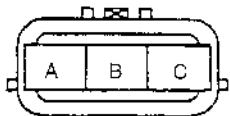



# TROUBLESHOOTING [ENGINE CONTROL]

<b>DTC P1122</b>		<b>Throttle position is CLOSED stuck</b>	
<b>DETECTION CONDITION</b>		● Throttle valve position is below 12.5% when engine coolant temperature is above 80 °C {176 °F} and mass intake air flow is above 63.2 g/sec {2.23 oz/sec.}	
<b>POSSIBLE CAUSE</b>		● Throttle position sensor malfunction or substandard performance ● Mass air flow sensor malfunction or substandard performance ● Open or short circuit in wiring from throttle position sensor terminal C to PCM terminal 3E ● Open or short circuit in wiring from mass air flow sensor terminal B to PCM terminal 2L ● Open circuit in wiring from throttle position sensor terminal B to PCM terminal 3F ● Open circuit in wiring from mass air flow sensor terminal A to PCM terminal 3C ● Open or short circuit in wiring from main relay terminal D to mass air flow sensor terminal C	
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Do throttle position sensor connector, mass air flow sensor connector, IAC valve connector and PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 6.
		No	Go to next step.
3	Implement PID/DATA MONITOR AND RECORD (TP V) of DIAGNOSTIC DATA LINK by using NGS. Is voltage as specified?	Yes	Go to next step.
		No	Inspect throttle position sensor. ☐ 01-40 THROTTLE POSITION SENSOR INSPECTION (Substandard performance), then go to step 6.
4	Implement PID/DATA MONITOR AND RECORD (MAF V) of DIAGNOSTIC DATA LINK by using NGS. Is voltage as specified?	Yes	Go to next step.
		No	Inspect mass air flow sensor (substandard performance), then go to step 6.
5	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
6	Clear diagnostic trouble code from memory. Is there a diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

(MASS AIR FLOW SENSOR)



(THROTTLE POSITION SENSOR)



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

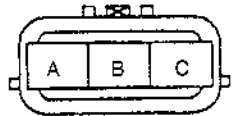
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X5U101WEB

# TROUBLESHOOTING [ENGINE CONTROL]

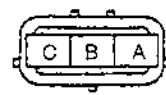
DTC P1123		Throttle position is OPEN stuck	
DETECTION CONDITION		● Throttle valve position is above 50% when engine speed is above 500 rpm and mass intake air flow is below 5.3 g/sec {0.187 oz/sec.}	
POSSIBLE CAUSE		● Throttle position sensor malfunction or substandard performance ● Mass air flow sensor malfunction or substandard performance ● Open or short circuit in wiring from throttle position sensor terminal C to PCM terminal 3E ● Open or short circuit in wiring from mass air flow sensor terminal B to PCM terminal 2L ● Open circuit in wiring from throttle position sensor terminal A to PCM terminal 2I ● Open circuit in wiring from throttle position sensor terminal B to PCM terminal 3F ● Open circuit in wiring from mass air flow sensor terminal A to PCM terminal 3C ● Open or short circuit in wiring from main relay terminal D to mass air flow sensor terminal C	
STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Do throttle position sensor connector, mass air flow sensor connector and PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 8.
		No	Go to next step.
3	Inspect throttle body. Is throttle valve opened according to accelerator pedal being depressed? And is throttle valve closed according to accelerator pedal being released?	Yes	Go to next step.
		No	Inspect throttle body and accelerator cable, then go to step 8.
4	Verify stored DTC. Have DTCs P0102, P0103, P0122 and/or P0123 been stored?	Yes	Inspect and repair DTC P0102, P0103, P0122 or P0123, then go to step 7.
		No	Go to next step.
5	Implement PID/DATA MONITOR AND RECORD (TP V) of DIAGNOSTIC DATA LINK by using NGS. Is voltage as specified?	Yes	Go to next step.
		No	Inspect throttle position sensor. 01-40 THROTTLE POSITION SENSOR INSPECTION (Substandard performance), then go to step 8.
6	Implement PID/DATA MONITOR AND RECORD (MAF V) of DIAGNOSTIC DATA LINK by using NGS. Is voltage as specified?	Yes	Go to next step.
		No	Inspect mass air flow sensor (substandard performance), then go to step 8.
7	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
8	Clear diagnostic trouble code from memory. Is there a diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

(MASS AIR FLOW SENSOR)



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

(THROTTLE POSITION SENSOR)

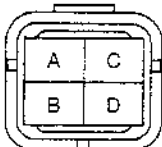


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# TROUBLESHOOTING [ENGINE CONTROL]

<b>DTC P1135</b>		<b>Front heated oxygen sensor heater circuit low</b>	
<b>DETECTION CONDITION</b>		PCM voltage is below 5.8 V when no power is supplied (during 322—327 sec. after engine start) to heated oxygen sensor heater (front)	
<b>POSSIBLE CAUSE</b>		<ul style="list-style-type: none"><li>• Heated oxygen sensor heater (front) malfunction</li><li>• Open or short to ground circuit in wiring from heated oxygen sensor (front) terminal C to ignition switch</li><li>• Open or short to ground circuit in wiring from heated oxygen sensor (front) terminal D to PCM terminal 1U</li></ul>	
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Does heated oxygen sensor (front) connector or PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 8.
		No	Go to next step.
3	Is PCM terminal 1U voltage okay?	Yes	Go to step 7.
		No	Go to next step.
4	Disconnect heated oxygen sensor (front) harness side connector and turn ignition switch to ON. Is there any battery positive voltage at harness side connector terminal C?	Yes	Go to next step.
		No	Inspect for open or short to ground circuit in wiring harness (Ignition switch — Heated oxygen sensor (front) terminal C), and repair or replace. Then go to step 8.
5	Is there any continuity between harness side connector terminal D and PCM terminal 1U?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 8.
6	Is there any continuity between heated oxygen sensor (front) side connector terminal D and C?	Yes	Go to next step.
		No	Replace heated oxygen sensor (front), then go to step 8.
7	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
8	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

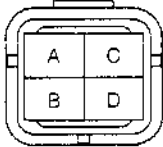
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X5U101WDV

DTC P1136		Front heated oxygen sensor heater circuit high	
DETECTION CONDITION		PCM voltage is above 11.5 V when power is supplied to heated oxygen sensor heater (front)	
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>• Heated oxygen sensor heater (front) malfunction</li><li>• Short power circuit in wiring from heated oxygen sensor (front) terminal D to PCM terminal 1U</li></ul>	
STEP	INSPECTION		ACTION
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Is PCM terminal 1U voltage okay?	Yes	Go to step 4.
		No	Go to next step.
3	Disconnect heated oxygen sensor (front) harness side connector and turn ignition switch to ON. Is there any battery positive voltage at harness side connector terminal D?	Yes	Go to next step.
		No	Check for short to power circuit in wiring harness (Heated oxygen sensor (front) terminal D — PCM), and repair or replace. Then go to step 5.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
4	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
5	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

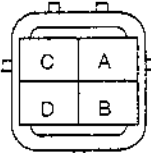


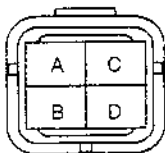
HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

XEU-01WDW

<b>DTC P1141</b>		<b>Rear heated oxygen sensor heater circuit low</b>	
<b>DETECTION CONDITION</b>		● PCM voltage is below 5.8 V when no power is supplied (during 322—327 sec. after engine start) to heated oxygen sensor heater (rear)	
<b>POSSIBLE CAUSE</b>		● Heated oxygen sensor heater (rear) malfunction ● Open or short to ground circuit in wiring from heated oxygen sensor (rear) terminal C to ignition switch ● Open or short to ground circuit in wiring from heated oxygen sensor (rear) terminal D to PCM terminal 3V	
<b>STEP</b>	<b>INSPECTION</b>	<b>ACTION</b>	
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Does heated oxygen sensor (rear) connector or PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 8.
		No	Go to next step.
3	Is PCM terminal 3V voltage okay?	Yes	Go to step 7.
		No	Go to next step.
4	Disconnect heated oxygen sensor (rear) harness side connector and turn ignition switch to ON. Is there battery positive voltage at harness side connector terminal C?	Yes	Go to next step.
		No	Check for open or short to ground circuit in wiring harness (Ignition switch — Heated oxygen sensor (rear) terminal C), and repair or replace. Then go to step 8.
5	Is there any continuity between harness side connector terminal D and PCM terminal 3V?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 8.
6	Is there any continuity between heated oxygen sensor (rear) side connector terminal D and C?	Yes	Go to next step.
		No	Replace heated oxygen sensor (rear), then go to step 8.
7	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
8	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

(EXCEPT CALIFORNIA EMISSION REGULATIONS APPLICABLE MODEL)



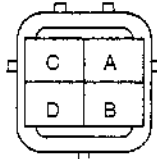
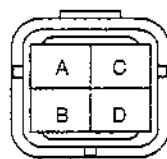


(CALIFORNIA EMISSION REGULATIONS APPLICABLE MODEL)

HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

X5U101WDX

# TROUBLESHOOTING [ENGINE CONTROL]

DTC P1142		Rear heated oxygen sensor heater circuit high	
DETECTION CONDITION		• PCM voltage is above 11.5 V when power is supplied to heated oxygen sensor heater (rear)	
POSSIBLE CAUSE		• Heated oxygen sensor heater (rear) malfunction • Short to power circuit in wiring from heated oxygen sensor (rear) terminal D to PCM terminal 3V	
STEP	INSPECTION	ACTION	
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Is PCM terminal 3V voltage okay?	Yes	Go to step 4.
		No	Go to next step.
3	Disconnect heated oxygen sensor (rear) harness side connector and turn ignition switch to ON. Is there battery positive voltage at harness side connector terminal D?	Yes	Go to next step.
		No	Inspect for short to power circuit in wiring harness (Heated oxygen sensor (rear) terminal D — PCM), and repair or replace. Then go to step 5.
4	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
5	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.
<div style="display: flex; justify-content: space-around; align-items: center;"><div style="text-align: center;"><p>(EXCEPT CALIFORNIA EMISSION REGULATIONS APPLICABLE MODEL)</p><p>HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL CONNECTOR)</p></div><div style="text-align: center;"><p>(CALIFORNIA EMISSION REGULATIONS APPLICABLE MODEL)</p></div></div>			

X5U101WDY

X5U101WDY

# TROUBLESHOOTING [ENGINE CONTROL]

DTC P1170		Heated oxygen sensor (Front) (Inversion)	
DETECTION CONDITION		When heated oxygen sensor (front) signal stays above 0.45 V for 42 seconds after the engine has reached normal operating temperature and running at 1,500 rpm or over	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Heated oxygen sensor (front) deterioration</li> <li>• Heated oxygen sensor heater (front) malfunction</li> <li>• Fuel injector malfunction</li> <li>• Pressure regulator malfunction</li> <li>• Pulsation damper malfunction</li> <li>• Fuel pump malfunction</li> <li>• Fuel filter clogged</li> <li>• Fuel delivery hose clogged or leaking</li> <li>• Fuel return hose clogged</li> <li>• Leakage intake-air system</li> <li>• Leakage exhaust system</li> <li>• Positive crankcase ventilation valve malfunction</li> <li>• Purge solenoid valve malfunction</li> <li>• Purge solenoid hoses hooked up incorrectly</li> <li>• Ignition coil malfunction</li> <li>• Ignition control module malfunction</li> <li>• Insufficient compression</li> <li>• Mass air flow sensor malfunction</li> <li>• Engine coolant temperature malfunction</li> <li>• Throttle position sensor malfunction</li> <li>• EGR system malfunction</li> <li>• Open or short circuit in wiring harness</li> <li>• Poor connection of connector</li> <li>• Vacuum hoses damaged or loose</li> </ul> <p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION		ACTION
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Verify stored DTC. Have DTCs P0102, P0103, P0117, P0118, P0122, P0123, P0443, P0500, P1102, P1103, P1122, P1123, P1496, P1497, P1498 and/or P1499 been stored?	Yes	Inspect or repair DTC P0102, P0103, P0117, P0118, P0122, P0123, P0443, P0504, P1102, P1103, P1122, P1123, P1496, P1497, P1498 or P1499, then go to step 33.
		No	Go to next step.
3	Is DTC P1170 on FREEZE FRAME PID DATA?	Yes	Go to next step.
		No	Inspect or repair DTC on FREEZE FRAME PID DATA, then go to step 33.
4	Temporarily clear DTC. Verify RPM, LOAD, ECT and VSS on FREEZE FRAME PID DATA. Drive for approx. 1 minute under same condition. Is P1170 stored on PENDING TROUBLE CODE?	Yes	Trouble is in process. Go to next step.
		No	Go to "01-01A ENGINE SYSTEM TROUBLESHOOTING, INTERMITTENT CONCERNS".
5	Implement PID/DATA MONITOR AND RECORD (ECT V, RPM, TP V) from DIAGNOSTIC DATA LINK by using NGS tester. Is there any signal that is far out of specification when ignition switch is at ON, and run engine at idle?	Yes	Implement "01-01A ENGINE DIAGNOSTIC INSPECTION, Input System Investigation Procedure" and repair or replace, then go to step 33.
		No	Go to next step.
6	Continue monitoring items on previous step. Is there any input signal which causes drastic changes when it is set to be in trouble condition?	Yes	Implement "01-01A ENGINE DIAGNOSTIC INSPECTION, Input System Investigation Procedure" and repair or replace, then go to step 33.
		No	Go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
7	Inspect exhaust system, upstream from heated oxygen sensor (front). Is there any gas leak?	Yes	Repair or replace faulty exhaust parts, then go to step 33.
		No	Go to next step.
8	Inspect installation of heated oxygen sensor (front). Is it okay?	Yes	Go to next step.
		No	Install heated oxygen sensor properly, then go to step 33.
9	Implement PID/DATA MONITOR AND RECORD (FHO2S) from DIAGNOSTIC DATA LINK by using NGS tester. Is voltage on heated oxygen sensor as follows while racing engine (in neutral)? <ul style="list-style-type: none"> <li>More than 0.45 V when suddenly accelerator pedal: rich condition</li> <li>Less than 0.45 V during fuel cut: lean condition</li> </ul>	Yes	Go to next step.
		No	Inspect and repair or replace faulty heated oxygen sensor (front), harness, connector or terminal. ☞ 01-40 HEATED OXYGEN SENSOR INSPECTION Then go to step 33.
10	Inspect heated oxygen sensor heater (front) and related harness, connector and terminal. ☞ 01-40 HEATED OXYGEN SENSOR INSPECTION Is it okay?	Yes	Go to next step.
		No	Repair or replace faulty heated oxygen sensor (front), harness, connector or terminal, then go to step 33.
11	Inspect for open, poor connection and other problems on following harnesses, connectors and terminals (for fuel injector at each cylinders): <ul style="list-style-type: none"> <li>From main relay to fuel injector</li> <li>From fuel injector to PCM</li> </ul> Is there any trouble?	Yes	Repair or replace faulty harness, connector or terminal, then go to step 33.
		No	Go to next step.
12	Inspect injection amount of each injector. ☞ 01-14 FUEL INJECTOR INSPECTION, Volume Test Is there any fuel injector in abnormal condition for amount or condition of injection?	Yes	Replace faulty fuel injector, then go to step 33.
		No	Go to next step.
13	Inspect LONGFT1 and SHRTFT1 on FREEZE FRAME PID DATA which are verified at step 1. Does it shift to negative side: lean side?	Yes	Go to next step.
		No	Go to step 18.
14	Inspect purge control system. ☞ 01-01A ENGINE SYSTEM INSPECTION, Purge Control Inspection Is it okay?	Yes	Go to next step.
		No	By following system inspection, repair or replace faulty parts, then go to step 33.
15	Inspect positive crankcase ventilation operation. ☞ 01-16 PCV VALVE INSPECTION Is it okay?	Yes	Go to next step.
		No	Replace positive crankcase ventilation valve, then go to step 33.
16	Inspect fuel line pressure under trouble condition. ☞ 01-01A ENGINE SYSTEM INSPECTION, Fuel line Pressure Inspection Is fuel line pressure okay?	Yes	Inspect on fuel leakage and injection amount ☞ 01-14 FUEL INJECTOR INSPECTION Replace faulty fuel injector, then go to step 33.
		No	Go to next step.
17	Inspect pressure regulator. ☞ 01-14 PRESSURE REGULATOR INSPECTION Is it okay?	Yes	Inspect and repair clogged fuel return hose, then go to step 33.
		No	Replace pressure regulator, then go to step 33.
18	Inspect for air suction at followings: <ul style="list-style-type: none"> <li>From air cleaner to throttle body</li> <li>From throttle body to dynamic chamber</li> <li>From dynamic chamber to intake manifold</li> </ul> Visually inspect cracks, and damages, and check fluctuation after spraying rust penetrating agent, then select air suction area. Can air suction be confirmed?	Yes	Repair or replace source of air suction, then go to step 33.
		No	Go to next step.
19	Inspect for air suction on vacuum hose which has negative pressure on intake manifold, same way as previous step. Can air suction be confirmed?	Yes	Repair or replace source of air suction, then go to step 33.
		No	Go to next step.
20	Inspect fuel line pressure under trouble condition. ☞ 01-01A ENGINE SYSTEM INSPECTION, Fuel Line Pressure Inspection Is fuel line pressure okay?	Yes	Go to step 27.
		No	Go to next step.

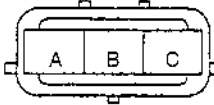
# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
21	Inspect fuel pump maximum pressure. ☞ 01-14 FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure Is it okay?	Yes	Go to next step.
		No	Replace fuel pump, then go to step 33.
22	Inspect pulsation damper for leaks and clogging. Is it okay?	Yes	Go to next step.
		No	Replace pulsation damper, then go to step 33.
23	Inspect clogging at fuel filter (high-pressure side). Is there any foreign material in fuel on fuel pump side of filter?	Yes	Go to next step.
		No	Go to step 25.
24	Inspect inside of fuel tank for foreign materials and stain. Is inside of fuel tank okay?	Yes	Replace fuel filter (high-pressure side), then go to step 33.
		No	Clean inside of fuel tank and fuel filter (low-pressure side). Replace fuel filter (high-pressure side), then go to step 33.
25	Inspect for leaks and clogging in fuel line from fuel distributor to fuel pump. Is it okay?	Yes	Go to next step.
		No	Repair or replace source of fuel leaks or clogging, then go to step 33.
26	Inspect for leaks in fuel line from fuel filter (high-pressure side) to fuel tank (return side). Is it okay?	Yes	Replace pressure regulator, then go to step 33.
		No	Repair or replace source of fuel leaks, then go to step 33.
27	Verify blinking condition on each cylinders by setting timing light on high-tension lead under trouble condition. Does it blink regularly and stable?	Yes	Go to step 30.
		No	Go to next step.
28	Inspect resistance of ignition coil. ☞ 01-18 IGNITION COIL INSPECTION Is it okay?	Yes	Go to next step.
		No	Replace ignition coil, then go to step 33.
29	Inspect ignition control module. ☞ 01-18 IGNITION CONTROL MODULE INSPECTION Is it okay?	Yes	Inspect harness for poor connection, contacting body and wear from ignition control module to PCM. Repair faulty harness, then go to step 33.
		No	Replace ignition coil, then go to step 33.
30	Inspect EGR control system. ☞ 01-01A ENGINE SYSTEM INSPECTION, EGR Control Inspection Is it okay?	Yes	Go to next step.
		No	By following system inspection, repair faulty parts, then go to step 33.
31	Remove radiator cap. Implement procedure to bleed air from engine coolant, then run engine at idle. Is there any small bubble which makes engine coolant white at filling opening?  <b>Note</b> • Large bubbles are normal since they are remaining air coming out from engine coolant passage.	Yes	Air gets in from poor sealing on head gasket or other areas between combustion chamber and engine coolant passage. Repair or replace faulty parts, then go to step 33.
		No	Go to next step.
32	Inspect engine compression. ☞ 01-10 COMPRESSION INSPECTION Is it okay?	Yes	Go to next step.
		No	Implement engine overhaul, then go to next step.
33	Clear DTC. Verify stored PENDING TROUBLE CODE and DTC, after running under DRIVE MODE. Is there any PENDING TROUBLE CODE and/or DTC stored?	Yes	Go to applicable DTC inspection.  <b>Note</b> • If malfunction remains even though all inspections have been performed, get assistance from Technical Hotline/your distributor.
		No	Troubleshooting completed.



# TROUBLESHOOTING [ENGINE CONTROL]

DTC P1345		No SGC signal	
DETECTION CONDITION		No SGC signal input from camshaft position sensor while engine rotates	
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>Camshaft position sensor malfunction</li><li>Open or short circuit in wiring from camshaft position sensor 3-pin connector terminal A to main relay terminal D</li><li>Open or short circuit in wiring from PCM terminal 2H to camshaft position sensor 3-pin connector terminal B</li></ul>	
STEP	INSPECTION	ACTION	
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Does camshaft position sensor 3-pin connector or PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 9.
		No	Go to next step.
3	Disconnect camshaft position sensor 3-pin connector. Turn ignition switch to ON. Is there any battery positive voltage at connector terminal A?	Yes	Go to next step.
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — Camshaft position sensor 3-pin connector terminal A)
4	Is there any continuity between connector terminal B and PCM terminal 2H?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 9.
5	Is there continuity between connector terminal C and PCM terminal 3C?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 9.
6	Is PCM terminal 2H voltage okay?	Yes	Go to step 9.
		No	Go to next step.
7	Is camshaft position sensor okay? ➡ 01-40 CAMSHAFT POSITION SENSOR INSPECTION	Yes	Go to next step.
		No	Replace distributor, then go to step 9.
8	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
9	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL SIDE)

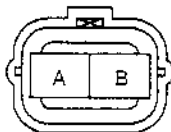
X5U1C~W02

X5U1C-WCZ

DTC P1449		Canister drain cut valve (CDCV) open or short	
DETECTION CONDITION		Open or short circuit is observed in canister drain cut valve system when ignition switch is turned ON	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>Canister drain cut valve malfunction</li> <li>Open or short circuit in wiring from canister drain cut valve terminal A to main relay terminal D</li> <li>Open or short circuit in wiring from canister drain cut valve terminal B to PCM terminal 3U</li> </ul>	
STEP	INSPECTION	ACTION	
1	Does canister drain cut valve connector or PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 8.
		No	Go to next step.
2	Implement PID/DATA MONITOR AND RECORD (CDCV) of DIAGNOSTIC DATA LINK by using NGS tester. Does it operate normally?	Yes	Go to step 6.
		No	Go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION
3	Disconnect canister drain cut valve connector. Turn ignition switch to ON. Is there battery positive voltage at harness side connector terminal A?	Yes Go to next step.
		No Check for open or short circuit in wiring harness. (Main relay terminal D — Canister drain cut valve terminal A), then go to step 7.
4	Is there continuity between canister drain cut valve harness side connector terminal B and PCM terminal 3U?	Yes Go to next step.
		No Repair or replace wiring harness, then go to step 7.
5	Is there continuity between canister drain cut valve terminals A and B?	Yes Go to next step.
		No Replace canister drain cut valve, then go to step 7.
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes Go to applicable DTC inspection.
		No Troubleshooting completed.



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

X5U101WE0

DTC P1450		Evaporative emission control system malfunction	
DETECTION CONDITION		Fuel tank pressure is less than -3.9 kPa [-29.4 mmHg, -1.2 inHg] for more than 10 sec. in 3.1—400 sec. after engine is started in cold condition and vehicle speed is less than 100 km {62 mph}	
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>• Purge solenoid valve malfunction</li><li>• Canister drain cut valve malfunction</li><li>• Tank pressure control valve malfunction</li><li>• Vent cut valve malfunction</li><li>• Charcoal canister malfunction</li><li>• Air filter clogged</li><li>• Check valve (two-way) clogged</li><li>• Evaporative hose clogged (drain)</li><li>• Fuel tank pressure sensor malfunction</li><li>• Engine coolant temperature sensor malfunction</li><li>• Vehicle speed sensor malfunction</li><li>• Open or short circuit in wiring harness</li><li>• Poor connection of connector</li></ul>	
STEP	INSPECTION		ACTION
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Verify stored DTC. Have DTCs P0117, P0118, P0335, P0443, P0500 and/or P1449 been stored?	Yes	Inspect and repair DTC P0117, P0118, P0335, P0443, P0500 or P1449, then go to step 16.
		No	Go to next step.
3	Implement PID/DATA MONITOR AND RECORD (BARO V, ETC V, FTL V, FTP V, IAT V, MAF V, TP V, VS) from DIAGNOSTIC DATA LINK by using NGS tester. Is there any signal that is far out of specification when ignition switch is at ON and run engine at idle?	Yes	Implement "01-01A ENGINE DIAGNOSTIC INSPECTION, Input System Investigation Procedure" and repair or replace, then go to step 16.
		No	Go to next step.
4	Carry out IGNITION ON TEST from SIMULATION TEST by using NGS tester. Is canister drain cut valve and tank pressure control valve operating sound heard when CDCV is turned from OFF to ON?	Yes	Go to next step.
		No	Go to step 7.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
5	Carry out IDLING TEST from SIMULATION TEST by using NGS tester. Detach vacuum hose on charcoal canister at purge solenoid valve side, then while increasing PRG V from 0% to 100%, measure intake manifold negative pressure using vacuum gauge. Does it change from atmosphere pressure to intake manifold negative pressure?	Yes	Go to step 8.
		No	Go to next step.
6	Inspect purge solenoid valve for air leak and open stuck. ☞ 01-16 PURGE SOLENOID VALVE INSPECTION Is it okay?	Yes	Inspect and repair or replace for open, poor connection and other problems on following harnesses, connectors and terminals: ● From main relay to purge solenoid valve ● From purge solenoid valve to PCM Then go to step 16.
		No	Replace purge solenoid valve, then go to step 16.
7	Inspect canister drain cut valve for air tightness and closed stuck. ☞ 01-16 CANISTER DRAIN CUT VALVE INSPECTION Is it okay?	Yes	Inspect and repair or replace for open, poor connection and other problems on following harnesses, connectors and terminals: ● From main relay to canister drain cut valve ● From canister drain cut valve to PCM Then go to step 16.
		No	Replace canister drain cut valve, then go to step 16.
8	Remove charcoal canister and inspect for clogging. ☞ 01-16 CHARCOAL CANISTER INSPECTION Is it okay?	Yes	Go to next step.
		No	Replace charcoal canister, then go to step 16.
9	Find hose, which is led from tank pressure control valve to charcoal canister. Clamp on this hose and remove filler cap. Implement PID/DATA MONITOR AND RECORD (FTP, FTP V) from DIAGNOSTIC DATA LINK by using NGS tester. After FTP and FTPV values same as atmospheric pressure?	Yes	Install filler cap, then go to step 11.
		No	Go to next step.
10	Inspect fuel tank pressure sensor. ☞ 01-40 FUEL TANK PRESSURE SENSOR INSPECTION Is it okay?	Yes	Go to next step.
		No	Repair fuel tank pressure sensor, then go to step 16.
11	Inspect tank pressure control valve for air tightness and closed stuck. ☞ 01-16 TANK PRESSURE CONTROL VALVE INSPECTION Is it okay?	Yes	Go to next step.
		No	Replace tank pressure control valve, then go to step 16.
12	Remove tank pressure control valve, then attach T pipe and vacuum pump. Apply negative pressure by using vacuum pump. Implement PID/DATA MONITOR AND RECORD (FTP, FTP V) from DIAGNOSTIC DATA LINK by using NGS tester. Do FTP, FTPV values change on negative pressure side?	Yes	Go to step 14.
		No	Go to next step.
13	Inspect vent cut valve for clogging. ☞ 01-14 VENT CUT VALVE INSPECTION Is it okay?	Yes	Inspect and repair or replace clogged on following hoses: ● From charcoal canister to vent cut valve ● From vent cut valve to fuel tank Then go to step 16.
		No	Replace filler pipe assembly, then go to step 16.
14	Remove and inspect check valve (two-way) for clogging. ☞ 01-16 CHECK VALVE (TWO-WAY) INSPECTION Is it okay?	Yes	Go to next step.
		No	Replace check valve (two-way), then go to step 16.

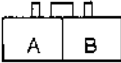
# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
15	Remove and inspect air filter for clogging. Is it okay?	Yes	Inspect and repair or replace for clogged on following hoses: <ul style="list-style-type: none"> <li>From charcoal canister to canister drain cut valve</li> <li>From canister drain cut valve to air filter</li> <li>From air filter to two-way check valve</li> </ul> Then go to next step.
		No	Replace air filter, then go to next step.
16	Implement PID/DATA MONITOR AND RECORD from DIAGNOSTIC DATA LINK by using NGS tester. Verify that following PID's are within indicated ranges when ignition switch at ON. <ul style="list-style-type: none"> <li>BARO V 72.0 kPa {21.3 inHg} or higher</li> <li>ECT V 0—35 °C {32—95 °F}</li> <li>IAT 10—60 °C {50—140 °F}</li> </ul> Verify that fuel gauge reads with 1/4—3/4 of tank. Were readings within indicated ranges?	Yes	Correct condition, then go to next step.
		No	Take corrective action, then go to next step.  <b>Note</b> <ul style="list-style-type: none"> <li>Readings need to be in the indicated ranges to perform DRIVE MODE.</li> </ul>
17	Clear DTC. Run DRIVE MODE. → 01-01A ENGINE DIAGNOSTIC INSPECTION, Fuel Tank Pressure Graph Recording Procedure Verify that CDCV and FTP graphs. Is there any problem detected?	Yes	Go back to step 2.  <b>Note</b> <ul style="list-style-type: none"> <li>If malfunction remains even though all inspections have been performed, get assistance from Technical Hotline/your distributor.</li> </ul>
		No	Go to next step.
18	Verify stored PENDING TROUBLE CODE, DTC and DIAGNOSTIC MONITORING TEST RESULTS. Is there any code stored and/or out of specification?	Yes	Go to appropriate DTC inspection.
		No	Troubleshooting completed.

