SERVICE BULLETIN

QUALITY INFORMATION ANALYSIS
OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION

SERVICE BULLETIN	**No.:** MSB-99E16-001	
	Date: 2000-04-15	**<Model>** / **<M/Y>**
Subject: CHANGE OF GLOW PLUG		(EC)L200(K60,K70) 98-10 (EC)L300(P00) 98-10 (EC)L300(P5T) 98-10 (EC)L400(PA0V) 98-10 (EC)PAJERO (V10,V20,V30,V40) 98-10
Group: ENGINE ELECTRICAL	**Draft No.:** 99SY531611	
INFORMATION	**INTERNATIONAL CAR ADMINISTRATION OFFICE**	Tomoaki Nitta T.NITTA - PROJECT LEADER AFTER SALES SERVICE & CS PROMOTION

1. Description:

On the 4D56 engine, the ceramic type glow plug has been changed to a new metal type glow plug.

2. Interchangeability:

Interchangeable if replaced as a set for four cylinders. (the old and new glow plugs cannot be intermixed with each other.)

3. Effective Date:

From February 1998 (except L200)

4. Details:

Since glow control is the same as that of the ceramic type glow (the glow control unit remains unchanged), the service procedures for the new metal type glow are the same as those for the ceramic type, except the glow plug resistance values. The new metal type glow plug. Therefore, check procedures for the glow system, including all the glow plugs, have been established as below (inspection of the glow relay and the engine coolant temperature sensor is not included)

- Change details

		New	Old	Reference
Type		New metal type	Ceramic type	Conventional metal type
Part. No		MD344469	MD197511	MD301950 or MD354500
Overall length mm		84.5	84.5	88.0
Diameter of heating element mm		5 (4.5 at top end)	3.5	5
Length of heating element mm		18	9	20
Identification painting		None	Blue painting on tightend hexagonal part	None
Resistance value (Ω) (at 20°C)	Single glow plug	0.6-1.0	0.4-0.6	0.9-1.1
	4 glow plugs in parallel	0.15-0.25	0.10-0.15	0.20-0.30

SERVICE SPECIFICATIONS

120001413

Item		Standard value <Correct>
Resistance between glow plug plate and glow plug body (parallel resistance for 4 glow plugs) (at 20°C) Ω		~~0.10-0.15~~ <Incorrect> <Ceramic type> 0.10-0.15 <New metal type> 0.15-0.25 <Conventional metal type> 0.20-0.30
Voltage between glow plug plate and glow body V	Immediately after ignition switch is turned to ON (without starting the engine)	9-11 <Incorrect> (Drops to 0 V after ~~4-8 seconds~~ have passed)
	While engine is cranking	6 or more
	While engine is warming up	12-15 (Drops to 0 V when the engine coolant temperature increases to 60° or more or if ~~180 seconds~~ have passed since the engine was started)
Glow plug resistance (at 20°C) Ω		~~0.4-0.6~~ <Incorrect> <Incorrect>

SEALANT

120001414

Item	Specified sealant	Remark
Engine coolant temperature sensor	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

<Deleted>

<Correct>
<Ceramic type> 0.4-0.6
<New metal type> 0.6-1.0
<Conventional metal type> 0.9-1.1

<Correct>
<Ceramic and new metal types> 180 seconds
<Conventional metal type> 30 seconds

<Correct>
<Ceramic and new metal types> 4-8 seconds
<Conventional metal type> 6-12 seconds

ON-VEHICULE SERVICE → ~~**SERVICE AJUSTMENT PROCEDURES**~~
<Correct> **<Incorrect>**

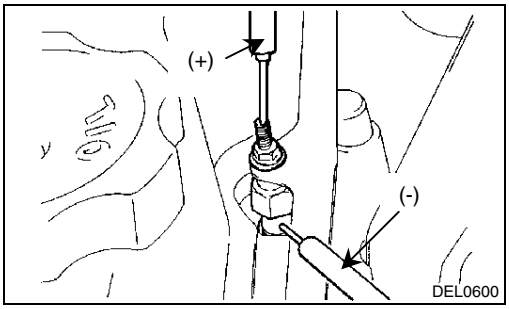
120001415

CHECK → **SELF-REGULATING GLOW SYSTEM**
<Correct> ~~**INSPECTION**~~ **<Incorrect>**

1. Check that the battery voltage is 11 –13 V.
2. Check that the engine coolant temperature is 40°C or less.
   NOTE
   If the engine coolant temperature is too high, disconnect the engine coolant temperature sensor connector.

