Computers and Control Systems: Pinpoint Tests
Test Z: Intermittent
PINPOINT TEST Z: INTERMITTENT

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Note

This pinpoint Test is intended to diagnose and isolate intermittent concerns for the following:

All Electronic EC subsystems.

Coil Pack ignition systems using the Distributorless Ignition System Tester (DIST).

This chart is used to determine which test to run for the suspect circuit. Corresponding PIDs to each circuit are listed. Some circuits do not have an associated PID or the PID may not be available and will have to be measured with a digital multimeter. More specific PIDs can be found in Section 6. if the vehicle has a coil pack system with a no start condition, perform the ignition test with the distributorless ignition system tester. Do not use the DIST for coil on plug applications.

Note

There are two main procedures used to isolate and repair an intermittent concern. one would utilize the Rotunda Distributorless Ignition System Tester (DIST) or similar after market tool, and the other being a scan tool with digital multimeter. This vehicle has Coil On Plug (COP) ignition. It does not have (DIST).

PCM/TCM PIDS/SIGNALS

PCM/TCM PIDS/SIGNALS	Associated Circuit	Test Type
4X4	4X4	input
ACCS	A/CCS	input
ACCR	ACCR	input
ACET	ACET	input
ACFDS	ACFDS	input
ACLPCS	ACLPCS	input
ACP,ACPV	ACPSW	input
ACRDV	ACRDV	output
ACRSW	ACRSW	input
Use Digital Multimeter	AFC	input

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Note And Chart

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PCM/TCM PIDS/SIGNALS

PCM/TCM PIDS/SIGNALS	Associated Circuit	Test Type
AMC	AMC	output
APP1	APPS	input
APP2	APPS	input
APP3	APPS	input
BARO	BARO	input
BPP/BOO	BPP	input
Use Digital Multimeter	BPS	input
CAS GND	case GND	input
CCS	CCS	output
Use Digital Multimeter	CD-A (primary)	output
Use Digital Multimeter	CD-B (primary)	output
Use Digital multimeter	CD-C (primary)	output
Use Digital Multimeter	CD-D (primary)	output
CHT, CHT V	CHT	input
CKP/CPS	CKP	input
CMP/CID	CMP	input
CTO	CTO	output
DCE	DC/DC CONVERT	output
EGRMC1	EGR	output
EGRMC2	EGR	output
EGRMC3	EGR	output
EGRMC4	EGR	output
EFC*	EFC	output
CVV	EVAPCV	output
EVMV	EVAP	output
FC1	FC1/LFC	output
FC2	FC2/MFC	output
FC3	FC3/HFC	output
FP	FPDM	output
FPM	FPDM	input
FRP	FIPT/S	input
FRT	FIPT/S	input
FTIV	FTIV	output
FTPT	FTPT	input

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PCM/TCM PIDS/SIGNALS

PCM/TCM PIDS/SIGNALS	Associated Circuit	Test Type
GSDN	GSDN	output
HPCR	HPCR	output
HOS11	HEGO	input
HOS12	HEGO	input
HOS13	HEGO	input
HTR11	HEGO	output
HTR12	HEGO	output
HTR13	HEGO	output
IAT	IAT	input
INJ1	INJECTOR	output
INJ2	INJECTOR	output
INJ3	INJECTOR	output
INJ4	INJECTOR	output
Use Digital Multimeter	KAPWR	input
KS1P	KS	input
MAF	MAF	input
MAP/TMAP	MAP	input
MECP	MECP	output
MECT	MECT	input
MSDN	MSDN	output
PAZV	PAZV	output
PSR	PSR	output
SAIR	Secondary AIR	output
SAIRM	Secondary AIRM	input
SCV	SCV	output
SCVM	SCVM	input
TGAC*	TGAC	output
TMAC*	TMAC	output
TPCMD1	TACM+/ETB	output
TPCMD2	TACM-/ETB	output
TP1	TP	input
TP2	TP	input
TR-A1	TRANS	input
TR-A2	TRANS	input
TR-A3	TRANS	input
TSS/ISS	TSS	input
CAMDCR,RCAM	VCT	output

