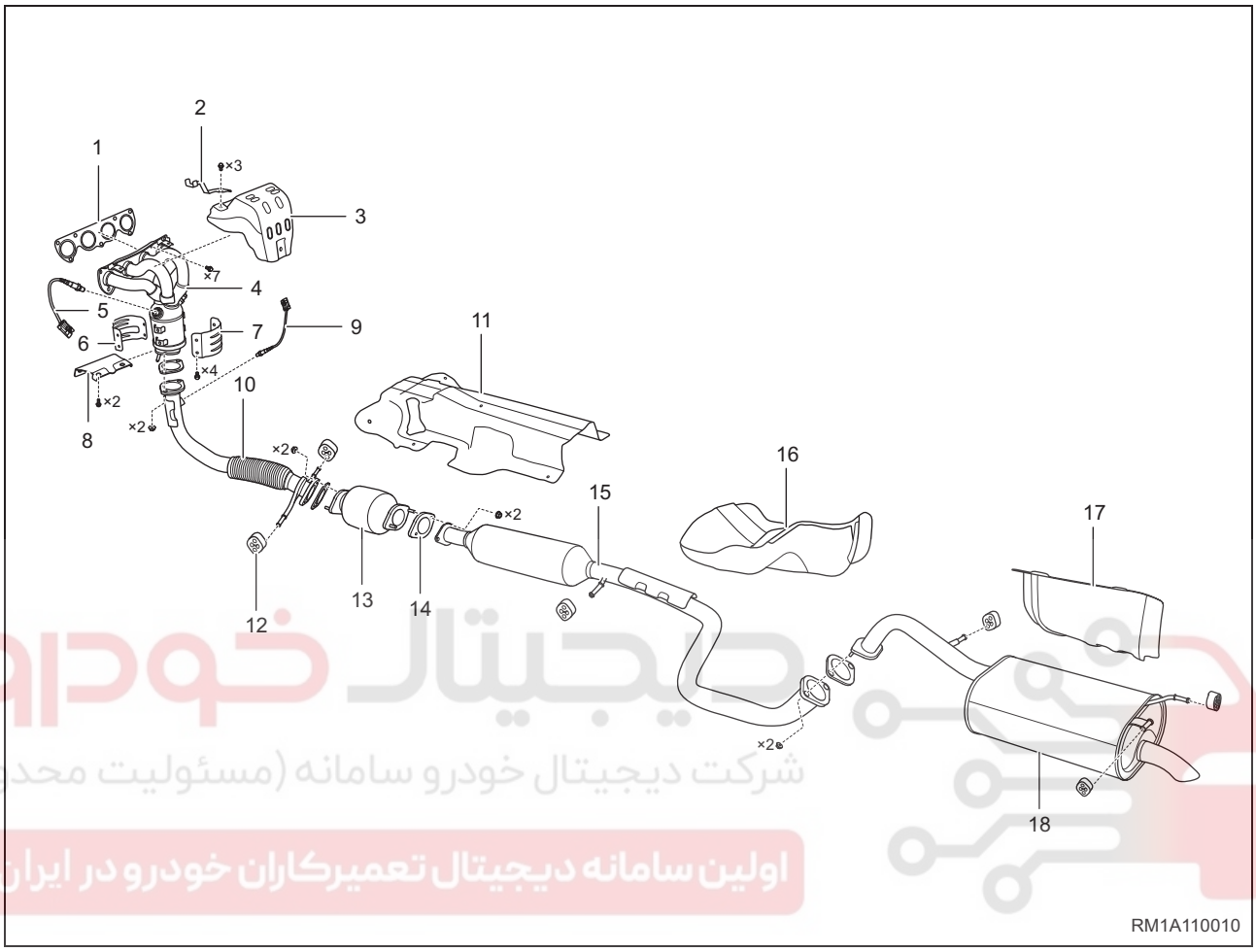
E4T15B EXHAUST SYSTEM

GENERAL INFORMATION

Description



1 - Exhaust Manifold Gasket	2 - Oxygen Sensor Bracket
3 - Exhaust Manifold Heat Insulator	4 - Exhaust Manifold Assembly
5 - Upstream Oxygen Sensor	6 - Front Precatalytic Converter Heat Insulator
7 - Rear Precatalytic Converter Heat Insulator	8 - Exhaust Manifold Bracket
9 - Downstream Oxygen Sensor	10 - Front Exhaust Pipe Assembly
11 - Muffler Heat Insulator 2	12 - Diamond Shaped Hanger Block
13 - Main Catalytic Converter Assembly	14 - Gasket
15 - Front Muffler Assembly	16 - Fuel Tank Heat Insulator
17 - Muffler Heat Insulator 1	18 - Rear Muffler Assembly

Exhaust system is used to control engine exhaust, reducing vehicle emissions by precatalytic converter and main catalytic converter, and eliminating exhaust noise by muffler. When exhaust system discharges exhaust gas, oxygen sensor monitors oxygen content in exhaust gas. Engine control module adjusts air-fuel ratio of combustible gas mixture to control vehicle emissions and achieve optimal fuel economy according to feedback signals of oxygen sensor and combining with other sensor signals.

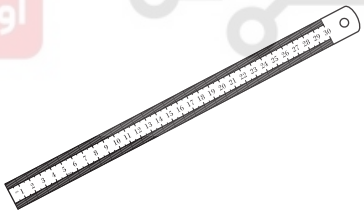
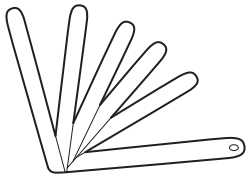
Specifications

Torque Specifications

Description	Torque (N·m)
Exhaust Manifold Heat Insulator Fixing Bolt	8 + 3
Coupling Nut Between Exhaust Manifold Assembly and Front Exhaust Pipe Assembly	45 ± 5
Coupling Bolt Between Exhaust Manifold Assembly and Exhaust Manifold Bracket	20 + 5
Exhaust Manifold Assembly Fixing Nut	20 + 5
Precatalytic Converter Heat Insulator Fixing Bolt	8 + 3
Coupling Nut Between Main Catalytic Converter Assembly and Front Exhaust Pipe Assembly	45 ± 5
Coupling Nut Between Main Catalytic Converter Assembly and Front Muffler Assembly	45 ± 5
Coupling Nut Between Front Muffler Assembly and Rear Muffler Assembly	45 ± 5
Upstream Oxygen Sensor	40 - 60
Downstream Oxygen Sensor	40 - 60

Tools

General Tools

Precision Straightedge	 RCH0000063
Feeler Gauge	 RCH0000060

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair or adjust faulty components, or replace as necessary.

