

2013 PACCAR MX-13

Diagnostic Service Manual

EPA2013

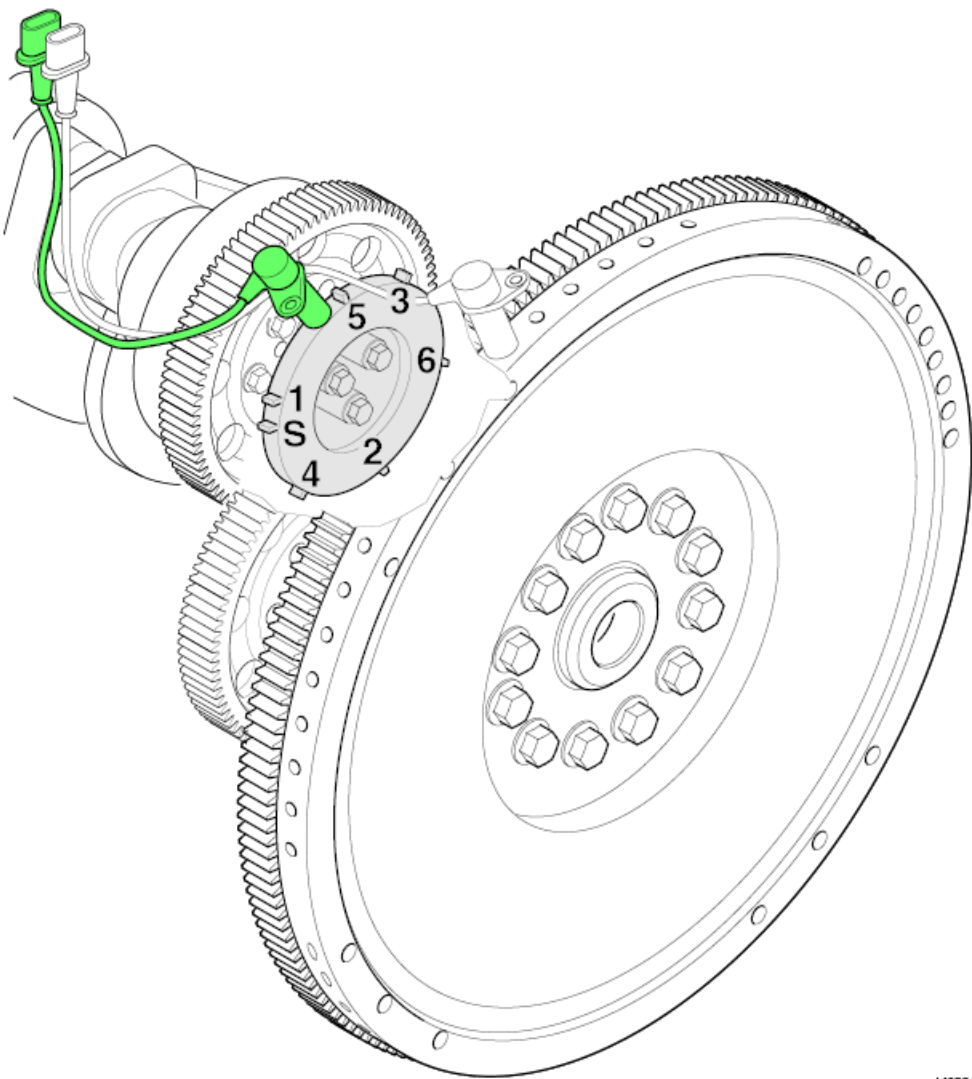
(P0016 to P060C)

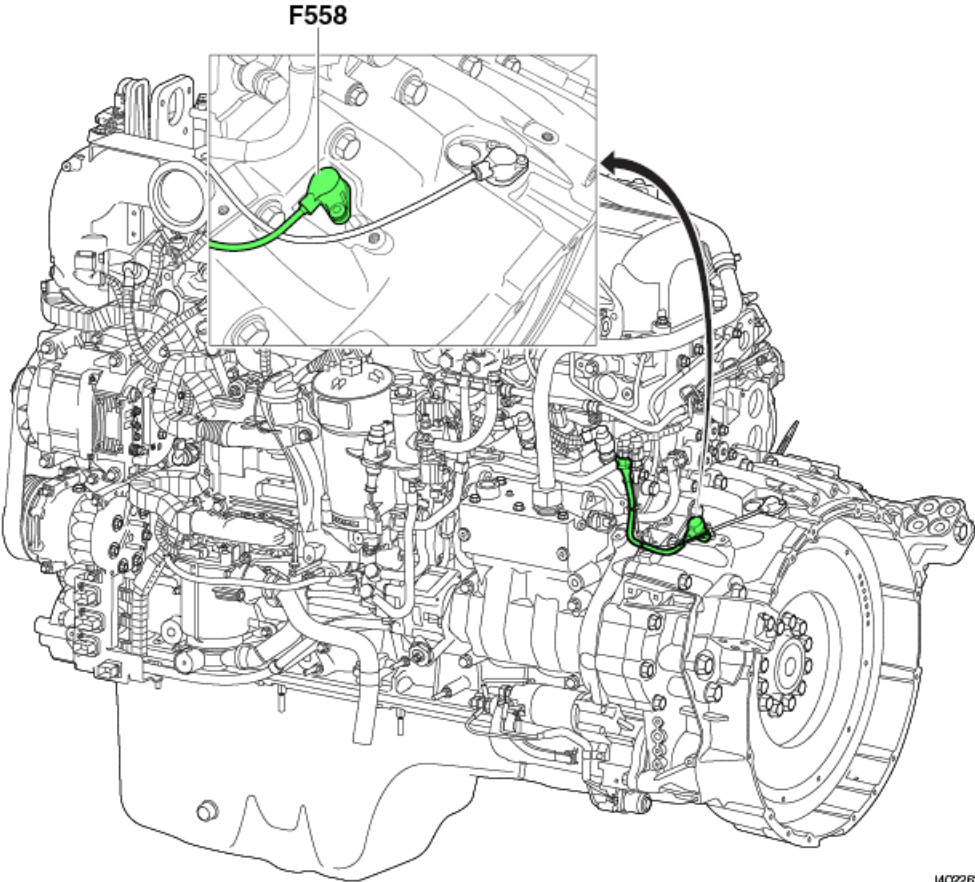
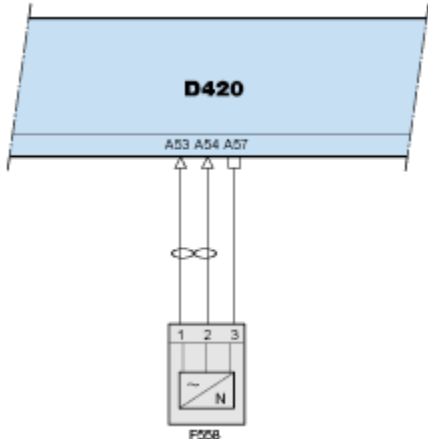


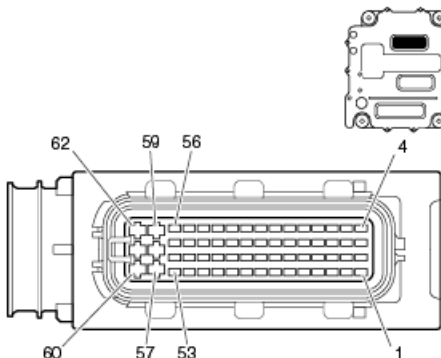
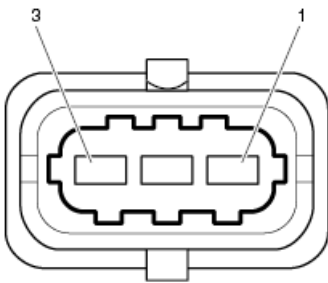
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P0016

Code number	P0016
Fault code description	Camshaft speed signal - Not corresponding with engine position
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	 1402245 Effect on the system • Cylinder detection • Synchronization during starting (together with crankshaft signal) • Monitors correct alignment between the crankshaft and the camshaft • Back up for the crankshaft signal (F552)

Location of component(s)	 I402262
Diagnostic condition	This diagnostic runs during starting.
Set condition of fault code	The PCI ECU (D420) detects that the camshaft sensor (F558) signal does not correspond to the crankshaft sensor (F552) signal (engine position) after some engine revolutions.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	 I401882

	<table><tr><th>D420</th><th>F558</th><th>Function</th></tr><tr><td>A53</td><td>1</td><td>Signal, camshaft speed</td></tr><tr><td>A54</td><td>2</td><td>Ground</td></tr><tr><td>A57</td><td>3</td><td>Shield</td></tr></table>  Wiring harness connector D420.A front view  Component connector F558	D420	F558	Function	A53	1	Signal, camshaft speed	A54	2	Ground	A57	3	Shield		
D420	F558	Function													
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A54	2	Ground													
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Technical data	Component and wiring checks, camshaft sensor (F558) Component check, camshaft sensor (F558) Preparation • Key off the ignition • Disconnect connector F558 • Measure on component connector F558 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774– 964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>0.5 V</td><td>Effective AC voltage (VAC) when engine starting</td></tr><tr><td>2.3 V</td><td>Effective AC voltage (VAC) when engine idling</td></tr><tr><td>8.0 V</td><td>Effective AC voltage (VAC) when engine at 1200 rpm</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	774– 964 Ω	Resistance value at 20°C [68°F]	0.5 V	Effective AC voltage (VAC) when engine starting	2.3 V	Effective AC voltage (VAC) when engine idling	8.0 V	Effective AC voltage (VAC) when engine at 1200 rpm
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Possible causes	• 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 • Faulty or soiled crankshaft sensor (F552) and/or camshaft sensor (F558) • Damaged flywheel and/or pulse wheel • Incorrect timing gear setting (applicable after a repair)														

Additional information	• Crankshaft sensor is used as backup to start the engine. • Engine torque is reduced 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 DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. Step 1 Investigate Related DTCs Before troubleshooting this code, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC. <table border="1"> <tr> <td colspan="2">Step 1A Investigate related DTCs</td></tr> <tr> <td colspan="2">Action</td></tr> <tr> <td colspan="2">1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.</td></tr> <tr> <td colspan="2">Are these or any other related DTCs active?</td></tr> <tr> <td colspan="2">P0017</td></tr> <tr> <td>Yes</td><td>No</td></tr> <tr> <td>Refer to the troubleshooting information for these codes before continuing with this procedure.</td><td></td></tr> <tr> <td></td><td>Go to step 2A</td></tr> </table> Step 2 Camshaft Sensor (F558) Checks <table border="1"> <tr> <td colspan="2">Step 2A Visual inspection, connections and wiring, camshaft sensor (F558)</td></tr> <tr> <td colspan="2">Action</td></tr> <tr> <td colspan="2">1. Visually inspect the associated component connections and wiring for any</td></tr> </table>	Step 1A Investigate related DTCs		Action		1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.		Are these or any other related DTCs active?		P0017		Yes	No	Refer to the troubleshooting information for these codes before continuing with this procedure.			Go to step 2A	Step 2A Visual inspection, connections and wiring, camshaft sensor (F558)		Action		1. Visually inspect the associated component connections and wiring for any	
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Action																							
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of the following:

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

Was there evidence of any of the above?

Yes

No

Correct any issues found. If the camshaft sensor (F558) is found to be damaged or broken, replace it.
Refer to Step 3A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to Step 2B.

Go to step 2B

Step 2B DAVIE Monitor, fuel release control when starting

Action

1. Use the DAVIE monitor Fuel Release Control When Starting to observe the cam-crank signal value when cranking the engine.

Is the cam-crank signal value reported as "Not synchronized"?

Yes

No

Continue to step 2C to identify which sensor is most likely causing this issue.

Cam-crank signal value is "Synchronized".

Go to step 2C

Go to step 2D

Step 2C Isolate non-synchronized sensor

Action

1. Disconnect the electronic unit fuel pumps. Then, use the DAVIE monitor Fuel Release Control When Starting to observe the engine speed value when cranking the engine.

Is there a delay in the reported engine speed from the time the engine starts to crank?

Yes

No

Possible failed crankshaft sensor. Stop this procedure and refer to the troubleshooting information for P0017.	
	Go to step 2D

Step 2D Electrical checks, resistance, camshaft sensor (F558)	
	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 Confirm the sensor resistance value as outlined in the procedure, <u>“component check, camshaft sensor (F558).”</u>	
Is the measured value within expected range?	
Yes	No
	Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate a sensor error. Refer to Step 3A to perform the corresponding repair verification cycles and rechecks.
Go to step 2E	

Step 2E Electrical checks, signal voltage, camshaft sensor (F558)	
	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 - With the ignition key OFF, disconnect the camshaft sensor. - Referring to the data in, <u>“component check, camshaft sensor (F558),”</u> use an AC voltmeter to check the effective voltage values between the signal and ground pins of the camshaft sensor, during engine start, when the engine is idling, and at an engine speed of 1200 rpm.	
Are the measured voltage values within the expected range?	
Yes	No
Continue to step 2F to check the harness for a short or open condition.	
Go to step 2F	Go to step 2G

Step 2F Electrical checks, harness continuity, camshaft sensor (F558)



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

Action

1. With ignition key set to OFF, disconnect the engine harness from the PCI. Perform continuity checks on all wires associated with the camshaft sensor (F558).

Are the measured resistance values within the expected range?

Yes

No

Suspected faulty harness. Correct any issues found or contact PACCAR Engine Support Center for confirmation before replacing the harness.

Go to step 2G

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

Step 2G Visual inspection, camshaft sensor (F558)

Action

1. With the ignition key set to OFF, remove the sensor and inspect it for any of the following:
 - Debris interference or damage to the mating surface or o-ring seal
 - Damage to the sensor
 - The incorrect sensor

Was there evidence of any of the above?

Yes

No

Correct any issues found, or replace the camshaft sensor (F558) if it was found to be damaged.
Refer to Step 3A 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 3A Repair verification cycles

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



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

Action

1. Start-up

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

Were the identified repair verification cycles able to be completed?

Yes

No

Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.

Go to step 3B

Go to step 3B

Step 3B DAVIE Diagnostics, Quick Check

Action

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

Has P0016 been cleared?

Yes

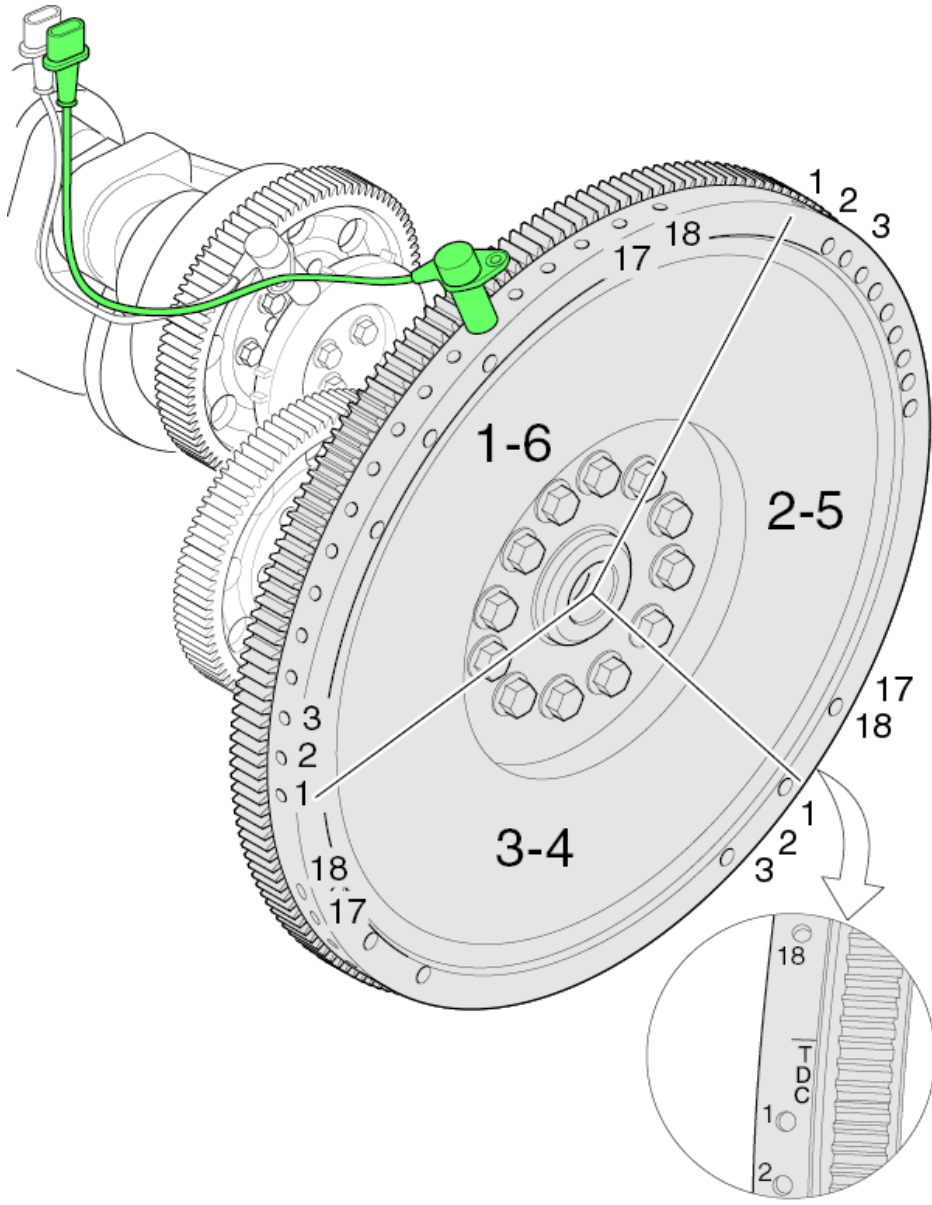
No

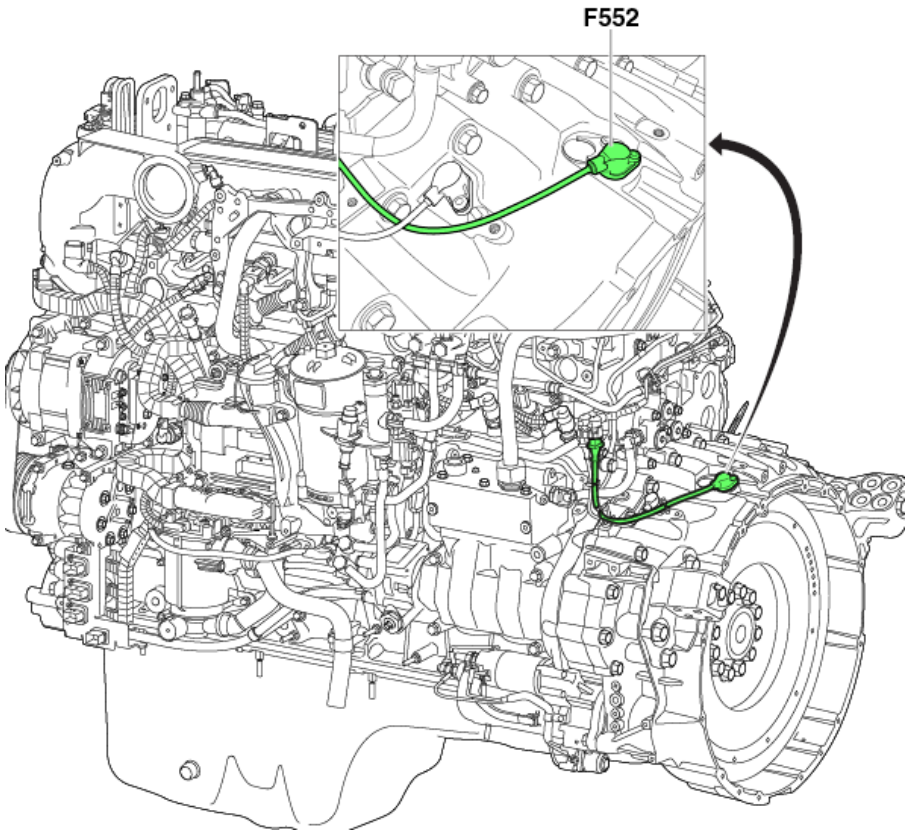
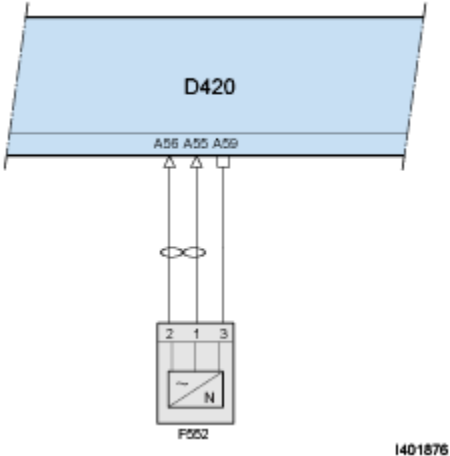
Problem resolved. No further actions.

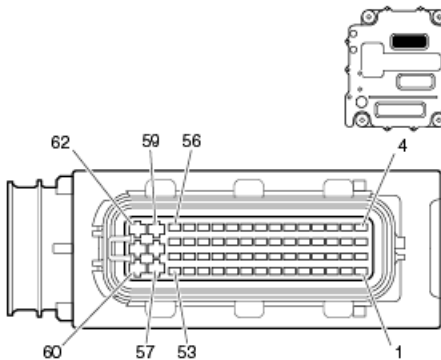
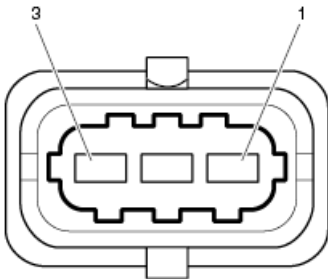
Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

	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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P0017

Code number	P0017
Fault code description	Crankshaft speed signal - Not corresponding with engine position
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
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 during starting.
Set condition of fault code	The PCI ECU (D420) detects that the crankshaft sensor (F552) signal does not correspond to the camshaft sensor (F558) signal (engine position) after some engine revolutions.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	

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Technical data	Component and wiring checks, crankshaft sensor (F552) Component check, crankshaft sensor (F552) Preparation • Key off the ignition • Disconnect connector F552 • Measure on component connector F552 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>0.5 V</td><td>Effective AC voltage (VAC) when engine starting</td></tr><tr><td>2.3 V</td><td>Effective AC voltage (VAC) when engine idling</td></tr><tr><td>8.0 V</td><td>Effective AC voltage (VAC) when engine at 1200 rpm</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	774–964 Ω	Resistance value at 20°C [68°F]	0.5 V	Effective AC voltage (VAC) when engine starting	2.3 V	Effective AC voltage (VAC) when engine idling	8.0 V	Effective AC voltage (VAC) when engine at 1200 rpm
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Possible causes	• Air gap too large between the camshaft sensor (F558) and the pulse wheel • Air gap too large between the crankshaft sensor (F552) and the flywheel • Faulty or soiled camshaft sensor (F558) and/or crankshaft sensor (F552)														

	• Damaged flywheel and/or pulse wheel • Incorrect timing gear setting (applicable after a repair)																
Additional information	• Camshaft sensor is used as backup to start the engine. • 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.  ▪ 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 DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. Step 1 Investigate Related DTCs Before troubleshooting this code, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC. <table border="1"> <tr> <td colspan="2">Step 1A Investigate related DTCs</td></tr> <tr> <td colspan="2">Action</td></tr> <tr> <td colspan="2">1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.</td></tr> <tr> <td colspan="2">Are these or any other related DTCs active?</td></tr> <tr> <td colspan="2">P0016</td></tr> <tr> <td>Yes</td><td>No</td></tr> <tr> <td>Refer to the troubleshooting information for these codes before continuing with this procedure.</td><td></td></tr> <tr> <td></td><td>Go to step 2A</td></tr> </table>	Step 1A Investigate related DTCs		Action		1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.		Are these or any other related DTCs active?		P0016		Yes	No	Refer to the troubleshooting information for these codes before continuing with this procedure.			Go to step 2A
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P0016																	
Yes	No																
Refer to the troubleshooting information for these codes before continuing with this procedure.																	
	Go to step 2A																

Step 2 Crankshaft Sensor (F552) Checks

Step 2A Visual inspection, connections and wiring, camshaft sensor (F552)

Action

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

Was there evidence of any of the above?

Yes

No

Correct any issues found. If the crankshaft sensor (F552) is found to be damaged or broken, replace it. Refer to Step 3A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to Step 2B.

Go to step 2B

Step 2B DAVIE Monitor, fuel release control when starting

Action

1. Use the DAVIE monitor Fuel Release Control When Starting to observe the cam-crank signal value when cranking the engine.

Is the cam-crank signal value reported as "Not synchronized"?

Yes

No

Continue to step 2C to identify which sensor is most likely causing this issue.

Cam-crank signal value is "Synchronized".

Go to step 2C

Go to step 2D

Step 2C Isolate non-synchronized sensor

Action

1. Disconnect the electronic unit fuel pumps. Then, use the DAVIE monitor Fuel Release Control When Starting to observe the engine speed value when cranking the engine.

Is there a delay in the reported engine speed from the time the engine starts to crank?

Yes

No

Possible failed camshaft sensor. Stop this procedure and refer to the troubleshooting information for P0016.

Go to step 2D

Step 2D Electrical checks, resistance, crankshaft sensor (F552)



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 value as outlined in the procedure, “component check, crankshaft sensor (F552).”

Is the measured value within expected range?

Yes

No

Correct any issues found, or replace the crankshaft sensor (F552) if measured values indicate a sensor error. Refer to Step 3A to perform the corresponding repair verification cycles and rechecks.

Go to step 2E

Step 2E Electrical checks, signal voltage, camshaft sensor (F552)



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

Action

1. With the ignition key OFF, disconnect the camshaft sensor.
2. Referring to the data in, “component check, camshaft sensor (F552),” use an AC voltmeter to check the effective voltage values between the signal and ground pins of the crankshaft sensor, during engine start, when the engine is idling, and at an engine speed of 1200 rpm.

Are the measured voltage values within the expected range?

Yes

No

Continue to step 2F to check the harness for a short or open condition.

Go to step 2F

Go to step 2G

Step 2F Electrical checks, harness continuity, crankshaft sensor (F552)



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

Action

1. With ignition key set to OFF, disconnect the engine harness from the PCI. Perform continuity checks on all wires associated with the crankshaft sensor (F552).

Are the measured resistance values within the expected range?

Yes

No

Suspected faulty harness. Correct any issues found or contact PACCAR Engine Support Center for confirmation before replacing the harness.

Go to step 2G

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

Step 2G Visual inspection, crankshaft sensor (F552)

Action

- With the ignition key set to OFF, remove the sensor and inspect it for any of the following:
 - Debris interference or damage to the mating surface or o-ring seal
 - Damage to the sensor
 - The incorrect sensor

Was there evidence of any of the above?

Yes

Correct any issues found, or replace the crankshaft sensor (F552) if it was found to be damaged.
Refer to Step 3A 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.

No

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 3A Repair verification cycles

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



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

Action

- 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

Go to step 3B

No

Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.

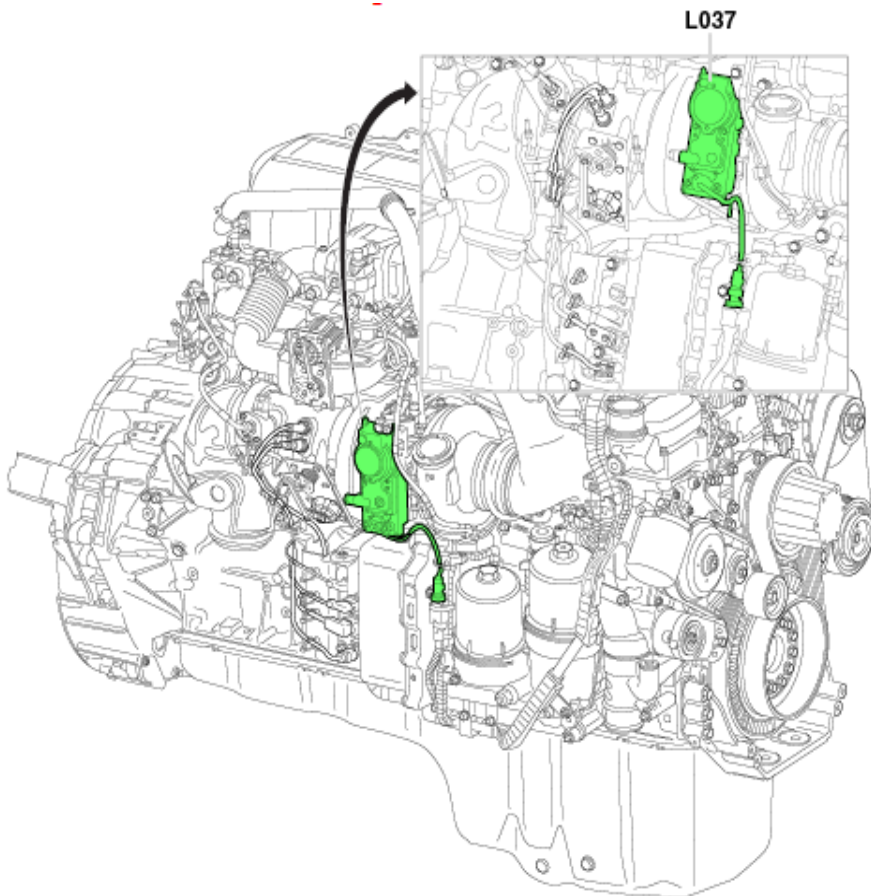
Go to step 3B

	Step 3B DAVIE Diagnostics, Quick Check	
	Action	
	1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this trouble code.	
	Has P0017 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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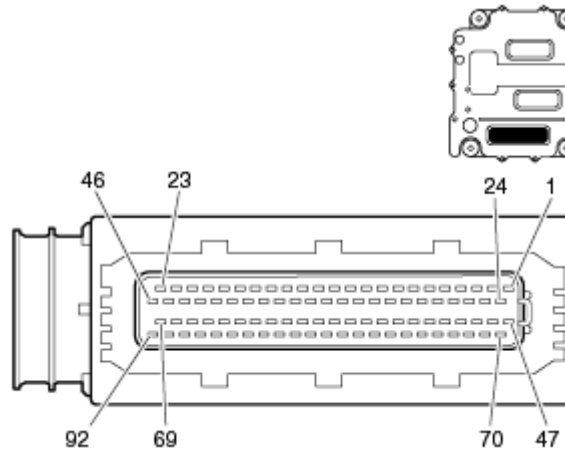
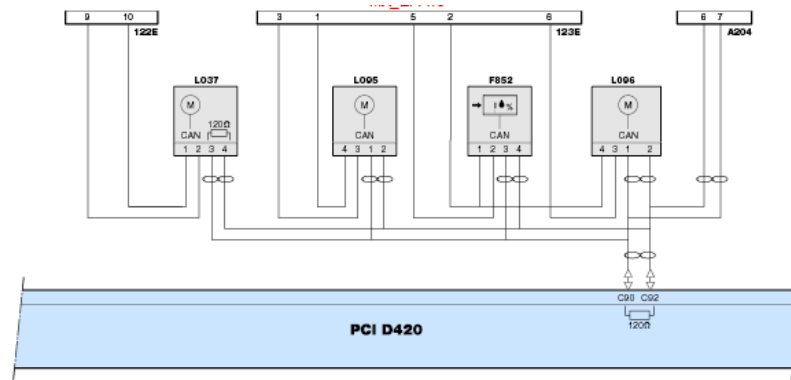
P0027

Code number	P0027
Fault code description	BPV position control fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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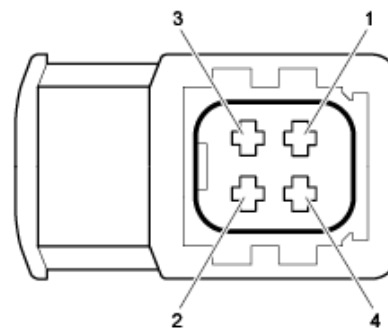
P0046

Code number	P0046
Fault code description	VTG turbo charger actuator position – Reference fault or internal error.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Boost
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: • the reference point is not detected • the end stops are out of range, or • the calibration procedure with DAVIE cannot be finished correctly, or • an internal actuator failure
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	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 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>3</td><td>4</td><td>± 120 Ω</td><td></td></tr></table> Wiring check, VTG turbocharger actuator (L037) Preparation • Key off the ignition. • Disconnect connector L037 • Measure on component connector L037 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>Ubat</td><td>Ignition keyed on</td></tr><tr><td>3</td><td>4</td><td>± 120 Ω</td><td> • Ignition keyed off • Ground cable from the battery disconnected • Vehicle Communication Interface (VCI) of DAVIE disconnected </td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	3	4	± 120 Ω		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
Pin (+ probe)	Pin (- probe)	Value	Additional information																		
3	4	± 120 Ω																			
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 installation of the actuator: no or incorrect initialization procedure run through. • Frozen actuator/nozzle ring assembly • Faulty actuator or turbo charger nozzle ring mechanism. Check the actuator and the turbo charger nozzle ring mechanism: 1. Remove the actuator. Check the sector gear travel. 1. 2.Check the actuator output gear for damage 2. Check the actuator output gear for adequate rotation (minimum of one complete rotation). 3. 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. • The position of the actuator is monitored with an internal sensor and a reference magnet (reference point). • 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 motor is switched off 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 ID046a	SRT

Update the engine software to ensure that the truck has the most recent version. Key cycle the vehicle.
Does the code remain/become active?

- Yes – Proceed to step 4.
- No – Proceed to step 2

Step 2	Step ID0046b	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 3.
- No – Proceed to step 4.

Step 3	Step ID0046c	SRT

Perform the verification procedure. Do the fault codes recur?

- Yes – Proceed to step 4.
- No – Complete repair.

Step 4	Step ID0046d	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 5.
- No – Turbo will need to be replaced.

Step 5	Step ID0046e	SRT

Check the turbo sector gear teeth for damage. Have damaged turbo sector gear teeth been found?

- Yes – Turbo will need to be replaced.
- No – Proceed to step 6

Step 6	Step ID0046f	SRT

Check the actuator output gear for damage. Is the actuator output gear damaged?

- Yes – Turbo will need to be replaced.

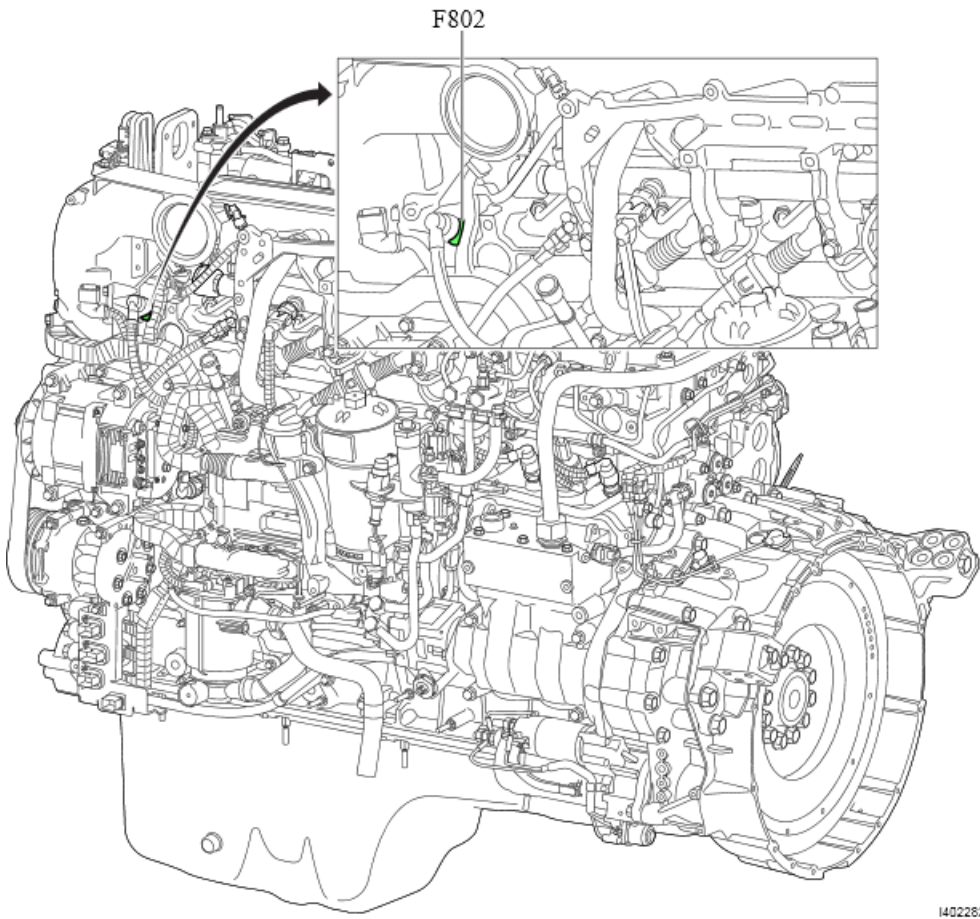
	No – Proceed to step 7.		
	Step 7	Step ID0046g	SRT
	Check the actuator output gear for adequate rotation (minimum of one complete rotation). Is the actuator output rotation adequate? - Yes – Proceed to step 8. - No – Actuator will need to be replaced.		
	Step 8	Step ID0046h	SRT
	Reinstall and reinitialize the turbo actuator. Check codes. Is P0046 still active? - Yes – Contact the Engine Support Center. - No – Proceed to the verification procedure.		
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		

P0049

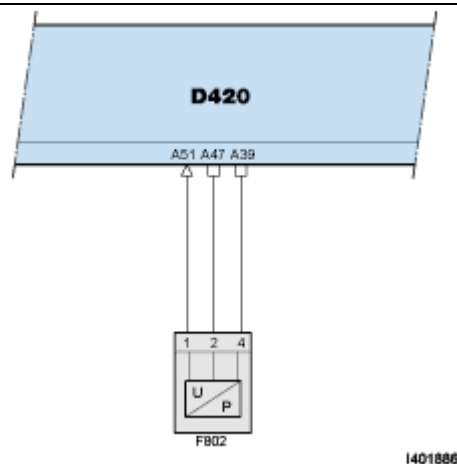
Code number	P0049
Fault code description	Air Module VGT speed over range
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set 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

P0069

Code number	P0069
Fault code description	Boost pressure - Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	Boost pressure sensor (F802) The boost pressure is measured in the inlet manifold, near cylinder 1. Effect on the system • Determines the smoke limit A higher measured boost pressure increase results in higher torque for the same smoke level • Determines soot emissions A higher measured boost pressure results in lower calculated soot emission by the engine. • Determines NOx emissions A higher measured boost pressure results in higher calculated NOx emission by the engine. • Calculates exhaust gas mass flow used for DEF dosing estimation by the EAS-3 system. A higher measured boost pressure results in higher calculated exhaust gas mass flow. • Calculates the temperature after the compressor (VTG turbo charger) A higher measured boost pressure results in higher calculated temperature after the compressor. • Calculates the temperature before the turbine. A higher measured boost pressure results in lower calculated exhaust gas temperature before the turbine.

Location of component(s)	 1402282
Diagnostic condition	This diagnostic runs: • when the ignition is keyed on (NO engine start), and • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured boost pressure differs by more than 0.17 bar [2.5 psi] from the average of other pressure sensor readings on the engine for more than 5 seconds.
Reset condition of fault code	To validate the repair, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.

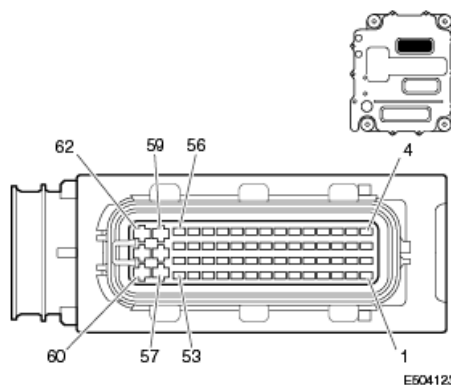
Electrical diagram(s)



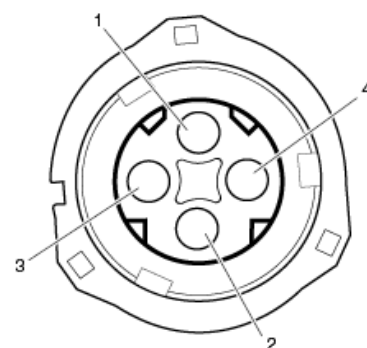
D420 PCI ECU

F802 Boost pressure sensor

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



Wiring harness connector D420.A front view



Wiring harness connector F802 front view



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

Technical data

Component check, boost pressure sensor (F802)

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

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

	Component & wiring check, ECU (D420) Preparation - Key off the ignition - Disconnect connector F802 - Measure on the front side of wiring harness connector F802 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>2</td><td>4</td><td>5V</td><td>Ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	2	4	5V	Ignition keyed on
Pin (+ probe)	Pin (- probe)	Value	Additional information						
2	4	5V	Ignition keyed on						
Possible causes	Boost pressure sensor deviation								
Additional information	For this diagnostic, the boost pressure sensor (F802) reading is compared with an average of other engine pressure sensor readings.								
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 2. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes.								

	Are these or any other related codes active? P0107; P0108; P104B; P104C	
	Yes	No
	Refer to the troubleshooting information for these codes before continuing with this procedure.	
		Go to step 2.A
	Step 2. Boost Pressure Sensor (F802) Checks	
	Step 2. A Visual inspection, boost pressure sensor (F802)	
	Action	
	2. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Batteries not fully charged or contacts are not tight • Boost pressure sensor (F801) is damaged or not installed correctly	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. If the boost pressure sensor (F801) 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 Electrical checks, supply voltage, boost pressure sensor (F802)	



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

Action

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

Is the measured value within expected range?

Yes

Possible electrical issue in the harness or boost pressure sensor (F802)

Go to step 2.D

No

Possible electrical issue in the harness or PCI ECU

Go to step 2.C

Step 2.C Electrical checks, isolation of electrical short in PCI, boost pressure sensor (F802)

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 Supply and Ground terminals on the PCI ECU.
The expected value is between 4.75 and 5.25 V.

Is the measured voltage within the expected range?

Yes

Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the engine harness.

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.

No

Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the PCI ECU.
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.

Step 2.D Electrical checks, isolation of electrical open in harness, boost pressure sensor (F802)

Action

1. Set the ignition key to OFF.
2. Disconnect the boost pressure sensor (F802) and the engine harness D420.A connector at the PCI ECU.
3. Measure the resistance value on the signal wire between the sensor connector and the D420.A connector.

Is the measured resistance less than 10 Ω ?

Yes

Replace the boost pressure sensor (F802).

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.

No

Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the engine harness.

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.

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

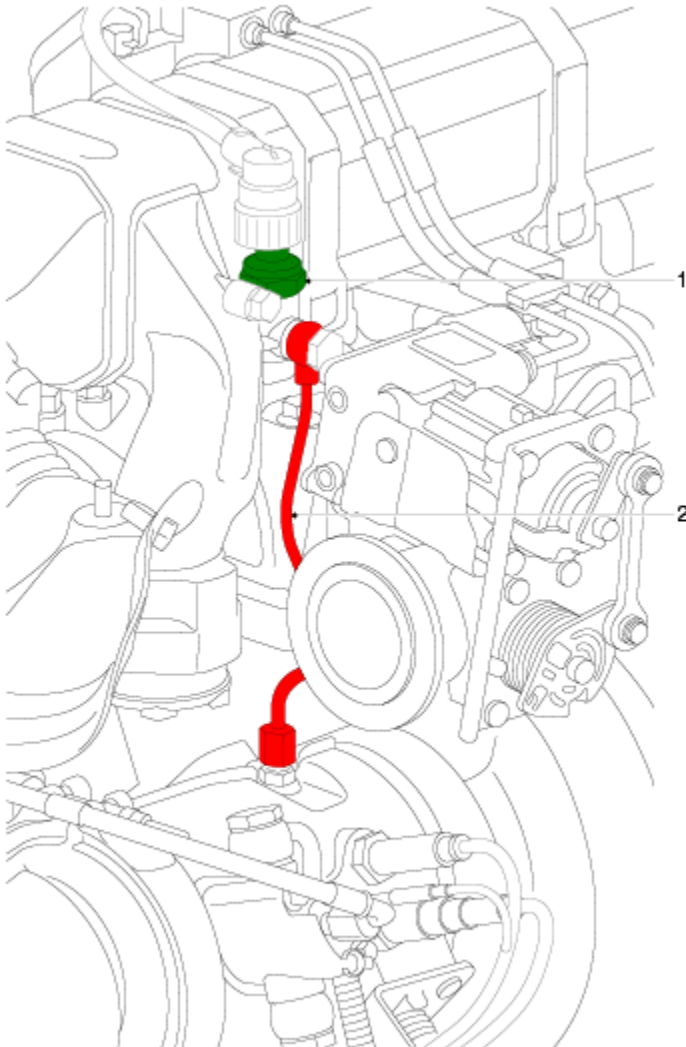
2. Power-up/electrical

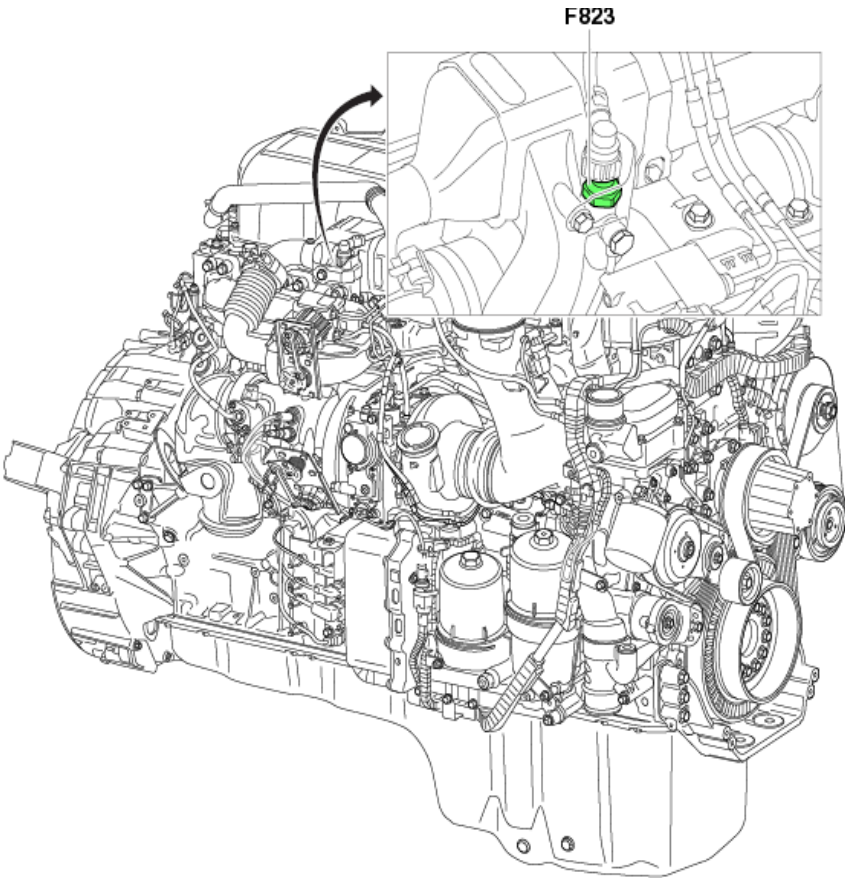
With the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics.

Were the identified repair verification cycles able to be completed?

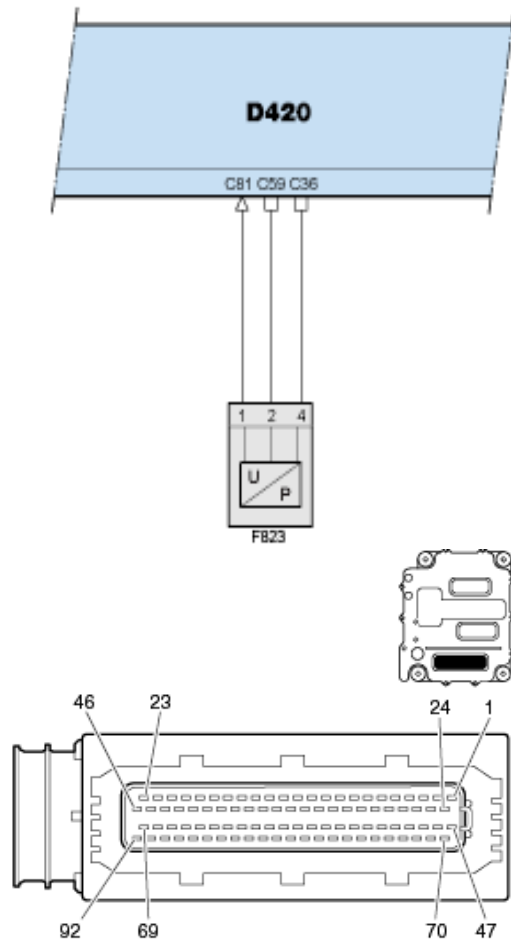
	Yes	No
		Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
	Go to step 3.B	Go to step 3.B
	Step 3.B DAVIE Diagnostics, Quick Check	
	Action	
	2. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.	
	Has P0069 been cleared?	
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.		
	Back to Index	

P006B

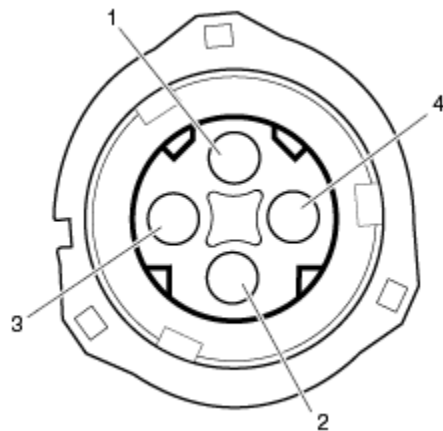
Code number	P006B
Fault code description	Pressure after BPV – Data erratic, intermittent, or incorrect at ignition ON
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 Description, pressure sensor after BPV (F823) The exhaust gas pressure after the BPV valve is measured by the sensor (1) via a steel tube (2). Effect on the system: • Correction of the NOx sensor before the catalyst signal A higher measured exhaust gas pressure after the BPV valve results in lower calculated NOx emissions by the engine. • Calculates the exhaust gas temperature before the turbine Lower measured exhaust gas pressure after the BPV valve results in higher calculated exhaust gas temperature before the turbine.

Location of component(s)	 F823
Diagnostic condition	This diagnostic runs: • when the ignition is keyed on (NO engine start), and • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured pressure after BPV differs by more than 0.07 bar [1 psi] from the average of other pressure sensors on the engine for more than 5 seconds.
Reset condition of fault code	To validate the repair, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.

Electrical diagram(s)



Wiring harness connector D420.C front view



Wiring harness connector F823 front view

D420 PCI ECU
F823 pressure sensor after BPV.

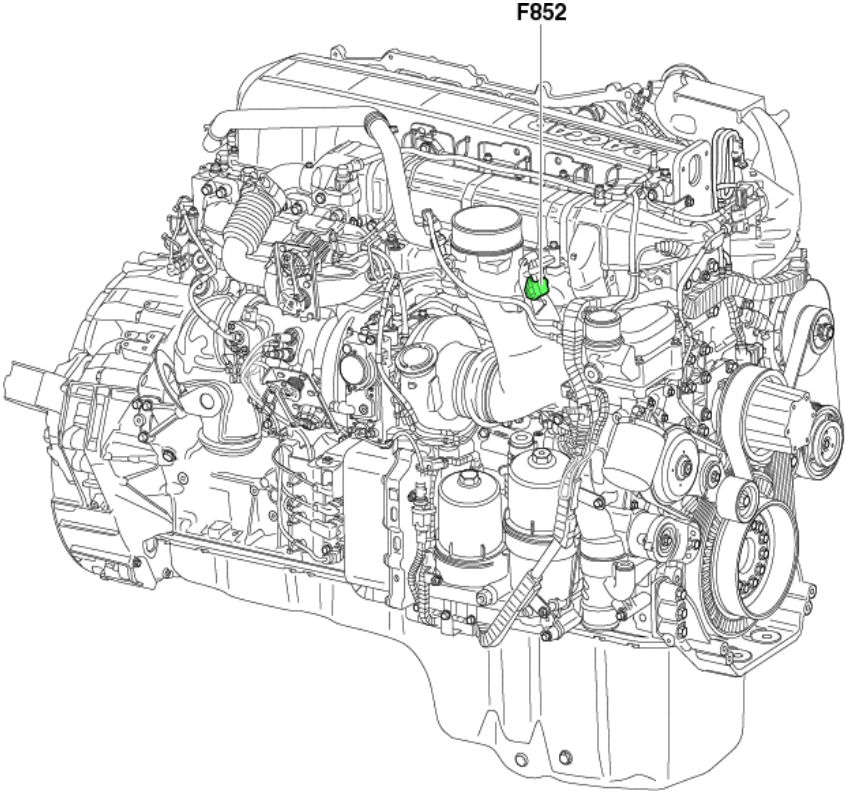
D420	F823	Function
C36	4	Ground

	C59 2 Power supply C81 1 Signal, pressure after BPV																		
Technical data	Handle connectors and pins with care and use matching measuring probes. Component & wiring check, ECU (D420) Preparation • Key off the ignition. • Disconnect connector F823 • Measure on the front side of wiring harness connector F823 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>2</td><td>4</td><td>5V</td><td>ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	2	4	5V	ignition keyed on										
Pin (+ probe)	Pin (- probe)	Value	Additional information																
2	4	5V	ignition keyed on																
Possible causes	Pressure sensor after BPV deviation																		
Additional information	For this diagnostic, the pressure sensor after BPV (F823) reading is compared with an average of other pressure sensor readings on/off the engine.																		
Diagnostic Step-by-Step	 Please perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components.  • This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly. • Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pin out locations, always refer to the technical data in Rapido. • It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido. <table><tr><td>Step 1</td><td>Step ID 006Ba</td><td>SRT</td></tr><tr><td colspan="3">With DAVIE connected and key ON, reprogram the engine basis software with the most recent PRS file. Navigate through DAVIE and monitor errors. • If the fault is still active – Proceed to step 2. • If the fault is NO longer active – Proceed to the verification procedure. </td></tr></table> <table><tr><td>Step 2</td><td>Step ID 006Bb</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 3</td></tr></table> <table><tr><td>Step 3</td><td>Step ID 006Bc</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the pressure sensor harness from the engine harness. Turn the key ON. Check the voltage between the ground terminal circuit and the supply terminal circuit at the connector harness.</td></tr></table>	Step 1	Step ID 006Ba	SRT	With DAVIE connected and key ON, reprogram the engine basis software with the most recent PRS file. Navigate through DAVIE and monitor errors. • If the fault is still active – Proceed to step 2. • If the fault is NO longer active – Proceed to the verification procedure.			Step 2	Step ID 006Bb	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 3			Step 3	Step ID 006Bc	SRT	With key OFF, disconnect the pressure sensor harness from the engine harness. Turn the key ON. Check the voltage between the ground terminal circuit and the supply terminal circuit at the connector harness.		
Step 1	Step ID 006Ba	SRT																	
With DAVIE connected and key ON, reprogram the engine basis software with the most recent PRS file. Navigate through DAVIE and monitor errors. • If the fault is still active – Proceed to step 2. • If the fault is NO longer active – Proceed to the verification procedure.																			
Step 2	Step ID 006Bb	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 3																			
Step 3	Step ID 006Bc	SRT																	
With key OFF, disconnect the pressure sensor harness from the engine harness. Turn the key ON. Check the voltage between the ground terminal circuit and the supply terminal circuit at the connector harness.																			

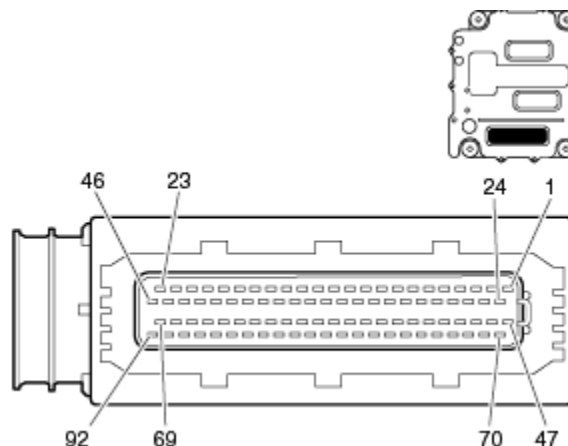
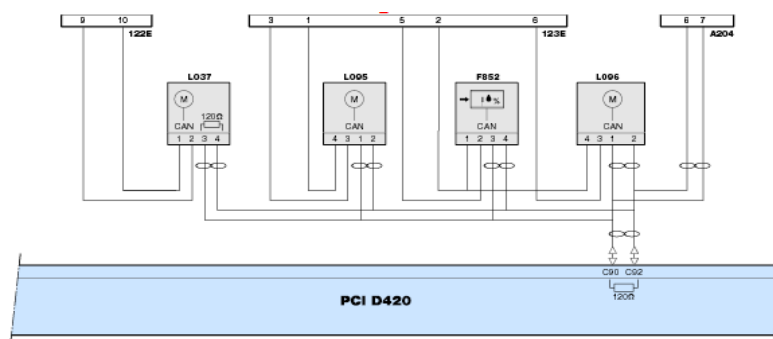
	• If the voltage measured is between 4.75 volts and 5.25 volts – Proceed to step 6. • If the voltage measured is NOT between 4.75 volts and 5.25 volts – Proceed to step 4.			
	<table><tr><td>Step 4</td><td>Step ID 006Bd</td><td>SRT</td></tr></table> With key OFF, disconnect the engine harness connector at the PCI. Turn the key ON. Check the voltage between the ground terminal circuit and the supply terminal circuit on the PCI. • If the voltage measured is between 4.75 volts and 5.25 volts – Proceed to step 6. • If the voltage measured is NOT between 4.75 volts and 5.25 volts – Proceed to step 5.	Step 4	Step ID 006Bd	SRT
	Step 4	Step ID 006Bd	SRT	
	<table><tr><td>Step 5</td><td>Step ID 006Be</td><td>SRT</td></tr></table> Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.	Step 5	Step ID 006Be	SRT
	Step 5	Step ID 006Be	SRT	
<table><tr><td>Step 6</td><td>Step ID 006Bf</td><td>SRT</td></tr></table> With key OFF, disconnect the pressure sensor and the engine harness at the PCI. Check the resistance on the signal wire between the engine harness connector and the sensor connector. • If the resistance measured is LESS than 10 ohms – Proceed to step 7 • If the resistance measured is GREATER than 10 ohms – Replace the harness and proceed to the verification procedure	Step 6	Step ID 006Bf	SRT	
Step 6	Step ID 006Bf	SRT		
<table><tr><td>Step 7</td><td>Step ID 006Bg</td><td>SRT</td></tr></table> With key OFF, replace the pressure sensor. • If the fault is still active – Proceed to step 5. • If the fault is NO longer active – Proceed to the verification procedure.	Step 7	Step ID 006Bg	SRT	
Step 7	Step ID 006Bg	SRT		
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			

P006C

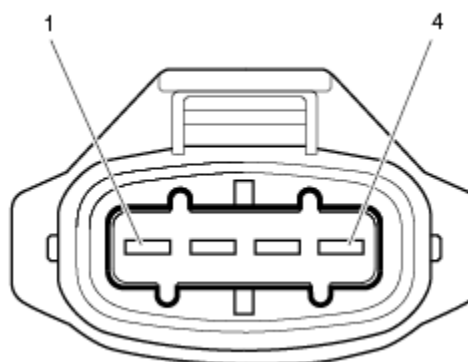
Code number	P006C
Fault code description	Pressure before turbo (humidity sensor) – Data erratic, intermittent, or incorrect at ignition on.
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The humidity sensor is a smart sensor that communicates with the PCI ECU via E-CAN. The sensor measures the following three properties of the drawn in precompressor (VTG turbo charger) air in the inlet air pipe: • Relative humidity • Pressure • Temperature Relative humidity • The relative humidity refers to the moisture content percentage of the air compared with the saturated moisture level at the same temperature and pressure. Effect on the system: • Determines NOx emissions • Higher measured relative humidity results in a lower calculated NOx emission. Precompressor temperature Effect on the system: • Determines soot emissions Higher measured precompressor temperature results in lower calculated soot formation in the engine. • Calculates exhaust gas pressure before the turbine; Higher measured precompressor temperature results in lower calculated exhaust gas pressure before the turbine. • Limits the maximum engine torque; for example, to limit the cylinder pressures during cold ambient conditions or driving at high altitudes. • Determines turbocharger compressor flow and thus the detection of VTG surge Surge can typically occur at high compressor pressure ratios and low compressor mass flows. • Calculates the temperature after the turbocharger compressor Higher measured precompressor temperature results in higher calculated temperature after the turbocharger compressor. Precompressor pressure Effect on the system: • Corrects pressure before turbine Higher measured precompressor pressure results in higher calculated exhaust gas pressure before the turbine. • Determines soot emissions Higher measured precompressor pressure results in lower calculated soot formation in the engine. • Calculates the temperature after the turbocharger compressor Lower measured precompressor pressure results in higher calculated temperature after the turbocharger compressor.

	- Limits the maximum engine torque when driving at high altitudes (low air density) Lower measured precompressor pressure results in higher engine torque reduction. - Detects VTG surge, the sensor is used to determine the compressor pressure ratio; surge can typically occur at high compressor pressure ratios and low compressor mass flows.
Location of component(s)	
Diagnostic condition	This diagnostic runs: - when the ignition is keyed on (NO engine start), and - ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured pressure reading of the humidity sensor differs by more than 0.06 bar [0.9 psi] from the average of other pressure sensor readings on the engine for more than 5 seconds.
Reset condition of fault code	To validate the repair, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.

Electrical diagram(s)



Wiring harness connector D420.C front view



Wiring harness connector F852 front view

122E 12-pin interface connector
 123E 7-pin interface connector
 A204 electronic fan interface connector
 D420 PCI ECU
 F852 humidity sensor
 L037 VTG turbocharger actuator
 L095 EGR valve module
 L096 BPV valve

D420	F852	Function
C90	3	E-CAN high

	C92 4 E-CAN low 1 Power supply after ignition 2 Ground																
Technical data	Component & wiring check, humidity sensor (F852) Preparation Key off the ignition. Disconnect connector F852 Measure on the front side of wiring harness connector F852 <table><tr><td>Pin</td><td>Pin</td><td></td><td></td></tr><tr><td>(+ probe)</td><td>(- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>Ubat</td><td>ignition keyed on</td></tr><tr><td>3</td><td>4</td><td>± 60 Ω</td><td> Ignition keyed off Ground cable from the battery disconnected Vehicle Communication Interface (VCI) of DAVIE disconnected </td></tr></table>	Pin	Pin			(+ probe)	(- probe)	Value	Additional information	1	2	Ubat	ignition keyed on	3	4	± 60 Ω	Ignition keyed off Ground cable from the battery disconnected Vehicle Communication Interface (VCI) of DAVIE disconnected
Pin	Pin																
(+ probe)	(- probe)	Value	Additional information														
1	2	Ubat	ignition keyed on														
3	4	± 60 Ω	Ignition keyed off Ground cable from the battery disconnected Vehicle Communication Interface (VCI) of DAVIE disconnected														
Possible causes	Humidity sensor deviation																
Additional information	The humidity sensor is a smart sensor that communicates with the PCI ECU via E-CAN. The sensor measures the following three properties of the drawn in precompressor (VTG turbo charger) air in the inlet air pipe: Relative humidity Pressure Temperature For this diagnostic, the pressure reading of the humidity sensor (F852) is compared with an average of other engine pressure sensor readings.																
Diagnostic Step-by-Step	Please perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components. This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly. Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. For specific electrical component information and pin out locations, always refer to the technical data in Rapido. It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors. Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido. <table><tr><td>Step 1</td><td>Step ID 006C-a</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>	Step 1	Step ID 006C-a	SRT	Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.												
Step 1	Step ID 006C-a	SRT															
Visual inspection - Visually inspect all applicable connectors and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.																	

	<table><tr><td>Step 2</td><td>Step ID 006C-b</td><td>SRT</td></tr><tr><td colspan="3">Visual Inspection: Pressure sensor before turbo Visually inspect the identified component for any of the following: - Moisture or excessive build-up Was there evidence of any of the above? - Yes - Proceed to step 3 - No - Proceed to step 4 </td></tr></table>	Step 2	Step ID 006C-b	SRT	Visual Inspection: Pressure sensor before turbo Visually inspect the identified component for any of the following: - Moisture or excessive build-up Was there evidence of any of the above? - Yes - Proceed to step 3 - No - Proceed to step 4		
	Step 2	Step ID 006C-b	SRT				
	Visual Inspection: Pressure sensor before turbo Visually inspect the identified component for any of the following: - Moisture or excessive build-up Was there evidence of any of the above? - Yes - Proceed to step 3 - No - Proceed to step 4						
	<table><tr><td>Step 3</td><td>Step ID 006C-c</td><td>SRT</td></tr><tr><td colspan="3">Repairs or appropriate component replacements and use DAVIE to re-check for the presence of active faults. - Fault inactive – issue resolve - Fault active - Proceed to step 4 </td></tr></table>	Step 3	Step ID 006C-c	SRT	Repairs or appropriate component replacements and use DAVIE to re-check for the presence of active faults. - Fault inactive – issue resolve - Fault active - Proceed to step 4		
	Step 3	Step ID 006C-c	SRT				
Repairs or appropriate component replacements and use DAVIE to re-check for the presence of active faults. - Fault inactive – issue resolve - Fault active - Proceed to step 4							
<table><tr><td>Step 4</td><td>Step ID 006C-d</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 5 - No - Proceed to step 6 </td></tr></table>	Step 4	Step ID 006C-d	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 4	Step ID 006C-d	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							
<table><tr><td>Step 5</td><td>Step ID 006C-e</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 6 </td></tr></table>	Step 5	Step ID 006C-e	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 5	Step ID 006C-e	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							
<table><tr><td>Step 4</td><td>Step ID 006C-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 Engine Support Call Center at 1-800-477-0251.</td></tr></table>	Step 4	Step ID 006C-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.			
Step 4	Step ID 006C-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, 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						

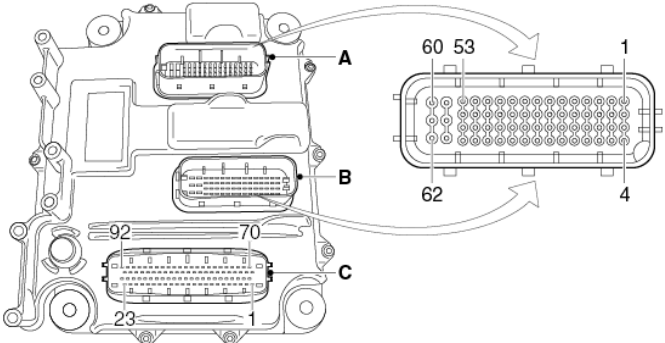
P0071

Code number	P0071
Fault code description	Ambient air temperature rate of change fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P0072

Code number	P0072
Fault code description	Ambient air temperature under range fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0073

Code number	P0073																																																						
Fault code description	Ambient temperature – Voltage too high or short circuit to supply on ECU D420 pin C78																																																						
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive																																																						
Description of component(s)	Refer to the OEM service manual for more information.																																																						
Location of component(s)	Refer to the OEM service manual for more information.																																																						
Diagnostic condition	When sensor output voltage is too high (above 4.89 V)																																																						
Set condition of fault code	The PCI detects the sensor output voltage is too high (above 4.99 V) or too low (below 3.99 V).																																																						
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.																																																						
Electrical diagram(s)	 A Electronic unit connection point B Description of connection point C Reading at connection point (Ubat = battery voltage) D Measuring unit E Explanatory notes (if applicable) F The 'X' indicates that additional information is available in 'Technical Data.'																																																						
Technical data	<table><tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr><tr><td>C56</td><td>Ground, ambient temperature sensor (F748)</td><td>0</td><td>VDC</td><td></td><td></td></tr><tr><td>C78</td><td>Input signal, ambient temperature sensor (F748)</td><td>5</td><td>VDC</td><td>Open voltage, with detached connector</td><td>X</td></tr><tr><td colspan="2">Temperature (°F (°C))</td><td colspan="2">Resistance (KΩ)</td><td colspan="2"></td></tr><tr><td colspan="2"></td><td>Minimum</td><td></td><td>Maximum</td><td></td></tr><tr><td colspan="2">-40 (-40)</td><td>315</td><td></td><td>336</td><td></td></tr><tr><td colspan="2">-22 (-30)</td><td>177</td><td></td><td>188</td><td></td></tr><tr><td colspan="2">-4 (-20)</td><td>92</td><td></td><td>102</td><td></td></tr><tr><td colspan="2">14 (-10)</td><td>53</td><td></td><td>57</td><td></td></tr></table>	A	B	C	D	E	F	C56	Ground, ambient temperature sensor (F748)	0	VDC			C78	Input signal, ambient temperature sensor (F748)	5	VDC	Open voltage, with detached connector	X	Temperature (°F (°C))		Resistance (KΩ)						Minimum		Maximum		-40 (-40)		315		336		-22 (-30)		177		188		-4 (-20)		92		102		14 (-10)		53		57	
A	B	C	D	E	F																																																		
C56	Ground, ambient temperature sensor (F748)	0	VDC																																																				
C78	Input signal, ambient temperature sensor (F748)	5	VDC	Open voltage, with detached connector	X																																																		
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	<table><tr><td>32 (0)</td><td>31.3</td><td>34</td></tr><tr><td>50 (10)</td><td>19.2</td><td>20.6</td></tr><tr><td>68 (20)</td><td>12.1</td><td>12.8</td></tr><tr><td>77 (25)</td><td>9.7</td><td>10.3</td></tr><tr><td>86 (30)</td><td>7.8</td><td>8.3</td></tr><tr><td>104 (40)</td><td>5.1</td><td>5.5</td></tr><tr><td>122 (50)</td><td>3.5</td><td>3.7</td></tr><tr><td>140 (60)</td><td>2.3</td><td>2.5</td></tr><tr><td>158 (70)</td><td>1.7</td><td>1.8</td></tr><tr><td>176 (80)</td><td>1.2</td><td>1.3</td></tr></table>	32 (0)	31.3	34	50 (10)	19.2	20.6	68 (20)	12.1	12.8	77 (25)	9.7	10.3	86 (30)	7.8	8.3	104 (40)	5.1	5.5	122 (50)	3.5	3.7	140 (60)	2.3	2.5	158 (70)	1.7	1.8	176 (80)	1.2	1.3
32 (0)	31.3	34																													
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140 (60)	2.3	2.5																													
158 (70)	1.7	1.8																													
176 (80)	1.2	1.3																													
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. <table><tr><td>Step 1</td><td>Step ID 0073a</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 0073b</td><td>SRT</td></tr><tr><td colspan="3">With Key OFF, disconnect the engine harness from the sensor. Turn the Key ON, measure supply voltage on the harness: - If the voltage measures above 5.5 volts – Proceed to step 8 - If the voltage measures below 5.5 volts – Proceed to step 3 </td></tr></table> <table><tr><td>Step 3</td><td>Step ID 0073c</td><td>SRT</td></tr><tr><td colspan="3">With DAVIE connected, the Key ON, and harness disconnected at the sensor, install a jumper wire between the supply and ground wires of the ambient air temperature circuit on the engine harness connector and navigate through DAVIE to read errors. - If (Active Low Code) – Replace sensor and reconnect harness, then proceed to the verification procedure listed at the end of this document </td></tr></table>	Step 1	Step ID 0073a	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 0073b	SRT	With Key OFF, disconnect the engine harness from the sensor. Turn the Key ON, measure supply voltage on the harness: - If the voltage measures above 5.5 volts – Proceed to step 8 - If the voltage measures below 5.5 volts – Proceed to step 3			Step 3	Step ID 0073c	SRT	With DAVIE connected, the Key ON, and harness disconnected at the sensor, install a jumper wire between the supply and ground wires of the ambient air temperature circuit on the engine harness connector and navigate through DAVIE to read errors. If (Active Low Code) – Replace sensor and reconnect harness, then proceed to the verification procedure listed at the end of this document														
Step 1	Step ID 0073a	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 0073b	SRT																													
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Step 3	Step ID 0073c	SRT																													
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	• If (Active High Code) – Proceed to step 4.
Step 4	Step ID 0073d SRT With DAVIE connected and Key ON, disconnect the engine harness connector A142 from the OEM engine harness and install a jumper wire between supply and ground terminals of the air ambient temperature sensor circuit on the C harness connector. • If (Active Low Code) – Proceed to step 6. • If (Active High Code) – Proceed to step 5.
Step 5	Step ID 0073e SRT With DAVIE connected, the Key ON, and the C connector disconnected from the PCI, install a jumper wire between supply and ground terminals of the ambient air temperature sensor circuit on the PCI and navigate to read errors: • If (Active Low Code) – Replace engine harness and proceed to the verification procedure • If (Active High Code) – Proceed to step 7
Step 6	Step ID 0073f SRT The electrical problem resides in the OEM harnesses on the signal or ground wire of the ambient air temperature sensor circuit located between the ambient temperature sensor and the C connector engine harness. With the proper OEM diagram, check for a short to voltage, open-circuit, or high resistance due to corrosion.
Step 7	Step ID 0073g SRT Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the ECU.
Step 8	Step ID 0073h SRT With DAVIE connected and Key ON, disconnect the engine harness connector A142 from the OEM engine harness, and measure the voltage at the air ambient temperature supply terminal on the C harness connector. • If the voltage measures above 5.5 volts – Proceed to step 9 • If the voltage measures below 5.5 volts – Proceed to step 6
Step 9	Step ID 0073i SRT With DAVIE connected, the Key ON, and the C connector disconnected from the PCI, measure the voltage at the supply terminal of the ambient air temperature sensor circuit. • If the voltage measures above 5.5 volts – Proceed to step 7 • If the voltage measures below 5.5 volts – Replace engine harness and proceed to the verification procedure
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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P0075

Code number	P0075
Fault code description	Air Shutdown Actuator Open Circuit
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0076

Code number	P0076
Fault code description	Air Shutdown Actuator short circuit low
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0077

Code number	P0077
Fault code description	Air Shutdown Actuator short circuit high
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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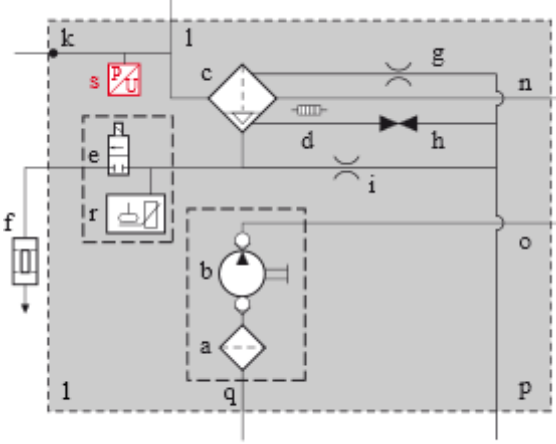
P0079

Code number	P0079
Fault code description	BPV sensor position out of range low fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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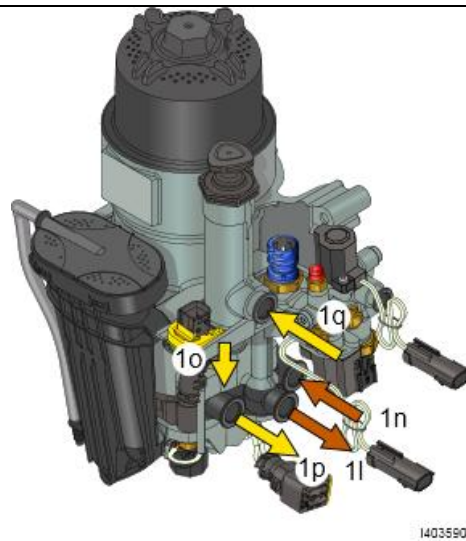
P0080

Code number	P0080
Fault code description	BPV sensor position out of range high fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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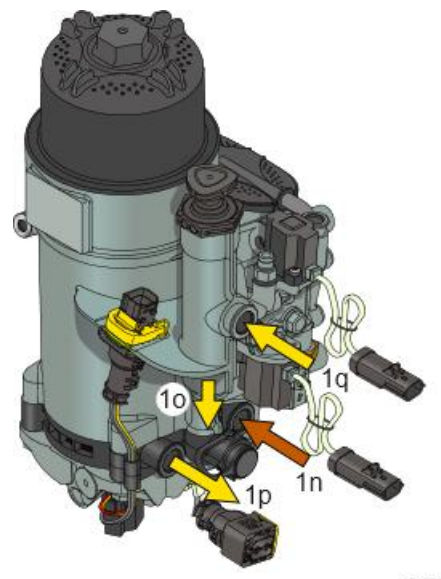
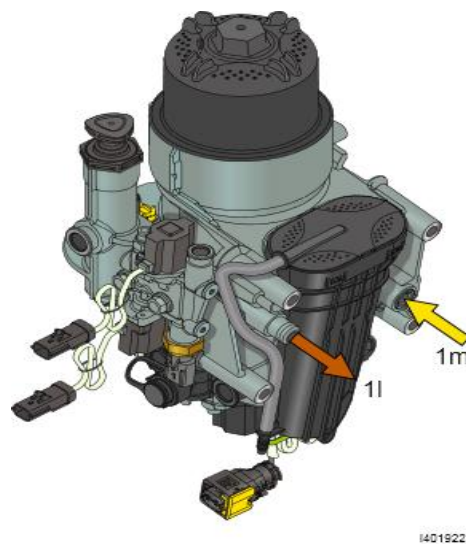
P0087

Code number	P0087
Fault code description	Fuel pressure - Data valid but too low, most severe
Fault code information	1 trip Stop Engine lamp 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	Fuel pressure sensor (F801) The low-pressure fuel pressure is measured at the end of the low-pressure fuel supply gallery. Effect on the system: - Limitation of the engine torque when the fuel pressure is too low. Fuel temperature sensor (F803) The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: - Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). - Limitation of the engine torque when the fuel temperature is too high. Fuel filtration module (L097) Hydraulic overview MX-11  1 "Fuel filtration module (L097)" 1a "Fuel sieve" 1b "Hand priming pump" 1c Filter and water separator element 1d Fuel heater 1e "Water drain valve" 1f "Activated Carbon canister" 1g Orifice for bleeding 1h Drain line (filter change) 1i Water overflow (redundancy) 1403589

	1r "Water in fuel sensor" The main components of the fuel filtration module are: • prefilter • hand priming pump • fine filter/water separator • fuel heater • water-in-fuel sensor/water drain valve • Activated Carbon filter • (MX-11) Fuel pressure sensor Prefilter This suction side filter is a 300 micron filter. The filter contains two non-return valves that are necessary for operation of the priming pump. Hand priming pump The hand priming pump must be screwed out before it can be operated. File filter/water separator element The filter/water separator is a combined filter element. The element has the no filter-no run feature. The absence of the filter element results in non-starting of the engine. The use of a non-original filter results in severely reduced engine performance. The fine filter is a 3 micron filter. Fuel heater The fuel heater is a 300-W self-regulating heater (bi-metal switch and PTC). The heater switches ON below $+2 \pm 5^{\circ}\text{C}$ and switches OFF above $+24 \pm 5^{\circ}\text{C}$. Water-in-fuel sensor/water drain valve The water-in-fuel sensor/water drain valve is a combined component. The water level in the lower bowl is sensed by the water-in-fuel sensor. If water is present the PCI ECU activates the water drain valve for 1 second to open the entrance to the AC filter canister. A safety valve (floating ball) prevents external drainage of fuel. Activated carbon filter When the AC canister is full, the clean water is drained to the environment. Fuel pressure sensor MX-11 Connections



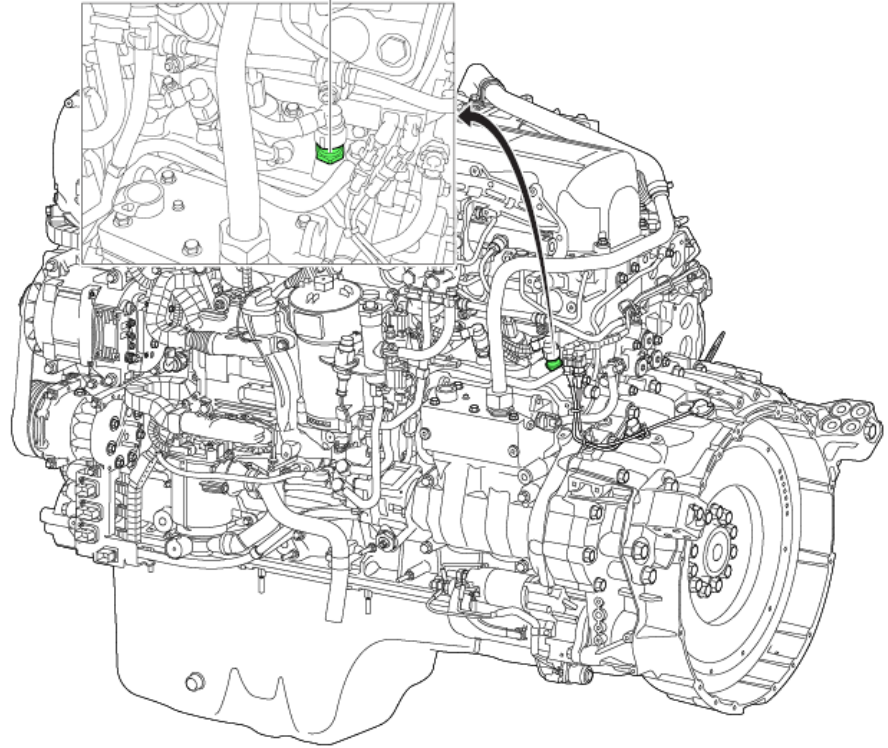
MX-13 Connections



Location of component(s)

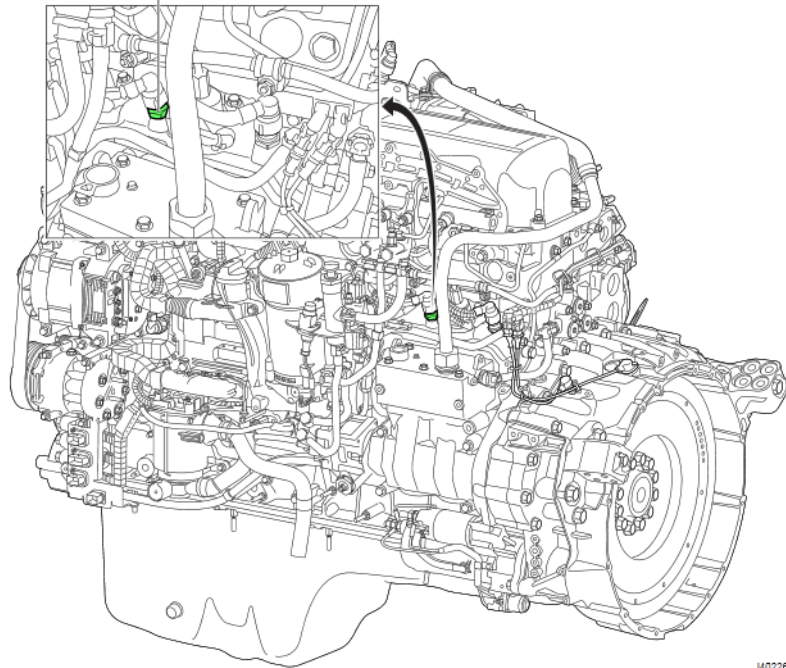
Fuel pressure sensor (F801)

F801



Fuel temperature sensor (F803)

F803

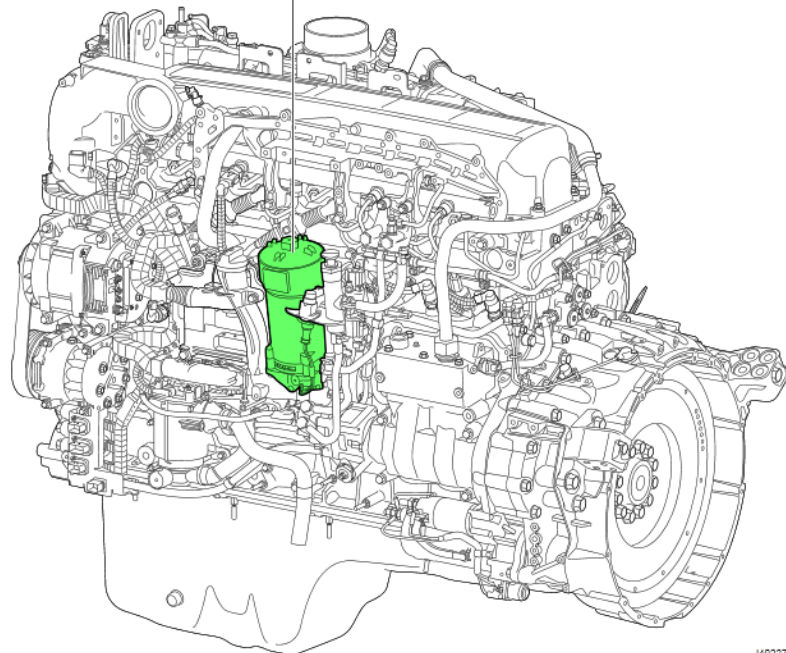


1402264

Fuel filtration module (L097)

MX_EPA13, MX-13

L097



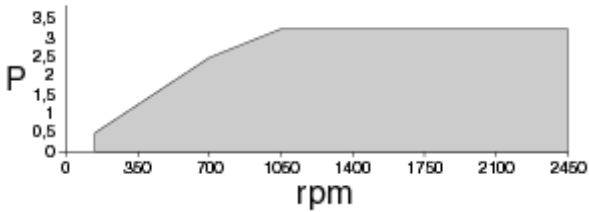
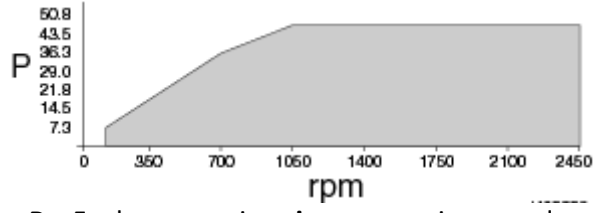
1402279

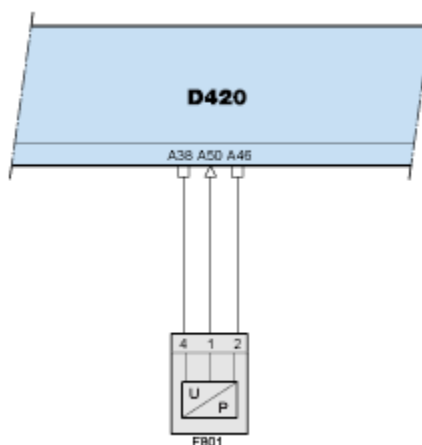
Diagnostic condition

This diagnostic runs when the engine is running for more than 200 seconds.

Set condition of fault code

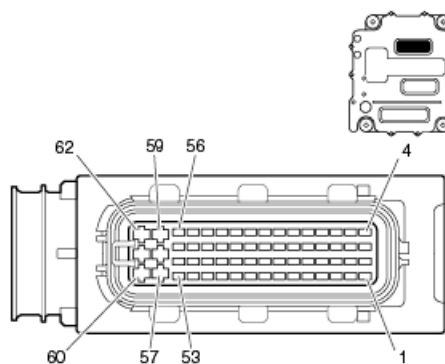
The PCI ECU (D420) detects that the fuel pressure is too low (gray area of the graph)

	for more than 25 seconds.  P = Fuel pressure in bar; rpm = engine speed  P = Fuel pressure in psi; rpm = engine speed
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, then key on again. Start the engine and operate it at several engine speeds of the engine speed range for more than 25 seconds. This code cannot be cleared from the ECU memory
Electrical diagram(s)	Checking data, fuel pressure sensor (F801)

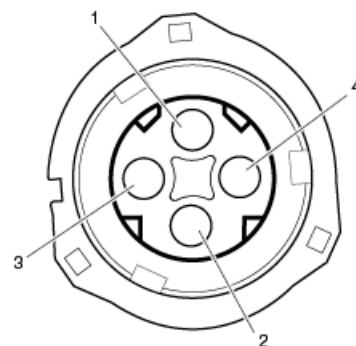


I401884

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



**Wiring harness connector D420.A
front view**



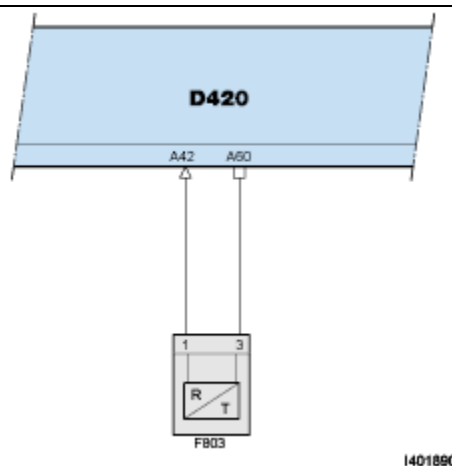
**Wiring harness connector F801
front view**

E504115



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

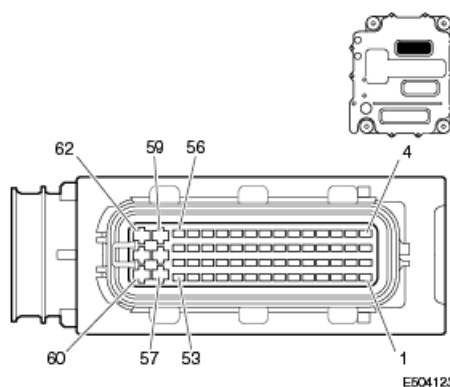
Checking data, fuel temperature sensor (F803)



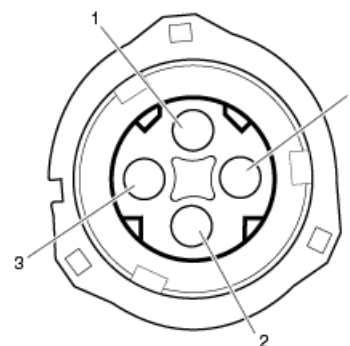
D420 PCI ECU

F803 Fuel temperature sensor

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



Wiring harness connector D420.A front view



Wiring harness connector F803 front view



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

Technical data

Component and wiring check, fuel pressure sensor (F801)

Component check, fuel pressure sensor (F801)

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

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

Component & wiring check, ECU (D420)

Preparation

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

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

Component check, fuel temperature sensor (F803)

Preparation

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

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

Component & wiring check, ECU (D420)

Preparation

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

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

Possible causes

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

Items to check:

- The position of the nonreturn valves and the cleanliness of the fuel sieve in the hand primer pump, using the job, “replace strainer (Fuel system)”, job ID

	66976.” Fuel pressure according to the job, “<u>check fuel system low pressure (Fuel system), job ID 68720.</u>”												
Additional information	- The low-pressure fuel pressure is measured by the fuel pressure sensor (F801). - Engine torque is reduced (derate) with this DTC 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. One or multiple other codes could have been the cause for this code. <table><tr><th colspan="2">Step 1.A Investigate related trouble codes</th></tr><tr><td colspan="2"> Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. </td></tr><tr><td colspan="2"> Are these or any other related codes active? P2541; P2542 </td></tr><tr><td>Yes</td><td>No</td></tr><tr><td colspan="2"> Refer to the troubleshooting information for these codes before continuing with this procedure. </td></tr><tr><td colspan="2"> Go to step 2.A </td></tr></table>	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? P2541; P2542		Yes	No	Refer to the troubleshooting information for these codes before continuing with this procedure.		Go to step 2.A	
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? P2541; P2542													
Yes	No												
Refer to the troubleshooting information for these codes before continuing with this procedure.													
Go to step 2.A													

Step 2. Fuel System, Low Pressure Checks

Step 2.A Visual inspection, connections and wiring, fuel pressure (F801) and fuel temperature (F803) sensors

Action

1. Visually inspect the associated component connections and wiring for any of the following:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - The correct parts are not installed
 - ECU connections are damaged or disconnected
 - Battery not fully charged or contacts not tight
 - Fuel pressure sensor (F801)
 - Fuel temperature sensor (F803) broken or not installed correctly

Was there evidence of any of the above?