(Continued)

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PCM/TCM PIDS/SIGNALS

PCM/TCM PIDS/SIGNALS	Associated Circuit	Test Type
VPWR	VPWR	input
Use Digital Multimeter	VREF	output
Use Digital Multimeter	VSO	output
VSS	VSS+	input
WAC	WAC	output

	Test Steps	Results →	Action to Take
Z1	DIRECTION FOR INTERMITTENT DIAGNOSTIC PATH		
	CAUTION: Proceed with this step only if a PCM Reset was not performed previously. Be sure to record freeze frame data prior to PCM Reset. PCM Reset will clear freeze frame data and eliminate FMEM. This will also insure reproduction of any PCM related symptoms. • Connect scan tool to Data Link Connector (DLC). • Key ON Engine OFF. • Complete PCM Reset. • **Is the PCM Reset complete?**	Yes → No →	GO to **Z2**. Complete PCM Reset. GO to **Z2**.
Z2	SELECT 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 Reference Values. • Highlight each available PID/Signal recommended by the charts under the PID/Signal selection menu on the scan tool. • **Have all available PIDs/Signals related to the symptom been selected?**	Yes → No →	GO to **Z3**. Repeat Z2
Z3	DECISION TO VERIFY SYMPTOM		
	Note: The path to symptom verification is optional, but is recommended for several reasons. For example: the vehicle is in service for a repeat repair, or there is no DTC present. • **Has a fault symptom been detected?**	Yes → No →	GO to **Z10**. GO to **Z4**.

Chart And Test Z1-Z3

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Test Steps		Results →	Action to Take
Z4	COLLECT ANY SYMPTOM RELATED DATA TO AID IN VERIFICATION		
	Note: Only MIL codes will trigger freeze frame data. REFER to scan tool instruction manual to retrieve freeze frame information. • Prepare freeze frame data for use with information from the Symptom Charts. • CHECK Continuous Memory DTCs that should have been recorded from earlier pinpoint test. • Access information from the customer worksheet and the customer if available. Access any other symptom related data available, such as TSBs and CQIS reports. • **Has all available data been recorded?**	Yes → No →	GO to **Z5**. Gather as much data as possible to aid in isolating the intermittent fault area. Repeat Z4
Z5	RECREATE SYMPTOM USING ALL AVAILABLE DATA		
	Note: To recreate original conditions that set the DTC or caused the symptom vehicle may require some driving. • With scan tool, select and monitor the same PIDs as displayed in freeze frame along with previously selected PIDs / Signals from step Z2. Using 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 alike to aid in producing the correct conditions for recreating the symptom. • When the symptom occurs, press trigger to begin recording. (REFER to the scan tool instruction manual for recorder function). • **Could symptom be recreated?**	Yes → No →	GO to **Z10**. GO to **Z6**.

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	Test Steps	Results →	Action to Take
Z6	RECREATE SYMPTOM USING KOEO AND ROAD TEST PROCEDURE		
	• The road test is the last attempt to locate the area of concern before physically disturbing vehicle circuits. Note: PIDs for output in the Reference Value Charts represent command values only. Circuit measurements with digital multimeter indicate actual output status. Therefore, in the case of a fault, the PID and circuit reading on the vehicle may not correspond with each other. PIDs for PCM/TCM circuits with a mismatch in digital multimeter measurement indicate a possible PCM/TCM concern. • 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 four different conditions - KOEO, HOT IDLE, 30 mph and 55 mph (48and 88 kph). Use the typical diagnostic Reference Values to compare with the actual vehicle values. For actual road test at speeds, a planned route or test track and passenger is required. • Locate the correct Reference Value chart in Reference Values. • Set vehicle up to measure circuits with a digital multimeter and a scan tool. • Connect scan tool to Data Link Connector (DLC). • Key ON Engine OFF. • With the scan tool, select and monitor PIDs and measure circuits shown in the Reference Value Chart in Reference Values. • Compare the scan tool PIDs and digital multimeter values to the Reference Value Charts. • **Are any values out of range?**	Yes →	GO to **Z10**.
		No →	GO to **Z7**.
Z7	RECREATE SYMPTOM USING HOT IDLE ROAD TEST PROCEDURE		
	• Engine temperature should be at least 195 deg F (87 deg C). • Key ON Engine RUN. • Continue to monitor the PIDs and circuits as in the previous step. • **Are any values out of range?**	Yes →	GO to **Z10**.
		No →	GO to **Z8**.

