SERVICE BULLETIN

MITSUBISHI MOTORS

AFTERSALES SERVICE OFFICE, MITSUBISHI MOTORS CORPORATION

PURPOSE : CORRECTION	ISSUE NO. : MSB-08E13-506	DATE : 2008-08-05
SUBJECT : TECHNICAL INFORMATION MANUAL AND WORKSHOP MANUAL FOR 4HN ENGINE		<MODEL> <M/Y> (EUR) 08–09 OUTLANDER (GS45X)(CW0W)
GROUP : FUEL		

1. Description:

For the 4HN engine, the following changes are made in the Technical Information Manual and Workshop Manual stored in the applicable Workshop Manual CD-ROM. This Service Bulletin contains the modified descriptions.

Technical Information Manual
- A description of the common rail type fuel injection system is added.
- The description of the injector is modified.

Workshop Manual
- Some diagnosis codes are deleted and some code names and associated context frames are corrected.
- The details of the freeze frame data are corrected.
- Some circuit diagrams are corrected.
- The illustrations that indicate the locations of some connectors are corrected.
- The data list reference table is corrected.
- The actuator test reference table is corrected.
- Some check items for ECU terminal inspection and illustrations of the ECU connectors are corrected.

2. Applicable Manuals:

See Attachments A, B.

3. Corrected Specifications:
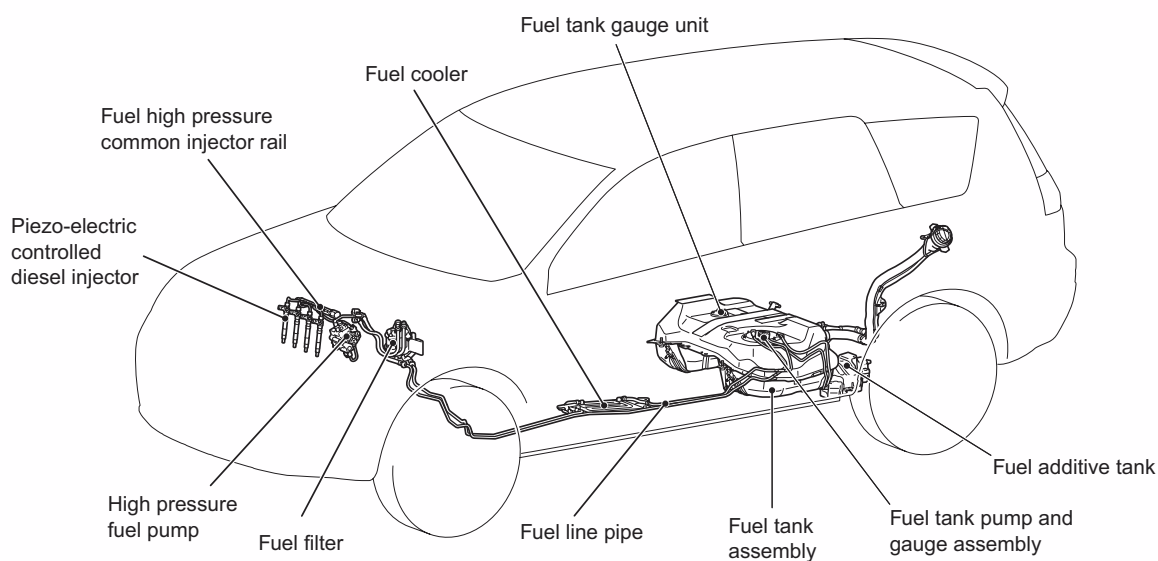
See Attachments 1 to 8.

Manual	Pub. No.	Engine	Type	Group	Title (Info-ID)	Attachment
2008 OUTLANDER Workshop Manual CD-ROM	CGXE08E2 -CD (English) CGXS08E2 -CD (Spanish) CGXF08E2 -CD (French) CGXG08E2 -CD (German)	4HN	TIM	13B	Comon Rail Type Fuel Injection System <4HN> (M134-00-040-01600-01)	Attachment 1, 2
				13E	Actuator (M133-00-200-27100-01)	Attachment 3, 4
			WSM	13E	Diagnosis Function (M133-00-380-32900-01)	Attachment 5 (1/46–13/46), 6
					Inspection Chart for Diagnosis Code (M133-00-400-36000-01)	Attachment 5 (14/46–18/46)
					Code No. P11A0 Fuel Mean Adaptation High (M133-54-140-01200-01)	Attachment 5 (19/46)
					Code No. P11A1 Fuel Mean Adaptation Low (M133-54-150-01900-01)	Attachment 5 (20/46)
					Code No. P11A2 Fuel Mean Adaptation Plausibility (M133-54-160-01600-01)	Attachment 5 (21/46)
					Code No. P1526 Alternator Hardware Fault Detected (M133-55-320-01500-01)	Attachment 5 (22/46)
					Code No. P1527 Alternator Charge Ratio Low (M133-55-330-01200-01)	Attachment 5 (23/46)
					Code No. P1528 Alternator Charge Ratio High (M133-54-500-01600-01)	Attachment 5 (24/46)
					Code No. P1613 Variant Coding Not Done/Fail (M133-54-610-01600-01)	Attachment 5 (25/46)
					Code No. P1728 Invalid Torque (M133-54-760-01400-01)	Attachment 5 (26/46)
					Code No. P250B Engine Oil Level Sensor Range (M133-55-050-01700-01)	Attachment 3 (27/46)
					Code No. P2533 Ignition Switch on Position Circuit (M133-55-120-01900-01)	Attachment 3 (28/46)
					Intake Air Temperature Sensor System (M133-60-740-06800-01)	Attachment 5 (29/46–31/46)
					Fuel Flow Regulator System (M133-60-940-01900-01)	Attachment 5 (32/46–34/46), 7
					High Pressure Fuel Regulator (M133-60-950-01600-01)	Attachment 5 (35/46–37/46), 7
					Data List Reference Table (M133-00-420-37500-01)	Attachment 5 (38/46–40/46), 8
					Actuator Test Reference Table (M133-00-440-31300-01)	Attachment 5 (41/46)
					Check at the Engine-ECU Terminals (M133-00-450-36500-01)	Attachment 5 (42/46–44/46), 8

Manual	Pub. No.	Engine	Type	Group	Title (Info-ID)	Attachment
2009 OUTLANDER Workshop Manual CD-ROM	CGXE09E1 -CD (English) CGXS09E1 -CD (Spanish) CGXF09E1 -CD (French) CGXG09E1 -CD (German)	4HN	WSM	13E	Intake Air Temperature Sensor System (M133-60-740-06800-01)	Attachment 5 (29/46–31/46)
					Fuel Flow Regulator System (M133-60-940-01900-01)	Attachment 5 (32/46–34/46), 7
					High Pressure Fuel Regulator (M133-60-950-01600-01)	Attachment 5 (35/46–37/46), 7
					Data List Reference Table (M133-00-420-37500-01)	Attachment 5 (38/46–40/46), 8
					Actuator Test Reference Table (M133-00-440-31300-01)	Attachment 5 (41/46)
					Check at the Engine-ECU Terminals (M133-00-450-42800-01)	Attachment 5 (45/46–46/46), 8

GENERAL INFORMATION

Item		Specification
Fuel filter type		Cartridge (incorporates tank pump and gauge assembly)
		Cartridge
Fuel injector	Type	Piezo-electric controlled
	Quantity	4

CONSTRUCTION DIAGRAM

Fuel tank gauge unit

Fuel cooler

Fuel high pressure common injector rail

Piezo-electric controlled diesel injector

Fuel additive tank

High pressure fuel pump

Fuel filter

Fuel line pipe

Fuel tank assembly

Fuel tank pump and gauge assembly

AC704603

This fuel system is designed with consideration for global environment protection to ensure safety at a collision, reduce weight, and improve reliability and quality. This system has the following features:
- The surface of under floor fuel line pipes is coated with 1-mm thickness of resin to improve resistance to corrosion and chipping.

- The fuel cooler has been installed to the fuel return line to suppress rise in the fuel temperature inside the fuel tank, and the evolution of fuel vapour has been reduced.
- A fuel additive tank has been added to add the specified quantity of additive during refuelling.

Insert Attachment 2.

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>

In the common rail type fuel injection system, the pressurized fuel is supplied by the high pressure fuel pump, stored in the common rail, and injected through the piezo-electric controlled type fuel injectors.
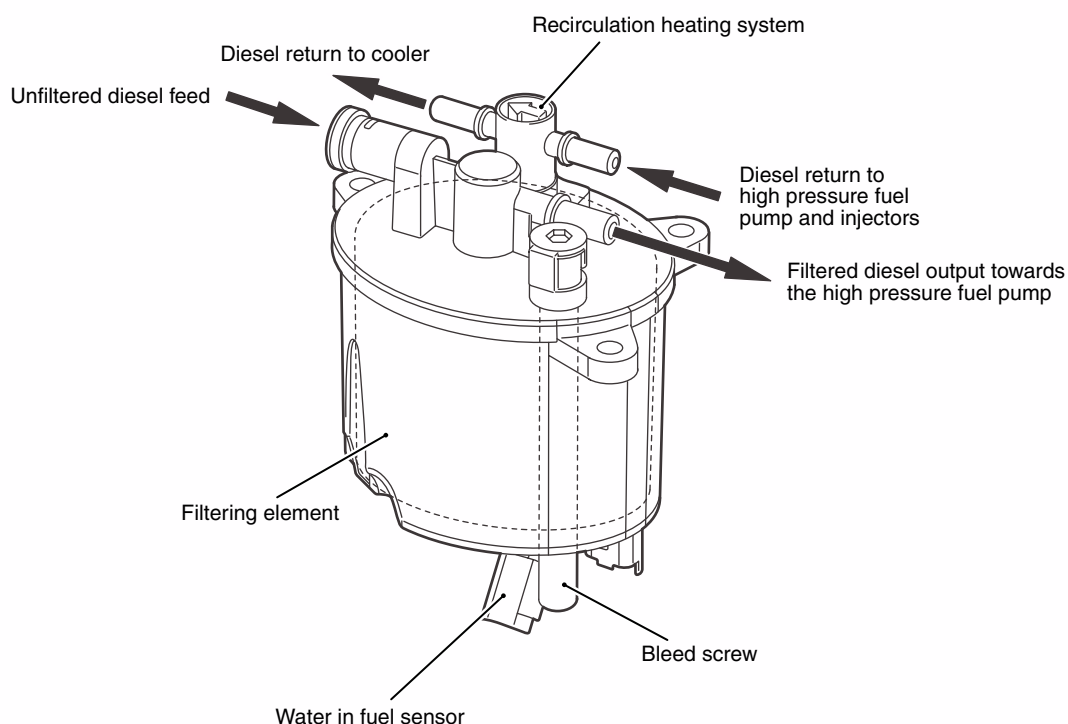
CONSTRUCTION DIAGRAM
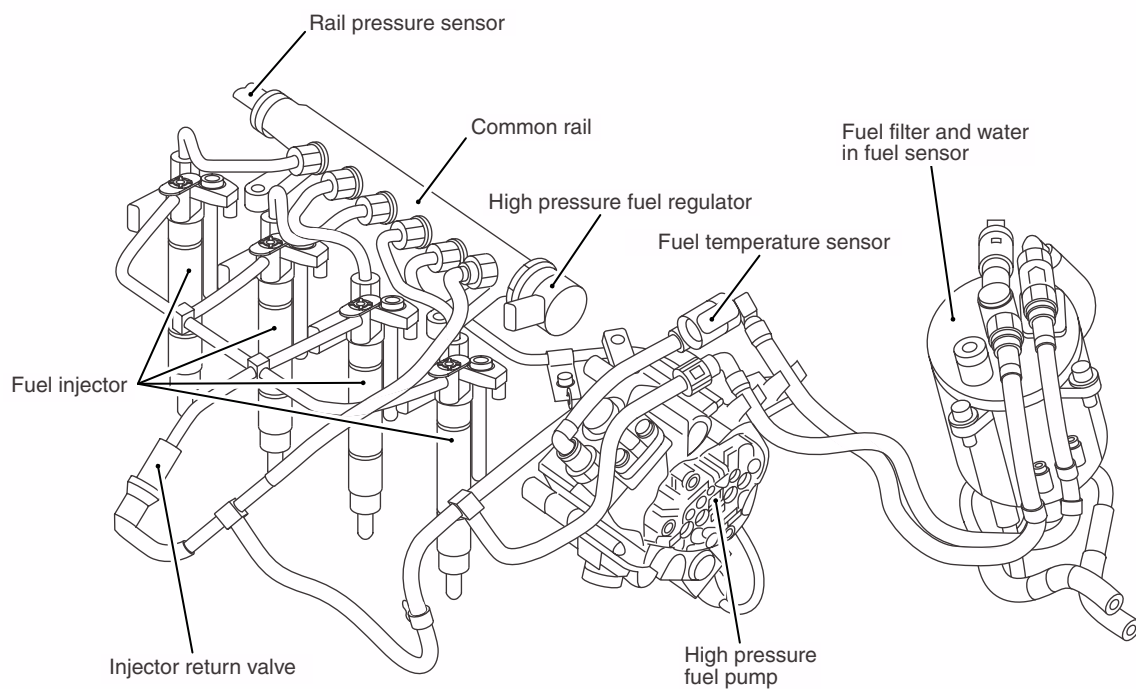
AK703554 AB

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>

FUEL FILTER ASSEMBLY

View of the component

Recirculation heating system

Diesel return to cooler

Unfiltered diesel feed

Diesel return to high pressure fuel pump and injectors

Filtered diesel output towards the high pressure fuel pump

Filtering element

Bleed screw

Water in fuel sensor

AK800522 AB

Location
The fuel filter assembly is located on the left side of the engine compartment near the dash panel.

Function
The fuel filter assembly serves to:
- Filter the diesel coming from the tank via the gauge-pump module.
- Inform the engine-ECU when water is present in the diesel.
- Help heat the diesel by means of a recirculation mechanism.

How reheating by recirculation works:
This is a mechanical system with a diesel return bypass. This enables the diesel to recirculate for a more effective temperature increase. Under the temperature influence, this device enables the diesel returning from the injectors and high pressure fuel pump to be directed towards the tank or to be sent back to be high pressure fuel pump.

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>

AK800523AB
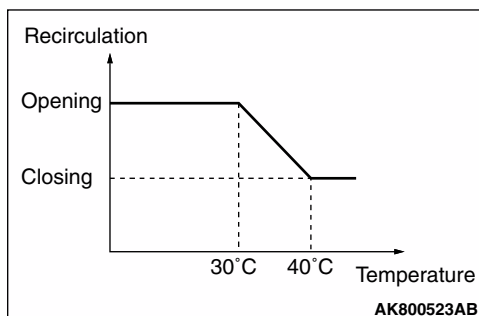
The thermostatic valve enables the fuel to recirculate for a more rapid rise in temperature up to 30°C. It then progressively closes until 40°C in order to maintain a minimum of fuel recirculation.