Yes

No

Correct any issues found. If the fuel pressure sensor (F801) or the fuel temperature sensor (F803) 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, fuel pressure

Action

1. Ensure the ignition switch has been set to OFF.
3. Disconnect and remove the fuel temperature sensor (F803).
4. Install a pressure gauge at the fuel temperature sensor (F803) port.
5. Set the ignition switch to ON.
6. Note the fuel pressure readings at 650 rpm and at 2100 rpm.
7. Use DAVIE to monitor the fuel pressure values at the same engine speeds.

8. Compare the monitored pressure values.

The expected results should be within the following pressure ranges:

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

Are the compared fuel pressure values within the expected range?

Yes

No

Possible obstruction or leakage in the fuel supply.

Go to step 2.C

Go to step 2.C

Step 2.C Visual inspection, low pressure circuit

Action

1. Inspect the low pressure side of the fuel system for any of the following:



*For additional information related to some of these check points, see “[replace fuel filter element \(Fuel system\)](#), job ID 66433.”

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

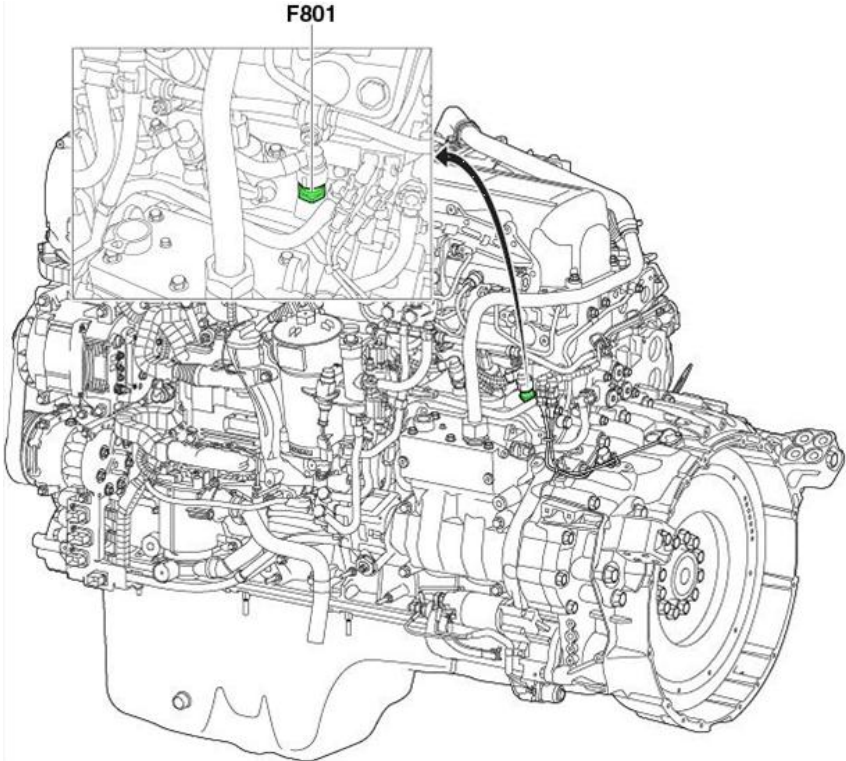


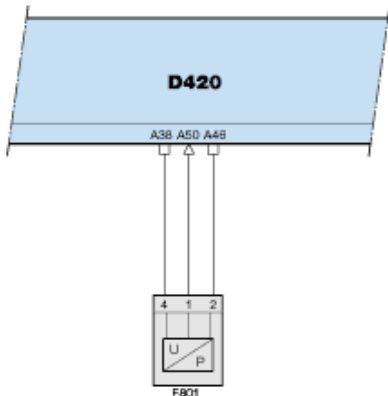
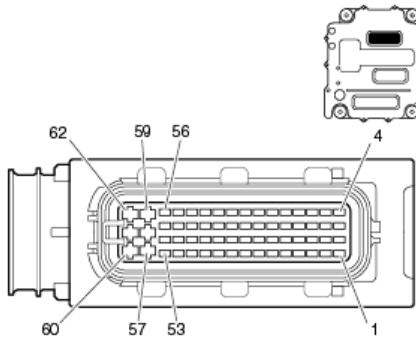
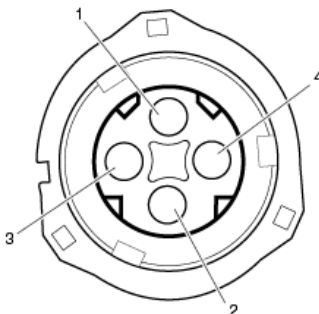
A damaged o-ring on the power steering pump could lead to an overheating condition for the power steering pump, which can be transmitted via thermal conduction to the fuel pump.

Did these checks identify any failing conditions?	
Yes	No
Correct any issues found. If the fuel lift pump o-ring has failed, change the o-ring and inspect the fuel pump integrity. If the fuel lift pump is failing, replace it. If the power steering pump o-ring is damaged, replace the o-ring. Refer to Step 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 P0087 been cleared?	
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
	 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.	
	Back to Index	

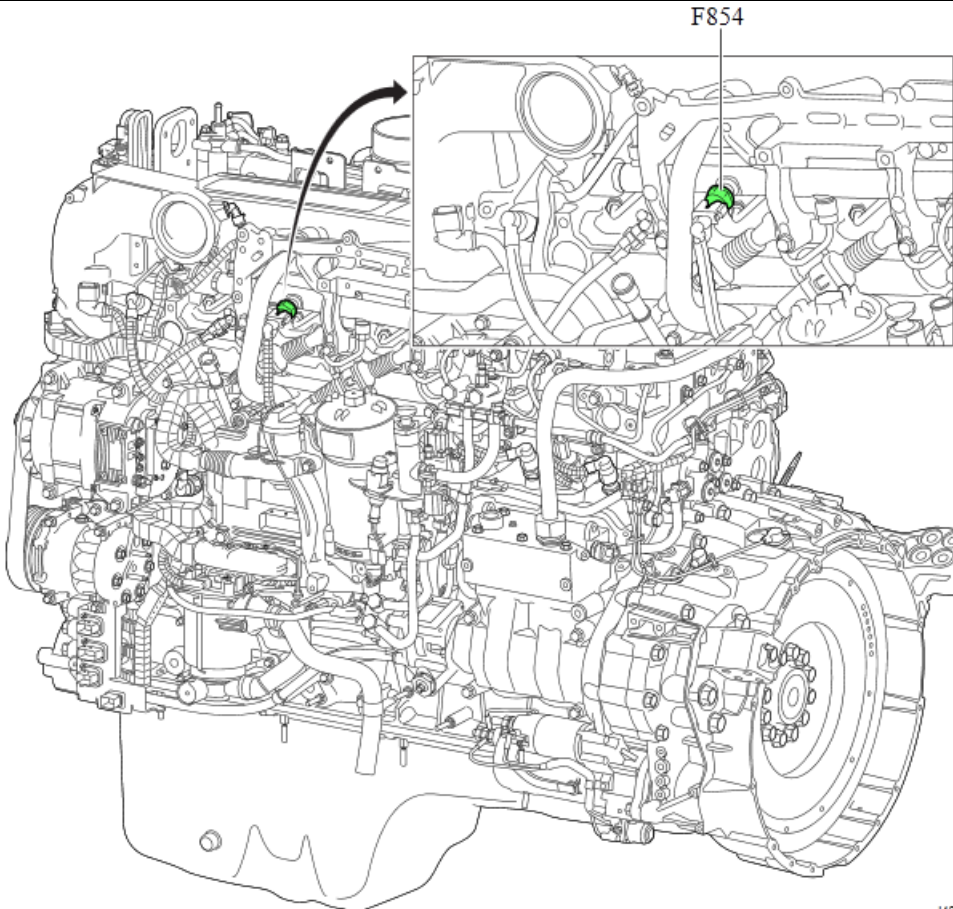
P0088

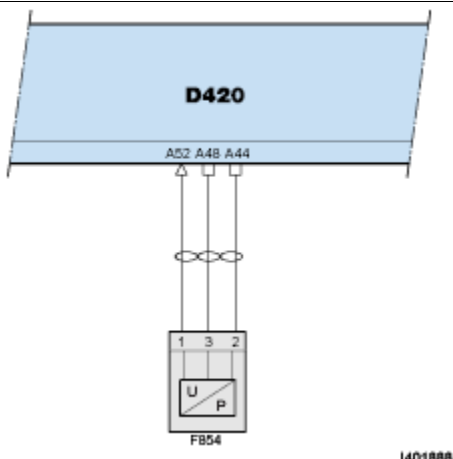
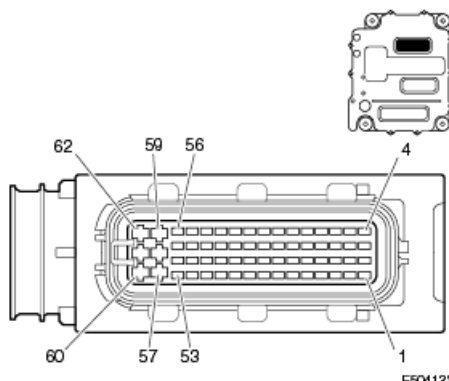
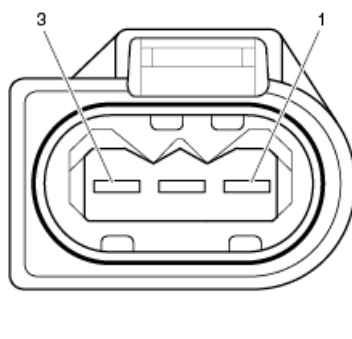
Code number	P0088
Fault code description	Fuel Pressure – Data valid but too high
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	The low-pressure fuel pressure is measured at the end of the low-pressure fuel supply gallery. 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 the engine is running for more than 200 seconds.
Set condition of fault code	The PCI ECU (D420) detects that the fuel pressure is 14 bar [203 psi] or more 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, key off the ignition for at least 15 seconds, key on again. Then start the engine and operate it at several engine speeds of the engine speed range for more than 10 seconds.

Electrical diagram(s)	  Wiring harness connector D420.A front view  Wiring harness connector F801 front view <table><tr><td>D420</td><td>F801</td><td>Function</td></tr><tr><td>A38</td><td>4</td><td>Ground</td></tr><tr><td>A46</td><td>2</td><td>Power supply</td></tr><tr><td>A50</td><td>1</td><td>Signal, fuel pressure</td></tr></table>	D420	F801	Function	A38	4	Ground	A46	2	Power supply	A50	1	Signal, fuel pressure
D420	F801	Function											
A38	4	Ground											
A46	2	Power supply											
A50	1	Signal, fuel pressure											
Technical data	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><td>Pin</td><td>Pin</td><td></td><td></td></tr><tr><td>(+ probe)</td><td>(- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>2</td><td>4</td><td>5V</td><td>Ignition keyed on</td></tr></table>	Pin	Pin			(+ probe)	(- probe)	Value	Additional information	2	4	5V	Ignition keyed on
Pin	Pin												
(+ probe)	(- probe)	Value	Additional information										
2	4	5V	Ignition keyed on										
Possible causes	• Restriction in the fuel to tank returns circuit or faulty fuel pressure regulating valve. • Check the fuel pressure according to the prescribed job.												

Additional information	The low-pressure fuel pressure is measured by the fuel pressure sensor (F801).																			
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.  • Use Rapido with chassis-specific settings for fuel specifications and the fuel pressure check procedure. • The fault code is triggered when the fuel pressure is below 47 psi (325 kPa). • This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly. • Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pin out locations, always refer to the technical data in Rapido. • It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify any change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido. <table border="1"> <tr> <td>Step 1</td><td>Step ID 0088a</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 border="1"> <tr> <td>Step 2</td><td>Step ID 0088b</td><td>SRT</td></tr> <tr> <td colspan="3"> With key OFF, remove the fuel temperature sensor and connect a pressure gauge. Reconnect the temperature sensor harness to the sensor and tie it back in a safe position. Start the engine. • If the fuel pressure is below 1400 kPa - Proceed to step 3. • If the fuel pressure is above 1400 kPa - Proceed to Engine Rapido for diagnostic/troubleshooting of the fuel system </td></tr> </table> <table border="1"> <tr> <td>Step 3</td><td>Step ID 0088c</td><td>SRT</td></tr> <tr> <td colspan="3"> Verify the gauge reading with the reading in DAVIE. • If the reading is the same, contact the Engine Support Center regarding possible PCI failure. • If the reading is NOT the same, replace the sensor and proceed to the verification procedure at the end of this document. </td></tr> </table>		Step 1	Step ID 0088a	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 0088b	SRT	With key OFF, remove the fuel temperature sensor and connect a pressure gauge. Reconnect the temperature sensor harness to the sensor and tie it back in a safe position. Start the engine. • If the fuel pressure is below 1400 kPa - Proceed to step 3. • If the fuel pressure is above 1400 kPa - Proceed to Engine Rapido for diagnostic/troubleshooting of the fuel system			Step 3	Step ID 0088c	SRT	Verify the gauge reading with the reading in DAVIE. • If the reading is the same, contact the Engine Support Center regarding possible PCI failure. • If the reading is NOT the same, replace the sensor and proceed to the verification procedure at the end of this document.		
Step 1	Step ID 0088a	SRT																		
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Step 2	Step ID 0088b	SRT																		
With key OFF, remove the fuel temperature sensor and connect a pressure gauge. Reconnect the temperature sensor harness to the sensor and tie it back in a safe position. Start the engine. • If the fuel pressure is below 1400 kPa - Proceed to step 3. • If the fuel pressure is above 1400 kPa - Proceed to Engine Rapido for diagnostic/troubleshooting of the fuel system																				
Step 3	Step ID 0088c	SRT																		
Verify the gauge reading with the reading in DAVIE. • If the reading is the same, contact the Engine Support Center regarding possible PCI failure. • If the reading is NOT the same, replace the sensor and proceed to the verification procedure at the end of this document.																				
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																			

P0093

Code number	P0093
Fault code description	Engine rail pressure - Sudden pressure drop
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	The rail pressure is measured in the common rail. The rail pressure sensor is part of the common rail and is not interchangeable as a separate part. Effect on the system Feedback on the rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the rail pressure demands determined by the ECU and the rail pressure feedback measured by the common rail pressure sensor.
Location of component(s)	 F854 1402260

Diagnostic condition	This diagnostic runs when the rail pressure operating state is: Pump unit only												
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure drops suddenly.												
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)	 D420 PCI ECU F854 engine rail pressure sensor <table><tr><th>D420</th><th>F854</th><th>Function</th></tr><tr><td>A44</td><td>2</td><td>Ground</td></tr><tr><td>A48</td><td>3</td><td>Power supply</td></tr><tr><td>A52</td><td>1</td><td>Signal, common rail pressure</td></tr></table>  Wiring harness connector D420.A front view  Wiring harness connector F854 front view	D420	F854	Function	A44	2	Ground	A48	3	Power supply	A52	1	Signal, common rail pressure
D420	F854	Function											
A44	2	Ground											
A48	3	Power supply											
A52	1	Signal, common rail pressure											
 Handle connectors and pins with care and use matching measuring probes.													

Technical data	Component check, common rail pressure sensor (F854) This type of component cannot be checked with a multimeter or oscilloscope. Perform the following to assess the component: • Monitor/test the component with DAVIE • Perform the wiring check Component & wiring check, ECU (D420) Preparation • Key off the ignition • Disconnect connector F854 • Measure on the front side of wiring harness connector F854 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>3</td><td>2</td><td>5V</td><td>Ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	3	2	5V	Ignition keyed on
Pin (+ probe)	Pin (- probe)	Value	Additional information						
3	2	5V	Ignition keyed on						
Possible causes	An external or internal fuel leakage on the high pressure fuel system components.								
Additional information	The rail pressure is closed-loop controlled. A comparison is made between the requested and actual rail pressure measured by the common rail pressure sensor. The rail pressure is measured in the common rail by the common rail pressure sensor (F854). When this DTC is active: • the engine torque is reduced. • the engine runs in protection mode								
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?

Fuel filter	P1191; P1194
Fuel pressure sensor	P0087; P0088; P1087; P1564
Common rail pressure sensor	P0192, P0193; P1091, P2541; P2542
HPV	P009F; P109C; P109D; P228E; P2294; P2296; P229A; P229B; P229C; P229D
Fuel injectors	P0263; P0266; P0269; P0272; P0275; P0278; P1263; P1266; P1269; P1272; P1275; P1278
Electronic unit pumps	P0201; P0205; P0261; P0262; P0273; P0274; P2147; P2148; P2150; P2151

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 2.A

Step 2. Fuel System, High Pressure Checks

Step 2.A Visual inspection, high pressure common rail

Action

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

	the following: • Signs of fuel leaks • A fuel line from the high pressure common rail to the injector is damaged • Any bent or broken fuel lines • Related fuel components not installed correctly • Damaged electrical components/connections	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.B.	Go to step 2.B
	Step 2.B Visual inspection, common rail pressure sensor (F854)	
	Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connector • Bent, broken, corroded or loose connector pins • Moisture or dirt in the connection • Damage to the wire harness or insulation • Sensor is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.C	Go to step 2.C	
Step 2.C Electrical checks, supply voltage, common rail pressure sensor (F854)		



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

Action

1. Use a multimeter to measure the sensor power supply voltage across the corresponding wiring harness supply and ground connector pins as outlined in the procedure for the common rail pressure sensor (F854), component & wiring check, ECU (D420).

Is the measured value outside of the expected range?

Yes

No

Correct any issues found.

Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.

Use DAVIE Diagnostics to check for current trouble codes.

If this DTC is still present, go to 2.D

Go to 2.D

Step 2.D DAVIE Test, High Pressure Fuel Pump Unit

Action

1. Run the prescribed test to determine if the electronic unit pumps are working correctly.

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

Yes

No

Possible faulty electronic unit pump.

Contact the PACCAR Engine Support Center for additional troubleshooting assistance and guidance in replacing the suspect electronic unit pump.

Refer to step 4.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 3.A.

Go to step 3.A

Step 3. Fuel System, Low Pressure Checks

Step 3.A Visual inspection, low pressure circuit

Action

1. Visually inspect the associated components or systems for any of the following:
 - Fuel level in fuel tank
 - fuel filter is damaged or needs replacement
 - air in fuel system
 - fuel leaks
 - damaged or kinked fuel lines

Was there evidence of any of the above?

Yes

No

Correct any issues found.

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 Rapido Maintenance: Check fuel system, low pressure (Job ID: 68721)

Action



To perform the bleed process associated with this procedure, refer to the job "bleed (Fuel system), job ID 66537."

1. Use the identified maintenance job, as outlined in the Rapido documentation, to check the low pressure side of the fuel system.

Do any of the tests result in a failed state based on the criteria provided?

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

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support

further assistance.

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 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. 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 4.B

Go to step 4.B

Step 4.B DAVIE Diagnostics, Quick Check

Action

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

Has P0093 been cleared?

Yes

No

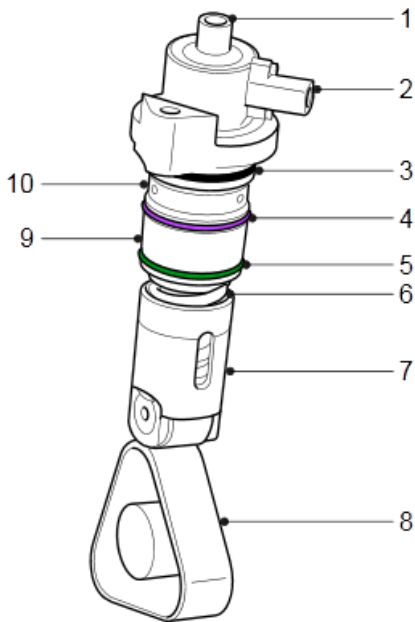
Problem resolved. No further actions.

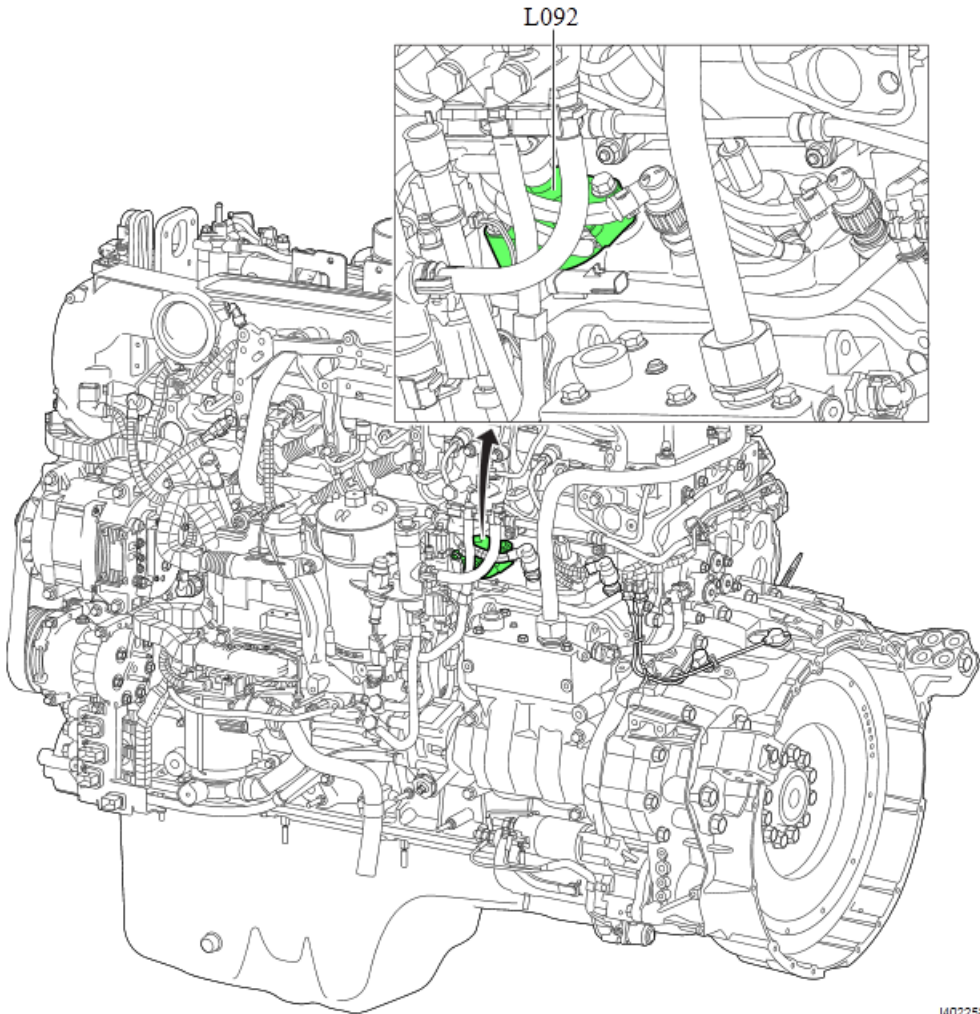
Continue with the next step in this troubleshooting procedure.

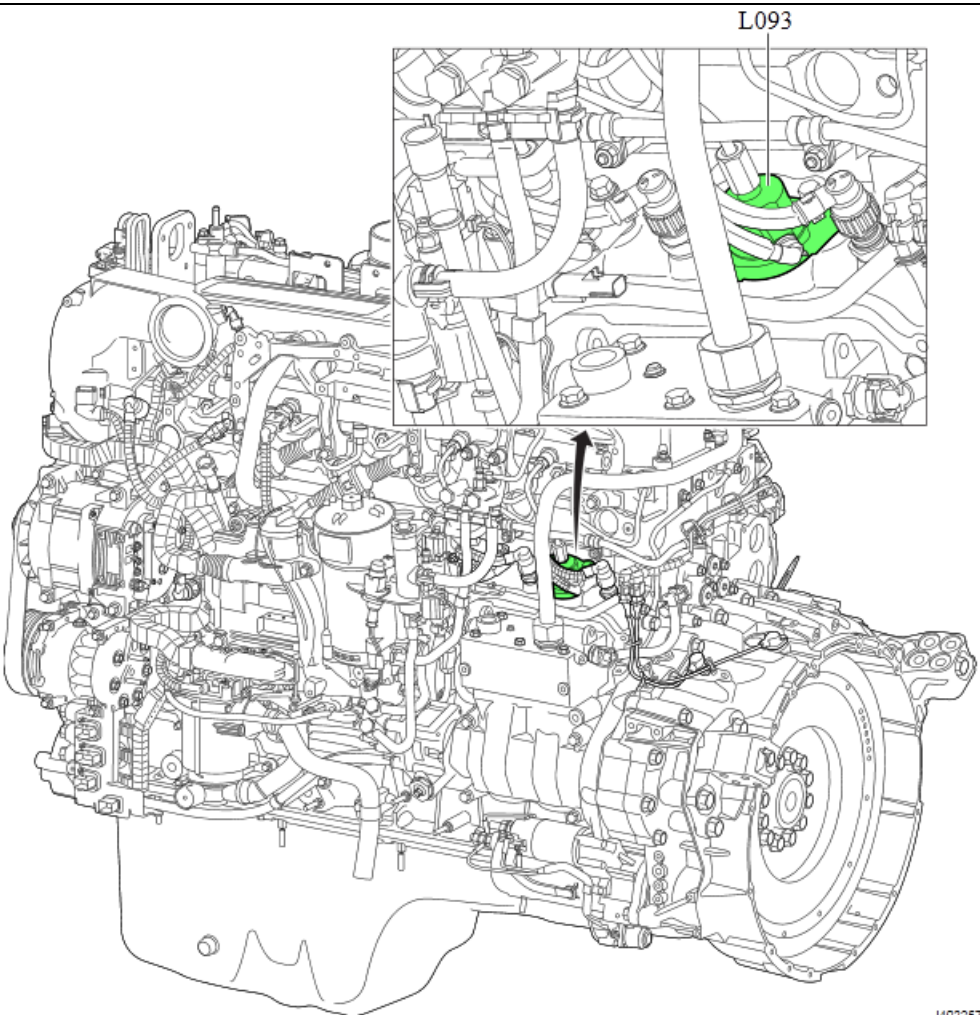
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

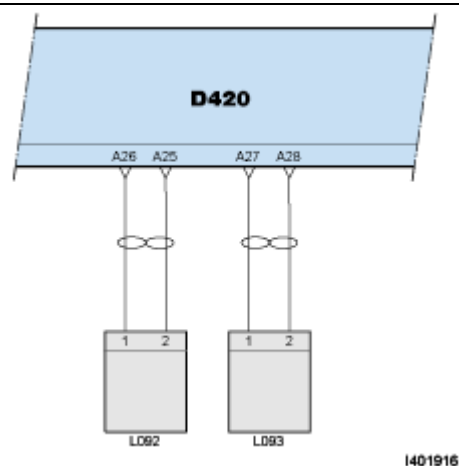
	Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
	Back to Index

P0094

Code number	P0094
Fault code description	Common rail pump unit control - Incorrect
Fault code information	1 trip MIL + 1 trip Stop Engine lamp 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	Common rail pump units 1–2 (L092–L093) Common rail pump units 1 and 2 supply fuel to the common rail.  1 Outlet port 2 Solenoid connector 3 Sealing ring fuel supply gallery - outside 4 Sealing ring fuel supply gallery - fuel return gallery 5 Sealing ring fuel return gallery - crankcase 6 Spring 7 Roller lifter 8 Common rail pump unit cam 9 Fuel return port 10 Fuel supply port 1402301 Operation The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three pump events every two crankshaft revolutions. Fuel from the fuel gallery can enter the pump plunger area via an internal valve. A pump event starts when the plunger travels up, the PCI ECU activates the solenoid briefly, and the internal valve closes the opening to the fuel gallery. The internal valve is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the outlet bore of the pump unit. The pump event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downward again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents fuel from flowing back from the rail to the plunger area. Control The amount of fuel pumped to the rail depends on the duration of the pump event. The

	earlier the solenoid is activated by the PCI ECU in the up stroke of the pump plunger, the more (mg/stroke) fuel is pumped to the rail Effect on the system • Rail pressure control The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.
Location of component(s)	Common rail pump unit 1 (L092)  Common rail pump unit 2 (L093) I402258

	 1402257
Diagnostic condition	This diagnostic runs when the rail pressure control state is: Pump unit only
Set condition of fault code	The PCI ECU (D420) detects that the actual rail pressure is too low for the duration of the pump events (pump delivery percentage) of the common rail pump units for more than 4 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)	Checking data, common rail pump unit 1-2 (L092-L093)

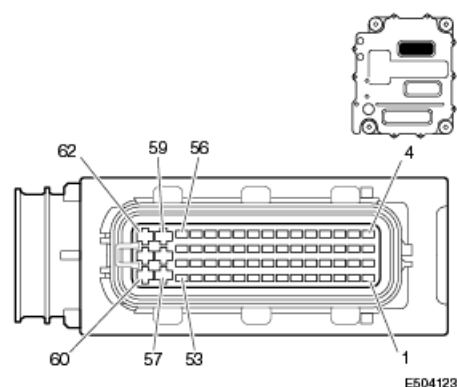


D420 PCI ECU

L092 common rail pump unit 1

L093 common rail pump unit 2

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



Wiring harness connector D420.A front view



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

Technical data

Component check, common rail pump unit 1 (L092)

Preparation

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

	Pin (+ probe)	Pin (- probe)	Value	Additional information
	1	2	~ 0.67 Ω	Resistance value at 20°C [68°F]
			maximum 0.94 Ω	Resistance value at 120°C [248°F]
Component check, common rail pump unit 2 (L093) Preparation • Key off the ignition • Disconnect connector L093 • Measure on the component connector L093				
	Pin (+ probe)	Pin (- probe)	Value	Additional information
	1	2	~ 0.67 Ω	Resistance value at 20°C [68°F]
			maximum 0.94 Ω	Resistance value at 120°C [248°F]
Possible causes	• Air present in the fuel system. If the fuel system or parts of it have been emptied during maintenance or repair, this DTC may become active temporarily after the engine is started. If the DTC stays inactive when the engine is running, no further investigation is necessary. • Malfunction in the low-pressure fuel system • An external or internal leakage on the high-pressure fuel system components. • Common rail pump unit failure			
Additional information	The common rail pump units (L092 and L093) supply fuel to the common rail. The amount of fuel pumped to the rail (rail pressure) depends on the duration of the pump events of the pump units (pump delivery percentage). The common rail pump unit control is closed-loop controlled. A comparison is made between the expected and the actual common rail pump unit activation duration. P228D can also be active when this DTC is active. When this DTC is active: • The engine torque is reduced • The engine runs in protection mode • The maximum rail pressure is limited to 1300 bar			
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 trouble code, take notice of any other active or inactive trouble codes. One or multiple other trouble codes could have been the cause for this trouble 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 present?

P0087, P1087

Yes

No

Possible restriction in the fuel supply, fuel primer pump, or rail pressure sensor.

Go to the troubleshooting information for these codes before continuing with this procedure.

Go to step 2.A

Step 2. Fuel System, Leak Checks

Step 2.A Visual inspection, component connections, high pressure fuel system

Action

1. Switch ignition OFF.
2. Visually inspect for external leakage on:
 - Common rail pump unit 1 (L092) and unit 2 (L093)

- Fuel injection pipes from pump unit to fuel rail
- Fuel rail
- Fuel injection pipes

Are the high-pressure fuel system components free of external leaks?

Yes

No

Go to step 3.A

Go to step 4.A

Step 3. Common Rail Pump Units 1 and 2 (L092, L093) Checks

Step 3.B Rapido maintenance: Checking the common rail pump unit performance with stationary vehicle

Action

1. Ensure the engine is at operating temperature.
2. Perform the identified maintenance job, outlined in "Checking the common rail pump unit performance with stationary vehicle."

Is the common rail pump unit performance sufficient during this test?

Yes

No

1. Ensure that all connectors are connected.
2. Reset DTCs.
3. Collect all log files.

Replace the underperforming common rail pump unit.

Contact the Engine Support Center for further instructions.

Go to step 4.A

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.

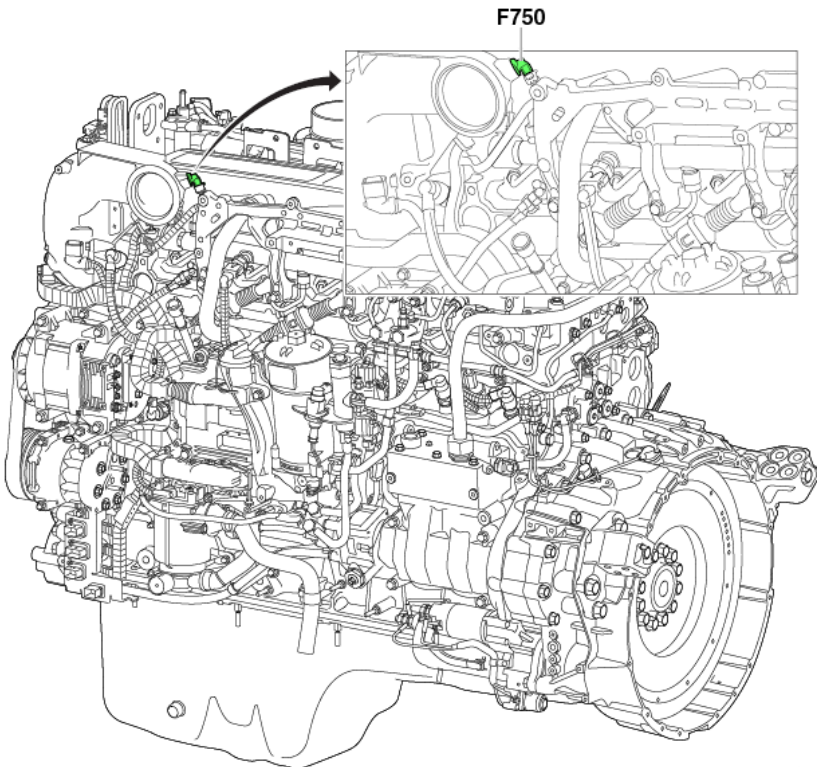


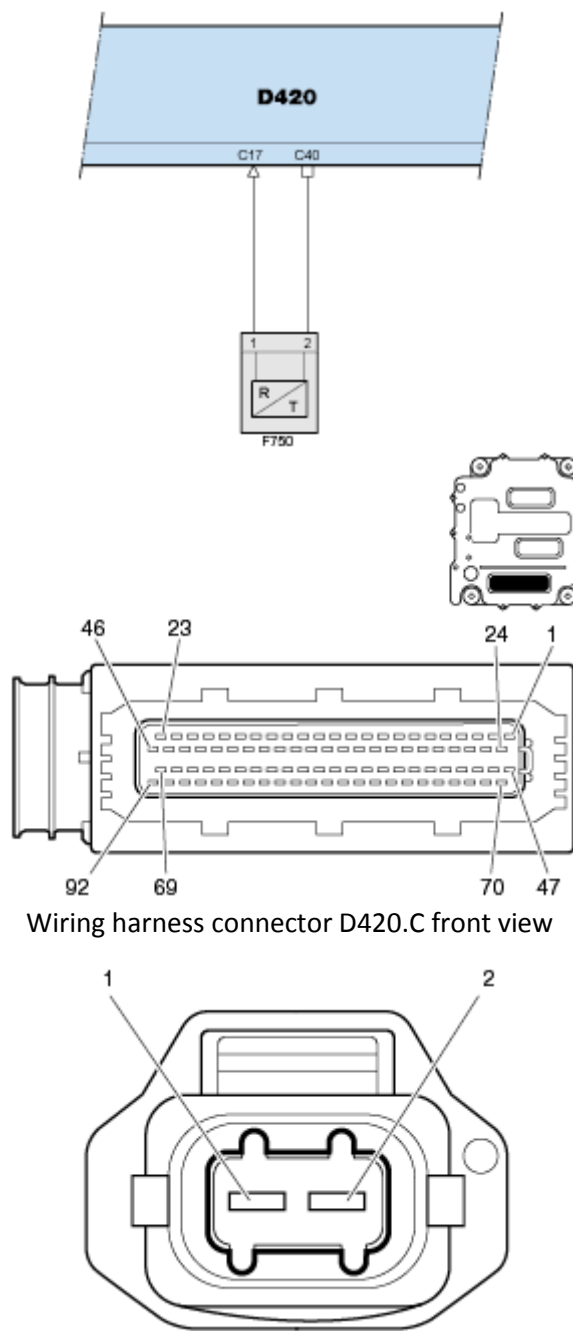
Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.

	Action	
	1. System Initiation Drive the truck under normal conditions until the coolant temperature reaches a minimum of 150°F. This cycle can be conducted with a loaded trailer or bobtail. 2. Steady State This cycle is best performed on a level grad road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.	
	Were the identified repair verification cycles able to be completed?	
	Yes	No
		Investigate and correct any issues preventing these repair verification cycles and rechecks from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.
	Go to step 4.B	Go to step 4.B
	Step 4.B DAVIE Diagnostics, Quick Check	
	Action	
	1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the actions taken have cleared this trouble code.	
	Has P0094 been cleared?	
	Yes	No
	Problem resolved. No further actions.	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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P0095

Code number	P0095
Fault code description	Intercooler temperature - Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The intercooler outlet temperature is measured before the EGR mixer. Effect on the system: Monitors intercooler performance
Location of component(s)	
Diagnostic condition	This diagnostic runs: - when the ignition has been keyed off continuously for at least 8 hours; - difference between the coolant temperature and ambient temperature is less than 15°C [59°F] - ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured intercooler temperature sensor differs by more than 3°C [37°F] from the average of other temperature sensor readings on/off the engine for more than 5 seconds (after the ignition has been keyed off for at least 8 hours).
Reset condition of fault code	The 8-hour ignition off diagnostics consists of three separate steps: - The vehicle ignition may NOT be switched on or engine started for 8-10 consecutive hours (ideal situation would be overnight). - Once the 8 to 10 consecutive hours have been reached, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.

	Start the engine and let it idle for 2 minutes. This DTC changes to inactive when the fault is no longer detected.									
Electrical diagram(s)	 Wiring harness connector D420.C front view Wiring harness connector F750 front view D420 PCI ECU F750 intercooler temperature sensor <table><tr><th>D420</th><th>F750</th><th>Function</th></tr><tr><td>C17</td><td>1</td><td>Signal, intercooler temperature</td></tr><tr><td>C40</td><td>2</td><td>Ground</td></tr></table>	D420	F750	Function	C17	1	Signal, intercooler temperature	C40	2	Ground
D420	F750	Function								
C17	1	Signal, intercooler temperature								
C40	2	Ground								
Technical data	Component check, intercooler temperature sensor (F750) Preparation									

	• Key off the ignition • Disconnect connector F750 • Measure on component connector F750 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>5248–5732 Ω</td><td>Resistance value at 0°C [34°F]</td></tr><tr><td></td><td></td><td>2334–2505 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>1133–1198 Ω</td><td>Resistance value at 40°C [104°F]</td></tr><tr><td></td><td></td><td>593–619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr><tr><td></td><td></td><td>331–341 Ω</td><td>Resistance value at 80°C [176°F]</td></tr><tr><td></td><td></td><td>195–199 Ω</td><td>Resistance value at 100°C [212°F]</td></tr></table> Component & wiring check, ECU (D420) Preparation • Key off the ignition • Disconnect connector F750 • Measure on the front side of wiring harness connector F750 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>5V</td><td>Ignition keyed on</td></tr></table>	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]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	Ignition keyed on
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Pin (+ probe)	Pin (- probe)	Value	Additional information																																		
1	2	5V	Ignition keyed on																																		
Possible causes	Intercooler temperature sensor deviation																																				
Additional information	For this diagnostic, the intercooler temperature sensor (F750) reading is compared with an average of other temperature sensor readings on/off the engine after the ignition has been keyed off for at least 8 hours.																																				
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. <table><tr><td>Step 1</td><td>Step ID 0095a</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 0095b</td><td>SRT</td></tr><tr><td colspan="3">Electrical Checks</td></tr></table>	Step 1	Step ID 0095a	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 0095b	SRT	Electrical Checks																										
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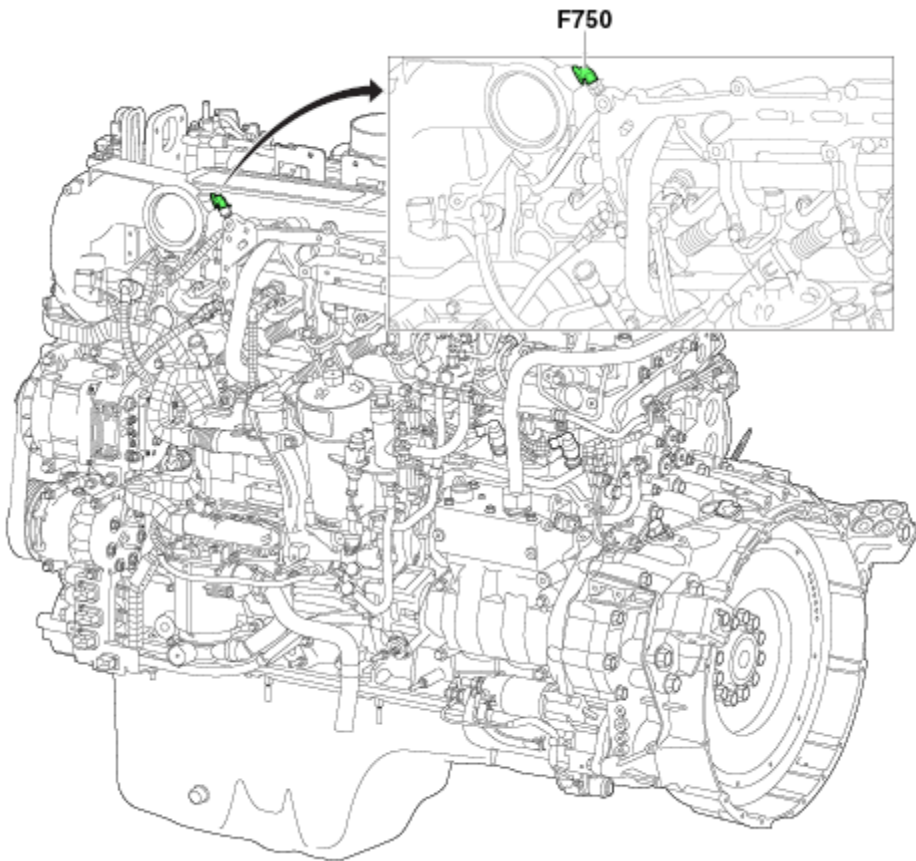
	Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: • Supply and signal voltages (12V). • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? • Yes - Proceed to step 3 • No - Proceed to step 4			
	<table><tr><td>Step 3</td><td>Step ID 0095c</td><td>SRT</td></tr></table> Ancillary Test: Air Side Pressure Perform the prescribed test to determine if there are any leaks in the air system. Does the test fail to complete or result in a failed state? No: Continue to the next step in the troubleshooting process. Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the next step in the troubleshooting process.	Step 3	Step ID 0095c	SRT
Step 3	Step ID 0095c	SRT		
	<table><tr><td>Step 4</td><td>Step ID 0095d</td><td>SRT</td></tr></table> Replace: Post Intercooler temperature 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, 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 0095d	SRT
Step 4	Step ID 0095d	SRT		
	<table><tr><td>Step 5</td><td>Step ID 0095e</td><td>SRT</td></tr></table> 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.	Step 5	Step ID 0095e	SRT
Step 5	Step ID 0095e	SRT		
Verification Drive Cycle	Use these verification cycles following any corrective actions taken, to confirm that this fault is no longer active: Cold Soak • The truck must remain off (key to OFF and the engine OFF) for 8-10 consecutive hours. Wait for this time to elapse before continuing. • Perform the Electrical & Power-Up cycle. • Perform the Start-Up cycle. Power-up • 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. Start-up 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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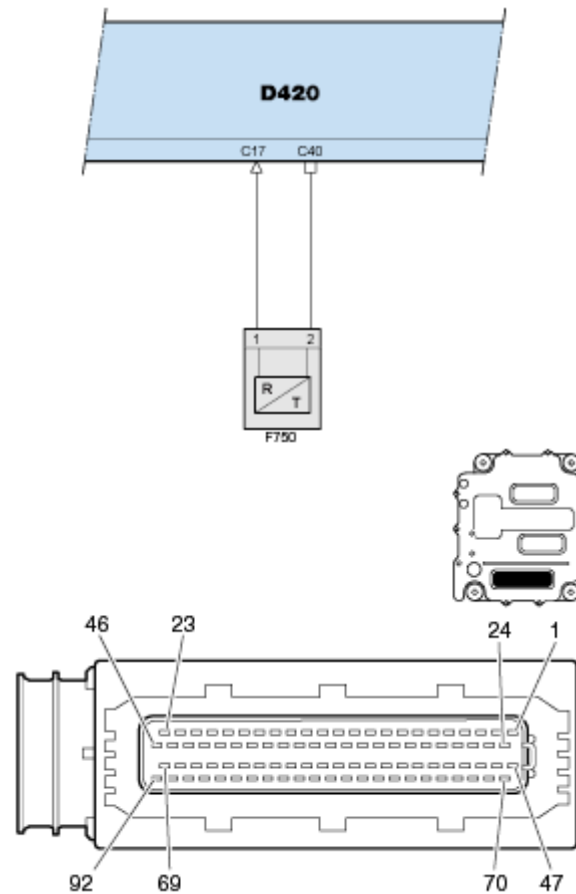
P0097

Code number	P0097
Fault code description	Intercooler temperature - Voltage too low or short circuit to ground on ECU D420 pin C17
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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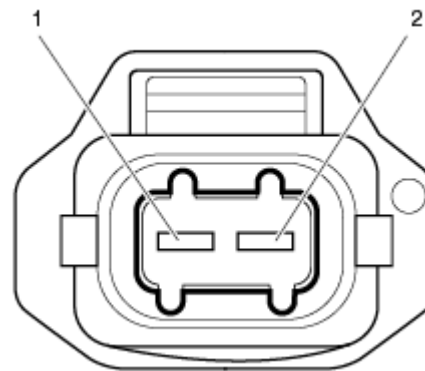
P0098

Code number	P0098
Fault code description	Intercooler temperature - Voltage too high or short circuit to supply on ECU D420 pin C17
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The intercooler outlet temperature is measured before the EGR mixer. Effect on the system: Monitors intercooler performance
Location of component(s)	 The diagram illustrates the engine layout with the intercooler outlet temperature sensor (F750) highlighted. An arrow points from the main engine view to a detailed inset of the sensor and its connection point on the intercooler outlet pipe.
Diagnostic condition	Sensor output voltage is greater than 4.865V
Set condition of fault code	The PCI detects sensor output voltage is too high (above 4.89 V).
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)



Wiring harness connector D420.C front view



Wiring harness connector F750 front view

D420 PCI ECU

F750 intercooler temperature sensor

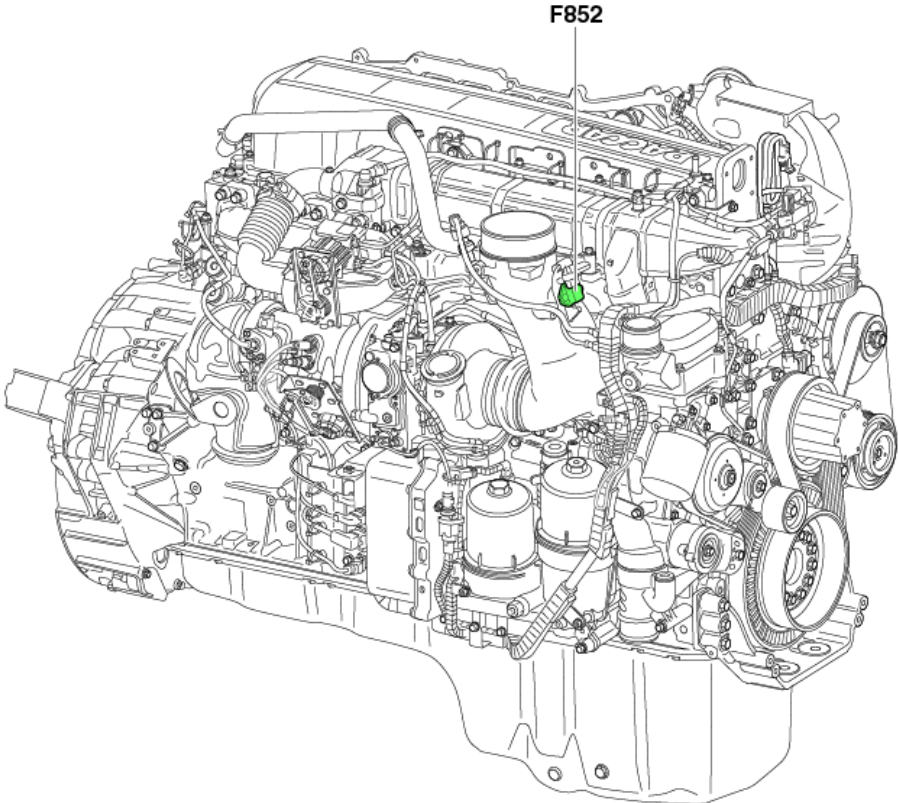
D420	F750	Function
C17	1	Signal, intercooler temperature
C40	2	Ground

Technical data	Component check, intercooler temperature sensor (F750) Preparation - Key off the ignition - Disconnect connector F750 - Measure on component connector F750 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>5248–5732 Ω</td><td>Resistance value at 0°C [34°F]</td></tr><tr><td></td><td></td><td>2334–2505 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>1133–1198 Ω</td><td>Resistance value at 40°C [104°F]</td></tr><tr><td></td><td></td><td>593–619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr><tr><td></td><td></td><td>331–341 Ω</td><td>Resistance value at 80°C [176°F]</td></tr><tr><td></td><td></td><td>195–199 Ω</td><td>Resistance value at 100°C [212°F]</td></tr></table> Component & wiring check, ECU (D420) Preparation - Key off the ignition - Disconnect connector F750 - Measure on the front side of wiring harness connector F750 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>5V</td><td>ignition keyed on</td></tr></table>	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]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	ignition keyed on
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1	2	5V	ignition keyed on																																		
Possible causes	- Faulty wiring - Faulty connector - Faulty sensor																																				
Additional information	No additional information available.																																				
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components.  - This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly. - Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. - For specific electrical component information and pin out locations, always refer to the technical data in Rapido. - It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors. - Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido. <table><tr><td>Step 1</td><td>Step ID 0098a</td><td>SRT</td></tr><tr><td colspan="3">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><tr><td>Step 2</td><td>Step ID 0098b</td><td>SRT</td></tr></table>	Step 1	Step ID 0098a	SRT	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 0098b	SRT																											
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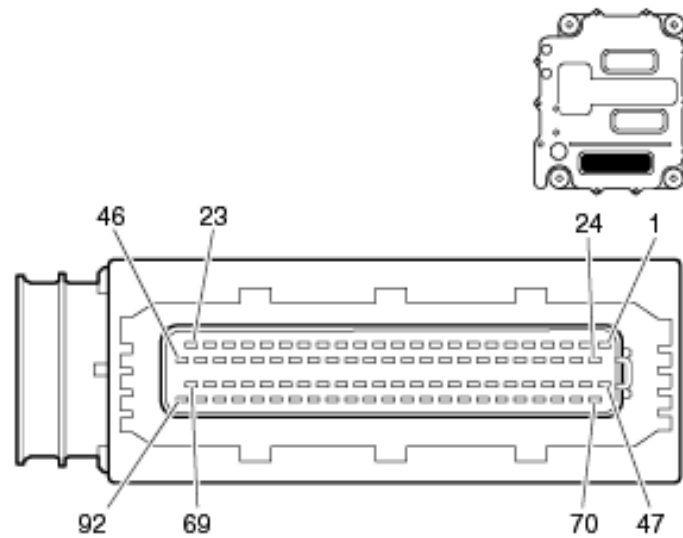
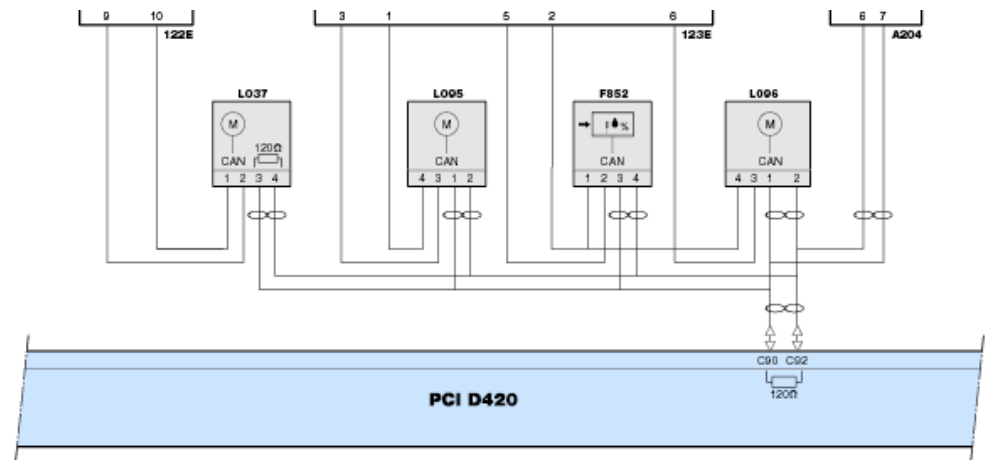
	With key OFF, disconnect the harness from the temperature sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the pressure sensor circuit on the engine harness: • If the voltage is above 5.5 V – Proceed to step 4. • If the voltage is below 5.5 V – Proceed to step 3.		
	Step 3	Step ID 0098c	SRT
	With key OFF, install a jumper wire between the supply and ground wires of the temperature sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0097 – Replace the sensor and reconnect the harness, and then proceed to verification procedure listed at the end of this document. • If P0098 – Proceed to step 4.		
	Step 4	Step ID 0098d	SRT
	With key OFF, disconnect the engine harness from the PCI, and install a jumper wire between the supply and ground pins of the sensor circuit on the PCI. Turn the key ON and navigate to read errors: • If P0097 – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P0098 – Proceed to step 5.		
Verification Drive Cycle	Step 5	Step ID 0098e	SRT
	Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		
	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		

P009A

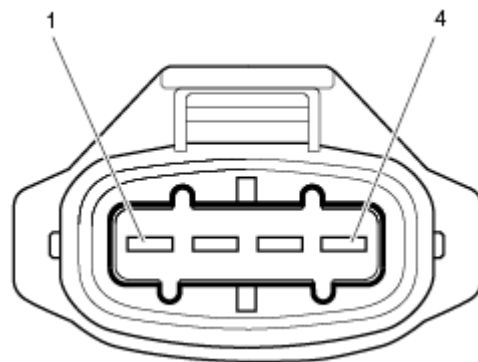
Code number	P009A
Fault code description	Ambient temperature - Data erratic, intermittent, or incorrect
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The humidity sensor is a smart sensor that communicates with the PCI ECU via E-CAN. The sensor measures the following three properties of the drawn in precompressor (VTG turbo charger) air in the inlet air pipe: • Relative humidity • Pressure • Temperature Relative humidity The relative humidity refers to the moisture content percentage of the air compared with the saturated moisture level at the same temperature and pressure. Effect on the system: • Determines NOx emissions Higher measured relative humidity results in a lower calculated NOx emission. Precompressor temperature Effect on the system: • Determines soot emissions Higher measured precompressor temperature results in lower calculated soot formation in the engine. • Calculates exhaust gas pressure before the turbine; Higher measured precompressor temperature results in lower calculated exhaust gas pressure before the turbine. • Limits the maximum engine torque; for example, to limit the cylinder pressures during cold ambient conditions or driving at high altitudes. • Determines turbocharger compressor flow and thus the detection of VTG surge Surge can typically occur at high compressor pressure ratios and low compressor mass flows. • Calculates the temperature after the turbocharger compressor Higher measured precompressor temperature results in higher calculated temperature after the turbocharger compressor. Precompressor pressure Effect on the system: • Corrects pressure before turbine Higher measured precompressor pressure results in higher calculated exhaust gas pressure before the turbine. • Determines soot emissions Higher measured precompressor pressure results in lower calculated soot formation in the engine. • Calculates the temperature after the turbocharger compressor Lower measured precompressor pressure results in higher calculated temperature after the turbocharger compressor.

	- Limits the maximum engine torque when driving at high altitudes (low air density) Lower measured precompressor pressure results in higher engine torque reduction. - Detects VTG surge, the sensor is used to determine the compressor pressure ratio; surge can typically occur at high compressor pressure ratios and low compressor mass flows.
Location of component(s)	
Diagnostic condition	This diagnostic runs: 300 seconds after an engine start, and; - when the engine is running at a steady load, and; - vehicle speed is above 35 km/h [22 mph], and;
Set condition of fault code	The PCI ECU (D420) detects that the measured ambient temperature differs too much from the calculated ambient 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 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 F852 front view

- 122E 12-pin interface connector
- 123E 7-pin interface connector
- A204 electronic fan interface connector
- D420 PCI ECU
- F852 humidity sensor
- L037 VTG turbocharger actuator

	L095 EGR valve module L096 BPV valve D420 F852 Function C90 3 E-CAN high C92 4 E-CAN LOW 1 Power supply after ignition 2 Ground
Technical data	Component & wiring check, humidity sensor (F852) Preparation Key off the ignition. Disconnect connector F852 Measure on the front side of wiring harness connector F852 Pin Pin (+ probe) (- probe) Value Additional information 1 2 Ubat Ignition keyed on 3 4 ± 60 Ω Ignition keyed off Ground cable from the battery disconnected Vehicle Communication Interface (VCI) of DAVIE disconnected
Possible causes	Ambient temperature sensor deviation Humidity sensor deviation
Additional information	The measured ambient temperature is compared with the calculated ambient temperature. The ambient temperature is calculated by the PCI ECU. Other involved sensors and input signals used to calculate the ambient temperature are the pre-compressor temperature (humidity sensor (F852)), engine cooling fan state (on or off), vehicle speed, and fuel injection quantity.
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 009Aa 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 009Ab	SRT

Visual inspection - Air Cleaner

If the truck is equipped with an under-the-hood air cleaner, visually inspect for any of the following:

- Improper sealing between the hood and the air cleaner mounting surface
- Mounting seal is folded over, cut, torn, or missing
- If any of the above is not found proceed with step 3.
- If evidence of any of these is 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, proceed with step 2.

Step 3	Step ID 009Ac	SRT

Davie Direct Monitor: Ambient Air Temperature Sensor and Humidity Sensor

Use DAVIE to select and monitor the identified temperature sensors for comparison.

- While monitoring, no temperature should vary by a value of more than 35°F (1.7°C).

Do any monitored values vary by more than 35°F (1.7°C) for more than 5 seconds?

- If NO proceed with step 4.
- If YES
 - Clean, adjust, repair, or replace affected components for any issues identified.
 - Use DAVIE to re-check for the presence of active faults:
 - If this related fault is no longer active, then this issue has been resolved.
 - If this related fault is still active, proceed with step 4.

Step 4	Step ID 009Ad	SRT

Ancillary Test: Air Side Pressure

Perform the prescribed test to determine if there are any leaks in the air system.

- If the test fails to complete or result in a failed state, proceed with step 5.
- If test runs,
 - Find and make the appropriate repairs or component replacements.
 - Use DAVIE to re-check for the presence of active faults:
 - If this related fault is no longer active, then this issue has been resolved.
 - If this related fault is still active, proceed with step 5.

Step 5	Step ID 009Ae	SRT

	Replace: Ambient Air Temperature 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, then this issue has been resolved. • If this related fault is still active, continue step 6. <table><tr><td>Step 6</td><td>Step ID 009Af</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>	Step 6	Step ID 009Af	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.		
Step 6	Step ID 009Af	SRT					
Contact the PACCAR Engine Support Call Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.							
Verification Drive Cycle	To validate the repair, this cycle is best performed on a level grade road (least amount of incline possible) and under load using a trailer. If a loaded trailer is unavailable, produce engine load by turning the A/C and fan to ON. With the System Initiation cycle complete, proceed to a road with a minimum speed limit of 50 mph, then get to the highest gear possible with the engine speed between 1100-1500 rpm, and set the cruise control. Run this cycle for roughly 3 to 5 miles or in three separate 1-mile increments if a steady 3 to 5 miles is unachievable.						
	Back to Index						

P009F

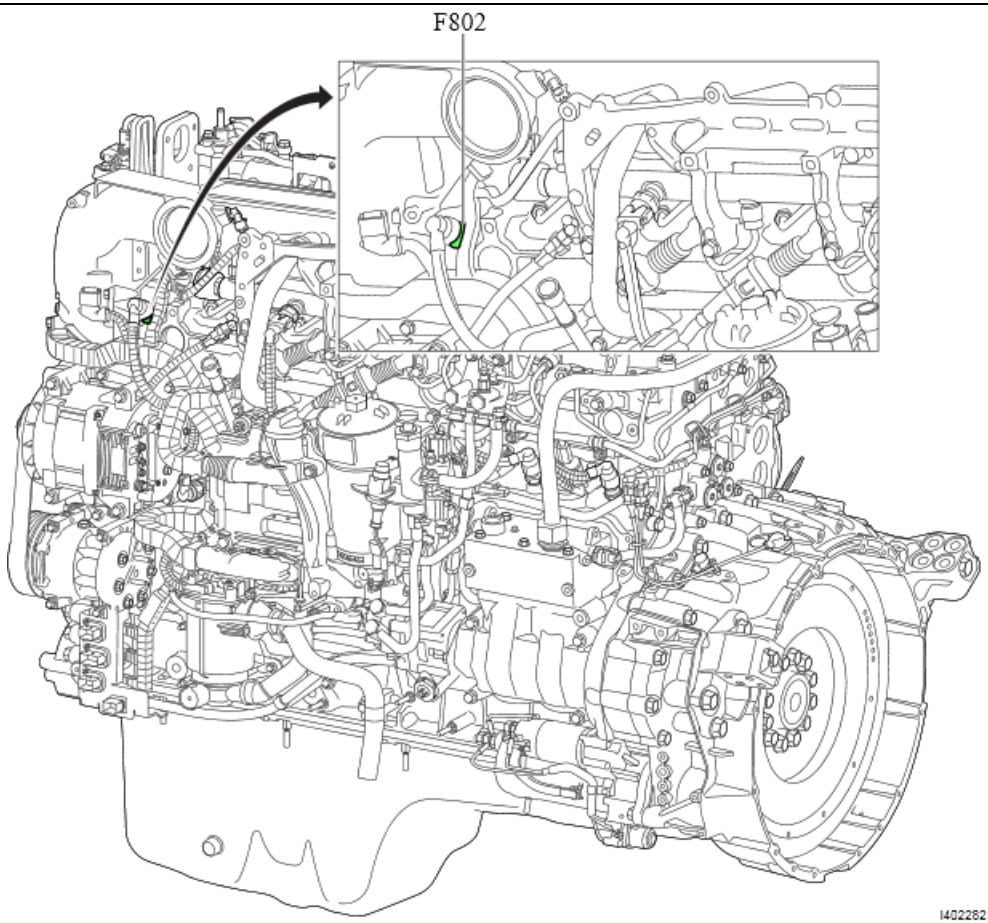
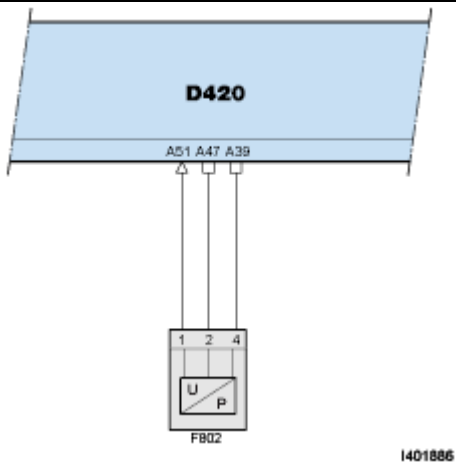
Code number	P009F
Fault code description	Checks for stuck HPV by creating a small leak and looking at the MV closed loop trim (intrusive) + causes discharge disable.
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please Contact the Engine 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

P00BA

Code number	P00BA
Fault code description	Detects if rail pressure is too low to inject demanded pulses
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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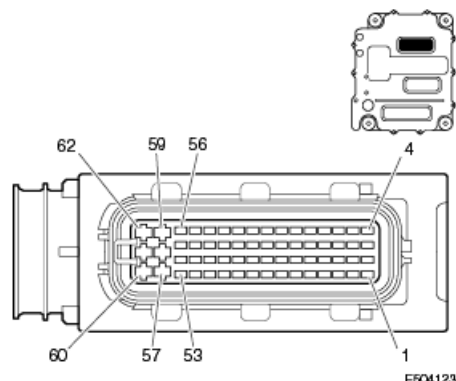
P0107

Code number	P0107
Fault code description	Boost pressure - Voltage too low or short circuit to ground on ECU (D420) pin (A51)
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	Boost pressure sensor (F802) The boost pressure is measured in the inlet manifold, near cylinder 1. Effect on the system • Determines the smoke limit A higher measured boost pressure increase results in higher torque for the same smoke level • Determines soot emissions A higher measured boost pressure results in lower calculated soot emission by the engine. • Determines NOx emissions A higher measured boost pressure results in higher calculated NOx emission by the engine. • Calculates exhaust gas mass flow used for DEF dosing estimation by the EAS-3 system. A higher measured boost pressure results in higher calculated exhaust gas mass flow. • Calculates the temperature after the compressor (VTG turbo charger) A higher measured boost pressure results in higher calculated temperature after the compressor. • Calculates the temperature before the turbine. A higher measured boost pressure results in lower calculated exhaust gas temperature before the turbine.

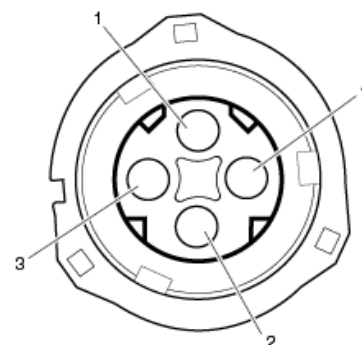
Location of component(s)	 I402262
Diagnostic condition	
Set condition	The PCI ECU detects the sensor output voltage is too low
Reset condition	This fault code will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	 I401886 D420 PCI ECU

F802 Boost pressure sensor

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



Wiring harness connector D420.A front view



Wiring harness connector F802 front view



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

Technical data

Component check, boost pressure sensor (F802)

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

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

Component & wiring check, ECU (D420)

Preparation

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

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

Possible causes	- Faulty wiring - Faulty connection - Faulty sensor								
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. - 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. Boost Pressure Sensor (F802) Checks <table border="1"> <tr> <td colspan="2">Step 1.A Visual inspection, boost pressure sensor (F802)</td></tr> <tr> <td colspan="2"> Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Batteries not fully charged or contacts are not tight - Boost pressure sensor (F802) is damaged or not installed correctly </td></tr> <tr> <td colspan="2">Was there evidence of any of the above?</td></tr> <tr> <td>Yes</td><td>No</td></tr> </table>	Step 1.A Visual inspection, boost pressure sensor (F802)		Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Batteries not fully charged or contacts are not tight - Boost pressure sensor (F802) is damaged or not installed correctly		Was there evidence of any of the above?		Yes	No
Step 1.A Visual inspection, boost pressure sensor (F802)									
Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Batteries not fully charged or contacts are not tight - Boost pressure sensor (F802) is damaged or not installed correctly									
Was there evidence of any of the above?									
Yes	No								

	Correct any issues found. If the boost pressure sensor (F802) is found to be damaged or broken, replace it.	
	Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to Step 1.B	Go to step 1.B
Step 1.B Electrical checks, supply voltage, boost pressure sensor (F802)		
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.		
Action		
1. Confirm the supply voltage level as outlined in the corresponding checking data, " <u>Component check, boost pressure sensor (F802).</u> "		
Is the measured value within expected range?		
Yes		No
Possible electrical issue in the harness or boost pressure sensor (F802)		Possible electrical issue in the harness or PCI ECU
Go to step 1.D		Go to step 1.C
Step 2.C Electrical checks, isolation of electrical short in PCI, boost pressure sensor (F802)		
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 Supply and Ground terminals on the PCI ECU. The expected value is between 4.75 and 5.25 V.		
Is the measured voltage within the expected range?		

	Yes		No	
	Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the engine harness. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.		Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the PCI ECU. Refer to Step 2.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 1.D Electrical checks, isolation of electrical open in harness, boost pressure sensor (F802)			
	Action 1. Set the ignition key to OFF. 2. Disconnect the boost pressure sensor (F802) and the engine harness D420.A connector at the PCI ECU. 3. Measure the resistance value on the signal wire between the sensor connector and the D420.A connector.			
	Is the measured resistance less than 10 Ω?			
	Yes		No	
	Replace the boost pressure sensor (F802). Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.		Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the engine harness. Refer to Step 2.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 2. Repair Verification				

Step 2.A Repair verification cycles

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



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

Action

1. Power-up/electrical

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

Were the identified repair verification cycles able to be completed?

Yes

No

Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.

Go to step 2.B

Go to step 2.B

Step 2.B DAVIE Diagnostics, Quick Check

Action

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

Has P0107 been cleared?

Yes

No

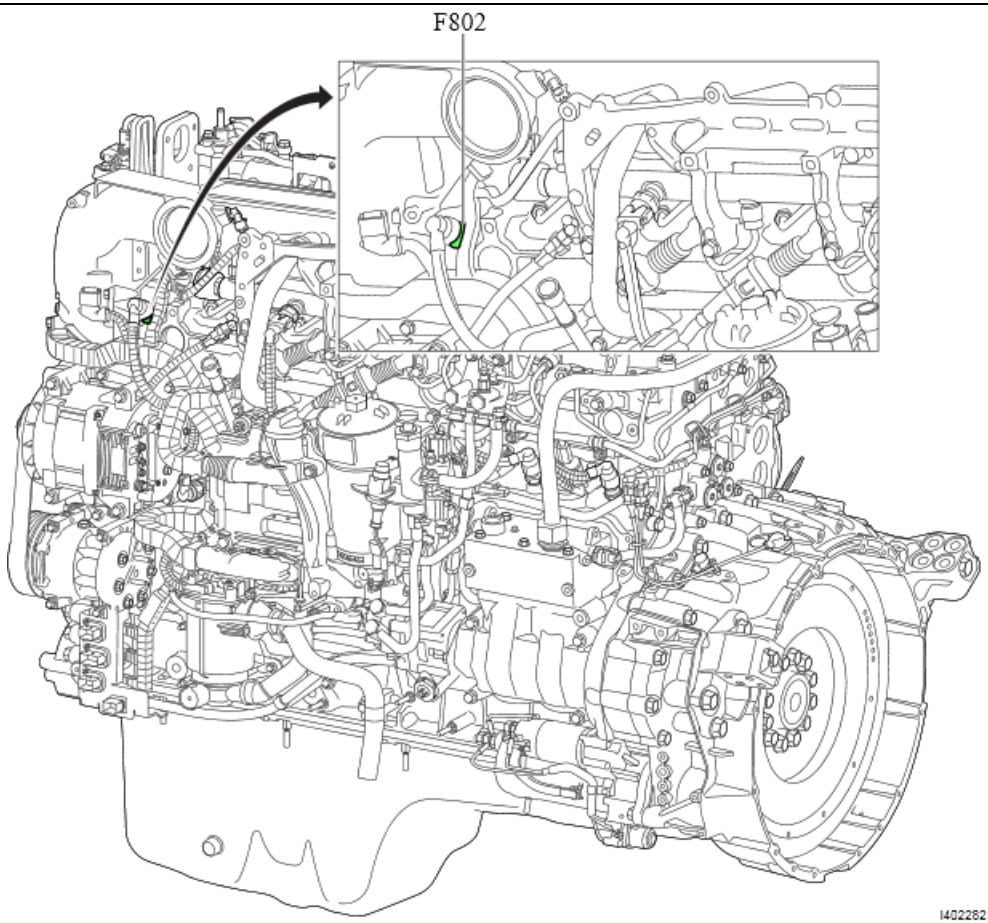
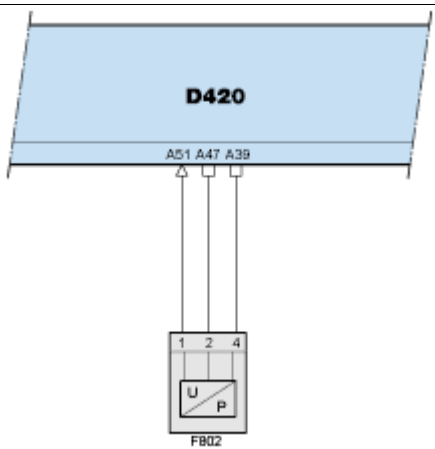
Problem resolved. No further actions.

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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P0108

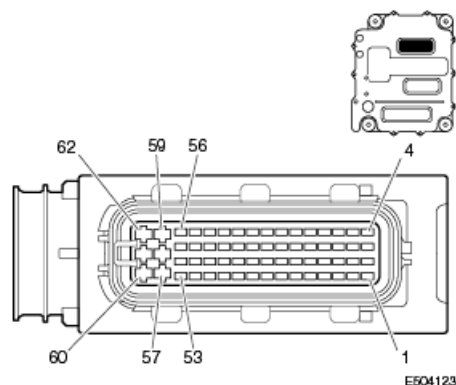
Code number	P0108
Fault code description	Boost pressure - Voltage too high or short circuit to supply on ECU (D420) pin (A51)
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	Boost pressure sensor (F802) The boost pressure is measured in the inlet manifold, near cylinder 1. Effect on the system • Determines the smoke limit A higher measured boost pressure increase results in higher torque for the same smoke level • Determines soot emissions A higher measured boost pressure results in lower calculated soot emission by the engine. • Determines NOx emissions A higher measured boost pressure results in higher calculated NOx emission by the engine. • Calculates exhaust gas mass flow used for DEF dosing estimation by the EAS-3 system. A higher measured boost pressure results in higher calculated exhaust gas mass flow. • Calculates the temperature after the compressor (VTG turbo charger) A higher measured boost pressure results in higher calculated temperature after the compressor. • Calculates the temperature before the turbine. A higher measured boost pressure results in lower calculated exhaust gas temperature before the turbine.

Location of component(s)	 I402262
Diagnostic condition	
Set condition	The PCI ECU detects the sensor output voltage is too high.
Reset condition	This fault code will change to inactive immediately after the diagnostic runs and passes. This fault cannot be cleared from the ECU's memory. Contact the PACCAR Engine Support Center for further instructions.
Electrical diagram(s)	 I401886

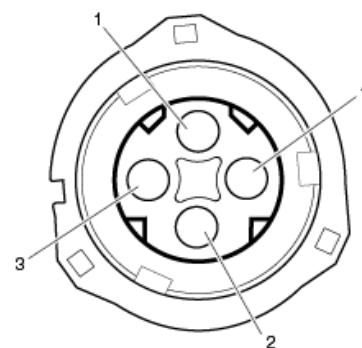
D420 PCI ECU

F802 Boost pressure sensor

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



Wiring harness connector D420.A front view



Wiring harness connector F802 front view



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

Technical data

Component check, boost pressure sensor (F802)

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

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

Component & wiring check, ECU (D420)

Preparation

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

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

Possible causes	- Faulty wiring - Faulty connection - Faulty sensor										
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. - 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. Boost Pressure Sensor (F802) Checks <table border="1"> <tr> <td colspan="2">Step 1.A Visual inspection, boost pressure sensor (F802)</td></tr> <tr> <td colspan="2">Action</td></tr> <tr> <td colspan="2"> 1. Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Batteries not fully charged or contacts are not tight - Boost pressure sensor (F802) is damaged or not installed correctly </td></tr> <tr> <td colspan="2">Was there evidence of any of the above?</td></tr> <tr> <td>Yes</td><td>No</td></tr> </table>	Step 1.A Visual inspection, boost pressure sensor (F802)		Action		1. Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Batteries not fully charged or contacts are not tight - Boost pressure sensor (F802) is damaged or not installed correctly		Was there evidence of any of the above?		Yes	No
Step 1.A Visual inspection, boost pressure sensor (F802)											
Action											
1. Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Batteries not fully charged or contacts are not tight - Boost pressure sensor (F802) is damaged or not installed correctly											
Was there evidence of any of the above?											
Yes	No										

	Correct any issues found. If the boost pressure sensor (F802) is found to be damaged or broken, replace it.	
	Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to Step 1.B	Go to step 1.B
Step 1.B Electrical checks, supply voltage, boost pressure sensor (F802)		
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.		
Action		
1. Confirm the supply voltage level as outlined in the corresponding checking data, " <u>Component check, boost pressure sensor (F802).</u> "		
Is the measured value within expected range?		
Yes		No
Possible electrical issue in the harness or boost pressure sensor (F802)		Possible electrical issue in the harness or PCI ECU
Go to step 1.D		Go to step 1.C
Step 2.C Electrical checks, isolation of electrical short in PCI, boost pressure sensor (F802)		
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 Supply and Ground terminals on the PCI ECU. The expected value is between 4.75 and 5.25 V.		
Is the measured voltage within the expected range?		

	Yes		No	
	Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the engine harness. Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.		Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the PCI ECU. Refer to Step 2.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 1.D Electrical checks, isolation of electrical open in harness, boost pressure sensor (F802)			
	Action 1. Set the ignition key to OFF. 2. Disconnect the boost pressure sensor (F802) and the engine harness D420.A connector at the PCI ECU. 3. Measure the resistance value on the signal wire between the sensor connector and the D420.A connector.			
	Is the measured resistance less than 10 Ω?			
	Yes		No	
	Replace the boost pressure sensor (F802). Refer to Step 2.A to perform the corresponding repair verification cycles and rechecks.		Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue, and for possible replacement of the engine harness. Refer to Step 2.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 2. Repair Verification				

Step 2.A Repair verification cycles

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



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

Action

1. Power-up/electrical

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

Were the identified repair verification cycles able to be completed?

Yes

No

Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.

Go to step 2.B

Go to step 2.B

Step 2.B DAVIE Diagnostics, Quick Check

Action

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

Has P0108 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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P0110

Code number	P0110
Fault code description	Air temp out of range at powerup
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

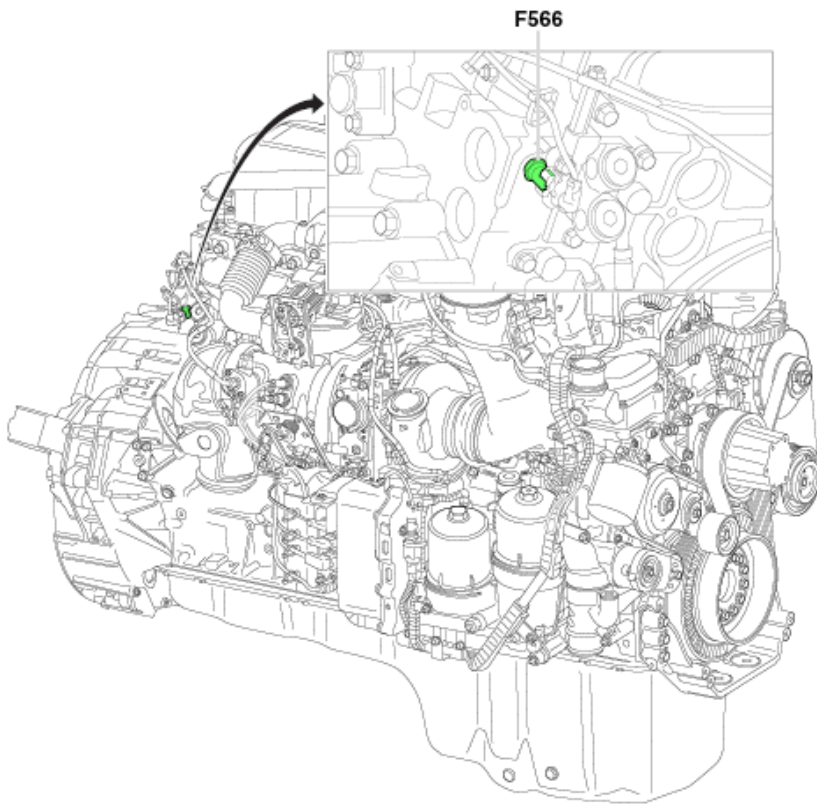
P0112

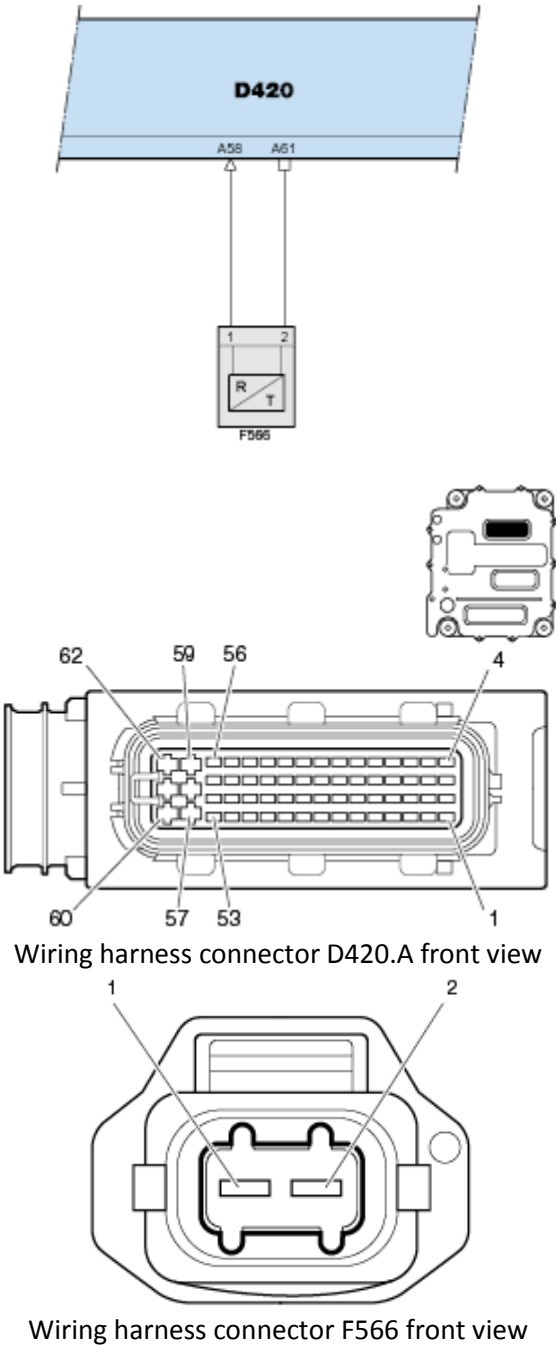
Code number	P0112
Fault code description	Boost temperature – Voltage too low or short circuit to ground on ECU D420 pin A43
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please Contact the Engine Support Center
Description of component(s)	
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

P0113

Code number	P0113
Fault code description	Boost temperature – Voltage too high or short circuit to supply on ECU D420 pin A43
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P0115

Code number	P0115
Fault code description	Coolant temperature - Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group - None Freeze frame type - Cooling
Description of component(s)	The coolant temperature is measured in the coolant return gallery at the right rear end of the cylinder block. Effect on the system: • Calculates the quantity of fuel to inject and the injection timing • Displays the coolant temperature to the driver • Displays warnings to the driver concerning high coolant temperature • Limits the engine torque when the coolant temperature is too high • Limits the maximum engine speed when the engine is cold • Enables condition for severity of (OBD) diagnostic checks • Fast idle speed control • Cold start aid
Location of component(s)	
Diagnostic condition	This diagnostic runs: • when the ignition has been keyed off continuously for at least 8 hours; • difference between the coolant and ambient temperature is less than 15°C [59°F]; • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured coolant temperature differs by more than 3°C [37°F] from the average of other temperature sensors on the engine for

	more than 5 seconds (after the ignition has been keyed off for at least 8 hours).
Reset condition of fault code	The 8-hour ignition off diagnostics consists of three separate steps: • The vehicle ignition may NOT be switched on or engine started for 8-10 consecutive hours (ideal situation would be overnight). • Once the 8 to 10 consecutive hours have been reached, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run. • Start the engine and let it idle for 2 minutes. • This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	 Wiring harness connector D420.A front view Wiring harness connector F566 front view

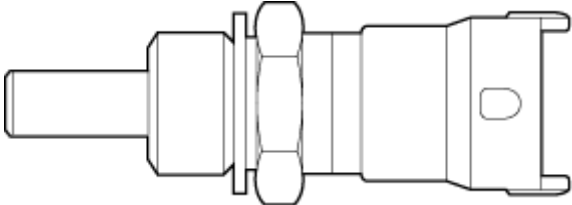
	D420 F552 Function A58 1 Signal, Coolant Temperature A61 2 Ground																																												
Technical data	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>14936–15961 Ω</td><td>Resistance value at -20°C [-4°F]</td></tr><tr><td></td><td></td><td>5727–6056 Ω</td><td>Resistance value at 0°C [32°F]</td></tr><tr><td></td><td></td><td>2439–2557 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>1151–1197 Ω</td><td>Resistance value at 40°C [104°F]</td></tr><tr><td></td><td></td><td>585–604 Ω</td><td>Resistance value at 60°C [140°F]</td></tr><tr><td></td><td></td><td>318–327 Ω</td><td>Resistance value at 80°C [176°F]</td></tr><tr><td></td><td></td><td>185–188 Ω</td><td>Resistance value at 100°C [212°F]</td></tr><tr><td></td><td></td><td>111–114 Ω</td><td>Resistance value at 120°C [248°F]</td></tr></table> <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>	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]	Pin (+ Probe)	Pin (- Probe)	Value	Additional Information	1	2	5V	Ignition Keyed on
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Pin (+ Probe)	Pin (- Probe)	Value	Additional Information																																										
1	2	5V	Ignition Keyed on																																										
Possible causes	- Engine (block) heater used - Coolant temperature sensor deviation																																												
Additional information	For this diagnostic, the engine coolant temperature sensor (F566) reading is compared with average readings of other temperature sensors on/off the engine after the ignition has been keyed off for at least 8 hours.																																												
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  - Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. - For specific electrical component information and pinout locations, always refer to the technical data. - It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. - Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. <table><tr><td>Step 1</td><td>Step ID 0115a</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 0115b</td><td>SRT</td></tr><tr><td colspan="3">Electrical Checks For all electrical checks and diagrams, refer to the Engine Service Rapido electrical schematic viewer (ESV) for detailed schematics, connector pin locations, and corresponding signal values. - In the component code box select F566 then Search. </td></tr></table>	Step 1	Step ID 0115a	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 0115b	SRT	Electrical Checks For all electrical checks and diagrams, refer to the Engine Service Rapido electrical schematic viewer (ESV) for detailed schematics, connector pin locations, and corresponding signal values. In the component code box select F566 then Search.																																		
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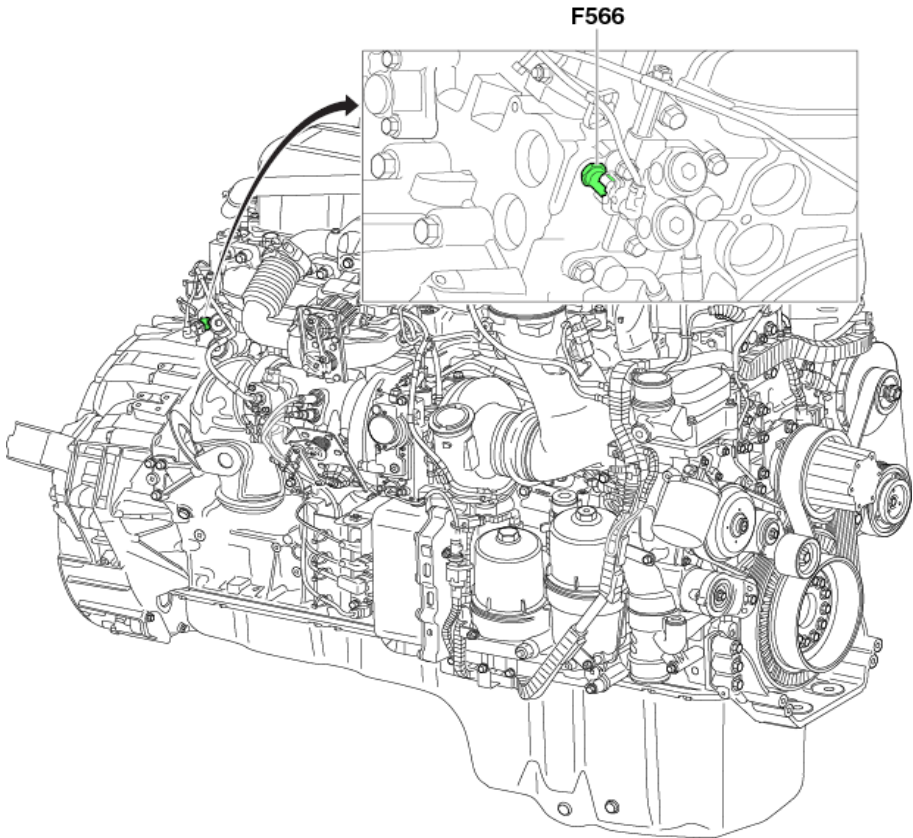
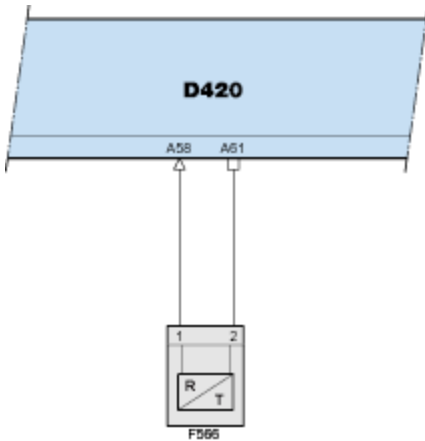
	Based on the fault message provided, confirm that the following electrical values are within specified ranges or limits: Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. • Supply and signal voltages. • Cable continuity (no opens or shorts). Are measured electrical values outside of expected range or limits? a. If measured electrical values are not outside of expected range or limits continue to the step 3 in the troubleshooting process. b. If measured electrical values outside of expected range or limits: • Make the appropriate repairs or component replacements. • Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 3 in the troubleshooting process						
	<table><tr><td>Step 3</td><td>Step ID 0115c</td><td>SRT</td></tr><tr><td colspan="3">Replace Smart Sensor: Coolant temperature sensor Replace the identified faulty sensor. Use DAVIE to check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 4 in the troubleshooting process. </td></tr></table>	Step 3	Step ID 0115c	SRT	Replace Smart Sensor: Coolant temperature sensor Replace the identified faulty sensor. Use DAVIE to check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 4 in the troubleshooting process.		
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	<table><tr><td>Step 4</td><td>Step ID 0115d</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>	Step 4	Step ID 0115d	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.		
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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, 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						

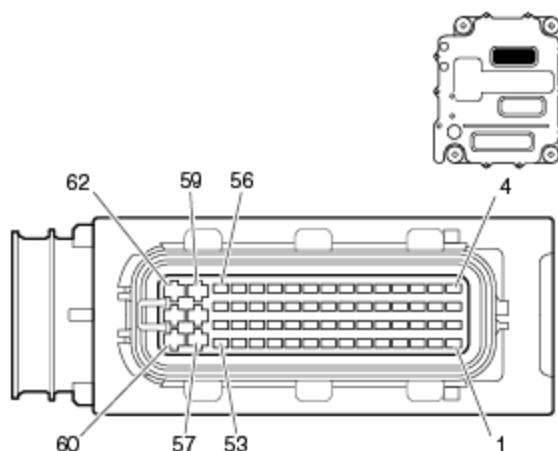
P0116

Code number	P0116
Fault code description	Coolant temperature sensor rate of change fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

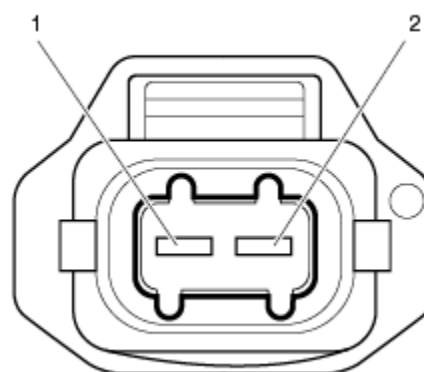
P0117

Code number	P0117
Fault code description	Coolant Temperature – Voltage too low or short circuit to ground on ECU D420 pin A58
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Cooling
Description of component(s)	 The coolant temperature is measured in the coolant return gallery at the right rear end of the cylinder block. Effect on the system: • Calculates the quantity of fuel to inject and the injection timing • Displays the coolant temperature to the driver • Displays warnings to the driver concerning high coolant temperature • Limits the engine torque when the coolant temperature is too high • Limits the maximum engine speed when the engine is cold • Enables condition for severity of (OBD) diagnostic checks • Fast idle speed control • Cold start aid

Location of component(s)	
Diagnostic condition	When Sensor output voltage is too low (below 0.23V)
Set condition of fault code	The PCI-2 detects that the sensor output voltage is too low (below 0.23 V).
Reset condition of fault code	This fault code changes to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	



Wiring harness connector D420.A front view



Wiring harness connector F566 front view

Technical data

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 [32°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]
Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	5V	Ignition keyed on

Possible causes

- Faulty wiring
- Faulty connector
- Faulty sensor

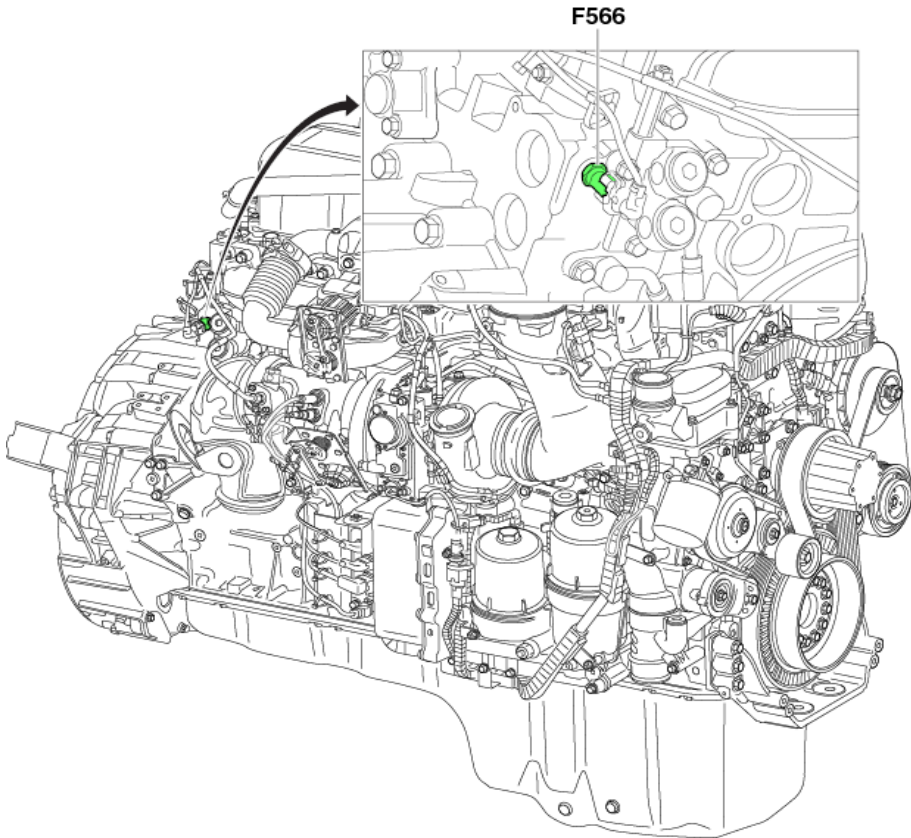
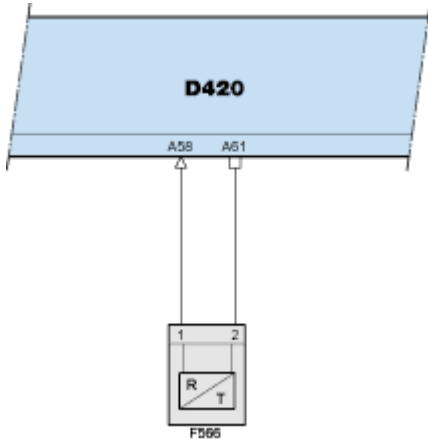
Additional information

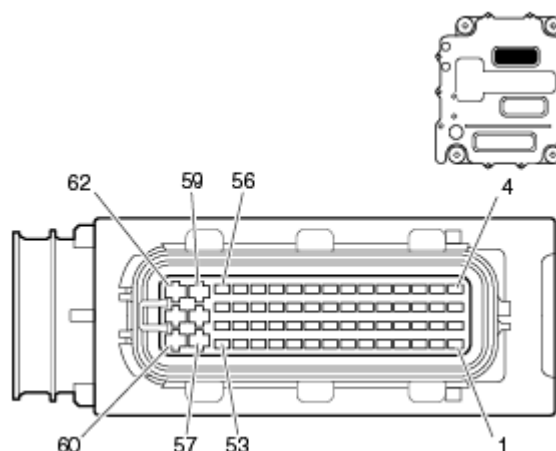
No additional information available.

Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section.						
	<table><tr><td>Step 1</td><td>Step ID P0117a</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>	Step 1	Step ID P0117a	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 1	Step ID P0117a	SRT				
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	<table><tr><td>Step 2</td><td>Step ID P0117b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the temperature sensor. Turn the key ON, and navigate through DAVIE to read errors: • If P0117 is active – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document. • If P0118 is active – Proceed to step 3. </td></tr></table>	Step 2	Step ID P0117b	SRT	With key OFF, disconnect the temperature sensor. Turn the key ON, and navigate through DAVIE to read errors: • If P0117 is active – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document. • If P0118 is active – Proceed to step 3.		
Step 2	Step ID P0117b	SRT					
With key OFF, disconnect the temperature sensor. Turn the key ON, and navigate through DAVIE to read errors: • If P0117 is active – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document. • If P0118 is active – Proceed to step 3.							
<table><tr><td>Step 3</td><td>Step ID P0117c</td><td>SRT</td></tr><tr><td colspan="3">With the key OFF, disconnect the harness from the PCI. Turn the key ON, and navigate through DAVIE to read errors: • If P0117 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P0118 is active – Proceed to step 4. </td></tr></table>	Step 3	Step ID P0117c	SRT	With the key OFF, disconnect the harness from the PCI. Turn the key ON, and navigate through DAVIE to read errors: • If P0117 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P0118 is active – Proceed to step 4.			
Step 3	Step ID P0117c	SRT					
With the key OFF, disconnect the harness from the PCI. Turn the key ON, and navigate through DAVIE to read errors: • If P0117 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P0118 is active – Proceed to step 4.							
<table><tr><td>Step 4</td><td>Step ID P0117d</td><td>SRT</td></tr><tr><td colspan="3">Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.</td></tr></table>	Step 4	Step ID P0117d	SRT	Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.			
Step 4	Step ID P0117d	SRT					
Possible PCI failure – Contact the Engine Support Center for further instructions on replacing the PCI.							
Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.						
	Back to Index						

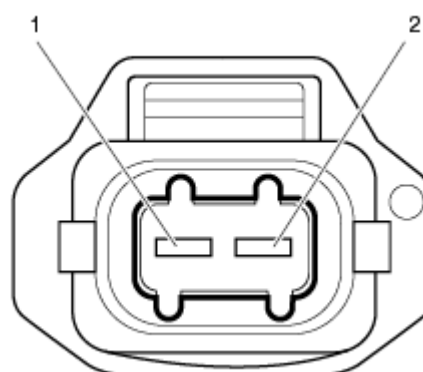
P0118

Code number	P0118
Fault code description	Coolant Temperature – Voltage too high or short circuit to supply on ECU D420 pin A58
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Cooling
Description of component(s)	The coolant temperature is measured in the coolant return gallery at the right rear end of the cylinder block. Effect on the system: • Calculates the quantity of fuel to inject and the injection timing • Displays the coolant temperature to the driver • Displays warnings to the driver concerning high coolant temperature • Limits the engine torque when the coolant temperature is too high • Limits the maximum engine speed when the engine is cold • Enables condition for severity of (OBD) diagnostic checks • Fast idle speed control • Cold start aid

Location of component(s)	 F566
Diagnostic condition	When sensor output voltage is too high (above 4.89 V)
Set condition of fault code	The PCI detects that the sensor output voltage is too high (above 4.89 V).
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.
Electrical diagram(s)	 D420 A58 A61 1 2 R T F566



Wiring harness connector D420.A front view



Wiring harness connector F566 front view

D420 PCI ECU
F566 coolant temperature sensor

D420	F566	Function
A58	1	Signal, coolant temperature
A61	2	Ground

Technical data

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	14936–15961 Ω	Resistance value at -20°C [-4°F]
	2	5727–6056 Ω	Resistance value at 0°C [32°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]

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 0118a	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 0118b	SRT

With key OFF, disconnect the coolant temperature sensor. Turn the key ON and measure the voltage between a battery ground and the supply terminal of the coolant temperature sensor circuit on the engine harness:

- If the voltage is above 5.5 V – Proceed to step 4.
- If the voltage is below 5.5 V – Proceed to step 3.

Step 3	Step ID 0118c	SRT

With key OFF, install a jumper wire between the supply and ground wires of the coolant temperature sensor connector on the engine harness. Turn the key ON, and navigate through DAVIE to read errors:

- If P0117 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document.
- If P0118 is active – Proceed to step 4.

Step 4	Step ID 0118d	SRT

With key OFF, disconnect the engine harness from the PCI, and install a jumper wire between the supply and ground pins of the sensor circuit on the PCI. Turn the key ON, and navigate through DAVIE to read errors:

- If P0117 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document.
- If P0118 is active – Proceed to step 5.

Step 5	Step ID 0118e	SRT

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

Verification Drive Cycle

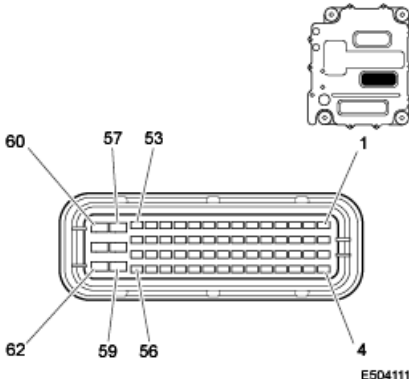
With DAVIE connected and the key ON, clear the errors. Start the engine and let it idle

	to verify with DAVIE that the errors do not recur.
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P011A

Code number	P011A
Fault code description	Stalled Water Pump detected
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P0121

Code number	P0121																		
Fault code description	Dual PWM accelerator pedal Sticking pedal																		
Fault code information	# trip MIL – N/A 3 drive cycle recovery Readiness Group - None Freeze frame type - Crankcase																		
Description of component(s)	Dual pulse width modulation (PWM) sensor/switch																		
Location of component(s)																			
Diagnostic condition	This diagnostic runs continuously when the engine is on.																		
Set condition of fault code	> 10 seconds of concurrent application of both the brake and accelerator pedals.																		
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 (J2) front view <table><tr><th>D420</th><th>Signal Name</th><th>Function</th></tr><tr><td>B38</td><td>PWM accelerator pedal 1 (5 V) supply</td><td>Determining the accelerator pedal position</td></tr><tr><td>B41</td><td>PWM accelerator pedal 1 signal</td><td>Determining the accelerator pedal position</td></tr><tr><td>B42</td><td>PWM accelerator pedal 1 ground</td><td>Determining the accelerator pedal position</td></tr><tr><td>B45</td><td>PWM accelerator pedal 2 signal</td><td>Determining the accelerator pedal position</td></tr><tr><td>B46</td><td>PWM accelerator pedal 2 ground</td><td>Determining the accelerator pedal position</td></tr></table>	D420	Signal Name	Function	B38	PWM accelerator pedal 1 (5 V) supply	Determining the accelerator pedal position	B41	PWM accelerator pedal 1 signal	Determining the accelerator pedal position	B42	PWM accelerator pedal 1 ground	Determining the accelerator pedal position	B45	PWM accelerator pedal 2 signal	Determining the accelerator pedal position	B46	PWM accelerator pedal 2 ground	Determining the accelerator pedal position
D420	Signal Name	Function																	
B38	PWM accelerator pedal 1 (5 V) supply	Determining the accelerator pedal position																	
B41	PWM accelerator pedal 1 signal	Determining the accelerator pedal position																	
B42	PWM accelerator pedal 1 ground	Determining the accelerator pedal position																	
B45	PWM accelerator pedal 2 signal	Determining the accelerator pedal position																	
B46	PWM accelerator pedal 2 ground	Determining the accelerator pedal position																	

	B50	PWM accelerator pedal 2 (5 V) supply	Determining the accelerator pedal position
Technical data			
Possible causes	1. Accelerator pedal and service brake applied at the same time 2. Brake pedal or hand brake lever not returned/released completely 3. Faulty wiring 4. Faulty connector 5. Accelerator pedal mechanical fault		
Additional information	This DTC is provided mainly for information purposes. Its occurrence will be captured in the corresponding diagnostic log file, however, no corresponding dashboard lamp is lit. If this fault does not self-clear during driving operations it will result in a reduced torque/derate condition. For additional information and assistance in troubleshooting this fault, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		
Diagnostic Step-by-Step	</		

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

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

Was there evidence of any of the above?

Yes Correct any issues found.

Use DAVIE to clear current faults.

Refer to Step 3.A to perform the corresponding repair verification cycles.

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

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

No Step 2.B

Step P0121_2.B	DAVIE Monitor: Throttle pedal	SRT:

Use the DAVIE Monitor selection, Throttle pedal, to determine if correct response values are given when the accelerator pedal is depressed and then released.

Are monitored values within expected range?

Yes If this trouble code is no longer present, stop troubleshooting.

If this trouble code is still present, continue to step 2.C.

No Step 4.A

Step P0121_2.C	DAVIE Monitor: Brake switch	SRT:

Use the DAVIE Monitor selection, Individual Component > Brake switch, to determine if the correct response (Active/Inactive) is given when the brake pedal or Johnson lever is applied.

Are the monitored values within expected range?

Yes If this trouble code is no longer present, stop troubleshooting.

If this trouble code is still present, continue to step 4.A.

No Step 4.A

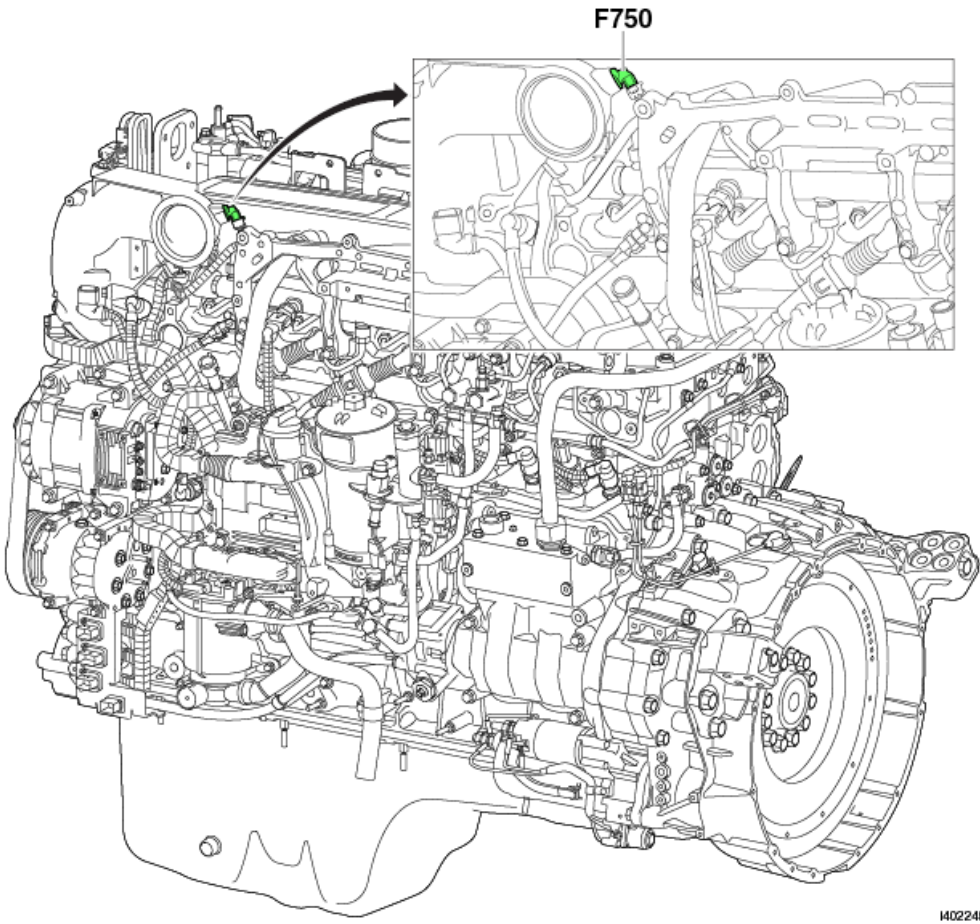
Step 3. Repair Verification Cycles



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

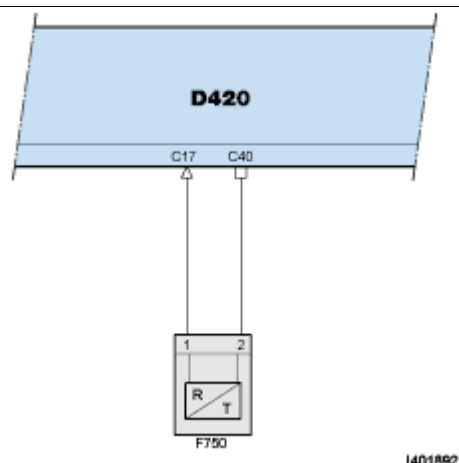
	Step P0121_3.A	Repair Verification Cycle: N/A	SRT:
	Not applicable to this fault. This DTC is self-clearing, however, if it persists during normal drive operations it will result in a reduced torque/derate condition. Should this condition be detected, contact PACCAR Engine Support for additional information and guidance in replacing the accelerator pedal switch.		
	Step 4. Contact PACCAR Engine Support Center		
	Step P0121_4.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.		
	Back to Index		

P0127

Code number	P0127
Fault code description	Intercooler temperature - Data valid but too high, most severe
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Boost
Description of component(s)	The intercooler outlet temperature is measured before the EGR mixer. Effect on the system Monitors intercooler performance
Location of component(s)	 1402248
Diagnostic condition	This diagnostic runs 300 seconds after the engine is started.
Set condition of fault code	The PCI ECU (D420) detects that the intercooler outlet temperature is more than 100°C [212°F] for more than 30 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, drive the vehicle until the coolant temperature is at least 70°C [158°F]. Once the minimum target temperature has been reached, perform several low to higher speed accelerations with moderate engine load. Also perform high-load to

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

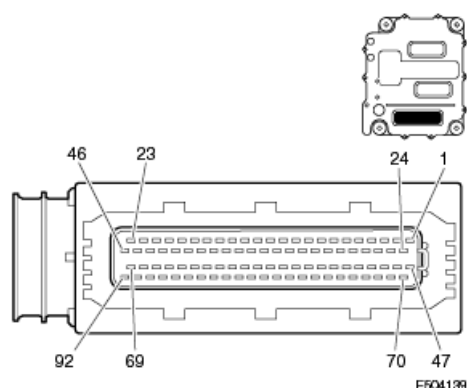
Electrical diagram(s)



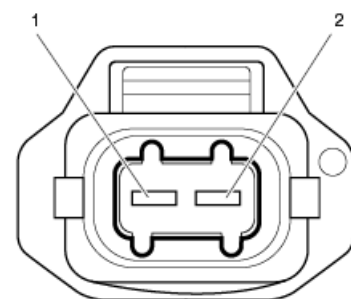
D420 PCI ECU

F750 Intercooler temperature sensor

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



Wiring harness connector D420.C front view



Wiring harness connector F750 front view



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

Technical data

Component check, intercooler temperature sensor (F750)

Preparation

- Key off the ignition

	• Disconnect connector F750 • Measure on the component connector F750 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="6">1</td><td rowspan="6">2</td><td>5248–5732 Ω</td><td>Resistance value at 0°C [32°F]</td></tr><tr><td>2334–2505 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>1133–1198 Ω</td><td>Resistance value at 40°C [104°F]</td></tr><tr><td>593–619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr><tr><td>331–341 Ω</td><td>Resistance value at 80°C [176°F]</td></tr><tr><td>195–199 Ω</td><td>Resistance value at 100°C [212°F]</td></tr></table> Component & circuit check, ECU (D420) Preparation • Key off the ignition • Disconnect connector F750 • Measure on the front side of wiring harness connector F750 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>5V</td><td>Ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5248–5732 Ω	Resistance value at 0°C [32°F]	2334–2505 Ω	Resistance value at 20°C [68°F]	1133–1198 Ω	Resistance value at 40°C [104°F]	593–619 Ω	Resistance value at 60°C [140°F]	331–341 Ω	Resistance value at 80°C [176°F]	195–199 Ω	Resistance value at 100°C [212°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	Ignition keyed on
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		195–199 Ω	Resistance value at 100°C [212°F]																								
Pin (+ probe)	Pin (- probe)	Value	Additional information																								
1	2	5V	Ignition keyed on																								
Possible causes	• Contaminated intercooler • Faulty engine cooling fan • Intercooler temperature sensor deviation • Use of a winterfront at temperatures above 40°F [4°C] • Use of an aftermarket winterfront that has excessive airflow restriction through the intercooler																										
Additional information	• The intercooler outlet temperature is measured before the EGR mixer temperature by the intercooler temperature sensor (F750). • 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.																										



- 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

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

Are these or any other related codes active?

Ambient air temp sensor	P0072; P0073; P009A
Coolant temperature sensor	P0115; P0117; P0118; P1115; P2181; P2183
Post-intercooler air temperature sensor	P0095; P0097; P0098; P0127; P1127
EGR (venturi) temperature sensor	P040B; P040C; P040D, or related EGR codes
Pre-compressor air temperature sensor	P2199; U1071
Boost air temperature sensor	P0110; P0112; P0113; P1128; P1573

Yes

Refer to the troubleshooting information for these codes before continuing with this procedure.

No

Go to step 2.A

Step 2. Intercooler (F750) Checks

Step 2. A Visual inspection, intercooler (F750)

Action

2. Visually inspect the intercooler (charge air cooler) and associated components for any of the following:
 - Loose or broken clamps on the air system
 - Dirt or debris build-up (blockage) at the front of the intercooler
 - Air system parts are removed or damaged
 - Hump hoses are folded over or have holes
 - Damage to or incorrect installation of any of the following sensors:
 - Coolant temperature sensor (F566)
 - Post-intercooler temperature sensor (F750)
 - Pre-compressor air (after BPV) temperature sensor (F853)
 - EGR (venturi) temperature sensor (F749)
 - Boost air temperature sensor (F804)
 - Boost air pressure sensor (F802)

Was there evidence of any of the above?

Yes

No

Correct any issues found. If a sensor is found to be damaged or broken, replace it.
Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to Step 2.B.

Step 2.B

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



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

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

Are measured values within expected range?

Yes

No

Correct any issues found, or replace the intercooler temperature sensor (F750) if measured values indicate a sensor error.

Refer to Step 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, supply voltage, intercooler temperature sensor (F750)		
 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 supply voltage as outlined in the corresponding checking data, <u>“Component check, intercooler temperature sensor (F750).”</u>		
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.D		If this code is still present, go to step 2.D.
Step 2.D DAVIE monitor, intercooler temperature and related sensors		
Action		
2. Use DAVIE to select and monitor the following temperature and pressure values for comparison: • Coolant temperature (turbo control) • Post-intercooler air temperature(turbo control) • Pre-compressor air temperature(turbo control) • EGR temperature (EGR control) • Boost air pressure (turbo control)		
For initial temperature readings, monitor with the ignition key to ON and the engine to OFF. Start the engine and allow it to idle for a minimum of 10 minutes to allow the temperature sensors to stabilize. While monitoring, no temperature should vary by a value of more than 50°F for a period of more than 5 seconds.		

Do any monitored values vary by more than 50°F (24°C) for more than 5 seconds?	
Yes	No
Correct any issues found, or replace the related sensor if measured values indicate a sensor error. Refer to Step 3.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.E.	Go to step 2.E
Step 2.E Special test, intake/exhaust leak	
Action	
1. Perform this test using the Intake/Exhaust Leak Test Kit (#1903034) to determine whether there are any leaks in the intake air system.	
Was there evidence of a leak in the air system?	
Yes	No
Correct any issues found. Refer to Step 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

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 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 P0127 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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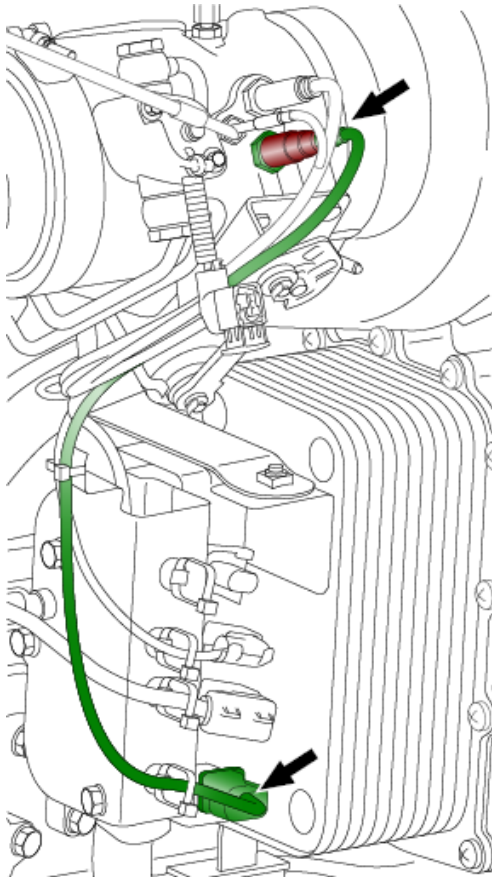
P0128

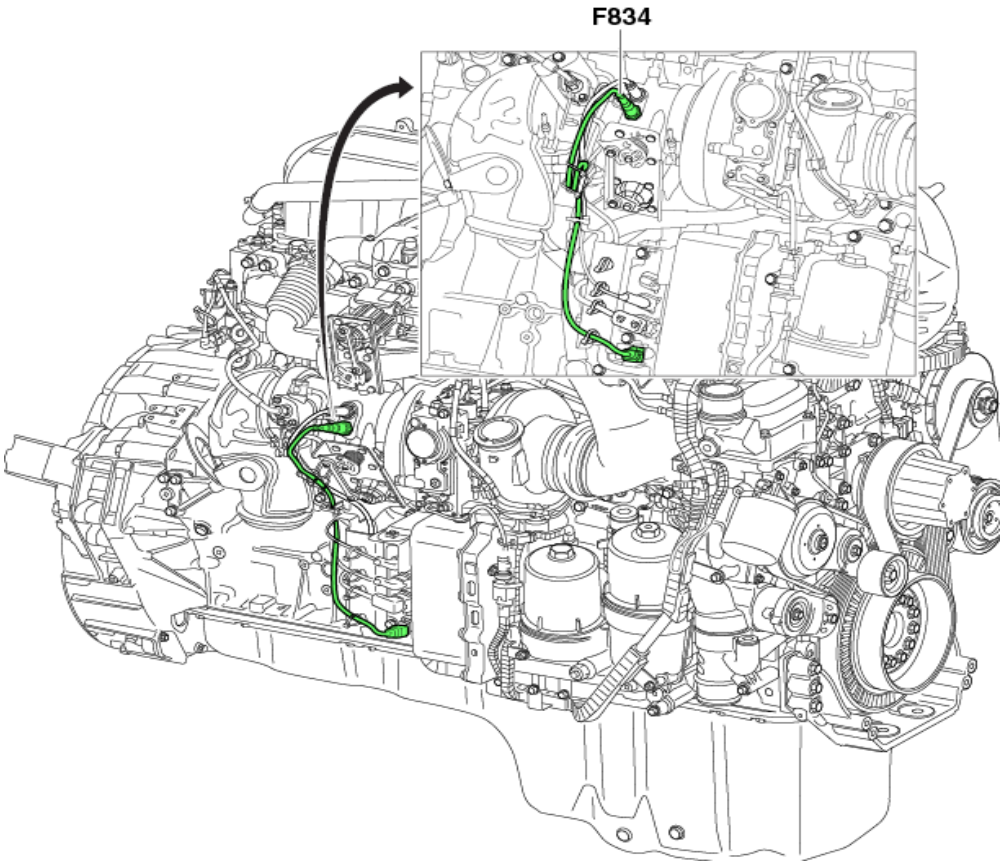
Code number	P0128
Fault code description	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please Contact the Engine Support Center
Description of component(s)	
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

P0130

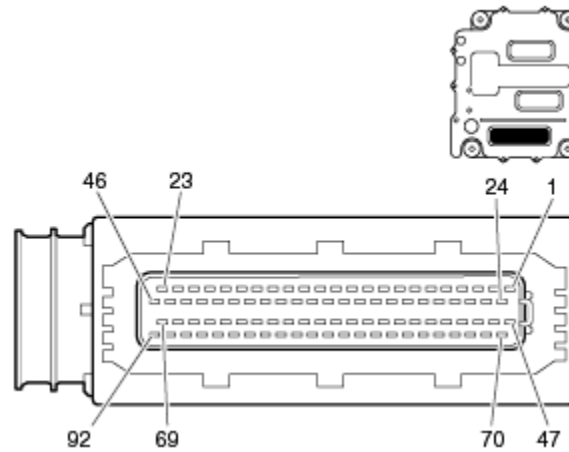
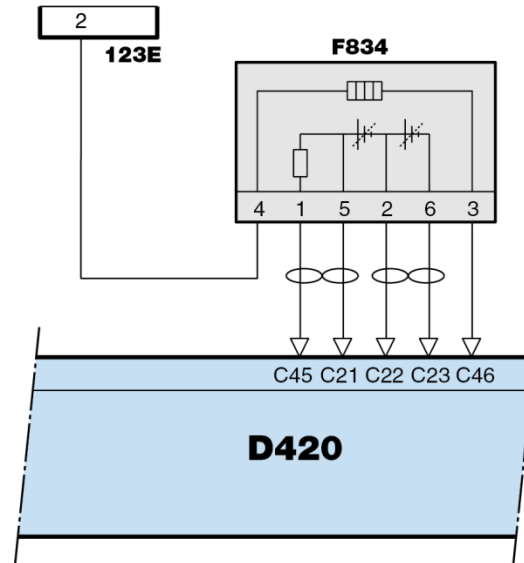
Code number	P0130
Fault code description	Warf sensor age learning fault
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set 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

P0135

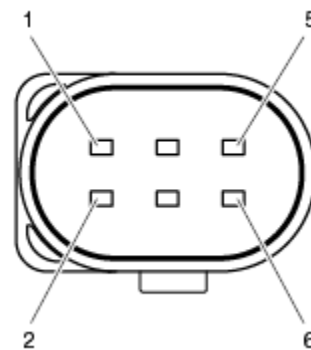
Code number	P0135
Fault code description	Lambda sensor heater – Current too low or open circuit on ECU D420 pin C46
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type –Exhaust gas
Description of component(s)	The lambda sensor measures the oxygen concentration in the exhaust gases after the BPV valve.  Air/fuel ratio The PCI ECU uses the measured oxygen concentration in the exhaust to determine the air/fuel ratio of the combustion process. Typical air/fuel ratios are 18 to 45. A high value indicates a high oxygen concentration measured by the lambda sensor. Sensor heater The sensor has an integrated heater to maintain a sensor operating temperature of approximately 750°C [1382°F]. The PCI ECU controls the heater. • The first stage starts when the ignition is keyed on. The sensor is heated to a value at which any condensate evaporates from the sensor. • The second stage starts after the 'dew point' is reached. The sensor is heated to its operating temperature of approximately 750°C [1382°F]. The PCI ECU

	determines the 'dew point' by calculating how much energy (heat by burning fuel in the engine) is pumped through the exhaust. If the 'dew point' is not/no longer reached, the sensor temperature stays at/drops to the standby temperature, similar to the first stage heating. Effect on the system • Determines the air/fuel ratio of the combustion process • Controls the smoke limit; where the measured exhaust gas oxygen concentration is compared with a target value for smoke limitation. A higher measured oxygen concentration results in lower calculated soot formation by the engine. • Controls NOx emissions; determines whether the target Exhaust Gas Recirculation is being achieved to control NOx emissions. A higher measured oxygen concentration results in higher calculated NOx formation by the engine. • Controls regeneration of the diesel particulate filter (DPF). The soot particles in the DPF are 'burned' using the oxygen present in the exhaust gas
Location of component(s)	
Diagnostic condition	This diagnostic starts five minutes after the engine starts.
Set condition of fault code	This diagnostic starts five minutes after the engine starts. The diagnostic runs continuously.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)



Wiring harness connector D420.C front view



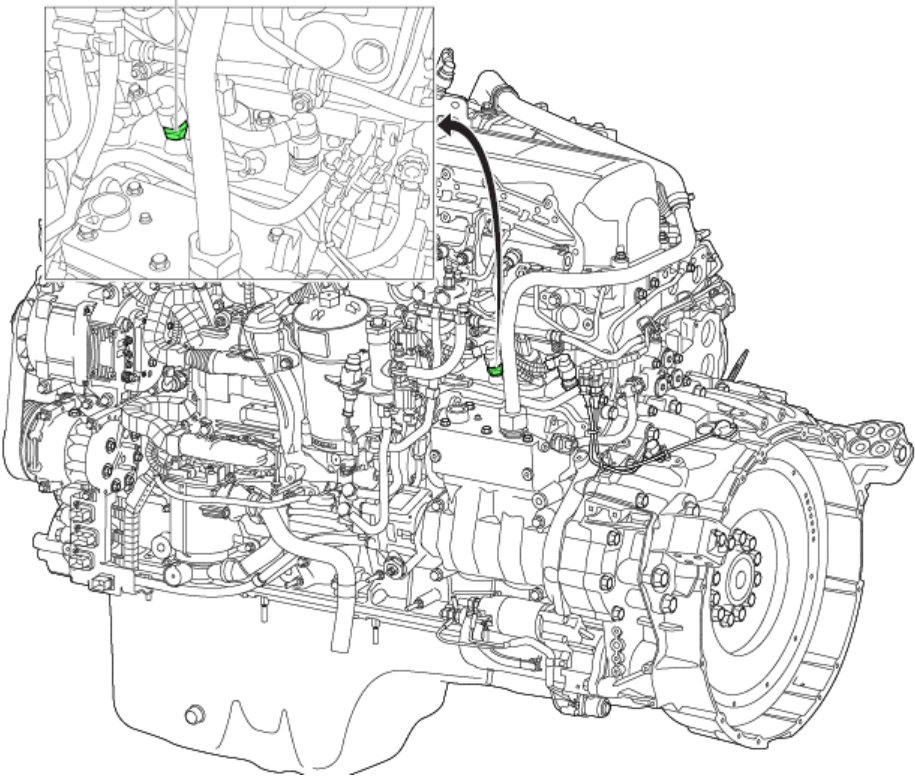
Wiring harness connector F834 front view

123E 7-pin interface connector
D420 PCI ECU

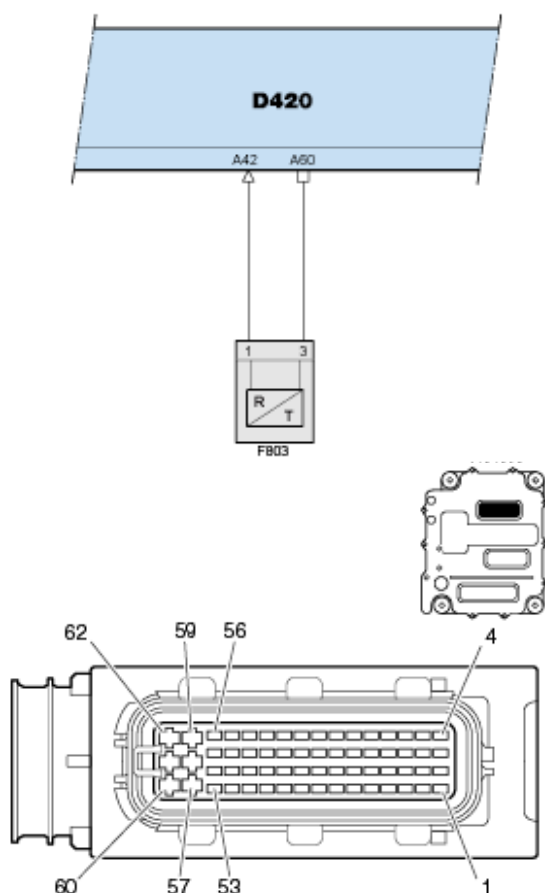
	F834 lambda sensor <table><tr><th>D420</th><th>F834</th><th>Function</th></tr><tr><td>C21</td><td>5</td><td>Trimming resistor</td></tr><tr><td>C22</td><td>2</td><td>Ground, sensor element</td></tr><tr><td>C23</td><td>6</td><td>Signal, nernst sensor</td></tr><tr><td>C45</td><td>1</td><td>Signal, pump cell current</td></tr><tr><td>C46</td><td>3</td><td>Ground, heater element</td></tr><tr><td></td><td>4</td><td>Power supply, heater element</td></tr></table>	D420	F834	Function	C21	5	Trimming resistor	C22	2	Ground, sensor element	C23	6	Signal, nernst sensor	C45	1	Signal, pump cell current	C46	3	Ground, heater element		4	Power supply, heater element
D420	F834	Function																				
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C22	2	Ground, sensor element																				
C23	6	Signal, nernst sensor																				
C45	1	Signal, pump cell current																				
C46	3	Ground, heater element																				
	4	Power supply, heater element																				
Technical data	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>4</td><td>3</td><td>2.4–4.0 Ω</td><td>Heater element resistance at 20°C [68°C]</td></tr></table> <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>4</td><td>Ground</td><td>Ubat</td><td>Heater element power supply with ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	4	3	2.4–4.0 Ω	Heater element resistance at 20°C [68°C]	Pin (+ probe)	Pin (- probe)	Value	Additional information	4	Ground	Ubat	Heater element power supply with ignition keyed on					
Pin (+ probe)	Pin (- probe)	Value	Additional information																			
4	3	2.4–4.0 Ω	Heater element resistance at 20°C [68°C]																			
Pin (+ probe)	Pin (- probe)	Value	Additional information																			
4	Ground	Ubat	Heater element power supply with ignition keyed on																			
Possible causes	- Faulty wiring - Faulty connector - Faulty sensor																					
Additional information	No additional information available.																					
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  - Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. - For specific electrical component information and pinout locations, always refer to the technical data. - It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. - Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. <table><tr><td>Step 1</td><td>Step ID 0135a</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 0135b</td><td>SRT</td></tr><tr><td colspan="3">Replace Lambda sensor. Use DAVIE to re-check for the presence of active faults. - Fault inactive - issue resolve - Fault active - Proceed to step 3. </td></tr></table>	Step 1	Step ID 0135a	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 0135b	SRT	Replace Lambda sensor. Use DAVIE to re-check for the presence of active faults. - Fault inactive - issue resolve - Fault active - Proceed to step 3.											
Step 1	Step ID 0135a	SRT																				
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Step 2	Step ID 0135b	SRT																				
Replace Lambda sensor. Use DAVIE to re-check for the presence of active faults. - Fault inactive - issue resolve - Fault active - Proceed to step 3.																						

	Step 3	Step ID 0135c	SRT
	For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		
Verification Drive Cycle	To validate the repair, drive the vehicle with the brakes set, start the engine and allow it to run at idle for 6 minutes for the system to initialize and run diagnostics.		
	Back to Index		

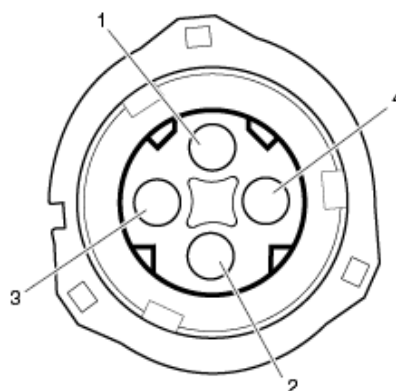
P0168

Code number	P0168
Fault code description	Fuel temperature - Data valid but too high, most severe
Fault code information	1 trip red fault lamp 3 drive cycle recovery Readiness group – none Freeze frame type – Fuel
Description of component(s)	The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: - Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). - Limitation of the engine torque when the fuel temperature is too high.
Location of component(s)	F803 
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The PCI ECU (D420) detects that the fuel temperature is more than 98°C [208°F] for more than 30 seconds.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected. To validate the repair, key off the ignition for at least 15 seconds, key on again. Then start the engine and let it idle for more than 30 seconds.

Electrical diagram(s)



Wiring harness connector D420.A front view



Wiring harness connector F803 front view

D420 PCI ECU
F803 fuel temperature sensors

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

Technical data

Component check, fuel temperature sensor (F803)
Preparation

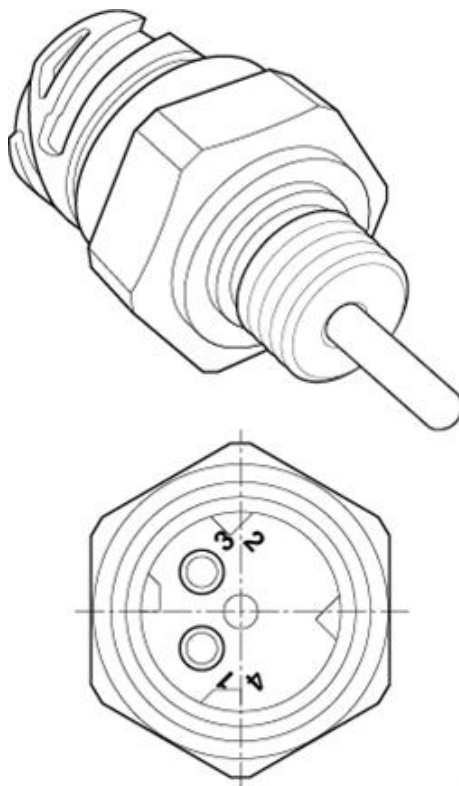
- Key off the ignition.

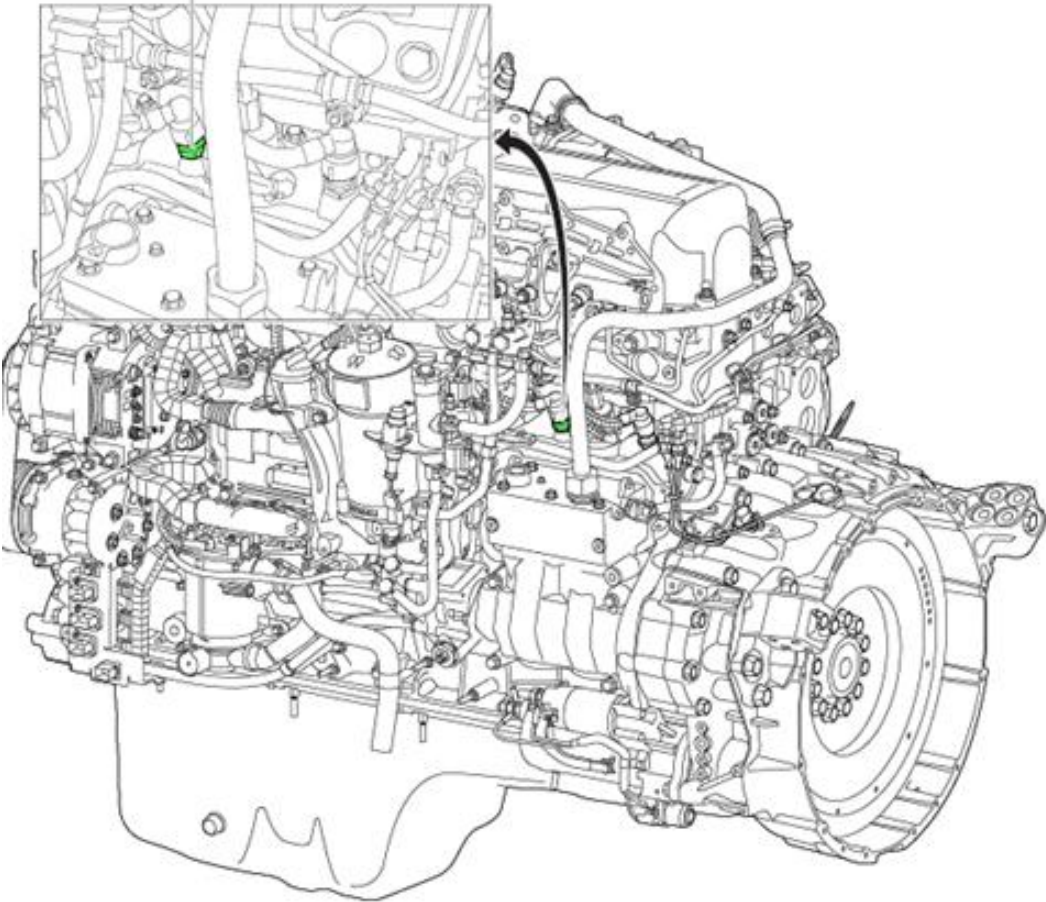
	• Disconnect connector F803 • Measure on component connector F803 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>3</td><td>5633 - 6120 Ω</td><td>Resistance value at 0°C [34°F]</td></tr><tr><td></td><td></td><td>2411 - 2573 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>1128 - 1213 Ω</td><td>Resistance value at 40°C [104°F]</td></tr><tr><td></td><td></td><td>568 - 619 Ω</td><td>Resistance value at 60°C [140°F]</td></tr><tr><td></td><td></td><td>306 - 337 Ω</td><td>Resistance value at 80°C [176°F]</td></tr><tr><td></td><td></td><td>176 - 196 Ω</td><td>Resistance value at 100°C [212°F]</td></tr></table> Component & wiring check, ECU (D420) Preparation • Key off the ignition. • Disconnect connector F803 • Measure on the front side of wiring harness connector F803 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Condition</th></tr><tr><td>1</td><td>3</td><td>5V</td><td>Ignition switched on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	3	5633 - 6120 Ω	Resistance value at 0°C [34°F]			2411 - 2573 Ω	Resistance value at 20°C [68°F]			1128 - 1213 Ω	Resistance value at 40°C [104°F]			568 - 619 Ω	Resistance value at 60°C [140°F]			306 - 337 Ω	Resistance value at 80°C [176°F]			176 - 196 Ω	Resistance value at 100°C [212°F]	Pin (+ probe)	Pin (- probe)	Value	Condition	1	3	5V	Ignition switched on
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Pin (+ probe)	Pin (- probe)	Value	Condition																																		
1	3	5V	Ignition switched on																																		
Possible causes	• Restriction in the fuel to tank return circuit or faulty fuel pressure regulating valve. Check the fuel pressure according to the prescribed job. • Excessive dumping of fuel from the common rail through common rail pressure release valve (L094).																																				
Additional information	• The low-pressure fuel temperature is measured by the fuel temperature sensor (F803). • Engine torque is reduced with this DTC 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. <table><tr><td>Step 1</td><td>Step ID 0168a</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>	Step 1	Step ID 0168a	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.																																
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	Step 2	Step ID 0168b	SRT
	Verify fuel pressure Troubleshooting steps • Perform the fuel leakage shutoff valve test found on Engine Rapido. • Perform the fuel pressure test found on Engine Rapido. Does the fuel pressure pass these tests? • Yes – Proceed to step 3. • No – Repair as needed. Proceed to step 8.		
	Step 3	Step ID 0168c	SRT
	Verify fuel temperature Troubleshooting steps • Drive the truck under conditions similar to those that caused the fault code. • Stop the truck. • Use DAVIE to view the fuel temperature. • A passing fuel blender temperature is 100 to 125°F. • A failing fuel blender temperature is above 160°F. • A passing fuel blender bypassed fuel is 80 to 100°F. Is the fuel blender temperature above 160°F? • Yes – Replace the fuel blender. Proceed to step 4. • No – Contact Engine Support Center (ESC).		
	Step 4	Step ID 0168d	SRT
	Inspect the fuel sensor and connector pins Troubleshooting steps • Turn the key switch OFF. • Disconnect the fuel temperature sensor. • Inspect the fuel temperature sensor connector/harness interface for: • corroded or dirty pins, • damaged pins, • pushed back or expanded pins, • loose connector, • moisture in or on the connector, • connector shell damage, • missing or damaged connector seals and/or • Wire insulation damage. Has dirt or damage been found? • Yes – Clean, repair or replace the damaged connection or harness if possible. Proceed to step 5. • No – Proceed to step 5.		
	Step 5	Step ID 0168e	SRT
	Check the circuit response before the sensor Troubleshooting steps • Turn the key switch OFF.		

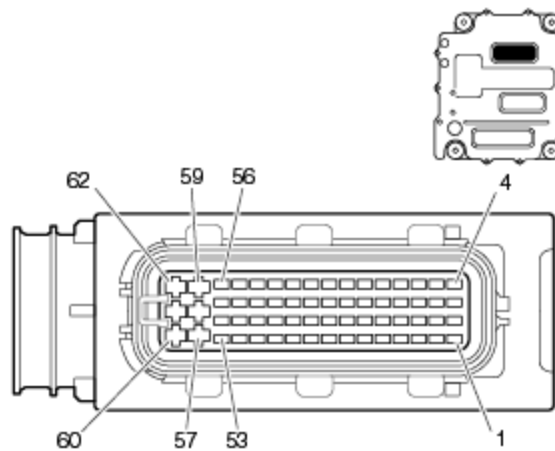
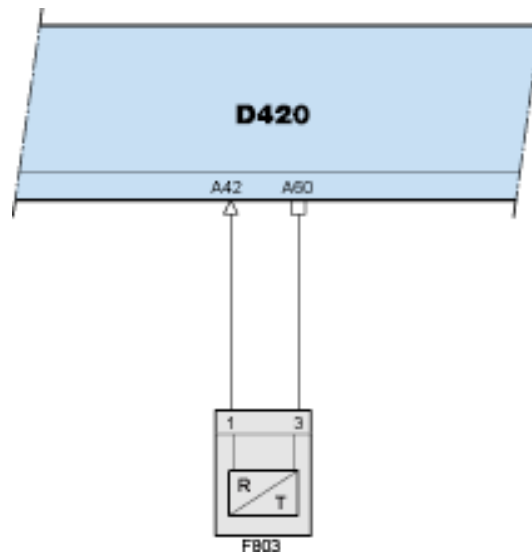
	• Disconnect the fuel temperature sensor. • Pin the power supply leg. • If voltage is 4.8V to 5.2V – Pass. Proceed to step 6. • If voltage is lower than 4.8V or higher than 5.2V – Fail. Repair/replace harness as needed, then retest. Proceed to step 6.		
	Step 6	Step ID 0168f	SRT
	Check the circuit response after the sensor Troubleshooting steps • Turn the key switch OFF. • Disconnect the fuel sensor. • Place a jumper wire between the power supply and the harness at the sensor connector. • Pin the return leg of the circuit. • If voltage is 4.8V to 5.2V – Pass. Proceed to step 7. • If voltage is lower than 4.8V or higher than 5.2V – Fail. Repair/replace harness on signal return leg as needed, then retest. Proceed to step 7		
	Step 7	Step ID 0168g	SRT
	Check the continuity of sensor signal pin to chassis ground Troubleshooting steps • Turn the key switch OFF. • Disconnect the fuel temperature sensor. • Pin the sensor signal pin to the chassis ground. Does the ohmmeter indicate that there is continuity between the sensor signal pin and the chassis ground? • Yes – Repair/replace the grounded portion of the circuit on the return leg as needed, then retest. Proceed to step 7. • No – Proceed to step 8.		
	Step 8	Step ID 0168h	SRT
	Validation 1. Turn the key switch ON. 2. Drive the truck under condition similar to those that caused the fault code. 3. Use DAVIE to view the active fault codes. Is P0168 still active? • Yes – Proceed to step 9 • No – The repair is complete.		
Verification Drive Cycle:	To validate the repair, with the brakes set, start engine and allow it to run at idle for 2 minutes.		
	Back to Index		

P0180

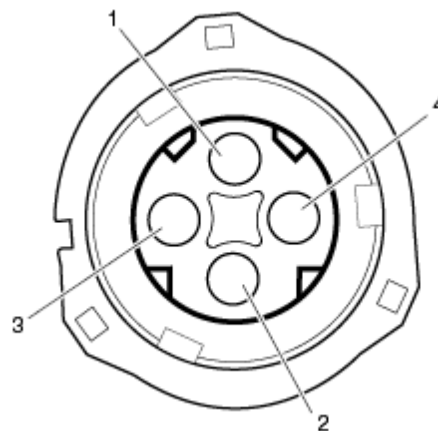
Code number	P0180
Fault code description	Fuel temperature – Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
Description of component(s)	 The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: - Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). - Limitation of the engine torque when the fuel temperature is too high.

Location of component(s)	F803 
Diagnostic condition	This diagnostic runs: • When the ignition has been keyed off continuously for at least 8 hours; • Difference between the coolant temperature and ambient temperature is less than 15°C [59°F] • Ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured fuel temperature sensor reading differs by more than 3°C [37°F] from the average of other temperature sensor readings on the engine for more than 5 seconds (after the ignition has been keyed off for at least 8 hours).
Reset condition of fault code	The 8-hour ignition off diagnostics consists of three separate steps: • The vehicle ignition may NOT be switched on or engine started for 8-10 consecutive hours (ideal situation would be overnight). • Once the 8 to 10 consecutive hours have been reached, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run. • Start the engine and let it idle for 2 minutes. • This DTC changes to inactive when the fault is no longer detected.

Electrical diagram(s)



Wiring harness connector D420.A front view



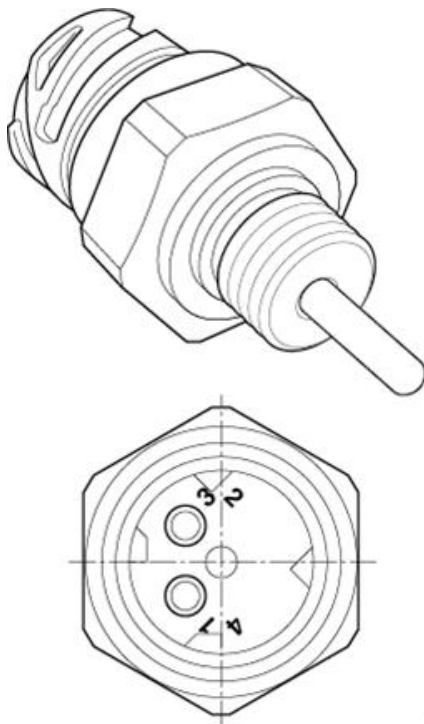
Wiring harness connector F803 front view

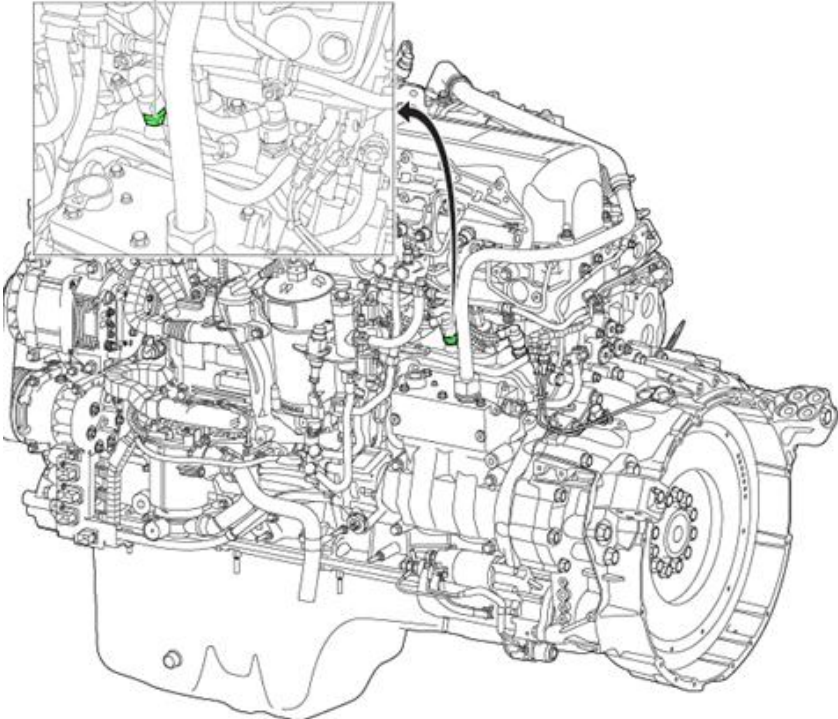
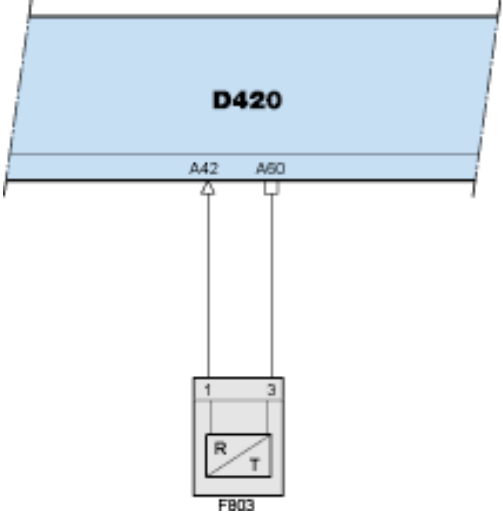
D420	PCI ECU
F803	fuel temperature sensor

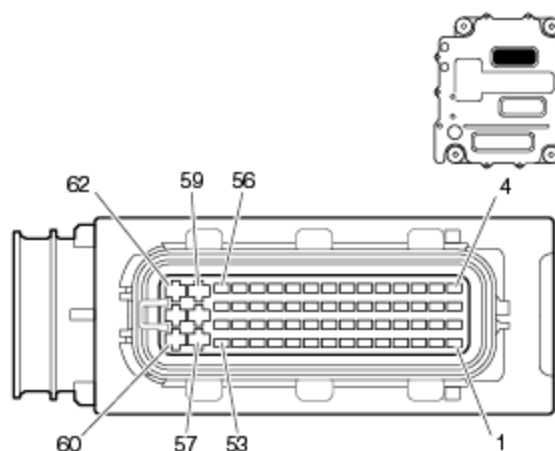
	<table><tr><td>D420</td><td>F803</td><td>Function</td></tr><tr><td>A42</td><td>1</td><td>Signal, coolant temperature</td></tr><tr><td>A60</td><td>3</td><td>Ground</td></tr></table>	D420	F803	Function	A42	1	Signal, coolant temperature	A60	3	Ground																											
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Pin (+ probe)	Pin (- probe)	Value	Additional information																																		
1	3	5V	Ignition keyed on																																		
Possible causes	Fuel temperature sensor deviation																																				
Additional information	For this diagnostic, the fuel temperature sensor (F803) reading is compared with an average of other temperature sensors on the engine after the ignition has been switched off for at least 8 hours.																																				
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. <table><tr><td>Step 1</td><td>Step ID 0180a</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 0180b</td><td>SRT</td></tr><tr><td colspan="3">Note: - ignition key/switch has been set to OFF before disconnecting related cables. Electrical Checks (F803) • Check for measured electrical values outside of expected range or limits • Supply and signal voltages. </td></tr></table>	Step 1	Step ID 0180a	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 0180b	SRT	Note: - ignition key/switch has been set to OFF before disconnecting related cables. Electrical Checks (F803) • Check for measured electrical values outside of expected range or limits • Supply and signal voltages.																										
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	• Cable continuity (no opens or shorts). Ensure that Use DAVIE to re-check for the presence of active faults. • P0180 inactive: Issue is resolved. • P0180 active: Proceed to step 3.			
	<table><tr><td>Step 3</td><td>Step ID 0180c</td><td>SRT</td></tr></table> Monitor values for fuel temperature and ambient air temperature: • Compare monitored values for fuel temperature and ambient air temperature to determine if an internal problem has occurred with the Fuel Temperature sensor. Use DAVIE to re-check for the presence of active faults. • P0180 inactive: Issue is resolved. • P0180 active: Proceed to step 4.	Step 3	Step ID 0180c	SRT
	Step 3	Step ID 0180c	SRT	
	<table><tr><td>Step 4</td><td>Step ID 0180d</td><td>SRT</td></tr></table> Replace: Fuel Temperature sensor Replace the identified faulty component. Use DAVIE to re-check for the presence of active faults. • P0180 inactive: Issue is resolved. • P0180 active: Proceed to step 5.	Step 4	Step ID 0180d	SRT
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<table><tr><td>Step 5</td><td>Step ID 0180e</td><td>SRT</td></tr></table> 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.	Step 5	Step ID 0180e	SRT	
Step 5	Step ID 0180e	SRT		
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			

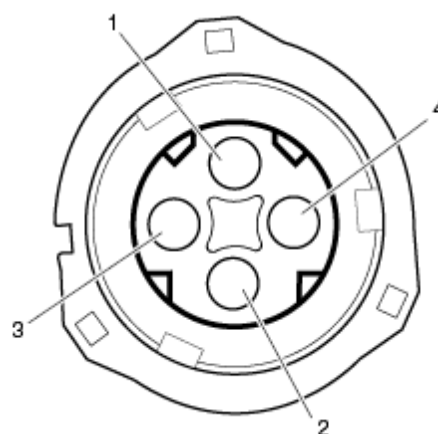
P0182

Code number	P0182
Fault code description	Fuel temperature - Voltage too low or short circuit to ground on ECU D420 pin A42
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	 The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: • Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). • Limitation of the engine torque when the fuel temperature is too high.

Location of component(s)	F803 
Diagnostic condition	Sensor output voltage is too low (below 0.215 V)
Set condition of fault code	The PCI detects sensor output voltage is too low (below 0.215 V).
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 F803 front view

Technical data

D420 PCI ECU
F803 fuel temperature sensor

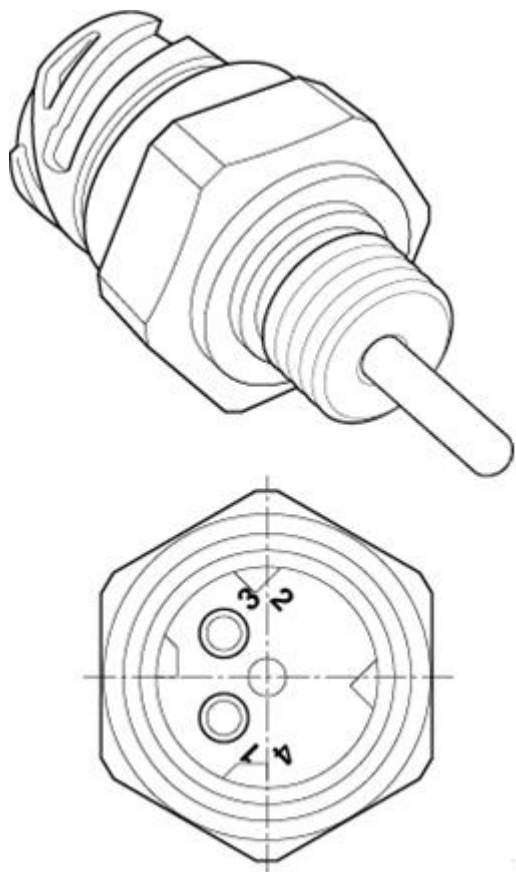
D420	F803	Function
A42	1	Signal, coolant temperature
A60	3	Ground

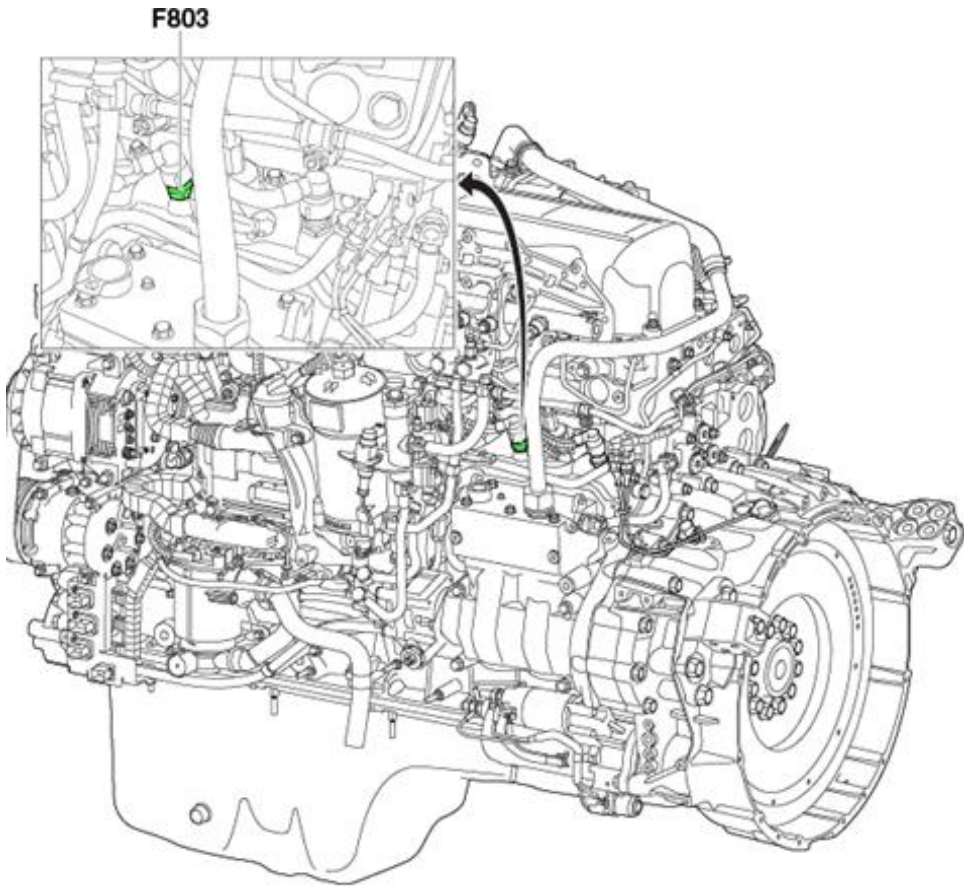
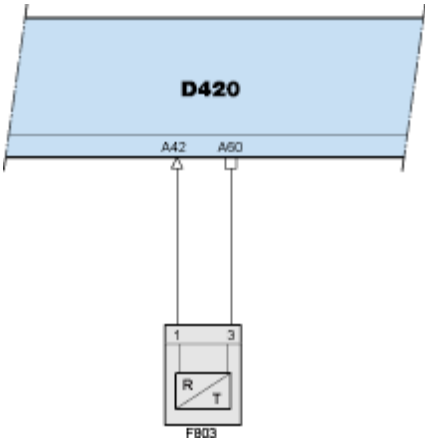
Pin (+ probe)	Pin (- probe)	Value	Additional information
1	3	5633–6120 Ω	Resistance value at 0°C [34°F]
1	3	2411–2573 Ω	Resistance value at 20°C [68°F]
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1	3	568–619 Ω	Resistance value at 60°C [140°F]
1	3	306–337 Ω	Resistance value at 80°C [176°F]
1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

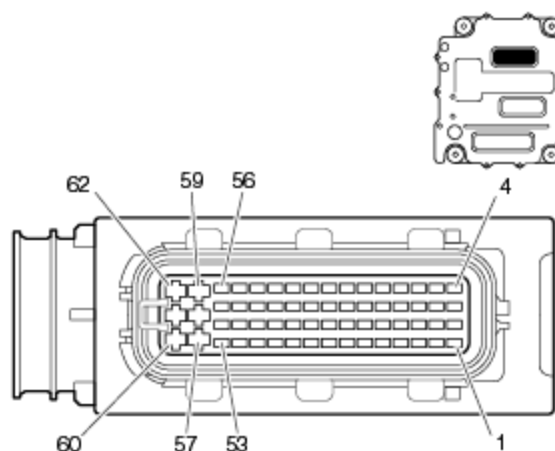
Pin (+ probe)	Pin (- probe)	Value	Additional information
1	3	5V	Ignition keyed on

Possible causes	- Faulty wiring - Faulty connector - Faulty sensor																								
Additional information	No additional information available.																								
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  - Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. - For specific electrical component information and pinout locations, always refer to the technical data. - It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. - Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. <table><tr><td>Step 1</td><td>Step ID 0182a</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 0182b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the fuel temperature sensor. Turn the key ON and navigate through DAVIE to read errors: - If P0183 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document. - If P0182 is active – Proceed to step 3. </td></tr></table> <table><tr><td>Step 3</td><td>Step ID 0182c</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: - If P0183 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. - If P0182 is active – Proceed to step 4. </td></tr></table> <table><tr><td>Step 4</td><td>Step ID 0182d</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>	Step 1	Step ID 0182a	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 0182b	SRT	With key OFF, disconnect the fuel temperature sensor. Turn the key ON and navigate through DAVIE to read errors: - If P0183 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document. - If P0182 is active – Proceed to step 3.			Step 3	Step ID 0182c	SRT	With key OFF, disconnect the harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: - If P0183 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. - If P0182 is active – Proceed to step 4.			Step 4	Step ID 0182d	SRT	Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.		
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		Back to Index																							

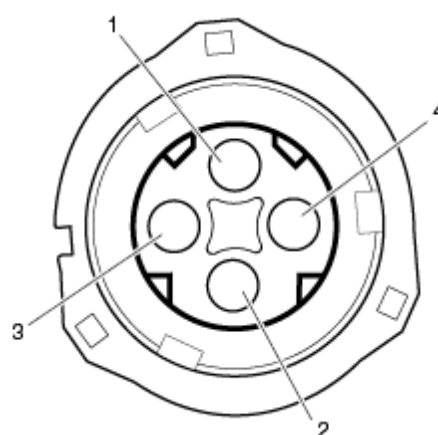
P0183

Code number	P0183
Fault code description	Fuel temperature - Voltage too high or short circuit to supply on ECU D420 pin A42
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	 The fuel temperature is measured in the low-pressure fuel supply gallery between the common rail pump units. Effect on the system: • Preventing automatic fuel module water draining activation when the fuel temperature is very low (the water present may be frozen). • Limitation of the engine torque when the fuel temperature is too high.

Location of component(s)	
Diagnostic condition	Sensor output voltage is too high (above 4.934 V).
Set condition of fault code	The PCI detects sensor output voltage is too high (above 4.934 V).
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 F803 front view

D420 PCI ECU

F803 fuel temperature sensor

D420	F803	Function
A42	1	Signal, coolant temperature
A60	3	Ground

Technical data

Component check, fuel temperature sensor (F803)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
1	3	5633–6120 Ω	Resistance value at 0°C [34°F]
1	3	2411–2573 Ω	Resistance value at 20°C [68°F]
1	3	1128–1213 Ω	Resistance value at 40°C [104°F]
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	Component & wiring check, ECU (D420) Preparation • Key off the ignition. • Disconnect connector F803 • Measure on the front side of wiring harness connector F803 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>3</td><td>5V</td><td>Ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	3	5V	Ignition keyed on										
Pin (+ probe)	Pin (- probe)	Value	Additional information																
1	3	5V	Ignition keyed on																
Possible causes	• Faulty wiring • Faulty connector • Faulty sensor																		
Additional information	No additional information available.																		
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.  • Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors. • For specific electrical component information and pinout locations, always refer to the technical data. • It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify a change in errors. • Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive fault codes. Refer to the 'possible causes' section. <table><tr><td>Step 1</td><td>Step ID 0183a</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 0183b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the harness from the fuel temperature sensor. Turn the key ON and measure the voltage between a battery ground and the supply terminal of the fuel temperature sensor circuit on the engine harness: • If the voltage is above 5.5 V – Proceed to step 4. • If the voltage is below 5.5 V – Proceed to step 3. </td></tr></table> <table><tr><td>Step 3</td><td>Step ID 0183c</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, install a jumper wire between the supply and ground wires of the fuel temperature sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0182 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document. </td></tr></table>	Step 1	Step ID 0183a	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 0183b	SRT	With key OFF, disconnect the harness from the fuel temperature sensor. Turn the key ON and measure the voltage between a battery ground and the supply terminal of the fuel temperature sensor circuit on the engine harness: • If the voltage is above 5.5 V – Proceed to step 4. • If the voltage is below 5.5 V – Proceed to step 3.			Step 3	Step ID 0183c	SRT	With key OFF, install a jumper wire between the supply and ground wires of the fuel temperature sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0182 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document.		
Step 1	Step ID 0183a	SRT																	
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Step 3	Step ID 0183c	SRT																	
With key OFF, install a jumper wire between the supply and ground wires of the fuel temperature sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0182 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document.																			

	If P0183 is active – Proceed to step 4.		
	Step 4	Step ID 0183d	SRT
	With key OFF, disconnect the engine harness from the PCI and install a jumper wire between the supply and ground pins of the sensor circuit on the PCI. Turn the key ON and navigate through DAVIE to read errors: - If P0182 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. - If P0183 is active – Proceed to step 5.		
	Step 5	Step ID 0183e	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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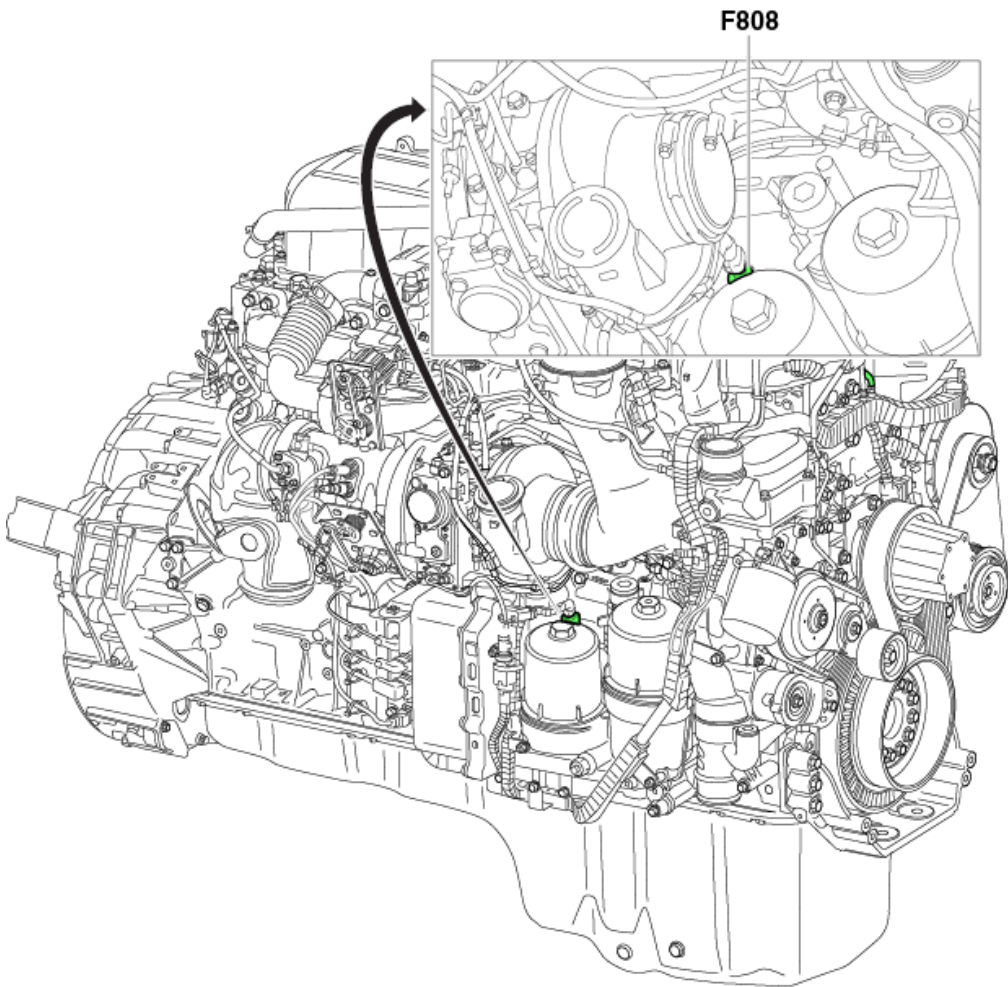
P0192

Code number	P0192
Fault code description	Engine rail pressure – Voltage too low or short circuit to ground on ECU D420 pin A52
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please contact the Engine support center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

P0193

Code number	P0193
Fault code description	Engine rail pressure – Voltage too high or short circuit to supply on ECU D420 pin A52
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please contact the Engine support center
Location of component(s)	
Diagnostic condition	
Set condition of fault code	
Reset condition of fault code	
Electrical diagram(s)	
Technical data	
Possible causes	
Additional information	
Diagnostic Step-by-Step	
Verification Drive Cycle	
	Back to Index

P0195

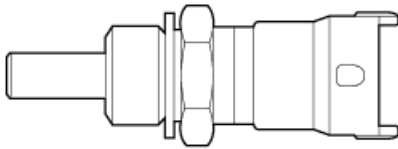
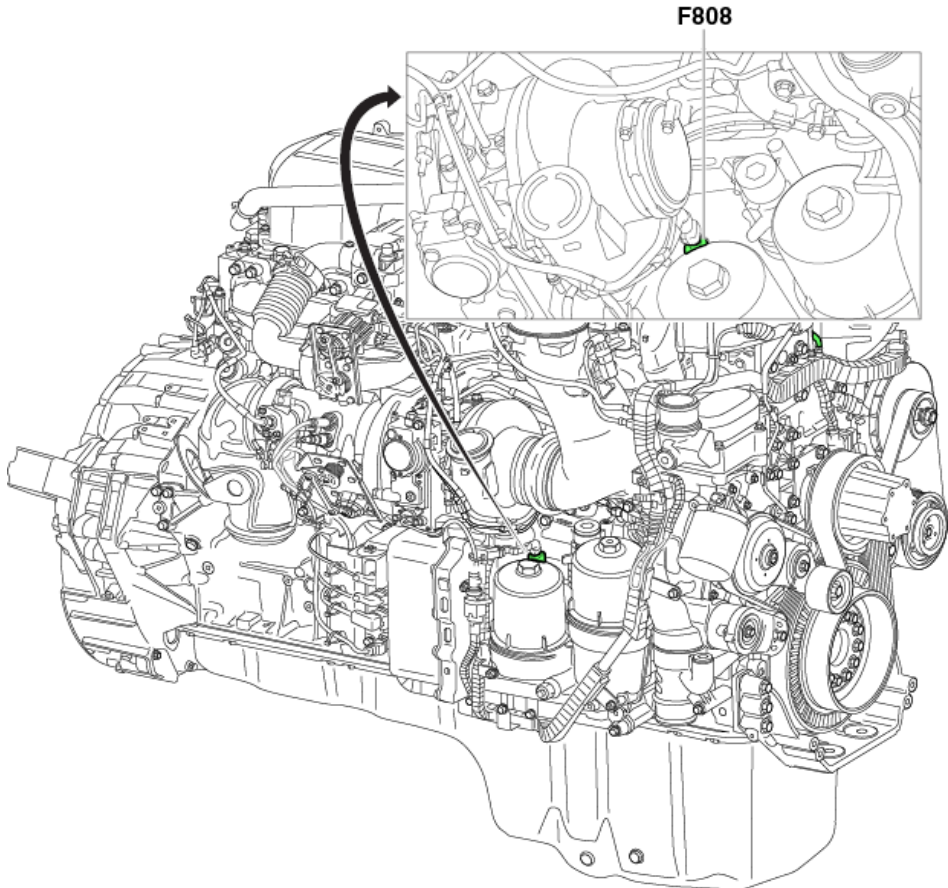
Code number	P0195
Fault code description	Oil temperature – Data erratic intermittent or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The oil temperature is measured in the oil module before the oil cooler. Effect on the system Limitation of the engine torque when the oil temperature is too high.
Location of component(s)	 The diagram illustrates the engine compartment with a focus on the oil system. A green plug, labeled F808, is shown in a magnified callout view, indicating its location in the oil module before the oil cooler. A curved arrow points from the callout to the main engine diagram.
Diagnostic condition	This diagnostic runs: - When the ignition has been keyed off continuously for at least 8 hours; - Difference between the coolant temperature and ambient temperature is less than 15°C [59°F] - Ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured oil temperature differs by more than 3°C [37°F] from the average of other temperature sensor readings on the engine for more than 5 seconds (after the ignition has been keyed off for at least 8 hours).
Reset condition of fault code	The 8-hour ignition off diagnostics consists of three separate steps: The vehicle ignition may NOT be switched on or engine started for 8-10

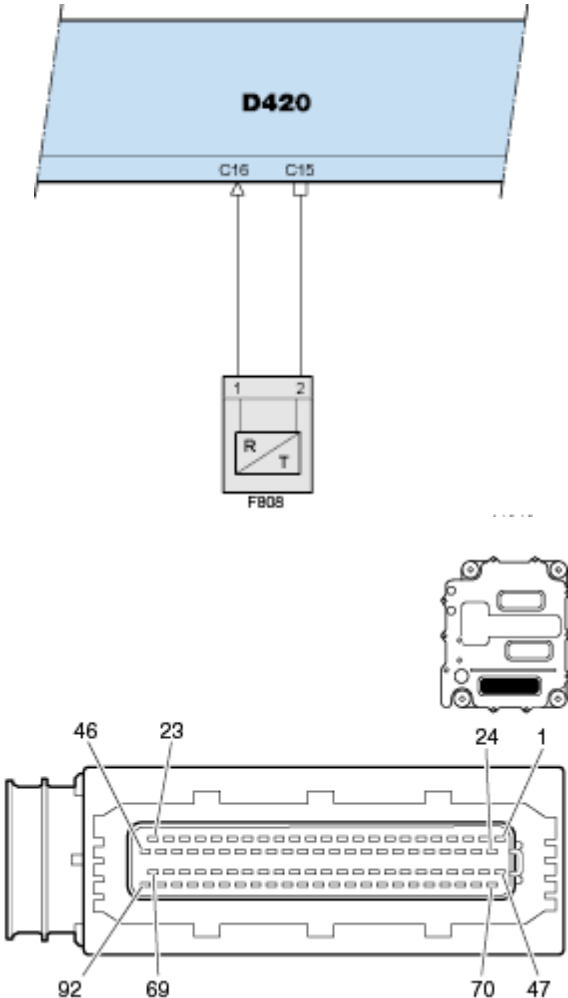
	consecutive hours (ideal situation would be overnight). - Once the 8 to 10 consecutive hours have been reached, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run. - Start the engine and let it idle for 2 minutes. This DTC changes to inactive when the fault is no longer detected.						
Electrical diagram(s)	Wiring harness connector D420.C front view Wiring harness connector F808 front view D420 PCI ECU F808 oil temperature sensor <table><tr><th>D420</th><th>F808</th><th>Function</th></tr><tr><td></td><td></td><td></td></tr></table>	D420	F808	Function			
D420	F808	Function					

	<table><tr><td>C15</td><td>2</td><td>Ground</td></tr><tr><td>C16</td><td>1</td><td>Signal, oil temperature</td></tr></table>	C15	2	Ground	C16	1	Signal, oil temperature																																						
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 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></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><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>5V</td><td>Ignition keyed on</td></tr></table>	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]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	Ignition keyed on
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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 sensor (F808) reading is compared with an average of other temperature sensors on the engine after the ignition has been keyed off for at least 8 hours.																																												
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components 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 0195a</td><td>SRT</td></tr><tr><td colspan="3">Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the</td></tr></table>	Step 1	Step ID 0195a	SRT	Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the																																								
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	diagnostic procedure. Proceed to step 2.		
	Step 2	Step ID 0195b	SRT
	Ensure that the ignition key/switch has been set to OFF before disconnecting related cables. Check for measured electrical values outside of expected range or limits • Supply and signal voltages. • Cable continuity (no opens or shorts). Use DAVIE to re-check for the presence of active faults. • P0195 inactive: Issue is resolved. • P0195 active: Proceed to step 3.		
	Step 3	Step ID 0195c	SRT
	DAVIE Direct Monitor: Oil temperature Perform check at ambient temperature. Select the DAVIE Monitor, Oil; Oil temperature to determine if the related sensor is reading correctly Does the monitored value appear incorrect? • No: Continue to the next step in the troubleshooting process. • Yes: Clean adjust, repair or replace affected components for any issues identified. Use DAVIE to re-check for the presence of active faults. • P0195 inactive: Issue is resolved. • P0195 active: Proceed to step 4.		
	Step 4	Step ID 0195d	SRT
	Replace the identified faulty component. Use DAVIE to re-check for the presence of active faults. • P0195 inactive: Issue is resolved. • P0195 active: Proceed to step 5.		
	Step 5	Step ID 0195e	SRT
	For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center at 1-800-477-0251.		
Verification Drive Cycle	To validate the repair, with DAVIE connected and the key ON, clear the errors. Start the engine and let it idle for more than 5 minute to verify with DAVIE that the errors do not reoccur.		
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P0197

