

## Z: Intermittent

[← Z: Introduction](#)

### Z1 DIRECTION FOR INTERMITTENT DIAGNOSTIC PATH

**Note:** Proceed with this step only if the powertrain control module (PCM) was not previously cleared. Record freeze frame data prior to clearing the PCM DTCs. Clearing the DTCs clears any freeze frame data and eliminates FMEM. This helps to recreate the original conditions that set the DTCs or caused the symptom.

- Ignition ON, engine OFF.
- Clear the PCM DTC.

Are the PCM DTCs cleared?

Yes	No
GO to <a href="#">Z2</a> .	RESET the keep alive memory (KAM). REFER to Section 2, <a href="#">Resetting The Keep Alive Memory (KAM)</a> .

### Z2 SELECT THE PIDS AND/OR SIGNALS RELATED TO THE SYSTEM

- A list of related PIDs and/or signals are needed for use with the scan tool to monitor the suspect areas. Obtain the customer symptom description. Use the Reference Value Symptom chart and proceed to the Reference Value PID/Signal Measurement chart located at the beginning of Section 6, Reference Values.
- Highlight each available PID/signal recommended by the charts under the PID/signal selection menu on the scan tool.

Are all available PIDs/signals related to the symptom selected?

Yes	No
GO to <a href="#">Z3</a> .	REPEAT the test step. GO to <a href="#">Z2</a> .

### Z3 DECISION TO VERIFY THE SYMPTOM

**Note:** The path to symptom verification is optional but is recommended for several reasons. For example, the vehicle is back for a repeat repair, or there is no DTC present.

Is a concern symptom detected?

Yes	No
GO to <a href="#">Z10</a> .	GO to <a href="#">Z4</a> .

### Z4 COLLECT ANY SYMPTOM RELATED DATA TO AID IN VERIFICATION

**Note:** Only MIL codes trigger freeze frame data. Refer to the scan tool instruction manual to retrieve the freeze frame information.

- Prepare the freeze frame data for use with information from the Symptom Charts in Section 3.
- Check for continuous memory DTCs that should have been recorded from an earlier pinpoint test.
- Access the information from the customer information worksheet and the customer if available. Access any other symptom related data available, such as TSBs and OASIS reports.

**Is all available data recorded?**

Yes	No
GO to <a href="#">Z5</a> .	GATHER as much data as possible to aid in isolating the intermittent concern area. REPEAT the test step. GO to <a href="#">Z4</a> .

**Z5 RECREATE THE SYMPTOM USING ALL AVAILABLE DATA**

**Note:** To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.

- With the scan tool, select and monitor the same PIDs as displayed in freeze frame along with any previously selected PIDs/signals from step Z2. Using the freeze frame data recorded earlier, recreate the conditions described by each freeze frame PID. Pay special attention to ECT, LOAD, RPM and VSS. Also, use any available data from the customer, TSBs, and other sources to aid in producing the correct conditions for recreating the symptom.
- When the symptom occurs, press the trigger to begin recording. Refer to the scan tool instruction manual for information on the recorder function.

**Can the symptom be recreated?**

Yes	No
GO to <a href="#">Z10</a> .	GO to <a href="#">Z6</a> .

**Z6 RECREATE THE SYMPTOM**

**Note:** PIDs for output in the Reference Value Charts represent command values only. Circuit measurements with a digital multimeter indicate the actual output status. Therefore, in the case of a concern, the PID and circuit reading on the vehicle may not correspond with each other. PIDs for PCM circuits with a mismatch in the digital multimeter measurement indicate a possible PCM concern.

- The road test is the last attempt to locate the area of concern before physically disturbing vehicle circuits.
- The Intermittent Road Test Procedure is a set of instructions for monitoring PIDs/signals with a scan tool and circuit measurements with a digital multimeter. This is done under 4 different conditions - ignition on and engine off, hot idle, 48 km/h (30 mph) and 88 km/h (55 mph). Use the typical diagnostic reference values from Section 6 to compare with the actual vehicle.
- Locate the correct Reference Value Chart in Section 6.
- Setup the vehicle to measure the circuits with a digital multimeter and a scan tool.
- Connect a scan tool to the DLC.
- Ignition ON, engine OFF.
- With the scan tool, select and monitor PIDs and measure the circuits shown in the Reference Value Chart in Section 6.
- Compare the scan tool PIDs and digital multimeter values to the Reference Value Charts.

**Are any values out of range?**

Yes	No
GO to <a href="#">Z10</a> .	GO to <a href="#">Z7</a> .

