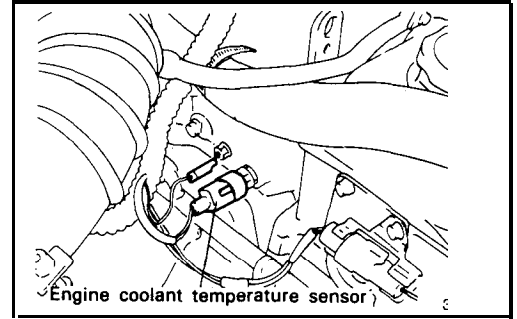


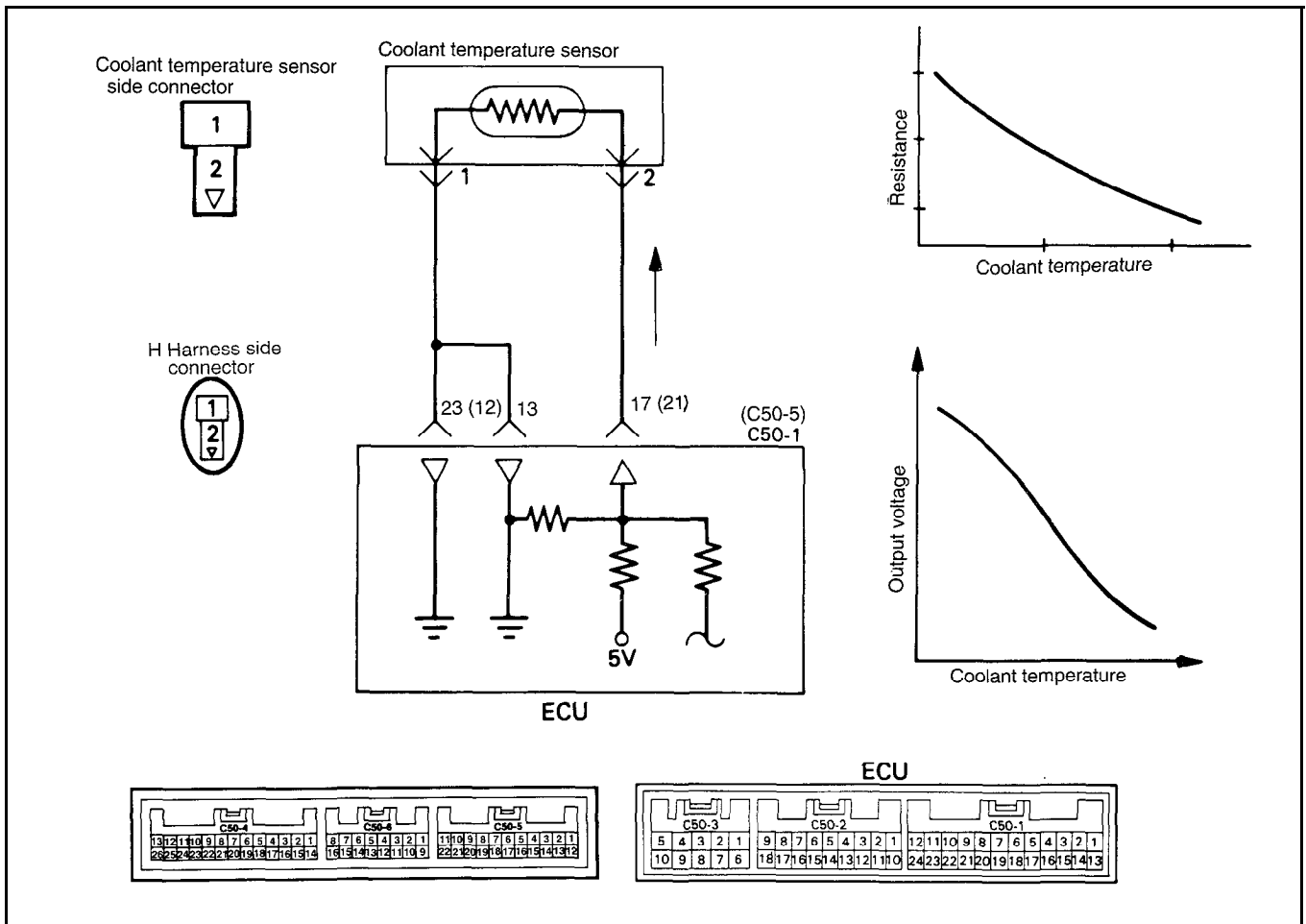
COOLANT TEMPERATURE SENSOR

The coolant temperature sensor is installed in the engine coolant passage of the cylinder head. The ECU judges engine temperature by the sensor output voltage and provides optimum fuel enrichment when the engine is cold.



Circuit Diagram

() : California only



Troubleshooting Hints

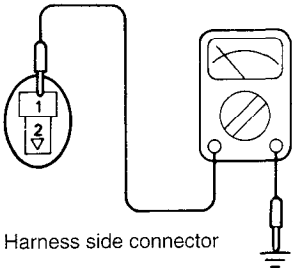
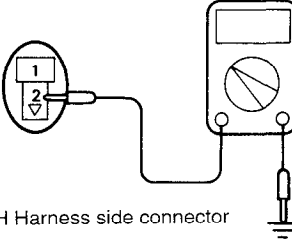
If the fast idle speed is not enough or the engine gives off dark smoke during the engine warm-up operation, the engine coolant temperature sensor might be the causes.

Using Multi-use Tester

Check Item	Data display	Check conditions	Coolant temperature	Test specification
Engine coolant temperature sensor o Service data o Item No. 21	Sensor temperature	Ignition switch: ON or engine running	When -20°C (-4°F)	-20°C
			When 0°C (32°F)	0°C
			When 20°C (68°F)	20°C
			When 40°C (104°F)	40°C
			When 80°C (176°F)	80°C

Harness Inspection Procedures

* California only

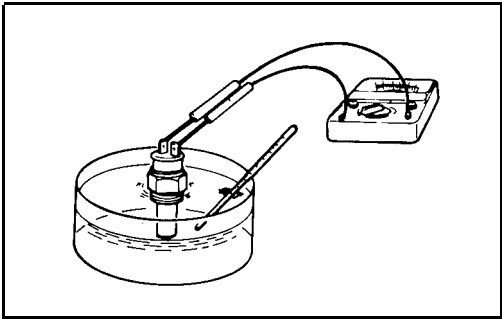
<div style="border: 1px solid black; padding: 5px; width: 40px; float: left; text-align: center; font-weight: bold;">1</div>  <p style="text-align: center;">H Harness side connector</p> <p style="text-align: right; font-size: small;">31J066</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 20px;"> <div style="text-align: right;"> <p>OK →</p> <p>NG →</p> </div> <div style="border: 1px solid black; padding: 10px; width: 150px;"> <div style="border: 1px solid black; padding: 2px; text-align: center; font-weight: bold; margin-bottom: 10px;">2</div> <p>Repair the harness (H 1 - C50-1 23 , 13) * (H 1 - C50-5 12)</p> </div> </div>
<div style="border: 1px solid black; padding: 5px; width: 40px; float: left; text-align: center; font-weight: bold;">2</div>  <p style="text-align: center;">H Harness side connector</p> <p style="text-align: right; font-size: small;">31J067</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: 4.5-4.9V <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 20px;"> <div style="text-align: right;"> <p>OK →</p> <p>NG →</p> </div> <div style="border: 1px solid black; padding: 10px; width: 150px;"> <p>END !</p> <p>Repair the harness. (H 2 - C50-1 17) * (H 2 - C50-5 21)</p> </div> </div>

Sensor Inspection

- 1. Remove engine coolant temperature sensor from the intake manifold.
- 2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Temperature °C (°F)	Resistance (KΩ)
0 (32)	5.9
20 (68)	2.5
40 (104)	1.1
80 (176)	0.3

- 3. If the resistance deviates from the standard value greatly, replace the sensor.



Installation

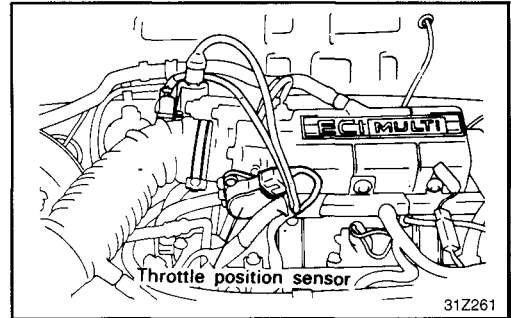
- 1. Apply sealant LOCTITE 962T or equivalent to threaded portion.
- 2. Install engine coolant temperature sensor and tighten it to specified torque.

Tightening torque
20-40 Nm (200-400 kg.cm, 14-29 lb.ft)

- 3. Connect the harness connector securely.

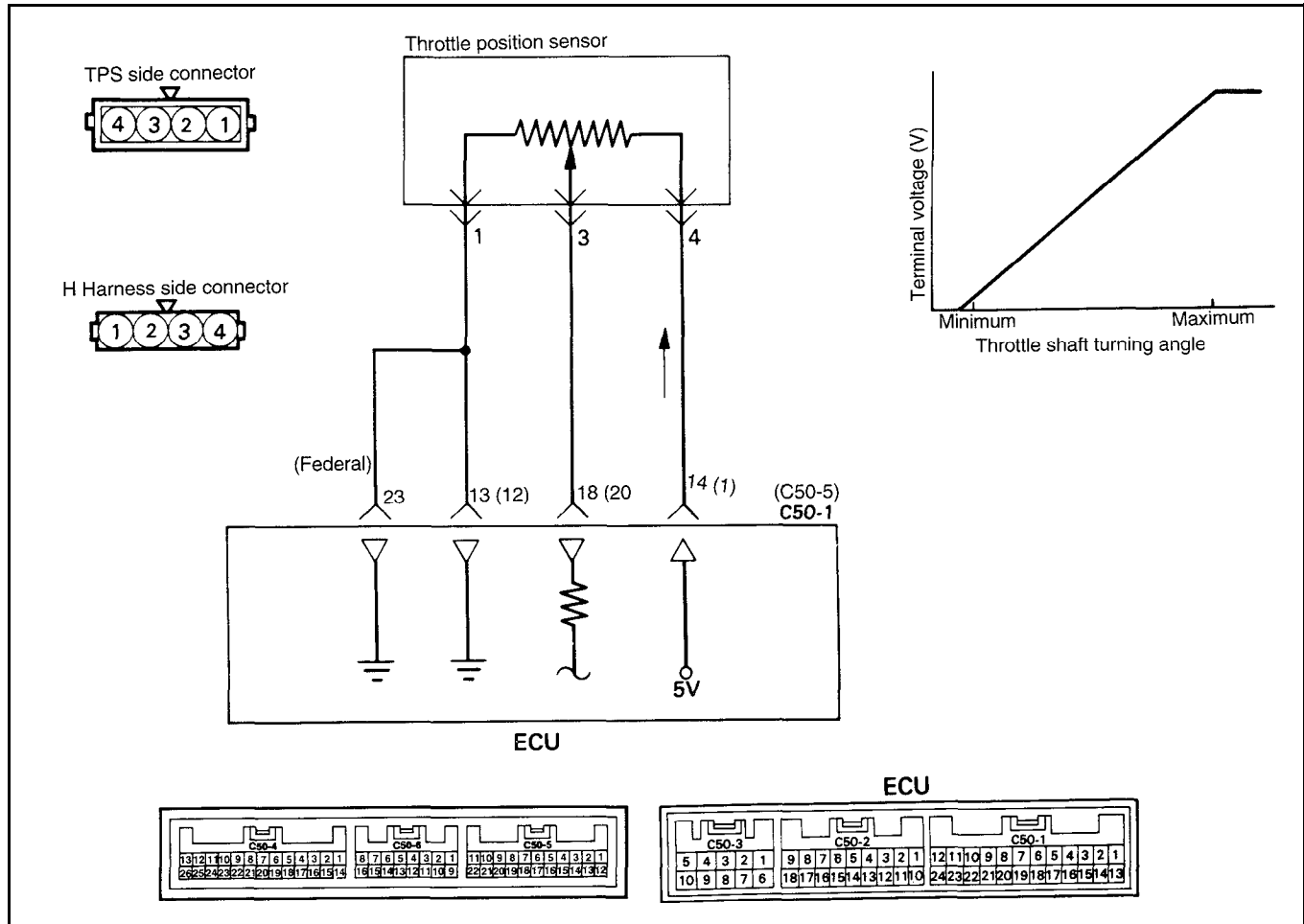
THROTTLE POSITION SENSOR (TPS)

The TPS is a rotating type variable resistor that rotates with the throttle body throttle shaft to sense the throttle valve angle. As the throttle shaft rotates, the output voltage of the TPS changes and the ECU detects the throttle valve opening based on the change of the voltage.



Circuit Diagram

() : California only



Troubleshooting Hints

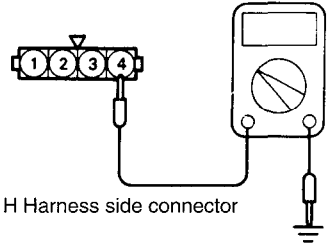
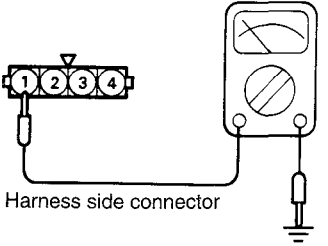
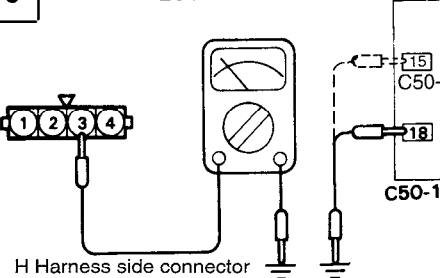
1. The TPS signal is important in the control of automatic transaxle. Shift shock and other troubles will occur if the sensor is faulty.

Using Multi-use Tester

Check Item	Data display	Check conditions	Throttle valve	Test specification
Throttle position sensor o Service data o Item No. 14	Sensor voltage	Ignition switch: ON	At idle position	450-550 mV
			Open slowly	Increases with valve opening
			Open widely	4,500-5,500 mV

Harness Inspection Procedures

* California only

<p>1</p>  <p>H Harness side connector</p> <p>31J069</p>	<p>Measure the power supply voltage of the throttle position sensor.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: 4.8-5.2V <p>OK →</p> <p>NG →</p>	<p>2</p> <p>Repair the harness (H 4 - C50-1 14) * (H 4 - C50-5 1)</p>
<p>2</p>  <p>H Harness side connector</p> <p>31J070</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected <p>OK →</p> <p>NG →</p>	<p>3</p> <p>Repair the harness. (H 1 - C50-1 23 , 13) * (H 1 - C50-5 12)</p>
<p>3</p> <p>ECU Harness side connector</p>  <p>H Harness side connector</p> <p>31J071</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the throttle position sensor.</p> <ul style="list-style-type: none"> o Throttle position sensor connector: Disconnected o Engine control unit connector: Disconnected <p>OK →</p> <p>NG →</p>	<p>END !</p> <p>Repair the harness. (H 3 - C50-1 18) * (H 3 - C50-5 20)</p>

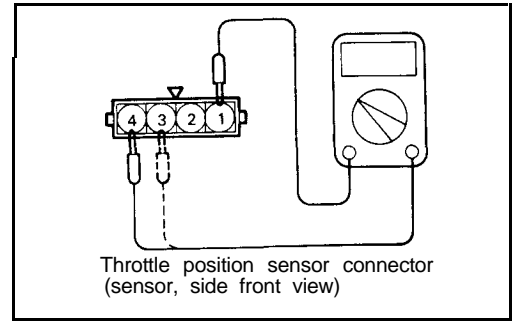
Sensor Inspection

1. Disconnect the throttle position sensor connector.
2. Measure resistance between terminal 1 (sensor ground) and terminal 4 (sensor power).

