IDENTIFICATION OF VEHICLE MODEL CODE

LIST OF VEHICLE MODEL CODES

LIST OF APPLICABLE VEHICLE MODELS

JP18Z00010102007

VEHICLE MODEL		ENGINE MODEL	TRANSMISSION MODEL
FM	1A	A09C	FULLER RTO11909ALL
			ALLISON 3500RDS

DESIGNATION OF VEHICLE MODEL CODE

JP18Z00010102008

F	M	1A	R	K	A
①	②	③	④	⑤	⑥

①	CLASSIFICATION OF VEHICLE TYPE F: Cab-over-engine truck
②	VEHICLE CLASS AND DRIVE SYSTEM
③	CLASSIFICATION OF ENGINE 1A: A09C
④	CLASSIFICATION OF WHEEL BASE L: 4,750 to 4,999 mm {187.0 to 196.8 in.} R: 5,750 to 5,999 mm {226.4 to 236.1 in.} W: Over 7,000 mm {275.6 in.}
⑤	POSITION OF STEERING WHEEL K : Right-hand steering wheel
⑥	INDICATION OF VEHICLE BODY CONFIGURATION A: Leaf-suspension type cargo truck M: Mixer truck G: Air-suspension type cargo truck

	CLASS OF PAYLOAD (TONNAGE)	DRIVE SYSTEM
M	10.0	6 x 4 (FOUR-REAR-WHEEL DRIVE)

SHTS01ZZZ0100001

OUTLINE OF VEHICLE (CHANGE)

LIST OF VEHICLE (CHANGE) OUTLINE

LIST OF CHANGE OUTLINE

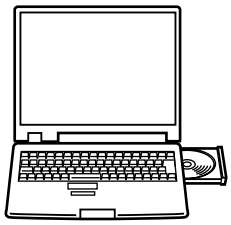
JP18Z00010102011

RELEVANT CHAPTER			NAME OF COMPONENT	OUTLINE OF VEHICLE (CHANGE)	EFFECTIVENESS
02	Engine	[A09C] Engine control	Engine ECU	Increased accuracy of injection system; versatile engine ECU specialized in controlling the engine; connection to vehicle control ECU via CAN communication	
02	Engine	[A09C] Engine control	Engine ECU	Use of ECU cooler (cooling by fuel) for ECU directly mounted on engine (with anti-vibration mechanism)	Higher reliability
02	Engine	[A09C] Engine control	Harness assembly	Addition of twist tube and thermal-resistant tube into corrugation	Higher reliability
02	Engine	[A09C] Fuel system	Supply pump	Use of Bosch's supply pump	Compliance with US04 emission standards
02	Engine	[A09C] Fuel system	Supply pump	Separately arranged layout of flange mount, geared feed pump, fuel temperature sensor and priming pump	Higher reliability and serviceability
02	Engine	[A09C] Fuel system	Common rail	Use of Bosch's common rail	Compliance with US04 emission standards
02	Engine	[A09C] Fuel system	Injector (nozzle & nozzle holder)	Use of Bosch's injector	Compliance with US04 emission standards
02	Engine	[A09C] Fuel system	Injector (nozzle & nozzle holder)	Fuel leakage circuit built in the cylinder head	Higher reliability and serviceability
02	Engine	[A09C] Fuel system	Common rail pressure sensor	Use of high-accuracy common rail pressure sensor	Higher immunity to electromagnetic interference
02	Engine	[A09C] Fuel system	Fuel filter	Optimization of relief valve opening pressure	

RELEVANT CHAPTER			NAME OF COMPONENT	OUTLINE OF VEHICLE (CHANGE)	EFFECTIVENESS
02	Engine	[A09C] Lubrication	Oil pan	New parts; 8 L difference between upper and lower	Longer interval of oil refilling
02	Engine	[A09C] Lubrication	Oil strainer	Aluminum mould	
02	Engine	[A09C] Lubrication	Oil pump	Built in the cylinder block ; elimination of feed pipe	Weight-saving
02	Engine	[A09C] Lubrication	Oil cooler	Integrated full-flow/bypass element; reduction from 11 to 8 rows in cooler core	Weight-saving
02	Engine	[A09C] Lubrication	Oil cooler	Sealing surface in contact with block: change from gasket to O-ring	Higher reliability
02	Engine	[A09C] Starting/charging	Belt auto tensioner	Use of auto tensioner	Higher serviceability
02	Engine	[A09C] Starting/charging	V-belt	Use of poly V-belt (one belt to drive a coolant pump, a cooler compressor and an alternator)	Higher serviceability
02	Engine	[A09C] Turbocharger	Variable nozzle turbocharger	Variable nozzle drive: DC motor drive	Compliance with US04 emission standards
02	Engine	[A09C] Turbocharger	Variable nozzle turbocharger	Variable nozzle control: variable control	Compliance with US04 emission standards
02	Engine	[A09C] Turbocharger	Variable nozzle turbocharger	Variable nozzle support: both-ends-supported	Higher reliability
02	Engine	[A09C] Turbocharger	Variable nozzle turbocharger	New controller	
02	Engine	[A09C] Air compressor	Air compressor	Use of water-cooling and lead valve	Lower discharge temperature
02	Engine	[A09C] Air compressor	Air compressor	Extended piston skirt	Reduction of oil leak into combustion chamber via piston ring
02	Engine	[A09C] Flywheel PTO	Flywheel PTO	Applicable to mixer truck Output torque: 45 kg·m Ratio: 1	Applicability to heavy-duty body build

COMPUTER

- This system uses a computer in rewriting/updating the data and in diagnosing failures.

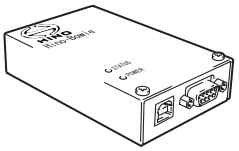


EXEMPLUM: COMPUTER

SHTS021200600059

INTERFACE

- The Hino-Bowie must be selected as an interface when connecting a computer to the engine ECU and the vehicle control ECU.