DTC P1487		EGR boost sensor solenoid valve open or short	
DETECTION CONDITION		• Open or short circuit is observed in EGR boost sensor solenoid valve system when ignition switch is turned ON	
POSSIBLE CAUSE		• EGR boost sensor solenoid valve malfunction • Open or short circuit in wiring from EGR boost sensor solenoid valve terminal A to main relay terminal D • Open or short circuit in wiring from EGR boost sensor solenoid valve B to PCM terminal 3T	
STEP	INSPECTION		ACTION
1	Does EGR boost sensor solenoid valve connector or PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 7.
		No	Go to next step.
2	Implement PID/DATA MONITOR AND RECORD (EGRB V) of DIAGNOSTIC DATA LINK by using NGS tester. Does it operate normally?	Yes	Go to step 6.
		No	Go to next step.
3	Disconnect EGR boost sensor solenoid valve connector. Turn ignition switch to ON. Is there battery positive at connector terminal A?	Yes	Go to next step.
		No	Check for open or short circuit in wiring harness (Main relay terminal D — EGR boost sensor solenoid valve terminal A), then go to step 7.
4	Is there continuity between connector terminal B and PCM terminal 3T?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
5	Is there continuity between EGR boost sensor solenoid valve terminals A and B?	Yes	Go to next step.
		No	Replace EGR boost sensor solenoid valve, then go to step 7.
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

X5U101WE1

<b>DTC P1496</b>		<b>EGR valve motor coil 1 open or short</b>	
<b>DETECTION CONDITION</b>	• Open or short circuit is observed in EGR valve (stepping motor #1 coil) system when ignition switch is turned ON		
<b>POSSIBLE CAUSE</b>	• EGR valve (stepping motor #1 coil) malfunction • Open or short circuit in wiring from EGR valve terminal C to main relay terminal D • Open or short circuit in wiring from EGR valve terminal E to PCM terminal 2M		
<b>STEP</b>	<b>INSPECTION</b>	<b>ACTION</b>	
1	Does EGR valve connector or PCM connector have poor connection?	Yes	Repair or replace as necessary, then go to step 7.
		No	Go to next step.
2	Implement PID/DATA MONITOR AND RECORD (SEGR P) of DIAGNOSTIC DATA LINK by using NGS tester. Is voltage as specified?	Yes	Go to step 6.
		No	Go to next step.
3	Disconnect EGR valve connector. Turn ignition switch ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step.
		No	Check for open or short circuit in wiring harness (Main relay terminal D — EGR valve terminal C), then go to step 7.
4	Is there continuity between EGR valve connector terminal E and PCM terminal 2M?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
5	Is there continuity between EGR valve connector terminal C and E?	Yes	Go to next step.
		No	Replace EGR valve, then go to step 7.
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

A	C	E
B	D	F

HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

X5U101WE2

DTC P1497		EGR valve motor coil 2 open or short	
DETECTION CONDITION		● Open or short circuit is observed in EGR valve (stepping motor #2 coil) system when ignition switch is turned ON	
POSSIBLE CAUSE		● EGR valve (stepping motor #2 coil) malfunction ● Open or short circuit in wiring from EGR valve terminal C to main relay terminal D ● Open or short circuit in wiring from EGR valve terminal A to PCM terminal 2N	
STEP	INSPECTION		ACTION
1	Does EGR valve connector or PCM connector have poor connection?	Yes	Repair or replace as necessary, then go to step 7.
		No	Go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
2	Implement PID/DATA MONITOR AND RECORD (SEGR P) of DIAGNOSTIC DATA LINK by using NGS tester. Does it operate normally?	Yes	Go to step 6.
		No	Go to next step.
3	Disconnect EGR valve connector. Turn ignition switch ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step.
		No	Check for open or short circuit in wiring harness (Main relay terminal D — EGR valve terminal C), then go to step 7.
4	Is there continuity between EGR valve connector terminal A and PCM terminal 2N?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
5	Is there continuity between EGR valve connector terminal C and A?	Yes	Go to next step.
		No	Replace EGR valve, then go to step 7.
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

A	C	E
B	D	F

HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

X5U101WE

X5U101WE3

DTC P1498		EGR valve motor coil 3 open or short	
DETECTION CONDITION	• Open or short circuit is observed in EGR valve (stepping motor #3 coil) system when ignition switch is turned ON		
POSSIBLE CAUSE	• EGR valve (stepping motor #3 coil) malfunction • Open or short circuit in wiring from EGR valve terminal C to main relay terminal D • Open or short circuit in wiring from EGR valve terminal B to PCM terminal 2O		
STEP	INSPECTION		ACTION
1	Does EGR valve connector or PCM connector have poor connection?	Yes	Repair or replace as necessary, then go to step 7.
		No	Go to next step.
2	Implement PID/DATA MONITOR AND RECORD (SEGR P) of DIAGNOSTIC DATA LINK by using NGS tester. Does it operate normally?	Yes	Go to step 6.
		No	Go to next step.
3	Disconnect EGR valve connector. Turn ignition switch ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step.
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — EGR valve terminal C)
4	Is there continuity between EGR valve connector terminal B and PCM terminal 2O?	Yes	Go to next step.
		No	Repair or replace wiring harness.
5	Is there continuity between EGR valve connector terminal C and B?	Yes	Go to next step.
		No	Replace EGR valve.
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION							
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.						
		No	Troubleshooting completed.						
<table><tr><td>A</td><td>C</td><td>E</td></tr><tr><td>B</td><td>D</td><td>F</td></tr></table> <p>HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL CONNECTOR)</p>				A	C	E	B	D	F
A	C	E							
B	D	F							

X5U101WE4

X5U101WE4

DTC P1499		EGR valve motor coil 4 open or short							
DETECTION CONDITION		● Open or short circuit is observed in EGR valve (stepping motor #4 coil) system when ignition switch is turned ON							
POSSIBLE CAUSE		● EGR valve (stepping motor #4 coil) malfunction ● Open or short circuit in wiring from EGR valve terminal C to main relay terminal D ● Open or short circuit in wiring from EGR valve terminal F to PCM terminal 2P							
STEP	INSPECTION		ACTION						
1	Does EGR valve connector or PCM connector have poor connection?	Yes	Repair or replace as necessary, then go to step 7.						
		No	Go to next step.						
2	Implement PID/DATA MONITOR AND RECORD (SEGR P) of DIAGNOSTIC DATA LINK by using NGS tester. Does it operate normally?	Yes	Go to step 7.						
		No	Go to next step.						
3	Disconnect EGR valve connector. Turn ignition switch ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step.						
		No	Check for open or short circuit in wiring harness (Main relay terminal D — EGR valve terminal C), then go to step 7.						
4	Is there continuity between EGR valve connector terminal F and PCM terminal 2P?	Yes	Go to next step.						
		No	Repair or replace wiring harness, then go to step 7.						
5	Is there continuity between EGR valve connector terminal C and F?	Yes	Go to next step.						
		No	Replace EGR valve, then go to step 7.						
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.						
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.						
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.						
		No	Troubleshooting completed.						
<table><tr><td>A</td><td>C</td><td>E</td></tr><tr><td>B</td><td>D</td><td>F</td></tr></table> <p>HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL CONNECTOR)</p>				A	C	E	B	D	F
A	C	E							
B	D	F							

X5U101WE

X5U101WE5

# TROUBLESHOOTING [ENGINE CONTROL]

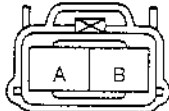
DTC P1504		Idle air control circuit malfunction	
DETECTION CONDITION	<ul style="list-style-type: none"> <li>PCM detects no voltage from idle air control valve while driving in the following condition               <ul style="list-style-type: none"> <li>① Except cranking</li> <li>② At battery positive voltage above 11 V</li> <li>③ IAC valve actuation time is 0.37—1.43 msec.</li> </ul> </li> </ul>		
	POSSIBLE CAUSE <ul style="list-style-type: none"> <li>IAC valve malfunction</li> <li>Open circuit in wiring from IAC valve terminal A to PCM terminal 3M</li> <li>Open or short circuit in wiring from IAC valve terminal B to PCM terminal 3O</li> </ul>		
STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Do IAC valve connector and PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 7.
		No	Go to next step.
3	Implement PID/DATA MONITOR AND RECORD (IAC V) of DIAGNOSTIC DATA LINK by using NGS. Does it operate normally?	Yes	Go to step 7.
		No	Inspect IAC valve. ☞ 01-13 IDLE AIR CONTROL VALVE INSPECTION Then go to next step.
4	Is there continuity between IAC valve side connector terminal A and PCM terminal 3M?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
5	Is there continuity between IAC valve side connector terminal B and PCM terminal 3O?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
6	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
7	Clear diagnostic trouble code from memory. Is there a diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

DTC P1523		VICS circuit malfunction	
DETECTION CONDITION	<ul style="list-style-type: none"><li>Open or short circuit is observed in VICS solenoid valve system when ignition switch is turned ON</li></ul>		
POSSIBLE CAUSE	<ul style="list-style-type: none"><li>VICS solenoid valve malfunction</li><li>Open or short circuit in wiring from VICS solenoid valve terminal A to Main relay terminal D</li><li>Open or short circuit in wiring from PCM terminal 3Q to VICS solenoid valve terminal B</li></ul>		
STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Does VICS solenoid valve connector PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 8.
		No	Go to next step.
3	Implement PID/DATA MONITOR AND RECORD (VICS V) of DIAGNOSTIC DATA LINK by using NGS tester. Is voltage as specified?	Yes	Go to step 7.
		No	Go to next step.
4	Disconnect purge solenoid valve connector. Turn ignition switch is ON. Is there any battery positive voltage at harness side connector terminal A?	Yes	Go to next step.
		No	Check for open or short circuit in wiring harness (Harness side connector terminal A — Main relay terminal D), then go to step 8.
5	Is there any continuity between harness side connector terminal B and PCM terminal 3Q?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 8.
6	Is there any continuity between VICS solenoid valve terminals?	Yes	Go to next step.
		No	Replace VICS solenoid valve, then go to step 8.



## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
7	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
8	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.



HARNESS SIDE CONNECTOR  
(VIEW FROM TERMINAL CONNECTOR)

XSU101WE6

<b>DTC P1562</b>		<b>PCM +BB voltage is low</b>	
<b>DETECTION CONDITION</b>		● Back-up voltage of PCM memory is below 1.4 V when not cranking	
<b>POSSIBLE CAUSE</b>		● Open circuit in wiring from battery to PCM terminal 1A	
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Does fuel PCM connector terminal 1A have poor connection?	Yes	Repair or replace connector, then go to step 5.
		No	Go to next step.
3	Is there continuity between battery and PCM terminal 1A?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 5.
4	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
5	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

<b>DTC P1601</b>		<b>Communication line error (PCM — TCM)</b>	
<b>DETECTION CONDITION</b>		<ul style="list-style-type: none"><li>• No PCM — TCM communication when ignition switch is turned on</li></ul>	
<b>POSSIBLE CAUSE</b>		<ul style="list-style-type: none"><li>• Open or short circuit in wiring from PCM terminal 1K to TCM terminal AL</li><li>• Open or short circuit in wiring from PCM terminal 1N to TCM terminal O</li><li>• Open or short circuit in wiring ignition switch to TCM terminal AR</li><li>• Open circuit in wiring from TCM terminal AP to ground</li></ul>	
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Has FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Does TCM connector or PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 7.
		No	Go to next step.
3	TCM terminal AR and AP voltage okay?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
4	Is there continuity between PCM terminal 1K and TCM terminal AL?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.
5	Is there continuity between PCM terminal 1N and TCM terminal O?	Yes	Go to next step.
		No	Repair or replace wiring harness, then go to step 7.

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION
6	Clear diagnostic trouble code from memory. Is same code No. present after rechecking.	Yes Get assistance from technical Hotline/your distributor, then replace PCM if necessary.
		No Check TCM, then go to next step.
7	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes Go to applicable DTC inspection.
		No Troubleshooting completed.

<b>DTC P1608, P1609</b>		
<b>DETECTION CONDITION</b>	<ul style="list-style-type: none"> <li>PCM does not read diagnostic trouble codes from output devices</li> </ul>	
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>PCM malfunction</li> </ul>	
STEP	INSPECTION	ACTION
—	—	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.

<b>DTC P1631</b>		<b>Generator output voltage signal no electricity</b>	
<b>DETECTION CONDITION</b>	<ul style="list-style-type: none"><li>When PCM demands generated current above 20 A to generator, PCM judges generator output voltage below 8.5 V</li></ul>		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"><li>Generator malfunction</li><li>Open or short circuit in wiring from generator to PCM terminal 1T</li><li>Open or short circuit in wiring from generator to PCM terminal 1O</li></ul>		
<b>STEP</b>	<b>INSPECTION</b>	<b>ACTION</b>	
1	Does generator connector or PCM connector have poor connection?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 8.
2	Is generator generating current when engine is running? ➡ 01-17 GENERATOR INSPECTION	Yes	Go to next step.
		No	Go to step 5.
3	Implement PID/DATA MONITOR AND RECORD (ALTT V) of DIAGNOSTIC DATA LINK by using NGS tester. Is voltage as specified?	Yes	Go to step 6.
		No	Go to next step.
4	Disconnect generator connector. Is there continuity between connector terminal P and PCM terminal 1T?	Yes	Check generator, then go to step 8. ➡ 01-17 GENERATOR INSPECTION
		No	Repair or replace connector, then go to step 8.
5	Implement PID/DATA MONITOR AND RECORD (ALT F) of DIAGNOSTIC DATA LINK by using NGS tester. Is voltage as specified?	Yes	Go to next step.
		No	Go to step 7.
6	Is there continuity between connector terminal D and PCM terminal 1O?	Yes	Check generator, then go to step 8. ➡ 01-17 GENERATOR INSPECTION
		No	Repair or replace connector, then go to step 9
7	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
8	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

## TROUBLESHOOTING [ENGINE CONTROL]

DTC P1632		Battery voltage monitor signal circuit malfunction	
DETECTION CONDITION		• When PCM judges battery positive voltage below 8 V	
POSSIBLE CAUSE		• Open or short circuit in wiring from battery to PCM terminal 1H	
STEP	INSPECTION		ACTION
1	Does PCM connector have poor connection?	Yes	Repair or replace connector, then go to step 4.
		No	Go to next step.
2	Implement PID/DATA MONITOR AND RECORD (B+) of DIAGNOSTIC DATA LINK by using NGS tester. Is voltage as specified?	Yes	Go to next step.
		No	Check continuity between battery and PCM, then go to step 4.
3	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
4	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

DTC P1633		Battery overcharge	
DETECTION CONDITION		When PCM judges generator output voltage above 18 V or battery positive voltage above 16 V	
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>Generator malfunction (overcharge)</li><li>PCM malfunction</li><li>Open or short circuit in wiring from generator to PCM terminal 1B</li></ul>	
STEP	INSPECTION		ACTION
1	Does generator connector or PCM connector have poor connection?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 6.
2	Is generator generating current when engine is running? ☞ 01-17 GENERATOR INSPECTION	Yes	Check generator, then go to step 6. ☞ 01-17 GENERATOR INSPECTION
		No	Go to next step.
3	Disconnect generator connector. Is generator connector terminal D voltage okay?  <b>Ignition switch ON: Approx. 0 V</b>	Yes	Go to step 5.
		No	Go to next step.
4	Implement PID/DATA MONITOR AND RECORD (B+) of DIAGNOSTIC DATA LINK by using NGS tester. Is voltage as specified?	Yes	Go to next step.
		No	Repair or replace wiring harness between generator side connector terminal D and PCM terminal 4R, then go to step 6.
5	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
6	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

# TROUBLESHOOTING [ENGINE CONTROL]

DTC P1634		Generator terminal B circuit open	
<b>DETECTION CONDITION</b>		<ul style="list-style-type: none"> <li>Generator output voltage is above 17 V and battery voltage is below 11 V while idling</li> </ul>	
<b>POSSIBLE CAUSE</b>		<ul style="list-style-type: none"> <li>Generator malfunction</li> <li>Battery malfunction</li> <li>Open or short circuit in wiring from battery to generator</li> </ul>	
STEP	INSPECTION		ACTION
1	Does generator terminal B connector have poor connection?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 6.
2	Is battery positive voltage normal when battery is fully charged? ➤ 01-17 BATTERY INSPECTION	Yes	Go to next step.
		No	Check battery, then go to step 6. ➤ 01-17 BATTERY INSPECTION
3	Disconnect generator terminal B connector. Is harness side connector voltage okay?  <b>Voltage: B+</b>	Yes	Go to next step.
		No	Repair or replace wiring harness between generator terminal B and battery positive terminal, then go to step 6.
4	Is generator terminal B voltage normal at idle?  <b>Voltage 13—15 V</b>	Yes	Go to next step.
		No	Check generator, then go to step 6. ➤ 01-17 GENERATOR INSPECTION
5	Clear diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Get assistance from Technical Hotline/your distributor, then replace PCM if necessary.
		No	Intermittent poor connection in harness or connector. Repair connector and/or harness, then go to next step.
6	Clear diagnostic trouble code from memory. Is there any diagnostic trouble code present after performing "After Repair Procedure"?	Yes	Go to applicable DTC inspection.
		No	Troubleshooting completed.

# TROUBLESHOOTING [ENGINE CONTROL]

## ENGINE SYMPTOM TROUBLESHOOTING

X5U101W33

### Diagnostic Index

TROUBLESHOOTING ITEM			DESCRIPTION
No.	TROUBLE		
1	Melts main or other fuse		—
2	Will not crank		Starter does not work
3	Hard start/long crank/erratic start/erratic crank		Starter cranks engine at normal speed but engine requires excessive cranking
4	Engine stalls	After start	Engine stops unexpectedly at idle and/or after start
		At idle	
5	Crankes normally but will not start		Starter cranks engine at normal speed but engine will not run
6	Slow return to idle		Engine takes more time than normal to return to idle speed
7	Engine runs rough/rolling idle		Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake Idle speed too slow and excessive engine shake
8	Fast idle/runs on		Engine speed continues at fast idle after warm-up Engine runs after ignition switch is turned off
9	Low idle/stalls during deceleration		Engine stops unexpectedly at beginning of deceleration or recovery from deceleration
10	Engine stalls/quits	Acceleration/cruise	Engine stops unexpectedly at beginning of acceleration or during acceleration Engine stops unexpectedly while cruising
	Engine runs rough	Acceleration/cruise	Engine speed fluctuates during acceleration or cruising
	Misses	Acceleration/cruise	Engine misses during acceleration or cruising
	Buck/jerk	Acceleration/cruise deceleration	Vehicle bucks/jerks during acceleration, cruising, or deceleration
	Hesitation/stumble	Acceleration	Momentary pause at beginning of acceleration, or during acceleration
	Surges	Acceleration/cruise	Momentary minor irregularity in engine output
11	Lack/loss of power	Acceleration/cruise	Performance poor under load (i.e., power down when climbing hills)
12	Knocking/pinging	Acceleration/cruise	Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)
13	Poor fuel economy		Fuel economy unsatisfactory
14	Emissions compliance		Fails emissions test
15	MIL never on		Malfunction indicator lamp never on
16	High oil consumption/leakage		Oil consumption excessive
17	Cooling system concerns	Overheating	Engine runs at higher than normal temperature/overheats
18	Cooling system concerns	Runs cold	Engine does not reach normal operating temperature
19	Exhaust smoke		Blue, black, or white smoke from exhaust system
20	Fuel odor (in engine compartment)		Gasoline fuel smell or visible leaks
21	Engine noise		Engine noise from under hood
22	Vibration concerns (engine)		Vibration from under hood or driveline
23	A/C does not work		A/C compressor magnetic clutch does not engage when A/C is turned on
24	A/C always on/A/C compressor runs continuously		A/C compressor magnetic clutch does not disengage
25	A/C does not cut off under wide open throttle conditions		A/C compressor magnetic clutch does not disengage under wide open throttle
26	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust
27	Intermittent concerns		Symptom occurs randomly and is difficult to diagnose

## TROUBLESHOOTING [ENGINE CONTROL]

TROUBLESHOOTING ITEM			DESCRIPTION
No.	TROUBLE		
28	Automatic transmission concerns	Upshift downshift/engagement	☞ 05-01 AUTOMATIC TRANSMISSION
29	Fuel fill issues		Fuel tank does not fill smoothly
30	Fuel filling shut off issues		Fuel does not shut off properly
31	Constant voltage		Incorrect constant voltage

# TROUBLESHOOTING [ENGINE CONTROL]

## Quick Diagnostic Chart

Possible factor																					
Troubleshooting item																					
1	Melts main or other fuse																				
2	Will not crank	x	x	x																	
3	Hard start/long crank/ erratic start/erratic crank																				
4	Engine stalls																				
	After start																				
	At idle																				
5	Cranks normally but will not start																				
6	Slow return to idle																				
7	Engine runs rough/rolling idle																				
8	Fast idle/runs on																				
9	Low idle/stalls during deceleration																				
10	Engine stalls/quits																				
	Acceleration/cruise																				
	Engine runs rough																				
	Acceleration/cruise																				
	Misses																				
	Acceleration/cruise																				
	Buck/jerk																				
	Acceleration/cruise / deceleration																				
	Hesitation/stumble																				
	Acceleration																				
	Surges																				
	Acceleration/cruise																				
11	Lack/loss of power																				
	Acceleration/cruise																				
12	Knocking/pinging																				
	Acceleration/cruise																				
13	Poor fuel economy																				
14	Emission compliance																				
15	MIL never on																				
16	High oil consumption/leakage																				
17	Cooling system																				
	Overheating																				
18	Cooling system																				
	Runs cold																				
19	Exhaust smoke																				
20	Fuel odor (in engine compartment)																				
21	Engine noise																				
22	Vibration concerns(engine)																				
23	A/C does not work																				
24	A/C always on/A/C compressor runs continuously																				
25	A/C does not cut off under wide open throttle conditions																				
26	Exhaust sulfur smell																				
27	Intermittent concerns																				
28	Automatic transmission concerns																				
	Upshift/downshift/ engagement																				
29	Fuel refill concerns																				
30	Fuel filling shut off issues																				
31	Constant voltage																				

05-01 AUTOMATIC TRANSMISSION

X5U10:WEP

# TROUBLESHOOTING [ENGINE CONTROL]

Possible factor										Troubleshooting Item	
Malfunction of fuel pump (Mechanically or electrically)											
Malfunction of pressure regulator											
Restriction or clogged in fuel hoses											
Malfunction of fuel injectors (leak or clogged, impactive)											
Fuel leakage from fuel system (including injector, injector O-ring)											
Fuel filters restriction or clogged											
Damaged camshaft position sensor (i.e. Open or short circuits)											
Damaged camshaft											
Improper air/fuel mixture ratio control											
Exhaust system restriction or clogged											
Malfunction of catalytic converter											
Malfunction of EGR system											
Malfunction of evaporative emission control system											
Malfunction of PCV valve											
Malfunction of V-reference supply circuit											
Malfunction of main relay (Mechanically or electrically)											
Malfunction of engine coolant temperature sensor											
Transmission range sensor mis-adjustment											
Inhibitor switch in transmission range sensor open											
Malfunction of brake on/off switch and related circuit											
Malfunction of neutral or clutch switch and related circuit											
Malfunction of mass air flow sensor and related circuit											
Malfunction of throttle position sensor (including looseness)											
Mis-adjustment or throttle position sensor and related circuit											
Malfunction of knock sensor and related circuit											
Malfunction of power steering pressure switch and related circuit											
Improper refrigerant charging amount											
Malfunction of A/C demands signal circuit											
Malfunction of condenser fan system											
Improper load signal input											
MIL burned out											
Damaged instrument cluster including circuit board											
Clutch slippage											
Malfunction of automatic transaxle related parts											
Malfunction of vehicle speed sensor and related circuit											
Improper ATF level											
Brake dragging											
Loosen parts											
Improper balance of wheels & tires											
Malfunction of drive line											
Malfunction of suspension											
Not in applicable										Melts main or other fuse	1
										Will not crank	2
										Hard start/long crank/ erratic start/erratic crank	3
										Engine stalls	4
										After start At idle	
										Cranks normally but will not start	5
										Slow return to idle	6
										Engine runs rough/rolling idle	7
										Fast idle/runs on	8
										Low idle/stalls during deceleration	9
										Engine stalls/cuts	Acceleration/cruise
										Engine runs rough	Acceleration/cruise
										Misses	Acceleration/cruise
										Buck/jerk	Acceleration/cruise deceleration
										Hesitation/stumble	Acceleration
										Surges	Acceleration/cruise
										Lack/loss of power	Acceleration/cruise
										Knocking/pinging	Acceleration/cruise
										Poor fuel economy	12
										Emission compliance	13
										MIL never on	14
										High oil consumption/leakage	15
										Cooling system concerns	Overheating
										Cooling system concerns	Runs cold
										Exhaust smoke	18
										Fuel odor (in engine compartment)	19
										Engine noise	20
										Vibration concerns(engine)	21
											22
										A/C does not work	23
										A/C always on/A/C compressor runs continuously	24
										A/C does not cut off under wide open throttle conditions	25
										Exhaust sulfur smell	26
										Intermittent concerns	27
										Automatic transmission concerns	Upshift/downshift/ engagement
										Fuel refill concerns	29
										Fuel filling shut off issues	30
										Constant voltage	31

05-01 AUTOMATIC TRANSMISSION

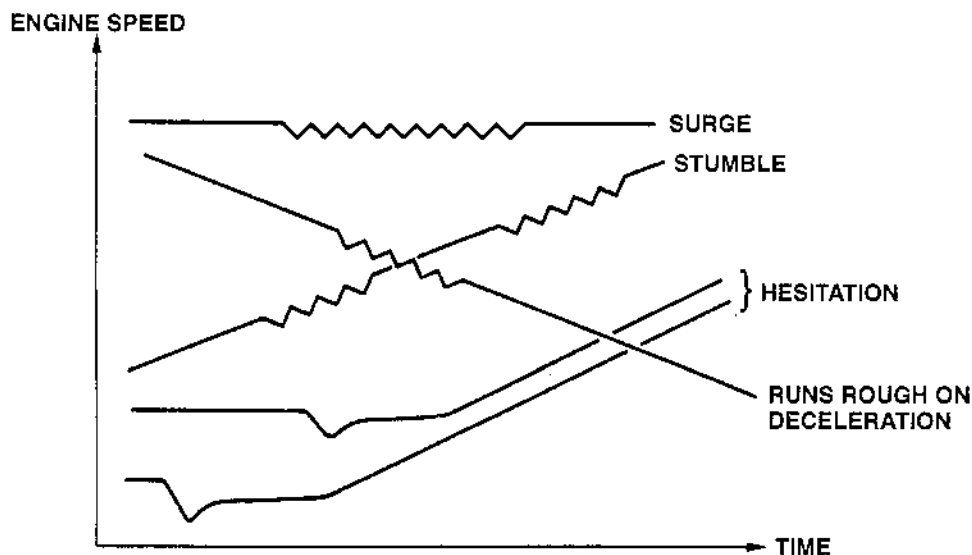
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## TROUBLESHOOTING [ENGINE CONTROL]

### Description of Drivability Problems

- **STUMBLE:** Mildly irregular performance during acceleration.
- **HESITATION:** A dip or flat spot in performance just after the accelerator pedal is depressed.
- **SURGE:** Continuous irregular performance during cruising.



X5U101WA7

### Fuel Pressure Release and Servicing Fuel System

#### Warning

- **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- Fuel in the fuel system is under high-pressure when the engine is not running.

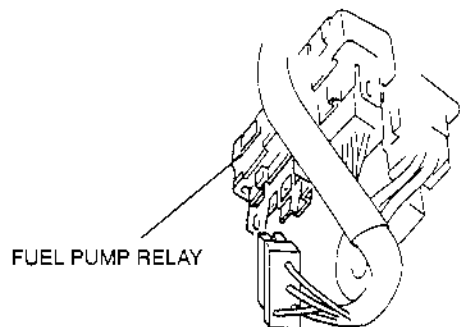
#### Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedure".**

4. After the engine stalls, crank the engine several times.
5. Turn the ignition switch off.
6. Install the fuel pump relay.

### Fuel Line Safety Procedures

1. Remove the fuel-filler cap and release the pressure in the fuel tank.
2. Disconnect the fuel pump relay connector (6-pin type connector; 4 terminal) located above the accelerator pedal.



X5U101WA8

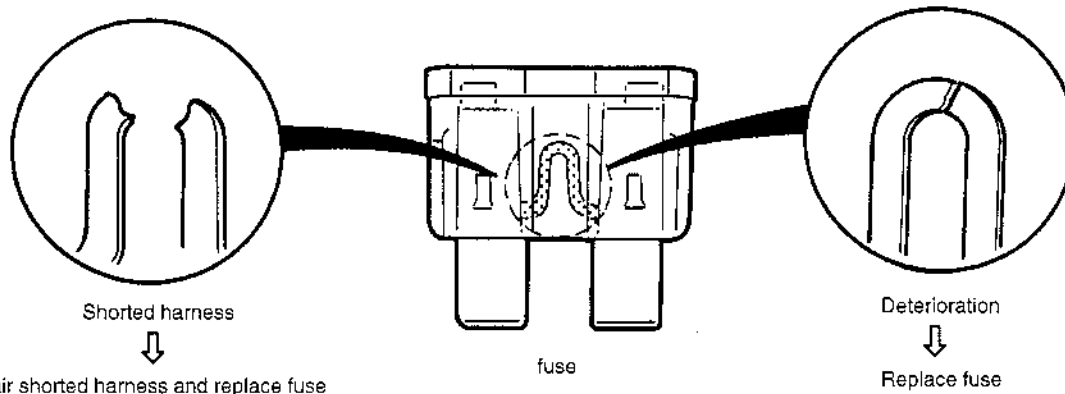
3. Start the engine.