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	Test Steps	Results →	Action to Take
Z8	RECREATE SYMPTOM USING 30 MPH (48 KPH) SLOW CRUISE ROAD TEST PROCEDURE		
	• Drive vehicle on preplanned route. • Continue to monitor the PIDs and circuits as in the previous step. • **Are any values out of range?**	Yes → No →	GO to **Z10.** GO to **Z9.**
Z9	RECREATE SYMPTOM USING 55 MPH (88 KPH) HIGH CRUISE ROAD TEST PROCEDURE		
	• Continue to drive vehicle on preplanned route. • Continue to monitor the PIDs and circuits as in the previous step. • **Are any values out of range?**	Yes → No →	GO to **Z10.** It is now necessary to physically disturb selected vehicle circuits in an attempt to recreate the Intermittent concern. GO to **Z10.**
Z10	SELECT CIRCUITS FROM THE INTERMITTENT TEST CHART		
	• Remain in the PID/Signal selection menu with the scan tool. • If the intermittent road test was used to verify the symptom, highlight PIDs/Signals that displayed as mismatch to the Reference Values from Reference Values. Otherwise highlight only the PIDs/Signals from step Z2. • Proceed to the intermittent Test Chart located at the beginning of this pinpoint. • Match 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 recorder function). Note: From the same chart, be sure to select and proceed with the appropriate test type. • Input Test- Used on sensing such as temperature, position or oxygen. • Output Test- Used on output devices such as relays, coils or solenoids. • **Has a test been chosen?**	Yes → No →	**For Input Test** GO to **Z11.** **For Output Test** GO to **Z15.** To diagnose other drivability symptoms, Go to Symptom Charts.

Test Z8-Z10

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	Test Steps	Results →	Action to Take
Z11	KOEO INPUT TEST PROCEDURE FOR PCM/TCM SENSORS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. • Using circuits chosen from the Intermittent Test 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 fault. • Key ON Engine OFF. • If the input is a switch type-component, turn on manually. • Monitor the PID or digital multimeter while tapping on component. • Monitor while wiggling sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **Are there abrupt changes in the PID values that do not compare with Section 6 readings?**	Yes No	→ REPAIR as necessary. VERIFY repair. → GO to **Z13**.
Z12	KOER INPUT TEST PROCEDURE PCM/TCM SENSORS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. • Key ON Engine RUN. • Continue to monitor the PIDs and circuits as in the previous step. • Proceed to the area of the suspect wiring or component fault. • If the input is a switch type-component, turn on manually. • Monitor the PID or digital multimeter while tapping on component. • Monitor while wiggling sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **Are any values fluctuating in and out of range?**	Yes No	→ REPAIR as necessary. VERIFY repair. → GO to **Z13**.

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Test Steps		Results →	Action to Take
Z13	KOEO WATER SOAK TEST PROCEDURE FOR PCM/TCM SENSORS EXCLUDING HIGH VOLTAGE CIRCUITS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. • Key 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 fault. • If the input is a switch type-component, turn on manually. • Monitor the PID or digital multimeter values while lightly spraying a water mist on the component to PCM/TCM. • Monitor while spraying sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **Are any values fluctuating in and out of range?**	Yes No	→ REPAIR as necessary. VERIFY repair. → GO to **Z14**.
Z14	KOER WATER SOAK TEST PROCEDURE FOR PCM/TCM SENSORS EXCLUDING HIGH VOLTAGE CIRCUITS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. • Key ON Engine RUN. • Continue to monitor the PIDs and circuits as in the previous step. • Proceed to the area of the suspect wiring or component fault. • If the input is a switch type-component, turn on manually. • Monitor the PID or digital multimeter values while lightly spraying a water mist on the component to PCM/TCM. • Monitor while spraying sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **Are any values fluctuating in and out of range?**	Yes No	→ REPAIR as necessary. VERIFY repair. → GO to **Z15**.