NOTE: the maximum opening percentage is 80%
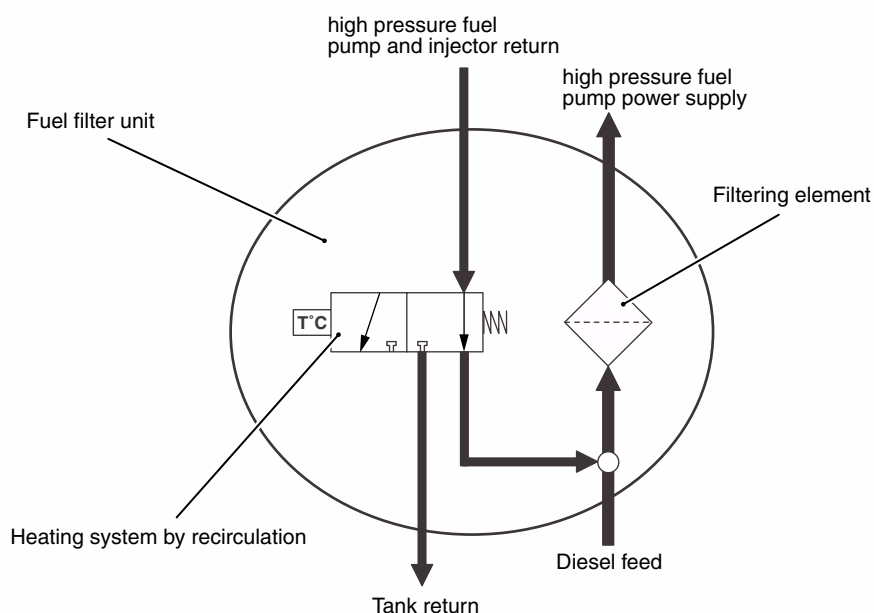
AK800524AB

When the diesel is "cold" (less than 30°C) the assembly is in its recirculation position: the diesel is sent to the filter bowl. The diesel returning from the high pressure fuel pump and injectors has been reheated while passing through the high pressure circuit (compression). In being sent to the filter bowl, it mixes with the diesel coming from the tank, thus increasing the overall temperature of the diesel contained in the fuel filter.

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>
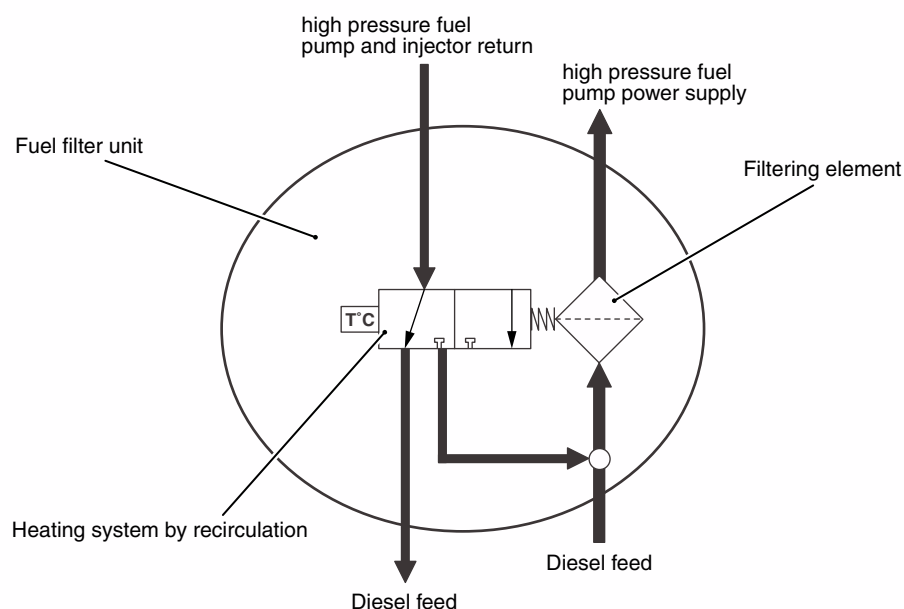
AK800525AB

When the diesel is "hot" (greater than 40°C) the assembly is in its tank return position: the diesel is sent back the tank via the diesel cooler.

WATER IN FUEL SENSOR
Refer to GROUP 13E <4HN> – Sensor .

FUEL TEMPERATURE SENSOR
Refer to GROUP 13E <4HN> – Sensor ·

HIGH PRESSURE FUEL PUMP
The high pressure fuel pump is used to supply diesel from the tank by means of the transfer pump and then to compress the amount of diesel determined by the engine-ECU.

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>

View of the component

Fuel return from the high pressure fuel pump towards the fuel tank

Fuel flow regulator

Fuel inlet into the transfer pump

Fuel outlet from the high pressure fuel pump towards the common rail
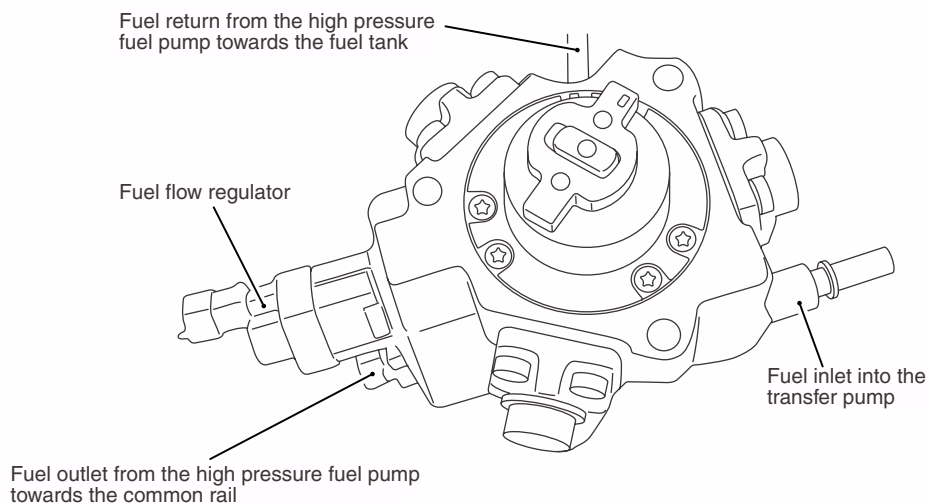
AK703556 AB

Internal structure

Pressure limiter

Transfer pump

Fuel inlet into the transfer pump

Lubrication valve

High pressure fuel pump

Fuel flow regulator

High pressure fuel pump fuel outlet to the common rail

Fuel return from the high pressure fuel pump towards the fuel tank

Outlet valve of the pumping component

Inlet valve of the pumping component
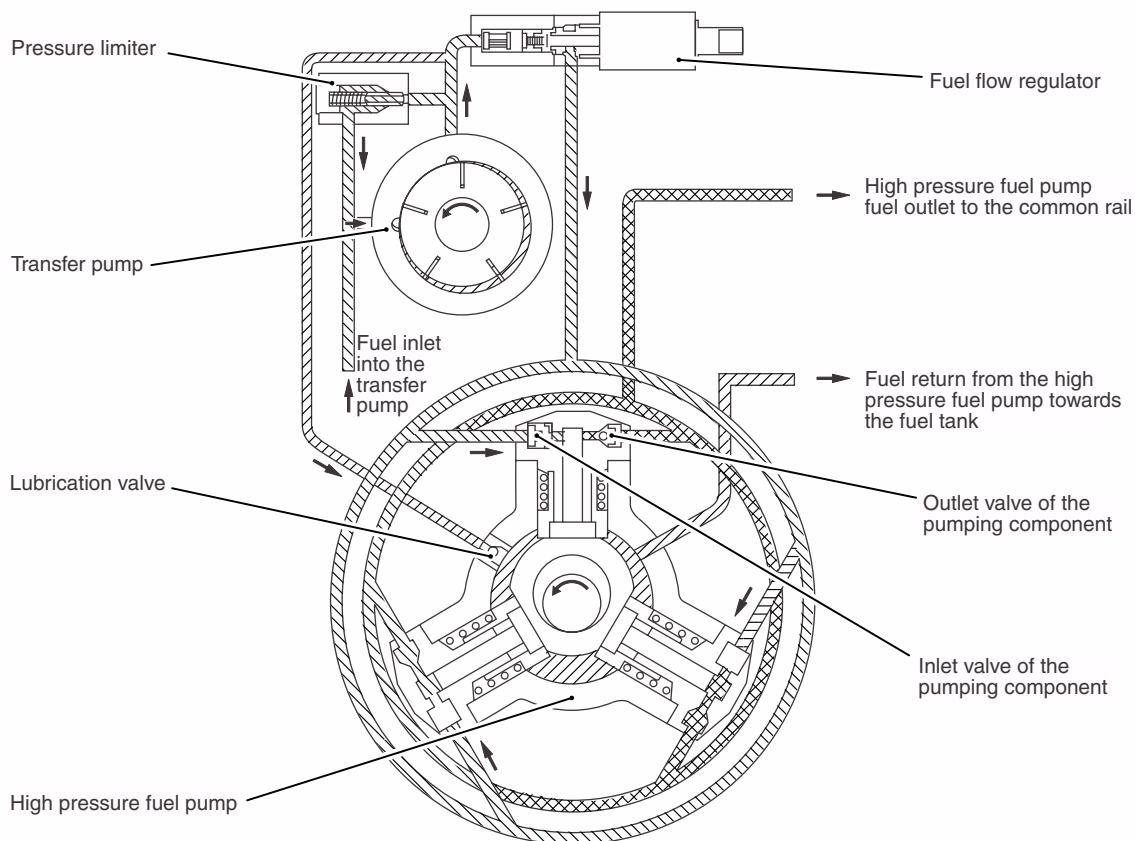
AK703555 AB

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>

Location
The high pressure fuel pump is driven by the intake camshaft.

Characteristics
This is a BOSCH CP1H-type pump.

It is driven by an Oldham coupling and does not need timing.

It sends the diesel at a maximum pressure of 160Mpa.

It includes a feed pump as well as a fuel flow regulator. Assembly component cannot be separated.

FUEL FLOW REGULATOR
Refer to GROUP 13E <4HN> − Actuator.

COMMON RAIL

Location
The common rail is located under the cylinder head cover.

Characteristics
The fuel rail is mechanically welded.

It includes:

- High pressure nozzles on the rail with built-in jets which feed the injectors have vibration and less wear impact on the injectors.
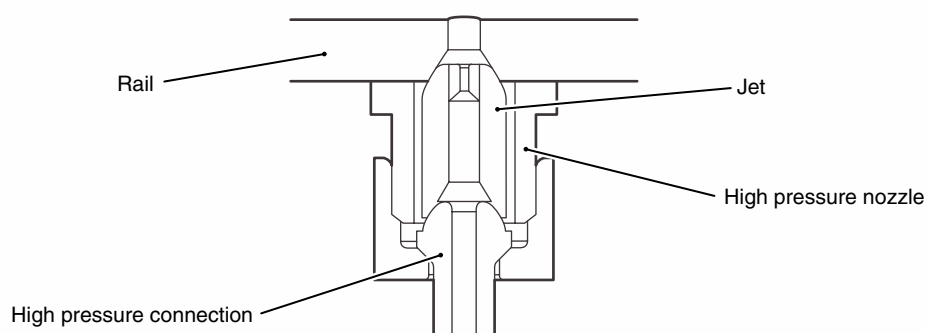
AK800548 **AB**

- Rail pressure sensor
- High pressure fuel regulator

HIGH PRESSURE FUEL REGULATOR
Refer to GROUP 13E <4HN> − Actuator.

RAIL PRESSURE SENSOR
Refer to GROUP 13E <4HN> − Sensor.

COMMON RAIL TYPE FUEL INJECTION SYSTEM <4HN>

FUEL INJECTOR
Refer to GROUP 13E <4HN> − Actuator .

INJECTOR RETURN VALVE

Location
This is located on the diesel return pipe of the fuel injectors.

Characteristics
This is a mechanical valve which maintains the pressure at 1MPa.

Function
Its role is to guarantee the optimal functioning of the fuel injectors by maintaining a return pressure of the 1Mpa.

ACTUATOR

Number of injections per cycle
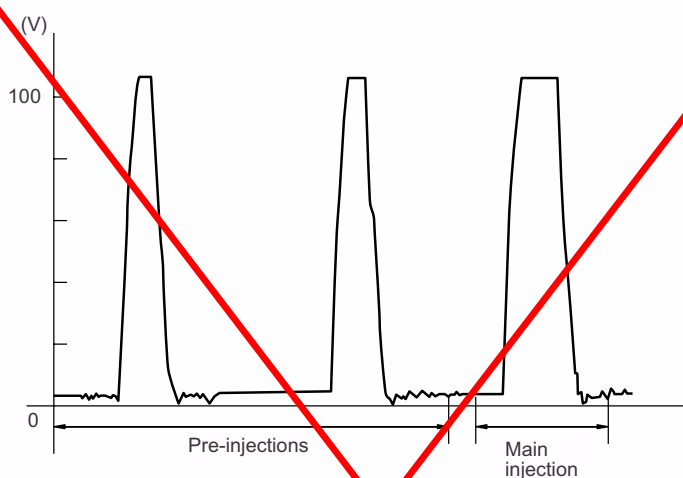
The number of injections per cycle varies in relation to the engine load. It can reach up to 5 injections per cycle:

- 2 pilot up to 3,200 r/min (Then 1 up to 4,500 r/min)
- 1 Main
- 2 post injections depending on the vehicle load (During the regeneration phase)

Reference graph: 2 pilot injections and main injection.

Insert Attachment 4.

AK703229 AB

Strategies used

- Hydraulic compensation

    On the conventional piezo-electric diesel injectors, there is an operating clearance between the actuator and the mushroom valve, to compensate for the variations linked with the thermal expansion of the parts.

    Over time, this clearance tends to increase.

    When the injection ends, any clearances are compensated.

    The thrust rod spring exerts a pressure which tends to increase the volume of the hydraulic chamber.

    If the clearances have increased, a corresponding quantity of diesel fuel infiltrates via the internal leak-offs of the thrust rod to compensate for them.

    The guarantee the operation of the diesel injector, this remains full of diesel fuel so that the hydraulic chamber of the thrust rod does not empty.

    A valve incorporated in the global return pipe of the 4 diesel injectors provides this function by maintaining a pressure of 10 bars.

- Adaptation of the pilot injection for each diesel injector

    Principle of analysis of the acceleration of the crankshaft when the pedal is released.

    Individual adaptation of the pilot injection.

    The engine-ECU measures the acceleration of the crankshaft obtained by injecting very small pilot quantities, each time the pedal is released.

    Depending on the results, the engine-ECU increases or reduces the quantities injected (diesel injector control time) until the acceleration corresponds to a typical graph pre-recorded in the memory of the engine-ECU.

ACTUATOR

The engine-ECU analyses the corrections to be made to the control of each diesel injector.

Insert Attachment 4.

- Regulation of the place to place flow

  Principle of analysis of the acceleration of the crankshaft at idle.

  Management of the place to place flow.

  The engine-ECU measures the acceleration of the crankshaft during the pressure relief phase when the engine is at idle and at low engine speeds.