Symptom	Suspected Area	See page
Excessive exhaust noise	Exhaust pipe (loose connection)	11-4
	Exhaust manifold assembly (damaged or leaked)	11-6
	Main catalytic converter assembly (damaged or leaked)	11-12
	Front muffler assembly (damaged or leaked)	11-14
	Rear muffler assembly (damaged or leaked)	11-16
	Exhaust pipe gasket (damaged)	-
Excessive exhaust temperature	Exhaust manifold assembly (blocked)	11-6
	Main catalytic converter assembly (blocked)	11-12
	Precatalytic converter assembly (blocked)	-
	Incorrect ignition timing in ignition system	-
	Inadequate gas mixture combustion	-
Exhaust pipe leakage	Exhaust pipe gasket (damaged)	-
	Exhaust manifold assembly (damaged or leaked)	11-6
	Main catalytic converter assembly (damaged or leaked)	11-12
	Front muffler assembly (damaged or leaked)	11-14
	Rear muffler assembly (damaged or leaked)	11-16

Exhaust System Gas Leakage Inspection

Method to check gas leakage in exhaust system joints:

Warm up engine for a while, and check for gas leakage in exhaust system joints. A certain amount of gas leakage at exhaust pipe joint is allowed, but gas leakage at joint between exhaust manifold and cylinder head is prohibited. Judging standard is that engine does not shudder and no "poof" sound is heard from joints.

ON-VEHICLE SERVICE

Exhaust Manifold Assembly (E4G15B)

Removal

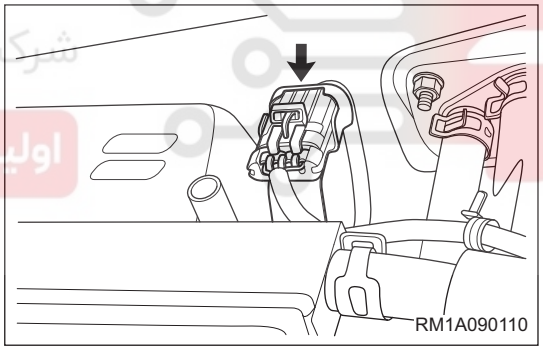
⚠ WARNING

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

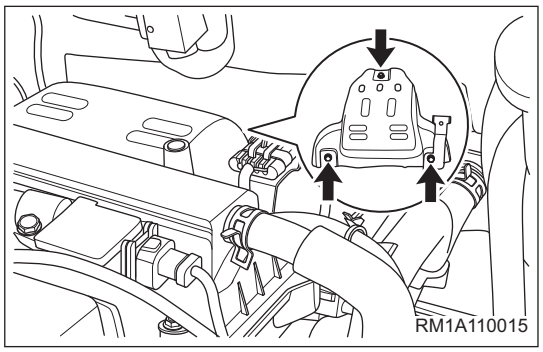
CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the exhaust manifold heat insulator.
   a. Remove and disconnect upstream oxygen sensor connector (arrow) from bracket.

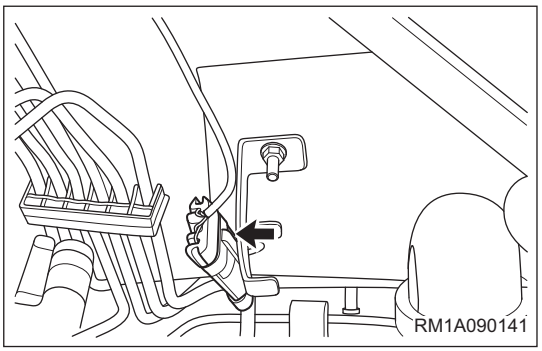


   b. Remove 3 fixing bolts (arrow) from exhaust manifold heat insulator, and remove downstream oxygen sensor bracket.
   (Tightening torque: 8 + 3 N·m)

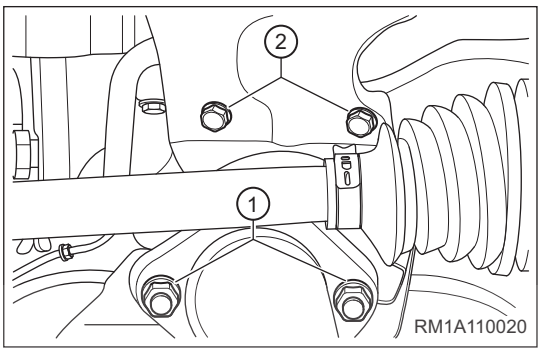


   c. Remove the exhaust manifold heat insulator.

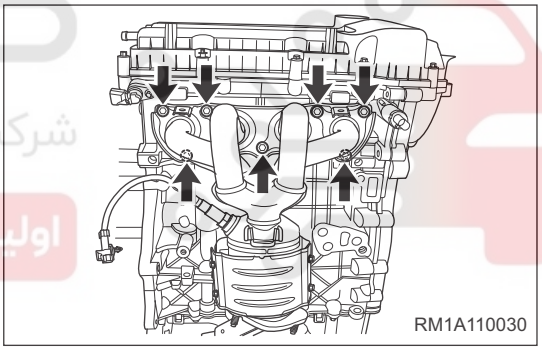
5. Remove the exhaust manifold assembly.
   a. Remove and disconnect downstream oxygen sensor connector (arrow) from bracket.



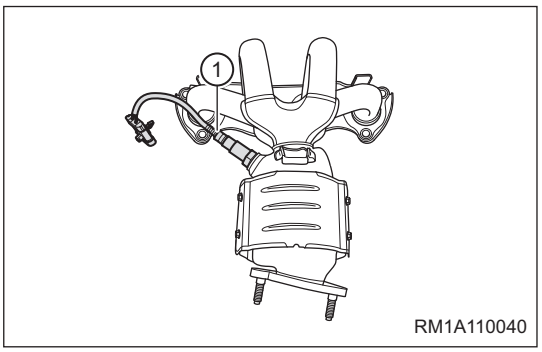
   b. Remove 2 coupling nuts (1), then disconnect connection between exhaust manifold assembly and front exhaust pipe assembly, and take off gasket from connecting part.
   (Tightening torque: 45 ± 5 N·m)
   c. Remove 2 coupling bolts (2) between exhaust manifold assembly and exhaust manifold bracket.
   (Tightening torque: 20 + 5 N·m)



