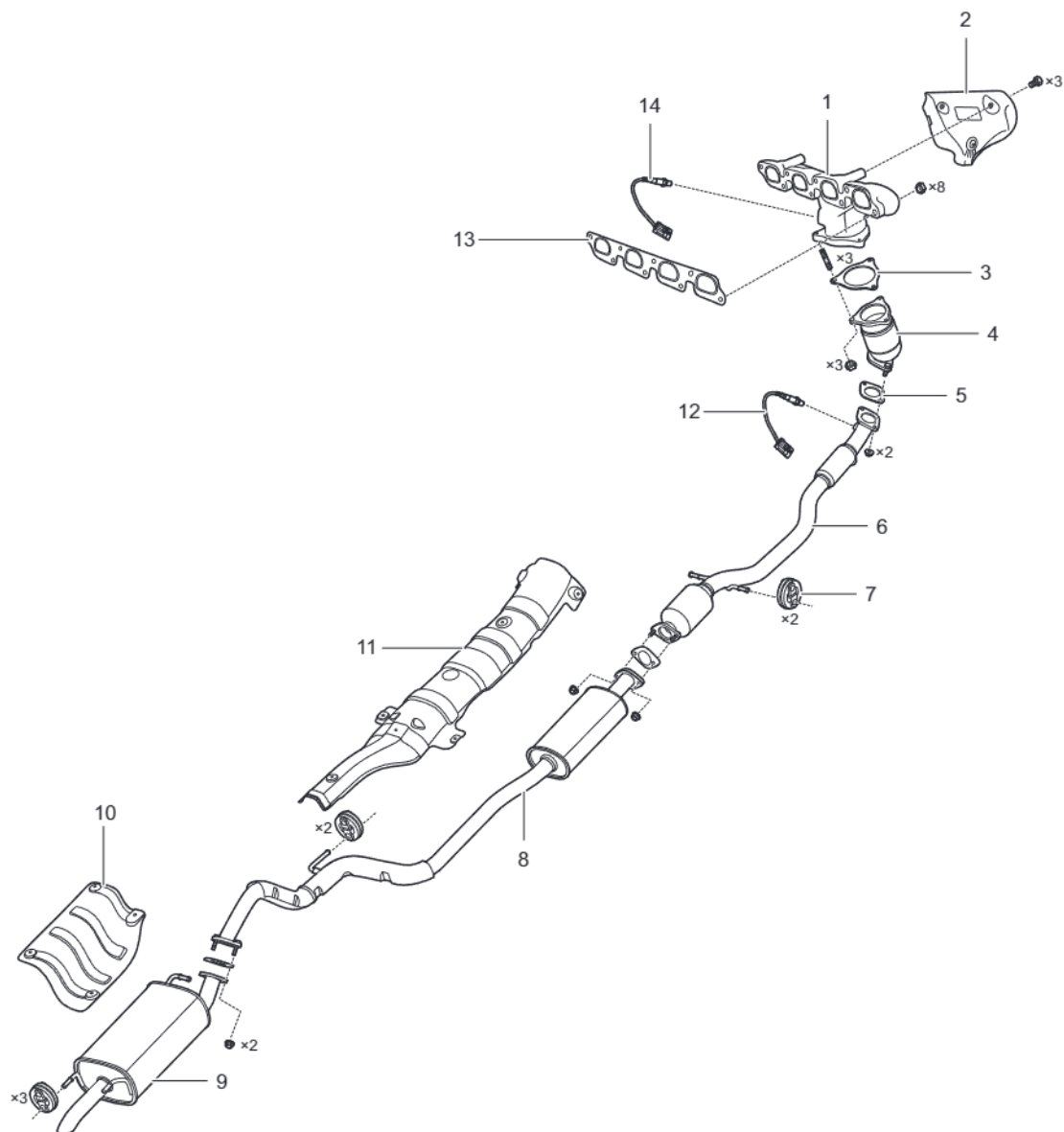

SQR477F EXHAUST SYSTEM

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GENERAL INFORMATION

Description



RA19110010

1 - Exhaust Manifold Assembly	2 - Exhaust Manifold Heat Insulator
3 - Gasket	4 - Precatalytic Converter Assembly
5 - Gasket	6 - Main Catalytic Converter Assembly
7 - Diamond Shaped Hanger Block	8 - Front Muffler Assembly
9 - Rear Muffler Assembly	10 - Muffler Heat Insulator II
11 - Muffler Heat Insulator I	12 - Downstream Oxygen Sensor
13 - Exhaust Manifold Gasket	14 - Upstream Oxygen Sensor

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

Specifications

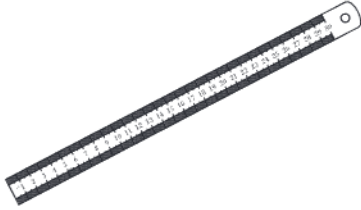
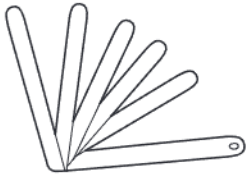
Torque Specifications

Description	Torque (N·m)
Exhaust Manifold Heat Insulator Fixing Bolt	25 ± 5
Exhaust Manifold Fixing Nut	45 ± 5
Coupling Nut Between Exhaust Manifold and Precatalytic Converter Assembly	45 ± 5
Upstream Oxygen Sensor	45 ± 5
Downstream Oxygen Sensor	45 ± 5
Coupling Nut Between Main Catalytic Converter Assembly and Precatalytic Converter 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

Tools

General Tools

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Precision Ruler	 RCH0000063
Feeler Gauge	 RCH0000060

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Symptom	Suspected Area	See page