Standard value: 3.5-6.5 k Ω

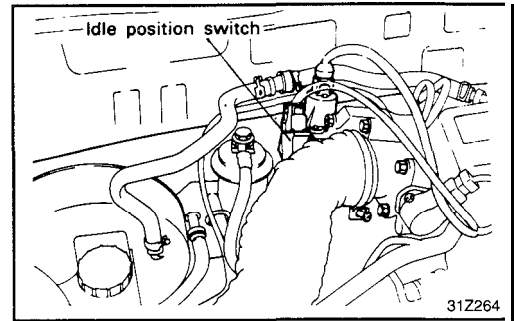
3. Connect a pointer type ohmmeter between terminal 1 (sensor ground) and terminal 3 (sensor output).
4. Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
5. If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

TPS tightening torque
1.5-2.5 Nm (15-25 kg.cm, 1.1-1.8 lb.ft)



IDLE POSITION SWITCH

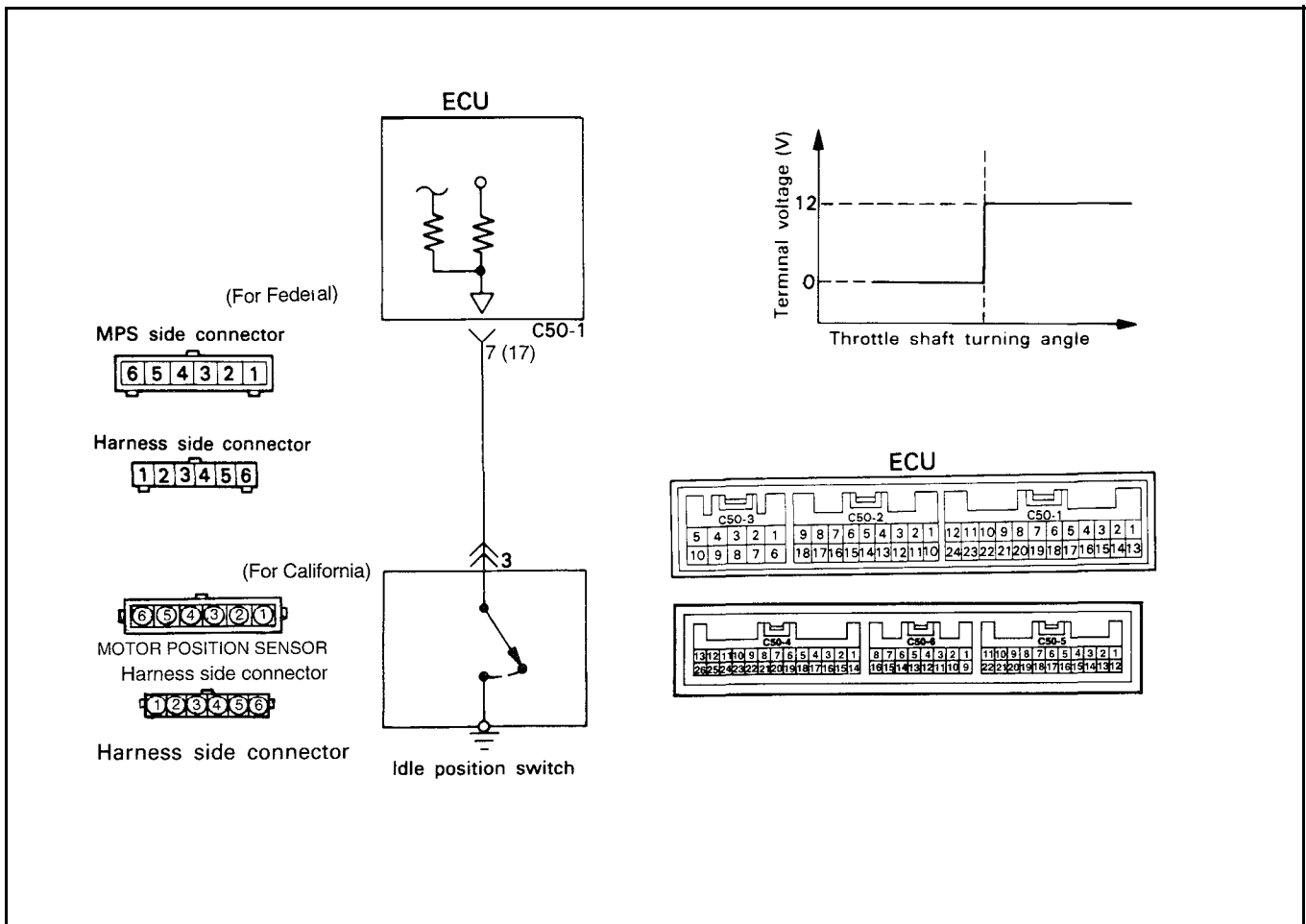
The idle switch, which is a contact type switch, senses accelerator operation. When the throttle valve is in the idle position, the ISC lever pushes the push pin to turn on the contact.



31Z264

Circuit Diagram

() : California only



Troubleshooting Hints

If the idle position switch harness and individual part check results are normal but the idle position switch output is abnormal, check for the following items.

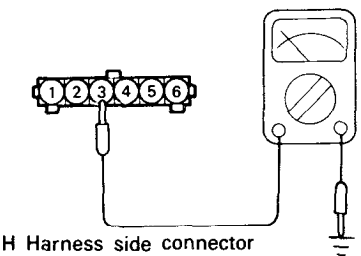
1. Poorly adjusted accelerator cable or auto-cruise control cable.
2. Poorly adjusted idle position switch (fixed SAS).

Using Multi-use Tester

Check Item	Data display	Check conditions	Throttle valve	Normal indication
Idle position switch o Service data o Item No. 26	Switch state	Ignition switch: ON (check by operating accelerator pedal repeatedly)	At idle position	ON
			Open a little	OFF

Harness Inspection Procedures

* California only

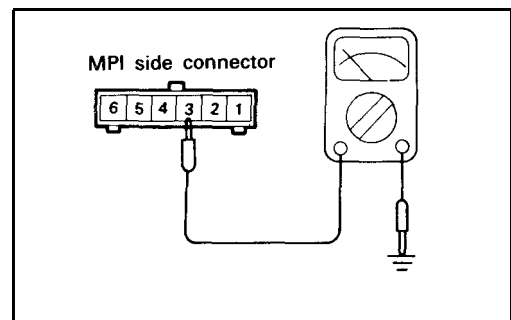
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">1</div>  <p>H Harness side connector</p>	<p>Measure the power supply voltage of the idle position switch.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: 4V or more 	<p>OK → END !</p> <p>NG →</p> <p>Repair the harness. (H3-C50-17) *(I3-C50-517)</p>
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Sensor Inspection

1. Disconnect the idle position switch connector.
2. Check the continuity between terminal 3 and sensor ground.

Accelerator pedal	Continuity
Depressed	Non-conductive ($\infty \Omega$)
Released	Conductive (0 Ω)

3. If out of specification, replace the idle position switch.



Using Multi-use Tester

Function	Item No.	Data display	Check conditions	Load state	Standard value
Data reading	15	Sensor Voltage	Check condition o Engine coolant temperature: 80 to 95°C (176 to 205°F) o Lamps, electric cooling fan, accessory units: All off o Transaxle: Neutral P range for vehicle with A/T) o Steering wheel: Neutral o Idle position switch: ON (Compressor clutch to be operating in case air conditioner switch is ON) o Engine: At idle	Air conditioner switch: OFF	500-1,300 mV
				Air conditioner switch: ON	800-1,800 mV
				o Air conditioner switch: ON o Selector lever: Shift to D range	900-1,900 mV

NOTE

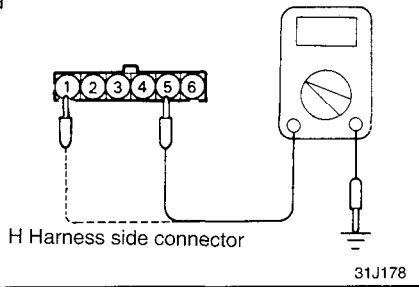
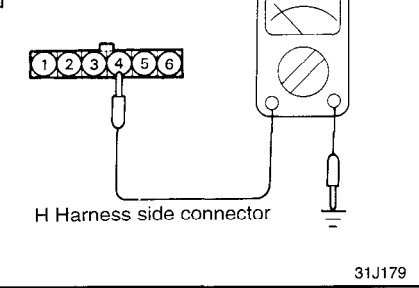
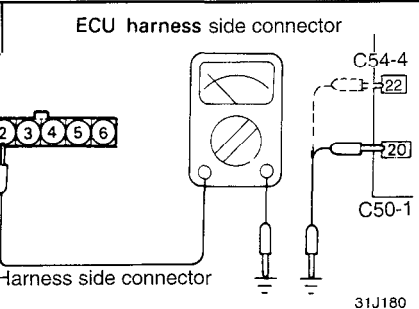
When the vehicle is new [within initial operation of about 500 km (300 miles)], the motor position sensor output voltage may be about 500 mV higher.

CAUTION

When shifting the selector lever to the D range, apply brake to prevent the vehicle from moving forward.

Harness Inspection Procedures

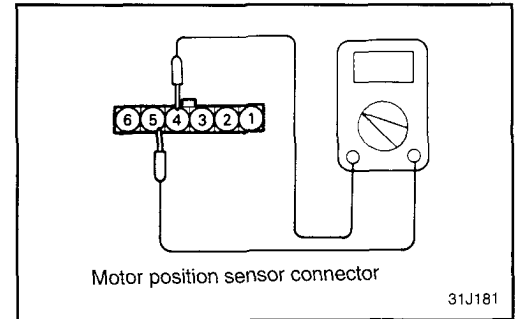
* California only

<div>1</div> <div><p>H Harness side connector</p><p>31J178</p></div>	<p>Measure the power supply voltage of the motor position sensor.</p> <ul style="list-style-type: none">o Connector: Disconnectedo Ignition switch: ON <table border="1"><thead><tr><th>Voltage (V)</th></tr></thead><tbody><tr><td>4.8-5.2</td></tr></tbody></table> <div>OK → <div>2</div></div> <div>NG →</div>	Voltage (V)	4.8-5.2	<p>Repair the harness.</p> <p>(H 1 , 5 - C50-1 24, 14)</p> <p>* (I 1,5 - C50-5 1)</p>
Voltage (V)				
4.8-5.2				
<div>2</div> <div><p>H Harness side connector</p><p>31J179</p></div>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none">o Connector: Disconnected <div>OK → <div>3</div></div> <div>NG →</div>	<p>Repair the harness.</p> <p>(H 4 - C50-1 13 , 23)</p> <p>* (I 4 - C50-5 12)</p>		
<div>3</div> <div><p>ECU harness side connector</p><p>H Harness side connector</p><p>31J180</p></div>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the motor position sensor.</p> <ul style="list-style-type: none">o Engine control unit connector: Disconnectedo Motor position sensor connector: Disconnected <div>OK →</div> <div>NG →</div>	<p>END !</p> <p>Repair the harness.</p> <p>(H 2 - C50-1 20)</p> <p>* (I 2 - C50-4 22)</p>		

Sensor Inspection

1. Disconnect the motor position sensor connector.
2. Measure the resistance between terminals 4 and 5.

Standard value : 3.5-6.5 k Ω



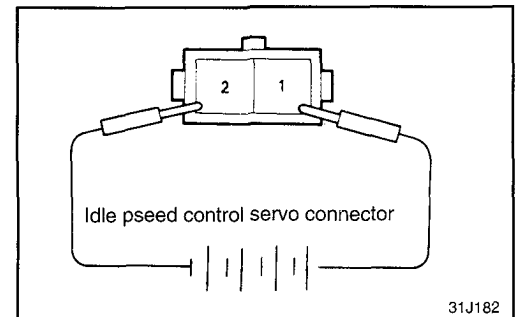
3. Disconnect the idle speed control servo connector.
4. Connect DC 6V between terminals 1 and 2 of idle speed control servo connector, and then measure the resistance between terminals 2 and 4 of the motor position sensor connector when the idle speed control servo is activated (caused to expand and contract).

Standard value: Increases or decreases smoothly as the plunger of the idle speed control servo extends or retracts.

CAUTION

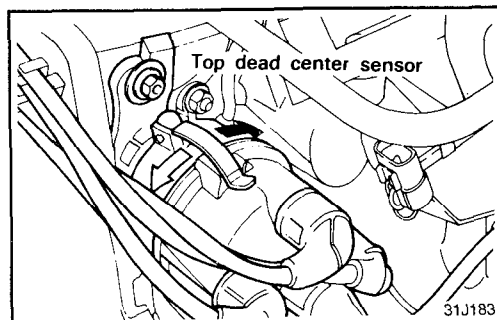
Apply only a 6V DC or lower voltage. Application of a higher voltage could cause locking of the servo gears.

5. If there is a deviation from the standard value, or if the change is not smooth, replace the idle speed control servo assembly.



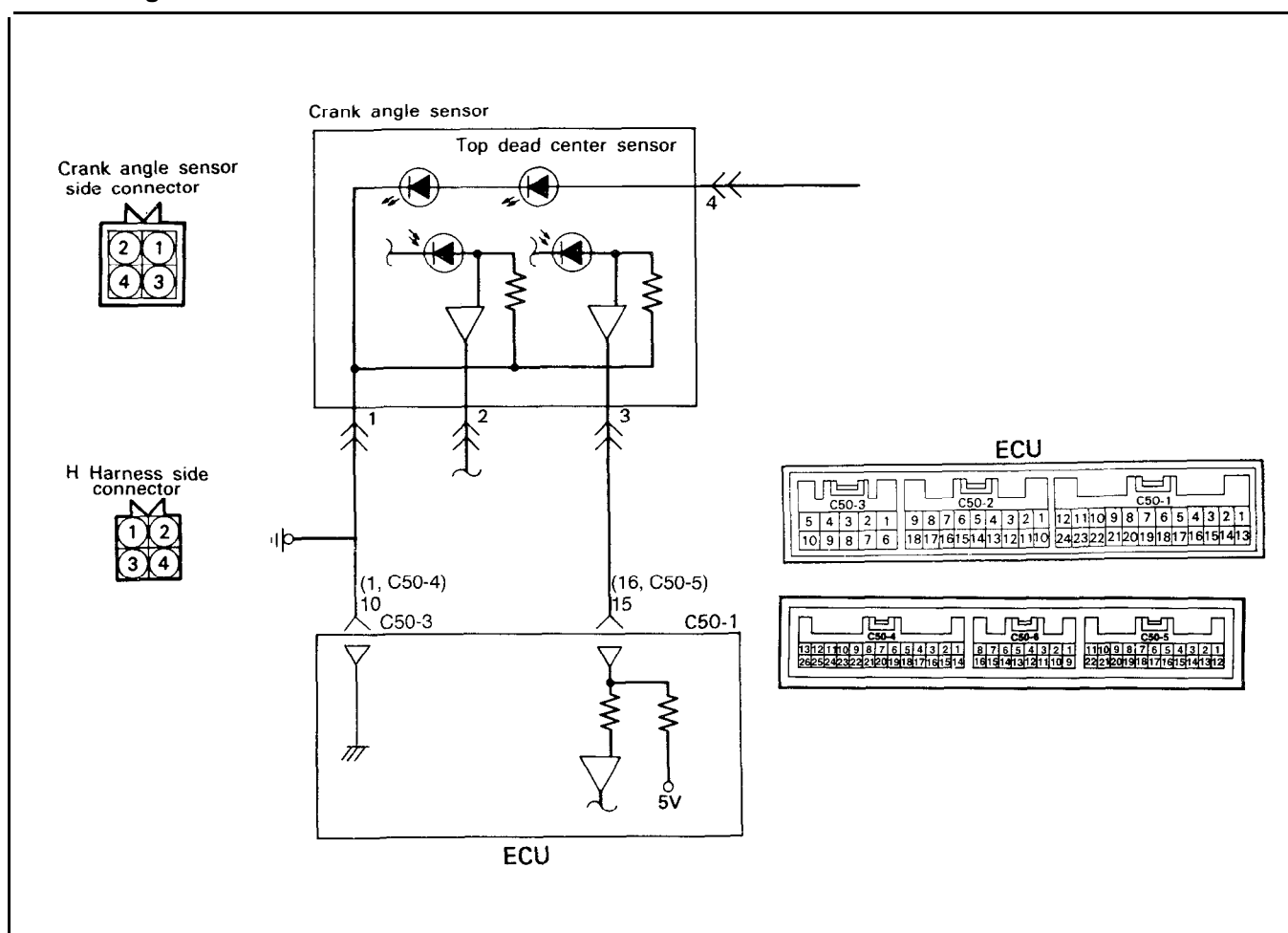
TOP DEAD CENTER (TDC) SENSOR

The TDC sensor senses the top dead center on compression stroke of the No. 1 and No. 4 cylinders, converts it into a pulse signal and inputs it to the ECU. The ECU then computes the fuel injection sequence, etc. based on the input signal.