## Symptom Troubleshooting

### 1 | MELTS MAIN OR OTHER FUSE

#### [TROUBLESHOOTING HINTS]

Inspect the condition of the fuse



Damaged Fuse	Related Wiring Harness
MAIN (100 A)	<b>Main fuse</b> <ul style="list-style-type: none"> <li>• Condenser fan relay</li> <li>• Cooling fan relay</li> <li>• A/C relay</li> <li>• Heated oxygen sensor</li> <li>• Generator</li> <li>• Ignition switch</li> <li>• TCM</li> <li>• PCM</li> </ul>
BTN (40 A)	<b>BTN fuse</b> <ul style="list-style-type: none"> <li>• ROOM fuse</li> </ul>
ROOM (15 A)	<b>ROOM fuse</b> <ul style="list-style-type: none"> <li>• PCM</li> </ul>
EGI INJ (30 A)	<b>Main relay</b> <ul style="list-style-type: none"> <li>• PCM</li> <li>• Fuel injectors</li> <li>• Camshaft position sensor</li> <li>• EGR Boost sensor solenoid valve</li> <li>• Crankshaft position sensor</li> <li>• EGR valve</li> <li>• IVC valve</li> <li>• Purge solenoid valve</li> <li>• CDCV solenoid valve</li> <li>• Tank pressure control valve</li> <li>• Mass air flow sensor</li> <li>• Fuel pump relay</li> </ul>
ENGINE (10 A)	<b>ENGINE fuse</b> <ul style="list-style-type: none"> <li>• Main relay</li> <li>• Fuel pump relay</li> </ul>
METER (10 A)	<b>METER fuse</b> <ul style="list-style-type: none"> <li>• Transaxle range switch</li> <li>• TCM</li> </ul>

X5U101WA9

# TROUBLESHOOTING [ENGINE CONTROL]

2		WILL NOT CRANK	
DESCRIPTION		Starter does not work	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Open starter circuit between ignition switch and starter</li> <li>• Transmission range sensor malfunction (A/T)</li> <li>• Transmission range sensor mis-adjustment (A/T)</li> <li>• Starter interlock switch malfunction (M/T)</li> <li>• Starter malfunction</li> <li>• Seized/hydrolocked engine, flywheel or drive plate</li> </ul>	
STEP	INSPECTION	ACTION	
1	Verify follows: <ul style="list-style-type: none"> <li>• Battery connection</li> <li>• Transmission in Park or Neutral (A/T)</li> <li>• Clutch fully depressed (M/T)</li> <li>• Fuses</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary and repeat step 1.
2	Is clicking sound heard from starter when ignition switch is turned to START?	Yes	Go to next step.
		No	Go to step 4.
3	Inspect starting system. Is starting system okay?	Yes	Inspect for seized/hydrolocked engine, flywheel or drive plate. ➤ 01-50 FLYWHEEL INSPECTION
		No	Service as required. ➤ 01-19 STARTER INSPECTION
4	Do any other electrical accessories work?	Yes	Go to next step.
		No	Inspect the charging system. ➤ 01-17 BATTERY INSPECTION ➤ 01-17 GENERATOR INSPECTION
5	<b>Note</b> <ul style="list-style-type: none"> <li>• Following test should be performed on automatic transmissions only. For manual transmissions, go to next step.</li> </ul> Connect NGS tester to DLC-2. Access TR SW PID. Turn ignition switch to ON. Is TR SW PID indicated ON when selecting P or N range?	Yes	Go to next step.
		No	Inspect for adjustment of transmission range sensor. If transmission range sensor is adjusted properly, inspect for open circuit between transmission range sensor and PCM terminal V or starter.
6	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed</b> Inspect following: <ul style="list-style-type: none"> <li>• START circuit in ignition switch</li> <li>• Open circuit between ignition switch and starter</li> <li>• Starter interlock switch (M/T)</li> </ul>
		No	<b>DTC displayed</b> Go to appropriate DTC test. <b>If communication error message is displayed on NGS tester, inspect following:</b> <ul style="list-style-type: none"> <li>• Open circuit between main relay and PCM terminal 1B</li> <li>• Open main relay ground circuit</li> <li>• Main relay stuck open</li> <li>• Open or poor ground circuit (PCM terminal 3A, 3B or 3C)</li> <li>• Poor connection of vehicle body ground</li> </ul>
7	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

## Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

3		HARD START/LONG CRANK/ERRATIC START/ERRATIC CRANK	
DESCRIPTION		<ul style="list-style-type: none"> <li>Starter cranks engine at normal speed but engine requires excessive cranking time before start</li> <li>Battery in normal condition</li> </ul>	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>Spark leakage from high-tension leads</li> <li>Vacuum leakage</li> <li>Poor fuel quality</li> <li>Starting system malfunction</li> <li>Spark plug malfunction</li> <li>Air leakage from intake air system</li> <li>Erratic signal from crankshaft position sensor</li> <li>Erratic signal from camshaft position sensor</li> <li>Air cleaner restriction</li> <li>IAC valve malfunction</li> <li>PCV valve malfunction</li> <li>Inadequate fuel pressure</li> <li>Purge solenoid valve malfunction</li> <li>Mass air flow sensor contamination</li> <li>Restriction in exhaust system</li> <li>EGR valve malfunction</li> </ul> <p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION	ACTION	
1	Verify following: <ul style="list-style-type: none"> <li>Vacuum leakage</li> <li>Fuel quality (i.e proper octane, contamination, winter/summer blend)</li> <li>Loose bands on intake air system</li> <li>Cracks on intake air system parts</li> <li>Air cleaner restriction</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Is engine overheating?	Yes	Go to flowchart 17 for "COOLING SYSTEM CONCERNS OVERHEATING"
		No	Go to next step.
4	Inspect for cracks on high-tension leads. Is there any crack on high-tension leads?	Yes	Repair suspected high-tension lead.
		No	Go to next step.
5	Inspect spark plug conditions. Is spark plug wet, converted with carbon or grayish white?	Yes	If spark plug is wet or converted with carbon, inspect for fuel leakage from fuel injector. If spark plug is grayish white, inspect for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to next step.
6	Visually inspect crankshaft position (CKP) sensor and teeth of crankshaft pulley. Is CKP sensor and teeth of crankshaft pulley okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION
7	Measure gap between crank position (CKP) sensor and teeth of crankshaft pulley.  <b>Specification: 0.5—1.5 mm {0.020—0.59 in}</b>  Is gap within specification?	Yes Go to next step.
		No Adjust CKP sensor.
8	Remove PCV valve and inspect PCV valve. Does PCV valve rattle?	Yes Go to next step.
		No Replace PCV valve.
9	Install fuel gauge between fuel filter and fuel distributor. Connect a jumper wire between F/P terminal at DLC in engine compartment and ground. ➤ 01-14 AFTER REPAIR PROCEDURE Turn ignition switch to ON. Is fuel line pressure correct?  <b>Fuel line pressure:</b> <b>370—420 kPa</b> <b>{3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}</b>	Yes Go to next step.
		No <b>Zero or low:</b> <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for open fuel pump relief valve</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> <b>High</b> <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>
10	Is fuel line pressure held after ignition switch is turned off?  <b>Fuel line pressure:</b> <b>370—420 kPa</b> <b>{3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}</b>	Yes Go to next step.
		No Inspect pressure regulator diaphragm condition. If condition is okay, inspect fuel injector. If condition is not okay, replace pressure regulator.
11	Disconnect a vacuum hose from purge solenoid valve and plug opening end of vacuum hose. Attempt to start engine. Is starting condition improved?	Yes Inspect if purge solenoid valve stuck open.
		No Go to next step.
12	Inspect for contaminated mass air flow sensor. Is there any contamination?	Yes Replace mass airflow sensor.
		No Go to next step.
13	Is there restriction in exhaust system?	Yes Inspect exhaust system.
		No Go to next step.
14	Inspect engine condition while tapping EGR valve housing. Does engine condition improve?	Yes Replace EGR valve.
		No Go to next step.
15	Inspect starting system. ➤ 01-19 STARTER INSPECTION Is starting system normal?	Yes Inspect for loosen connectors or poor terminal contact. If okay, remove EGR valve and visually inspect for mechanically stuck EGR valve.
		No Inspect continuity of stepping motor coil.
16	Verify test results. If okay, return to diagnostic index to service any additional symptoms.	

## Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

4	ENGINE STALLS — AFTER START, AT IDLE		
DESCRIPTION	Engine stops unexpectedly.		
POSSIBLE CAUSE	<ul style="list-style-type: none"><li>• A/C system improper operation</li><li>• Air leakage from intake air system parts</li><li>• Purge solenoid valve malfunction</li><li>• Improper operation of IAC valve</li><li>• EGR valve malfunction</li><li>• No signal from crankshaft position sensor or camshaft position sensor due to sensor, related wire or wrong installation</li><li>• Vacuum leakage</li><li>• Low engine compression</li><li>• Spark leakage from high-tension leads</li><li>• Poor fuel quality</li><li>• PCV valve malfunction</li><li>• Air cleaner restriction</li><li>• Restriction in exhaust system</li><li>• Electrical connector disconnection</li><li>• Open or short circuit in fuel pump and related harness</li><li>• No battery power supply to PCM or poor ground</li><li>• Inadequate fuel pressure</li><li>• Fuel pump mechanical malfunction</li><li>• Fuel leakage from fuel injector</li><li>• Fuel injector clogged</li></ul>		
	<p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"><li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li><li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li></ul> <p>➤ 01-14 BEFORE REPAIR PROCEDURE ➤ 01-14 AFTER REPAIR PROCEDURE</p>		
STEP	INSPECTION		ACTION
1	Verify following: <ul style="list-style-type: none"><li>• Vacuum connection</li><li>• Air cleaner element</li><li>• No air leakage from intake air system</li><li>• No restriction of intake air system</li><li>• Proper sealing of intake manifold and components attached to intake manifold: (EGR valve, IAC valve)</li></ul>	Yes	Go to next step.
	<ul style="list-style-type: none"><li>• Ignition wiring</li><li>• Fuel quality; such as proper octane, contamination, winter/summer blend</li><li>• Electrical connections</li><li>• Smooth operation of throttle valve</li></ul> Are all items okay?	No	Service as necessary and repeat step 1.
2	Turn ignition switch to ON. Disconnect throttle position sensor connector. Measure voltage at throttle position sensor connector 21 terminal with ignition switch ON.	Yes	Go to next step.
	<b>Voltage: 4.5—5.5 V</b>  Is voltage okay?	No	Go to troubleshooting No.31 "CONSTANT VOLTAGE".

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
3	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test. <b>If communication error message is displayed on NGS tester, inspect follows:</b> <ul style="list-style-type: none"> <li>• Open circuit between main relay and PCM terminal 1B</li> <li>• Open main relay ground circuit</li> <li>• Main relay stuck open</li> <li>• Open PCM ground circuit (terminal 3A, 3B or 3C)</li> <li>• Poor connection of vehicle body ground</li> </ul>
4	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect IAC valve and wiring harness.
		No	Go to next step.
5	Connect NGS tester to DLC-2. Access RPM PID. Is RPM PID indicating engine speed during cranking of engine?	Yes	Go to next step.
		No	Inspect following: <ul style="list-style-type: none"> <li>• Open or short circuit in CKP sensor</li> <li>• Open or short circuit between CKP sensor and PCM terminal 2J</li> <li>• Open or short circuit in CKP sensor harnesses</li> </ul> If CKP sensor and harness okay, go to next step.
6	Visually inspect crankshaft position (CKP) sensor and teeth of crankshaft pulley Is CKP sensor and teeth of crankshaft pulley okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
7	Measure gap between crankshaft position (CKP) sensor and teeth of crankshaft pulley.  <b>Specification:</b> <b>0.5—1.5 mm (0.020—0.059 in)</b>  Is gap within specifications?	Yes	Go to next step.
		No	Adjust CKP sensor.
8	Inspect for cracks on high-tension leads. Is there any crack on high-tension leads?	Yes	Repair suspected high-tension lead.
		No	Go to next step.
9	Is strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Go to next step. If symptom occurs with A/C on, go to step 15.
		No	Inspect following: <ul style="list-style-type: none"> <li>• Open or short circuit in ignition coil</li> <li>• Open circuit in high-tension leads</li> <li>• Open circuit between ignition coil connector ground terminal and body ground</li> <li>• Open circuit between ignition switch and ignition coil</li> <li>• Open circuit between ignition coil and PCM terminal 3G or 3H</li> </ul>
10	Inspect spark plug conditions. Is spark plug wet, converted with carbon or grayish white?	Yes	If spark plug is wet or converted with carbon, inspect for fuel leakage from injector. If spark plug is grayish white, inspect for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to next step.
11	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
12	Is there restriction in the exhaust system? Is there any restriction?	Yes	Inspect exhaust system.
		No	Go to next step.

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
13	Install fuel gauge between fuel filter and fuel distributor. Connect a jumper wire between F/P terminal at DLC in engine compartment and ground. Turn ignition switch to ON. Is fuel line pressure correct with ignition switch ON?  <b>Fuel line pressure:</b> <b>370—420 kPa</b> <b>{3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}</b>	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>• Inspect fuel pump circuit</li> <li>• Inspect for open fuel pump relief valve</li> <li>• Inspect for fuel leakage inside pressure regulator</li> <li>• Inspect for clogged main fuel line</li> <li>• Inspect pulsation damper</li> </ul> <b>High</b> <ul style="list-style-type: none"> <li>• Inspect pressure regulator for high pressure cause</li> <li>• Inspect for clogged fuel return line</li> </ul>
14	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service as necessary. Does fuel line pressure hold after ignition switch is turned off? ☞ 01-14 PRESSURE REGULATOR INSPECTION, Fuel Hold Pressure Inspection	Yes	Go to next step.
		No	Inspect pressure regulator diaphragm condition. If condition is okay, inspect fuel injector. If condition is not okay, replace pressure regulator.
15	<b>Note</b> <ul style="list-style-type: none"> <li>• The following test is for stall concerns with A/C on. If other symptoms exist, go to next step.</li> </ul> Connect pressure gauges to A/C low and high pressure side lines. Turn A/C on and measure low side and high side pressure. Are pressures within specifications? ☞ 07-10 REFRIGERANT PRESSURE CHECK	Yes	Go to next step.
		No	If A/C is always on, go to symptom troubleshooting No.24 "A/C always on/ A/C compressor runs continuously". For other symptoms, inspect following: <ul style="list-style-type: none"> <li>• Refrigerant charging amount</li> <li>• Condenser fan operation</li> </ul>
16	Disconnect vacuum hose between purge solenoid valve and intake manifold from purge solenoid side. Plug opening end of vacuum hose. Start engine. Is engine stall now eliminated?	Yes	Inspect if purge solenoid valve stuck open. Inspect evaporative emission control system.
		No	Go to next step.
17	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace.
		No	Go to next step.
18	Inspect engine condition while tapping EGR valve housing. Does engine condition improve?	Yes	Replace EGR valve.
		No	Go to next step.
19	Is engine compression correct?	Yes	Inspect for valve timing.
		No	Inspect for cause.
20	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.



# TROUBLESHOOTING [ENGINE CONTROL]

5		CRANKS NORMALLY BUT WILL NOT START	
DESCRIPTION		<ul style="list-style-type: none"> <li>• Starter cranks engine at normal speed but engine will not run</li> <li>• Refer to "ENGINE STALLS" if this symptom appears after engine stall</li> <li>• Fuel in tank</li> <li>• Battery in normal condition</li> </ul>	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• No battery power supply to PCM</li> <li>• Air leakage from intake air system</li> <li>• Open PCM ground or vehicle body ground</li> <li>• Improper operation of IAC valve</li> <li>• EGR valve malfunction</li> <li>• No signal from crankshaft position sensor or camshaft position sensor due to sensor, related wire or incorrect installation</li> <li>• Low engine compression</li> <li>• Vacuum leakage</li> <li>• Spark leakage from high-tension leads</li> <li>• Poor fuel quality</li> <li>• PCV valve malfunction</li> <li>• Air cleaner restriction</li> <li>• Restriction in exhaust system</li> <li>• Disconnected electrical connector</li> <li>• Open or short circuit in fuel pump and related harness</li> <li>• Inadequate fuel pressure</li> <li>• Fuel pump mechanical malfunction</li> <li>• Fuel leakage from injector</li> <li>• Fuel injector clogged</li> <li>• Purge solenoid valve malfunction</li> </ul> <p><b>Warning</b>  The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☐ 01-14 BEFORE REPAIR PROCEDURE  ☐ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION		ACTION
1	Verify following: <ul style="list-style-type: none"> <li>• Vacuum connection</li> <li>• External fuel shut off or accessory (kill switch, alarm, etc.)</li> <li>• Fuel quality; such as proper octane, contamination, winter/summer blend</li> <li>• No air leakage from intake air system</li> <li>• Proper sealing of intake manifold and components attached to intake manifold: (EGR valve, IAC valve)</li> <li>• Ignition wiring</li> <li>• Electrical connections</li> <li>• Fuses</li> <li>• Smooth operation of throttle valve.</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary and repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test. <b>If communication error message is displayed on NGS tester, inspect follows:</b> <ul style="list-style-type: none"> <li>• Open circuit between main relay and PCM terminal 1B</li> <li>• Open main relay ground circuit</li> <li>• Main relay stuck open</li> <li>• Open PCM ground circuit (PCM terminal 3A, 3B or 3C)</li> <li>• Poor connection of vehicle body ground</li> </ul>

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
3	Turn ignition switch to ON. Disconnect TP sensor connector. Measure voltage at TP sensor connector 2l terminal with ignition switch ON.  <b>Voltage: 4.5—5.5 V</b>  Is voltage okay?	Yes	Go to next step.
		No	Go to troubleshooting No.31 "CONSTANT VOLTAGE".
4	Does engine start with throttle closed?	Yes	Go to step 20.
		No	Go to next step.
5	Will engine start and run smoothly at part throttle?	Yes	Inspect IAC valve and wiring harness.
		No	Go to next step.
6	Connect NGS tester to DLC-2. Access RPM PID. Is RPM PID indicating engine speed when cranking engine?	Yes	Go to next step.
		No	Inspect following: <ul style="list-style-type: none"> <li>• Open or short circuit in CKP sensor</li> <li>• Open or short circuit between CKP sensor and PCM terminal 2J</li> <li>• Open or short circuit in CKP sensor harnesses</li> </ul> If CKP sensor and harness okay, go to next step.
7	Visually inspect crankshaft position (CKP) sensor and teeth of crankshaft pulley. Is CKP sensor and teeth of crankshaft pulley okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
8	Measure gap between crankshaft position (CKP) sensor and teeth of crankshaft pulley.  <b>Specification: 0.5—1.5 mm {0.020—0.059 in}</b>  Is gap within specifications?	Yes	Go to next step.
		No	Adjust CKP sensor.
9	Inspect for cracks on high-tension leads. Is there any crack on high-tension leads?	Yes	Repair suspected high-tension lead.
		No	Go to next step.
10	Is strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Go to next step.
		No	Inspect follows: <ul style="list-style-type: none"> <li>• Open or short circuit in ignition coil</li> <li>• Open circuit in high-tension leads</li> <li>• Open circuit between ignition coil connector ground terminal and ground</li> <li>• Open circuit between ignition switch and ignition coil</li> <li>• Open circuit between ignition coil and PCM terminal 3G or 3H</li> </ul>
11	Inspect spark plug conditions. Is spark plug wet, converted with carbon or grayish white?	Yes	If spark plug is wet or converted with carbon, inspect for fuel leakage from injector. If spark plug is grayish white, inspect for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to next step.
12	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
13	Is there any restriction in exhaust system?	Yes	Inspect exhaust system.
		No	Go to next step.
14	Install fuel gauge between fuel filter and fuel distributor. Connect a jumper wire between F/P terminal at DLC in engine compartment and ground. Turn ignition switch to ON. Is fuel line pressure correct when ignition switch is cycled ON/OFF five times?  <b>Fuel line pressure: 250 kPa (2.55 kgf/cm<sup>2</sup>, 36.3 psi)</b>	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>• Inspect fuel pump circuit</li> <li>• Inspect for open fuel pump relief valve</li> <li>• Inspect for fuel leakage inside pressure regulator</li> <li>• Inspect for clogged main fuel line</li> <li>• Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>• Inspect pressure regulator for high pressure cause</li> <li>• Inspect for clogged fuel return line</li> </ul>

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
15	Visually inspect for fuel leakage at fuel injector O-ring, pulsation damper, and fuel line. Service as necessary. Is fuel line pressure held after ignition switch is turned off? ☞ 01-14 PRESSURE REGULATOR INSPECTION, Fuel Hold Pressure Inspection	Yes	Go to next step.
		No	Inspect pressure regulator diaphragm condition. If condition is okay, inspect fuel injector. If condition is not okay, replace pressure regulator.
16	Disconnect vacuum hose between purge solenoid valve and intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Attempt to start engine. Is starting condition improved?	Yes	Inspect if purge solenoid valve stuck open mechanically. Inspect evaporative emission control system.
		No	Go to next step.
17	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace.
		No	Go to next step.
18	Inspect engine condition while tapping EGR valve housing. Does engine condition improve?	Yes	Replace EGR valve.
		No	Go to next step.
19	Is engine compression correct?	Yes	Inspect valve timing.
		No	Inspect for causes.
20	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

6	SLOW RETURN TO IDLE		
DESCRIPTION	Engine takes more time than normal to return to idle speed		
POSSIBLE CAUSE	<ul style="list-style-type: none"> <li>Malfunction of engine coolant temperature sensor</li> <li>Thermostat stuck open</li> <li>Throttle body malfunction</li> <li>Air leakage from intake air system</li> </ul>		
STEP	INSPECTION		ACTION
1	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
2	Remove thermostat and inspect operation. ☞ 01-12 THERMOSTAT REMOVAL/INSTALLATION ☞ 01-12 THERMOSTAT INSPECTION Is thermostat okay?	Yes	Engine coolant temperature and thermostat are okay. Go to next step.
		No	Access ECT V PID on NGS tester. Inspect for both ECT V and temperature gauge on instrument cluster readings. If temperature gauge on instrument cluster indicates normal range but ECT V is not same as temperature gauge reading, inspect engine coolant temperature sensor. If temperature gauge on instrument cluster indicates cold range but ECT V is normal, inspect temperature gauge and heat gauge unit.
3	Is throttle body free of contaminations?	Yes	Inspect for air leakage from intake air system components while racing engine to higher speed.
		No	Clean or replace throttle body.
4	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

7		ENGINE RUNS ROUGH/ROLLING IDLE	
DESCRIPTION		<ul style="list-style-type: none"> <li>Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake</li> <li>Idle speed is too slow and excessive engine shake</li> </ul>	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>Air leakage from intake air system parts</li> <li>A/C system improper operation</li> <li>Spark leakage from high-tension leads</li> <li>Purge solenoid valve malfunction</li> <li>Improper operation of IAC valve</li> <li>EGR valve malfunction</li> <li>Erratic or no signal from camshaft position sensor</li> <li>Low engine compression</li> <li>Erratic signal from crankshaft position sensor</li> <li>Poor fuel quality</li> <li>PCV valve malfunction</li> <li>Air cleaner restriction</li> <li>Restriction in exhaust system</li> <li>Disconnected electrical connectors</li> <li>Inadequate fuel pressure</li> <li>Fuel pump mechanical malfunction</li> <li>Fuel leakage from fuel injector</li> <li>Fuel injector clogged</li> <li>Engine overheating</li> <li>Vacuum leakage</li> </ul> <p><b>Warning</b>  The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE  ☞ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION		ACTION
1	Verify following: <ul style="list-style-type: none"> <li>External fuel shut off or accessory (kill switch, alarm etc.)</li> <li>Fuel quality; such as proper octane, contamination, winter/summer blend</li> <li>No air leakage from intake air system</li> <li>Proper sealing of intake manifold and components attached to intake manifold; such as EGR control valve, IAC solenoid</li> <li>Ignition wiring</li> <li>Electrical connections</li> <li>Fuses</li> <li>Smooth operation of throttle valve</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary and repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Is engine overheating?	Yes	Go to symptom troubleshooting No.17 "COOLING SYSTEM CONCERNS OVERHEATING".
		No	Go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
4	<b>Note</b> <ul style="list-style-type: none"> <li>Following test is for engine running rough idle with A/C ON concerns. If other symptoms exist, go to next step.</li> </ul> Connect pressure gauge to A/C low and high pressure side lines. Start engine and run it at idle. Turn A/C switch on. Measure low side and high side pressures. Are reading pressures within specification? ➤ 07-10 REFRIGERANT PRESSURE CHECK	Yes	Go to next step.
		No	If A/C is always on, go to symptom troubleshooting No.24 "A/C always ON/ A/C compressor runs continuously." For other symptoms, inspect following: <ul style="list-style-type: none"> <li>Refrigerant charging amount</li> <li>Condenser fan operation</li> </ul>
5	<b>Note</b> <ul style="list-style-type: none"> <li>Following test is for engine running rough with P/S ON. If other symptoms exist, go to next step.</li> </ul> Start engine and run it at idle. Access PSP SW PID. Inspect if PSP PID is on while turning steering wheel right to left. Is PSP SW PID okay?	Yes	Inspect power steering pressure switch operation and wiring harness between power steering pressure switch connector and PCM connector terminal 1G.
		No	Go to next step.
6	Visually inspect crankshaft position (CKP) sensor and teeth of crankshaft pulley. Is CKP sensor and teeth of crankshaft pulley okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
7	Measure gap between crankshaft position (CKP) sensor and teeth of crankshaft pulley.  <b>Specification:</b> 0.5—1.5 mm {0.020—0.059 in}  Is gap within specifications?	Yes	Go to next step.
		No	Adjust CKP sensor.
8	Inspect for cracks on high-tension leads. Is there any crack on high-tension leads?	Yes	Repair suspected high-tension lead.
		No	Go to next step.
9	Inspect spark plug conditions. Is spark plug wet, converted with carbon or grayish white?	Yes	If spark plug is wet or converted with carbon, inspect for fuel leakage from injector. If spark plug is grayish white, inspect for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to next step.
10	Start engine and disconnect IAC valve connector. Does rpm drop or engine stall?	Yes	Go to next step.
		No	Inspect IAC valve and wiring harness.
11	Install fuel pressure gauge between fuel filter and fuel distributor. Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for open fuel pump relief valve</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>
12	Visually inspect for fuel leakage at fuel injector O-ring, pulsation damper, and fuel line. Service as necessary. Does fuel line pressure hold after ignition switch turned off? ➤ 01-14 PRESSURE REGULATOR INSPECTION, Fuel Hold Pressure Inspection	Yes	Go to next step.
		No	Inspect pressure regulator diaphragm condition. If condition is okay, inspect fuel injector. If condition is not okay, replace pressure regulator.

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
13	Connect NGS tester to DLC-2. Start the engine and run it at idle. Access LONGFT1 PID. Measure LONGFT1 PID at idle. Is PID value between -15% and +15%?	Yes	Go to next step.
		No	LONGFT1 PID is out of specification. <b>Less than specification (too rich):</b> Inspect evaporative emission control system. If system is okay, go to step 15. <b>Greater than specification (too lean):</b> Inspect for air leakage at intake air system components. If system is okay, go to next step.
14	Disconnect vacuum hose between purge solenoid valve and intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start engine. Does engine condition improve?	Yes	inspect if purge solenoid valve stuck open mechanically. Inspect evaporative emission control system.
		No	Go to next step.
15	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
16	Is there restriction in exhaust system?	Yes	Inspect exhaust system.
		No	Go to next step.
17	Visually inspect camshaft position (CMP) sensor and tooth of camshaft. Is CMP sensor and tooth of camshaft okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
18	Inspect engine condition while tapping EGR valve housing. Does engine condition improve?	Yes	Replace EGR valve.
		No	Go to next step.
19	Is engine compression correct?	Yes	Inspect valve timing.
		No	Inspect for causes.
20	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

## TROUBLESHOOTING [ENGINE CONTROL]

8	<b>FAST IDLE/RUNS ON</b>		
<b>DESCRIPTION</b>	<ul style="list-style-type: none"> <li>Engine speed continues at fast idle after warm-up</li> <li>Engine runs after ignition switch is turned off</li> </ul>		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>Engine coolant temperature malfunction</li> <li>Air leakage from intake air system</li> <li>Throttle body malfunction</li> <li>Mis-adjustment of accelerator cable free play</li> <li>Mis-adjustment of cruise control cable</li> </ul>		
STEP	INSPECTION		ACTION
1	Connect NGS tester to DLC-2. Access ECT PID. Start and warm-up engine to normal operating temperature. Is ECT PID reading between 112 °C {233.6 °F} and 82 °C {179.6 °F}?	Yes	Go to next step.
		No	If ECT PID is higher than 112 °C {233.6 °F}: Go to symptom troubleshooting No.17 "COOLING SYSTEM CONCERNS OVERHEATING". If ECT PID is less than 82 °C {179.6 °F}: Go to symptom troubleshooting No.18 "COOLING SYSTEM CONCERNS RUNS COLD".
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Is there air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace parts as necessary.
		No	Verify accelerator control cable free play. Inspect VICS. ➤ 01-13 ACCELERATOR CABLE INSPECTION/ADJUSTMENT
4	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

9		LOW IDLE/STALLS DURING DECELERATION	
DESCRIPTION		Engine stops unexpectedly at beginning of deceleration or recovery from deceleration	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Vacuum leakage</li> <li>• IAC valve malfunction</li> <li>• Air leakage from intake air system</li> <li>• Throttle position sensor or related circuit malfunction</li> <li>• Mass-airflow sensor or related circuit malfunction</li> <li>• Brake on/off switch or related circuit malfunction</li> <li>• Clutch position and/or neutral position switch or related circuit malfunction</li> </ul>	
STEP	INSPECTION		ACTION
1	Does engine idle rough?	Yes	Go to flow chart 7 for "Engine runs rough/Rolling idle".
		No	Go to next step.
2	Inspect following: <ul style="list-style-type: none"> <li>• Proper routing and no damage of vacuum lines</li> <li>• IAC valve properly connected</li> <li>• No air leakage from intake air system</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary. Repeat step 2.
3	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
4	Does idle speed drop or stall when disconnecting IAC valve?	Yes	Go to next step.
		No	Inspect following: <ul style="list-style-type: none"> <li>• Circuit from idle air control valve to PCM connector terminal 3M or 3O for open and short</li> <li>• IAC valve stuck</li> </ul> If okay, go to next step.
5	Disconnect vacuum hose between purge solenoid valve and intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive vehicle. Does engine condition improve?	Yes	Inspect evaporative emission control system.
		No	Go to next step.
6	Connect NGS tester to DLC-2. Access TP V PID, MAF V PID, VS PID, BRK SW PID, TR SW PID (A/T), NL SW PID (M/T) and CLT SW (M/T). Monitor each PIDs while driving vehicle. 01-40 PID/DATA MONITOR INSPECTION Are PIDs okay?	Yes	Go to flow chart 27 for "Intermittent concerns".
		No	TP V PID: Inspect for throttle position sensor. MAF V PID: Inspect for mass air flow sensor. VS PID: Inspect vehicle speed sensor. BRK SW PID: Inspect brake switch. TR SW PID: Inspect TR switch. NL SW PID: Inspect neutral switch. CLT SW PID: Inspect clutch switch.
7	Verify test results. If okay, return to diagnostic index to service any additional symptoms		

## Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.