Excessive exhaust noise	Exhaust pipe (loose connection)	-
	Precatalytic converter assembly (damaged or leaked)	11-10
	Main catalytic converter assembly (damaged or leaked)	11-11
	Front muffler assembly (damaged or leaked)	11-13
	Rear muffler assembly (damaged or leaked)	11-15
	Exhaust manifold assembly (broken or leaked)	11-7
Excessive exhaust temperature	Precatalytic converter assembly (blocked)	11-10
	Main catalytic converter assembly (blocked)	11-11
	Incorrect ignition timing in ignition system	07-28
	Inadequate gas mixture combustion	-
Exhaust pipe leakage	Exhaust pipe gasket (damaged)	-
	Exhaust pipe (damaged)	-

Exhaust System Gas Leakage Inspection

Method to check the gas leakage in the exhaust system joints:

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

ON-VEHICLE SERVICE

Exhaust Manifold Assembly

Removal

WARNING

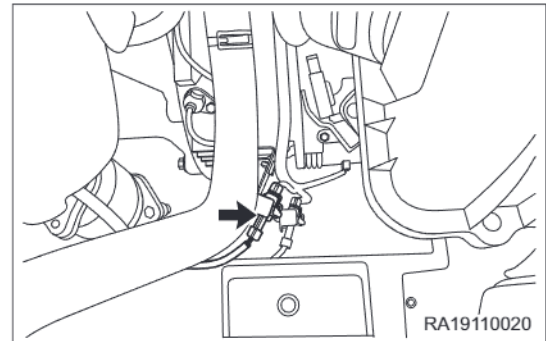
- The temperature of exhaust system is very high when the engine is running.
- Before removal, you must make sure that the engine has stopped running; otherwise, there is a risk of scald injury.

1. Turn off all the electrical equipment and ignition switch.

CAUTION

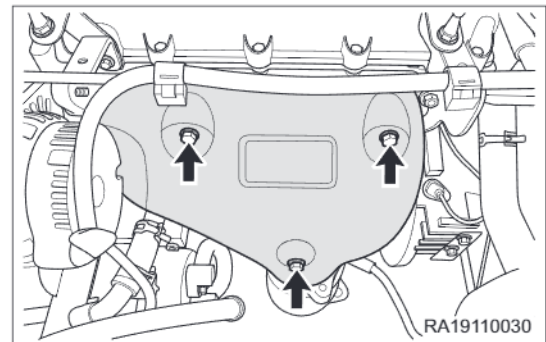
- Install the protector to prevent the body from being scratched.