Circuit Diagram

() : California only

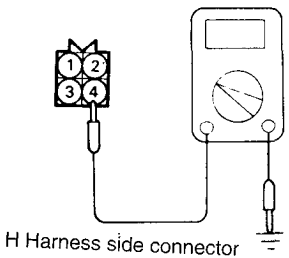
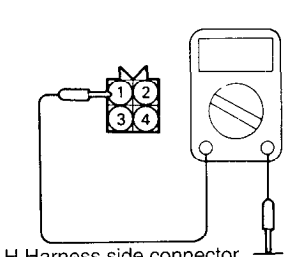
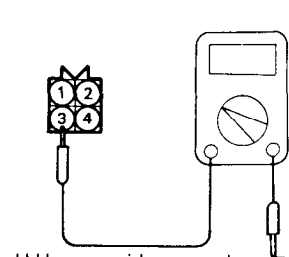


Troubleshooting Hints

If the TDC sensor does not operate correctly, correct sequential injection is not made so that the engine may stall or run irregularly at idle or fail to accelerate normally.

Harness Inspection Procedures

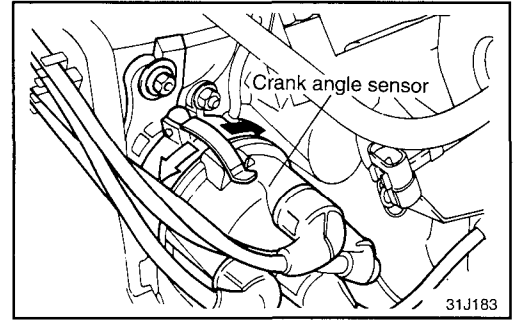
* California only

<div>1</div>  <div>31J185</div>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage (V): System voltage <p>OK →</p> <p>NG →</p>	<div>2</div> <p>Repair the harness (H 4 - Ignition switch (IG1))</p>
<div>2</div>  <div>31J186</div>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected <p>OK →</p> <p>NG →</p>	<div>3</div> <p>Repair the harness. (H 1 - C50-3 10, Ground) * (H 1 - C50-4 1)</p>
<div>3</div>  <div>31J187</div>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: 4.8-5.2V <p>OK →</p> <p>NG →</p>	<p>END !</p> <p>Repair the harness. (H 3 - C50-1 15) * (H 3 - C50-5 16)</p>

CRANK ANGLE SENSOR

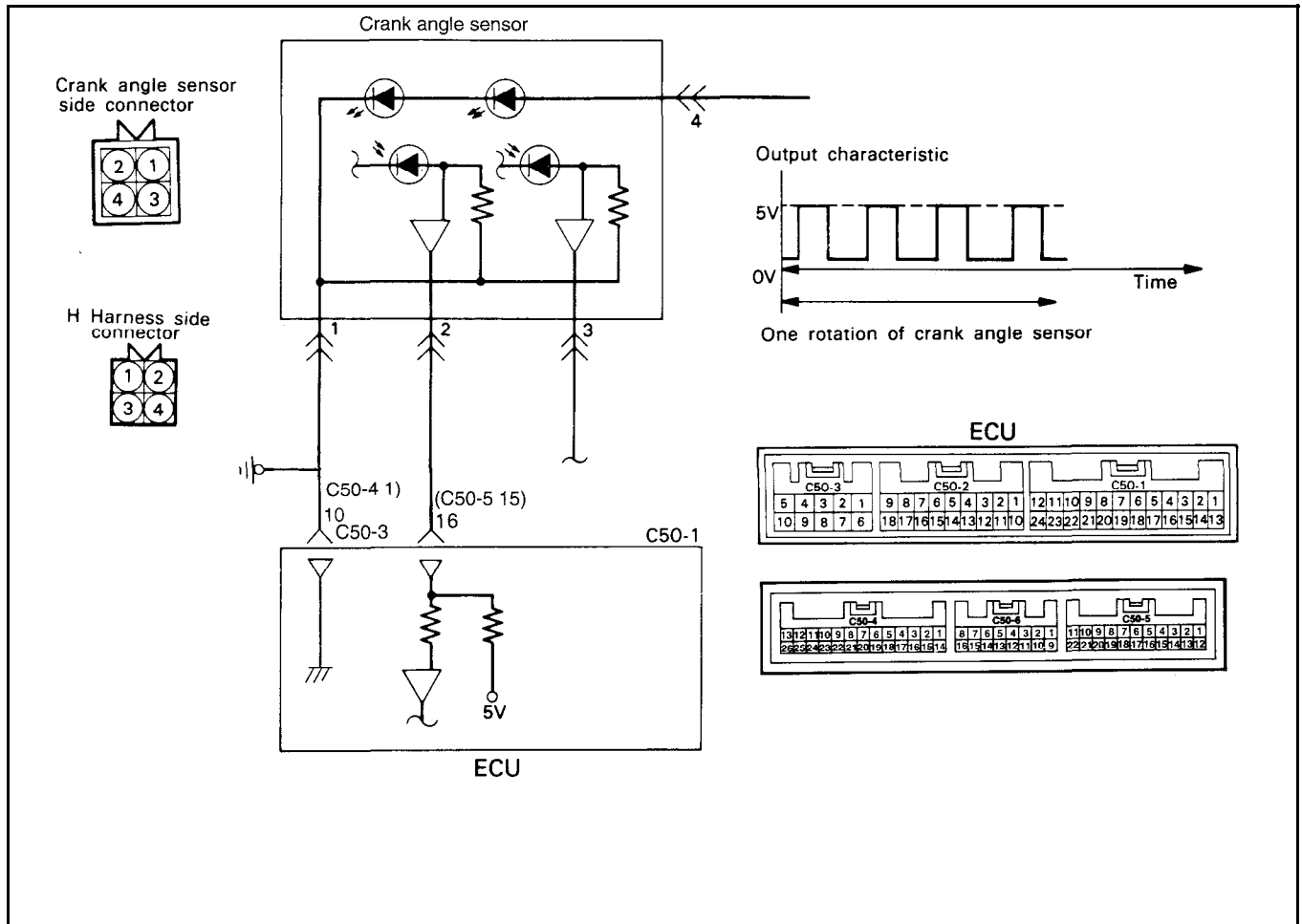
The crank angle sensor senses the crank angle (piston position) of each cylinder, converts it into a pulse signal.

The ECU computes the engine speed and controls the fuel injection timing and ignition timing based on the input signal.



Circuit Diagram

() : California only



Troubleshooting Hints

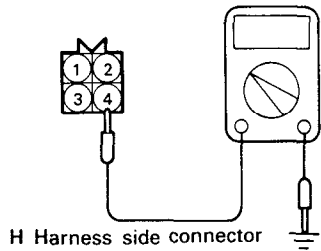
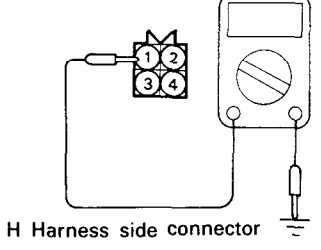
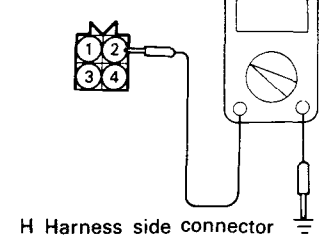
1. If unexpected shocks are felt during driving or the engine stalls suddenly, shake the crank angle sensor harness. If this causes the engine to stall, check for poor contact of the sensor connector.
2. If the tachometer reads 0 rpm when the engine is cranked, check for faulty crank angle sensor, broken timing belt or ignition system problems.
3. If the engine can be run at idle even if the crank angle sensor reading is out of specification, check the followings:
 - 1) Faulty engine coolant temperature sensor
 - 2) Faulty idle speed control servo
 - 3) Poorly adjusted reference idle speed

Using Multi-use Tester

Check Item	Data display	Check conditions	Check content	Normal state
Crank angle sensor o Service data o Item No. 22	Cranking speed	o Engine cranking o Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and multi-tester reading	Indicated speed agrees
Check Item	Data display	Check conditions	Coolant temperature	Test specification
Crank angle sensor o Service data o Item No.22	Idle speed	Check condition o Engine: Running at idle o Idle position switch: ON	When -20°C (-4°F)	1,500-1,700 rpm
			When 0°C (32°F)	1,350-1,550 rpm
			When 20°C (68°F)	1,200-1,400 rpm
			When 40°C (104°F)	1,000-1,200 rpm
			When 80°C (176°F)	650-850 rpm

Harness Inspection Procedures

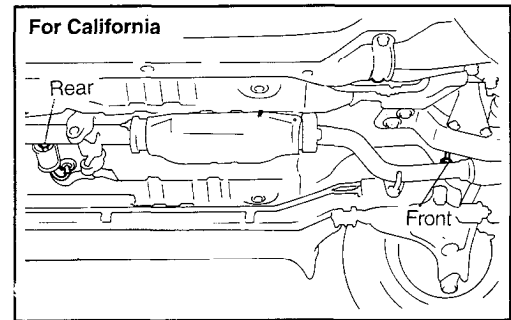
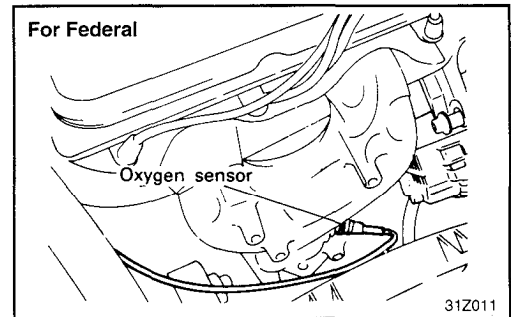
* California only

<div>1</div>  <p>H Harness side connector</p> <p>31J189</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage (V): System voltage 	<p>OK → 2</p> <p>NG → Repair the harness (H 4 -Ignition switch (IG1))</p>
<div>2</div>  <p>H Harness side connector</p> <p>31J190</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected 	<p>OK → 3</p> <p>NG → Repair the harness. (H 1 - C50-3 10, Ground) * (H 1 - C50-4 1)</p>
<div>3</div>  <p>H Harness side connector</p> <p>31J191</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: 4.8-5.2V 	<p>OK → END !</p> <p>NG → Repair the harness. (H 2 - C50-1 16) * (H 2 - C50-5 15)</p>

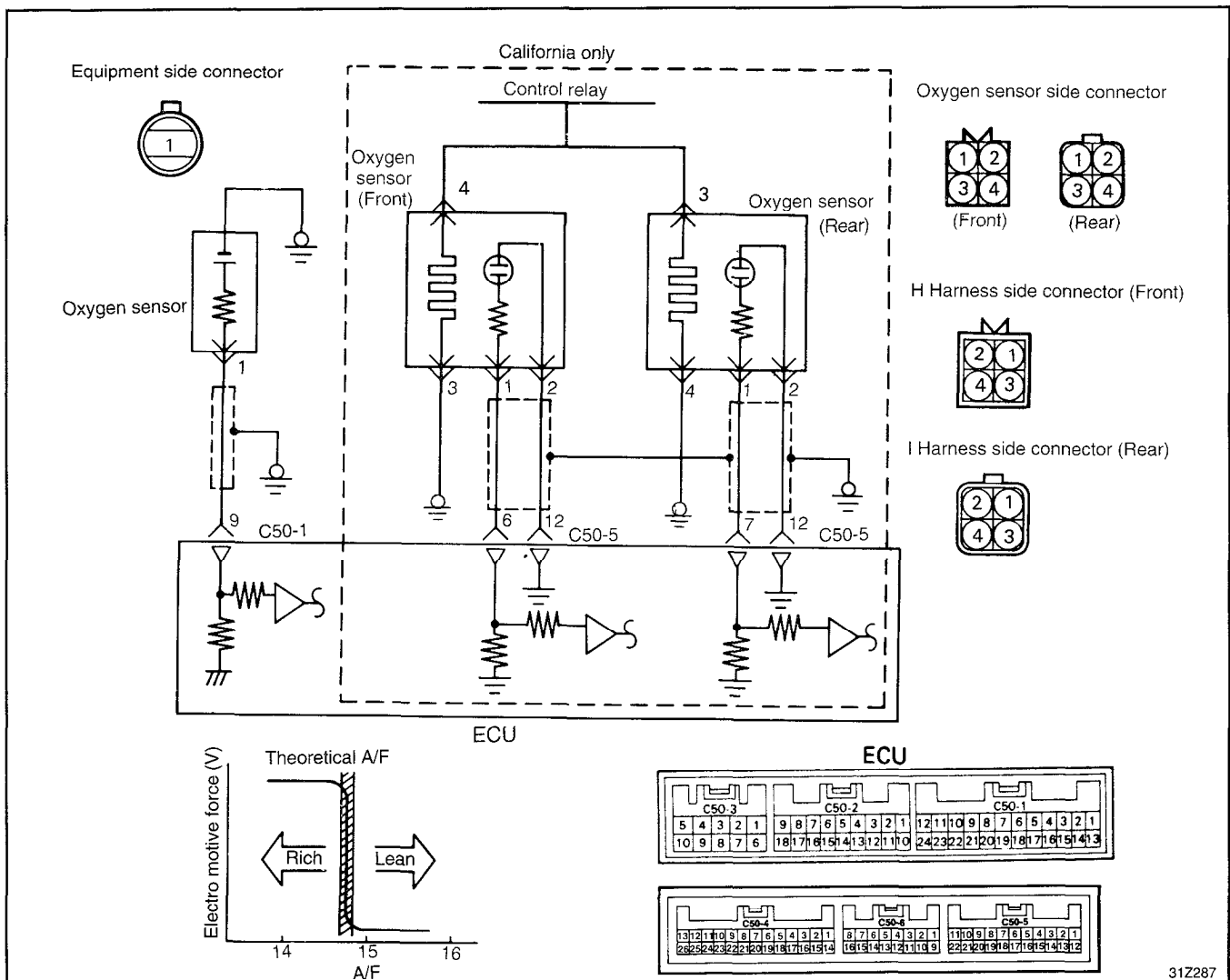
OXYGEN SENSOR

The oxygen sensor senses the oxygen concentration in exhaust gas, converts it into a voltage which is sent to the ECU. The oxygen sensor outputs about 1V when the air fuel ratio is richer than the theoretical ratio and outputs about 0V when the ratio is leaner (higher oxygen concentration in exhaust gas.).

The ECU controls the fuel injection ratio based on this signal so that the air fuel ratio is maintained at the theoretical ratio.



Circuit Diagram



Using Multi-use Tester

Check Item	Data display	Check conditions	Engine state	Test specification
Oxygen sensor o Service data o Item No.11, 59	Sensor voltage	Engine: Warm-up (make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
			When engine is suddenly raced	600-1,000 mV
		Engine: Warm-up (using the oxygen sensor signal, check the air/ fuel mixture ratio, and also check the condition of control by the ECU)	750 rpm (Idle)	400 mV or lower
			2,000 rpm	- (changes) 600-1,000 mV

Harness inspection Procedures (For Federal)

<p>1</p> <p>Engine control unit-harness side connector</p> <p>H Harness side connector</p> <p>C50-1</p>	<p>Check for an open-circuit, or a short-circuit to ground between the ECU and the oxygen sensor.</p> <ul style="list-style-type: none"> o Oxygen sensor connector: Disconnected o ECU connector: Disconnected 	<p>OK → END !</p> <p>NG → Repair the harness (H1-C50-1 9)</p>
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Harness Inspection Procedures (For California)

<p>1</p> <p>(Front) (Rear)</p> <p>H, I Harness side connector</p>	<p>Measure the power supply voltage of the oxygen sensor.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage (V): System voltage 	<p>OK → 2</p> <p>NG → Repair the harness (H 4, I 3 - control relay)</p>
<p>2</p> <p>ECU Harness side connector</p> <p>(Front) (Rear)</p> <p>H, I Harness side connector</p> <p>C50-5</p>	<p>Check for an open-circuit, or a short-circuit of ground between the engine control unit and the oxygen sensor.</p> <ul style="list-style-type: none"> o Oxygen sensor connector: Disconnected o ECU connector: Disconnected 	<p>OK → 3</p> <p>NG → Repair the harness. (H 1 - C50-5 6) (I 1 - C50-5 7)</p>

3

H Harness side connector

I Harness side connector

Check for continuity of the ground circuit.

