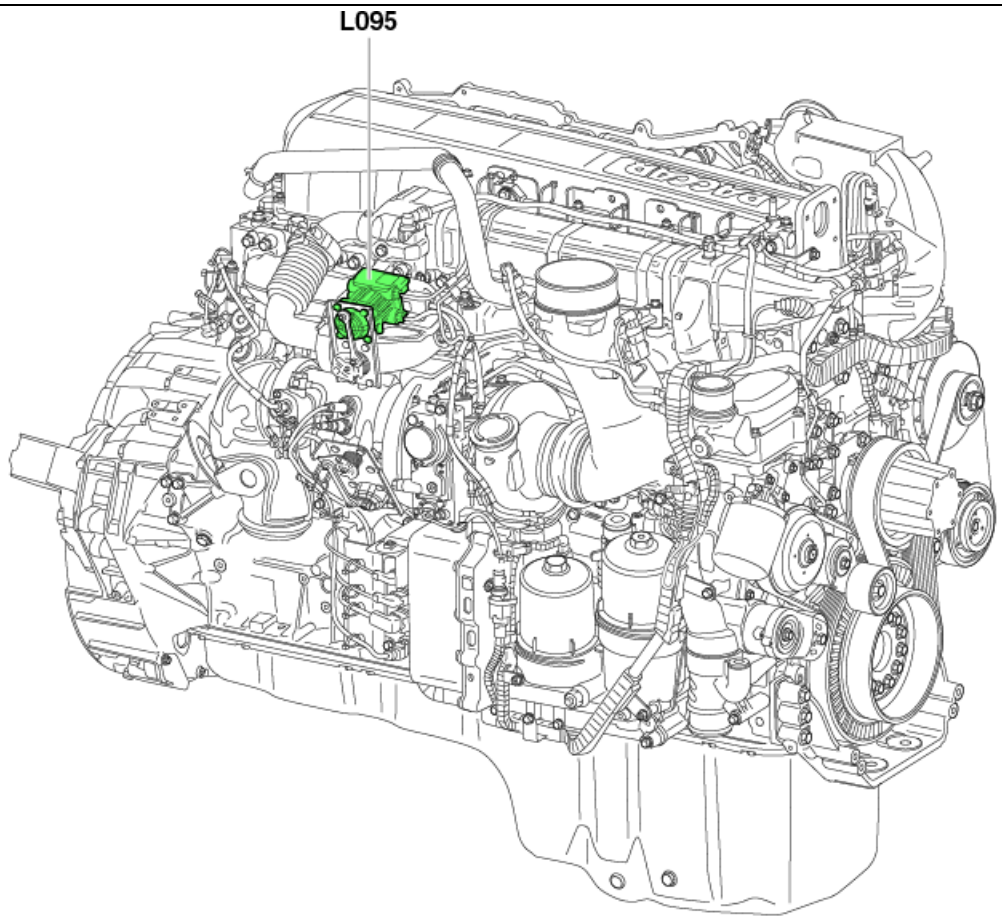
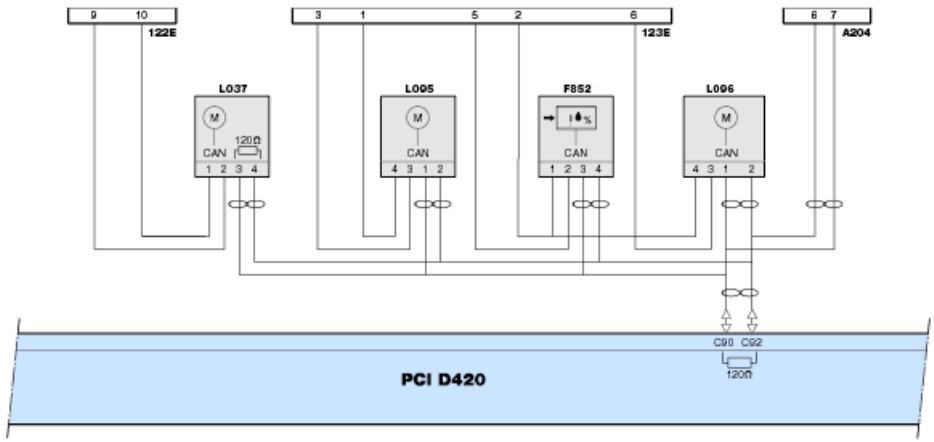
Step 6	Step ID 1458f	SRT
Ancillary Test: Air Side Pressure Test Perform the prescribed testing to identify any potential leaks in the system. Does the test fail to complete or result in a failed state? • Yes - Proceed to step 7 • No - Proceed to step 8		

	<table><tr><td>Step 7</td><td>Step ID 1458g</td><td>SRT</td></tr><tr><td colspan="3">Make the appropriate repairs or component replacements and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 8</td></tr></table> <table><tr><td>Step 8</td><td>Step ID 1458h</td><td>SRT</td></tr><tr><td colspan="3">Replace: EGR Temperature sensor Replace the identified smart sensor and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolved • Fault active - Proceed to step 9</td></tr></table> <table><tr><td>Step 9</td><td>Step ID 1458i</td><td>SRT</td></tr><tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr></table>
Verification Drive Cycle	To validate the repair, 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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P1480

Code number	P1480
Fault code description	EGR valve module position - Unable to reach target position
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – EGR
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  1. Butterfly valve 2. EGR valve actuator 3. Lever 4. Spring The main components of the EGR valve actuator: ECU Electromotor — The electromotor rotates the output shaft via internal gears Output shaft — The butterfly valve (1) 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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects a difference between the actual shaft position and the requested shaft position for more than 5 seconds.
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 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

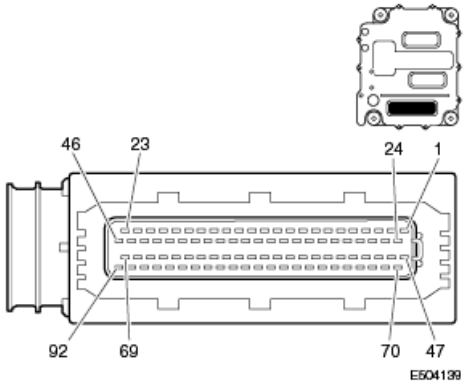
F852 humidity sensor

L037 VTG turbocharger actuator

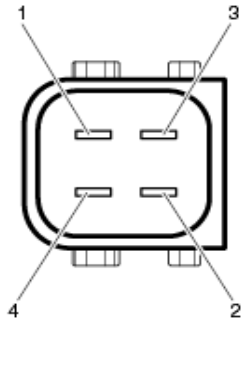
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

- Bent actuator lever and/or connection rod.
- Sticking or blocked EGR valve or mechanism.

Additional information

- The position of the actuator shaft, and therefore the position of the EGR valve, is monitored. Valve position: 0% is fully closed and 100% is fully open.
- The actuator motor is switched off and the EGR valve is fully closed (0% position).
- Engine torque is reduced after 10 hours of engine operation.
- After 36 hours of engine operation with P1480 active, P1518 becomes active.
- After 100 hours of engine operation with P1480 active, P151A and/or P151B becomes 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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1480 active?	
Yes	**No**

Go to 2.A	Step 2.B

Step 2. Check the EGR valve

Step 2.A Visual inspection, EGR valve mechanism
Action 1. Key off the ignition. 2. Visually check that the connection rod of the EGR valve mechanism is: • Installed correctly • Not damaged **Correct EGR valve mechanism**  I402210 **Example of a bent lever and connection rod**  I402265
Is the EGR valve mechanism free of damage?

Yes	No

	Replace the EGR valve module
Go to 2.B	**Step 4.A**

Step 2. B Check the free movement of the EGR valve mechanism

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

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

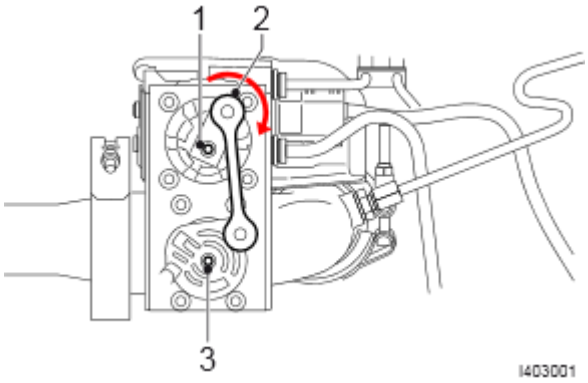
Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Check the free movement of the EGR valve mechanism by moving the actuator lever (2) by hand.

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



Does the EGR valve mechanism move freely?

Yes	**No**
Go to 3.A	**Step 2.C**

Step 2. C Check for blockage in the EGR valve housing

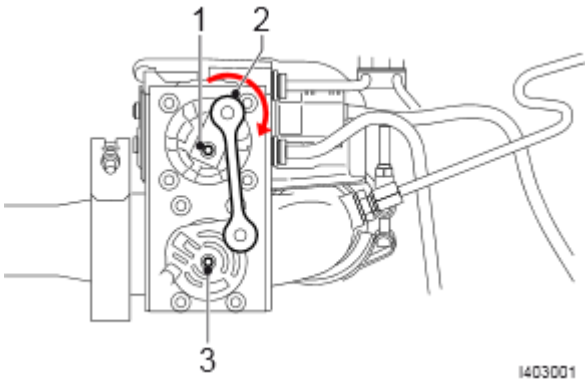
The EGR valve mechanism can move when the ignition is keyed on. Touching the mechanism can result in physical injury.

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

Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Remove the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler).
3. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the actuator lever/connecting rod (2).



Blockage found?

Yes	No
1. Remove blockage/clean the internal valve housing. 2. Monitor the EGR valve position with DAVIE to check that the cleaning was effective. 3. Install the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler.”	A malfunctioning EGR valve module has been detected. Replace the EGR valve module.

Go to 4.A	**Step 4.A**

Step 3. Try another EGR valve module

Step 3. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1480 active?	
Yes	**No**
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 4.A**

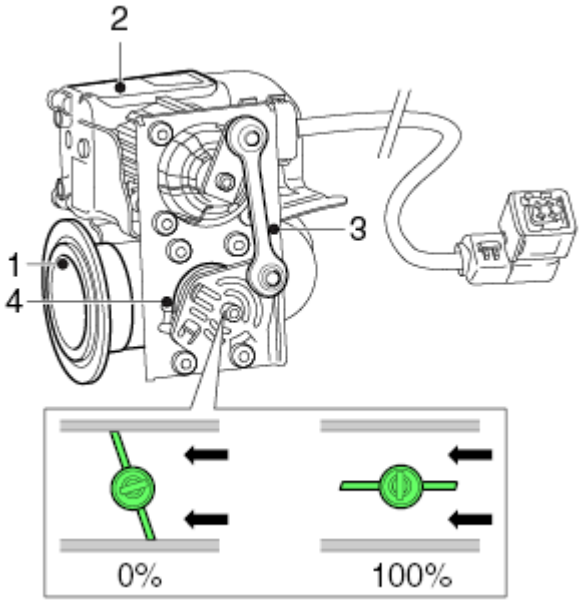
Step 4. Reset the DTCs

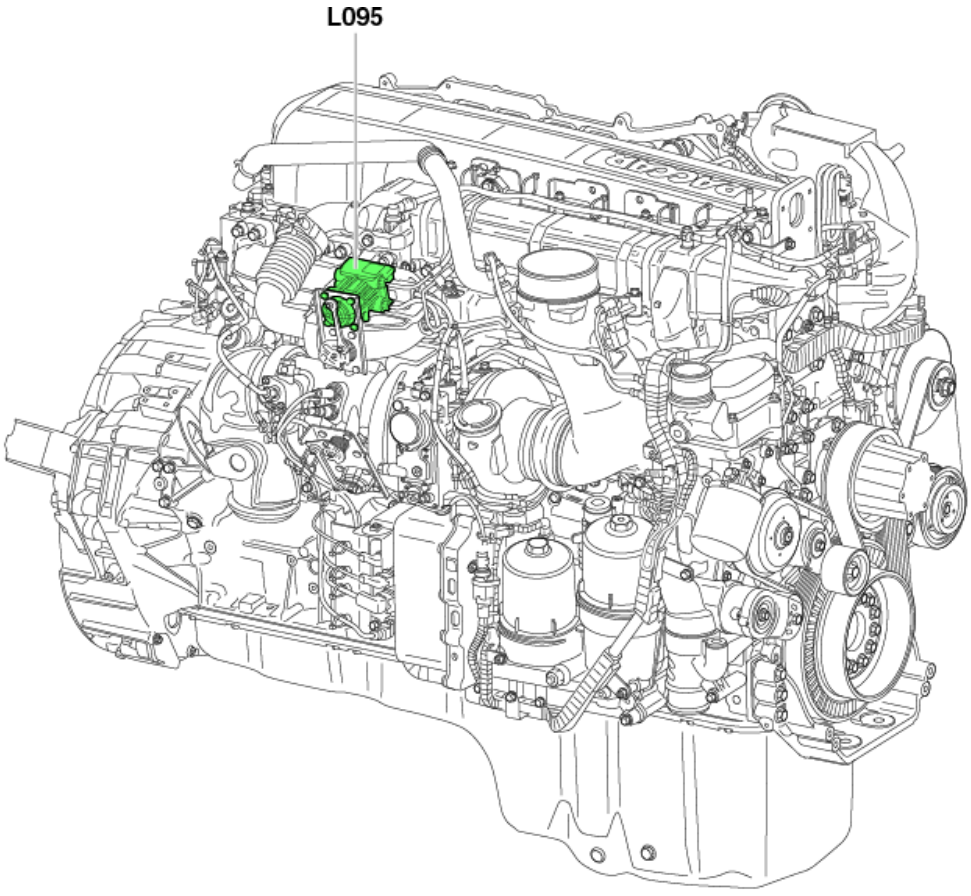
Step 4. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 1.A**

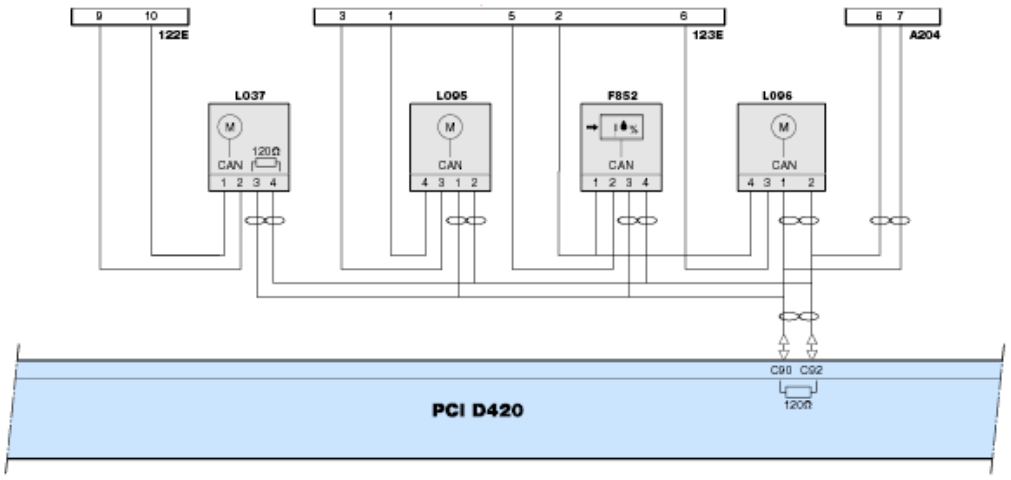
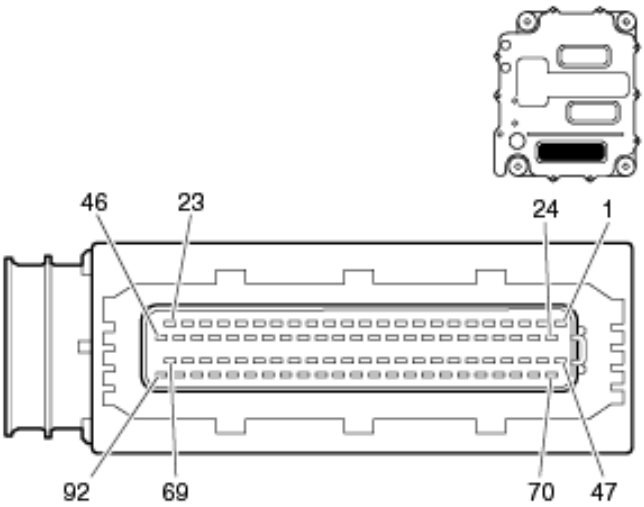
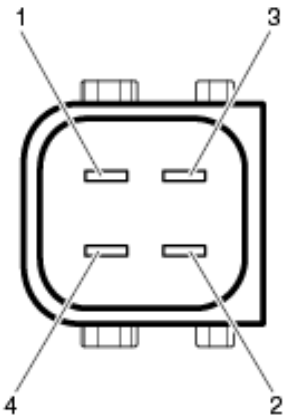
Verification Drive Cycle	Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active.

	 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.
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P1481

Code number	P1481
Fault code description	EGR valve module 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 EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back mainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  1 Butterfly valve 2 EGR valve actuator 3 Lever 4 Spring The main components of the EGR valve actuator are: • ECU • Electromotor • The electromotor rotates the output shaft via internal gears. • output shaft • The butterfly is moved via a lever by rotating the output shaft • electromotor position sensor • The position of the electromotor is monitored. • output shaft position sensor • The position of the output shaft is monitored. • temperature sensor • The temperature of the printed circuit board of the ECU is monitored.

	Control: The EGR valve actuator is a smart actuator that communicates with the PCI ECU via E-CAN. The actuator ECU is controlled by the PCI ECU but has its own diagnostics on the following actuator inputs and outputs: • power supply voltage • electromotor position • electromotor current • output shaft position • ECU printed circuit board temperature • ECU hardware and software After the ignition is keyed on, the valve position is 0% until the PCI ECU commands the actuator. Unpowered and fail-safe position: The unpowered and the fail-safe positions of the valve are controlled by a spring and are fully closed (0%). If a failure is detected the EGR valve moves to the fail-safe position, if possible. Effect on the system: Controlling the EGR gas flow to the inlet manifold. A higher opening percentage results in a higher amount of EGR flow at the same pressure difference between the pressure before turbine and the boost pressure
Location of component(s)	

Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects a difference between the actual shaft position and the demanded shaft position for more than 5 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 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 / • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	• Sticking or blocked EGR valve or mechanism. • High friction of the EGR 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 P1480 becoming active also. • After 36 hours of engine operation with P1481 active, P1518 becomes active. • After 100 hours of engine operation with P1481 active, P151A and/or P151B become 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 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 1481a	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.		

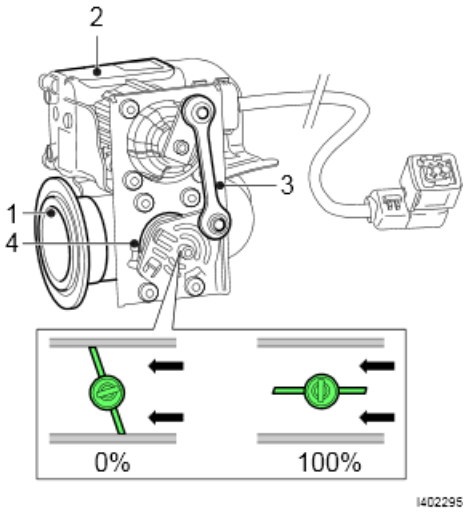
Step 2	Step ID 1481b	SRT
Electrical Checks Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable 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 1481c	SRT
Repair or replace EGR Valve Module and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 4		

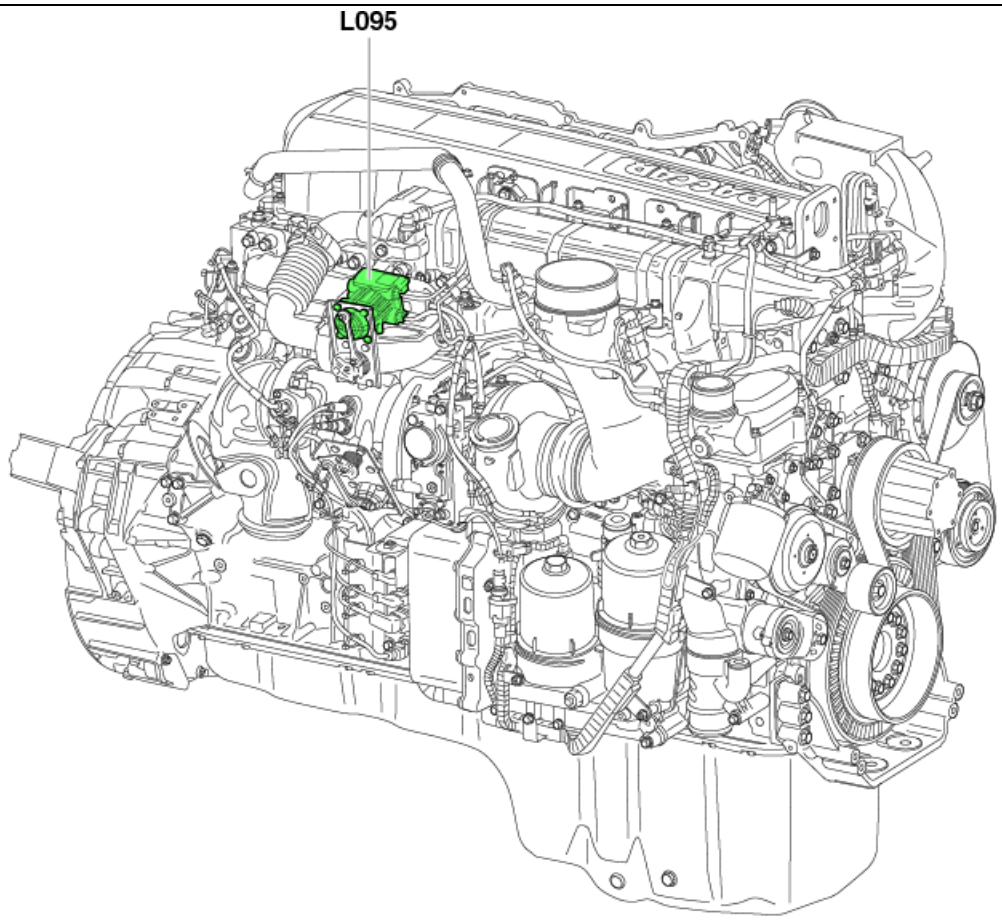
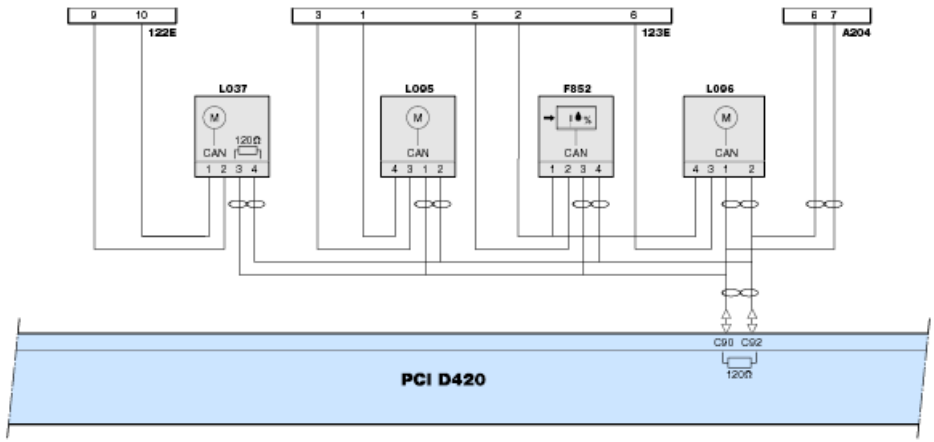
Step 4	Step ID 1481d	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

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

P1482

Code number	P1482
Fault code description	EGR valve module - Internal error
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  5. Butterfly valve 6. EGR valve actuator 7. Lever 8. Spring The main components of the EGR valve actuator: ECU Electromotor – The electromotor rotates the output shaft via internal gears Output shaft – The butterfly valve (1) 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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects an internal error.
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 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

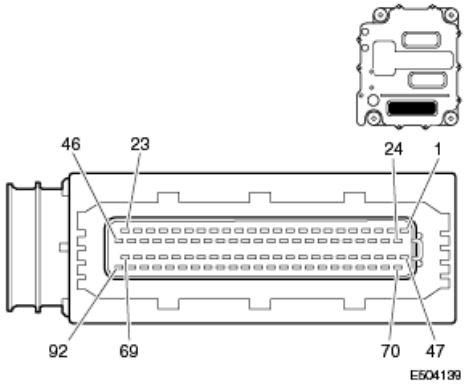
F852 humidity sensor

L037 VTG turbocharger actuator

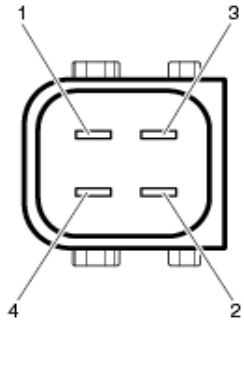
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

Faulty EGR valve actuator

Additional information

- The actuator motor is switched off with this fault active.
- Engine torque is reduced.