2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove and disconnect the upstream oxygen sensor connector (arrow) from bracket.



11

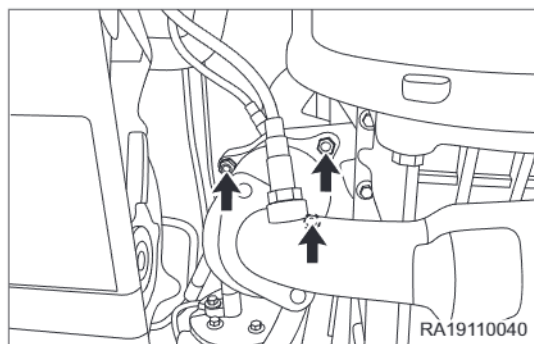
5. Remove the exhaust manifold heat insulator.
 - a. Remove 3 fixing bolts from exhaust manifold heat insulator (arrow).
(Tightening torque: $25 \pm 5\text{N}\cdot\text{m}$)



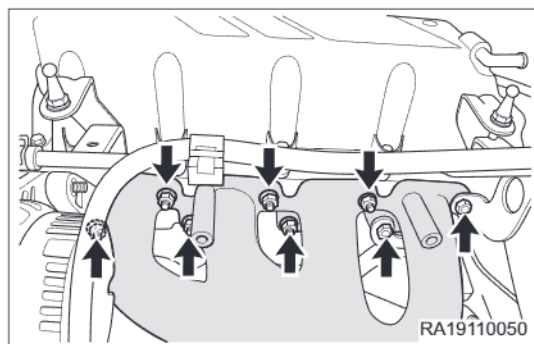
- b. Remove the exhaust manifold heat insulator.

6. Remove the exhaust manifold assembly.

- a. Remove 3 coupling nuts (arrow), then disconnect the connection between exhaust manifold assembly and precatalytic converter assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)



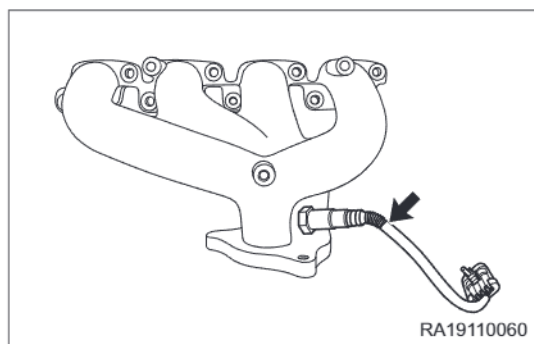
- b. Remove 8 fixing nuts from the exhaust manifold assembly (arrow).
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)



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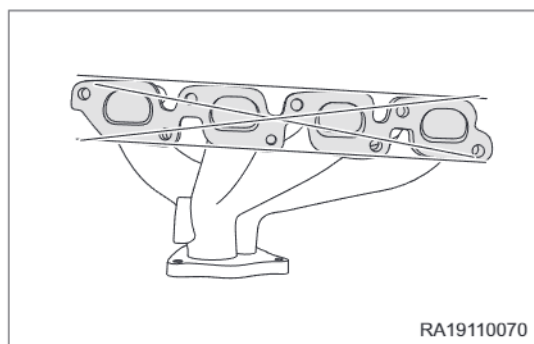
- c. Remove the engine lifting eye and exhaust manifold assembly, and take off the gasket in the manifold assembly.