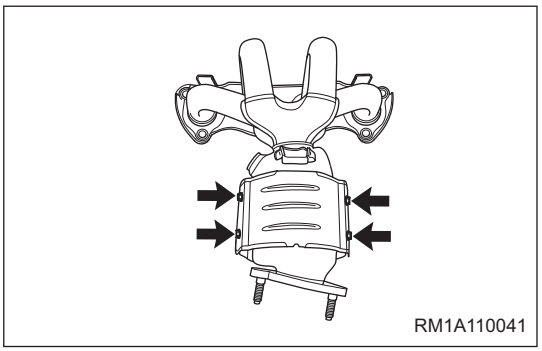
   d. Remove 7 fixing nuts (arrow) from exhaust manifold assembly.
   (Tightening torque: 20 + 5 N·m)



   e. Remove engine right mounting cushion, remove exhaust manifold assembly after lowering engine, and remove exhaust manifold assembly gasket.
6. Remove upstream oxygen sensor (1) from exhaust manifold assembly.
   (Tightening torque: 40 - 60 N·m)



7. Remove 4 precatalytic converter heat insulator fixing bolts (arrow) from exhaust manifold assembly, and remove heat insulator.
(Tightening torque: 8 + 3 N·m)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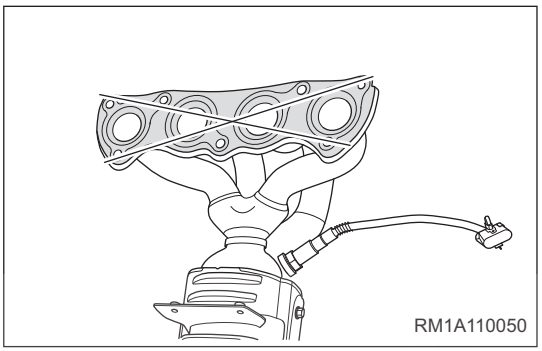
Inspection

1. Measure warpage on surface of exhaust manifold assembly with a straightedge and a feeler gauge. If warpage on surface is greater than 0.5 mm, replace it.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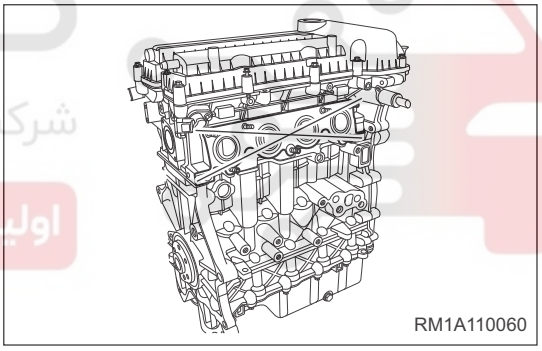
2. Measure warpage on exhaust surface of cylinder head with a straightedge and a feeler gauge. If warpage on surface is greater than 0.04 mm, replace it.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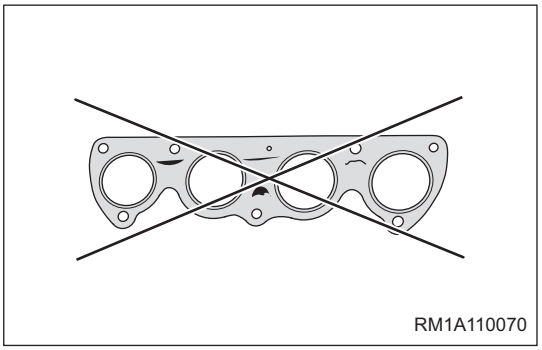
3. Check the exhaust manifold gasket. There should be no scratches or roughness. Otherwise, replace it.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Installation

Installation is in the reverse order of removal.

CAUTION

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in exhaust manifold assembly, replace it.
- Check that there is no exhaust gas leakage in connecting part of upstream oxygen sensor.
- Check that there is no exhaust gas leakage between exhaust manifold assembly and cylinder head or main catalytic converter assembly after installation is completed.

Front Exhaust Pipe Assembly

Removal

⚠ WARNING

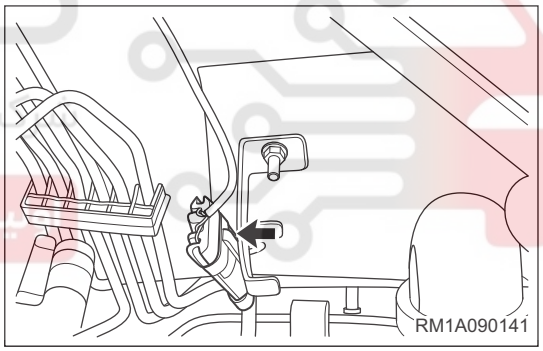
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

CAUTION

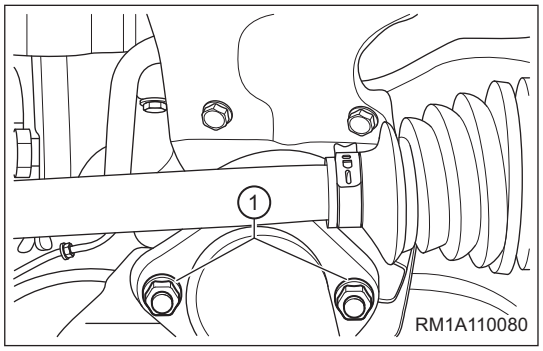
- When removing front exhaust pipe assembly, an assistant is needed to hold it. This can prevent front muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front exhaust pipe assembly.

a. Remove and disconnect downstream oxygen sensor connector (arrow) from bracket.

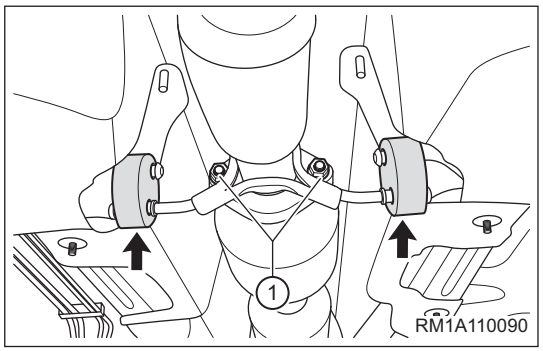


b. Remove 2 coupling nuts (1), then disconnect connection between exhaust manifold assembly and main catalytic converter assembly, and take off gasket from connecting part.
(Tightening torque: 45 ± 5 N·m)



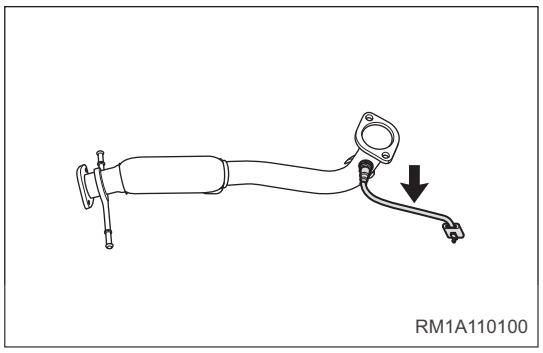
c. Remove 2 coupling nuts (1), then disconnect connection between front muffler assembly and main catalytic converter assembly, and take off gasket from connecting part.
(Tightening torque: 45 ± 5 N·m)

d. Separate 2 diamond shaped hanger blocks (arrow) between front exhaust pipe assembly and body hook.



e. Remove the front exhaust pipe assembly.