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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1482 active?	
Yes	**No**
Go to 2.A	**Step 3.A**

Step 2. Try another EGR valve module

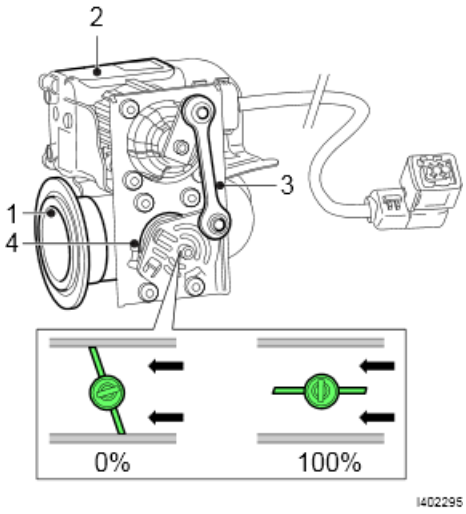
Step 2. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1482 active?	
Yes	**No**
	A malfunctioning EGR valve actuator has been detected. Replace the EGR valve module.  This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 3.A**

Step 3. Reset the DTCs

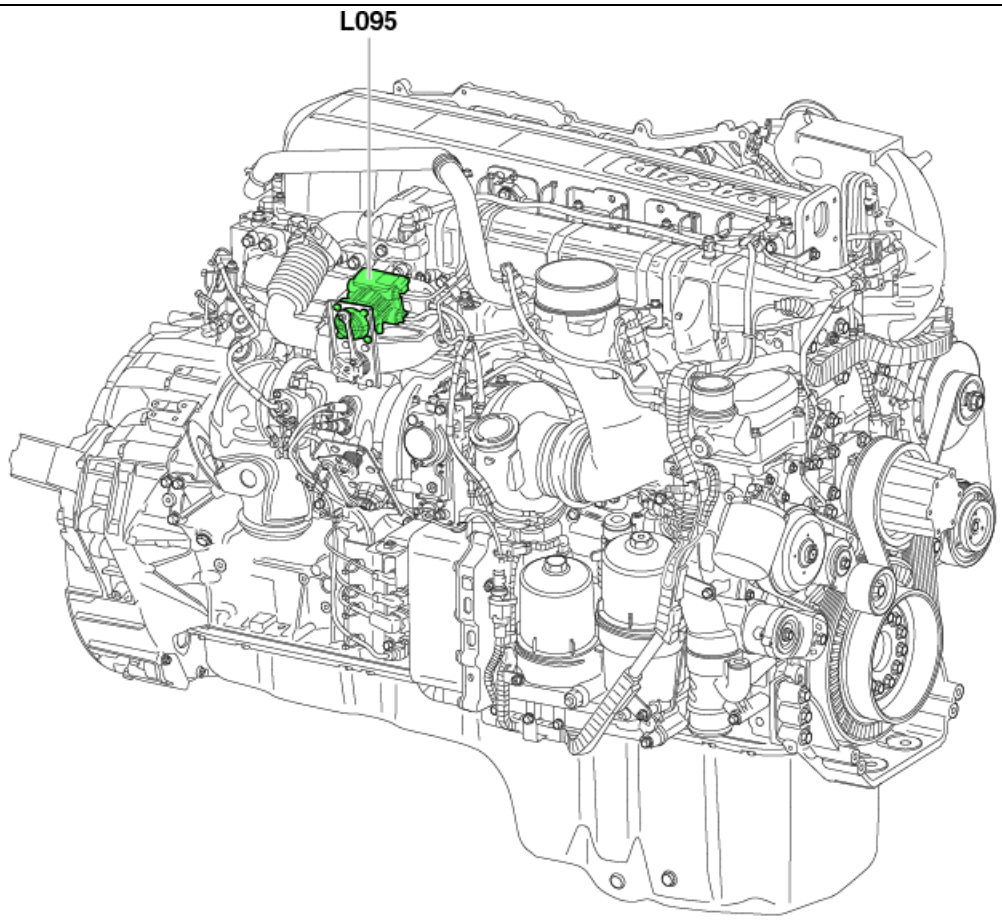
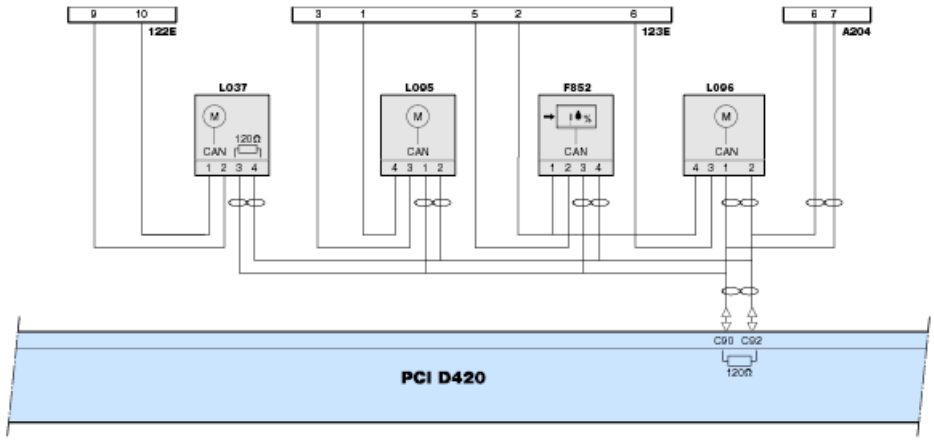
Step 3. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 1.A**

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. **Power-up** With the brakes set and the engine off, turn the key to the ON position, and allow 10 seconds for the monitoring system to initialize and run diagnostics.
	Back to Index

P1483

Code number	P1483
Fault code description	EGR valve module - CAN communication error
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  9. Butterfly valve 10. EGR valve actuator 11. Lever 12. Spring The main components of the EGR valve actuator: ECU Electromotor — The electromotor rotates the output shaft via internal gears Output shaft — The butterfly valve (1) 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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects that the cyclic CAN command message transmitted by the PCI ECU (D420) is missing for more than 7.5 seconds.
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

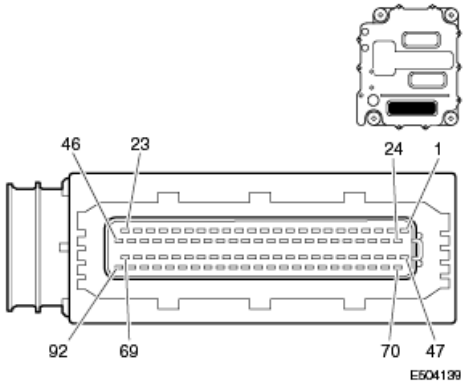
F852 humidity sensor

L037 VTG turbocharger actuator

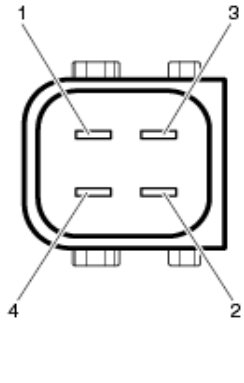
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

- CAN wiring

Additional information

- The EGR valve module (L095) is controlled by a cyclic CAN command message transmitted by the PCI ECU (D420) in which the operating mode and the target position are requested.
- There is still CAN communication between the EGR valve module and PCI ECU with this fault active.
- The actuator motor is switched off and the EGR valve is fully closed (0% position) with this fault active.
- Engine torque is reduced after 10 hours of engine operation.
- After 36 hours of engine operation with P1483 active, P1518 becomes active.
- After 100 hours of engine operation with P1483 active, P151A and/or P151B becomes 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 1. Key the ignition off for at least 15 seconds, then key it on again.

Is DTC P1483 active?	
Yes	**No**
Go to 2.A	**Step 5.A**

Step 2. Visual inspection, EGR valve module

Step 2. A Visual inspection, EGR valve module connections and wiring	
Action 1. Key off the ignition. 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 3.A	**Go to 5.A**

Step 3. Electrical checks, EGR valve module

Step 3. A Check the EGR valve module 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, EGR valve module (L095)".	
Are the CAN connection and power supply within the specifications?	
Yes	**No**
	Correct any issues found.

Go to 4.A	**Step 5.A**

Step 4. Try another EGR valve module

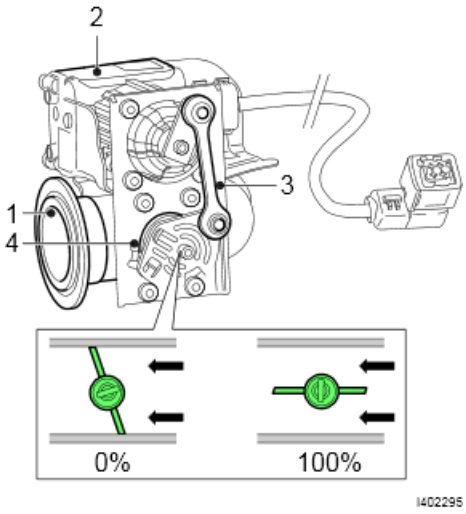
Step 4. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1483 active?	
Yes	**No**
	A malfunctioning EGR valve actuator has been detected. Replace the EGR valve module. This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 3.A**

Step 5. Reset the DTCs

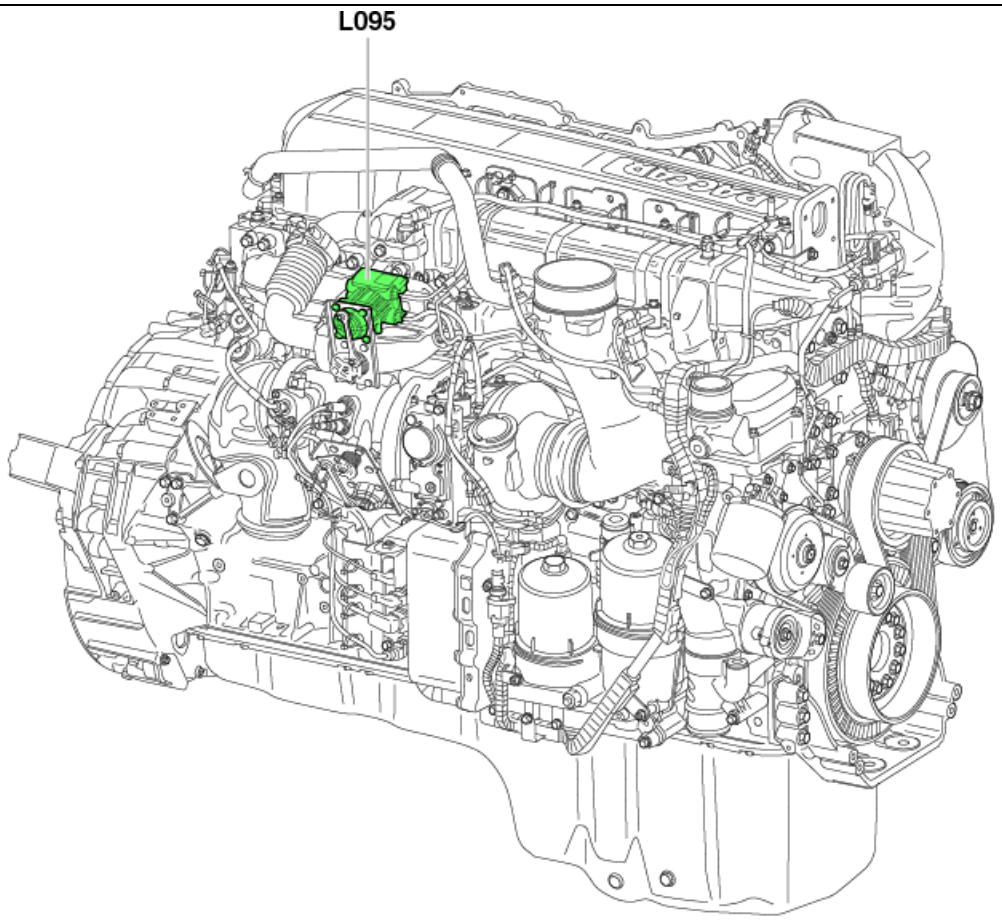
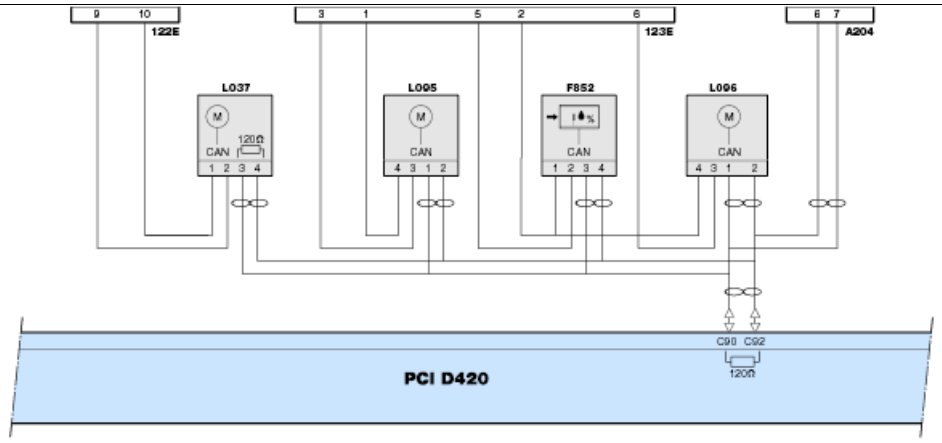
Step 5. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 1.A**

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. **Power-up** With the brakes set and the engine off, turn the key to the ON position, and allow 10 seconds for the monitoring system to initialize and run diagnostics.
	Back to Index

P1484

Code number	P1484
Fault code description	EGR valve module – Internal error
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  13. Butterfly valve 14. EGR valve actuator 15. Lever 16. Spring The main components of the EGR valve actuator: ECU Electromotor — The electromotor rotates the output shaft via internal gears Output shaft — The butterfly valve (1) 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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects that the internal actuator current is too high.
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 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

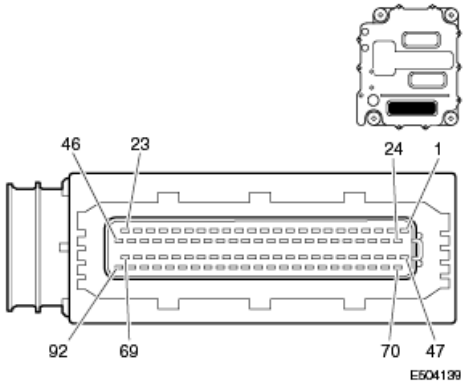
F852 humidity sensor

L037 VTG turbocharger actuator

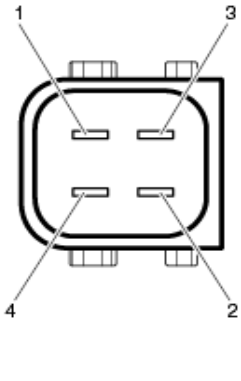
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

- High friction or sticking EGR valve bearings or mechanism
- Blocked EGR valve

Additional information

- The actuator current is monitored.
- The actuator motor is switched off and the EGR valve is fully closed (0% position).
- Engine torque is reduced after 10 hours of engine operation.
- After 36 hours of engine operation with P1484 active, P1518 becomes active.
- After 100 hours of engine operation with P1484 active, P151A and/or P151B becomes 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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1484 active?	
Yes	**No**

Go to 2.A	Step 2.B

Step 2. Check the EGR valve

Step 2.A Visual inspection, EGR valve mechanism
Action 1. Key off the ignition. 2. Visually check that the connection rod of the EGR valve mechanism is: • Installed correctly • Not damaged **Correct EGR valve mechanism**  I402210 **Example of a bent lever and connection rod**  I402265
Is the EGR valve mechanism free of damage?

Yes	No
	Replace the EGR valve module

Go to 2.B	Step 4.A

Step 2. B Check the free movement of the EGR valve mechanism

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

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

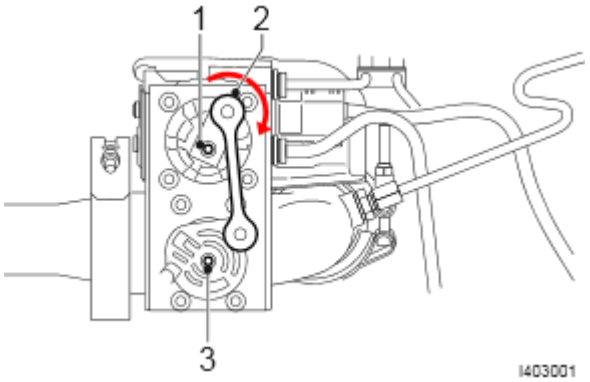
Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Check the free movement of the EGR valve mechanism by moving the actuator lever (2) by hand.

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



Does the EGR valve mechanism move freely?

Yes	No
	Possible blockage/soot accumulation in the valve housing.
Go to 3.A	Go to 2.C

Step 2. C Check for blockage in the EGR valve housing

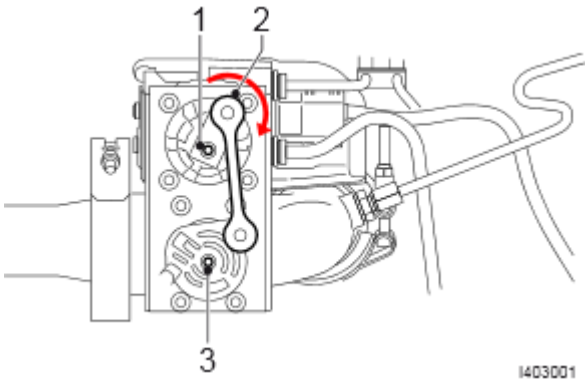
The EGR valve mechanism can move when the ignition is keyed on. Touching the mechanism can result in physical injury.

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

Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Remove the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler).
3. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the actuator lever/connecting rod (2).



Blockage found?

Yes	No
1. Remove blockage/clean the internal valve housing. 2. Monitor the EGR valve position with DAVIE to check that the cleaning was effective. 3. Install the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler.”	A malfunctioning EGR valve module has been detected. Replace the EGR valve module.

Go to 4.A	**Step 4.A**

Step 3. Try another EGR valve module

Step 3. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1484 active?	
Yes	**No**
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 4.A**

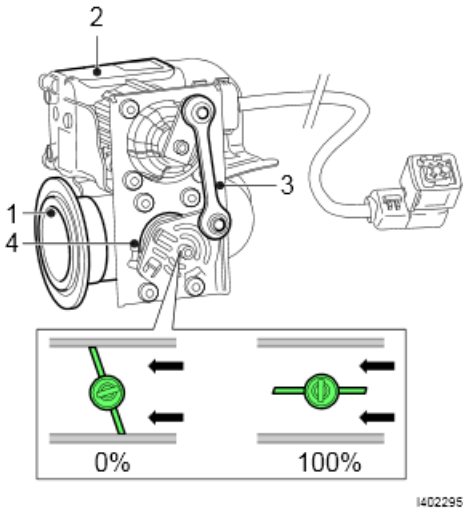
Step 4. Reset the DTCs

Step 4. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 1.A**

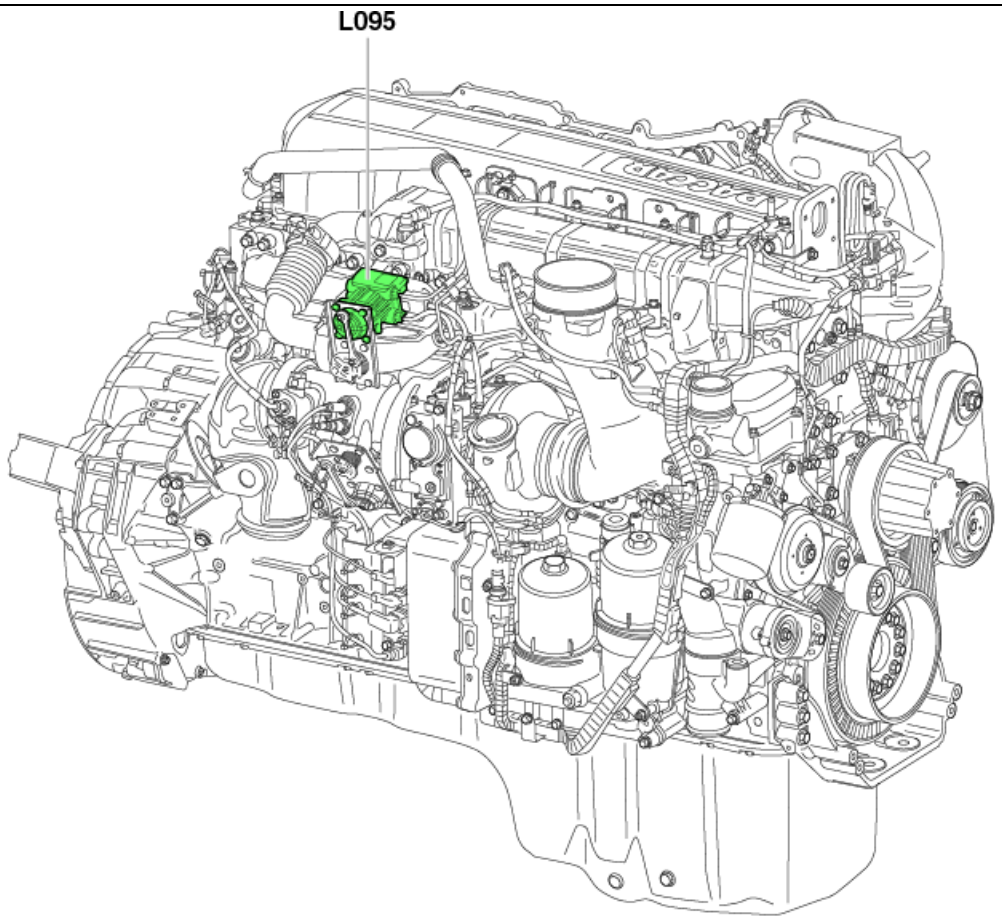
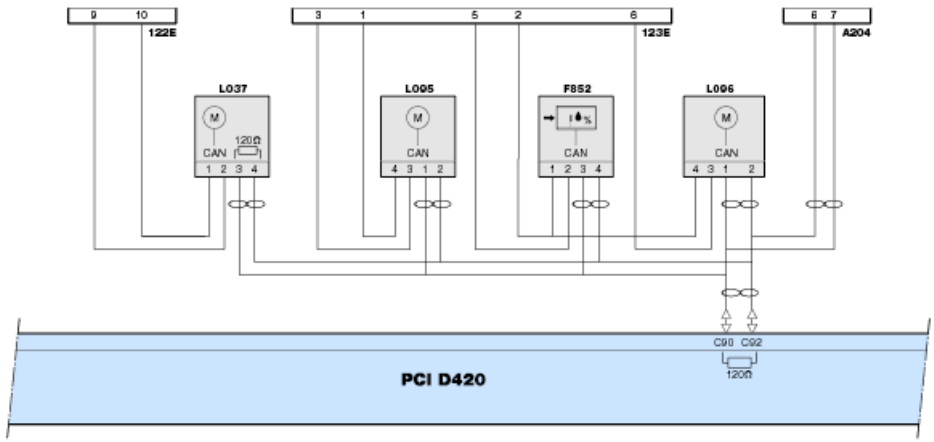
Verification Drive Cycle	Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active.