10	<b>ENGINE STALLS/QUITS — ACCELERATION/CRUISE</b> <b>ENGINE RUNS ROUGH — ACCELERATION/CRUISE</b> <b>MISSSES — ACCELERATION/CRUISE</b> <b>BUCK/JERK — ACCELERATION/CRUISE/DECELERATION</b> <b>HESITATION/STUMBLE — ACCELERATION</b> <b>SURGES — ACCELERATION/CRUISE</b>		
<b>DESCRIPTION</b>	<ul style="list-style-type: none"> <li>• Engine stops unexpectedly at beginning of acceleration or during acceleration</li> <li>• Engine stops unexpectedly while cruising</li> <li>• Engine speed fluctuates during acceleration or cruising</li> <li>• Engine misses during acceleration or cruising</li> <li>• Vehicle bucks/jerks during acceleration, cruising or deceleration</li> <li>• Momentary pause at beginning of acceleration or during acceleration</li> <li>• Momentary minor irregularity in engine output</li> </ul>		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>• A/C system improper operation</li> <li>• Erratic signal or no signal from camshaft position sensor</li> <li>• Air leakage from intake air system parts</li> <li>• Purge solenoid valve malfunction</li> <li>• Improper operation of IAC valve</li> <li>• EGR valve malfunction</li> <li>• Erratic signal from crankshaft position sensor</li> <li>• Low engine compression</li> <li>• Vacuum leakage</li> <li>• Poor fuel quality</li> <li>• Spark leakage from high-tension leads</li> <li>• Air cleaner restriction</li> <li>• PCV valve malfunction</li> <li>• Improper valve timing due to jumping out timing belt</li> <li>• Restriction in exhaust system</li> <li>• Intermittent open or short in fuel pump circuit</li> <li>• Inadequate fuel pressure</li> <li>• Fuel pump mechanical malfunction</li> <li>• Fuel leakage from fuel injector</li> <li>• Fuel injector clogged</li> <li>• Intermittent open or short of mass airflow sensor, throttle sensor and vehicle speed sensor</li> <li>• Automatic transmission malfunction</li> <li>• Clutch slippage</li> <li>• Improper VICS operation</li> </ul> <p><b>Warning</b>  The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE  ☞ 01-14 AFTER REPAIR PROCEDURE</p>		
STEP	INSPECTION	ACTION	
1	Verify following: <ul style="list-style-type: none"> <li>• Vacuum connection</li> <li>• Air cleaner element</li> <li>• No air leakage from intake air system</li> <li>• No restriction of intake air system</li> <li>• Proper sealing of intake manifold and components attached to intake manifold: (EGR valve, IAC valve)</li> <li>• Ignition wiring</li> <li>• Fuel quality: Proper octane, contamination, winter/summer blend</li> <li>• Electrical connections</li> <li>• Smooth operation of throttle valve</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary and repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
3	Is engine overheating?	Yes	Go to symptom troubleshooting No.17 "COOLING SYSTEM CONCERNS OVERHEATING".
		No	Go to next step.
4	Connect NGS tester to DLC-2. Access RPM PID, B+ PID, MAF V PID, TP V PID, and VS PID. Drive vehicle with monitoring PIDs. Are PIDs within specification? ☞ 01-40 PID/DATA MONITOR INSPECTION	Yes	Go to next step.
		No	RPM PID: Inspect crankshaft position (CKP) sensor and related harness; such as vibration, intermittent open/short circuit. B+ PID: Inspect for open circuit intermittently. MAF V PID: Inspect for open circuit of mass air flow sensor and related wire harness intermittently. TP V PID: Inspect if output signal from throttle position sensor changes smoothly. VS PID: Inspect for open circuit of vehicle speed sensor and related wire harness intermittently.
5	Visually inspect crankshaft position (CKP) sensor and teeth of crankshaft pulley. Is CKP sensor and teeth of crankshaft pulley okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
6	Measure gap between crankshaft position (CKP) sensor and teeth of crankshaft pulley.  <b>Specification:</b> 0.5—1.5 mm {0.020—0.059 in}  Is gap within specifications?	Yes	Go to next step.
		No	Adjust CKP sensor.
7	Inspect spark plug conditions. Is spark plug wet, converted with carbon or grayish white?	Yes	If spark plug is wet or converted with carbon, inspect for fuel leakage from fuel injector. If spark plug is grayish white, inspect for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to next step.
8	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
9	Verify that throttle lever is resting on throttle valve stop screw and/or throttle valve orifice plug. Is lever in correct position?	Yes	Go to next step.
		No	Adjust as necessary.
10	Are there restrictions in the exhaust system?	Yes	Inspect exhaust system.
		No	Go to next step.
11	Install fuel gauge between fuel filter and fuel distributor. Connect a jumper wire between F/P terminal at DLC in engine compartment and ground. Turn ignition switch to ON. Is fuel line pressure correct with ignition switch at ON?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes	Go to next step.
		No	<b>Zero or low:</b> ● Inspect fuel pump circuit ● Inspect for open fuel pump relief valve ● Inspect for fuel leakage inside pressure regulator ● Inspect for clogged main fuel line ● Inspect pulsation damper <b>High:</b> ● Inspect pressure regulator for high pressure cause ● Inspect for clogged fuel return line
12	Visually inspect for fuel leakage at fuel injector O-ring, pulsation damper, and fuel line. Service as necessary. Does fuel line pressure hold after ignition switch is turned off? ☞ 01-14 PRESSURE REGULATOR INSPECTION, Fuel Hold Pressure Inspection	Yes	Go to next step.
		No	Inspect pressure regulator diaphragm condition. If condition is okay, inspect fuel injector. If condition is not okay, replace pressure regulator.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
13	<b>Note</b> <ul style="list-style-type: none"> <li>The following test is for engine stalling with A/C on. If other symptom exists, go to next step.</li> </ul> <p>Connect a pressure gauge to A/C low and high pressure side lines. Turn A/C on and measure low side and high side pressure. Are pressures within specifications? ☞ 07-10 REFRIGERANT PRESSUER CHECK</p>	Yes	Go to next step.
		No	If A/C is always on, go to symptom troubleshooting No.24 "A/C always on/ A/C compressor runs continuously". For other symptoms, inspect follows: <ul style="list-style-type: none"> <li>Refrigerant charging amount</li> <li>Condenser fan operation</li> </ul>
14	<b>Note</b> <ul style="list-style-type: none"> <li>The following test is performed for symptom with cruise control ON. If other symptoms exist, go to next step.</li> </ul> <p>Inspect cruise control system. Is cruise control system okay?</p>	Yes	Go to next step.
		No	Repair or replace.
15	<p>Disconnect vacuum hose between purge solenoid valve and intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive vehicle. Does engine condition improve?</p>	Yes	Inspect if purge solenoid valve stuck open mechanically. Inspect evaporative emission control system.
		No	Go to next step.
16	<p>Visually inspect camshaft position (CMP) sensor and tooth of camshaft. Is CMP sensor and tooth of camshaft okay?</p>	Yes	Go to next step.
		No	Replace malfunctioning parts.
17	<p>Inspect VICS operation. ☞ 01-01A ENGINE SYSTEM INSPECTION, VICS Operation Inspection Is VICS okay?</p>	Yes	Go to next step.
		No	Repair or replace malfunctioning parts.
18	<p>Inspect EGR system. ☞ 01-01A ENGINE SYSTEM INSPECTION, EGR Control Inspection Is EGR system okay?</p>	Yes	Go to next step.
		No	Replace malfunctioning parts.
19	<p>Is engine compression correct?</p>	Yes	Inspect following: <ul style="list-style-type: none"> <li>Valve timing</li> <li>Internal transmission part (A/T only)</li> <li>Clutch (M/T only)</li> </ul>
		No	Inspect for cause.
20	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

## Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

11	LACK/LOSS OF POWER — ACCELERATION/CRUISE		
DESCRIPTION	Performance is poor under load (i.e., power down when climbing hills)		
POSSIBLE CAUSE	<ul style="list-style-type: none"> <li>• Improper A/C system operation</li> <li>• Erratic signal or no signal from camshaft position sensor</li> <li>• Air leakage from intake air system parts</li> <li>• Purge control solenoid malfunction</li> <li>• EGR valve malfunction</li> <li>• Brake dragging</li> <li>• Erratic signal from crankshaft position sensor</li> <li>• Low engine compression</li> <li>• Vacuum leakage</li> <li>• Poor fuel quality</li> <li>• Spark leakage from high-tension leads</li> <li>• Air cleaner restriction</li> <li>• PCV valve malfunction</li> <li>• Improper valve timing due to jumping out timing belt</li> <li>• Restriction in exhaust system</li> <li>• Intermittent open or short in fuel pump circuit</li> <li>• Inadequate fuel pressure</li> <li>• Fuel pump mechanical malfunction</li> <li>• Fuel leakage from fuel injector</li> <li>• Fuel injector clogged</li> <li>• Intermittent open or short of mass airflow sensor, throttle position sensor and vehicle speed sensor</li> <li>• Automatic transmission malfunction</li> <li>• Clutch slippage</li> <li>• Improper VICS operation</li> </ul> <p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>		
STEP	INSPECTION		ACTION
1	Verify following: <ul style="list-style-type: none"> <li>• Vacuum connection</li> <li>• Air cleaner element</li> <li>• No air leakage from intake air system</li> <li>• No restriction of intake air system</li> <li>• Proper sealing of intake manifold and components attached to intake manifold: (EGR valve, IAC valve)</li> <li>• Fuel quality: Proper octane, contamination, winter/summer blend</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary and repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Is engine overheating?	Yes	Go to symptom troubleshooting No.17 "COOLING SYSTEM CONCERNS OVERHEATING".
		No	Go to next step.

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
4	Connect NGS tester to DLC-2. Access RPM PID, MAF V PID, TP V PID, and VS PID. Drive vehicle with monitoring PIDs. Are PIDs within specification? ➤ 01-40 PID/DATA MONITOR INSPECTION	Yes	Go to next step.
		No	RPM PID: Inspect CKP sensor and related harness for vibration and/or intermittent open/short circuit. MAF V PID: Inspect for intermittent open circuit of mass air flow sensor and related wire harness. TP V PID: Inspect if throttle position sensor output increases smoothly. VS PID: Inspect for intermittent open circuit of vehicle speed sensor and related wire harness.
5	Visually inspect crankshaft position (CKP) sensor and teeth of crankshaft pulley. Is CKP sensor and teeth of crankshaft pulley okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
6	Measure gap between crankshaft position (CKP) sensor and teeth of crankshaft pulley.  <b>Specification:</b> <b>0.5—1.5 mm {0.020—0.059 in}</b>  Is the gap within specifications?	Yes	Go to next step.
		No	Adjust CKP sensor.
7	Inspect spark plug conditions. Is spark plug wet, converted with carbon or grayish white?	Yes	If spark plug is wet or converted with carbon, inspect for fuel leakage from fuel injector. If spark plug is grayish white, inspect for clogged fuel injector.
		No	Install spark plugs on original cylinders. Go to next step.
8	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
9	Are there restriction in exhaust system?	Yes	Inspect exhaust system.
		No	Go to next step.
10	Install fuel gauge between fuel filter and fuel distributor. Connect a jumper wire between F/P terminal at DLC in engine compartment and ground. Turn ignition switch to ON. Is fuel line pressure correct with ignition switch at ON?  <b>Fuel line pressure:</b> <b>370—420 kPa</b> <b>{3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}</b>	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for open fuel pump relief valve</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>
11	<b>Note</b> <ul style="list-style-type: none"> <li>Following test is for engine stalling with A/C on concern. If other symptom exists, go to next step.</li> </ul> Connect pressure gauge to A/C low and high side pressure lines. Turn A/C on and measure low side and high side pressure. Are the pressures within specifications? ➤ 07-10 REFRIGERANT PRESSURE CHECK	Yes	Go to next step.
		No	If A/C is always on, go to symptom troubleshooting No.24 "A/C always on/ A/C compressor runs continuously". For other symptoms, inspect following: <ul style="list-style-type: none"> <li>Refrigerant charging amount</li> <li>Condenser fan operation</li> </ul>
12	Inspect for A/C cut off operation. ➤ 01-01A ENGINE SYSTEM INSPECTION, A/C Cut Control Inspection Does A/C cut-off work properly?	Yes	Go to next step.
		No	Inspect A/C cut off system components.

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
13	Disconnect vacuum hose between purge solenoid valve and intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive vehicle. Does engine condition improve?	Yes	Inspect if purge solenoid valve sticks open mechanically. Inspect evaporative emission control system.
		No	Go to next step.
14	Verify VICS operation. ➤ 01-01A ENGINE SYSTEM INSPECTION, VICS Operation Inspection Is VICS operation okay?	Yes	Go to next step.
		No	Repair or replace malfunctioning parts.
15	Visually inspect camshaft position (CMP) sensor and tooth of camshaft. Is CMP sensor and tooth of camshaft okay?	Yes	Go to next step.
		No	Replace malfunctioning part.
16	Inspect EGR system. ➤ 01-01A ENGINE SYSTEM INSPECTION, EGR Control Inspection Is EGR system okay?	Yes	Go to next step.
		No	Replace malfunctioning parts.
17	Is engine compression correct?	Yes	Inspect following: <ul style="list-style-type: none"> <li>• Valve timing</li> <li>• Internal transmission components (A/T only)</li> <li>• Clutch (M/T only)</li> <li>• Brake system for dragging</li> </ul>
		No	Inspect for cause.
18	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

12	KNOCKING/PINGING — ACCELERATION/CRUISE		
DESCRIPTION	Sound is produced when air/fuel mixture is ignited by something other than spark plug (hot spot in combustion chamber)		
POSSIBLE CAUSE	<ul style="list-style-type: none"> <li>• Engine overheating due to cooling system malfunction</li> <li>• Engine coolant temperature sensor malfunction</li> <li>• Intake-air temperature sensor malfunction</li> <li>• Inadequate engine compression</li> <li>• Inadequate fuel pressure</li> <li>• Knock sensor and related circuit malfunction</li> </ul> <p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>		
STEP	INSPECTION		ACTION
1	Connect NGS tester to DLC-2. Access ECT PID. Verify ECT PID is less than 116 °C {240.8 °F} during driving. Is ECT PID less than specification?	Yes	Go to next step.
		No	Inspect cooling system for cause of overheating.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Is engine compression correct?	Yes	Go to next step.
		No	Inspect for cause.
4	Install fuel pressure gauge between fuel filter and fuel distributor. Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>• Inspect fuel pump circuit</li> <li>• Inspect for open fuel pump relief valve</li> <li>• Inspect for fuel leakage inside pressure regulator</li> <li>• Inspect for clogged main fuel line</li> <li>• Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>• Inspect pressure regulator for high pressure cause</li> <li>• Inspect for clogged fuel return line</li> </ul>
5	Measure resistance between knock sensor terminal and knock sensor body.  <b>Specification: Approx. 560 kΩ (20 °C {68 °F})</b>  Is resistance okay?	Yes	Inspect ignition timing.
		No	Replace knock sensor.
6	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

## Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

13		POOR FUEL ECONOMY	
DESCRIPTION		Fuel economy unsatisfactory	
POSSIBLE CAUSE	<ul style="list-style-type: none"><li>● Contaminated air cleaner element</li><li>● Engine cooling system malfunction</li><li>● Improper transmission fluid level</li><li>● Weak spark</li><li>● Poor fuel quality</li><li>● Erratic or no signal from camshaft position sensor</li><li>● Improper coolant level</li><li>● Inadequate fuel pressure</li><li>● Spark plug malfunction</li><li>● PCV valve malfunction</li><li>● Brake dragging</li><li>● Improper valve timing due to timing belt skip out</li><li>● Contaminated mass airflow sensor</li><li>● Improper engine compression</li><li>● Exhaust system clogged</li></ul>		
	<p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"><li>● <b>Fuel vapor is hazardous.</b> It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li><li>● <b>Fuel line spills and leaks are dangerous.</b> Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li></ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>		
STEP	INSPECTION		ACTION
1	Inspect following: <ul style="list-style-type: none"><li>● Contaminated air cleaner element</li><li>● Transmission fluid level</li><li>● Fuel quality</li><li>● Coolant level</li></ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary. Repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Connect NGS tester to DLC-2. Access ECT PID. Drive vehicle while monitoring PID. ☞ 01-40 PID/DATA MONITOR INSPECTION Is PID within specification?	Yes	Go to next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operations or thermostat operation.
4	Is strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Inspect follows: <ul style="list-style-type: none"><li>● Spark plugs malfunction</li><li>● CMP sensor improperly installed</li><li>● Trigger wheel damage on camshaft</li><li>● Open or short circuit on CMP sensor</li><li>● Open or short circuit between CMP sensor and PCM terminal 2H or 3C</li></ul> Repair or replace malfunctioning part. If okay, go to next step
		No	Inspect follows: <ul style="list-style-type: none"><li>● High-tension leads</li><li>● Ignition coil and connector</li></ul>



## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION
5	Install fuel pressure gauge between fuel filter and fuel distributor. Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes Go to next step.
		<b>No</b> <b>Zero or low:</b> <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for open fuel pump relief valve</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>
6	Remove and shake PCV valve. Does PCV valve rattle?	Yes Go to next step.
		No Replace PCV valve.
7	Is there restriction in exhaust system?	Yes Inspect exhaust system.
		No Go to next step.
8	Is brake system functioning properly?	Yes Go to next step.
		No Inspect for cause.
9	Inspect for contaminated mass air flow sensor. Is there any contamination?	Yes Replace mass air flow sensor.
		No Go to next step.
10	Is engine compression correct?	Yes Inspect for valve timing.
		No Inspect for cause.
11	Verify test results. If okay, return to diagnostic index to service any additional symptoms.	

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

14	EMISSION COMPLIANCE
DESCRIPTION	Emission compliance test is failed
POSSIBLE CAUSE	<ul style="list-style-type: none"> <li>Vacuum lines leakage or blockage</li> <li>Cooling system malfunction</li> <li>Spark plug malfunction</li> <li>Leakage from intake manifold</li> <li>Erratic or no signal from camshaft position sensor</li> <li>Inadequate fuel pressure</li> <li>PCV valve malfunction or incorrect valve installation</li> <li>EGR valve malfunction</li> <li>Exhaust system clogged</li> <li>Fuel tank ventilation system malfunction</li> <li>Charcoal canister damage</li> <li>Excessive carbon build up in combustion chamber</li> <li>Improper engine compression</li> <li>Improper valve timing</li> </ul> <p><b>Warning</b>                      The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☐ 01-14 BEFORE REPAIR PROCEDURE                      ☐ 01-14 AFTER REPAIR PROCEDURE</p>

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
1	Inspect following: • Vacuum lines for leakage or blockage • Electrical connections • Proper maintenance schedule followed • Intake air system and air cleaner element concerns: obstructions, leakage or dirtiness. Are all items okay?	Yes	Go to next step.
		No	Service as necessary. Repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Is any other drivability concern present?	Yes	Go to appropriate flow chart.
		No	Go to next step.
4	Connect NGS tester to DLC-2. Access ECT PID. Warm-up engine and run it at idle. Verify ECT PID is correct. 01-40 PID/DATA MONITOR INSPECTION Is ECT PID correct?	Yes	Go to next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operation or thermostat operation.
5	Is strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Inspect following: • Spark plugs malfunction • CMP sensor improperly installed. • Damage of trigger wheel on camshaft • Open or short circuit on CMP sensor • Open or short circuit between CMP sensor and PCM terminal 2H or 3C Repair or replace malfunctioning parts. If okay, go to next step.
		No	Inspect following: • High-tension leads • Ignition coil and connector
6	Install fuel pressure gauge between fuel filter and fuel distributor. Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle?  <b>Fuel line pressure:</b> <b>370—420 kPa</b> <b>{3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}</b>	Yes	Go to next step.
		No	<b>Zero or low:</b> • Inspect fuel pump circuit • Inspect for open fuel pump relief valve • Inspect for fuel leakage inside pressure regulator • Inspect for clogged main fuel line • Inspect pulsation damper <b>High:</b> • Inspect pressure regulator for high pressure cause • Inspect for clogged fuel return line
7	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
8	Inspect for fuel saturation inside charcoal canister. Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister.
		No	Inspect fuel tank vent system. Then, go to next step.
9	Is there a restriction in the exhaust system?	Yes	Inspect exhaust system.
		No	Inspect EGR system. 01-01A ENGINE SYSTEM INSPECTION, EGR Control Inspection
10	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

## TROUBLESHOOTING [ENGINE CONTROL]

15		MIL NEVER ON	
DESCRIPTION		Malfunction indicator light never on	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• MIL burned out</li> <li>• Open or short to power between MIL and PCM</li> <li>• Blown fuse</li> <li>• Open on instrument cluster</li> </ul>	
STEP	INSPECTION		ACTION
1	Is ROOM fuse burnt?	Yes	Repair wiring harness and replace fuse.
		No	Go to next step.
2	Connect NGS tester to DLC-2. Access MIL PID. Turn ignition switch to ON. Does MIL PID read ON?	Yes	Go to next step.
		No	Inspect for open circuit between PCM and battery or ground.
3	Is there correct voltage at MIL fuse?  <b>Specification: More than 10.5 V</b>	Yes	Go to next step.
		No	Repair open in wiring harness between fuse block and ignition switch.
4	Remove MIL bulb. Is voltage correct on positive side of MIL bulb socket?  <b>Specification: More than 10.5 V</b>	Yes	Go to next step.
		No	Repair open circuit in wiring harness between fuse block and MIL bulb socket.
5	Apply 12 volts and ground to MIL bulb. Does MIL illuminate?	Yes	Inspect for open circuit between MIL and PCM terminal E.
		No	Replace MIL bulb.

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

16		HIGH OIL CONSUMPTION/LEAKAGE	
DESCRIPTION		Oil consumption excessive	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• PCV valve malfunction</li> <li>• Improper dipstick</li> <li>• Improper engine oil viscosity</li> <li>• Engine internal part malfunction</li> </ul>	
STEP	INSPECTION		ACTION
1	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step.
		No	Replace PCV valve.
2	Verify following: <ul style="list-style-type: none"> <li>• External leakage</li> <li>• Proper dipstick</li> <li>• Proper engine oil viscosity</li> </ul> Are all items okay?	Yes	Inspect internal engine parts such as valves, valve guides, valve stem seals, cylinder head drain passage, piston rings.
		No	Service as necessary. Repeat step 2.

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

17		COOLING SYSTEM OVERHEATING	
DESCRIPTION		Engine runs at higher than normal temperature/Overheats	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Improper coolant level</li> <li>• Blown fuses</li> <li>• Coolant leakage</li> <li>• Excessive A/C system pressure</li> <li>• Improper water/anti-freeze mixture</li> <li>• Fans reverse rotation</li> <li>• Poor radiator condition</li> <li>• Thermostat malfunction</li> <li>• Radiator hoses damage</li> <li>• Condenser fan inoperative</li> <li>• Improper or damaged radiator cap</li> <li>• Main cooling fan inoperative</li> <li>• Malfunction of coolant overflow system</li> <li>• Improper tension of drive belt</li> <li>• Drive belt damage</li> </ul>	
STEP	INSPECTION		ACTION
1	Inspect following: • Engine coolant level • Coolant leakage • Water and anti-freeze mixture • Radiator condition • Collapsed or restricted radiator hoses • Radiator pressure cap • Overflow system • Fan rotational direction • Fuses Are all items okay?	Yes	Go to next step.
		No	Service as necessary. Repeat step 1.
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Start engine and run it at idle speed. Turn A/C switch on. Does A/C compressor engage?	Yes	Go to step 5.
		No	Inspect following and repair or replace as necessary: • Refrigerant charging amount • Open circuit between A/C magnet clutch relay and PCM terminal 1S • Seized A/C magnet clutch • A/C magnet clutch malfunction If all items are okay, go to next step.
4	Connect NGS tester to DLC-2. Access AC S/W PID on NGS tester. Start engine and run it at idle speed. Turn A/C switch on. Does AC S/W PID read on?	Yes	Go to next step.
		No	Inspect follows: • A/C pressure switch operation • A/C switch stuck open • Open or short circuit between A/C pressure switch and PCM terminal 1P • Open circuit of blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and amplifier

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
5	Start engine and run it at idle speed. Turn A/C switch on. Do condenser fan and main cooling fan operate?	Yes	Go to next step.
		No	<b>If condenser fan does not operate, inspect following:</b> <ul style="list-style-type: none"> <li>• Condenser fan relay stuck open</li> <li>• Condenser fan motor malfunction</li> <li>• Condenser fan motor ground open</li> <li>• Open circuit between condenser fan motor and relay</li> <li>• Open circuit between condenser fan relay and PCM terminal 11</li> <li>• Open battery power circuit for condenser fan relay</li> </ul> <b>If main cooling fan motor does not operate, inspect following:</b> <ul style="list-style-type: none"> <li>• Main cooling fan relay stuck open</li> <li>• Main cooling fan motor malfunction</li> <li>• Main cooling fan motor ground open</li> <li>• Open circuit between cooling fan motor and relay</li> <li>• Open circuit between cooling fan relay and PCM terminal 1R</li> <li>• Open battery power circuit for cooling fan relay</li> </ul>
6	Is drive belt okay?	Yes	Go to next step.
		No	Replace drive belt.
7	Is there any leakage around heater unit in passenger compartment?	Yes	Inspect and service heater for leakage.
		No	Go to next step.
8	Is there any leakage at coolant hoses and/or radiator?	Yes	Replace malfunctioning parts.
		No	Go to next step.
9	Cool down the engine. Remove thermostat and inspect operation. <div> <div>01-12 THERMOSTAT REMOVAL/INSTALLATION</div> <div>01-12 THERMOSTAT INSPECTION</div> </div> Is thermostat okay?	Yes	Engine coolant temperature and thermostat are okay, inspect engine block for leakage or blockage.
		No	Access ECT V PID on NGS tester. Inspect for both ECT V and temperature gauge readings. If temperature gauge on instrument cluster indicates normal range but ECT V is not same as temperature gauge reading, inspect engine coolant temperature sensor. If temperature gauge on instrument cluster indicates overheating but ECT V is normal, inspect temperature gauge and heat gauge unit.
10	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

## TROUBLESHOOTING [ENGINE CONTROL]

18	<b>COOLING SYSTEM RUNS COLD</b>		
<b>DESCRIPTION</b>	Engine takes excessive period for reaching normal operating temperature		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>• Thermostat malfunction</li> <li>• Malfunction of condenser fan system</li> <li>• Malfunction of main cooling fan system</li> </ul>		
<b>STEP</b>	<b>INSPECTION</b>	<b>ACTION</b>	
1	Is customer complaint "Lack of passenger compartment heat" only?	Yes	Inspect A/C and heater system.
		No	Go to next step.
2	Does engine speed continue at fast idle?	Yes	Go to symptom troubleshooting No.8 "FAST IDLE/RUNS ON".
		No	Go to next step.
3	Remove thermostat and inspect operation. ➤ 01-12 THERMOSTAT REMOVAL/INSTALLATION ➤ 01-12 THERMOSTAT INSPECTION Is thermostat okay?	Yes	Inspect condenser fan and main fan operation. If both or either fan operate abnormally, inspect follows: <ul style="list-style-type: none"> <li>• Main cooling fan relay stuck closed</li> <li>• Condenser fan relay stuck closed</li> <li>• Short to ground between main cooling fan relay and PCM terminal 1R</li> <li>• Short to ground between condenser fan relay and PCM terminal 1I</li> <li>• Circuit between main cooling fan relay and fan motor shorts to battery supply line</li> <li>• Circuit between condenser fan relay and fan motor shorts to battery supply line</li> </ul>
		No	Access ECT V PID on NGS tester. Inspect for both ECT V and temperature gauge on instrument cluster readings. If temperature gauge on instrument cluster indicates normal range but ECT V is not same as temperature gauge reading, inspect engine coolant temperature sensor. If temperature gauge on instrument cluster indicates cold range but ECT voltage is normal, inspect temperature gauge and heat gauge unit.
4	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

19		EXHAUST SMOKE	
DESCRIPTION		Blue, black, or white smoke from exhaust system	
POSSIBLE CAUSE		<b>Blue smoke (Burning oil):</b> <ul style="list-style-type: none"> <li>• PCV valve malfunction</li> <li>• Engine internal oil leakage</li> </ul> <b>White smoke (Water in combustion):</b> <ul style="list-style-type: none"> <li>• Malfunction of cooling system (coolant loss)</li> <li>• Engine internal coolant leakage</li> </ul> <b>Black smoke (Rich fuel mixture):</b> <ul style="list-style-type: none"> <li>• Air cleaner restricted</li> <li>• Intake air system collapsed or restricted</li> <li>• Fuel return line restricted</li> <li>• Excessive fuel pressure</li> <li>• Improper engine compression</li> <li>• Injector fuel leakage</li> <li>• Ignition system malfunction</li> </ul>	
		<b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> ➤ 01-14 BEFORE REPAIR PROCEDURE ➤ 01-14 AFTER REPAIR PROCEDURE	
STEP	INSPECTION		ACTION
1	What color is smoke coming from exhaust system?	Blue	Burning oil is indicated. Go to next step.
		White	Water in combustion is indicated. Go to step 3.
		Black	Rich fuel mixture is indicated. Go to step 4.
2	Remove and shake PCV valve. Does PCV valve rattle?	Yes	Inspect following: <ul style="list-style-type: none"> <li>• Damaged valve guide, stems or valve seals</li> <li>• Blocked oil drain passage in cylinder head</li> <li>• Piston rings for not seated, seized or worn</li> <li>• Damaged cylinder bore</li> </ul> If other drivability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Replace PCV valve.
3	Does cooling system hold pressure?	Yes	Inspect following: <ul style="list-style-type: none"> <li>• Cylinder head gasket leakage</li> <li>• Intake manifold gasket leakage</li> <li>• Engine block cracked or porous</li> </ul> If other drivability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Inspect for cause.
4	Inspect following: <ul style="list-style-type: none"> <li>• Air cleaner for restriction</li> <li>• Collapsed or restricted intake air system</li> <li>• Restricted fuel return line</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary. Repeat step 5.
5	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.

## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
6	Install fuel pressure gauge between fuel filter and fuel distributor. Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle?  <b>Fuel line pressure:</b> <b>370—420 kPa</b> <b>{3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}</b>	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for open fuel pump relief valve</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>
7	Is strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Inspect spark plugs and camshaft position sensor.
		No	inspect following: <ul style="list-style-type: none"> <li>High-tension leads</li> <li>Ignition coil and connector</li> </ul>
8	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

20		FUEL ODOR (IN ENGINE COMPARTMENT)	
DESCRIPTION		Gasoline fuel smell or visible leakage	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>Excessive fuel pressure</li> <li>Purge control solenoid malfunction</li> <li>Fuel tank vent system blockage</li> <li>Charcoal canister malfunction</li> </ul> <b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: <ul style="list-style-type: none"> <li>Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> ☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE	
STEP	INSPECTION		ACTION
1	Visually inspect for fuel leakage at fuel injector O-ring, pulsation damper and fuel line. Service as necessary. Is fuel line pressure held after ignition switch is turned off? ☞ 01-14 PRESSURE REGULATOR INSPECTION, Fuel Hold Pressure Inspection	Yes	Go to next step.
		No	Inspect pressure regulator diaphragm condition. If condition is okay, inspect fuel injector. If condition is not okay, replace pressure regulator.
2	Inspect for blockage/restriction or open between engine vacuum port and charcoal canister. Inspect for blockage in fuel tank vent system. Is fault indicated?	Yes	Replace vacuum hose.
		No	Go to next step.
3	Inspect purge solenoid valve. ☞ 01-14 PURGE SOLENOID VALVE INSPECTION Is solenoid operating properly?	Yes	Go to next step.
		No	Replace purge solenoid valve.



## TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
4	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Inspect charcoal canister for fuel saturation. If excess amount of liquid fuel present, replace charcoal canister.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
5	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

21	ENGINE NOISE		
DESCRIPTION	Engine noise from under hood		
POSSIBLE CAUSE	<b>Squeal, click or chirp noise:</b> <ul style="list-style-type: none"> <li>Improper engine oil level</li> <li>Improper drive belt tension</li> </ul> <b>Rattle sound noise:</b> <ul style="list-style-type: none"> <li>Loose parts</li> </ul> <b>Hiss sound noise:</b> <ul style="list-style-type: none"> <li>Vacuum leakage</li> <li>Loose spark plug</li> <li>Air leakage from intake air system</li> </ul> <b>Rumble or grind noise:</b> <ul style="list-style-type: none"> <li>Improper drive belt tension</li> </ul> <b>Rap or roar sound noise:</b> <ul style="list-style-type: none"> <li>Exhaust system loose</li> </ul> <b>Other noise:</b> <ul style="list-style-type: none"> <li>Camshaft friction gear noise or HLA noise</li> </ul>		
STEP	INSPECTION		ACTION
1	Is squeal, click or chirp sound present?	Yes	Inspect engine oil level or drive belts.
		No	Go to next step.
2	Is rumble or grind sound present?	Yes	Inspect drive belt.
		No	Go to next step.
3	Is rattle sound present?	Yes	Inspect location of rattle for loose parts.
		No	Go to next step.
4	Is hiss sound present?	Yes	Inspect following: <ul style="list-style-type: none"> <li>Vacuum leakage</li> <li>Spark plug loose</li> <li>Intake air system leakage</li> </ul>
		No	Go to next step.
5	Is rap or roar sound present?	Yes	Inspect exhaust system for loose parts.
		No	Go to next step.
6	Is knock sound present?	Yes	Go to symptom troubleshooting No.12 "KNOCKING/ PINGING".
		No	If noise comes from engine internal, inspect for friction gear or HLA noise.
7	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

## TROUBLESHOOTING [ENGINE CONTROL]

<b>22</b>	<b>VIBRATION CONCERNS (ENGINE)</b>		
<b>DESCRIPTION</b>	Vibration from under hood or driveline		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>Loose attaching bolts or worn parts</li> <li>Components malfunctioning such as worn parts</li> </ul>		
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Inspect following components for loose attaching bolts or worn parts: <ul style="list-style-type: none"> <li>Cooling fan</li> <li>Drive belt and pulleys</li> <li>Engine mounts</li> </ul> All items okay?	Yes	Inspect following systems: <ul style="list-style-type: none"> <li>Wheels</li> <li>Transmission</li> <li>Driveline</li> <li>Suspension</li> </ul>
		No	Readjust or retighten engine mount installation position. Service as necessary for other parts.
2	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

<b>23</b>	<b>A/C DOES NOT WORK</b>		
<b>DESCRIPTION</b>	A/C compressor magnetic clutch does not engage when A/C switch is turned on		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>Improper refrigerant charging amount</li> <li>Open A/C magnet clutch</li> <li>Open circuit between A/C relay and A/C magnet clutch</li> <li>Poor ground of A/C magnet clutch</li> <li>A/C high pressure switch stuck open</li> <li>A/C relay stuck open</li> <li>Seized A/C compressor</li> <li>Open circuit between A/C switch and PCM through both A/C pressure switch and amplifier</li> </ul>		
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
2	Disconnect A/C compressor connector. Start the engine and turn A/C switch on. Is there correct voltage at terminal of A/C compressor magnet clutch connector?  <b>Specification: More than 10.5 V</b>	Yes	Inspect for ground condition of magnet clutch on A/C compressor. If ground condition is okay, inspect for open circuit of magnet clutch coil.
		No	Go to next step.
3	Disconnect A/C high pressure switch connector. Connect jumper wires between terminals of A/C high pressure switch connector. Connect NGS tester to DLC-2. Access AC S/W PID on NGS tester. Turn ignition switch to ON. Turn A/C switch on and set blower fan at any speed. Does AC S/W PID read on?	Yes	Inspect A/C high pressure switch operation. Replace malfunctioning switch. If switch is okay, go to next step
		No	Inspect follows: <ul style="list-style-type: none"> <li>A/C switch stuck open</li> <li>Open circuit between A/C pressure switch and PCM terminal 1P</li> <li>Open circuit of blower motor fan switch and resistor (if blower motor does not operate)</li> <li>Evaporator temperature sensor and amplifier</li> </ul>
4	Remove jumper wire from switch connector. Reconnect connector to A/C high pressure switch. Start engine and turn A/C switch on. Verify fan operation. Does fan operate?	Yes	Inspect for stuck open A/C relay. Replace as necessary.
		No	Inspect follows and repair or replace as necessary: <ul style="list-style-type: none"> <li>Refrigerant charging amount</li> <li>A/C compressor seized</li> </ul>
5	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

### Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

<b>24</b>		<b>A/C ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY</b>	
<b>DESCRIPTION</b>		A/C compressor magnetic clutch does not disengage	
<b>POSSIBLE CAUSE</b>		<ul style="list-style-type: none"> <li>• Stuck engagement</li> <li>• A/C relay stuck closed</li> <li>• Short to ground between A/C switch and PCM</li> <li>• Short to ground circuit between A/C relay and PCM</li> <li>• A/C relay to magnet clutch circuit shorts to battery power</li> </ul>	
<b>STEP</b>	<b>INSPECTION</b>	<b>ACTION</b>	
1	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
2	Start engine and run it at idle. Turn A/C switch on. Remove A/C relay. Does A/C magnet clutch disengage?	Yes	Inspect following: <ul style="list-style-type: none"> <li>• A/C relay stuck closed</li> <li>• Short to ground circuit between A/C relay and PCM terminal 1S</li> </ul> If both items okay, go to next step.
		No	Inspect if circuit between A/C relay and magnet clutch shorts to battery power circuit. If circuit is okay, inspect magnet clutch stuck engagement or clearance.
3	Connect NGS tester to DLC-2. Access AC S/W PID on NGS tester. Start the engine and turn A/C switch on. Read AC S/W PID while disconnecting the high-pressure switch connector.  <b>Note</b> <ul style="list-style-type: none"> <li>• AC S/W PID should read OFF when disconnecting connector. If AC S/W PID reading remains ON, short to ground circuit may be present.</li> </ul> Does AC S/W PID reading remain on?	Yes	Inspect for short to ground circuit between high-pressure switch and PCM terminal 1P.
		No	Go to next step.
4	Reconnect high-pressure switch connector. Read AC S/W PID while turning off A/C switch.  <b>Note</b> <ul style="list-style-type: none"> <li>• AC S/W PID should read OFF when turning the A/C switch off. If AC S/W PID reading remains on, short to ground circuit may be present.</li> </ul> Does AC S/W PID reading remain on?	Yes	Inspect for short to ground circuit between high-pressure switch and A/C switch.
		No	Inspect for A/C switch stuck closed.
5	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

**Note**

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

## TROUBLESHOOTING [ENGINE CONTROL]

<b>25</b>	<b>A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS</b>		
<b>DESCRIPTION</b>	A/C compressor magnetic clutch does not disengage under wide open throttle		
<b>POSSIBLE CAUSE</b>	<ul style="list-style-type: none"> <li>• Throttle position sensor malfunction</li> <li>• Throttle position sensor mis-adjustment</li> <li>• Throttle position sensor loosely installed</li> </ul>		
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Does A/C compressor disengage when A/C switch is turned off?	Yes	Go to next step.
		No	Go to symptom troubleshooting No.24 "A/C always on A/C compressor runs continuously".
2	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Inspect throttle position sensor for proper adjustment.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
3	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

**Note**

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

26		EXHAUST SULPHUR SMELL	
DESCRIPTION		Rotten egg smell (sulphur) from exhaust	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>Electrical connectors disconnected or poor connection</li> <li>Charcoal canister malfunction</li> <li>Vacuum lines disconnected or improper connection</li> <li>Improper fuel pressure</li> </ul>	
		<p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>➤ 01-14 BEFORE REPAIR PROCEDURE ➤ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION		ACTION
1	Are any drivability or exhaust smoke concerns present?	Yes	Go to appropriate flow chart.
		No	Go to next step.
2	Inspect following: <ul style="list-style-type: none"> <li>Electrical connections</li> <li>Vacuum lines</li> </ul> Are all items okay?	Yes	Go to next step.
		No	Service as necessary. Repeat step 2.
3	Connect NGS tester to DLC-2. Turn ignition switch to ON. Retrieve any DTC. Is "SYSTEM PASSED (NO DTCs AVAILABLE)" displayed?	Yes	<b>No DTC displayed:</b> Go to next step.
		No	<b>DTC displayed:</b> Go to appropriate DTC test.
4	Install fuel pressure gauge between fuel filter and fuel distributor. Start engine and run it at idle. Is fuel line pressure correct at idle?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes	Go to next step.
		No	<b>Zero or low:</b> <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for open fuel pump relief valve</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> <b>High:</b> <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>
5	Inspect charcoal canister for fuel saturation. Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister.
		No	Inspect fuel tank vent system. If fuel tank vent system is okay: Since sulfur content can vary in different fuels, suggest trying a different brand. If fuel tank vent system is not okay: Repair or replace malfunctioning parts.

## Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

# TROUBLESHOOTING [ENGINE CONTROL]

27		INTERMITTENT CONCERNS	
DESCRIPTION		Symptom occurs randomly and is difficult to diagnose	
STEP	INSPECTION	ACTION	
1	Talk to customer. Review vehicle service history. Does vehicle have a number of previous repairs and components replaced for a certain symptom?	Yes	Go to next step.
		No	Go to Symptom Index.
2	Turn ignition switch off. Connect NGS tester to DLC-2. If input is a switch-type component, turn on manually. Turn ignition switch to ON. Engine is off. Access PIDs for suspect component. Lightly tap on suspect component, wiggle and pull each wire/connector at suspect component or PCM. Are any PID values out of range, or do they suddenly change and go back into range?	Yes	Inspect each wire for corrosion, bent or loose terminal crimps.
		No	Go to next step.
3	Turn ignition switch to ON. Engine is running. Lightly tap on suspect component, wiggle and pull each wire/connector at suspect component or PCM. Are any PID values out of range, or do they suddenly change and go back into range?	Yes	Inspect each wire for corrosion, bent or loose terminal crimps.
		No	Go to next step.
4	Turn ignition switch to ON. Engine is running. Access PIDs for suspect component. Accurately spray water on suspect component wire, component or vacuum line related to possible fault area. Are any PID values out of range, or suddenly change and go back into range, or was there a noticeable engine misfire/stumble?	Yes	Fault area is identified. <b>If fault occurred while spraying on component:</b> Replace part and verify repair. <b>If fault occurred while spraying wiring:</b> Inspect each wire for corrosion, bent or loose terminals and poor wire terminal crimps. <b>If fault occurred while spraying vacuum line:</b> Repair vacuum hoses.
		No	Inspect wire and connector at suspect component for corrosion, bent or loose terminals, poor wire terminal crimps and high tension of wire. Repair as necessary.

## TROUBLESHOOTING [ENGINE CONTROL]

29		FUEL REFILL CONCERNS	
DESCRIPTION		Fuel tank does not fill smoothly	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Clogged evaporative emission pipes</li> <li>• Non return valve malfunction</li> <li>• Fuel tank pressure control valve malfunction</li> <li>• Improper use of fuel nozzle</li> <li>• Inadequate fuel filling speed</li> </ul>	
		<p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION		ACTION
1	Retrieve DTCs. Are there any DTCs displayed?	Yes	Go to appropriate DTC test.
		No	Go to next step.
2	Remove fuel filler pipe. Make sure non return valve is installed properly. Inspect non return valve operation. Is non return valve okay?	Yes	Inspect as follows: <ul style="list-style-type: none"> <li>• Improper use of fuel nozzle</li> <li>• Inadequate fuel filling speed</li> <li>• Fuel tank pressure control valve</li> </ul>
		No	<p><b>If non return valve installed improperly:</b> Reinstall non return valve to proper position.</p> <p><b>If non return valve does not operate properly:</b> Replace non return valve.</p>

30		FUEL FILLING SHUT OFF ISSUES	
DESCRIPTION		Fuel does not shut off properly	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Clogged evaporative emission pipes</li> <li>• Non return valve malfunction</li> <li>• Fuel shut off valve malfunction</li> <li>• Fuel nozzle malfunction</li> <li>• Fuel nozzle does not insert correct</li> </ul>	
		<p><b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:</p> <ul style="list-style-type: none"> <li>• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.</li> <li>• Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.</li> </ul> <p>☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE</p>	
STEP	INSPECTION		ACTION
1	Retrieve DTCs. Are there any DTCs displayed?	Yes	Go to appropriate DTC test.
		No	Go to next step.
2	Remove fuel filler pipe. Make sure that non return valve is installed properly. Inspect non return valve operation. Is non return valve okay?	Yes	Inspect as follows: <ul style="list-style-type: none"> <li>• Fuel nozzle malfunction</li> <li>• Fuel does not insert correctly</li> <li>• Fuel shut off valve</li> </ul>
		No	<p><b>If non return valve installed improperly:</b> Reinstall non return valve to proper position.</p> <p><b>If non return valve does not operate properly:</b> Replace non return valve.</p>

# TROUBLESHOOTING [ENGINE CONTROL]

31	CONSTANT VOLTAGE		
DESCRIPTION	Incorrect constant voltage		
POSSIBLE CAUSE	Constant circuit malfunction  <b>Note</b> • EGR boost sensor, FTP sensor, TP sensor and TCM use constant voltage.		
STEP	INSPECTION		ACTION
1	Was constant voltage greater than 6.0 volts when measured in previous step?	Yes	Go to step 14.
		No	Go to next step.
2	Turn ignition switch to ON. Engine is off. Is voltage across battery terminals greater than 10.5 volts?	Yes	Go to next step.
		No	Inspect charging system.
3	Turn ignition switch to ON. Engine is off. Disconnect sensor where constant voltage circuit check failed. Measure voltage between battery positive terminal and ground (between PCM and appropriate sensor) circuit at appropriate sensor connector. Is voltage greater than 10.5 volts and within 1.0 volt of battery voltage?	Yes	Go to next step.
		No	Go to step 9.
4	<b>Note</b> • The purpose of this step is to determine if NGS tester is communicating with PCM.  Turn ignition switch to ON. Engine is off. Attempt to access ECT PID. Can ECT PID be accessed?	Yes	Go to step 8.
		No	Go to next step.
5	Turn ignition switch off. Leave TP sensor disconnected. Disconnect EGR boost sensor connector. Turn ignition switch to ON. Engine is off. Measure voltage between constant voltage and ground circuits at TP sensor connector. Is voltage between 4.0 and 6.0 volts?	Yes	Replace EGR boost sensor.
		No	Go to next step.
6	Turn ignition switch off. Disconnect TP sensor connector. Leave PCM disconnected. Turn ignition switch to ON. Engine is off. Measure voltage between PCM connector terminals 1B and 3B. Is voltage greater than 10.5 volts?	Yes	Go to next step.
		No	Repair open circuit between PCM terminal 1B and main relay.
7	Turn ignition switch off. Leave TP, EGR boost and fuel tank pressure sensors connectors disconnected. Disconnect NGS tester from DLC-2. Measure resistance between PCM connector terminals 2I and 3B. Is resistance greater than 10,000 ohms?	Yes	Inspect for constant voltage at suspect sensor connector again.  <b>Note</b> • Get assistance from technical Hotline/your distributor, then replace PCM if necessary.
		No	Repair constant voltage circuit short to ground.
8	Turn ignition switch off. Disconnect sensor connector where constant voltage circuit inspection failed. Leave PCM disconnected. Measure resistance between PCM connector terminal 2I and constant voltage circuit at appropriate sensor connector. Is resistance less than 5.0 ohms?	Yes	Inspect for constant voltage at suspect sensor connector again.  <b>Note</b> • Get assistance from technical Hotline/your distributor, then replace PCM if necessary.
		No	Repair open constant voltage circuit.



# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
9	<b>Note</b> <ul style="list-style-type: none"> <li>The purpose of this step is to determine if NGS tester is communicating with PCM.</li> </ul> Turn ignition switch to ON. Engine is off. Attempt to access ECT PID. Can ECT PID be accessed?	Yes	Go to next step.
		No	Go to step 12.
10	Are DTCs present for two or more sensors connected to PCM terminal 3F circuit? <b>Sensors connected to PCM terminal 3F:</b> EGR boost sensor, TP sensor, IAT sensor, ECT sensor, FTP sensor, HO2S—11, HO2S—12.	Yes	Go to next step.
		No	Repair open circuit to sensor where constant voltage circuit inspection failed.
11	Turn ignition switch off. Disconnect NGS tester from DLC-2. Disconnect sensor connector where constant voltage circuit inspection failed. Leave PCM disconnected. Measure resistance between ground circuit at appropriate sensor connector and PCM connector terminal 3F. Is resistance less than 5.0 ohms?	Yes	Reconnect sensor connector. Go to next step.
		No	Repair open ground circuit.
12	Turn ignition switch off. Disconnect NGS tester from DLC-2. Leave PCM disconnected. Measure resistance between battery negative terminal and PCM connector terminals 3A, 3B and 3C. Is each resistance less than 5.0 ohms?	Yes	Go to next step.
		No	Repair open ground circuit to ground.
13	Turn ignition switch off. Measure resistance between ground circuit at following sensor connector and ground. <ul style="list-style-type: none"> <li>EGR boost sensor</li> <li>Fuel tank pressure sensor</li> <li>TP sensor</li> <li>Engine coolant temperature sensor</li> <li>Heated oxygen sensor</li> <li>Intake-air temperature sensor</li> </ul> Is each resistance less than 5.0 ohms?	Yes	Ground circuits are okay.
		No	Inspect for constant voltage at suspect sensor connector again.  <b>Note</b> <ul style="list-style-type: none"> <li>Get assistance from technical hotline/your distributor, then replace PCM if necessary.</li> </ul>
14	Turn ignition switch off. Disconnect sensor connector where constant voltage inspection failed. Disconnect TP fuel tank pressure sensor and EGR boost sensor connectors. Disconnect PCM connector. Turn ignition switch to ON. Engine is off. Measure voltage between constant voltage circuit at TP sensor connector and battery negative terminal. Is voltage less than 0.5 volts?	Yes	Inspect for constant voltage at suspect sensor connector again.  <b>Note</b> <ul style="list-style-type: none"> <li>Get assistance from technical hotline/your distributor, then replace PCM if necessary.</li> </ul>
		No	Repair constant voltage circuit short to power in harness.

# TROUBLESHOOTING [ENGINE CONTROL]

## ENGINE DIAGNOSTIC INSPECTION

XSU101W04

### Spark Plug Condition Inspection Purpose

Inspecting spark plugs condition, can determine whether problem is related to a specific cylinder possibly all cylinders.

### Procedure

1. Remove the spark plug.
2. Inspect spark plug condition.
3. Go to appropriate troubleshooting chart for further information.

Spark plug condition	Troubleshooting chart
Specific plug is wet or covered with carbon	1 "Wet/carbon stuck on specific plug"
Specific plug looks grayish white	2 "Grayish white with specific plug"
All plugs are wet or covered with carbon	3 "Wet/carbon stuck on all plugs"
All plugs look grayish white	4 "Grayish white with all plugs"

1

Wet/carbon stuck on specific plug

[TROUBLESHOOTING HINTS]

① Spark-No spark visible or spark weak

② Air/fuel mixture-Excessive fuel injection volume

③ Compression-No compression, low compression

Others

① Faulty spark plugs

Warning

The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:

Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.

Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.

☞ 01-14 BEFORE REPAIR PROCEDURE

☞ 01-14 AFTER REPAIR PROCEDURE

STEP	INSPECTION		ACTION
1	Is spark plug wet/covered with carbon by engine oil?	Yes	Working up and down, inspect all areas related to oil.
		No	Go to next step.
2	Inspect spark plug for following. <ul style="list-style-type: none"> <li>Cracked insulator</li> <li>Heating value</li> <li>Air gap</li> <li>Worn electrode</li> </ul> Is spark plug okay?	Yes	Go to next step.
		No	Replace spark plug.
3	Inspect compression pressure at suspected faulty cylinder. Is compression pressure correct? ☞ 01-10 COMPRESSION INSPECTION	Yes	Go to next step.
		No	Repair or replace malfunctioning part.
4	Install all spark plugs. Carry out spark test at suspected faulty cylinder. Is strong blue spark visible? (Compare with normal cylinder.)	Yes	Go to next step.
		No	Repair or replace malfunctioning part.
5	Perform fuel line pressure test. ☞ 01-14 PRESSURE REGULATOR INSPECTION Is fuel line pressure okay?	Yes	Inspect fuel injector for following. <ul style="list-style-type: none"> <li>Open or short in injector</li> <li>Leakage</li> <li>Injection volume</li> </ul>
		No	Zero or low: <ul style="list-style-type: none"> <li>Inspect fuel pump circuit</li> <li>Inspect for fuel pump relief valve open</li> <li>Inspect for fuel leakage inside pressure regulator</li> <li>Inspect for clogged main fuel line</li> <li>Inspect pulsation damper</li> </ul> High: <ul style="list-style-type: none"> <li>Inspect pressure regulator for high pressure cause</li> <li>Inspect for clogged fuel return line</li> </ul>

2	Grayish white with specific plug		
<b>[TROUBLESHOOTING HINTS]</b>			
① Air/fuel mixture-Insufficient fuel injection volume			
Others			
① Faulty spark plug			
<b>Warning</b>			
The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:			
● Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.			
● Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.			
☞ 01-14 BEFORE REPAIR PROCEDURE			
☞ 01-14 AFTER REPAIR PROCEDURE			
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	Inspect spark plug for following. <ul style="list-style-type: none"><li>● Heating value</li><li>● Air gap</li></ul> Are they okay?		Yes Go to next step.
			No Replace spark plug.
2	Remove suspected fuel injector. Inspect following: <ul style="list-style-type: none"><li>● Resistance<ul style="list-style-type: none"><li>☞ 01-14 FUEL INJECTOR INSPECTION</li></ul></li><li>● Fuel injection volume<ul style="list-style-type: none"><li>☞ 01-14 FUEL INJECTOR INSPECTION</li></ul></li></ul> Are all above items okay?		Yes Inspect for open circuit between suspected fuel injector connector terminal and PCM connector following terminal: For #1 cyl: 3W For #2 cyl: 3X For #3 cyl: 3Y For #4 cyl: 3Z
			No Replace fuel injector.

### 3 Wet/carbon stuck on all plugs

#### [TROUBLESHOOTING HINTS]

- ① Spark-Spark weak
- ② Air/fuel mixture-Too rich
- ③ Compression-Low compression
- Others
- ① Clogs in intake/exhaust system

#### Warning

The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:

- Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.
- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.

☞ 01-14 BEFORE REPAIR PROCEDURE

☞ 01-14 AFTER REPAIR PROCEDURE

STEP	INSPECTION	ACTION
1	Is air cleaner element free of restrictions?	Yes
		No
2	Carry out spark test. Is a strong blue spark visible at each cylinder?	Yes
		No
3	Carry out fuel pressure inspection. Is fuel pressure correct?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes
		No

Zero or low:

- Inspect fuel pump circuit
- Inspect for fuel pump relief valve open
- Inspect for fuel leakage inside pressure regulator
- Inspect for clogged main fuel line
- Inspect pulsation damper

High:

- Inspect pressure regulator for high pressure cause
- Inspect for clogged fuel return line

# TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
4	Inspect following PID. • MAF V PID ☞ 01-40 MASS AIR FLOW SENSOR INSPECTION • ECT PID ☞ 01-40 ENGINE COOLANT TEMPERATURE SENSOR INSPECTION • HO2S11, HO2S12 PID ☞ 01-40 HEATED OXYGEN SENSOR INSPECTION (When engine can be started.) Are PIDs okay?	Yes	Go to next step.
		No	Repair or replace.
5	Carry out purge control inspection (When engine can be started.) ☞ 01-01A ENGINE SYSTEM INSPECTION, Purge Control Inspection Is purge control correct?	Yes	Go to next step.
		No	Repair or replace.
6	Carry out compression inspection. Is compression correct?	Yes	Inspect clogs in exhaust system.
		No	Repair or replace.

4	Grayish white with all plugs		
<b>[TROUBLESHOOTING HINTS]</b> ① Air/fuel mixture-Too lean  <b>Warning</b> The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel. • Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual. ☞ 01-14 BEFORE REPAIR PROCEDURE ☞ 01-14 AFTER REPAIR PROCEDURE			
<b>STEP</b>	<b>INSPECTION</b>		<b>ACTION</b>
1	When engine cannot be started, inspect intake-air system for air leakage. When engine can be started, carry out intake manifold vacuum inspection. Is air sucked in from intake-air system?	Yes	Repair or replace.
		No	Go to next step.
2	Carry out fuel pressure inspection. Is fuel pressure correct?  <b>Fuel line pressure:</b> 370—420 kPa {3.7—4.3 kgf/cm <sup>2</sup> , 53—61 psi}	Yes	Inspect following PID. • MAF V PID ☞ 01-40 MASS AIR FLOW SENSOR INSPECTION • ECT PID ☞ 01-40 ENGINE COOLANT TEMPERATURE SENSOR INSPECTION • O2S11, O2S12 PID ☞ 01-40 HEATED OXYGEN SENSOR INSPECTION (When engine can be started.) • Inspect PCM ground condition
		No	Zero or low: • Inspect fuel pump circuit • Inspect for fuel pump relief valve open • Inspect for fuel leakage inside pressure regulator • Inspect for clogged main fuel line • Inspect pulsation damper High: • Inspect pressure regulator for high pressure cause • Inspect for clogged fuel return line

## Input Signal System Investigation Procedure

1. Find an unusual signal (Refer to procedures below).
2. Locate its source (Refer to procedures below).
3. Repair or replace the defective part.
4. Confirm that the unusual signal has been erased.

## Finding Unusual Signals

While referring to the diagnostic trouble code inspection section of the on-board diagnostic system, use the PID monitor to check the input signal system relating to the problem.

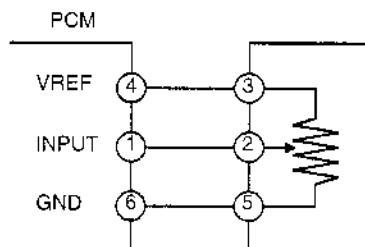
1. Turn the ignition to ON and idle the vehicle. You can assume that any signals that are out of specifications by a wide margin are unusual.
2. When recreating the problem, any sudden change in monitor input signals that is not consciously created by the driver can be judged as unusual.

## Locating the Source of Unusual Signals

### Caution

- Compare the NGS monitor voltage with the measurement voltage using the NGS "DIGITAL MEASUREMENT SYSTEM" function. If you use another tester, misreading may occur.
- When measuring voltage, attach the tester ground to the GND of the PCM that is being tested, or to the engine itself. If this is not done, the measured voltage and actual voltage may differ.
- After connecting the pin to a waterproof coupler, confirming continuity and measuring the voltage, check the waterproof connector for cracks. If there are any, use sealant to fix them. Failure to do this may result in deterioration of the harness or terminal from water damage, leading to problems with the vehicle.

## Variable Resistance Type 1 (Throttle Position, Fuel Tank Pressure and Barometric Absolute Pressure Sensors)



X5U101WAA

## Investigate the input signal system

1. When you get an unusual signal, measure the #1 PCM terminal voltage.
  - (1) If the #1 terminal voltage and the NGS monitor voltage are the same, proceed to the next step.
  - (2) If there is a difference of 0.5 V or more, inspect the following points concerning the PCM connector:

- Female terminal opening loose
  - Coupler (pin holder) damage
  - Pin discoloration (blackness)
  - Harness/pin clamp is loose or disconnected
2. When you get an unusual signal, measure the #2 sensor terminal voltage.
    - (1) If there is a 0.5 V or more difference between the sensor and NGS voltages, inspect the harness for open or short circuits.
    - (2) If the sensor and NGS voltages are the same, inspect the following points concerning the sensor connector. If there are no problems, proceed to next investigation below.
      - Female terminal opening loose
      - Coupler (pin holder) damage
      - Pin discoloration (blackness)
      - Harness/pin clamp is loose or disconnected

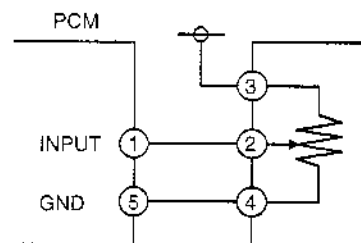
## Investigate the standard power supply system

1. Confirm that the #3 terminal is at 5 V.
  - (1) If the measured voltage on the #3 terminal is 5 V, inspect the following points on the sensor connector. If there is no problem, proceed to next investigation below.
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
  - (2) If the #3 terminal measures other than 5 V, inspect the following points:
    - Open or short circuit in harness
    - Harness/pin clamp is loose or disconnected

## Investigate the GND system

1. Confirm that terminal sensor #5 is at 0 V.
  - (1) If it is at 0 V, inspect the sensor. If necessary, replace the sensor.
  - (2) If not, inspect the following points:
    - Open or short circuit in harness
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected

## Variable Resistance Type 2 (Fuel Tank Level and Mass Airflow Sensors)



X5U101WAB

## Investigate the input signal system

1. When you get an unusual signal, measure the #1 PCM terminal voltage.
  - (1) If the #1 terminal voltage and the NGS monitor voltage are the same, proceed to the next step.

- (2) If there is a difference of 0.5 V or more, inspect the following points concerning the PCM connector:
  - Female terminal opening loose
  - Coupler (pin holder) damage
  - Pin discoloration (blackness)
  - Harness/pin clamp is loose or disconnected
2. When you get an unusual signal, measure the #2 sensor terminal voltage.
  - (1) If there is a 0.5 V or more difference between the sensor and NGS voltages, inspect the harness for open or short circuits.
  - (2) If the sensor and NGS voltages are the same, inspect the following points concerning the sensor connector. If there are no problems, proceed to next investigation below.
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected

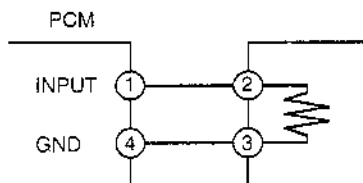
## Investigate the electrical supply system

1. Confirm that the sensor #3 terminal is B+.
- (1) If the measured voltage on the #3 terminal is B+, inspect the following points on the sensor connector. If there is no problem, proceed to next investigation below.
  - Female terminal opening loose
  - Coupler (pin holder) damage
  - Pin discoloration (blackness)
- (2) If the #3 terminal measures other than B+, inspect the following points:
  - Open or short circuit in harness
  - Harness/pin clamp is loose or disconnected

## Investigate the GND system

1. Confirm that terminal sensor #4 is at 0 V.
- (1) If it is at 0 V, inspect the sensor. If necessary, replace the sensor.
- (2) If not at, 0 V, inspect the following points:
  - Open circuit in harness
  - Female terminal opening loose
  - Coupler (pin holder) damage
  - Pin discoloration (blackness)
  - Harness/pin clamp is lose or disconnected

## Thermistor Type (Intake Air Temperature and Engine Coolant Temperature Sensors)



X5U101WAC

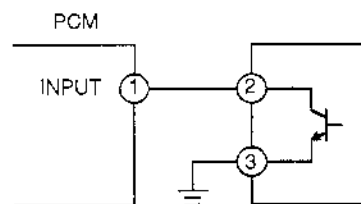
## Investigate the input signal system

1. When you get an unusual signal, measure the #1 PCM terminal voltage.
  - (1) If the #1 terminal voltage and the NGS monitor voltage are the same, proceed to the next step.
  - (2) If there is a difference of 0.5 V or more, check the following points concerning the PCM connector:
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected
2. When you get an unusual signal, measure the #2 sensor terminal voltage.
  - (1) If there is a 0.5 V or more difference between the sensor and NGS voltages, inspect the harness for open or short circuits.
  - (2) If the sensor and NGS voltages are the same, inspect the following points concerning the sensor connector. If there are no problems, proceed to next investigation below.
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected

## Investigate the GND system

1. Confirm that terminal sensor #3 is at 0 V.
- (1) If it is at 0 V, inspect the sensor. If necessary, replace the sensor.
- (2) If not, inspect the following points:
  - Open or short circuit in harness
  - Female terminal opening loose
  - Coupler (pin holder) damage
  - Pin discoloration (blackness)
  - Harness/pin clamp is loose or disconnected

## Vehicle Speed Sensor



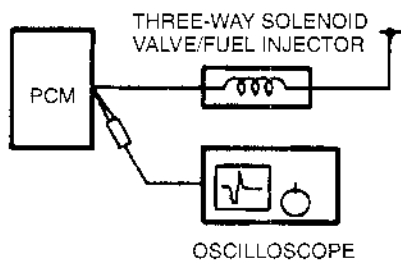
X5U101WAD

1. Measure the #1 PCM terminal voltage and confirm that it is at 0 V or 5 V when the ignition switch is at ON and the engine at idle.
  - (1) If it is at 0 V or 5 V, proceed to "Intermittent Diagnostic Test".
  - (2) If not, inspect the following points concerning the PCM connector. If there is no problems, proceed to next step.
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected

2. Measure the #2 sensor terminal voltage and confirm that it is at 0 V or 5 V when the ignition switch is at ON and the engine at idle.
  - (1) If it is at 0 V or 5 V, proceed to "Intermittent Diagnostic Test".
  - (2) If not, inspect the following points concerning the sensor connector. If there are no problems, proceed to next step.
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected
3. Confirm that the #3 terminal switch voltage is at 0 V.
  - (1) If it is at 0 V, inspect the sensor. If necessary, replace the sensor.
  - (2) If not at 0 V, inspect the following points:
    - Open circuit in harness
    - Female terminal opening loose
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin clamp is loose or disconnected.

## Inspection Using an Oscilloscope (Reference) Purpose

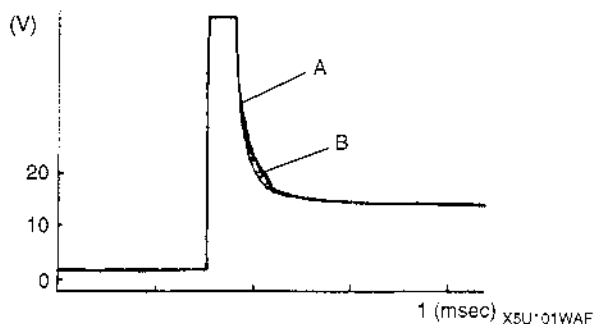
By using an oscilloscope, inspection such as a stuck solenoid valve is made possible without actually removing parts.