  The engine-ECU then adjusts the control of the diesel injectors (main injection) to obtain identical accelerations; the aim being to obtain a great regularity of operation.

- Lowering of the fuel pressure (protection of the fuel circuit)

  Principle of analysis of the diesel fuel temperature.

  In order to protect the high pressure pump and the components of the fuel circuit, the temperature at the high pressure fuel pump inlet must remain below 70°C.

  If the temperature exceeds this value, the fuel pressure is lowered to reduce the temperature of the diesel fuel.

Injector
FDFFCED030
050503 9659228880
Identification code
AK703230AB
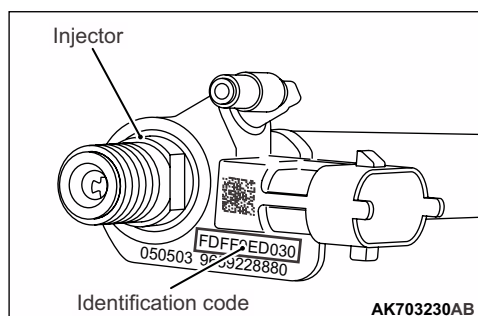
Injector ID code

An ID code (consisting of 10 alphanumeric characters) is stamped on the head of each injector, representing the injection characteristics of the individual injector. The engine-ECU uses this information to realize optimal injection amount control. When a new injector is used on a vehicle, its ID code must be input into the system through the use of the M.U.T.-III.

Turbocharger
Variable geometry piloting actuator (incorporating variable geometry control motor)
AK703527AC
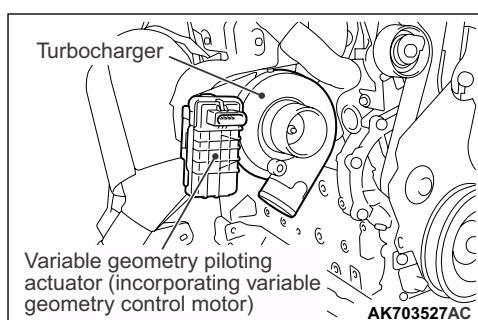
VARIABLE GEOMETRY CONTROL MOTOR

The variable geometry control motor is built in the turbocharger controller installed to the turbocharger and varies the nozzle vane angle of turbocharger. The engine-ECU controls the boost pressure by changing the electrical currents going through the variable geometry control motor coil.

Number of injections per cycle

The number of injections per cycle varies according to engine load.

There may be up to 5 injections per cycle:

- 1 or 2 pilot injections (see pilot injection mapping).
- 1 or 2 main injections (split injection).
- 1 post-injection during the DPF regeneration phase only (see post-injection mapping).

(1) Pilot injection

The pilot injection activation strategy depends on the mapping memorised in the engine-ECU and shown below:

Total flow injected in mg/stroke
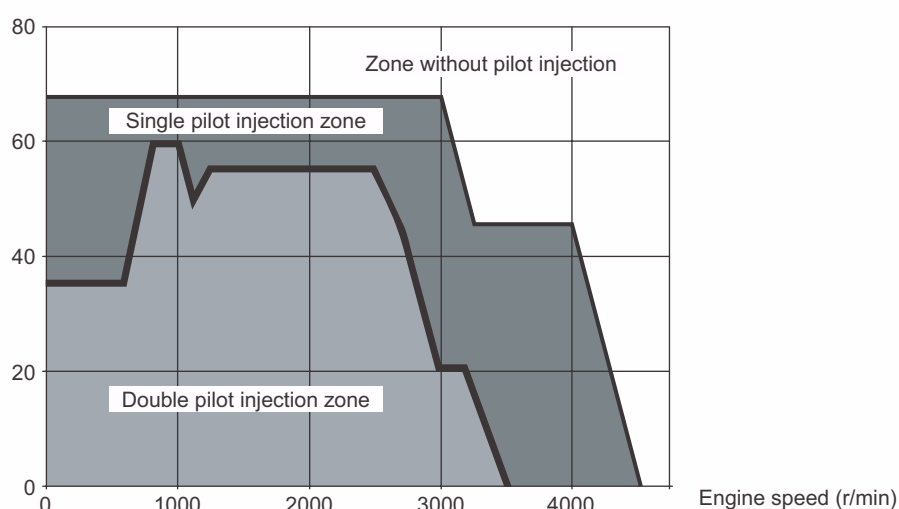
AK800606AB

(2) Main injection

Over a limited operating range, "split-type injection" occurs for the main injection.

Spilit injection is used in the emissions phase (MVEG* cycle) for speeds between 70 and 120 km/h. The aim is to split the main injection in two.

The aim is to improve the NOx / particle compromise.

The drawback is that the downgrade in combustion efficiency results in downgraded consumption.

The zone in which split injection is applied is not very wide as outside of this range pollutants become a problem (NOx).
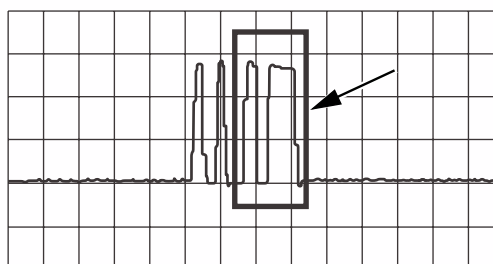
AK800607

The operating range for split injection is:

- Engine speed up to 2,400 r/min.
- Load of 25 to 60 %
- Vehicle speed between 70 and 120 km/h.
- Engine coolant temperature is more than 70°C.
- Air temperature between 20 and 40°C.

NOTE: (*) MVEG Cycle: Motor Vehicle Emission Group (the emissions measurement cycle currently used in Europe). The EURO pollution control standard defines a pollution level cycle based on vehicle speed and time. This is the MVEG cycle.

(3) Post-injection

- This is only acitvated during the DPF regeneration phase.
- It depends on the mapping memorised in the engine-ECU.

Total flow injected in mg/stroke

Post injection zone

Engine speed (r/min)
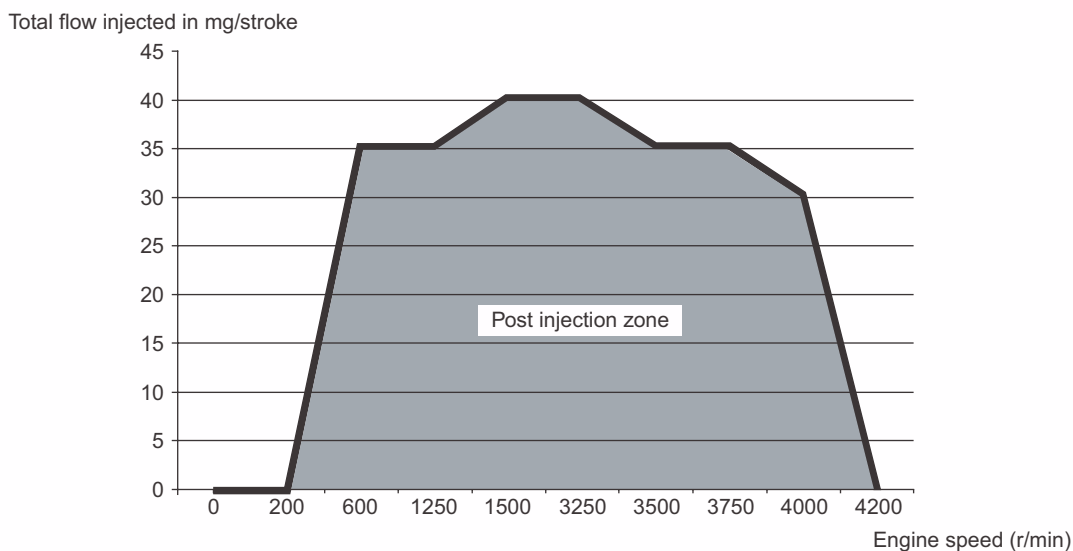
AK800605AB

Post-injeciton serves to increase the temperature of the exhaust gases in order to entrance the combustion of the particles stored in the DPF. It is thus applied during DPF regeneration.

DIAGNOSIS FUNCTION

Code No.	Diagnosis item	Associated context frames
P0171	Proportional oxygen sensor value	4026
P0182	Fuel temperature sensor low	4010
P0183	Fuel temperature sensor high	4010
P0192	Rail pressure sensor low	4011
P0193	Rail pressure sensor high	4011
P0197	Engine oil temperature sensor low	4011
P0198	Engine oil temperature sensor high	4011
P0201	No. 1 fuel injector circuit	4032
P0202	No. 2 fuel injector circuit	4032
P0203	No. 3 fuel injector circuit	4032
P0204	No. 4 fuel injector circuit	4032
P0215	Engine control relay 1	4016
P0222	Accelerator pedal position sensor (main) low	4002
P0223	Accelerator pedal position sensor (main) high	4002
P0227	Accelerator pedal position sensor (sub) low	4002
P0228	Accelerator pedal position sensor (sub) high	4002
P0234	Turbocharger over boost	4021
P0235	Intake air pressure sensor	4020
P0237	Intake air pressure sensor low	4007
P0238	Intake air pressure sensor high	4007
P023E	Intake air pressure sensor correlation	4007
P0243	Variable geometry control motor	4037
P0244	Variable geometry control motor range	4037
P0245	Variable geometry control motor low	4037
P0246	Variable geometry control motor high	4037
P0262	No. 1 Fuel injector quantity lower	4032
P0265	No. 2 Fuel injector quantity lower	4032
P0268	No. 3 Fuel injector quantity lower	4032
P0271	No. 4 Fuel injector quantity lower	4032
P0299	Turbocharger underboost	4021
P0336	Crank angle sensor range	4016
P0339	Crank angle sensor intermittent	4016
P0341	Camshaft position sensor range	4016
P0401	EGR flow insufficient	4018
P0402	EGR flow excessive	4018
P0405	EGR valve position sensor low	4017
P0406	EGR valve position sensor high	4017
P0420	DPF overload	4024
P0460	Diesel gauge defect	4022

For P0197 and P0198 rows: <Correct> 4001 → 4011 <Incorrect>

DIAGNOSIS FUNCTION

Code No.	Diagnosis item	Associated context frames
P0470	Exhaust differential pressure sensor	4013
P0472	Exhaust differential pressure sensor low	4013
P0473	Exhaust differential pressure sensor high	4013
P0483	Fan control	4015
P0487	Throttle valve too open	4035
P0488	Throttle valve too closed	4035
P0489	Throttle valve too much open	4023
P0490	Throttle valve not enough open	4023
P0500	Vehicle speed signal <Correct> — → 4038 <Incorrect>	4038
P0521	Engine oil pressure switch range	4033
P0524	Engine oil pressure switch low	4033
P0562	Battery voltage low	4001
P0563	Battery voltage high	4001
P0568	Cruise control vehicle speed	4031
P0571	Brake switch information (ABS/ASC data)	4008
P0578	Cruise control switch	4031
P0579	Cruise setpoint CAN data invalid	4031
P0600	Alternator excitation current	4001
P0603	EEPROM error	4029
P0606	Engine-ECU	4003
P0615	Starter relay circuit	4016
P0617	Starter relay circuit high	4016
P0630	Chassis number not programmed	4028
P0658	Sensor supply voltage #1 too low	4025
P0659	Sensor supply voltage #1 too high	4025
P0668	ECU internal temperature low	4003
P0669	ECU internal temperature high	4003
P0686	Fuel pump relay circuit low	4000
P0687	Fuel pump relay circuit high	4000
P0691	Fan 1 control circuit	4015
P0692	Fan 1 control no load	4015
P0693	Fan 2 control circuit	4015
P0694	Fan 2 control no load	4015
P0704	Clutch switch	4030
P1113	Rail pressure under threshold	4022
P1161	Throttle valve stuck	4035
P1162	EGR valve stuck open	4023
P1166	Rail pressure over threshold	4022

Annotations (handwritten in red):
- P0500: <Correct> — → 4038 <Incorrect>
- P0606: "relay" <Correct>; <Correct> — → 4003 / 4029 <Incorrect>
- P0615 / P0617: Starter ~~relay~~ circuit <Incorrect>
- P0686 / P0687: → 4000 <Incorrect>; <Correct> — → 4000

DIAGNOSIS FUNCTION

Code No.	Diagnosis item	Associated context frames
P1197	Fuel injector	4010
P1199	Fuel tank level low	~~100~~ <Incorrect> ~~4022~~ <Correct> — <Incorrect>
P119F	Oil dilution detected	4025
P11A0	Fuel mean adaptation high	4019
P11A1	Fuel mean adaptation low	4019
P11A2	Fuel mean adaptation plausibility	4019
P1206	High pressure fuel regulator high temperature	4010
P129A	Variable geometry control motor position below the setpoint	4020
P129B	Variable geometry control motor position over the setpoint	4020
P129E	Variable geometry control motor is jammed	4020
P1349	Glow plug circuit high/over temperature	4004
P1350	Glow plug circuit low/open	4004
P1351	Glow plug not supplied	4004
P1352	Glow plug continually supplied	4004
P1366	No. 1 Fuel injector harness defect	4032
P1367	No. 2 Fuel injector harness defect	4032
P1368	No. 3 Fuel injector harness defect	4032
P1369	No. 4 Fuel injector harness defect	4032
P1434	Fuel additive pump circuit	4014
P1435	Fuel additive-ECU fail	4014
P1443	Fuel additive pump circuit low	4014
P1444	Fuel additive pump circuit high	4014
P1445	Fuel additive tank volume high	4014
P1446	Fuel additive tank volume low	4014
P1447	DPF clogged	4024
P1457	DPF absent	4024
P1459	EGR valve stuck closed	4023
P1461	EGR valve position exceed (long time)	4017
P1462	EGR valve position exceed (short time)	4017
P1490	DPF regeneration request exceed	4024
P1491	Fuel mean adaptation correction exceed high limit	4019
P1492	Fuel mean adaptation correction exceed low limit	4019
P1493	Fuel mean adaptation too many correction	4019
P1494	Fuel mean adaptation positive deviation	4019
P1495	Fuel mean adaptation negative deviation	4019
P1505	Airbag crash signal received	4025
P1506	A/C pressure switch	4001
P1512	Immobilizer random No. request timeout	4001

The rows for P11A0, P11A1, P11A2 are marked <Deleted>.