- o Connector: Disconnected

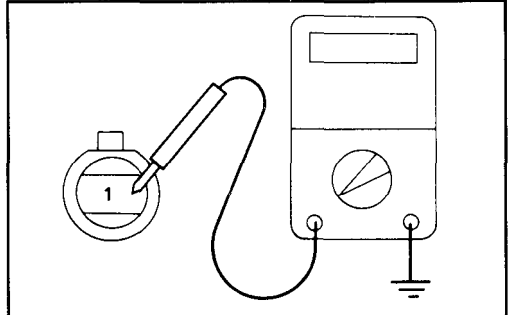
OK → **END !**

NG →

Repair the harness.
(H 2, I 2 - C50-5 12)
(H 3 - Ground)
(I 4 - Ground)

Sensor Inspection**[For Federal]****CAUTION**

- Before checking, warm up the engine until the engine coolant temperature reaches 80 to 95°C (176 to 205°F).
- Use an accurate digital voltmeter.
- Disconnect the oxygen sensor connector and connect a voltmeter to the oxygen sensor connector.
- While repeatedly racing the engine, measure the oxygen sensor output voltage.



Engine	Oxygen sensor output voltage	Remarks
Race	Min 0.6 V	Make air-fuel mixture rich by accelerator operation

Sensor Inspection**[For California]**

- Disconnect the oxygen sensor connector, and measure the resistance between terminal 3 and terminal 4.

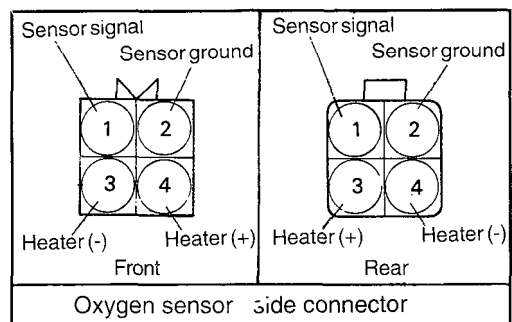
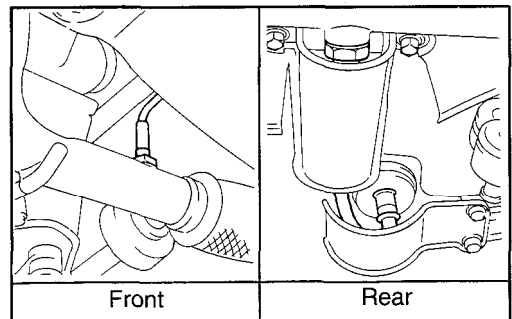
Standard value

Temperature °C (°F)	Resistance (Ω)
400 (752)	30 or more

- Replace the oxygen sensor if there is malfunction.
- Using the special tool (09392-33000), apply battery voltage directly between terminal 3 and terminal 4.

NOTE

Take care when applying the voltage, because damage will result if the terminals are incorrect or are short-circuited.



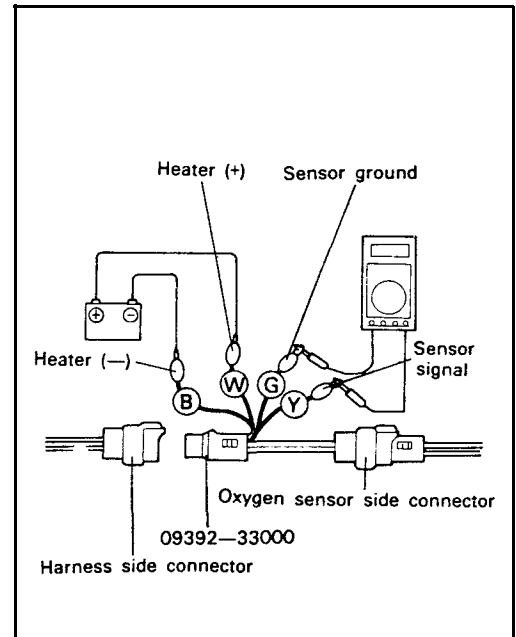
4. Connect a digital-type voltmeter between terminal 1 and terminal 2.
5. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Engine	Oxygen sensor output voltage	Remarks
Race	Min. 0.6V	Makes the air/fuel mixture rich by increased engine speed

6. If there is a problem, it is probable that there is a malfunction of the oxygen sensor.

Tightening torque

Oxygen sensor 40-50 Nm (400-500 kg.cm, 29-36 lb.ft)



Using Multi-use Tester

Check Item	Data display	Check conditions	Check content	Test specification
Injector o Service data o Item No. 41	Drive time* ¹	Engine: Cranking	0°C (32°F)* ²	Approx. 17 ms
			20°C (68°F)	Approx. 35 ms
			80°C (176°F)	Approx. 8.5 ms

Check Item	Data display	Check conditions	Engine state	Test specification
Injector o Service data o Item No. 41	Drive time	o Engine coolant temperature: 80 to 95°C (176 to 205°F) o Lamps, electric cooling fan, accessory units: All OFF o Transaxle: Neutral (P range for vehicle with A/T) o Steering wheel: Neutral	750 rpm (Idle)	2.2-2.9 ms
			2,000 rpm	1.8-2.6 ms
			Rapid racing	To increase

NOTE

*1 : The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.

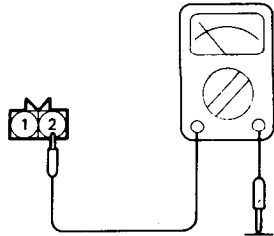
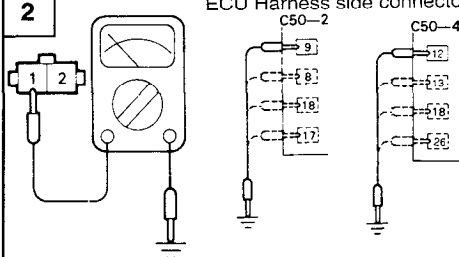
*2: When coolant temperature is lower than 0°C (32°F) the ECU fires all four cylinders simultaneously.

*3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.

Check Item	Item No.	Drive content	Check condition	Normal state
Injector o Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during after engine warm-up, check the idling condition)	Idle should become unstable as injector shut off.
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		

Harness Inspection Procedures

* California only

<div>1</div>  <p>A B C D Harness side connector</p> <p>31J099</p>	<p>Measure the power supply voltage of the injector.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage (V): System voltage 	<p>OK →</p> <p>NG →</p>	<div>2</div> <p>Repair the harness. (A B C D 2 - Control relay) Check the power supply.</p>
<div>2</div>  <p>ABCD Harness side connector</p> <p>31J100</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the injector.</p> <ul style="list-style-type: none"> o ECU connector: Disconnected o Injector connector: Disconnected 	<p>OK →</p> <p>NG →</p>	<p>END !</p> <p>Repair the harness. (A B C D 1 - C50-2 9 , 8 , 18 , 17) * (A B C D 1 - C50-4 12 , 13 , 25 , 26)</p>

Actuator Inspection

Operation Check

Using a multi-use tester, check as described below.

- o Cut off the fuel injectors in sequence.
- o Check the operation time of the injectors.

Operation Sound Check

1. Using a stethoscope, check the injectors for a clicking sound at idle. Check that the sound is produced at shorter intervals as the engine speed increases.

NOTE

Ensure that the sound from an adjacent injector is not being transmitted along the delivery pipe to an inoperative injector.

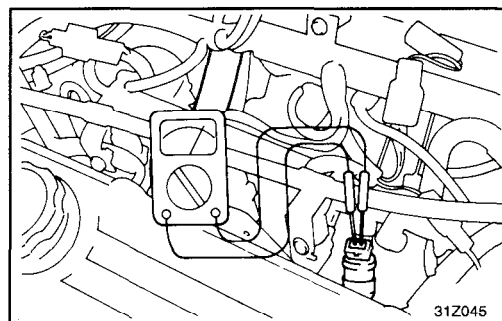
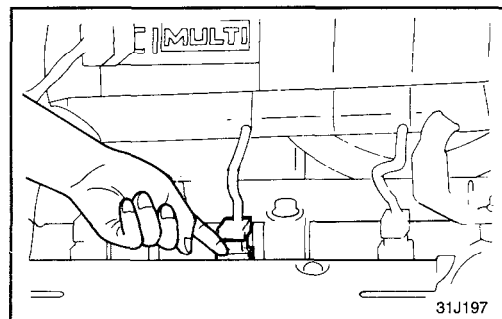
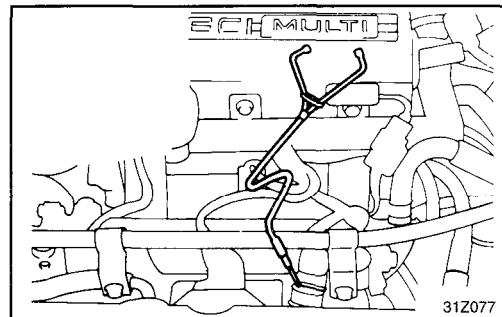
2. If a stethoscope is not available, check the injector operation with your finger.
If no vibrations are felt, check the wiring connector, injector, or injection signal from ECU.

Resistance Measurement Between Terminals

1. Disconnect the connector at the injector.
2. Measure the resistance between terminals.

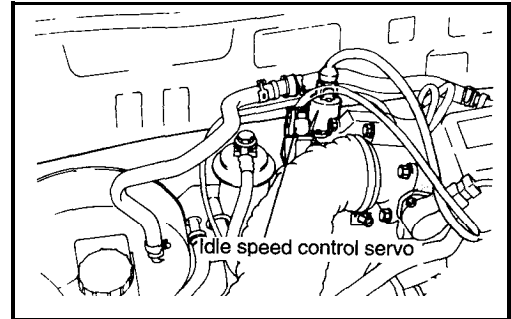
Standard value	13-16 Ω [at 20°C (68°F)]
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3. Connect the connector to the injector.



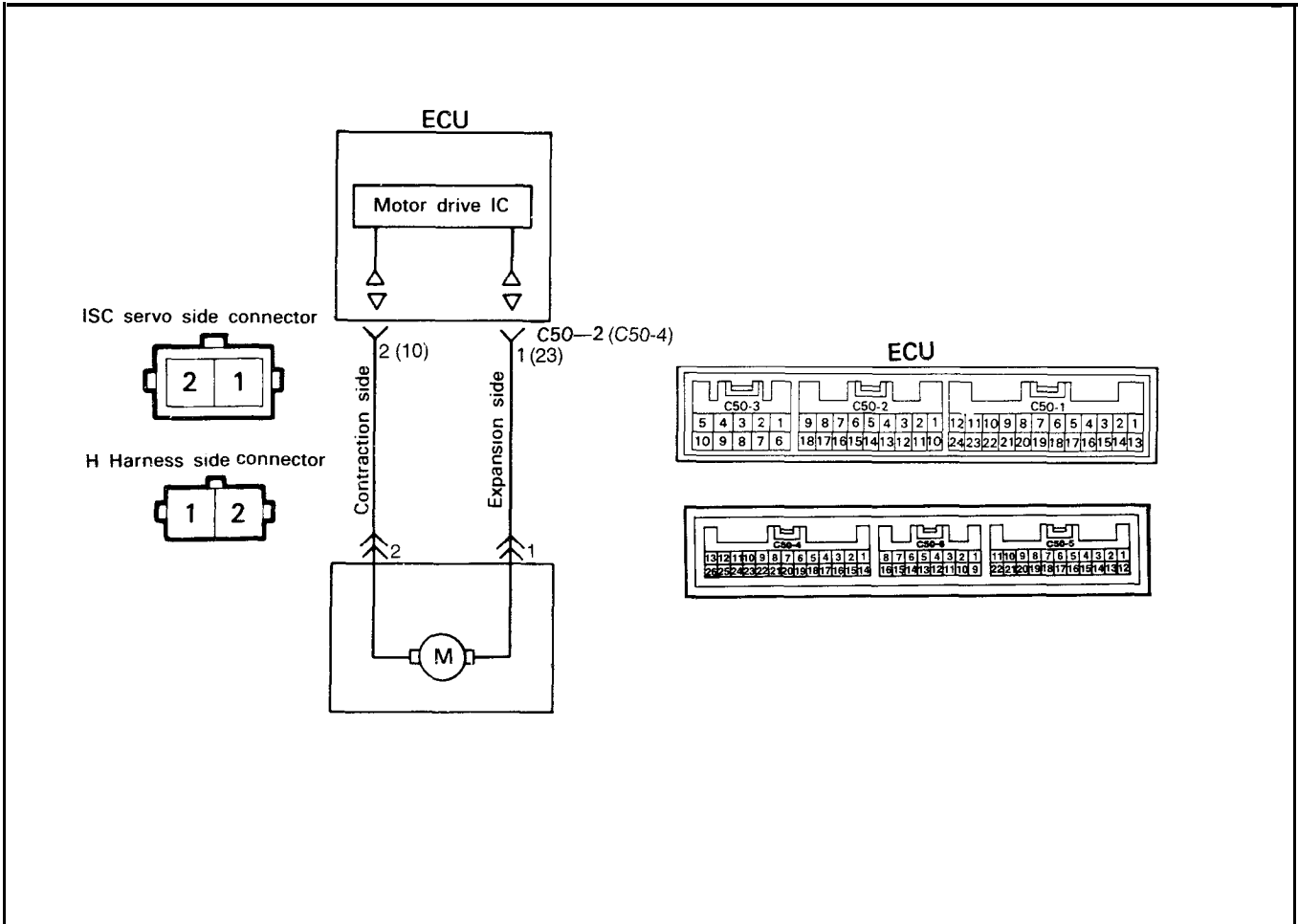
IDLE SPEED CONTROL SERVO (DC MOTOR TYPE)

The servo plunger extends or retracts to open or close the throttle valve, thereby controlling the intake air volume. And the DC motor is driven in forward or backward direction according to the current flow switched by the motor drive IC in the ECU.



Circuit Diagram

() : California only



Troubleshooting Hints

In case irregular idling or engine stall is caused but the causes cannot be determined, turn ON the ignition switch for 15 seconds or more. Then disconnect the servo connector. This facilitates troubleshooting. If necessary, turn the idle speed control adjusting screw to adjust the engine.

Harness Inspection Procedures

* California only

1

Check for an open-circuit, or a short-circuit to ground between the ECU and the ISC servo.

OK → **END !**

NG → Repair the harness.
(H 2-C50-2 2)
(H 1-C50-2 1)
* (H 2-C50-4 10)
* (H 1-C50-4 23)

Actuator InSpeCtIOn

1. Disconnect the idle speed control servo connector.
2. Check continuity of the idle speed control servo coil.

CAUTION

During check the continuity, make sure the ambient air temperature.