	 Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs. **Power-up** With the brakes set and the engine off, turn the key to the ON position, and allow 10 seconds for the monitoring system to initialize and run diagnostics.
	Back to Index

P1485

Code number	P1485
Fault code description	EGR valve module temperature – Data valid but too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – EGR
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  17. Butterfly valve 18. EGR valve actuator 19. Lever 20. Spring The main components of the EGR valve actuator: ECU Electromotor – The electromotor rotates the output shaft via internal gears Output shaft – The butterfly valve (1) 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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects that the temperature of the actuator is more than 142°C for more than 30 seconds.
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 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

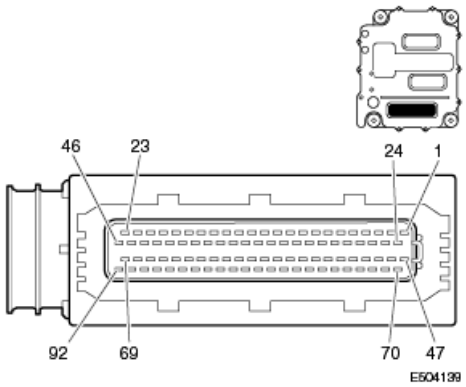
F852 humidity sensor

L037 VTG turbocharger actuator

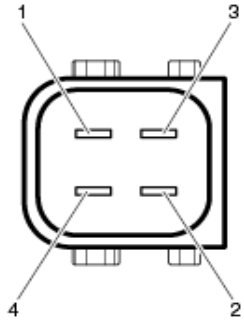
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

- 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 the 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 EGR valve is fully closed (0% 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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1485 active?	
Yes	**No**

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

Step 2. Operate the engine at normal operating temperature

Step 2. Check for an active P1485	
Action 1. Operate the engine at normal operating temperature.	
Is DTC P1485 active?	
Yes	**No**
Go to 3.A	**Go to 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 actuator in accordance with the job, "Check/clean all coolant pipes".

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 EGR valve module

Step 4. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1485 active?	
Yes	**No**
	A malfunctioning EGR valve actuator has been detected. Replace the EGR valve module.  This DTC can be set as a result of multiple failure modes. All steps of the troubleshooting tree must be completed.
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 5.A**

Step 5. Reset the DTCs

Step 5. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 1.A**

Verification Drive Cycle

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



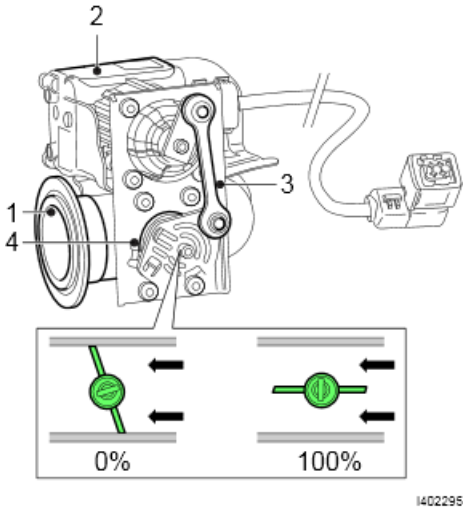
Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

Power-up

With the brakes set and the engine off, turn the key to the ON position, and allow 10 seconds for the monitoring system to initialize and run diagnostics.

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P1486

Code number	P1486
Fault code description	EGR valve module power supply - Incorrect
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  21. Butterfly valve 22. EGR valve actuator 23. Lever 24. Spring The main components of the EGR valve actuator: ECU Electromotor — The electromotor rotates the output shaft via internal gears Output shaft — The butterfly valve (1) 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.

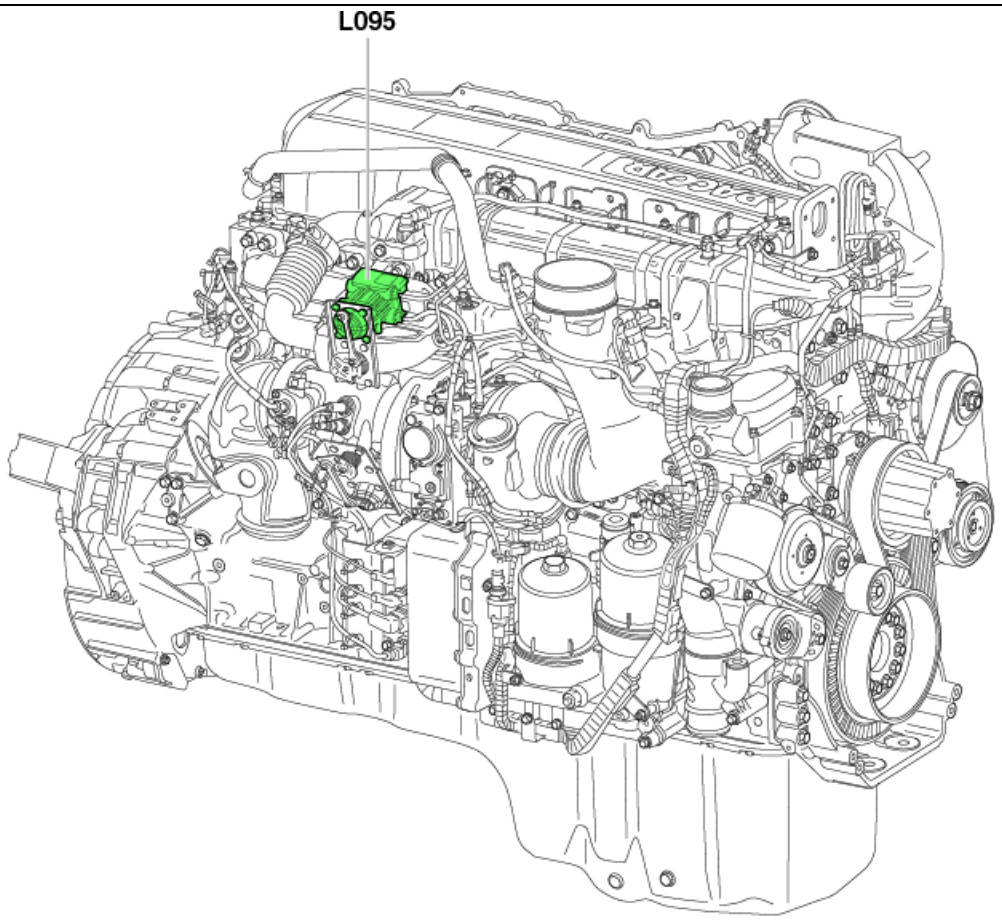
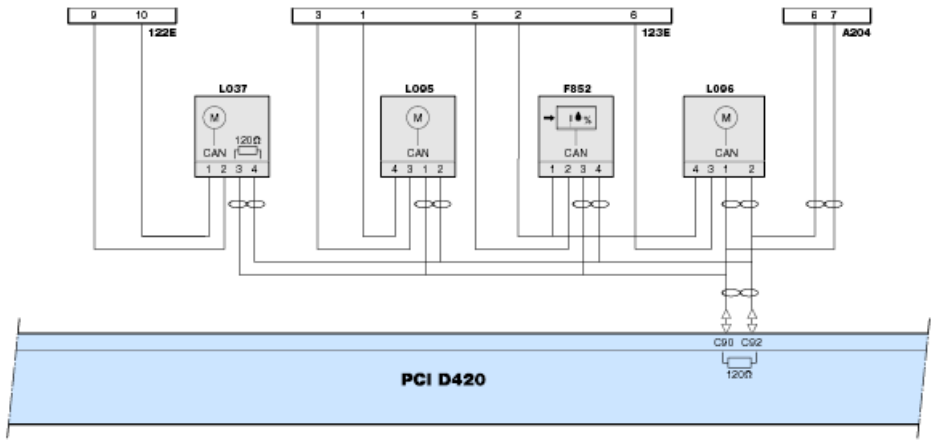
Unpowered and fail-safe position

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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) 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

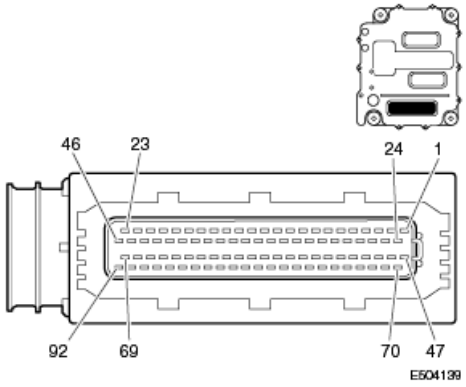
F852 humidity sensor

L037 VTG turbocharger actuator

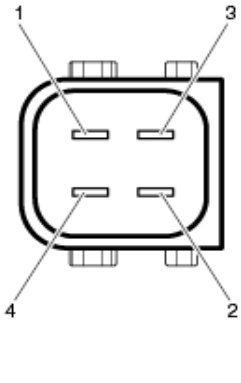
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

- Incorrect actuator power supply wiring..
- Malfunction in vehicle power supply system (battery, alternator, or wiring).

Additional information

- The actuator power supply is continuously monitored.
- The actuator motor is switched off and the EGR valve is fully closed (0% position) with this DTC 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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1486 active?	
Yes	**No**
Go to 2.A	**Step 4.A**

Step 2. Electrical checks, EGR valve module

Step 2.A Visual inspection, EGR valve module and wiring	
Action 1. Key off the ignition. 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	**Step 2.B**

Step 2. B Check the EGR valve module power supply	
Action 1. Monitor the vehicle power supply during engine startup and operation. 2. Check the actuator power supply according to, "Checking data, EGR valve module (L096)".	
Is the power supply within the specifications?	
Yes	**No**
	Correct any issues found.
Go to 3.A	**Step 4.A**

Step 3. Try another EGR valve module

Step 3. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1486 active?	
Yes	**No**
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 4.A**

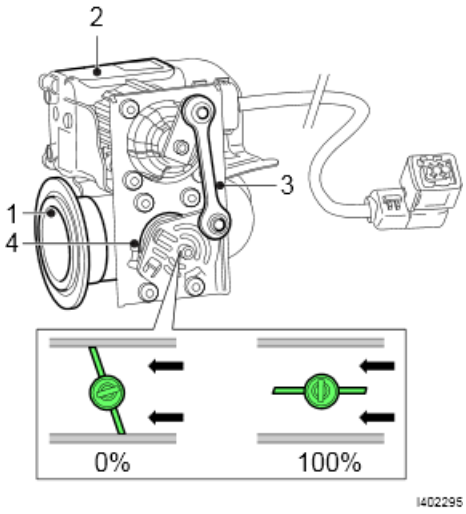
Step 4. Reset the DTCs

Step 4. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 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.

	Power-up With the brakes set and the engine off, turn the key to the ON position, and allow 10 seconds for the monitoring system to initialize and run diagnostics.
	Back to Index

P1487

Code number	P1487
Fault code description	EGR valve module 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)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  25. Butterfly valve 26. EGR valve actuator 27. Lever 28. Spring The main components of the EGR valve actuator: ECU Electromotor — The electromotor rotates the output shaft via internal gears Output shaft — The butterfly valve (1) 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.

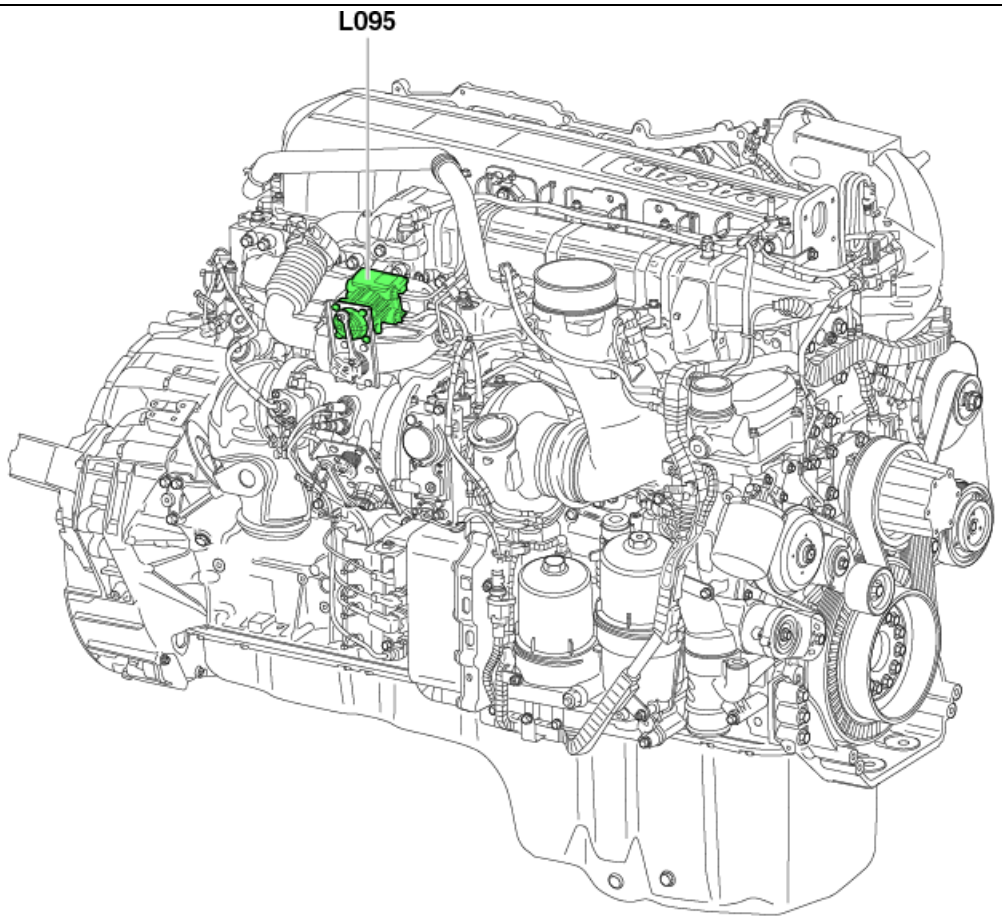
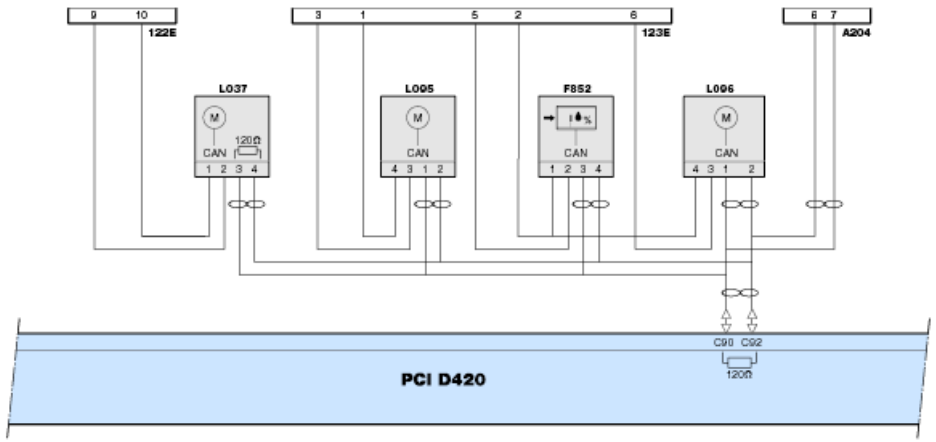
Unpowered and fail-safe position

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 continuously when the ignition is on.
Set condition of fault code	The EGR valve module (L095) detects a failure or deviation on the internal shaft 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

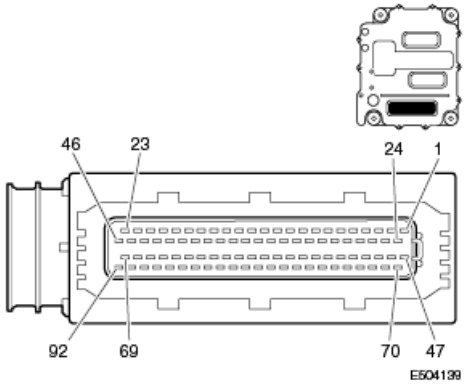
F852 humidity sensor

L037 VTG turbocharger actuator

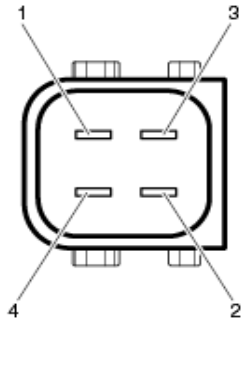
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

Faulty actuator if the DTC stays active after the ignition is keyed off for at least 15 seconds and keyed on again.

Additional information

- Bent actuator lever and/or connection rod.

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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1487 active?	
Yes	**No**
Go to 2.A	**Step 2.B**

Step 2. Check the EGR valve

Step 2.A Visual inspection, EGR valve mechanism

Action

1. Key off the ignition.
2. Visually check that the connection rod of the EGR valve mechanism is:
   - Installed correctly
   - Not damaged

Correct EGR valve mechanism



I402210

Example of a bent lever and connection rod



I402265

Is the EGR valve mechanism free of damage?

Yes	No
	Replace the EGR valve module
Go to 2.B	Step 4.A

Step 2. B Check the free movement of the EGR valve mechanism

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

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

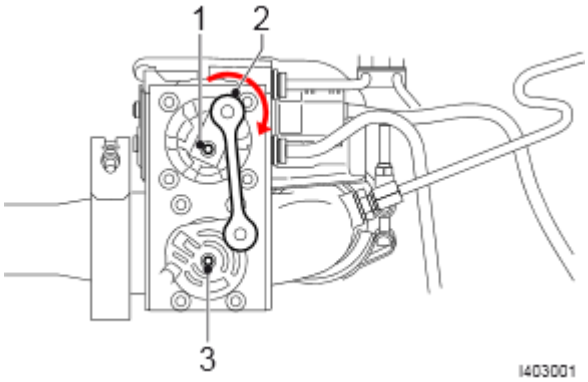
Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Check the free movement of the EGR valve mechanism by moving the actuator lever (2) by hand.

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



Does the EGR valve mechanism move freely?

Yes	No
	Possible blockage/soot accumulation in the valve housing.
Go to 3.A	**Step 2.C**

Step 2. C Check for blockage in the EGR valve housing

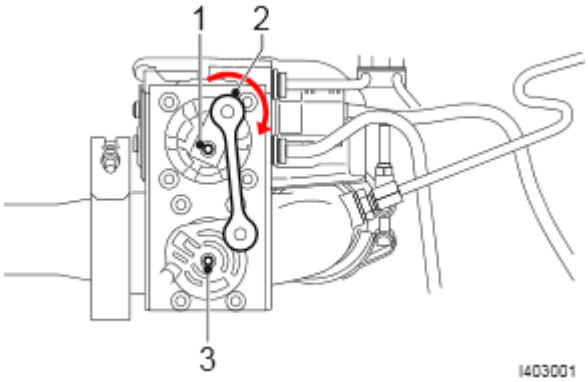
The EGR valve mechanism can move when the ignition is keyed on. Touching the mechanism can result in physical injury.

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

Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Remove the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler).
3. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the actuator lever/connecting rod (2).



Blockage found?

Yes	No
1. Remove blockage/clean the internal valve housing. 2. Monitor the EGR valve position with DAVIE to check that the cleaning was effective. 3. Install the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler.”	A malfunctioning EGR valve module has been detected. Replace the EGR valve module.
Go to 4.A	**Step 4.A**

Step 3. Try another EGR valve module

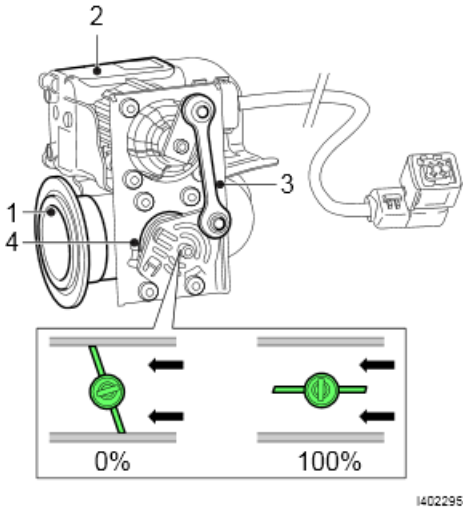
Step 3. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1487 active?	
Yes	**No**
	A malfunctioning EGR valve module has been detected. Replace the EGR valve module.  Malfunctioning of the originally installed actuator can be confirmed if DTC P1487 becomes active again when it is reconnected to the engine wiring harness connector.
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 4.A**

Step 4. Reset the DTCs

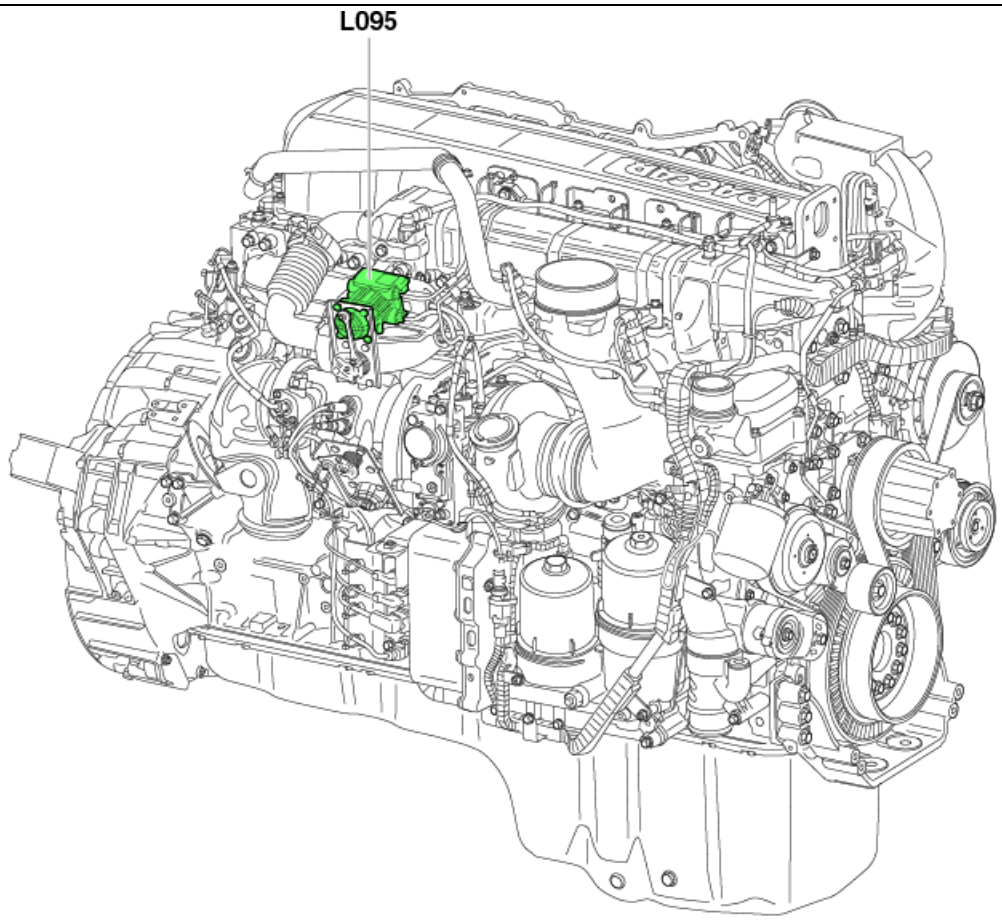
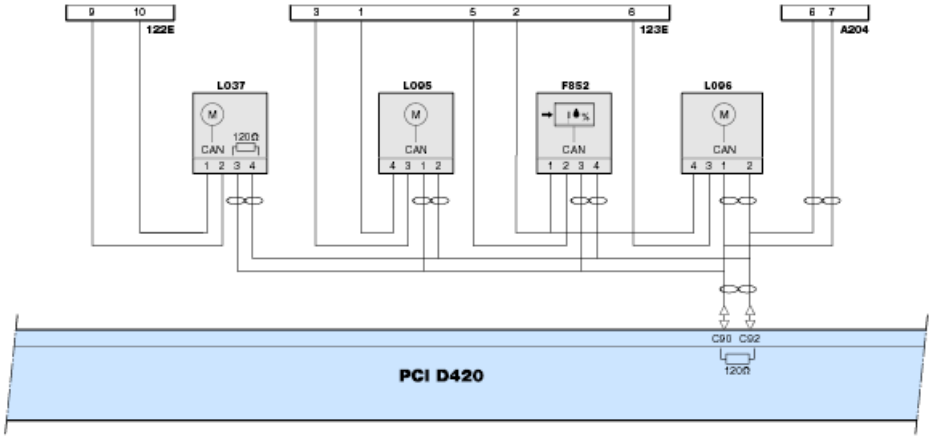
Step 4. A Reset the DTCs	
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.	
DTCs reset?	
Yes	**No**
	Return to troubleshooting steps
Repair complete	**Step 1.A**

