MITSUBISHI MOTORS

SERVICE BULLETIN

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SERVICE BULLETIN	No.: ESB-98E13-001REV	
	Date: 1998-12-15	<Model>: (EC,EXP)CARISMA; <M/Y>: 98-10
Subject:	CORRECTION OF '98 CARISMA GDI WORKSHOP MANUAL GROUP 13J	
Group:	FUEL	
INFORMATION	O. Kai - E.V.P. & G.M. After Sales Service Dept.	

This Service Bulletin is a revision to the previously issued MSB-98E13-001 (dated January 31, 1998 which contains errors in the " '98 CARISMA GDI troubleshooting" section. The previous S/B MSB-98E13-001 should be discarded.

1. Description:

In the group 13J of the '98 CARISMA GDI Workshop Manual, additions have been made to the GDI - Troubleshooting and the GDI-Fuel Pump (High Pressure) Removal Installation procedures.

2. Applicable Manuals:

Manual	Pub. No.	Language	Page(s)
'98 CARISMA Workshop Manual Chassis SUPPLEMENT GDI	PWDE9502-C	(English)	13J-9, 10, 11, 25, 35, 99, 102
	PWDS9503-C	(Spanish)	
	PWDF9504-C	(French)	
	PWDG9505-C	(German)	
	PWDD9506-C	(Dutch)	
	PWDW9507-C	(Swedish)	
	PWDI96E1-C	(Italian)	

3. Details:

Engine warning lamp inspection items

Engine-ECU
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Camshaft position sensor
Barometric pressure sensor
Detonation sensor
Injector
Abnormal combustion
Immobilizer system
~~Fuel pressure sensor~~ **<Incorrect>**
Excessive intake air amount
Brake vacuum sensor

<Correct>

Abnormal fuel pressure →

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

1. Carry out inspection by means of the data list and the actuator test function. If there is an abnormality, check and repair the chassis harnesses and components.
2. After repairing, re-check using the MUT-II and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the MUT-II.
5. Start the engine again and carry out a road test to confirm that the problem has disappeared.

FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

Malfunctioning item	Control contents during malfunction
Air flow sensor	(1) Lean fuel combustion driving and feedback control driving are prevented (2) Basic injection drive timing and basic ignition timing are set by means of the mapping values from the throttle position signal and the crank angle sensor signal.
Intake air temperature sensor	Control is carried out as if the intake air temperature is 25°C.
Throttle position sensor	(1) Lean fuel combustion driving is prevented. (2) Dashpot compensation for the idle speed control is prevented.
Engine coolant temperature sensor	Control is carried out as if the engine coolant temperature is 80°C. Furthermore, this control will continue until the ignition switch is turned to OFF, even if the sensor signal returns to normal.
Camshaft position sensor	Control is carried out as if the conditions before the failure judgement occurred are continuing.
Vehicle speed sensor	(1) Lean fuel combustion driving is prevented. However, this condition is cleared if the engine speed is continuously at 1,500 r/min or more for a certain length of time. (2) Lean fuel combustion during idle is prevented.
Barometric pressure sensor	Control is carried out as if the barometric pressure is 101 kPa (760 mmHg).
Detonation sensor	Ignition timing is fixed to the timing for standard petrol.
Injector	(1) Lean fuel combustion driving is prevented. (2) EGR operation is cut.
Abnormal combustion	Lean fuel combustion driving prevented.
Excessive intake air amount	When the air flow sensor output is compared with the throttle position sensor output and the air amount is judged to be excessive, compression stroke fuel injection and lean fuel combustion driving are set.
Communication line with A/T-ECU	Ignition timing retarding control (engine and transmission total control) during transmission gear shifting is prevented.
Alternator FR terminal	Alternator output suppression control under high electrical loads is prevented. (Alternator works as a normal alternator.)
Fuel pressure sensor	~~Control is carried out as if the fuel pressure is 5 Mpa.~~ **<Incorrect>**

<Correct>

(1) Control is carried out is carried out as if the fuel pressure is 5 Mpa. (Open circuit/short circuit)
(2) Fuel pump relay is turned OFF. (Abnormally high pressure)
(3) Fuel injection is shut off. (Engine speed exceeds 3,00 r/min with abnormally low pressure detected.)