4. Remove downstream oxygen sensor (arrow) from front exhaust pipe assembly.
(Tightening torque: 40 - 60 N·m)



Installation

Installation is in the reverse order of removal.

CAUTION

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- Check exhaust gas for leaks. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.
- Check that there is no exhaust gas leakage in connecting part of downstream oxygen sensor.

Main Catalytic Converter Assembly

Removal

⚠ WARNING

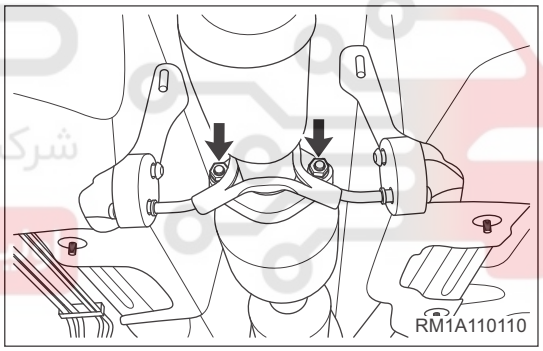
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

CAUTION

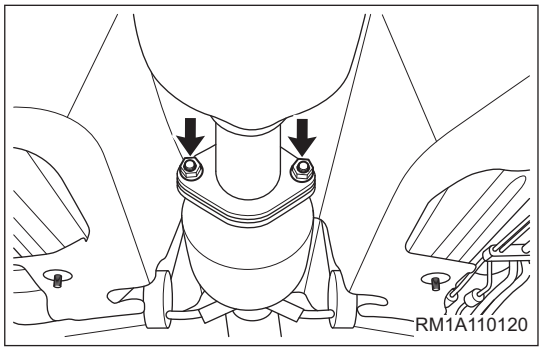
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Raise the vehicle to a proper height.
4. Remove the main catalytic converter assembly.

a. Remove 2 coupling nuts (arrow), then disconnect connection between front exhaust pipe assembly and main catalytic converter assembly, and take off gasket from connecting part.
(Tightening torque: 45 ± 5 N·m)



b. Remove 2 coupling nuts (arrow), then disconnect connection between main catalytic converter assembly and front muffler assembly, and take off gasket from connecting part.
(Tightening torque: 45 ± 5 N·m)



c. Remove the main catalytic converter assembly.

Installation

Installation is in the reverse order of removal.

CAUTION

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in main catalytic converter assembly, replace it.
- Check exhaust gas for leaks. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

Front Muffler Assembly

Removal

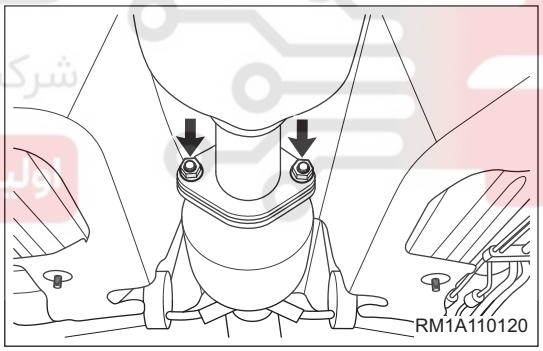
WARNING

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

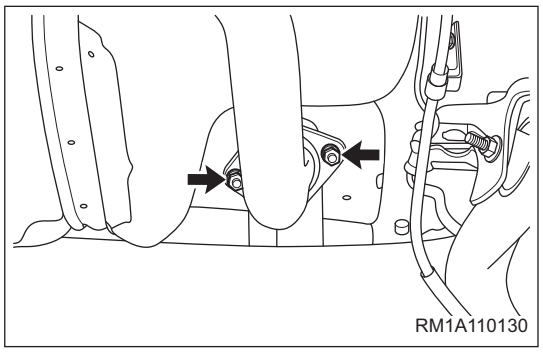
CAUTION

- When removing front muffler assembly, an assistant is needed to hold it. This can prevent front muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

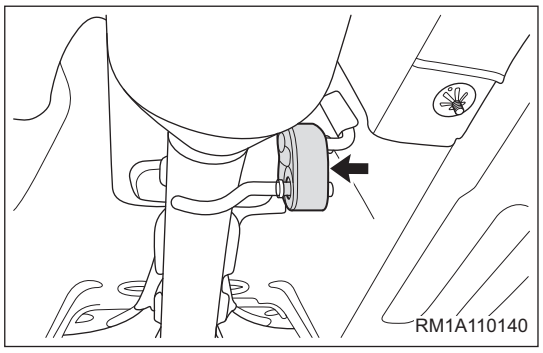
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Raise the vehicle to a proper position.
4. Remove the front muffler assembly.
   a. Remove 2 coupling nuts (arrow), then disconnect connection between front muffler assembly and main catalytic converter assembly, and take off gasket from connecting part.
   (Tightening torque: 45 ± 5 N·m)



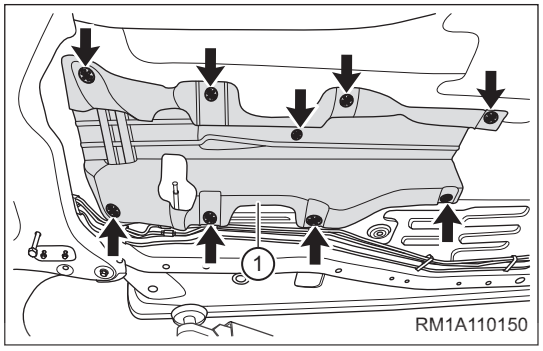
   b. Remove 2 coupling nuts (arrow), then disconnect connection between front muffler assembly and rear muffler assembly, and take off gasket from connecting part.
   (Tightening torque: 45 ± 5 N·m)



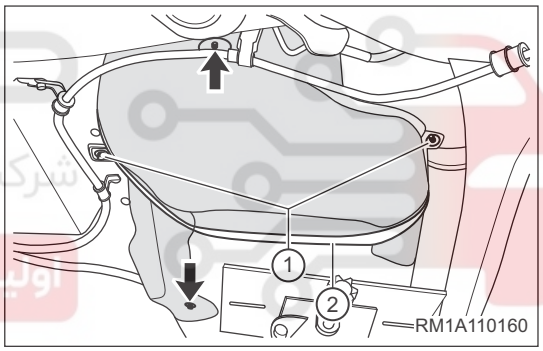
c. Separate diamond shaped hanger block (arrow) between front muffler assembly and body hook.