## Z7 RECREATE THE SYMPTOM USING THE HOT IDLE ROAD TEST

**Note:** The engine temperature should be at least 87°C (189 °F).

- Ignition ON, engine running.
- Continue to monitor the PIDs and circuits as in the previous step.

Are any values out of range?

Yes	No
GO to <a href="#">Z10</a> .	GO to <a href="#">Z8</a> .

## Z8 RECREATE THE SYMPTOM DURING AN 48 KM/H (30 MPH) ROAD TEST

- Drive the vehicle on a preplanned route.
- Continue to monitor the PIDs and circuits as in the previous step.

Are any values out of range?

Yes	No
GO to <a href="#">Z10</a> .	GO to <a href="#">Z9</a> .

## Z9 RECREATE THE SYMPTOM DURING AN 88 KM/H (55 MPH) ROAD TEST

- Continue to drive the vehicle on the preplanned route.
- Continue to monitor the PIDs and circuits as in the previous step.

Are any values out of range?

Yes	No
GO to <a href="#">Z10</a> .	It is now necessary to physically disturb the selected vehicle circuits in an attempt to recreate the intermittent concern. GO to <a href="#">Z10</a> .

## Z10 SELECT THE CIRCUITS FROM THE PCM PIDS/SIGNALS CHART

**Note:** From the same chart, be sure to select and proceed with the appropriate test type.

**Note:** The Input Test step should be used on sensing inputs such as temperature, position or oxygen.

**Note:** The Output Test step should be used on output devices such as relays, coils or solenoids.

- Remain in the PID/Signal selection menu with the scan tool.
- Highlight only the PIDs/signals from step Z2.
- Proceed to the PCM PIDS/SIGNALS chart located at the beginning of this test.
- Match the selected PIDs/signals to the corresponding circuit in the chart. There may be more than one circuit to test. If a PID/signal recording was made with the scan tool, it may be helpful to replay it at this time. Refer to the scan tool instruction manual for additional information.

Has a test been chosen?

---

Yes	No
For the input test step, GO to <a href="#">Z11</a> . For the output test step, GO to <a href="#">Z15</a> .	To diagnose other driveability symptoms, REFER to Section 3, <a href="#">No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index</a> .

## Z11 KOEO INPUT TEST PROCEDURE FOR THE PCM SENSORS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

- Using the circuits chosen from the PCM PIDS/SIGNALS Chart, select only the recommended PIDs/signals to monitor with the scan tool. If a PID is not available for the circuit, use a digital multimeter to check the value.
- Proceed to the area of the suspect wiring or component concern.
- Ignition ON, engine OFF.
- If the input is a switch type-component, turn it on manually.
- Monitor the PID or DMM while tapping on the component.
- Monitor while wiggling the sensor harness wire from the component to the PCM/TCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Are there abrupt changes in the PID values that do not compare with the Section 6 values?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z12</a> .

## Z12 KOER INPUT TEST PROCEDURE FOR THE PCM SENSORS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

- Ignition ON, engine running.
- Continue to monitor the PIDs and circuits as in the previous step.
- Proceed to the area of the suspect wiring or component concern.
- If the input is a switch type-component, turn it on manually.
- Monitor the PID or DMM while tapping on the component.
- Monitor while wiggling the sensor harness wire from the component to the PCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Are any values fluctuating in and out of range?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z13</a> .

## Z13 KOEO WATER SOAK TEST PROCEDURE FOR THE PCM SENSORS, EXCLUDING HIGH VOLTAGE CIRCUITS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

- Ignition ON, engine OFF.
- Continue to monitor the PIDs and circuits as in the previous step.
- Proceed to the area of the suspect wiring or component concern.
- If the input is a switch type-component, turn it on manually.
- Monitor the PID or DMM values while lightly spraying a water mist on the component.
- Monitor while spraying the sensor harness wire from the component to the PCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Are any values fluctuating in and out of range?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z14</a> .

## Z14 KOER WATER SOAK TEST PROCEDURE FOR THE PCM SENSORS, EXCLUDING HIGH VOLTAGE CIRCUITS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

- Ignition ON, engine running.
- Continue to monitor the PIDs and circuits as in the previous step.
- Proceed to the area of the suspect wiring or component concern.
- If the input is a switch type-component, turn it on manually.
- Monitor the PID or DMM values while lightly spraying a water mist on the component.
- Monitor while spraying the sensor harness wire from the component to the PCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Are any values fluctuating in and out of range?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z15</a> .