Hino-Bowie

SHTS021200600060

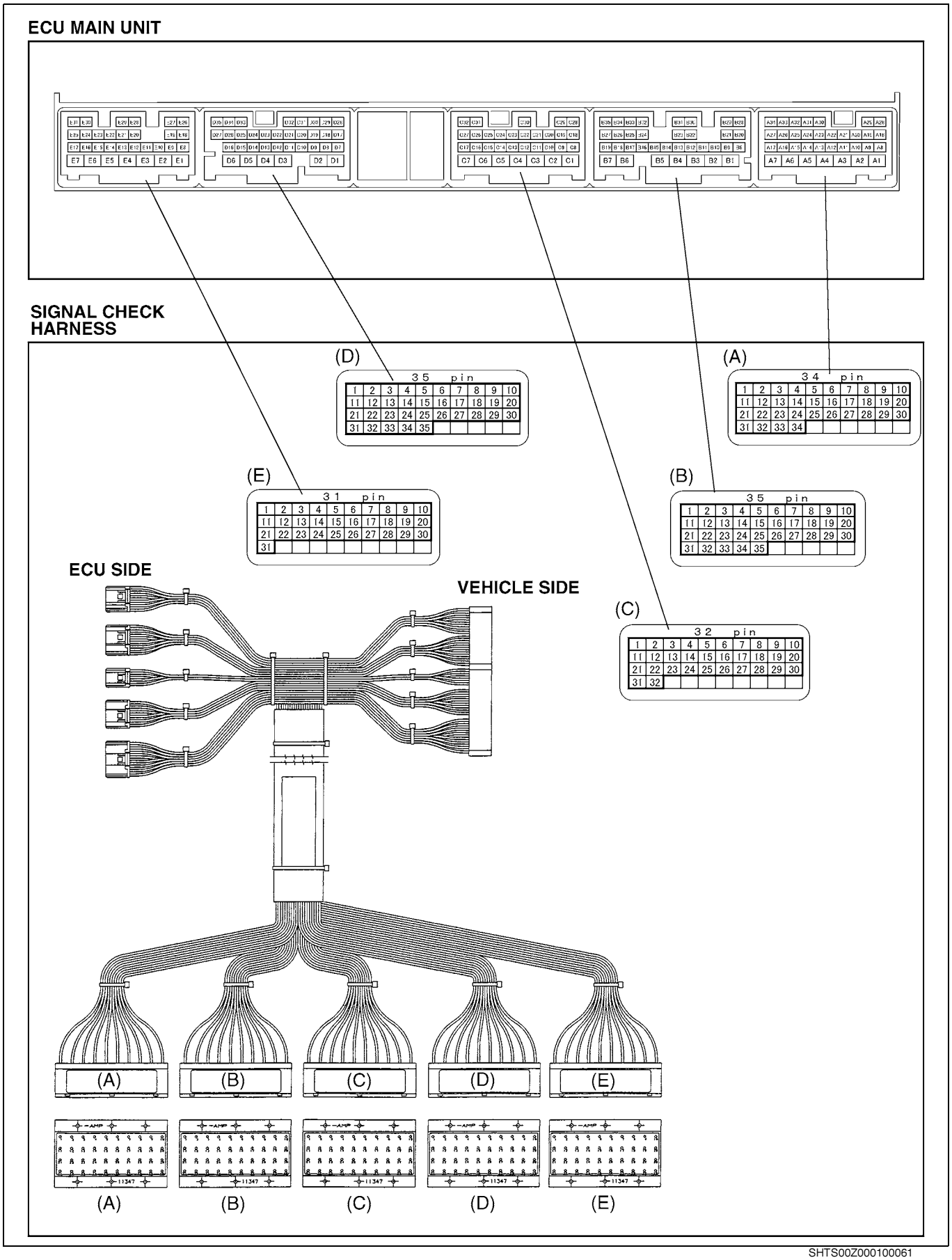
REPROGRAMMING SERVICE INFORMATION SYSTEM

- The reprogramming service information system within dealer's LAN prompts a password for security check. If a proper password would not be entered, the access to the server will be denied.

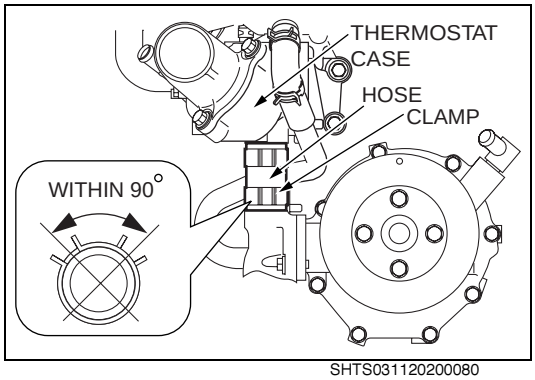
REPROGRAMMING MANAGER

- This software is used to install to the computer. By using this software, could read and rewrite the data of the engine ECU and the vehicle control ECU.

(2) Terminal number
ECU terminal numbers in the text correspond to connectors of signal check harness as shown below.



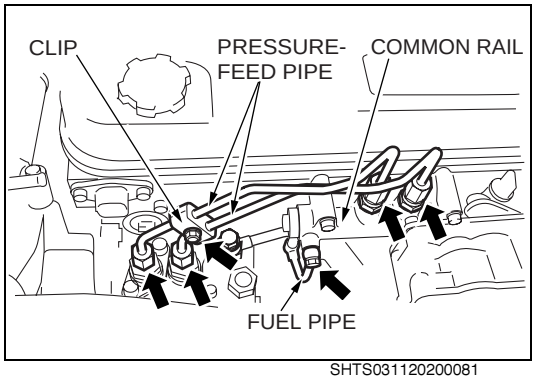
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SHTS031120200080

3. CONNECT THE COOLANT HOSE UNDER THE THERMOSTAT CASE.

(1) Fix the coolant hose under the thermostat case with a clamp.



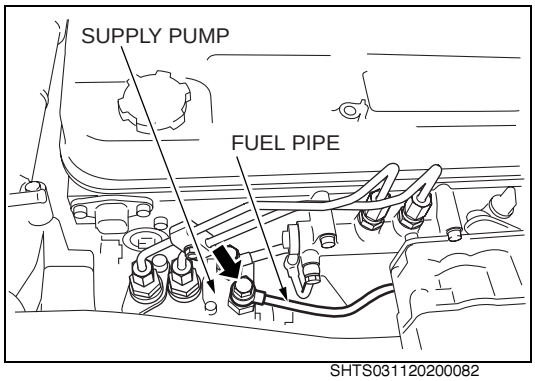
SHTS031120200081

4. CONNECT THE FUEL PIPE.

(1) Replace old gasket with a new one. Connect the fuel pipe to the common rail, and tighten a union bolt.
Tightening Torque:
12.5 N·m {128 kgf·cm, 9 lbf·ft}

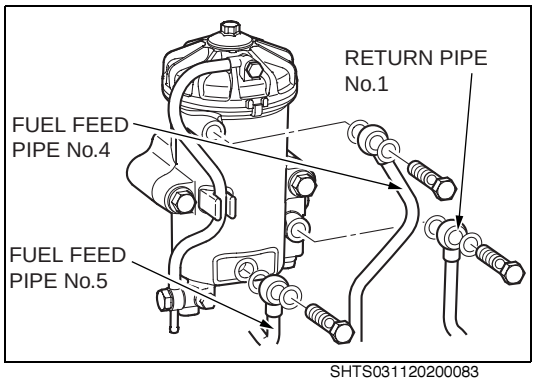
(2) connect new pressure-feed pipes, and fasten clips.
Tightening Torque:
32 N·m {330 kgf·cm, 24 lbf·ft}

⚠ CAUTION
Note that the pressure-feed pipe must be replaced with a new one. Otherwise fuel might leak out when a high pressure is applied.