INSPECTION CHART FOR DIAGNOSIS CODES

Code no.	Diagnosis item	Reference page
11	Oxygen sensor system	13J-12
12	Air flow sensor system	13J-13
13	Intake air temperature sensor system	13J-14
14	Throttle position sensor system	13J-15
21	Engine coolant temperature sensor system	13J-16
22	Crank angle sensor system	13J-17
23	Camshaft position sensor system	13J-18
24	Vehicle speed sensor system	13J-19
25	Barometric pressure sensor system	13J-20
31	Detonation sensor system	13J-21
41	Injector system	13J-22
44	Abnormal combustion	13J-23
54	Immobilizer system **<Incorrect>** **<Correct>**	13J-24
56	~~Fuel pressure sensor system~~ ← Abnormal fuel pressure system	13J-25
58	Excessive intake air mount	13J-26
61	Communication wire with A/T-ECU system	13J-26
64	Alternator FR terminal system	13J-27
66	Brake vacuum sensor system	13J-28

NOTE
Code No.56 may be output when air enters the high pressure fuel passage due to fuel shortage, etc.

<Added>

[A] on the next page added here.

<Correct>
Abnormal fuel pressure system

Code No.56 ~~Fuel pressure sensor system~~ **<Incorrect>**
Range of check
- Ignition switch: ON

Set conditions **<Incorrect>**
- ~~Sensor output voltage is 4,7 V or more~~

or **<Incorrect>**
- ~~Sensor output voltage is 0,3 V or less~~

<Correct>
Sensor output voltage is 4.8V or more for 4 seconds

<Correct>
Sensor output voltage is 0.2V or more for 4 seconds

Probable cause
- Malfunction of the fuel pressure sensor
- Open circuit or short-circuited harness wire of the fuel pressure sensor
- Malfunction of the engine-ECU

Measure at the fuel pressure sensor connector A-122
- Connect the connector. (Use test harness MB991348)
- Voltage between 2 and earth
  OK: 3V or less
  (Engine Cranking)
  0.3 - 4.7V (Engine: idling)

NG → Measure at the fuel pressure sensor connector A-122
- Disconnect the connector, and the harness side.
- Voltage between 1 and earth
  (Ignition switch: ON) **OK:** 4.8 - 5.2 V
- Continuity between 3 and earth
- **OK:** Continuity

NG → Check the following connector: B-22
OK → Check trouble symptom.
NG → **Repair**

Check trouble symptom.
NG → Check the harness wire between the engine-ECU and the fuel pressure sensor.
OK → Check the following connectors: A-122, B-22
NG → **Repair**

Check the following connectors: A-122, B-22
OK → Check trouble symptom.
NG → **Repair**

Check trouble symptom.
NG → Check the harness wire between the engine-ECU and the fuel pressure sensor.
OK → Replace the engine- ECU.
NG → **Repair**

Measure at the engine-ECU connector B-22
- Connect the connector
- Voltage between 74 an earth
  (Engine: idling) **OK:** 0.3 - 4.7V

NG → Check the harness wire between the engine-ECUY and the fuel pressure sensor, and repair if necessary.

OK → Check the following connectors: A-122, B22
OK → Check trouble symptom.
NG → Replace the engine-ECU.

Check the harness wire between the engine-ECU and the fuel pressure sensor.
OK → Replace the fuel pressure sensor.
NG → **Repair**

<Added>
~~Erase diagnosis code No.56.~~
Erase diagnosis code No.56
OK → Normal
NG

Changed to [B] on the next page.