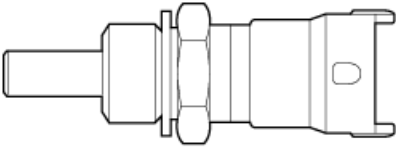
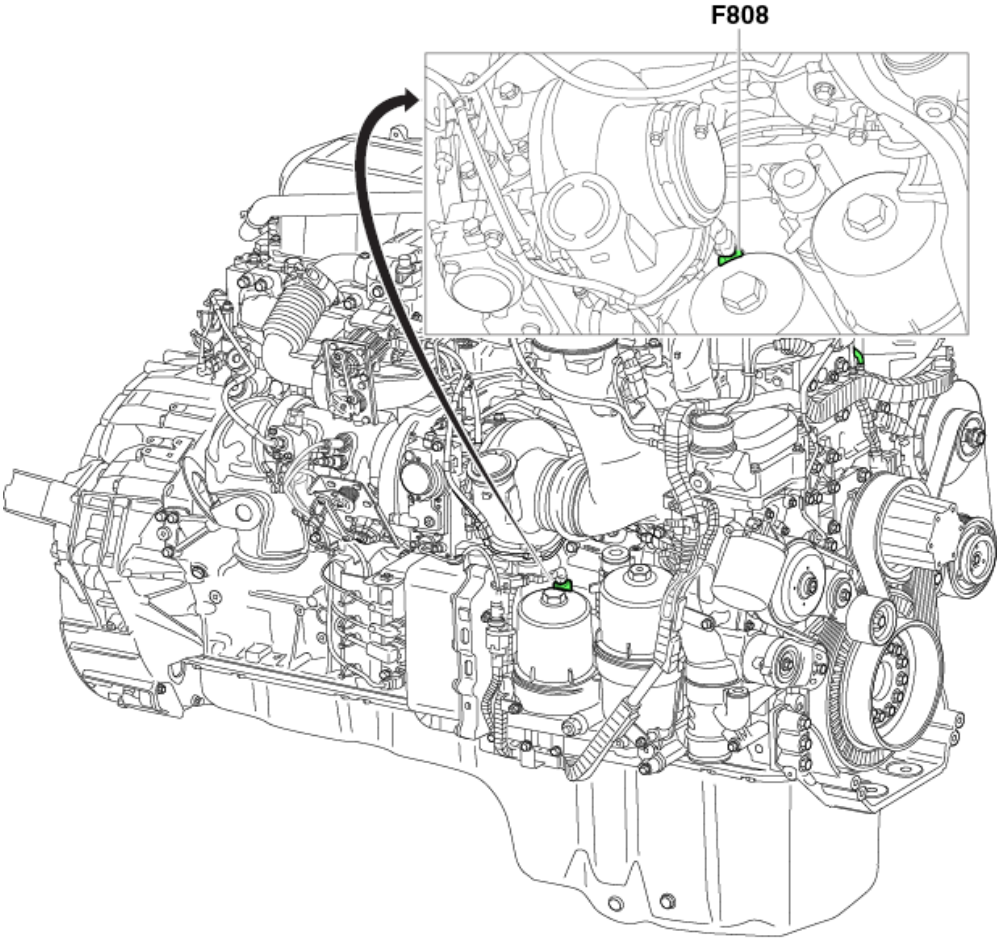
Code number	P0197
Fault code information	Oil temperature - Voltage too low or short circuit to ground on ECU D420 pin C16
Fault code description	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 The oil temperature is measured in the 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)	 F808
Diagnostic condition	Sensor output voltage is too low (below 0.26 V).
Set condition of fault code	The PCI detects sensor output voltage is too low (below 0.26 V).
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)	 Wiring harness connector D420.C front view Wiring harness connector F808 front view															
Technical data	<table><tr><td>D420</td><td>PCI ECU</td><td></td></tr><tr><td>F808</td><td>Oil temperature sensor</td><td></td></tr><tr><td>D420</td><td>F808</td><td>Function</td></tr><tr><td>C15</td><td>2</td><td>Ground</td></tr><tr><td>C16</td><td>1</td><td>Signal, oil temperature</td></tr></table>	D420	PCI ECU		F808	Oil temperature sensor		D420	F808	Function	C15	2	Ground	C16	1	Signal, oil temperature
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D420	F808	Function														
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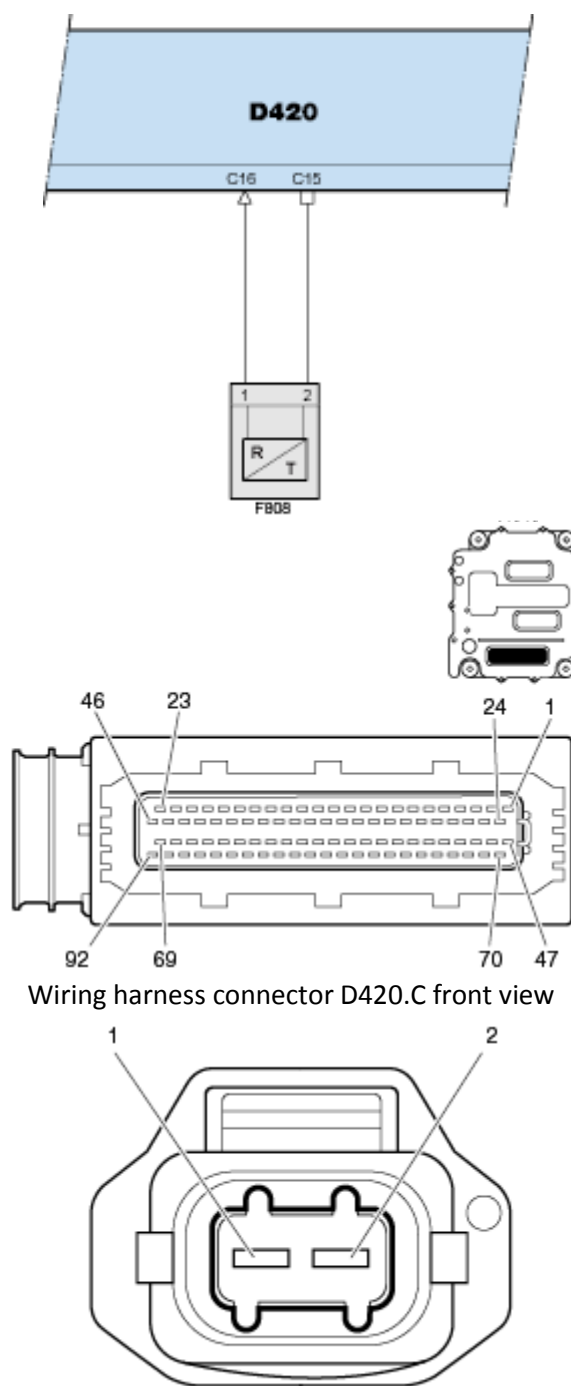
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Possible causes	- Faulty wiring - Faulty connector - Faulty sensor																																												
Additional information	No additional information available.																																												
Diagnostic Step-by-Step	 Perform 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. <table><tr><td>Step 1</td><td>Step ID 0197a</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 0197b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the oil temperature sensor. Turn the key ON and navigate through DAVIE to read errors: - If P0198 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document. - If P0197 is active – Proceed to step 3. </td></tr></table>	Step 1	Step ID 0197a	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 0197b	SRT	With key OFF, disconnect the oil temperature sensor. Turn the key ON and navigate through DAVIE to read errors: - If P0198 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document. - If P0197 is active – Proceed to step 3.																																		
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	Step 3	Step ID 0197c	SRT
	With key OFF, disconnect the harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If P0198 is active – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P0197 is active – Proceed to step 4.		
	Step 4	Step ID 0197d	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		

P0198

Code number	P0198
Fault code information	Oil temperature - Voltage too high or short circuit to supply on ECU D420 pin C16
Fault code description	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
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	When Sensor output voltage is too high (above 4.89 V)
Set condition of fault code	The PCI detects sensor output voltage is too high (above 4.89 V).
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)



Wiring harness connector D420.C front view

Wiring harness connector F808 front view

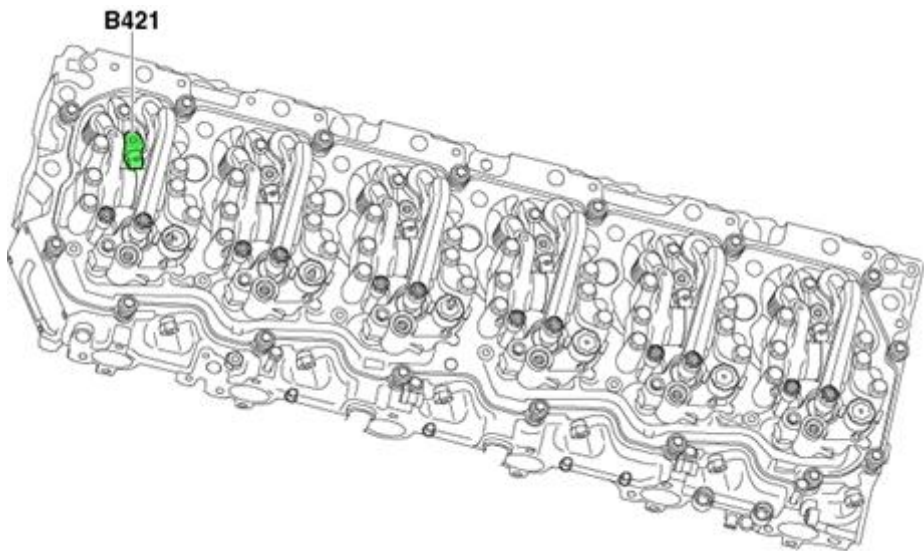
Technical data

D420	PCI ECU	
F808	Oil temperature sensor	
D420	F808	Function
C15	2	Ground
C16	1	Signal, oil temperature

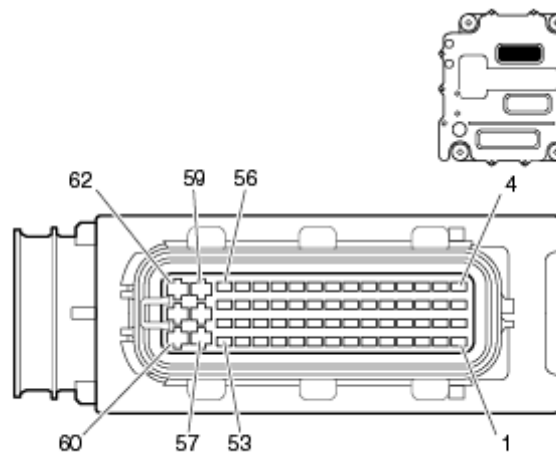
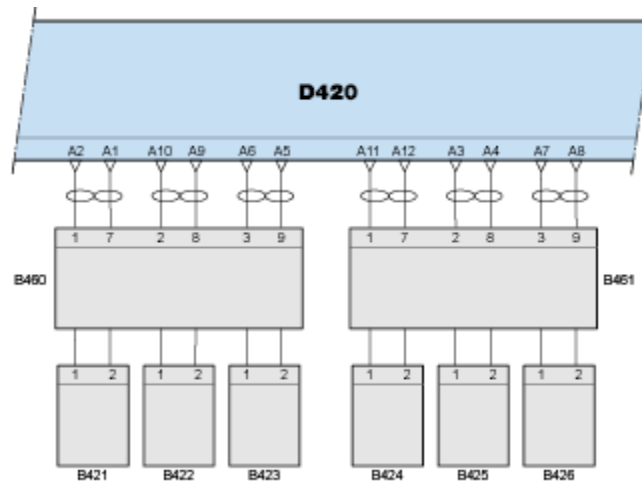
	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>14936–15961 Ω</td><td>Resistance value at -20°C [-4°F]</td></tr><tr><td>1</td><td>2</td><td>5727–6056 Ω</td><td>Resistance value at 0°C [34°F]</td></tr><tr><td>1</td><td>2</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> <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>	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]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	Ignition keyed on
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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. <table><tr><td>Step 1</td><td>Step ID 0198a</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 0198b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the oil temperature sensor. Turn the key ON and measure the voltage between a battery ground and the supply terminal of the oil temperature sensor circuit on the engine harness: - If the voltage is above 5.5 V – Proceed to step 4. - If the voltage is below 5.5 V – Proceed to step 3. </td></tr></table> <table><tr><td>Step 3</td><td>Step ID 0198c</td><td>SRT</td></tr></table>	Step 1	Step ID 0198a	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 0198b	SRT	With key OFF, disconnect the oil temperature sensor. Turn the key ON and measure the voltage between a battery ground and the supply terminal of the oil temperature sensor circuit on the engine harness: - If the voltage is above 5.5 V – Proceed to step 4. - If the voltage is below 5.5 V – Proceed to step 3.			Step 3	Step ID 0198c	SRT																													
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	With key OFF, install a jumper wire between the supply and ground wires of the oil temperature sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0197 is active – Replace the sensor and reconnect the harness, and then proceed to the verification procedure listed at the end of this document. • If P0198 is active – Proceed to step 4.		
	Step 4	Step ID 0198d	SRT
	With key OFF, disconnect the engine harness from the PCI and install a jumper wire between the supply and ground pins of the sensor circuit on the PCI. Turn the key ON and navigate through DAVIE to read errors: • If P0197 is active – Replace the engine harness, and proceed to the verification procedure listed at the end of this document. • If P0198 is active – Proceed to step 5.		
	Step 5	Step ID 0198e	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		

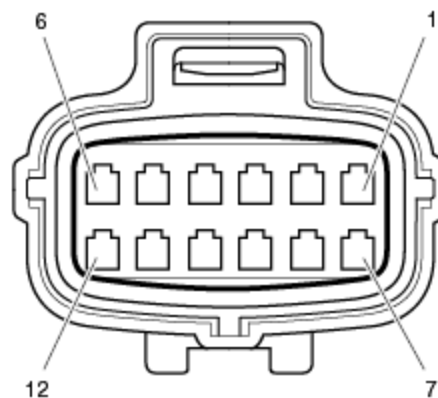
P0201

Code number	P0201
Fault code information	Injector solenoid valve cylinder 1 – Current too low or open circuit on ECU D420 pin A26 or A25
Fault code description	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)	 The diagram shows a top-down view of an engine block with multiple cylinders. A specific injector, labeled B421, is highlighted in green and indicated by a leader line. The injector is located on the left side of the engine block, near the front.
Diagnostic condition	The diagnostic runs whenever the Power stage hardware is active for less than 1 sec.
Set condition of fault code	This condition will be set if Current in Pump control valve is less than 4.5A
Reset condition of fault code	Please Contact the Engine Support Center

Electrical diagram(s)



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view

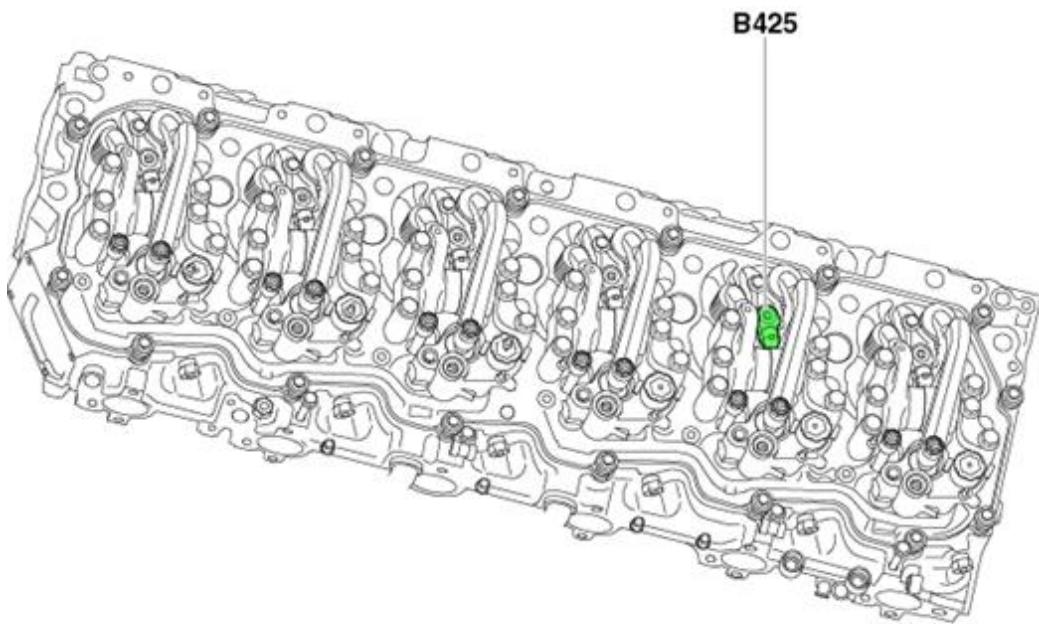
Technical data

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

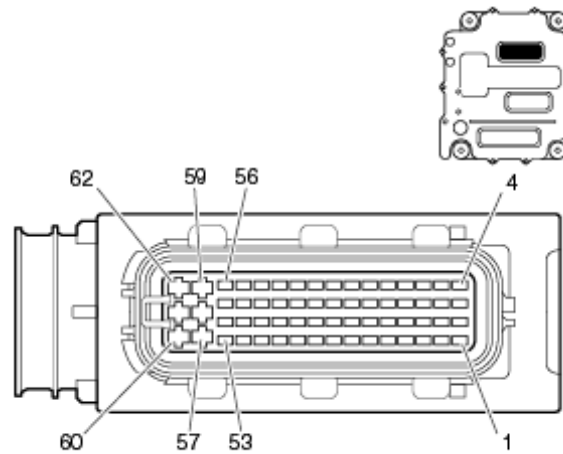
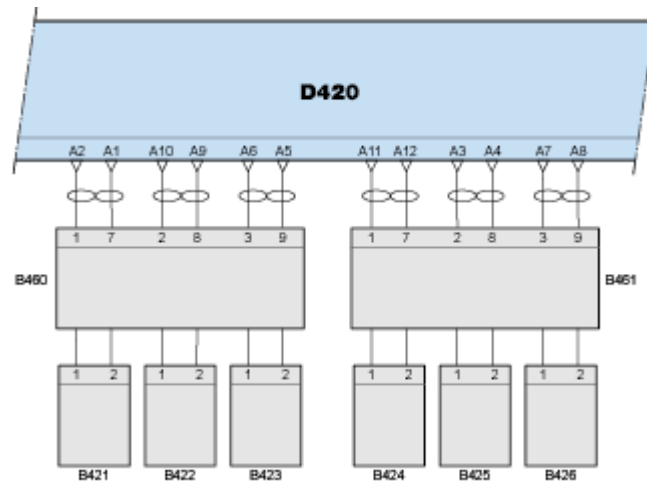
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	Step 3	Step ID 0201c	SRT
	With key OFF, disconnect the pump unit connector and perform a diode check between the connector ground circuit terminal and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure: • If the circuit is open during the REVERSE bias test and measures 600 mV $\pm$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 $\pm$200 mV during the FORWARD bias test is found - Proceed to step 4.		
	Step 4	Step ID 0201d	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 $\pm$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 $\pm$200 mV during the FORWARD bias test is found - Proceed to step 6.		
	Step 5	Step ID 0201e	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 0201f	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		

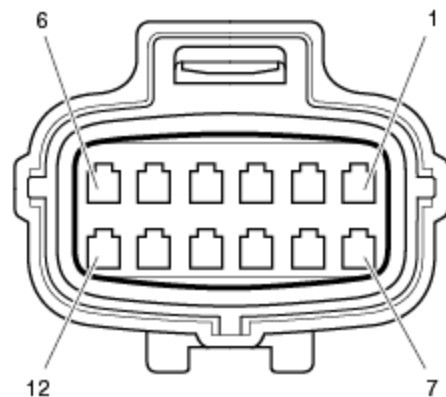
P0205

Code number	P0205
Fault code description	Injector solenoid valve cylinder 5 – Current too low or open 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	Please Contact the Engine Support Center
Set condition of fault code	Current in Pump control valve is less than 4.5 A.
Reset condition of fault code	This diagnostic runs when the engine is running.

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 Injector cylinders 1–3 <table><tr><th>D420</th><th>B460</th><th>B421</th><th>B422</th><th>B423</th><th>Function</th></tr><tr><td>A1</td><td>7</td><td>2</td><td></td><td></td><td>Signal low, injector solenoid valve cylinder 1</td></tr><tr><td>A2</td><td>1</td><td>1</td><td></td><td></td><td>Signal high, injector solenoid valve cylinder 1</td></tr><tr><td>A5</td><td>9</td><td></td><td></td><td>2</td><td>Signal low, injector solenoid valve cylinder 3</td></tr><tr><td>A6</td><td>3</td><td></td><td></td><td>1</td><td>Signal high, injector solenoid valve cylinder 3</td></tr><tr><td>A9</td><td>8</td><td></td><td>2</td><td></td><td>Signal low, injector solenoid valve cylinder 2</td></tr><tr><td>A10</td><td>2</td><td></td><td>1</td><td></td><td>Signal high, injector solenoid valve cylinder 2</td></tr></table> Injector cylinders 4–6 <table><tr><th>D420</th><th>B461</th><th>B424</th><th>B425</th><th>B426</th><th>Function</th></tr><tr><td>A3</td><td>2</td><td></td><td>1</td><td></td><td>Signal high, injector solenoid valve cylinder 5</td></tr><tr><td>A4</td><td>8</td><td></td><td>2</td><td></td><td>Signal low, injector solenoid valve cylinder 5</td></tr><tr><td>A7</td><td>3</td><td></td><td></td><td>1</td><td>Signal high, injector solenoid valve cylinder 6</td></tr><tr><td>A8</td><td>9</td><td></td><td></td><td>2</td><td>Signal low, injector solenoid valve cylinder 6</td></tr><tr><td>A11</td><td>1</td><td>1</td><td></td><td></td><td>Signal high, injector solenoid valve cylinder 4</td></tr><tr><td>A12</td><td>7</td><td>2</td><td></td><td></td><td>Signal low, injector solenoid valve cylinder 4</td></tr></table>	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	B461	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
D420	B460	B421	B422	B423	Function																																																																																
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Technical data	Component check, injector solenoid valve cylinder 1 (B421) Preparation - Key off the ignition - 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>1</td><td>7</td><td>$\pm 0.67 \Omega$ maximum 0.94 Ω</td><td>Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]</td></tr></table> Component check, injector solenoid valve cylinder 2 (B422) Preparation - Key off the ignition - 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>2</td><td>8</td><td>$\pm 0.67 \Omega$ maximum .94 Ω</td><td>Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]</td></tr></table> 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	1	7	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	2	8	$\pm 0.67 \Omega$ maximum .94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]																																																																				
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	<table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>3</td><td>9</td><td>$\pm 0.67 \Omega$ maximum 0.94 Ω</td><td>Resistance value at 20°C [68°F] 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><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>7</td><td>$\pm 0.67 \Omega$ maximum 0.94 Ω</td><td>Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]</td></tr></table> Component check, injector solenoid valve cylinder 5 (B425) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>2</td><td>8</td><td>$\pm 0.67 \Omega$ maximum 0.94 Ω</td><td>Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]</td></tr></table> Component check, injector solenoid valve cylinder 6 (B426) Preparation • Key off the ignition • Disconnect connector B461 • Measure on wiring harness connector B461 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>3</td><td>9</td><td>$\pm 0.67 \Omega$ maximum .94 Ω</td><td>Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	3	9	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	7	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	2	8	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	3	9	$\pm 0.67 \Omega$ maximum .94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]
Pin (+ probe)	Pin (- probe)	Value	Additional information																														
3	9	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]																														
Pin (+ probe)	Pin (- probe)	Value	Additional information																														
1	7	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]																														
Pin (+ probe)	Pin (- probe)	Value	Additional information																														
2	8	$\pm 0.67 \Omega$ maximum 0.94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]																														
Pin (+ probe)	Pin (- probe)	Value	Additional information																														
3	9	$\pm 0.67 \Omega$ maximum .94 Ω	Resistance value at 20°C [68°F] Resistance value at 120°C [248°F]																														
Possible causes	• Faulty wiring • Faulty connector • Faulty solenoid valve																																
Additional information	No additional information available.																																
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components.																																



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

Step 1	Step ID 0205a	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 0205b	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 0205c	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 $\pm$ 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 $\pm$ 200 mV during the FORWARD bias test is found - Proceed to step 4.

Step 4	Step ID 0205d	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 $\pm$ 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 $\pm$ 200 mV during the FORWARD bias test is found - Proceed to step 6.

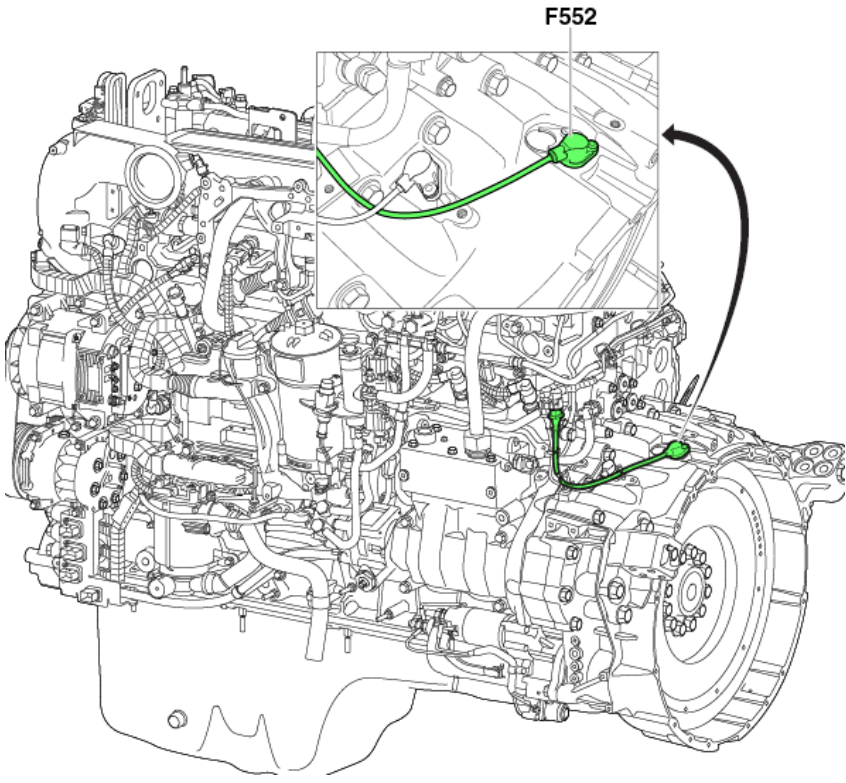
Step 5	Step ID 0205e	SRT

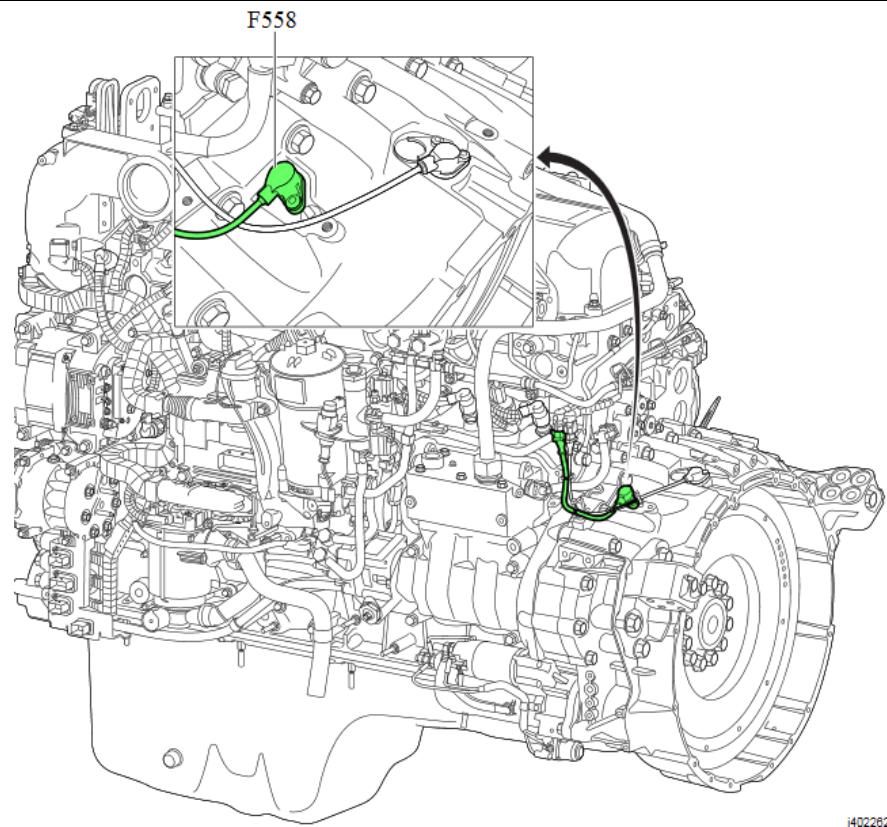
Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground:

- 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.

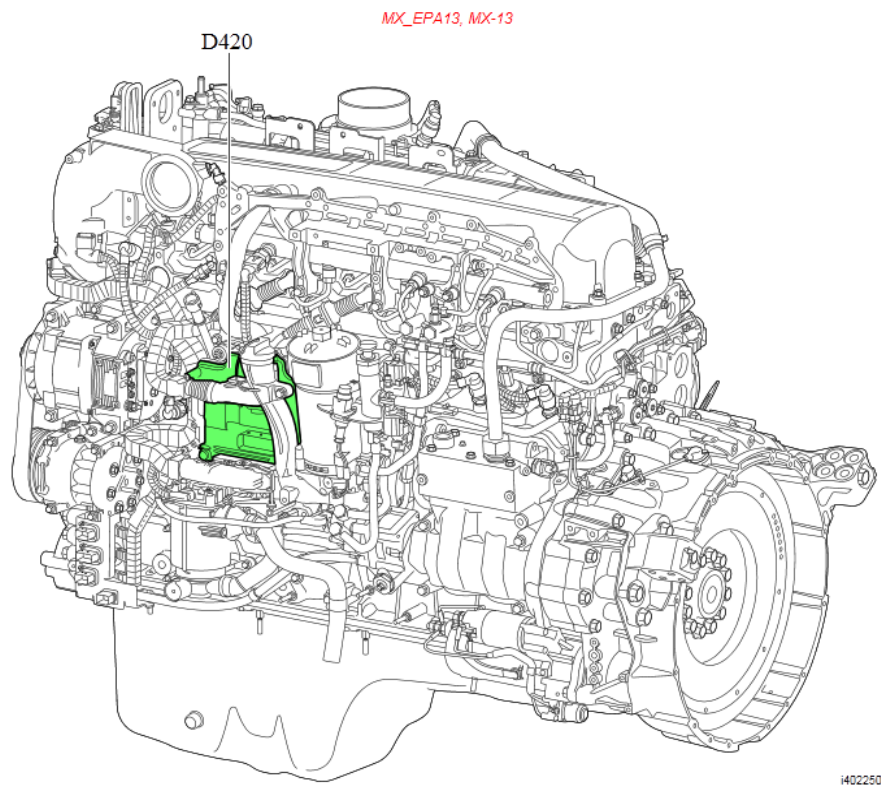
	If the measured voltage is below 5.0 V or above 9.0 V - Proceed to step 6.		
	Step 6	Step ID 0205g	SRT
	For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.		
Verification Drive Cycle	To validate the repair, with DAVIE connected and 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		

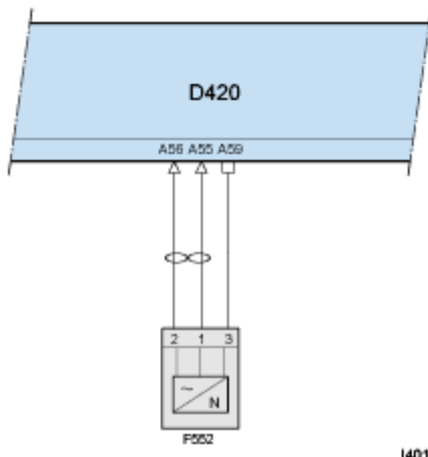
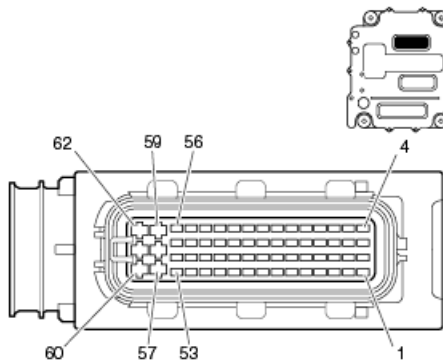
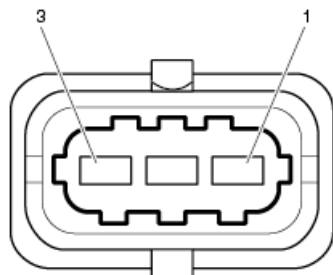
P0219

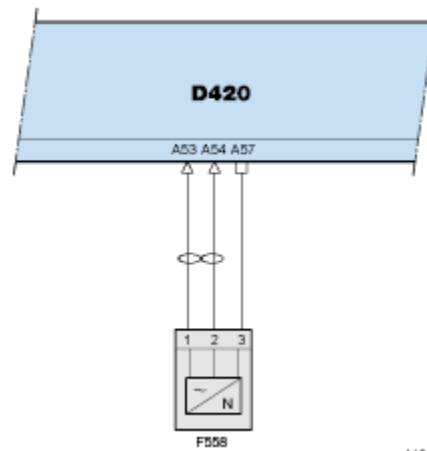
Code number	P0219
SRT	0.0 hour
Fault code description	Engine speed - Data valid but too high
Fault code information	1 trip Stop Engine lamp 3 drive cycle recovery Readiness Group – None Freeze frame type – Engine protection
Description of component(s)	The engine speed is determined by the crankshaft sensor (F552) signal and as backup by the camshaft sensor (F558) signal. These signals are delivered to PCI ECU (D420).
Location of component(s)	 Crankshaft Sensor (F552)



Camshaft sensor (F558)



	PCI ECU (D420)												
Diagnostic condition	This diagnostic runs continuously when the engine is running.												
Set condition of fault code	The PCI ECU (D420) detects that the engine speed is above 2300 rpm.												
Reset condition of fault code	- This DTC changes to inactive when the fault is no longer detected. - This fault cannot be cleared from the ECU memory.												
Electrical diagram(s)	Crankshaft sensor (F552)  I401876 <table><tr><th>D420</th><th>F552</th><th>Function</th></tr><tr><td>A55</td><td>1</td><td>Ground</td></tr><tr><td>A56</td><td>2</td><td>Signal, crankshaft speed</td></tr><tr><td>A59</td><td>3</td><td>Shield</td></tr></table>  Wiring harness connector D420.A front view Camshaft sensor (F558)  Component connector F552	D420	F552	Function	A55	1	Ground	A56	2	Signal, crankshaft speed	A59	3	Shield
D420	F552	Function											
A55	1	Ground											
A56	2	Signal, crankshaft speed											
A59	3	Shield											

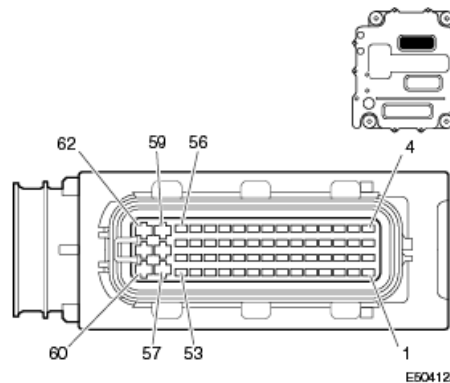


I401882

D420 PCI ECU

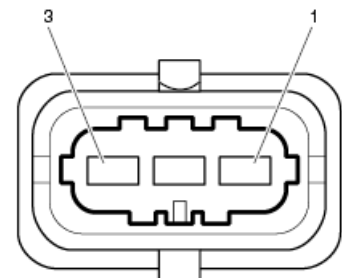
F558 camshaft sensor

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



Wiring harness connector D420A front view

E504123



Component connector F558

E504113



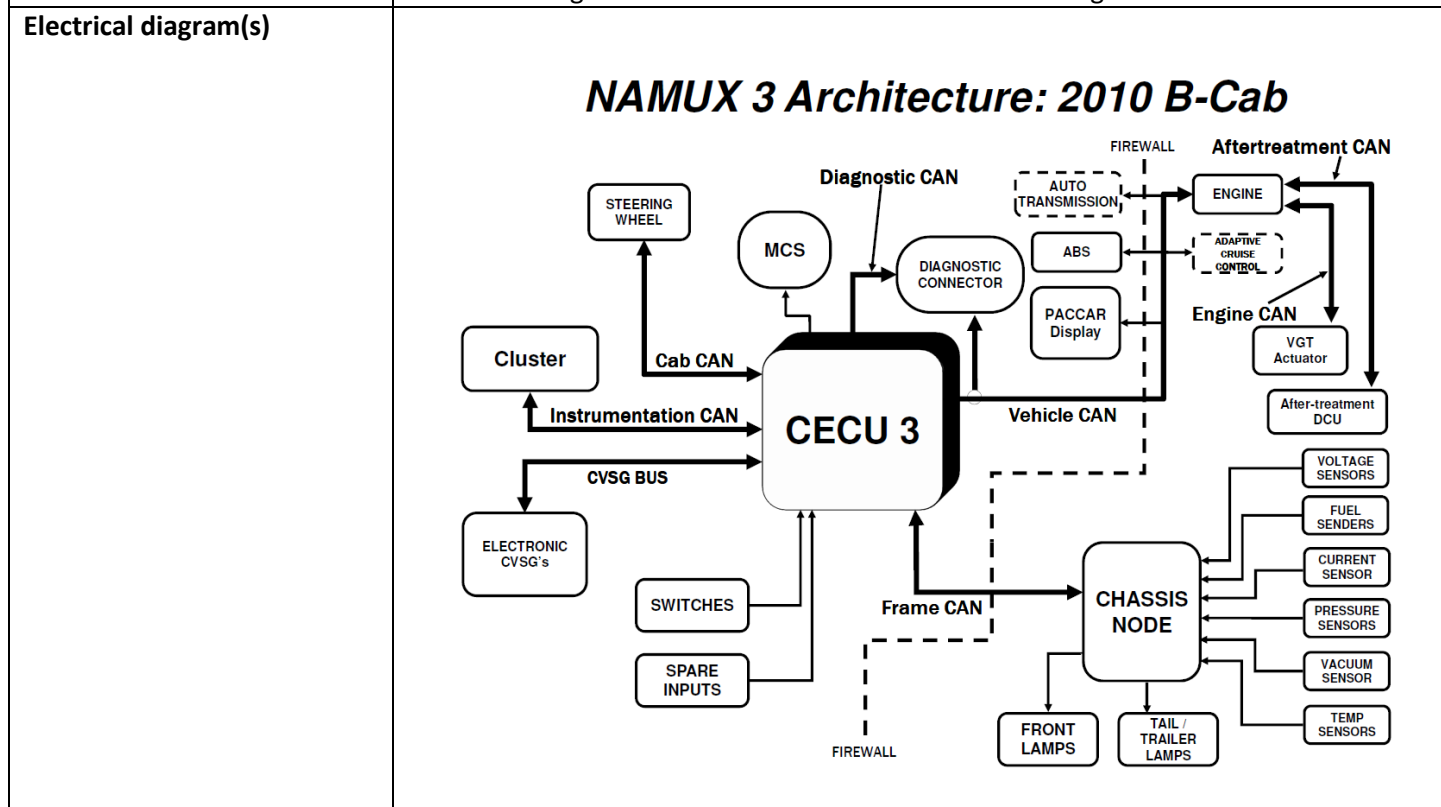
Handle connectors and pins with care and use matching measuring probes.

Technical data	Component check, crankshaft sensor (F552) Preparation • Key off the ignition • Disconnect connector F552 • Measure on component connector F552 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>± 1.5 V</td><td>Effective AC voltage (VAC) when engine starting</td></tr><tr><td>± 4.9 V</td><td>Effective AC voltage (VAC) when engine idling</td></tr><tr><td>± 8.0 V</td><td>Effective AC voltage (VAC) when engine at 1200 rpm</td></tr></table> Component check, camshaft sensor (F558) Preparation • Key off the ignition • Disconnect connector F558 • Measure on component connector F558 <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>± 0.5 V</td><td>Effective AC voltage (VAC) when engine starting</td></tr><tr><td>± 2.3 V</td><td>Effective AC voltage (VAC) when engine idling</td></tr><tr><td>± 8.0 V</td><td>Effective AC voltage (VAC) when engine at 1200 rpm</td></tr></table>	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) when engine at 1200 rpm	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	774–964 Ω	Resistance value at 20°C [68°F]	± 0.5 V	Effective AC voltage (VAC) when engine starting	± 2.3 V	Effective AC voltage (VAC) when engine idling	± 8.0 V	Effective AC voltage (VAC) when engine at 1200 rpm
	Pin (+ probe)	Pin (- probe)	Value	Additional information																									
1	2	774–964 Ω	Resistance value at 20°C [68°F]																										
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Pin (+ probe)	Pin (- probe)	Value	Additional information																										
1	2	774–964 Ω	Resistance value at 20°C [68°F]																										
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		± 2.3 V	Effective AC voltage (VAC) when engine idling																										
		± 8.0 V	Effective AC voltage (VAC) when engine at 1200 rpm																										
Possible causes	• External combustible (e.g., oil from turbocharger) drawn into the inlet path. • Operating fault.  Instruct the driver not to run the engine in the red area of the tachometer. Exceeding the permitted engine speed could seriously damage the engine.																												

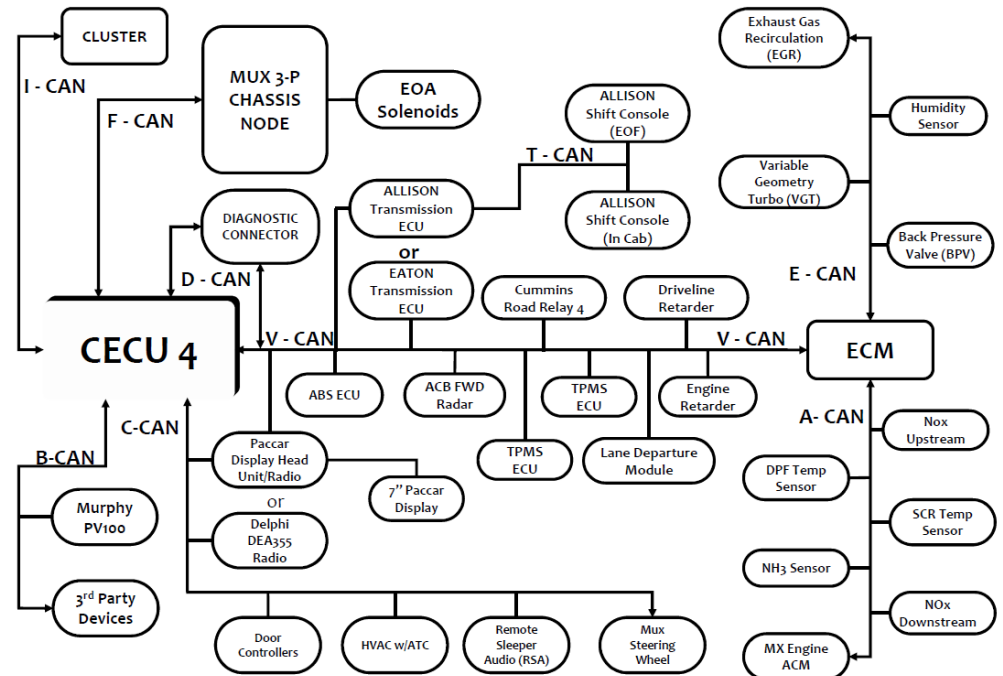
Additional information	• The engine speed is determined by the crankshaft sensor (F552) signal and as backup by the camshaft sensor (F558) signal. • Engine overspeed is detected. • The driver was informed by a warning. • At the moment of troubleshooting this DTC, it is probably inactive. Interview the driver about the circumstances in which the overspeed event(s) occurred.
Diagnostic Step-by-Step	This DTC is for informational purposes only. No troubleshooting is required. Step 1 Contact PACCAR Engine Support Center Step 1A Contacting the PACCAR Engine Support Center Action 1. If this DTC appears repeatedly or does not clear, contact the PACCAR Engine Support Center for further assistance.
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P0221

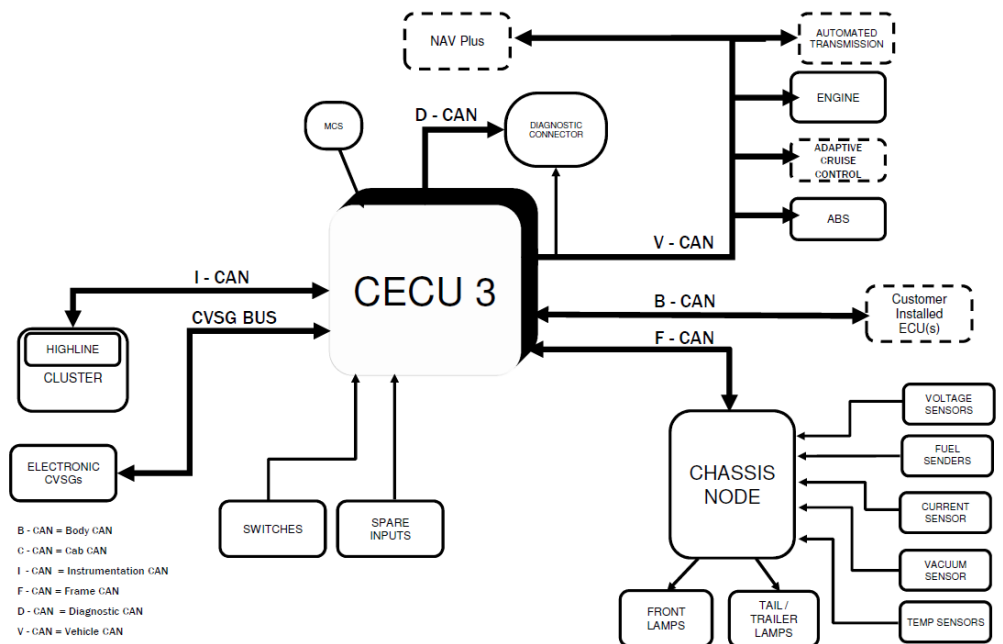
Code number	P0221
Fault code description	CAN communication - Message (EEC2) out of range - Remote accelerator pedal position
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	This code relates to a communication issue and not to a specific component.
Location of component(s)	This code relates to a communication issue and not to a specific component.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	
Reset condition of fault code	This DTC changes to inactive as soon as the error is no longer detected.



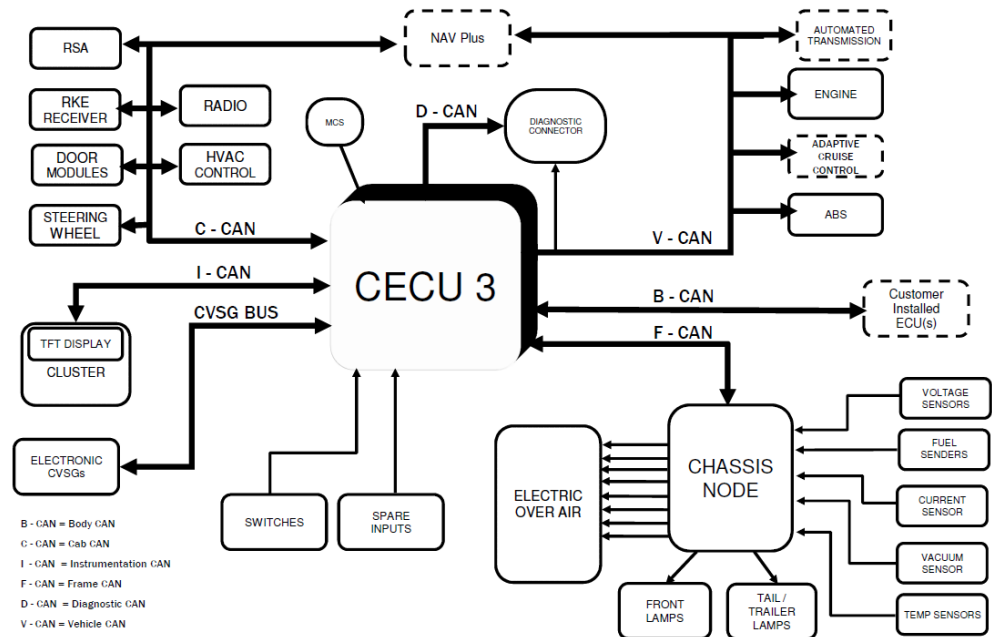
NAMUX 4 Architecture (Phase 1): T680



NAMUX 3 Architecture



NAMUX 4 Architecture



Technical data

This code relates to a communication issue and not to a specific component.

Possible causes

Check the cabin ECU for fault codes.

Additional information

No additional information available.

Diagnostic Step-by-Step

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

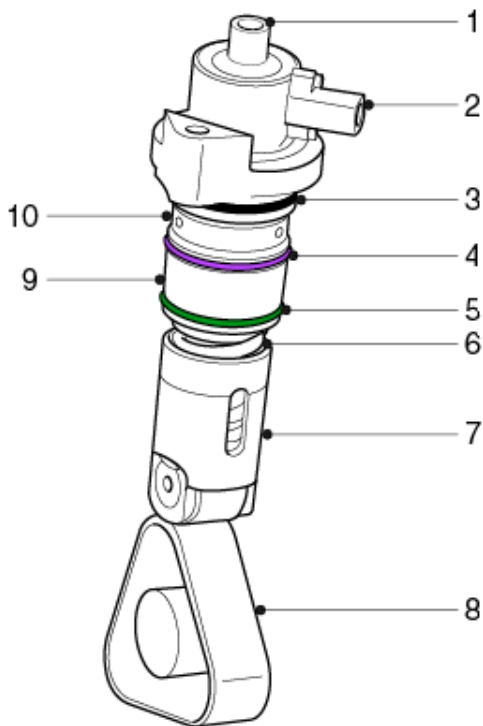


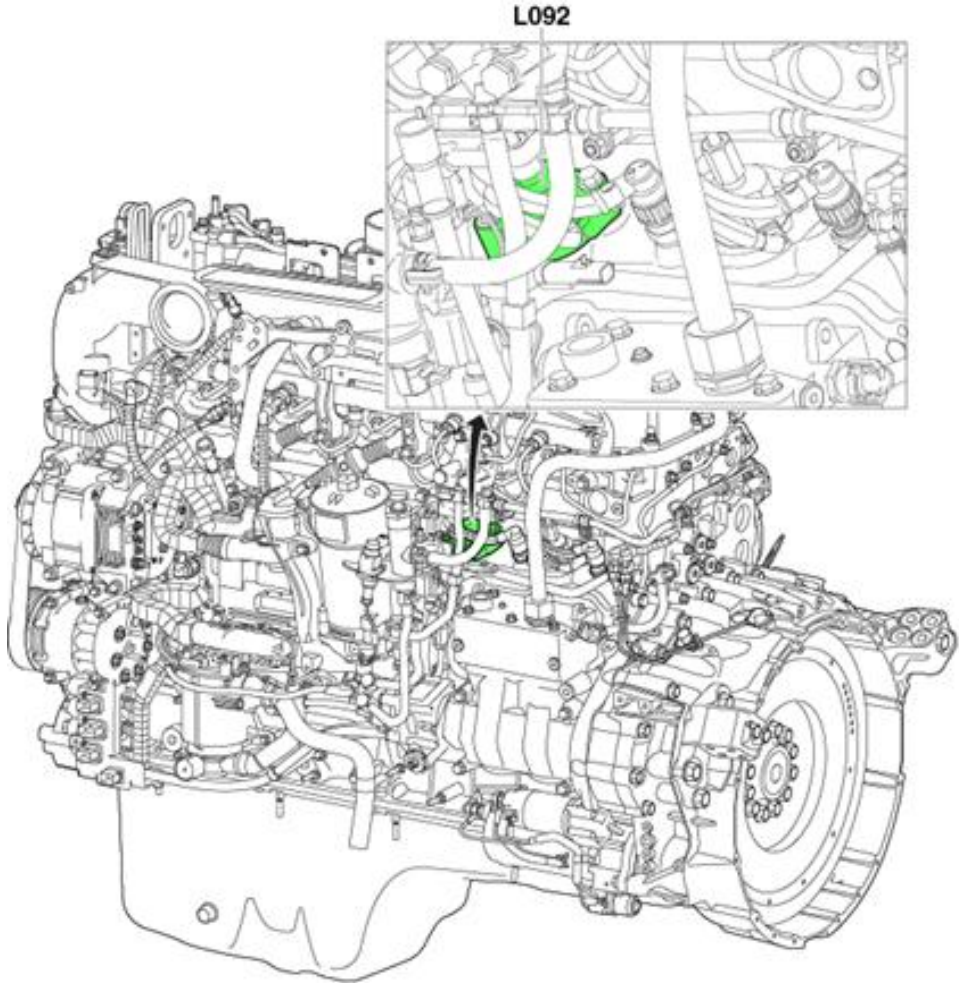
- Disconnecting the EAS connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data.
- It is necessary to exit the fault code menu in DAVIE and run the diagnostic test again to identify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

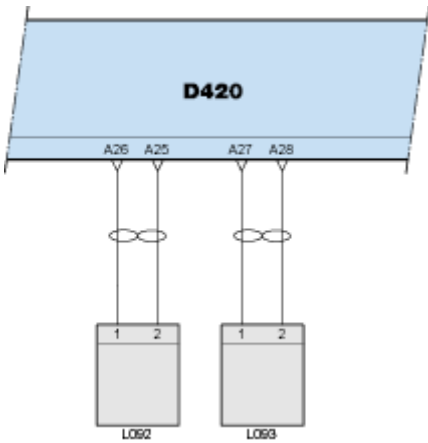
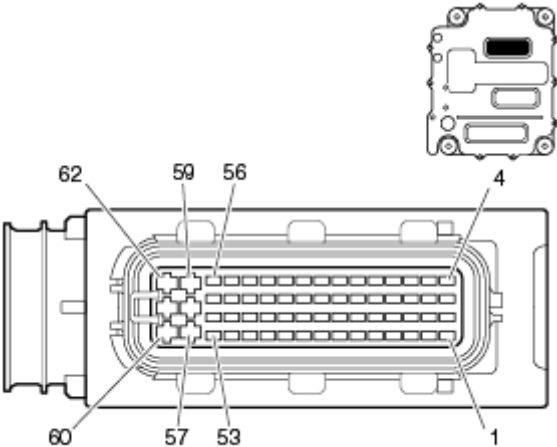
Step 1	Step ID 0221a	SRT
Visual Inspection OFF the ignition key, disconnect the connector from component and ECU. Visually inspect all applicable connectors (bent, broken, corroded or loose pins) damage to wire harness, sign of exhaust leaks during each step of the diagnostic procedure. Was there evidence of any of the above? • No: Proceed to step 2.		

	• Yes: Make the appropriate repairs or component replacements. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, Proceed to step 2			
	<table><tr><td>Step 2</td><td>Step ID 0221b</td><td>SRT</td></tr></table> Data check • Lookup the technical data of the specific system • Perform the checking data test of the specific component Is test pass? • No: Proceed to step 3 • Yes : Proceed to step4	Step 2	Step ID 0221b	SRT
	Step 2	Step ID 0221b	SRT	
	<table><tr><td>Step 3</td><td>Step ID 0221c</td><td>SRT</td></tr></table> Repair or replace component • Repair or replace the component, also check for electrical connection and wiring harness. • Reconnect the connector • ON the ignition key Use DAVIE to re-check for the presence of active faults: • Is DTC fault active: Proceed to step 4 • Is DTC fault inactive: Issue resolved. Clear inactive fault.	Step 3	Step ID 0221c	SRT
	Step 3	Step ID 0221c	SRT	
<table><tr><td>Step 4</td><td>Step ID 0221d</td><td>SRT</td></tr></table> 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.	Step 4	Step ID 0221d	SRT	
Step 4	Step ID 0221d	SRT		
Verification Drive Cycle	To validate the repair, with the brakes set, turn the key to the ON position with the engine off, and allow 10 seconds for the system to initialize and run diagnostics. With the brakes set, start the engine and allow it to run at idle for 2 minutes.			
	Back to Index			

P0261

Code number	P0261
Fault code description	Common rail pump unit 1 – Voltage too low or short circuit to ground on ECU D420 pin A25
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 The diagram shows an exploded view of a common rail pump unit. The components are numbered as follows: 1. Top inlet/outlet port, 2. Side inlet/outlet port, 3. Upper housing/bore, 4. Purple O-ring, 5. Green O-ring, 6. Lower housing/bore, 7. Plunger/needle assembly, and 8. Base mounting bracket. Callouts 9 and 10 point to the O-ring grooves on the lower housing. Operation The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three pump events every two crankshaft revolutions. Fuel from the fuel gallery can enter the pump plunger area via an internal valve. A pump event starts when the plunger travels up, the PCI ECU activates the solenoid briefly, and the internal valve closes the opening to the fuel gallery. The internal valve is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the outlet bore of the pump unit. The pump event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downward again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents fuel from flowing back from the rail to the plunger area. Control The amount of fuel pumped to the rail depends on the duration of the pump event. The earlier the solenoid is activated by the PCI ECU in the up stroke of the pump

	plunger, the more (mg/stroke) fuel is pumped to the rail. Effect on the system: Rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.
Location of component(s)	 The diagram shows a detailed view of the engine's internal components, including the common rail pump units. A green arrow points to the pump units, and a green highlight is shown in an inset image labeled L092.
Diagnostic condition	Please Contact the Engine Support Center
Set condition of fault code	If High side voltage on the injector (before injection) is less than 20% compared to battery voltage.
Reset condition of fault code	This diagnostic runs when the engine is running

Electrical diagram(s)	  Wiring harness connector D420.A front view D420 PCI ECU L092 common rail pump unit 1 L093 common rail pump unit 2																								
Technical data	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>1</td><td>2</td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr></table> <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>1</td><td>2</td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	0.67 Ω	Resistance value at 20°C [68°F]	1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	± 0.67 Ω	Resistance value at 20°C [68°F]	1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]
Pin (+ probe)	Pin (- probe)	Value	Additional information																						
1	2	0.67 Ω	Resistance value at 20°C [68°F]																						
1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]																						
Pin (+ probe)	Pin (- probe)	Value	Additional information																						
1	2	± 0.67 Ω	Resistance value at 20°C [68°F]																						
1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]																						
Possible causes	- Faulty wiring - Faulty connector - Faulty solenoid valve																								
Additional information	No additional information available.																								

Diagnostic Step-by-Step



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



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

Step 1	Step ID 0261a	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 0261b	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 0261c	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 $\pm$ 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 $\pm$ 200 mV during the FORWARD bias test is found - Proceed to step 4.

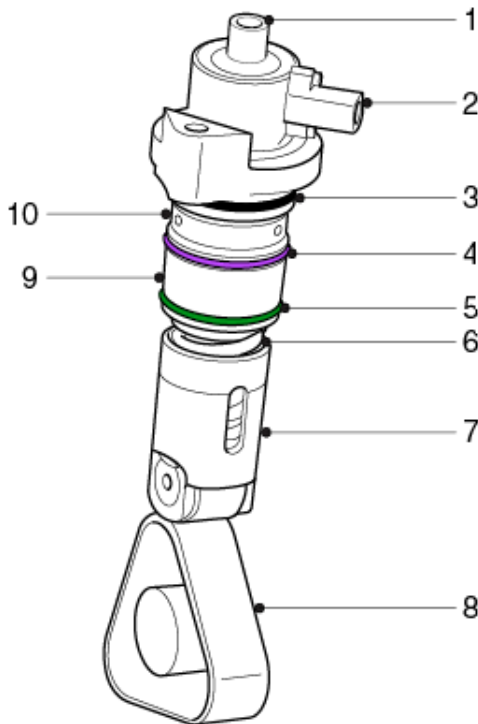
Step 4	Step ID 0261d	SRT

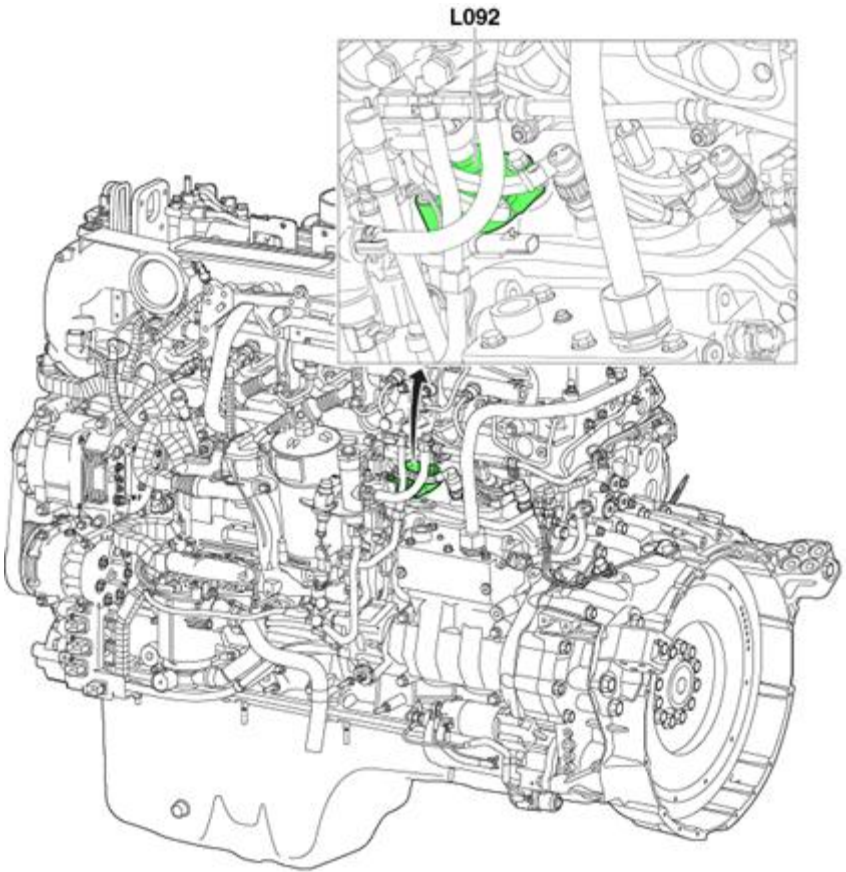
With key OFF, disconnect the encapsulated harness at the PCI, and perform a diode check between the ground circuit terminal on the PCI and battery ground. Please refer to your multimeter operation manual for the correct diode check procedure:

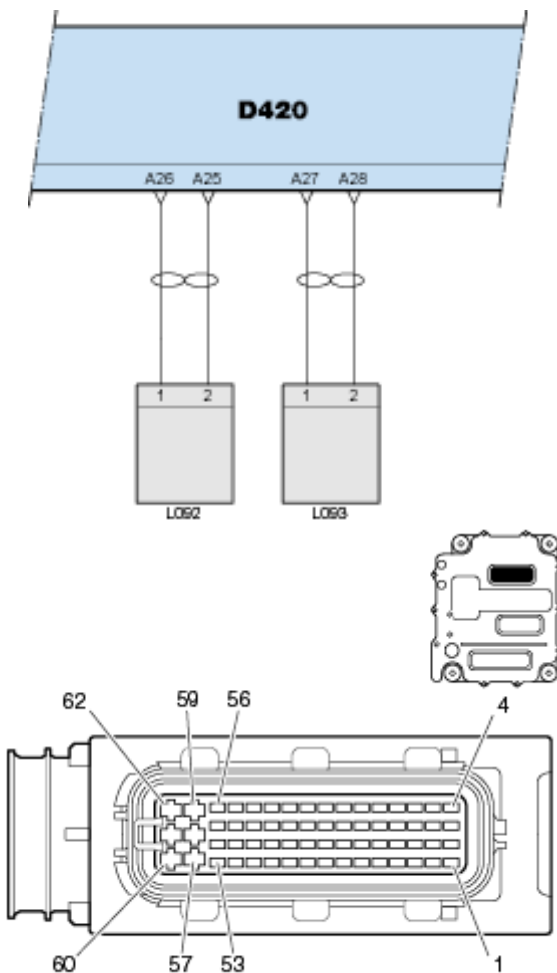
- If the circuit is open during the REVERSE bias test and measures 600 mV $\pm$ 200 mV during the FORWARD bias test – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document.
- If any result other than open circuit during the REVERSE bias test and 600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

	<table><tr><td>Step 5</td><td>Step ID 0261e</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: - Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6. </td></tr></table>	Step 5	Step ID 0261e	SRT	Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground: - Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.		
Step 5	Step ID 0261e	SRT					
Disconnect the encapsulated harness from the PCI. Turn the key ON and measure the voltage between the signal circuit terminal on the PCI and battery ground: - Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6.							
	<table><tr><td>Step 6</td><td>Step ID 0261f</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>	Step 6	Step ID 0261f	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.		
Step 6	Step ID 0261f	SRT					
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.							
Verification Drive Cycle	To validate the repair, with DAVIE connected and 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						

P0262

Code number	P0262
Fault code description	Common rail pump unit 1 – Voltage too high or short circuit to supply on ECU D420 pin A25
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	 The diagram shows an exploded view of a common rail pump unit. The components are numbered as follows: 1. Top inlet/outlet port, 2. Side inlet/outlet port, 3. Upper housing/bore, 4. Purple O-ring, 5. Green O-ring, 6. Lower housing/bore, 7. Plunger/needle assembly, and 8. Base mounting bracket. Callouts 9 and 10 point to the internal valve area within the upper housing. Operation The internal plunger is actuated via a roller lifter on the camshaft. Each pump has three pump events every two crankshaft revolutions. Fuel from the fuel gallery can enter the pump plunger area via an internal valve. A pump event starts when the plunger travels up, the PCI ECU activates the solenoid briefly, and the internal valve closes the opening to the fuel gallery. The internal valve is kept closed hydraulically, and the fuel is pumped to the rail via a check valve in the outlet bore of the pump unit. The pump event stops when the roller lifter passes the top of the camshaft lobe, causing the plunger to travel downward again. Due to this, the pressure above the plunger decreases and the internal valve opens the opening to the fuel gallery. The check valve in the outlet bore closes and prevents fuel from flowing back from the rail to the plunger area. Control

	The amount of fuel pumped to the rail depends on the duration of the pump event. The earlier the solenoid is activated by the PCI ECU in the up stroke of the pump plunger, the more (mg/stroke) fuel is pumped to the rail. Effect on the system: • Rail pressure control. The rail pressure is closed-loop controlled. A comparison is made between the actual rail pressure and rail pressure demands determined by the ECU. The rail pressure is adjusted by pumping more or less fuel to the rail with the common rail pump units.
Location of component(s)	
Diagnostic condition	Please Contact the Engine Support Center
Set condition of fault code	If High side voltage on the injector (before injection) is more than 80% compared to battery voltage.
Reset condition of fault code	This diagnostic runs when the engine is running

Electrical diagram(s)	 Wiring harness connector D420.A front view D420 PCI ECU L092 common rail pump unit 1 L093 common rail pump unit 2																								
Technical data	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>1</td><td>2</td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr></table> <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td>1</td><td>2</td><td>± 0.67 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>1</td><td>2</td><td>maximum 0.94 Ω</td><td>Resistance value at 120°C [248°F]</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	0.67 Ω	Resistance value at 20°C [68°F]	1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	± 0.67 Ω	Resistance value at 20°C [68°F]	1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]
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Pin (+ probe)	Pin (- probe)	Value	Additional information																						
1	2	± 0.67 Ω	Resistance value at 20°C [68°F]																						
1	2	maximum 0.94 Ω	Resistance value at 120°C [248°F]																						
Possible causes	- Faulty wiring - Faulty connector - Faulty solenoid valve																								
Additional information	No additional information available.																								
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage																								

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



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

Step 1	Step ID 0262a	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 0262b	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 0262c	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 $\pm$ 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 $\pm$ 200 mV during the FORWARD bias test is found - Proceed to step 4.

Step 4	Step ID 0262d	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 $\pm$ 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 $\pm$ 200 mV during the FORWARD bias test is found - Proceed to step 6.

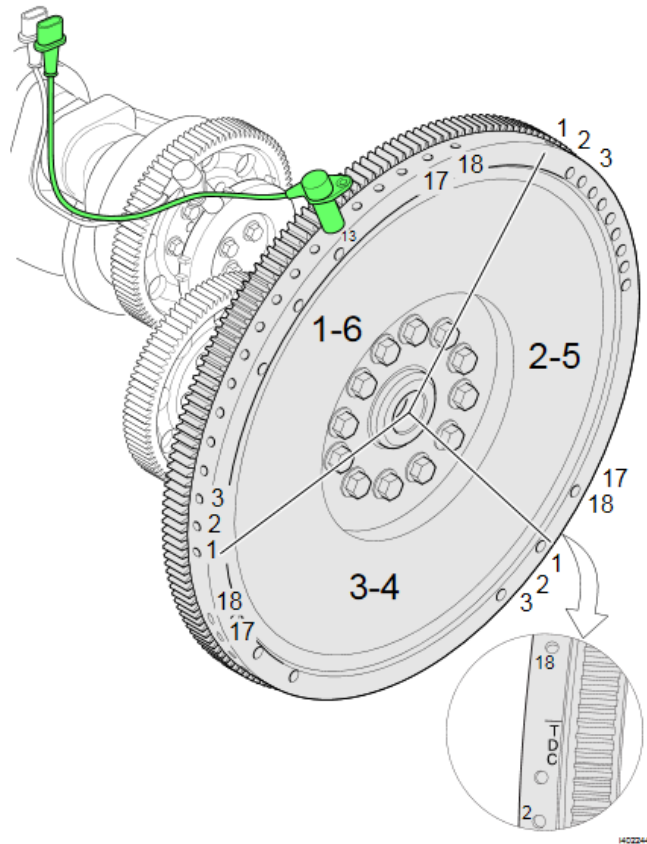
Step 5	Step ID 0262e	SRT

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

	- Measured voltage is approximately 7.0 V – Replace the encapsulated harness. Proceed to the verification procedure listed at the end of this document. - Measured voltage is below 5.0 V or above 9.0 V – Proceed to step 6. <table><tr><td>Step 6</td><td>Step ID 0262f</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>	Step 6	Step ID 0262f	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.		
Step 6	Step ID 0262f	SRT					
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.							
Verification Drive Cycle	To validate the repair, with DAVIE connected and 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						

P0263

Code number	P0263
Fault code description	Cylinder 1 - Torque contribution too low
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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. Description, crankshaft sensor (F552)



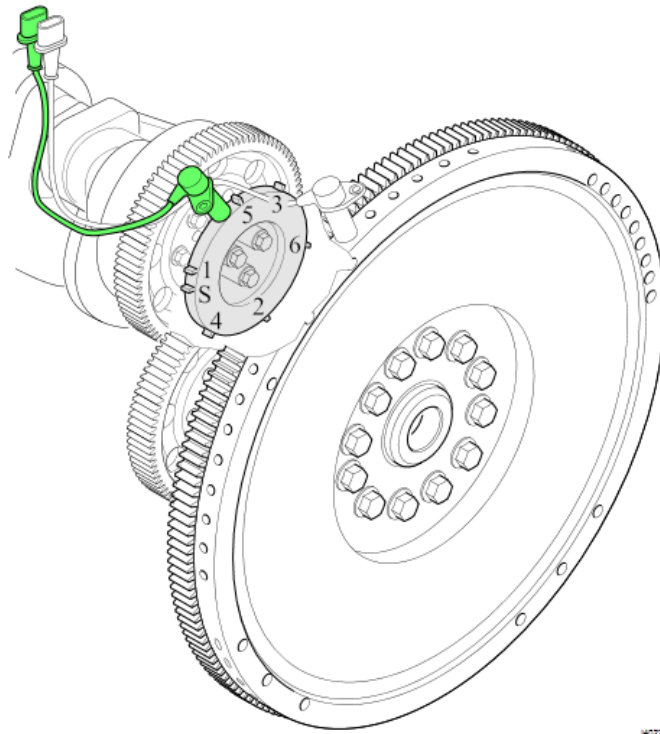
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

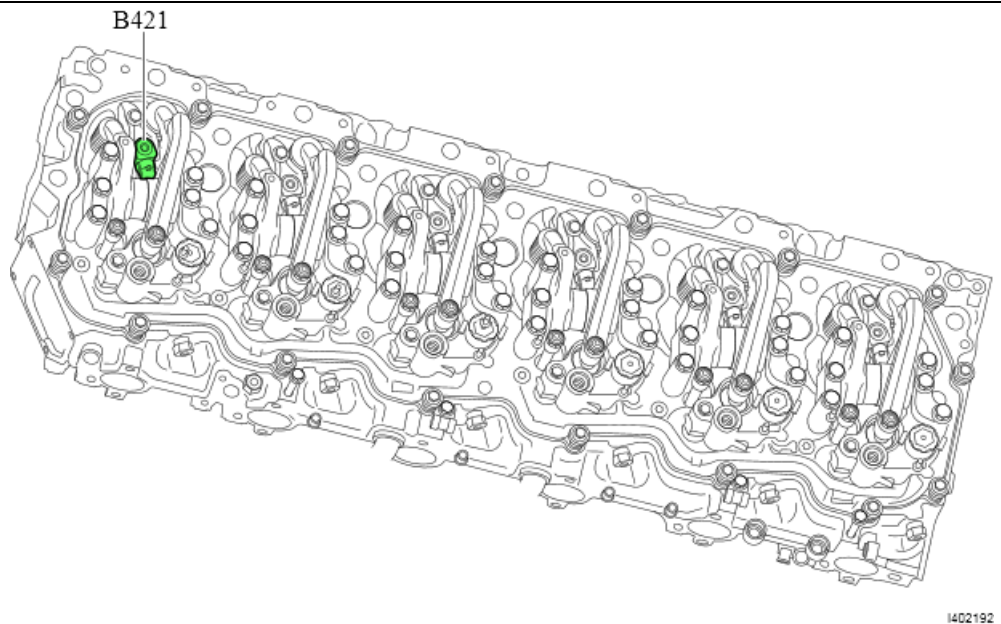


Effect on the system:

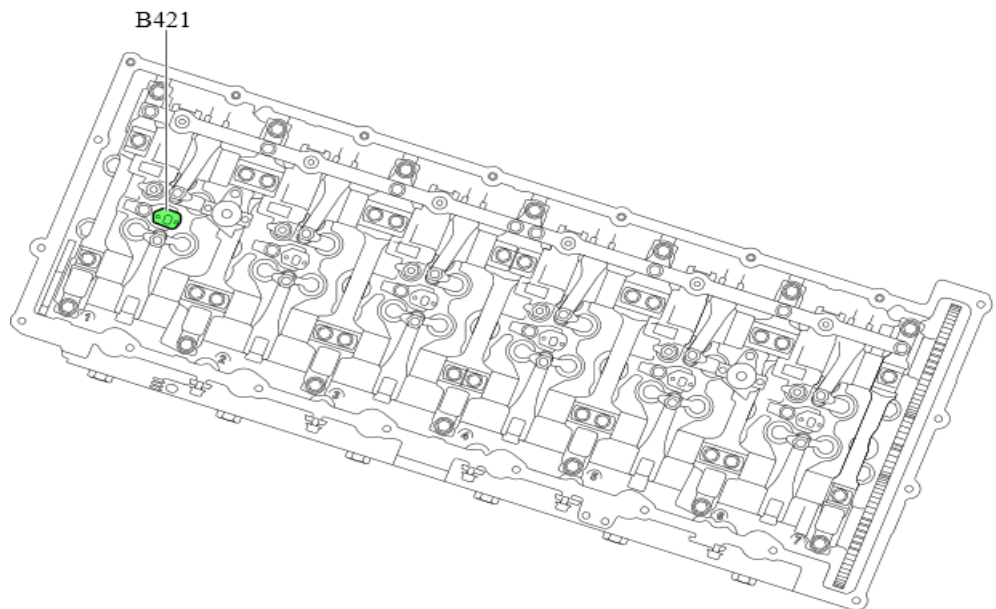
- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Description, solenoid valve engine brake cylinder 1-6 (L147-L152)

Location of component(s)	Solenoid valve injector cylinder 1 (B421)



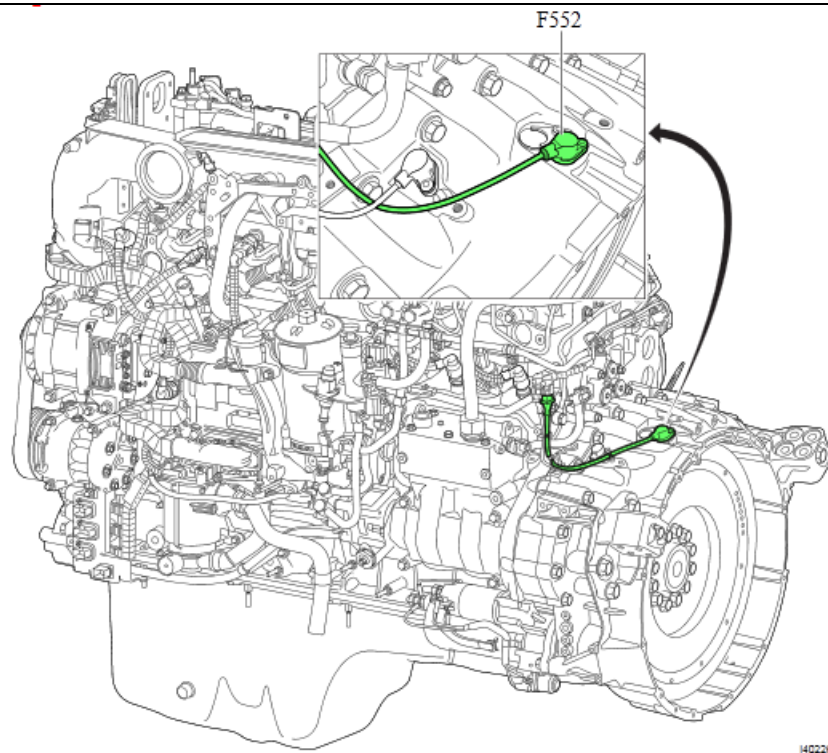
I402192



I402708

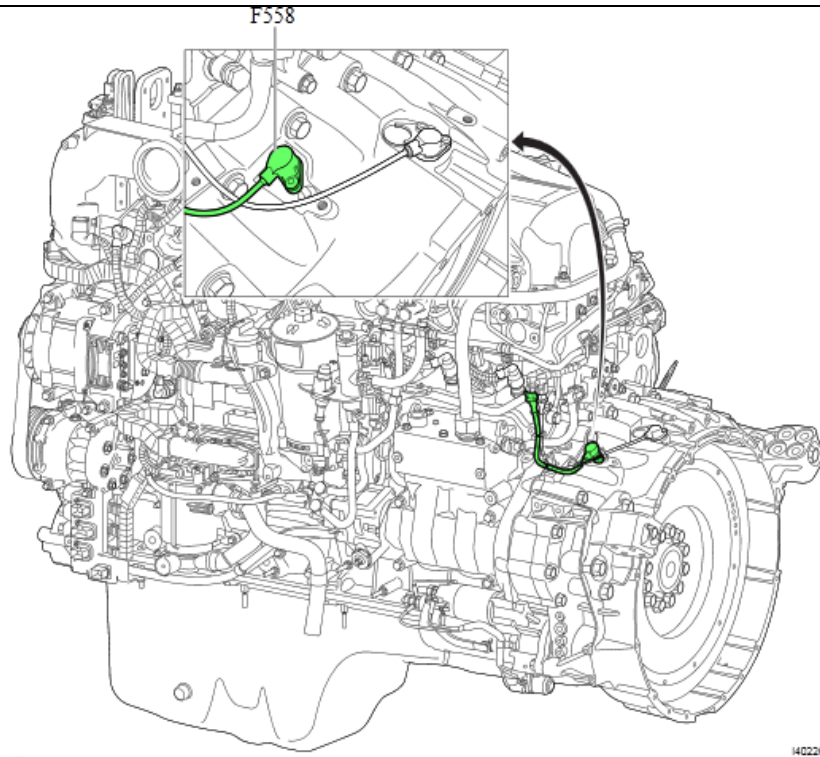
Crankshaft sensor (F552)

MX_EPA13, MX-13

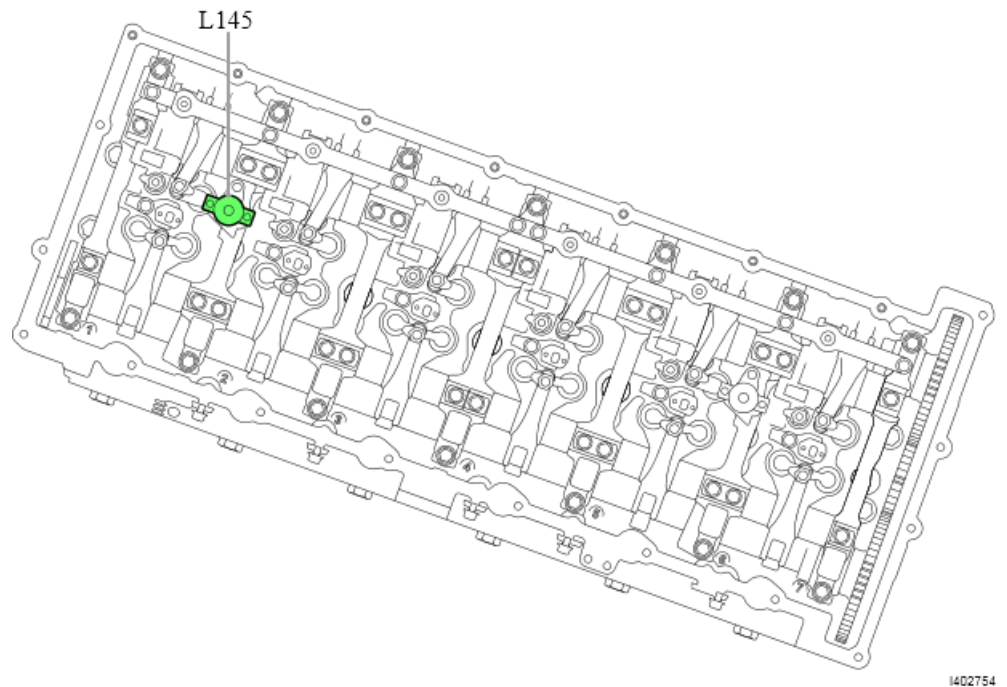


Camshaft sensor (F558)

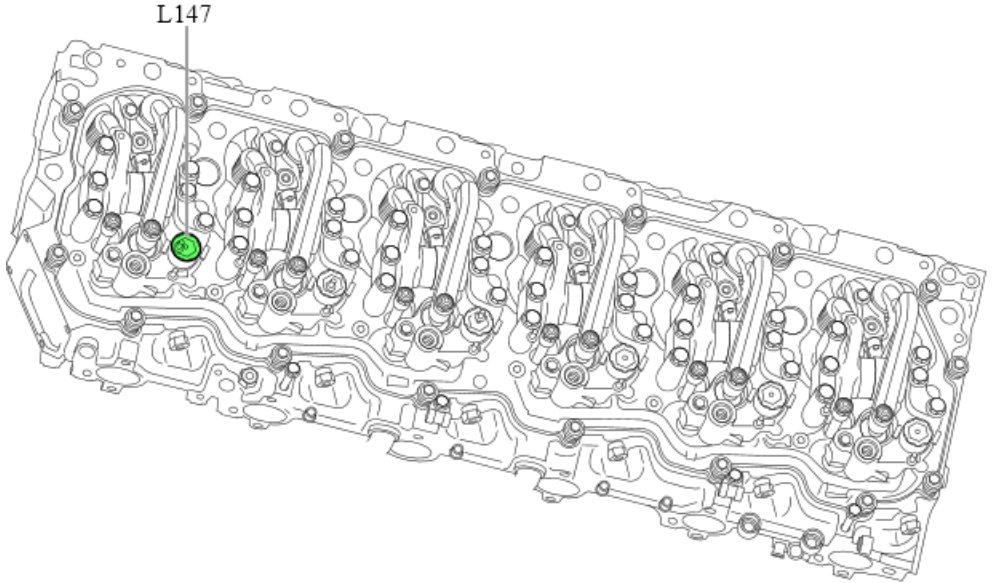
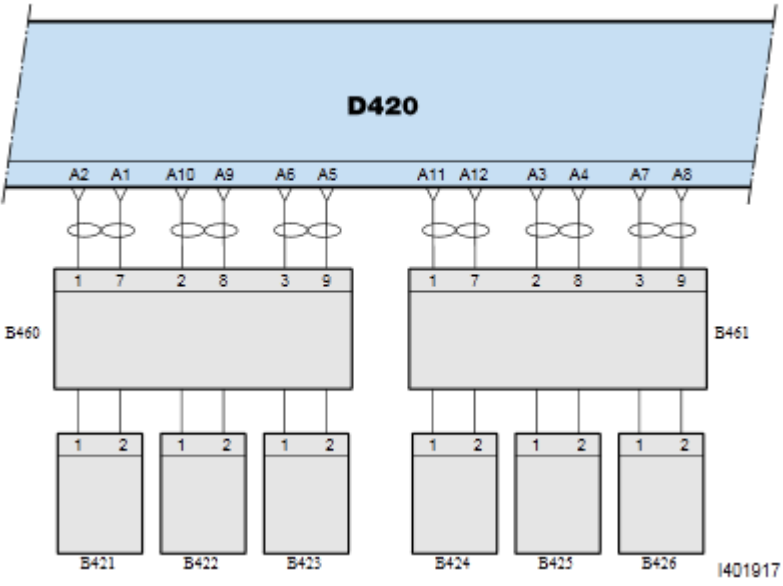
MX_EPA13, MX-13



MX-11 Engine Brake solenoid valve cylinder 1-3 (L145)



Solenoid valve engine brake MX cylinder 1 (L147)

	 I402185-2
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that the combustion contribution of cylinder 1 is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  I401917 B460 connector cylinders 1-3

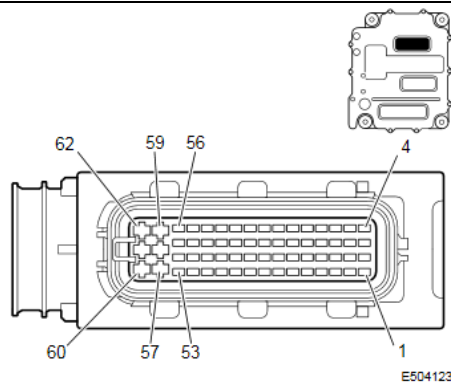
B461 connector cylinders 4-6
 D420 PCI ECU
 B421 solenoid valve injector cylinder 1
 B422 solenoid valve injector cylinder 2
 B423 solenoid valve injector cylinder 3
 B424 solenoid valve injector cylinder 4
 B425 solenoid valve injector cylinder 5
 B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

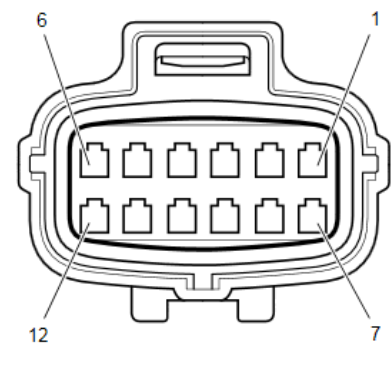
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

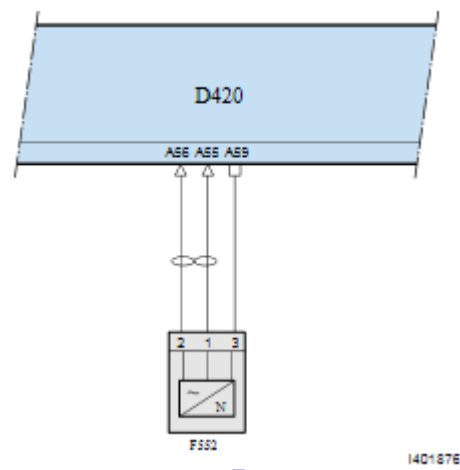


Wiring harness connector B460 & B461 front view



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

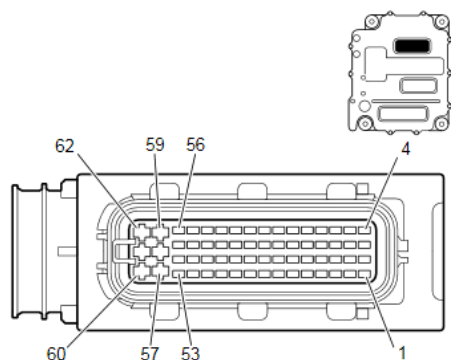
Checking data, crankshaft sensor (F552)



D420 PCI ECU

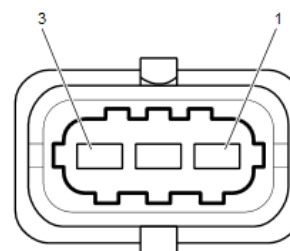
F558 camshaft sensor

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



E504123

Wiring harness connector D420.A front view



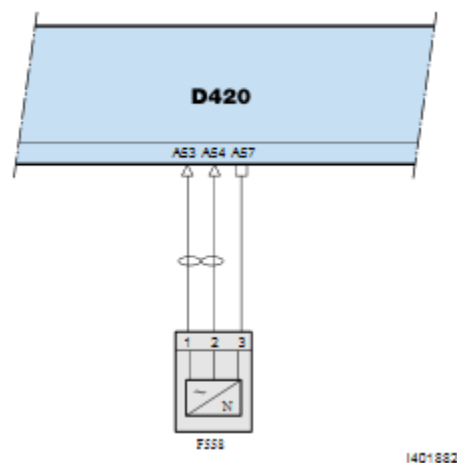
E504112

Component connector F552



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

Checking data, camshaft sensor (F558)



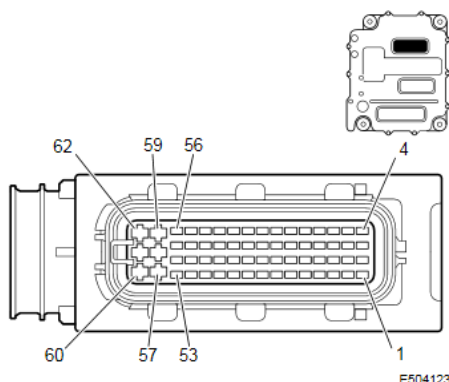
I401882

D420 PCI ECU

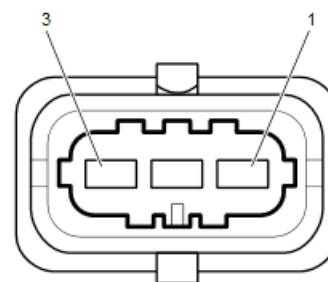
F558 camshaft sensor

D420	F558	Function

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



Wiring harness connector D420.A front view



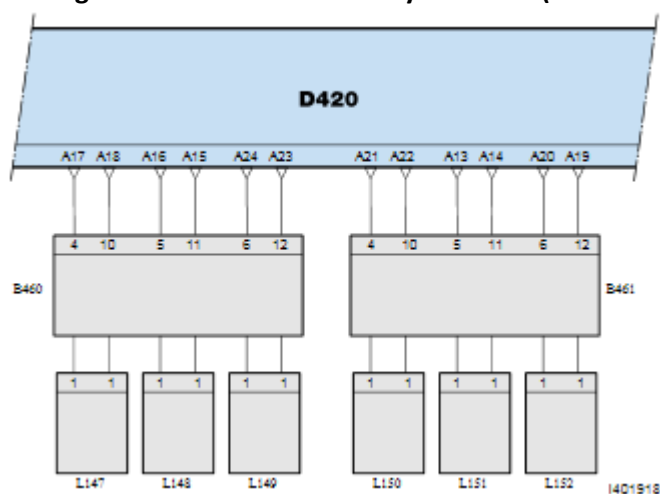
Component connector F558

E504113



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

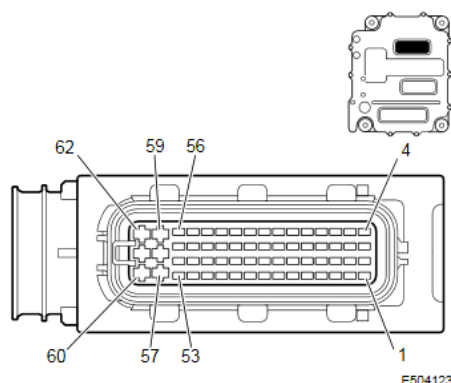
- L148 MX Engine Brake solenoid valve cylinder 2
- L149 MX Engine Brake solenoid valve cylinder 3
- L150 MX Engine Brake solenoid valve cylinder 4
- L151 MX Engine Brake solenoid valve cylinder 5
- L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

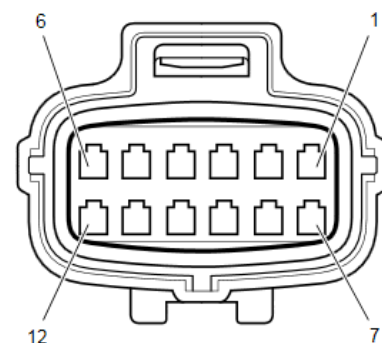
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view



Wiring harness connector B460 & B461 front view



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

- Key of the ignition
- Disconnect connector B460
- Measure on the 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]



If a measurement directly on the injector connector is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		~ 0.5 V	Effective AC voltage (VAC) when engine starting.
		~ 2.3 V	Effective AC voltage (VAC) when engine idling.
		~ 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Possible causes

- Faulty cylinder 1 injector (under-fueling)
- Faulty MX Engine Brake cylinder 1

	• Symptom: Slightly reduced power: • Incorrect valve clearance • Major imbalance in the drive shaft • Symptom: Engine block vibration at high load, damaged flywheel • Mechanical defect (for example damaged cam follower or broken valve)		
Additional information	• The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: • Cylinder-to-cylinder engine speed comparison, and • Cylinder-to-cylinder rotational crankshaft acceleration comparison • This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.		
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. <table><tr><td> Step 1.A Investigate related trouble codes </td></tr><tr><td> Action 1. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes. </td></tr></table>	Step 1.A Investigate related trouble codes	Action 1. Use DAVIE Diagnostics to perform a Quick Check for current 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? P0087, P1087, P228D, P0093, P0094, P1086	
Yes	No
Refer to the troubleshooting information for these codes before continuing with this procedure.	Go to step 1.B
Step 1.B Investigate related trouble codes	
Action 1. Refer to the current trouble codes obtained in step 1.A.	
Are any of these related codes inactive AND did they occur before P0263? P0087, P1087, P228D, P0093, P0094, P1086	
Yes	No
If P0263 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence. If P0263 is active, go to Step 2.A.	
If this code is still present, go to step 2.A	Go to step 2.A
Step 2. Quick Checks	
Step 2.A Visual inspection, connections and wiring, fuel injectors	

	Action - Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 4, and 5: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Battery not fully charged or contacts not tight	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.B	Go to step 2.B
	Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)	
	Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	

	<table border="1"> <tr> <td>If this code is still present, go to step 2.C</td> <td>Go to step 2.C</td> </tr> </table>		If this code is still present, go to step 2.C	Go to step 2.C
If this code is still present, go to step 2.C	Go to step 2.C			
Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558) Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected				
Was there evidence of any of the above?				
Yes		No		
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.				
If this code is still present, go to step 3.A		Go to step 3.A		
Step 3. Drivetrain Checks				
Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)  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 Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, crankshaft speed sensor (F552).”</u>				
Are measured values within expected range?				
Yes		No		

		Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Go to step 3.B	If this code is still present, go to step 3.B

Step 3.B Visual inspection, crankshaft speed sensor (F552)

Action

1. Referring to maintenance procedure, “replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following:

The correct parts are not installed

Sensor tip is damaged

Was there evidence of any of the above?