7. Remove the upstream oxygen sensor (arrow) from the exhaust manifold assembly. (Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)

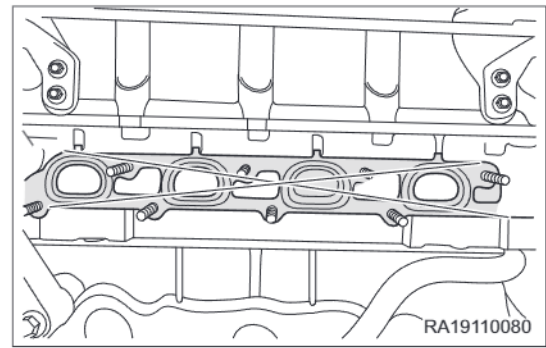


Inspection

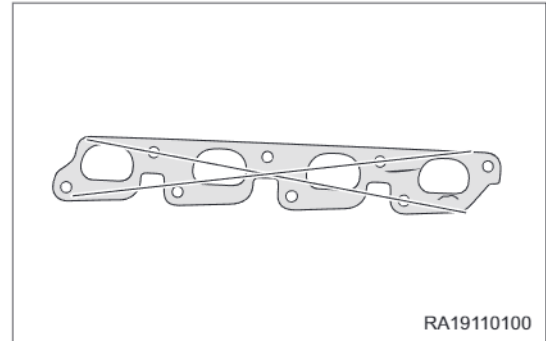
1. Measure warpage on the surface of the exhaust manifold assembly with a precision ruler and a feeler gauge. If the warpage on the surface is greater than 0.5 mm, replace it.



2. Measure warpage on the surface of the cylinder head exhaust side with a ruler and a feeler gauge. If the warpage on the surface is greater than 0.4 mm, replace it.



3. Check that there are no scratches and roughness on the exhaust manifold gasket. Otherwise, replace it.



Installation

Installation is in the reverse order of removal.

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CAUTION

- When the installation is completed, check that there is no exhaust gas leakage between the exhaust manifold assembly and the cylinder head, precatalytic converter assembly.
- Check that there is no exhaust gas leakage in the upstream oxygen connection.

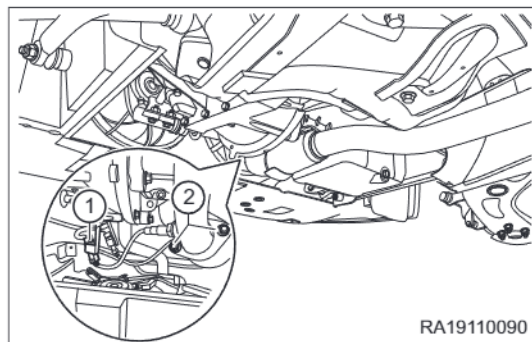
Precatalytic Converter Assembly

Removal

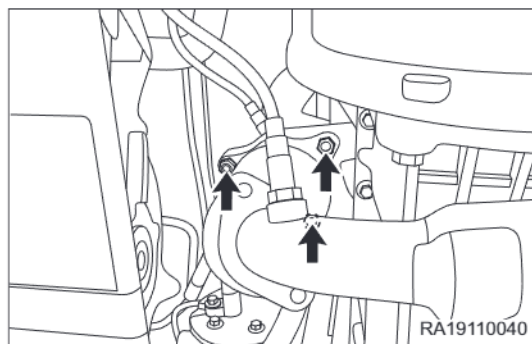
⚠ WARNING

- The temperature of exhaust system is very high when the engine is running.
- Before removal and installation, you must make sure that the engine has stopped running; otherwise, there is a risk of scald injury.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the precatalytic converter assembly.
 - a. Remove and disconnect the downstream oxygen sensor connector (1) from bracket.
 - b. Remove 2 coupling nuts (2), then disconnect the connection between main catalytic converter assembly and precatalytic converter assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)



- c. Remove 3 coupling nuts (arrow), then disconnect the connection between precatalytic converter assembly and exhaust manifold assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)



4. Remove the precatalytic converter assembly.

Installation

Installation is in the reverse order of removal.