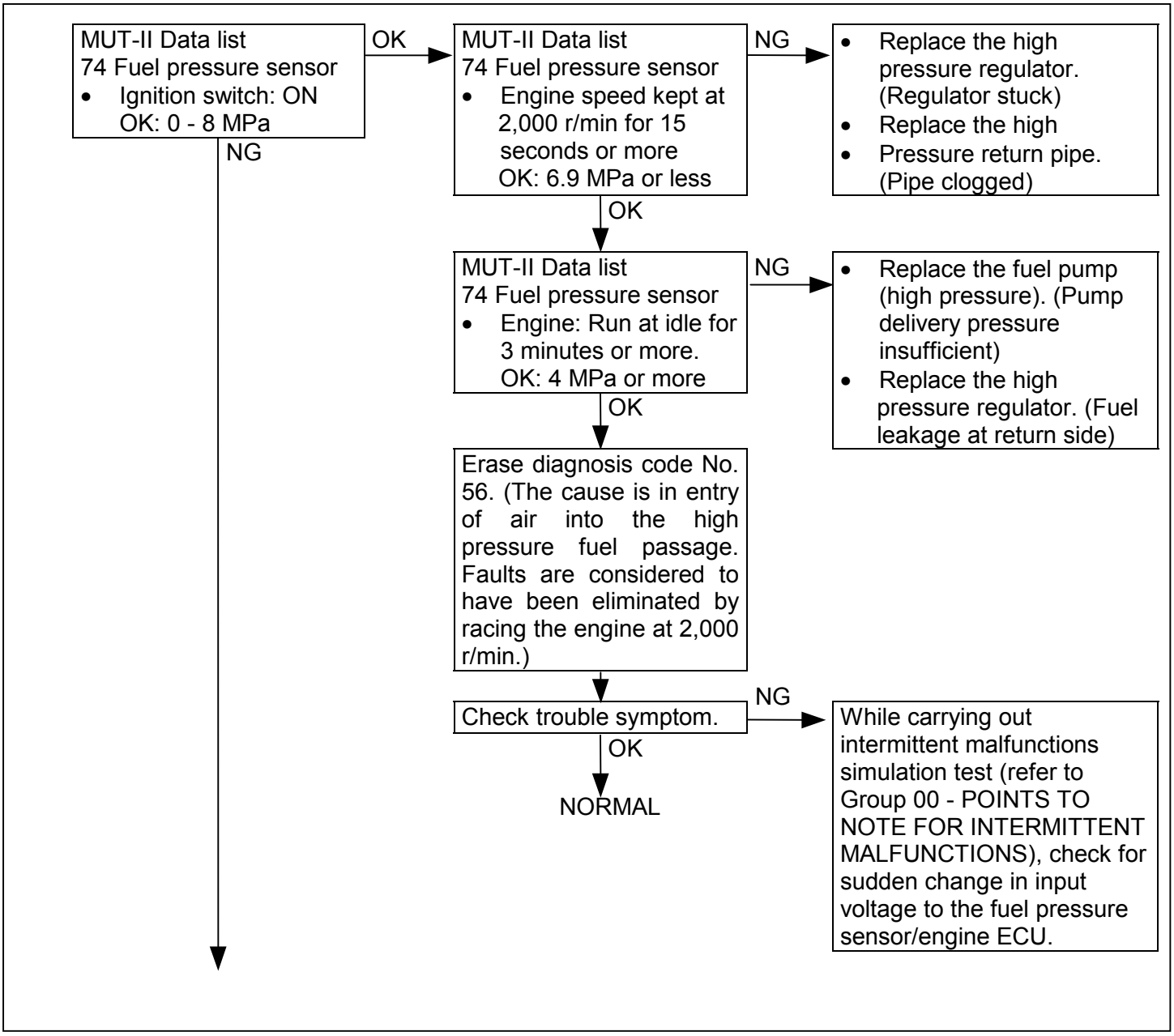
<Added>

This code is also generated when air enters the high pressure fuel passage due to fuel shortage, etc. In such a case, air can be removed by running the engine at 2000 rpm for more than 15 seconds. The diagnosis code, which is left generated, should be erased by the MUT-II	• Entry of air due to fuel shortage, etc.

