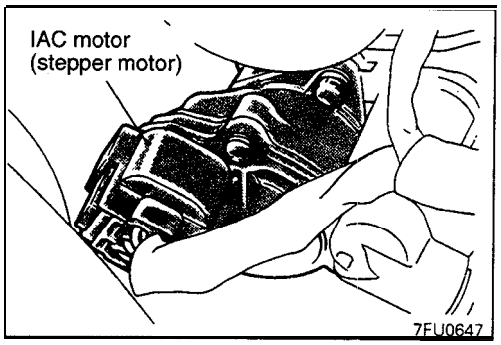
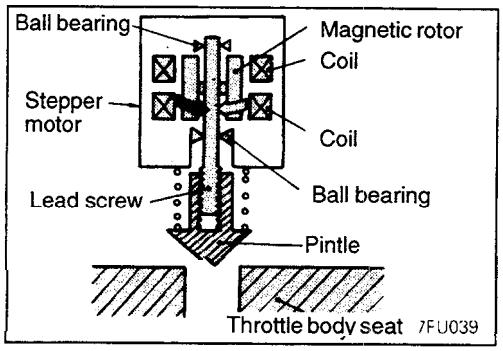
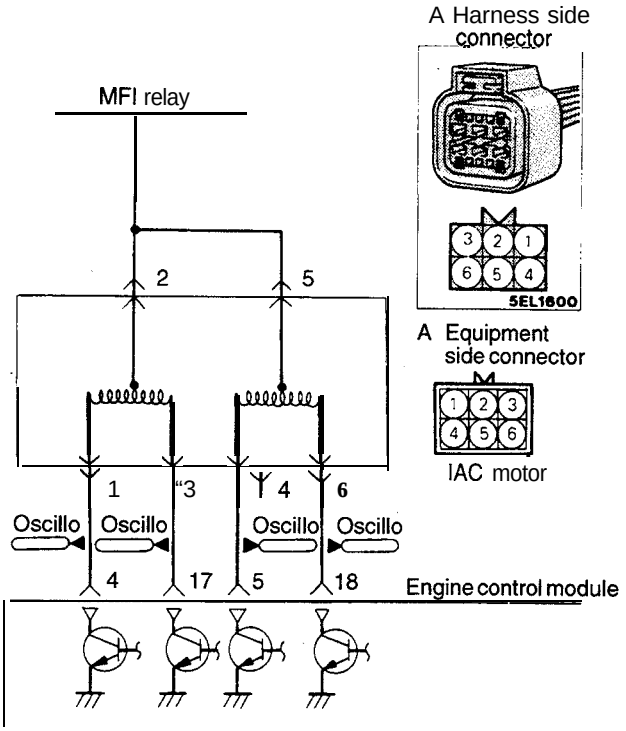
IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)







OPERATION

- The intake air volume during idling is controlled by opening or closing the servo valve provided in the air path that bypasses the throttle valve.
- The servo valve is opened or closed by operating the stepper motor in the speed control servo in normal or reverse direction.
- The battery power is supplied to the stepper motor through the MFI relay. As the engine control module turns on power transistors in the module one after another, the stepper motor coil is energized and the motor rotates in normal or reverse direction.

TROUBLESHOOTING HINTS

Hint 1: If the stepper motor step increases to 100 to 120 steps or decreases to 0 step, faulty stepper motor or open circuit in the harness is suspected.

Hint 2: If the idle air control motor harness and individual part checked good but the stepper motor steps are out of specification, the following faults are suspected.

(1) Poorly adjusted reference idle speed
(2) Deposit on the throttle valve
(3) Air leaking into the intake manifold through gasket gap
(4) Loose EGR valve seat
(5) Poor combustion in the cylinder (faulty ignition plug, ignition coil, injector, low compression pressure, etc.)

