

ENGINE SECTION 2

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS) FU(H4DOTC)

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES) EC(H4DOTC)

INTAKE (INDUCTION) IN(H4DOTC)

MECHANICAL ME(H4DOTC)

EXHAUST EX(H4DOTC)

COOLING CO(H4DOTC)

LUBRICATION LU(H4DOTC)

SPEED CONTROL SYSTEMS SP(H4DOTC)

IGNITION IG(H4DOTC)

STARTING/CHARGING SYSTEMS SC(H4DOTC)

ENGINE (DIAGNOSTICS) EN(H4DOTC)(diag)

EXHAUST

EX(H4DOTC)

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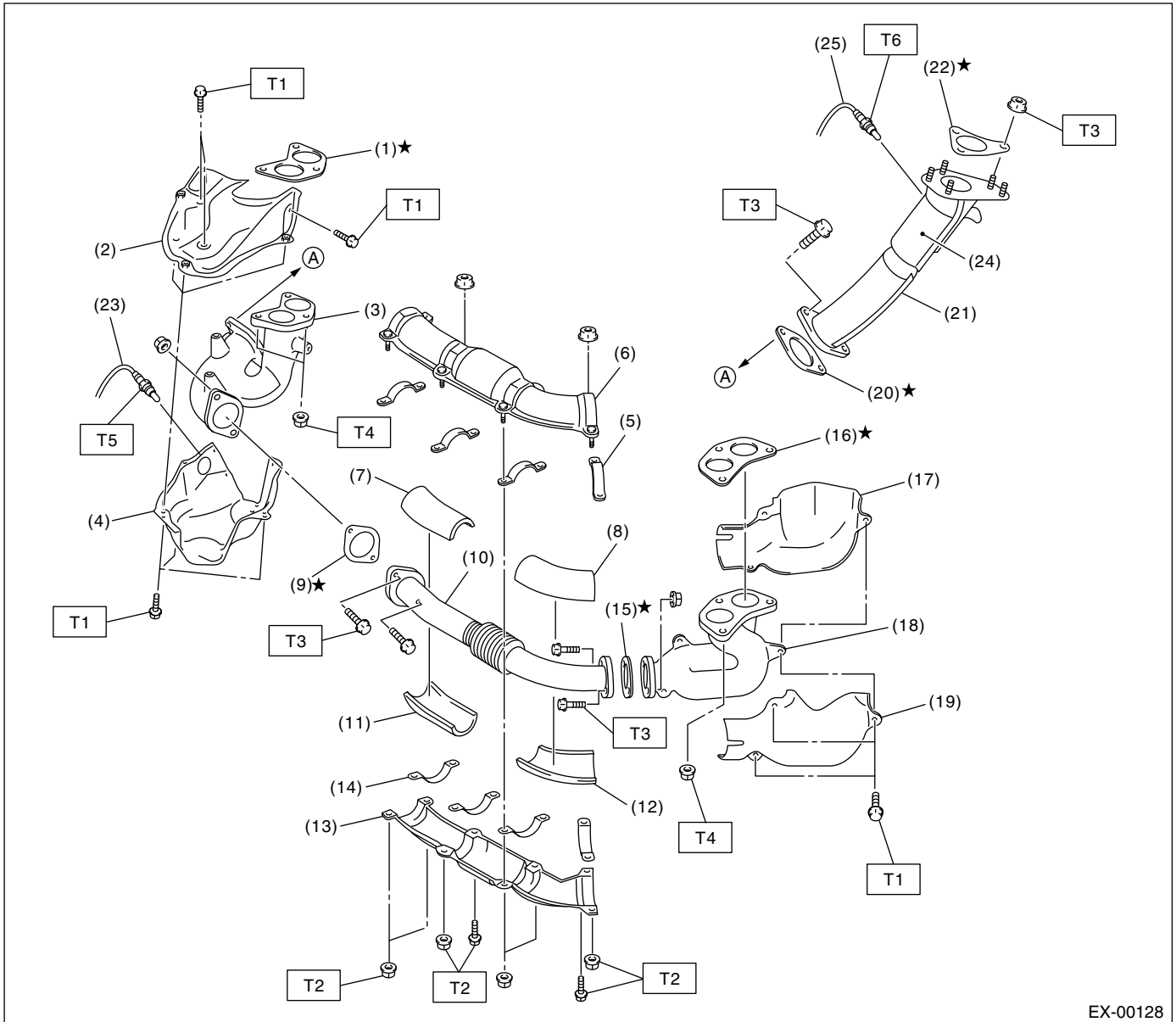
General Description