[A]

Range of check • Following conditions once detected after engine is started. (1) Engine speed: 1,000 r/min or more (2) Fuel pressure: 2 MPa or more • Engine in operation Set conditions • Fuel pressure is 6.9 MPa or more for 4 seconds. or • Fuel pressure is 2 MPa or less for 4 seconds.	• Malfunction of the fuel pump (high pressure) • Malfunction of the fuel pressure regulation (high pressure) • Clogged high pressure fuel lines

[B]



INSPECTION PROCEDURE 6

Initial combustion but no complete combustion (starting impossible) Long time to start (Improper starting)	Probable cause
The cause is probably poor ignition due to a malfunction spark plug (weak spark), an incorrect air/fuel ratio when starting or incorrect fuel pressure switching.	• Malfunction of the fuel supply system • Malfunction of the fuel pressure sensor • Malfunction of the ignition system • Malfunction of idle speed control system • Malfunction of the air by-pass control system • Malfunction of the engine-ECU

Check the battery voltage during cranking.
OK: 8 V or more
OK → Check the battery. (Refer to GROUP 54.)
OK ↓

MUT-II Self-Diag code
Is a diagnosis code displayed?
YES → Refer to P.13J-11. INSPECTION CHART FOR DIAGNOSIS CODES.
NO ↓

MUT-II Data list
18 Starter switch (Refer to P.13J-62.)
NG → Check the ignition switch-ST system <M/T> (Refer to P.13J-50, INSPECTION PROCEDURE 23.) Check the ignition switch-ST and inhibitor switch system <A/T> (Refer to P.13J-51, INSPECTION PROCEDURE 24.
OK ↓

MUT-II Data list
74 Fuel pressure sensor (Refer to P.13J-65.)
NG → **<Incorrect>** ~~Check the fuel pressure sensor system~~ (Refer to P.13J-25, Code No.56.)
OK ↓ **<Correct>** → **Check the abnormal fuel pressure system.**

MUT-II Actuator test
18 Air by-pass control solenoid valve(ON/OFF) (Refer to P.13J-66.)
32 Air by-pass control solenoid valve(DUTY) (Refer to P.13J-66.)
NG → Check the air by-pass control solenoid valve system. (Refer to P.13J-54, INSPECTION PROCEDURE 27.)
OK ↓

Can the sound of the injectors operating be heard while the engine is cranking? (Using a soundscope)
NG → Check the injector system (Refer to P.13J-22, Code No.41.)
OK ↓

Check the fuel leaks. (Refer to P.13J-90.)
NG → Replace the fuel pump(high pressure)
OK ↓

Is starting performance good when the accelerator pedal is depressed slightly during cranking?
NG → Check for sound of idle speed control servo operation. (Refer to P.13J-97)
NG → Check the idle speed control servo system. (refer to P.13J-53, INSPECTION PROCEDURE 26.)
OK ↓
- Clean around the throttle valve. (Refer to P.13J-84.)
- Check and adjust the fixed SAS. (Refer to P.13J-85.)