X5U101WAE

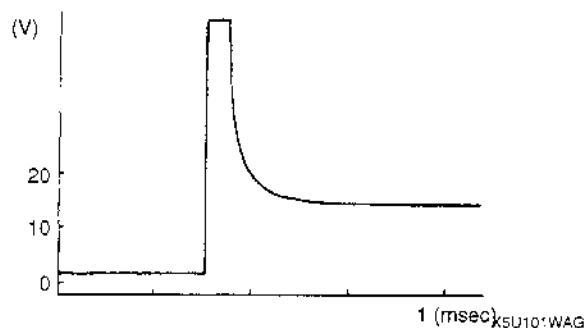
## When normal

Counter electromotive voltage A, generated when the three-way solenoid valve or the fuel injector is turned off from on, shows irregular convergence because induced electromotive voltage B, generated by the plunger return operation, is added to it.



## When plunger stuck

When the plunger is stuck, pulse convergence is smooth because no induced electromotive voltage B is generated.



## Fuel Tank Pressure, Graph Recording Procedure

1. After setting up the NGS tester for current vehicle, select "DIAGNOSTIC DATA LINK" and press the TRIGGER.

VEHICLE & ENGINE SELECTION  
**DIAGNOSTIC DATA LINK**  
 VIEW RECORDER AREAS  
 DIGITAL MEASUREMENT SYSTEM  
 GENERIC OBD II FUNCTIONS  
 SELECT ITEM AND PRESS TRIGGER TO START

X5U101WAI

2. Select, "PCM -- POWERTRAIN CONTROL MODULE" and press the TRIGGER.

PCM - POWERTRAIN CONTROL MODULE  
**ABS - ANTILOCK BRAKE MODULE**  
 CCM - CRUISE CONTROL MODULE  
 SELECT ITEM AND PRESS TRIGGER TO START

X5U101WAI

3. Select "PID/DATA MONITOR AND RECORD" and press the TRIGGER.

DIAGNOSTIC TEST MODE  
**PID / DATA MONITOR AND RECORD**  
 SIMULATION TEST  
 DIAGNOSTIC SUPPORT PROCEDURE  
 DIAGNOSTIC TROUBLE CODE LIBRARY  
 SELECT ITEM AND PRESS TRIGGER TO START

X5U101WAI

## TROUBLESHOOTING [ENGINE CONTROL]

4. Press Number 5 under CLEAR to clear previously selected PIDs.

**Note**

- PID screen will vary with different models.

PCM 03	1GR	A/C SW	B+2
	2GR	ALTF	BARO
	3GR	ALTT V	BARO V
TOTAL=0	4GR	ATFT V	BRK SW
	A/C RLY	B+	CDCV
<input type="button" value="CLEAR"/> <input type="button" value="START"/>			

X5U10:WAK

5. Turn the menu dial clockwise or counterclockwise to highlight CDCV and select by pressing the TRIGGER.

PCM 03	1GR	A/C SW	B+2
	2GR	ALTF	BARO
	3GR	ALTT V	BARO V
TOTAL=1	4GR	ATFT V	BRK SW
	A/C RLY	B+	* CDCV
<input type="button" value="CLEAR"/> <input type="button" value="START"/>			

X5U\*01WAL

6. Turn the menu dial clockwise or counterclockwise to highlight FTP and select by pressing the TRIGGER.

PCM 03	CHRG LMP	FANC	FTL V
	P SW	FANN	* FTP
	ECT	FHO2S	FTP V
TOTAL=2	ECT V	FHO2SH	IACV
	EGRBV	FP RLY	IAT
<input type="button" value="CLEAR"/> <input type="button" value="START"/>			

X5U10:WAM

7. PUSH Number 7 under START to view PIDs.

CDCV	OFF
FTP	0.1 Hg
PRESS TRIGGER TO CAPTURE DATA	

X5U101WAN

8. When you begin the drive mode PRESS TRIGGER to capture the data refer to the DRIVE MODE PROCEDURE.

**Note**

- Watch the CDCV PID. When the evaporative system is tested the display will change from OFF to ON. And when the test is complete the display will change back to OFF.

CDCV	OFF
FTP	0.1 Hg
CAPTURING DATA, PRESS TRIGGER TO SAVE	

X5U101WAO

9. When the monitor changes back to OFF wait a few seconds and press the TRIGGER to save the recorded information.
10. Select VIEW RECORDING then press the TRIGGER.

VIEW RECORDING
STORE RECORDING IN AREA 1
STORE RECORDING IN AREA 2
STORE RECORDING IN AREA 3
SELECT ITEM AND PRESS TRIGGER TO START

X5U101WAP

11. Select both PIDs by highlighting and pressing the TRIGGER.

* CDCV
* FTP
<input type="button" value="PRINT"/> <input type="button" value="CLEAR"/> <input type="button" value="GRAPH"/> <input type="button" value="TABLE"/>

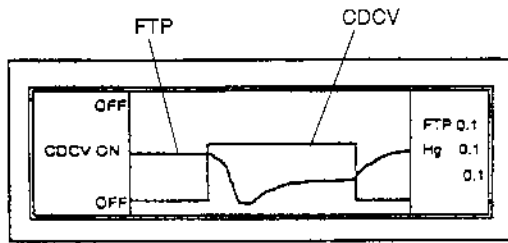
X5U101WAQ

12. Press the number key under GRAPH.

**Note**

- It will be necessary to press Number 8 key to advance the graph to the point where the CDCV is turned on.



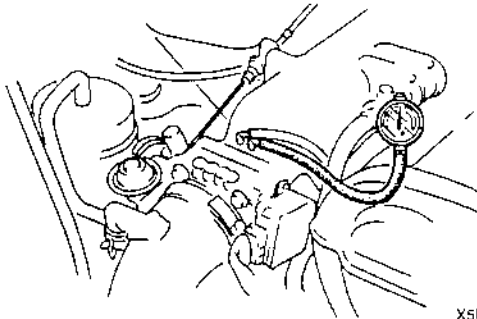


X5U101WAR

## ENGINE SYSTEM INSPECTION

### Intake Manifold Vacuum Inspection

1. Verify air intake hoses are installed properly.
2. Start the engine and run at idle.
3. Measure the intake manifold vacuum by using a vacuum gauge.



### Specification

**More than 60 kPa {450 mmHg, 18 inHg}**

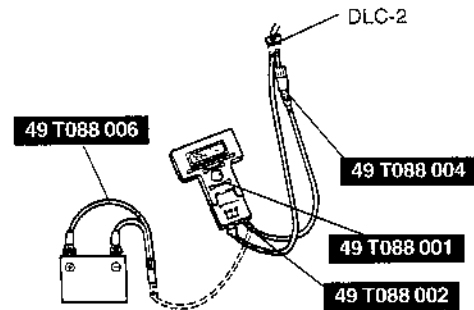
4. If not as specified, inspect following.
  - Air suction at:
    - Throttle body installation point
    - Intake manifold installation point
    - PCV valve installation point
  - Fuel injector insulator
  - Accelerator cable free play
  - Engine compression (Refer to section B, COMPRESSION INSPECTION.)

### Note

- Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.

### BAC Valve Operation Inspection

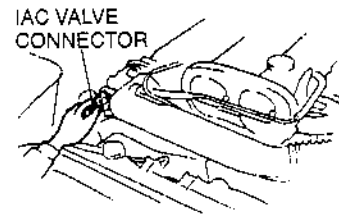
1. Connect the NGS tester to DLC-2.



2. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
3. Select "RPM" and press TRIGGER.
4. Verify that the engine is in cold condition, then start the engine.
5. Verify that the engine speed decreases as the engine warms up.
6. If the engine speed does not decrease or decreases slowly, inspect the water hose connected to the BAC valve for leakage and clogs.
7. If the water hose is okay, inspect the following.
  - Air valve
  - Idle air control valve

### Idle Air Control Inspection

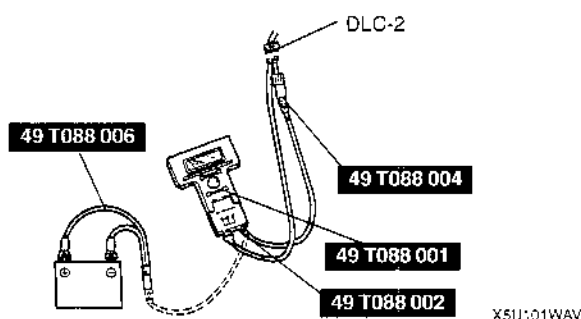
1. Start the engine and run it at idle.
2. Disconnect the IAC valve connector and verify that the engine rotation changes.



X5U101WAW

3. If the engine condition does not change, do as follows.

- (1) Connect the IAC valve connector.
- (2) Connect the NGS tester to DLC-2.



- (3) Verify that DTC P0506, P0507 or P1504 is not displayed. If DTC P0506, P0507 or P1504 is shown, carry out troubleshooting of the DTC P0506, P0507 or P1504.
- (4) Select the "SIMULATION TEST" function on the NGS display. Change the duty value of the IAC valve to 100% by using the "IAC V" and verify that the idle speed increases. If the idle speed does not change, inspect IAC valve air passage. Inspect for open or short circuit between IAC valve connector terminals and PCM connector terminals 3M and 3O.

4. Warm up the engine to normal operating temperature and run it at idle.

5. Turn the electrical loads on and verify that the engine speed is within the specification by using "PID/DATA MONITOR AND RECORD" function.

## Engine speed

Load condition	Idle-up speed (rpm)*1		
	MT	AT	
		N, P position	D range
E/L ON*2	750—850 (800 ± 50)	750—850 (800 ± 50)	700—800 (750 ± 50)
P/S ON*3			
A/C ON*4	950—1050 (1000 ± 50)		

\*1 : Excludes temporary idle speed drop just after the electrical loads (E/L) are turned on.

\*2 : Headlight is on, Fan switch (above 1st), Cooling fan are operating, Rear window defroster is on.

\*3 : Steering wheel is fully turned.

\*4 : A/C switch and fan switch are on.

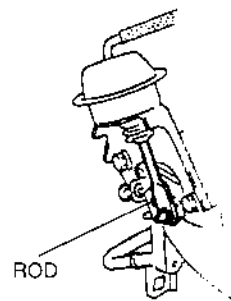
### Note

- Excludes temporary idle speed drop just after the electrical loads are turned on.

6. If not as specified, inspect the related switches and wiring harnesses.

## VICS Operation Inspection

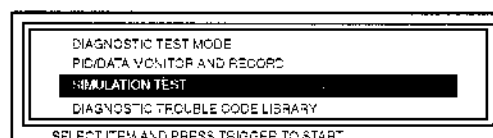
1. Start the engine.
2. Verify that the rod of the VICS shutter valve actuator is pulled.



X5U101WAW

3. If the rod is not pulled, do as follows.

- (1) Stop the engine.
- (2) Connect the NGS tester to DLC-2. (Refer to 01-40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION.)
- (3) Verify that diagnostic trouble code No. P1523 is not displayed. If code No. P1523 is shown, carry out troubleshooting of the code No. P1523. (Refer to 01-01A ENGINE ON-BOARD DIAGNOSIS, Diagnostic Trouble Code Inspection.)
- (4) If diagnostic trouble codes are not shown, do as follows.
  - ① Start the engine and run it at idle.
  - ② Select the SIMULATION TEST function on the NGS display.



X5U101WAX

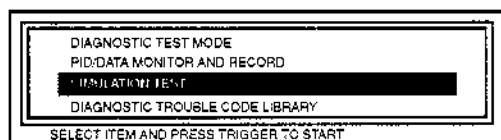
- ③ Turn the VICS solenoid valve from on to off by using the "VICS V" and inspect if operation sound of the solenoid valve is heard.
  - ④ If the operation sound is heard, inspect the following.
    - Loose or damaged vacuum hose and vacuum chamber
    - Shutter valve actuator (Refer to 01-13 SHUTTER VALVE ACTUATOR INSPECTION.)
  - ⑤ If the operation sound is not heard, inspect the following.
    - VICS solenoid valve (Refer to 01-13 VICS SOLENOID VALVE INSPECTION.)
4. Inspect the rod operation under the following conditions.

## Rod operation

Engine speed (rpm)	5250	
Shutter valve actuator	Not operate	Operate

5. If the rod operation is not as specified, do as follows.

- (1) Stop the engine.
- (2) Connect the NGS tester to DLC-2. (Refer to 01-40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION.)
- (3) Verify that diagnostic trouble code No. P1523 is not displayed. If code No. P1523 is shown, carry out troubleshooting of the code No. P1523. (Refer to 01-01A ENGINE ON-BOARD DIAGNOSIS [BP], Diagnostic Trouble Code Inspection.)
- (4) If diagnostic trouble codes are not shown, do as follows.
  - ① Start the engine and run it at idle.
  - ② Select the SIMULATION TEST function on the NGS display.



X5U101WAY

- ③ Turn the VICS solenoid valve from on to off by using the "VICS V" and inspect if operation sound of the solenoid valve is heard.
- ④ If the operation sound is heard, inspect the following.
  - Shutter valve actuator (Refer to 01-13 SHUTTER VALVE ACTUATOR INSPECTION [BP].)
- ⑤ If the operation sound is not heard, inspect the following.
  - VICS solenoid valve (Refer to 01-13 VICS SOLENOID VALVE INSPECTION [BP].)

## Note

- The shutter valve actuator rod extends for five seconds after the engine is started.

## Fuel Line Pressure Inspection

### Warning

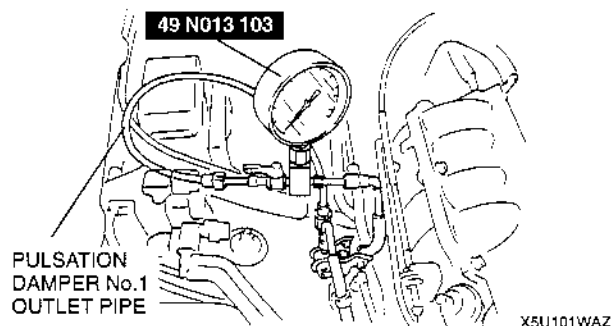
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01-14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.

3. Disconnect the fuel pipe on the pulsation damper No.1 outlet side. Set the **SST** between the pulsation damper No.1 and fuel distributor as shown in the figure. (Refer to 01-14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Removal Note.)

### Note

- Verify that a click is heard when the **SST** is pushed into the pulsation damper No.1



4. Pull the connector by hand and verify that it is installed securely. Visually inspect that the tabs of the retainer are securely fitted into the connector.
5. Connect the negative battery cable.
6. Start the engine and let it idle. Measure the fuel line pressure.

### Fuel line pressure

**370—420 kPa {3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}**

7. If not as specified, refer to 01-14 PRESSURE REGULATOR INSPECTION, Fuel Line Pressure Inspection.
8. Disconnect the **SST** and connect the fuel pipe to the pulsation damper No.1. (Refer to 01-14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Installation Note.)
9. Complete the "AFTER REPAIR PROCEDURE" (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

## Fuel Hold Pressure Inspection

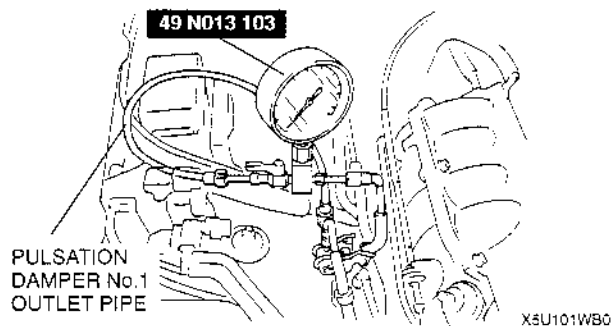
### Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01-14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Disconnect the fuel pipe on the pulsation damper No.1 outlet side. Set the **SST** between the pulsation damper No.1 and fuel distributor as shown in the figure. (Refer to 01-14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Removal Note.)

## Note

- Verify that a click is heard when the **SST** is pushed into the pulsation damper No.1.



X5U101WB2

## Specification

### Battery positive voltage (Ignition switch ON)

- Pull the connector by hand and verify that it is installed securely. Visually inspect that the tabs of the retainer are securely fitted into the connector.
- Connect the negative battery cable.
- Verify that vehicles for AT is at N range and MT is at neutral position, then start the engine.
- Observe the fuel pressure gauge indicator while heavy acceleration.
- Verify that the fuel pressure holds steady within specification during the test.

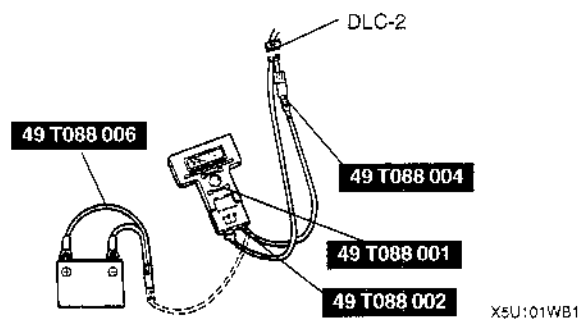
## Fuel hold pressure

370—420 kPa {3.7—4.3 kgf/cm<sup>2</sup>, 53—61 psi}

- Disconnect the **SST** and connect the fuel pipe to the pulsation damper No.1. (Refer to 01-14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Installation Note.)
- If not as specified, refer to 01-14 PRESSURE REGULATOR INSPECTION, Fuel Hold Pressure Inspection.

## Fuel Pump Operation Inspection

- Connect the NGS tester to the DLC-2.



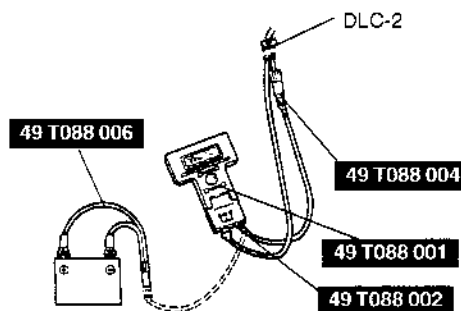
- Remove the fuel filler cap.
- Turn the ignition switch to ON.
- Select the "SIMULATION TEST" function on the NGS display. Turn the fuel pump relay from OFF to ON by using the "F/P RLY" and inspect if the operation sound is heard.
- If no operation sound is heard, measure the voltage at harness side fuel pump connector terminal B.

- If the voltage is as specified, inspect the following.
  - Fuel pump continuity
  - Fuel pump ground
  - Wiring harness between fuel pump relay and PCM terminal 3N

- If not as specified, inspect the following.
  - Fuel pump relay
  - Wiring harness and connector
    - Between main relay and fuel pump relay
    - Between fuel pump relay and fuel pump

## Fuel Pump Control Inspection

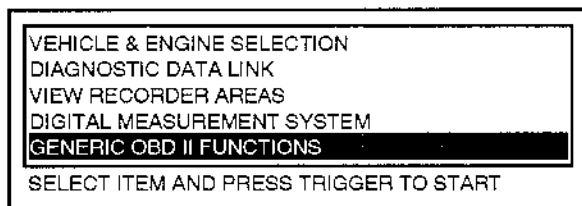
- Connect the NGS tester to DLC-2.



- Turn the ignition switch to ON.
- Select "SIMULATION TEST" and press TRIGGER.
- Select "IG ON TEST" and press TRIGGER.
- Select "FP RLY" and press TRIGGER.
- Press START.
- Turn the fuel pump relay from off to on and inspect if operation sound of the fuel pump relay is heard.
- If the operation sound is not heard, inspect the fuel pump relay.
- If the fuel pump relay is normal, inspect the following.
  - Wiring harnesses and connectors {Main relay—fuel pump relay—PCM}

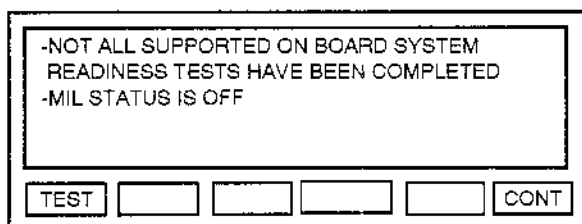
## Evaporative Emission Control System Inspection Whole system inspection

1. Disconnect the vacuum hose between the purge solenoid valve and the catch tank from the purge solenoid valve.
2. Insert hose on the vacuum pump.
3. Connect the NGS tester to the DLC-2.
4. Turn the ignition switch to ON.
5. Select "GENERIC OBD II FUNCTIONS" and press the TRIGGER.



X5U101WB6

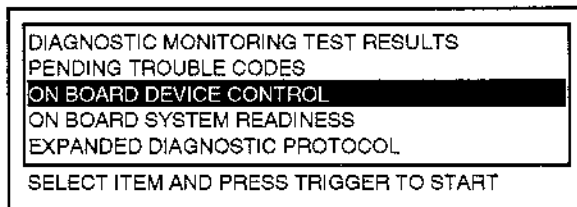
6. Press Number 8 under CONT to continue the GENERIC OBD II FUNCTIONS.



X5U101WEE

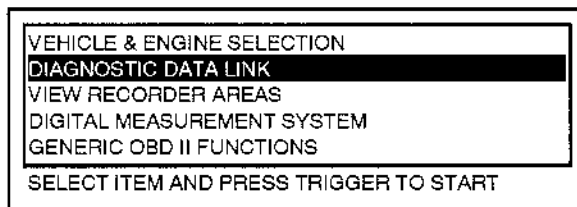
### Note

- The following conditions cancel the "ON BOARD DEVICE CONTROL" function:
    1. Ten minutes after the "TRIGGER" on the NGS tester is depressed.
    2. When engine is started.
    3. If the pressure in the evaporative emission control system exceeds 6.43 kPa {48.26 mmHg, 1.9 inHg}.
  - Therefore, the following tests, step 7 through 15, should be conducted under the following conditions.
    1. Within 10 minutes after TRIGGER on NGS tester is depressed.
    2. Without starting the engine.
7. Turn the menu dial clockwise or counterclockwise to highlight the "ON BOARD DEVICE CONTROL" and press the TRIGGER.



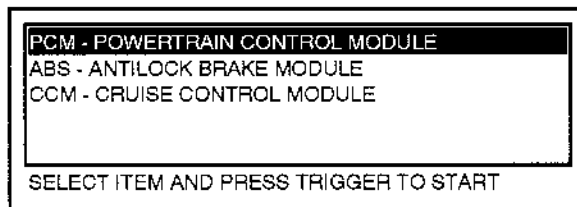
X5U101WB7

8. Press CANCEL two times.
9. Select "DIAGNOSTIC DATA LINK" and press the TRIGGER.



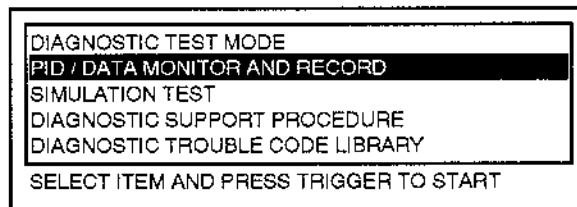
X5U101WBB

10. Select "PCM - POWERTRAIN CONTROL MODULE" and press the TRIGGER.



X5U101WB9

11. Select "PID/DATA MONITOR AND RECORD" and press the TRIGGER.



X5U101WBA

12. Press Number 5 under CLEAR to clear previously selected PIDs.

## TROUBLESHOOTING [ENGINE CONTROL]

PCM 00	1GR	A/C SW	B+2
	2GR	ALTF	BARO
	3GR	ALTT V	BARO V
TOTAL=00	4GR	ATFT V	BRK SW
	A/C RLY	B+	CDCV
<input type="button" value="CLEAR"/>			

X5U101WBB

13. Turn the menu dial clockwise or counterclockwise to highlight FTP and press TRIGGER.

PCM 01	CHRG LMP	FANC	FTL V
	P SW	FANN	* FTP
	ECT	FHO2S	FTP V
TOTAL=01	ECT V	FHO2SH	IACV
	EGRBV	FP RLY	IAT
<input type="button" value="CLEAR"/> <input type="button" value="START"/>			

X5U101WBC

14. Press Number 7 under STRAT to view PIDs.

FTP      0.0 Hg	IG ON      0.0 - 1.0
	IDLE      0.0 - 1.0
PRESS TRIGGER TO CAPTURE DATA	

X5U101WBD

15. Apply vacuum to 1.7 kPa {13 mmHg, 0.5 inHg} and they should remain at the specified readings for a minimum of 2 minutes.

FTP      -0.5 Hg	IG ON      0.0 - 1.0
	IDLE      0.0 - 1.0
PRESS TRIGGER TO CAPTURE DATA	

X5U101WBE

16. Return to the Diagnostic Trouble Code Inspection Procedures, and answer questions.

### Inspection from charcoal canister to fuel tank

1. Inspect for loose and wrongly connected hoses between the charcoal canister and the fuel tank refer to "01-16 Evaporative Emission Control System Components Location".
2. Disconnect the vacuum hose between the charcoal canister and the tank pressure control valve from the charcoal canister.
3. Insert hose on the vacuum pump.
4. Connect the NGS tester to DLC-2.
5. Turn the ignition switch to ON.
6. Select "GENERIC OBD II FUNCTIONS" and press the TRIGGER.

VEHICLE & ENGINE SELECTION DIAGNOSTIC DATA LINK VIEW RECORDER AREAS DIGITAL MEASUREMENT SYSTEM <b>GENERIC OBD II FUNCTIONS</b> SELECT ITEM AND PRESS TRIGGER TO START
--

X5U101WBG

7. Press Number 8 under CONT to continue the GENERIC OBD II FUNCTIONS.

-NOT ALL SUPPORTED ON BOARD SYSTEM READINESS TESTS HAVE BEEN COMPLETED -MIL STATUS IS OFF
<input type="button" value="TEST"/> <input type="button" value="CONT"/>

X5U101WBH

### Note

- The following conditions cancel the "ON BOARD DEVICE CONTROL" function:
  1. Ten minutes after the TRIGGER on the NGS tester is depressed.
  2. When engine is started.
  3. If the pressure in the evaporative emission control system exceeds 6.43 kPa {48.26 mmHg, 1.9 inHg}.
- Therefore, the following tests, steps 8 through 16, should be conducted under the following conditions.
  1. Within 10 minutes after TRIGGER on NGS tester is depressed.
  2. Ignition switch is ON, but is not started engine.

## TROUBLESHOOTING [ENGINE CONTROL]

8. Turn the menu dial clockwise or counterclockwise to highlight the "ON BOARD DEVICE CONTROL" and press the TRIGGER.

DIAGNOSTIC MONITORING TEST RESULTS	
PENDING TROUBLE CODES	
ON BOARD DEVICE CONTROL	
ON BOARD SYSTEM READINESS	
EXPANDED DIAGNOSTIC PROTOCOL	
SELECT ITEM AND PRESS TRIGGER TO START	

X5U101WBI

9. Press CANCEL two times.  
10. Select "DIAGNOSTIC DATA LINK" and press the TRIGGER.

VEHICLE & ENGINE SELECTION	
DIAGNOSTIC DATA LINK	
VIEW RECORDER AREAS	
DIGITAL MEASUREMENT SYSTEM	
GENERIC OBD II FUNCTIONS	
SELECT ITEM AND PRESS TRIGGER TO START	

X5U101WBJ

11. Select "PCM - POWERTRAIN CONTROL MODULE" and press the TRIGGER.

PCM - POWERTRAIN CONTROL MODULE	
ABS - ANTILOCK BRAKE MODULE	
CCM - CRUISE CONTROL MODULE	
SELECT ITEM AND PRESS TRIGGER TO START	

X5U101WBK

12. Select "PID/DATA MONITOR AND RECORD" and press the TRIGGER.

DIAGNOSTIC TEST MODE	
PID / DATA MONITOR AND RECORD	
SIMULATION TEST	
DIAGNOSTIC SUPPORT PROCEDURE	
DIAGNOSTIC TROUBLE CODE LIBRARY	
SELECT ITEM AND PRESS TRIGGER TO START	

X5U101WSL

13. Press Number 5 under CLEAR to clear previously selected PIDs.

PCM 00	1GR	A/C SW	B+2
	2GR	ALTF	BARO
	3GR	ALTT V	BARO V
	4GR	ATFT V	BRK SW
	A/C RLY	B+	CDCV
TOTAL=00			
[ ] [ ] CLEAR [ ] [ ] [ ]			

X5U101WBM

14. Turn the menu dial clockwise or counterclockwise to highlight the "FTP" and press TRIGGER.

PCM 01	CHRG LMP	FANC	FTL V
	P SW	FANN	* FTP
	ECT	FHO2S	FTP V
	ECT V	FHO2SH	IACV
	EGRBV	FP RLY	IAT
TOTAL=01			
[ ] [ ] CLEAR [ ] START [ ]			

X5U101WBN

15. Press the Number 7 under STRAT to view PIDs.

FTP	0.0 Hg	IG ON	0.0 - 1.0
		IDLE	0.0 - 1.0
PRESS TRIGGER TO CAPTURE DATA			

X5U101WBO

16. Apply vacuum to 1.7 kPa {13 mmHg, 0.5 inHg} and they should remain at the specified readings for a minimum of 2 minutes.

FTP	-0.5 Hg	IG ON	0.0 - 1.0
		IDLE	0.0 - 1.0
PRESS TRIGGER TO CAPTURE DATA			

X5U101WBP

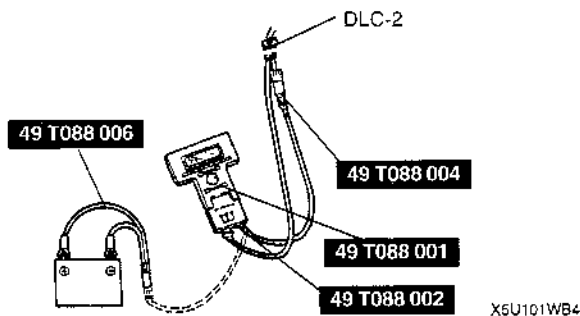
17. Return to the Diagnostic Trouble Code Inspection Procedures, and answer questions.

## Inspection from charcoal canister to purge solenoid valve

1. Inspect for loose and wrongly connected hoses between the charcoal canister and the purge solenoid valve refer to "01-16 Evaporative Emission Control System Components Location".
2. Disconnect the vacuum hose between the charcoal canister and the catch tank from the charcoal canister.
3. Insert hose on the vacuum pump.
4. Apply vacuum to 3.3 kPa {25 mmHg, 1.0 inHg} and they should remain at the specified readings for a minimum of 2 minutes.
5. Return to the Diagnostic Trouble Code Inspection Procedures, and answer questions.

## Purge Control Inspection

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put a finger to the purge solenoid valve and verify that there is no vacuum applied when the engine is cold.
4. If there is a vacuum, inspect the following.
  - Inspect wiring harness between purge solenoid valve and PCM terminal
  - Inspect purge solenoid valve
5. Warm up the engine to the normal operating temperature.
6. Stop the engine.
7. Connect the NGS tester to DLC-2.

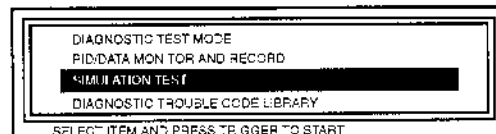


8. Turn the ignition switch to ON.
9. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
10. Select "ECT" and press TRIGGER, then verify that the engine coolant temperature is above 60 °C {140 °F}.
11. Press START.
12. If the NGS tester indicates below 60 °C {140 °F}, inspect the engine coolant temperature sensor.
13. Select "SIMULATION TEST" and press TRIGGER.
14. Select "PRG V" and press TRIGGER.
15. Press START.
16. Increase the duty valve of the purge solenoid valve to 50% and inspect if the operation sound of the valve is heard.
  - (1) If the operation sound is heard, inspect the loose or damaged vacuum hose. (Intake manifold—purge solenoid valve—charcoal canister)

- (2) If the operation sound is not heard, inspect the purge solenoid valve.