<Correct>

<Ceramic type> 0.10-0.15 Ω (at 20°C)
<New metal type> 0.15-0.25 Ω (at 20°C)
<Conventional metal type> 0.20-0.30 Ω (at 20°C)



3. Measure the resistance between the glow plug plate and the glow plug (earth)

   ~~**Standard value: 0.10 – 0.15 Ω (at 20°C)**~~
   <Incorrect>

   NOTE
   The resistance value is the parallel resistance value for the four glow plugs.
4. Connect a voltmeter between the glow plug plate and the glow plug body (earth).
5. Measure the voltage immediately after the ignition switch is turned to ON (without starting the engine)

<Incorrect>

Standard value: 9-11 V (Drops to 0 V after ~~4-8~~ seconds have passed)

<Correct>

<Ceramic and new metal type > 4-8 seconds
<Conventional metal type> 6-12 seconds

In addition, check to be sure that the glow indicator lamp (red) illuminates immediately after the ignition switch is turned to ON.
NOTE
The time during which the voltage appears (energizing time) will depend on the engine coolant temperature.

6. Measure the voltage while the engine is cranking.

   Standard value: 6 V or more

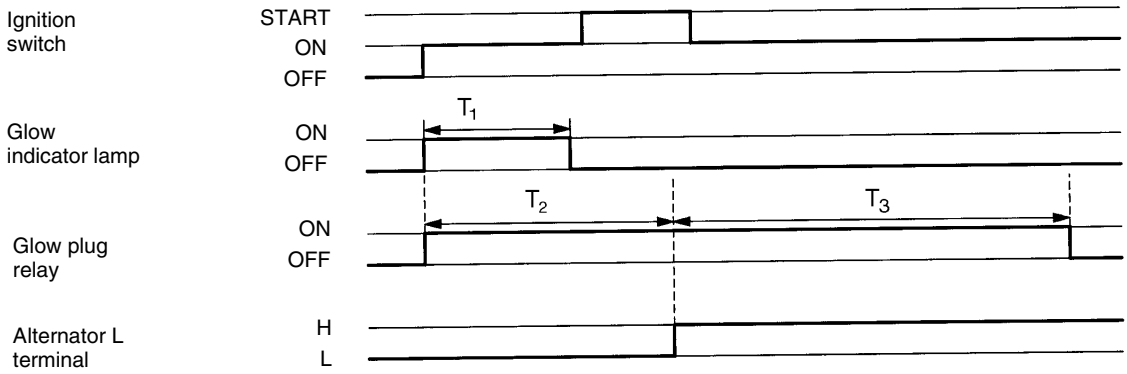
7. Start the engine and measure the voltage while the engine is warming up.
   <Incorrect>
   However, if the engine coolant temperature rises above 60°C or when ~~180 seconds~~ have passed since the engine was started, the voltage will always return to 0 V. (Refer to the Glow Plug Energization Timing Chart.)

<Correct>

<Ceramic and new metal type > 180 seconds
<Conventional metal type> 30 seconds

Standard value: 12-15 V

<Reference>
Glow Plug Energization Timing Chart



T_1: Glow indicator lamp
T_2: Glow plug relay drive time after ignition switch is turned ON
T_3: Glow plug relay drive time after engine starts (afterglow)

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NOTE
After glow time T3 becomes longer as the engine coolant temperature drops.

GLOW CONTROL UNIT ~~INSPECTION~~ ◄——— **CHECK**
<Incorrect> **<Correct>**

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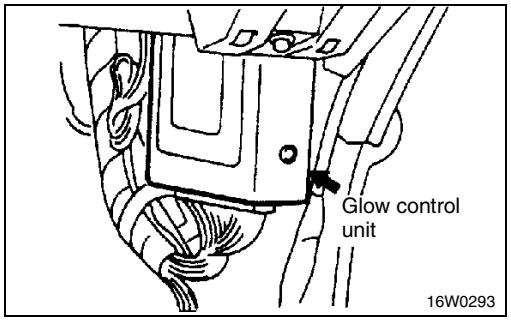
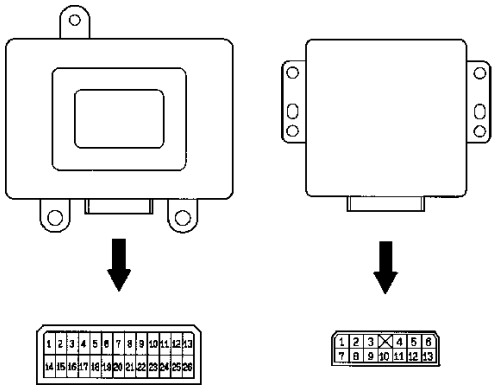


Vehicles with EGR **Vehicles without EGR**



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1. Measure the voltage at the control unit terminals.

   NOTE
   1. Inspect with the control unit connector connected
   2. When measuring the voltage, connect the control unit terminal (26) (terminal (10) for vehicles without EGR) to the earth.

<Ceramic and new metal types> 8 sec.
<Conventional metal type> 12 sec.