DIAGNOSIS FUNCTION

Code No.	Diagnosis item	Associated context frames
P1517	Immobilizer handshake timer timeout	4001
P1526	Alternator hardware fault detected <Deleted>	4001
P1527	Alternator charge ratio low	4001
P1528	Alternator charge ratio high	4001
P1530	EGR cooler solenoid valve	4006
P1531	EGR cooler solenoid valve low	4006
P1532	EGR cooler solenoid valve high	4006
P1536	Brake switch	4008
P1586	Sensor supply voltage #3 too low	4025
P1587	Sensor supply voltage #3 too high	4025
P1589	Air flow sensor supply voltage low	4005
P1590	Air flow sensor supply voltage high	4005
P1600	Fuel injector (ISA/IMA code)	4010
P1612	EEPROM error	4001
P1613	Variant coding not done/fail <Deleted>	4001
P1615	Immobilizer invalid key	4001
P1625	ASC torque request not plausible	4030
P1631	Overrun monitoring	<Correct> — 4003 <Incorrect> 4034
P1639	Fuel pump relay circuit open	4000
P1640	Fuel pump relay high temperature	4000
P1641	DC charge converter switch circuit	4010
P1655	Engine run signal circuit low	4000
P1656	Engine run signal circuit high	4000
P1657	Engine run signal	4000
P1667	A/D converter monitoring	4029
P1670	ASC invalid torque request	4030
P16A0	Oil burning detected	4025
P1700	ECU internal (watch dog)	4029
P1727	T/M over torque	4030
P1728	Invalid torque <Deleted>	4030
P1775	Gearbox requesting limp home	4030
P2031	Exhaust gas temperature sensor plausible	4013
P2032	Exhaust gas temperature sensor low	4013
P2033	Exhaust gas temperature sensor high	4013
P2100	Throttle valve control motor	4006
P2102	Throttle valve control motor circuit low	4006
P2103	Throttle valve control motor circuit high	4006
P2106	Throttle valve control motor current	4006

DIAGNOSIS FUNCTION

Code No.	Diagnosis item	Associated context frames
P2107	Throttle valve control motor under voltage	4006
P2111	Throttle valve stuck	4036
P2118	Throttle valve control motor temperature	4006
P2119	Throttle valve control motor high temperature	4006
P2137	Accelerator pedal position sensor 1/2 incorrect	4002
P2143	EGR valve circuit	4005
P2144	EGR valve circuit low	4005
P2145	EGR valve circuit high	4005
P2146	Fuel injector (bank 1) circuit	4010
P2147	Fuel injector (bank 1) harness defect	4010
P2149	Fuel injector (bank 2) circuit	4010
P2150	Fuel injector (bank 2) harness defect	4010
P2192	System too rich	4026
P2193	System too lean	4026
P2196	Proportional oxygen sensor signal low	4026
P2197	Proportional oxygen sensor signal high	4026
P2231	Proportional oxygen sensor shorted to heater	4026
P2245	Proportional oxygen sensor reference voltage low	4026
P2246	Proportional oxygen sensor reference voltage high	4026
P2299	Brake/Accel position incompatible	4002
P2408	Additive tank cork fault	4028
P2413	EGR system	4005
P250B	Engine oil level sensor range <Deleted>	4001
P250C	Engine oil level sensor signal low	4001
P250D	Engine oil level sensor signal high	4001
P2519	A/C compressor power circuit	4028
P2520	A/C compressor power circuit low	4028
P2521	A/C compressor power circuit high	4028
P2530	Ignition switch START position circuit	4016
P2533	Ignition switch ON position circuit <Deleted>	4000
P2563	Variable geometry position sensor range	4020
P2564	Variable geometry position sensor low	4039
P2565	Variable geometry position sensor high	4039
P2670	Sensor supply voltage #2 too low	4025
P2671	Sensor supply voltage #2 too high	4025
P3002	Rail pressure too much	4022
P3003	Rail pressure not enough	4022
P3007	Air flow sensor plausibility (high)	4005
P3008	Air flow sensor plausibility (low)	4005

DIAGNOSIS FUNCTION

Code No.	Diagnosis item	Associated context frames
U0064	Fuel additive-ECU CAN timeout	4028
U0110	4WD-ECU CAN timeout	4028
U0118	Brake switch information (CAN data)	4008
U0121	ABS-ECU CAN timeout	4028
U0122	ASC-ECU CAN timeout	4028
U1000	ECU mute	4028
U1003	CAN bus off	4028
U1118	ETACS-ECU CAN timeout	4028 4041
U1213	ASC communication (CAN)	4030

<Correct> — <Incorrect>

Freeze frame data details

NOTE: The details of associated context frames shown in the table "Freeze frame data for each diagnosis code" are shown below.

Insert Attachment 6.

Frame	Item No.	Data details	Unit
108	1	Fuel temperature	°C
	2	Pressure control valve	%
	3	Rail pressure (Limited)	MPa
	4	Engine speed	r/min
	5	Rail pressure (peak)	MPa
4000			
4001	6	Battery voltage	V
	7	Engine temperature	mV
	8	Atmospheric pressure	mV
	9	Accelerator position	%
	10	Vehicle speed	km/h
4002	6	Battery voltage	V
	10	Vehicle speed	km/h
	13	Accelerator pedal sensor 1	mV
	14	Accelerator pedal sensor 2	mV
	15	Brake status	ON, OFF
4003			

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4004	6	Battery voltage	V
	7	Engine temperature	mV
	18	Glow control relay (output)	ON, OFF
	19	Glow control status	no preheating, waiting, preheating prep, preheating, preheating abort, start preheating, start no preheat, wait post heat, post heating, post heat abort, waiting, int. preheating, abort decelerate
	20	Trouble in starting	rail pressure, engine speed, engine synchro, reversible req., irreversible req
4005	6	Battery voltage	V
	7	Engine temperature	mV
	23	Throttle valve (relative)	%
	24	Air mass sensor	mV
4006	6	Battery voltage	V
	7	Engine temperature	mV
	23	Throttle valve (relative)	%
	28	Air temperature (AFS)	°C
4007	6	Battery voltage	V
	7	Engine temperature	mV
	31	Boost pressure	mV
	32	Fuel mass	mg/st
	8	Atmospheric pressure	mV

Insert Attachment 6.

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4008	34	Brake status	OFF, not available, ON
	35	Brake status (CAN)	not valid, ON, severe pb, absent, hold
	36	Brake switch	OFF, ON
	37	Vehicle acceleration	m/s2
	10	Vehicle speed	km/h
4009			
4010	6	Battery voltage	V
	40	Fuel temperature	mV
	41	Metering unit	mV
	42	Pressure value	mV
	43	Rail pressure (peak)	mV
4011	6	Battery voltage	V
	40	Fuel temperature	mV
	46	Metering unit	mV
	42	Pressure value	mV
	48	Zero fuel calibration	inactive, active
4012	4	Engine speed	r/min
	50	Rail pressure (peak)	MPa
	51	Metering unit (target)	mA
	52	Metering unit	mV
	53	Engine current status	starting, running, afterrun
4013	6	Battery voltage	V
	7	Engine temperature	mV
	56	Differential pressure offset	mV
	57	DPF temperature sensor	mV
	58	Additive minimum level information	not reached, reached

Insert Attachment 6.

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4014	6	Battery voltage	V
	40	Fuel temperature	mV
	61	Additivation status	done, successful
	62	Additive tank volume	ml
	58	Additive minimum level information	not reached, reached
4015	6	Battery Voltage	V
	7	Engine temperature	mV
	66	PWM fun (output)	ON, OFF
	67	Fan control (after run)	ON, OFF
	68	Main relay previous opening	ON, OFF
4016	6	Battery voltage	V
	70	Coolant temperature	°C
	20	Trouble in starting	rail pressure, engine speed, engine synchro, reversible req., irreversible req
	68	Main relay previous opening	ON, OFF
4017	70	Coolant temperature	°C
	4	Engine speed	r/min
	76	EGR valve position (target)	%
	32	Fuel mass	mg/st
4018	70	Coolant temperature	°C
	4	Engine speed	r/min
	76	EGR valve position (target)	%
	81	Airmass per cylinder	mg/st
	32	Fuel mass	mg/st
4019	70	Coolant temperature	°C
	4	Engine speed	r/min
	85	Boost pressure	kPa
	86	Atmospheric pressure	kPa
	81	Airmass per cylinder	mg/st

Insert Attachment 6.

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4020	70	Coolant temperature	°C
	4	Engine speed	r/min
	90	Boost pressure actuator (target)	%
	91	Boost pressure act (relative)	%
	92	Boost pressure actuator (output)	%
4021	4	Engine speed	r/min
	32	Fuel mass	mg/st
	85	Boost pressure	kPa
	86	Atmospheric pressure	kPa
	97	Boost pressure (target)	kPa
4022	1	Fuel temperature	°C
	4	Engine speed	r/min
	32	Fuel mass	mg/st
	101	Rail pressure (Limited)	MPa
	50	Rail pressure (peak)	MPa
4023	70	Coolant temperature	°C
	4	Engine speed	r/min
	76	EGR valve position (target)	%
	106	PWM (output)	%
4024	1	Fuel temperature	°C
	4	Engine speed	r/min
	109	Differential pressure	kPa
	110	DPF gas flow rate	l/h
	111	Distance since last regeneration	km
4025	15	Brake status	ON, OFF
	4	Engine speed	r/min
	32	Fuel mass	mg/st
	115	Metering unit (target)	mA
	50	Rail pressure (peak)	MPa
4026	1	Fuel temperature	°C
	118	Lambda sensor status	invalid signal, valid signal
	119	Lambda sensor	–
	120	Fuel mean value adaptation	ON, OFF
	32	Fuel mass	mg/st

Insert Attachment 6.

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4027	1	Fuel temperature	°C
	118	Lambda sensor status	invalid signal, valid signal
	119	Lambda sensor	–
	125	LSU sensor status	inactive, active
	32	Fuel mass	mg/st
4028	4	Engine speed	r/min
	70	Coolant temperature	°C
	10	Vehicle speed	km/h
	6	Battery voltage	V
	53	Engine current status	starting, running, afterrun
4029	4	Engine speed	r/min
	70	Coolant temperature	°C
	6	Battery voltage	V
	10	Vehicle speed	km/h
4030	4	Engine speed	r/min
	10	Vehicle speed	km/h
	37	Vehicle acceleration	m/s2
	139	Torque order	Nm
	140	Propulsion torque	Nm
4031	4	Engine speed	r/min
	10	Vehicle speed	km/h
	143	Cruise control switch	MAIN, CANCEL, SET, RESUME, PAUSE, Error
	32	Fuel mass	mg/st

Insert Attachment 6.

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4032	4	Engine speed	r/min
	146	Injection quantity	mg/st
	147	Injection characteristic	post INJ 1, post INJ 2, main injection, INJ pilot 1, INJ pilot 2, INJ pilot 3
	20	Trouble in starting	rail pressure, engine speed, engine synchro, reversible req., irreversible req
	149	Fuel mass (target)	mg/st
4033	4	Engine speed	r/min
	151	Oil temperature	°C
	152	Oil pressure	high, low
	53	Engine current status	starting, running, afterrun
4034	4	Engine speed	r/min
	70	Coolant temperature	°C
	156	Torque demand 1	gas pedal, CC, propulsion, drag torque, traction, increasing, decreasing, low idle
	157	Torque demand 2	alternator, servo pump, AC compressor, active temp
	158	Exhaust gas temperature	warm, cold, split, DPF level 1, DPF level 2, DPF level 3, DPF level 4, DPF prep

Insert Attachment 6.

DIAGNOSIS FUNCTION

Frame	Item No.	Data details	Unit
4035	70	Coolant temperature	°C
	4	Engine speed	r/min
	161	Throttle valve (target)	%
	23	Throttle valve (relative)	%
	163	Throttle valve (output)	%
4036	6	Battery voltage	V
	70	Coolant temperature	°C
	23	Throttle valve (relative)	%
	163	Throttle valve (output)	%
4037	70	Coolant temperature	°C
	6	Battery voltage	V
	90	Boost pressure actuator (target)	%
	91	Boost pressure actuator (relative)	%
	92	Boost pressure actuator (output)	%
4038			
4039	6	Battery voltage	V
	70	Coolant temperature	°C
	32	Fuel mass	mg/st
	91	Boost pressure actuator (relative)	%
	92	Boost pressure actuator (output)	%
4041	4	Engine speed	r/min
	70	Coolant temperature	°C
	10	Vehicle speed	km/h
	6	Battery voltage	V
	182	Missing CAN data	208h, 412h, 248h, 325h, 325h

Insert Attachment 6.

INSPECTION CHART FOR DIAGNOSIS CODE

Code No.	Diagnosis item	Error type debounced	Engine warning lamp (check engine lamp)	Remaining amount of fuel additive warning mark	Reference page
P1197	Fuel injector	max fault	×	–	
		sig fault	×	–	
		sig fault	×	–	
		sig fault	×	–	
		max fault	×	–	
		min fault	×	–	
		sig fault	×	–	
		max fault	×	–	
		min fault	×	–	
		sig fault	×	–	
		max fault	×	–	
		min fault	×	–	
		max fault	×	–	
		min fault	×	–	
		max fault	×	–	
		sig fault	×	–	
		min fault	×	–	
P1199	Fuel tank level low	max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
		max fault	–	–	
P119F	Oil dilution detected <Deleted>	max fault	–	–	
P11A0	Fuel mean adaptation high	max fault	–	–	
P11A1	Fuel mean adaptation low	min fault	–		

INSPECTION CHART FOR DIAGNOSIS CODE

Code No.	Diagnosis item	Error type debounced	Engine warning lamp (check engine lamp)	Remaining amount of fuel additive warning mark	Reference page
P11A2	Fuel mean adaptation plausibility	npl fault		—	
P1206	High pressure fuel regulator high temperature	npl fault	×	—	
P129A	Variable geometry control motor position below the setpoint	max fault	—	—	
P129B	Variable geometry control motor position over the setpoint	min fault	—	—	
P129E	Variable geometry control motor is jammed	sig fault	—	—	
P1349	Glow plug circuit high/over temperature	max fault	—	—	
		npl fault	—	—	
P1350	Glow plug circuit low/open	min fault	—	—	
		sig fault	—	—	
P1351	Glow plug not supplied	min fault	—	—	
P1352	Glow plug continually supplied	max fault	×	—	
P1366	No. 1 Fuel injector harness defect	npl fault	×	—	
P1367	No. 2 Fuel injector harness defect	npl fault	×	—	
P1368	No. 3 Fuel injector harness defect	npl fault	×	—	
P1369	No. 4 Fuel injector harness defect	npl fault	×	—	
P1434	Fuel additive pump circuit	npl fault	—	—	
		sig fault	—	—	
P1435	Fuel additive-ECU fail	max fault	—	—	
P1443	Fuel additive pump circuit low	min fault	—	—	
P1444	Fuel additive pump circuit high	max fault	—	—	
P1445	Fuel additive tank volume high	npl fault	—	—	
P1446	Fuel additive tank volume low	npl fault	—	×	
P1447	DPF clogged	max fault	×	—	
P1457	DPF absent	max fault	×	—	
P1459	EGR valve stuck closed	max fault	—	—	
P1461	EGR valve position exceed (long time)	max fault	—	—	
P1462	EGR valve position exceed (short time)	max fault	—	—	
P1490	DPF regeneration request exceed	max fault	—	—	
P1491	Fuel mean adaptation correction exceed high limit	max fault	—	—	