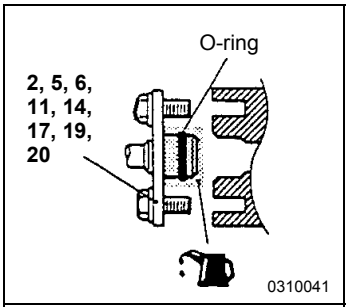
NO ↓

Check the ignition timing during cranking.
OK: Approx. 5° BTDC
OK → Check the following items in order given.
- Ignition coil, spark plug
- Compression pressure
- Fuel line clogging
- Contamination (water, kerosene, etc.) in the
- fuel

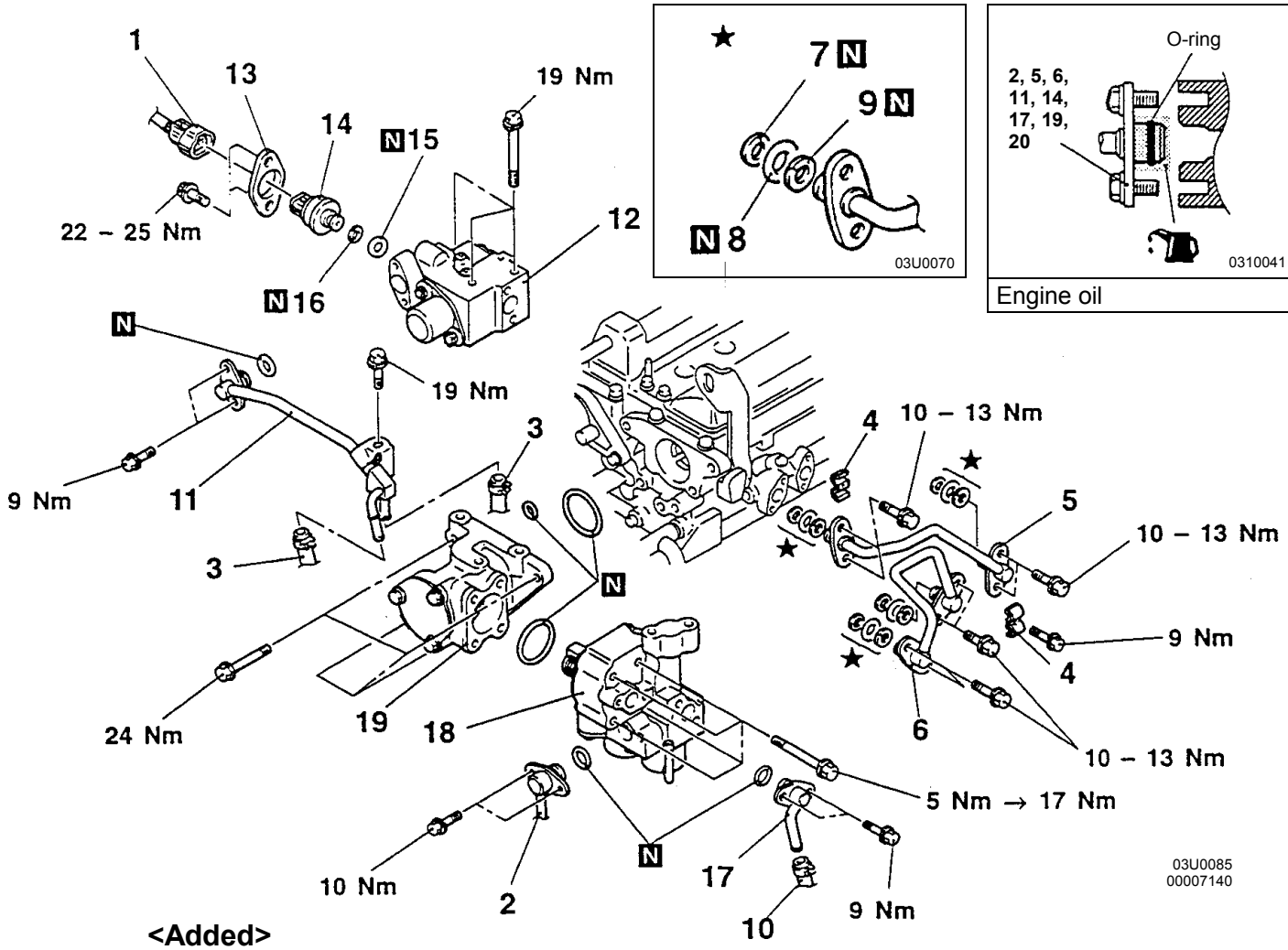
NG ↓
Check that the crank angle sensor and timing belt cover are installed properly.