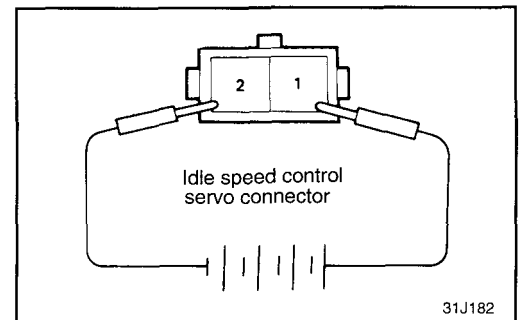
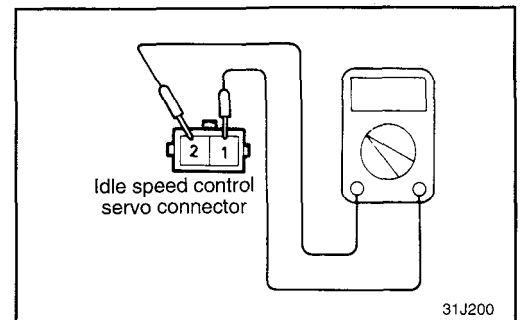
Measuring terminals	Continuity
1-2 conductive	5-70 Ω at 20°C (68°F)
	92 Ω at 100°C (212°F)

3. Connect 6V DC between terminal 1 and terminal 2 of the idle speed control servo connector, and check to be sure that the idle speed control operates.
4. If there is a deviation from the standard valve, but the idle speed control operate correctly. Then the idle speed control servo is normal.

CAUTION

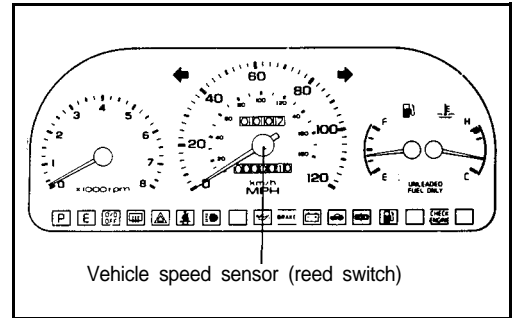
Apply only a 6V DC or lower voltage. Application of higher voltage could cause locking of the servo gears.

5. If not, operates, replace idle speed control servo as an assembly.



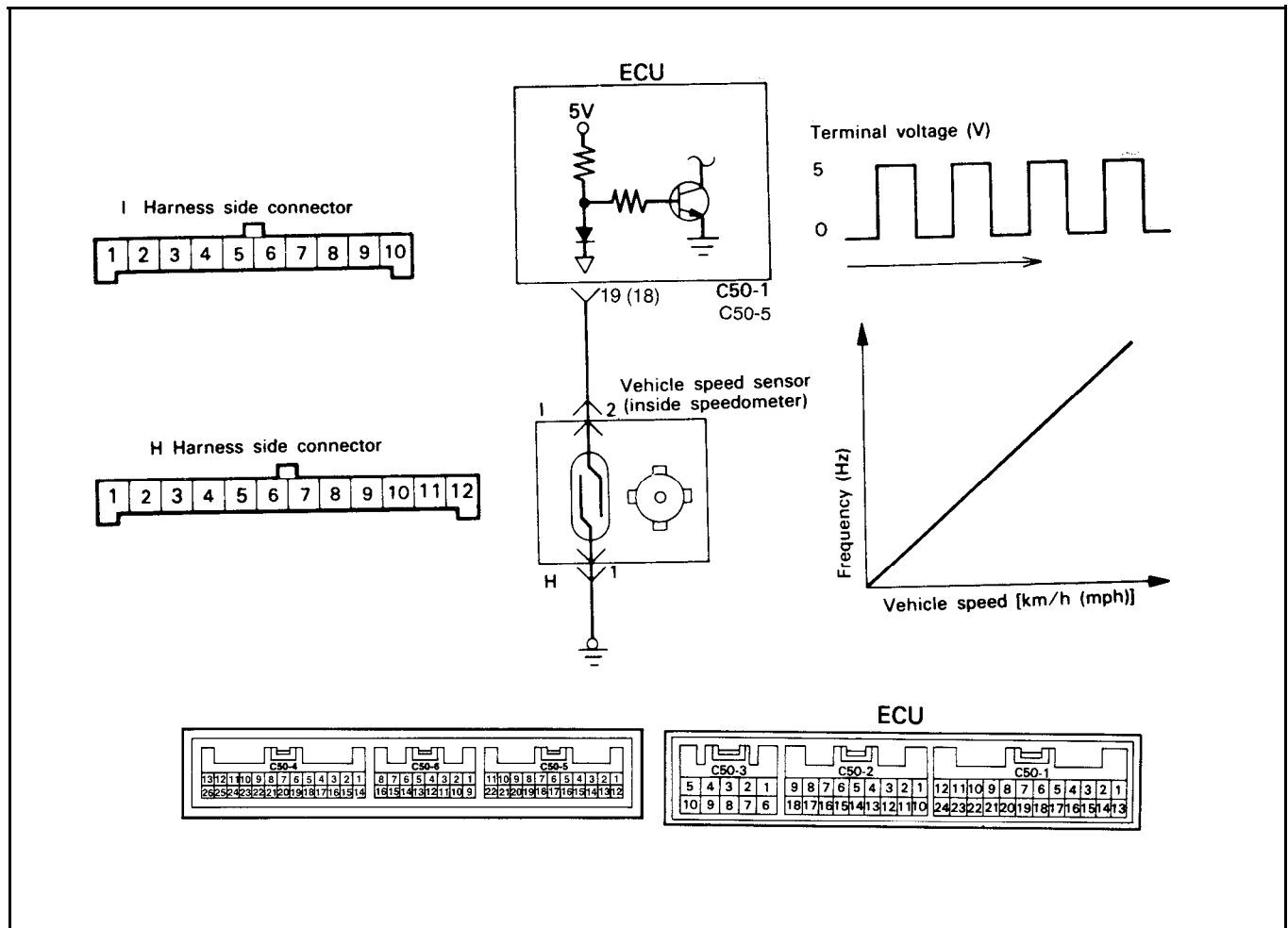
VEHICLE SPEED SENSOR

The vehicle speed sensor is a reed switch. The vehicle speed sensor is built into the speedometer and converts the transaxle gear revolutions into pulse signals, which are sent to ECU.



Circuit Diagram

() : California only

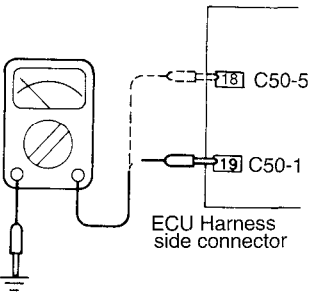
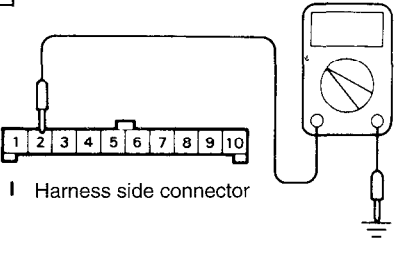
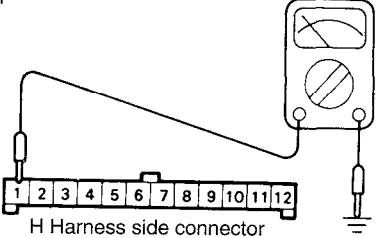


Troubleshooting Hints

If there is an open or short circuit in the vehicle speed sensor signal circuit, the engine may stall when the vehicle is decelerated to stop.

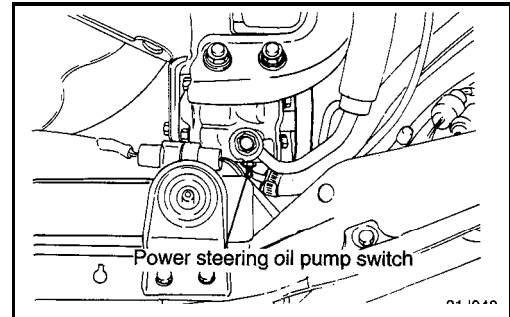
Harness Inspection Procedures

* California only

<div>2</div>  <p>31J089</p>	<p>Check the vehicle speed sensor output circuit for continuity</p> <ul style="list-style-type: none"> o Engine control unit connector: Disconnected o Move the vehicle <p>OK →</p> <p>NG →</p>	<p>END !</p> <p>2</p>
<div>2</div>  <p>31J090</p>	<p>Measure the power supply voltage of the vehicle speed sensor</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: 4.5-4.9V <p>OK →</p> <p>NG →</p>	<p>3</p> <p>Repair the harness (H 2 - C50-1 19)</p> <p>* (H 2 - C50-5 18)</p>
<div>3</div>  <p>31J091</p>	<p>Check for continuity of the ground circuit</p> <ul style="list-style-type: none"> o Connector: Disconnected <p>OK →</p> <p>NG →</p>	<p>END !</p> <p>Repair the harness (H 1-Ground)</p>

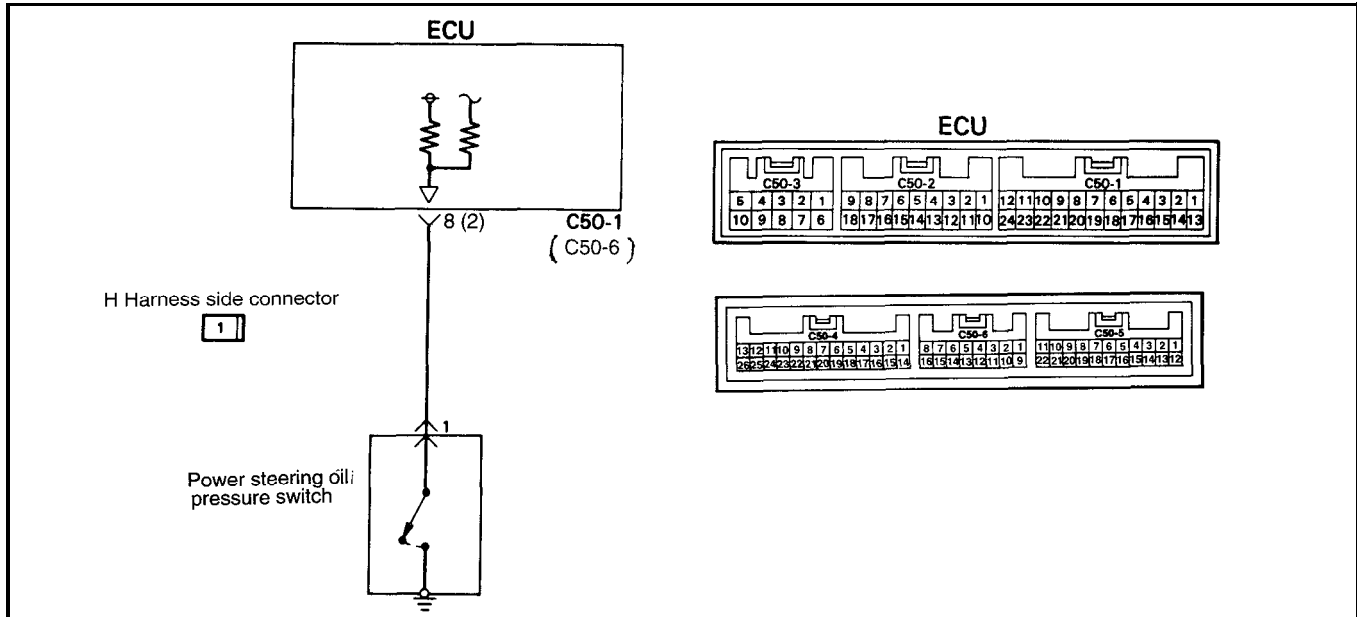
POWER STEERING OIL PRESSURE SWITCH

The power steering oil pressure switch senses the power steering load into low/high voltage and inputs it to ECU, which then controls the idle speed control servo based on this signal.



Circuit Diagram

() : California only



Using Multi-use Tester

Check Item	Data display	Check conditions	Steering wheel	Normal indication
Power steering oil pressure switch <ul style="list-style-type: none"> Service data Item No.27 	Switch state	Engine: Idling	Steering wheel neutral position (wheels straight-ahead direction)	OFF
			Steering wheel half turn	ON

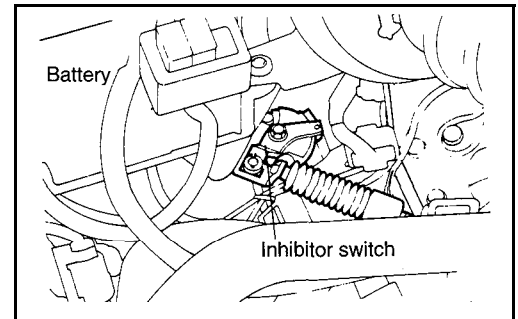
* California only

<div>3</div> <p>H Harness side connector</p> <p>31J093</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> Connector: Disconnected Ignition switch: ON Voltage (V): System voltage 	<p>OK → END !</p> <p>NG → Repair the harness. (H 1-C50-1 8) * (H 1 - C50 - 6 2)</p>
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IGNITION SWITCH-ST AND INHIBITOR SWITCH [A/T]

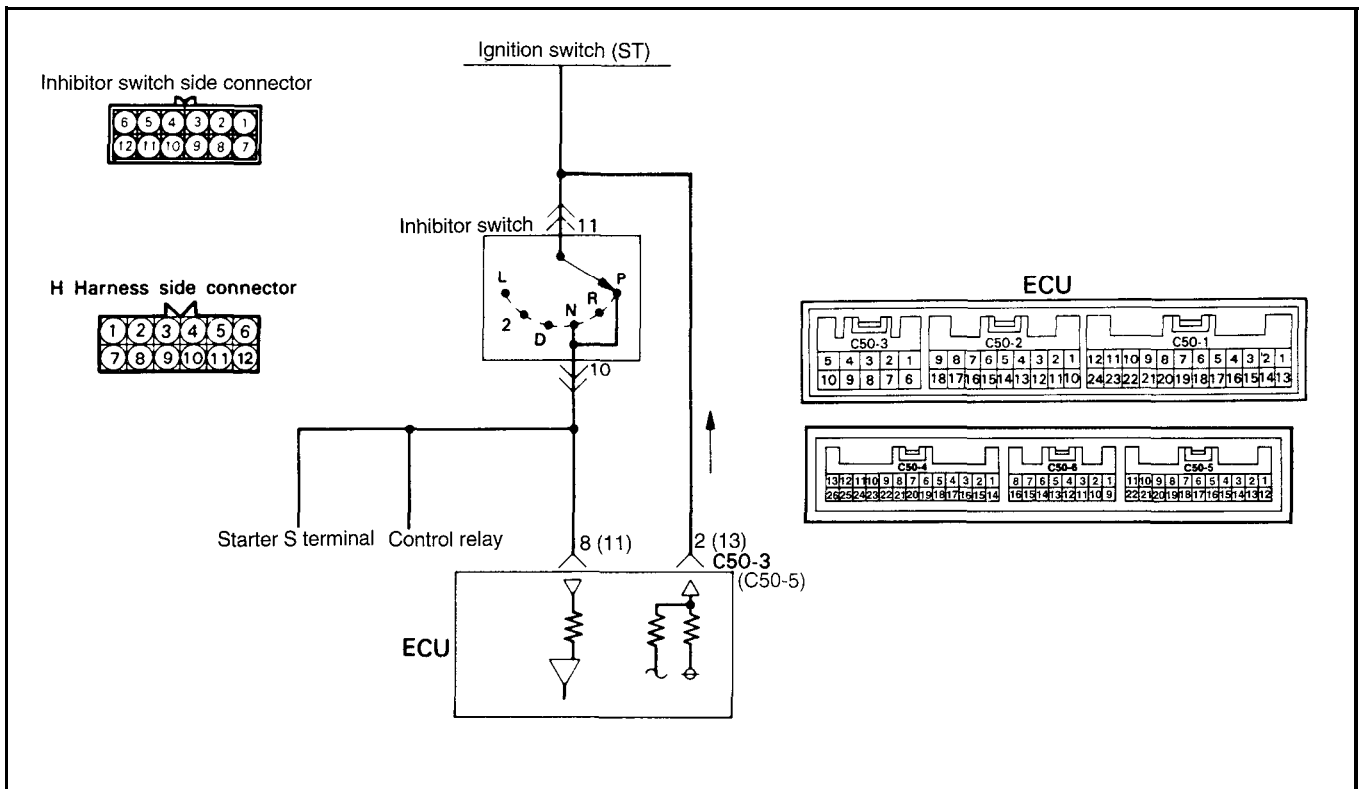
When the ignition switch is set ST position, the battery voltage is applied through the ignition switch and inhibitor switch to the ECU. If the selector lever is not P or N position, the battery voltage will not reach to the ECU.

