### 1990-91 ENGINE PERFORMANCE Self-Diagnostics - Montero

## **CRANK ANGLE SENSOR**

## Operation

- The crank angle sensor functions to detect the crank angle (position) of each cylinder, and to convert those data to pulse signals, which are then input to the engine control unit. The engine control unit, based upon those signals, calculates the engine RPM, and also regulates the fuel injection timing and the ignition timing.
- The power for the crank angle sensor is supplied from the control relay and is grounded to the vehicle body. The crank angle sensor, by intermitting the flow (to ground) of the 5-volt signal applied from the engine control unit, produces pulse signals. See <u>Fig. 40</u>.



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## **<u>Fig. 40: Identifying Crank Angle Sensor Circuit</u>** Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

### **Trouble Shooting Hints**

- 1. If an impact is suddenly felt during driving or the engine suddenly stalls during idling, try shaking the crank angle sensor during idling. If the engine stalls, the cause may be presumed to be improper or incomplete contact of the crank angle sensor's connector.
- 2. If the crank angle sensor output RPM is zero RPM during cranking when the engine cannot be started, the cause may be presumed to be a malfunction of the crank angle sensor or a broken timing belt.

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- 3. If the indicated value of the crank angle sensor output RPM is zero RPM during cranking when the engine cannot be started, the cause may be presumed to be a failure of the ignition coil's primary current to intermittently pulse correctly, so a malfunction of the ignition system circuitry, the ignition coil and/or the power transistor is the probable cause.
- 4. If idling is possible even though the crank angle sensor indicated RPM is a deviation from the standard value, the cause is usually a malfunction of something other than the crank angle sensor. For example:
  - Malfunction of the coolant temperature sensor.
  - Malfunction of the idle speed control servo.
  - Improper adjustment of the standard idling speed.

### Inspection Using Multi-Use Tester

# See <u>COMPONENTS INSPECTION PROCEDURE USING MULTI-USE TESTER</u>. For normal condition, see <u>Fig. 41</u>.

Function	Item No.	Data display	Check conditions	Check description	Normal condition
Data reading	22	Cranking rpm	<ul> <li>Engine is being cranked.</li> <li>Tachometer connected. (The tachometer is used to check the intermittent pulsation of the ignition coil's primary current.)</li> </ul>	Compare the cranking rpm and the rpm indicated by the multi-use tester.	Both agree.

Function	Item No.	Data display	Check conditions	Coolant temp.	Standard value
Data reading	22	Idling rpm	<ul> <li>Engine: idling</li> <li>Idle-position switch: ON</li> </ul>	When -20°C (-4°F)	1,450-1,650 rpm
				When 0°C (32°F)	1,250-1,450 rpm
				When 20°C (68°F)	1,050-1,250 rpm
				When 40°C (104°F)	850–1,050 rpm
				When 80°C (176°F)	600-800 rpm

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## **Fig. 41: Crank Angle Sensor Inspection Using Multi-Use Tester Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

#### **Inspection Using Oscilloscope**

- 1. Run engine at idle speed.
- 2. Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram. See <u>Fig. 40</u>. Waveform should be as illustrated. See <u>Fig. 42</u>.

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# **<u>Fig. 42: Crank Angle Sensor Waveform</u> Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

## **Harness Inspection**

For harness inspection, see <u>Fig. 43</u>. For component locations and connector terminal identification, see <u>Fig. 40</u>.

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**<u>Fig. 43: Crank Angle Sensor Harness Inspection</u> Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.</u>** 

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