5. Remove the muffler heat insulator 2.
   a. Remove 9 fixing clamps (arrow) and remove muffler heat insulator 2 (1).



6. Remove the fuel tank heat insulator assembly.
   a. Remove 2 fixing bolts (1) and remove fuel tank fixing strap II (2) when supporting fuel tank with a hydraulic jack.
   b. Remove 2 mounting nuts (arrow) from fuel tank heat insulator assembly.



c. Remove the fuel tank heat insulator assembly.

Installation

Installation is in the reverse order of removal.

CAUTION

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in rear muffler assembly, replace it.
- Check exhaust gas for leaks. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

Rear Muffler Assembly

Removal

⚠ WARNING

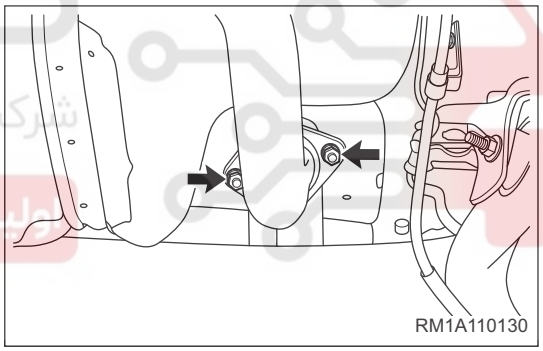
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

CAUTION

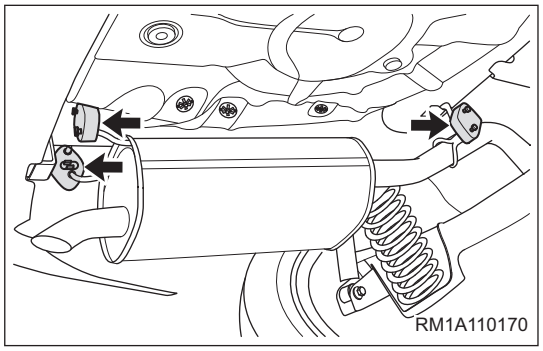
- When removing rear muffler assembly, an assistant is needed to hold it. This can prevent rear muffler assembly from dropping during operation, which may cause an accident.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Raise the vehicle to a proper position.
3. Remove the rear muffler assembly.

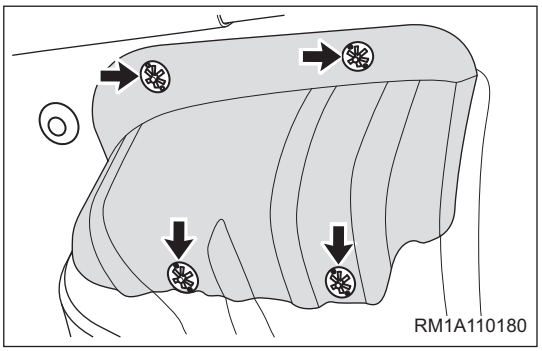
a. Remove 2 coupling nuts (arrow), then disconnect connection between rear muffler assembly and front muffler assembly, and take off gasket from connecting part.
(Tightening torque: 45 ± 5 N·m)



b. Separate 3 diamond shaped hanger blocks (arrow) between rear muffler assembly and body hooks.



4. Remove the rear muffler heat insulator assembly.
   a. Remove 4 mounting clamps (arrow) from rear muffler heat insulator assembly.



   b. Remove the rear muffler heat insulator assembly.

Installation

Installation is in the reverse order of removal.

CAUTION

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in rear muffler assembly, replace it.
- Check exhaust gas for leaks. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

Turbocharger Heat Insulator Assembly (E4T15B)

Removal

WARNING

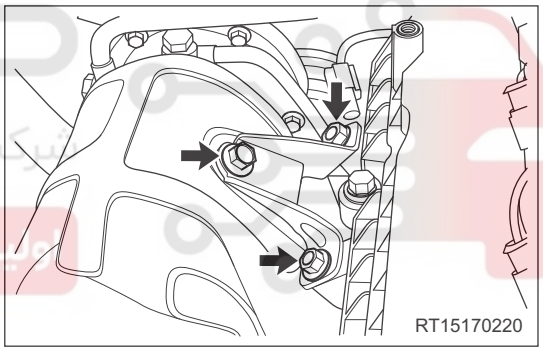
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

CAUTION

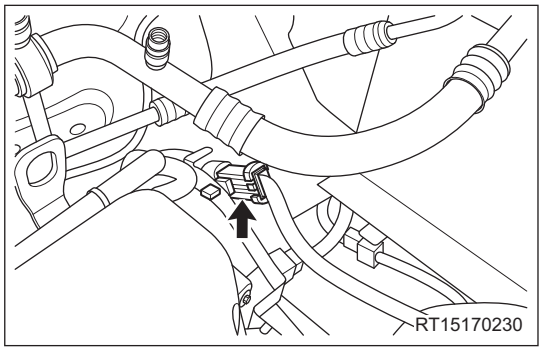
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the turbocharger fixing bracket.

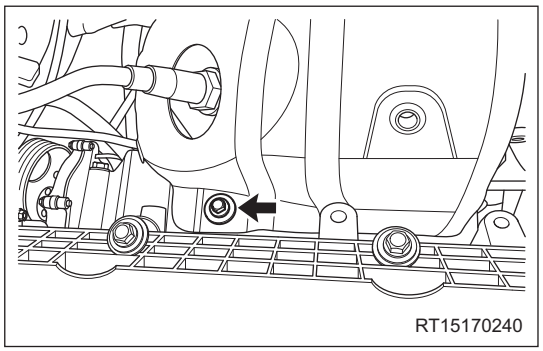
   a. Remove 3 fixing bolts (arrow) from turbocharger fixing bracket.
   (Tightening torque: 23 ± 3.5 N·m)



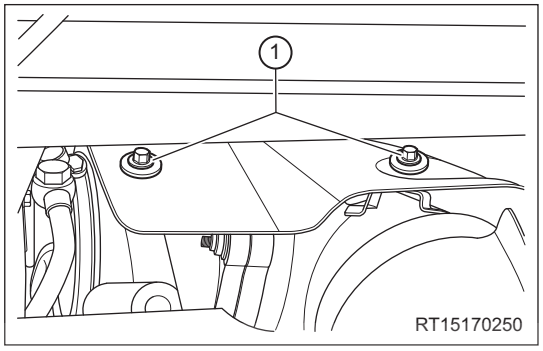
   b. Remove the turbocharger fixing bracket.
5. Remove the turbocharger heat insulator assembly.
   a. Disconnect the upstream oxygen sensor connector (arrow),



b. Remove the turbocharger heat insulator fixing bolt (arrow).
(Tightening torque: 9 ± 1.5 N·m)