Based on this signal, the ECU determines the automatic transaxle load and drives the idle speed actuator to maintain optimum idle speed.



Circuit Diagram

() : California only



Troubleshooting Hints

If the inhibitor switch harness check is normal but the inhibitor switch output is abnormal, check for the control cable adjustment.

Using Multi-use Tester

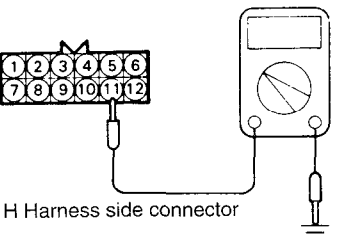
Check Item	Data display	Check conditions	Steering wheel	Normal indication
Crank signal o Service data o Item No. 18	Switch state	Ignition switch: ON	stop	OFF
			Cranking	ON

Check Item	Data display	Check conditions	Steering wheel	Normal indication
Inhibitor switch o Service data o Item No. 29	Switch state	Ignition switch: ON	P or N	P or N
			D, 2, L or R	D, 2, L or R

Harness Inspection

* California only

1



Measure the power supply voltage of the inhibitor switch

- o ECU connector: Disconnected
- o Inhibitor switch connector: Disconnected
- o Ignition switch: START and ON
- o Voltage (V): System voltage

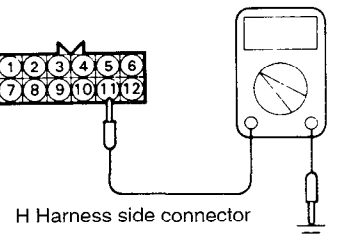
OK →

NG →

2

Check the power supply circuit.

2



Measure the input voltage of engine control unit

- o ECU connector: Connected
- o Inhibitor switch connector: Disconnected
- o Ignition switch: ON
- o Voltage (V): System voltage

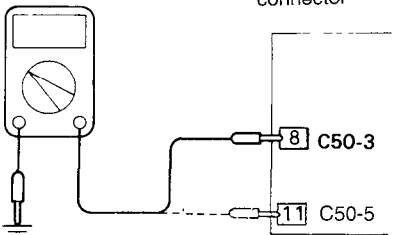
OK →

NG →

3

Repair the harness (H 11 - C50-3 2)
* (H 11 - C50-5 13)

2



Measure the input voltage of engine control unit

- o ECU connector: Disconnected
- o Inhibitor switch connector: Connected
- o Select lever: P range
- o Ignition switch: START
- o Voltage: 8V or more

OK →

NG →

END !

Repair the harness (H 10 - C50-3 8)
* (H 10 - C50-5 11)

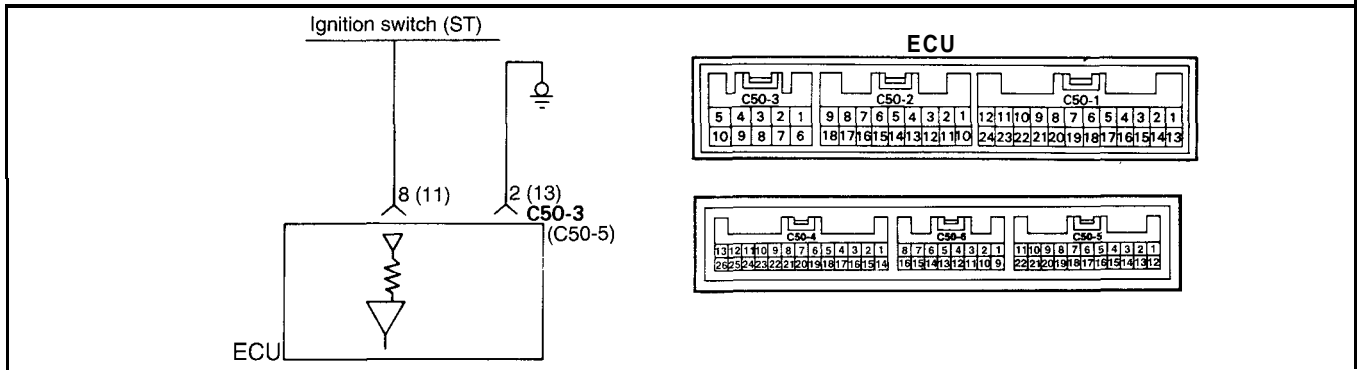
IGNITION SWITCH-ST [M/T]

The ignition switch-ST inputs a high signal to the ECU while the engine is cranking.

The ECU provides fuel injection control, etc. at engine start-up based on this signal.

Circuit Diagram

() : California only



Using Multi-use Tester

Function	Item No.	Data display	Check conditions	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	Stop	OFF
				Cranking	ON

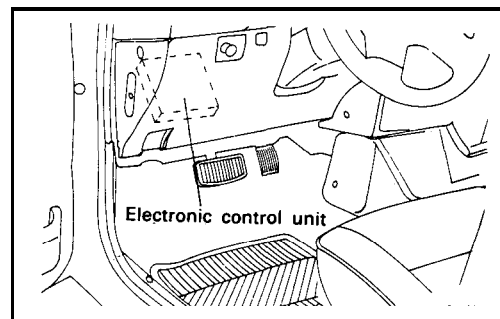
Harness Inspection

• California only

<p>1</p> <p>ECU Harness side connector</p> <p>31J195</p>	<p>Measure the input voltage to the ECU</p> <ul style="list-style-type: none"> ECU connector: Disconnected Ignition switch: START Voltage: 8V or more <p>OK → 2</p> <p>NG →</p>	<p>Repair the harness (C50-3 8- Ignition switch) * (C50-5 11 - Ignition switch)</p>
<p>2</p> <p>Engine control unit harness side connector</p> <p>31J196</p>	<p>Check for continuity of the ground circuit</p> <ul style="list-style-type: none"> ECU connector: Disconnected <p>OK → END !</p> <p>NG →</p>	<p>Repair the harness (C50-3 2- Ground) * (C50-5 13 - Ground)</p>

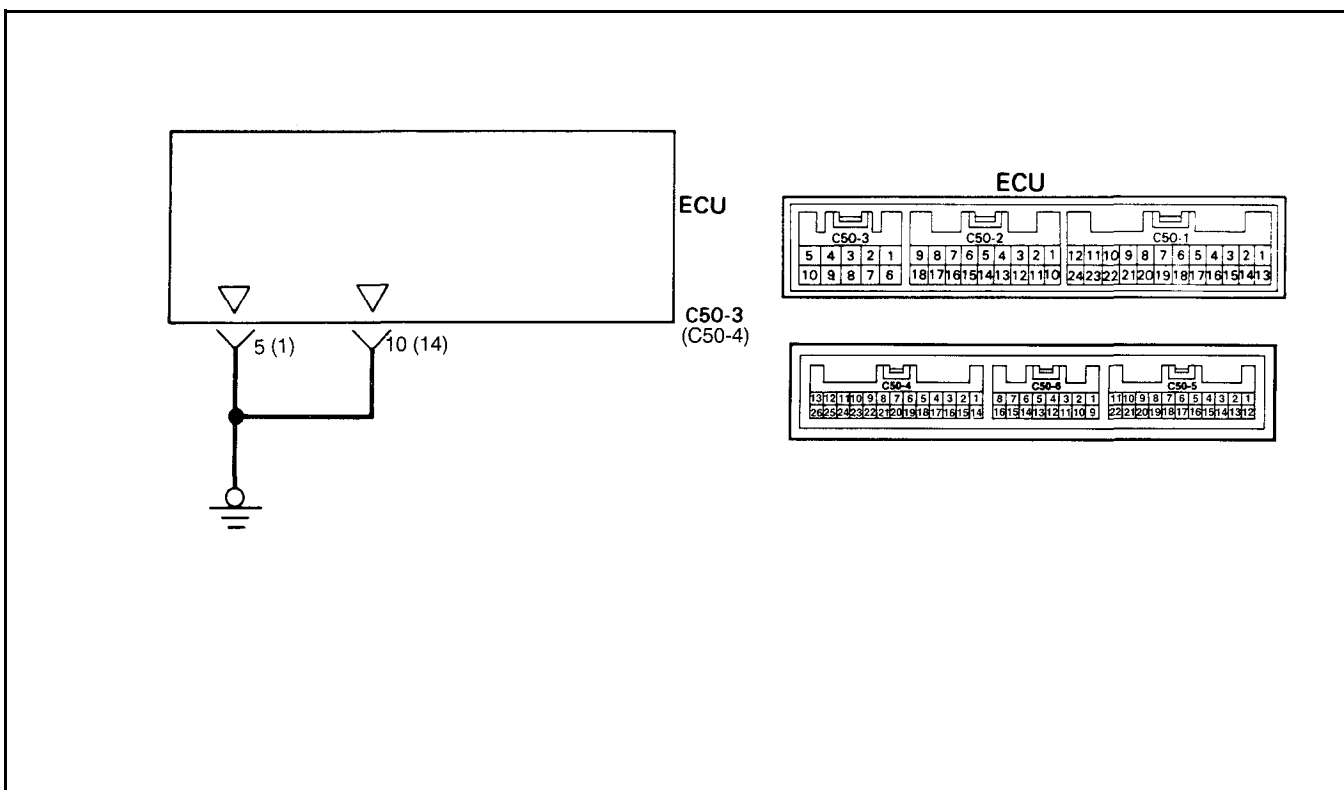
ELECTRONIC CONTROL UNIT (ECU)- POWER GROUND

Grounds the electronic control unit.



Circuit Diagram

() : California only



Troubleshooting Hints

If the ground wire of the ECU is not connected securely to ground, the unit will not operate correctly.

Harness Inspection

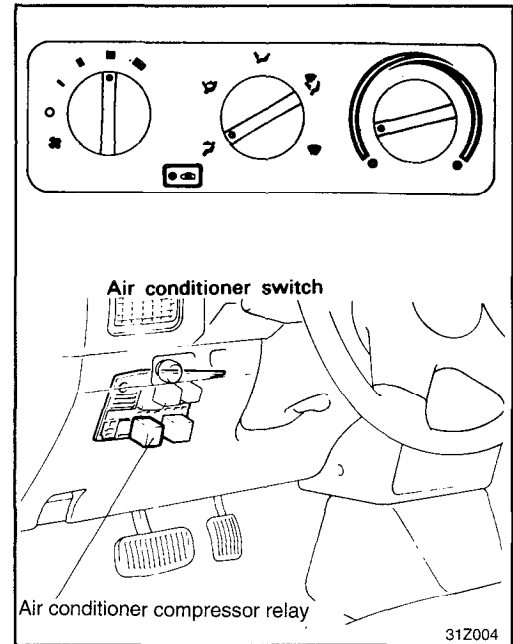
* California only

<p>1</p> <p>31J118</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o ECU connector: Disconnected <p>OK →</p> <p>NG →</p>	<p>END !</p> <p>Repair the harness (C50-3 5, 10 - Ground)</p> <p>* (C50-4 1, 14 - Ground)</p>
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AIR CONDITIONER SWITCH AND AIR CONDITIONER RELAY

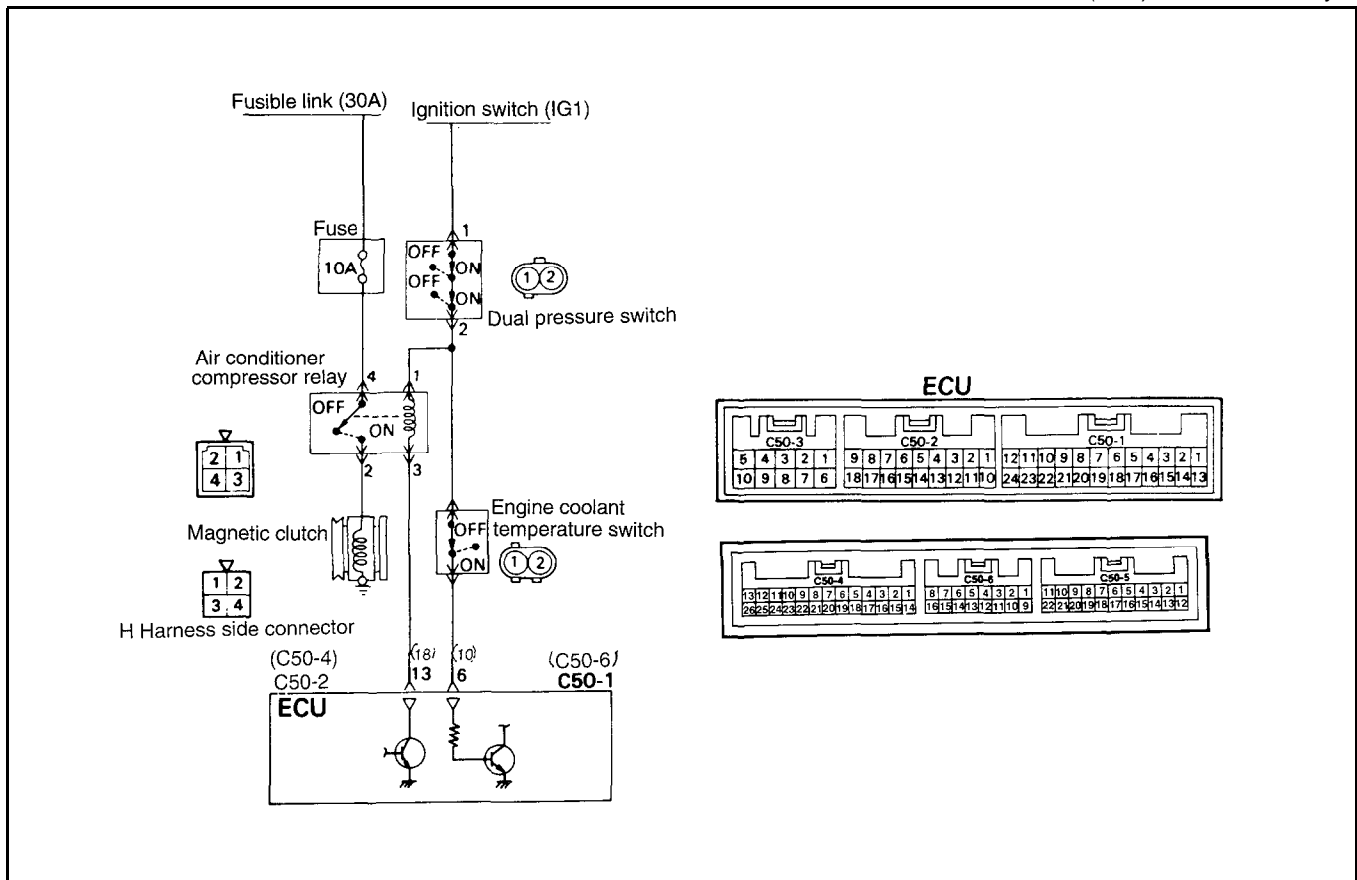
The air conditioner switch applies the battery voltage to the ECU when the air conditioner is turned on.

When the air conditioner ON signal is input, the ECU drives the ISC servo and turns ON the power transistor. And then the air conditioner power relay coil is energized to turn on the relay switch, which activates the air compressor magnetic clutch.



Circuit Diagram

() : California only



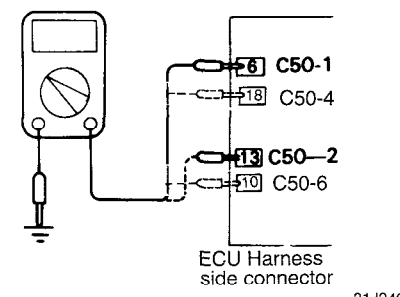
Troubleshooting Hints

If the air compressor magnet clutch is not activated when the air conditioner switch is turned on during idling, faulty air conditioner control system is suspected.