👁 CAUTION

- If the gasket is damaged, replace it, and remove the foreign matters on the joints and threads.
- If there are any cracks or leakage in the precatalytic converter assembly, replace the precatalytic converter assembly.
- Inspect for exhaust gas leaks. If gas leaks, tighten the defective area to prevent leaking. Replace the damaged parts as necessary.

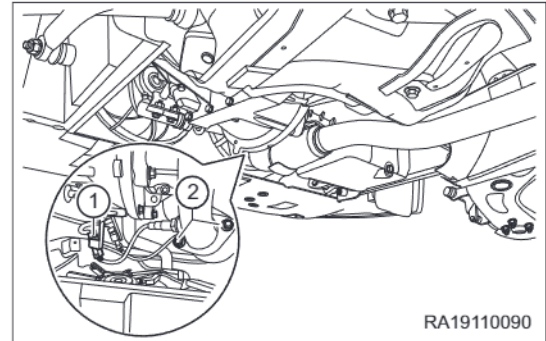
Main Catalytic Converter Assembly

Removal

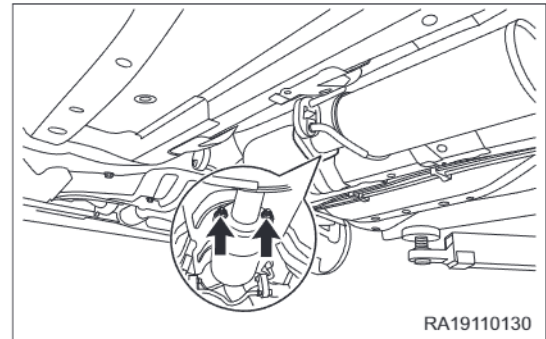
⚠ WARNING

- The temperature of exhaust system is very high when the engine is running.
- Before removal and installation, you must make sure that the engine has stopped running; otherwise, there is a risk of scald injury.

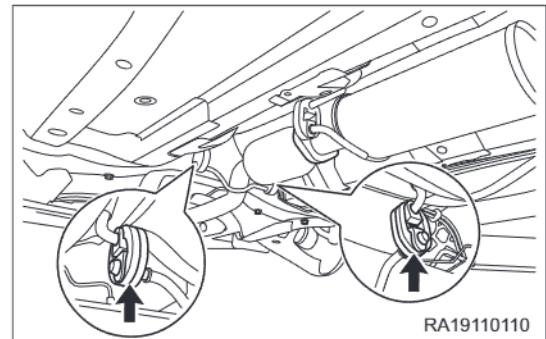
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the main catalytic converter assembly.
 - a. Remove and disconnect the downstream oxygen sensor connector (1) from bracket.
 - b. Remove 2 coupling nuts (2), then disconnect the connection between main catalytic converter assembly and precatalytic converter assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)



- c. Remove 2 coupling nuts (arrow), then disconnect the connection between main catalytic converter assembly and front muffler assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)

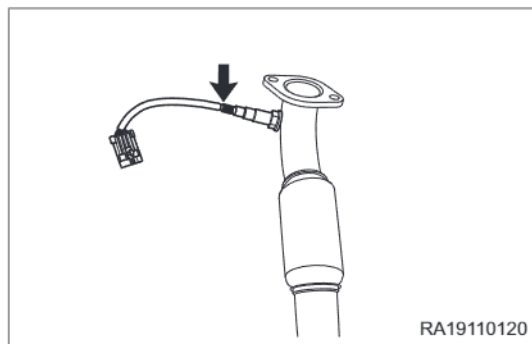


- d. Detach 2 diamond shaped hanger blocks (arrow) between the main catalytic converter assembly and the body hooks.



- e. Remove the main catalytic converter assembly.

4. Remove the downstream oxygen sensor (arrow) from the main catalyst assembly.
(Tightening torque: 45 ± 5 N·m)



Installation

Installation is in the reverse order of removal.