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.
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P1488

Code number	P1488
Fault code description	EGR valve module – Out of Calibration
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	**EGR valve module (L095)** The EGR module consists of an actuator and an EGR valve. The main task of the EGR valve is to control the EGR flow to the inlet manifold. The EGR position does not necessarily indicate the amount of EGR flow to the inlet manifold. The amount of EGR gas fed back ainly depends on the pressure difference between the pressure before turbine and the boost pressure, in combination with the EGR valve position.  29. Butterfly valve 30. EGR valve actuator 31. Lever 32. Spring The main components of the EGR valve actuator: ECU Electromotor – The electromotor rotates the output shaft via internal gears Output shaft – The butterfly valve (1) 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 once when the ignition is keyed on.
Set condition of fault code	The EGR valve module (L095) detects that the closed (0%) 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)	

122E 12-pin interface connector

123E 7-pin interface connector

A204 electronic fan interface connector

D420 PCI ECU

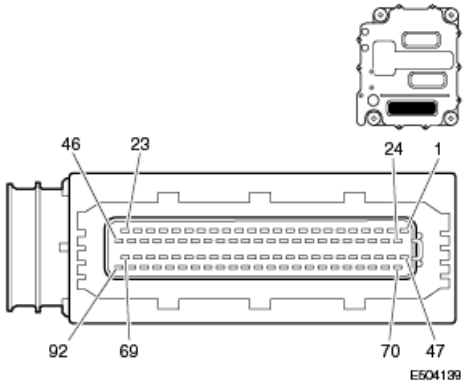
F852 humidity sensor

L037 VTG turbocharger actuator

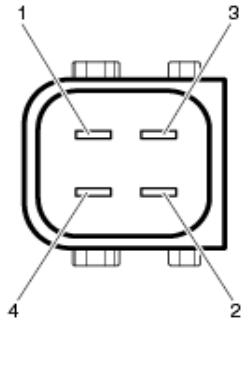
L095 EGR valve module

L096 BPV valve

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



Wiring harness connector D420.C front view



Wiring harness connector L095 front view

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

Technical data

Component check, EGR valve module (L095)

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

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

Wiring check, EGR valve module (L095)

Preparation

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

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

Possible causes

- Bent actuator lever and/or connection rod
- Incorrect actuator power supply wiring.
- High friction or sticking EGR valve bearings or mechanism.
- Blocked EGR valve.

Additional information

- The closed (0%) position of the EGR valve is checked by the actuator and compared with an ex-factory stored value.
- The actuator motor is switched off and the EGR valve is fully closed (0% position) with this DTC 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 1. Key the ignition off for at least 15 seconds, then key it on again.	
Is DTC P1488 active?	
Yes	**No**

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

Step 2. Check the EGR valve

Step 2.A Visual inspection, EGR valve mechanism	
Action 1. Key off the ignition. 2. Visually check that the connection rod of the EGR valve mechanism is: • Installed correctly • Not damaged **Correct EGR valve mechanism**  I402210 **Example of a bent lever and connection rod**  I402265	
Is the EGR valve mechanism free of damage?	
Yes	**No**

	Replace the EGR valve module
Go to 2.B	**Step 4.A**

Step 2. B Check the free movement of the EGR valve mechanism

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

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

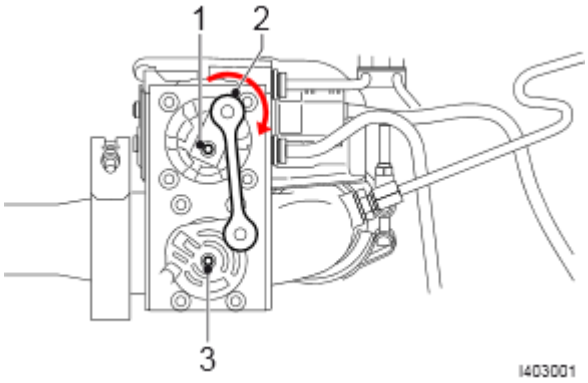
Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Check the free movement of the EGR valve mechanism by moving the actuator lever (2) by hand.

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



Does the EGR valve mechanism move freely?

Yes	**No**
	Possible blockage/soot accumulation in the valve housing.

Go to 3.A	Step 2.C

Step 2. C Check for blockage in the EGR valve housing

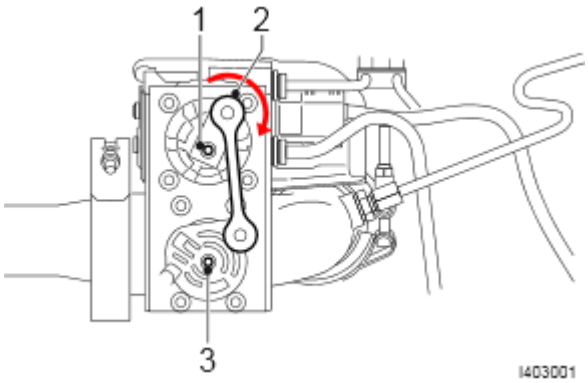
The EGR valve mechanism can move when the ignition is keyed on. Touching the mechanism can result in physical injury.

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

Do not use a tool to move the EGR valve mechanism

Action

1. Key off the ignition.
2. Remove the flexible EGR pipe according to the job, “Replace flexible EGR pipe from control valve to cooler).
3. Check if there is an internal blockage or excessive soot accumulation around the butterfly valve and housing. Open the valve by moving the actuator lever/connecting rod (2).



Blockage found?

Yes	No
1. Remove blockage/clean the internal valve housing. 2. Monitor the EGR valve position with DAVIE to check that the cleaning was effective. 3. Install the flexible EGR pipe according to the job, “Replace	A malfunctioning EGR valve module has been detected. Replace the EGR valve module.

flexible EGR pipe from control valve to cooler."	
Go to 4.A	**Step 4.A**

Step 3. Try another EGR valve module

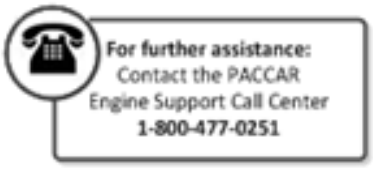
Step 3. A Try another EGR valve module	
Action 1. Key off the ignition. 2. Disconnect the EGR valve module connector form the engine wiring harness connector. 3. If available, connect another EGR valve module without installing it.	
Is DTC P1488 active?	
Yes	**No**
	A malfunctioning EGR valve module has been detected. Replace the EGR valve module. Malfunctioning of the originally installed actuator can be confirmed if DTC P1487 becomes active again when it is reconnected to the engine wiring harness connector.
Contact the PACCAR Engine Support Center for further assistance in troubleshooting this issue.	**Go to 4.A**

Step 4. Reset the DTCs

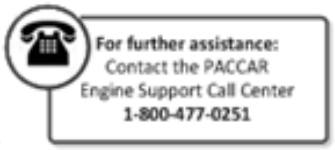
Step 4. A Reset the DTCs
Action 1. Reset the DTCs. 2. If DTCs are still active, troubleshoot the active DTCs.
DTCs reset?

	<table><tr><td>**Yes**</td><td>**No**</td></tr><tr><td></td><td>Return to troubleshooting steps</td></tr><tr><td>**Repair complete**</td><td>**Step 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.
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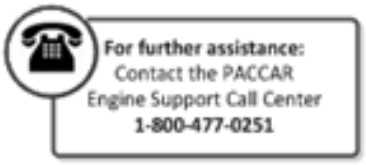
P1489

Code number	P1489
Fault code description	Coolant temperature sensor rate of change 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

P1490

Code number	P1490
Fault code description	EGR valve stuck open
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

P1494

Code number	P1494
Fault code description	EGR Position 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

P1495

Code number	P1495
Fault code description	Engine protection system - Power derate active
Fault code information	1 trip, Check Engine lamp 3 drive cycle recovery Readiness group – None Freeze frame type –Engine protection
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	Not available/required for this code
Set condition of fault code	This DTC is activated when DTC 1496 has been active for more than 10 hours of engine operation.
Reset condition of fault code	Perform the 'EGR derate disable' procedure with DAVIE to clear the DTC.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	This fault code is set by fault code P1496 (P1496 was active for 10 hours)
Additional information	• This DTC activates an engine torque derate. • Do not troubleshoot this DTC since it originates from another active DTC.
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	
This *cascading* diagnostic trouble code is activated by the presence of one or more other related trouble codes. **Action** 4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	
Are these or any other related codes active? P1496	
Yes	**No**
Refer to the troubleshooting information	**Go to 2.A**

	for the related trouble codes listed	

Step 2. Contacting PACCAR Engine Support Center

Step 2.A Contact PACCAR Engine Support Center
Action 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.

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P1496

Code number	P1496
Fault code description	EGR - Shut off
Fault code information	1 trip Check Engine lamp 3 drive cycle recovery Readiness group - None Freeze frame type –Engine protection
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	Not available/required for this code
Set condition of fault code	This DTC is activated by another active DTC.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	This DTC is activated through the occurrence of another active DTC
Additional information	• Engine mode: Protection is activated. The EGR valve is closed and no longer operated. • After 10 hours of engine operation with P1496 active, P1495 becomes active. • Do not troubleshoot this DTC since it originates from another active DTC.
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



This diagnostic trouble code is activated by the presence of one or more other related trouble codes.

Action

5. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.

Are these or any other related codes active?

P0046; P0069; P0071; P0072; P0073; P0107; P0108; P0110; P0112; P0113; P0115; P0116; P0117; P0118; P011A; P0128; P0201; P0202; P0203; P0204; P0205; P0206; P0217; P0261; P0262; P0263; P0264; P0265; P0266; P0267;

P0268; P0269; P0270; P0271; P0272; P0273; P0274; P0275; P0276; P0277; P0278; P0301; P0302; P0303; P0304; P0305; P0306; P1263; P1266; P1269; P1272; P1275; P1278; P1300; P1350; P1351; P1352; P1356; P1405; P1406; P1493; P1494; P1718; P1719; P171E; P171F; P1723; P1724; P1727; P2147; P2148; P2150; P2151; P2227; P2228; P2229; P2425; P2457; P2563; P3768; P3769; P3772; P3773; P3774; P3775; P3779; P3780; P3781; P3782; P3784; P3785; P3786; P3787; P3789; P3790; P3793; P3794; P3966; U0157; U1014; U104C; U1157; U1159

Yes	No
Refer to the troubleshooting information for the related trouble codes listed	Go to 2.A

Step 2. Contacting PACCAR Engine Support Center

Step 2.A Contact PACCAR Engine Support Center
Action 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.

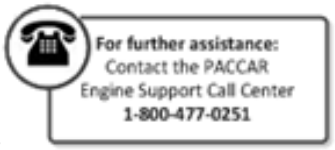
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P1501

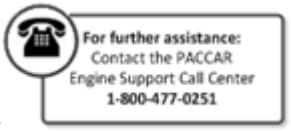
Code number	P1501
Fault code description	Vehicle speed – Current too low or open circuit on ECU D420 pin B40
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	No Description of components available
Location of component(s)	No Location of components available
Diagnostic condition	No Diagnostic condition available
Set condition of fault code	When vehicle speed is less than or equal to 1.864mph of a threshold value
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	No wiring diagram available
Technical data	No Technical data available
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 1501a | SRT Visually inspect all applicable connectors and harnesses for corrosion, damage, related sensor is not installed correctly, the installed wheel and tire size is incorrect during each step of the diagnostic procedure. Proceed to step 2. Step 2 | Step ID 1501b | SRT Check for electrical values of below: • 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

	<table><tr><td>Step 3</td><td>Step ID 1501c</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 1501d</td><td>SRT</td></tr><tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr></table>
Verification Drive Cycle	To validate the repair, with the brakes set, 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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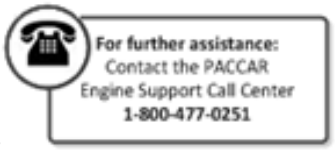
P1502

Code number	P1502
Fault code description	Vehicle speed pulse width modulated mark space ratio.
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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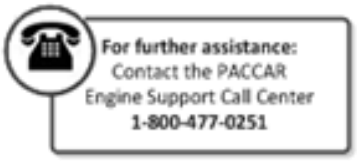
P1503

Code number	P1503
Fault code description	Vehicle speed – Voltage too high or short circuit to supply on ECU D420 pin B40
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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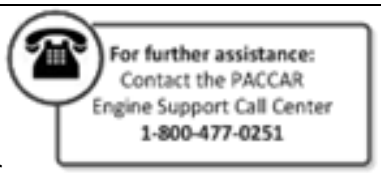
P1504

Code number	P1504
Fault code description	Vehicle speed pulse detection - PWM signal invalid
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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P1505

Code number	P1505
Fault code description	Vehicle speed sensor frequency
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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P150F

Code number	P150F
Fault code description	Oil level startup low warning level
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
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P1514

Code number	P1514
Fault code description	Emission control system Diesel Exhaust Fluid (DEF) dosing fault detected
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Crankcase
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	Not available/required for this code
Set condition of fault code	This DTC is activated by another active DTC.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Do not troubleshoot this DTC since it originates from another active DTC.
Additional information	P1514 is a diesel engine fluid operator interface (DEFOI) tampering category trouble code, activated by the occurrence and persistence of another code.
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**

P1514 is a diesel engine fluid operator (DEFOI) tampering category trouble code, activated by the occurrence and persistence of another code.

Step P1514_1.A	Investigate related trouble codes	SRT:
To resolve P1514, investigate any of these related active codes: P3808; P3809; P3810; P3812; P3813; P3814; P3830; P3844; P3845; P3846; P3847; P3848; P3856; P3857; P3858; P3859; P3862; P3890; P3904; P3905; P3909; P3912; P3978; P3980; P3985; P3986; P3994; P3996		

Step 2. Repair Verification Cycles



Perform these repair verification cycles following any corrective actions taken, to confirm that this trouble code is no longer present.

Step P1514_2.A	Verification Drive Cycle: Start-up	SRT:
With the brakes set, start the engine and allow it to run at idle for 2 minutes.		

Step 3. Contact PACCAR Engine Support Center

Step P1514_3.A	Contact PACCAR Engine Support Center	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.		

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P1516

Code number	P1516
Fault code description	Emission control system Diesel Exhaust Fluid (DEF) Monitor system category fault
Fault code information	2 trip MIL 3 drive cycle recovery Freeze frame type – Crankcase Readiness Group - None
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	Not available/required for this code
Set condition of fault code	This DTC is activated by another active DTC.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Do not troubleshoot this DTC since it originates from another active DTC.
Additional information	P1516 is a diesel engine fluid operator interface (DEFOI) tampering category trouble code, activated by the occurrence and persistence of another code.
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

P1516 is a diesel engine fluid operator (DEFOI) tampering category trouble code, activated by the occurrence and persistence of another code.

Step P1516_1.A	Investigate related trouble codes	SRT:
To resolve P1516, investigate any of these related active codes: P3866; P3893; P3894; P3921; P3922; P3949; P3963		

Step 2. Repair Verification Cycles



Perform these repair verification cycles following any corrective actions taken, to confirm that this trouble code is no longer present.

Step P1516_2.A	Verification Drive Cycle: Start-up	SRT:
With the brakes set, start the engine and allow it to run at idle for 2 minutes.		

Step 3. Contact PACCAR Engine Support Center

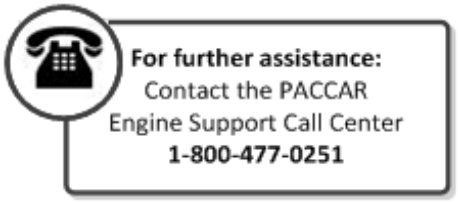
Step P1516_3.A	Contact PACCAR Engine Support Center	SRT:
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		

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P1518

Code number	P1518
Fault code description	Emission control system - Engine torque derate active
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	Not available/required for this code.
Location of component(s)	Not available/required for this code.
Diagnostic condition	Not available/required for this code.
Set condition of fault code	This DTC becomes active if the DTC from which it originates has been active for a certain time.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code.
Technical data	Not available/required for this code.
Possible causes	Not available/required for this code.
Additional information	• This DTC activates an engine torque derate. • Do not troubleshoot this DTC since it originates from another active DTC.
Diagnostic Step-by-Step	Since this originates from another active DTC please clear the other active fault to clear this.
Verification Drive Cycle	Not available/required for this code.
	Back to Index

P1519

<table>
<tr><td>Code number</td><td>P1519</td></tr>
<tr><td>Fault code description</td><td>Emission control system - DEF level low</td></tr>
<tr><td>Fault code information</td><td> 

Please Contact the Engine Support Center</td></tr>
<tr><td>Description of component(s)</td><td>Not available/required for this code.</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 ignition is on.</td></tr>
<tr><td>Set condition of fault code</td><td>The DEF level is less than 10% of the DEF tank volume.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC becomes inactive after the ignition is keyed on and the volume in the DEF tank is above the set condition value.</td></tr>
<tr><td>Electrical diagram(s)</td><td>Not available/required for this code.</td></tr>
<tr><td>Technical data</td><td>Not available/required for this code.</td></tr>
<tr><td>Possible causes</td><td>Empty DEF tank.</td></tr>
<tr><td>Additional information</td><td>Not available/required for this code.</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 1519a</td><td>SRT</td></tr>
<tr><td colspan="3">Is fault code P1519 active?
Yes – Visually check the DEF fluid level in the tank and compare the DEF level gauge in the cabin. If necessary, fill the tank with DEF and clear the fault code with DAVIE.
No – Proceed to the appropriate fault code.</td></tr>
</table></td></tr>
<tr><td>Verification Drive Cycle</td><td>Not available/required for this code.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

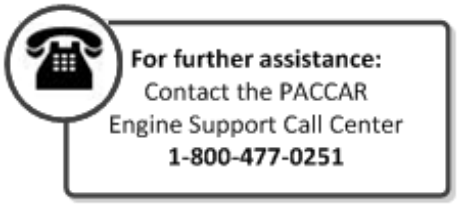
P151A

Code number	P151A
Fault code description	Emission control system - Vehicle speed limitation active
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	Not available/required for this code.
Location of component(s)	Not available/required for this code.
Diagnostic condition	Not available/required for this code.
Set condition of fault code	This DTC becomes active if the DTC from which it originates has been active for a certain time.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code.
Technical data	Not available/required for this code.
Possible causes	Not available/required for this code.
Additional information	• This DTC activates a vehicle speed limitation. • Do not troubleshoot this DTC since it originates from another active DTC.
Diagnostic Step-by-Step	Since this originates from another active DTC please clear the other active fault to clear this.
Verification Drive Cycle	Not available/required for this code.
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P151B

Code number	P151B
Fault code description	Emission control system - Upcoming vehicle speed limitation warning
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	Not available/required for this code
Set condition of fault code	This DTC becomes active if the DTC from which it originates has been active for a certain time.
Reset condition of fault code	This DTC becomes inactive as soon as the DTC from which it originates has become inactive.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Not available/required for this code
Additional information	• This DTC activates an upcoming vehicle speed limitation warning for the driver. • Do not troubleshoot this DTC since it originates from another active DTC.
Diagnostic Step-by-Step	Since this originates from another active DTC please clear the other active fault to clear this.
Verification Drive Cycle	Not available/required for this code
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P151C

Code number	P151C
Fault code description	Emission control system - DEF level too low
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The DEF level is less than 5% of the DEF tank volume.
Reset condition of fault code	This DTC becomes inactive after the ignition is keyed on and the volume in the DEF tank is above the set condition value.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Empty DEF tank.
Additional information	Not available/required for this code
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 151C-a | SRT Is fault code P151C active? • Yes – Visually check the DEF fluid level in the tank and compare the DEF level gauge in the cabin. If necessary, fill the tank with DEF and clear the fault code with DAVIE. • No – Proceed to the appropriate fault code.
Verification Drive Cycle	Not available/required for this code.
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P151D

<table>
<tr><td>Code number</td><td>P151D</td></tr>
<tr><td>Fault code description</td><td>Emission control system - DEF level very low</td></tr>
<tr><td>Fault code information</td><td>This code cannot be cleared through drive cycles - (255 drive cycle recovery).
Readiness group – None
Freeze frame type – Generic</td></tr>
<tr><td>Description of component(s)</td><td>Not available/required for this code.</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 ignition is on.</td></tr>
<tr><td>Set condition of fault code</td><td>The DEF level is less than 2.5% of the DEF tank volume.</td></tr>
<tr><td>Reset condition of fault code</td><td>This DTC becomes inactive after the ignition is keyed on and the volume in the DEF tank is above the set condition value.</td></tr>
<tr><td>Electrical diagram(s)</td><td>Not available/required for this code.</td></tr>
<tr><td>Technical data</td><td>Not available/required for this code.</td></tr>
<tr><td>Possible causes</td><td>Empty DEF tank.</td></tr>
<tr><td>Additional information</td><td>P1518 also becomes 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 151D-a</td><td>SRT</td></tr>
<tr><td colspan="3">Is fault code P151A active?
• Yes – Visually check the DEF fluid level in the tank and compare the DEF level gauge in the cabin. If necessary, fill the tank with DEF and clear the fault code with DAVIE.
• No – Proceed to the appropriate fault code.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>Not available/required for this code.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P151E

Code number	P151E
Fault code description	Emission control system - DEF tank empty
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The DEF level is less than 1% of the DEF tank volume.
Reset condition of fault code	This DTC becomes inactive after the ignition is keyed on and the volume in the DEF tank is above the set condition value.
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Low DEF fluid level and below listed faults are active: a) Exhaust temperature before SCR catalyst sensor b) Exhaust temperature after SCR catalyst sensor c) NOx after catalyst sensor d) Pump Module e) Tank heater valve f) Dosing valve g) EAS-3 ECU h) SCR Catalyst
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 151E-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 151E-b	SRT
Is fault code P151E active? • Yes – Visually check the DEF fluid level in the tank and compare the DEF level gauge in the cabin. If necessary, fill the tank with DEF and clear the fault code with DAVIE.		

- No – Proceed to step 3

Step 3	Step ID 151E-c	SRT

Check for Fault Codes

- Turn the key switch ON.
- Use DAVIE to check for fault codes.