Using Multi-use Tester

Check Item	Data display	Check conditions	Air conditioner switch	Normal indication
Air conditioner switch o Service data o Item No.28	Switch state	Engine: Idling (air compressor to be running when air conditioner switch is ON)	OFF	OFF
			ON	ON
Air conditioner relay o Service data o Item No.49	Air conditioner relay state	Engine: Idling after warm-up	OFF	OFF (compressor clutch non-activation)
			ON	ON (compressor clutch activation)

Harness Inspection

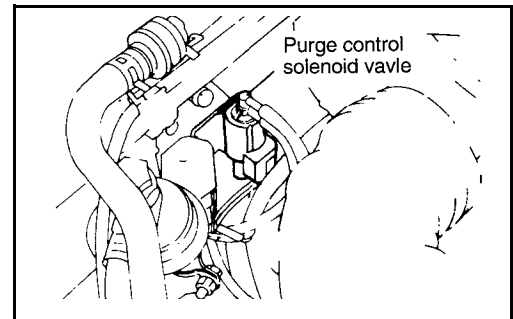
<div>1</div> 	<p>Measure the power supply voltage of the air conditioner circuit.</p> <ul style="list-style-type: none"> o Air conditioner switch: ON o Engine control unit connector: Disconnected o Ignition switch: ON o Voltage: System voltage 	<p>OK → END !</p> <p>NG → Check the air conditioner circuit</p>
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Air Conditioner Inspection

Refer to GROUP 97-Service Adjustment Procedures.

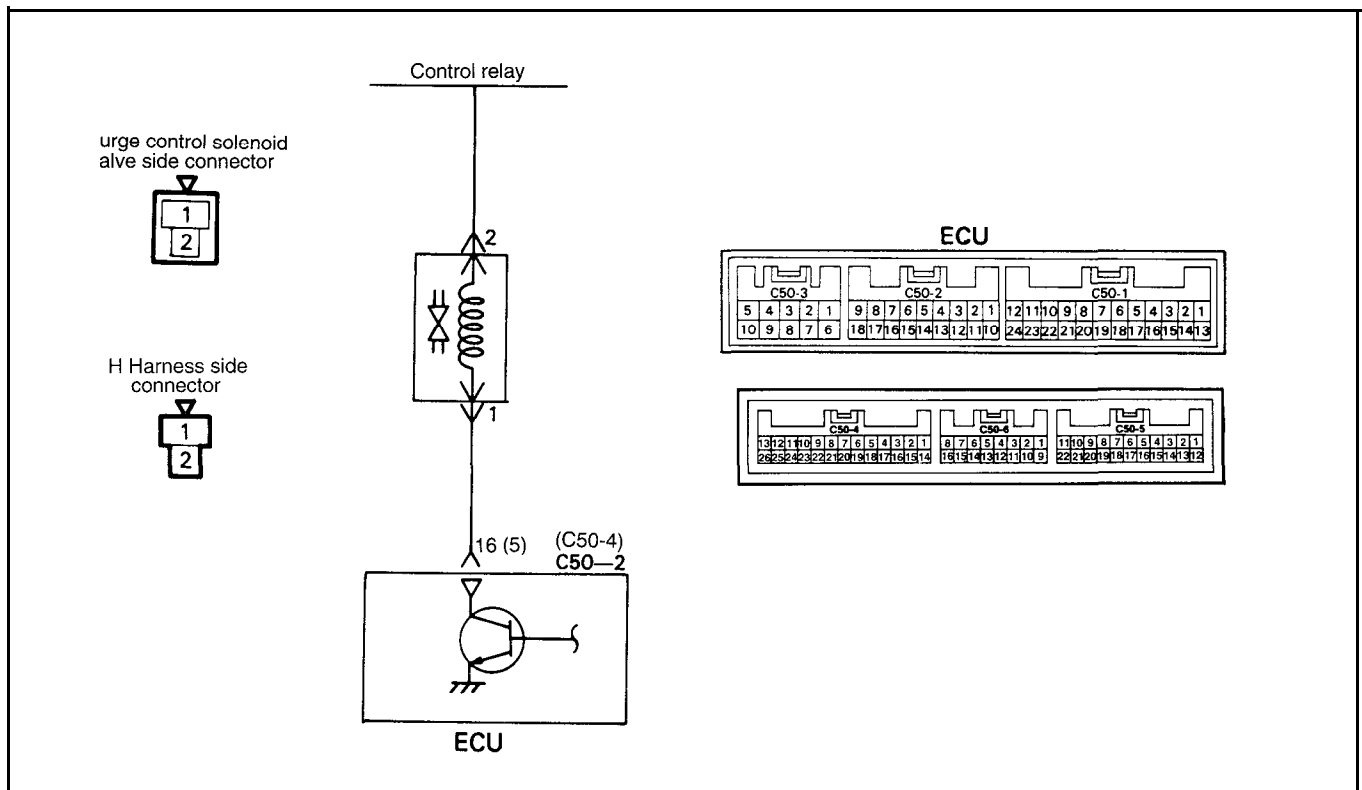
PURGE CONTROL SOLENOID VALVE

The purge control solenoid valve is an ON-OFF type, which controls introduction of purge air from the canister.



Circuit Diagram

() : California only

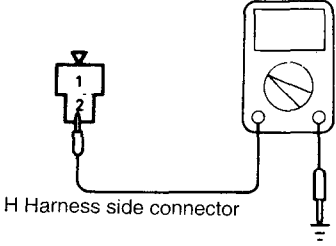
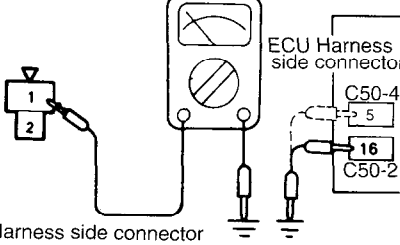


Using Multi-use Tester

Check Item	Drive content	Check condition	Normal state
Purge control solenoid valve o Service data o Item No.8	Solenoid valve from OFF to ON	Ignition switch: ON	Operating sound is heard when driven

Harness Inspection

* California only

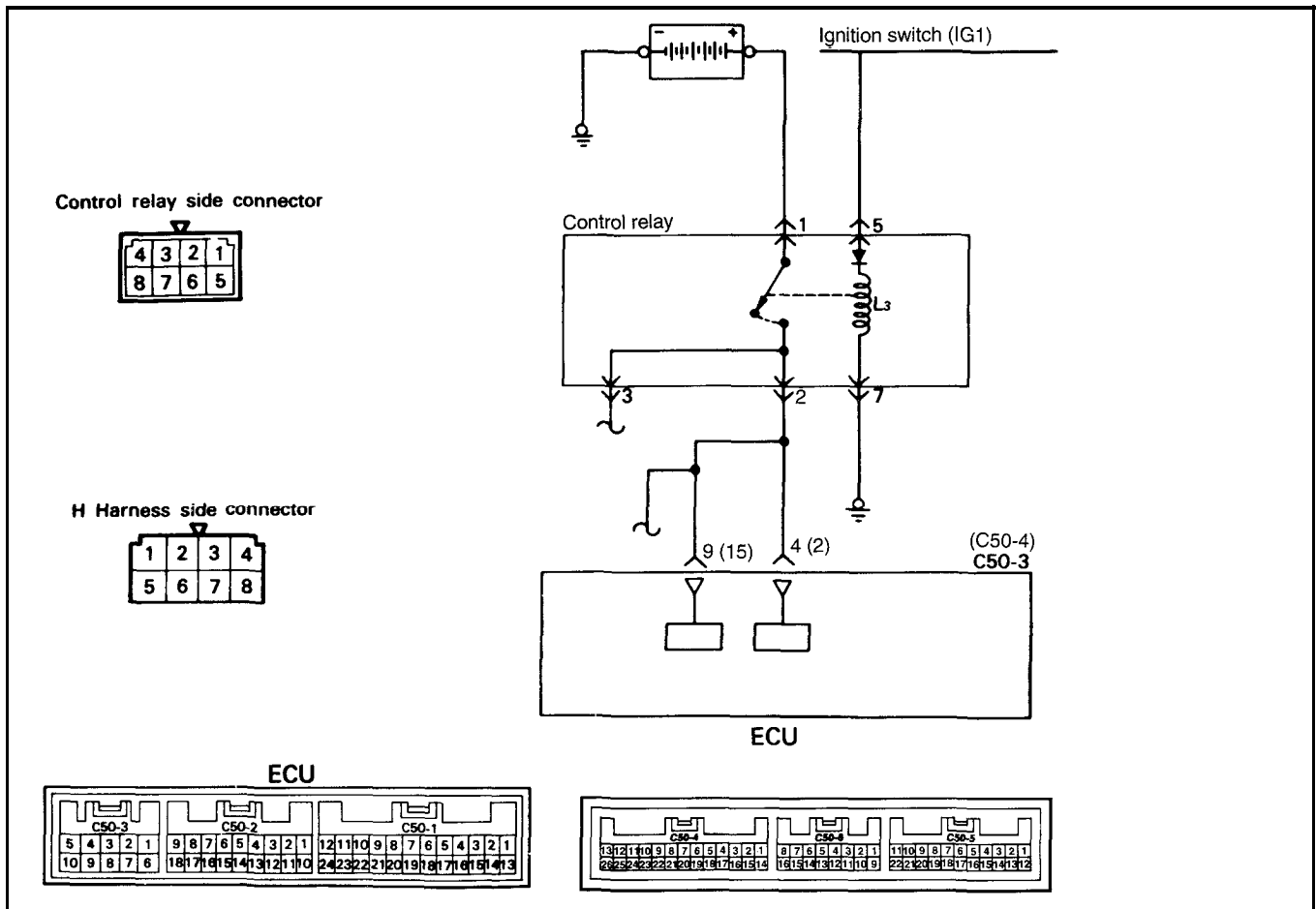
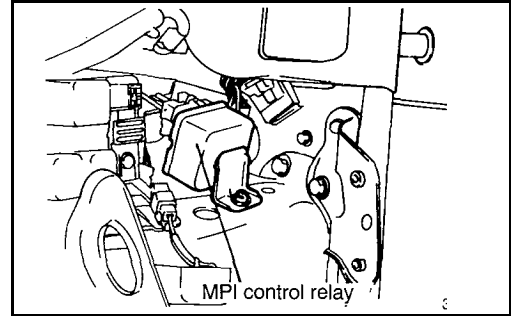
<div>1</div>  <div>31J223</div>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage: System voltage <p>OK →</p> <p>NG →</p>	<div>2</div> <p>Repair the harness. (Control relay - H 2)</p>
<div>2</div>  <div>31J224</div>	<p>Check for an open-circuit, or a short-circuit to ground between the purge control solenoid valve and the engine control unit.</p> <ul style="list-style-type: none"> o Engine control unit connector: Disconnected o Purge control solenoid valve connector: Disconnected <p>OK →</p> <p>NG →</p>	<p>END !</p> <p>Repair the harness. (H 1 - C50-2 16) * (H 1 - C50-4 5)</p>

Actuator Inspection

Refer to GROUP 29-Evaporative Emission Control System.

CONTROL RELAY

When the ignition switch is on, battery power is supplied to the ECU, the injector, the air flow sensor, etc. While the ignition switch is turned on, current flows from the ignition switch through the current relay coil to ground.

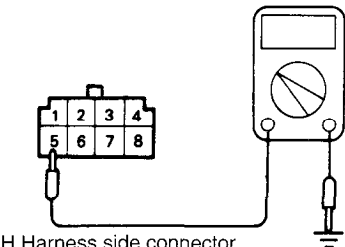
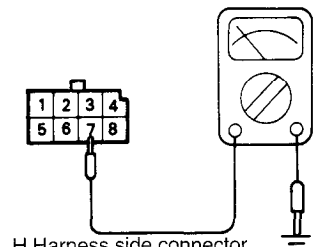
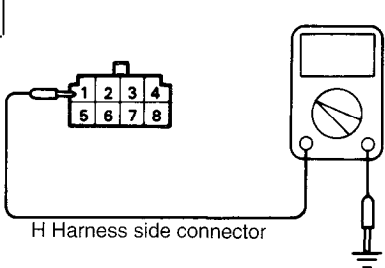
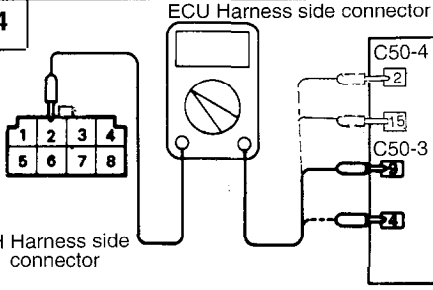


Using Multi-use Tester

Check Item	Data display	Check condition	Test specification
Battery voltage o Service data o Item No. 16	ECU power voltage	Ignition switch: ON	11-13V

Harness Inspection

* California only

<p>1</p>  <p>H Harness side connector</p> <p>31J202</p>	<p>Measure the power supply voltage of the control relay.</p> <ul style="list-style-type: none"> o Control relay connector: Disconnected o Ignition switch: ON o Voltage (V): System voltage 	<p>OK → 2</p> <p>NG → Repair the harness. (Ignition switch-H 5)</p>
<p>2</p>  <p>H Harness side connector</p> <p>31J203</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Control relay connector: Disconnected 	<p>OK → 3</p> <p>NG → Repair the harness. (H 7-Ground)</p>
<p>3</p>  <p>H Harness side connector</p> <p>31J204</p>	<p>Measure the power supply voltage of the control relay.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Voltage (V): System voltage 	<p>OK → 4</p> <p>NG → Repair the harness. (Battery-H 1)</p>
<p>4</p>  <p>H Harness side connector</p> <p>ECU Harness side connector</p> <p>31J206</p>	<p>Check for open-circuit, or short-circuit to ground, between the engine control unit and the control relay.</p> <ul style="list-style-type: none"> o ECU connector: Disconnected o Control relay connector: Disconnected 	<p>OK → END !</p> <p>NG → Repair the harness. (H2-C50-3 9) (H2-C50-3 4) * (H2-C50-4 2) * (H2-C50-4 15)</p>

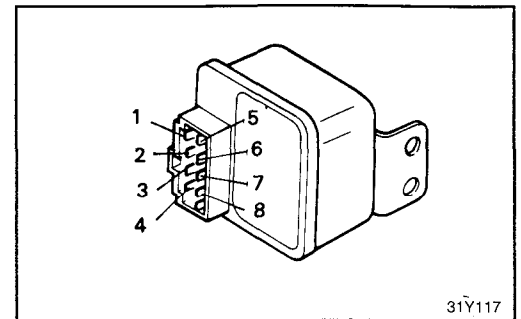
Control Relay Inspection

CAUTION

When applying battery voltage directly, make sure that it is applied to correct terminal. Otherwise, the relay could be damaged.

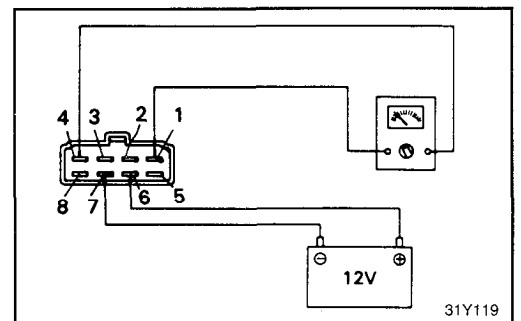
1. Check continuity of the control relay coil.

Measuring terminal	Continuity
2 - 8	Yes (approx. 95 Ω)
3 - 8	
6 - 7	Yes (approx. 35 Ω)
5 - 7	Yes, in one direction only



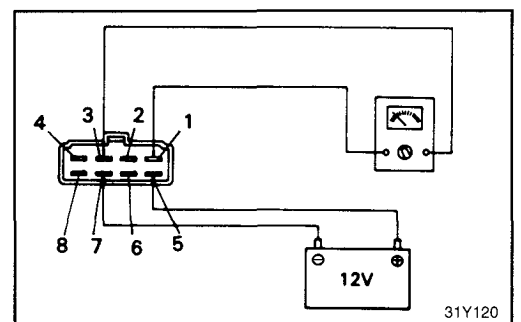
2. Check continuity of relay contacts between terminals 1 and 4.