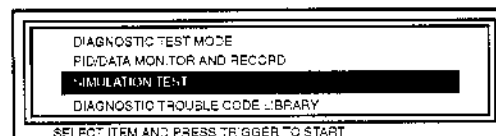
## EGR Control Inspection

1. Verify that EGR valve operation (initial operation) sound is heard when the ignition switch is turned to ON.
2. If the operation sound is not heard, connect the NGS tester to DLC-2 and verify that the diagnostic trouble code No. P1496, P1497, P1498 or P1499 is shown. Carry out troubleshooting of code No. P1496, P1497, P1498 or P1499.
3. Start the engine and run it at idle.
4. Select the SIMULATION TEST function on the NGS display.



X5U101WBS

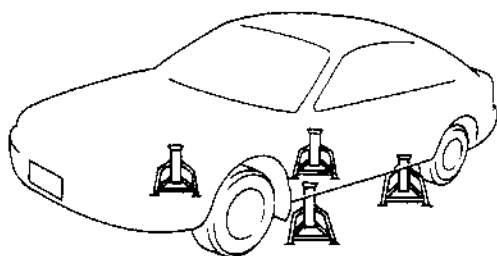
5. Increase the step value of EGR valve from 0 to 40 by using "SEGRP". Operate the EGR valve and inspect if the engine speed becomes unstable or the engine stalls.
6. If the engine speed will not change, do as follows.
  - (1) Stop the engine.
  - (2) Remove the EGR valve.
  - (3) Connect the EGR valve connector.
  - (4) Turn the ignition switch to ON.
  - (5) Select the SIMULATION TEST function on the NGS display.



X5U101WBT

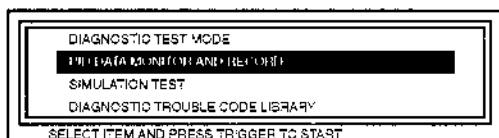
- (6) Increase the step value of EGR valve from 0 to 40 by using "SEGR P". Inspect the EGR operation.
  - ① If the EGR valve is operated, clean the EGR valve and reinspect from step 3.
  - ② If the EGR valve will not operate, replace the EGR valve and reinspect from step 3.
7. Warm up the engine to normal operating temperature.
8. On level ground, jack up the vehicle and support it evenly on safety stands or set the vehicle on the chassis roller.





X5U101WBU

9. Select the PID/DATA MONITOR function on the NGS display.



X5U101WBU

10. Select the following items.
  - SEGRP
  - RPM
  - VS
  - TP V
  - ECT V
11. Let the vehicle idle and verify that the SEGRP value is 0.
12. Depress the accelerator pedal and verify that the SEGRP value is increased.
13. If the SEGRP value will not increased, do as follows.
  - (1) Verify that the TP V value is increased when the accelerator pedal is depressed.
  - (2) Verify that the VS is increased when the tires are rotated.
  - (3) Verify that the ECT V is within the specified value when the engine warms up. (Refer to 01-40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION.)
  - (4) If not as specified, inspect the following.
    - Throttle position sensor
    - Vehicle speed sensor
    - Engine coolant temperature sensor
    - Wiring harnesses and connectors (PCM—throttle position sensor, PCM—vehicle speed sensor, PCM—engine coolant temperature sensor)
14. Stop the vehicle and verify that the SEGRP is returned 0.

## Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition switch is turned to ON and off.
2. If there is no operation sound, inspect the following.
  - Main relay
  - Harness and connector between ignition switch and main relay
  - Main relay ground

## Ignition Timing Control Inspection

1. Connect a timing light to the engine.
2. Crank the engine.
3. Verify that the timing mark (yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

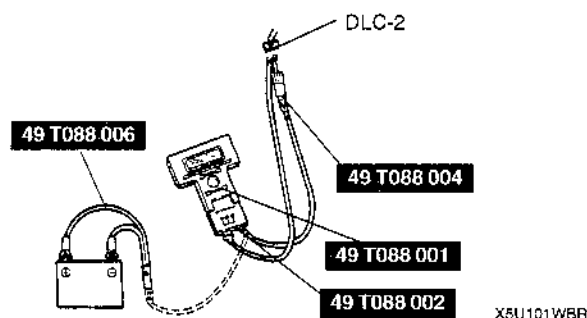
## Specification

BTDC 9°—11° (10° ± 1°)

4. Increase engine speed and verify ignition timing is advanced.

## A/C Cut Control Inspection

1. Start the engine.
2. Turn the A/C switch and fan switch on.
3. Verify that the A/C compressor magnet clutch actuates.
4. If it does not actuate, go to symptom troubleshooting No.23 "A/C does not work".
5. Fully open the throttle valve and verify that the A/C compressor magnet clutch does not actuate for 3—6 seconds.
6. If it actuates, inspect the following.
  - (1) Connect the NGS tester to DLC-2.



X5U101WBR

- (2) Turn the A/C switch off.
- (3) Turn the ignition switch to ON.
- (4) Select "SIMULATION TEST" and press TRIGGER.
- (5) Select "IG ON TEST" and press TRIGGER.
- (6) Select "A/C RLY" and press TRIGGER.
- (7) Press START.
- (8) Turn the A/C relay from off to on and inspect if the operation sound of the relay is heard.
- (9) If the operation sound is heard, inspect TP V PID.
- (10) If the operation sound is not heard, inspect following.
  - A/C relay
  - Open or short to ground circuit in wiring harness and connectors (Main relay—A/C relay—PCM terminal 1S.)
  - A/C related parts

## Cooling Fan Control System Inspection

## Cooling fan operation

Engine condition	Cooling fan relay	Condenser fan relay
Engine coolant temperature below 97 °C (207 °F)	OFF	OFF
Engine coolant temperature above 97 °C (207 °F)	ON	OFF
Engine coolant temperature above 108 °C (226 °F)	ON	OFF
Air conditioning switch ON	ON	ON
Engine coolant temperature sensor malfunction	ON	ON

## Cooling fan

1. Verify the engine is cold.
2. Turn the ignition switch to ON.
3. Verify the cooling fan is not operating.
4. If the cooling fan is operating:
  - (1) Connect the NGS tester to DLC-2.
  - (2) Select the "SIMULATION TEST". Then, select "FAN2" in "IG ON TEST".
  - (3) Send verify "OFF" and the cooling fan is OFF.
  - (4) If the cooling fan is ON inspect:
    - Cooling fan relay stuck in closed position.
    - Short to ground circuit between cooling fan relay and PCM terminal R.
    - Short to power in circuit between cooling fan relay.
    - DTCs for ECT sensor.
    - P0117, P0118, P0125
  - (5) If the cooling fan is OFF, inspect the following.
    - Short to ground circuit between A/C switch and PCM terminal P.
    - DTC for ECT sensor.
    - P0117, P0118, P0125
5. Start the engine.
6. Verify that the cooling fan is operating when engine is hot.
7. If the cooling fan does not operate, do as follows.
  - (1) Connect the **SSTs** (NGS tester) to the DLC-2.
  - (2) Select "SIMULATION TEST" mode.
  - (3) Select "IG ON TEST" mode.
  - (4) Select "FAN2".
  - (5) Press "Start".
  - (6) If the cooling fan operates, inspect the ECT sensor DTCs.
    - P0117, P0118, P0125
  - (7) If the cooling fan does not operate, do as follows.
    - ① Select "FAN2". Operate cooling fan by selecting "Start", and verify that operation sound is heard from the cooling fan relay.
    - ② If the operation sound is heard, inspect the wiring harnesses and connectors and cooling fan motor.
    - ③ If operational sound is heard, inspect cooling fan relay and open circuit in wiring harnesses and connectors.
8. Turn the A/C switch and fan switch on.
9. Verify the cooling fan is operating.
10. If fan does not operate, inspect A/C system.

## Condenser fan relay

1. Verify that A/C switch and fan switch are off.
2. Start the engine and let it idle.
3. Verify that the condenser fan is not operating.
4. If condenser fan is operating, inspect:
  - Condenser fan relay for stuck in closed position
  - Short to power in circuit between condenser fan relay and condenser fan
  - Short to ground in circuit between A/C pressure switch and PCM terminal 1P
  - Short to ground circuit between condenser fan relay and PCM terminal I (short circuit)
5. Turn the A/C switch and fan switch on.
6. Verify that the condenser fan is operating and operating sound of A/C compressor magnetic clutch is heard.
7. Turn the A/C switch and fan switch off.
8. If the condenser fan does not operate but operating sound of A/C compressor magnetic clutch is heard, inspect as follows:
  - Open circuit between ignition switch and condenser fan relay
  - Open circuit between battery and condenser fan relay
  - Open circuit between condenser fan relay and PCM terminal 1I
  - Open circuit between condenser fan relay and condenser fan motor or fan motor ground
  - Condenser fan relay stuck open
  - Condenser fan motor
9. If both condenser fan and A/C compressor do not operate, inspect:
  - TP V PID
  - A/C system

## TROUBLESHOOTING [ENGINE CONTROL]

### Spark Test

1. Disconnect the negative battery cable.
2. Disconnect the fuel pump relay connector.
3. Verify that each high-tension lead and connector is connected properly.
4. Inspect the ignition system in the following procedure.

### Warning

- **High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.**

STEP	INSPECTION		ACTION
1	Remove high-tension lead from spark plug. Hold high-tension lead with installed pliers 5—10 mm {0.20—0.39 in} from ground. Turn ignition switch to START and verify that there is a strong blue spark. (Inspect each cylinder)	Yes	Ignition system is okay.
		No	If some cylinders do not spark, go to step 2. If all cylinders do not spark, go to step 3.
2	Is high-tension lead resistance correct?	Yes	Inspect for crack or damage of high-tension lead and ignition coil.
		No	Replace the high-tension lead.
3	Does PCM or ignition coil connector have poor connection?	Yes	Repair or replace connector.
		No	Go to next step.
4	Is ignition coil winding resistance okay?	Yes	Go to next step.
		No	Replace ignition coil.
5	Are following parts okay? • Crankshaft position sensor and crankshaft pulley also, inspect gap • PCM terminal 3G/3H voltage	Yes	Inspect for open or short in wiring harness and connectors of CKP sensor.
		No	Repair or replace.

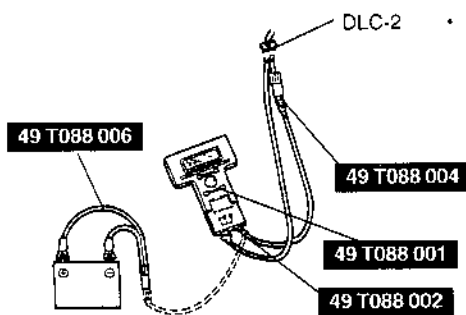
### Fuel Injector Operation Inspection

STEP	INSPECTION		ACTION
1	While cranking engine, inspect for fuel injector operation sound at each cylinder by using a soundscope. Is operation sound heard?	Yes	Fuel injector operation is okay.
		No	If operation sound is not heard from all cylinders, go to step 2. If operation sound is not heard from some cylinders, go to step 3.
2	Carry out main relay operation. Is main relay operation normal?	Yes	Inspect following: • Fuel injector power system related wiring harnesses and connectors • PCM connectors • PCM terminal voltage • Fuel injector ground and related wiring harness and connectors
		No	Repair or replace.
3	Change fuel injector connector of not operating fuel injector and operating fuel injector. Is operation sound heard?	Yes	Go to next step.
		No	Replace the fuel injector.
4	Are wiring harnesses and connectors of operating fuel injector okay? (Operating or not operating)	Yes	Repair or replace.
		No	Inspect PCM terminal voltage fuel injector signal.

## TROUBLESHOOTING [ENGINE CONTROL]

### Fuel Cut Control Inspection

1. Warm up the engine and let it idle.
2. Turn off the electrical loads and A/C switch.
3. Connect the NGS tester to DLC-2.



4. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
5. Select "RPM" and "INJ". Then, press TRIGGER.
6. Press START.
7. Monitor both PIDs while performing the following steps:
  - (1) Depress the accelerator pedal and increase the engine speed to 2,500 rpm.
  - (2) Release the accelerator pedal (brake pedal is not depressed) and verify that the fuel injector duration time is 0 msec., and 2—5 msec. when the engine speed drops below 1,000 rpm.

## 01-01C TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

## CRUISE CONTROL SYSTEM ON-BOARD

<b>DIAGNOSIS</b> .....	<b>01-01C-1</b>
Outline .....	<b>01-01C-1</b>
Inspection Order .....	<b>01-01C-1</b>
Inspection of Diagnostic Trouble Codes for Operation Mode .....	<b>01-01C-1</b>

Reading DTCs Procedure .....	<b>01-01C-2</b>
Inspection of Diagnostic Trouble Codes for Condition Detection Mode .....	<b>01-01C-7</b>
Reading DTCs Procedure .....	<b>01-01C-7</b>

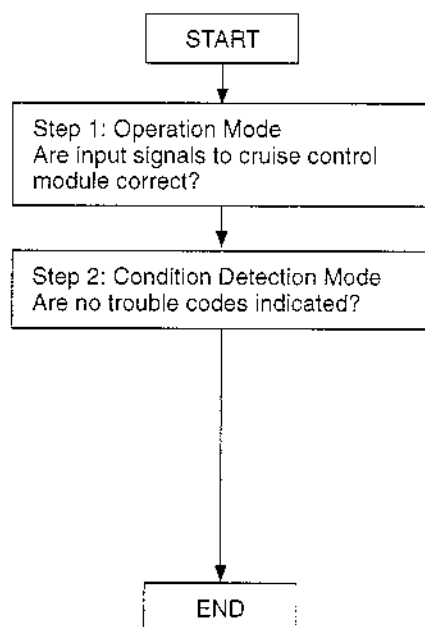
## CRUISE CONTROL SYSTEM ON-BOARD DIAGNOSIS

XSU101:W9A

## Outline

- There are two on-board diagnostic functions:  
Operation Mode, which inspects for and indicates correct operation of the input signals to the control module, and Condition Detection Mode, which indicates troubles in the system
- The two functions can be done by using either of the following methods:
  - Verifying the flashing pattern of the cruise set indicator light in the instrument cluster.
  - Verifying the output of the data link connector by using the **SST** (NGS set).

## Inspection Order



XSU101:WV0

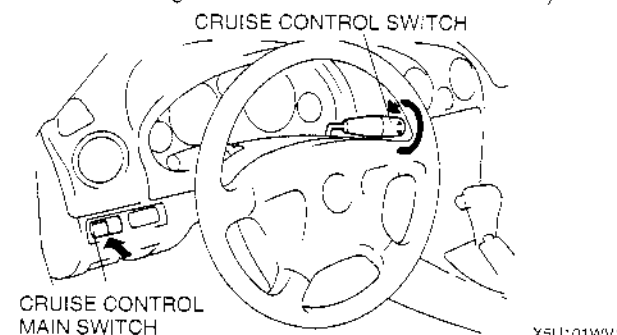
## Inspection of Diagnostic Trouble Codes for Operation Mode

## Note

- If an Operation Mode is not indicated, the following may be the cause of the malfunction.
  - Cruise control switch (RESUME/ACCEL switch)
  - Cruise control main switch
  - Cruise control module
  - Open or short circuit in wiring harness

## Using the cruise set indicator light

- Turn the ignition switch to ON.
- Verify that the cruise control main switch is off.
- Turn and hold the RESUME/ACCEL switch on then turn on the cruise control main switch to activate system inspection. (The cruise set indicator light will illuminate for **3 seconds**.)



- Operate each switch as described in the operation code list and note the operation code list pattern. If the cruise set indicator light does not flash, inspect the corresponding system area.
- The operation mode is canceled by turning the ignition switch to LOCK or turning off the cruise control main switch.

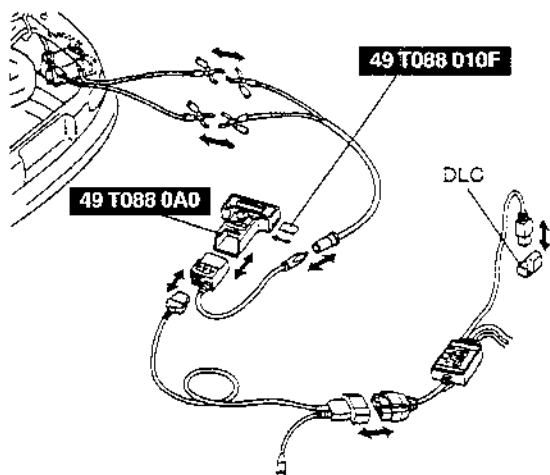
## TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

### Using the SST (NGS set) New generation star (NGS) tester hookup procedure

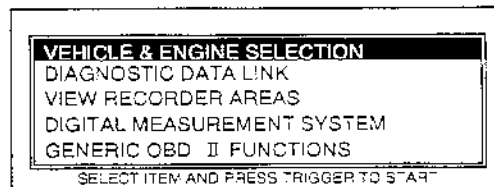
#### Note

- Verify that ignition switch is at LOCK.

1. Insert the interface module and program card into the **SST** (NGS tester) control unit.
2. Plug the NGS OBD II adapter into the interface module and the connector into the data link connector (DLC) located in the engine compartment via the Super MECS Adapter.
3. Plug the **SST** (NGS tester) power cable into the cigarette lighter or use Battery Hookup Adapter.

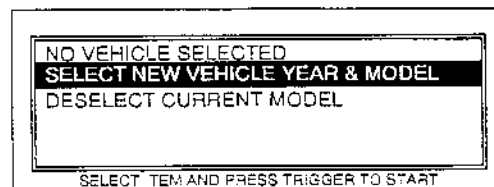


X5U101WV2



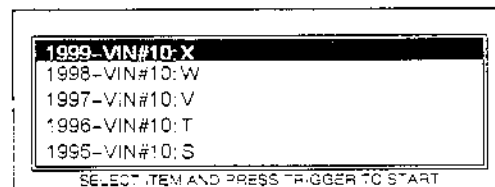
X5U101WV3

3. Move the cursor to **SELECT NEW VEHICLE YEAR & MODEL**. Press TRIGGER to enter this selection.



X5U101WV4

4. Move the cursor to **1999 — VIN # 10:X**. Press TRIGGER to enter this selection.



X5U101WV5

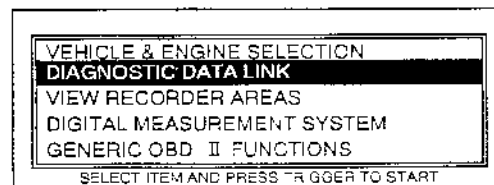
### Reading DTCs Procedure

#### Note

- In case the OBD test is performed under the following conditions or NGS tester isn't operated properly, **NO CODES RECEIVED** may be indicated even if the cruise control module sends any DTCs.
  1. Open or short circuit in wiring harness connected with the terminal FSC of the data link connector
  2. Poor positive battery voltage

1. Perform the necessary vehicle preparation and visual inspection. Hookup the **SST** (NGS tester) to the vehicle. (Refer to Using the **SST** (NGS set), New generation star (NGS) tester hookup procedure.)
2. Move the cursor to **VEHICLE & ENGINE SELECTION** in the main menu screen. Press TRIGGER to enter this selection.

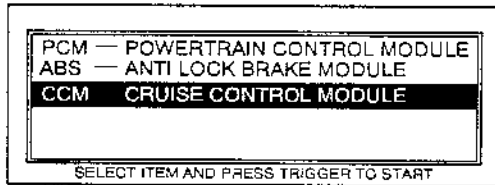
5. Move the cursor to appropriate model. Press TRIGGER to enter this selection.
6. The vehicle selection screen showing the selected vehicle will be displayed. Move the cursor to the vehicle selected. Press TRIGGER to enter this selection.
7. Move the cursor to **DIAGNOSTIC DATA LINK** in the main menu screen. Press TRIGGER to enter this selection.



X5U101WV6

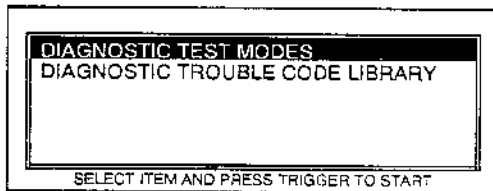
# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

- Move the cursor to **CCM — CRUISE CONTROL MODULE**. Press TRIGGER to enter this selection.



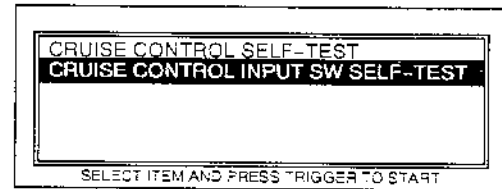
X5U101WV7

- Move the cursor to **DIAGNOSTIC TEST MODES**. Press TRIGGER to enter this selection.



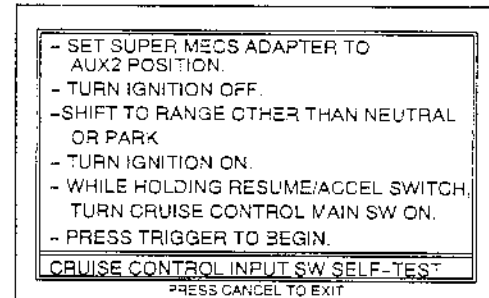
X5U101WV8

- Move the cursor to **CRUISE CONTROL INPUT SW SELF-TEST**. Press TRIGGER to enter this selection.



X5U101WV9

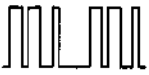




- Press the START button.
- Follow the operating instructions from the menu.



X5U101WVA

- Operate each switch as described in the operation code list and note the operation code pattern. If a diagnostic trouble code is not indicated, inspect the corresponding system area.
- Remove the **SST** (NGS set).
- The Operation Mode is canceled by turning the ignition switch to LOCK or turning off the cruise control main switch.

## Operation code list

Operation		DTC	Output pattern	Display on the NGS	Diagnosed circuit	
Turn SET/COAST switch on		21	 X5U101WVB	SET/COAST SW-PRESS	Cruise control switch (SET/COAST switch)	
Turn RESUME/ACCEL switch on		22	 X5U101WVC	RESUME/ACCEL SW-PRESS	Cruise control switch (RESUME/ACCEL switch)	
Depress brake pedal		31	 X5U101WVD	BRAKE PEDAL-DEPRESS	Brake switch	
AT	Shift selector lever to P or N range	35	 X5U101WVE	P OR N RANGE/NEUTRAL POSITION-SHIFT	AT	Transmission range switch
MT	Depress clutch pedal				MT	Clutch switch
Drive vehicle above 40 km/h {25 mph}		37	 X5U101WVF	VEHICLE SPEED-ABOVE 40 KM/H (25 MPH)	Vehicle speed sensor	

# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

## Inspection of diagnostic trouble codes

DTC 21		CRUISE CONTROL SWITCH (SET/COAST SWITCH)		
DETECTION CONDITION		Resistance detected between terminal N and ground is other than 240 Ω.		
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>• Cruise control module malfunction</li><li>• Cruise control switch (wiper lever) malfunction</li></ul>		
STEP	INSPECTION		ACTION	
—	Remove lower panel. Turn ignition switch to ON. Turn cruise control main switch on. Turn SET/COAST switch on. Is voltage at terminal AE of combination switch connector <b>approximately 1.5 V</b> ?		Yes	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
			No	Replace wiper lever. ➤ 09-18 COMBINATION SWITCH DISASSEMBLY/ASSEMBLY

COMBINATION SWITCH CONNECTOR

X5U1C:WVG


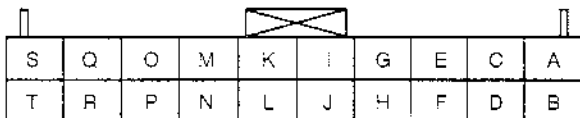
X5U1C:WVG

DTC 22		CRUISE CONTROL SWITCH (RESUME/ACCEL SWITCH)	
DETECTION CONDITION		Resistance detected between terminal N and ground is other than 910 $\Omega$ .	
POSSIBLE CAUSE		Cruise control module malfunction	
STEP	INSPECTION		ACTION
—	—		Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION

DTC 31		BRAKE SWITCH	
DETECTION CONDITION		Voltage detected at terminal M is not approximately 12 V or voltage detected at terminal O is not approximately 0 V.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>• Burnt STOP 15 A fuse</li> <li>• Cruise control module malfunction</li> <li>• Brake switch malfunction</li> <li>• Malfunction in wiring harness between STOP 15 A fuse and brake switch</li> <li>• Malfunction in wiring harness between cruise control module and brake switch</li> </ul>	
STEP	INSPECTION		ACTION
1	Does brake light illuminate when brake pedal is depressed?	Yes	Go to step 6.
		No	Go to next step.
2	Is STOP 15 A fuse okay?	Yes	Go to next step.
		No	Replace fuse after checking and repairing wiring harness.
3	Depress brake pedal. Is voltage at terminal 1B of brake switch connector <b>approximately 12 V</b> ?	Yes	Go to step 5.
		No	Go to next step.
4	Is voltage at terminal 1A of brake switch connector <b>approximately 12 V</b> ?	Yes	Replace brake switch. ➤ 04-11 BRAKE PEDAL REMOVAL/INSTALLATION
		No	Repair wiring harness. (STOP 15 A fuse—Brake switch)



# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

STEP	INSPECTION	ACTION	
5	Remove lower panel. Remove cruise control module with connector connected. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION Depress brake pedal. Is voltage at terminal M of cruise control module connector <b>approximately 12 V</b> ?	Yes	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Repair wiring harness. (Cruise control module—Brake switch)
6	Remove lower panel. Remove cruise control module with connector connected. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION Depress brake pedal. Is voltage at terminal M of cruise control module connector <b>approximately 12 V</b> ?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module—Brake switch)
7	Turn ignition switch to ON. Turn cruise control main switch on. Depress brake pedal. Is voltage at terminal O of cruise control module connector <b>approximately 0 V</b> ?	Yes	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Replace brake switch. ➤ 04-11 BRAKE PEDAL REMOVAL/INSTALLATION
<div><div><div>Brake Switch Connector</div><div></div></div><div><div>Cruise Control Module Connector</div><div></div></div></div>			

X5U101WVH

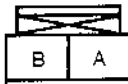
X5U101WVH

DTC 35		CLUTCH SWITCH (AT : TRANSMISSION RANGE SWITCH)	
DETECTION CONDITION		Voltage detected at terminal J is not approximately 0 V.	
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>• Cruise control module malfunction</li><li>• Clutch switch (AT: transmission range switch) malfunction</li><li>• Malfunction in wiring harness between clutch switch (AT: transmission range switch) and ground</li><li>• Malfunction in wiring harness between cruise control module and clutch switch (AT: transmission range switch)</li></ul>	
STEP	INSPECTION	ACTION	
1	Does vehicle have MT?	Yes	Go to next step.
		No	Go to step 6.
2	Inspect clutch switch. ➤ 01-40 CLUTCH SWITCH INSPECTION Is clutch switch okay?	Yes	Go to next step.
		No	Replace clutch switch. ➤ 05-10 CLUTCH PEDAL REMOVAL/INSTALLATION
3	Disconnect clutch switch connector. Is there continuity between terminal B of clutch switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Clutch switch—GND)
4	Turn ignition switch to ON. Turn cruise control main switch on. Keep clutch pedal released. Is voltage at terminal A of clutch switch connector <b>approximately 12 V</b> ?	Yes	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Go to next step.
5	Remove lower panel. Remove cruise control module with connector connected. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION Is voltage at terminal J of cruise control module connector <b>approximately 12 V</b> ?	Yes	Repair wiring harness. (Cruise control module—Clutch switch)
		No	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION

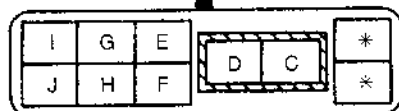
# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

STEP	INSPECTION	ACTION	
6	Inspect transmission range switch. ☞ 05-13 TRANSMISSION RANGE SWITCH INSPECTION Is transmission range switch okay?	Yes	Go to next step.
		No	Replace transmission range switch. ☞ 05-13 TRANSMISSION RANGE SWITCH REMOVAL/INSTALLATION
7	Disconnect transmission range switch connector. Is there continuity between terminal C of transmission range switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Transmission range switch—GND)
8	Turn ignition switch to ON. Turn cruise control main switch on. Shift selector lever to D or R range. Is voltage at terminal D of transmission range switch connector <b>approximately 12 V</b> ?	Yes	Replace cruise control module. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Go to next step.
9	Remove lower panel. Remove cruise control module with connector connected. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION Is voltage at terminal J of cruise control module connector <b>approximately 12 V</b> ?	Yes	Repair wiring harness. (Cruise control module—Transmission range switch)
		No	Replace cruise control module. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION

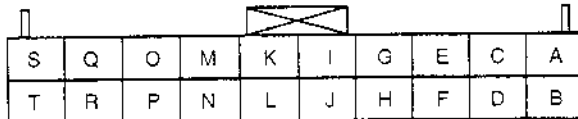
CLUTCH SWITCH CONNECTOR



TRANSMISSION RANGE SWITCH CONNECTOR



CRUISE CONTROL MODULE CONNECTOR

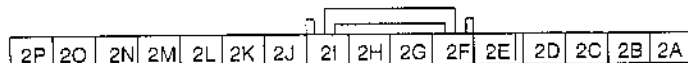


X5U-01WV


X5U\*01WVJ

DTC 37		VEHICLE SPEED SENSOR	
DETECTION CONDITION		Voltage detected at terminal P is not 0 V ⇔ 5 V.	
POSSIBLE CAUSE		<ul style="list-style-type: none"><li>• Cruise control module malfunction</li><li>• Instrument cluster malfunction</li><li>• Malfunction in wiring harness between cruise control module and instrument cluster</li></ul>	
STEP	INSPECTION	ACTION	
1	Disconnect instrument cluster connector. Remove lower panel. Disconnect cruise control module connector. Is there continuity between terminal P of cruise control module and terminal 2L of instrument cluster.	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module—Instrument cluster)
2	Turn ignition switch to ON. Turn cruise control main switch on. Rotate rear tires. Is voltage at terminal 2L of instrument cluster connector 0 ⇔ 5 V?	Yes	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Replace instrument cluster. ➤ 09-22 INSTRUMENT CLUSTER REMOVAL/INSTALLATION

INSTRUMENT CLUSTER CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



X5U101WVK

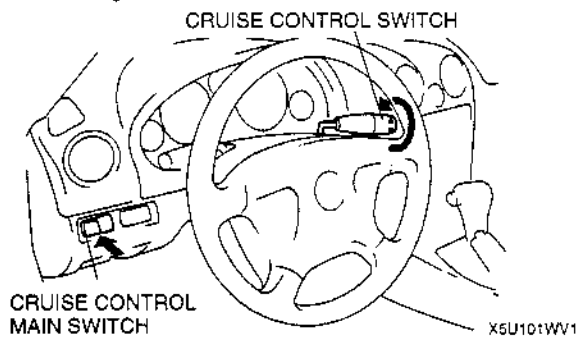
X5U101WVK

## Inspection of Diagnostic Trouble Codes for Condition Detection Mode Using the cruise set indicator light

### Note

- If the RESUME/ACCEL switch on the cruise control switch is malfunctioning, the cruise set indicator light will not give a correct indication when you inspect the system. Use the **SST** (NGS set) to determine the cause of the malfunction.