Yes	No
Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
If this code is still present, go to step 3.C	Go to step 3.C

Step 3.C Electrical checks, resistance, camshaft sensor (F558)

i

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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, “Component check, camshaft sensor (F558).”

Are measured values within expected range?

	Yes		No	
			Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	Got to step 3.D		If this code is still present, go to step 3.D	
	Step 3.D Visual inspection, camshaft sensor (F558)			
	Action			
	1. Referring to maintenance procedure, “ <u>replace camshaft sensor (Sensors el. syst. eng.),” job ID 67579</u> , remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged			
	Was there evidence of any of the above?			
	Yes		No	
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		Reinstall and reconnect camshaft sensor (F558).	
If this code is still present, go to step 3.E		Go to step 3.E		
Step 3.E Maintenance procedure, valve clearance				
Action				
2. Check the valve clearance for cylinders 1, 4, and 5 as outlined in the maintenance procedure, “ <u>adjust valve clearance (Basic assy.), job ID - 66829.</u> ”				
Is the measured valve clearance for any of the cylinders outside of the specified range?				
Yes		No		

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 1), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 1, repeat step 4.A for cylinder 4.

If the problem has not been found after exchanging components for cylinder 4, repeat step 4.A for cylinder 5.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

If the problem moved with the injector, replace the injector.
If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid.
Refer to Step 5.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.

No

If all exchanges still result in P0263, there may be a possible issue with a cylinder or the flywheel.
Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.

Step 5. Repair Verification

Step 5.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 clear all current DTCs from the PCI and EAS-3 ECUs.

Action

1. Start-up

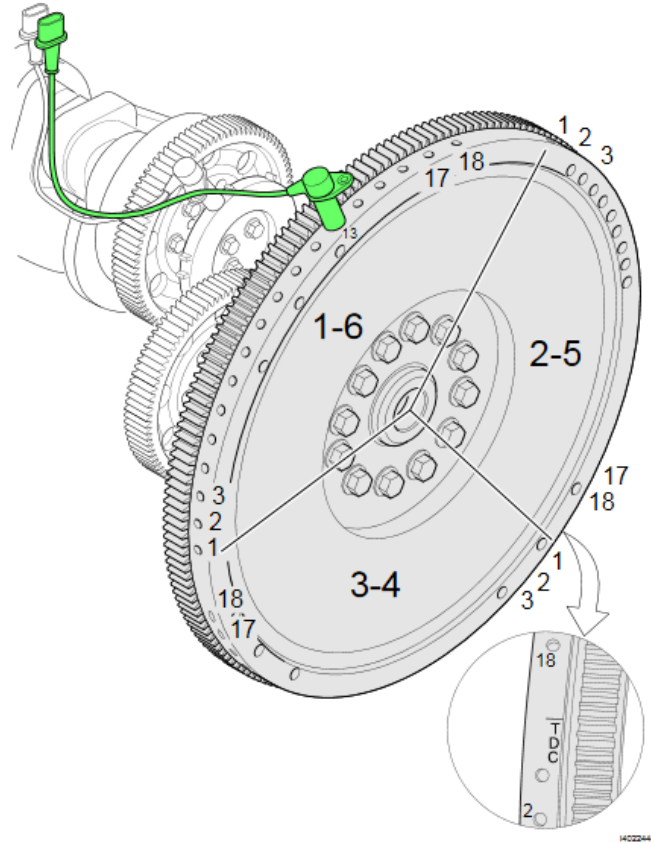
With the brakes set, start the engine and allow it to run at idle for 2 minutes.

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 5.B	Go to step 5.B
Step 5.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 P0263 been cleared?		
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.		
	Back to Index	

P0266

Code number	P0266
Fault code description	Decrease in combustion in cylinder 2 relative to the others without causing complete failure
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)

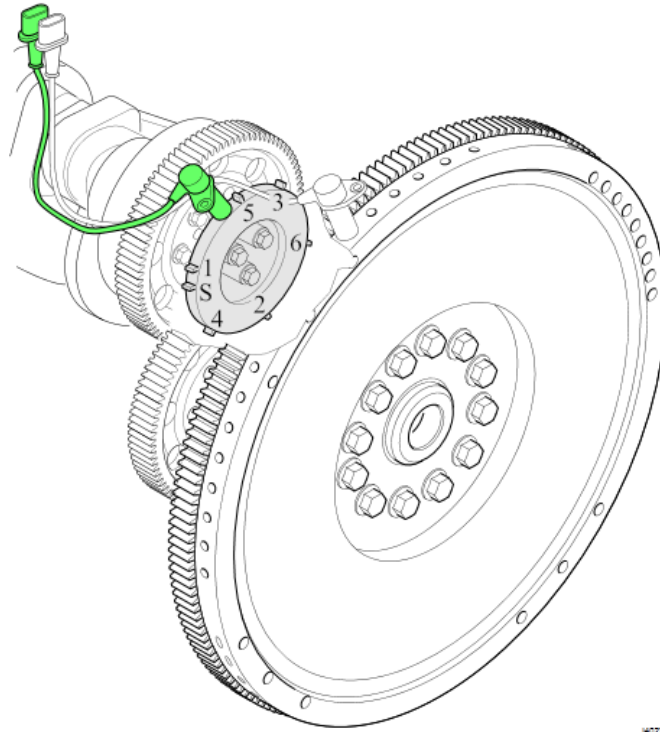
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Checking data, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

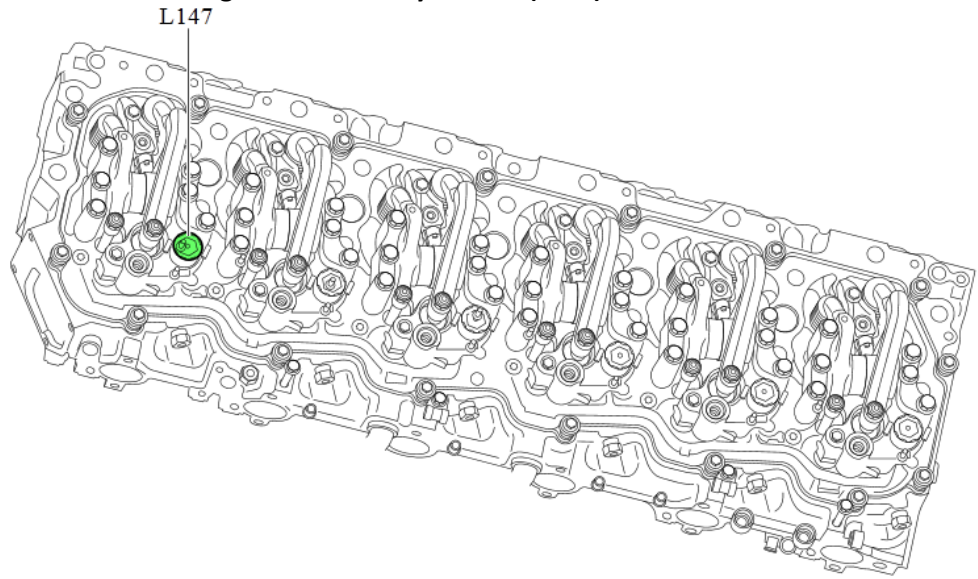


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

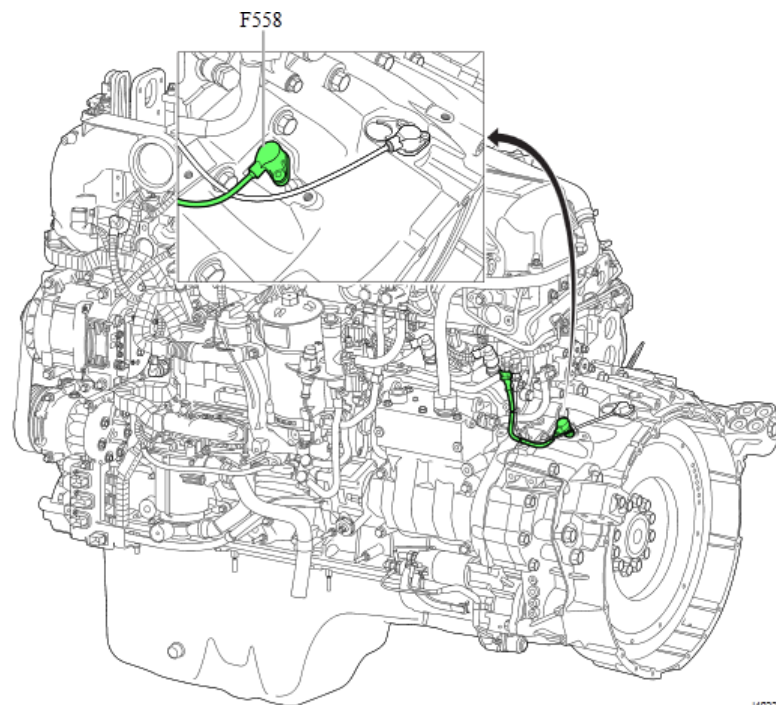
Solenoid valve engine brake MX cylinder 1 (L147)



i402185-2

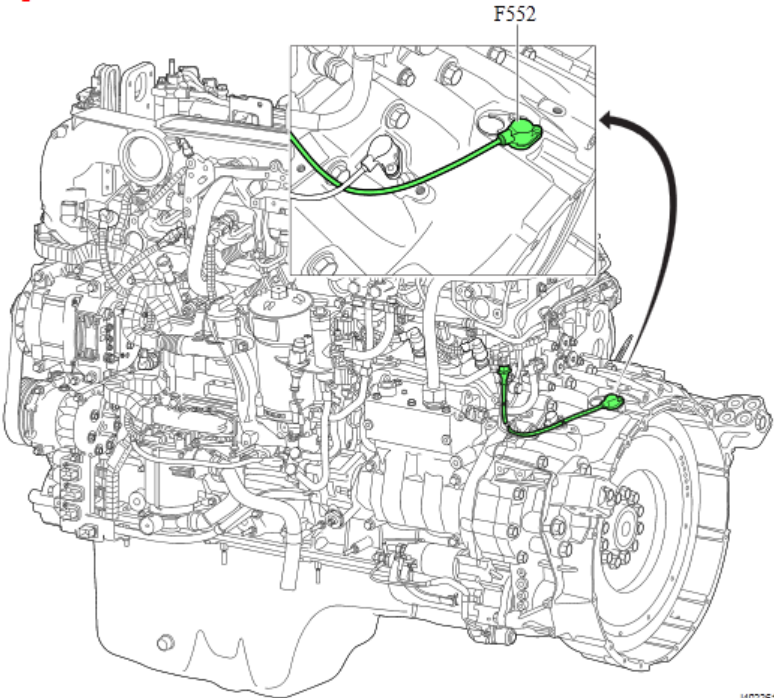
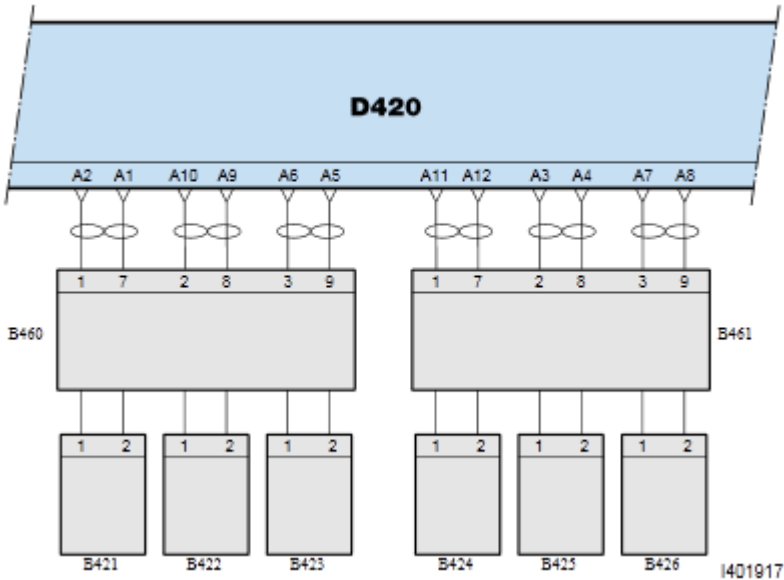
Checking data, camshaft sensor (F558)

MX_EPA13, MX-13



i402262

Crankshaft sensor (F552)

	<i>MX_EPA13, MX-13</i>  I402251
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that the combustion contribution of cylinder 2 is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  I401917 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

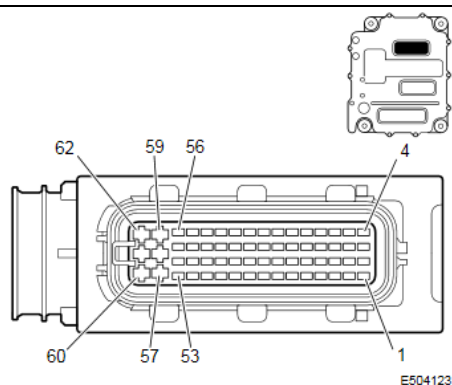
B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

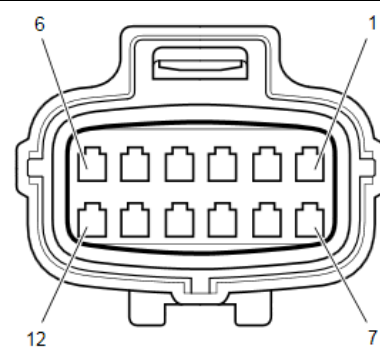
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

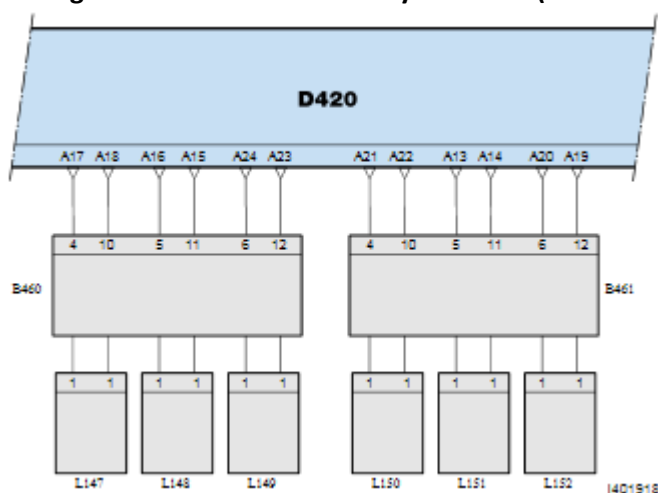


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

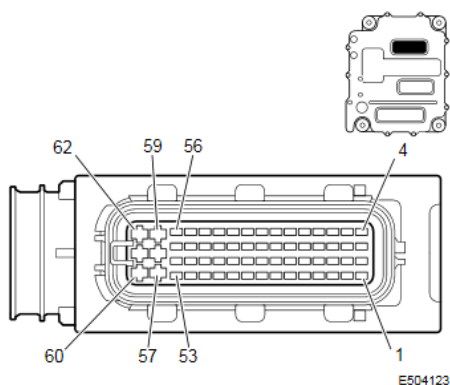
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

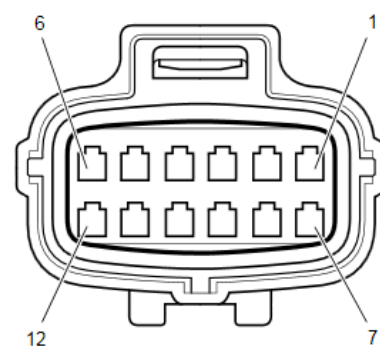
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

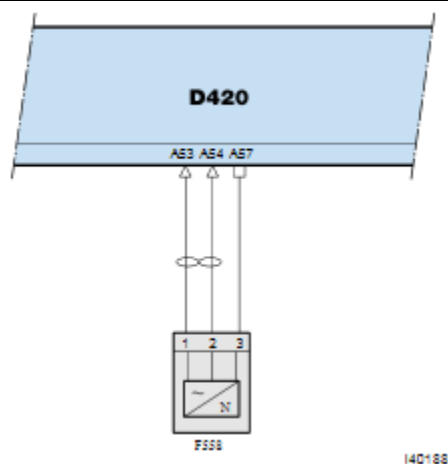


Wiring harness connector B460 & B461 front view



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

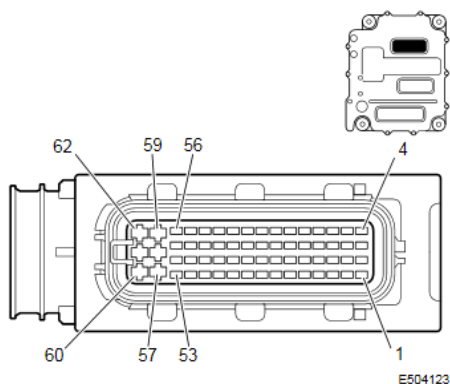
Checking data, camshaft sensor (F558)



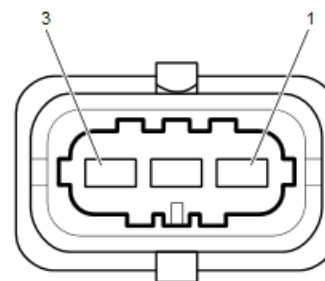
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

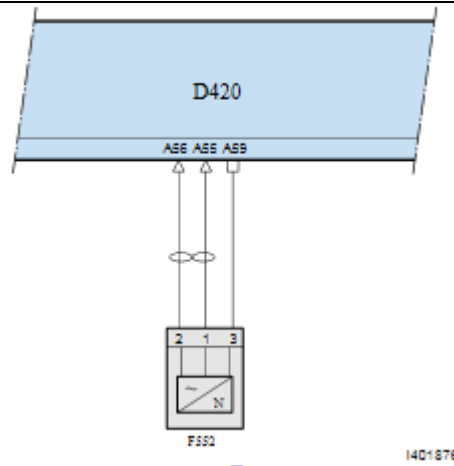


Component connector F558



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

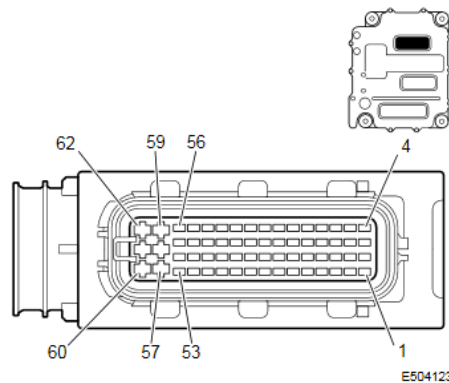
Checking data, crankshaft sensor (F552)



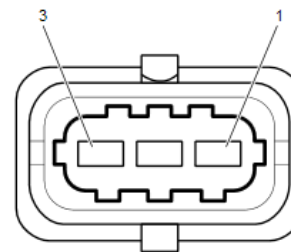
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake

test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.

			± 2.3 V	Effective AC voltage (VAC) when engine idling.
			± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.
	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.
Possible causes	• Faulty cylinder 2 injector (under-fueling) • Faulty MX Engine Brake cylinder 2 • Symptom: Slightly reduced power: • Incorrect valve clearance • Major imbalance in the drive shaft • Symptom: Engine block vibration at high load, damaged flywheel • Mechanical defect (for example damaged cam follower or broken valve)			
Additional information	• The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: • Cylinder-to-cylinder engine speed comparison, and • Cylinder-to-cylinder rotational crankshaft acceleration comparison • This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.			
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0266? P0087, P1087, P228D, P0093, P0094, P1086	
Yes	No
If P0266 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence. If P0266 is active, go to Step 2.A.	
If this code is still present, go to step 2.A	Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors	
Action	
1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 2, 4, and 6: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight	
Was there evidence of any of the above?	
Yes	No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.B	Go to step 2.B

Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)	
Action	

	1. Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.C	Go to step 2.C

Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)		
Action		
1. Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected		
Was there evidence of any of the above?		
Yes	No	
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		
If this code is still present, go to step 3.A	Go to step 3.A	

Step 3. Drivetrain Checks

Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)



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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, “Component check, crankshaft speed sensor (F552).”

Are measured values within expected range?

Yes

No

Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Go to step 3.B

If this code is still present, go to step 3.B

Step 3.B Visual inspection, crankshaft speed sensor (F552)

Action

1. Referring to maintenance procedure, “replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following:
 - The correct parts are not installed
 - Sensor tip is damaged

Was there evidence of any of the above?

Yes

No

Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Reinstall and reconnect crankshaft speed sensor (F552).

If this code is still present, go to step 3.C

Go to step 3.C

Step 3.C Electrical checks, resistance, camshaft sensor (F558)



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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, "Component check, camshaft sensor (F558)."

Are measured values within expected range?

Yes

No

Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Got to step 3.D

If this code is still present, go to step 3.D

Step 3.D Visual inspection, camshaft sensor (F558)

Action

1. Referring to maintenance procedure, "replace camshaft sensor (Sensors el. syst. eng.)," job ID 67579, remove the crankshaft sensor and visually inspect it for any of the following:
 - The correct parts are not installed
 - Sensor tip is damaged

Was there evidence of any of the above?

Yes

No

Replace camshaft sensor (F558).
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Reinstall and reconnect camshaft sensor (F558).

If this code is still present, go to step 3.E

Go to step 3.E

Step 3.E Maintenance procedure, valve clearance

Action

1. Check the valve clearance for cylinders 2, 4, and 6 as outlined in the maintenance procedure, "adjust valve clearance (Basic assy.), job ID - 66829."

Is the measured valve clearance for any of the cylinders outside of the specified range?

Yes

No

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 2), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4

	6	3, 2	6 with 1	6 with 5
	MX-13 Ignition Firing Order: 1,5,3,6,2,4			
3. Start the engine and allow it to run at idle for a minimum of 2 minutes. 4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either: a. the suspected injector to its new exchanged location, or b. the corresponding rocker-solenoid to its new exchanged location.				
i Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.				
5. Use DAVIE to update trim codes for all injectors that have been exchanged. 6. If the problem has not been found after exchanging components for cylinder 2, repeat step 4.A for cylinder 4. If the problem has not been found after exchanging components for cylinder 4, repeat step 4.A for cylinder 6.				
Did the problem reported through DAVIE move to the new cylinder location?				
Yes		No		
If the problem moved with the injector, replace the injector. If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		If all exchanges still result in P0266, there may be a possible issue with a cylinder or the flywheel. Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.		
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.				
Step 5. Repair Verification				
Step 5.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 5.B

Go to step 5.B

Step 5.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 P0266 been cleared?

Yes

No

Problem resolved. No further actions.

Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.



Contacting the PACCAR Engine Support Center

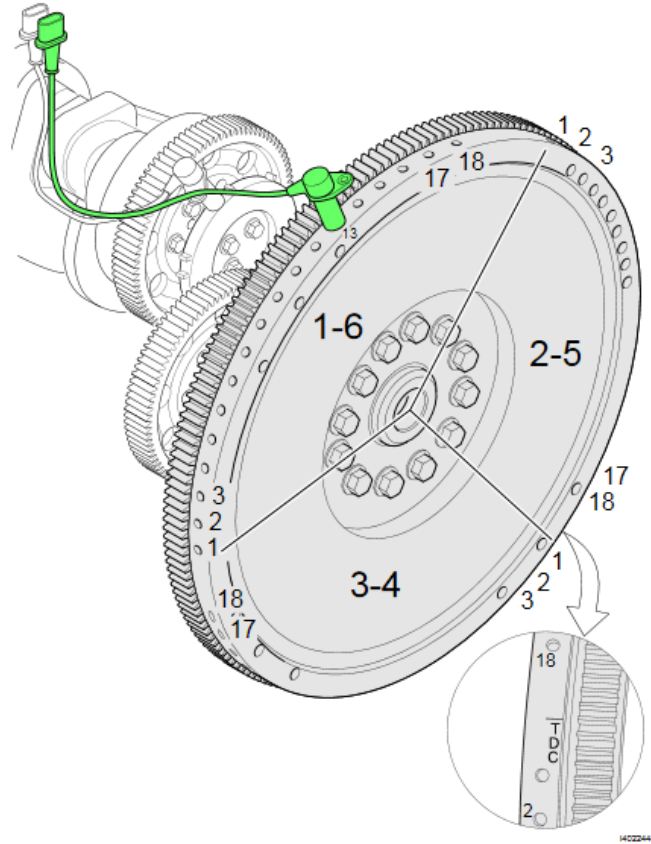
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

[Back to Index](#)

P0269

Code number	P0269
Fault code description	Cylinder 3 balancing correction angle above threshold
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



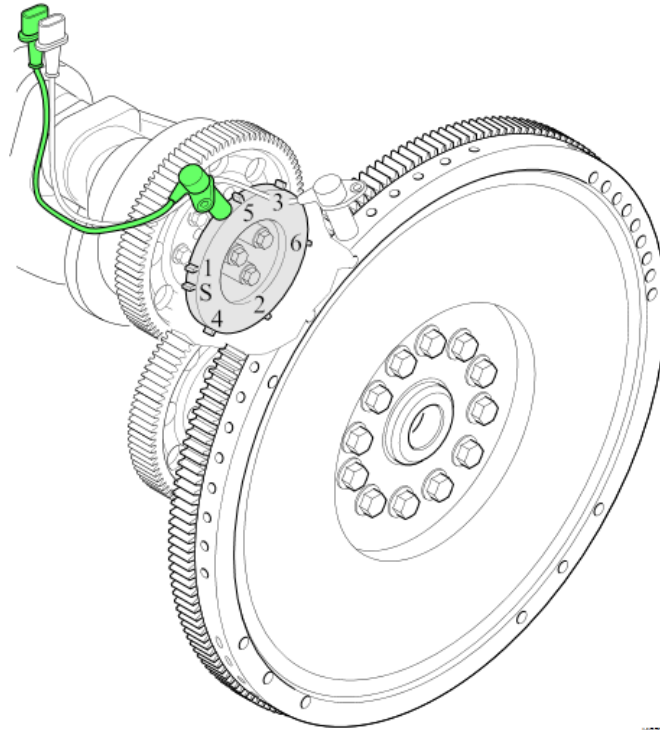
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Checking data, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

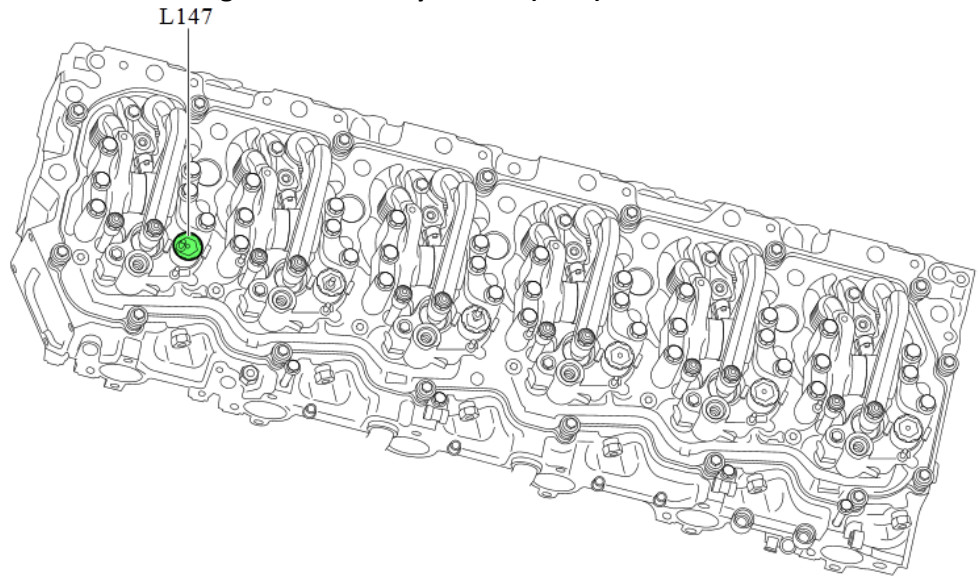


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

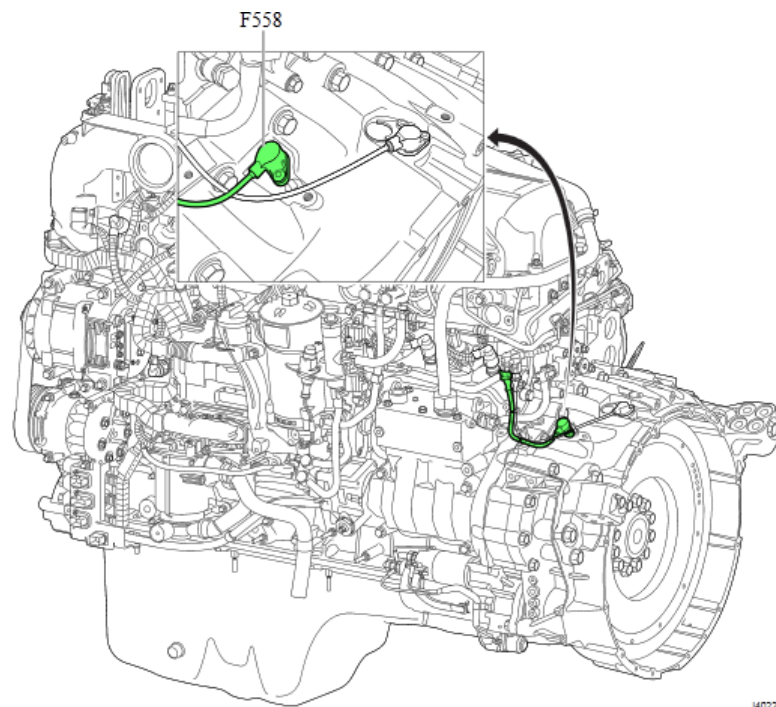
Solenoid valve engine brake MX cylinder 1 (L147)



i402185-2

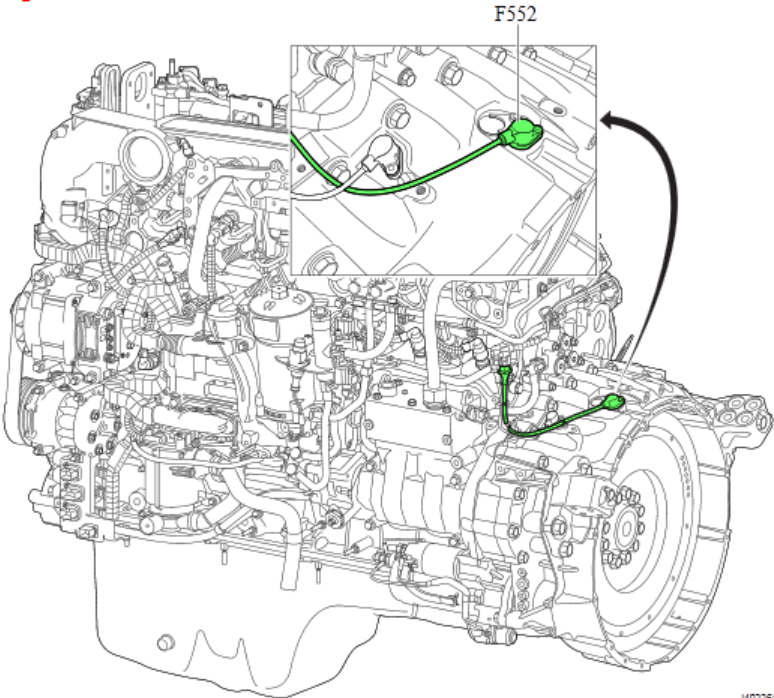
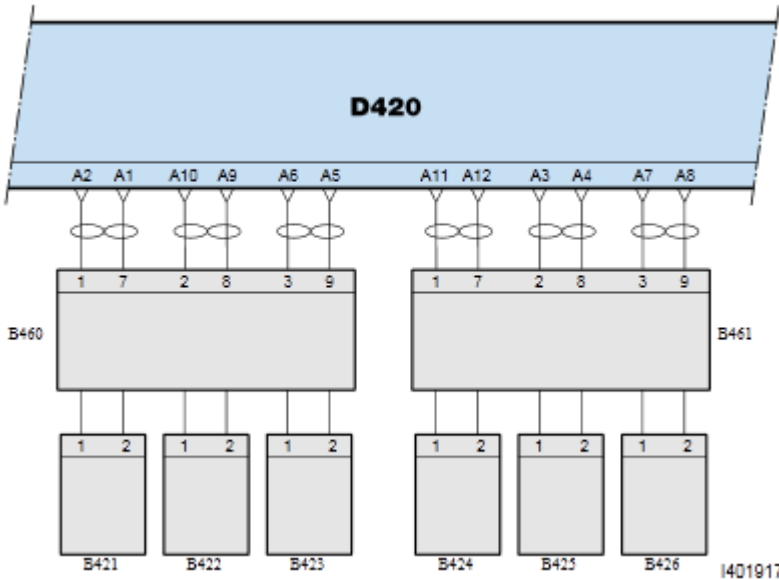
Checking data, camshaft sensor (F558)

MX_EPA13, MX-13



i402262

Crankshaft sensor (F552)

	<i>MX_EPA13, MX-13</i>  1402261
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that the combustion contribution of cylinder 3 is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  1401917 B460 connector cylinders 1-3 B461 connector cylinders 4-6

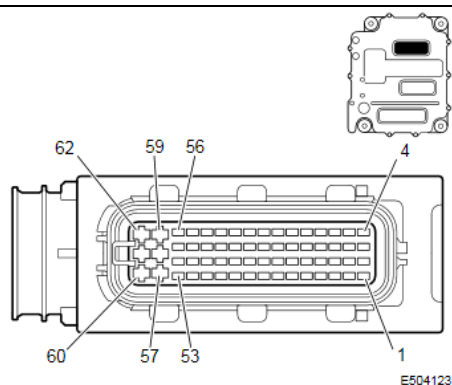
D420 PCI ECU
 B421 solenoid valve injector cylinder 1
 B422 solenoid valve injector cylinder 2
 B423 solenoid valve injector cylinder 3
 B424 solenoid valve injector cylinder 4
 B425 solenoid valve injector cylinder 5
 B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

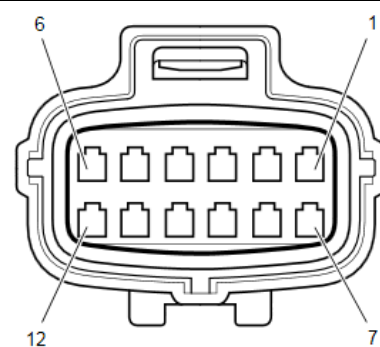
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

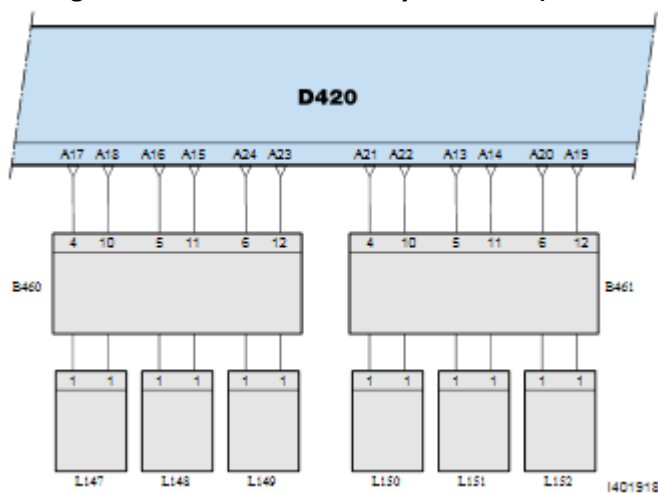


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

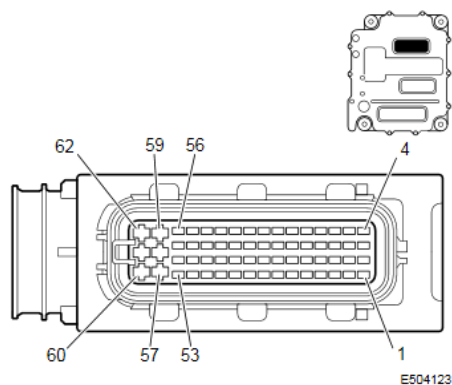
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

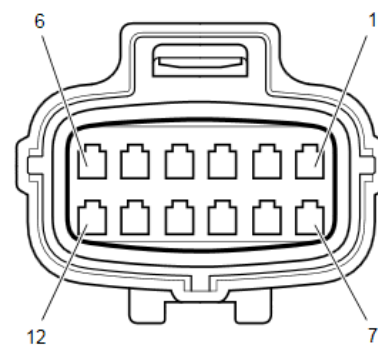
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

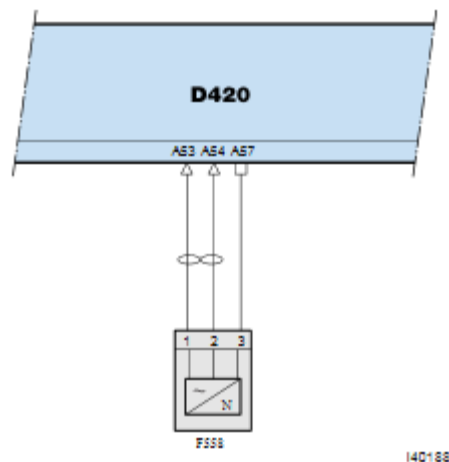


Wiring harness connector B460 & B461 front view



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

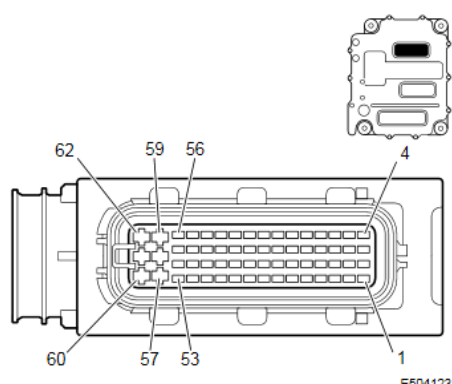
Checking data, camshaft sensor (F558)



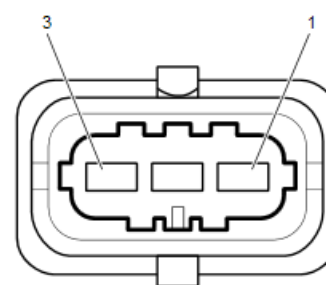
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

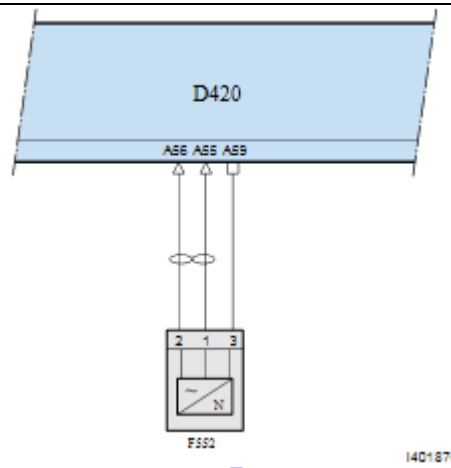


Component connector F558



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

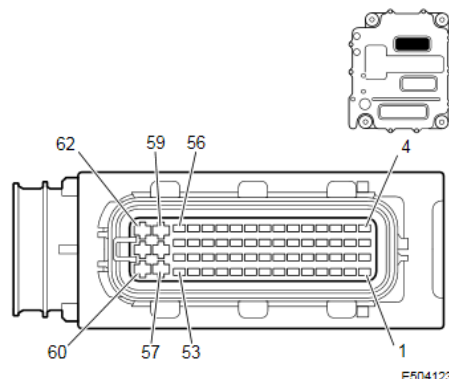
Checking data, crankshaft sensor (F552)



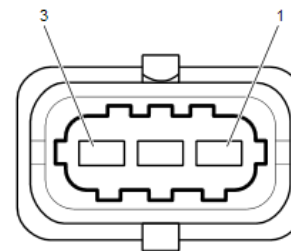
D420 PCI ECU

F552 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

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

6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

Component check, crankshaft sensor (F552)

Preparation

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

	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>± 1.5 V</td><td>Effective AC voltage (VAC) when engine starting.</td></tr><tr><td>± 4.9 V</td><td>Effective AC voltage (VAC) when engine idling.</td></tr><tr><td>± 8.0 V</td><td>Effective AC voltage (VAC) engine at 1200 rpm.</td></tr></table>	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.
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.												
Possible causes	- Faulty cylinder 3 injector (under-fueling) - Faulty MX Engine Brake cylinder 3 - Symptom: Slightly reduced power: - Incorrect valve clearance - Major imbalance in the drive shaft - Symptom: Engine block vibration at high load, damaged flywheel - Mechanical defect (for example damaged cam follower or broken valve)														
Additional information	- The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: - Cylinder-to-cylinder engine speed comparison, and - Cylinder-to-cylinder rotational crankshaft acceleration comparison - This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.														
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0269?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

If P0269 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.
If P0269 is active, go to Step 2.A.

If this code is still present, go to step 2.A

Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors	
Action	
1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 3, 5, and 6: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected - Battery not fully charged or contacts not tight	
Was there evidence of any of the above?	
Yes	No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.B	Go to step 2.B
Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)	
Action	
1. Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected	
Was there evidence of any of the above?	
Yes	No

	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.C	Go to step 2.C
	Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)	
	Action	
	1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 3.A	Go to step 3.A
	Step 3. Drivetrain Checks	
	Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)	
	 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
	Action	
	1. Confirm the resistance level as outlined in the corresponding checking data, " <u>Component check, crankshaft speed sensor (F552).</u> "	

	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Go to step 3.B	If this code is still present, go to step 3.B
	Step 3.B Visual inspection, crankshaft speed sensor (F552)	
	Action	
	- Referring to maintenance procedure, <u>“replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420</u>, remove the crankshaft sensor and visually inspect it for any of the following: - The correct parts are not installed - Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
Step 3.C Electrical checks, resistance, camshaft sensor (F558)		
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.		

	Action	
	1. Confirm the resistance level as outlined in the corresponding checking data, " <u>Component check, camshaft sensor (F558).</u> "	
	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Got to step 3.D	If this code is still present, go to step 3.D
	Step 3.D Visual inspection, camshaft sensor (F558)	
	Action	
	1. Referring to maintenance procedure, " <u>replace camshaft sensor (Sensors el. syst. eng.)," job ID 67579</u> , remove the crankshaft sensor and visually inspect it for any of the following:	
	• The correct parts are not installed • Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect camshaft sensor (F558).
	If this code is still present, go to step 3.E	Go to step 3.E
	Step 3.E Maintenance procedure, valve clearance	

Action

1. Check the valve clearance for cylinders 3, 5, and 6 as outlined in the maintenance procedure, "adjust valve clearance (Basic assy.), job ID - 66829."

Is the measured valve clearance for any of the cylinders outside of the specified range?

Yes

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 3), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1

4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 3, repeat step 4.A for cylinder 5.

If the problem has not been found after exchanging components for cylinder 5, repeat step 4.A for cylinder 6.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

If the problem moved with the injector, replace the injector.
 If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid.
 Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If all exchanges still result in P0269, there may be a possible issue with a cylinder or the flywheel.
 Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

Step 5. Repair Verification

Step 5.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 5.B

Go to step 5.B

Step 5.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 P0269 been cleared?

Yes

No

Problem resolved. No further actions.

Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.



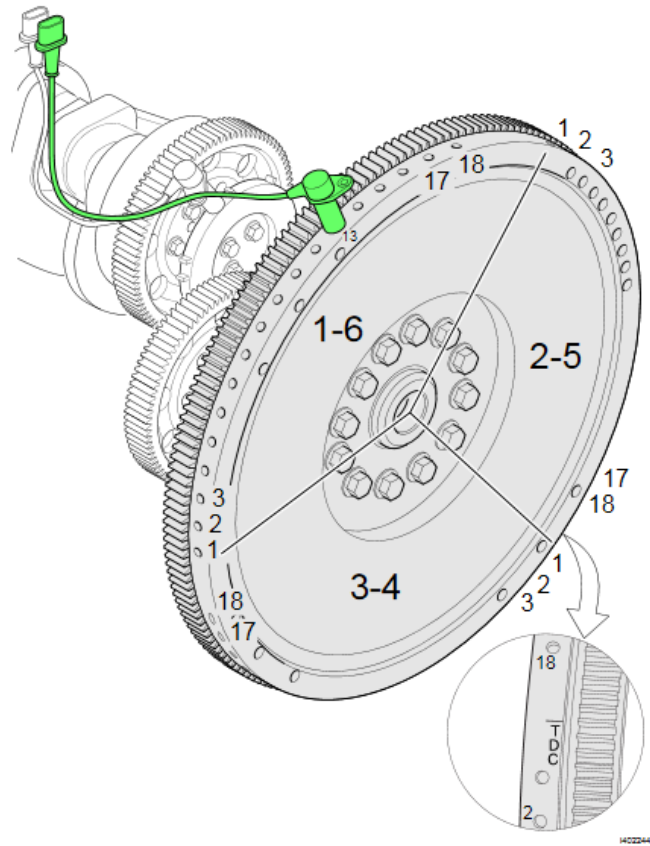
Contacting the PACCAR Engine Support Center

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

	Back to Index

P0272

Code number	P0272
Fault code description	Cylinder 4 - Torque contribution too low
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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. Description, crankshaft sensor (F552)



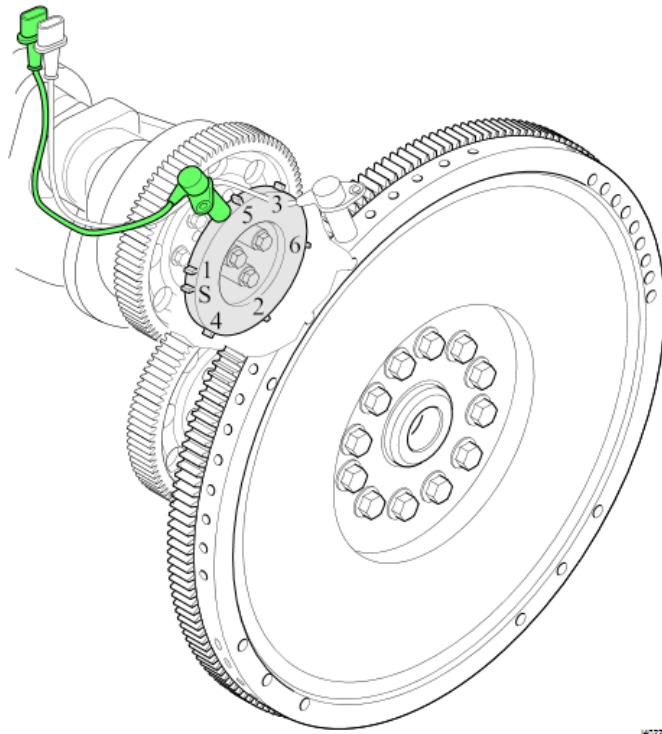
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Checking data, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.



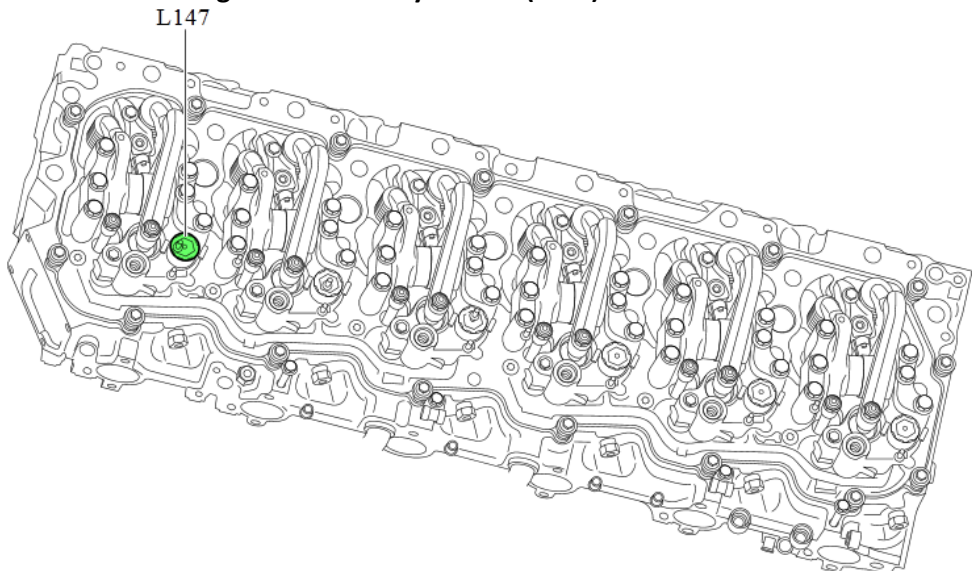
I402245

Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

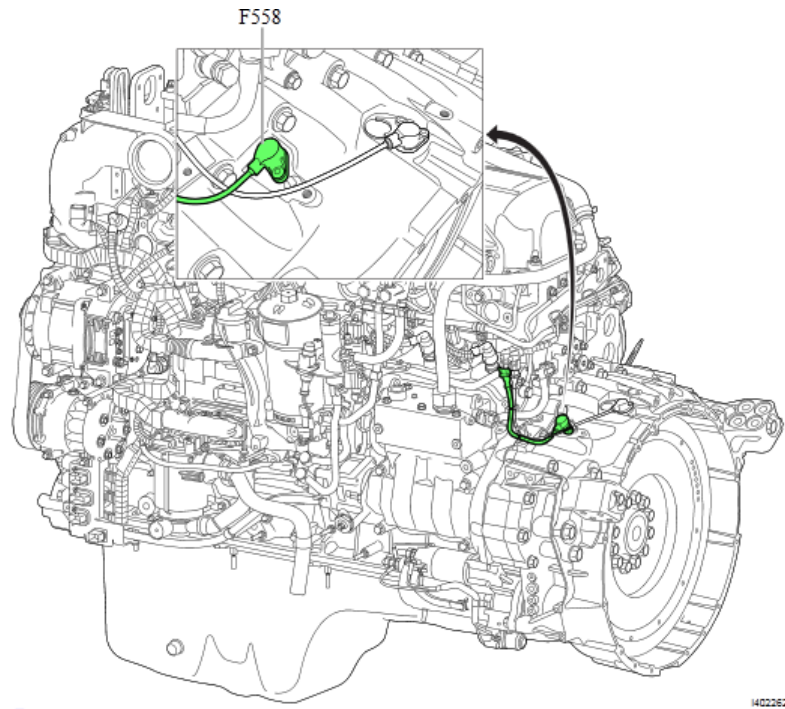
Solenoid valve engine brake MX cylinder 1 (L147)



I402185-2

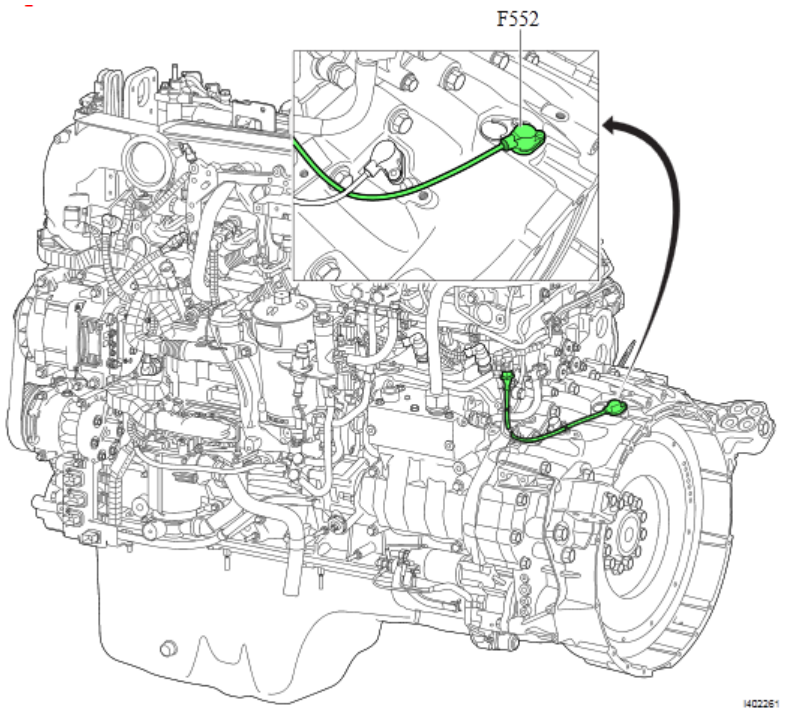
Checking data, camshaft sensor (F558)

MX_EPA13, MX-13



Crankshaft sensor (F552)

MX_EPA13, MX-13

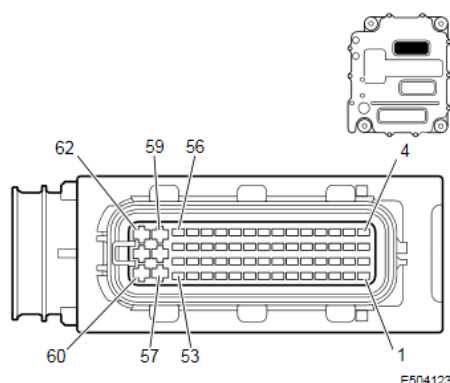


Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.																								
Set condition of fault code	The PCI ECU (D420) detects that the combustion contribution of cylinder 4 is lower relative to the other cylinders.																								
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.																								
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426) 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 I401917 <table><tr><th>D420</th><th>B460</th><th>B421</th><th>B422</th><th>B423</th><th>Function</th></tr><tr><td>A1</td><td>7</td><td>2</td><td></td><td></td><td>Signal low, injector solenoid valve cylinder 1</td></tr><tr><td>A2</td><td>1</td><td>1</td><td></td><td></td><td>Signal high, injector solenoid valve cylinder 1</td></tr><tr><td>A5</td><td>9</td><td></td><td></td><td>2</td><td>Signal low, injector solenoid valve</td></tr></table>	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
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																				

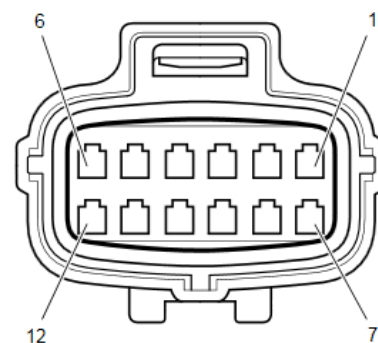
					cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve cylinder 2
A10	2		1		Signal high, injector solenoid valve cylinder 2

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

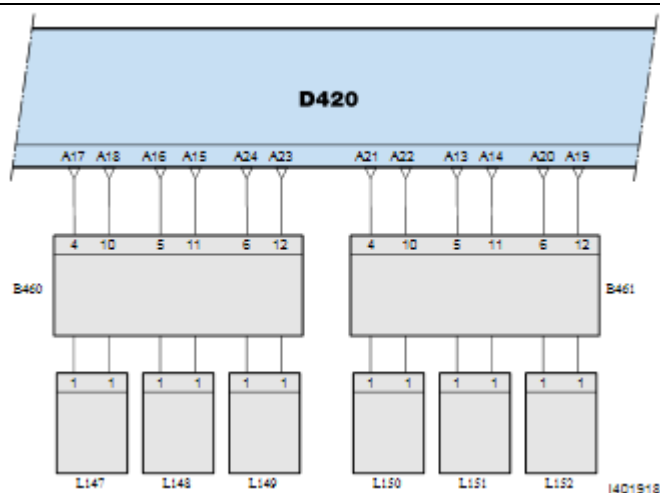


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

L152 MX Engine Brake solenoid valve cylinder 6

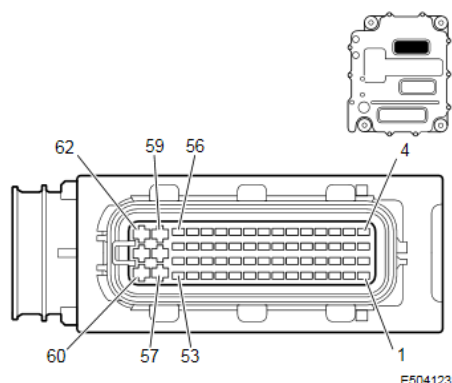
MX Engine Brakes cylinders 1–3

D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

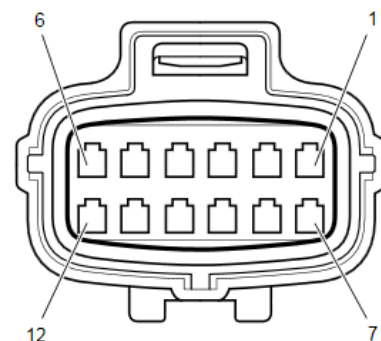
MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground

A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

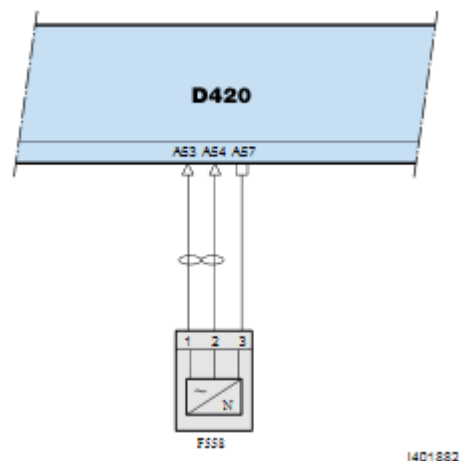


Wiring harness connector B460 & B461 front view



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

Checking data, camshaft sensor (F558)

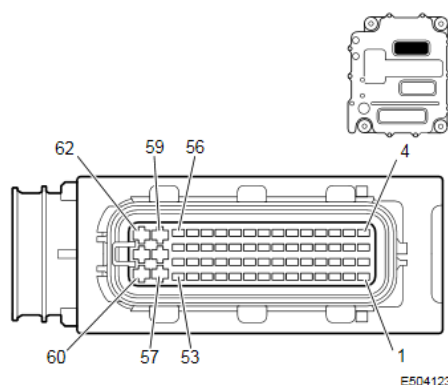


D420 PCI ECU

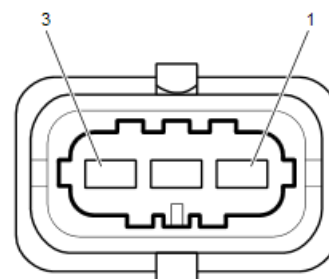
F558 camshaft sensor

D420	F558	Function

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



Wiring harness connector D420.A front view

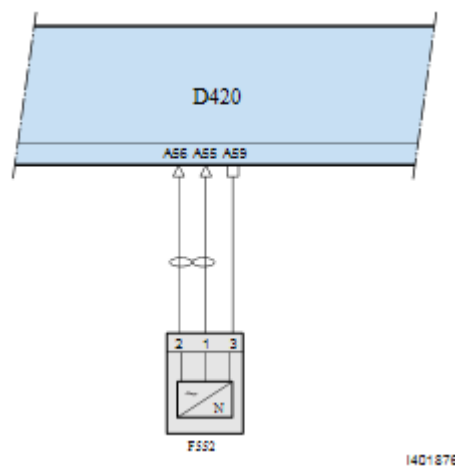


Component connector F558



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

Checking data, crankshaft sensor (F552)

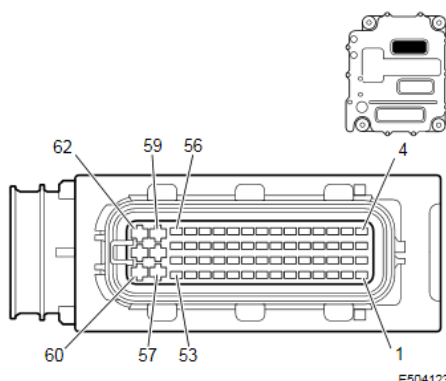


D420 PCI ECU

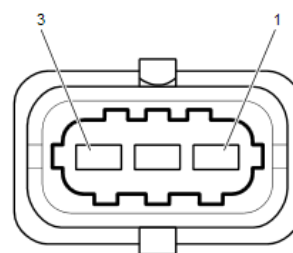
F558 camshaft sensor

D420	F552	Function

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

- Key of the ignition
- Disconnect connector B460
- Measure on the 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]



If a measurement directly on the injector connector is necessary, the valve cover must be removed. Consult the prescribed job.

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]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake

test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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.

Possible causes

- Faulty cylinder 4 injector (under-fueling)

	• Faulty MX Engine Brake cylinder 4 • Symptom: Slightly reduced power: ○ Incorrect valve clearance ○ Major imbalance in the drive shaft • Symptom: Engine block vibration at high load, damaged flywheel • Mechanical defect (for example damaged cam follower or broken valve)		
Additional information	• The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: ○ Cylinder-to-cylinder engine speed comparison, and ○ Cylinder-to-cylinder rotational crankshaft acceleration comparison • This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.		
Diagnostic Step-by-Step	 The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to the components.  ▪ This troubleshooting procedure is based on the assumption that supply power and ground to the PCI are functioning properly. ▪ Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. ▪ Specific electrical component information and pin out locations are provided in this procedure as a reference only. Always refer to the technical data sections in Rapido for the most up-to-date changes. ▪ It is necessary to use DAVIE to clear all current DTCs from the PCI and EAS-3 ECUs, and then run the Quick Check to identify a change in fault status. ▪ This DTC can be set as a result of multiple failure modes. For proper fault isolation, complete all troubleshooting steps in the sequence provided. Step 1 Investigate Related DTCs Before troubleshooting this DTC, take notice of any other active or inactive DTCs. One or multiple other DTCs could have been the cause for this DTC. <table><tr><td>Step 1A Investigate related DTCs</td></tr><tr><td> Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs. </td></tr></table>	Step 1A Investigate related DTCs	Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.
Step 1A Investigate related DTCs			
Action 1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs.			

	Are these or any other related DTCs active? P0087, P1087, P228D, P0093, P0094, P1086	
	Yes	No
	Refer to the troubleshooting information for these DTCs before continuing with this procedure.	Go to step 1B
	Step 1B Investigate related DTCs	
	Action	
	1. Refer to the current DTCs obtained in step 1A.	
	Are any of these related DTCs inactive AND did they occur before P0272? P0087, P1087, P228D, P0093, P0094, P1086	
	Yes	No
	If P0272 is inactive, refer to step 5A to determine whether this was just a temporary occurrence. If P0272 is active, go to step 2A.	
	If this DTC is still present, go to step 2A	Go to step 2A
Step 2 Quick Checks		
	Step 2A Visual inspection, connections and wiring, fuel injectors	
	Action	
	1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 2, and 4:	
	- Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - The correct parts are not installed - ECU connections are damaged or disconnected	

- Battery not fully charged or contacts not tight

Was there evidence of any of the above?

Yes

No

Correct any issues found.
Refer to step 5A to perform the
corresponding repair verification cycles
and rechecks.

If this DTC is still present, go to step 2B

Go to step 2B

Step 2B Visual inspection, wiring and connections, crankshaft speed sensor (F552)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - ECU connections are damaged or disconnected

Was there evidence of any of the above?

Yes

No

Correct any issues found.
Refer to step 5A to perform the
corresponding repair verification cycles
and rechecks.

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

Go to step 2C

Step 2C Visual inspection, wiring and connections, camshaft sensor (F558)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - ECU connections are damaged or disconnected

Was there evidence of any of the above?

Yes

No

Correct any issues found.
Refer to step 5A to perform the corresponding repair verification cycles and rechecks.

If this DTC is still present, go to step 3A

Go to step 3A

Step 3 Drivetrain Checks

Step 3A Electrical checks, resistance, crankshaft speed sensor (F552)



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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, "Component check, crankshaft speed sensor (F552)."

Are measured values within expected range?

Yes

No

Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to step 5A to perform the corresponding repair verification cycles and rechecks.

	Go to step 3B		If this DTC is still present, go to step 3B	
	Step 3B Visual inspection, crankshaft speed sensor (F552)			
	Action			
	1. Referring to maintenance procedure, “replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following:			
	- The correct parts are not installed - Sensor tip is damaged			
	Was there evidence of any of the above?			
	Yes		No	
	Replace crankshaft speed sensor (F552). Refer to step 5A to perform the corresponding repair verification cycles and rechecks.		Reinstall and reconnect crankshaft speed sensor (F552).	
	If this DTC is still present, go to step 3C		Go to step 3C	
Step 3C Electrical checks, resistance, camshaft sensor (F558)				
 Refer to the corresponding checking data for associated supply and signal voltages, resistance values, and related connector pin test points.				
Action				
1. Confirm the resistance level as outlined in the corresponding checking data, “Component check, camshaft sensor (F558).”				
Are measured values within expected range?				
Yes		No		
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to step 5A to perform the corresponding repair verification cycles		

		and rechecks.
	Got to step 3D	If this DTC is still present, go to step 3D
	Step 3D Visual inspection, camshaft sensor (F558)	
	Action	
	1. Referring to maintenance procedure, “ <u>replace camshaft sensor (Sensors el. syst. eng.), job ID 67579</u> ”, remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace camshaft sensor (F558). Refer to step 5A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect camshaft sensor (F558).
	If this DTC is still present, go to step 3E	Go to step 3E
	Step 3E Maintenance procedure, valve clearance	
	Action	
	1. Check the valve clearance for cylinders 1, 2, and 4 as outlined in the maintenance procedure, “ <u>adjust valve clearance (Basic assy.), job ID - 66829.</u> ”	
	Is the measured valve clearance for any of the cylinders outside of the specified range?	
	Yes	No
	Correct any issues found in the valve train assembly and adjust the valve clearance as specified. Refer to step 5A to perform the corresponding repair verification cycles and rechecks.	

If this DTC is still present, go to step 4A

Go to step 4A

Step 4 Fuel System Checks

Step 4A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID DTCs can result from variations in engine speed. A DTC reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current DTC (cylinder 4), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting DTC(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 4, repeat step 4.A for cylinder 1.

If the problem has not been found after exchanging components for cylinder

	1, repeat step 4.A for cylinder 2.	
	Did the problem reported through DAVIE move to the new cylinder location?	
	Yes	No
	If the problem moved with the injector, replace the injector. If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid. Refer to step 5A to perform the corresponding repair verification cycles and rechecks.	If all exchanges still result in P0272, there may be a possible issue with a cylinder or the flywheel. Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.
	If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	
	Step 5 Repair Verification	
	Step 5A Repair verification cycles	
	Perform these repair verification cycles following any corrective actions taken, to enable related OBD monitors to reach a readiness state associated with the DTC or system being investigated.	
	 Before beginning these repair verification cycles, use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.	
	Action	
	1. Start-up With the brakes set, start the engine and allow it to run at idle for 2 minutes.	
	Were the identified repair verification cycles able to be completed?	
	Yes	No
		Investigate and correct any issues preventing these repair verification cycles from being completed, then re-run. For additional assistance, contact the PACCAR Engine Support Center.

	Go to step 5B		Go to step 5B	
	Step 5B DAVIE Diagnostics, Quick Check			
	Action			
	1. Use DAVIE Diagnostics to perform a Quick Check for current DTCs to determine whether the actions taken have cleared this DTC.			
	Has P0272 been cleared?			
	Yes		No	
	Problem resolved. No further actions.		Continue with the next step in this troubleshooting procedure. If all steps have been completed and this DTC is still present, contact the PACCAR Engine Support Center for further assistance.	
	 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.			
Back to Index				

P0273

Code number	P0273
Fault code description	Cylinder 5: Injector spill valve low side short circuit to ground Injector solenoid valve cylinder 5 – Voltage too low or short circuit to ground
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

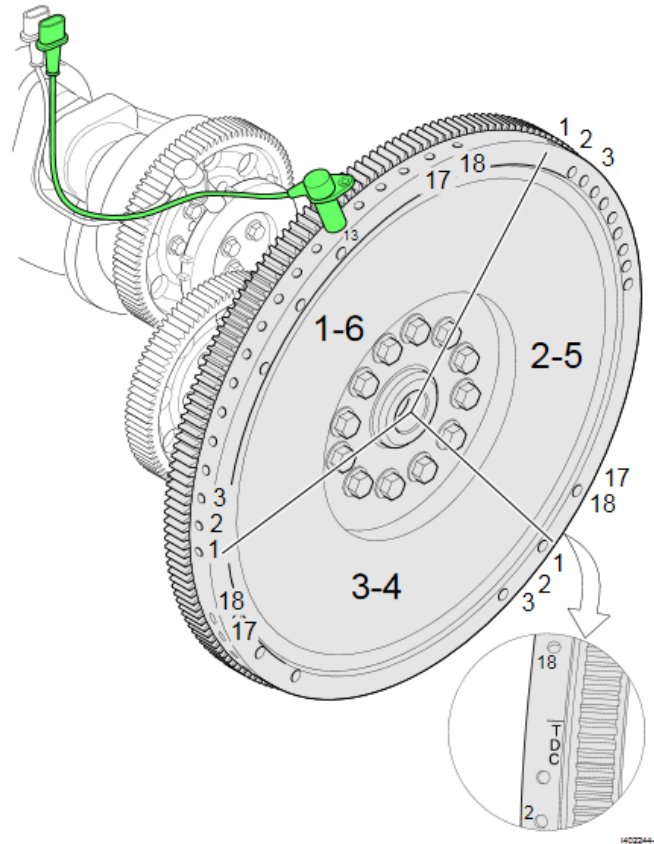
P0274

Code number	P0274
Fault code description	Cylinder 5: Injector spill valve low side short circuit to battery voltage Common rail pump unit2 – Voltage too high or short circuit to supply on ECU D420 pin A28
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P0275

Code number	P0275
Fault code description	Decrease in combustion in cylinder 5 relative to the others without causing complete failure
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



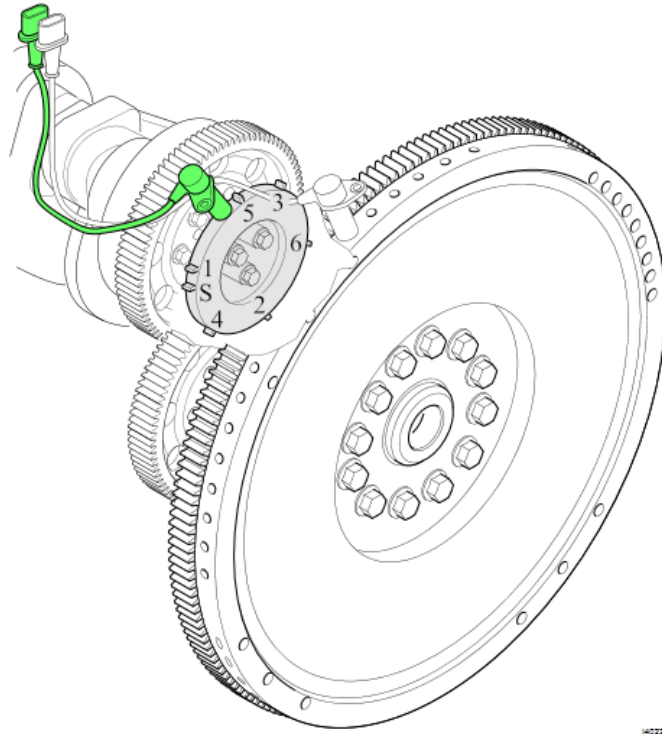
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Checking data, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

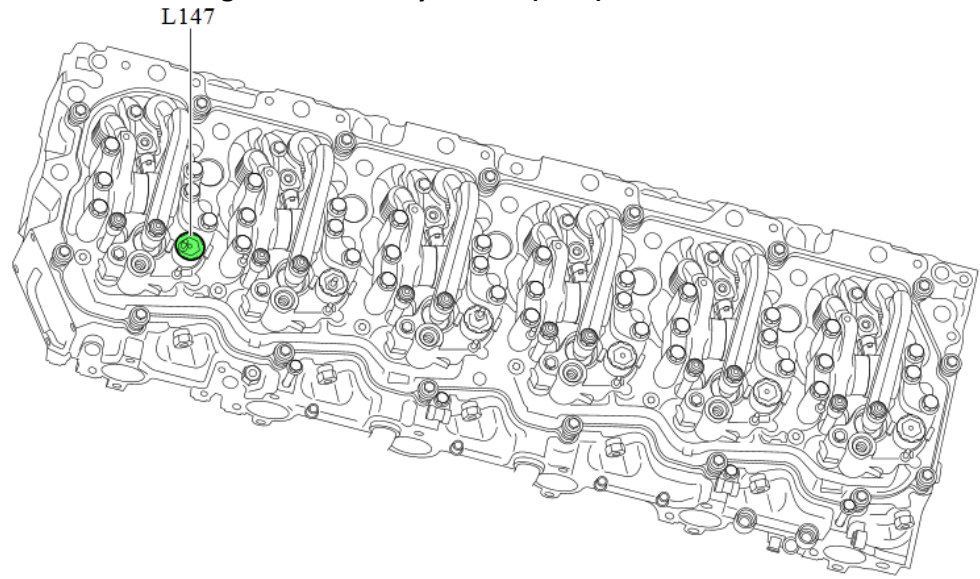


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

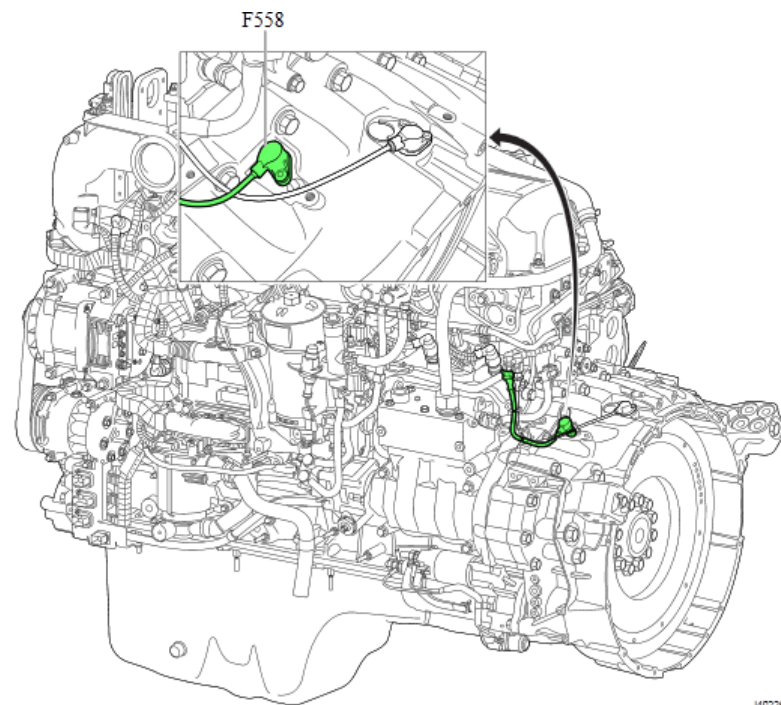
Solenoid valve engine brake MX cylinder 1 (L147)



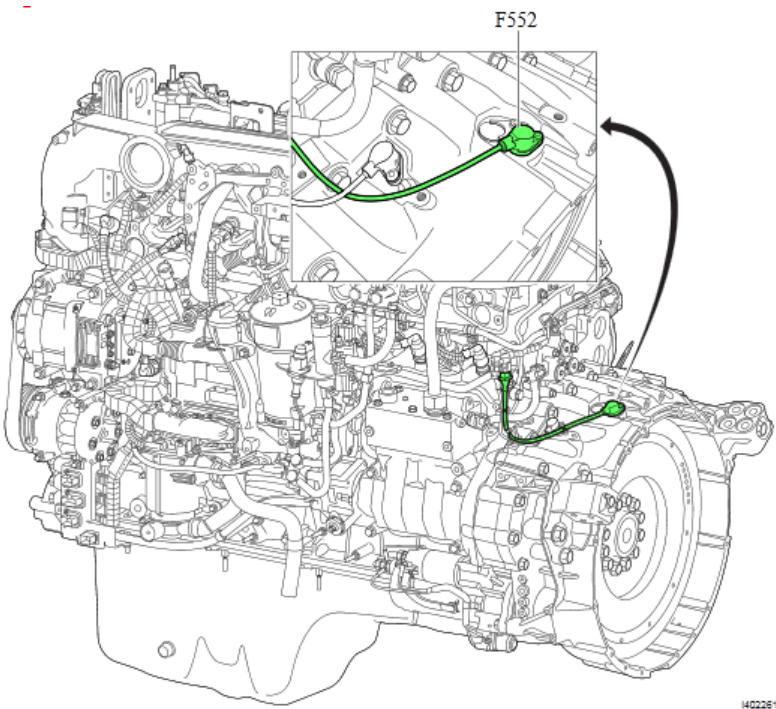
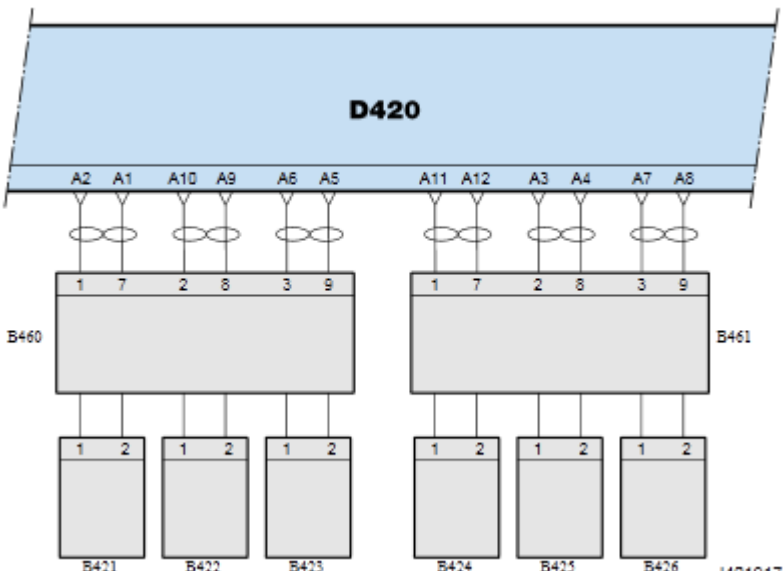
i402185-2

Checking data, camshaft sensor (F558)

MX_EPA13, MX-13



i402262

	Crankshaft sensor (F552) <i>MX_EPA13, MX-13</i>  1402261
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that the combustion contribution of cylinder 5 is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  1401917 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

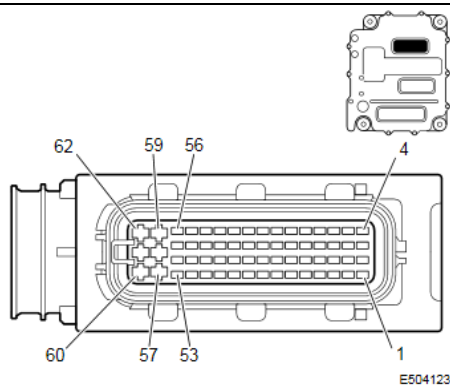
B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

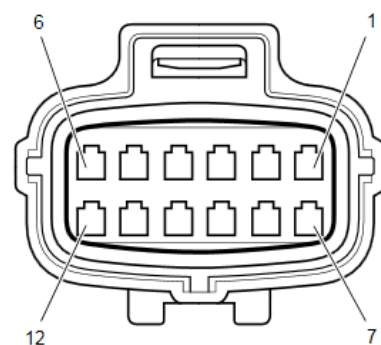
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

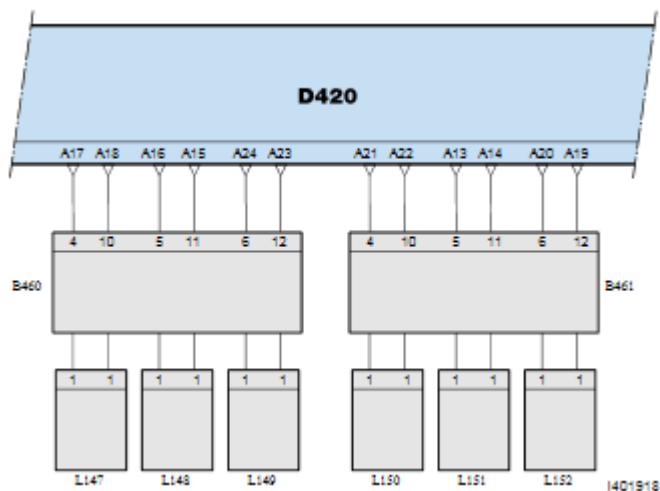


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

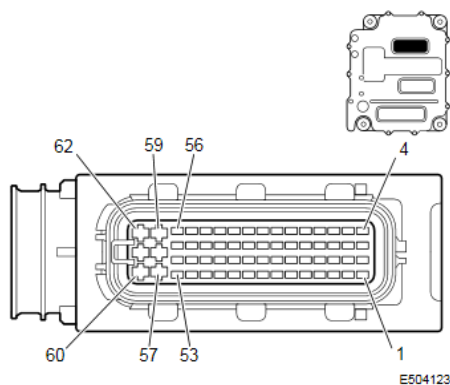
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

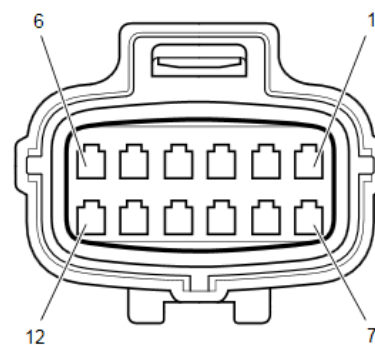
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

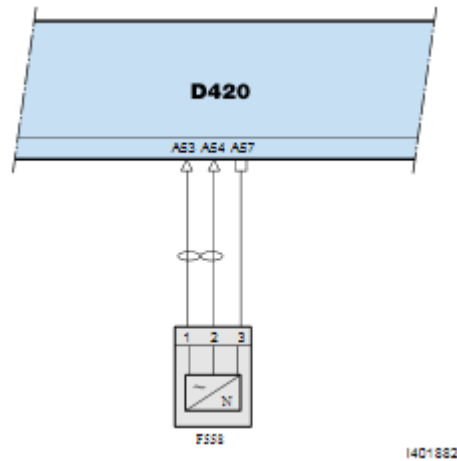


Wiring harness connector B460 & B461 front view



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

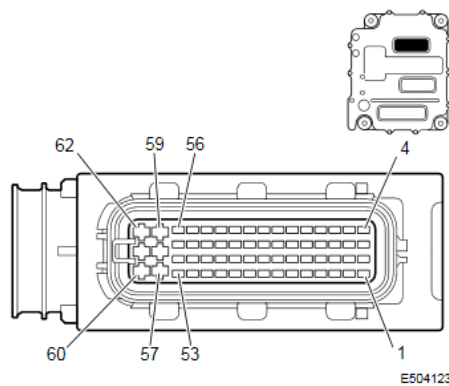
Checking data, camshaft sensor (F558)



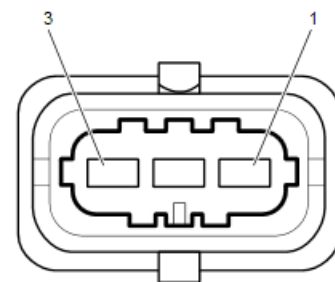
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

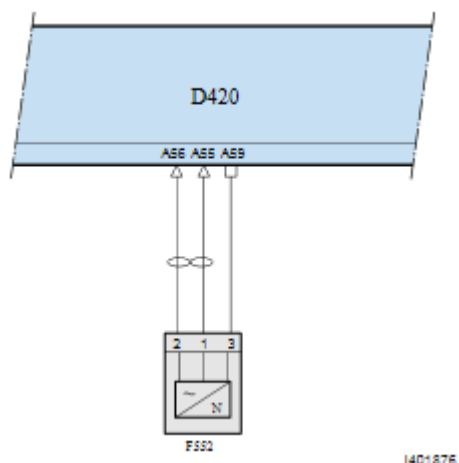


Component connector F558



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

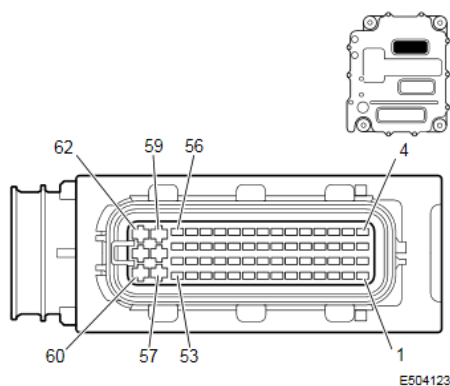
Checking data, crankshaft sensor (F552)



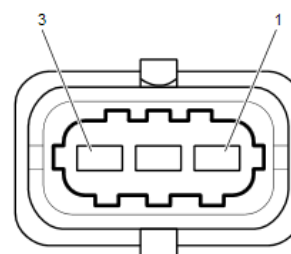
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

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

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum	Resistance value at 120°C [248°F]

		0.94 Ω	



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

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

4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake

test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

	Component check, crankshaft sensor (F552) Preparation • Key off the ignition. • Disconnect connector F552 • Measure on component connector F552. <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>± 1.5 V</td><td>Effective AC voltage (VAC) when engine starting.</td></tr><tr><td>± 4.9 V</td><td>Effective AC voltage (VAC) when engine idling.</td></tr><tr><td>± 8.0 V</td><td>Effective AC voltage (VAC) engine at 1200 rpm.</td></tr></table>	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.
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.												
Possible causes	• Faulty cylinder 5 injector (under-fueling) • Faulty MX Engine Brake cylinder 5 • Symptom: Slightly reduced power: • Incorrect valve clearance • Major imbalance in the drive shaft • Symptom: Engine block vibration at high load, damaged flywheel • Mechanical defect (for example damaged cam follower or broken valve)														
Additional information	• The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: • Cylinder-to-cylinder engine speed comparison, and • Cylinder-to-cylinder rotational crankshaft acceleration comparison • This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.														
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0275?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

	If P0275 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence. If P0275 is active, go to Step 2.A.	
	If this code is still present, go to step 2.A	Go to step 2.A
Step 2. Quick Checks		
Step 2.A Visual inspection, connections and wiring, fuel injectors		
Action 1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 3, and 5: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight		
Was there evidence of any of the above?		
Yes		No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		
If this code is still present, go to step 2.B		Go to step 2.B
Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)		

	Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected	
Was there evidence of any of the above?		
Yes		No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		
If this code is still present, go to step 2.C		Go to step 2.C

Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)		
Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected		
Was there evidence of any of the above?		
Yes		No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		

If this code is still present, go to step 3.A	Go to step 3.A
Step 3. Drivetrain Checks	
Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)	
i Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, crankshaft speed sensor (F552).”</u>	
Are measured values within expected range?	
Yes	No
	Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
Go to step 3.B	If this code is still present, go to step 3.B
Step 3.B Visual inspection, crankshaft speed sensor (F552)	
Action 1. Referring to maintenance procedure, <u>“replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420</u>, remove the crankshaft sensor and visually inspect it for any of the following: - The correct parts are not installed - Sensor tip is damaged	
Was there evidence of any of the above?	
Yes	No

	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
Step 3.C Electrical checks, resistance, camshaft sensor (F558)		
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.		
Action 1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, camshaft sensor (F558).”</u>		
Are measured values within expected range?		
Yes		No
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
Got to step 3.D		If this code is still present, go to step 3.D
Step 3.D Visual inspection, camshaft sensor (F558)		
Action 1. Referring to maintenance procedure, <u>“replace camshaft sensor (Sensors el. syst. eng.),”</u> job ID 67579, remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged		

	Was there evidence of any of the above?	
	Yes	No
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect camshaft sensor (F558).
	If this code is still present, go to step 3.E	Go to step 3.E
	Step 3.E Maintenance procedure, valve clearance	
	Action	
	1. Check the valve clearance for cylinders 1, 3, and 5 as outlined in the maintenance procedure, " <u>adjust valve clearance (Basic assy.), job ID - 66829.</u> "	
	Is the measured valve clearance for any of the cylinders outside of the specified range?	
	Yes	No
	Correct any issues found in the valve train assembly and adjust the valve clearance as specified. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 4.A	Go to step 4.A
	Step 4. Fuel System Checks	
	Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid	
	 CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.	