SHTS031120200082

(3) Replace the gasket with a new one. Connect the fuel pipe (supply pump side) between the fuel filter case and the supply pump.
Tightening Torque:
27 N·m {275 kgf·cm, 20 lbf·ft}



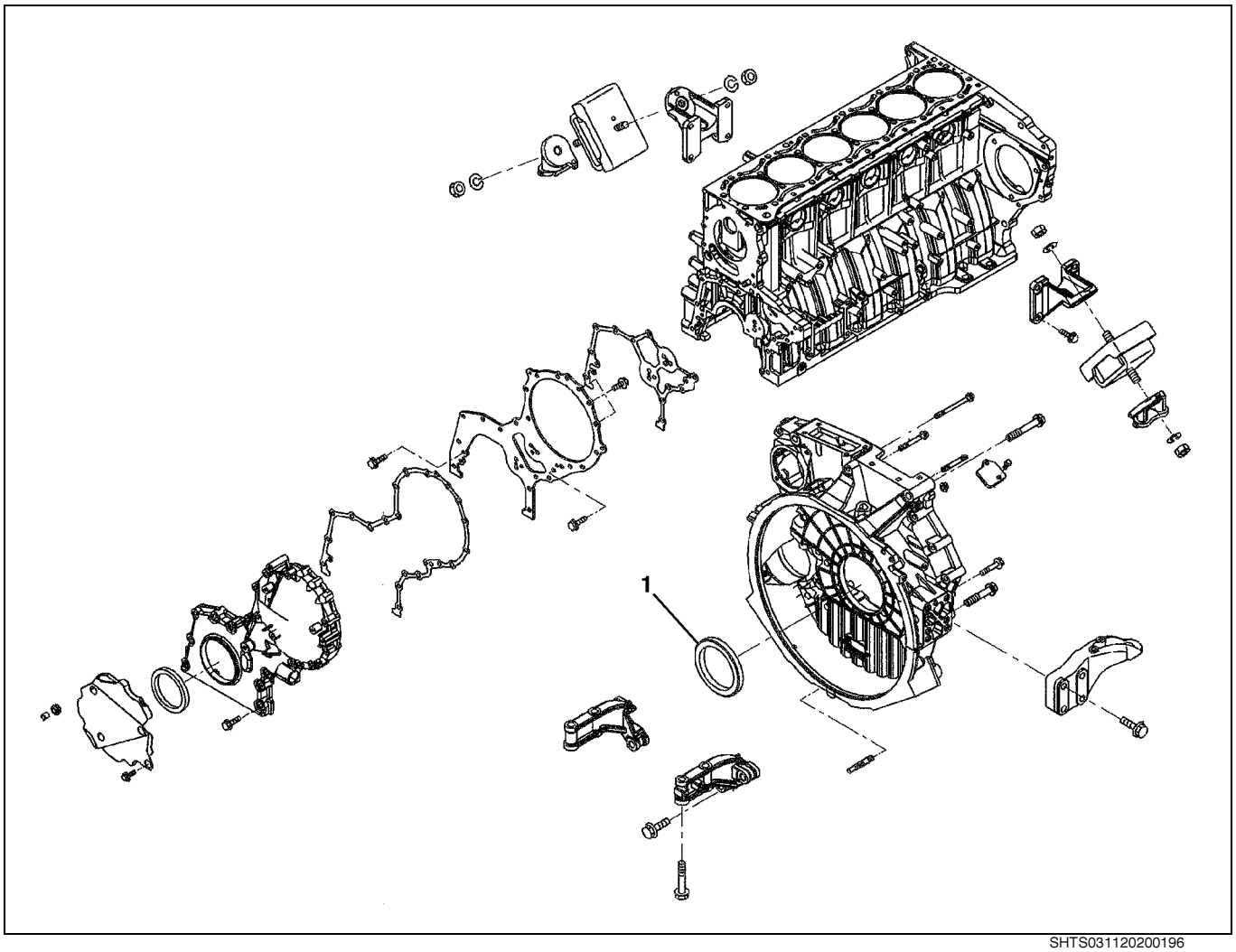
SHTS031120200083

(4) Replace the gasket with a new one. Connect three fuel pipes to the fuel filter case, and fasten union bolts.

CRANKSHAFT REAR OIL SEAL

COMPONENT LOCATOR

EN0311202D100010



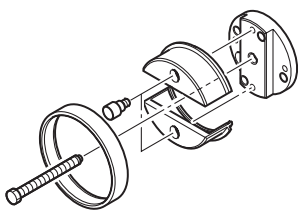
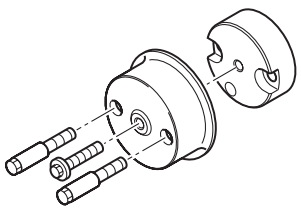
SHTS031120200196

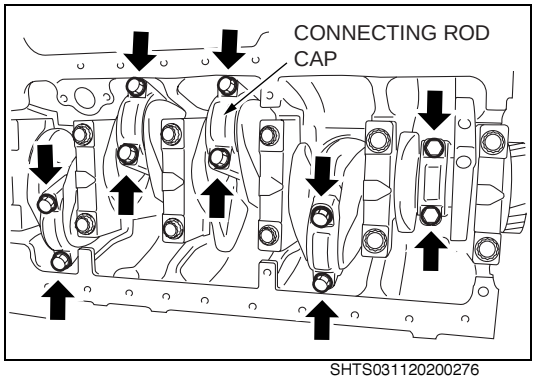
1 Crankshaft rear oil seal	

SPECIAL TOOL

EN0311202K100004

Prior to starting an engine overhaul, it is necessary to have these special tools.