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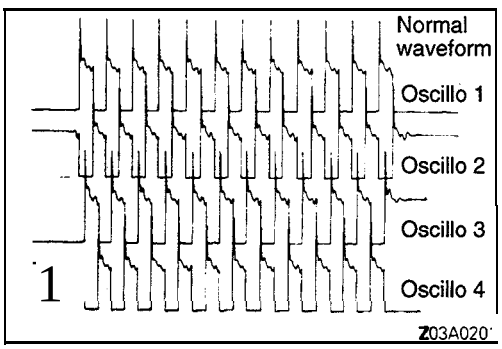
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Load state	Standard value
Data	45	Stepper motor steps	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T>) • Steering wheel: Neutral • Idle position switch: ON (compressor clutch to be ON if airconditioning switch is ON) • Engine: Idling	Air conditioning switch: OFF	2–25 step
				Air conditioning switch: ON	Increase by 10–70 step
				• Air conditioning switch: ON • Selector lever: Shift to D range	Increase by 5–50 step

NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the stepper motor steps may be about 30 steps more than standard.

Caution
When the selector lever is shifted to the "D" range, the brakes must be used to prevent the vehicle from moving forward.



Using Oscilloscope

(1) Connect the probe to each oscilloscope pick-up point as shown in the circuit diagram.
(2) Start the engine.
(3) When the air conditioning switch is turned on, the idling speed increases to operate the idle speed control. Check the instantaneous waveform.

NOTE
Keep in mind that the waveform can be observed only when idle speed control is in operation.

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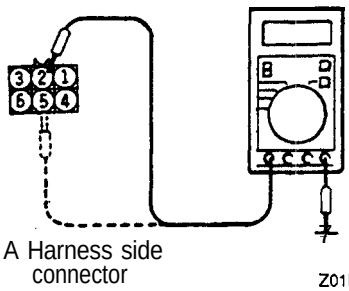
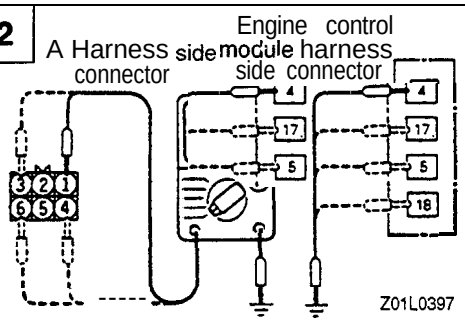
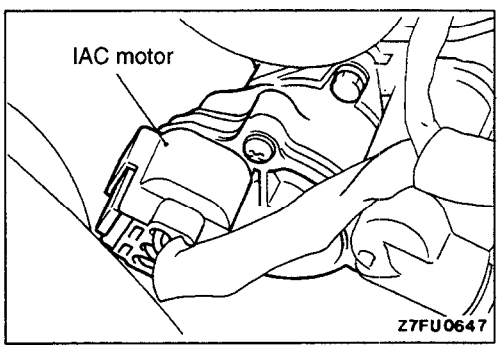
HARNESS INSPECTION

1		Measure the power supply voltage of idle air control motor. • Idle air control motor connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness. (MFI relay – A2) (MFI relay – A5)
2		Check for an open-circuit, or a short-circuit to ground between the engine control module and the idle air control motor. • Engine control module connector: Disconnected • Idle air control motor connector: Disconnected	OK → STOP NG → Repair the harness. (AI -4) (A3–17) (A4–5) (A6–18)



ACTUATOR INSPECTION

Checking the Operation Sound

(1) Check that the operation sound of the stepper motor can be heard after the ignition is switched ON (but without starting the motor).
(2) If the operation sound cannot be heard, check the stepper motor's activation circuit.
If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control module.