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 5), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 5, repeat step 4.A for cylinder 1.

If the problem has not been found after exchanging components for cylinder 1, repeat step 4.A for cylinder 3.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

No

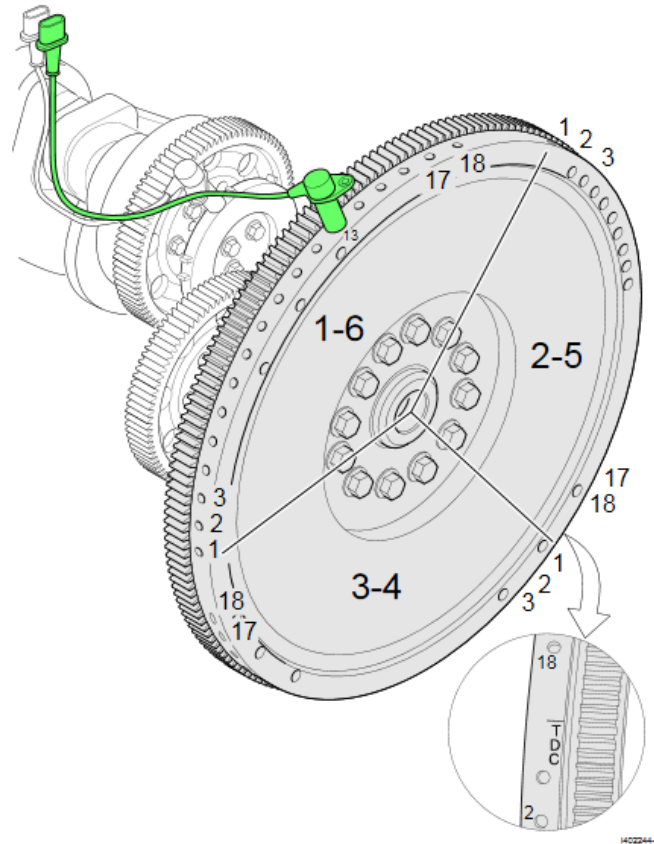
	If the problem moved with the injector, replace the injector. If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	If all exchanges still result in P0275, there may be a possible issue with a cylinder or the flywheel. Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.
	If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	
Step 5. Repair Verification		
Step 5.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 5.B		Go to step 5.B
Step 5.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 P0275 been cleared?	
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
	 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.	
	Back to Index	

P0278

Code number	P0278
Fault code description	Decrease in combustion in cylinder 6 relative to the others without causing complete failure
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



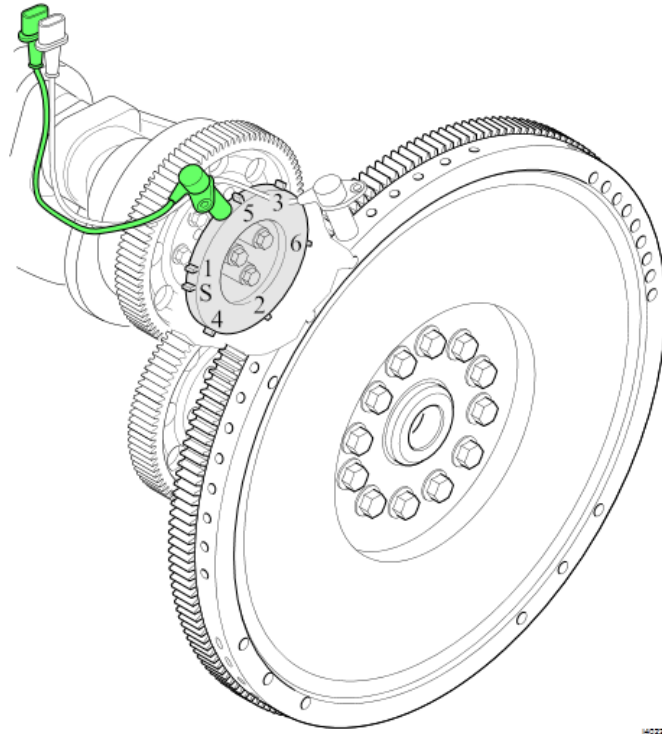
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Checking data, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

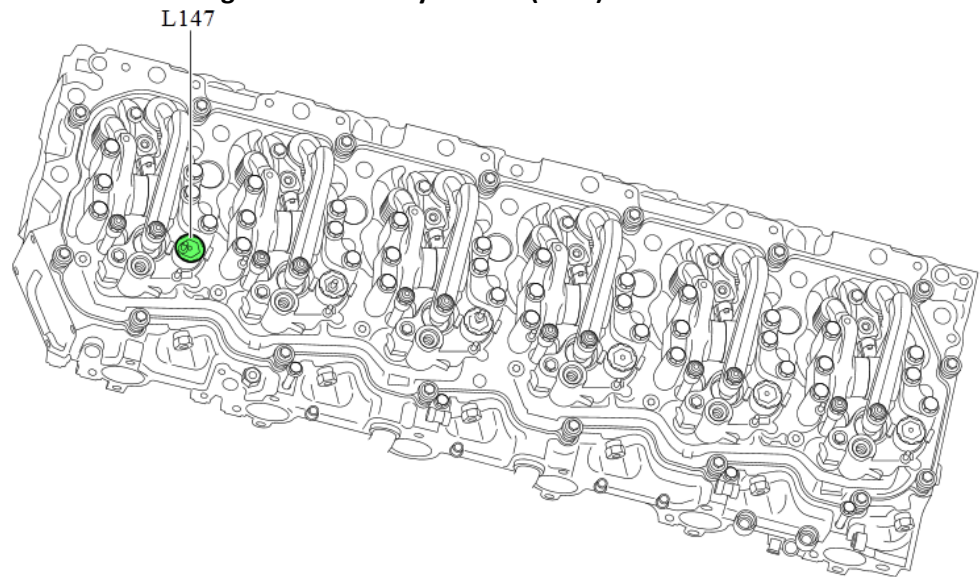


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

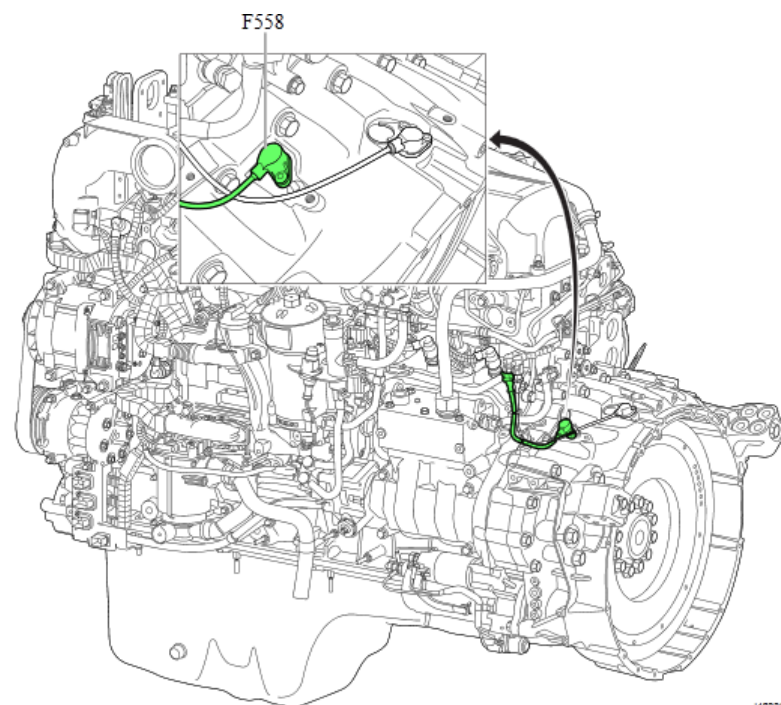
Solenoid valve engine brake MX cylinder 1 (L147)



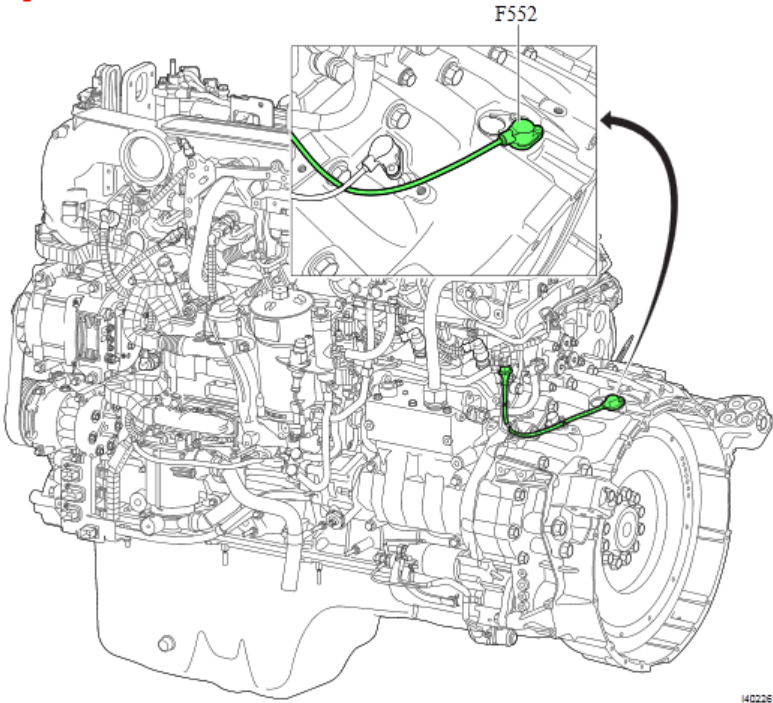
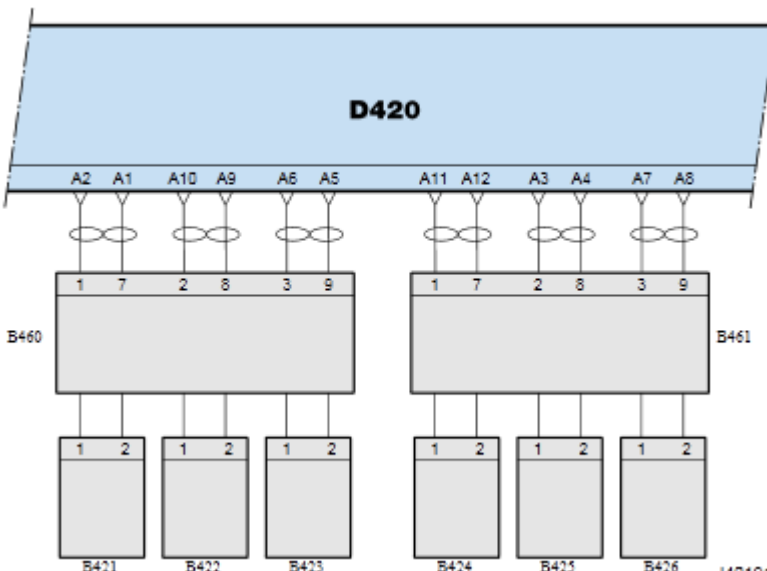
i402185-2

Checking data, camshaft sensor (F558)

MX_EPA13, MX-13



i402262

	Crankshaft sensor (F552) <i>MX_EPA13, MX-13</i> 
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that the combustion contribution of cylinder 6 is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  B460 connector cylinders 1-3

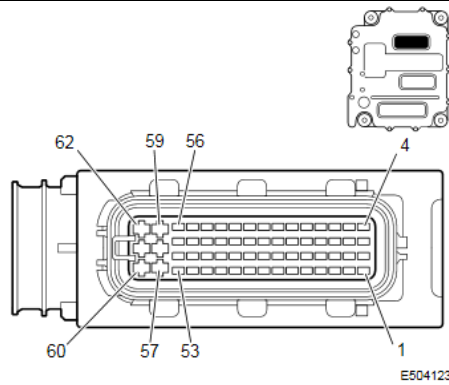
B461 connector cylinders 4-6
 D420 PCI ECU
 B421 solenoid valve injector cylinder 1
 B422 solenoid valve injector cylinder 2
 B423 solenoid valve injector cylinder 3
 B424 solenoid valve injector cylinder 4
 B425 solenoid valve injector cylinder 5
 B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

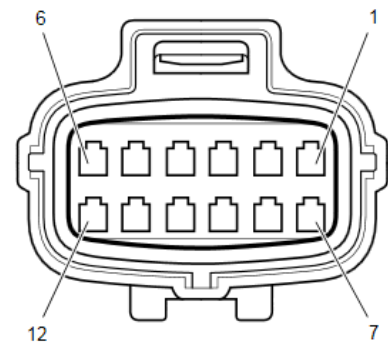
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

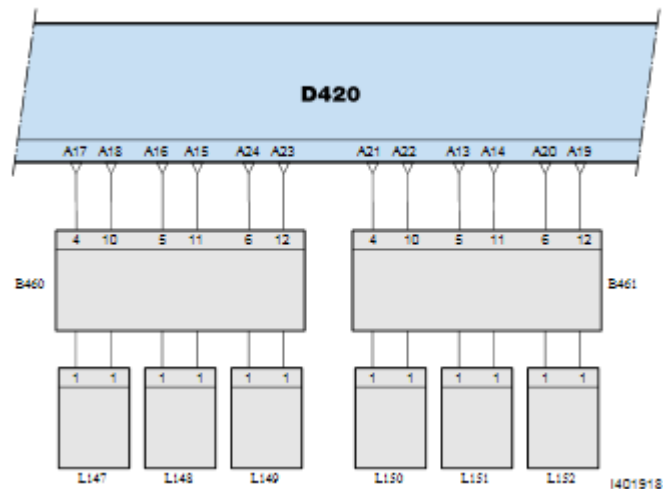


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

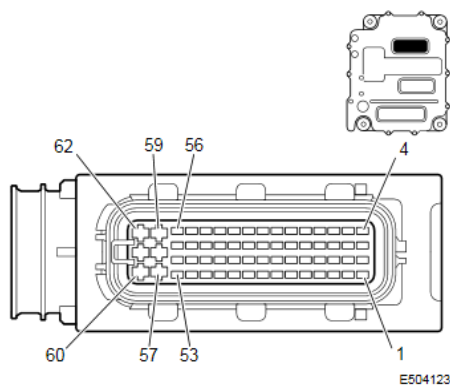
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

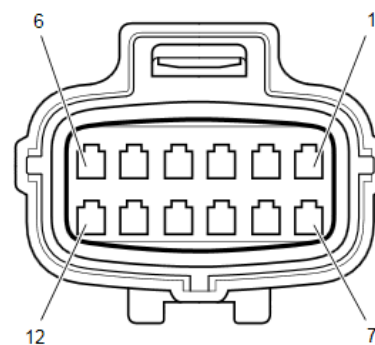
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

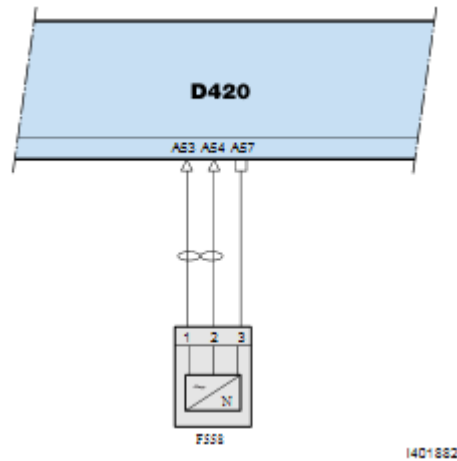


Wiring harness connector B460 & B461 front view



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

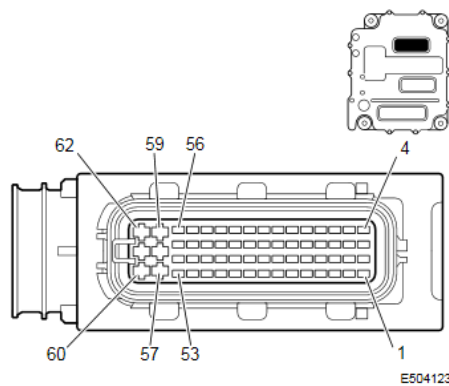
Checking data, camshaft sensor (F558)



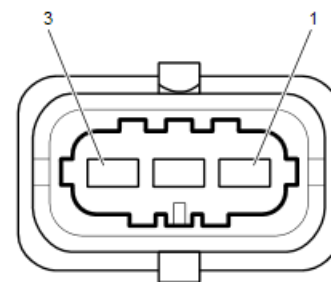
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

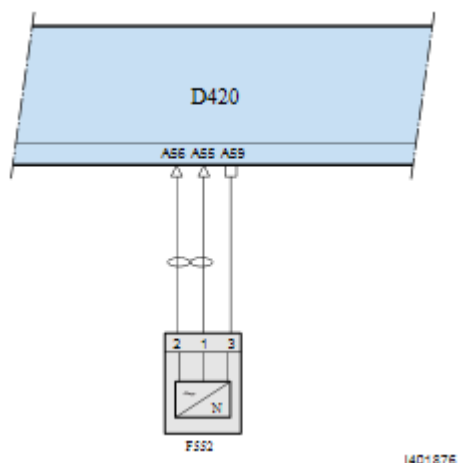


Component connector F558



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

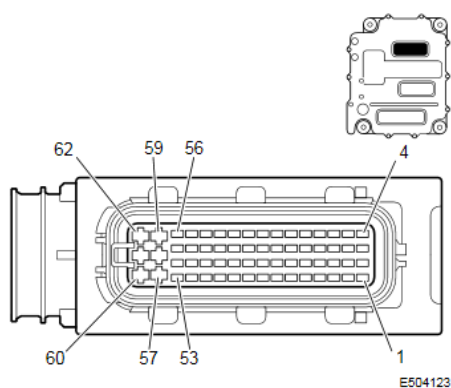
Checking data, crankshaft sensor (F552)



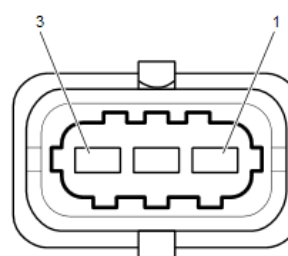
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

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

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum	Resistance value at 120°C [248°F]

		0.94 Ω	



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

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

4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.

		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.	
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.
Possible causes	• Faulty cylinder 6 injector (under-fueling) • Faulty MX Engine Brake cylinder 6 • Symptom: Slightly reduced power: • Incorrect valve clearance • Major imbalance in the drive shaft • Symptom: Engine block vibration at high load, damaged flywheel • Mechanical defect (for example damaged cam follower or broken valve)			
Additional information	• The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: • Cylinder-to-cylinder engine speed comparison, and • Cylinder-to-cylinder rotational crankshaft acceleration comparison • This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.			
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0278?

P0087, P1087, P228D, P0093, P0094, P1086

	Yes		No	
	If P0278 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.			
	If P0278 is active, go to Step 2.A.			
	If this code is still present, go to step 2.A		Go to step 2.A	
	Step 2. Quick Checks			
	Step 2.A Visual inspection, connections and wiring, fuel injectors			
	Action			
	1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 2, 3, and 6:			
	• Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight			
	Was there evidence of any of the above?			
	Yes		No	
	Correct any issues found.			
	Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.			
If this code is still present, go to step 2.B		Go to step 2.B		
Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)				

	Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected	
Was there evidence of any of the above?		
Yes		No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		
If this code is still present, go to step 2.C		Go to step 2.C

Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)		
Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected		
Was there evidence of any of the above?		
Yes		No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		

If this code is still present, go to step 3.A	Go to step 3.A
Step 3. Drivetrain Checks	
Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)	
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
Action 1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, crankshaft speed sensor (F552).”</u>	
Are measured values within expected range?	
Yes	No
	Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
Go to step 3.B	If this code is still present, go to step 3.B
Step 3.B Visual inspection, crankshaft speed sensor (F552)	
Action 1. Referring to maintenance procedure, <u>“replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420</u>, remove the crankshaft sensor and visually inspect it for any of the following: - The correct parts are not installed - Sensor tip is damaged	
Was there evidence of any of the above?	
Yes	No

	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
Step 3.C Electrical checks, resistance, camshaft sensor (F558)		
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.		
Action 1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, camshaft sensor (F558).”</u>		
Are measured values within expected range?		
Yes		No
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
Got to step 3.D		If this code is still present, go to step 3.D
Step 3.D Visual inspection, camshaft sensor (F558)		
Action 1. Referring to maintenance procedure, <u>“replace camshaft sensor (Sensors el. syst. eng.),”</u> job ID 67579, remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged		

Was there evidence of any of the above?	
Yes	No
Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect camshaft sensor (F558).
If this code is still present, go to step 3.E	Go to step 3.E
Step 3.E Maintenance procedure, valve clearance	
Action	
1. Check the valve clearance for cylinders 2, 3, and 6 as outlined in the maintenance procedure, " <u>adjust valve clearance (Basic assy.), job ID - 66829.</u> "	
Is the measured valve clearance for any of the cylinders outside of the specified range?	
Yes	No
Correct any issues found in the valve train assembly and adjust the valve clearance as specified. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 4.A	Go to step 4.A
Step 4. Fuel System Checks	
Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid	
 CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.	

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 6), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 6, repeat step 4.A for cylinder 3.

If the problem has not been found after exchanging components for cylinder 3, repeat step 4.A for cylinder 2.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

No

	If the problem moved with the injector, replace the injector. If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	If all exchanges still result in P0278, there may be a possible issue with a cylinder or the flywheel. Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.
	If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	
Step 5. Repair Verification		
Step 5.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 5.B		Go to step 5.B
Step 5.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 P0278 been cleared?	
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
	 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.	
	Back to Index	

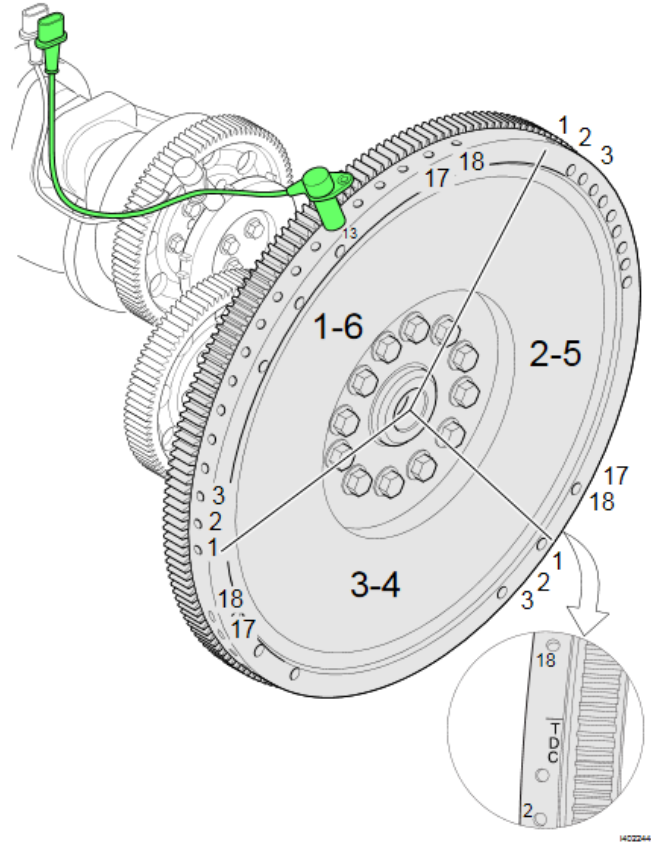
P0298

Code number	P0298
Fault code description	Oil temperature too high warning level
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P0301

Code number	P0301
Fault code description	Major decrease in combustion in cylinder 1 relative to the others.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



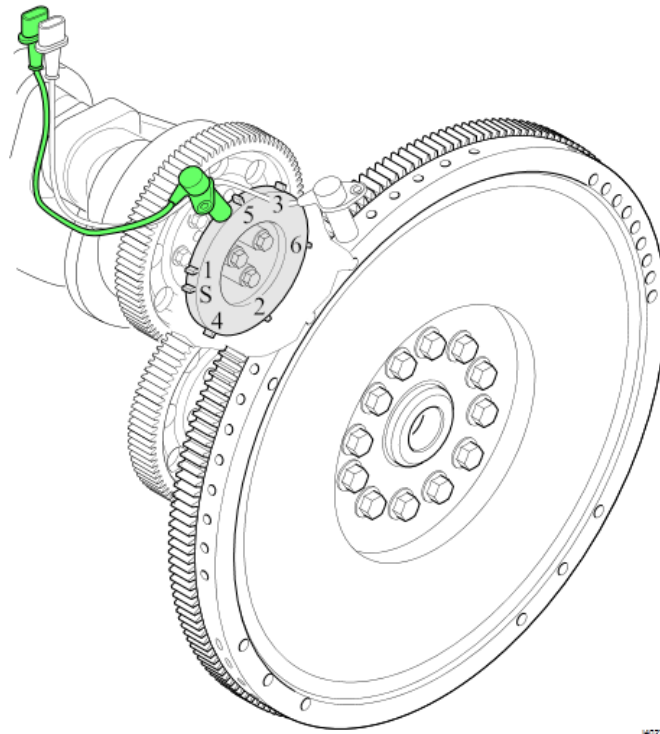
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

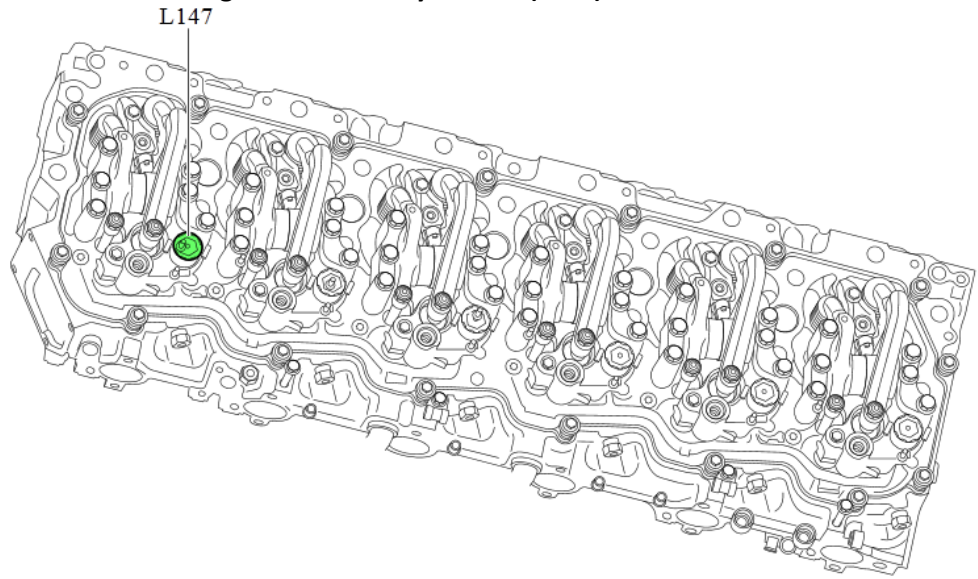


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

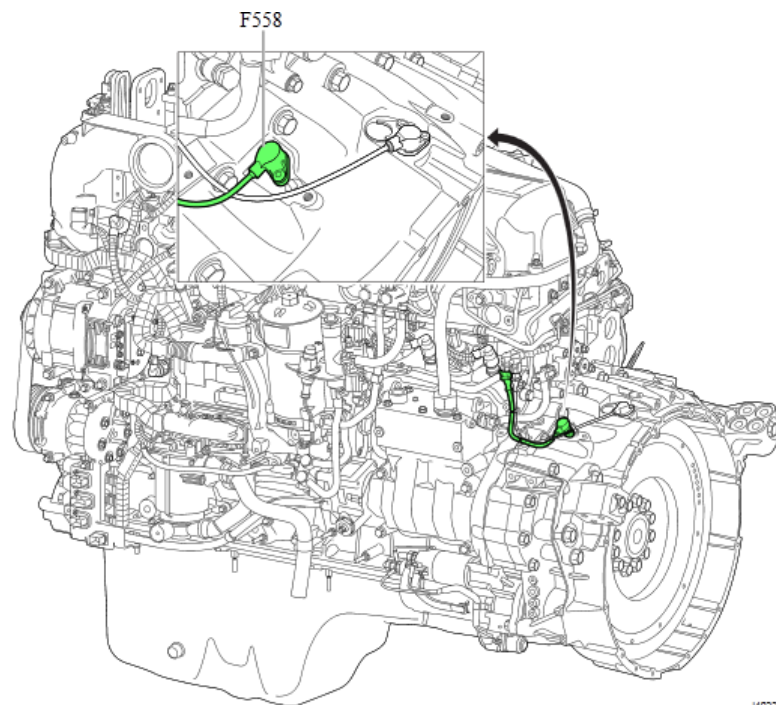
Solenoid valve engine brake MX cylinder 1 (L147)



i402185-2

Camshaft sensor (F558)

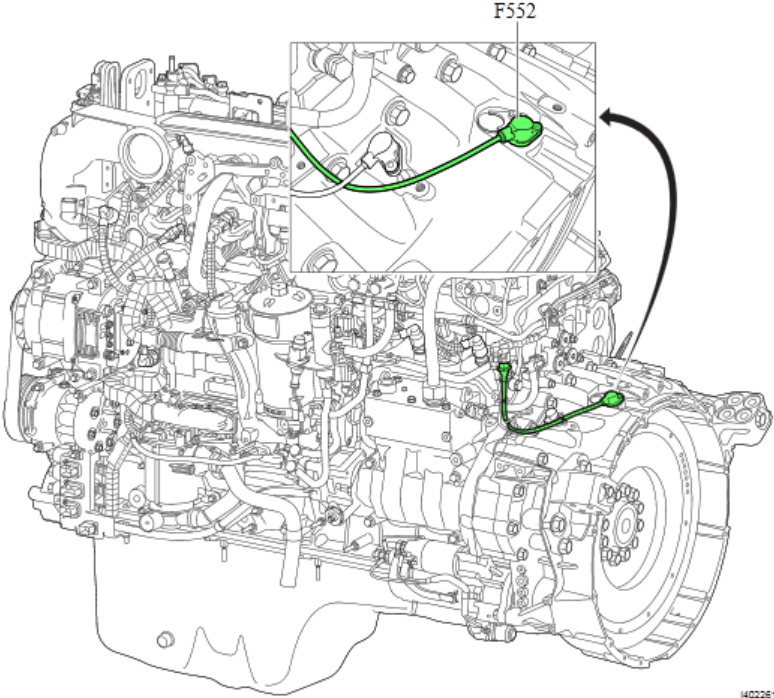
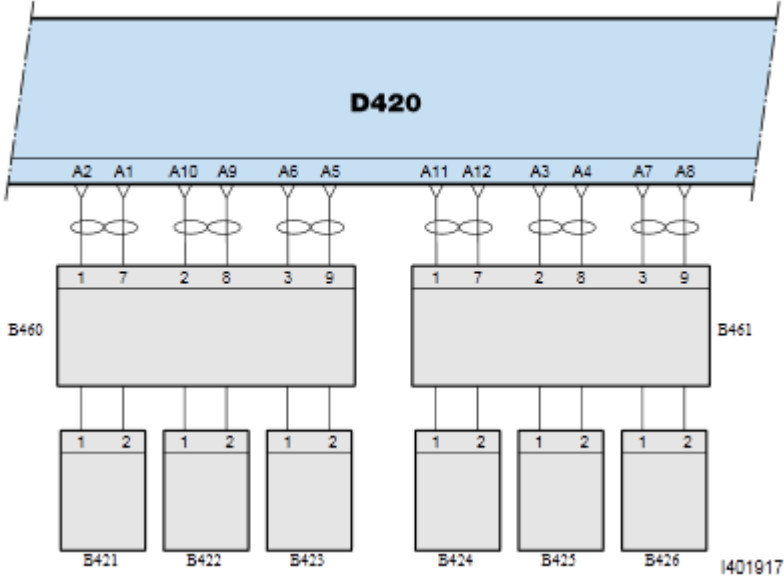
MX_EPA13, MX-13



i402262

Crankshaft sensor (F552)

MX_EPA13, MX-13

	 1402261
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that cylinder 1 is misfiring or the combustion contribution is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  1401917 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

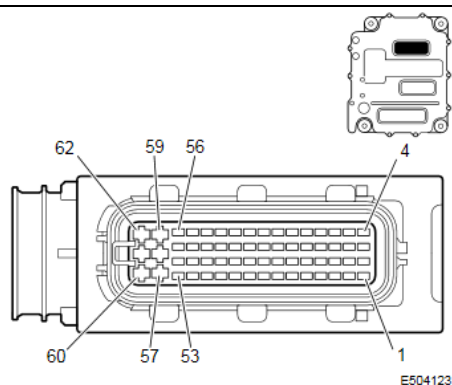
B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

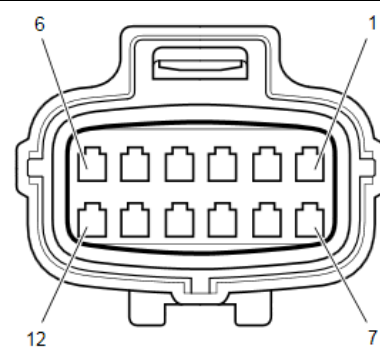
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

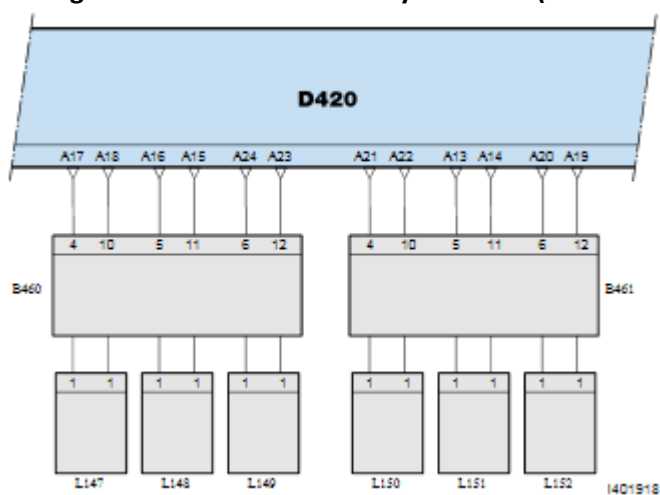


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

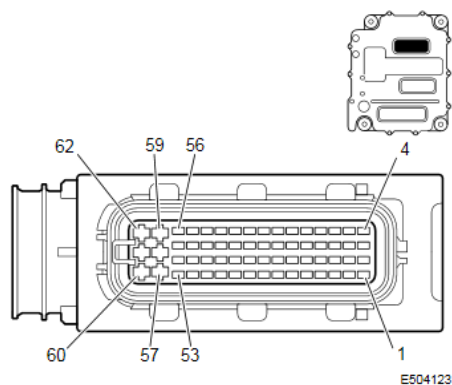
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

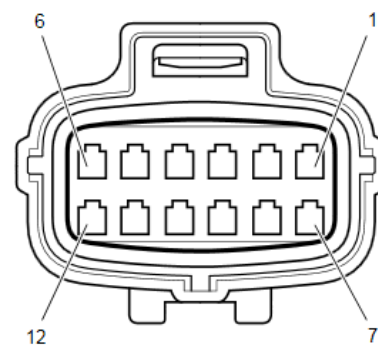
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

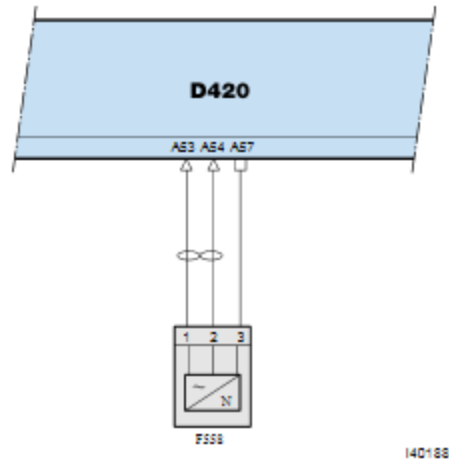


Wiring harness connector B460 & B461 front view



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

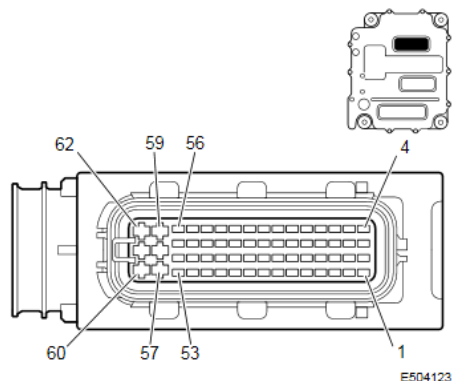
Checking data, camshaft sensor (F558)



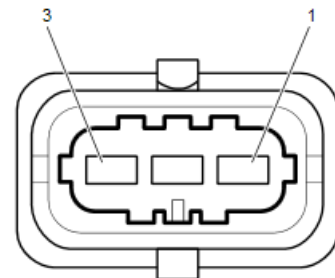
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

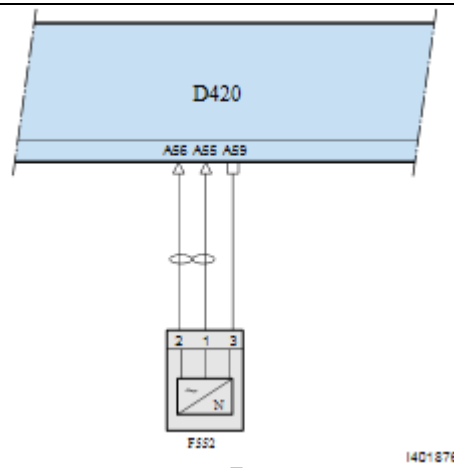


Component connector F558



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

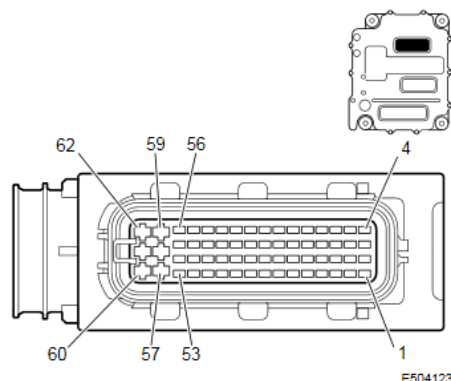
Checking data, crankshaft sensor (F552)



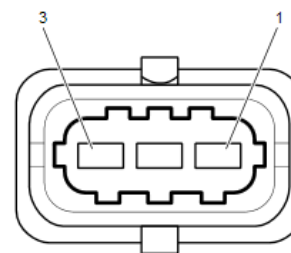
D420 PCI ECU

F552 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

Component check, crankshaft sensor (F552)

Preparation

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

	<table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>± 1.5 V</td><td>Effective AC voltage (VAC) when engine starting.</td></tr><tr><td>± 4.9 V</td><td>Effective AC voltage (VAC) when engine idling.</td></tr><tr><td>± 8.0 V</td><td>Effective AC voltage (VAC) engine at 1200 rpm.</td></tr></table>	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.
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.												
Possible causes	- Faulty cylinder 1 injector (not fueling or under-fueling) - Loose cylinder 1 injector - Faulty MX Engine Brake cylinder 1 - Symptom: Slightly reduced power: - Incorrect valve clearance - Large imbalance in the drive shaft - Symptom: Engine block vibration at high load, damaged flywheel - Mechanical defect (for example damaged cam follower or broken valve)														
Additional information	- The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: - Cylinder-to-cylinder engine speed comparison, and - Cylinder-to-cylinder rotational crankshaft acceleration comparison - This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.														
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0301?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

If P0301 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.
If P0301 is active, go to Step 2.A.

If this code is still present, go to step 2.A

Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors

Action

1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 4, and 5:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - The correct parts are not installed
 - ECU connections are damaged or disconnected
 - Battery not fully charged or contacts not tight

Was there evidence of any of the above?

Yes

No

Correct any issues found.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 2.B

Go to step 2.B

Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - ECU connections are damaged or disconnected

Was there evidence of any of the above?

Yes

No

Correct any issues found.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

	If this code is still present, go to step 2.C Go to step 2.C	
	Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)	
	Action - Visually inspect the associated component connections and wiring for any of the following: - Damaged or loose connectors - Bent, broken, corroded, or loose connector pins - Moisture or dirt in the connections - Damage to the wire harness or insulation - ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 3.A Go to step 3.A	
	Step 3. Drivetrain Checks	
	Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)	
	 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 Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, crankshaft speed sensor (F552).”</u>	
	Are measured values within expected range?	
Yes	No	

		Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Go to step 3.B	If this code is still present, go to step 3.B
Step 3.B Visual inspection, crankshaft speed sensor (F552)		
Action - Referring to maintenance procedure, <u>“replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420</u>, remove the crankshaft sensor and visually inspect it for any of the following: - The correct parts are not installed - Sensor tip is damaged		
Was there evidence of any of the above?		
Yes		No
Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		Reinstall and reconnect crankshaft speed sensor (F552).
If this code is still present, go to step 3.C		Go to step 3.C
Step 3.C Electrical checks, resistance, camshaft sensor (F558)		
 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 Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, camshaft sensor (F558).”</u>		
Are measured values within expected range?		

	Yes		No	
			Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	Got to step 3.D		If this code is still present, go to step 3.D	
	Step 3.D Visual inspection, camshaft sensor (F558)			
	Action			
	1. Referring to maintenance procedure, “ <u>replace camshaft sensor (Sensors el. syst. eng.)</u> ,” <u>job ID 67579</u> , remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged			
	Was there evidence of any of the above?			
	Yes		No	
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		Reinstall and reconnect camshaft sensor (F558).	
If this code is still present, go to step 3.E		Go to step 3.E		
Step 3.E Maintenance procedure, valve clearance				
Action				
1. Check the valve clearance for cylinders 1, 4, and 5 as outlined in the maintenance procedure, “ <u>adjust valve clearance (Basic assy.)</u> ,” <u>job ID - 66829</u> .”				
Is the measured valve clearance for any of the cylinders outside of the specified range?				
Yes		No		

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 1), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, “replace 1 (one) injector (Fuel system), job ID 65503.”

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 1, repeat step 4.A for cylinder 4.

If the problem has not been found after exchanging components for cylinder 4, repeat step 4.A for cylinder 5.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

If the problem moved with the injector, replace the injector.
If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid.
Refer to Step 5.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.

No

If all exchanges still result in P0301, there may be a possible issue with a cylinder or the flywheel.
Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.

Step 5. Repair Verification

Step 5.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.

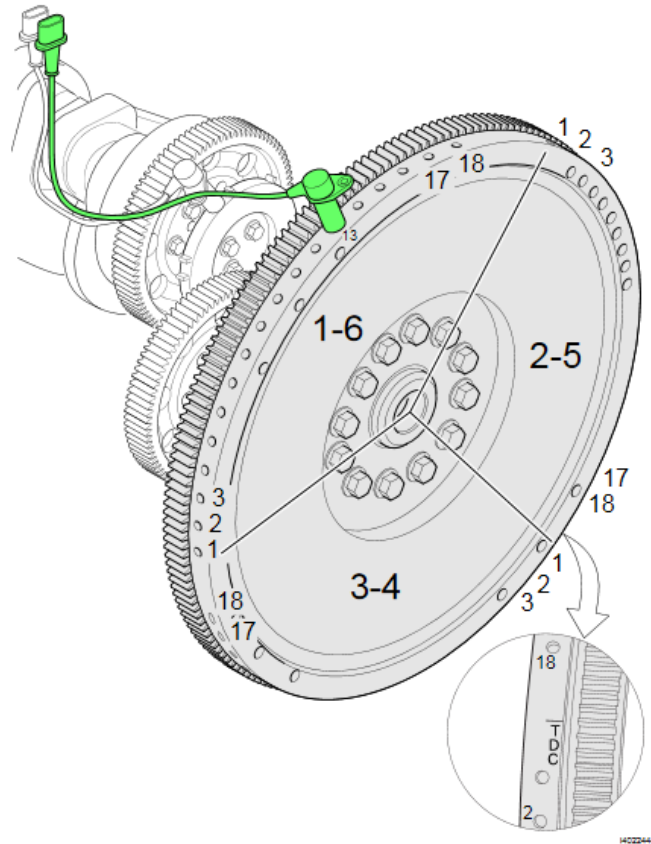
Were the identified repair verification cycles able to be completed?

	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 5.B	Go to step 5.B
Step 5.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 P0301 been cleared?		
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.		
	Back to Index	

P0302

Code number	P0302
Fault code description	Major decrease in combustion in cylinder 2 relative to the others.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



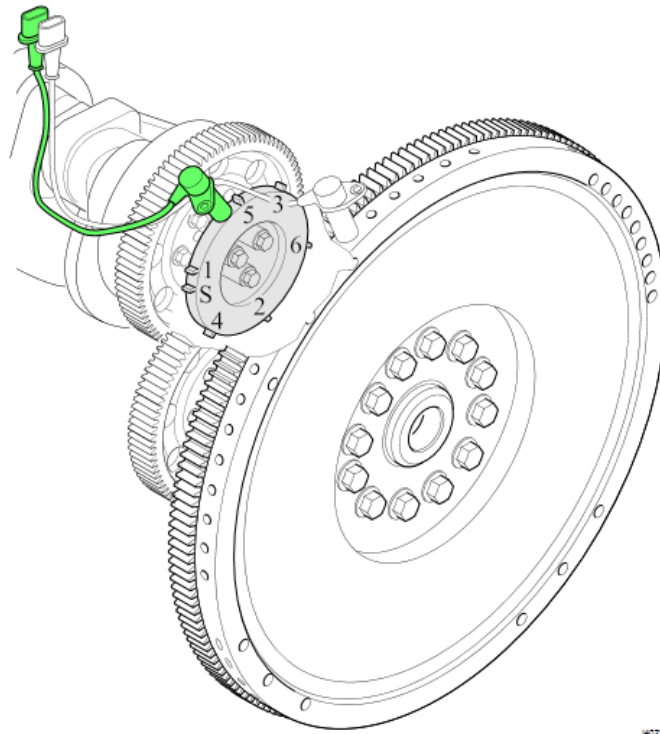
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.



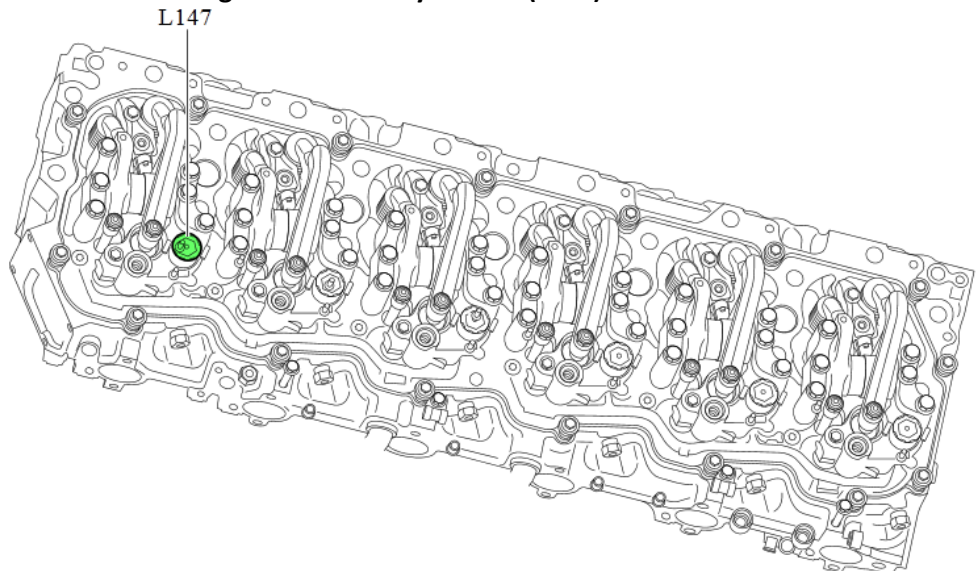
i402245

Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

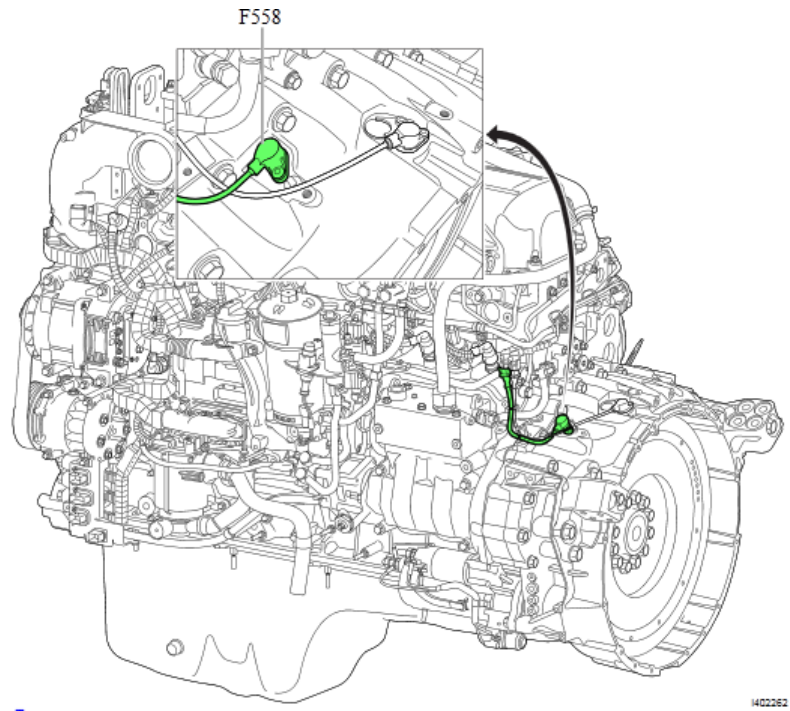
Solenoid valve engine brake MX cylinder 1 (L147)



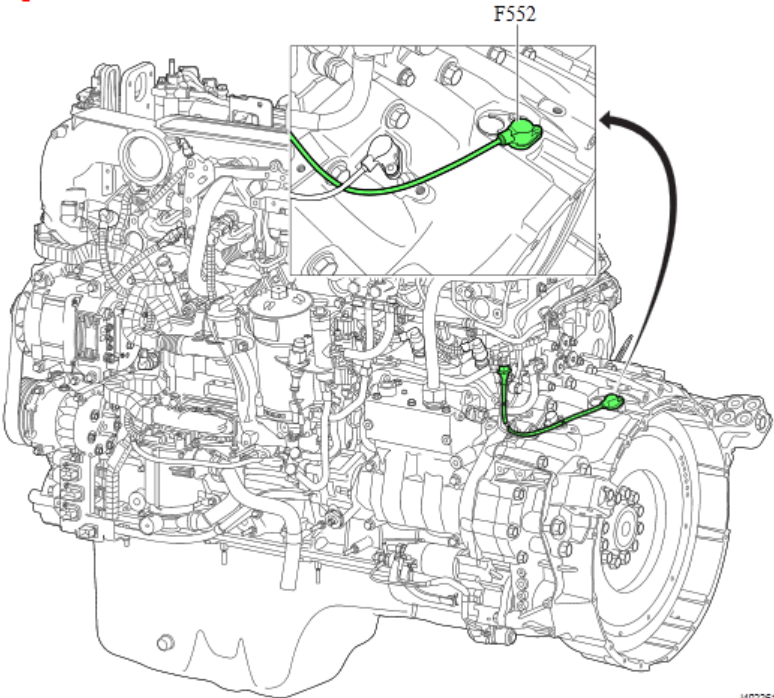
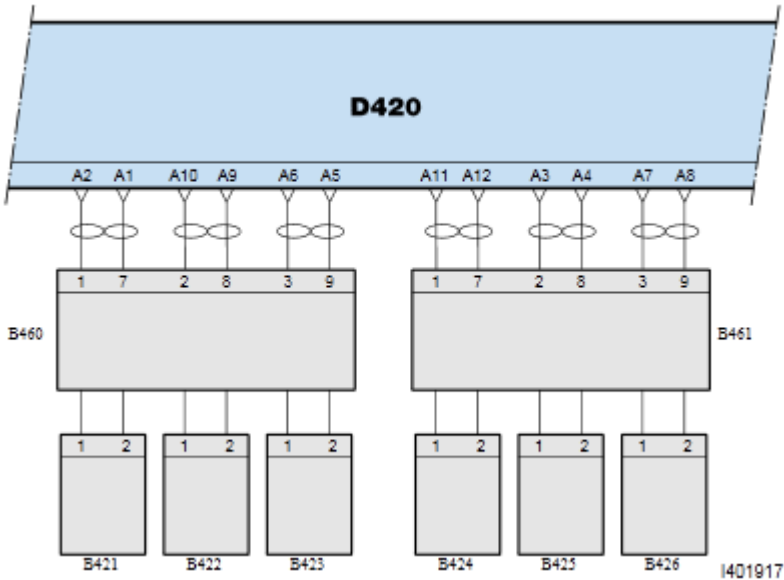
i402185-2

Camshaft sensor (F558)

MX_EPA13, MX-13



Crankshaft sensor (F552)

	<i>MX_EPA13, MX-13</i>  I402251
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that cylinder 1 is misfiring or the combustion contribution is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  I401917 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

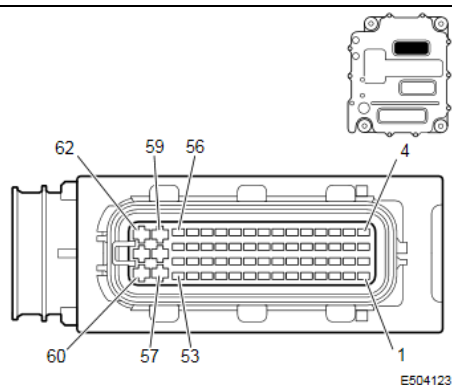
B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

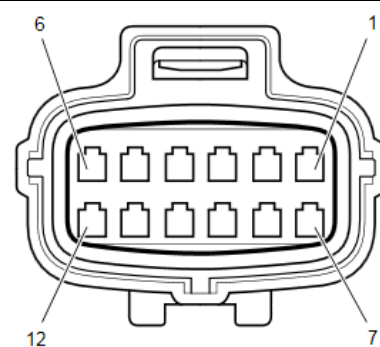
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

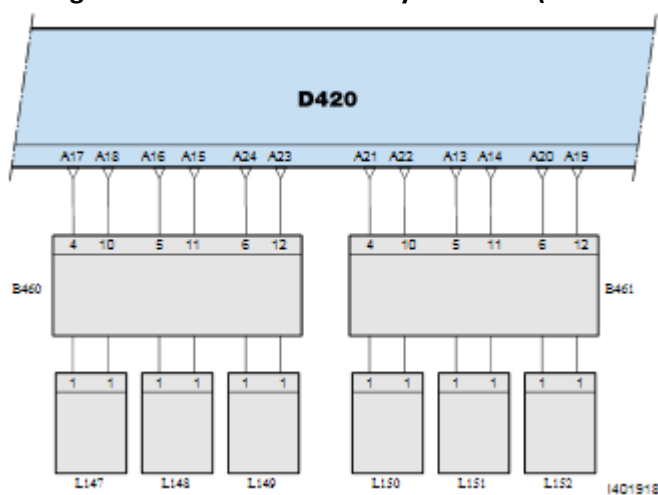


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

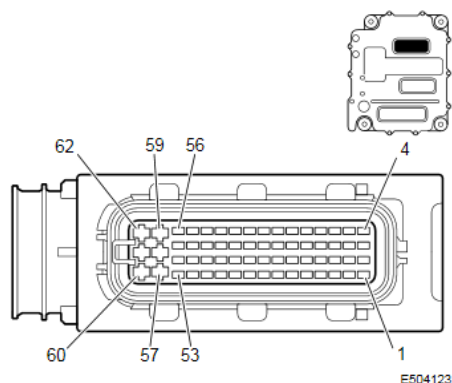
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

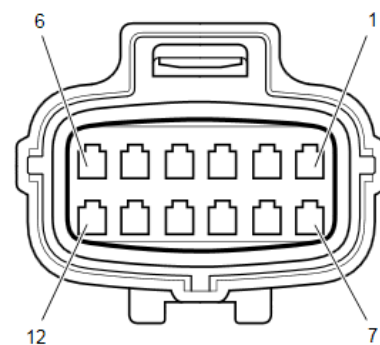
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

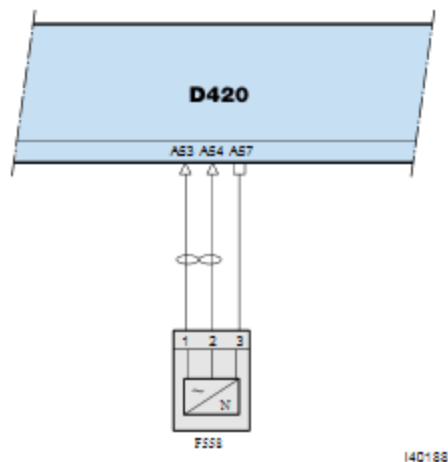


Wiring harness connector B460 & B461 front view



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

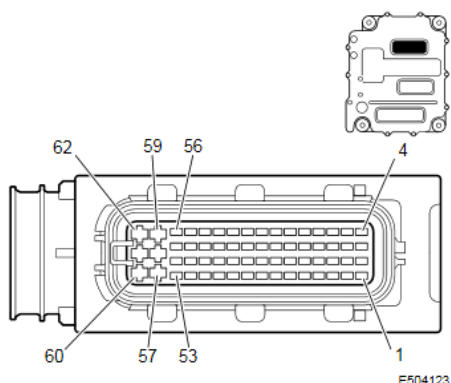
Checking data, camshaft sensor (F558)



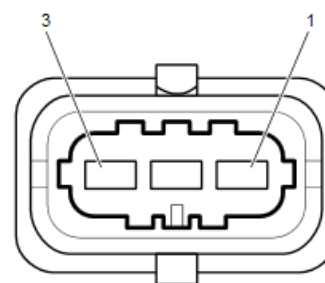
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

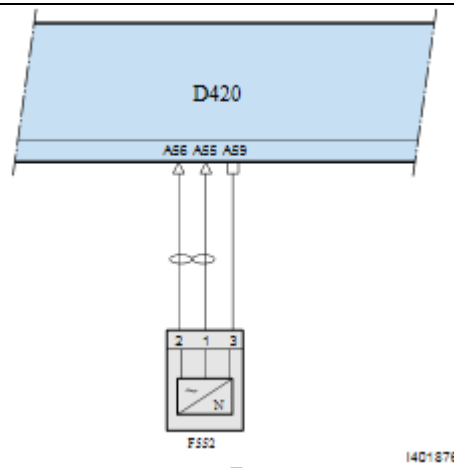


Component connector F558



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

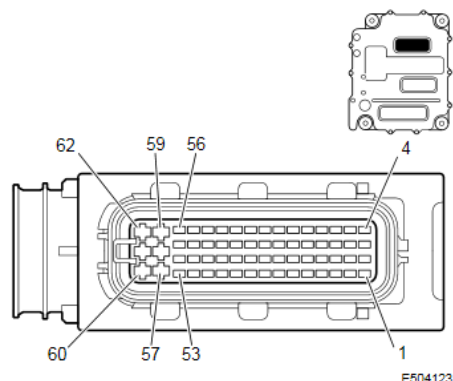
Checking data, crankshaft sensor (F552)



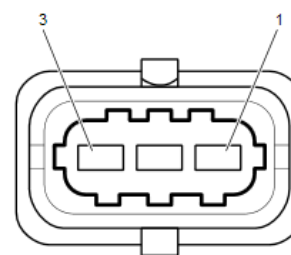
D420 PCI ECU

F552 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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.
Possible causes	- Faulty cylinder 2 injector (not fueling or under-fueling) - Loose cylinder 2 injector - Faulty MX Engine Brake cylinder 2 - Symptom: Slightly reduced power: - Incorrect valve clearance - Large imbalance in the drive shaft - Symptom: Engine block vibration at high load, damaged flywheel Mechanical defect (for example damaged cam follower or broken valve)			
Additional information	- The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: - Cylinder-to-cylinder engine speed comparison, and - Cylinder-to-cylinder rotational crankshaft acceleration comparison - This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.			
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0302?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

If P0302 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.
If P0302 is active, go to Step 2.A.

If this code is still present, go to step 2.A

Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors

Action

1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 2, 4, and 6:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - The correct parts are not installed
 - ECU connections are damaged or disconnected
 - Battery not fully charged or contacts not tight

Was there evidence of any of the above?

Yes

No

Correct any issues found.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 2.B

Go to step 2.B

Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - ECU connections are damaged or disconnected

Was there evidence of any of the above?

Yes

No

	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		
	If this code is still present, go to step 2.C		Go to step 2.C
	Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)		
	Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected		
	Was there evidence of any of the above?		
	Yes		No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		
	If this code is still present, go to step 3.A		Go to step 3.A
	Step 3. Drivetrain Checks		
	Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)		
Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.			
Action 1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, crankshaft speed sensor (F552).”</u>			
Are measured values within expected range?			

	Yes		No	
			Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	Go to step 3.B		If this code is still present, go to step 3.B	
	Step 3.B Visual inspection, crankshaft speed sensor (F552)			
	Action			
	1. Referring to maintenance procedure, <u>“replace crankshaft sensor (Sensors el. syst. eng.),”</u> job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following: The correct parts are not installed Sensor tip is damaged			
	Was there evidence of any of the above?			
	Yes		No	
	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		Reinstall and reconnect crankshaft speed sensor (F552).	
	If this code is still present, go to step 3.C		Go to step 3.C	
	Step 3.C Electrical checks, resistance, camshaft sensor (F558)			
	i Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.			
	Action			
	1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, camshaft sensor (F558).”</u>			

	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Got to step 3.D	If this code is still present, go to step 3.D
	Step 3.D Visual inspection, camshaft sensor (F558)	
	Action	
	- Referring to maintenance procedure, "<u>replace camshaft sensor (Sensors el. syst. eng.)</u>," job ID 67579, remove the crankshaft sensor and visually inspect it for any of the following: - The correct parts are not installed - Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect camshaft sensor (F558).
	If this code is still present, go to step 3.E	Go to step 3.E
	Step 3.E Maintenance procedure, valve clearance	
	Action	
	Check the valve clearance for cylinders 2, 4, and 6 as outlined in the maintenance procedure, "<u>adjust valve clearance (Basic assy.)</u>," job ID - <u>66829</u>."	
	Is the measured valve clearance for any of the cylinders outside of the specified range?	

Yes	No
Correct any issues found in the valve train assembly and adjust the valve clearance as specified. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 4.A	Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 2), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, “replace 1 (one) injector (Fuel system), job ID 65503.”

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 2, repeat step 4.A for cylinder 4.

If the problem has not been found after exchanging components for cylinder 4, repeat step 4.A for cylinder 6.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

If the problem moved with the injector, replace the injector.
If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid.
Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If all exchanges still result in P0302, there may be a possible issue with a cylinder or the flywheel.
Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

Step 5. Repair Verification

Step 5.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.

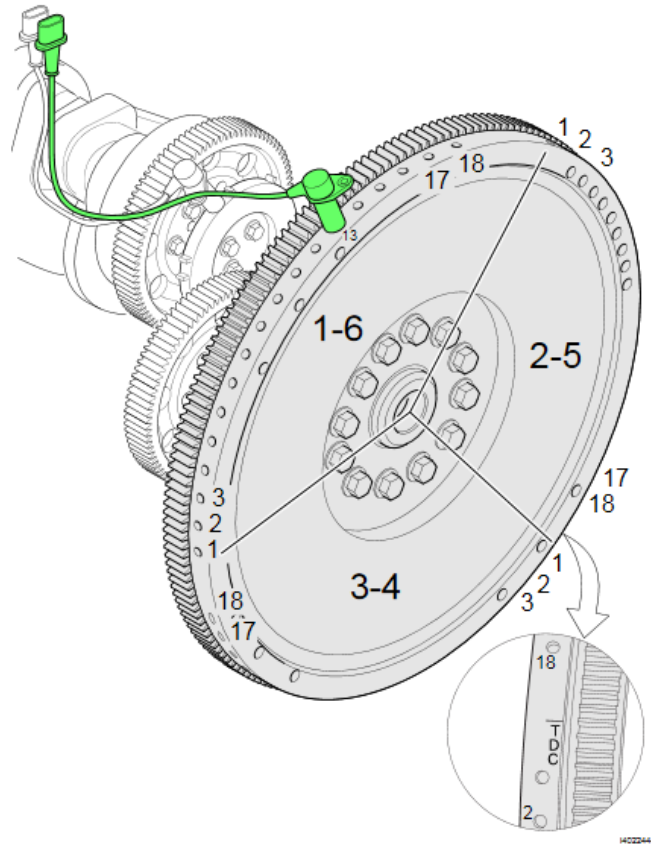
Were the identified repair verification cycles able to be completed?

	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 5.B	Go to step 5.B
	Step 5.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 P0302 been cleared?	
	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.		
	Back to Index	

P0303

Code number	P0303
Fault code description	Major decrease in combustion in cylinder 3 relative to the others
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



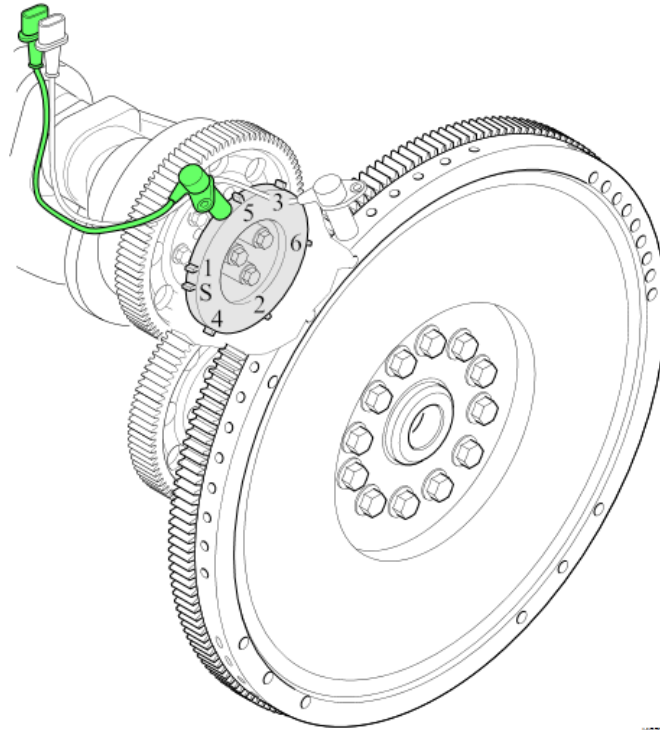
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

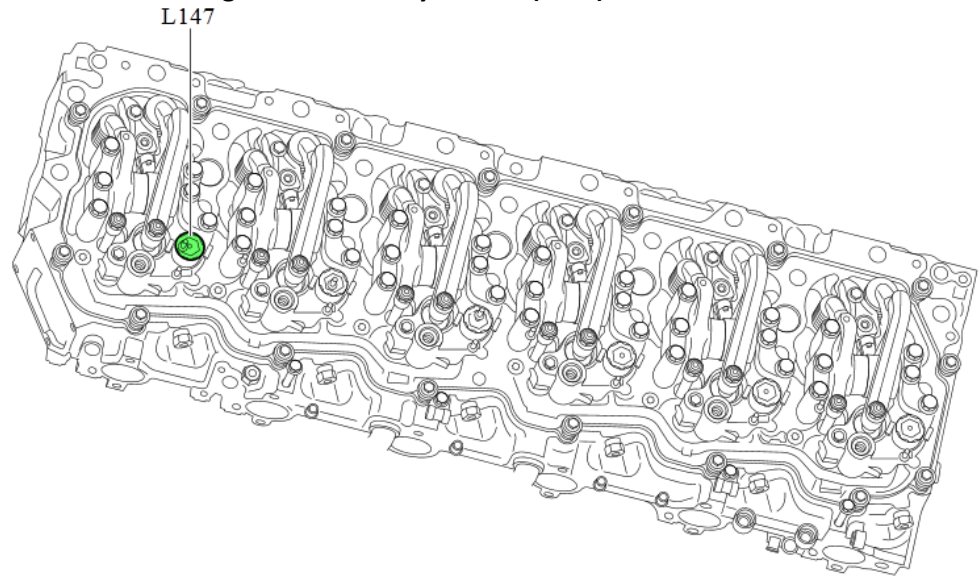


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

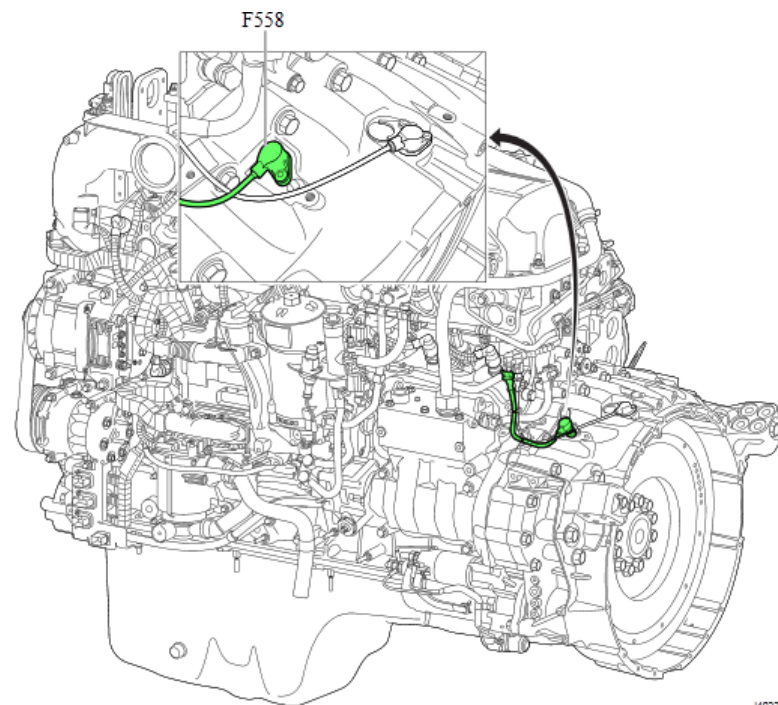
Solenoid valve engine brake MX cylinder 1 (L147)



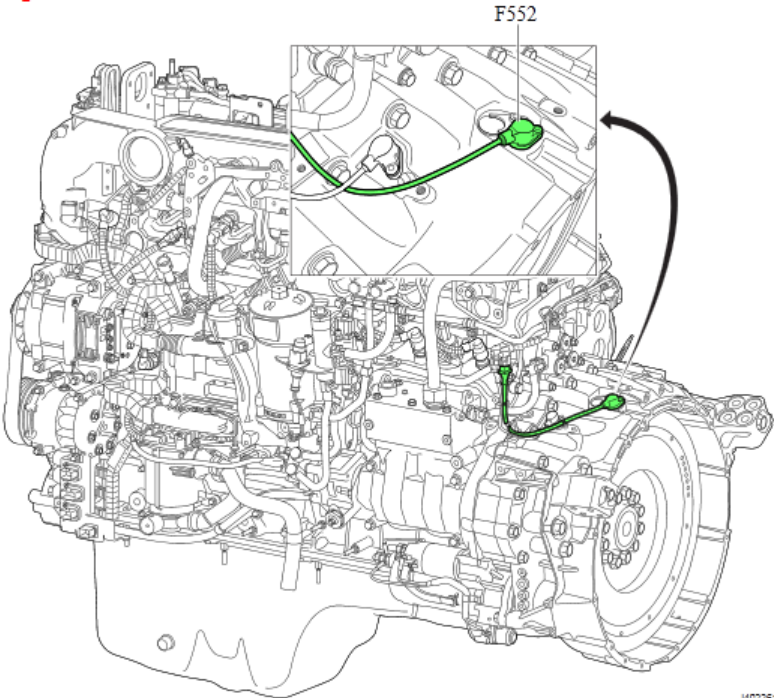
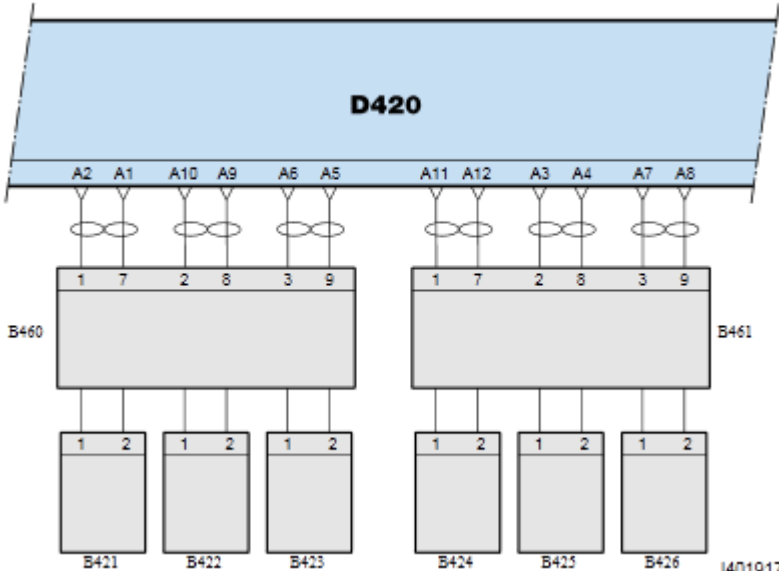
i402185-2

Camshaft sensor (F558)

MX_EPA13, MX-13



i402262

	Crankshaft sensor (F552) <i>MX_EPA13, MX-13</i>  1402281
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that cylinder 1 is misfiring or the combustion contribution is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Injector solenoid valve cylinder 1-6 (B421-B426)  1401917 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

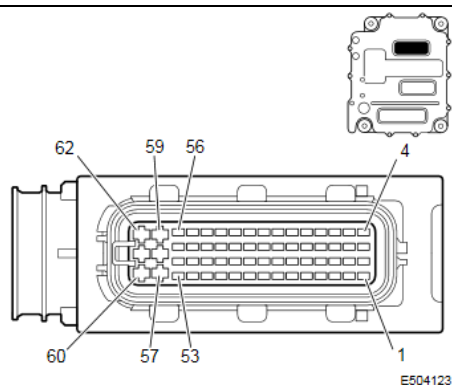
B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

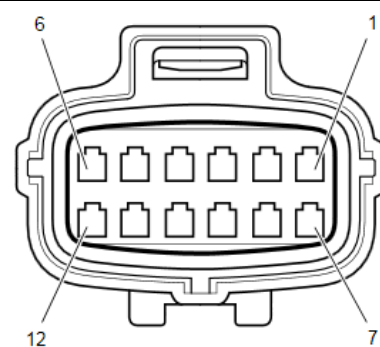
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

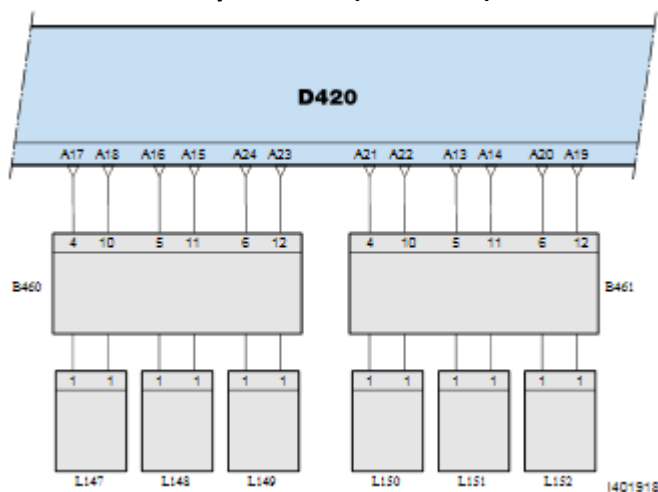


Wiring harness connector B460 & B461 front view



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

MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

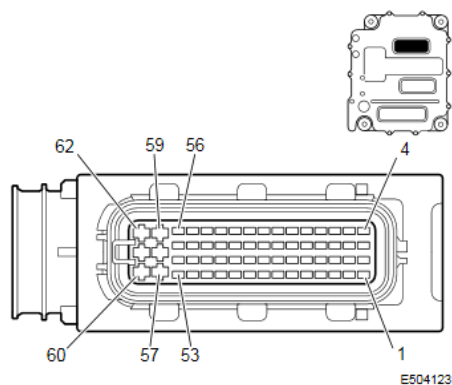
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

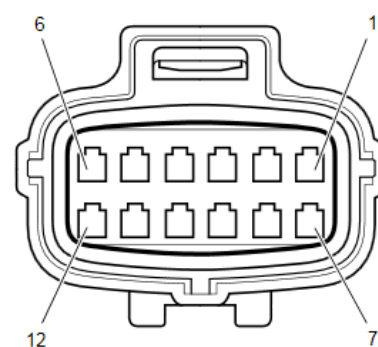
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

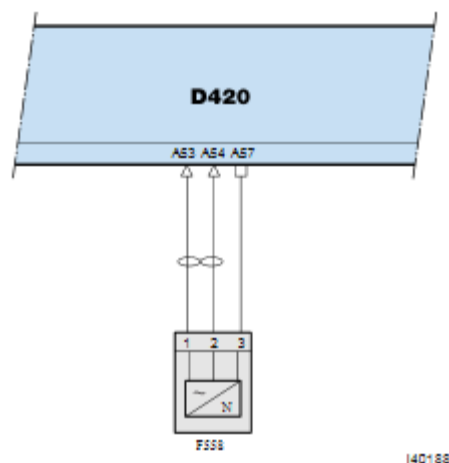


Wiring harness connector B460 & B461 front view



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

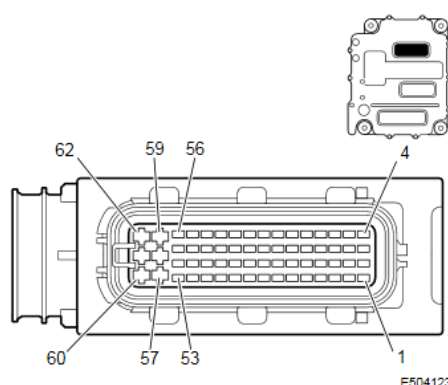
Camshaft sensor (F558)



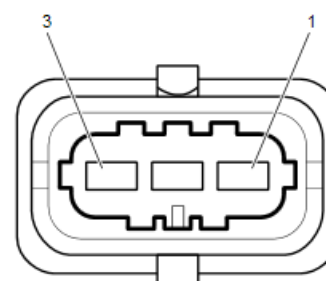
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

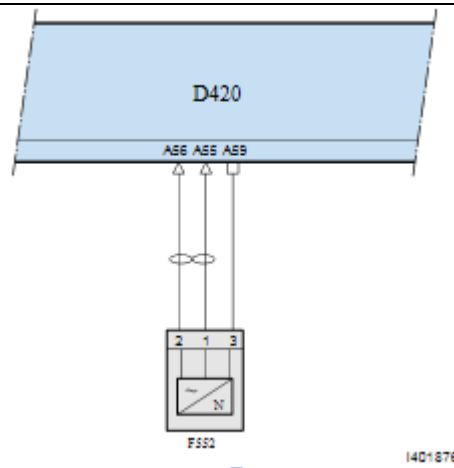


Component connector F558



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

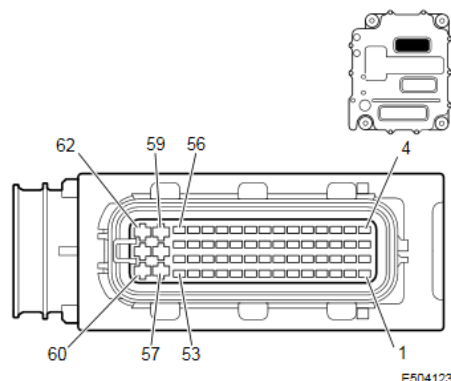
Crankshaft sensor (F552)



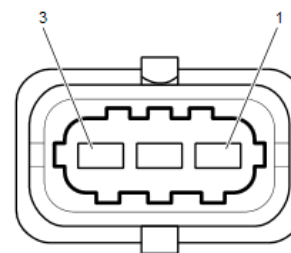
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA.13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

	Component check, crankshaft sensor (F552) Preparation • Key off the ignition. • Disconnect connector F552 • Measure on component connector F552. <table><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr><tr><td rowspan="4">1</td><td rowspan="4">2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td>± 1.5 V</td><td>Effective AC voltage (VAC) when engine starting.</td></tr><tr><td>± 4.9 V</td><td>Effective AC voltage (VAC) when engine idling.</td></tr><tr><td>± 8.0 V</td><td>Effective AC voltage (VAC) engine at 1200 rpm.</td></tr></table>	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.
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.												
Possible causes	• Faulty cylinder 3 injector (not fueling or under-fueling) • Loose cylinder 3 injector • Faulty MX Engine Brake cylinder 3 • Symptom: Slightly reduced power: • Incorrect valve clearance • Large imbalance in the drive shaft • Symptom: Engine block vibration at high load, damaged flywheel Mechanical defect (for example damaged cam follower or broken valve)														
Additional information	• The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: • Cylinder-to-cylinder engine speed comparison, and • Cylinder-to-cylinder rotational crankshaft acceleration comparison • This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.														
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0303?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

	If P0303 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence. If P0303 is active, go to Step 2.A.	
	If this code is still present, go to step 2.A	Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors	
Action 1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 3, 5, and 6: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight	
Was there evidence of any of the above?	
Yes	No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.B	Go to step 2.B

Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)	

	Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.C	Go to step 2.C
	Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)	
	Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 3.A	Go to step 3.A	

Step 3. Drivetrain Checks

Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)



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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, “Component check, crankshaft speed sensor (F552).”

Are measured values within expected range?

Yes	No
	Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
Go to step 3.B	If this code is still present, go to step 3.B

Step 3.B Visual inspection, crankshaft speed sensor (F552)

Action

1. Referring to maintenance procedure, “replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following:
 - The correct parts are not installed
 - Sensor tip is damaged

Was there evidence of any of the above?

Yes	No

	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
Step 3.C Electrical checks, resistance, camshaft sensor (F558)		
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.		
Action 1. Confirm the resistance level as outlined in the corresponding checking data, <u>“Component check, camshaft sensor (F558).”</u>		
Are measured values within expected range?		
Yes		No
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
Got to step 3.D		If this code is still present, go to step 3.D
Step 3.D Visual inspection, camshaft sensor (F558)		
Action 1. Referring to maintenance procedure, <u>“replace camshaft sensor (Sensors el. syst. eng.),” job ID 67579</u> , remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged		
Was there evidence of any of the above?		

	Yes		No	
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.		Reinstall and reconnect camshaft sensor (F558).	
	If this code is still present, go to step 3.E		Go to step 3.E	
	Step 3.E Maintenance procedure, valve clearance			
	Action			
	1. Check the valve clearance for cylinders 3, 5, and 6 as outlined in the maintenance procedure, “ <u>adjust valve clearance (Basic assy.), job ID - 66829.</u> ”			
	Is the measured valve clearance for any of the cylinders outside of the specified range?			
	Yes		No	
	Correct any issues found in the valve train assembly and adjust the valve clearance as specified. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.			
	If this code is still present, go to step 4.A		Go to step 4.A	
Step 4. Fuel System Checks				
Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid				
 CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.				
Action				
1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.				

2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 3), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, “replace 1 (one) injector (Fuel system), job ID 65503.”

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1
4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 3, repeat step 4.A for cylinder 5.

If the problem has not been found after exchanging components for cylinder 5, repeat step 4.A for cylinder 6.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

If the problem moved with the injector, replace the injector.
If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid.

No

If all exchanges still result in P0303, there may be a possible issue with a cylinder or the flywheel.
Contact the PACCAR Engine Support Center for additional assistance in

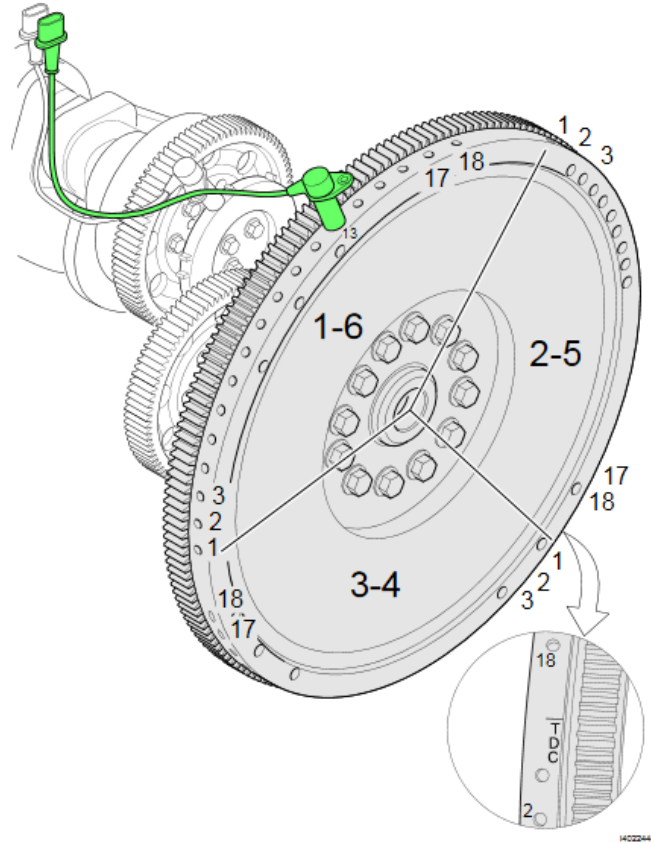
	Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	diagnosing this issue.
	If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	
Step 5. Repair Verification		
Step 5.A Repair verification 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 5.B		Go to step 5.B
Step 5.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 P0303 been cleared?		