<Deleted>

INSPECTION CHART FOR DIAGNOSIS CODE

Code No.	Diagnosis item	Error type debounced	Engine warning lamp (check engine lamp)	Remaining amount of fuel additive warning mark	Reference page
P1492	Fuel mean adaptation correction exceed low limit	min fault	–	–	
P1493	Fuel mean adaptation too many correction	npl fault	–	–	
P1494	Fuel mean adaptation positive deviation	max fault	–	–	
P1495	Fuel mean adaptation negative deviation	min fault	–	–	
P1505	Airbag crash signal received	max fault	–	–	
P1506	A/C pressure switch	npl fault	–	–	
		sig fault	–	–	
P1512	Immobilizer random No. request timeout	max fault	–	–	
P1517	Immobilizer handshake timer timeout	min fault	–	–	<Deleted>
P1526	Alternator hardware fault detected	npl fault	–	–	
P1527	Alternator charge ratio low	min fault	–	–	
P1528	Alternator charge ratio high	max fault	–	–	
P1530	EGR cooler solenoid valve	sig fault	–	–	
P1531	EGR cooler solenoid valve low	min fault	–	–	
P1532	EGR cooler solenoid valve high	npl fault	–	–	
P1536	Brake switch	npl fault	–	–	
P1586	Sensor supply voltage #3 too low	min fault	×	–	
P1587	Sensor supply voltage #3 too high	max fault	×	–	
P1589	Air flow sensor supply voltage low	min fault	×	–	
P1590	Air flow sensor supply voltage high	max fault	×	–	
P1600	Fuel injector (ISA/IMA code)	npl fault	×	–	
P1612	EEPROM error	max fault	–	–	
		min fault	–	–	<Deleted>
P1613	Variant coding not done/fail	npl fault	–	–	
P1615	Immobilizer invalid key	npl fault	–	–	
		sig fault	–	–	
P1625	ASC torque request not plausible	max fault	–	–	
P1631	Overrun monitoring	max fault	–	–	
		max fault	–	–	
P1639	Fuel pump relay circuit open	sig fault	–	–	

INSPECTION CHART FOR DIAGNOSIS CODE

Code No.	Diagnosis item	Error type debounced	Engine warning lamp (check engine lamp)	Remaining amount of fuel additive warning mark	Reference page
P1640	Fuel pump relay high temperature	npl fault	–	–	
P1641	DC charge converter switch circuit	sig fault	×	–	
P1655	Engine run signal circuit low	max fault	–	–	
P1656	Engine run signal circuit high	min fault	–	–	
P1657	Engine run signal	npl fault	–	–	
		sig fault	–	–	
P1667	A/D converter monitoring	max fault	–	–	
		min fault	–	–	
		npl fault	–	–	
		sig fault	–	–	
P1670	ASC invalid torque request	max fault	–	–	
		max fault	–	–	
		max fault	–	–	
P16A0	Oil burning detected	max fault	–	–	
		max fault	–	–	
P1700	ECU internal (watch dog)	npl fault	–	–	
P1727	T/M over torque	max fault	–	–	<Deleted>
P1728	Invalid torque	max fault	–	–	
		min fault	–	–	
P1775	Gearbox requesting limp home	max fault	–	–	
P2031	Exhaust gas temperature sensor plausible	sig fault	×	–	
P2032	Exhaust gas temperature sensor low	min fault	×	–	
P2033	Exhaust gas temperature sensor high	max fault	×	–	
P2100	Throttle valve control motor	sig fault	×	–	
		sig fault	×	–	
P2102	Throttle valve control motor circuit low	min fault	×	–	
		min fault	×	–	
P2103	Throttle valve control motor circuit high	max fault	×	–	
		max fault	×	–	
P2106	Throttle valve control motor current	min fault	×	–	
P2107	Throttle valve control motor under voltage	max fault	×	–	
P2111	Throttle valve stuck	npl fault	–	–	

INSPECTION CHART FOR DIAGNOSIS CODE

Code No.	Diagnosis item	Error type debounced	Engine warning lamp (check engine lamp)	Remaining amount of fuel additive warning mark	Reference page <Deleted>
P250B	Engine oil level sensor range	npl fault	–	–	
		sig fault	–	–	
P250C	Engine oil level sensor signal low	min fault	–	–	
P250D	Engine oil level sensor signal high	max fault	–	–	
P2519	A/C compressor power circuit	npl fault	–	–	
		sig fault	–	–	
P2520	A/C compressor power circuit low	min fault	–	–	
P2521	A/C compressor power circuit high	max fault	–	–	
P2530	Ignition switch START position circuit	sig fault	–	–	<Deleted>
P2533	Ignition switch ON position circuit	npl fault		–	
P2563	Variable geometry position sensor range	max fault	×	–	
P2564	Variable geometry position sensor low	min fault	×	–	
		min fault	×	–	
P2565	Variable geometry position sensor high	max fault	×	–	
		max fault	×	–	
P2670	Sensor supply voltage #2 too low	min fault	×	–	
P2671	Sensor supply voltage #2 too high	max fault	×	–	
P3002	Rail pressure too much	max fault	×	–	
P3003	Rail pressure not enough	max fault	×	–	
P3007	Air flow sensor plausibility (high)	max fault	–	–	
P3008	Air flow sensor plausibility (low)	min fault	×	–	
U0064	Fuel additive-ECU CAN timeout	max fault	–	–	
U0110	4WD-ECU CAN timeout	max fault	–	–	
		min fault	–	–	
		max fault	–	–	
U0118	Brake switch information (CAN data)	max fault	×	–	
U0121	ABS-ECU CAN timeout	max fault	–	–	
U0122	ASC-ECU CAN timeout	max fault	×	–	
U1000	ECU mute	max fault	×	–	
U1003	CAN bus off	max fault	×	–	
U1118	ETACS-ECU CAN timeout	max fault	×	–	

Code No. P11A0: Fuel Mean Adaptation High

Code No. P11A0: Fuel Mean Adaptation High

TROUBLE JUDGMENT
- Injection correction not coherent

PROBABLE CAUSE
- Failed engine-ECU

<Deleted>

Code No. P11A1: Fuel Mean Adaptation Low

Code No. P11A1: Fuel Mean Adaptation Low

TROUBLE JUDGMENT
- Injection correction not coherent

PROBABLE CAUSES
- Failed engine-ECU

<Deleted>

Code No. P11A2: Fuel Mean Adaptation Plausibility

Code No. P11A2: Fuel Mean Adaptation Plausibility

TROUBLE JUDGMENT
- Injection correction not coherent

PROBABLE CAUSE
- Failed engine-ECU

<Deleted>

Code No. P1526: Alternator Hardware Fault Detected

Code No. P1526: Alternator Hardware Fault Detected

TROUBLE JUDGMENT
- Alternator charge: Hardware fault detected

PROBABLE CAUSE
- Failed alternator
- Failed electrical harness in alternator circuit

(Refer to Symptom Procedure – Alternator System)

<Deleted>

Code No. P1527: Alternator Charge Ratio Low

Code No. P1527: Alternator Charge Ratio Low

TROUBLE JUDGMENT
- Alternator charge: charge ratio control < minimum threshold

PROBABLE CAUSE
- Failed alternator
- Failed electrical harness in alternator circuit

(Refer to Symptom Procedure – Alternator System)

<Deleted>

Code No. P1528: Alternator Charge Ratio High

Code No. P1528: Alternator Charge Ratio High

TROUBLE JUDGMENT
- Alternator charge: charge ratio control > minimum threshold

PROBABLE CAUSE
- Failed alternator
- Failed electrical harness in alternator circuit

(Refer to Symptom Procedure – Alternator System)

<Deleted>

Code No. P1613: Variant Coding Not Done/Fail

Code No. P1613: Variant Coding Not Done/Fail

TROUBLE JUDGMENT
- Configuration incorrect or not carried out

PROBABLE CAUSES
- The variant coding is not entered   - Failed engine-ECU

<Deleted>

Code No. P1728: Invalid Torque

Code No. P1728: Invalid Torque

TROUBLE JUDGMENT
- Torque invalid

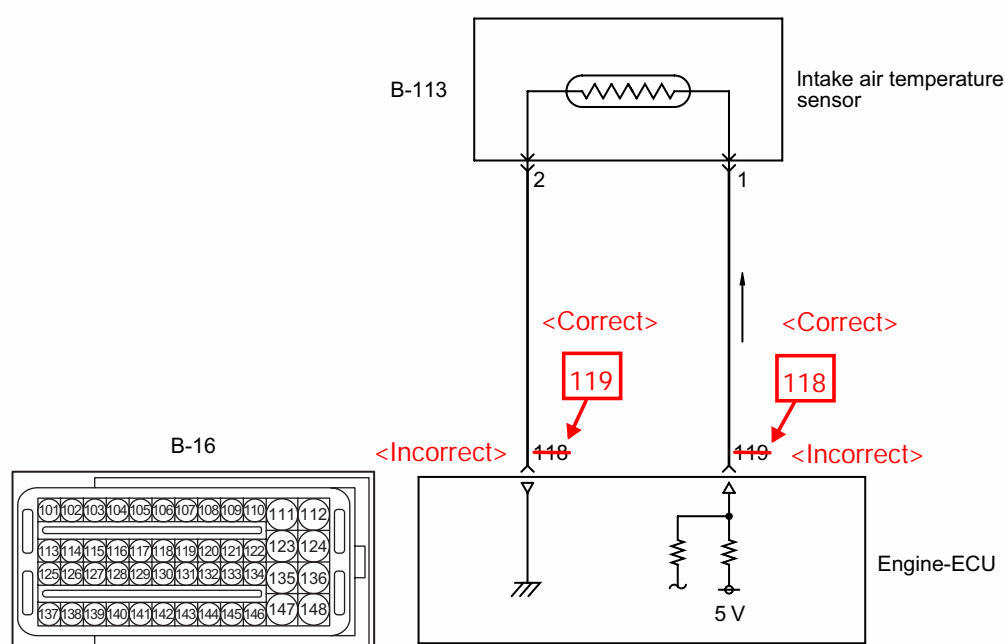**PROBABLE CAUSE**

<Deleted>

Code No. P250B: Engine Oil Level Sensor Range

Code No. P250B: Engine Oil Level Sensor Range

TROUBLE JUDGMENT
- Open circuit or excessive temperature

PROBABLE CAUSES
- Failed engine oil level sensor
- Failed electrical harness in engine oil level sensor circuit (Refer to Symptom Procedure − Engine Oil Level Sensor System)

<Deleted>

Code No. P2533: Ignition Switch On Position Circuit

Code No. P2533: Ignition Switch On Position Circuit

TROUBLE JUDGMENT
- Fault on the starter positive

PROBABLE CAUSES
- Failed electrical harness in engine-ECU power

supply, engine control relay, ignition switch-IG1 circuit (Refer to Symptom Procedure – engine-ECU power supply, engine control relay, ignition switch-IG1)

<Deleted>

Inspection Procedure 6: Intake Air Temperature Sensor System

Intake Air Temperature Sensor Circuit

AK703644AB

Connector: B-113

Engine oil level gauge

B-113 (G)

AK703743AB

Connector: B-16

B-16 (GR)

AK703744AB
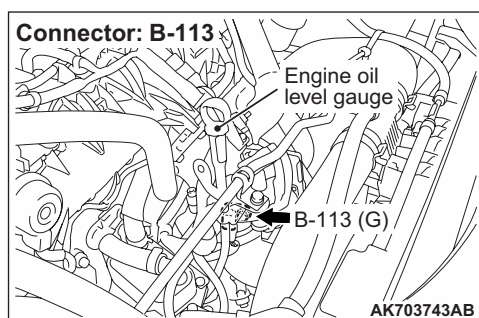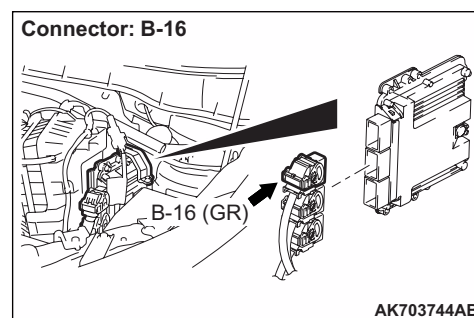
OPERATION

- A power voltage of 5 V is applied to the intake air temperature sensor output terminal (terminal No. 1) from the engine-ECU (terminal No. ~~119~~). <Correct> 118 <Incorrect> 119
- The power voltage is earthed to the engine-ECU (terminal No. ~~118~~) from the intake air temperature sensor (terminal No. 2). <Incorrect> <Correct> 119

FUNCTION

- The intake air temperature sensor converts the intake air temperature into a voltage signal, and inputs the voltage to the engine-ECU.
- The engine-ECU uses the signal of the intake air temperature sensor for the air/fuel ratio control.
- The intake air temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the intake air temperature rises. Therefore, the sensor output voltage varies with the intake air temperature, and becomes lower as the intake air temperature rises.

PROBABLE CAUSES
- Failed intake air temperature sensor
- Open/short circuit or harness damage in intake

air temperature sensor circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-113 intake air temperature sensor connector

Q: Is the check result normal?
> **YES :** Go to Step 2 .
> **NO :** Repair or replace the connector.

STEP 2. Perform resistance measurement at B-113 intake air temperature sensor connector.
- Disconnect connector, and measure at the harness side.
- Resistance between terminal No. 2 and earth.

> **OK: Continuity (2 Ω or less)**

Q: Is the check result normal?
> **YES :** Go to Step 6 .
> **NO :** Go to Step 3 .

STEP 3. Connector check: B-16 engine-ECU connector

Q: Is the check result normal?
> **YES :** Go to Step 4 .
> **NO :** Repair or replace the connector.

<Correct> 119

STEP 4. Check harness between B-113 (terminal No. 2) intake air temperature sensor connector and B-16 (terminal No. 119) engine-ECU connector. <Incorrect>
- Check earthing line for open circuit and damage.

Q: Is the check result normal?
> **YES :** Go to Step 5 .
> **NO :** Repair the damaged harness wire.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?
> **YES :** Replace the engine-ECU.
> **NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 6. Perform voltage measurement at B-113 intake air temperature sensor connector.
- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

> **OK: 4.5 − 4.9 V**

Q: Is the check result normal?
> **YES :** Go to Step 9 .
> **NO :** Go to Step 7 .

STEP 7. Connector check: B-16 engine-ECU connector

Q: Is the check result normal?

    YES : Go to Step 8 .

    NO : Repair or replace the connector.

<Correct> 118

STEP 8. Check harness between B-113 (terminal No. 1) intake air temperature sensor connector and B-16 (terminal No. ~~119~~) engine-ECU connector.

  <Incorrect>

• Check output line for open/short circuit.

Q: Is the check result normal?

    YES : Go to Step 5 .

    NO : Repair the damaged harness wire.

STEP 9. Connector check: B-16 engine-ECU connector

Q: Is the check result normal?

    YES : Go to Step 10 .

    NO : Repair or replace the connector.

<Correct> 118

STEP 10. Check harness between B-113 (terminal No. 1) intake air temperature sensor connector and B-16 (terminal No. ~~119~~) engine-ECU connector.

  <Incorrect>

• Check output line for damage.

Q: Is the check result normal?

    YES : Go to Step 11 .