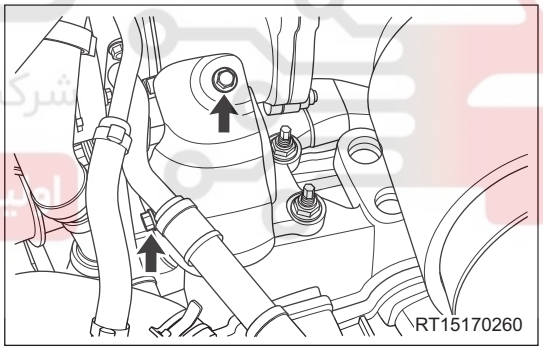
c. Remove 2 turbocharger heat insulator fixing bolts (1).
(Tightening torque: 9 ± 1.5 N·m)



d. Remove the turbocharger heat insulator assembly.

6. Remove the turbocharger heat insulator II.

a. Remove 2 turbocharger heat insulator II fixing bolts (arrow).
(Tightening torque: 8 + 3 N·m)



b. Remove the turbocharger heat insulator II.

Installation

Installation is in the reverse order of removal.

Turbocharger Assembly (E4T15B)

Removal

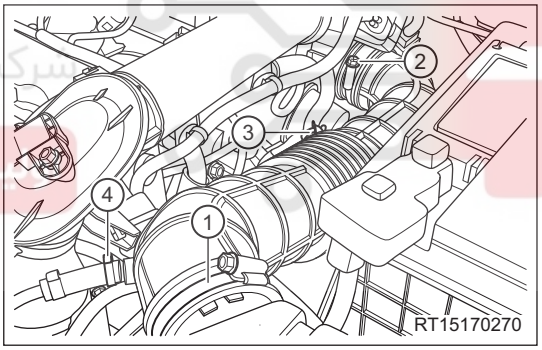
WARNING

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

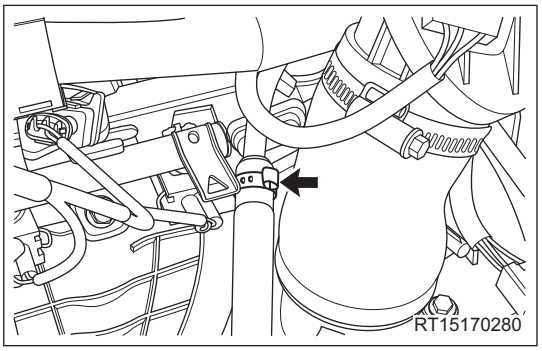
CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the muffler assembly (See page 10-14).
5. Remove the precatalytic converter assembly.
6. Remove the intake hose assembly.
   a. Loosen worm clamp (1) and disconnect connection between intake hose and air filter assembly.
   b. Loosen worm clamp (2) and disconnect connection between intake hose and turbocharger assembly.
   c. Loosen elastic clamp (3) and disconnect connection between crankcase ventilation hose and intake hose.
   d. Loosen elastic clamp (4) and disconnect connection between fuel vapour pipe set and intake hose.

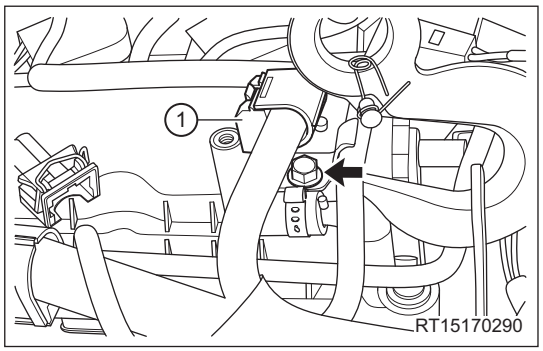


   e. Remove the intake hose assembly.
7. Remove the turbocharger water outlet pipe set assembly.
   a. Loosen clamping ring (arrow) and disconnect connection between intercooler water outlet pipe set and turbocharger water outlet pipe set.

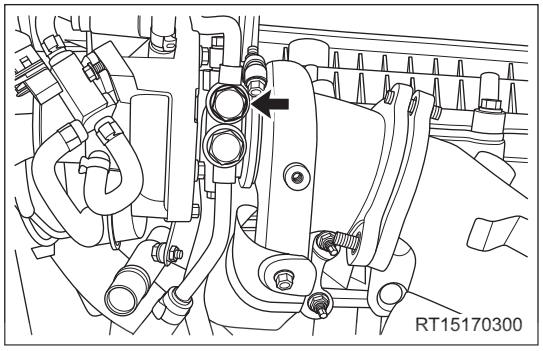


b. Disconnect the engine wire harness fixing clip (1).

c. Remove fixing bolt (arrow) from turbocharger water outlet pipe set bracket.
(Tightening torque: 8 + 3 N·m)



d. Remove hollow bolt (arrow) between turbocharger water outlet pipe set and turbocharger assembly.
(Tightening torque: 25 + 5 N·m)



e. Remove the turbocharger water outlet pipe set assembly.

CAUTION

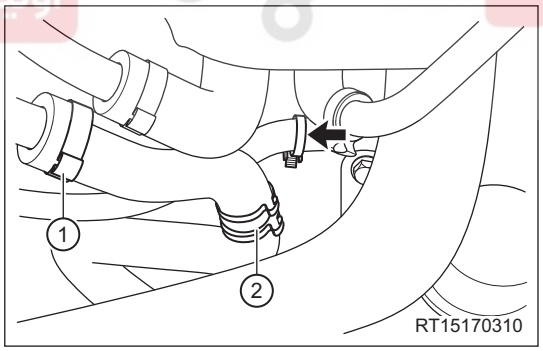
- Pay attention not to drop upper and lower washers of hollow bolt during removal and do not reuse them.

8. Remove the turbocharger water inlet pipe set assembly.

a. Loosen clamping ring (1) and disconnect connection between turbocharger water inlet pipe set hose and intercooler assembly.