Illustration	Part number	Tool name	Remarks
	09220-E1070	OIL SEAL PULLER	
	09220-E1040	OIL SEAL PRESS	For Cylinder liner



SHTS031120200276

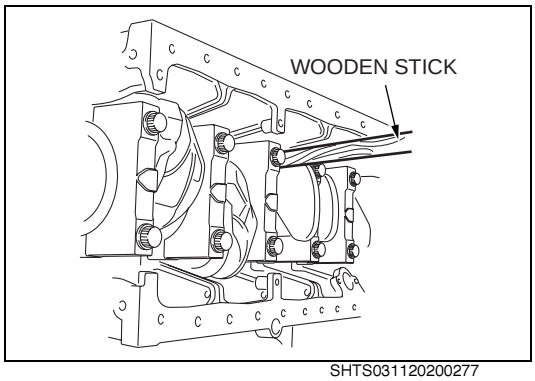
(5) Remove the bolts from the connecting rod cap to remove the connecting rod cap.

NOTICE

- **Take care as the connecting rod bearing attached to the connecting rod cap might drop off due to impacts.**
- **Misassembly of connecting rods and connecting rod caps can be prevented by identifying the removed connecting rod caps in the order of cylinder numbers in storage.**

HINT

In order to prevent turning of the crankshaft, insert a crowbar into the adjust hole in the balance weight and place it against the oil pan mounting flange.

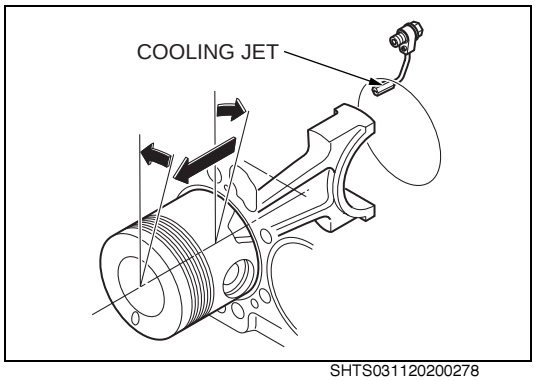


SHTS031120200277

(6) Use a wooden stick to push (tap at) the connecting rod from beneath the engine and remove the connecting rods together with the pistons in the upward direction of the engine.

NOTICE

- **Take care as the connecting rod bearing attached to the connecting rod might drop off due to impacts.**



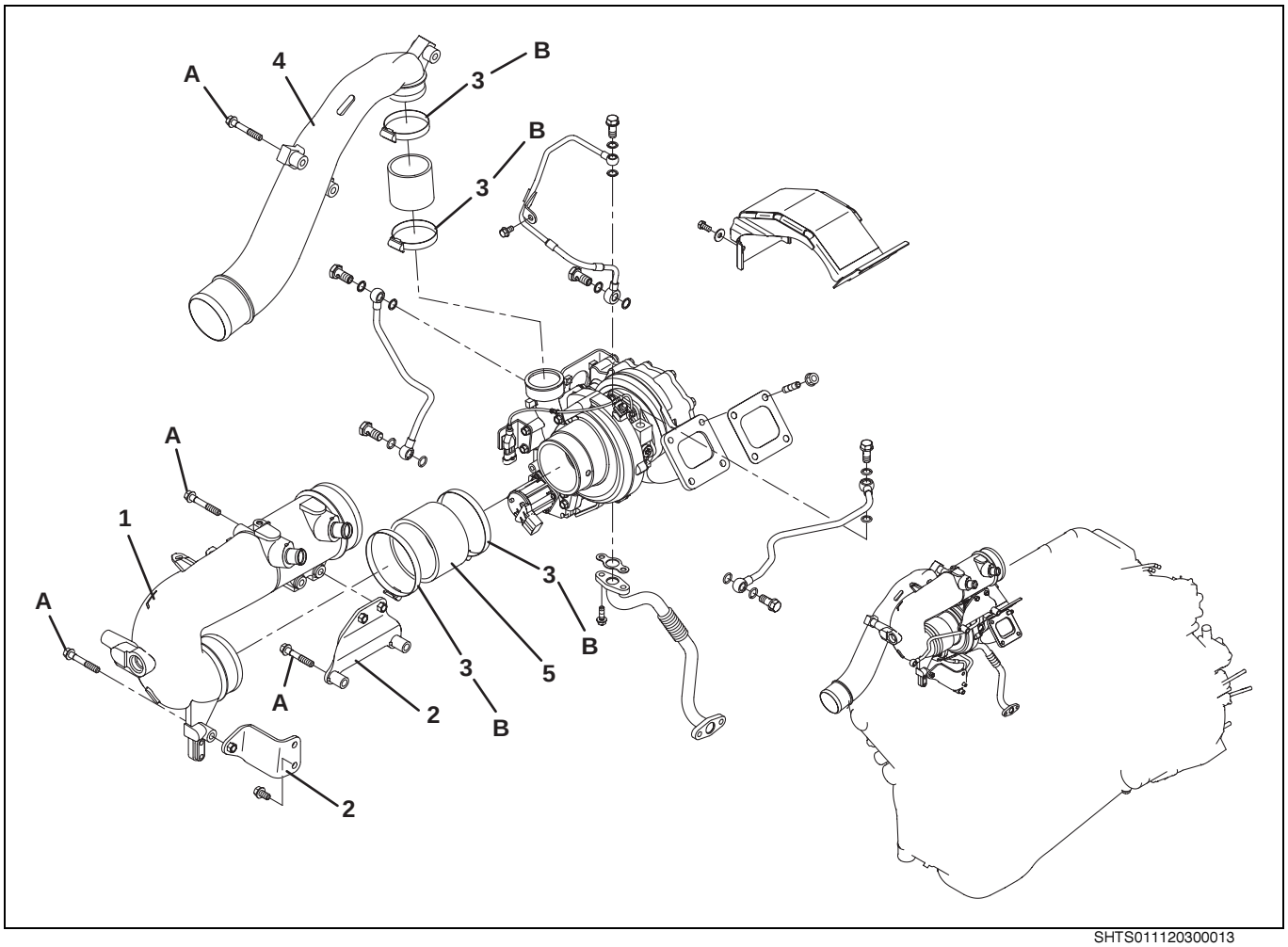
SHTS031120200278

- **When removing the piston, be careful that the cooling jet is not struck by the connecting rod.**
- **The removed connecting rod caps in the order of cylinder numbers in storage.**

INTAKE PIPE (EXHAUST SIDE)