FUEL PUMP (HIGH PRESSURE)
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying
- Prevention of fuel discharge <before removal only>
- Air Intake Hose Assembly Removal and Installation
- Engine Cover Removal and Installation
- Ignition Coil Removal and Installation
- Throttle Body removal and Installation (Refer to 13J-106.)
- Accelerator Cable Adjustment <after installation only>
- Fuel Leak Check <after installation only>



Engine oil

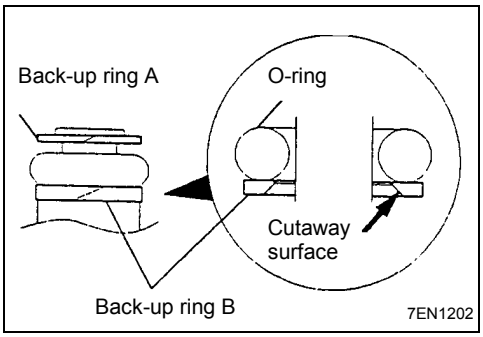


<Added>

▶J◀ • Air bleeding of high pressure fuel pump

Removal steps

1. Fuel pressure sensor connector
▶I◀ 2. High-pressure fuel hose connection
3. Fuel return hose connection
4. Clamp
▶H◀ 5. Fuel return pipe assembly
▶H◀ 6. Fuel feed pipe assembly
▶G◀ 7. Back-up ring A
▶G◀ 8. O-ring
▶G◀ 9. Back-up ring B
10. Fuel hose connection
▶F◀ 11. Fuel return lower pipe assembly
12. Fuel pressure regulator (high pressure) assembly
◀A▶ ▶E◀ 13. Flange
▶E◀ 14. Fuel pressure sensor
▶D◀ 15. O-ring
▶D◀ 16. Back-up ring
▶C◀ 17. Fuel nipple ring
▶B◀ 18. Fuel pump (high pressure)
▶A◀ 19. Pump camshaft case assembly



▶G◀ BACK-UP RING B/O-RING/BACK-UP RING A INSTALLATION

Install the back-up rings and the O-ring as shown in the illustration.

Caution

1. **Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration**
2. **Confirm the outer diameter of the back-up ring A. Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14,8 mm)**

▶H◀ FUEL FEED PIPE ASSEMBLY/FUEL RETURN PIPE ASSEMBLY INSTALLATION

Apply a small amount of fresh engine oil to the O-ring.

Caution
Take care not to let any of the engine oil get inside the fuel pump (high pressure) or the delivery pipe assembly.

▶I◀ HIGH-PRESSURE FUEL HOSE INSTALLATION

1. Apply a small amount of fresh engine oil to the O-ring.

Caution
Take care not to let any of the engine oil get inside the fuel pump (high pressure) or the delivery pipe assembly.

2. While being careful not to damage the O-ring, turn the high-pressure fuel hose to the left and right and connect it to the fuel pump(high pressure). After connecting, check that the hose turns smoothly.
3. If the hose does not turn smoothly, the cause may be that the O-ring is getting caught. Disconnect the hose, check the O-ring for damage and re-connect the hose to the fuel pump (high pressure) and then re-check.

<Added>

▶J◀ HIGH-PRESSURE FUEL PUMP AIR BLEEDING

1. Run the engine at 2,000 r/min for more than 15 seconds to remove air from inside the pump.

   NOTE
   When the high pressure fuel pump is removed, air may enter the pump. At this time, abnormal fuel pressure causes the diagnosis code No.56 to be output.

2. After that, check the diagnosis code using MUT-II. If the code No.56 is output for the fuel pressure sensor system, erase it.