	Yes	No
	Problem resolved. No further actions.	Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.
	 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.	
	Back to Index	

P0304

Code number	P0304
Fault code description	Major decrease in combustion in cylinder 4 relative to the others
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



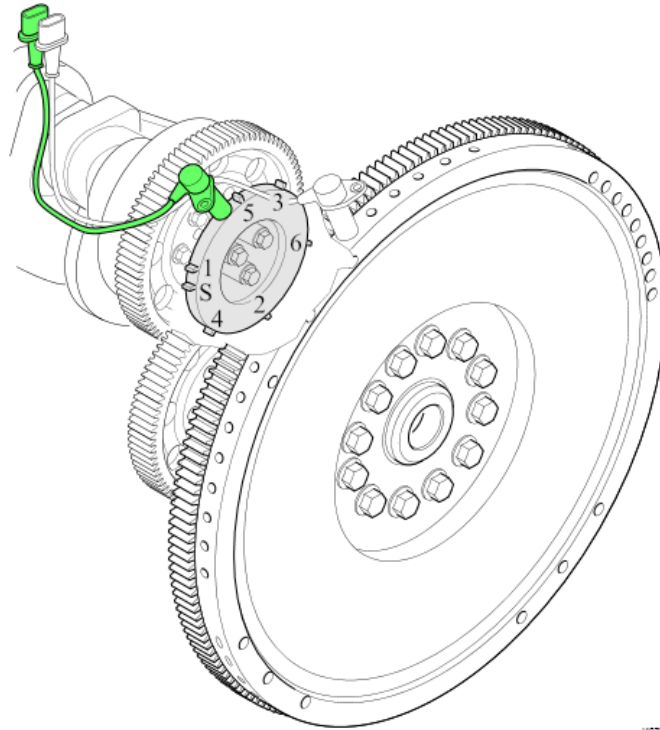
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

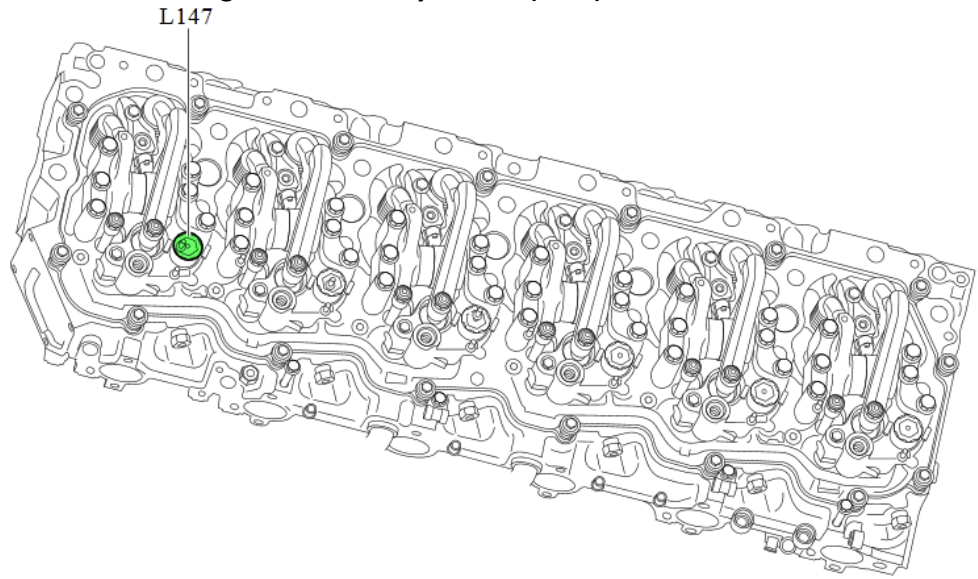


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

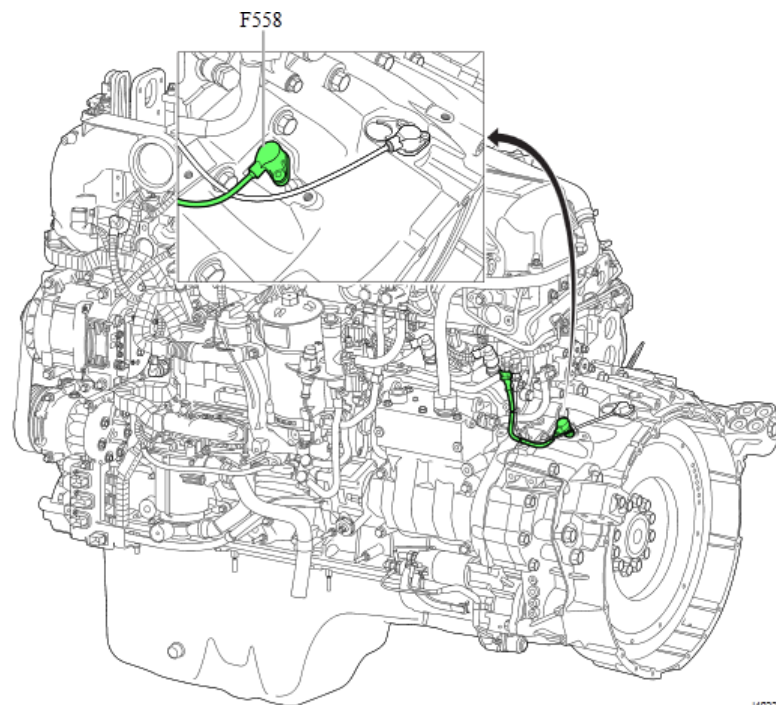
Solenoid valve engine brake MX cylinder 1 (L147)



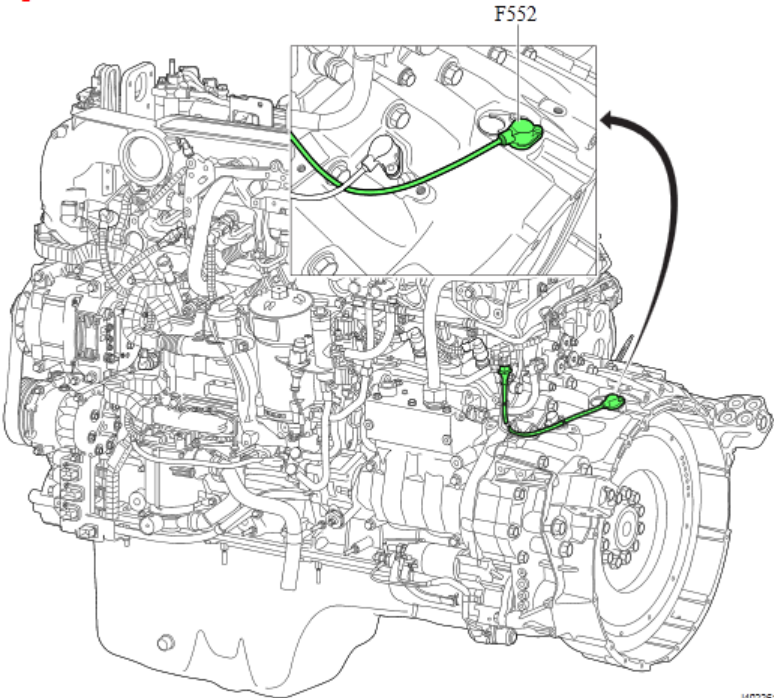
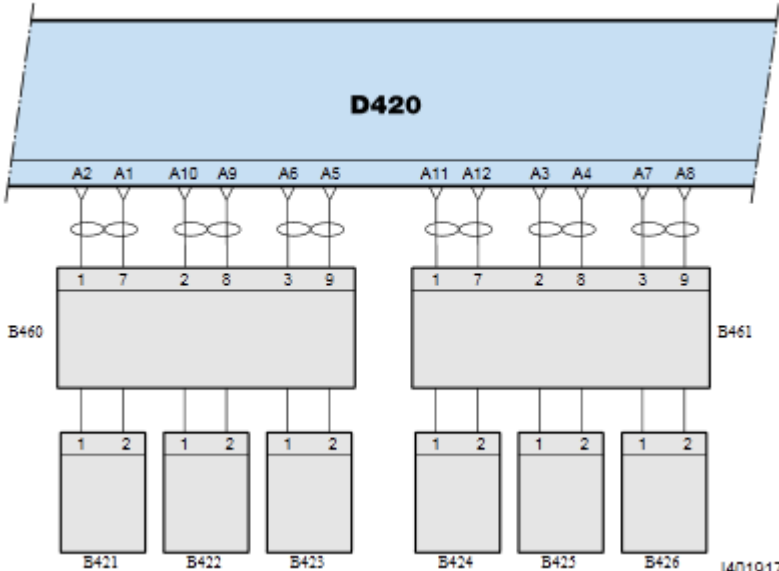
i402185-2

Camshaft sensor (F558)

MX_EPA13, MX-13



i402262

	Crankshaft sensor (F552) <i>MX_EPA13, MX-13</i>  1402281
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that cylinder 1 is misfiring or the combustion contribution is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426)  1401917 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

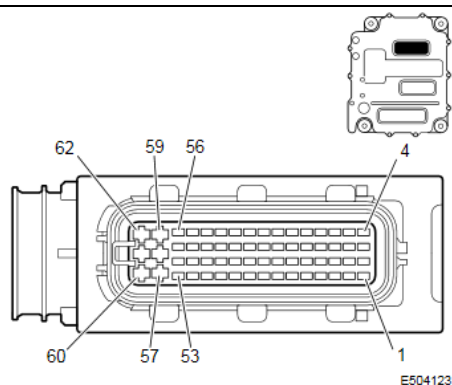
B426 solenoid valve injector cylinder 6

Injector cylinders 1–3

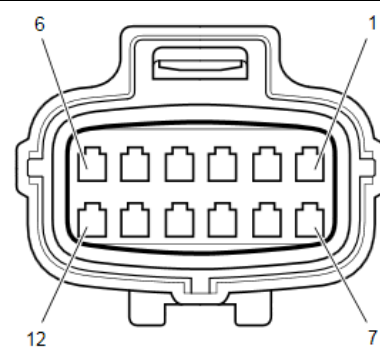
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

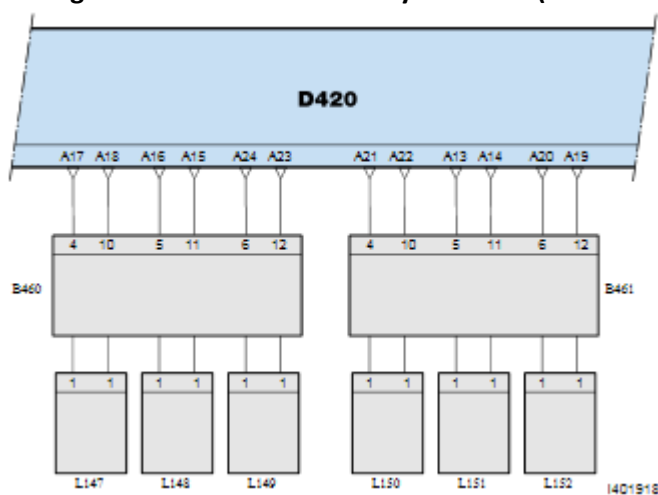


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

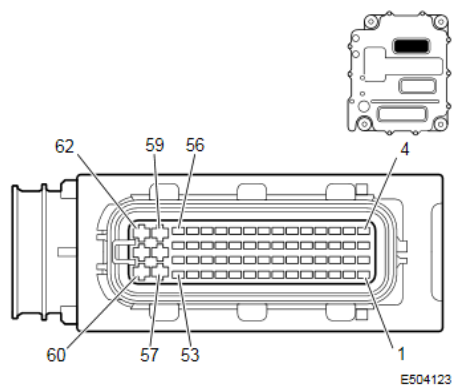
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

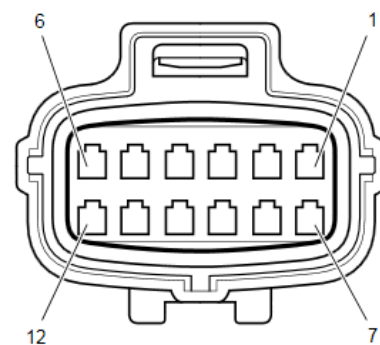
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

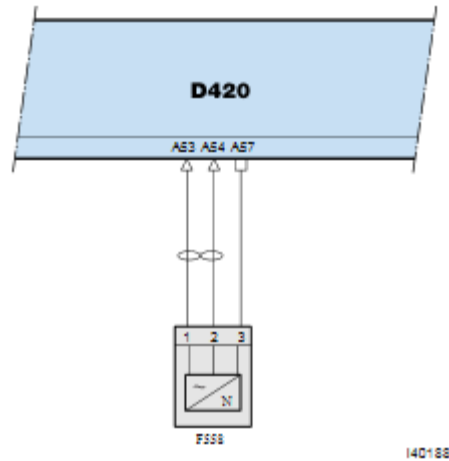


Wiring harness connector B460 & B461 front view



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

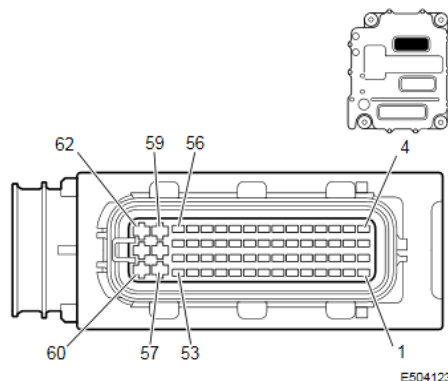
Checking data, camshaft sensor (F558)



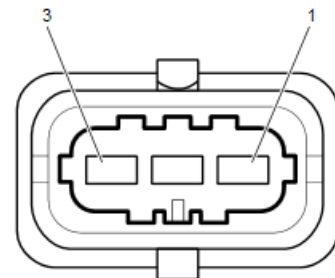
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

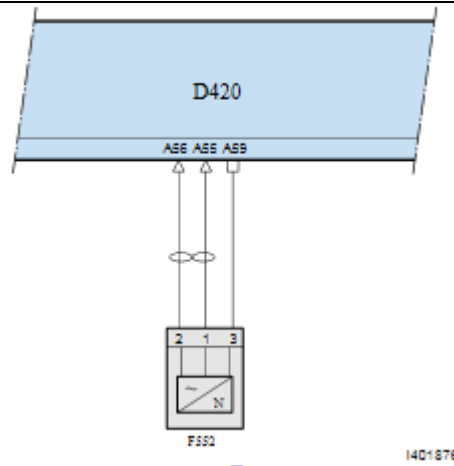


Component connector F558



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

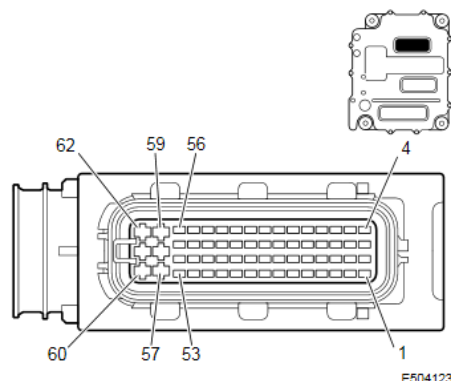
Checking data, crankshaft sensor (F552)



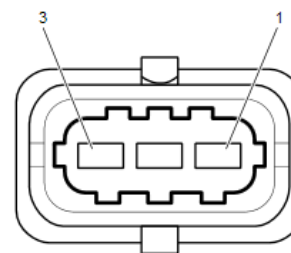
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA.13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461

- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

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

6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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.
Possible causes	- Faulty cylinder 4 injector (not fueling or under-fueling) - Loose cylinder 4 injector - Faulty MX Engine Brake cylinder 4 - Symptom: Slightly reduced power: - Incorrect valve clearance - Large imbalance in the drive shaft - Symptom: Engine block vibration at high load, damaged flywheel Mechanical defect (for example damaged cam follower or broken valve)			
Additional information	- The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: - Cylinder-to-cylinder engine speed comparison, and - Cylinder-to-cylinder rotational crankshaft acceleration comparison - This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.			
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0304?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

If P0304 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.
If P0304 is active, go to Step 2.A.

If this code is still present, go to step 2.A

Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors	
Action	
1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 2, and 4: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight	
Was there evidence of any of the above?	
Yes	No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.B	Go to step 2.B
Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)	
Action	
1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
Was there evidence of any of the above?	
Yes	No

	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.C	Go to step 2.C
	Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)	
	Action	
	1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 3.A	Go to step 3.A
	Step 3. Drivetrain Checks	
	Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)	
	 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	
	Action	
	1. Confirm the resistance level as outlined in the corresponding checking data, " <u>Component check, crankshaft speed sensor (F552).</u> "	

	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Go to step 3.B	If this code is still present, go to step 3.B
	Step 3.B Visual inspection, crankshaft speed sensor (F552)	
	Action	
	- Referring to maintenance procedure, <u>“replace crankshaft sensor (Sensors el. syst. eng.),” job ID 65420</u>, remove the crankshaft sensor and visually inspect it for any of the following: - The correct parts are not installed - Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
	Step 3.C Electrical checks, resistance, camshaft sensor (F558)	
	 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	

	Action	
	1. Confirm the resistance level as outlined in the corresponding checking data, " <u>Component check, camshaft sensor (F558).</u> "	
	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Got to step 3.D	If this code is still present, go to step 3.D
	Step 3.D Visual inspection, camshaft sensor (F558)	
	Action	
	1. Referring to maintenance procedure, " <u>replace camshaft sensor (Sensors el. syst. eng.)," job ID 67579</u> , remove the crankshaft sensor and visually inspect it for any of the following:	
	• The correct parts are not installed • Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace camshaft sensor (F558). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect camshaft sensor (F558).
	If this code is still present, go to step 3.E	Go to step 3.E
	Step 3.E Maintenance procedure, valve clearance	

Action

1. Check the valve clearance for cylinders 1, 2, and 4 as outlined in the maintenance procedure, "adjust valve clearance (Basic assy.), job ID - 66829."

Is the measured valve clearance for any of the cylinders outside of the specified range?

Yes

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 4), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2
2	4, 6	2 with 5	2 with 3
3	5, 6	3 with 4	3 with 1

4	2, 1	4 with 3	4 with 6
5	1, 3	5 with 2	5 with 4
6	3, 2	6 with 1	6 with 5
MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3. Start the engine and allow it to run at idle for a minimum of 2 minutes.
4. Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:
 - a. the suspected injector to its new exchanged location, or
 - b. the corresponding rocker-solenoid to its new exchanged location.



Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5. Use DAVIE to update trim codes for all injectors that have been exchanged.
6. If the problem has not been found after exchanging components for cylinder 4, repeat step 4.A for cylinder 1.

If the problem has not been found after exchanging components for cylinder 1, repeat step 4.A for cylinder 2.

Did the problem reported through DAVIE move to the new cylinder location?

Yes

If the problem moved with the injector, replace the injector.
 If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid.
 Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If all exchanges still result in P0304, there may be a possible issue with a cylinder or the flywheel.
 Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.

If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

Step 5. Repair Verification

Step 5.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 5.B

Go to step 5.B

Step 5.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 P0304 been cleared?

Yes

No

Problem resolved. No further actions.

Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.



Contacting the PACCAR Engine Support Center

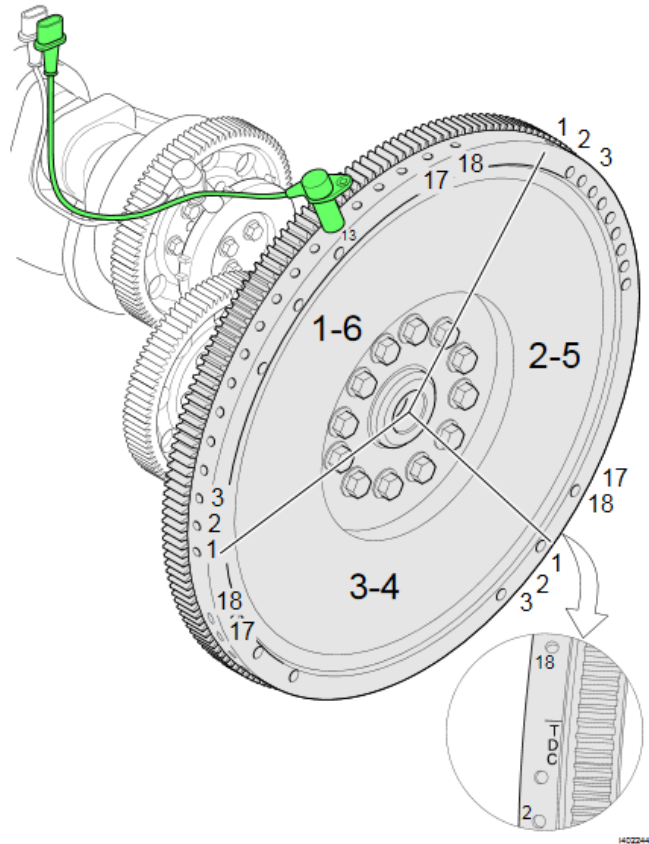
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.

	Back to Index

P0305

Code number	P0305
Fault code description	Major decrease in combustion in cylinder 5 relative to the others.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



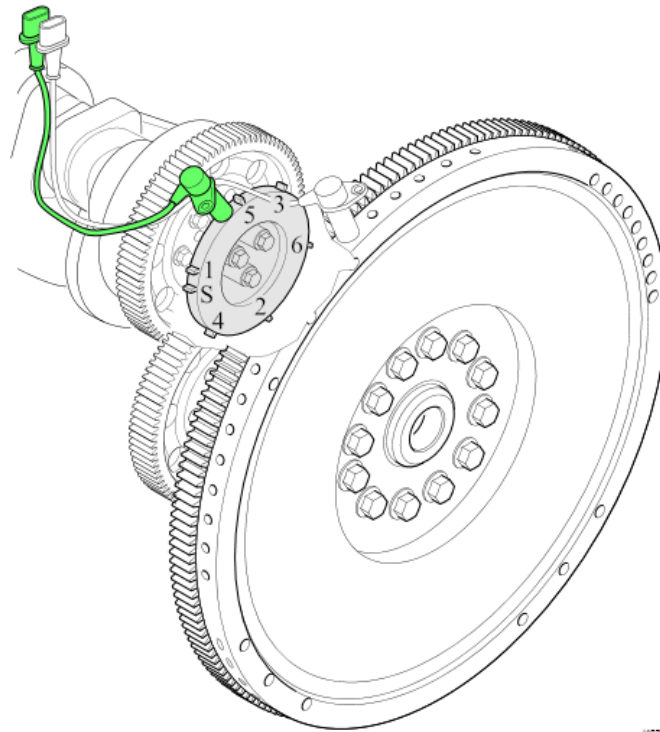
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

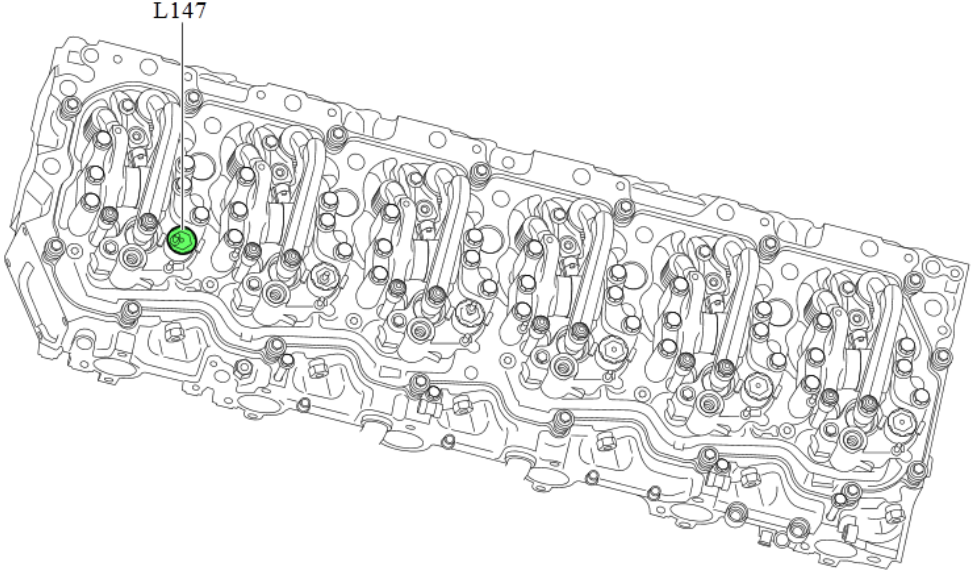
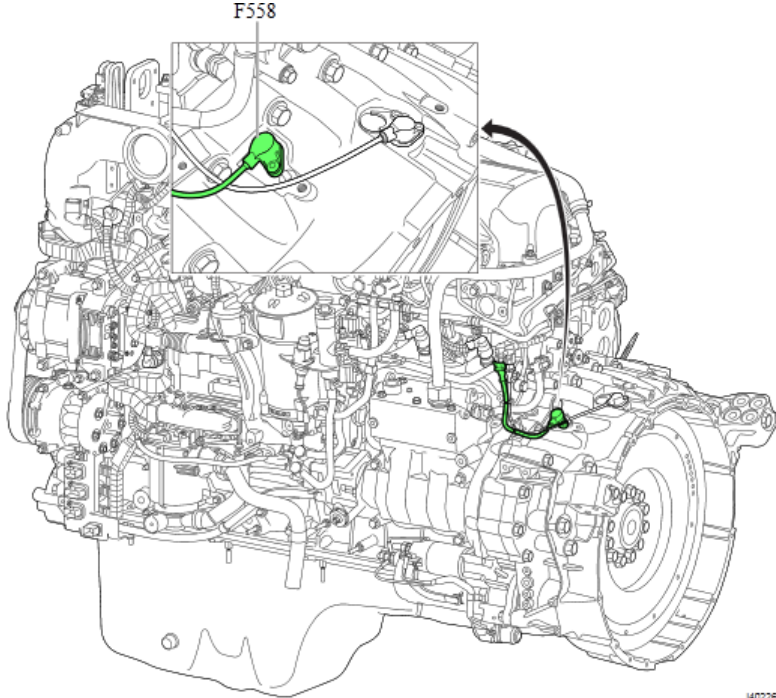
MX-11

The pulse wheel is attached to the inlet camshaft.



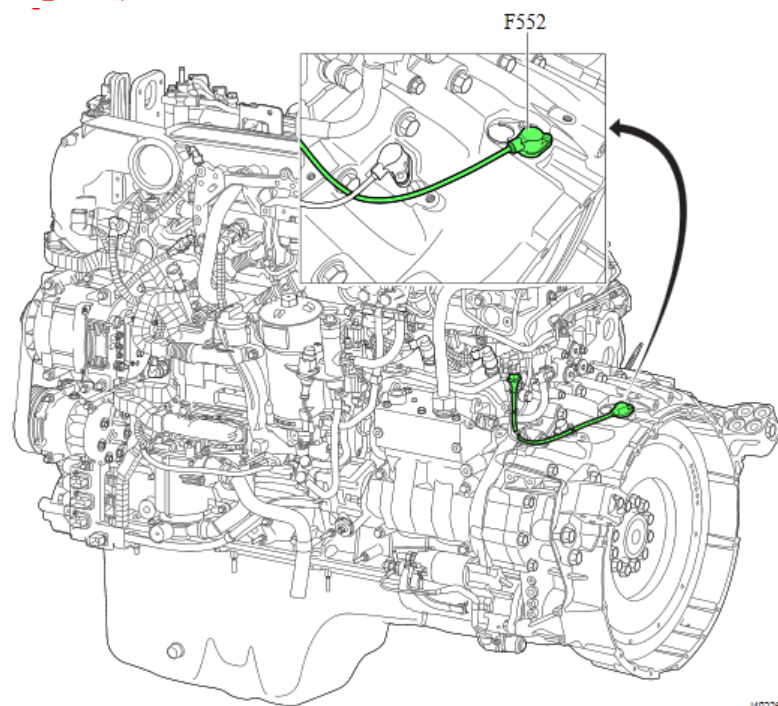
Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)	Solenoid valve engine brake MX cylinder 1 (L147)  i402185-2 Camshaft sensor (F558) <i>MX_EPA13, MX-13</i>  i402262

Crankshaft sensor (F552)

MX_EPA13, MX-13



Diagnostic condition

This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.

Set condition of fault code

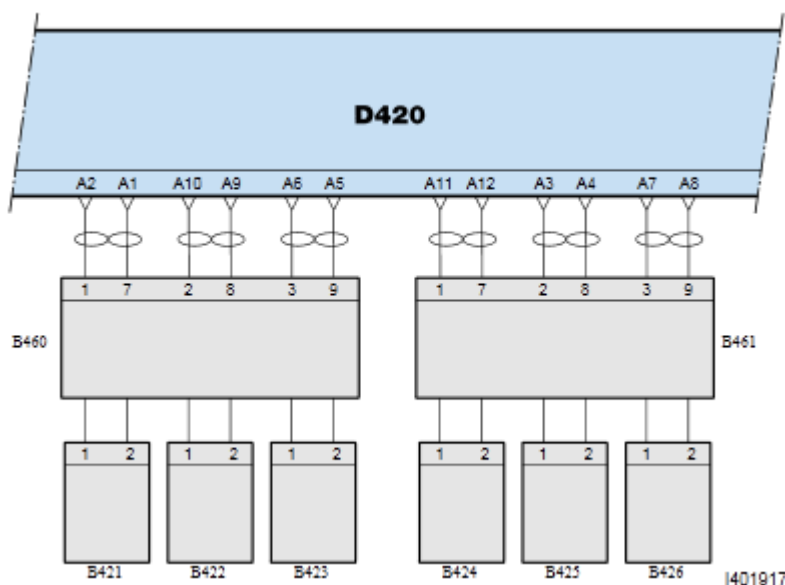
The PCI ECU (D420) detects that cylinder 1 is misfiring or the combustion contribution is lower relative to the other cylinders.

Reset condition of fault code

This DTC changes to inactive when the fault is no longer detected.

Electrical diagram(s)

Checking data, injector solenoid valve cylinder 1-6 (B421-B426)



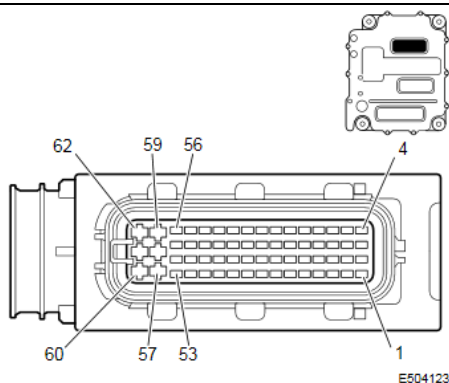
B460 connector cylinders 1-3
 B461 connector cylinders 4-6
 D420 PCI ECU
 B421 solenoid valve injector cylinder 1
 B422 solenoid valve injector cylinder 2
 B423 solenoid valve injector cylinder 3
 B424 solenoid valve injector cylinder 4
 B425 solenoid valve injector cylinder 5
 B426 solenoid valve injector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

Injector cylinders 1–3

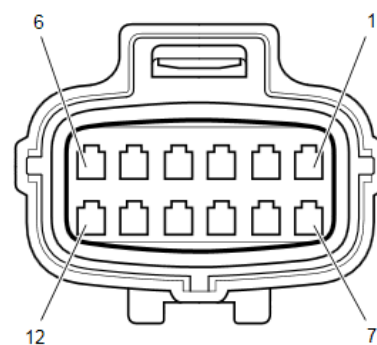
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

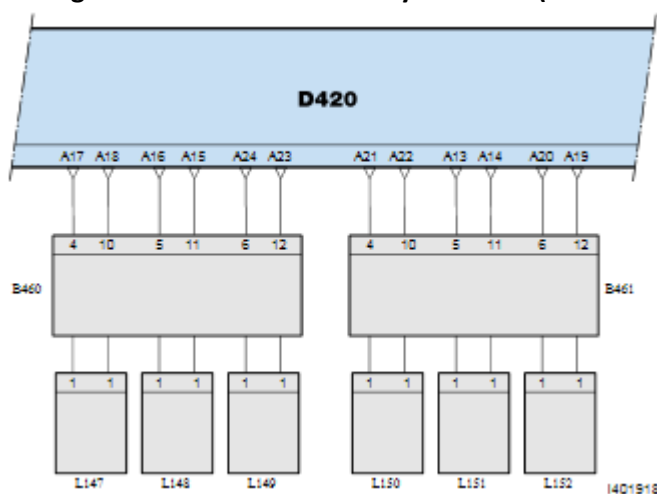


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

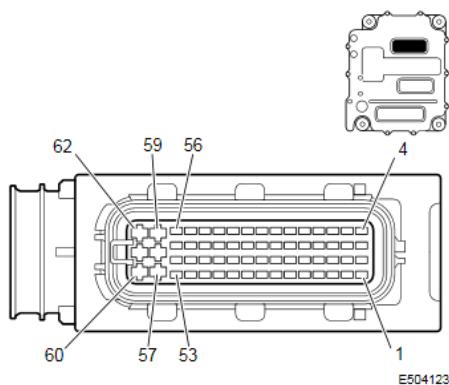
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

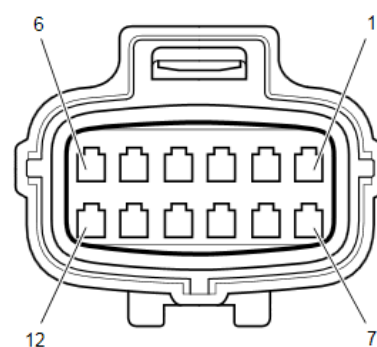
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

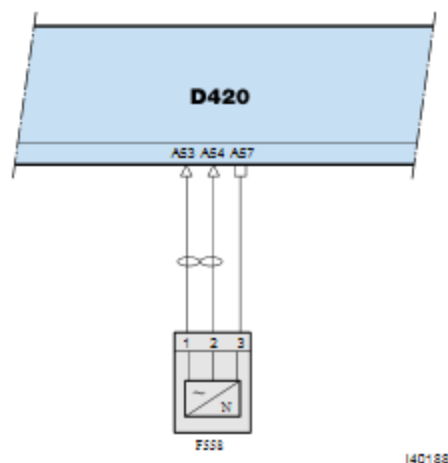


Wiring harness connector B460 & B461 front view



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

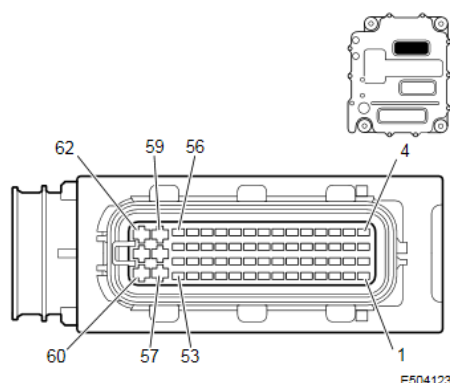
Checking data, camshaft sensor (F558)



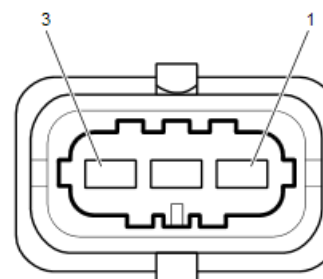
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

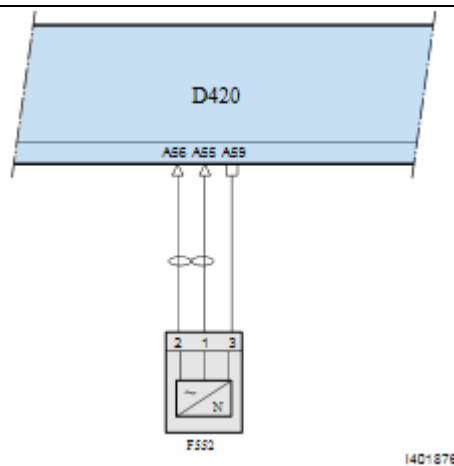


Component connector F558



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

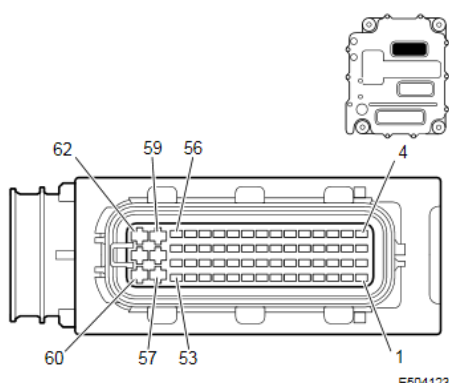
Checking data, crankshaft sensor (F552)



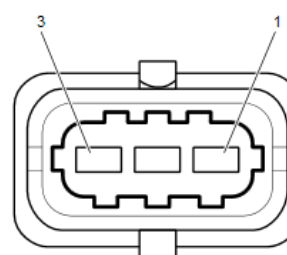
D420 PCI ECU

F552 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461

- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

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

6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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.
Possible causes	- Faulty cylinder 5 injector (not fueling or under-fueling) - Loose cylinder 5 injector - Faulty MX Engine Brake cylinder 5 - Symptom: Slightly reduced power: - Incorrect valve clearance - Large imbalance in the drive shaft - Symptom: Engine block vibration at high load, damaged flywheel Mechanical defect (for example damaged cam follower or broken valve)			
Additional information Block diagram	- The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: - Cylinder-to-cylinder engine speed comparison, and - Cylinder-to-cylinder rotational crankshaft acceleration comparison - This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.			
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0305?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

If P0305 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.

If P0305 is active, go to Step 2.A.

	<table border="1"> <tr> <td>If this code is still present, go to step 2.A</td> <td>Go to step 2.A</td> </tr> </table>		If this code is still present, go to step 2.A	Go to step 2.A										
If this code is still present, go to step 2.A	Go to step 2.A													
Step 2. Quick Checks														
<table border="1"> <tr> <td colspan="2"> Step 2.A Visual inspection, connections and wiring, fuel injectors </td></tr> <tr> <td colspan="2"> Action 1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 3, and 5: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight </td></tr> <tr> <td colspan="2"> Was there evidence of any of the above? </td></tr> <tr> <td> Yes </td><td> No </td></tr> <tr> <td> Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks. </td><td></td></tr> <tr> <td> If this code is still present, go to step 2.B </td><td> Go to step 2.B </td></tr> </table>			Step 2.A Visual inspection, connections and wiring, fuel injectors		Action 1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 1, 3, and 5: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • The correct parts are not installed • ECU connections are damaged or disconnected • Battery not fully charged or contacts not tight		Was there evidence of any of the above?		Yes	No	Correct any issues found. Refer to Step 5.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.A Visual inspection, connections and wiring, fuel injectors														
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Was there evidence of any of the above?														
Yes	No													
Correct any issues found. Refer to Step 5.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													
<table border="1"> <tr> <td colspan="2"> Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552) </td></tr> <tr> <td colspan="2"> Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected </td></tr> </table>			Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)		Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected									
Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)														
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected														

Was there evidence of any of the above?	
Yes	No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
If this code is still present, go to step 2.C	Go to step 2.C

Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)
Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected
Was there evidence of any of the above?
Yes
No
Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
If this code is still present, go to step 3.A

Step 3. Drivetrain Checks

Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)
 Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.

	Action	
	1. Confirm the resistance level as outlined in the corresponding checking data, " <u>Component check, crankshaft speed sensor (F552).</u> "	
	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Go to step 3.B	If this code is still present, go to step 3.B
	Step 3.B Visual inspection, crankshaft speed sensor (F552)	
	Action	
	1. Referring to maintenance procedure, " <u>replace crankshaft sensor (Sensors el. syst. eng.),</u> " job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following: • The correct parts are not installed • Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
Step 3.C Electrical checks, resistance, camshaft sensor (F558)		



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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, “Component check, camshaft sensor (F558).”

Are measured values within expected range?

Yes

No

Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Got to step 3.D

If this code is still present, go to step 3.D

Step 3.D Visual inspection, camshaft sensor (F558)

Action

1. Referring to maintenance procedure, “replace camshaft sensor (Sensors el. syst. eng.),” job ID 67579, remove the crankshaft sensor and visually inspect it for any of the following:
 - The correct parts are not installed
 - Sensor tip is damaged

Was there evidence of any of the above?

Yes

No

Replace camshaft sensor (F558).

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Reinstall and reconnect camshaft sensor (F558).

If this code is still present, go to step 3.E

Go to step 3.E

Step 3.E Maintenance procedure, valve clearance

Action

1. Check the valve clearance for cylinders 1, 3, and 5 as outlined in the maintenance procedure, "adjust valve clearance (Basic assy.), job ID - 66829."

Is the measured valve clearance for any of the cylinders outside of the specified range?

Yes

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 5), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2

		2	4, 6	2 with 5	2 with 3
		3	5, 6	3 with 4	3 with 1
		4	2, 1	4 with 3	4 with 6
		5	1, 3	5 with 2	5 with 4
		6	3, 2	6 with 1	6 with 5
		MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3.

Start the engine and allow it to run at idle for a minimum of 2 minutes.

4.

Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:

a.

the suspected injector to its new exchanged location, or

b.

the corresponding rocker-solenoid to its new exchanged location.

i

Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5.

Use DAVIE to update trim codes for all injectors that have been exchanged.

6.

If the problem has not been found after exchanging components for cylinder 5, repeat step 4.A for cylinder 1.

If the problem has not been found after exchanging components for cylinder 1, repeat step 4.A for cylinder 3.

Did the problem reported through DAVIE move to the new cylinder location?

Yes	No
If the problem moved with the injector, replace the injector. If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	If all exchanges still result in P0305, there may be a possible issue with a cylinder or the flywheel. Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	

Step 5. Repair Verification

Step 5.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 5.B

Go to step 5.B

Step 5.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 P0305 been cleared?

Yes

No

Problem resolved. No further actions.

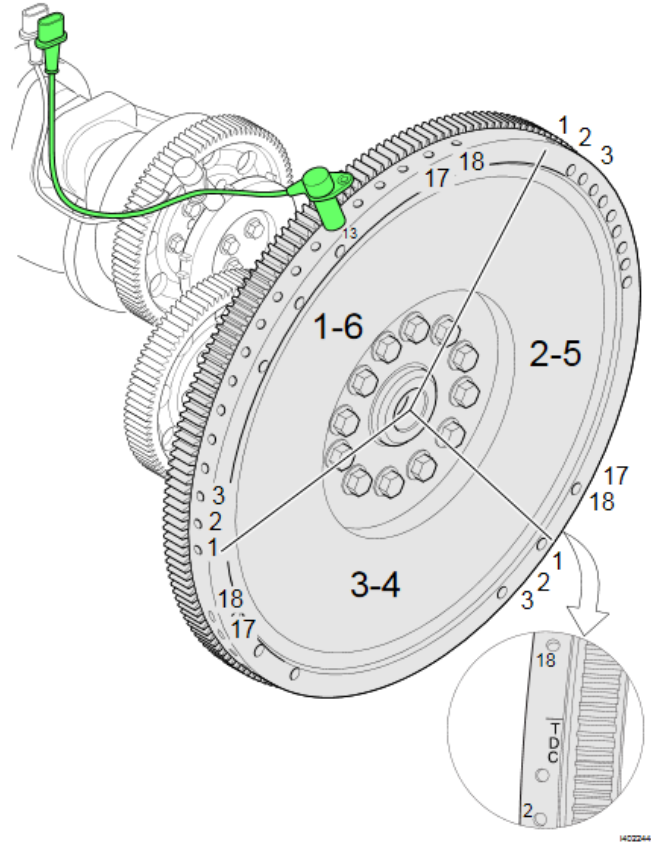
Continue with the next step in this troubleshooting procedure. If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.

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

P0306

Code number	P0306
Fault code description	Major decrease in combustion in cylinder 6 relative to the others.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Fuel system Freeze frame type - Fuel
Description of component(s)	Description, injector (B421, B422, B423, B424, B425, B426) 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. Minimum opening pressure The injectors do not open below a rail pressure of 180–190 bar [2610–2756 psi]. 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.

Description, crankshaft sensor (F552)



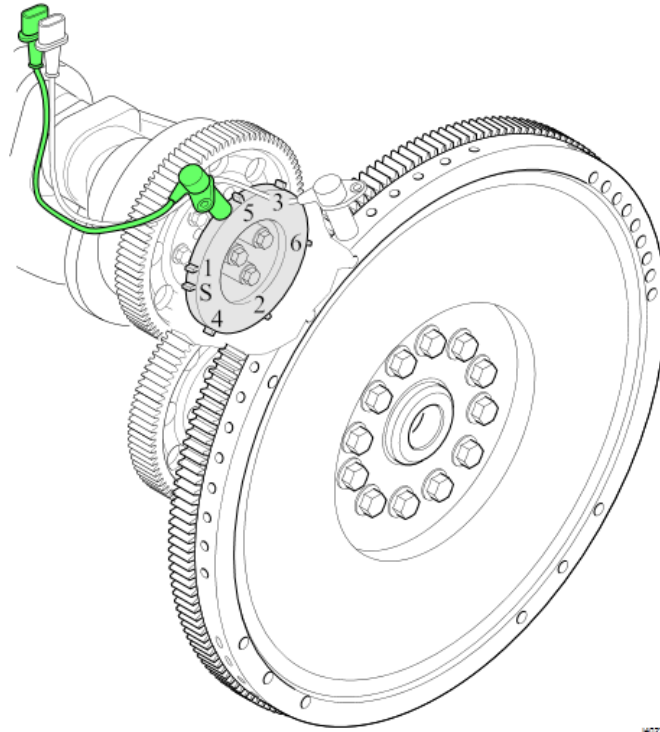
Effect on the system:

- registration of crankshaft speed
- registration of crankshaft position
- calculation of the engine speed
- 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)

Description, camshaft sensor (F558)

MX-11

The pulse wheel is attached to the inlet camshaft.

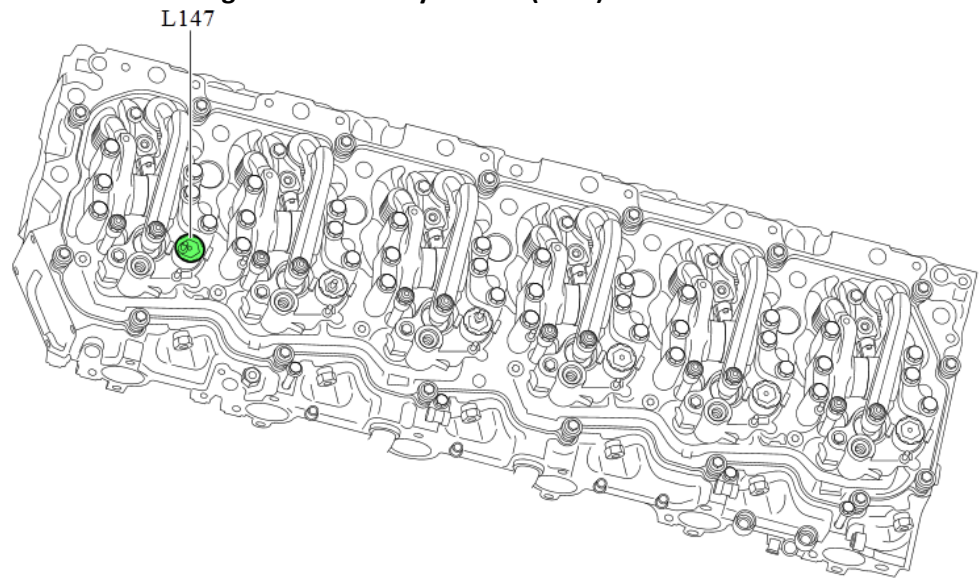


Effect on the system:

- Cylinder detection
- Synchronization during starting (together with crankshaft signal)
- Monitors correct alignment between the crankshaft and the camshaft
- Back up function for the calculation of the engine speed and crankshaft position in case the absence of the crankshaft signal (F552).

Location of component(s)

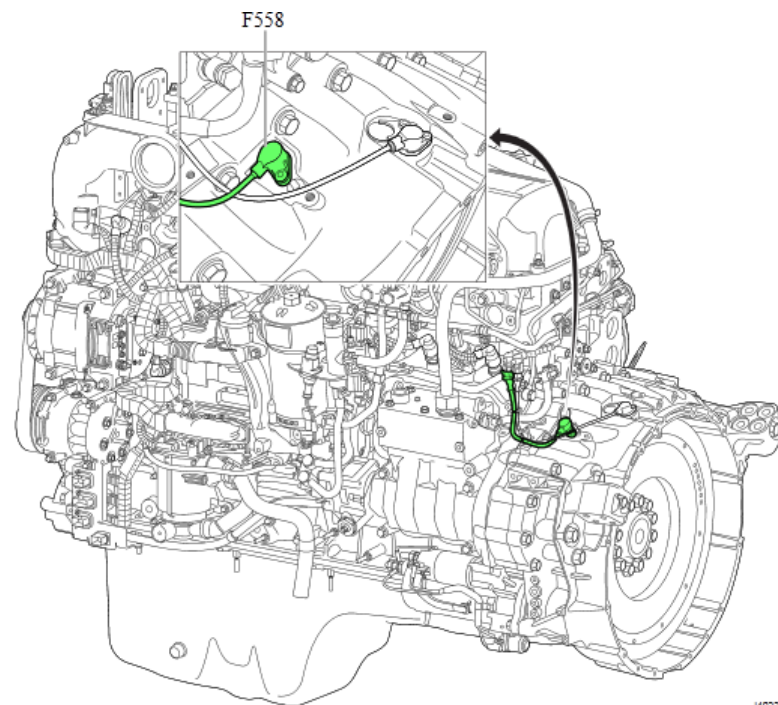
Solenoid valve engine brake MX cylinder 1 (L147)



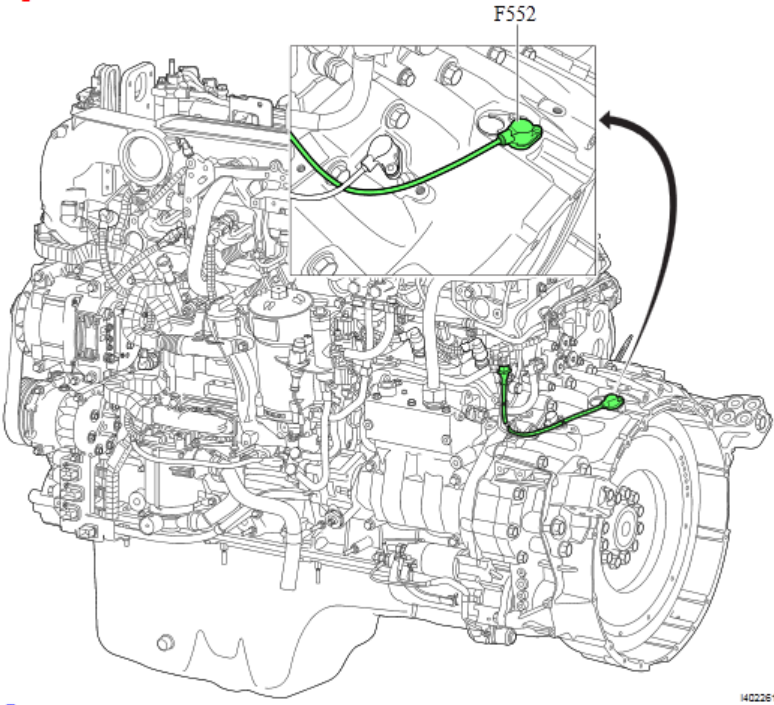
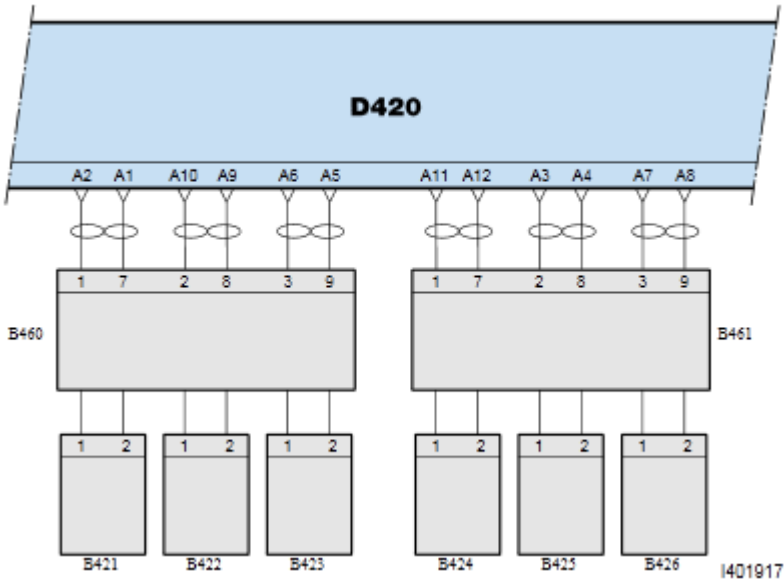
i402185-2

Camshaft sensor (F558)

MX_EPA13, MX-13



i402262

	Crankshaft sensor (F552) <i>MX_EPA13, MX-13</i> 
Diagnostic condition	This diagnostic runs when the engine is running at a steady speed and load, and the vehicle speed is steady.
Set condition of fault code	The PCI ECU (D420) detects that cylinder 1 is misfiring or the combustion contribution is lower relative to the other cylinders.
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.
Electrical diagram(s)	Checking data, injector solenoid valve cylinder 1-6 (B421-B426) 

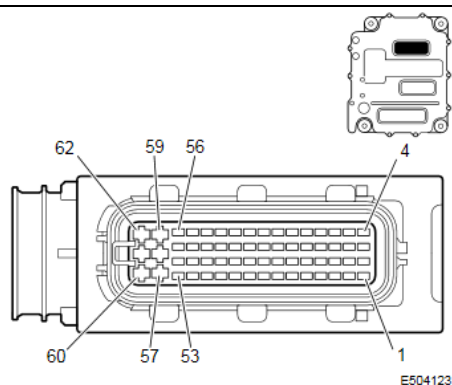
B460 connector cylinders 1-3
 B461 connector cylinders 4-6
 D420 PCI ECU
 B421 solenoid valve injector cylinder 1
 B422 solenoid valve injector cylinder 2
 B423 solenoid valve injector cylinder 3
 B424 solenoid valve injector cylinder 4
 B425 solenoid valve injector cylinder 5
 B426 solenoid valve injector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

Injector cylinders 1–3

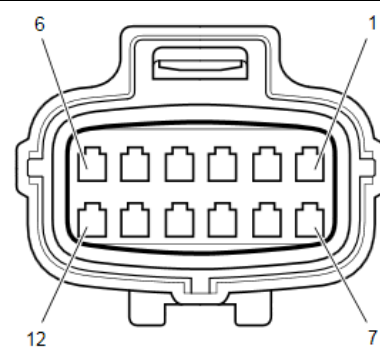
D420	B460	B421	B422	B423	Function
A1	7	2			Signal low, injector solenoid valve cylinder 1
A2	1	1			Signal high, injector solenoid valve cylinder 1
A5	9			2	Signal low, injector solenoid valve cylinder 3
A6	3			1	Signal high, injector solenoid valve cylinder 3
A9	8		2		Signal low, injector solenoid valve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

Injector cylinders 4–6

D420	B461	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



Wiring harness connector D420.A front view

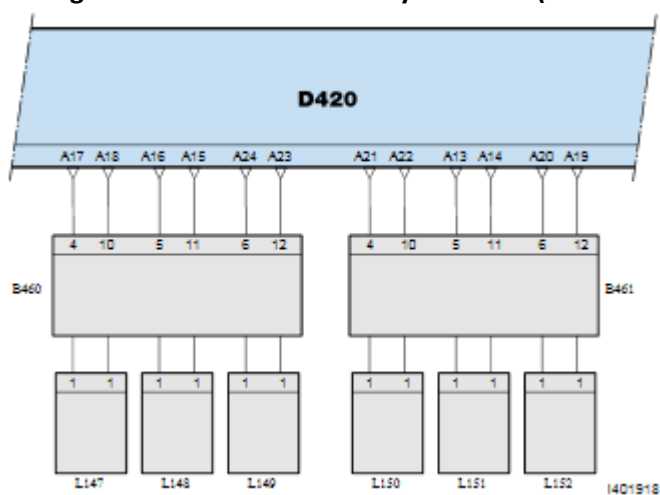


Wiring harness connector B460 & B461 front view



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

Checking data, MX Engine Brake solenoid valve cylinder 1-6 (L147-L152)



B460 connector cylinders 1-3

B461 connector cylinders 4-6

D420 PCI ECU

L147 MX Engine Brake solenoid valve cylinder 1

L148 MX Engine Brake solenoid valve cylinder 2

L149 MX Engine Brake solenoid valve cylinder 3

L150 MX Engine Brake solenoid valve cylinder 4

L151 MX Engine Brake solenoid valve cylinder 5

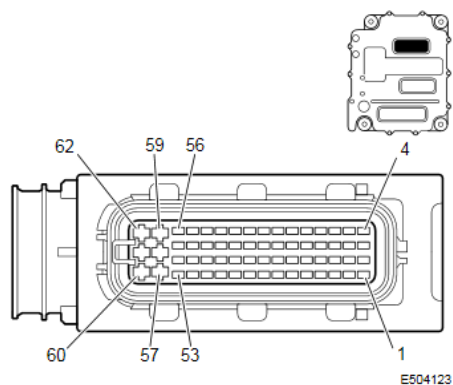
L152 MX Engine Brake solenoid valve cylinder 6

MX Engine Brakes cylinders 1–3

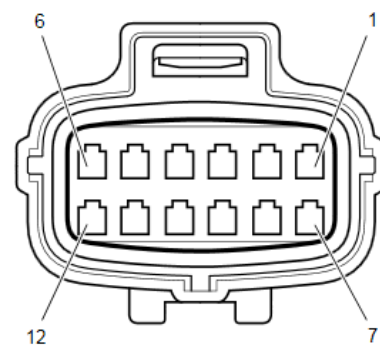
D420	B460	L147	L148	L149	Function
A15	11		1		Ground
A16	5		1		Signal, MX Engine Brake solenoid valve cylinder 2
A17	4	1			Signal, MX Engine Brake solenoid valve cylinder 1
A18	10	1			Ground
A23	12			1	Ground
A24	6			1	Signal, MX Engine Brake solenoid valve cylinder 3

MX Engine Brakes cylinders 4–6

D420	B461	L150	L151	L152	Function
A13	5		1		Signal, MX Engine Brake solenoid valve cylinder 5
A14	11		1		Ground
A19	12			1	Ground
A20	6			1	Signal, MX Engine Brake solenoid valve cylinder 6
A21	4	1			Signal, MX Engine Brake solenoid valve cylinder 4
A22	10	1			Ground



Wiring harness connector D420.A front view

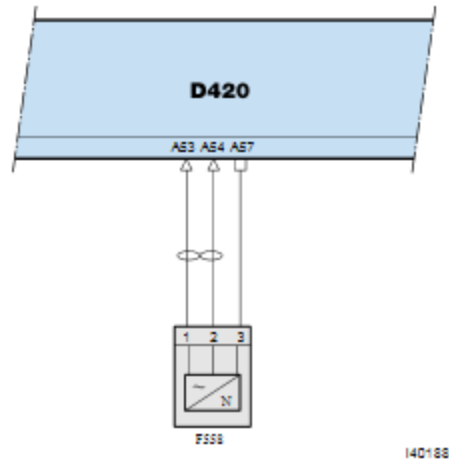


Wiring harness connector B460 & B461 front view



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

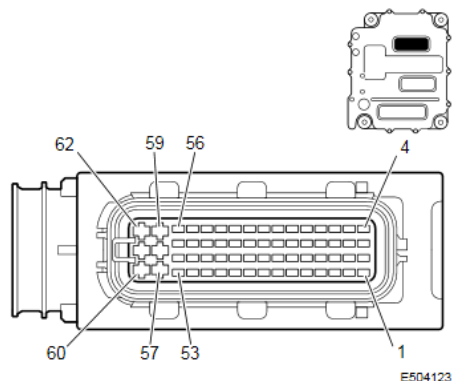
Checking data, camshaft sensor (F558)



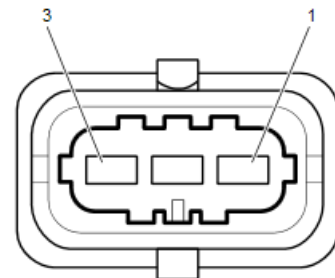
D420 PCI ECU

F558 camshaft sensor

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



Wiring harness connector D420.A front view

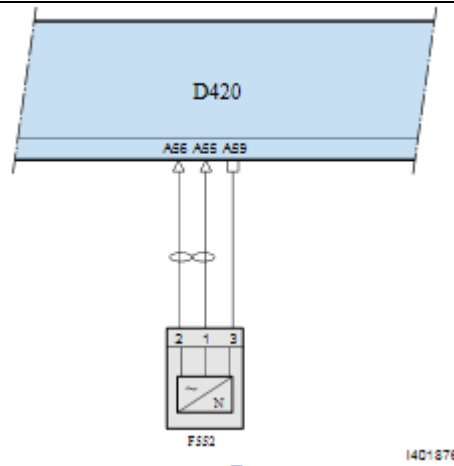


Component connector F558



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

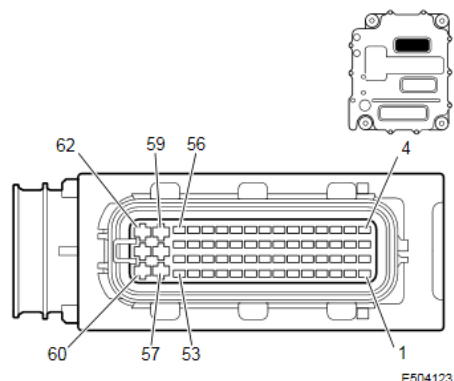
Checking data, crankshaft sensor (F552)



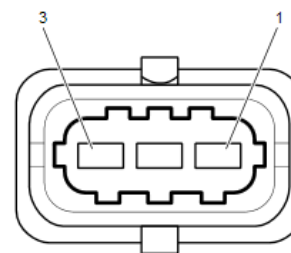
D420 PCI ECU

F552 camshaft sensor

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



Wiring harness connector D420.A front view



Component connector F552



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

Technical data

Component check, injector solenoid valve cylinder 1 (B421)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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	$\pm 0.67 \Omega$	Resistance value at 20°C [68°F]
		maximum 0.94 Ω	Resistance value at 120°C [248°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 1 (L147)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 1 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 2 (L148)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 2 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 3 (L149)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B460
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 3 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 4 (L150)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
4	10	Ubat	Activate the MX Engine Brake of cylinder 4 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 5 (L151)

Preparation

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

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
5	11	Ubat	Activate the MX Engine Brake of cylinder 5 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component check, MX Engine Brake solenoid valve cylinder 6 (L152)

Preparation

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

MX_EPA13

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	8.7–9.9 Ω	Resistance value at 25°C [68°F]



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

Component & wiring check, ECU (D420)

Preparation

- Key off the ignition.
- Connect DAVIE
- Disconnect connector B461
- Measure the front side of wiring harness connector B460

Pin (+ probe)	Pin (- probe)	Value	Additional information
6	12	Ubat	Activate the MX Engine Brake of cylinder 6 with the MX Engine Brake test in DAVIE.



If a measurement directly on the solenoid valve is necessary, the valve cover must be removed. Consult the prescribed job.

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]
		± 0.5 V	Effective AC voltage (VAC) when engine starting.
		± 2.3 V	Effective AC voltage (VAC) when engine idling.
		± 8.0 V	Effective AC voltage (VAC) engine at 1200 rpm.

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.
Possible causes	- Faulty cylinder 6 injector (not fueling or under-fueling) - Loose cylinder 6 injector - Faulty MX Engine Brake cylinder 6 - Symptom: Slightly reduced power: - Incorrect valve clearance - Large imbalance in the drive shaft - Symptom: Engine block vibration at high load, damaged flywheel Mechanical defect (for example damaged cam follower or broken valve)			
Additional information	- The PCI ECU can detect and identify the cylinder contribution of every cylinder based on analysis of the rotational speed of the crankshaft using a: - Cylinder-to-cylinder engine speed comparison, and - Cylinder-to-cylinder rotational crankshaft acceleration comparison - This DTC can be the result of another DTC that indicates too high of a combustion contribution of another cylinder.			
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?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

Refer to the troubleshooting information for these codes before continuing with this procedure.

Go to step 1.B

Step 1.B Investigate related trouble codes

Action

1. Refer to the current trouble codes obtained in step 1.A.

Are any of these related codes inactive AND did they occur before P0306?

P0087, P1087, P228D, P0093, P0094, P1086

Yes

No

If P0306 is inactive, refer to Step 5.A to determine whether this was just a temporary occurrence.

If P0306 is active, go to Step 2.A.

If this code is still present, go to step 2.A

Go to step 2.A

Step 2. Quick Checks

Step 2.A Visual inspection, connections and wiring, fuel injectors

Action

1. Visually inspect the associated component connections and wiring for any of the following related to the fuel injectors for cylinders 2, 3, and 6:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - The correct parts are not installed
 - ECU connections are damaged or disconnected
 - Battery not fully charged or contacts not tight

Was there evidence of any of the above?

Yes

No

Correct any issues found.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

If this code is still present, go to step 2.B

Go to step 2.B

Step 2.B Visual inspection, wiring and connections, crankshaft speed sensor (F552)

Action

1. Visually inspect the associated component connections and wiring for any of the following:
 - Damaged or loose connectors
 - Bent, broken, corroded, or loose connector pins
 - Moisture or dirt in the connections
 - Damage to the wire harness or insulation
 - ECU connections are damaged or disconnected

Was there evidence of any of the above?

Yes

No

	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 2.C	Go to step 2.C
	Step 2.C Visual inspection, wiring and connections, camshaft sensor (F558)	
	Action 1. Visually inspect the associated component connections and wiring for any of the following: • Damaged or loose connectors • Bent, broken, corroded, or loose connector pins • Moisture or dirt in the connections • Damage to the wire harness or insulation • ECU connections are damaged or disconnected	
	Was there evidence of any of the above?	
	Yes	No
	Correct any issues found. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	
	If this code is still present, go to step 3.A	Go to step 3.A
	Step 3. Drivetrain Checks	
	Step 3.A Electrical checks, resistance, crankshaft speed sensor (F552)	
	Refer to the corresponding Checking Data in Engine Service – Rapido for associated supply and signal voltages, resistance values, and related connector pin test points.	

	Action	
	1. Confirm the resistance level as outlined in the corresponding checking data, " <u>Component check, crankshaft speed sensor (F552).</u> "	
	Are measured values within expected range?	
	Yes	No
		Correct any issues found, or replace the crankshaft speed sensor (F552) if measured values indicate an error. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.
	Go to step 3.B	If this code is still present, go to step 3.B
	Step 3.B Visual inspection, crankshaft speed sensor (F552)	
	Action	
	1. Referring to maintenance procedure, " <u>replace crankshaft sensor (Sensors el. syst. eng.),</u> " job ID 65420, remove the crankshaft sensor and visually inspect it for any of the following:	
	• The correct parts are not installed • Sensor tip is damaged	
	Was there evidence of any of the above?	
	Yes	No
	Replace crankshaft speed sensor (F552). Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	Reinstall and reconnect crankshaft speed sensor (F552).
	If this code is still present, go to step 3.C	Go to step 3.C
	Step 3.C Electrical checks, resistance, camshaft sensor (F558)	



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

Action

1. Confirm the resistance level as outlined in the corresponding checking data, "Component check, camshaft sensor (F558)."

Are measured values within expected range?

Yes

No

Correct any issues found, or replace the camshaft sensor (F558) if measured values indicate an error.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Got to step 3.D

If this code is still present, go to step 3.D

Step 3.D Visual inspection, camshaft sensor (F558)

Action

1. Referring to maintenance procedure, "replace camshaft sensor (Sensors el. syst. eng.)," job ID 67579, remove the crankshaft sensor and visually inspect it for any of the following:
 - The correct parts are not installed
 - Sensor tip is damaged

Was there evidence of any of the above?

Yes

No

Replace camshaft sensor (F558).

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

Reinstall and reconnect camshaft sensor (F558).

If this code is still present, go to step 3.E

Go to step 3.E

Step 3.E Maintenance procedure, valve clearance

Action

1. Check the valve clearance for cylinders 2, 3, and 6 as outlined in the maintenance procedure, "adjust valve clearance (Basic assy.), job ID - 66829."

Is the measured valve clearance for any of the cylinders outside of the specified range?

Yes

Correct any issues found in the valve train assembly and adjust the valve clearance as specified.

Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.

No

If this code is still present, go to step 4.A

Go to step 4.A

Step 4. Fuel System Checks

Step 4.A Isolate a suspected fuel injector and engine brake rocker-solenoid



CSID trouble codes can result from variations in engine speed. A code reported for a suspected cylinder may actually be the result of issues on the associated prior or post firing cylinders. To isolate the problem, this step may need to be performed up to three times to evaluate components from each suspected cylinder.

Action

1. Use the DAVIE Diagnostics, Quick Check function to clear all current DTCs from the PCI and EAS-3 ECUs.
2. Referring to the table below for the suspected cylinder identified by the current trouble code (cylinder 6), exchange the injector and corresponding engine brake rocker-solenoid pair as identified using the procedure, "replace 1 (one) injector (Fuel system), job ID 65503."

Suspected Cylinder	Associated Cylinders	Exchange Injector	Exchange Rocker-Solenoid
1	4, 5	1 with 6	1 with 2

		2	4, 6	2 with 5	2 with 3
		3	5, 6	3 with 4	3 with 1
		4	2, 1	4 with 3	4 with 6
		5	1, 3	5 with 2	5 with 4
		6	3, 2	6 with 1	6 with 5
		MX-13 Ignition Firing Order: 1,5,3,6,2,4			

3.

Start the engine and allow it to run at idle for a minimum of 2 minutes.

4.

Use DAVIE Diagnostics to perform a Quick Check for current trouble codes to determine whether the problem has followed either:

a.

the suspected injector to its new exchanged location, or

b.

the corresponding rocker-solenoid to its new exchanged location.

i

Following the exchange of a suspected injector or rocker-solenoid, the resulting trouble code(s) reported through DAVIE will most likely be associated with the new exchange cylinder location.

5.

Use DAVIE to update trim codes for all injectors that have been exchanged.

6.

If the problem has not been found after exchanging components for cylinder 6, repeat step 4.A for cylinder 3.

If the problem has not been found after exchanging components for cylinder 3, repeat step 4.A for cylinder 2.

Did the problem reported through DAVIE move to the new cylinder location?

Yes	No
If the problem moved with the injector, replace the injector. If the problem moved with the rocker-solenoid pair, replace the compression brake rocker and solenoid. Refer to Step 5.A to perform the corresponding repair verification cycles and rechecks.	If all exchanges still result in P0306, there may be a possible issue with a cylinder or the flywheel. Contact the PACCAR Engine Support Center for additional assistance in diagnosing this issue.
If all steps have been completed and this trouble code is still present, contact the PACCAR Engine Support Center for further assistance.	

Step 5. Repair Verification

Step 5.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 5.B

Go to step 5.B

Step 5.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 P0306 been cleared?

Yes

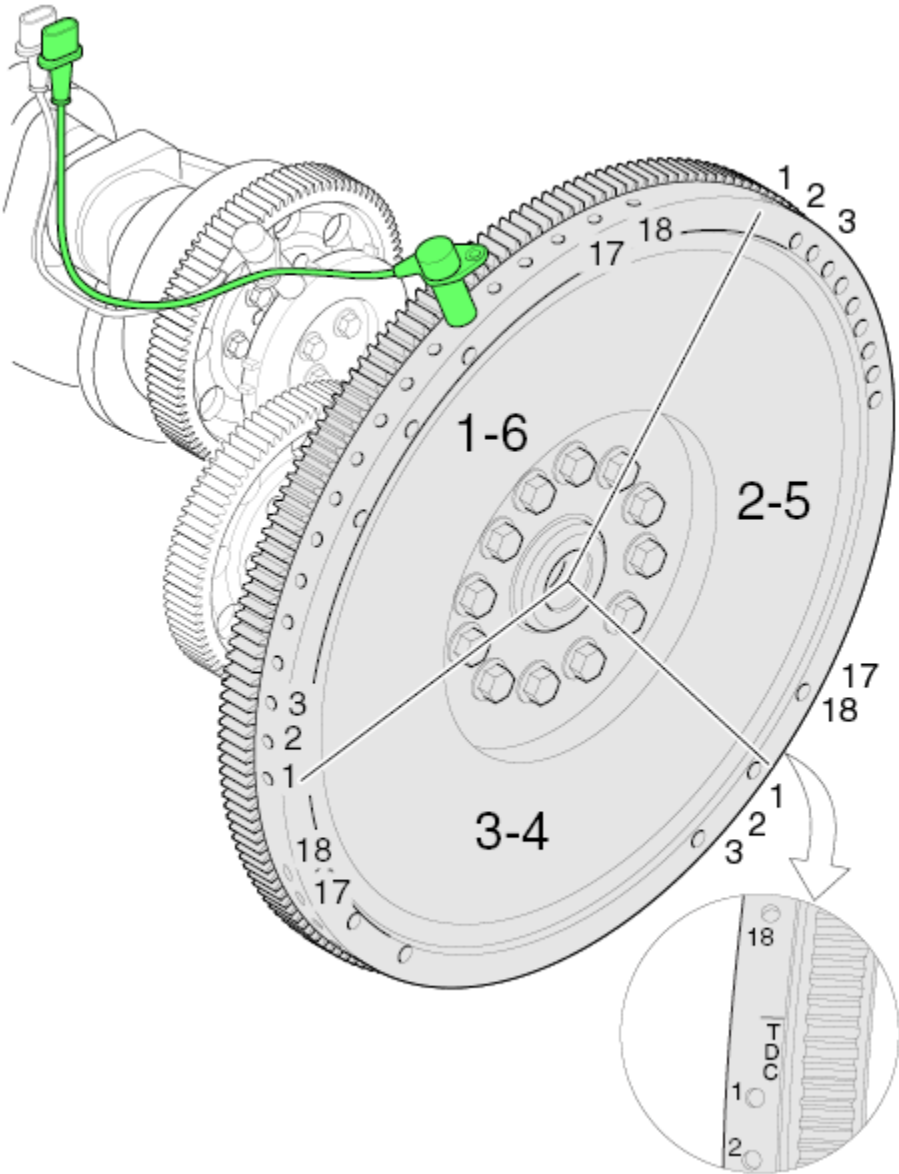
No

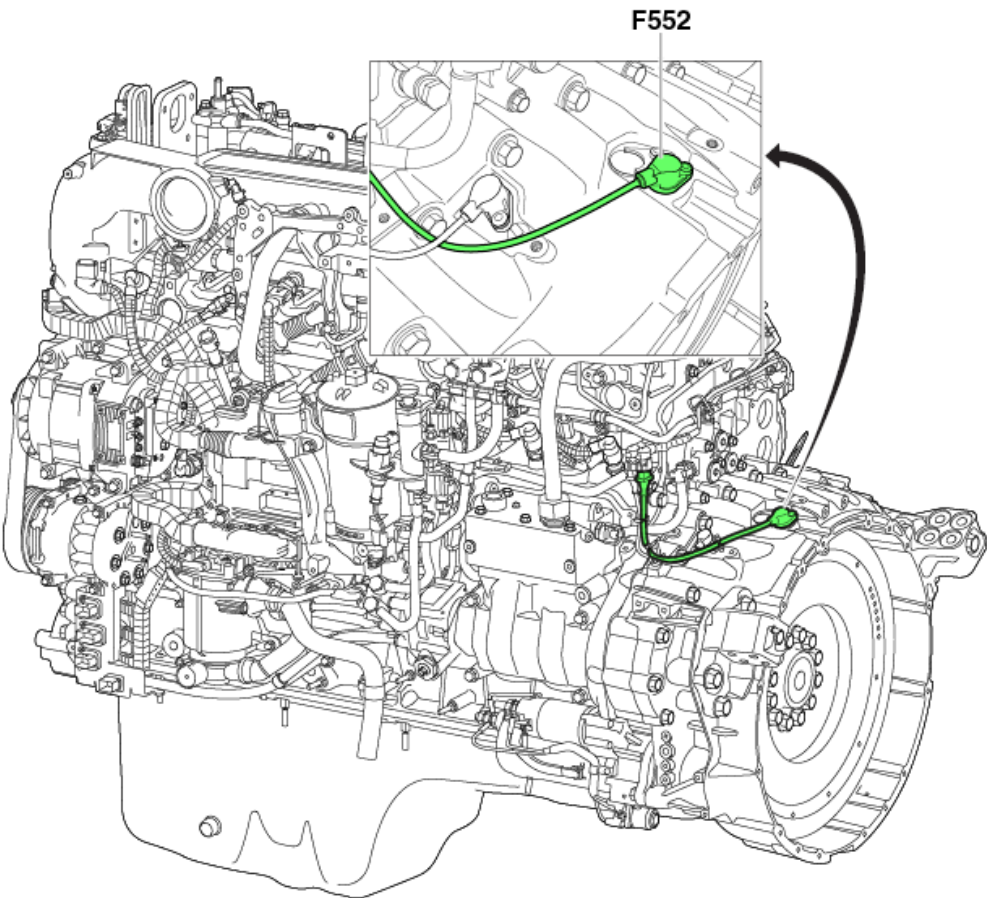
Problem resolved. No further actions.

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.

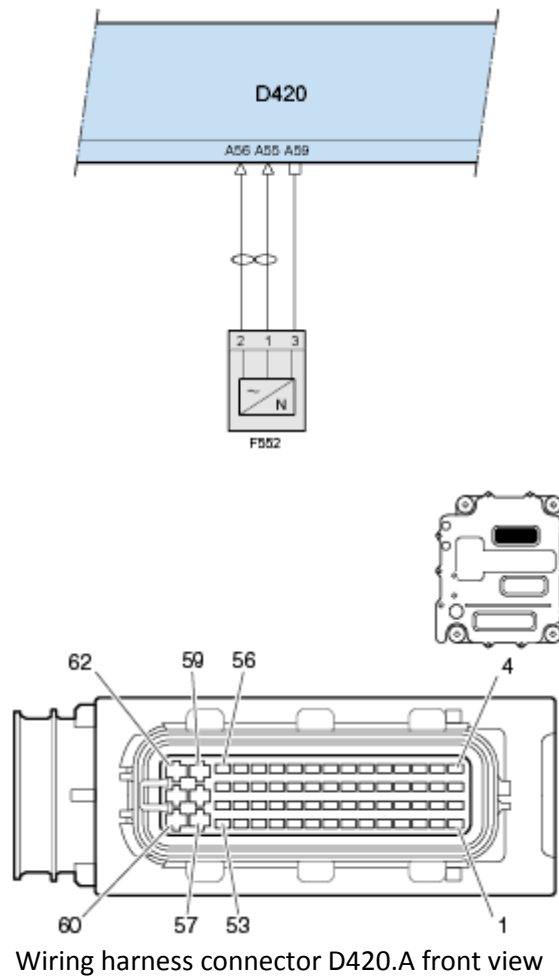
	 Contacting the PACCAR Engine Support Center For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the PACCAR Engine Support Call Center.
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P0315

Code number	P0315
Fault code description	Cylinder unbalance - Detected
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – Misfire Freeze frame type – Fuel
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)	

	 F552
Diagnostic condition	This diagnostic runs 30 seconds after the engine has started and when the engine is running at a steady speed and load between 600 and 1900 rpm.
Set condition of fault code	The PCI ECU (D420) detects an imbalance for more than 500 crankshaft revolutions.
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	F552	Function
A55	1	Ground
A56	2	Signal, crankshaft speed
A59	3	Shield

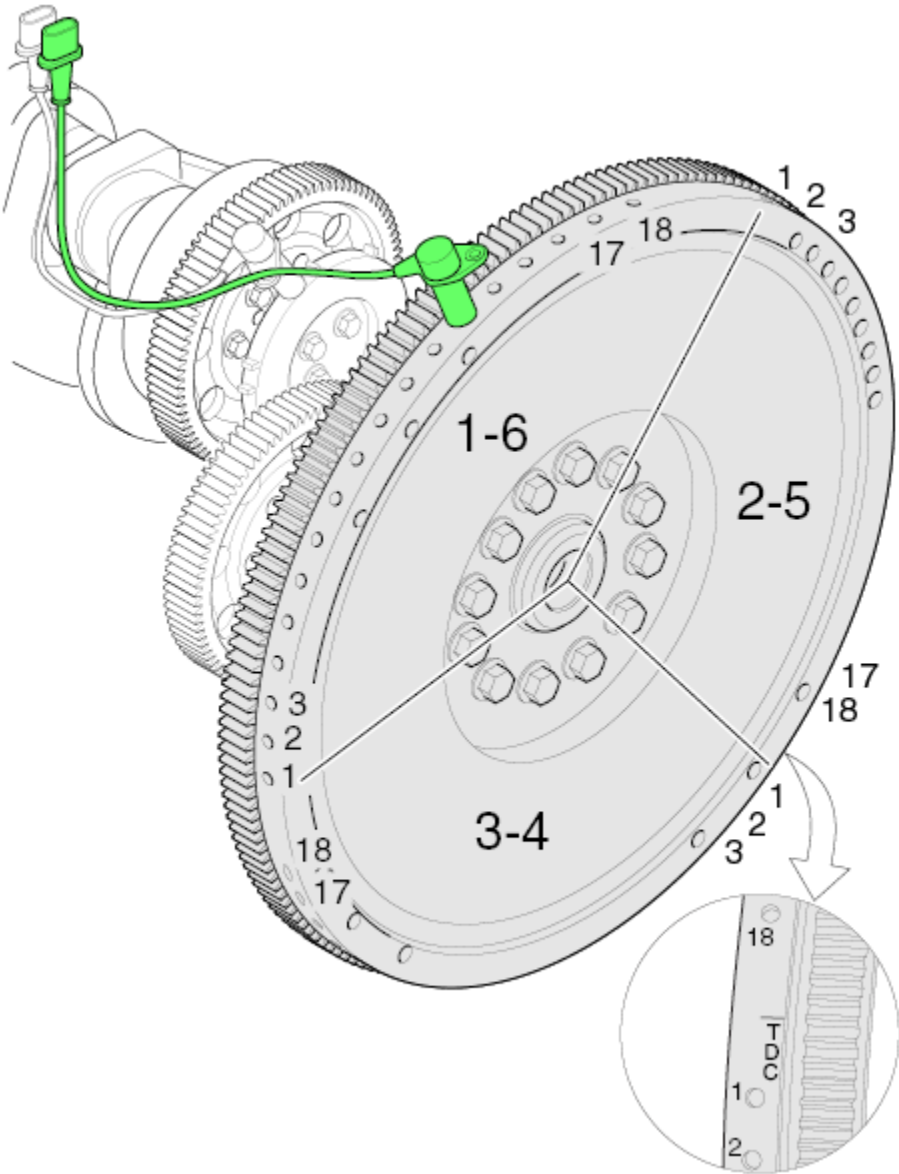
Technical data

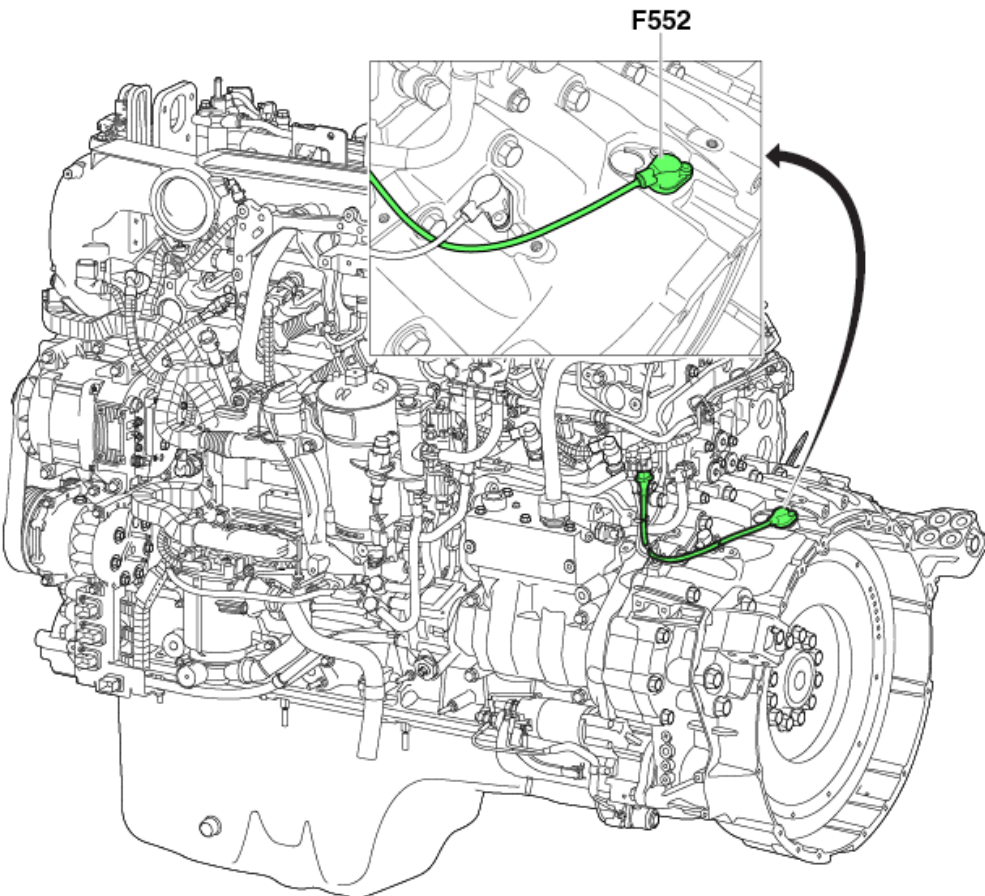
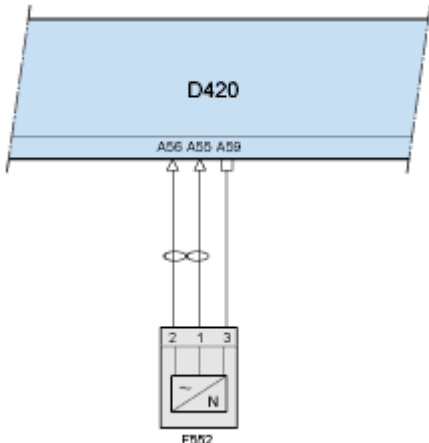
Pin (+ probe)	Pin (- probe)	Value	Additional information
1	2	774–964 Ω ± 1.5 V	Resistance value at 20°C [68°F] Effective AC voltage (VAC) when engine starting.

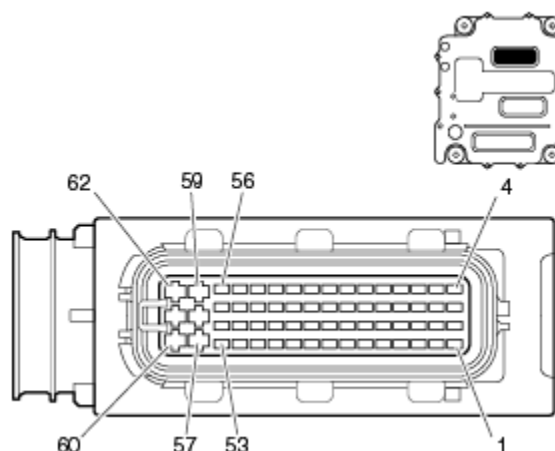
	± 4.9 V Effective AC voltage (VAC) when engine idling. ± 8.0 V Effective AC voltage (VAC) engine at 1200 rpm.																								
Possible causes	- Fuel injector failure - Mechanical engine failure																								
Additional information	The detection of cylinder misfiring is based on piston acceleration, converted to crankshaft acceleration, which is directly related to the amount of torque that a cylinder produces. To determine crankshaft acceleration, several measurements are performed by the crankshaft sensor (F552) signal.																								
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components.  - This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly. - Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors. - For specific electrical component information and pin out locations, always refer to the technical data in Rapido. - It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors. - Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido. <table><tr><td>Step 1</td><td>Step ID 0315a</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 0315b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, remove the crankshaft sensor and check for contamination and damage. - If the sensor is OK and not contaminated - Proceed to step 3. - If the sensor is contaminated – Clean the sensor and proceed to the verification procedure. - If the sensor is damaged – Replace the sensor and proceed to the verification procedure. </td></tr></table> <table><tr><td>Step 3</td><td>Step ID 0315c</td><td>SRT</td></tr><tr><td colspan="3">Turn the Key OFF, inspect the flywheel for damage. - If no damage is found – Proceed to step 4. - If there is damage – Refer to Rapido for repair. </td></tr></table> <table><tr><td>Step 4</td><td>Step ID 0315d</td><td>SRT</td></tr><tr><td colspan="3">With key ON, reprogram the PCI with the most current PRS file. Test drive the vehicle to see if the fault code reappears.</td></tr></table>	Step 1	Step ID 0315a	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 0315b	SRT	With key OFF, remove the crankshaft sensor and check for contamination and damage. - If the sensor is OK and not contaminated - Proceed to step 3. - If the sensor is contaminated – Clean the sensor and proceed to the verification procedure. - If the sensor is damaged – Replace the sensor and proceed to the verification procedure.			Step 3	Step ID 0315c	SRT	Turn the Key OFF, inspect the flywheel for damage. - If no damage is found – Proceed to step 4. - If there is damage – Refer to Rapido for repair.			Step 4	Step ID 0315d	SRT	With key ON, reprogram the PCI with the most current PRS file. Test drive the vehicle to see if the fault code reappears.		
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	• If the code ceases – Proceed to the verification procedure. • If the code still exists - 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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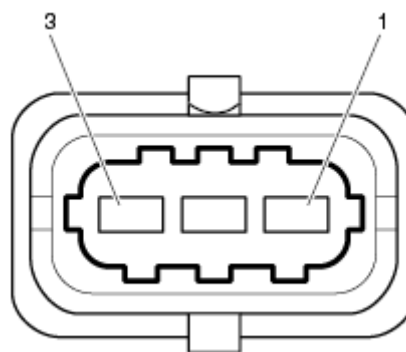
P0335

Code number	P0335
Fault code description	Crankshaft speed signal - Disturbed or no signal during engine operation
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Fuel
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 the engine is running.
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	F552	Function
A55	1	Ground
A56	2	Signal, crankshaft speed
A59	3	Shield

Technical data	Pin (+ probe)	Pin (- probe)	Value	Additional information
	1	2	774–964 Ω ± 1.5 V ± 4.9 V ± 8.0 V	Resistance value at 20°C [68°F] Effective AC voltage (VAC) when engine starting. Effective AC voltage (VAC) when engine idling. Effective AC voltage (VAC) engine at 1200 rpm.
Possible causes	- Faulty crankshaft sensor signal - Check the effective AC voltage (VAC) generated by the sensor. - Damaged flywheel - Faulty crankshaft sensor			
Additional information	- 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.			

Diagnostic Step-by-Step



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



- This troubleshooting tree is based on the assumption that supply power and ground to the PCI is functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
- It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step 1	Step ID 0335a	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 0335b	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 diagnosis for code P0016.		

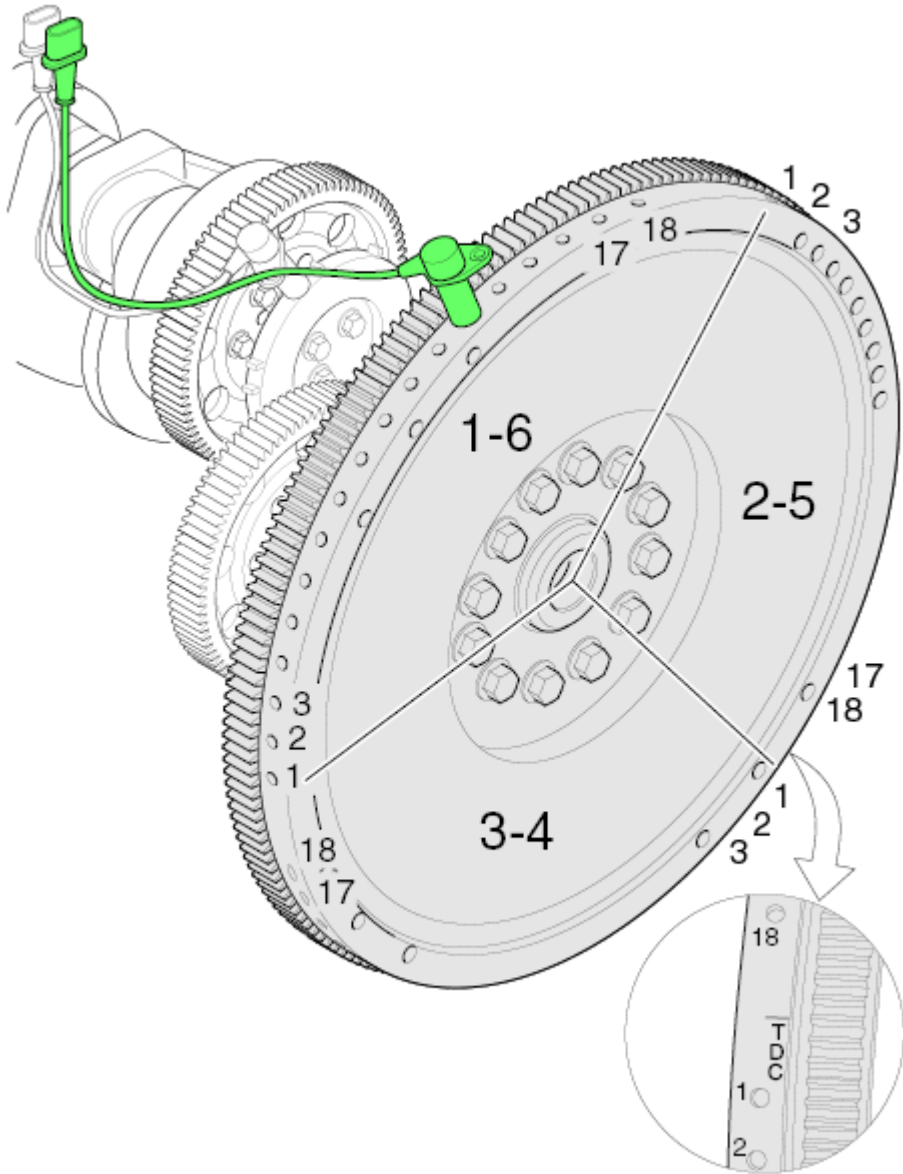
Step 3	Step ID 0335c	SRT
With key OFF, disconnect the crankshaft sensor. Measure the resistance between the signal and ground pins of the crankshaft sensor.		
Resistance values change with temperature.		
• If the resistance is acceptable – Proceed to step 4. • If the resistance is NOT acceptable – Replace the sensor and reconnect the harness, then proceed to the verification procedure listed at the end of this document.		