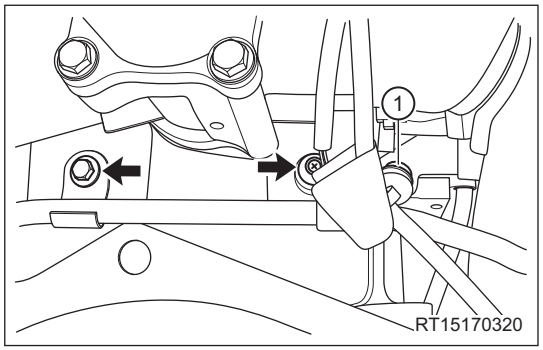
b. Loosen clamping ring (2) and disconnect connection between turbocharger water inlet pipe set and electric water pump water outlet hose.

c. Disconnect the engine wire harness fixing clip (arrow).

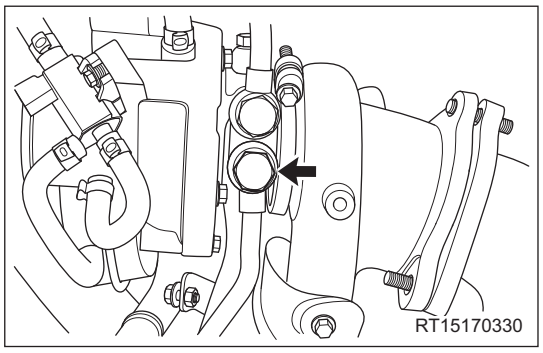


d. Disconnect the engine wire harness fixing clip (1).

e. Remove 2 fixing bolts (arrow) from turbocharger water inlet pipe set bracket.
(Tightening torque: 8 + 3 N·m)



f. Remove hollow bolt (arrow) between turbocharger water inlet pipe and turbocharger assembly.
(Tightening torque: 25 + 5 N·m)



g. Remove the turbocharger water inlet pipe set assembly.

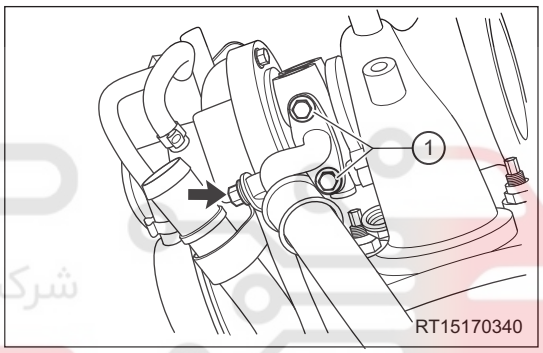
CAUTION

- Pay attention not to drop upper and lower washers of hollow bolt during removal and do not reuse them.

9. Remove the turbocharger fluid return pipe assembly.

a. Remove fixing bolt (arrow) from turbocharger fluid return pipe bracket.
(Tightening torque: 8 + 3 N·m)

b. Remove 2 coupling bolts (1) between turbocharger fluid return pipe and turbocharger assembly.
(Tightening torque: 8 + 3 N·m)



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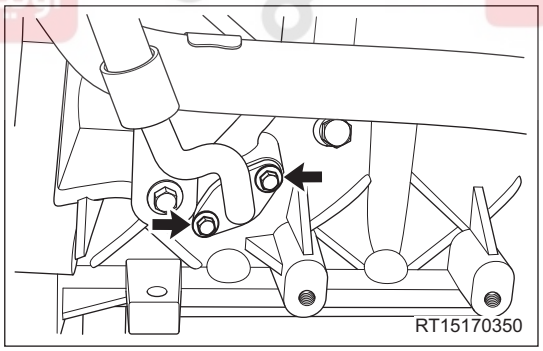
c. Remove 2 coupling bolts (arrow) between turbocharger fluid return pipe and cylinder block assembly.
(Tightening torque: 8 + 3 N·m)



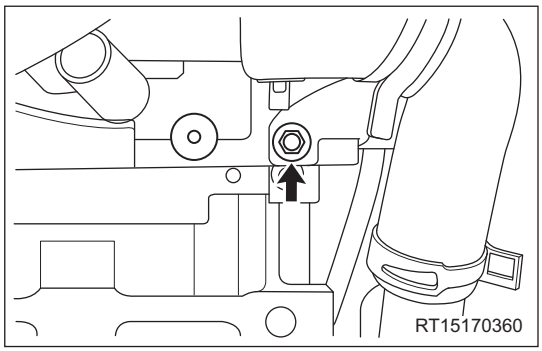
d. Remove the turbocharger fluid return pipe assembly.

CAUTION

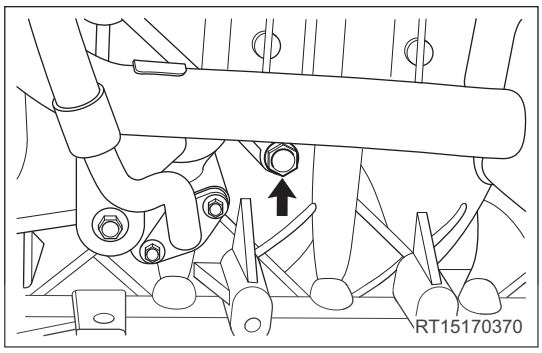
- Pay attention not to drop the upper and lower washers of hollow bolt and the bolt during removal and do not reuse them.

10. Remove the turbocharger fluid inlet pipe assembly.

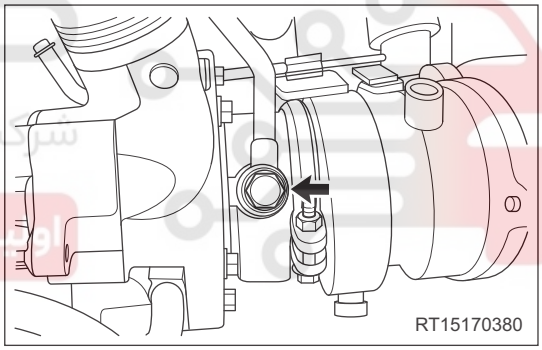
a. Remove fixing bolt (arrow) from turbocharger fluid inlet pipe bracket.
(Tightening torque: 8 + 3 N·m)



b. Remove hollow bolt (arrow) between turbocharger fluid inlet pipe and cylinder block assembly.
(Tightening torque: 20 + 5 N·m)



c. Remove hollow bolt (arrow) between turbocharger water inlet pipe and turbocharger assembly.
(Tightening torque: 20 + 5 N·m)



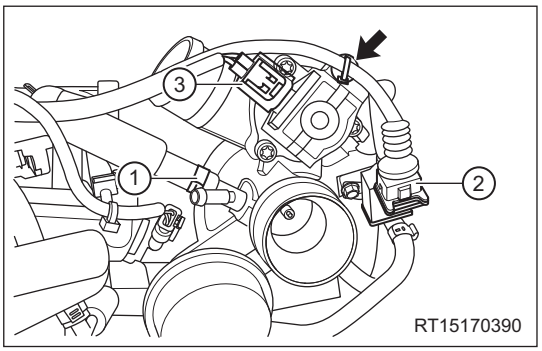
d. Remove the turbocharger fluid inlet pipe assembly.