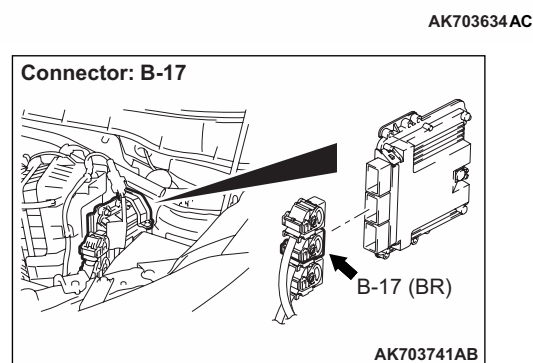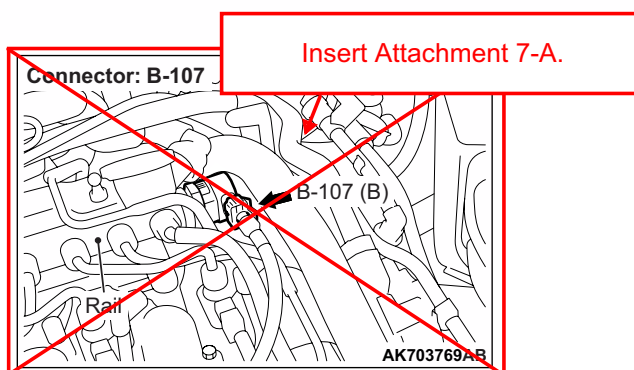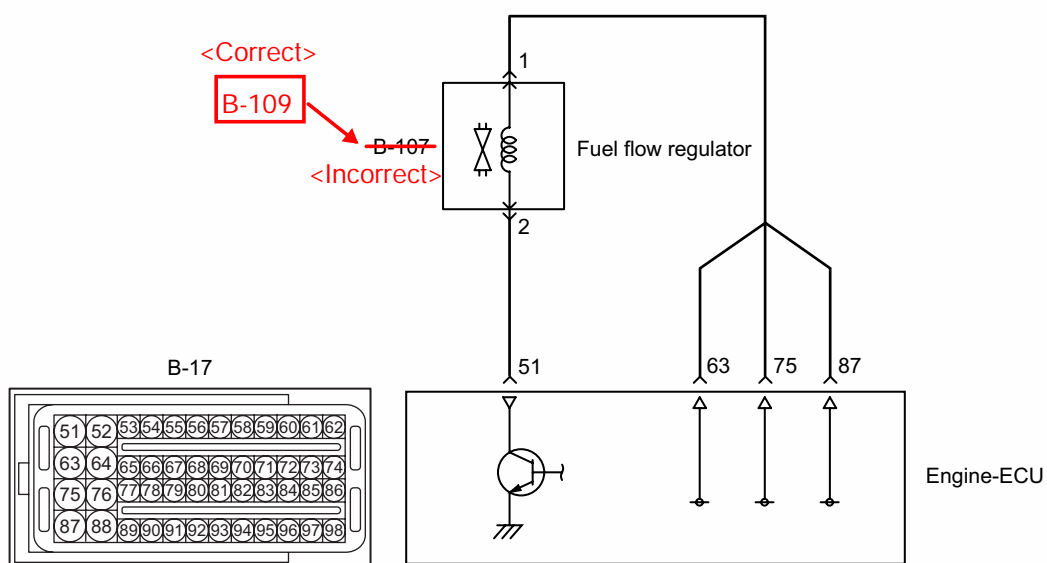   **NO :** Repair or replace the connector.

STEP 11. Replace the intake air temperature sensor.

• After replacing the intake air temperature sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

    YES : Replace the engine-ECU.

    NO : The check is end.

Inspection Procedure 35: Fuel Flow Regulator System

Fuel Flow Regulator Circuit

<Correct>

B-109

B-107

<Incorrect>

Fuel flow regulator

B-17

Engine-ECU

AK703634AC

Connector: B-107

Insert Attachment 7-A.

B-107 (B)

Rail

AK703769AB

Connector: B-17

B-17 (BR)

AK703741AB

OPERATION
- Power is supplied to the fuel flow regulator (terminal No. 1) from the engine-ECU (terminal No. 63, terminal No. 75 and terminal No. 87).
- The engine-ECU (terminal No. 51) makes the power transistor in the unit be in "ON" position, and that makes currents go on the fuel flow regulator (terminal No. 2).

FUNCTION
- The fuel flow regulator controls the fuel flow by using the signal sent from the engine-ECU.

PROBABLE CAUSES
- Failed fuel flow regulator
- Open/short circuit or harness damage in fuel flow regulator circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

<Incorrect>

STEP 1. Connector check: ~~B-107~~ fuel flow regulator connector

Q: Is the check result normal?
B-109   <Correct>
    YES : Go to Step 2 .
    NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at ~~B-107~~ fuel flow regulator connector.
<Incorrect>
- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

    OK: System voltage

Q: Is the check result normal?
    YES : Go to Step 6 .
    NO : Go to Step 3 .

STEP 3. Connector check: B-17 engine-ECU connector

Q: Is the check result normal?
    YES : Go to Step 4 .
    NO : Repair or replace the connector.

STEP 4. Check harness between B-109 (terminal No. 1) fuel flow regulator connector and B-17 (terminal No. 63, terminal No. 75 and terminal No. 87) engine-ECU connector.
- Check power supply line for open/short circuit.

Q: Is the check result normal?
    YES : Go to Step 5 .
    NO : Repair the damaged harness wire.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?
    YES : Replace the engine-ECU.
    NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 6. Connector check: B-17 engine-ECU connector

Q: Is the check result normal?
    YES : Go to Step 7 .
    NO : Repair or replace the connector.

<Incorrect>

STEP 7. Check harness between ~~B-107~~ (terminal No. 2) fuel flow regulator connector and B-17 (terminal No. 51) engine-ECU connector.

- Check earthing line for open/short circuit and damage.

Q: Is the check result normal?

    YES : Go to Step 8 .

    NO : Repair the damaged harness wire.

B-109 <Correct>

<Incorrect>

STEP 8. Check harness between ~~B-107~~ (terminal No. 1) fuel flow regulator connector and B-17 (terminal No. 63, terminal No. 75 and terminal No. 87) engine-ECU connector.

- Check power supply line for damage.

Q: Is the check result normal?

    YES : Go to Step 9 .

    NO : Repair the damaged harness wire.

STEP 9. Replace the fuel flow regulator assembly.

- After replacing the fuel flow regulator, re-check the trouble symptoms.

Q: Does trouble symptom persist?

    YES : Replace the engine-ECU.

    NO : The check is end.

Inspection Procedure 36: High Pressure Fuel Regulator System

High Pressure Fuel Regulator Circuit

AK703634 AD

Insert Attachment 7-B.

AK703770AB

Connector: B-17

B-17 (BR)

AK703741AB
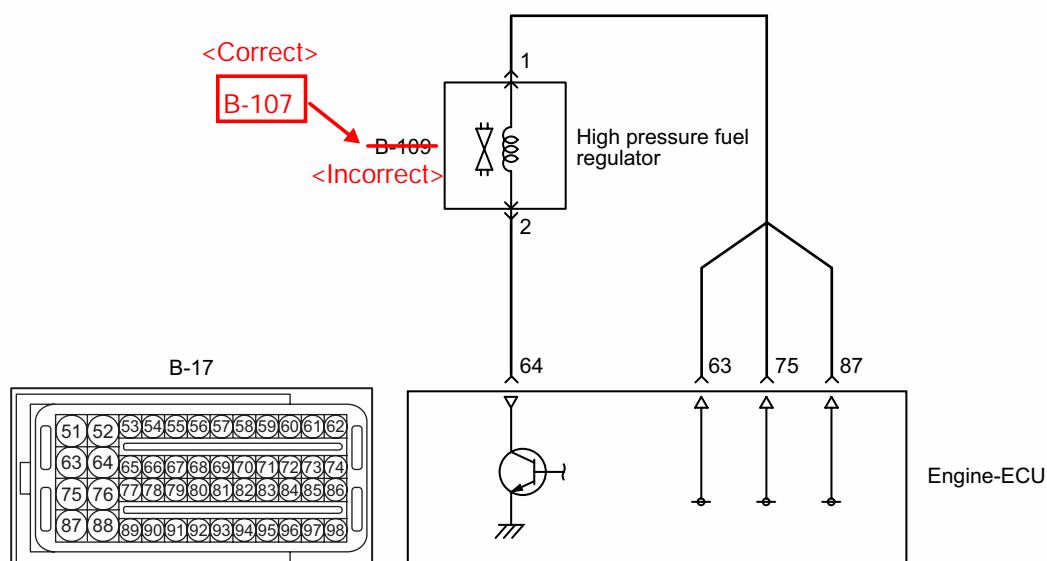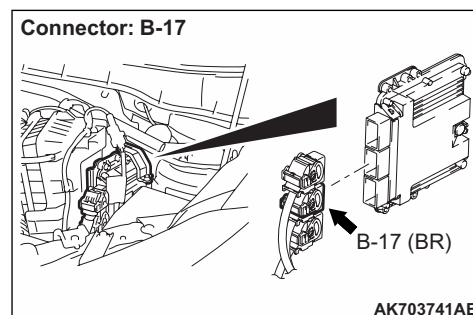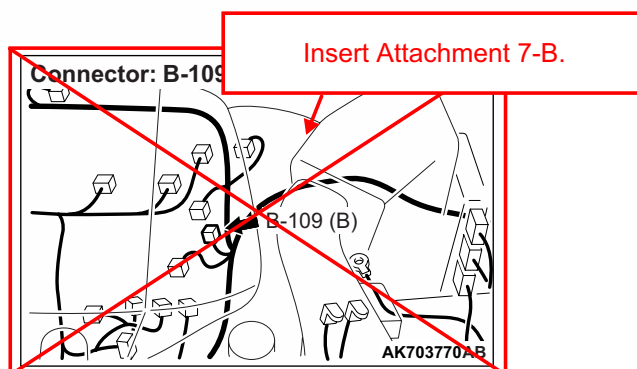
OPERATION
- Power is supplied to the high pressure fuel regulator (terminal No. 1) from the engine-ECU (terminal No. 63, terminal No. 75 and terminal No. 87).
- The engine-ECU (terminal No. 64) makes the power transistor in the unit be in "ON" position, and that makes currents go on the high pressure fuel regulator (terminal No. 1).

FUNCTION
- The high pressure fuel regulator regulates the fuel pressure to keep the standard pressure by using the signal sent from the engine-ECU.

PROBABLE CAUSES
- Failed high pressure fuel regulator
- Open/short circuit or harness damage in high pressure fuel regulator circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

<Incorrect>

STEP 1. Connector check: B-109 high pressure fuel regulator connector

Q: Is the check result normal?

    YES : Go to Step 2 .
    NO : Repair or replace the connector.

<Incorrect>

STEP 2. Perform voltage measurement at B-109 high pressure fuel regulator connector.

- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

   OK: System voltage

Q: Is the check result normal?

B-107   <Correct>

    YES : Go to Step 6 .
    NO : Go to Step 3 .

STEP 3. Connector check: B-17 engine-ECU connector

Q: Is the check result normal?

    YES : Go to Step 4 .
    NO : Repair or replace the connector.

<Incorrect>

STEP 4. Check harness between B-109 (terminal No. 1) high pressure fuel regulator connector and B-17 (terminal No. 63, terminal No. 75 and terminal No. 87) engine-ECU connector.

- Check power supply line for open/short circuit.

Q: Is the check result normal?

    YES : Go to Step 5 .
    NO : Repair the damaged harness wire.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

    YES : Replace the engine-ECU.
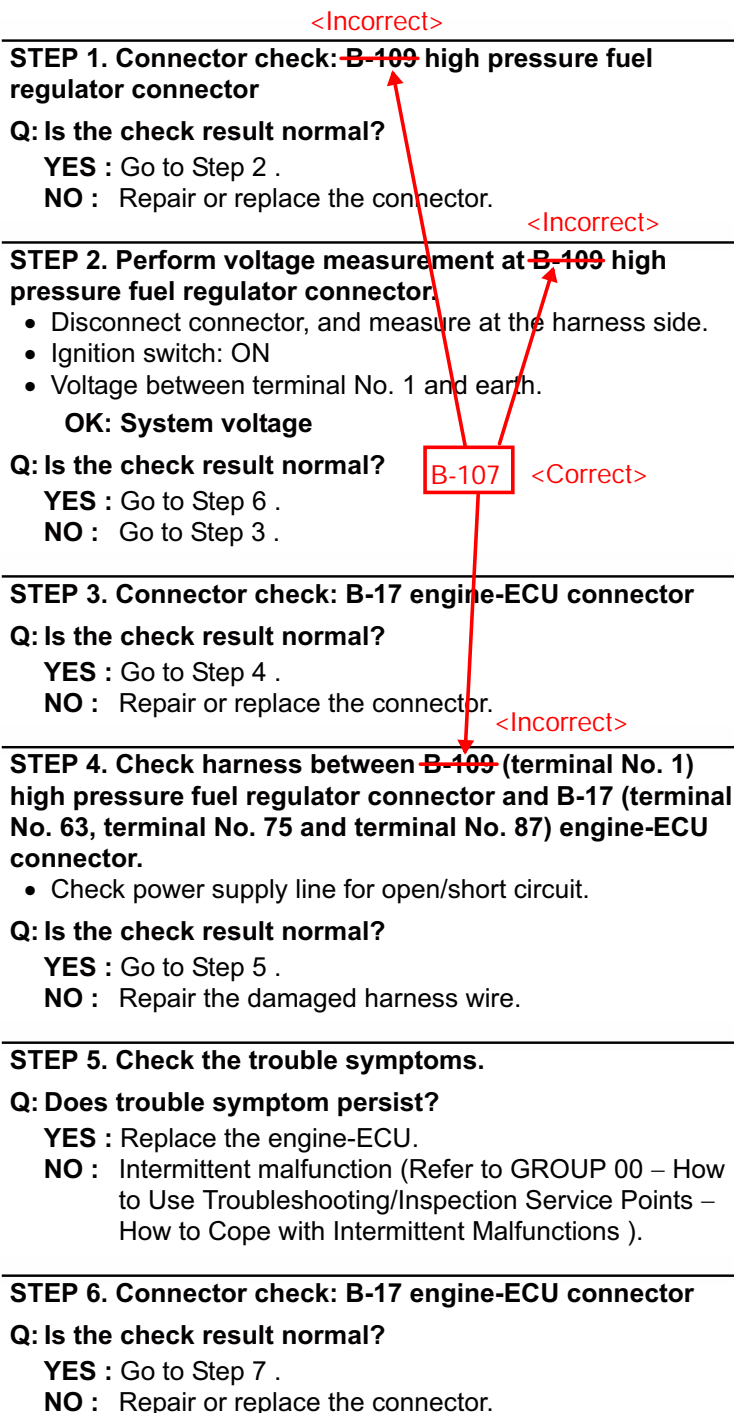   **NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 6. Connector check: B-17 engine-ECU connector

Q: Is the check result normal?

    YES : Go to Step 7 .
    NO : Repair or replace the connector.