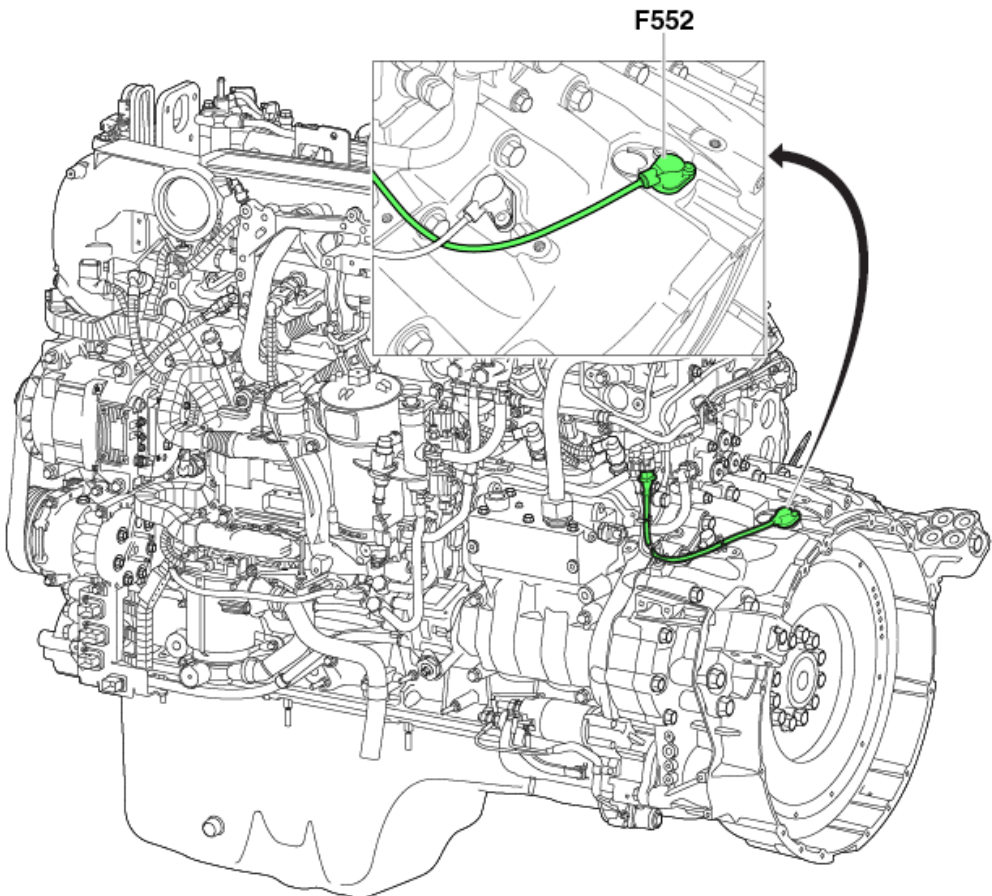
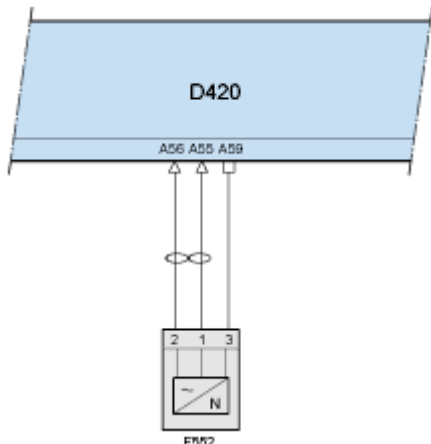
Step 4	Step ID 0335d	SRT
With key OFF, disconnect the engine harness from the PCI. Perform a continuity test on all wires associated with the sensor:		
• If the continuity is acceptable – Proceed to step 5. • If the continuity is NOT acceptable – Replace engine harness. Reconnect the harness, then proceed to the verification procedure listed at the end of this document.		

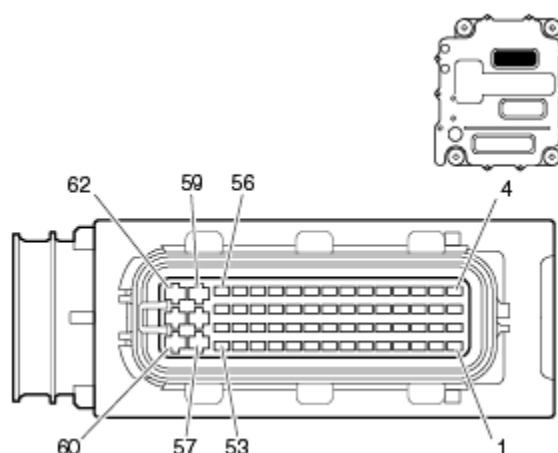
Step 5	Step ID 0335e	SRT
Inspect the connection pins of the engine harness, crankshaft sensor, and PCI:		

	• 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.						
	<table><tr><td>Step 6</td><td>Step ID 0335f</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>	Step 6	Step ID 0335f	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 6	Step ID 0335f	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.						
	<table><tr><td>Step 7</td><td>Step ID 0335g</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>	Step 7	Step ID 0335g	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 7	Step ID 0335g	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.						
<table><tr><td>Step 8</td><td>Step ID 00335h</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>	Step 8	Step ID 00335h	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 8	Step ID 00335h	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.							
<table><tr><td>Step 9</td><td>Step ID 00335i</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>	Step 9	Step ID 00335i	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 9	Step ID 00335i	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.							
<table><tr><td>Step 10</td><td>Step ID 00335j</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 P0335 is still active- Proceed to step 11. </td></tr></table>	Step 10	Step ID 00335j	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 P0335 is still active- Proceed to step 11.			
Step 10	Step ID 00335j	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 P0335 is still active- Proceed to step 11.							
<table><tr><td>Step 11</td><td>Step ID 00335k</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>	Step 11	Step ID 00335k	SRT	Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.			
Step 11	Step ID 00335k	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						

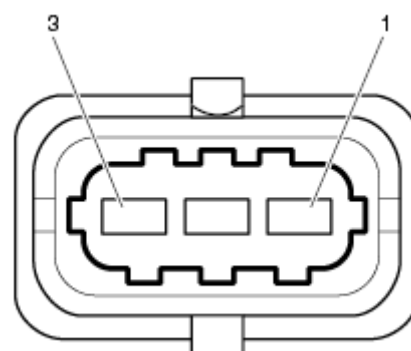
P0340

Code number	P0340
Fault code description	Camshaft speed signal-Distributed or no signal during engine operation
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
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 the engine is running.
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



Component connector F552

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

Technical data	<table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>774–964 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>± 1.5 V</td><td>Effective AC voltage (VAC) when engine starting.</td></tr><tr><td></td><td></td><td>± 4.9 V</td><td>Effective AC voltage (VAC) when engine idling.</td></tr><tr><td></td><td></td><td>± 8.0 V</td><td>Effective AC voltage (VAC) engine at 1200 rpm.</td></tr></table>	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.
Pin (+ probe)	Pin (- probe)	Value	Additional information																		
1	2	774–964 Ω	Resistance value at 20°C [68°F]																		
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		± 4.9 V	Effective AC voltage (VAC) when engine idling.																		
		± 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	 Please perform the troubleshooting steps below utilizing the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it																				

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

- This troubleshooting tree is based on the assumption that supply power and ground to the PCI is functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
- It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step 1	Step ID 0340a	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 0340b	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 engine does NOT start – Proceed to step-by-step diagnostic for code P0017

Step 3	Step ID 0340c	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, then proceed to the verification procedure listed at the end of this document.

Step 4	Step ID 0340d	SRT

With key OFF, disconnect the engine harness from 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 engine harness. Reconnect the harness, then proceed to the verification procedure listed at the end of this document.

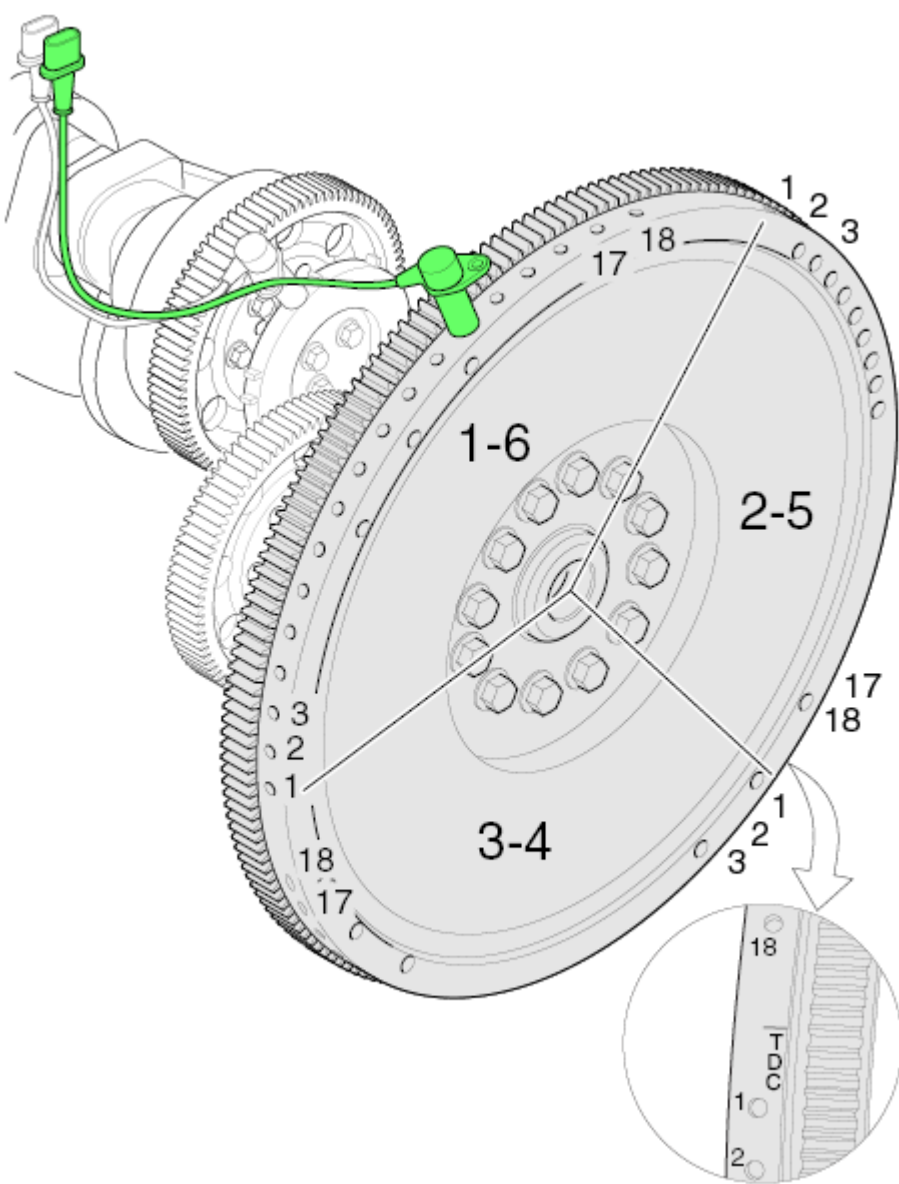
Step 5	Step ID 0340e	SRT

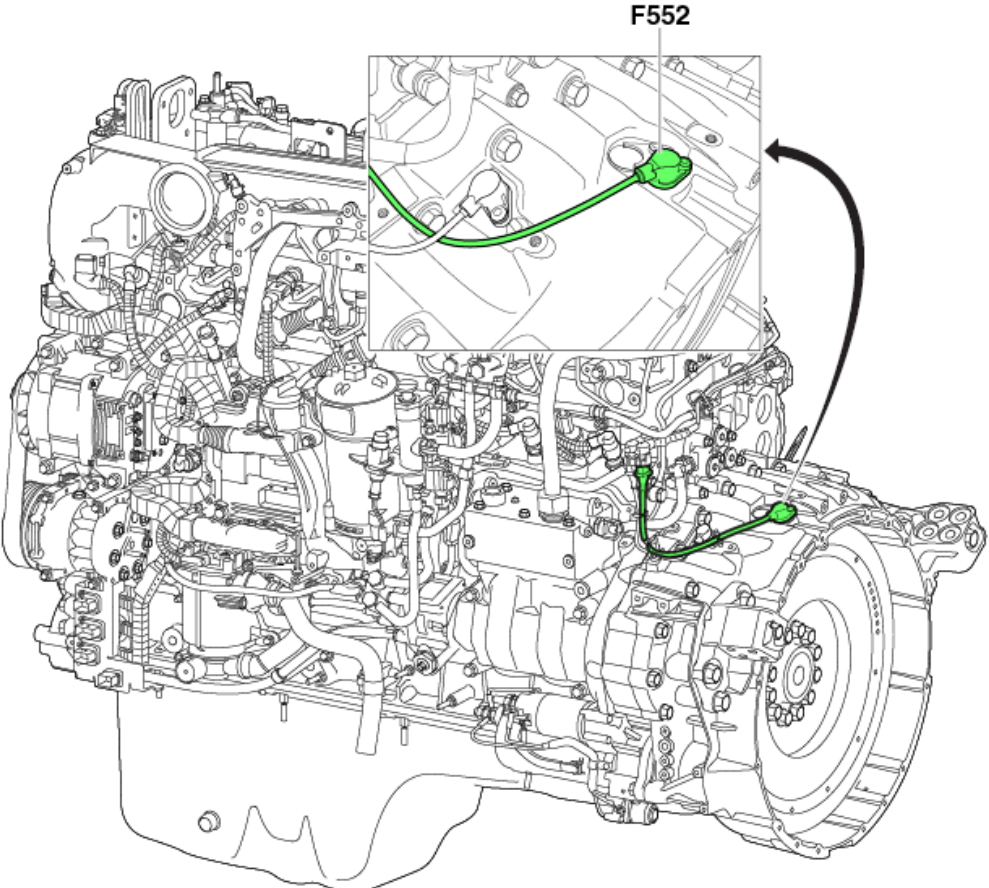
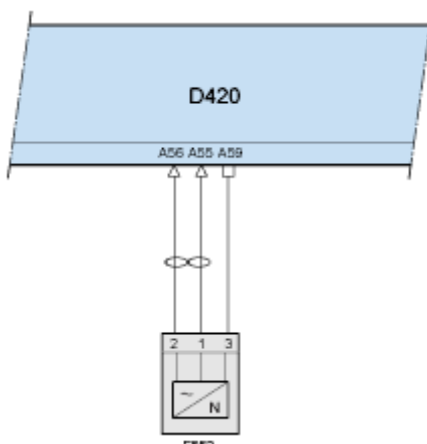
Inspect the connection pins of the engine harness, crankshaft sensor, and PCI:

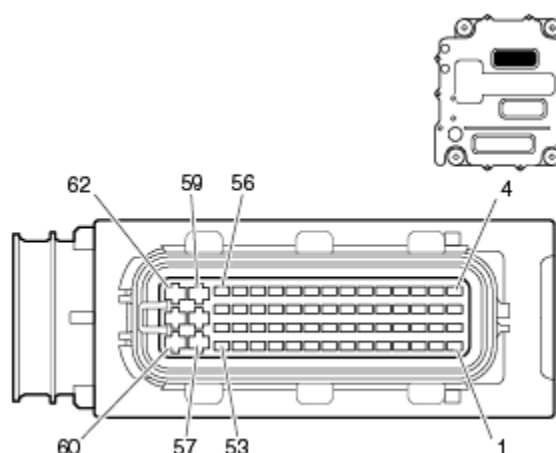
- If the pins are acceptable – Proceed to step 6.
- If the pins are NOT acceptable – Replace the engine harness. Reconnect the harness, then proceed to the verification procedure listed at the end of this document.

	<table><tr><td>Step 6</td><td>Step ID 0340f</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>	Step 6	Step ID 0340f	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 6	Step ID 0340f	SRT				
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	<table><tr><td>Step 7</td><td>Step ID 0340g</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>	Step 7	Step ID 0340g	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 7	Step ID 0340g	SRT				
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<table><tr><td>Step 8</td><td>Step ID 0340h</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>	Step 8	Step ID 0340h	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 8	Step ID 0340h	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.							
<table><tr><td>Step 9</td><td>Step ID 0340i</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>	Step 9	Step ID 0340i	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 9	Step ID 0340i	SRT					
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<table><tr><td>Step 10</td><td>Step ID 0340j</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 P0340 is still active- Proceed to step 11. </td></tr></table>	Step 10	Step ID 0340j	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 P0340 is still active- Proceed to step 11.			
Step 10	Step ID 0340j	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 P0340 is still active- Proceed to step 11.							
<table><tr><td>Step 11</td><td>Step ID 0340k</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>	Step 11	Step ID 0340k	SRT	Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.			
Step 11	Step ID 0340k	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						

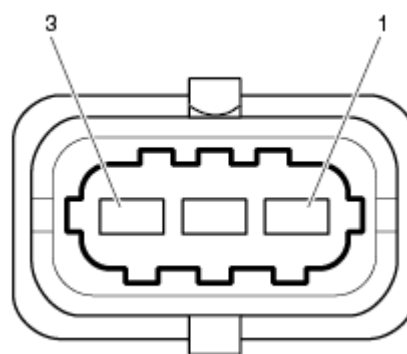
P0341

Code number	P0341
Fault code description	Camshaft speed signal-out of range during engine operation.
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Fuel
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)	 The diagram shows a side view of an engine. A green line traces the wiring from the camshaft sensor (F552) to the PCI ECU (D420). An inset provides a detailed view of the sensor's connection point on the engine block.
Diagnostic condition	This diagnostic runs Continuously when the engine is running.
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)	 The electrical diagram shows the PCI ECU (D420) at the top with pins A56, A55, and A59. Below it, the camshaft sensor (F552) is shown with pins 2, 1, and 3. The connections are as follows: - A56 is connected to pin 2. - A55 is connected to pin 1. - A59 is connected to pin 3.



Wiring harness connector D420.A front view



Component connector F552

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

Technical data	Pin (+ probe)	Pin (- probe)	Value	Additional information
	1	2	774–964 Ω ± 1.5 V ± 4.9 V ± 8.0 V	Resistance value at 20°C [68°F] Effective AC voltage (VAC) when engine starting. Effective AC voltage (VAC) when engine idling. 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 to reduce the likelihood of damage to electrical components



- This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data in Rapido.
- It is necessary to exit the '**active errors**' screen in DAVIE and run the diagnostic test again to identify changes in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step 1	Step ID 0341a	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 0341b	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 engine does NOT start – Proceed to step-by-step diagnostic for code P0017

Step 3	Step ID 0341c	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 0341d	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 0341e	SRT

Inspect the connection pins of the engine harness, crankshaft sensor, and PCI:

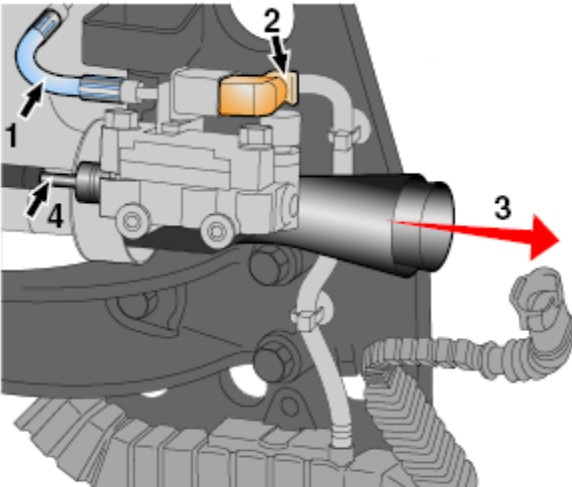
- If the pins are acceptable – Proceed to step 6.

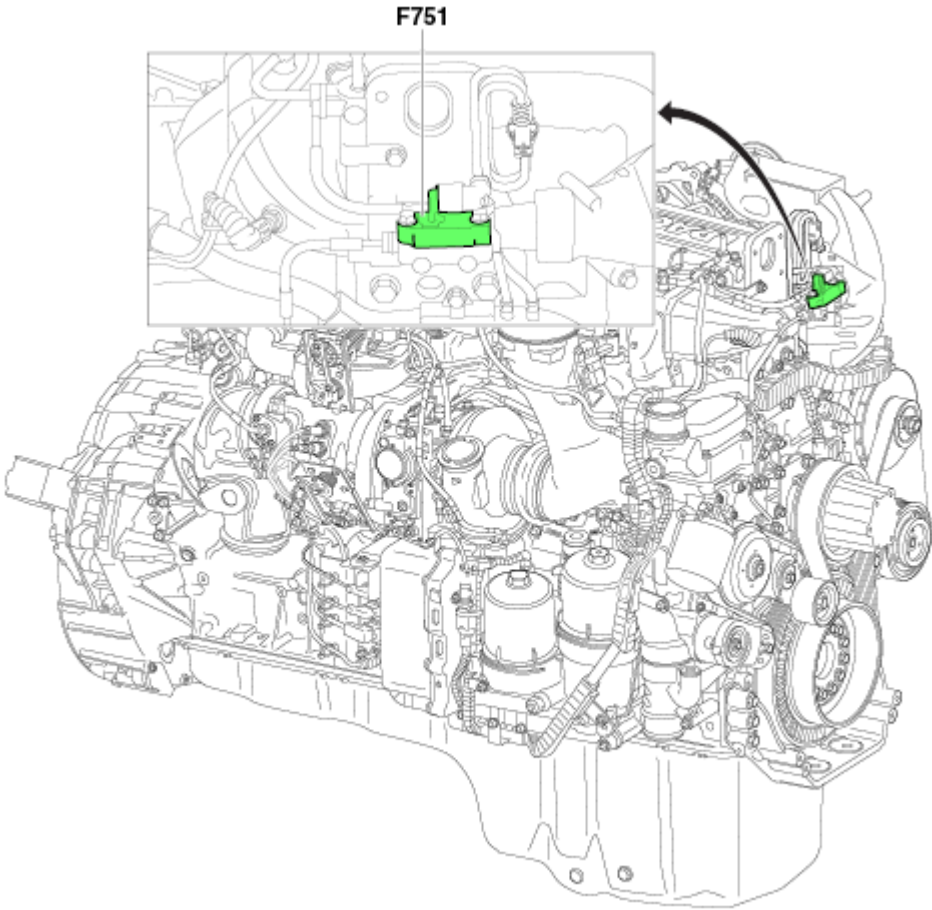
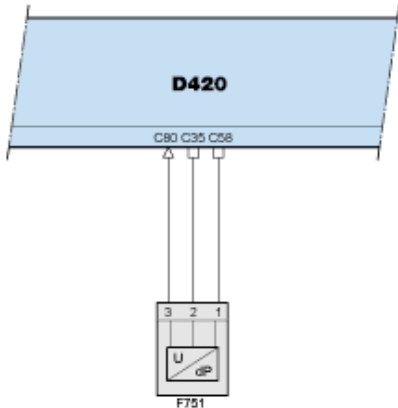
	If the pins are NOT acceptable – Replace the engine harness and reconnect. Proceed to the verification procedure listed at the end of this document.		
	Step 6	Step ID 0341f	SRT
	With key OFF, reconnect all the harnesses. Reprogram the ECU. Proceed to the verification procedure listed at the end of this document: - 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 0341g	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 0341h	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 0341i	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 0341j	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 P0341 is still active - Proceed to step 11		
	Step 11	Step ID 0341k	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		

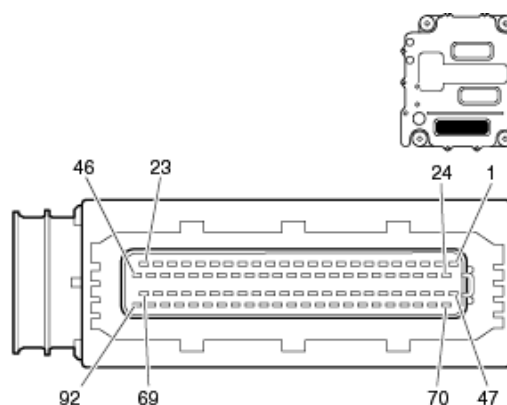
P0407

Code number	P0407
Fault code description	EGR pressure difference – Voltage too low or short circuit to ground on ECU D420 pin C80
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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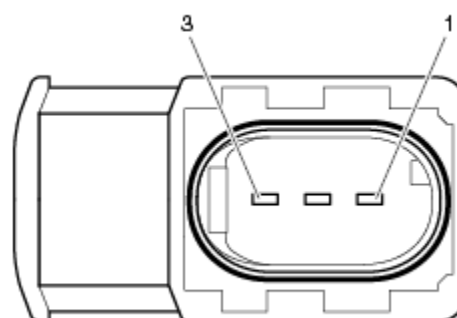
P0408

Code number	P0408
Fault code description	EGR pressure difference – Voltage too high or short circuit to supply on ECU D420 pin C80
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
Description of component(s)	The sensor measures the EGR gas pressure before and after a venturi in the EGR pipe between the EGR cooler and the engine intake pipe. The sensor operating temperature is limited to 125°C [257°F]. To prevent overheating, the sensor is cooled by the engine cooling system.  1. Coolant out 2. Electrical connection 3. EGR gas flow direction 4. Coolant in EGR flow The EGR pressure difference sensor contains two internal pressure sensors with electronics. One pressure sensor measures before the venturi and the other after the venturi. The electronics in the EGR pressure difference sensor converts this to one differential pressure signal. The PCI ECU uses the signal to calculate the EGR flow. Effect on the system: • Calculates EGR gas flow

Location of component(s)	 F751
Diagnostic condition	Diagnostic Condition Not Available
Set condition of fault code	The PCI detects sensor output voltage is too high (above 4.81 V).
Reset condition of fault code	This fault code will immediately change to inactive after the diagnostic runs and passes.
Electrical diagram(s)	 D420 C80 C35 C58 3 2 1 F751



Wiring harness connector D420.C front view



Wiring harness connector F751 front view

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 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>5 V</td><td>Ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5 V	Ignition keyed on
Pin (+ probe)	Pin (- probe)	Value	Additional information						
1	2	5 V	Ignition keyed on						
Possible causes	1. Faulty sensor 2. Short circuit to supply on pin C80 of the ECU 3. Short circuit between pin C80 and pin C14 of the ECU 4. Faulty connector								
Additional information	No Additional Information Available								
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical components								



- This troubleshooting tree is based on the assumption that supply power and ground to the PCI are functioning properly.
- Disconnecting the PCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pinout locations, always refer to the technical data in Rapido.
- It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify changes in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step 1	Step 0408a	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 0408b	SRT
With key OFF, disconnect the pressure sensor. Turn the key ON and navigate through DAVIE to read errors. • If P0407 is active – Proceed to Step 3. • If P0408 is active – Proceed to Step 4.		

Step 3	Step 0408c	SRT
With key OFF, disconnect the harness from the pressure sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the pressure sensor circuit on the engine harness: • If the voltage is between 4.75 and 5.25 V – Replace the pressure sensor and reconnect the harness. Proceed to the verification procedure listed at the end of this document. • If the voltage is not between 4.75 and 5.25 V – Proceed to Step 4.		

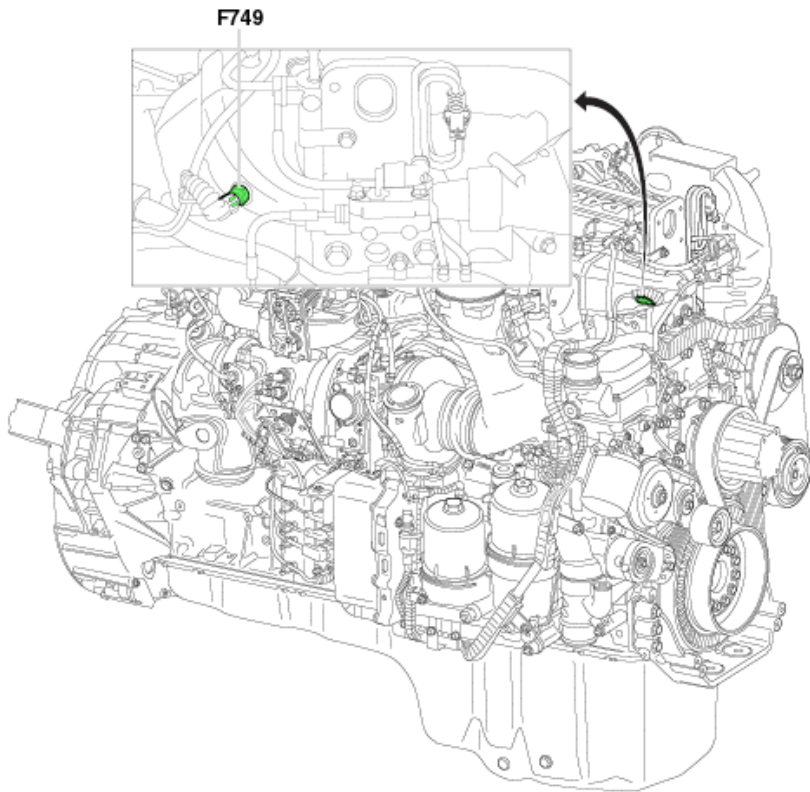
Step 4	Step 0408d	SRT
With the key OFF, clear the codes. Install a jumper wire between the 5V ref pin 1 and the signal wire pin 3 at the sensor. Turn the key ON and navigate through DAVIE to read errors. • If P0407 is active – Replace the sensor. Proceed to the verification procedure listed at the end of this document. • If P0408 is active – Proceed to Step 5.		

Step 5	Step 0408e	SRT
Possible PCI failure – Contact the Engine Support Center for further instructions about replacing the PCI.		

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

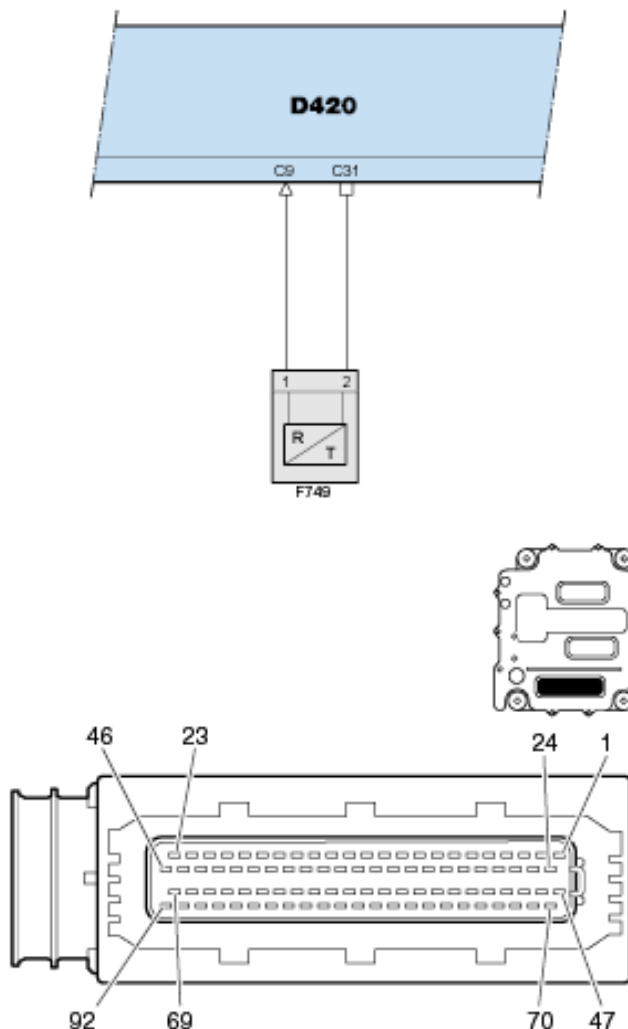
[Back to Index](#)

P040B

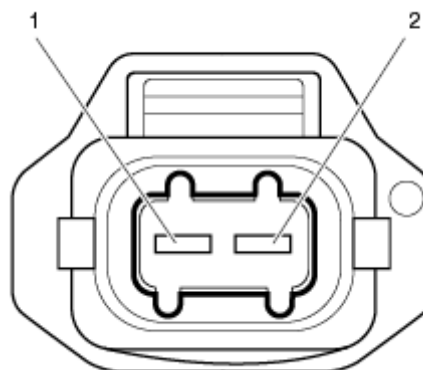
Code number	P040B
Fault code description	EGR Temperature – Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	The EGR gas flow temperature is measured after 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)	F749 
Diagnostic condition	This diagnostic runs: • when the ignition has been keyed off continuously for at least 8 hours; • difference between the coolant and ambient temperature is less than 15°C [59°F]; • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured EGR temperature sensor differs by more than 3°C [37°F] from the average of other temperature sensor readings on/off the engine for more than 5 seconds (after the ignition has been keyed off for at least 8 hours).
Reset condition of fault code	The 8-hour ignition off diagnostics consists of three separate steps: • The vehicle ignition may NOT be switched on or engine started for 8-10 consecutive hours (ideal situation would be overnight).

- Once the 8 to 10 consecutive hours have been reached, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.
- Start the engine and let it idle for 2 minutes.
 - This DTC changes to inactive when the fault is no longer detected.

Electrical diagram(s)



Wiring harness connector D420.C front view

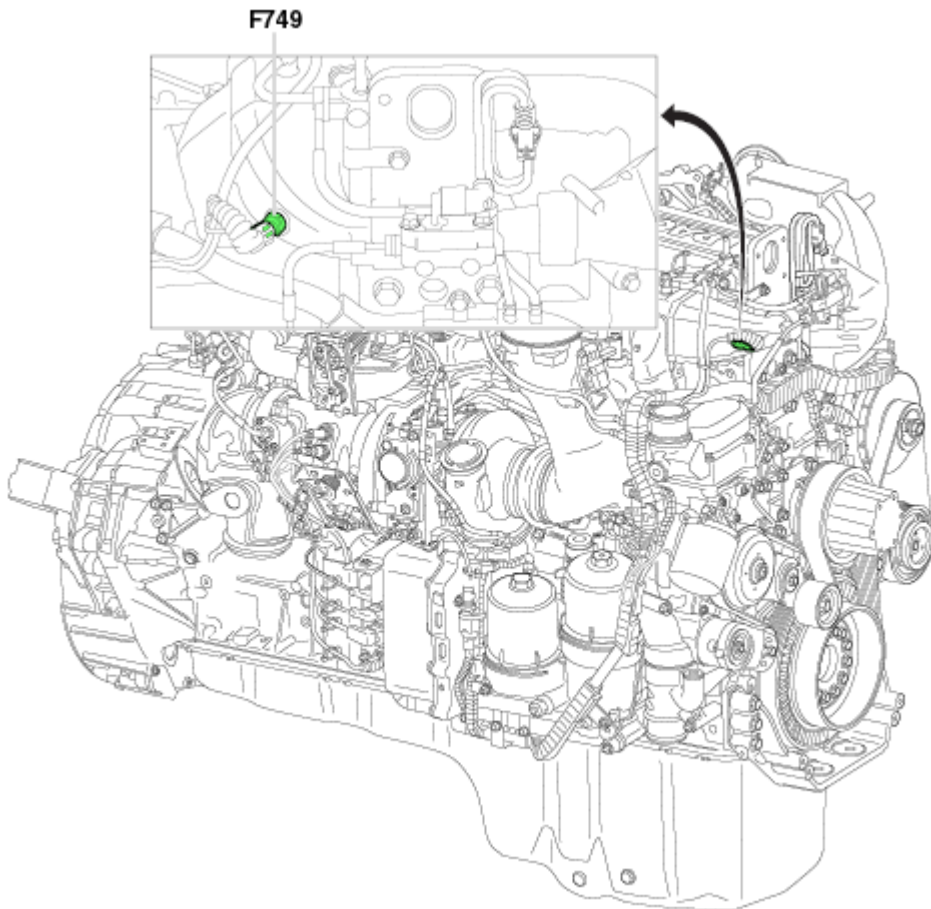


Wiring harness connector F749 front view

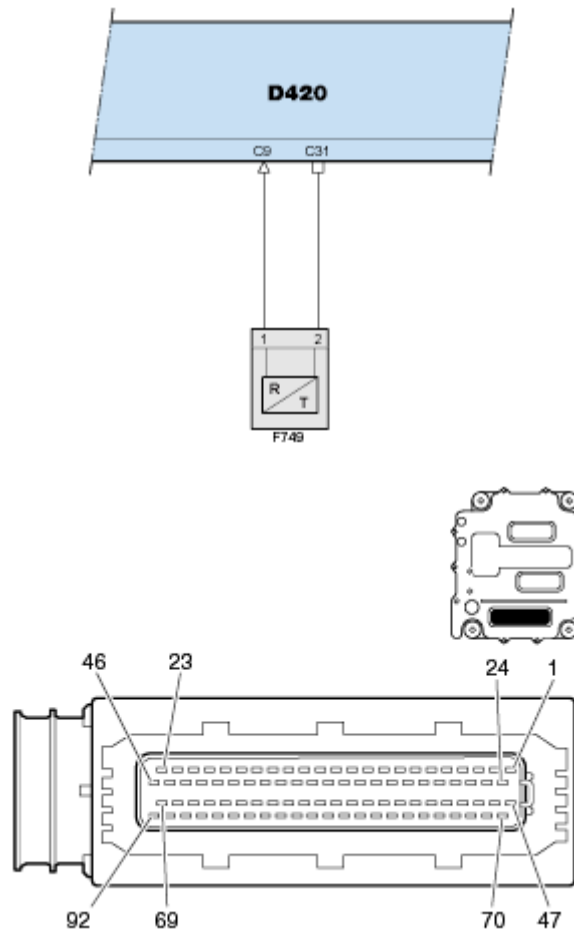
	D420 F749 Function C9 1 Signal, EGR temperature C31 2 Ground																																
Technical data	Component check, EGR temperature sensor (F749) Preparation - Key off the ignition - Disconnect connector F749 - Measure on component connector F749 <table><thead><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr></thead><tbody><tr><td>1</td><td>2</td><td>97.7–100.3 Ω</td><td>Resistance value at 0°C [32°F]</td></tr><tr><td></td><td></td><td>107.4–108.2 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>137.5–139.1 Ω</td><td>Resistance value at 100°C [212°F]</td></tr><tr><td></td><td></td><td>167.3–169.7 Ω</td><td>Resistance value at 180°C [356°F]</td></tr><tr><td></td><td></td><td>192.5–195.5 Ω</td><td>Resistance value at 250°C [482°F]</td></tr></tbody></table> Component & circuit check, ECU (D420) Preparation - Key off the ignition - Disconnect connector F749 - Measure on the front side of wiring harness connector F749 <table><thead><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional information</th></tr></thead><tbody><tr><td>1</td><td>2</td><td>5V</td><td>Ignition Keyed on</td></tr></tbody></table>	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]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	Ignition Keyed on
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Pin (+ probe)	Pin (- probe)	Value	Additional information																														
1	2	5V	Ignition Keyed on																														
Possible causes	EGR temperature sensor deviation																																
Additional information	For this diagnostic, the EGR temperature sensor (F749) reading is compared with an average of other temperature sensors on the engine after the ignition has been keyed off for at least 8 hours.																																
Diagnostic Step-by-Step	 Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components in order to reduce the likelihood of damage to electrical components. <table><tr><td>Step 1</td><td>Step ID 040Ba</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 040Bb</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? </td></tr></table>	Step 1	Step ID 040Ba	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 040Bb	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?																						
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	• Yes - Proceed to step 3 • No - Proceed to step 4		
	Step 3	Step ID 040Bc	SRT
	Replace: EGR Temperature sensor Replace the identified smart sensor. Use DAVIE to re-check for the presence of active faults. • If this related fault is no longer active, then this issue has been resolved. • If this related fault is still active, continue to the step 4 in the troubleshooting process		
	Step 4	Step ID 040Bd	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, 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		

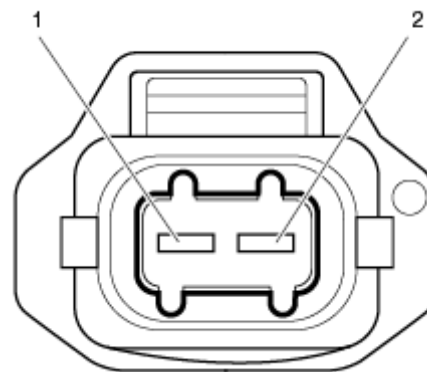
P040C

Code number	P040C
Fault code description	EGR temperature - Voltage too low or short circuit to ground on ECU D420 pin C9
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
Description of component(s)	The EGR gas flow temperature is measured after the EGR cooler. Effect on the system: • Corrects EGR gas flow calculation (the temperature is an indication of the gas density) • Closes the EGR valve when the EGR temperature is too high • Monitors EGR cooler performance
Location of component(s)	
Diagnostic condition	When Sensor output voltage is too low.
Set condition of fault code	The PCI detects sensor output voltage is too low (below 0.05 V).
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)



Wiring harness connector D420.C front view



Wiring harness connector F749 front view

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

Technical data

Component check, EGR temperature sensor (F749)

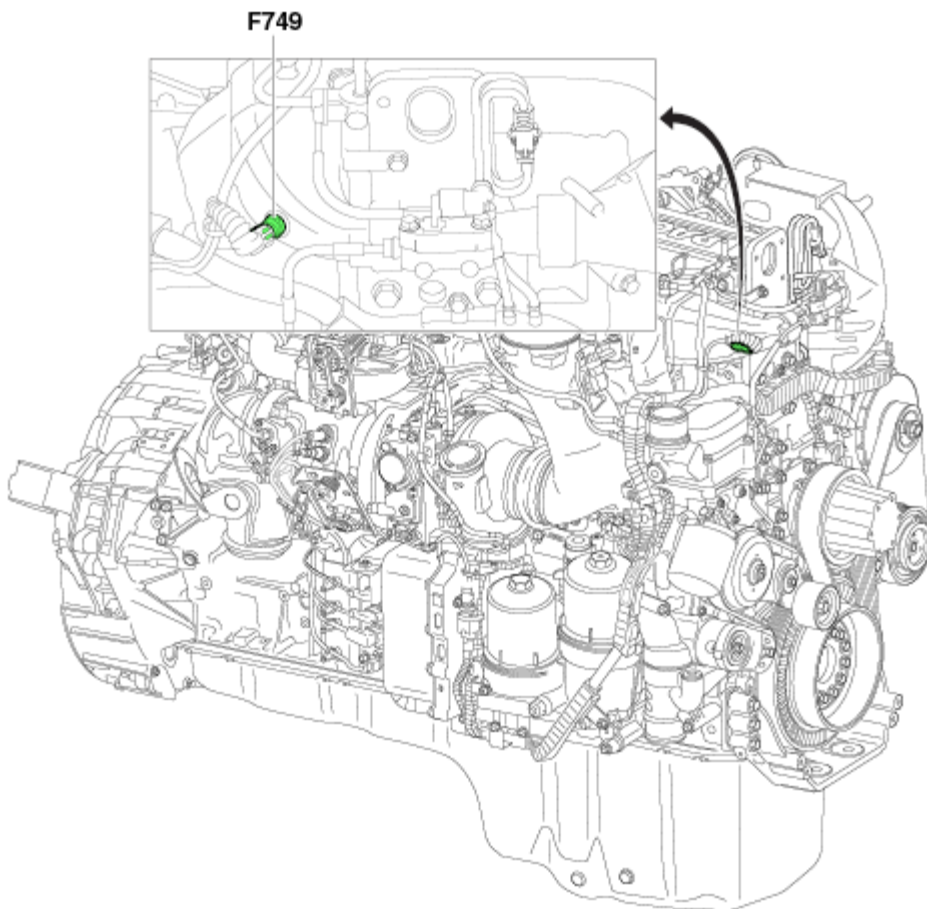
Preparation

- Key off the ignition
- Disconnect connector F749

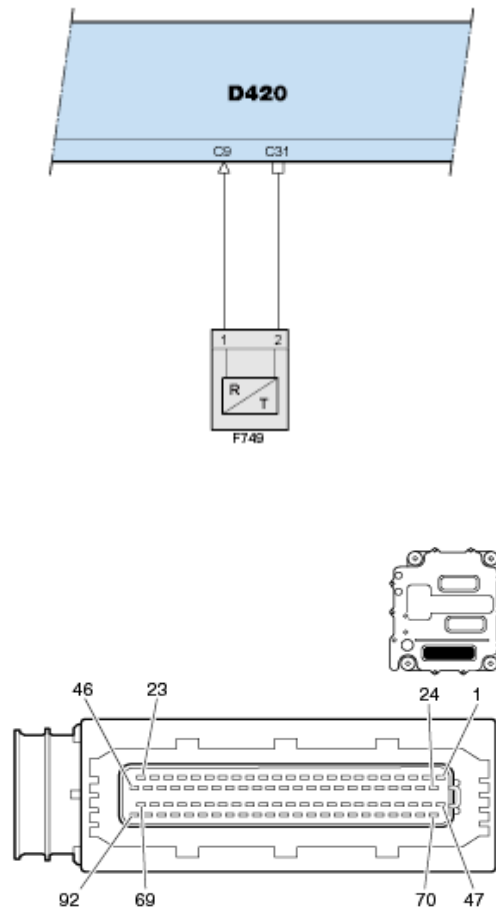
	- Measure on component connector F749 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>97.7–100.3 Ω</td><td>Resistance value at 0°C [32°F]</td></tr><tr><td></td><td></td><td>107.4–108.2 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>137.5–139.1 Ω</td><td>Resistance value at 100°C [212°F]</td></tr><tr><td></td><td></td><td>167.3–169.7 Ω</td><td>Resistance value at 180°C [356°F]</td></tr><tr><td></td><td></td><td>192.5–195.5 Ω</td><td>Resistance value at 250°C [482°F]</td></tr></table> Component & circuit check, ECU (D420) Preparation - Key off the ignition - Disconnect connector F749 - Measure on the front side of wiring harness connector F749 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>5V</td><td>Ignition Keyed on</td></tr></table>	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]	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5V	Ignition Keyed on
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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. <table><tr><td>Step 1</td><td>Step ID 040C-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 040C-b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the temperature sensor. Turn the key ON and navigate through DAVIE to read errors: - If P040D is active – Replace the sensor and reconnect the harness, and proceed to the verification procedure listed at the end of this document. - If P040C is active – Proceed to step 3. </td></tr></table>	Step 1	Step ID 040C-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 040C-b	SRT	With key OFF, disconnect the temperature sensor. Turn the key ON and navigate through DAVIE to read errors: - If P040D is active – Replace the sensor and reconnect the harness, and proceed to the verification procedure listed at the end of this document. - If P040C is active – Proceed to step 3.																						
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	<table><tr><td>Step 3</td><td>Step ID 040C-c</td><td>SRT</td></tr><tr><td colspan="3">With the key OFF, disconnect the harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If P040D – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P040C – Proceed to step 4. </td></tr></table>	Step 3	Step ID 040C-c	SRT	With the key OFF, disconnect the harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If P040D – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P040C – Proceed to step 4.		
Step 3	Step ID 040C-c	SRT					
With the key OFF, disconnect the harness from the PCI. Turn the key ON and navigate through DAVIE to read errors: • If P040D – Replace the engine harness and proceed to the verification procedure listed at the end of this document. • If P040C – Proceed to step 4.							
	<table><tr><td>Step 4</td><td>Step ID 040C-d</td><td>SRT</td></tr><tr><td colspan="3">Possible PCI failure! 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>	Step 4	Step ID 040C-d	SRT	Possible PCI failure! 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.		
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Possible PCI failure! For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.							
Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.						
	Back to Index						

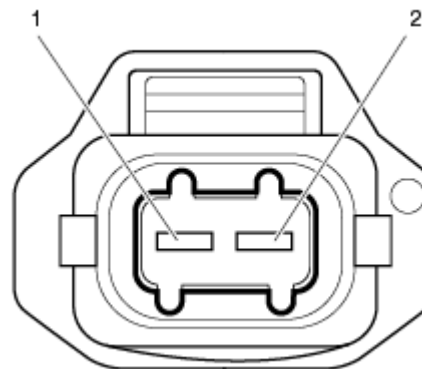
P040D

Code number	P040D
Fault code description	EGR temperature - Voltage too high or short circuit to supply on ECU D420 pin C9
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive
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)	 The diagram illustrates the engine layout with the EGR gas flow temperature sensor (F749) highlighted. An inset shows a detailed view of the sensor's location on the engine block, indicated by a green dot and the label F749. A curved arrow points from the main engine view to the inset.
Diagnostic condition	This diagnostic runs continuously when the ignition is on.
Set condition of fault code	The PCI ECU (D420) detects that EGR temperature sensor circuit output voltage is greater than 4.9 V.
Reset condition of fault code	This fault code will change to inactive immediately after the diagnostic runs and passes.

Electrical diagram(s)



Wiring harness connector D420.C front view



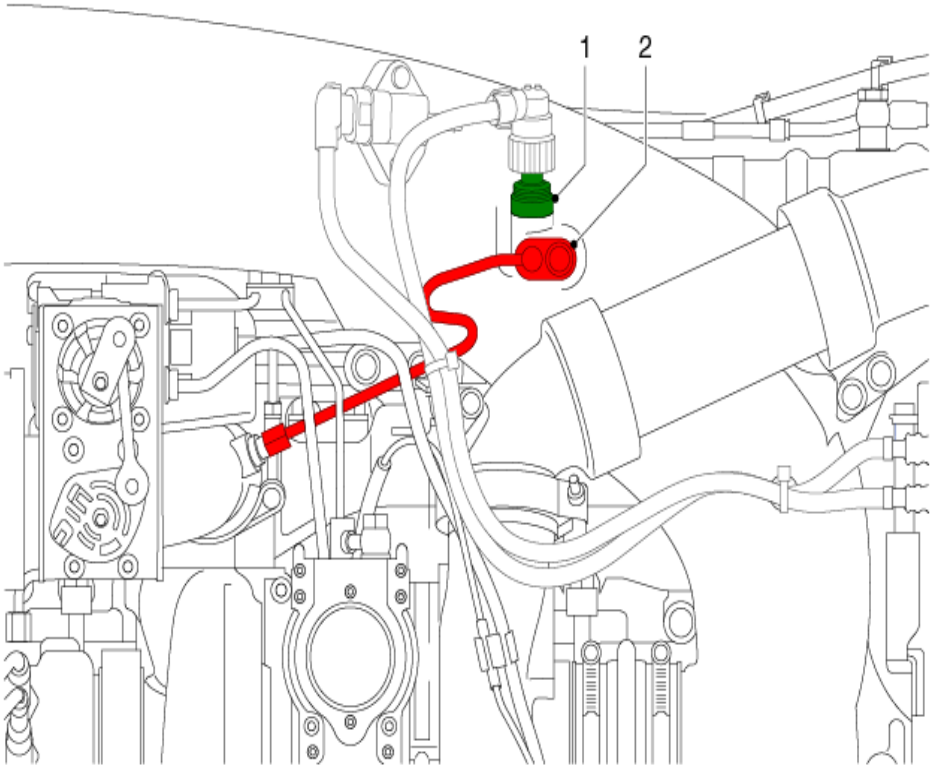
Wiring harness connector F749 front view

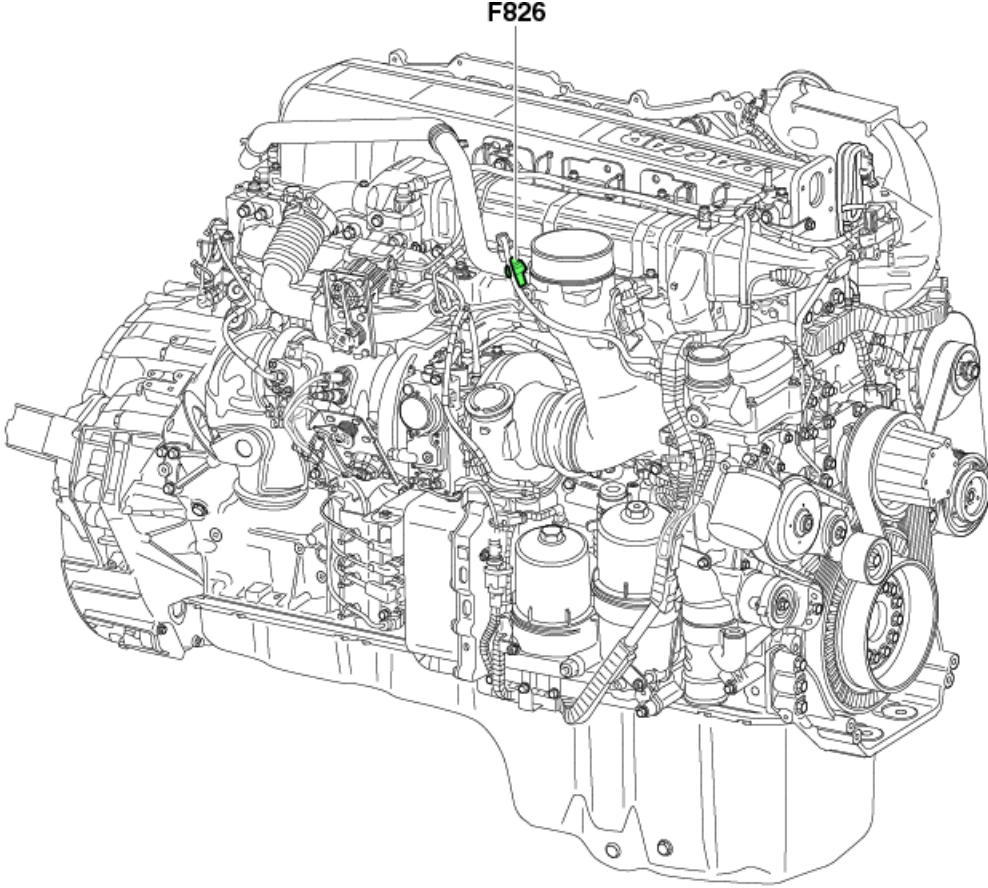
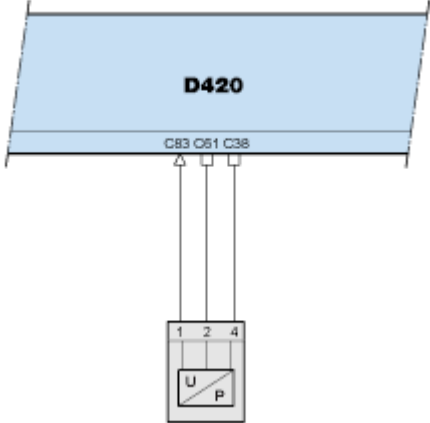
D420	PCI ECU	
F749	EGR Temperature Sensor	
D420	F749	Function
C9	1	Signal, EGR temperature
C31	2	Ground

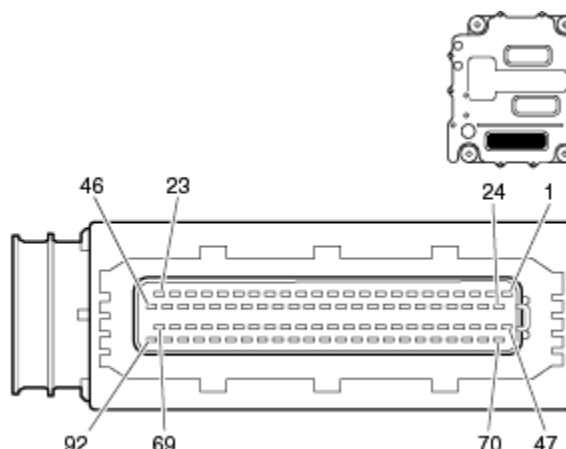
Technical data	Component check, EGR temperature sensor (F749) Preparation - Key off the ignition - Disconnect connector F749 - Measure on component connector F749 <table><thead><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional Information</th></tr></thead><tbody><tr><td>1</td><td>3</td><td>97.7–100.3 Ω</td><td>Resistance value at 0°C [32°F]</td></tr><tr><td></td><td></td><td>107.4–108.2 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>137.5–139.1 Ω</td><td>Resistance value at 20°C [68°F]</td></tr><tr><td></td><td></td><td>167.3–169.7 Ω</td><td>Resistance value at 180°C [356°F]</td></tr><tr><td></td><td></td><td>192.5–195.5 Ω</td><td>Resistance value at 250°C [482°F]</td></tr></tbody></table> Component & circuit check, ECU (D420) Preparation - Key off the ignition - Disconnect connector F749 - Measure on the front side of wiring harness connector F749 <table><thead><tr><th>Pin (+ probe)</th><th>Pin (- probe)</th><th>Value</th><th>Additional Information</th></tr></thead><tbody><tr><td>1</td><td>3</td><td>5V</td><td>Ignition keyed on</td></tr></tbody></table>	Pin (+ probe)	Pin (- probe)	Value	Additional Information	1	3	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 20°C [68°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]	Pin (+ probe)	Pin (- probe)	Value	Additional Information	1	3	5V	Ignition keyed on
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	Step 2	Step ID 040D-b	SRT				
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Possible PCI failure – Contact the Engine Support Center for further instructions on replacement of the PCI.							
Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.						
	Back to Index						

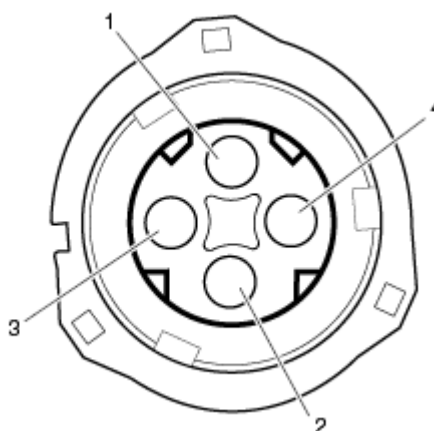
P0471

Code number	P0471
Fault code description	Pressure before turbine – Data erratic, intermittent, or incorrect at Ignition ON
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group - None Freeze frame type -Comprehensive
Description of component(s)	The exhaust gas pressure before the turbine is measured with sensor (1) via a steel tube (2) before the EGR valve.  The diagram shows a cross-section of an engine and its exhaust system. A green sensor, labeled '1', is connected to a red steel tube, labeled '2'. The tube runs from the sensor through the exhaust manifold and before the EGR valve. The sensor is connected to a wiring harness. The EGR valve is shown as a large component with a circular opening. The exhaust manifold is shown with multiple ports. The diagram is a technical line drawing with some color highlights for the sensor and tube. Effect on the system: • Control of the VTG turbo charger • Control of the EGR flow • Control of the BPV valve • Control of the engine brake • Calculates the exhaust gas temperature before the turbine Lower measured exhaust gas pressure before turbine results in higher calculated exhaust gas temperature before the turbine.

Location of component(s)	 F826
Diagnostic condition	This diagnostic runs: • when the ignition is switched on (NO engine start), and; • ambient temperature is more than -20°C [-4°F]
Set condition of fault code	The PCI ECU (D420) detects that the measured pressure before turbine sensor reading differs by more than 0.36 bar [5.2 psi] from the average of other pressure sensor readings on the engine for more than 5 seconds.
Reset condition of fault code	To validate the repair, key on the ignition (NO engine start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.
Electrical diagram(s)	



Wiring harness connector D420.C front view



Wiring harness connector F826 front view

D420	F829	Function
C38	4	Ground
C61	2	Power supply
C83	1	Signal, pressure before turbine

Technical Data

Component & wiring check, ECU (D420)

Preparation

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

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

Possible causes

Pressure sensor before turbine deviation

Additional information

For this diagnostic, the pressure sensor before turbine (F826) reading is compared with an average of other pressure sensor readings on/off the engine.

Diagnostic Step-by-Step



Perform the troubleshooting steps below using the breakout harness, if necessary, to check electrical components, such as sensors, electrical control units, and harnesses. Back probing is not recommended, as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components 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 0471a

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 0471b

SRT

Visual Inspection: Pressure sensor before turbo (P3)

Visually inspect the identified component for any of the following:

- Moisture or excessive build-up

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 ID 0471c

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 4

Step ID 0471d

SRT

Replace: Pressure sensor before turbo (P3)

Replace the identified faulty component.

Use DAVIE to check for the presence of active faults.

- If this related fault is no longer active, then this issue has been resolved.
- If this related fault is still active, continue to the next step 5 in the troubleshooting process.

	Step 5	Step ID 0471e	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, 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		

P0472

Code number	P0472
Fault code description	Pre-turbine air pressure under range fault Pressure before turbine - Voltage too low or short circuit to ground on ECU D420 pin C83
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P0473

Code number	P0473
Fault code description	Pre-turbine air pressure under range fault Pressure before turbine - Voltage too high or short circuit to supply on ECU D420 pin C83
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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

P047C

Code number	P047C
Fault code description	Air pressure post-BPV under range
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please contact 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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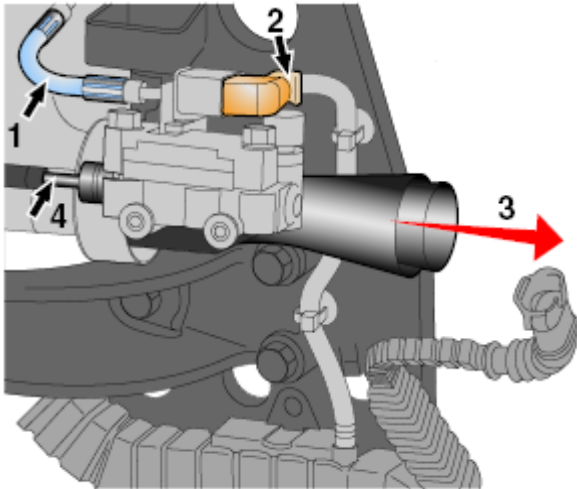
P047D

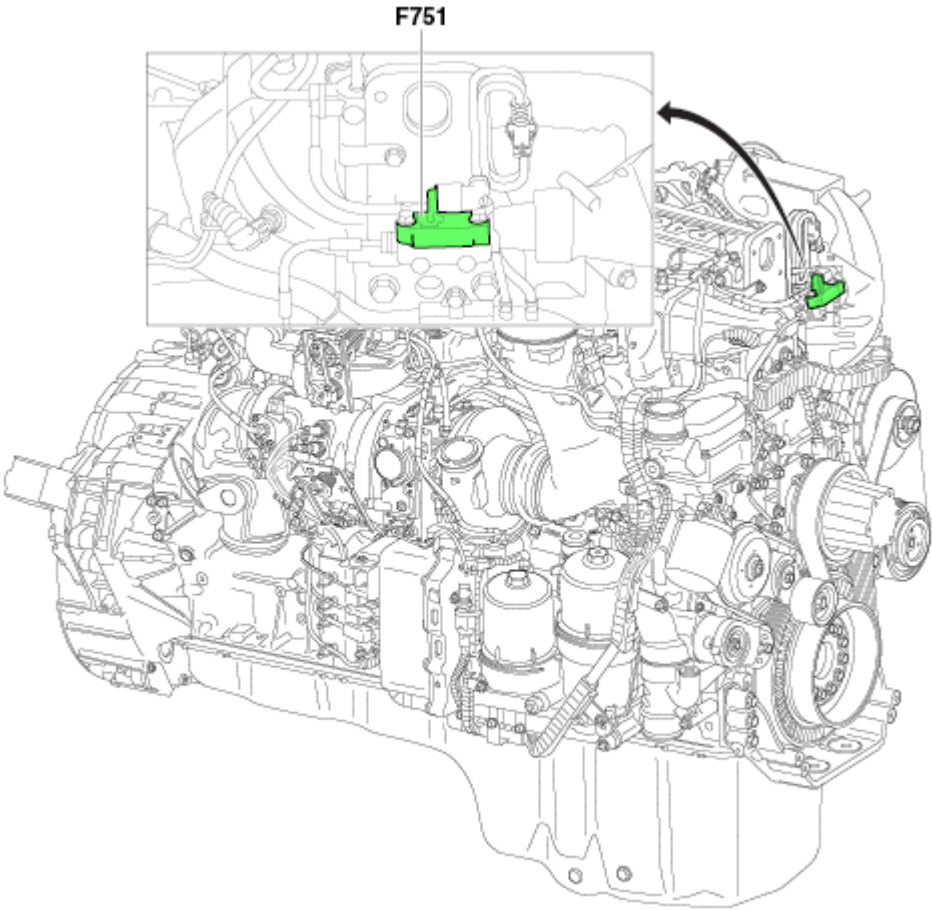
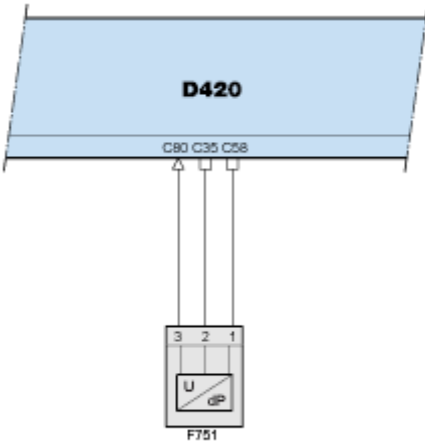
Code number	P047D
Fault code description	Air pressure post-BPV over range
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please contact Engine support center
Description of component(s)	
Location of component(s)	
Diagnostic condition	
Set 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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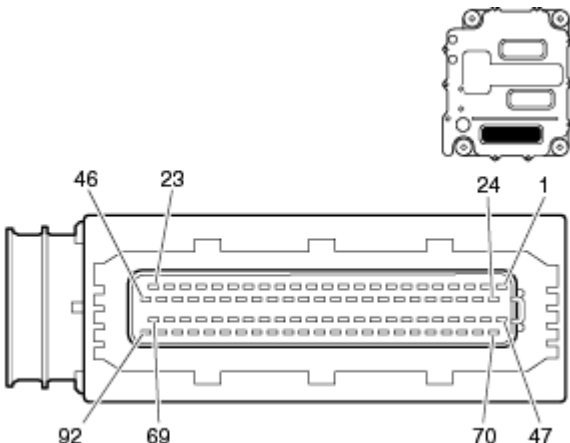
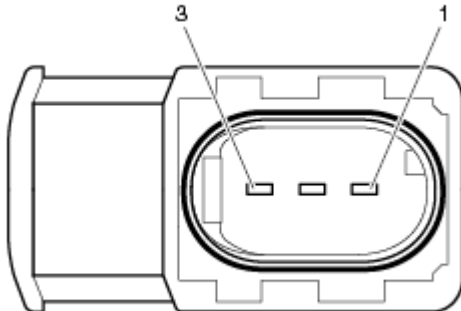
P0480

Code number	P0480
Fault code description	Electronic controlled fan - Current too low or open circuit on ECU D420 pin C74
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0486

Code number	P0486
Fault code description	EGR pressure difference – Data erratic, intermittent, or incorrect at ignition on
Fault code information	2 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	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.  5. Coolant out 6. Electrical connection 7. EGR gas flow direction 8. 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)	 F751
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 measured EGR pressure difference deviates by more than 5 mbar [0.07 psi].
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 start) and wait for 10 seconds to allow the system to power up and the diagnostics to run.
Electrical diagram(s)	

	 Wiring harness connector D420.C front view  Wiring harness connector F751 front view <table><tr><td>D420</td><td>F751</td><td>Function</td></tr><tr><td>C35</td><td>2</td><td>Ground</td></tr><tr><td>C58</td><td>1</td><td>Power supply</td></tr><tr><td>C80</td><td>3</td><td>Signal, EGR pressure difference</td></tr></table>	D420	F751	Function	C35	2	Ground	C58	1	Power supply	C80	3	Signal, 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 <table><tr><td>Pin (+ probe)</td><td>Pin (- probe)</td><td>Value</td><td>Additional information</td></tr><tr><td>1</td><td>2</td><td>5 V</td><td>Ignition keyed on</td></tr></table>	Pin (+ probe)	Pin (- probe)	Value	Additional information	1	2	5 V	Ignition keyed on				
Pin (+ probe)	Pin (- probe)	Value	Additional information										
1	2	5 V	Ignition keyed on										
Possible causes	EGR pressure difference sensor deviation												
Additional information	The EGR pressure difference sensor (F751) is monitored 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 0486a	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 0486b	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 0486c	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 and 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 0486d	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, 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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P0501

Code number	P0501
Fault code description	Vehicle speed – Data erratic, intermittent, or incorrect
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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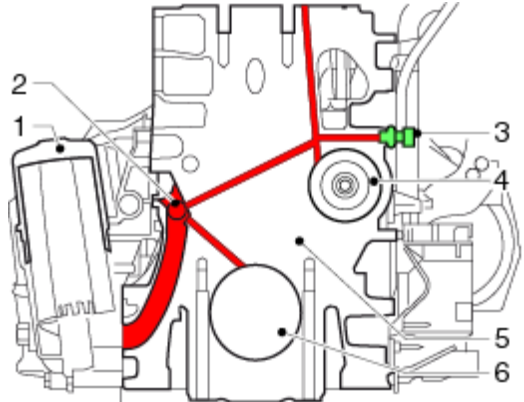
P0502

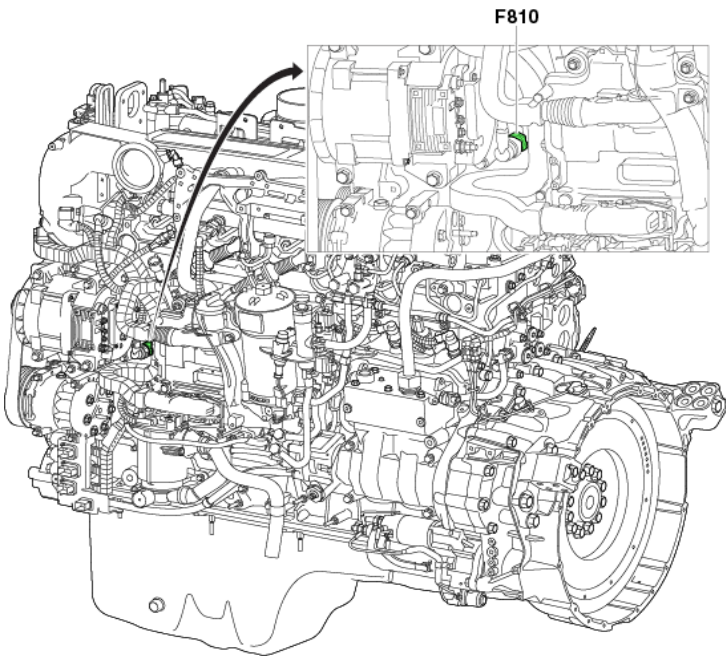
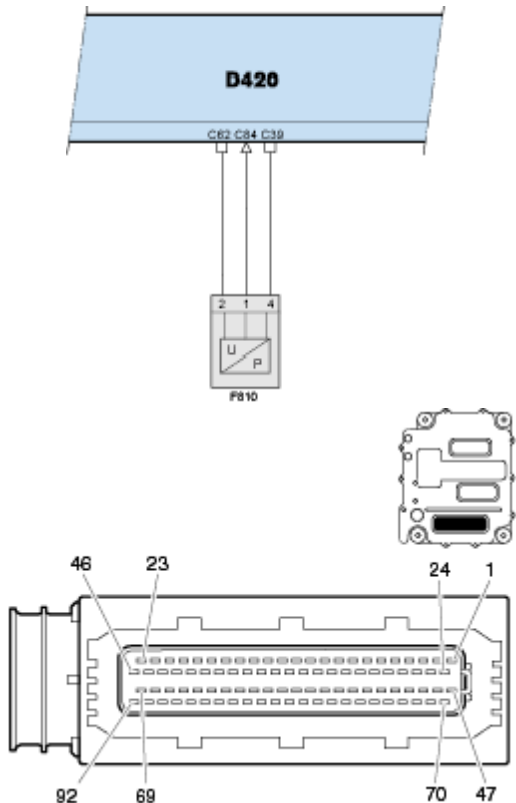
Code number	P0502
Fault code description	Vehicle speed sensor short circuit to ground
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 Please Contact the Engine Support Center
Description of component(s)	
Location of component(s)	
Diagnostic 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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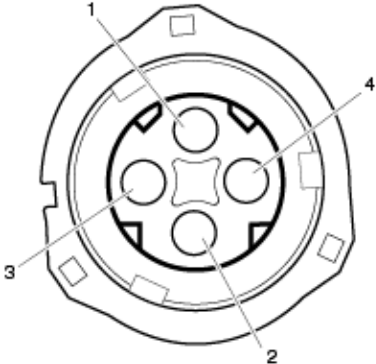
P0503

Code number	P0503
Fault code description	Vehicle speed out of range
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0522

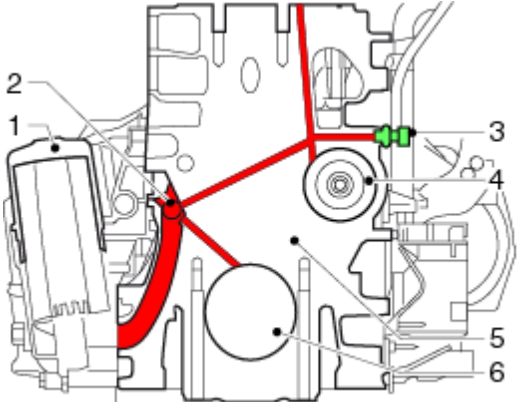
Code number	P0522
Fault code description	Oil pressure – Voltage to low or short circuit to ground on ECU D420 pin C84
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type –Comprehensive
Description of component(s)	 1 Oil module 2 Main oil gallery 3 Oil pressure sensor 4 Camshaft 5 Cylinder block 6 Crankshaft Oil pressure sensor (F810) The oil pressure is measured in the side duct of the second camshaft bearing/first rocker seat oil supply duct. Effect on the system: • Display a warning to the driver concerning low oil pressure. • Limitation of the engine torque when the oil pressure is too low.

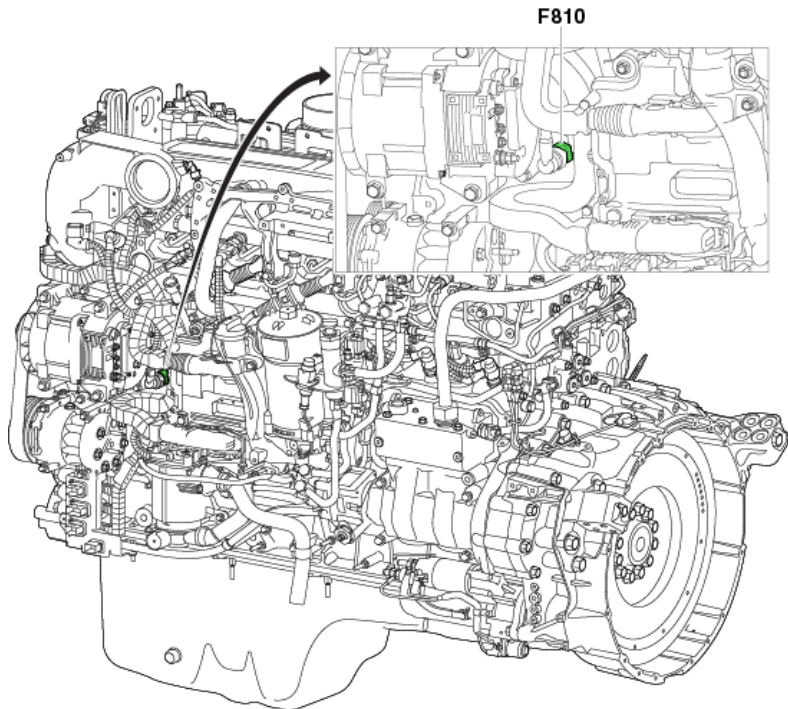
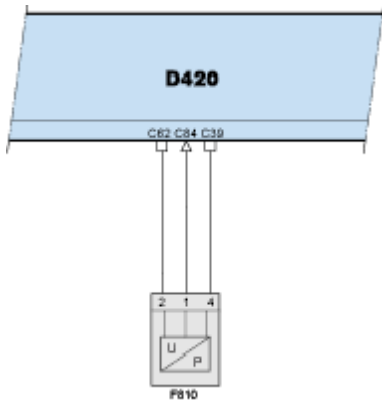
Location of component(s)	
Diagnostic condition	This diagnostic is running whenever the engine is running.
Set condition of fault code	This is an engine protection code. This code will set when the oil pressure is below specified guidelines. See the lubrication section of Rapido for additional details.
Reset condition of fault code	This code will rest on the first drive cycle after the restoration of oil pressure within specified guidelines.
Electrical diagram(s)	 Wiring harness connector D420.C front view

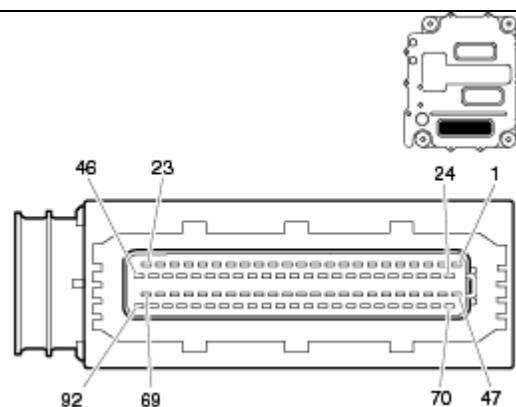
	 Wiring harness connector F810 front view D420 PCI ECU F810 oil pressure sensor D420 F801 Function C39 4 Ground C62 2 Power supply C84 1 Signal, oil pressure												
Technical data	Component & wiring check, ECU (D420) Preparation • Disconnect connector F810 • Measure on the front side of wiring harness connector F810 <table><tr><td>Pin</td><td>Pin</td><td></td><td></td></tr><tr><td>(+ probe)</td><td>(- probe)</td><td>Value</td><td>Condition</td></tr><tr><td>2</td><td>4</td><td>5V</td><td>ignition keyed on</td></tr></table>	Pin	Pin			(+ probe)	(- probe)	Value	Condition	2	4	5V	ignition keyed on
Pin	Pin												
(+ probe)	(- probe)	Value	Condition										
2	4	5V	ignition keyed on										
Possible causes	• The oil level is too low • Short circuit to ground on pin C84 of the ECU • Short circuit between pin C84 and pin C39 of the ECU • 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.												

	<table><tr><td>Step 1</td><td>Step ID 0552a</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>	Step 1	Step ID 0552a	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 1	Step ID 0552a	SRT				
	Visually inspect all applicable connectors (bent, broken, corroded or loose pins) and harnesses for corrosion, damage, and rubbing during each step of the diagnostic procedure. Proceed to step 2.						
	<table><tr><td>Step 2</td><td>Step ID 0552b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the harness from the pressure sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the pressure sensor circuit on the engine harness: • If the voltage is between 4.75 and 5.25 – Proceed to step 3. • If the voltage is not between 4.75 and 5.25 – Proceed to step 4. </td></tr></table>	Step 2	Step ID 0552b	SRT	With key OFF, disconnect the harness from the pressure sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the pressure sensor circuit on the engine harness: • If the voltage is between 4.75 and 5.25 – Proceed to step 3. • If the voltage is not between 4.75 and 5.25 – Proceed to step 4.		
	Step 2	Step ID 0552b	SRT				
With key OFF, disconnect the harness from the pressure sensor. Turn the key on and measure the voltage between a battery ground and the supply terminal of the pressure sensor circuit on the engine harness: • If the voltage is between 4.75 and 5.25 – Proceed to step 3. • If the voltage is not between 4.75 and 5.25 – Proceed to step 4.							
<table><tr><td>Step 3</td><td>Step ID 0552c</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, install a jumper wire between the supply and signal terminals of the pressure sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0523 is active – Replace the pressure sensor and reconnect the harness. Continue the verification procedure listed at the end of this document. • If P0522 is active – Proceed to step 4. </td></tr></table>	Step 3	Step ID 0552c	SRT	With key OFF, install a jumper wire between the supply and signal terminals of the pressure sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0523 is active – Replace the pressure sensor and reconnect the harness. Continue the verification procedure listed at the end of this document. • If P0522 is active – Proceed to step 4.			
Step 3	Step ID 0552c	SRT					
With key OFF, install a jumper wire between the supply and signal terminals of the pressure sensor connector on the engine harness. Turn the key ON and navigate through DAVIE to read errors: • If P0523 is active – Replace the pressure sensor and reconnect the harness. Continue the verification procedure listed at the end of this document. • If P0522 is active – Proceed to step 4.							
<table><tr><td>Step 4</td><td>Step ID 0552d</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the engine harness from the PCI and install a jumper wire between the supply pin C62 and signal terminals pin C84 of the sensor circuit on the PCI. Turn the key on and navigate to read errors: • If P0523 is active – Replace the engine harness and continue to the verification procedure listed at the end of this document. • If P0522 is active – Proceed to step 5. </td></tr></table>	Step 4	Step ID 0552d	SRT	With key OFF, disconnect the engine harness from the PCI and install a jumper wire between the supply pin C62 and signal terminals pin C84 of the sensor circuit on the PCI. Turn the key on and navigate to read errors: • If P0523 is active – Replace the engine harness and continue to the verification procedure listed at the end of this document. • If P0522 is active – Proceed to step 5.			
Step 4	Step ID 0552d	SRT					
With key OFF, disconnect the engine harness from the PCI and install a jumper wire between the supply pin C62 and signal terminals pin C84 of the sensor circuit on the PCI. Turn the key on and navigate to read errors: • If P0523 is active – Replace the engine harness and continue to the verification procedure listed at the end of this document. • If P0522 is active – Proceed to step 5.							
<table><tr><td>Step 5</td><td>Step ID 0552e</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>	Step 5	Step ID 0552e	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.			
Step 5	Step ID 0552e	SRT					
For further assistance in diagnosing this issue or for confirmation prior to the replacement of suspect components, contact the Engine Support Call Center at 1-800-477-0251.							
Verification Drive Cycle	To validate the repair, with DAVIE connected and key ON, clear the errors. Start the engine and let it idle to verify with DAVIE that the errors do not recur.						
	Back to Index						

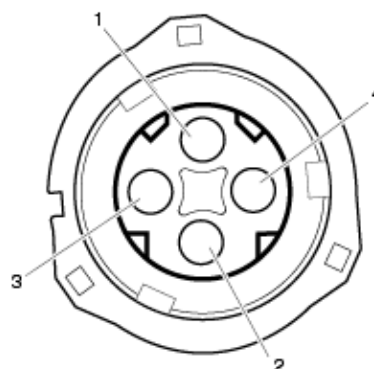
P0523

Code number	P0523
Fault code description	Oil pressure – Voltage to high or short circuit to supply on ECU D420 pin C84
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type –Comprehensive
Description of component(s)	 1 Oil module 2 Main oil gallery 3 Oil pressure sensor 4 Camshaft 5 Cylinder block 6 Crankshaft Oil pressure sensor (F810) The oil pressure is measured in the side duct of the second camshaft bearing/first rocker seat oil supply duct. Effect on the system: • Display a warning to the driver concerning low oil pressure. • Limitation of the engine torque when the oil pressure is too low.

Location of component(s)	 F810
Diagnostic condition	This diagnostic is running whenever the engine is running.
Set condition of fault code	This is an engine protection code. This code will set when the oil pressure is above specified guidelines. See the lubrication section of Rapido for additional details.
Reset condition of fault code	This code will rest on the first drive cycle after the restoration of oil pressure within specified guidelines.
Electrical diagram(s)	 D420 C82 C84 C39 2 1 4 U P F810



Wiring harness connector D420.C front view



Wiring harness connector F810 front view

D420 PCI ECU
F810 oil pressure sensor

D420	F801	Function
C39	4	Ground
C62	2	Power supply
C84	1	Signal, oil pressure

Technical data

Component & wiring check, ECU (D420)

Preparation

- Disconnect connector F810
- Measure on the front side of wiring harness connector F810

Pin	Pin		
(+ probe)	(- probe)	Value	Condition
2	4	5V	ignition keyed on

Possible causes

- Short circuit to supply on pin C84 of the ECU
- 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

P0524

Code Number	P0524
Fault code description	Engine oil pressure - Data valid but too low, most severe
	Diagnostic and supporting information for this DTC is available in Engine Rapido.
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P0527

Code number	P0527
Fault code description	Electronic controlled fan - Voltage too high or short circuit to supply on ECU D420 pin C8
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0528

Code number	P0528
Fault code description	Electronic controlled fan - Voltage too low or short circuit to ground on ECU D420 pin C8
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0541

Code number	P0541
Fault code description	Grid heater - Voltage too low or short circuit to ground on ECU D420 pin C72
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0542

Code number	P0542
Fault code description	Grid heater - Voltage too high or short circuit to supply on ECU D420 pin C72 or C49
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0543

Code number	P0543
Fault code description	Grid heater - Current too low or open circuit on ECU D420 pin C72
Fault code information	3 drive cycle recovery Readiness group – None Freeze frame type – Comprehensive
Description of component(s)	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P0562

Code number	P0562																					
Fault code description	ECU PCI power supply - Data valid but too low on ECU D420 pin B60 or B61 or B62																					
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive																					
Description of component(s)	This information not required since this is an internal PCI issue.																					
Location of component(s)	This information not required since this is an internal PCI issue.																					
Diagnostic condition	This diagnostic runs continuously when the ignition is on.																					
Set condition of fault code	The ECU power supply voltage is too low.																					
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.																					
Electrical diagram(s)	This information not required since this is an internal PCI issue.																					
Technical data	This information not required since this is an internal PCI issue.																					
Possible causes	Check the power supply level.																					
Additional information	Numerous diagnostics will not run 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. <table><tr><td>Step 1</td><td>Step ID 0562a</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 0562b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the OEM harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If good - Proceed to step 3. • If there is a problem – Refer to the OEM manual for repair. </td></tr></table> <table><tr><td>Step 3</td><td>Step ID 0562c</td><td>SRT</td></tr><tr><td colspan="3">Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If good - Proceed to step 4. • If there is a problem – Refer to the OEM manual for repair. </td></tr></table> <table><tr><td>Step 4</td><td>Step ID 0562d</td><td>SRT</td></tr></table>	Step 1	Step ID 0562a	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 0562b	SRT	With key OFF, disconnect the OEM harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If good - Proceed to step 3. • If there is a problem – Refer to the OEM manual for repair.			Step 3	Step ID 0562c	SRT	Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If good - Proceed to step 4. • If there is a problem – Refer to the OEM manual for repair.			Step 4	Step ID 0562d	SRT
Step 1	Step ID 0562a	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 0562b	SRT																				
With key OFF, disconnect the OEM harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If good - Proceed to step 3. • If there is a problem – Refer to the OEM manual for repair.																						
Step 3	Step ID 0562c	SRT																				
Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If good - Proceed to step 4. • If there is a problem – Refer to the OEM manual for repair.																						
Step 4	Step ID 0562d	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 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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P0563

Code number	P0563																					
Fault code description	ECU PCI power supply - Data valid but too high on ECU D420 pin B60 or B61 or B62																					
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type - Comprehensive																					
Description of component(s)	This information not required since this is an internal PCI issue.																					
Location of component(s)	This information not required since this is an internal PCI issue.																					
Diagnostic condition	This diagnostic runs continuously when the ignition is on.																					
Set condition of fault code	The ECU power supply voltage is too low.																					
Reset condition of fault code	This DTC changes to inactive when the fault is no longer detected.																					
Electrical diagram(s)	This information not required since this is an internal PCI issue.																					
Technical data	This information not required since this is an internal PCI issue.																					
Possible causes	Check the power supply level.																					
Additional information	Numerous diagnostics will not run 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. <table><tr><td>Step 1</td><td>Step ID P0563a</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 P0563b</td><td>SRT</td></tr><tr><td colspan="3">With key OFF, disconnect the OEM harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If good - Proceed to step 3. • If there is a problem – Refer to the OEM manual for repair. </td></tr></table> <table><tr><td>Step 3</td><td>Step ID P0563c</td><td>SRT</td></tr><tr><td colspan="3">Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If good - Proceed to step 4. • If there is a problem – Refer to the OEM manual for repair. </td></tr></table> <table><tr><td>Step 4</td><td>Step ID P0563d</td><td>SRT</td></tr></table>	Step 1	Step ID P0563a	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 P0563b	SRT	With key OFF, disconnect the OEM harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If good - Proceed to step 3. • If there is a problem – Refer to the OEM manual for repair.			Step 3	Step ID P0563c	SRT	Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If good - Proceed to step 4. • If there is a problem – Refer to the OEM manual for repair.			Step 4	Step ID P0563d	SRT
Step 1	Step ID P0563a	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 P0563b	SRT																				
With key OFF, disconnect the OEM harness from the PCI. Verify that there is 12-volt battery power and that grounds are good. • If good - Proceed to step 3. • If there is a problem – Refer to the OEM manual for repair.																						
Step 3	Step ID P0563c	SRT																				
Turn the key ON, and verify that there is 12-volt ignition power to the PCI: • If good - Proceed to step 4. • If there is a problem – Refer to the OEM manual for repair.																						
Step 4	Step ID P0563d	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 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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P0571

Code number	P0571
Fault code description	CAN communication - Message (CCVS) out of range - Brake switch from vehicle controller
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P060A

Code number	P060A
Fault code description	Fault on the engine controller CPU watchdog.
Fault code information	 For further assistance: Contact the PACCAR Engine Support Call Center 1-800-477-0251 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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P060C

Code number	P060C
Fault code description	Internal ECU injector power generation - Fault detected
Fault code information	1 trip MIL 3 drive cycle recovery Readiness group – None Freeze frame type – Generic
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 once after the ignition is keyed on.
Set condition of fault code	The PCI ECU (D420) detects an internal error on the injector control.
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	Clear the fault with DAVIE. If the fault reoccurs after ignition on, replace the ECU.
Additional information	No additional information available.
Diagnostic Step-by-Step	Clear the fault with DAVIE. If the fault reoccurs after ignition on, replace the ECU.
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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