## Z15 KOER WIGGLE TEST PROCEDURE FOR THE PCM SENSORS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

**Note:** Remember that PIDs selected from the PCM PIDS/SIGNALS Chart display commanded values only. A digital multimeter measurement is needed to display the actual values. Be sure to compare them. Look for fluctuations to occur during any part of the following test. The output state test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators.

- Using the circuits chosen from the PCM PIDS/SIGNALS Chart, select only the recommended PIDs/signals to monitor with the scan tool. If a PID is not available for the circuit, use a DMM to check the value.
- Ignition ON, engine OFF.
- With the scan tool, turn on selected outputs using output state control. Refer to the scan tool instruction manual.
- Proceed to the area of the suspect wiring or component concern.
- Monitor the PID or DMM while tapping on the component.
- Monitor while wiggling the sensor harness wire from the component to the PCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Is there a mismatch between command and actual or are any values fluctuating in and out of range when compared to the Reference Value Charts in section 6?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z16</a> .

**Z16 KOER OUTPUT TEST PROCEDURE FOR THE PCM ACTUATORS**



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

**Note:** Remember that PIDs selected from the PCM PIDS/SIGNALS Chart display commanded values only. A digital multimeter measurement is needed to display the actual values. Be sure to compare them. Look for fluctuations to occur during any part of the following test. The output state test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators.

- Ignition ON, engine running.
- Proceed to the area of the suspect wiring or component concern.
- Monitor the PIDs with the scan tool and note the values. Compare the scan tool values with values from a digital multimeter with the engine at idle. While tapping on the suspect component look for fluctuations in the values.
- If a coil for a coil on plug application is suspect, turn off the ignition. Gain access to the coil and measure continuity from the spark plug terminal to the signal terminal while tapping the coil. A large fluctuation in resistance indicates an intermittent open or short.
- Monitor while wiggling the sensor harness wire from the component to the PCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Is there a scan tool to DMM value mismatch or an idle fluctuation?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z17</a> .

## Z17 KOEO WATER SOAK TEST PROCEDURE FOR THE PCM ACTUATORS, EXCLUDING HIGH VOLTAGE CIRCUITS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

**Note:** Remember that PIDs selected from the PCM PIDS/SIGNALS Chart display commanded values only. A digital multimeter measurement is needed to display the actual values. Be sure to compare them. Look for fluctuations to occur during any part of the following test. The output state test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators.

- Ignition ON, engine OFF.
- With the scan tool, turn on selected outputs using output state control. Refer to the scan tool instruction manual.
- Proceed to the area of the suspect wiring or component concern.
- Monitor the PID or DMM values while lightly spraying a water mist on the component.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Is there a mismatch between command and actual or are any values fluctuating in and out of range when compared to the Reference Value Charts in section 6?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z18</a> .

## Z18 KOER WATER SOAK TEST PROCEDURE FOR THE PCM ACTUATORS



**WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.**

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.**

- Ignition ON, engine running.
- Using the circuits chosen from the PCM PIDS/SIGNALS Chart, select only the recommended PIDs/signals to monitor with the scan tool. If a PID is not available for the circuit, use a DMM to check the value.
- Proceed to the area of the suspect wiring or component concern.
- Monitor the PID or DMM values while lightly spraying a water mist on the component.
- Monitor while spraying the sensor harness wire from the component to the PCM/TCM.
- Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in Section 6.

**Is there a mismatch between command and actual or are any values fluctuating in and out of range when compared to the Reference Value Charts in Section 6?**

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	GO to <a href="#">Z19</a> .

## Z19 INSPECT FOR INTERMITTENT MECHANICAL CONCERNS

**Note:** It is possible for an intermittent mechanical concern to cause a good PCM system to react abnormally.

- An inspection of DTC related mechanical systems should have been carried out in an earlier section. If not, visually inspect at this time.
- Look for possible vacuum lines, wires, cables, linkage or hoses that may become kinked, shorted or restricted during normal engine operation.
- This may include engine/transmission gear changes, acceleration and deceleration, rough roads and various engine RPM and torque related conditions.

### Is a mechanical concern detected?

Yes	No
REPAIR as necessary. VERIFY the repair. CLEAR the DTCs. REPEAT the self-test.	It is necessary to seek additional help. REFER to the Professional Technician Society (PTS) web site, the OASIS system or the Technical Hotline. A vehicle data recorder (VDR) or similar recorder may also be useful.

---