COMPONENT LOCATOR

EN0111203D100002



SHTS011120300013

1	U-turn pipe	4	Boost pipe
2	Bracket	5	Air hose
3	Clamp		

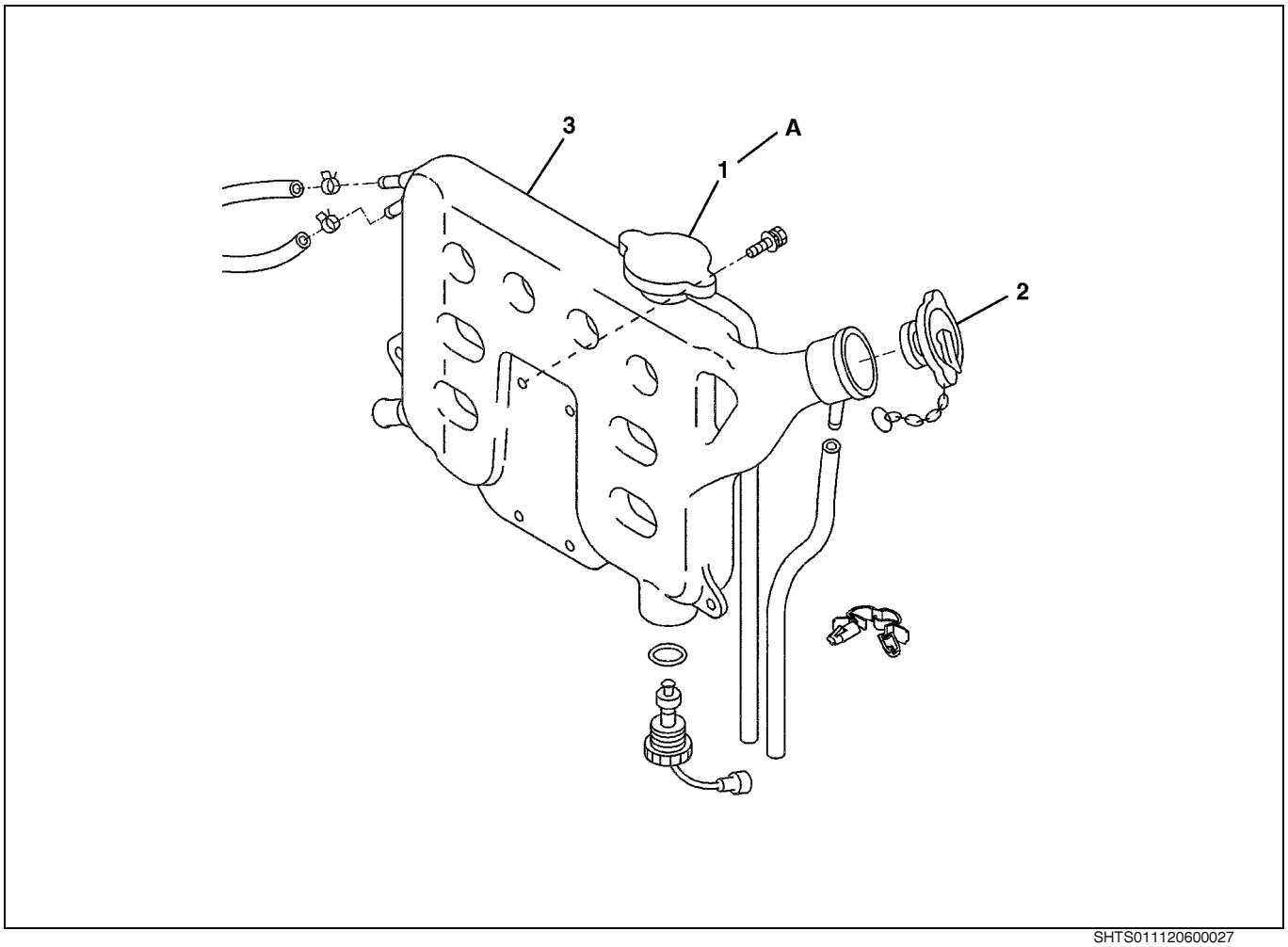
Tightening torque **Unit: N·m {kgf·cm, lbf·ft}**

A	55 {560, 41}	B	5 {50, 3.7}

RADIATOR CAP

COMPONENT LOCATOR

EN0111206D100003



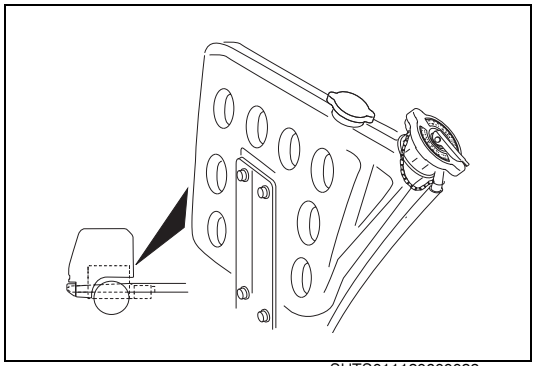
SHTS011120600027

1	Radiator cap (For prevent the overflow)	3	Header tank
2	Radiator cap (For feeding coolant)		

A: This cap will not be necessary to be removed and be sealed to prevent from mistaking to feed coolant with a wire.

REPLACEMENT

EN0111206H100001



SHTS011120600028

REMOVE THE RADIATOR CAP (FOR PREVENT THE OVERFLOW).

1. REMOVE THE RADIATOR CAP.

(1) Make sure that the engine is not hot.

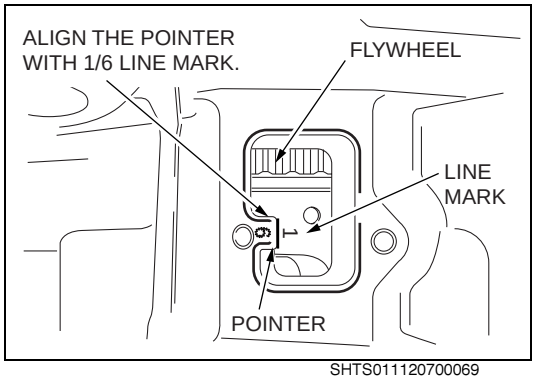
(2) Turn the radiator cap counterclockwise to remove it.

⚠ CAUTION

- **Do not open the radiator cap when hot.**
- **Retighten the cap if a large volume of vapor comes out. Wait until a coolant temperature is low enough to proceed with works.**

HINT

If coolant would be worm, wear two to three pairs of thick gloves before proceeding with works.