<Incorrect>

STEP 7. Check harness between ~~B-109~~ (terminal No. 2) high pressure fuel regulator connector and B-17 (terminal No. 64) engine-ECU connector.

B-107 <Correct>

- Check earthing line for open/short circuit and damage.

Q: Is the check result normal?

    YES : Go to Step 8 .
    NO : Repair the damaged harness wire.

<Incorrect>

STEP 8. Check harness between ~~B-109~~ (terminal No. 1) high pressure fuel regulator connector and B-17 (terminal No. 63, terminal No. 75 and terminal No. 87) engine-ECU connector.

- Check power supply line for damage.

Q: Is the check result normal?

    YES : Go to Step 9 .
    NO : Repair the damaged harness wire.

STEP 9. Replace the high pressure fuel regulator assembly.

- After replacing the high pressure fuel regulator, re-check the trouble symptoms.

Q: Does trouble symptom persist?

    YES : Replace the engine-ECU.
    NO : The check is end.

DATA LIST REFERENCE TABLE

Item No.	Inspection item	Inspection condition		Normal condition
8	Gear information	The shift must be changed during the vehicle running.		The display screen changes according to the shift position. • Neutral • 1st or Rev • 2nd • 3rd • 4th • 5th • 6th
9	Brake signal	Ignition switch: ON	Release the brake pedal	OFF
			Depress the brake pedal	ON
10	Engine current status	Ignition switch: ON		starting
31	Engine coolant temperature sensor	Ignition switch: ON or engine running	Engine coolant temperature: −20°C	−20°C
			Engine coolant temperature: 0°C	0°C
			Engine coolant temperature: 20°C	20°C
			Engine coolant temperature: 40°C	40°C
			Engine coolant temperature: 80°C	80°C
32	PWM fan (output)	Engine: Idling after warming up	A/C switch OFF	0 %
			• A/C switch ON • The set temperature must be changed	The value changes according to the A/C load.
33	PWM fan	Engine: Idling after warming up	A/C switch OFF	0 %
			• A/C switch ON • The set temperature must be changed	The value changes according to the A/C load.
34	PWM fan relay	Engine: Idling after warming up	Radiator and condenser fan are not operating	OFF
			Radiator and condenser fan are operating	ON
35	A/C status	Engine: Idling after warming up	A/C switch OFF	OFF
			A/C switch ON	ON

Insert Attachment 8-A.

DATA LIST REFERENCE TABLE

Item No.	Inspection item	Inspection condition		Normal condition
82	Air temperature sensor	Ignition switch: ON or engine running	Intake air temperature: −20°C	−20°C
			Intake air temperature: 0°C	0°C
			Intake air temperature: 20°C	20°C
			Intake air temperature: 40°C	40°C
			Intake air temperature: 80°C	80°C
83	Intake air temperature sensor	Ignition switch: ON or engine running	Intake air temperature: −20°C	−20°C
			Intake air temperature: 0°C	0°C
			Intake air temperature: 20°C	20°C
			Intake air temperature: 40°C	40°C
			Intake air temperature: 80°C	80°C
85	Throttle valve position (target)	Ignition switch: ON		100 %
86	Throttle position sensor	Ignition switch: ON		0 %
87	EGR status	Engine: After warming up	Ignition switch: ON	~~active~~
			Idle operation	~~inactive~~
89	EGR valve position sensor	Engine: After warming up	Ignition switch: ON	0 %
			Racing	The value changes.
92	~~Fuel mean value adaption status~~	Engine: Idling		active
93	Proportional oxygen sensor	Engine: Idling after warming up → 3,000 r/min for approximately 1 minute		The value changes.
94	~~Proportional oxygen sensor~~	Engine: Idling after warming up → 3,000 r/min for approximately 1 minute		The value changes.
95	Proportional oxygen sensor heater	Engine: Idling after warming up → 3,000 r/min for approximately 1 minute		The value changes.
110	Boost pressure governor state	Engine: Idling		controlled
111	Intake air pressure sensor	Ignition switch: ON	Altitude: 0 m	101 kPa
			Altitude: 600 m	95 kPa
			Altitude: 1,200 m	88 kPa
			Altitude: 1,800 m	81 kPa
112	Boost pressure (target)	Engine: After warming up	Idle operation	Approximately 100 kPa
			Racing	The value increase.

Annotations (handwritten in red):
- Item 86/87 area: `<Correct> interrupted`
- Item 87 `active`: `<Incorrect>`
- Item 87 `inactive`: `<Correct> authorised` / `<Incorrect>`
- Item 89 `<Incorrect>`
- Item 92: `<Correct> Proportional oxygen sensor`
- Item 93: `<Incorrect>`
- Item 94: arrow to `<Correct> Proportional oxygen sensor A/F`

DATA LIST REFERENCE TABLE

Item No.	Inspection item	Inspection condition		Normal condition
113	Boost pressure <Deleted>	Engine: After warming up	Idle operation	Approximately 100 kPa
			Racing	The value increase.
114	Boost pressure actuator (output)	Engine: After warming up	Idle operation	Approximately 0 %
			Racing	The value increase
115	Boost pressure actuator	Engine: After warming up	Idle operation	Approximately 85 %
			Racing	The value changes.
130	Soot charge ratio	The conditions of soot accumulated is shown.		
131	Regeneration assistance status	The conditions of regeneration is shown. Insert Attachment 8-B.		
135	Exhaust gas temperature sensor ← (over 100)	The exhaust gas temperature at the upstream of DPF is shown. <Added>		
136	Exhaust differential pressure sensor	The differential pressure between the exhaust gas pressure at the upstream of DPF and the atmospheric pressure. <Deleted>		
142	Distance since DPF change	The travel distance after the DPF replacement is shown.		
145	Distance since last regeneration	The travel distance after the DPF regeneration is shown.		
146	Distance last 5 regeneration AVG	The average travel distance to the regeneration over the last 5 times is shown.		
157	Additive available quantity	The amount of additive remaining is shown.		
158	Additive minimum level INFO	When the additive is sufficient,	not reached	
		When the additive almost runs out,	reached	
159	Additive added to fuel quantity <Incorrect>	The amount of material remaining in the DPF without being burnt is shown. Additive deposit in DPF <Correct>		
161	First addition information	The conditions of additive system is shown.		
162	Ash of DPF	The conditions of ash accumulated in the DPF is shown.		
163	Distance before cleaning DPF <Incorrect>	The timing of DPF replacement is shown. replacing <Correct>		
200	EGR valve learning status	When the learning for the opening degree of EGR valve is not completed,	not carried out	
		When the learning for the opening degree of EGR valve is completed,	carried out	
203	Throttle valve learning status	When the learning for the opening degree of throttle valve is not completed,	not carried out	
		When the learning for the opening degree of throttle valve is completed,	carried out	

ACTUATOR TEST REFERENCE TABLE

Select the menu item "Test" in the "Special Function" to carry out the actuator test.

Item No.	Inspection item	Drive contents	Inspection conditions	Value to be determined as normal
1	~~Diesel flow rate regulation ACT~~ <Incorrect> [Fuel flow regulator] <Correct>	The fuel flow regulator must be turned ON and OFF.	Ignition switch: ON	The operation noise is heard.
2	~~Glow relay~~ <Incorrect> [Glow control relay] <Correct>	The glow control relay must be turned ON and OFF.	Ignition switch: ON	The operation noise is heard.
3	~~Additive pump test~~ <Incorrect> [Fuel additive pump] <Correct>	The fuel additive pump must be driven.	Ignition switch: ON	The operation noise is heard.
4	~~FAN1~~ <Incorrect> [Fan relay] <Correct>	The radiator fan and the condenser fan must be driven.	Ignition switch: ON	The radiator fan and the condenser fan are rotated.
5	~~Diesel pressure regulation CONT~~ <Incorrect> [High pressure fuel regulator] <Correct>	The high pressure fuel regulator must be turned ON and OFF.	Ignition switch: ON	The operation noise is heard.
6	EGR valve	The EGR valve must be driven.	Ignition switch: ON	The operation noise is heard.
7	~~Bypass EGR~~ <Incorrect> [EGR cooler solenoid valve] <Correct>	The EGR cooler solenoid valve must be turned ON and OFF.	Ignition switch: ON <Deleted>	The operation noise is heard.
8	~~Turbo fins~~	~~The variable geometry control motor must be driven.~~	~~Ignition switch: ON~~	~~The rod of variable geometry control motor is operated.~~
9	~~EGR throttle valve~~ <Incorrect> [Throttle valve] <Correct>	The throttle valve must be driven.	Ignition switch: ON	The operation noise is heard.

CHECK AT THE ECU TERMINALS

1. Disconnect the engine-ECU connector B-16, B-17 and B-18, and connect the check harness special tool MB996206, MB996207 and MB996208 among the engine-ECU connectors.
2. Measure the voltage between each check harness connector terminal and check harness connector earth terminal (No. 11 or No. 12).
3. Connect a needle-nosed wire probe to a voltmeter probe.
4. Referring to the check sheet, insert the micromini probe into the check harness connector and measure the voltage.
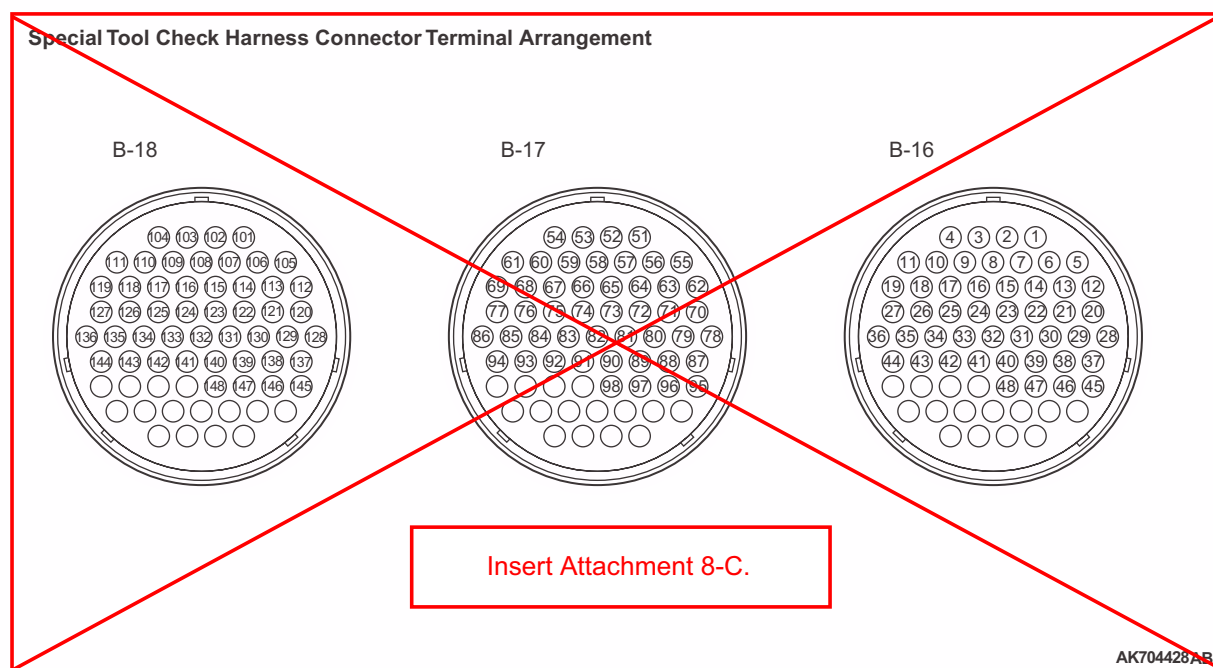   *NOTE:*
   1. *You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.*
   2. *The checks can be carried out off the order given in the chart.*

   ⚠ CAUTION

   Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

5. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
6. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

TERMINAL VOLTAGE CHECK CHART

AK704428AB

CHECK AT THE ECU TERMINALS

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
76	Power supply voltage applied to throttle position sensor	Ignition switch: ON		4.9 – 5.1 V
79	Power supply voltage applied to intake air pressure sensor	Ignition switch: ON		4.9 – 5.1 V
80	Power supply voltage applied to rail pressure sensor	Ignition switch: ON		4.9 – 5.1 V
83	Engine oil temperature sensor	Ignition switch: ON	When engine oil temperature is 25 °C	Approximately 2.8 V
88 <Incorrect>	Power supply voltage applied to ~~engine speed sensor~~ crank angle sensor <Correct>	Ignition switch: ON		4.9 – 5.1 V
89 <Incorrect>	~~Engine speed sensor~~	Engine: Cranking		1.0 – 6.0 V [*1]
		Engine: Idling after warming up		2.8 – 5.2 V [*1]
90	Glow plug relay	Ignition switch: ON (at engine coolant temperature of 5°C or less)		4 V or more (1.5 – 18 seconds)
91	Power supply voltage applied to camshaft position sensor Crank angle sensor <Correct>	Ignition switch: ON		4.9 – 5.1 V
92	Power supply voltage applied to EGR valve position sensor	Ignition switch: ON		4.9 – 5.1 V
93	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant temperature is 25 °C	Approximately 2.8 V
98	Camshaft position sensor	Engine: Cranking		1.0 – 6.0 V [*1]
		Engine: Idling after warming up		4.0 – 7.4 V [*1]
104	Fuel temperature sensor	Ignition switch: ON	When fuel temperature is 25 °C	Approximately 2.0 V
107	Alternator FR terminal	Engine: Idle operation after warm-up Radiator fan: Non-operation Head lamp switch: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON		Voltage decreases
109	Power supply voltage applied to variable geometry position sensor	Ignition switch: ON		4.9 – 5.1 V

CHECK AT THE ECU TERMINALS

Engine-ECU Harness Side Connector

B-16 ← (Grey) <Added> B-17 ← (Brown) <Added> B-18 ← (Black) <Added>
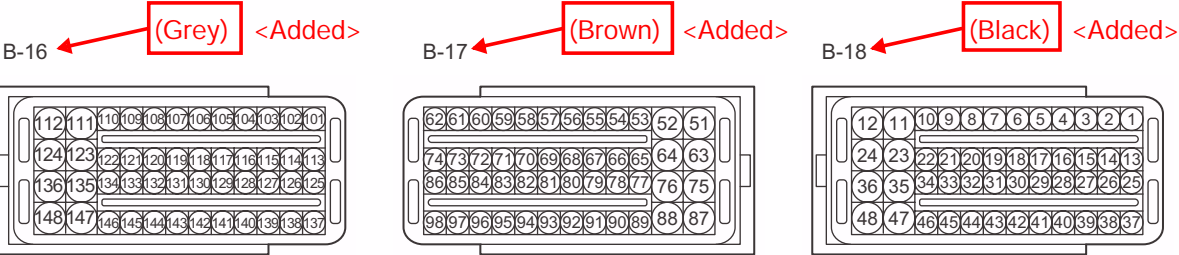
AK704429AB

Terminal No.	Inspection item	Normal condition
11 − Body earth	ECU earth	Continuity (2 Ω or less)
12 − Body earth		

CHECK AT THE ECU TERMINALS

1. Disconnect the engine-ECU connector B-16, B-17 and B-18, and connect the check harness special tool MB996206, MB996207 and MB996208 among the engine-ECU connectors.