Is the fault related to below components are active:

- Exhaust temperature before SCR catalyst sensor
- Exhaust temperature after SCR catalyst sensor
- NOx after catalyst sensor
- Pump Module
- Tank heater valve
- Dosing valve
- EAS-3 ECU
- SCR Catalyst
  - Yes – Proceed with the appropriate fault to reset that fault.
  - No – Proceed to step 4.

Step 4	Step ID 151E-d	SRT

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

Verification Drive Cycle

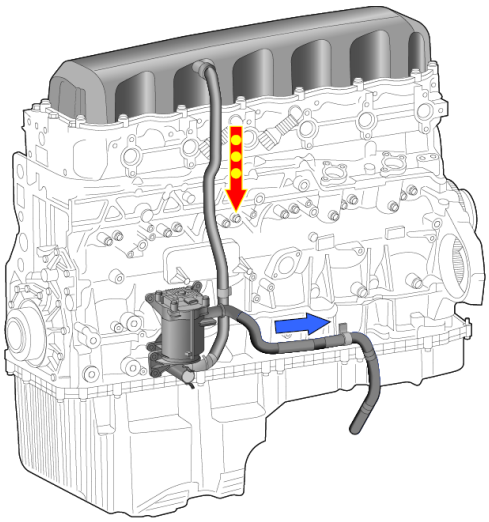
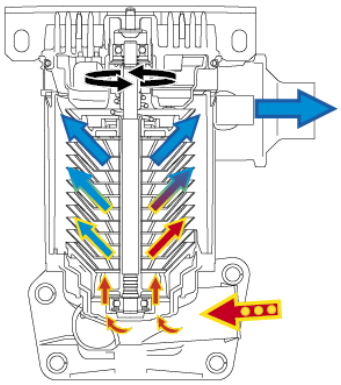
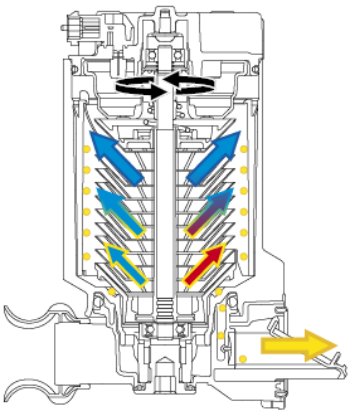
To validate the repair, perform the same procedure outlined for the Steady State cycle.
Using DAVIE, select the following Monitor values to record:

- Exhaust Temperature Before SCR
- Exhaust Temperature After SCR
- Pump Module

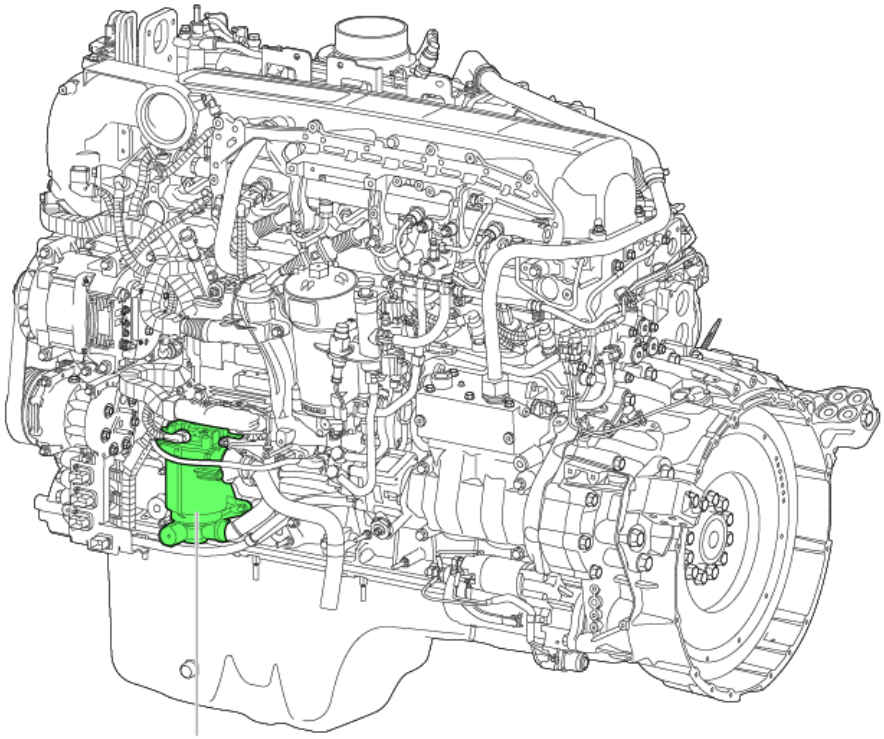
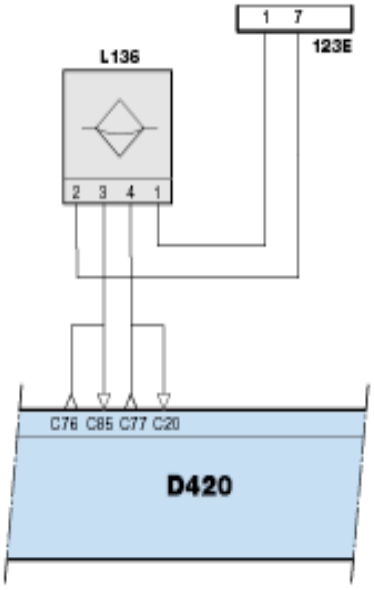
Once the SCR temperatures have reached a minimum of 536°F (280°C), continue the remainder of this cycle with the high idle. The monitored Pump Module value will indicate when dosing starts. Allow dosing to occur for a minimum of 15 minutes. Check the recorded values after the driving has been completed to verify temperatures and dosing.

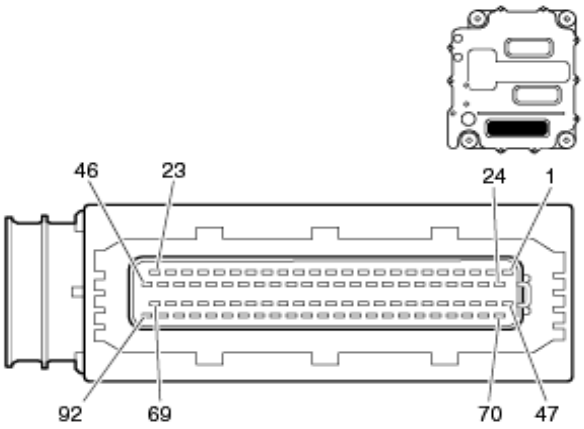
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P153B

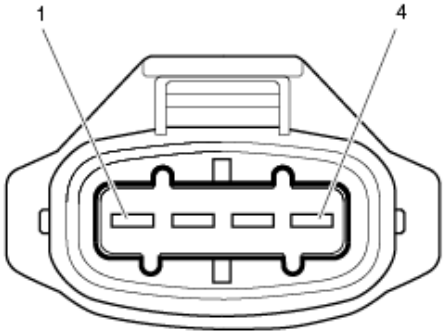
Code number	P153B
Fault code description	Crankcase ventilation rotor speed - Data valid but too low, least severe
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	   Red arrow Crankcase gas entering module Blue arrow Cleaned gas exiting module Yellow arrow Separated oil back to oil sump

	The main components of the crankcase ventilation module are: • ECU The internal ECU communicates with the PCI ECU (D420) via pin 3 of the module. • Electrometer The electromotor drives an internal element with 98 circular discs with a rotating speed of 12,000 rpm • Speed sensor The element speed is monitored by the PCI ECU (D420) with a speed sensor on pin 4 of the module. Control The crankcase ventilation module is a smart actuator that communicates with the PCI ECU. The element of the crankcase ventilation module starts rotating after an engine start, the PCI ECU connects pin 3 of the module to 5 V. The PCI ECU can stop the module by pulling pin 3 to earth. Diagnostics The PCI ECU starts monitoring the element speed 1 minute after the engine has been started. A DTC is stored if the PCI ECU detects that the element speed is less than 8000 rpm for more than ten minutes. If the crankcase ventilation module detects a failure the module pulls pin 3 to earth, resulting in a DTC stored in the PCI ECU. Effect on the system • separating oil from crankcase gas

Location of component(s)	
Diagnostic condition	This diagnostic runs when the time since key on >60 seconds and the engine speed >500 rpm.
Set condition of fault code	The PCI ECU (D420) detects that the measured oxygen concentration in the exhaust differs too much from the expected oxygen concentration.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	



Wiring harness connector D420.C front view



Wiring harness connector L090 front view

123E 7-pin interface connector
D420 PCI ECU
L136 crankcase ventilation module

D420	L136	Function
C20	4	Signal, crankcase ventilation speed
C76	3	Signal, crankcase ventilation activation
C77	4	Signal, crankcase ventilation low speed
C85	3	Signal, crankcase ventilation diagnostic
C64	1	Power supply after ignition
	2	Earth

Technical data

Wiring check, crankcase ventilation module (L136)
Preparation

- Switch off the ignition.
- Disconnect connector L136

Measure on the front side of wiring harness connector L136

Pin (+probe)	Pin (- probe)	Value	Additional information
1	2	Ubat	Ignition switch on

Possible causes

Malfunction of the crankcase ventilation speed sensor.

Additional information

Underspeed of the crankcase ventilation rotor detected.

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 pin out 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 153B-a	SRT
Test Drive to Confirm Fault Perform the following pre-check steps to confirm any CCV related issues 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 2 in the troubleshooting process.		

Step 2	Step ID 153B-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 153B-c	SRT
Electrical Checks Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • Yes - Proceed to step 4 • No - Proceed to step 5		

Step 4	Step ID 153B-d	SRT
Repairs or component replacements appropriate component and use DAVIE to re-		

check for the presence of active faults.
- Fault inactive – issue resolve
- Fault active - Proceed to step 5

Step 5	Step ID 153B-e	SRT

Visual Inspection: CCV Oil Port
Remove the CCV Module and visually inspect the oil port for any of the following:
- Blockage
- Damage

Was there evidence of any of the above?
- No: Proceed to step 6.
- 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 6	Step ID 153B-f	SRT

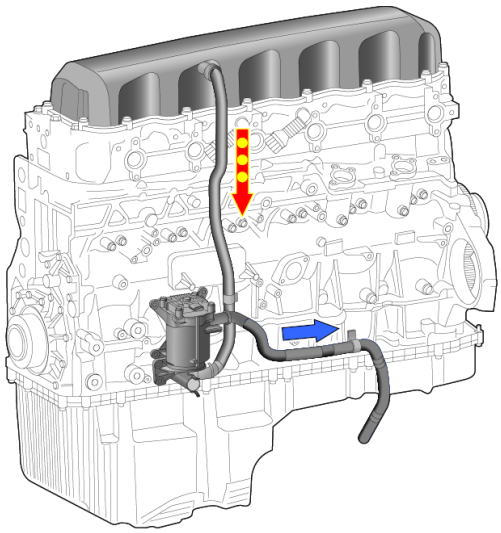
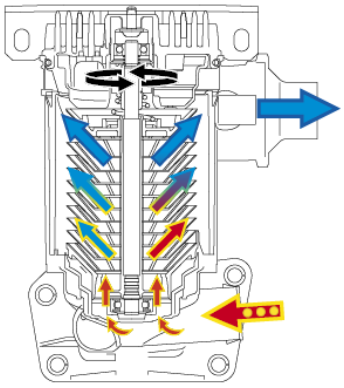
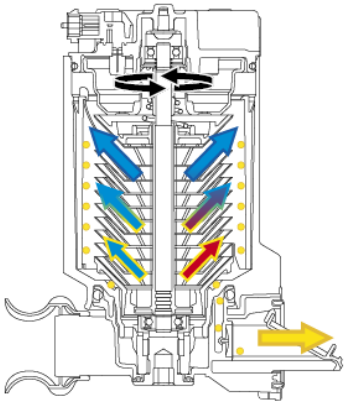
Replace: Crankcase Ventilation Module
If no problems were detected in the preceding steps, an internal problem has most likely occurred with the crankcase ventilation module.
Replace the identified faulty component.
Following component replacement, use DAVIE to re-check for the presence of active faults.
- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, Proceed to step 7

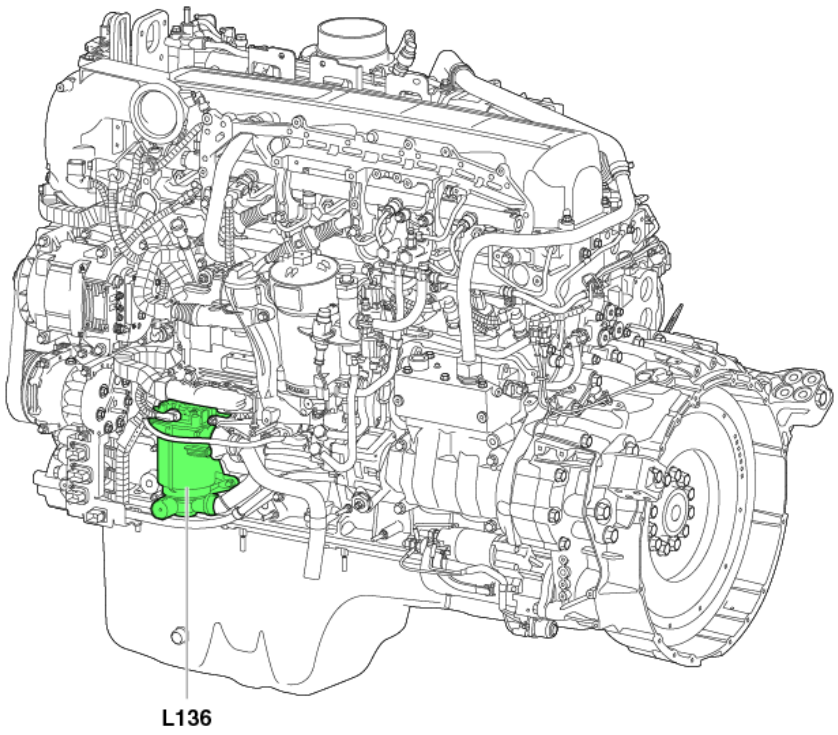
Step 7	Step ID 153B-g	SRT

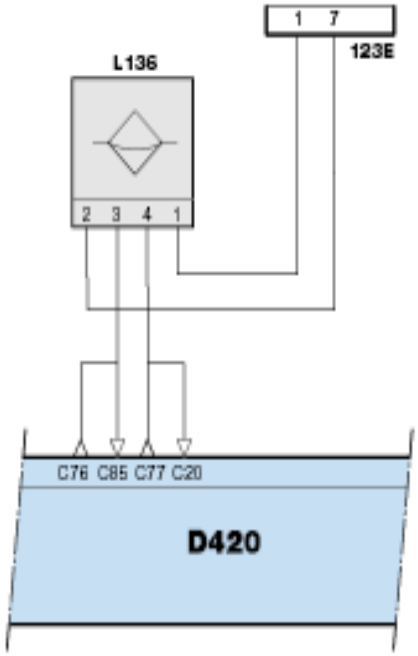
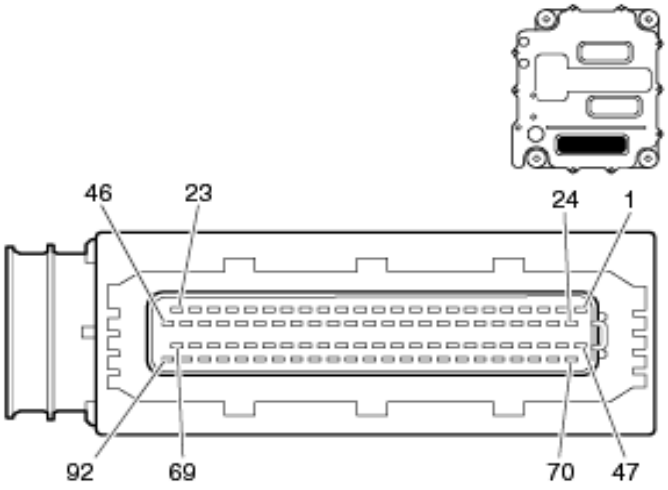
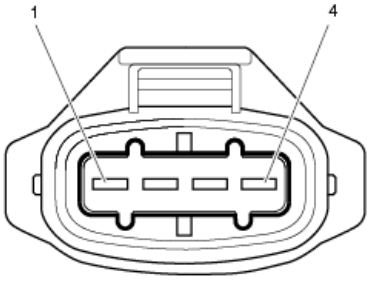
For further assistance in diagnosing this issue or for confirmation prior to the replacement of
Suspect components; contact the PACCAR Engine Support Call Center at 1-800-477-0251.

Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
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P153C

Code number	P153C
Fault code description	Crankcase ventilation – rotor speed too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	   Red arrow Crankcase gas entering module Blue arrow Cleaned gas exiting module Yellow arrow Separated oil back to oil sump

	The main components of the crankcase ventilation module are: • ECU The internal ECU communicates with the PCI ECU (D420) via pin 3 of the module. • Electrometer The electromotor drives an internal element with 98 circular discs with a rotating speed of 12,000 rpm • Speed sensor The element speed is monitored by the PCI ECU (D420) with a speed sensor on pin 4 of the module. Control The crankcase ventilation module is a smart actuator that communicates with the PCI ECU. The element of the crankcase ventilation module starts rotating after an engine start, the PCI ECU connects pin 3 of the module to 5 V. The PCI ECU can stop the module by pulling pin 3 to earth. Diagnostics The PCI ECU starts monitoring the element speed 1 minute after the engine has been started. A DTC is stored if the PCI ECU detects that the element speed is less than 8000 rpm for more than ten minutes. If the crankcase ventilation module detects a failure the module pulls pin 3 to earth, resulting in a DTC stored in the PCI ECU. Effect on the system • separating oil from crankcase gas
Location of component(s)	

Diagnostic condition	This diagnostic runs when the time since key on > 60 seconds and the engine speed > 500 rpm.
Set condition of fault code	The crankcase ventilation speed sensor value > 15000 rpm.
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 L090 front view

	123E 7-pin interface connector D420 PCI ECU L136 crankcase ventilation module D420 L136 Function C20 4 Signal, crankcase ventilation speed C76 3 Signal, crankcase ventilation activation C77 4 Signal, crankcase ventilation low speed C85 3 Signal, crankcase ventilation diagnostic C64 1 Power supply after ignition 2 Earth
Technical data	Wiring check, crankcase ventilation module (L136) Preparation • Switch off the ignition. • Disconnect connector L136 Measure on the front side of wiring harness connector L136 Pin (+probe) / Pin (- probe) / Value / Additional information 1 / 2 / Ubat / Ignition switch on
Possible causes	Malfunction of the crankcase ventilation speed sensor.
Additional information	Overspeed of the crankcase ventilation rotor detected.
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 pin out 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 153C-a | SRT Test Drive to Confirm Fault Perform the following pre-check steps to confirm any CCV related issues 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 step 2 in the troubleshooting process.

Step 2	Step 153C-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 153C-c	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 - Make the appropriate repairs or component replacements. • No - Continue to the next step 4 in the troubleshooting process. 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 153C-d	SRT
Visual Inspection: CCV Oil Port Remove the CCV Module and visually inspect the oil port for any of the following: • Blockage • Damage Was there evidence of any of the above? • 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 step 5 in the troubleshooting process.		

Step 5	Step 153C-e	SRT
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 6 in the troubleshooting process		

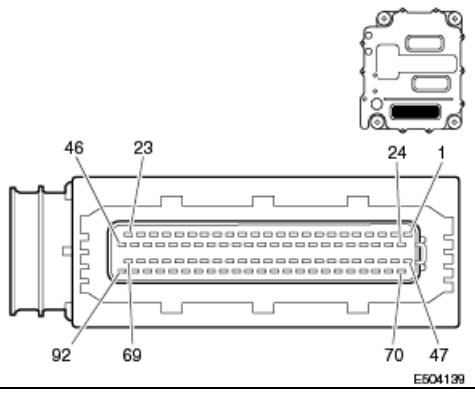
Step 6	Step 153C-f	SRT

	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
Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.
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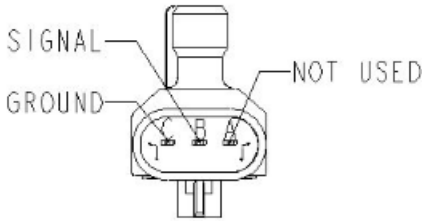
P1560

Code number	P1560
Fault code description	Coolant level Data valid but too low, moderately severe
Fault code information	1 trip, no lamp 3 drive cycle recovery Readiness Group - None Freeze frame type - Cooling Related engine protection code - P2104
Description of component(s)	The coolant level sensor is used to measure the level of the engine coolant in the radiator top tank reservoir. The coolant level sensor is normally immersed in the coolant and returns a different signal voltage when immersed in coolant versus being out of coolant. The ECU monitors the change in the signal voltage to determine the level of the engine coolant.
Location of component(s)	The engine coolant level sensor is located in the radiator top tank reservoir or surge tank.
Diagnostic condition	This diagnostic runs continuously when the key switch is in the ON position or when the engine is running.
Set condition of fault code	The ECU detected the coolant level sensor signal voltage is between 2.0 VDC and 3.0 VDC for more than 90 seconds, indicating a low coolant level.
Reset condition of fault code	Perform a key cycle, start the engine and let it idle for 1 minute. The fault code should change to inactive immediately after passing the diagnostic run.
Electrical diagram(s)	D420 PCI ECU

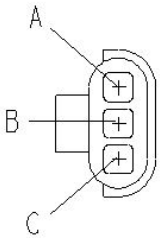
D420	3-wire, float type sensor	2-wire, contact type sensor	Function
C53	A		5 V supply (not used)
C07	B	A	Signal
C29	C	C	Ground



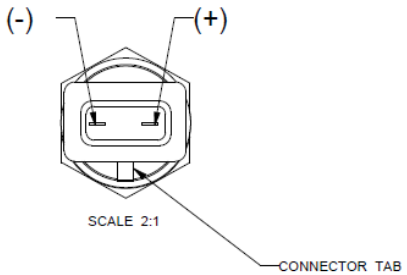
Wiring harness connector D420.C front view



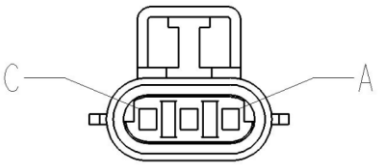
Float Type, Non-Immersion Coolant Level Sensor (Behr/GenTech)



Float Type, Non-Immersion Coolant Level Sensor Connector



Coolant Level Sensor, Contact Type



Coolant Level Sensor, Contact Type, Connector

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

Technical data

Coolant Level Sensor Voltage Output Ranges

2-wire, contact type sensor

Pin (+ probe)	Pin (- probe)	Level	Signal (VDC)
A	C	Normal	0.75V – 1.75V
		Low	2.00V – 3.00V
		Very Low	3.25V – 4.25V

3-wire, floating type sensor

Pin (+ probe)	Pin (- probe)	Level	Signal (VDC)
B	C	Normal	0.75V – 1.75V
		Low	2.00V – 3.00V
		Very Low	3.25V – 4.25V

Possible causes	• Unpurged air in the cooling system • Coolant leak; internal or external • Faulty coolant level sensor • Faulty wiring
Additional information	
Diagnostic Step-by-Step	**The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.** ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PMCI are functioning properly. ▪ Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors. ▪ For specific electrical component information and pin out locations, always refer to the technical data in Rapido. ▪ It is necessary to exit the 'Active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. **Step 1. Investigate Related Trouble Codes** Before troubleshooting this code, take notice of any other active or inactive trouble codes. One or multiple other codes could have been the cause for this code.