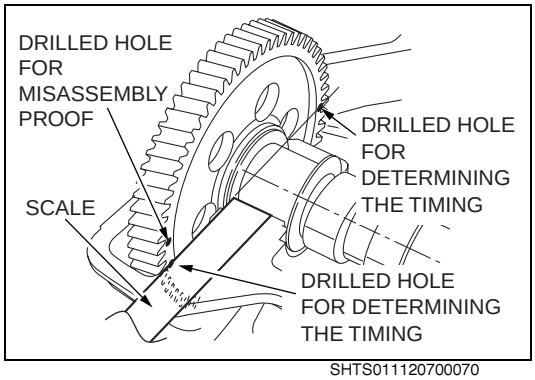


SHTS011120700069

INSTALL THE SUPPLY PUMP.

1. SETTING THE TOP DEAD CENTER ON THE COMPRESSION STROKE OF THE CYLINDER No.1 (WHEN THE SUPPLY PUMP IS NOT INSTALLED)

(1) Turn the crankshaft in the engine rotation direction (clockwise as viewed from the cooling fan) and position the "1/6" line mark shown on the outer peripheries of the crankshaft damper and of the flywheel, in alignment with the pointer.



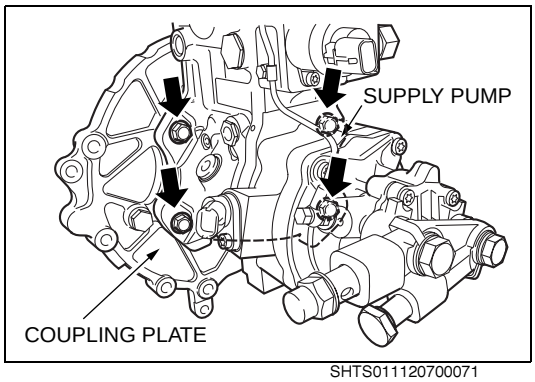
SHTS011120700070

(2) When placing the camshaft assembly, position two drilled holes located at an angle of 180° (drilled holes for determining the timing) to be in parallel to the top surface of the cylinder head.

NOTICE

Place a transparent plastic scale or an edged scale on the top face of the cylinder head and on the side face of the camshaft gear, and check that drilled holes for misassembly-proof lie at a height above the scale.

(3) If drilled holes for misassembly-proof lie at a height below the top face of the cylinder head, the cylinder No.6 is set at the top dead center on the compression stroke. Make one additional rotation of the crankshaft again and check that drilled holes for misassembly-proof on the camshaft lie at a height above the top face of the cylinder head.

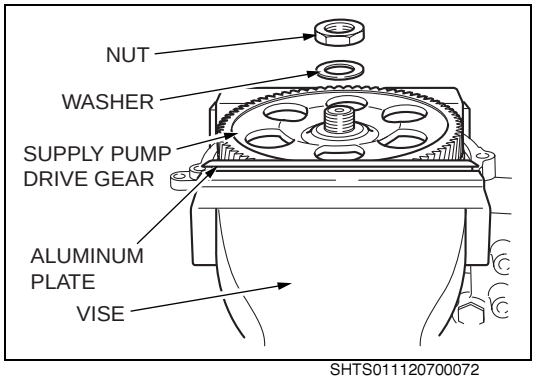


SHTS011120700071

2. INSTALL THE SUPPLY PUMP.

(1) Check that the cylinder No.1 is set at the top dead center on the compression stroke.

(2) Replace an old O-ring with a new one. Install the supply pump to the coupling plate, and tighten four bolts.
Tightening Torque:
55 N·m {560 kgf·cm, 41 lbf·ft}



SHTS011120700072

(3) Set an aluminum sheet in a vise. Use this vise to fixate the supply pump drive gear. Attach a washer and tighten a nut to secure the supply pump drive gear and the washer.
Tightening Torque:
250 N·m {2,550 kgf·cm, 184 lbf·ft}

REPLACEMENT

EN0111210H100001

REMOVE THE EGR VALVE AND COOLER.

1. CHECK BEFORE START OF MAINTENANCE WORKS.

(1) Use the Hino-DX to check the air flow sensor.
Refer to the section **"AIR FLOW SENSOR"** in the chapter **"AIR INTAKE SYSTEM"**.

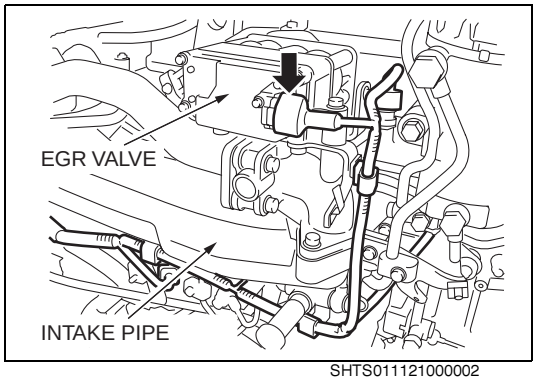
(2) Use the Hino-DX to check operations of the onboard EGR valve.

2. DRAIN THE COOLANT.

(1) Drain the coolant.
Refer to the section **"RADIATOR"** in the chapter **"COOLING SYSTEM"**.

3. DISCONNECT THE HARNESS.

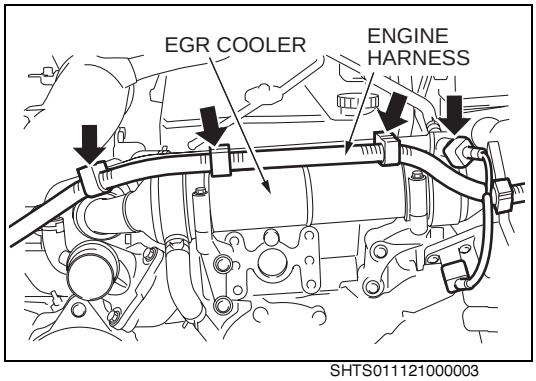
(1) Disconnect a connector of the EGR valve.



SHTS011121000002

(2) Disconnect a connector from the EGR cooler outlet coolant temperature sensor.

(3) Unlock three clamps and disconnect the engine harness from the EGR cooler.