2. Measure the voltage between each check harness connector terminal and check harness connector earth terminal (No. 11 or No. 12).

3. Connect a needle-nosed wire probe to a voltmeter probe.

4. Referring to the check sheet, insert the micromini probe into the check harness connector and measure the voltage.
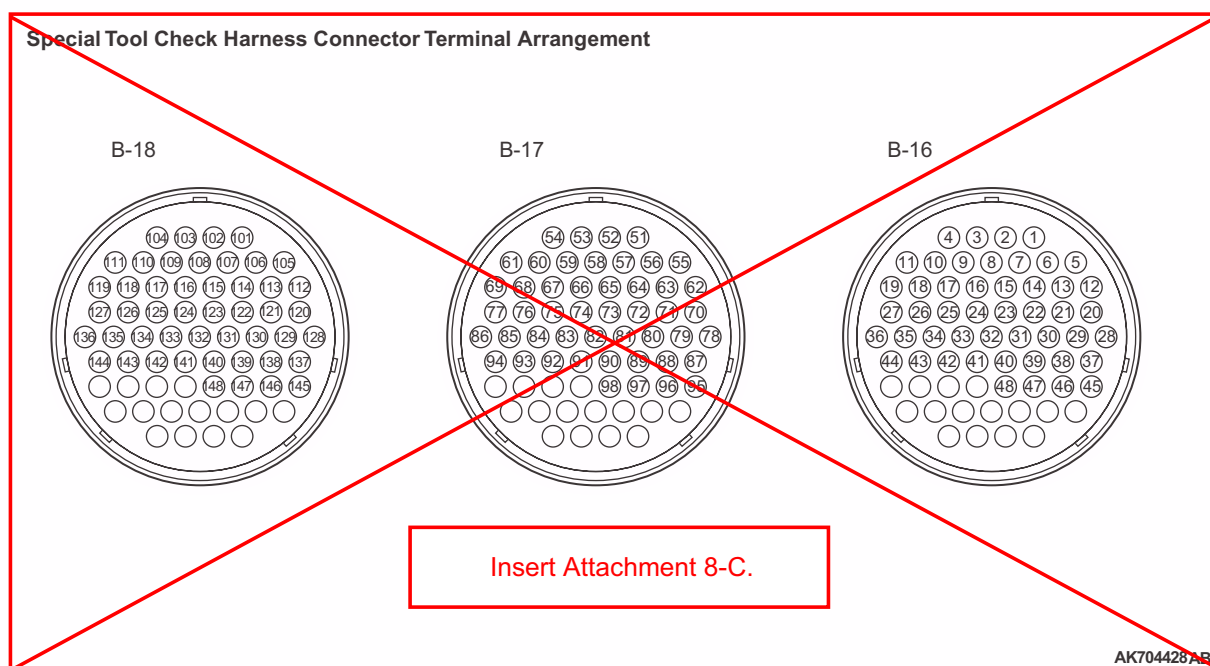
   NOTE:

   1. You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.

   2. The checks can be carried out off the order given in the chart.

   ⚠ CAUTION

   Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

5. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.

6. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

TERMINAL VOLTAGE CHECK CHART

Special Tool Check Harness Connector Terminal Arrangement

B-18   B-17   B-16

Insert Attachment 8-C.

AK704428AB

CHECK AT THE ECU TERMINALS

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
76	Power supply voltage applied to throttle position sensor	Ignition switch: ON		4.9 – 5.1 V
79	Power supply voltage applied to intake air pressure sensor	Ignition switch: ON		4.9 – 5.1 V
80	Power supply voltage applied to rail pressure sensor	Ignition switch: ON		4.9 – 5.1 V
83	Engine oil temperature sensor	Ignition switch: ON	When engine oil temperature is 25 °C	Approximately 2.8 V
88 <Incorrect>	Power supply voltage applied to ~~engine speed sensor~~ crank angle sensor <Correct>	Ignition switch: ON		4.9 – 5.1 V
89 <Incorrect>	~~Engine speed sensor~~	Engine: Cranking		1.0 – 6.0 V [*1]
		Engine: Idling after warming up		2.8 – 5.2 V [*1]
90	Glow plug relay	Ignition switch: ON (at engine coolant temperature of 5°C or less)		4 V or more (1.5 – 18 seconds)
91	Power supply voltage applied to camshaft position sensor Crank angle sensor <Correct>	Ignition switch: ON		4.9 – 5.1 V
92	Power supply voltage applied to EGR valve position sensor	Ignition switch: ON		4.9 – 5.1 V
93	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant temperature is 25 °C	Approximately 2.8 V
98	Camshaft position sensor	Engine: Cranking		1.0 – 6.0 V [*1]
		Engine: Idling after warming up		4.0 – 7.4 V [*1]
104	Fuel temperature sensor	Ignition switch: ON	When fuel temperature is 25 °C	Approximately 2.0 V
107	Alternator FR terminal	Engine: Idle operation after warm-up Radiator fan: Non-operation Head lamp switch: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON		Voltage decreases
109	Power supply voltage applied to variable geometry position sensor	Ignition switch: ON		4.9 – 5.1 V

Frame	Item No.	Data details	Unit
4001	6	Battery voltage	V
	7	Engine temperature	mV
	8	Atmospheric pressure	mV
	9	Accelerator position	%
	10	Vehicle speed	km/h
4002	6	Battery voltage	V
	10	Vehicle speed	km/h
	13	Accelerator pedal sensor 1	mV
	14	Accelerator pedal sensor 2	mV
	15	Brake pedal switch	OFF, ON
4003	5	Rail pressure (peak)	MPa
	6	Battery voltage	V
	7	Engine temperature	mV
	8	Atmospheric pressure	mV
	190	Afterrun state	no afterrun, shut off, ENG stand still, afterrun tests, fan stop wait, EXT. event wait, storage trigger, data storage, EXT. event wait2, RLY off trigger, no open relay
4004	6	Battery voltage	V
	7	Engine temperature	mV
	18	Glow control relay (output)	OFF, ON
	19	Glow control status	abort decelerate, no preheating, waiting, preheating prep., preheating, preheating abort, start preheating, start no preheat, wait post heat, post heating, post heat abort, waiting, int. preheating
	201	Starting (rail prs insufficient)	OFF, ON
	202	Starting (engine speed min)	OFF, ON
	203	Starting (problem ENG synchro.)	OFF, ON
	204	Starting (reversible shut-off)	OFF, ON
	205	Starting (irreversible shut-off)	OFF, ON
4005	6	Battery voltage	V
	7	Engine temperature	mV
	23	Throttle valve (relative)	%
	24	Air mass sensor	mV
4006	6	Battery voltage	V
	7	Engine temperature	mV
	23	Throttle valve (relative)	%
	28	Air temperature (AFS)	°C

Frame	Item No.	Data details	Unit
4007	6	Battery voltage	V
	7	Engine temperature	mV
	8	Atmospheric pressure	mV
	31	Boost pressure	mV
	32	Fuel mass	mg/st
4008	10	Vehicle speed	km/h
	15	Brake pedal switch	OFF, ON
	36	Brake switch	ON, OFF
	37	Vehicle acceleration	m/s2
	210	Brake status CAN (invalid)	OFF, ON
	211	Brake status CAN (pressed)	OFF, ON
	212	Brake status CAN (sever pb)	OFF, ON
	213	Brake status CAN (absent)	OFF, ON
	214	Brake status CAN (hold)	OFF, ON
4009	6	Battery voltage	V
	7	Engine temperature	mV
	8	Atmospheric pressure	mV
	31	Boost pressure	mV
	185	Intake air temperature	mV
4010	6	Battery voltage	V
	40	Fuel temperature	mV
	41	Metering unit	mV
	42	Pressure value	mV
	43	Rail pressure (peak)	mV
4011	6	Battery voltage	V
	40	Fuel temperature	mV
	41	Metering unit	mV
	42	Pressure value	mV
	48	Zero fuel calibration	inactive, active
4012	4	Engine speed	r/min
	41	Metering unit	mV
	50	Rail pressure (peak)	MPa
	51	Metering unit (target)	mA
	53	Engine current status	starting, running, P.latch afterrun
4013	6	Battery voltage	V
	7	Engine temperature	mV
	56	Differential pressure offset	mV
	57	DPF temperature sensor	mV
	58	Additive minimum level information	not reached, reached
4014	6	Battery voltage	V
	40	Fuel temperature	mV
	58	Additive minimum level information	not reached, reached
	61	Additivation status	not requested, requested, carried out
	62	Additive tank volume	ml

Frame	Item No.	Data details	Unit
4015	6	Battery Voltage	V
	7	Engine temperature	mV
	66	PWM fun (output)	ON, OFF
	67	Fan control (after run)	ON, OFF
	68	Main relay previous opening	ON, OFF
4016	6	Battery voltage	V
	68	Main relay previous opening	ON, OFF
	70	Coolant temperature	°C
	201	Starting (rail prs insufficient)	OFF, ON
	202	Starting (engine speed min)	OFF, ON
	203	Starting (problem ENG synchro.)	OFF, ON
	204	Starting (reversible shut-off)	OFF, ON
	205	Starting (irreversible shut-off)	OFF, ON
4017	4	Engine speed	r/min
	32	Fuel mass	mg/st
	70	Coolant temperature	°C
	76	EGR valve position (target)	%
4018	4	Engine speed	r/min
	32	Fuel mass	mg/st
	70	Coolant temperature	°C
	76	EGR valve position (target)	%
	81	Airmass per cylinder	mg/st
4019	4	Engine speed	r/min
	70	Coolant temperature	°C
	81	Airmass per cylinder	mg/st
	85	Boost pressure	kPa
	86	Atmospheric pressure	kPa
4020	4	Engine speed	r/min
	70	Coolant temperature	°C
4021	4	Engine speed	r/min
	32	Fuel mass	mg/st
	85	Boost pressure	kPa
	86	Atmospheric pressure	kPa
	97	Boost pressure (target)	kPa
4022	1	Fuel temperature	°C
	3	Rail pressure (Limited)	MPa
	4	Engine speed	r/min
	32	Fuel mass	mg/st
	50	Rail pressure (peak)	MPa
4023	4	Engine speed	r/min
	70	Coolant temperature	°C
	76	EGR valve position (target)	%
	106	PWM (output)	%
4024	1	Fuel temperature	°C
	4	Engine speed	r/min
	109	Differential pressure	kPa
	110	DPF gas flow rate	l/h
	111	Distance since last regeneration	km

Frame	Item No.	Data details	Unit
4025	4	Engine speed	r/min
	15	Brake pedal switch	OFF, ON
	32	Fuel mass	mg/st
	50	Rail pressure (peak)	MPa
	51	Metering unit (target)	mA
4026	1	Fuel temperature	°C
	32	Fuel mass	mg/st
	118	Lambda sensor status	invalid signal, valid signal
	119	Lambda sensor	-
	120	Fuel mean value adaptation	inactive, active
4027	1	Fuel temperature	°C
	32	Fuel mass	mg/st
	118	Lambda sensor status	invalid signal, valid signal
	119	Lambda sensor	-
	125	LSU sensor status	inactive, active
4028	4	Engine speed	r/min
	6	Battery voltage	V
	10	Vehicle speed	km/h
	53	Engine current status	starting, running, P.latch afterrun
	70	Coolant temperature	°C
4029	4	Engine speed	r/min
	6	Battery voltage	V
	10	Vehicle speed	km/h
	70	Coolant temperature	°C
4030	4	Engine speed	r/min
	10	Vehicle speed	km/h
	37	Vehicle acceleration	m/s2
	139	Torque order	Nm
	140	Propulsion torque	Nm
4031	4	Engine speed	r/min
	10	Vehicle speed	km/h
	32	Fuel mass	mg/st
	143	Cruise control switch	MAIN, CANCEL, SET, RESUME, PAUSE, Error

Frame	Item No.	Data details	Unit
4032	4	Engine speed	r/min
	146	Injection quantity	mg/st
	149	Fuel mass (target)	mg/st
	201	Starting (rail prs insufficient)	OFF, ON
	202	Starting (engine speed min)	OFF, ON
	203	Starting (problem ENG synchro.)	OFF, ON
	204	Starting (reversible shut-off)	OFF, ON
	205	Starting (irreversible shut-off)	OFF, ON
	221	Post injection 1 active	OFF, ON
	222	Post injection 2 active	OFF, ON
	223	Injection principle active	OFF, ON
	224	Injection pilot 1 active	OFF, ON
	225	Injection pilot 2 active	OFF, ON
	226	Injection pilot 3 active	OFF, ON
4033	4	Engine speed	r/min
	53	Engine current status	starting, running, P.latch afterrun
	151	Oil temperature	°C
	152	Oil pressure	high, low
4035	4	Engine speed	r/min
	70	Coolant temperature	°C
	161	Throttle valve (target)	%
	163	Throttle valve (output)	%
4036	6	Battery voltage	V
	23	Throttle valve (relative)	%
	70	Coolant temperature	°C
	163	Throttle valve (output)	%
4037	6	Battery voltage	V
	70	Coolant temperature	°C
4039	6	Battery voltage	V
	70	Coolant temperature	°C

A

Connector: B-109

B-109 (B)

AK703770AB

B

Connector: B-107

B-107 (B)

Rail
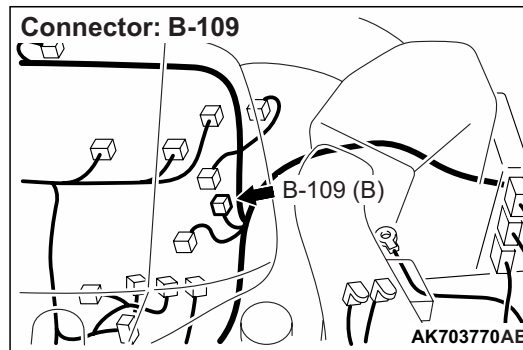
AK703769AB
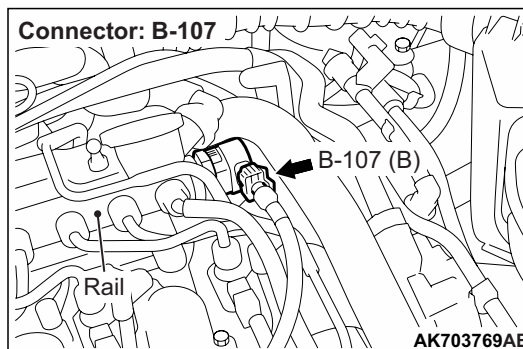
A

10	Engine current status	Ignition switch: ON	starting
		Engine: Idle operation	running

B

131	Regeneration assistance	Show "ON" on the display during the regeneration.
132	Preparation for regeneration	Carry out the regeneration using the MUT-III, and then show "ON" during the actual regeneration.
133	Regeneration stop start	Show "ON" during the period in which the regeneration is completed and the normal control is started.

C

Special Tool Check Harness Connector Terminal Arrangement

B-18   B-17   B-16

AK801126AB