Step 1.A Investigate related trouble codes	
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.	
Are these or any other related codes active? P2558; P2559	
Yes	**No**
Possible coolant level sensor or related wiring fault. Refer to the troubleshooting information for these faults before continuing with this procedure.	
	Step 2.A

Step 2. Coolant Level Checks

Step 2. A Visual inspection, coolant level

Action

1. Visually inspect the expansion tank reservoir for any of the following:
   - Coolant is below the appropriate fill level



Coolant level can be lower under either of the following conditions:

- if the truck is equipped with Auxiliary Power Unit or devices that require additional coolant volume
- if recent cooling system service was performed without fully purging air out of the system

Is the coolant level below the appropriate fill level?	
Yes	**No**
Possible external coolant leak.	Possible internal coolant leak.
Step 2.B	**Step 2.C**

Step 2. B Visual inspection, external coolant leaks

Action

1. Inspect for visible signs of a restriction or a coolant leak around the radiator and expansion tank reservoir, coolant pump, thermostat housing, coolant filter, VGT, EGR cooler, and aftertreatment system (DEF heating lines), as well as all related hoses, fittings, connections, and seals.



A suspected coolant leak originating from the coolant pump pulley shaft seal should be evaluated using the diagnosis information outlined in, Coolant leakage, coolant pump shaft seal, to determine if the leak is severe enough (a class III leak) to require replacement of the coolant pump.

Were signs of a restriction or coolant leak visible?	
Yes	**No**
Correct any issues found or replace the coolant pump if the leak matches the criteria for a class III leak. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.	Possible internal coolant leak.
If this code is still present, go to step 2.C.	**Step 2.C**

Step 2. C Special test, cooling system pressure

Action

1. Perform a basic system pressure test to determine if there may be an external leak in the cooling system.



To avoid causing damage to seals and fittings, do not apply more than 20 psi of air pressure to the cooling system.

Does the cooling system pass a basic pressure test?

Yes	No
	Locate and correct the source of the leak. Fill coolant to the appropriate level. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.
Step 2.D	**If this code is still present, go to step 2.D.**

Step 2.D Special test, radiator cap pressure

Action

1. Use a standard test kit to confirm that the radiator cap functions correctly at its rated pressure level.



If the radiator cap is unable to properly regulate coolant pressure, this can effectively lower the boiling point of the liquid, leading to a possible engine overheating condition. When this happens, coolant temperature and/or system protection DTCs may also be set.

A faulty cap can also leak coolant, which typically reaches very high temperature when the vehicle is in operation. If this is the case, leaked coolant residue may be visible around the cap edges.

Does the radiator cap pass the pressure test and have the correct pressure rating for the current application?

Yes	No
	Replace the radiator cap. Fill coolant to the appropriate level. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.
Step 3.A	**If this code is still present, go to step 3.A.**

Step 3. Coolant Level Sensor Checks

Step 3. A Visual inspection, coolant level sensor (OEM)

Action

1. Visually inspect the coolant level sensor for any of the following:
   - Damaged or loose connectors
   - Bent, broken, corroded or loose connector pins
   - Moisture or dirt in the connections
   - Damage to the wire harness or insulation
   - ECU connections damaged or disconnected
   - Batteries are not okay, contacts are not tight
   - Signs of exhaust or coolant leaks on the EGR
   - Sensor damaged

Are any of the above conditions present?

Yes	No
Correct any issues found, or replace the coolant level sensor if found to be damaged or broken. Refer to Step 4.A to perform the corresponding repair verification cycles.	
If this code is still present, go to Step 3.B	**Go to step 3.B**

Step 3.B Electrical checks, signal voltage, coolant level sensor (OEM)



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

Action

1. Ensure the coolant level is normal.
2. Measure the voltage drop across pins B and C of the coolant level sensor.

Is the measured voltage value within 0.75V – 1.75V?

Yes	No
	Correct any issues found, or replace the sensor if measured values indicate a sensor error. Refer to Step 4.A to perform the corresponding repair verification cycles.
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	

Step 4. Repair Verification

Step 4.A Repair verification cycles

Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the trouble code or system being investigated.



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

Action

2. 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 4.B	**Go to step 4.B**

Step 4.B DAVIE Diagnostics, Quick Check

Action

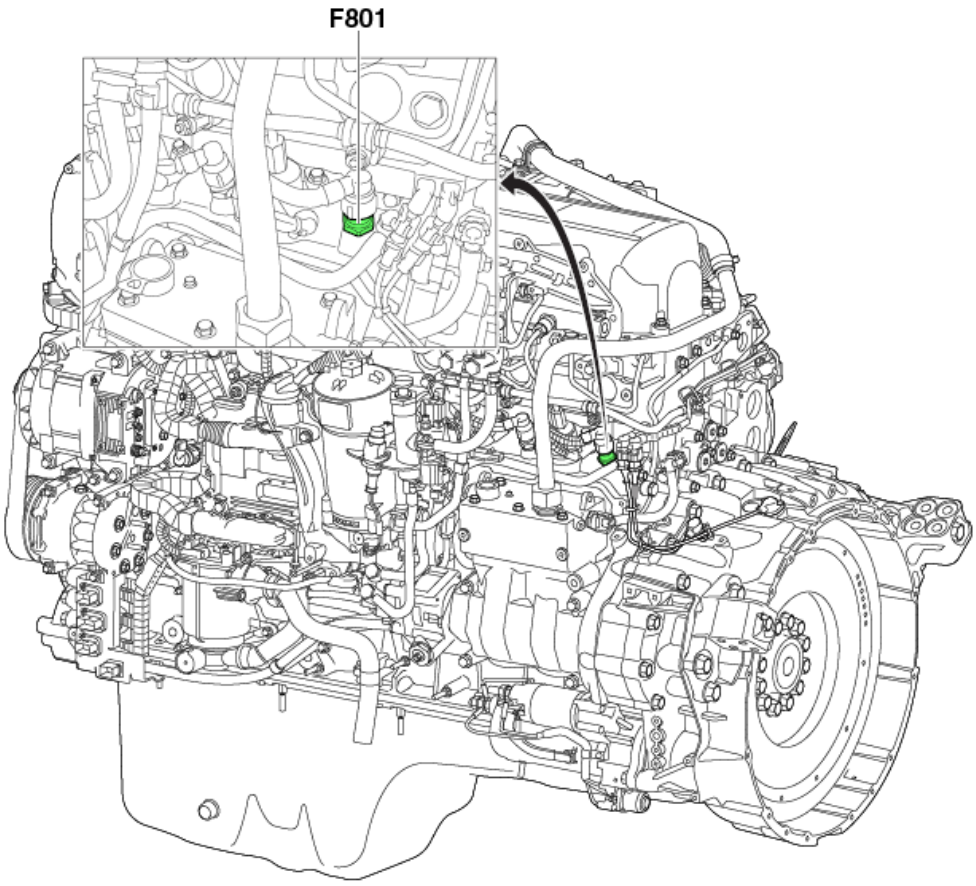
3. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.

Has P1560 been cleared?

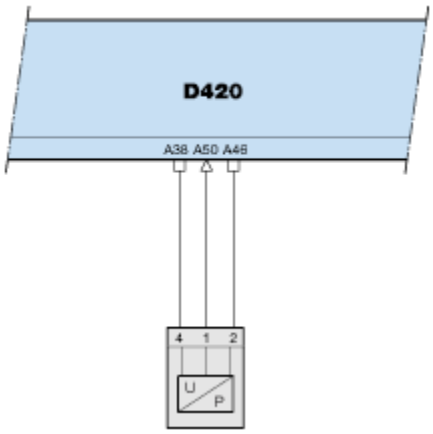
Yes	No
Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

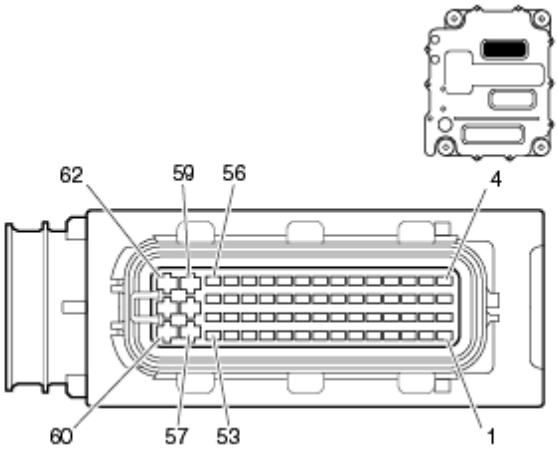
	 For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
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P1564

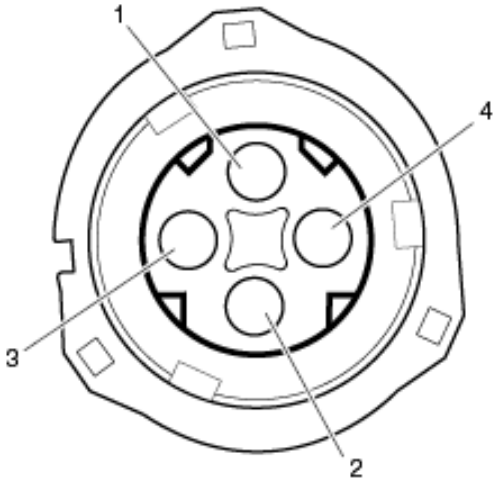
Code number	P1564
Fault code description	Fuel pressure – Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Generic
Description of component(s)	The low-pressure fuel pressure is measured at the end of the low-pressure fuel supply gallery. Effect on the system: • Limitation of the engine torque when the fuel pressure is too low.
Location of component(s)	
Diagnostic condition	This diagnostic runs when: • engine is not running, and; • the ignition is keyed on after it has been off for more than 60 minutes.
Set condition of fault code	The PCI ECU (D420) detects that the fuel pressure is 1.2 bar [17 psi] or more 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, monitor the fuel pressure sensor (F801) reading with DAVIE when the engine is off and while running.

Electrical diagram(s)





Wiring harness connector D420.A front view



Wiring harness connector F801 front view

D420 PCI ECU
F801 fuel pressure sensor

D420	F801	Function
A38	4	Ground
A46	2	Power supply
A50	1	Signal, fuel pressure

<table>
<tr><td>Technical data</td><td>Component & wiring check, ECU (D420)
Preparation
Key off the ignition.
Disconnect connector F801
Measure on the front side of wiring harness connector F801
<table>
<tr><th>Pin (+probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>2</td><td>3</td><td>5V</td><td>Ignition switch on</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Fuel pressure sensor deviation
Faulty fuel pressure sensor wiring</td></tr>
<tr><td>Additional information</td><td>For this diagnostic, the low-pressure fuel pressure is monitored when the engine is not running.
The low-pressure fuel pressure is measured by the fuel pressure sensor (F801).</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 pin out 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 1564a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all associated component connections and wiring (leaks, bent, broken fuel lines, debris or blockage in fuel tanks) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.

Was there evidence of any of the above?
No: Continue to the next step 2 in the troubleshooting process.
Yes: Clean, adjust, repair, or replace affected components for any issues identified.</td></tr>
</table>
<table>
<tr><td>Step 2</td><td>Step 1564b</td><td>SRT</td></tr>
<tr><td colspan="3">Visual Inspection: Fuel Filter Housing
Visually inspect the associated component connections and wiring for any of the following:
Excessive debris build-up
Fuel filter is dirty or collapsed
Was there evidence of any of the above?</td></tr>
</table></td></tr>
</table>

- No - Continue to the next step 3 in the troubleshooting process.
- Yes - Replace the fuel filter.

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 1564c	SRT

Visual Inspection: Fuel Tank Supply Lines
Remove both ends of the fuel tank supply lines. Using an air nozzle, shoot compressed air through each line to see if there is any blockage or holes in the fuel lines.

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.

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 1564d	SRT

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 5 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 5 in the troubleshooting process.

Step 5	Step 1564e	SRT

Pump & Needle Diagnostics
Run the prescribed DAVIE Direct test to determine if there is a pressure related issue between the common rail and injectors.

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

- No - Continue to the next step 6 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.

<table>
<tr><td></td><td>
If this related fault is still active, continue to the next step 6 in the troubleshooting process.
<table>
<tr><td>Step 6</td><td>Step 1564f</td><td>SRT</td></tr>
<tr><td colspan="3">Replace the Fuel Pressure sensor (F801).
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 7 in the troubleshooting process.</td></tr>
</table>
<table>
<tr><td>Step 7</td><td>Step 1564g</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

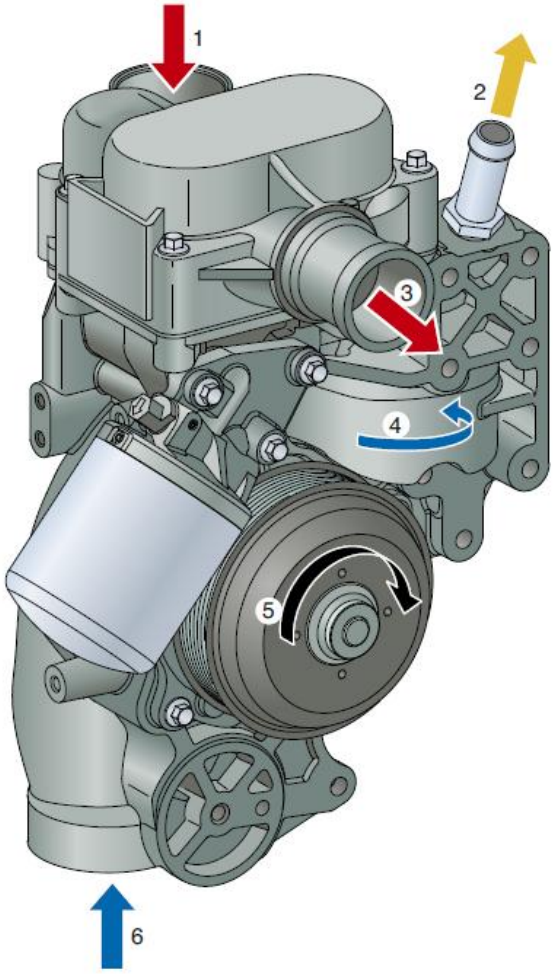
P1568

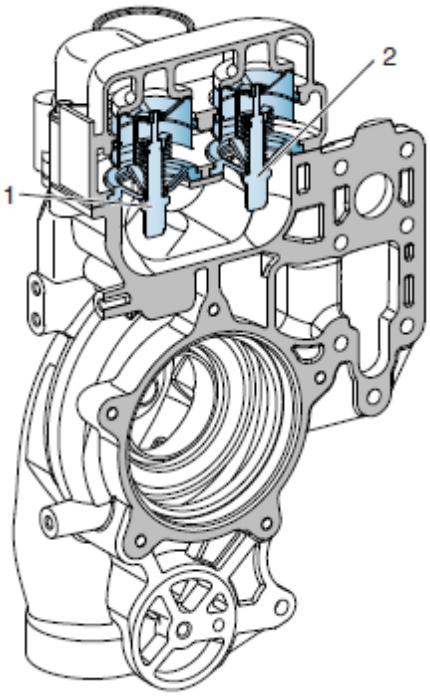
Code number	P1568
Fault code description	Coolant pump clutch 1 - Short circuit to ground
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Fault code information	Please Contact the Engine Support Center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
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P1569

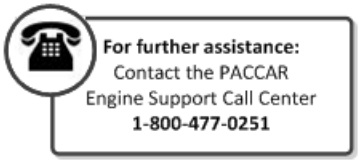
Code number	P1569
Fault code description	Coolant pump clutch 1 - Short circuit to supply
Fault code information	 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
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P156A

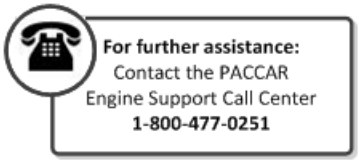
Code number	P156A
Fault code description	Coolant pump clutch 1 – Current too low or open circuit
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	 • 1 Coolant from EGR-cooler • 2 Coolant from engine return gallery to • Cabin heater *! no connection to pump • Just passing through! • 3 Coolant to radiator (hot) • 4 Coolant to engine block and oil cooler • 5 Rotation direction of the pump • 6 Coolant from radiator (Page 93) The coolant pump is located at the right-front side of the engine and driven by a single belt from the crankshaft pulley (5). The pump has two integrated thermostats to reduce the pressure difference over the pump. The coolant entering the pump comes from the EGR-cooler (full flow)(1) and flows, depending on the temperature, through the radiator (3 » 6) or directly into the engine block (4). The pump is

	equipped with as sensor that detects a stalled pump, the sensor is located at the V-belt tensioner. The coolant entering the engine block is divided between the main coolant gallery in the block and the coolant supply to the oil cooler. The coolant returning from the oil cooler enters at the rear side of the pump. The supply for the cabin heater is connected at (2) but this part of the pump has no internal connection to the coolant pump. The return gallery in the engine block feeds the cabin heater. The coolant pump is equipped with two thermostats (1 and 2) to provide sufficient flow over the pump 
Location of component(s)	Not available/required for this code
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Not available/required for this code
Additional information	Not available/required for this code
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	Not available/required for this code
	Back to Index

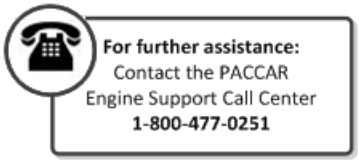
P156B

Code number	P156B
Fault code description	Coolant pump clutch 2 - Short circuit to ground
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	Please contact the Engine Support Center 
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Index

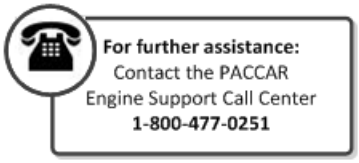
P156C

Code number	P156C
Fault code description	Coolant pump clutch 2 - Short circuit to supply
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
	Back to Index

P156D

Code number	P156D
Fault code description	Coolant pump clutch 2 - Current too low or open circuit
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
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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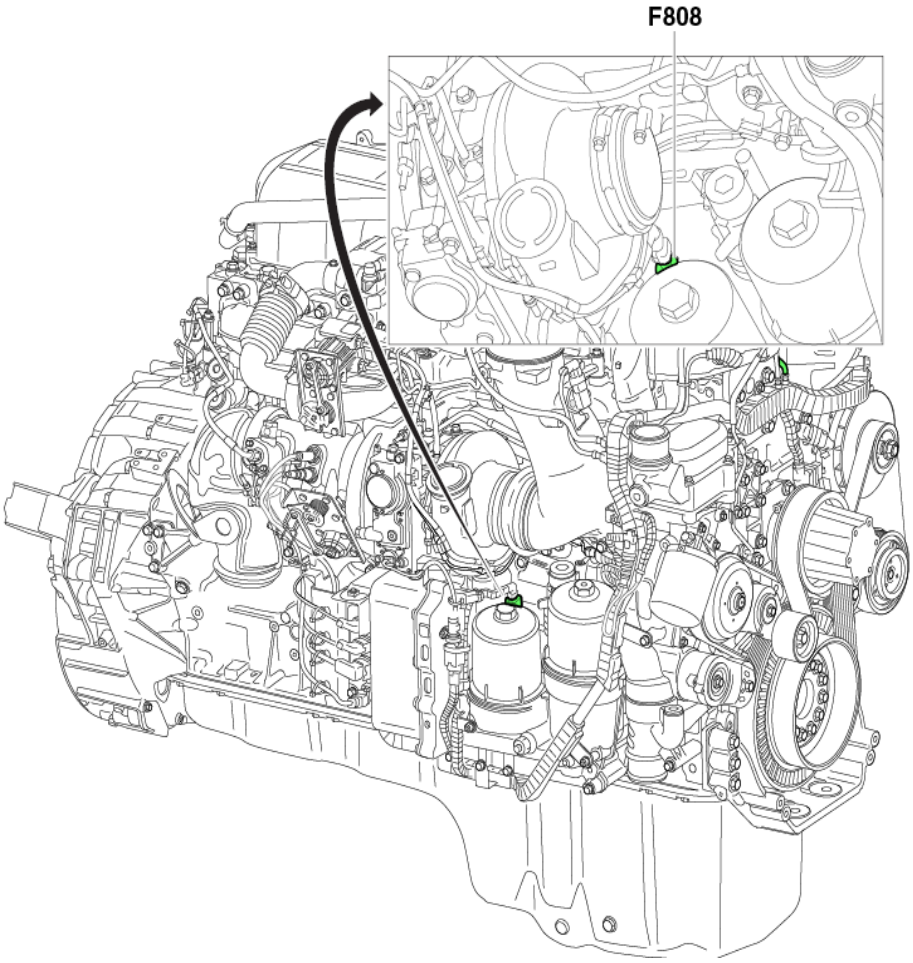
P156E

Code number	P156E
Fault code description	Vehicle speed - Voltage too low or short circuit to ground on ECU D420 pin B12
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
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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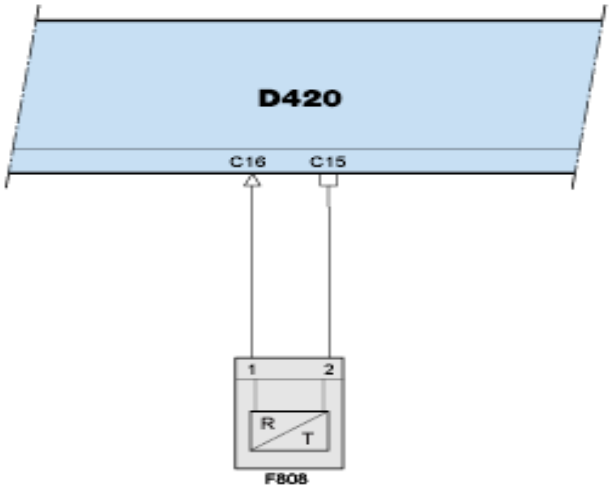
P156F

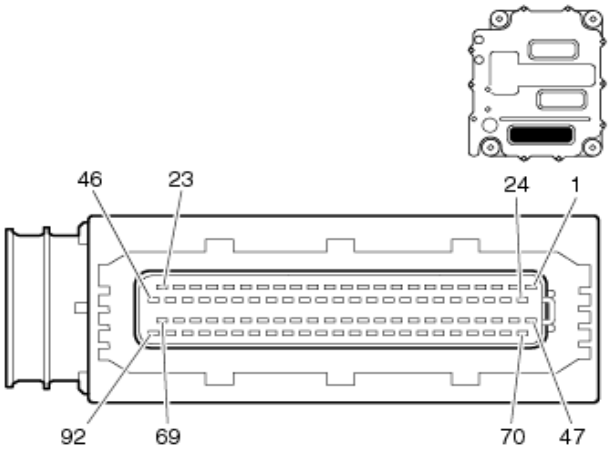
Code number	P156F
Fault code description	Vehicle speed – Voltage too high or short circuit to supply on ECU D420 pin B12
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	Not available/required for this code
Location of component(s)	Not available/required for this code
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	If voltage is across the MIL circuit is zero volt.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes
Electrical diagram(s)	Not available/required for this code
Technical data	Not available/required for this code
Possible causes	Not available/required for this code
Additional information	Not available/required for this code
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	Not available/required for this code
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P1570

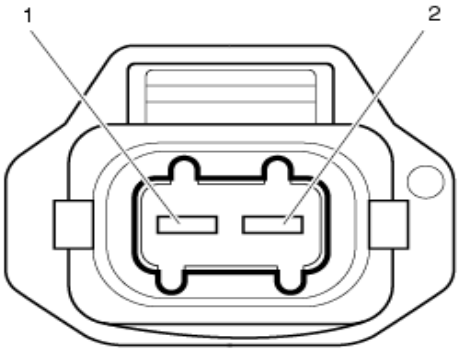
Code number	P1570
Fault code description	Oil temperature - Data erratic, intermittent, or incorrect during engine warm-up
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	The oil temperature is measured in the oil module before the oil cooler. Effect on the system: Limitation of the engine torque when the oil temperature is too high.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 60 seconds after an engine start, and; • When coolant temperature is more than 40°C [104°F].
Set condition of fault code	The PCI ECU (D420) detects that the measured oil temperature differs too much from the expected oil temperature at the moment the coolant temperature reaches 74°C [165°F].
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 75°C [167°F] in normal driving conditions. This activity can be best conducted with a loaded vehicle/trailer.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F808 front view

D420 PCI ECU
F808 Oil temperature sensor

D420	F808	Function
C15	2	Ground
C16	1	Signal, oil temperature

<table>
<tr><td>Technical data</td><td>
Component check, oil temperature sensor (F808)
Preparation

Key off the ignition
Disconnect connector F808
Measure on component connector F808

<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>1</td><td>2</td><td>5727–6056 Ω</td><td>Resistance value at 0°C [34°F]</td></tr>
<tr><td>1</td><td>2</td><td>2439–2557 Ω</td><td>Resistance value at 20°C [68°F]</td></tr>
<tr><td>1</td><td>2</td><td>1151–1197 Ω</td><td>Resistance value at 40°C [104°F]</td></tr>
<tr><td>1</td><td>2</td><td>585–604 Ω</td><td>Resistance value at 60°C [140°F]</td></tr>
<tr><td>1</td><td>2</td><td>318–327 Ω</td><td>Resistance value at 80°C [176°F]</td></tr>
<tr><td>1</td><td>2</td><td>185–188 Ω</td><td>Resistance value at 100°C [212°F]</td></tr>
<tr><td>1</td><td>2</td><td>111–114 Ω</td><td>Resistance value at 120°C [248°F]</td></tr>
</table>
Component & wiring check, ECU (D420)
Preparation

Key off the ignition
Disconnect connector F808
Measure on the front side of wiring harness connector F808

<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>Oil temperature sensor deviation</td></tr>
<tr><td>Additional information</td><td>

For this diagnostic, the engine oil temperature is compared with the engine coolant temperature when the engine is warming up.
The oil temperature is monitored by the oil temperature sensor (F808), and 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.