CAUTION

- If the gasket is damaged, replace it, and remove the foreign matters on the joints and threads.
- If there are any cracks or leakage in the main catalytic converter assembly, replace the main catalytic converter assembly.
- Keep sufficient space between the main catalytic converter assembly and the vehicle body during installation.
- Apply lubricant to the joints firstly, which can be helpful in disconnecting the connection between the front exhaust pipe assembly and the diamond shaped hanger block.
- Inspect for exhaust gas leaks. If gas leaks, tighten the defective area to prevent leaking. Replace the damaged parts as necessary.

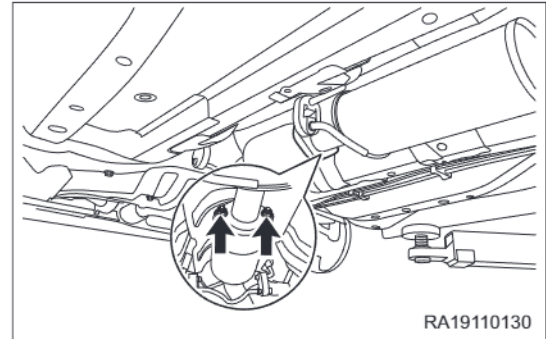
Front Muffler Assembly

Removal

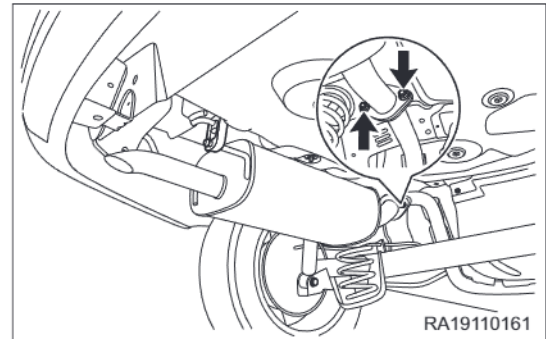
WARNING

- The temperature of exhaust system is very high when the engine is running.
- Before removal and installation, you must make sure that the engine has stopped running; otherwise, there is a risk of scald injury.

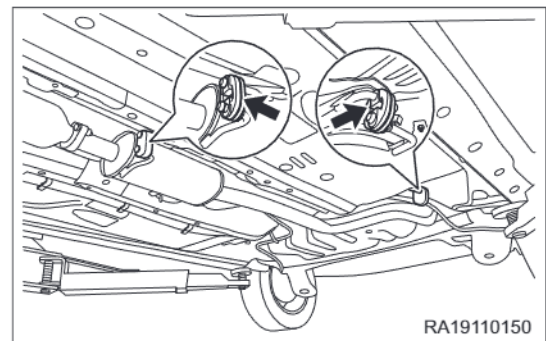
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front muffler assembly.
 - a. Remove 2 coupling nuts (arrow), then disconnect the connection between main catalytic converter assembly and front muffler assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)



- b. Remove 2 coupling nuts (arrow), then disconnect the connection between front muffler assembly and rear muffler assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)

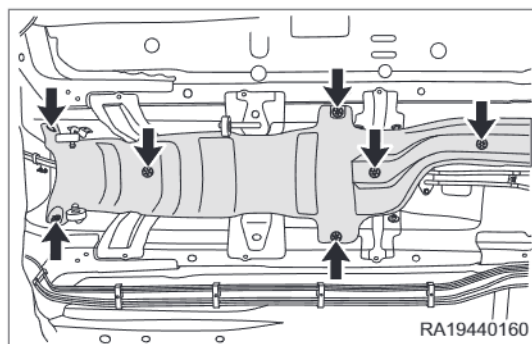


- c. Detach 2 diamond shaped hanger blocks (arrow) between the front muffler assembly and the body hook.



- d. Take off the front muffler assembly.