CAUTION

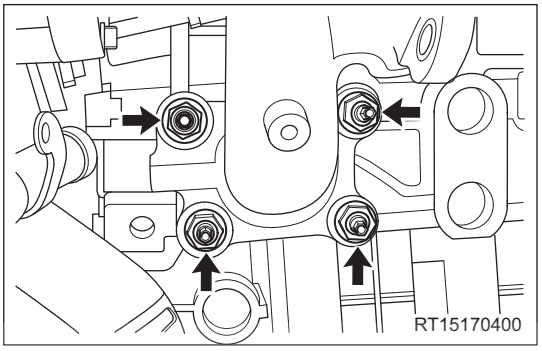
- Pay attention not to drop the upper and lower washers of hollow bolt and the bolt during removal and do not reuse them.

11. Remove the turbocharger assembly.

a. Loosen clamping ring (1) and disconnect connection between crankcase ventilation tube and turbocharger assembly.
b. Disconnect the exhaust by-pass control solenoid valve connector (2).
c. Disconnect the engine wire harness fixing clip (arrow).
d. Disconnect the relief control solenoid valve connector (3).



e. Remove 4 turbocharger fixing nuts.
(Tightening torque: 25 + 5 N·m)



f. Remove the turbocharger assembly.

Inspection

1. Check turbine rotor for stuck.
2. Check turbine rotor for abnormal noise.
3. Check rotor vane for damage.
4. Check turbocharger for fluid and water leakage.

Installation

Installation is in the reverse order of removal.

CAUTION

- If washers are damaged, replace them and clean foreign matters in connecting part.
- Check for air leakage, if so, check if all nuts and bolts are tightened; if component is damaged, replace damaged component.

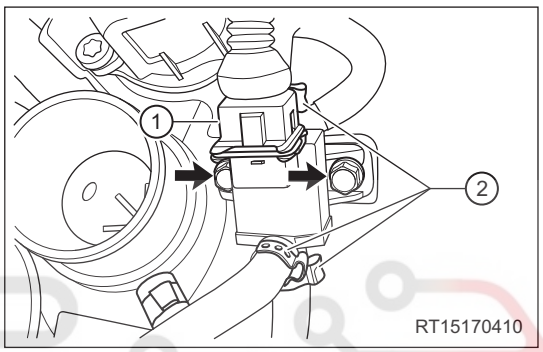
Exhaust By-pass Control Solenoid Valve (E4T15B)

Removal

CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the exhaust by-pass control solenoid valve.
   a. Disconnect the exhaust by-pass control solenoid valve connector (1).
   b. Loosen clamping rings (2) and disconnect 3 connections between hoses and exhaust by-pass control solenoid valve.
   c. Remove 2 fixing bolts (arrow) from exhaust by-pass control solenoid valve.



   d. Remove the exhaust by-pass control solenoid valve assembly.

Installation

Installation is in the reverse order of removal.

Electric Water Pump Assembly and Bracket, Water Pipe (E4T15B)

Removal

WARNING

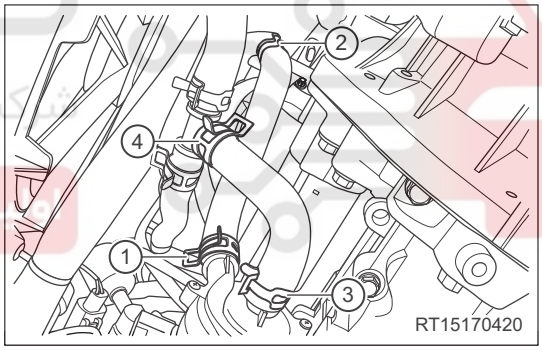
- Be sure that engine cooling system is at low temperature before handling. If engine is in hot status, high-temperature and high-pressure coolant may flow out and cause serious personal injury.
- If your body contacts coolant accidentally, immediately wash the affected area with water and seek medical attention if it is serious.

CAUTION

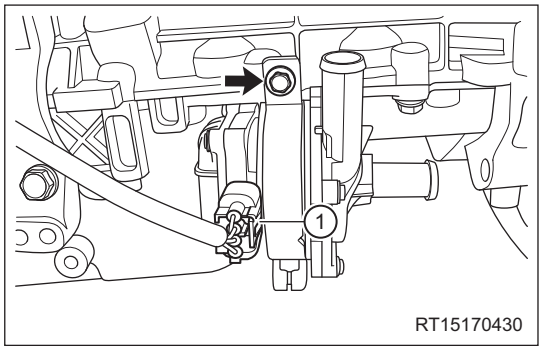
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.

4. Remove electric water pump water inlet and outlet pipes.
   a. Loosen elastic clamp (1) and disconnect connection between electric water pump assembly and electric water pump water outlet hose.
   b. Loosen clamping ring (2) and disconnect connection between electric water pump water outlet hose and water inlet pipe set.
   c. Loosen elastic clamp (3) and disconnect connection between electric water pump water inlet hose and electric water pump assembly.
   d. Loosen elastic clamp (4) and disconnect connection between electric water pump water inlet hose and low temperature radiator water outlet hose.

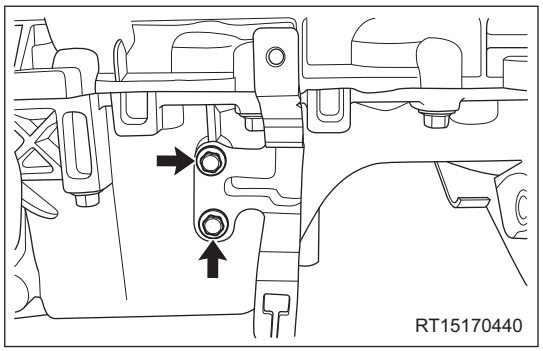


   e. Remove the electric water pump water inlet and outlet pipe assembly.
5. Remove the electric water pump assembly.
   a. Disconnect the electric water pump assembly connector (1).
   b. Remove fixing bolt (arrow) from electric water pump assembly.
   (Tightening torque: 8 + 3 N·m)



   c. Remove the electric water pump assembly.

6. Remove the electric water pump assembly mounting bracket.
   a. Remove 2 fixing bolts (arrow) from electric water pump assembly bracket.
   (Tightening torque: 8 + 3 N·m)



   b. Remove the electric water pump assembly bracket.

Installation

Installation is in the reverse order of removal.

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