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

Step 1	Step ID 1570a	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 1570b	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 1570c	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 1570d	SRT
DAVIE Direct Monitor: Oil temperature: This check is best performed at ambient temperature. Oil temperature to determine if the related sensor is reading correctly. Does the monitored value appear correct? • Yes- Proceed to step 5 • No- Proceed to step 6		

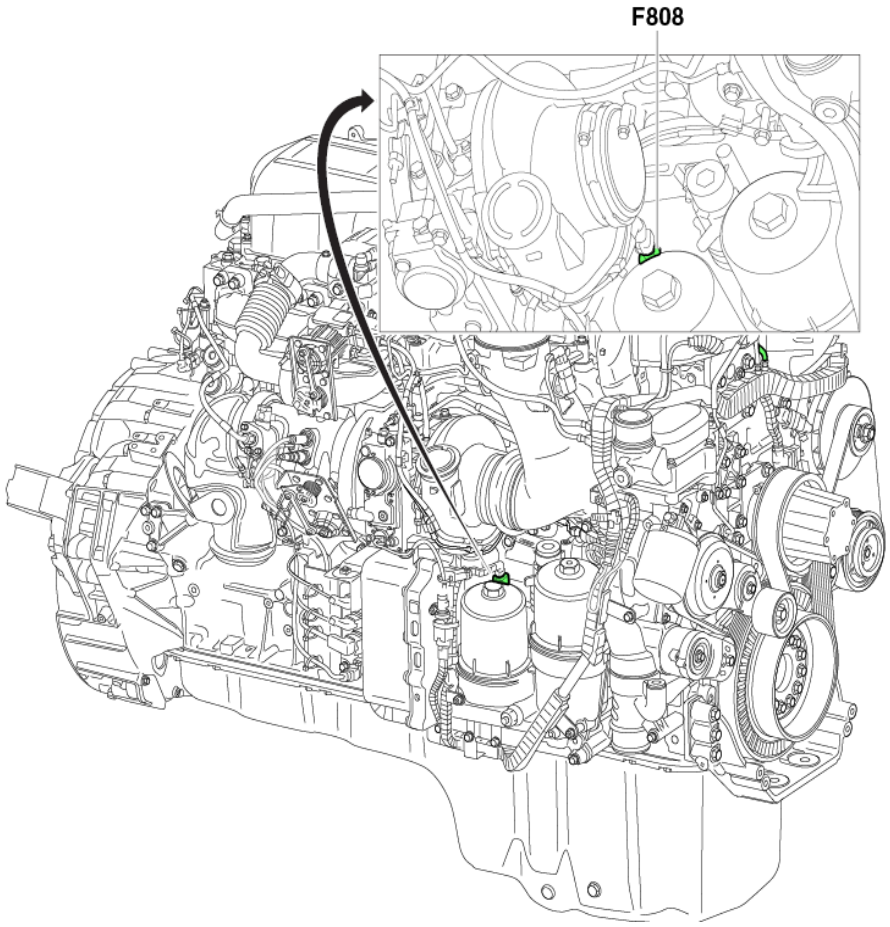
Step 5	Step ID 1570e	SRT
Repairs or component replacements appropriate component and use DAVIE to re-check for the presence of active faults. • Fault inactive – issue resolve • Fault active - Proceed to step 6		

Step 6	Step ID 1570f	SRT
Replace: Oil Temperature Sensor: 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 7		

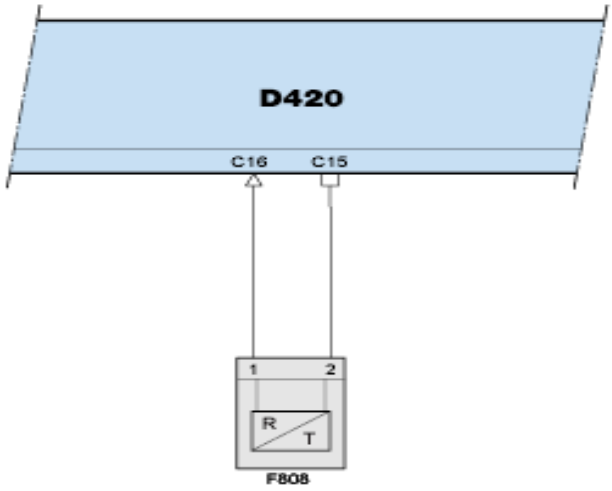
Step 7	Step ID 1570g	SRT
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		

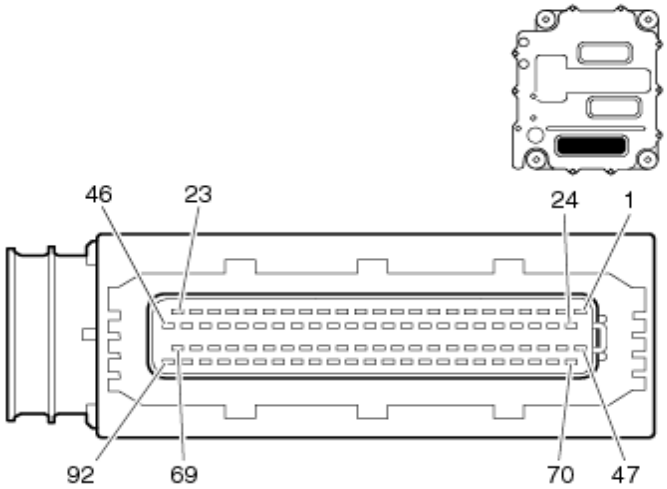
Verification Drive Cycle	To validate the repair: • The truck must remain off (key to OFF and the engine OFF) for 8-10 consecutive hours. Wait for this time to elapse before continuing. • With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. • With the brakes set, start the engine and allow it to run at idle for 2 minutes.
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P1571

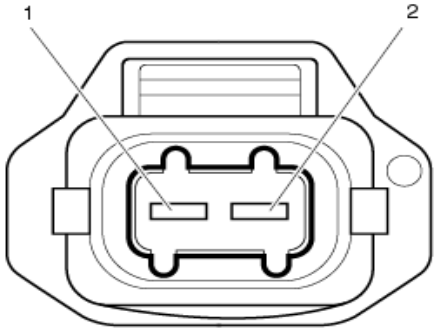
Code number	P1571
Fault code description	Oil temperature - Data erratic, intermittent, or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	The oil temperature is measured in the oil module before the oil cooler. Effect on the system: Limitation of the engine torque when the oil temperature is too high.
Location of component(s)	
Diagnostic condition	This diagnostic runs: • 60 seconds after an engine start, and; • When coolant temperature is more than 65°C [149°F].
Set condition of fault code	The PCI ECU (D420) detects that the measured oil temperature differs too much from the expected oil temperature 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 75°C [167°F] in normal driving conditions. This activity can be best conducted with a loaded vehicle/trailer.

Electrical diagram(s)





Wiring harness connector D420.C front view



Wiring harness connector F808 front view

D420 PCI ECU
F808 Oil temperature sensor

D420	F808	Function
C15	2	Ground
C16	1	Signal, oil temperature

Technical data

Component check, oil temperature sensor (F808)

Preparation

- Key off the ignition
- Disconnect connector F808
- Measure on component connector F808

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	14936–15961 Ω	Resistance value at -20°C [-4°F]
1	2	5727–6056 Ω	Resistance value at 0°C [34°F]
1	2	2439–2557 Ω	Resistance value at 20°C [68°F]
1	2	1151–1197 Ω	Resistance value at 40°C [104°F]
1	2	585–604 Ω	Resistance value at 60°C [140°F]
1	2	318–327 Ω	Resistance value at 80°C [176°F]
1	2	185–188 Ω	Resistance value at 100°C [212°F]
1	2	111–114 Ω	Resistance value at 120°C [248°F]

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition
- Disconnect connector F808
- Measure on the front side of wiring harness connector F808

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

Possible causes

Oil temperature sensor deviation

Additional information

- For this diagnostic, the engine oil temperature is compared with the engine coolant temperature when the engine is at normal operating temperature.
- The oil temperature is monitored by the oil temperature sensor (F808), and the engine coolant temperature is monitored by the coolant temperature sensor (F566).

Diagnostic Step-by-Step



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



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

Step 1	Step ID 1571a	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 1571b	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 1571c	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 1571d	SRT

Oil temperature Monitor:
This check is best performed at ambient temperature.
Oil temperature to determine if the related sensor is reading correctly.
Does the monitored value appear correct?

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

Step 5	Step ID 1571e	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 1571f	SRT

Replace: Oil Temperature Sensor:
Replace the identified faulty component.
Use DAVIE to re-check for the presence of active faults.

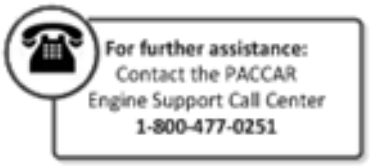
- Fault inactive – issue resolve
- Fault active - Proceed to step 7

Step 7	Step ID 1571g	SRT

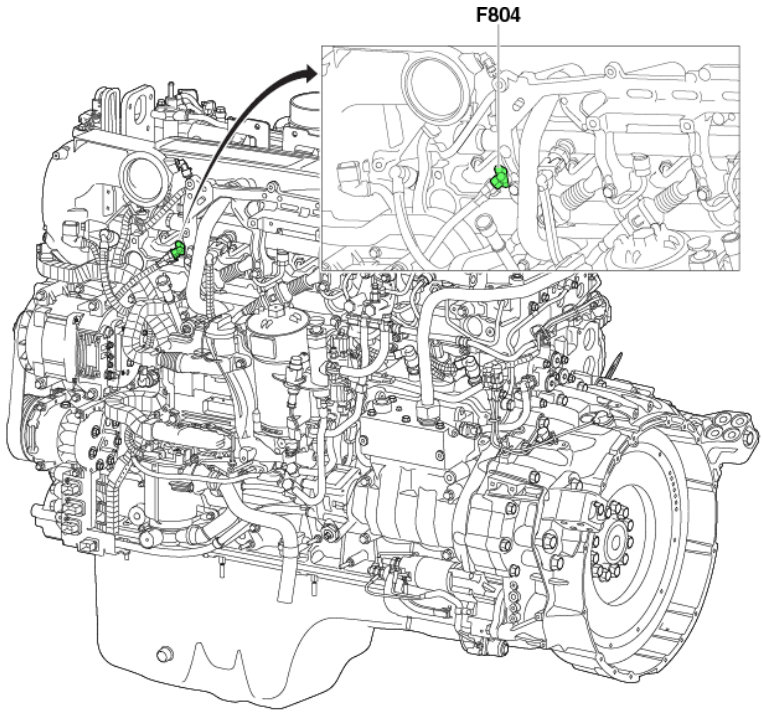
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.

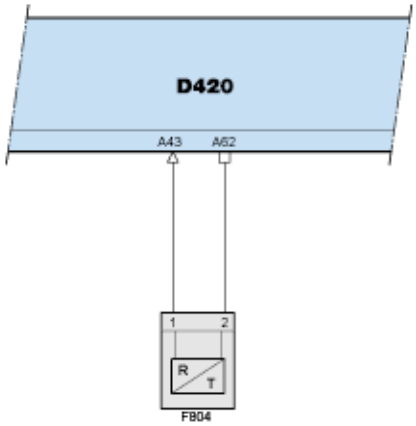
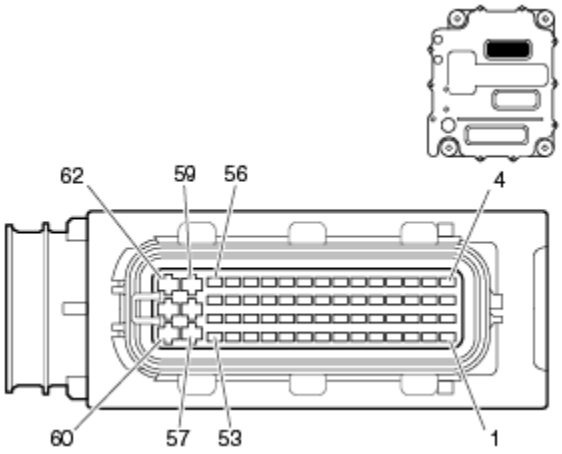
Verification Drive Cycle	To validate the repair: • The truck must remain off (key to OFF and the engine OFF) for 8-10 consecutive hours. Wait for this time to elapse before continuing. • With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. • With the brakes set, start the engine and allow it to run at idle for 2 minutes.
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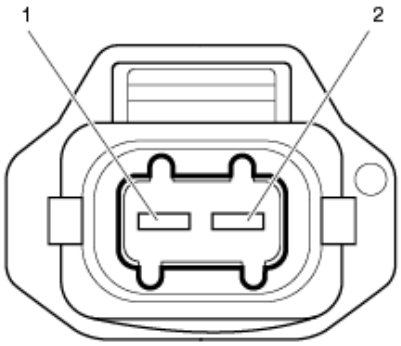
P1572

Code number	P1572
Fault code description	Post Compressor temperature plausibility fault
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
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	
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P1573

Code number	P1573
Fault code description	Boost temperature - 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 boost temperature is measured in the inlet manifold near cylinder 2. Effect on the system: • Determines the smoke limit • A higher measured boost temperature results in lower calculated smoke emission by the engine. • Determines NOx emissions • A higher measured boost temperature results in higher calculated NOx emission by the engine. • Calculates exhaust gas mass flow used for DEF dosing by the EAS-3 system • A higher measured boost temperature results in lower calculated exhaust gas mass flow. • Calculates oxygen concentration in the exhaust gas used for the DPF soot collection prediction and regeneration • A higher measured boost temperature results in lower calculated oxygen concentration in the exhaust gas. • Calculates exhaust gas temperature before the turbine • A higher measured boost temperature results in higher calculated exhaust gas temperature before the turbine. • Controls the BPV valve • A higher measured boost temperature results in lower calculated back pressure; therefore, the BPV valve is opened relatively more.
Location of component(s)	

Diagnostic condition	The diagnostic runs 180 seconds after the engine is started.
Set condition of fault code	The PCI ECU (D420) detects that the boost temperature is more than 127°C [261°F] for more than 120 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control. This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.
Electrical diagram(s)	  Wiring harness connector D420.A front view



Wiring harness connector F804 front view

D420 PCI ECU
F804 boost temperature sensor

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

Technical data

Component check, boost temperature sensor (F804)
Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5248–5732 Ω	Resistance value at 0°C [34°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 check, boost temperature sensor (F804)
Preparation

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

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

Possible causes

- Contaminated intercooler
- Faulty engine cooling fan
- Boost temperature deviation

Additional information

The boost temperature is measured in the inlet manifold near cylinder 2 by the boost temperature sensor (F804).

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 1573a	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 1573b	SRT
Perform the prescribed test (Air Side Pressure) 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 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 in the troubleshooting process.		

Step 3	Step ID 1573c	SRT
Electrical Checks Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • Yes - Proceed to step 4 • No - Proceed to step 5		

Step 4	Step ID 1573d	SRT

<table>
<tr><td></td><td>
Repair or replace Boost Temperature sensor, and use DAVIE to re-check for the presence of active faults.

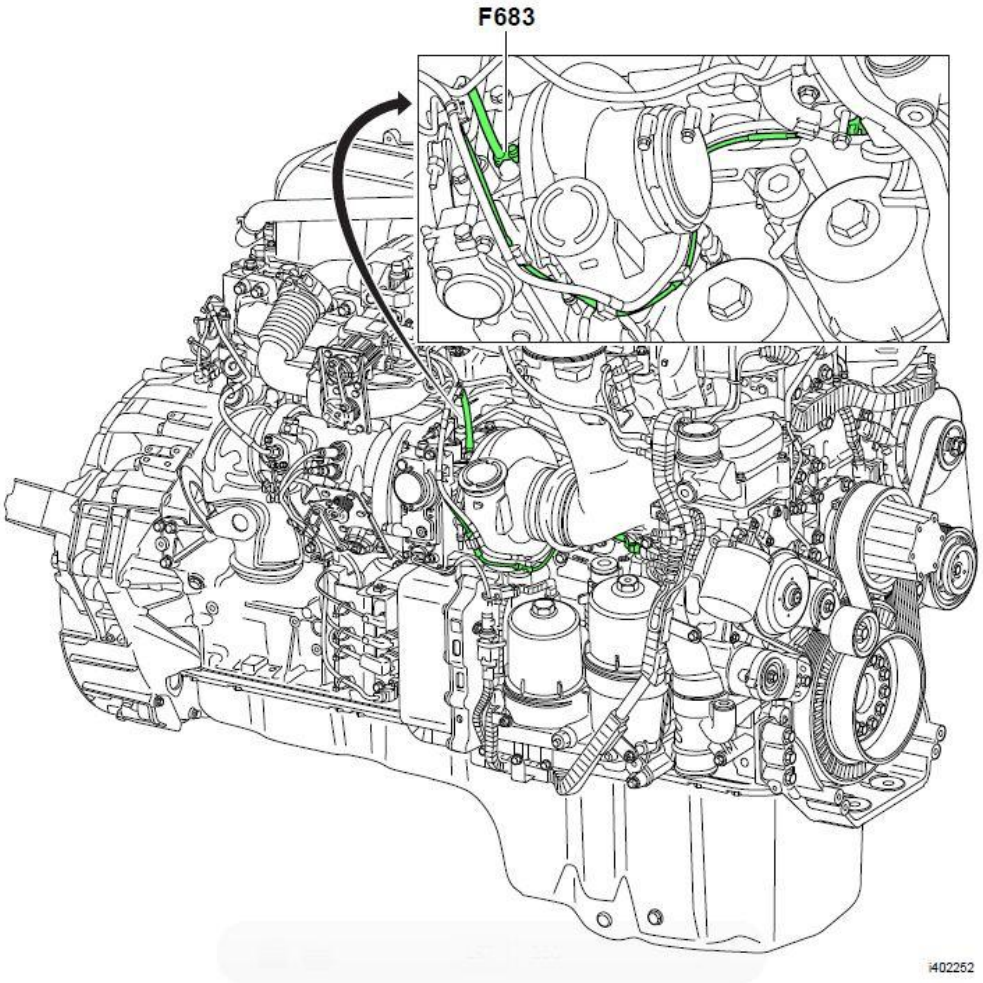
Fault inactive – issue resolved
Fault active - Proceed to step 5

<table>
<tr><td>Step 5</td><td>Step ID 1573e</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, proceed at a minimum speed of 80 km/h [50 mph] in the highest gear possible with the engine speed between 1100 and 1500 rpm and set the cruise control.

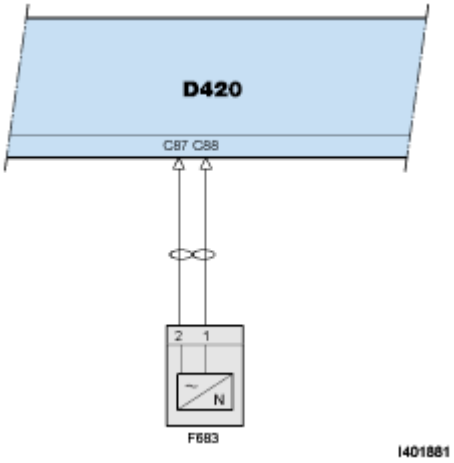
This test is best performed with a loaded vehicle/trailer, but if load is unavailable, turn as many engine power consumers on to produce engine load. Perform this test for roughly 5 to 8 km [3 to 5 miles] or in 3 separate 1.5 km [1 mile] increments if a steady 5 to 8 km [3 to 5 miles] is unachievable. Use a flat road, if possible.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1580

Code number	P1580
Fault code description	Turbo speed - Data valid but too high
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	**Turbo speed sensor (F683)** The turbo speed is monitored on the turbine-compressor shaft. Effect on the system: • Turbo charger speed limiting The engine torque is limited if the speed is too high. • Stalled turbo charger detection • Calculates the exhaust gas temperature before the turbine A higher measured turbo speed results in lower calculated exhaust gas temperature before the turbine. • Diagnostic check on the boost pressure system.

Location of component(s)	
Diagnostic condition	This diagnostic runs: • when engine speed is above 1000 rpm, and; • the engine is loaded, and; • the VTG turbocharger position is less than 95%.
Set condition of fault code	The PCI ECU (D420) detects that the turbo speed is above 115,700 rpm for more than 20 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.

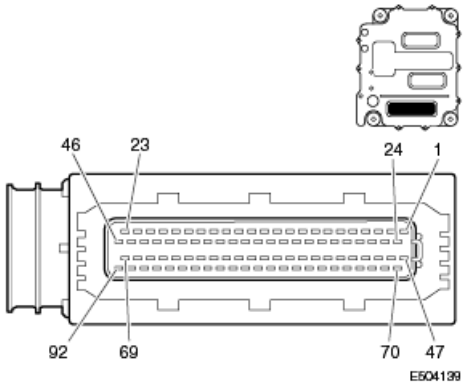
Electrical diagram(s)



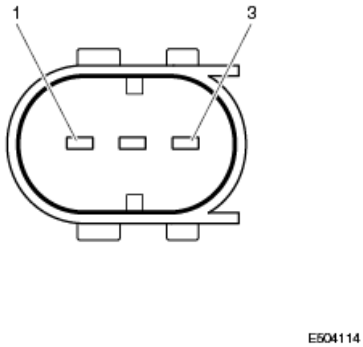
D420 PCI ECU

F683 turbo speed sensor

D420	F683	Function
C87	2	Signal, turbo speed
C88	1	Ground



Wiring harness connector D420.C front view



Component connector F683

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

Technical data

Component check, turbo speed sensor (F683)

Preparation

- Key off the ignition
- Disconnect connector F683

- Measure on the component connector F683

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	600—1000 Ω	Resistance value at 20°C [68°F]

Possible causes

- Malfunction on the turbo speed sensor wiring
- Malfunction on the turbo speed sensor

Additional information

- Engine torque is reduced.

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.