4. Remove the muffler heat insulator I.
 - a. Remove 7 muffler heat insulator I clamping pieces (arrow).



- b. Remove the muffler heat insulator I.

Installation

Installation is in the reverse order of removal.

CAUTION

- If the gasket is damaged, replace it, and remove the foreign matters on the joints and threads.
- If there are cracks or leaks, replace the damaged parts.
- During installation, check that the exhaust system components do not contact with the muffler heat insulator I or the vehicle underbody. Make sure that the clearance between the exhaust system components and the muffler heat insulator I or the vehicle underbody is more than 25 mm.
- Inspect for exhaust gas leaks. If gas leaks, tighten the defective area to prevent leaking. Replace the damaged parts as necessary.

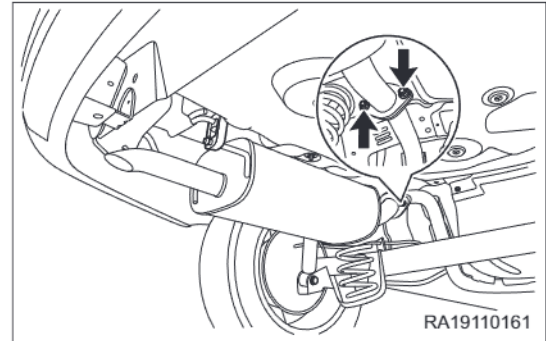
Rear Muffler Assembly

Removal

WARNING

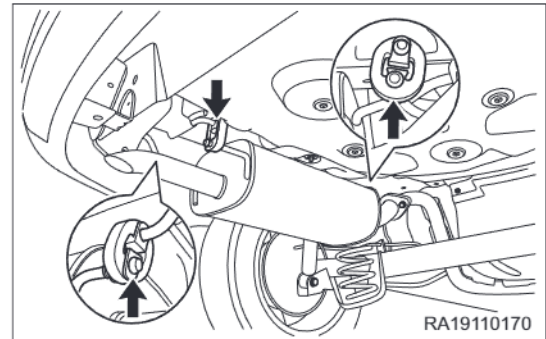
- The temperature of exhaust system is very high when the engine is running.
- Before removal, you must make sure that the engine has stopped running; otherwise, there is a risk of scald injury.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the rear muffler assembly.
 - a. Remove 2 coupling nuts (arrow), then disconnect the connection between front muffler assembly and rear muffler assembly, and take off the gasket in the connecting part.
(Tightening torque: $45 \pm 5 \text{ N}\cdot\text{m}$)

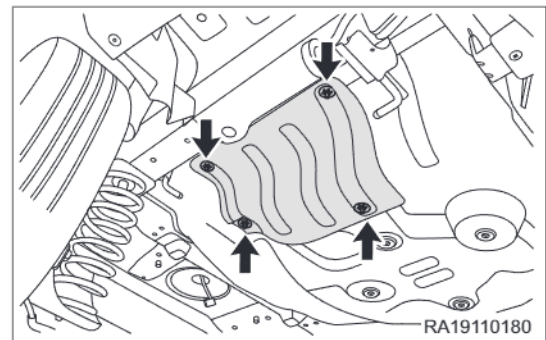


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- b. Detach 3 diamond shaped hanger blocks (arrow) between the rear muffler assembly and the body hooks.



- c. Remove the rear muffler assembly.
4. Remove the muffler heat insulator II.
 - a. Remove 4 muffler heat insulator II clamping pieces (arrow).



- b. Remove the muffler heat insulator II.

Installation

Installation is in the reverse order of removal.

CAUTION

- If the gasket is damaged, replace it, and remove the foreign matters on the joints and threads.
- If there are cracks or leaks, replace the damaged parts.
- During installation, make sure that the clearance between the tailpipe of the rear muffler assembly and the bumper on the rear body is more than 30 mm.
- Inspect for exhaust gas leaks. If gas leaks, tighten the defective area to prevent leaking. Replace the damaged parts as necessary.