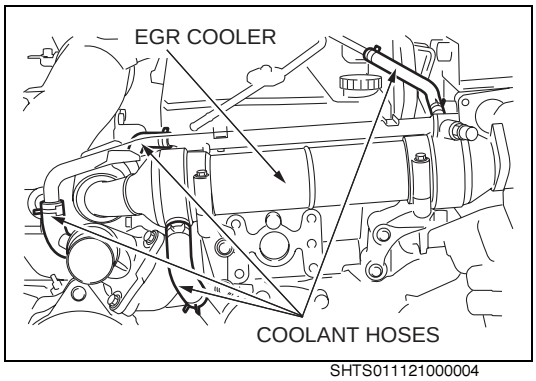
SHTS011121000003

4. DISCONNECT THE COOLANT HOSES.

(1) Remove eight clips to disconnect four coolant hoses from the EGR cooler.

⚠ CAUTION
Proceed with all replacement works only after all related components/parts cool down. Otherwise hot components/parts will cause burn injury. (Set the starter switch to the "LOCK" position and leave it for at least 30 min.)

HINT
Use a container and a waste as coolant might drip off during disconnection of coolant hoses.



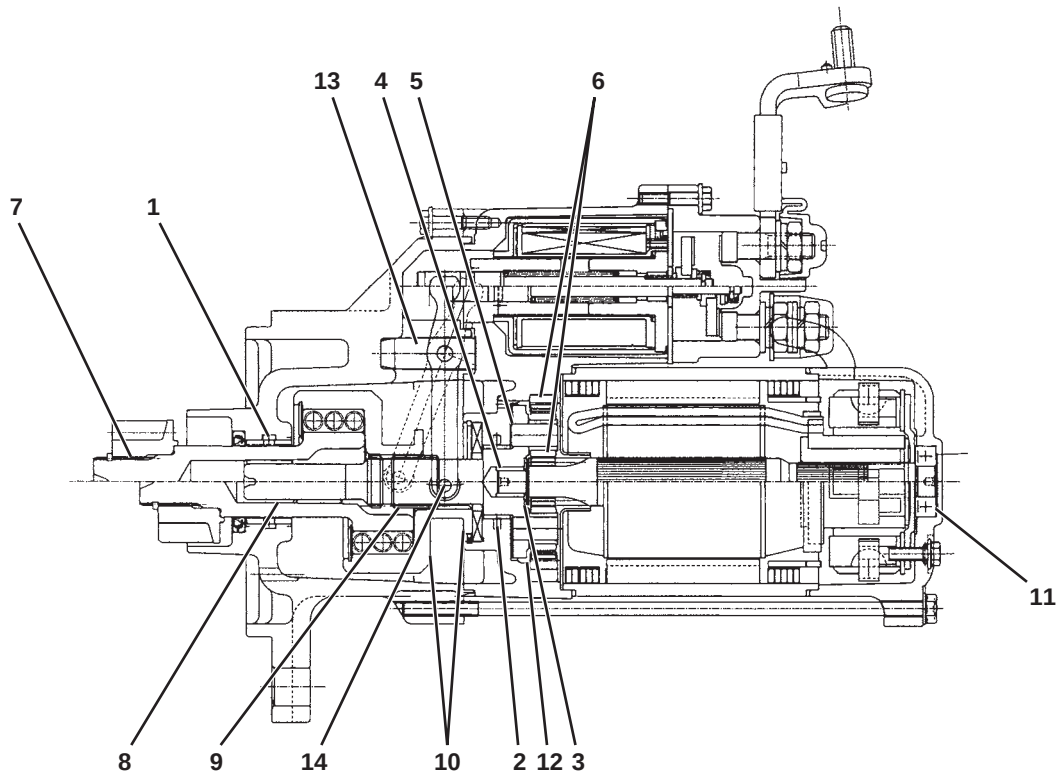
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19. LUBRICATION

(1) Apply the grease to the portion as shown in the figure.

NOTICE

Grease should be adhered on commutator surface, brash nor other connecting points.