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Test Steps		Results →	Action to Take
Z15	KOER WATER SOAK TEST PROCEDURE FOR PCM SENSORS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. • Using circuits chosen from the Intermittent Test 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. Note: Remember that PIDs selected from the Intermittent Test Chart will display commanded values only. A Digital multimeter measurements will be needed to display actual values. Be sure to compare them. Look for fluctuations to occur during any of the following test. Output State Test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators. **CAUTION: Cooling fans or fuel pump may turn on during the next steps.** • Key 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 fault. • Monitor the PID or digital multimeter while tapping on component. • Monitor while wiggling sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **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?**	Yes No	→ REPAIR as necessary. VERIFY repair. → GO to **Z16.**

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Test Steps		Results →	Action to Take
Z16	KOER OUTPUT TEST PROCEDURE FOR PCM/TCM ACTUATORS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. Note: Remember that PIDs selected from the Intermittent Test Chart will display commanded values only. A Digital multimeter measurements will be needed to display actual values. Be sure to compare them. Look for fluctuations to occur during any of the following test. Output State Test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators. • To test these output types, Go to Z18. • Key ON Engine RUN. • Proceed to the area of the suspect wiring or component fault. • Monitor PIDs with the scan tool and note the values. Compare the scan tool values with values from a Digital multimeter with 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 key. 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 will indicate an intermittent open or short. • Monitor while wiggling sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **Is there a scan tool to digital multimeter value mismatch or an idle fluctuation.**	Yes →	REPAIR as necessary. VERIFY repair.
		No →	GO to **Z17**.

Test Z16

Intermittent — Z

	Test Steps	Results →	Action to Take
Z17	KOEO WATER SOAK TEST PROCEDURE FOR PCM/TCM ACTUATORS EXCLUDING HIGH VOLTAGE CIRCUITS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. **CAUTION: When performing any test steps, always be aware of hands, clothing or tools near cooling fans, belts or hot surfaces.** Note: Remember that PIDs selected from the Intermittent Test Chart will display commanded values only. A Digital multimeter measurements will be needed to display actual values. Be sure to compare them. Look for fluctuations to occur during any of the following test. Output State Test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators. • To test these output types, Go to Z18. • Key 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 fault. • Monitor the PID or digital multimeter values while lightly spraying a water mist on the component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values in Reference Values. • **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?**	Yes →	REPAIR as necessary. VERIFY repair.
		No →	GO to **Z18**.

Intermittent — Z

	Test Steps	Results →	Action to Take
Z18	KOER WATER SOAK TEST PROCEDURE FOR PCM/TCM ACTUATORS		
	WARNING: WHEN PERFORMING ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. **CAUTION: When performing any test steps, always be aware of hands, clothing or tools near cooling fans, belts or hot surfaces.** • Key ON Engine RUN. • Using circuits chosen from the Intermittent Test 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 fault. • Monitor the PID or digital multimeter values while lightly spraying a water mist on the component to PCM/TCM. • Monitor while spraying sensor harness wire from component to PCM/TCM. • Look for abrupt changes in values. Compare these actual values to the Typical Diagnostic Reference Values. • **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 →	REPAIR as necessary. VERIFY repair.
		No →	GO to **Z19**.
Z19	INSPECT FOR INTERMITTENT MECHANICAL CONCERNS		
	Note: It is possible for an intermittent mechanical concern to cause a good PCM/TCM system to react abnormally. • An inspection of DTC related mechanical systems should have been performed 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 →	REPAIR as necessary. VERIFY repair.
		No →	It is necessary to seek additional help. REFER to (PTS) Professional Technician Society web site, the OASIS system or the Technical Hotline. A (VDR) Vehicle Data Recorder or similar flight recorder may also be useful.