Terminal Voltage Reference Table **<Correct>**

Inspection terminal	Inspection item	Inspection condition		Standard value
5 13*	Engine coolant temperature sensor (Engine coolant temperature detection)	Ignition switch "ON" → OFF	Engine coolant temperature: -20°C	4.3-4.5 V
			Engine coolant temperature: 0°C	3.7-3.9 V
			Engine coolant temperature: 20°C	2.8-3.0 V
			Engine coolant temperature: 40°C	1.9-2.1 V
			Engine coolant temperature: 80°C	0.5-0.7 V
12 2*	Ignition switch (power supply)	Ignition switch "ON" → OFF		8 V or more
14 7*	Glow plug relay (glow time control)	Ignition switch "OFF" → ON Engine coolant temperature: 40°C (104°F) or less (Pre-glow function inspection)		9-12 V 0-0.5 V after approx. ~~8 sec~~. (when engine coolant temperature is 20° C)
17 3*	Glow indicator lamp	Ignition switch "OFF" → ON Engine coolant temperature: 40°C (104°F) or less.		0-1 V after approx. ~~1 sec.~~ (when engine coolant temperature is 20° C)
23 *6	Alternator charging signal ("L" terminal)	Ignition switch "OFF" → ON		1-4 V
		Engine is idling		11V or more
26 10*	Earth	–		–

*: indicates vehicles without EGR

<Ceramic and new metal types> 1 sec.
<Conventional metal type> 4 sec.

<Correct>

Glow control unit harness-side connector as seen from the terminal side

Vehicles with EGR

13	12	11	10	9	8	7	6	5	4	3	2	1
26	25	24	23	22	21	20	19	18	17	16	15	14

Vehicles without EGR

6	5	4		3	2	1
13	12	11	10	9	8	7

DEN0822

2. Remove the control unit connector and check the continuity between the harness-side connector terminals.

Inspection terminal	Inspection item	Continuity (resistance value)
14-26 7-10*	Glow plug relay	Continuity (approx. 3 Ω)

*: indicates vehicles without EGR

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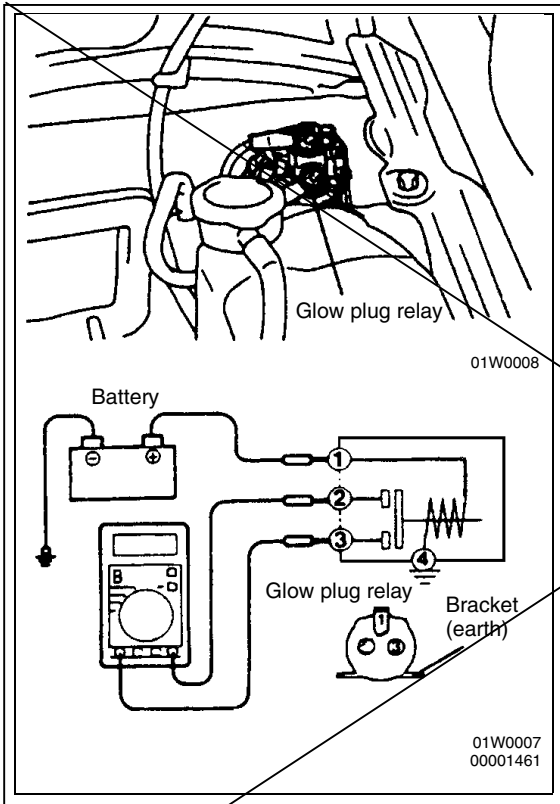


GLOW PLUG RELAY INSPECTION

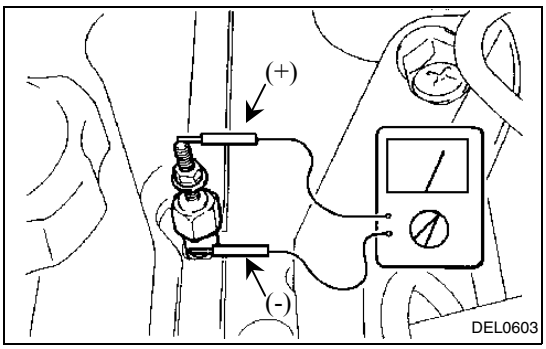
120002540

1. Check to be sure that there is continuity (approx. 3 Ω) between glow plug relay terminal (1) and the bracket (earth).
2. Use jumper cables to connect terminal (1) of the glow plug relay to the battery (+) terminal and the bracket to the battery (-) terminal.

Caution
(1) Always be sure to disconnect the harnesses connected to glow plug relay terminals (2) and (3) before using the jumper cables.
(2) The terminal of the disconnected harnesses must not be shorted to earth.
(3) When connecting the jumper cables, be very careful not to make a mistake in connecting the terminals, as this will cause damage to the relay.

3. Check the continuity between glow plug relay terminals (2) and (3) while disconnecting and connecting the jumper cable at the battery (+) terminal.

Jumper cable at battery (+) terminal	Continuity between terminals (2) – (3)
Connected	Continuity (0.01 Ω or less)
Disconnected	No continuity (∞ Ω)



GLOW PLUG RELAY INSPECTION

120001418

1. Remove the glow plug plate.
2. Measure the resistance between the glow plug terminals and the body.

Standard value: ~~0.4-0.6 Ω (at 20°C)~~ <Incorrect>

<Correct>

<Ceramic type> 0.4-0.6 Ω (at 20°C)
<New metal type>0.6-1.0 Ω (at 20°C)
<Conventional metal type> 0.9-1.1Ω (at 20°C)