SHTS011121200049

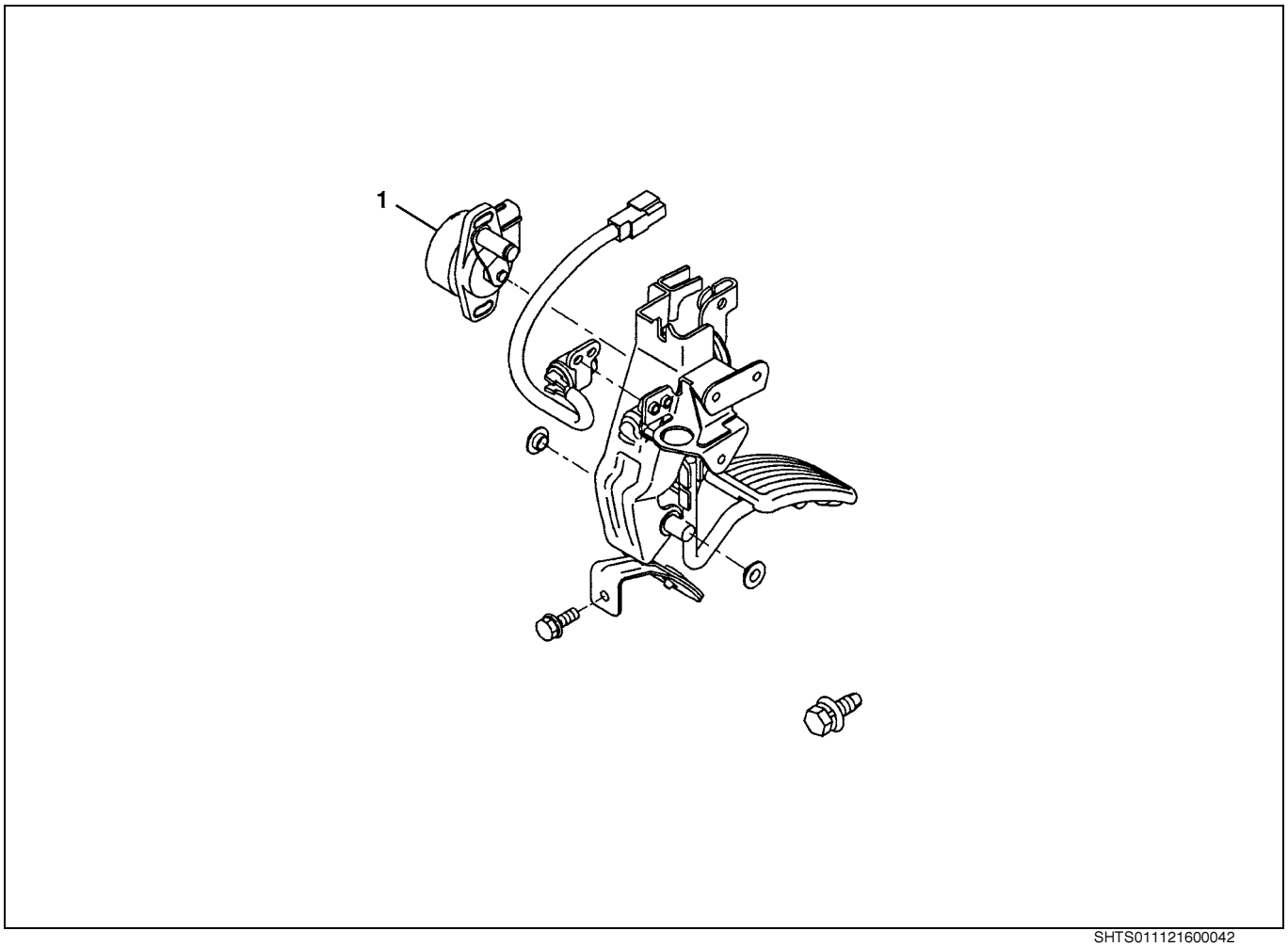
LIST OF LUBRICATION

No.	Part of lubrication	Grease	Quantity (g)	Remarks
1	Pinion case bushing and grease joint	Multemp AC-N	0.8-1.5	
2	Bracket center bushing and grease joint	Multemp AC-N	0.8-1.5	
3	Shim washer	Multemp AC-N	0.2-0.5	Washer (both sides)
4	Armature front bushing	Multemp AC-N	0.5-1.0	
5	Shim washer	Multemp AC-N	0.2-0.5	Washer (both sides)
6	Internal gear	Multemp AC-N	7-11	
	Armature gear			
	Planetary gear			
7	Pinion straight spline	Multemp AC-N	0.5-1.0	
8	Inner sleeve bushing	Multemp AC-N	0.3-0.6	
9	Helical spline	Multemp AC-N	0.5-1.0	
10	Clutch case lever shifter unit	Pyronoc No.2	1-2	
11	Bracket rear bearing housing	Pyronoc No.2	0.2-0.5	
12	Planetary gear housing	Multemp AC-N	1-2	
13	Lever holder unit	Multemp AC-N	0.4-0.8	
14	Lever roller rod unit	Pyronoc No.2	0.2-0.5	

ACCELERATOR STROKE SENSOR

COMPONENT LOCATOR

EN0111216D100006

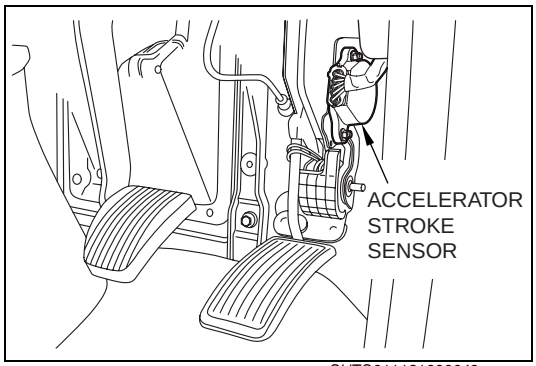


SHTS011121600042

1 Accelerator stroke sensor	

REPLACEMENT

EN0111216H100005



SHTS011121600043

REMOVE THE ACCELERATOR STROKE SENSOR.

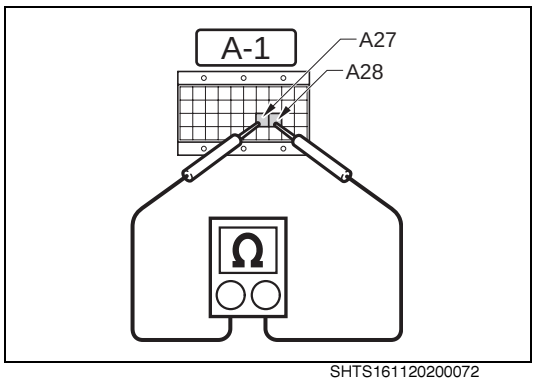
1. REMOVE THE ACCELERATOR STROKE SENSOR.

(1) Disconnect a connector of the accelerator stroke sensor.

EGR COOLANT TEMPERATURE SENSOR

EN1611202F200025

MC No.	19	DTC No.	P1417	EGR coolant temperature sensor malfunction (Input too low)
MC No.	19	DTC No.	P1418	EGR coolant temperature sensor malfunction (Input too high)



SHTS161120200072

1. CHECK THE RESISTANCE BETWEEN TERMINALS.

(1) Set the starter switch to the "LOCK" position and connect the signal check harness.
(2) Disconnect the signal check harness connector on the ECU side.
(3) Measure the resistance between A27 and A28 terminals of the signal check harness.

HINT

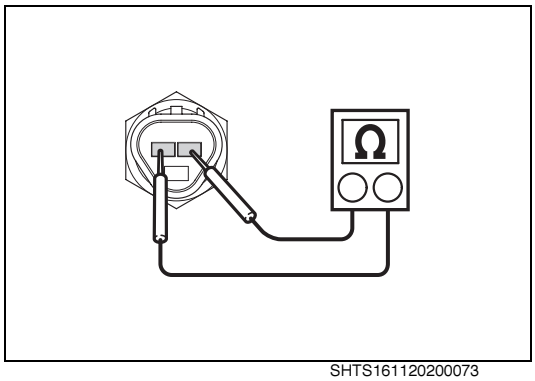
Measure the resistance under any of the following conditions.

Standard:

Coolant temperature	Resistance
20°C {68°F}	**2.45 kΩ**
40°C {104°F}	**1.15 kΩ**
60°C {140°F}	**584 Ω**
80°C {176°F}	**318 Ω**

NO → Proceed to 2.

YES → Proceed to 3.



SHTS161120200073

2. CHECK THE RESISTANCE BETWEEN TERMINALS.

(1) Disconnect the connector of EGR coolant temperature sensor.
(2) Measure the resistance between No.1 and No.2 terminals of EGR coolant temperature sensor.

HINT

Measure the resistance under any of the following conditions.

Standard:

Coolant temperature	Resistance
20°C {68°F}	**2.45 kΩ**
40°C {104°F}	**1.15 kΩ**
60°C {140°F}	**584 Ω**
80°C {176°F}	**318 Ω**

NO → Malfunction of EGR coolant temperature sensor

YES →

- Malfunction of harness
- Malfunction of the connector