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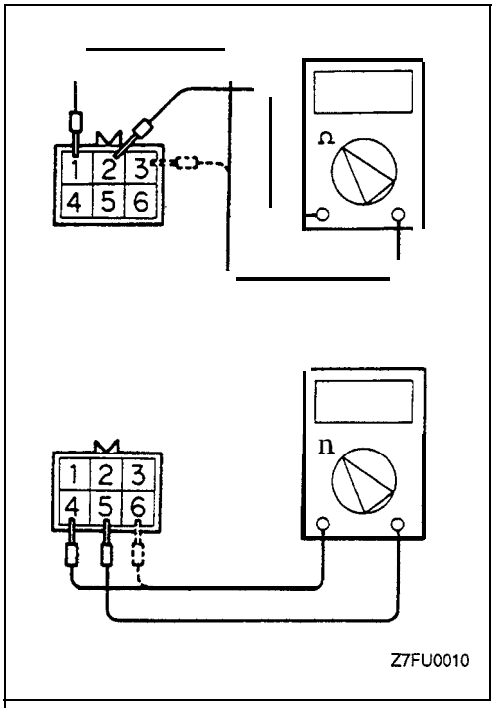


Checking the Coil Resistance

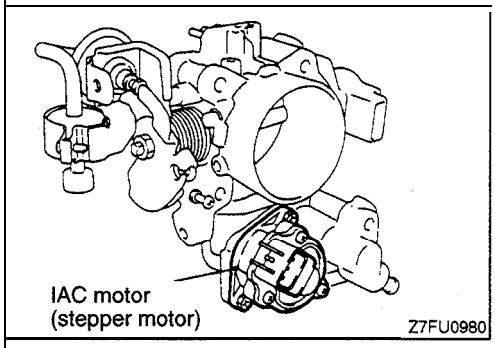
(1) Disconnect the idle air control motor connector and connect the special tool (test harness).

(2) Measure the resistance between terminal (2) (white clip of the special tool) and either terminal (1) (red clip) or terminal (3) (blue clip) of the connector at the idle air control motor side.

Standard value: 28-33 Ω at 20°C (68°F)

(3) Measure the resistance between terminal (5) (green clip of the special tool) and either terminal (6) (yellow clip) or terminal (4) (black clip) of the connector at the idle air control motor side.

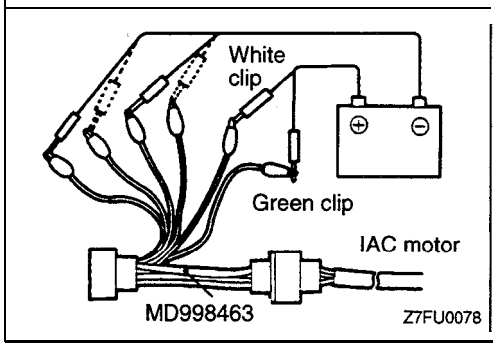
Standard value: 28-33 Ω at 20°C (68°F)



Operational Check

(1) Remove the throttle body.

(2) Remove the stepper motor.



(3) Connect the special tool (test harness) to the idle air control motor connector.

(4) Connect the positive (+) terminal of a power supply (approx. 6 V) to the white clip and the green clip.

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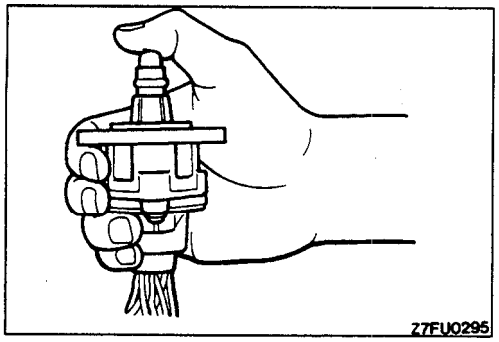

(5) With the idle air control motor as shown in the illustration, connect the negative (–) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
   1) Connect the negative (–) terminal of the power supply to the red and black clip.
   2) Connect the negative (–) terminal of the power supply to the blue and black clip.
   3) Connect the negative (–) terminal of the power supply to the blue and yellow clip.
   4) Connect the negative (–) terminal of the power supply to the red and yellow clip.
   5) Connect the negative (–) terminal of the power supply to the red and black clip.
   6) Repeat the tests in sequence from (5) to (1).

(6) If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.