1. Drive the vehicle at over **16 km/h {10 mile/h}**.
2. Operate each of the cruise control switches.
3. Stop the vehicle and let it idle.
4. Turn on the cruise control main switch.
5. Turn and hold the RESUME/ACCEL switch on for at least **3 seconds**. The cruise set indicator light will illuminate for **3 seconds**, and then go off for at least **2 seconds**. Thus, the condition detection mode begins.



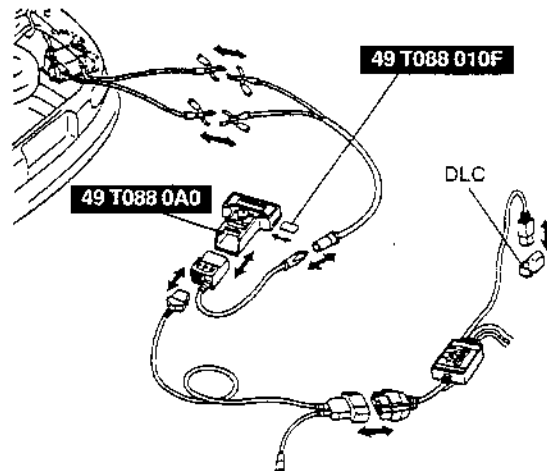
6. If a diagnostic trouble code is indicated, inspect the corresponding system area.
7. The condition detection mode is canceled by turning the ignition switch to LOCK or turning off the cruise control main switch.

## Using the SST (NGS set) New generation star (NGS) tester hookup procedure

### Note

- Verify that ignition switch is at LOCK.

1. Insert the interface module and program card into the **SST** (NGS tester) control unit.
2. Plug the NGS OBD II adapter into the interface module and the connector into the data link connector (DLC) located in the engine compartment via the Super MECS Adapter.
3. Plug the **SST** (NGS tester) power cable into the cigarette lighter or use a battery hookup adapter.

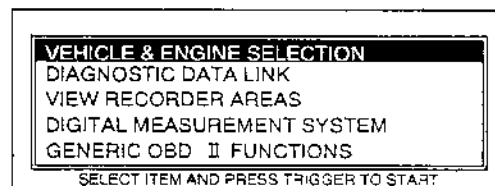


## Reading DTCs Procedure

### Note

- In case the OBD test is performed in the following conditions or NGS tester isn't operated properly, **NO CODES RECEIVED** may be indicated even if the cruise control module sends any DTCs.
  1. Open or short circuit in wiring harness connected with the terminal FSC of the data link connector
  2. Poor positive battery voltage

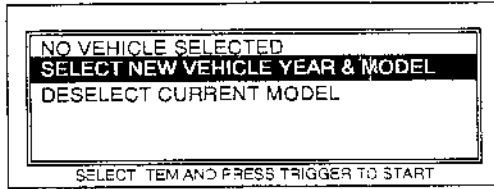
1. Perform the necessary vehicle preparation and visual inspection. Hookup the **SST** (NGS tester) to the vehicle. (Refer to Using the **SST** (NGS set), New generation star (NGS) tester hookup procedure.)
2. Move the cursor to **VEHICLE & ENGINE SELECTION** in the main menu screen. Press TRIGGER to enter this selection.



3. Move the cursor to **SELECT NEW VEHICLE YEAR & MODEL**. Press TRIGGER to enter this selection.

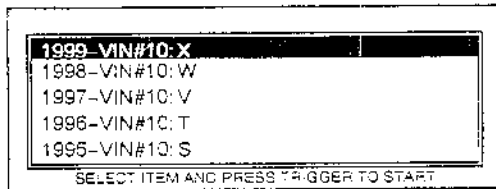
# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

- Move the cursor to **DIAGNOSTIC TEST MODES**. Press TRIGGER to enter this selection.



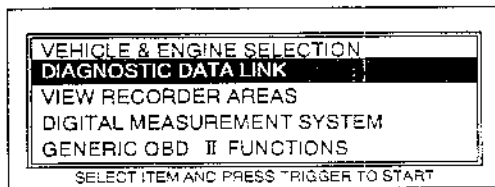
X5U101WV4

- Move the cursor to **1999 — VIN # 10:X**. Press TRIGGER to enter this selection.



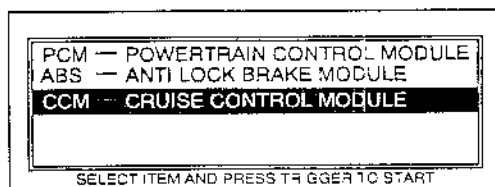
X5U101WV5

- Move the cursor to appropriate model. Press TRIGGER to enter this selection.
- The vehicle selection screen showing the selected vehicle will be displayed. Move the cursor to the vehicle selected. Press TRIGGER to enter this selection.
- Move the cursor to **DIAGNOSTIC DATA LINK** in the main menu screen. Press TRIGGER to enter this selection.

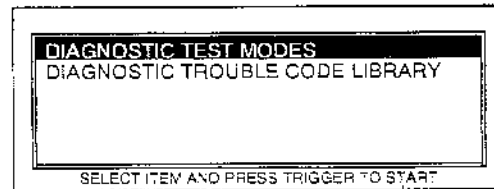


X5U101WV6

- Move the cursor to **CCM—CRUISE CONTROL MODULE**. Press TRIGGER to enter this selection.

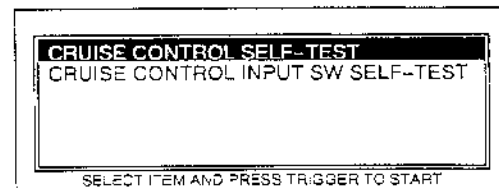


X5U101WV7



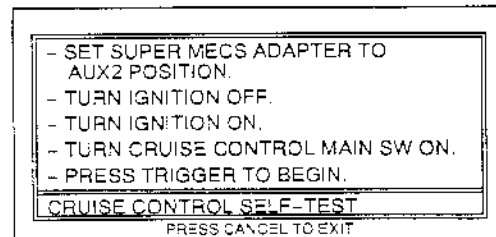
X5U101WV8

- Move the cursor to **CRUISE CONTROL SELF-TEST**. Press TRIGGER to enter this selection.



X5U101WV9

- Press the START button.
- Follow the operating instructions from the menu.









X5U101WV0

- If a diagnostic trouble code is not indicated, inspect the corresponding system area.
- Remove the **SST** (NGS set).
- The condition detection mode is canceled by turning the ignition switch to **LOCK**, turning off the cruise control main switch or driving the vehicle at over **16 km/h {10 mile/h}**.

# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

## Condition code list

DTC	Output pattern	Display on the NGS	Diagnosed circuit
01	 X5U101WVN	ACTUATOR OR STOPLIGHT SW-DEFECT	Cruise actuator
05	 X5U101WVP	STOP FUSE OR WIRING-BLOWN, DEFECT	Brake switch
07	 X5U101WVQ	STOPLIGHT SWITCHES-DEFECT	Brake switch
11	 X5U101WVR	SET/COAST SW-DEFECT (ALWAYS ON)	Cruise control switch (SET/COAST switch)
12	 X5U101WVS	RESUME/ACCEL SW-DEFECT (ALWAYS ON)	Cruise control switch (RESUME/ACCEL switch)
15	 X5U101WVT	CRUISE CONTROL MODULE-DEFECT	Cruise control module

### Note

- When two or more service codes are indicated, inspect the malfunction with the smallest number first.


## Inspection of diagnostic trouble codes

DTC 01		CRUISE ACTUATOR	
DETECTION CONDITION		Voltages detected at terminal A, B or C are not approximately 12 V.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> <li>Cruise control module malfunction</li> <li>Cruise actuator malfunction</li> <li>Malfunction in wiring harness between cruise control module and cruise actuator</li> <li>Malfunction in wiring harness between cruise actuator and brake switch</li> <li>Malfunction in wiring harness between cruise control module and brake switch</li> </ul>	
STEP	INSPECTION	ACTION	
1	Are wiring harnesses between cruise control module and cruise actuator okay?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module—Cruise actuator)
2	Disconnect cruise actuator connector. Turn ignition switch to ON. Turn cruise control main switch on. Is voltage at terminal C of cruise actuator connector <b>approximately 12 V</b> ?	Yes	Go to step 6.
		No	Go to next step.
3	Is voltage at terminal 2B of brake switch connector <b>approximately 12 V</b> ?	Yes	Repair wiring harness. (Cruise actuator—Brake switch)
		No	Go to next step.
4	Is voltage at terminal 2A of brake switch connector <b>approximately 12 V</b> ?	Yes	Replace brake switch. ➡ 04-11 BRAKE PEDAL REMOVAL/INSTALLATION
		No	Go to next step.

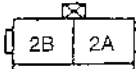
# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

STEP	INSPECTION	ACTION	
5	Remove lower panel. Remove cruise control module with connector connected. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION Is voltage at terminal H of cruise control module connector <b>approximately 12 V</b> ?	Yes	Repair wiring harness. (Cruise control module—Brake switch)
		No	Replace cruise control module. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
6	Connect cruise actuator connector. Turn ignition switch to ON. Turn cruise control main switch on. Is voltage at terminal B of cruise actuator connector <b>approximately 12 V</b> ?	Yes	Go to next step.
		No	Replace cruise actuator. ☞ 01-20 CRUISE ACTUATOR REMOVAL/INSTALLATION
7	Is voltage at terminal D of cruise actuator connector <b>approximately 12 V</b> ?	Yes	Go to next step.
		No	Replace cruise actuator. ☞ 01-20 CRUISE ACTUATOR REMOVAL/INSTALLATION
8	Is voltage at terminal A of cruise actuator connector <b>approximately 12 V</b> ?	Yes	Replace cruise control module. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Replace cruise actuator. ☞ 01-20 CRUISE ACTUATOR REMOVAL/INSTALLATION

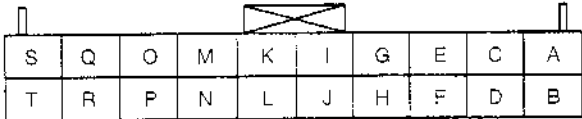
BRAKE SWITCH CONNECTOR



CRUISE ACTUATOR CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



XSU 31WVU

X5U-31WVU


DTC 05		BRAKE SWITCH	
DETECTION CONDITION		Always approximately 0 V detected at terminal M	
POSSIBLE CAUSE		Cruise control module malfunction	
STEP	INSPECTION		ACTION
—	Was operation mode performed?		Yes
			Perform operation mode on-board diagnostic again. Even if no malfunctions are detected in operation mode, if DTC 05 is indicated in condition detection mode on-board diagnostic, replace cruise control module. ☞ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
			No
			Perform operation mode.

DTC 07		BRAKE SWITCH	
DETECTION CONDITION	<ul style="list-style-type: none"><li>• Voltages detected at terminal M or O are always approximately 12 V.</li><li>• Voltage detected at terminal O is always approximately 0 V.</li></ul>		
POSSIBLE CAUSE	<ul style="list-style-type: none"><li>• Cruise control module malfunction</li><li>• Brake switch malfunction</li><li>• Malfunction in wiring harness between cruise control module and brake switch</li></ul>		
STEP	INSPECTION	ACTION	
1	Disconnect brake switch connector. Is there continuity between terminal 1A and 1B of brake switch?	Yes	Replace brake switch. ➡ 04-11 BRAKE PEDAL REMOVAL/INSTALLATION
		No	Go to next step.

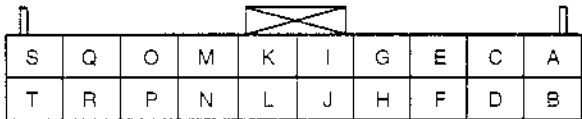
# TROUBLESHOOTING [CRUISE CONTROL SYSTEM]

STEP	INSPECTION	ACTION	
2	Remove lower panel. Remove cruise control module with connector connected. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION Turn ignition switch to ON. Turn cruise control main switch on. Depress brake pedal. Is voltage at terminal M of cruise control module connector <b>approximately 0 V</b> ?	Yes	Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Repair wiring harness. (Cruise control module—Brake switch)

BRAKE SWITCH CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



XSU\*01WVH

DTC 11		CRUISE CONTROL SWITCH (SET/COAST SWITCH)	
DETECTION CONDITION		Resistance detected between terminal N and ground is always 240 Ω.	
POSSIBLE CAUSE		Cruise control module malfunction	
STEP	INSPECTION		ACTION
—	Was operation mode performed?	Yes	Perform operation mode on-board diagnostic again. Even if no malfunctions are detected in operation mode, if DTC 11 is indicated in condition detection mode on-board diagnostic, replace cruise control module. ↳ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Perform operation mode.

DTC 12		CRUISE CONTROL SWITCH (RESUME/ACCEL SWITCH)	
DETECTION CONDITION		Resistance detected between terminal N and ground is always 910 Ω.	
POSSIBLE CAUSE		Cruise control module malfunction	
STEP	INSPECTION		ACTION
—	Was operation mode performed?	Yes	Perform operation mode on-board diagnostic again. Even if no malfunctions are detected in operation mode, if DTC 12 is indicated in condition detection mode on-board diagnostic, replace cruise control module. → 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION
		No	Perform operation mode.

DTC 15		CRUISE CONTROL MODULE	
DETECTION CONDITION		Malfunction in cruise control module circuit	
POSSIBLE CAUSE		Cruise control module malfunction	
STEP	INSPECTION		ACTION
—	—		Replace cruise control module. ➤ 01-20 CRUISE CONTROL MODULE REMOVAL/INSTALLATION

## 01-10 MECHANICAL

<b>DRIVE BELT INSPECTION</b> .....	01-10-1
Drive Belt Deflection Check .....	01-10-1
Drive Belt Tension Check .....	01-10-1
<b>DRIVE BELT ADJUSTMENT</b> .....	01-10-2
<b>VALVE CLEARANCE INSPECTION</b> ....	01-10-3
<b>VALVE CLEARANCE ADJUSTMENT</b> ..	01-10-4
<b>COMPRESSION INSPECTION</b> .....	01-10-5
<b>TIMING BELT</b>	
<b>REMOVAL/INSTALLATION</b> .....	01-10-6
Pulley Lock Bolt	
Removal/Installation Note .....	01-10-7
Timing Belt Removal Note .....	01-10-7
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## DRIVE BELT INSPECTION

## Drive Belt Deflection Check

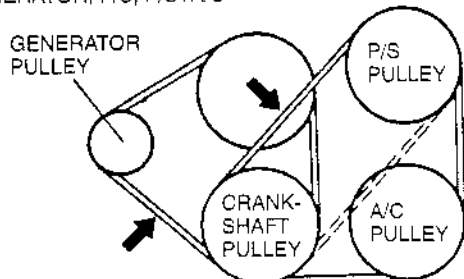
1. Verify the drive belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped. Apply moderate pressure **98 N {10 kgf, 22 lbf}** midway between the specified pulleys.

## Deflection

Drive belt	*New	Used	Limit
Generator	5.5—7.0 {0.22—0.27}	6.0—7.5 {0.24—0.29}	8.0 {0.31}
P/S, A/C, P/S+A/C	8.0—9.0 {0.32—0.35}	9.0—10.0 {0.36—0.39}	11.5 {0.45}

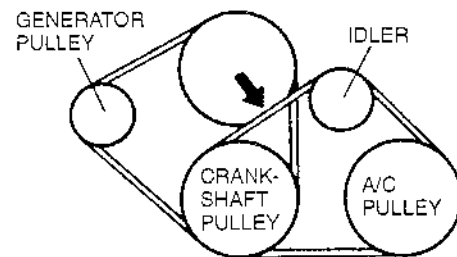
\* : A belt that has been on a running engine for less than 5 minutes.

GENERATOR, P/S, P/S+A/C



X5U110WAC

A/C



X5U110WA1

2. If the deflection is not within the specification, adjust it. (Refer to 01-10 DRIVE BELT ADJUSTMENT.)

## Drive Belt Tension Check

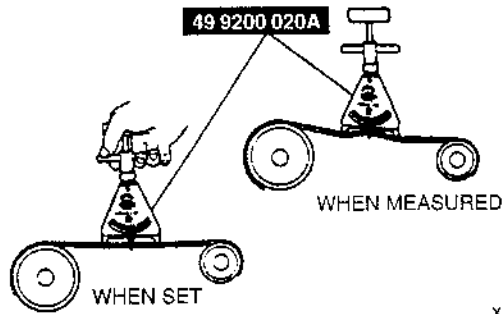
1. Belt tension can be verified in place of belt deflection. Verify the drive belt tension when the engine is cold, or at least 30 minutes after the engine has stopped. Using the **SST**, verify the belt tension between any two pulleys.

## Tension

Drive belt	*New	Used	Limit
Generator	491—745 {50—76, 110—167}	491—706 {50—72, 110—158}	343 {35, 77}
P/S, A/C, P/S+A/C	491—588 {50—60, 110—132}	422—490 {43—50, 95—110}	245 {25, 55}

\* : A belt that has been on a running engine for less than 5 minutes.





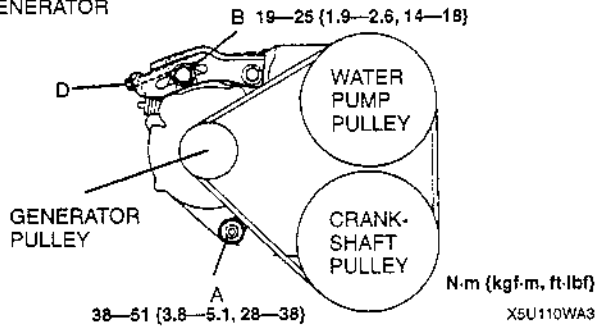
X5U110WA2

2. If the tension is not within the specification, adjust it. (Refer to 01-10 DRIVE BELT ADJUSTMENT.)

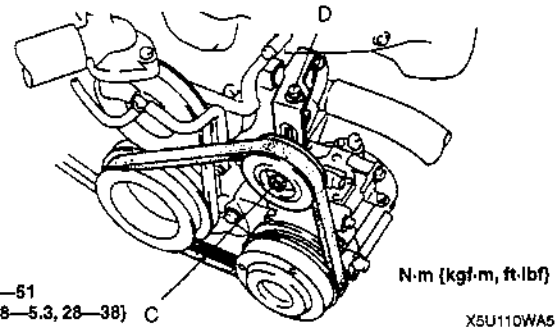
## DRIVE BELT ADJUSTMENT

1. Loosen mounting bolts A, B and nut C.
2. Adjust the belt deflection or tension by turning the adjusting bolt D. (Refer to 01-10 DRIVE BELT INSPECTION.)
3. Tighten mounting bolts A, B and nut C.

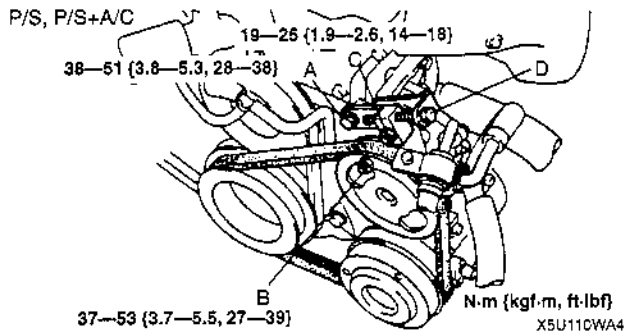
GENERATOR



A/C



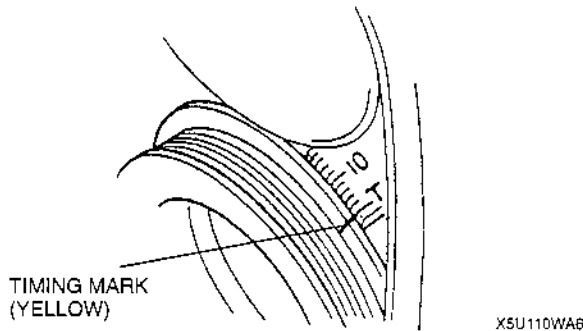
4. Verify the belt deflection or tension. (Refer to 01-10 DRIVE BELT INSPECTION.)



## VALVE CLEARANCE INSPECTION

X5U110W03

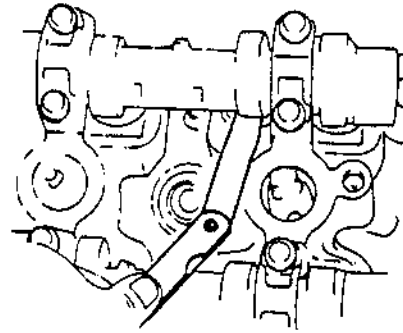
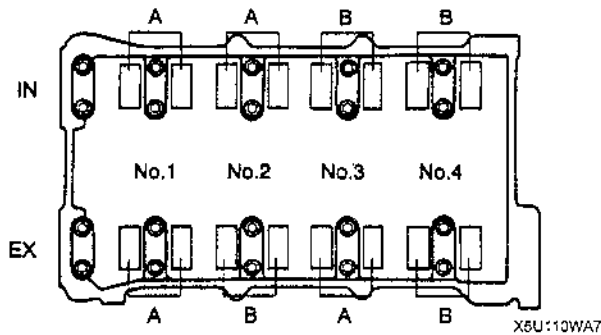
1. Remove the cylinder head cover.
2. Verify that the engine is in cold condition.
3. Measure the valve clearance.
  - (1) Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.



- (2) Measure the valve clearance at A in the figure.

### Standard [Engine cold]

IN: 0.18—0.24 mm {0.008—0.009 in}  
 (0.21 ± 0.03 mm {0.008 ± 0.0012 in})  
 EX: 0.28—0.34 mm {0.012—0.013 in}  
 (0.31 ± 0.03 mm {0.012 ± 0.0012 in})



- (3) If the valve clearance exceeds the standard, replace the adjustment shim. (Refer to 01-10 VALVE CLEARANCE ADJUSTMENT.)
- (4) Turn the crankshaft 360° clockwise so that the No.4 piston is at TDC of the compression stroke.
- (5) Measure the valve clearance at B in the figure.

### Standard [Engine cold]

IN: 0.18—0.24 mm {0.008—0.009 in}  
 (0.21 ± 0.03 mm {0.008 ± 0.0012 in})  
 EX: 0.28—0.34 mm {0.012—0.013 in}  
 (0.31 ± 0.03 mm {0.012 ± 0.0012 in})

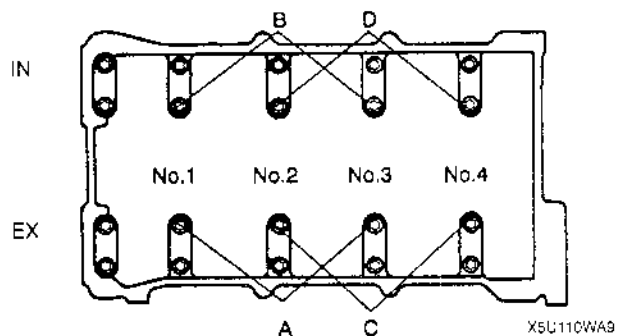
- (6) If the valve clearance exceeds the standard, replace the adjustment shim. (Refer to 01-10 VALVE CLEARANCE ADJUSTMENT.)
4. Install the cylinder head cover. (Refer to 01-10 CYLINDER HEAD GASKET REPLACEMENT, Cylinder Head Cover Installation Note.)

## VALVE CLEARANCE ADJUSTMENT

X5U110W04

Perform this same procedure for all camshafts requiring valve clearance adjustment.

1. Turn the crankshaft clockwise so that the cams on the camshaft requiring valve clearance adjustment are positioned straight up.
2. Remove the camshaft cap bolts as necessary. Remove only one pair of cap bolts at a time. Install the cap bolts before removing the next pair.
  - A: For EX side No.1, 2, 3 cylinder adjustment shim removal.
  - B: For IN side No.1, 2, 3 cylinder adjustment shim removal.
  - C: For EX side No.2, 3, 4 cylinder adjustment shim removal.
  - D: For IN side No.2, 3, 4 cylinder adjustment shim removal.



### Note

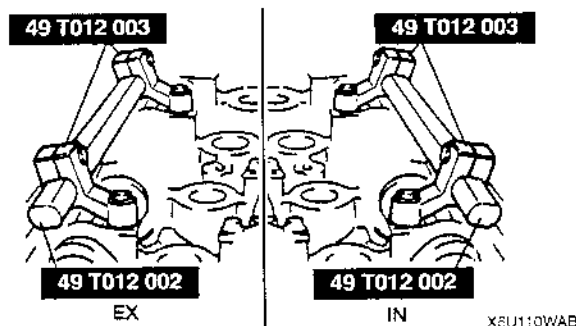
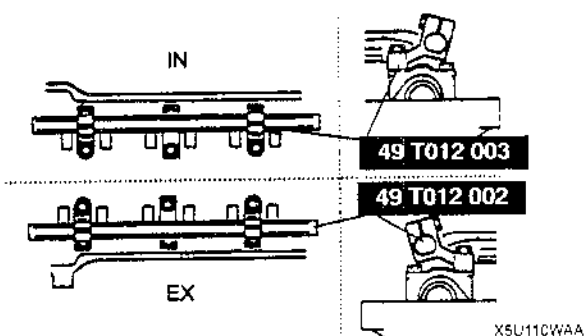
- For EX side No.2, 3 cylinder adjustment shim removal, remove bolts either A or C.
- For IN side No.2, 3 cylinder adjustment shim removal, remove bolts either B or D.

3. Install the **SSTs** on the camshaft using the camshaft cap bolt holes.

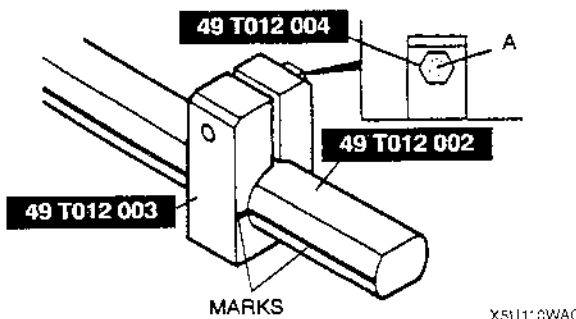
### Tightening torque

11.3—14.2 N·m

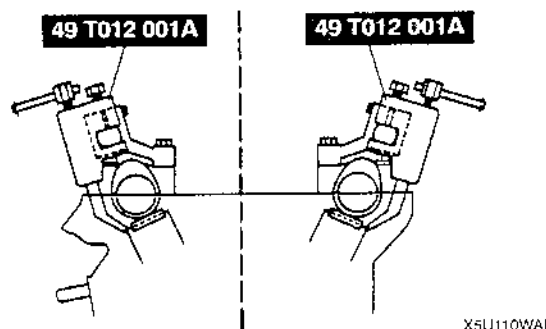
{115—145 kgf·cm, 100—125 in·lbf}



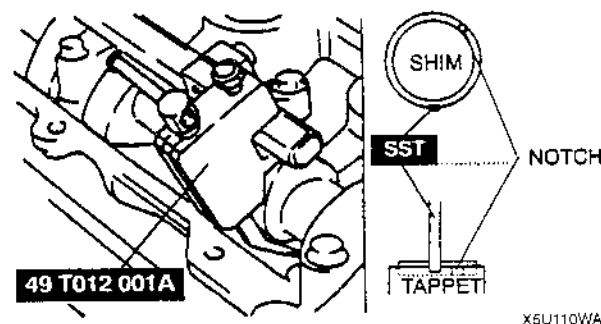
4. Align the marks on the **SSTs** (shaft and shaft clamp).
5. Tighten bolts A to secure the **SST** (shaft).



6. Face the **SST** (body) outside of the cylinder head, and mount it on the **SST** (shaft) at the point of the adjustment shim to be replaced.



7. Face the notch of the tappet so that a small screwdriver can be inserted.

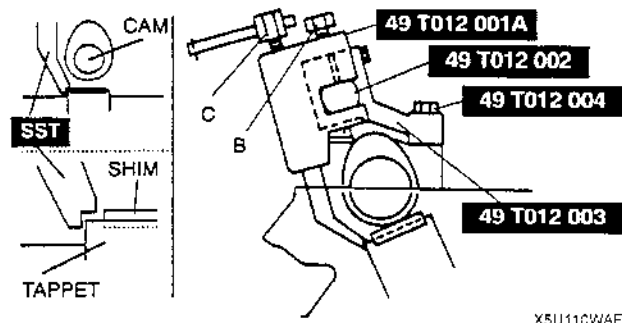


8. Set the **SST** on the tappet by its notch.
9. Tighten bolt B to secure the **SST** (body).

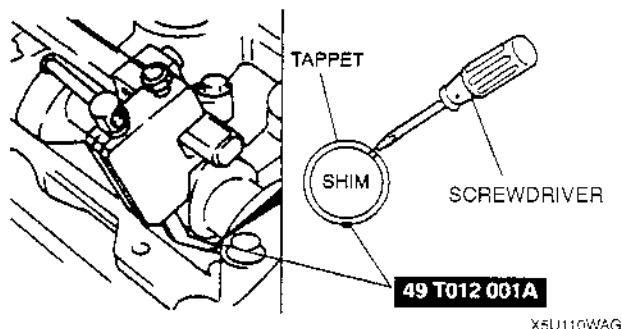
### Caution

- Cylinder head can be damaged when the tappet is pressed down.

10. Tighten bolt C, and press down the tappet.



11. Using a fine screwdriver, pry up the adjustment shim through the notch on the tappet. Remove the shim by using a magnet.



12. Select proper adjustment shim.

## New adjustment shim

= Removed shim thickness + Measured valve clearance – Standard valve clearance  
(IN: 0.21 mm {0.008 in}, EX: 0.31 mm {0.012 in})

13. Push the selected shim into the tappet.

14. Loosen bolt C to allow the tappet to move up.

15. Loosen bolt B and remove the SST (body).

16. Remove the SSTs and tighten the camshaft cap bolts.

## Tightening torque

11.3—14.2 N·m

{115—145 kgf·cm, 100—125 in·lbf}

17. Verify the valve clearance. (Refer to 01–10 VALVE CLEARANCE INSPECTION.)

## COMPRESSION INSPECTION

X5U110W05

### Warning

- When the engine and the oil are hot, they can badly burn. Be careful not to burn yourself during removal/installation of each component.

- Verify that the battery is fully charged. Charge it again as necessary. (Refer to 01–17 BATTERY INSPECTION.)
- Warm up the engine to the normal operating temperature.
- Stop the engine and allow it to cool off for about 10 minutes.
- Perform "Fuel Line Safety Procedure". Leave the fuel pump relay removed. (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
- Remove the spark plugs. (Refer to 01–18 SPARK PLUG REMOVAL/INSTALLATION.)
- Disconnect the ignition coil connector.
- Connect a compression gauge into the No.1 spark plug hole.
- Fully depress the accelerator pedal and crank the engine.
- Record the maximum gauge reading.
- Inspect each cylinder as above.

### Compression

kPa {kgf/cm<sup>2</sup>, psi} [rpm]

Item	Engine
	BP
Standard	1442 {14.7, 209} [300]
Minimum	1009 {10.29, 146} [300]
Maximum difference between cylinders	196 kPa {2.0 kgf/cm <sup>2</sup> , 28 psi}

11. If the compression in one or more cylinders is low or the compression difference between cylinders exceeds the maximum, pour a small amount of clean engine oil into the cylinder and inspect the compression again.

- If the compression increases, the piston, the piston rings, or cylinder wall may be worn and overhaul is required.
- If the compression stays low, a valve may be stuck or improperly seated and overhaul is required.
- If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head is distorted and overhaul is required.

12. Disconnect the compression gauge.

13. Connect the ignition coil connector.

14. Install the fuel pump relay.

15. Install the spark plugs. (Refer to 01–18 SPARK PLUG REMOVAL/INSTALLATION.)