Relay coil [between terminals 6 and 7.	Continuity
When de-energized	No ($\infty \Omega$)
When energized	Yes (0 Ω)



3. Check continuity of relay contacts between terminals 1 and 3.

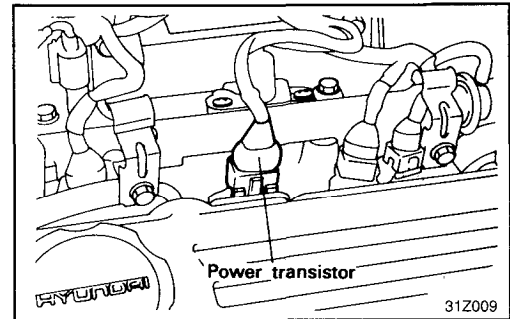
Relay coil (between terminals 5 and 7)	Continuity
When de-energized	No ($\infty \Omega$)
When energized	Yes (0 Ω)



4. If faulty, replace the control relay.

IGNITION COIL AND POWER TRANSISTOR

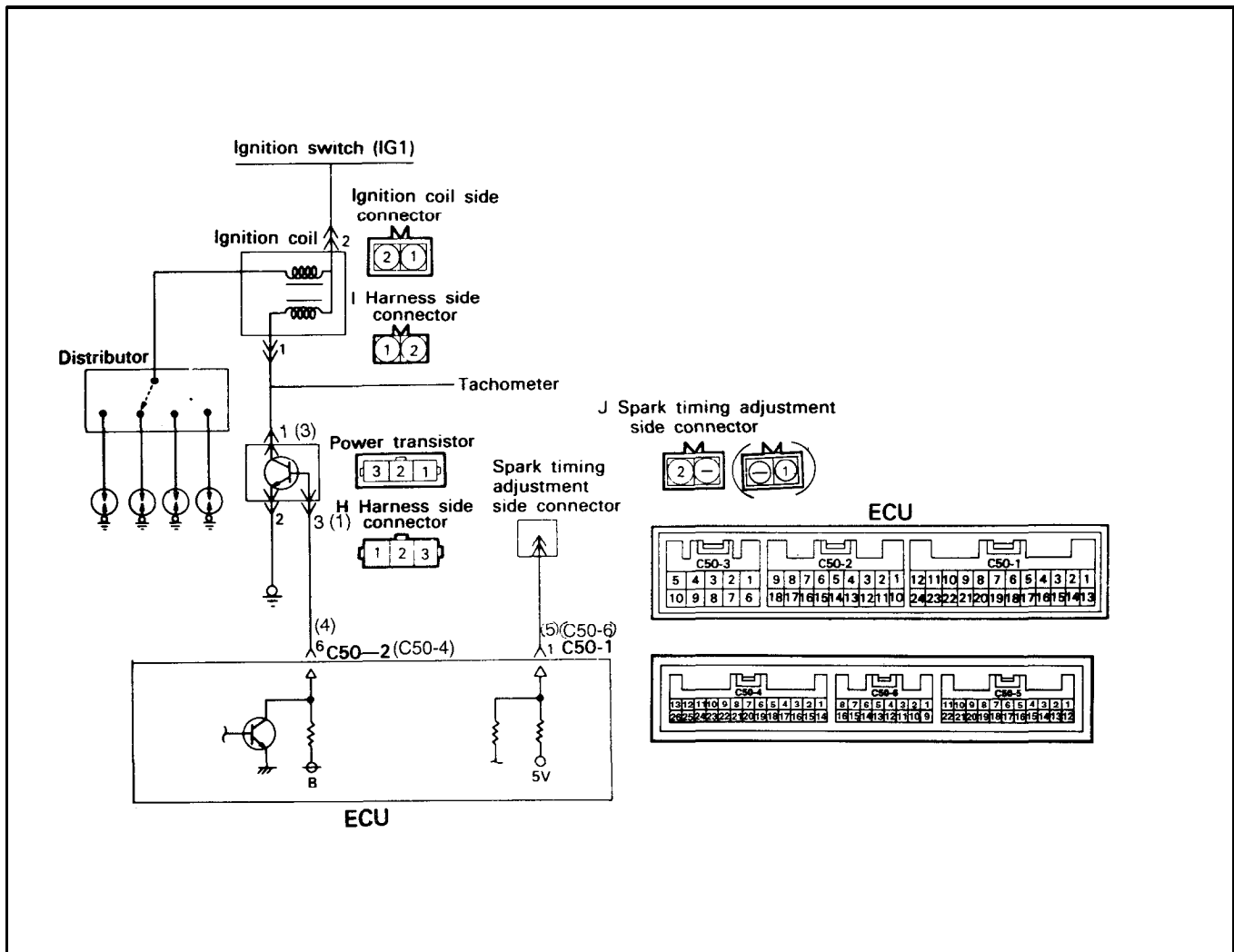
When the power transistor is turned ON by the signal from the ECU, primary current is shut off and a high voltage is induced in the secondary coil.



31Z009

Circuit Diagram

() : California only

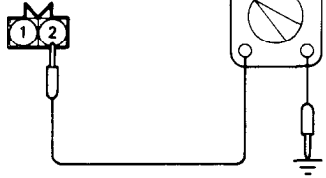
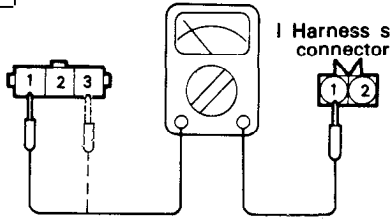
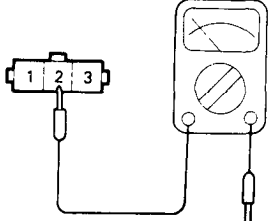
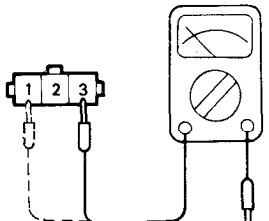
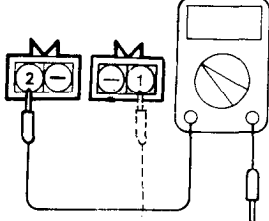


Using Multi-use Tester

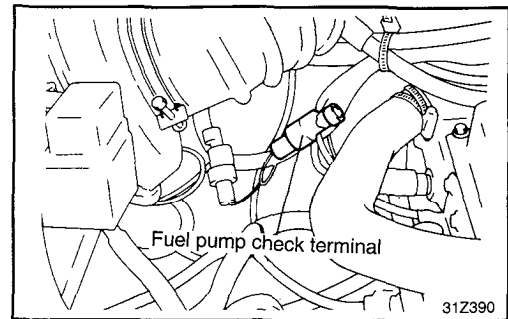
Check Item	Check condition	Engine state	Standard value
Ignition advance o Service data o Item No. 44	o Engine: Warmed up o Timing light: Set (set timing light to check actual ignition timing)	750 rpm (Idle)	8-12°BTDC
		2,000 rpm	26-34°BTDC

Harness Inspection

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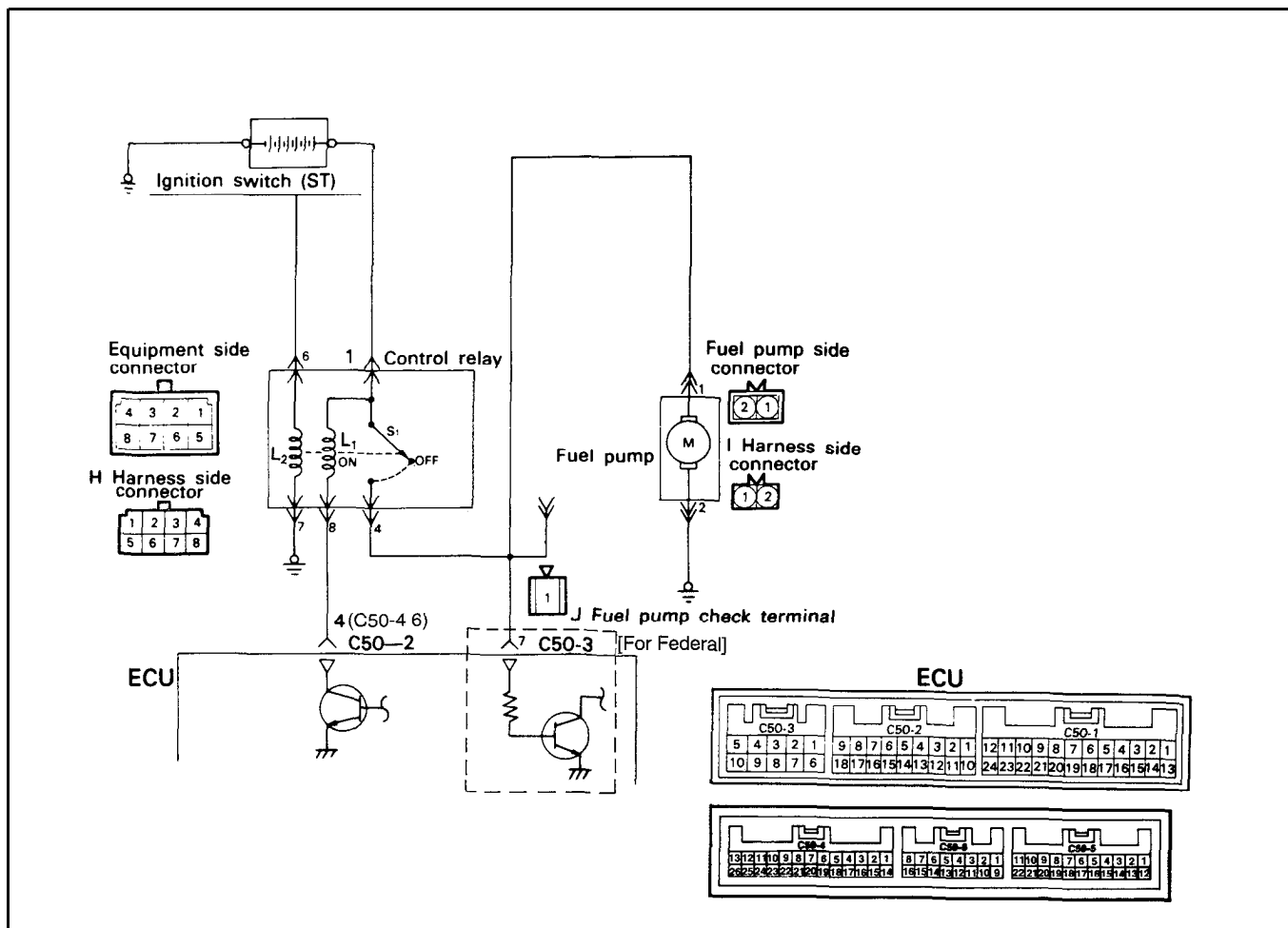
<p>1</p>  <p>I Harness side connector</p> <p>31J208</p>	<p>Measure the power supply voltage of the ignition coil.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: ON o Voltage (V): System voltage 	<p>OK → 2</p> <p>NG → Repair the harness. (I 2-Ignition switch)</p>
<p>2</p>  <p>H Harness side connector</p> <p>I Harness side connector</p> <p>31J209</p>	<p>Check for an open-circuit, or a short-circuit to ground between the power transistor and the ignition coil.</p> <ul style="list-style-type: none"> o Ignition coil connector: Disconnected o Power transistor connector: Disconnected 	<p>OK → 3</p> <p>NG → Repair the harness. (H 1 - I 1) * (H 3 - I 1)</p>
<p>3</p>  <p>H Harness side connector</p> <p>31J210</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> o Connector: Disconnected 	<p>OK → 4</p> <p>NG → Repair the harness. (H 2-Ground)</p>
<p>4</p>  <p>H Harness side connector</p> <p>31J211</p>	<p>Measure the voltage of the control signal circuit of the power transistor.</p> <ul style="list-style-type: none"> o Connector: Disconnected o Ignition switch: START o Voltage: 2 - 6 V 	<p>OK → 5</p> <p>NG → Repair the harness. (H 3 - C50-2 6) * (H 1 - C50-4 4)</p>
<p>5</p>  <p>J Spark timing adjustment side connector</p>	<p>Measure the voltage of the ignition timing adjustment terminal.</p> <ul style="list-style-type: none"> o Ignition switch: ON o Voltage: 4.0 - 5.2 V 	<p>OK → END !</p> <p>NG → Repair the harness. (J 2 - C50-1 1) * (J 1 - C50-6 5)</p>

FUEL PUMP



Circuit Diagram

() : California only

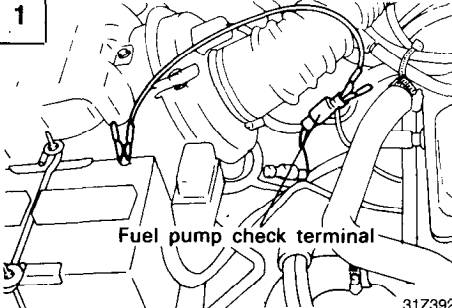
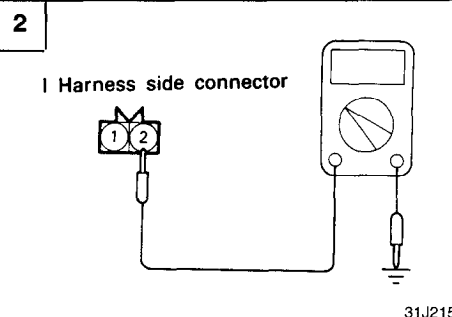
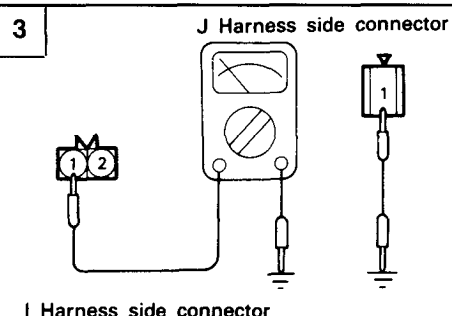
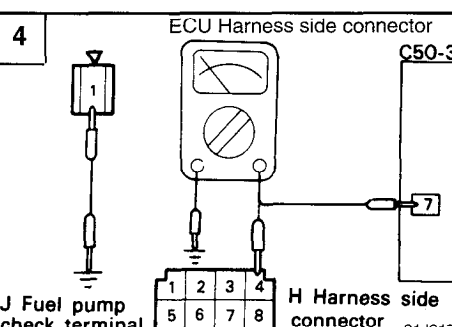


Using Multi-use Tester

Check Item	Drive	Check condition	Engine state	Normal state
Fuel pump o Actuator test o Item No.07	Fuel pump is driven to circulate fuel	o Engine cranking o Forced drive of fuel pump Check is made for above two conditions	Check content Hold return hose with fingers to feel pulsation indicating fuel flow	Pulsation is felt
			Listen to pump operating sound near fuel tank	Operating sound is heard

Harness Inspection

* California only

<p>1</p>  <p>Fuel pump check terminal</p> <p>31Z392</p>	<p>Check the fuel pump.</p> <ul style="list-style-type: none"> o Apply battery voltage to the checking terminal and operate the pump <p>OK → 4</p> <p>NG → 2</p>	
<p>2</p>  <p>I Harness side connector</p> <p>31J215</p>	<p>Check the ground circuit of the fuel pump.</p> <ul style="list-style-type: none"> o Connector: Disconnected <p>OK → 3</p> <p>NG → Repair the harness. (I 2-Ground)</p>	
<p>3</p>  <p>J Harness side connector</p> <p>I Harness side connector</p> <p>31J219</p>	<p>Check for continuity between the fuel pump and the checking terminal.</p> <ul style="list-style-type: none"> o Connector: Disconnected <p>OK → 4</p> <p>NG → Repair the harness. (I 1 - J 1)</p>	
<p>4</p>  <p>J Fuel pump check terminal</p> <p>ECU Harness side connector</p> <p>C50-3</p> <p>H Harness side connector</p> <p>31J217</p>	<p>Check for continuity between the checking terminal and the ECU, and between the control relay terminals.</p> <ul style="list-style-type: none"> o Control relay connector: Disconnected o ECU connector: Disconnected o Fuel pump connector: Disconnected <p>OK → 5</p> <p>NG → Repair the harness. (H 4- J 1) (J 1 - C50-3 7)</p>	