- 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? Pre-turbine pressure (P3) sensor related faults: P0471; P0472; P0473; P104D; P1057	
Yes	**No**
Refer to the troubleshooting information for these codes before continuing with this procedure.	Go to step 2

Step 2. Turbo Speed Sensor (F683) Checks

Step 2.A Visual Inspection, turbo speed sensor (F683) connections	
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 (Note: zip-tie hold downs may cause insulation damage if secured too tightly) • ECU connections are not damaged or disconnected • Batteries are not okay, contacts are not tight • Broken or missing clamps around the Turbo	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the turbo speed sensor (F683) is found to be damaged or broken, replace it. Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to step 2.B.	2.B

Step 2.B Electrical checks, resistance, turbo speed sensor (F683)	
Action 1. Set the ignition switch to OFF. 2. Disconnect the turbo speed sensor (F683) connector. 3. Confirm the sensor resistance value as outlined in the checking data for, component check, turbo speed sensor (F683).	
Are measured values within expected range?	
Yes	**No**
Go to step 2.C	Correct any issues found. If the turbo speed sensor (F683) is found to be

	damaged or broken, replace it. Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to Step 2.C.

Step 2.C Electrical checks, harness continuity, turbo speed sensor (F683)	
Action 1. Set the ignition switch to OFF. 2. Disconnect the engine harness from the PCI. 3. Perform a continuity test on all wires associated with the turbo speed sensor (F683).	
Are measured values within expected range?	
Yes	**No**
Go to step 2.D	Correct any issues found. If the harness is found to be damaged or broken, go to step 5 for assistance with further diagnosis or replacement. Refer to step 4 to perform the corresponding repair verification cycles. If this code is still present, go to step 2.D.

Step 2.D Visual Inspection, turbo speed sensor (F683)	
Action 1. Set the ignition key to OFF. 2. Remove the turbo speed sensor (F683) from the turbo and inspect it for any of the following: • Damaged or debris • Improper installation (Note: only one (1) o-ring is used for turbo speed sensor (F683) installation) • Incorrect sensor	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the turbo speed sensor (F683) is found to be damaged or broken, replace it.	Go to step 3

Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to step 3.	

Step 3. Exhaust System Checks

Step 3.A Special test, pressure testing (inlet/exhaust)	
Action 1. Perform the prescribed testing as outlined in, "pressure testing (inlet/exhaust)," to determine if there are any leaks in the exhaust system.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found. Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to step 5	Go to step 5

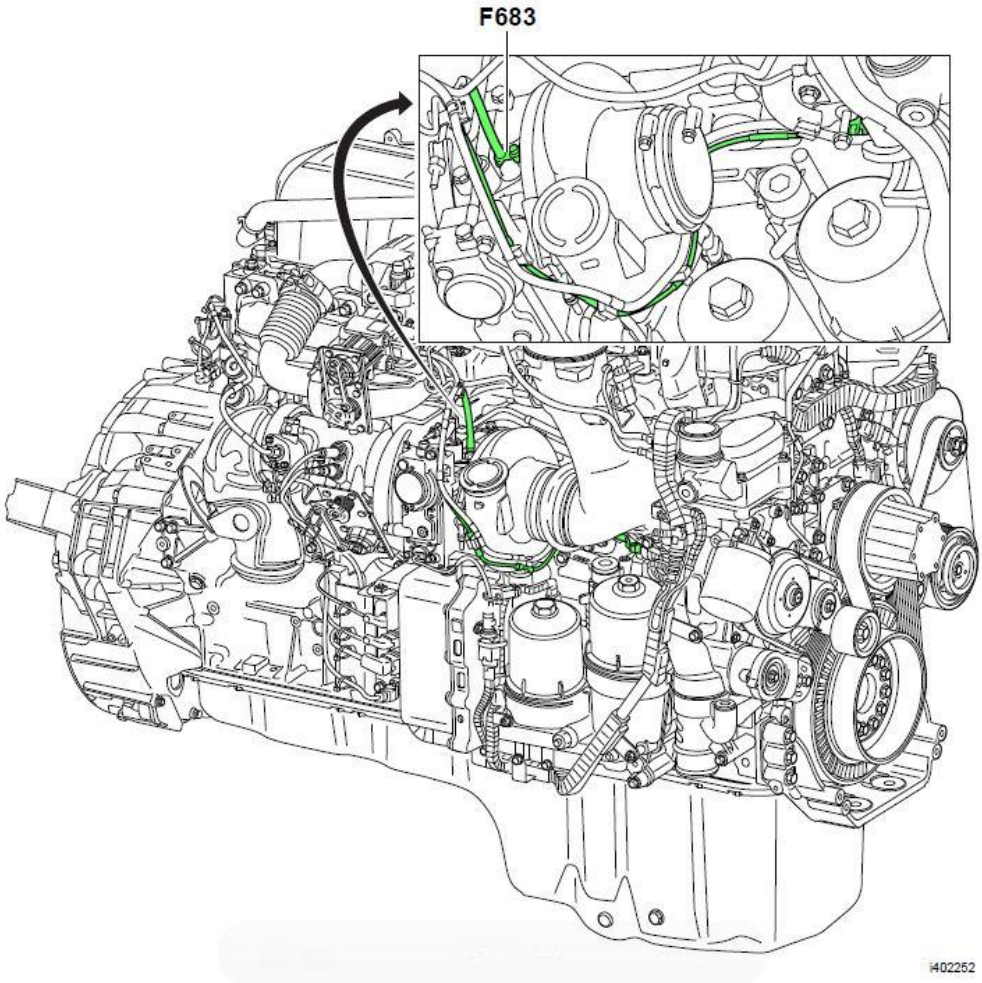
Step 4. Repair Verification

Step 4.A Repair Verification Cycles
Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active. Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
Action 1. System initiation Drive the truck under normal conditions until the coolant temperature reaches a minimum of 150°F. This cycle can be conducted with a loaded trailer or bobtail. 2. Transient With the System Initiation cycle complete, under moderate engine load (A/C and fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed untl reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.

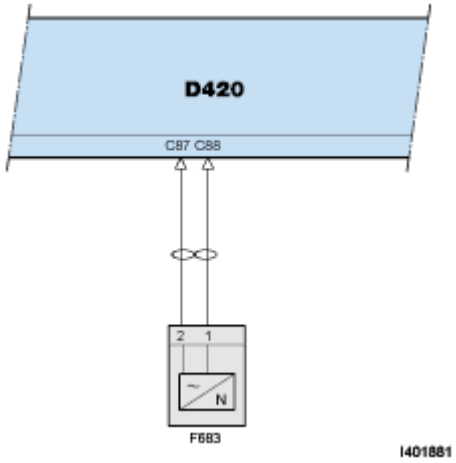
	Step 5. Contacting PACCAR Engine Support Center **Step 5.A Contact PACCAR Engine Support Center** **Action** 1. For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
	Back to Index

P1581

Code number	P1581
Fault code description	Turbo speed - Data valid but too low
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
Description of component(s)	**Turbo speed sensor (F683)** The turbo speed is monitored on the turbine-compressor shaft. Effect on the system: • Turbo charger speed limiting The engine torque is limited if the speed is too high. • Stalled turbo charger detection • Calculates the exhaust gas temperature before the turbine A higher measured turbo speed results in lower calculated exhaust gas temperature before the turbine. • Diagnostic check on the boost pressure system.

Location of component(s)	
Diagnostic condition	This diagnostic runs: • when engine speed is above 1000 rpm, and; • the engine is moderately loaded, and; • the VTG turbocharger position is greater than 10%.
Set condition of fault code	The PCI ECU (D420) detects that the turbo speed is below 20,000 rpm for more than 20 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.

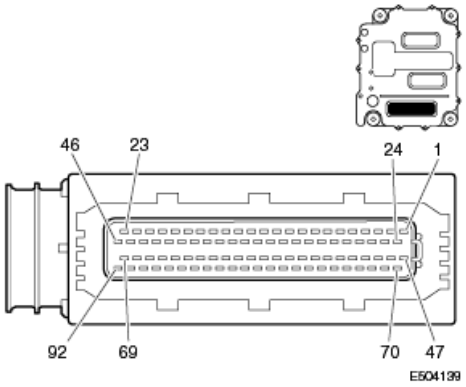
Electrical diagram(s)



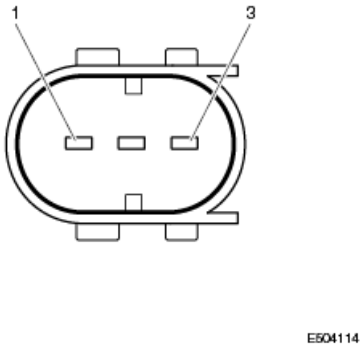
D420 PCI ECU

F683 turbo speed sensor

D420	F683	Function
C87	2	Signal, turbo speed
C88	1	Ground



Wiring harness connector D420.C front view



Component connector F683

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

Technical data

Component check, turbo speed sensor (F683)

Preparation

- Key off the ignition
- Disconnect connector F683

- Measure on the component connector F683

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	600—1000 Ω	Resistance value at 20°C [68°F]

Possible causes

- Malfunction on the turbo speed sensor wiring
- Malfunction on the turbo speed sensor

Additional information

- Engine torque is reduced.

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.

- 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? Pre-turbine pressure (P3) sensor related faults: P0471; P0472; P0473; P104D; P1057	
Yes	**No**
Refer to the troubleshooting information for these codes before continuing with this procedure.	Go to step 2

Step 2. Turbo Speed Sensor (F683) Checks

Step 2.A Visual Inspection, turbo speed sensor (F683) connections	
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 (Note: zip-tie hold downs may cause insulation damage if secured too tightly) • ECU connections are not damaged or disconnected • Batteries are not okay, contacts are not tight • Broken or missing clamps around the Turbo	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the turbo speed sensor (F683) is found to be damaged or broken, replace it. Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to step 2.B.	2.B

Step 2.B Electrical checks, resistance, turbo speed sensor (F683)	
Action 1. Set the ignition switch to OFF. 2. Disconnect the turbo speed sensor (F683) connector. 3. Confirm the sensor resistance value as outlined in the checking data for, component check, turbo speed sensor (F683).	
Are measured values within expected range?	
Yes	**No**
Go to step 2.C	Correct any issues found. If the turbo speed sensor (F683) is found to be

	damaged or broken, replace it. Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to Step 2.C.

Step 2.C Electrical checks, harness continuity, turbo speed sensor (F683)	
Action 1. Set the ignition switch to OFF. 2. Disconnect the engine harness from the PCI. 3. Perform a continuity test on all wires associated with the turbo speed sensor (F683).	
Are measured values within expected range?	
Yes	**No**
Go to step 2.D	Correct any issues found. If the harness is found to be damaged or broken, go to step 5 for assistance with further diagnosis or replacement. Refer to step 4 to perform the corresponding repair verification cycles. If this code is still present, go to step 2.D.

Step 2.D Visual Inspection, turbo speed sensor (F683)	
Action 1. Set the ignition key to OFF. 2. Remove the turbo speed sensor (F683) from the turbo and inspect it for any of the following: • Damaged or debris • Improper installation (Note: only one (1) o-ring is used for turbo speed sensor (F683) installation) • Incorrect sensor	
Was there evidence of any of the above?	
Yes	**No**
Correct any issues found. If the turbo speed sensor (F683) is found to be damaged or broken, replace it.	Go to step 3

Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to step 3.	

Step 3. Exhaust System Checks

Step 3.A Special test, pressure testing (inlet/exhaust)	
Action 1. Perform the prescribed testing as outlined in, "pressure testing (inlet/exhaust)," to determine if there are any leaks in the exhaust system.	
Does the test fail to complete or result in a failed state?	
Yes	**No**
Correct any issues found. Refer to step 4 to perform the corresponding repair verification cycles. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. If this code is still present, go to step 5	Go to step 5

Step 4. Repair Verification

Step 4.A Repair Verification Cycles
Perform these repair verification cycles following any corrective actions taken, to confirm that this fault is no longer active. Before beginning these repair verification cycles, use the DAVIE Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
Action 1. System initiation Drive the truck under normal conditions until the coolant temperature reaches a minimum of 150°F. This cycle can be conducted with a loaded trailer or bobtail. 2. Transient With the System Initiation cycle complete, under moderate engine load (A/C and fan both ON), perform a series of brief accelerations, progressing from a lower to a higher speed untl reaching a top speed of 40 mph. Once the top speed has been reached, perform several decelerations from a higher to a lower speed until reaching a bottom speed of 10 mph. Perform this cycle 5 times.

	Step 5. Contacting PACCAR Engine Support Center **Step 5.A Contact PACCAR Engine Support Center** **Action** 1. For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.
	Back to Index

P1601

Code number	P1601
Fault code description	ECU PCI - Internal error
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue
Location of component(s)	This information not required since this is an internal PCI issue
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue
Technical data	This information not required since this is an internal PCI issue
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1601a	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 1601b	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?		

<table>
<tr><td></td><td>
Yes - Proceed to step 3
No - Proceed to step 4
<table>
<tr><td>Step 3</td><td>Step ID 1601c</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 resolved
Fault active - Proceed to step 4</td></tr>
</table>
<table>
<tr><td>Step 4</td><td>Step ID 1601d</td><td>SRT</td></tr>
<tr><td colspan="3">Replace the identified faulty component. (Engine Controller Unit (ECU)) 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 1601e</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1602

Code number	P1602
Fault code description	ECU PCI - Faulty or incorrect software
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue
Location of component(s)	This information not required since this is an internal PCI issue
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue
Technical data	This information not required since this is an internal PCI issue
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.

Step 1	Step ID 1602a	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 1602b	SRT
DAVIE Direct: ECU Information Compare ECU S/W information with current configuration information available through Engine Rapido, or by contacting the PACCAR Engine Support Call Center. Is installed ECU software incorrect? • Yes - Make the appropriate updates or component replacements. Contact the PACCAR Engine Support Call Center for authorization and assistance in replacing the ECU or updating the corresponding software. • No - Proceed to step 3		

	<table><tr><td>Step 3</td><td>Step ID 1602c</td><td>SRT</td></tr><tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr></table>
Verification Drive Cycle	To validate the repair, with the brakes set, 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

P160A

Code number	P160A
Fault code description	ECU PCI-Internal error
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	Programmed software in the ECU not functioning correctly.
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	This fault indicates an internal error.
Additional information	• Software does not function correctly. • Unpredictable software reactions. • Functionality is not guaranteed anymore.
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 160A-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 160A-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?		

<table>
<tr><td></td><td>
Yes - Proceed to step 3
No - Proceed to step 4
<table>
<tr><td>Step 3</td><td>Step ID 160A-c</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 160A-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 the repair, with the brakes set, start the engine and allow it to run at idle for 2 minutes.</td></tr>
<tr><td></td><td>Back to Index</td></tr>
</table>

P1644

<table>
<tr><td>Code number</td><td>P1644</td></tr>
<tr><td>Fault code description</td><td>ECU PCI 5V sensor supply-Voltage too high or short circuit to supply.</td></tr>
<tr><td>Fault code information</td><td>1 trip MIL
3 drive cycle recovery
Readiness group – None
Freeze frame type - 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 reference sensor power supply is too high.</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>Broken reference sensor, internally in ECU.</td></tr>
<tr><td>Additional information</td><td>• Several after treatment functionalities are disabled.
• Many sensors do not function.</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.

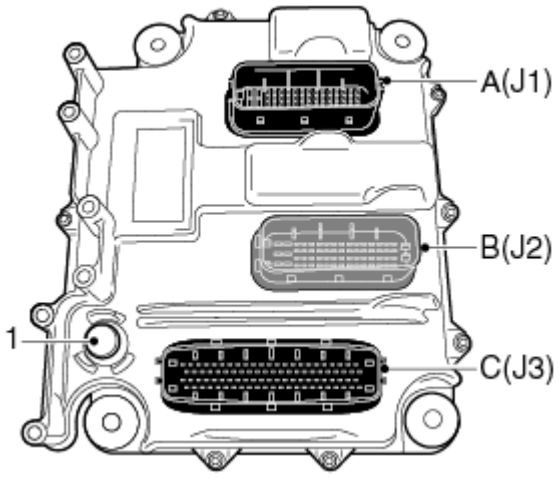
<table>
<tr><td>Step 1</td><td>Step ID 1644a</td><td>SRT</td></tr>
<tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.</td></tr>
</table>

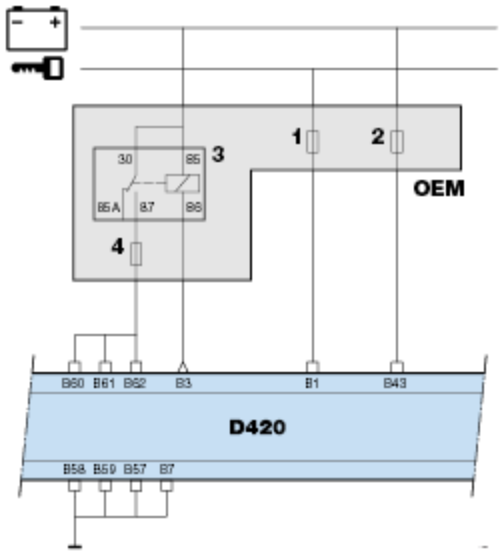
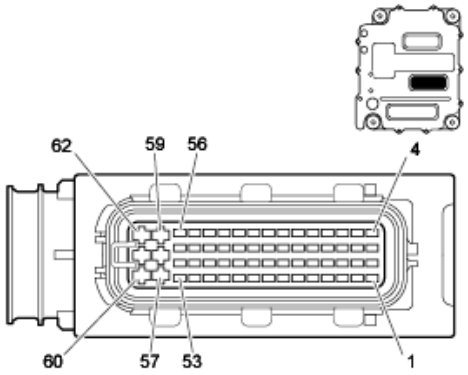
<table>
<tr><td>Step 2</td><td>Step ID 1644b</td><td>SRT</td></tr>
<tr><td colspan="3">With key ON, program the PCI with the most current PRS file. Test drive the vehicle to see if the fault code reappears.
• If the code ceases – Proceed to the verification procedure.
• If the code is still active – Proceed to step 3.</td></tr>
</table>

<table>
<tr><td>Step 3</td><td>Step ID 1644c</td><td>SRT</td></tr>
<tr><td colspan="3">Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.</td></tr>
</table></td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.</td></tr>
</table>

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P1645

Code number	P1645
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)	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)	Not available.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The internal ECU reference sensor power supply is too low.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	  Wiring harness connector D420.B front view D420 Function 1 fuse, power after ignition 2 fuse, ignition off duration counter 3 ECU main relay 4 fuse, power after ignition D420 PCI ECU D420 Function B1 Power supply, after ignition B3 Signal low, main relay B7 Ground, ECU case B43 Signal, ignition off duration counter B57 Ground B58 Ground B59 Ground B60 Power supply, via ECU main relay B61 Power supply, via ECU main relay

<table>
<tr><td></td><td>B62 Power supply, via ECU main relay</td></tr>
<tr><td>Technical data</td><td>Circuit check, ECU (D420) & wiring
Preparation
• Disconnect connector D420.B.
• Measure on the front of the wiring harness connector D420.B.
<table>
<tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr>
<tr><td>B7</td><td>Ground</td><td><0.5 V</td><td>Switch on all consumers</td></tr>
<tr><td>B57</td><td>Ground</td><td><0.5 V</td><td>Switch on all consumers</td></tr>
<tr><td>B58</td><td>Ground</td><td><0.5 V</td><td>Switch on all consumers</td></tr>
<tr><td>B59</td><td>Ground</td><td><0.5 V</td><td>Switch on all consumers</td></tr>
<tr><td>B1</td><td>B7</td><td>Ubat</td><td>Ignition keyed on</td></tr>
<tr><td>B43</td><td>B7</td><td>Ubat</td><td>Ignition keyed off</td></tr>
</table></td></tr>
<tr><td>Possible causes</td><td>Broken reference sensor, internally in ECU.</td></tr>
<tr><td>Additional information</td><td>• Several after treatment functionalities are disabled.
• Many sensors do not function.</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 1645a</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>

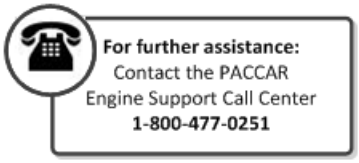
<table>
<tr><td>Step 2</td><td>Step ID 1645b</td><td>SRT</td></tr>
<tr><td colspan="3">Electrical Checks
Ensure that the ignition key/switch has been set to OFF before disconnecting related cables.

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).

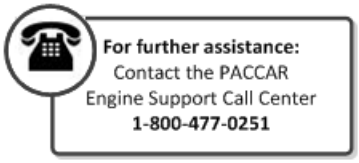
Are measured electrical values outside of expected range or limits?
• Yes - Proceed to step 3</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>
No - Proceed to step 4
<table>
<tr><td>Step 3</td><td>Step ID 1645c</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 1645d</td><td>SRT</td></tr>
<tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.</td></tr>
</table>
</td></tr>
<tr><td>Verification Drive Cycle</td><td>To validate the repair, 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>

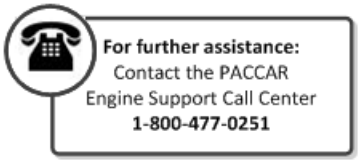
P1650

Code number	P1650
Fault code description	Red warning indication - Open circuit or short circuit to ground on ECU D420 pin B8
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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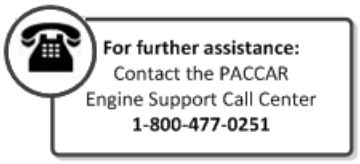
P1652

Code number	P1652
Fault code description	Red warning indication - Voltage too high or short circuit to supply on ECU D420 pin B8
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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P1653

Code number	P1653
Fault code description	Yellow warning indication - Open circuit or short circuit to ground on ECU D420 pin B4
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
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P1655

Code number	P1655
Fault code description	Yellow warning indication - Voltage too high or short circuit to supply on ECU D420 pin B4
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 Please contact the Engine Support Center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	Please refer to chassis wiring information.
Verification Drive Cycle	N/A
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P1674

Code number	P1674
Fault code description	ECU PCI – Faulty or incorrect software
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue
Location of component(s)	This information not required since this is an internal PCI issue
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue
Technical data	This information not required since this is an internal PCI issue
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. Step 1 | Step ID 1674a | 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 1674b | SRT DAVIE Direct: ECU Information Compare ECU S/W information with current configuration information available through Engine Rapido, or by contacting the PACCAR Engine Support Call Center. Is installed ECU software incorrect? • Yes - Make the appropriate updates or component replacements. Contact the PACCAR Engine Support Call Center for authorization and assistance in replacing the ECU or updating the corresponding software. • No - Proceed to step 3

	<table><tr><td>Step 3</td><td>Step ID 1674c</td><td>SRT</td></tr><tr><td colspan="3">For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.</td></tr></table>
Verification Drive Cycle	To validate the repair, with the brakes set, 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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P1675

Code number	P1675
Fault code description	ECU PCI – Faulty or incorrect software
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	This information not required since this is an internal PCI issue
Location of component(s)	This information not required since this is an internal PCI issue
Diagnostic condition	This diagnostic runs during start-up of the PCI ECU.
Set condition of fault code	Programmed data in the ECU not correct.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	This information not required since this is an internal PCI issue
Technical data	This information not required since this is an internal PCI issue
Possible causes	Reprogram the ECU.
Additional information	• The PCI ECU does not start up. • Engine cannot be started.
Diagnostic Step-by-Step	Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. Step 1 | Step ID 1675a | 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 1675b | SRT DAVIE Direct: ECU Information Compare ECU S/W information with current configuration information available through Engine Rapido, or by contacting the PACCAR Engine Support Call Center. Is installed ECU software incorrect? • Yes - Make the appropriate updates or component replacements. Contact the PACCAR Engine Support Call Center for authorization and assistance in replacing the ECU or updating the corresponding software. • No - Proceed to step 3

	Step 3 | Step ID 1675c | SRT For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.
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