EXHAUST

1. General Description

A: COMPONENT

1. FRONT EXHAUST PIPE



EX-00128

General Description

EXHAUST

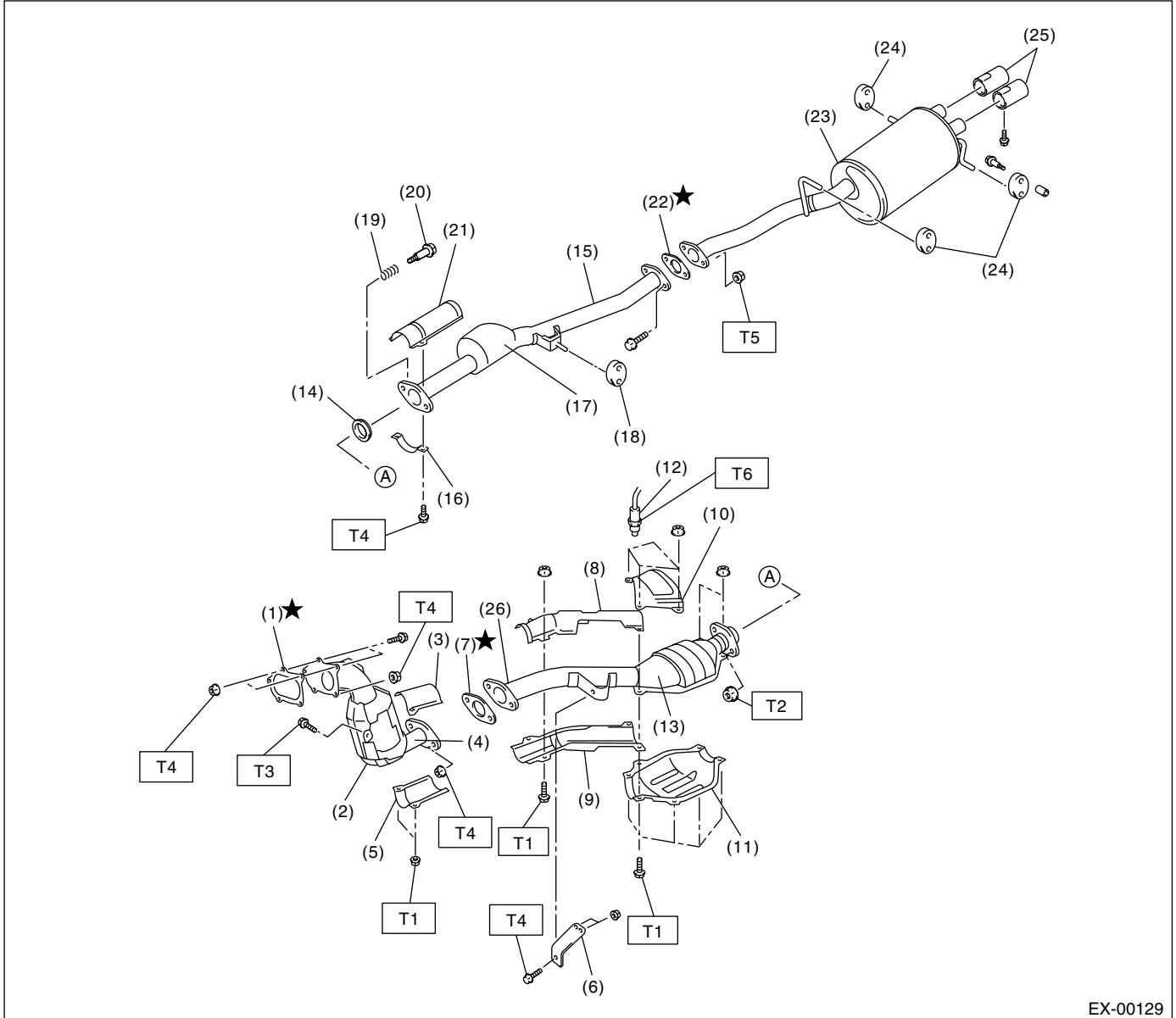
| | | |
|--|--|---|
| (1) Gasket | (13) Front exhaust pipe lower cover | Tightening torque: N-m (kgf-m, ft-lb) T1: 19 (1.9, 13.7) T2: 25 (2.5, 18.1) T3: 35 (3.6, 26.0) T4: 40 (4, 28.9) T5: <Ref. to FU(H4DOTC)-44, INSTALLATION, Front Oxygen (A/F) Sensor.> T6: <Ref. to FU(H4DOTC)-48, INSTALLATION, Exhaust Temperature Sensor.> |
| (2) Exhaust manifold upper cover (RH) | (14) Front exhaust pipe lower clamp | |
| (3) Exhaust manifold (RH) | (15) Gasket | |
| (4) Exhaust manifold lower cover (RH) | (16) Gasket | |
| (5) Front exhaust pipe upper clamp | (17) Exhaust manifold upper cover (LH) | |
| (6) Front exhaust pipe upper cover | (18) Exhaust manifold (LH) | |
| (7) Front exhaust pipe upper insulator (RH) | (19) Exhaust manifold lower cover (LH) | |
| (8) Front exhaust pipe upper insulator (LH) | (20) Gasket | |
| (9) Gasket | (21) Turbocharger joint pipe | |
| (10) Front exhaust pipe | (22) Gasket | |
| (11) Front exhaust pipe lower insulator (RH) | (23) Front oxygen (A/F) sensor | |
| (12) Front exhaust pipe lower insulator (LH) | (24) Precatalytic converter (Except Australia model and STi model) | |
| | (25) Exhaust temperature sensor (Except Australia model and STi model) | |

General Description

EXHAUST

2. CENTER AND REAR EXHAUST PIPE, AND MUFFLER

• EXCEPT AUSTRALIA MODEL



EX-00129

- | | | |
|---|--|---------------------------------|
| (1) Gasket | (12) Rear oxygen sensor | (24) Cushion rubber |
| (2) Front catalytic converter | (13) Rear catalytic converter | (25) Muffler cutter |
| (3) Center pipe upper cover (Front) | (14) Gasket | (26) Center exhaust pipe (Rear) |
| (4) Center exhaust pipe (Front) | (15) Rear exhaust pipe | |
| (5) Center pipe lower cover (Front) | (16) Clamp | |
| (6) Bracket | (17) Chamber | |
| (7) Gasket | (18) Cushion rubber | |
| (8) Center pipe upper cover (Rear) | (19) Spring | |
| (9) Center pipe lower cover (Rear) | (20) Bolt | |
| (10) Rear catalytic converter upper cover | (21) Rear exhaust pipe upper cover (Front) | |
| (11) Rear catalytic converter lower cover | (22) Gasket | |
| | (23) Muffler | |

Tightening torque: N-m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)

T2: 18 (1.8, 13.0)

T3: 30 (3.1, 22.4)

T4: 35 (3.6, 26.0)

T5: 48 (4.9, 35.4)

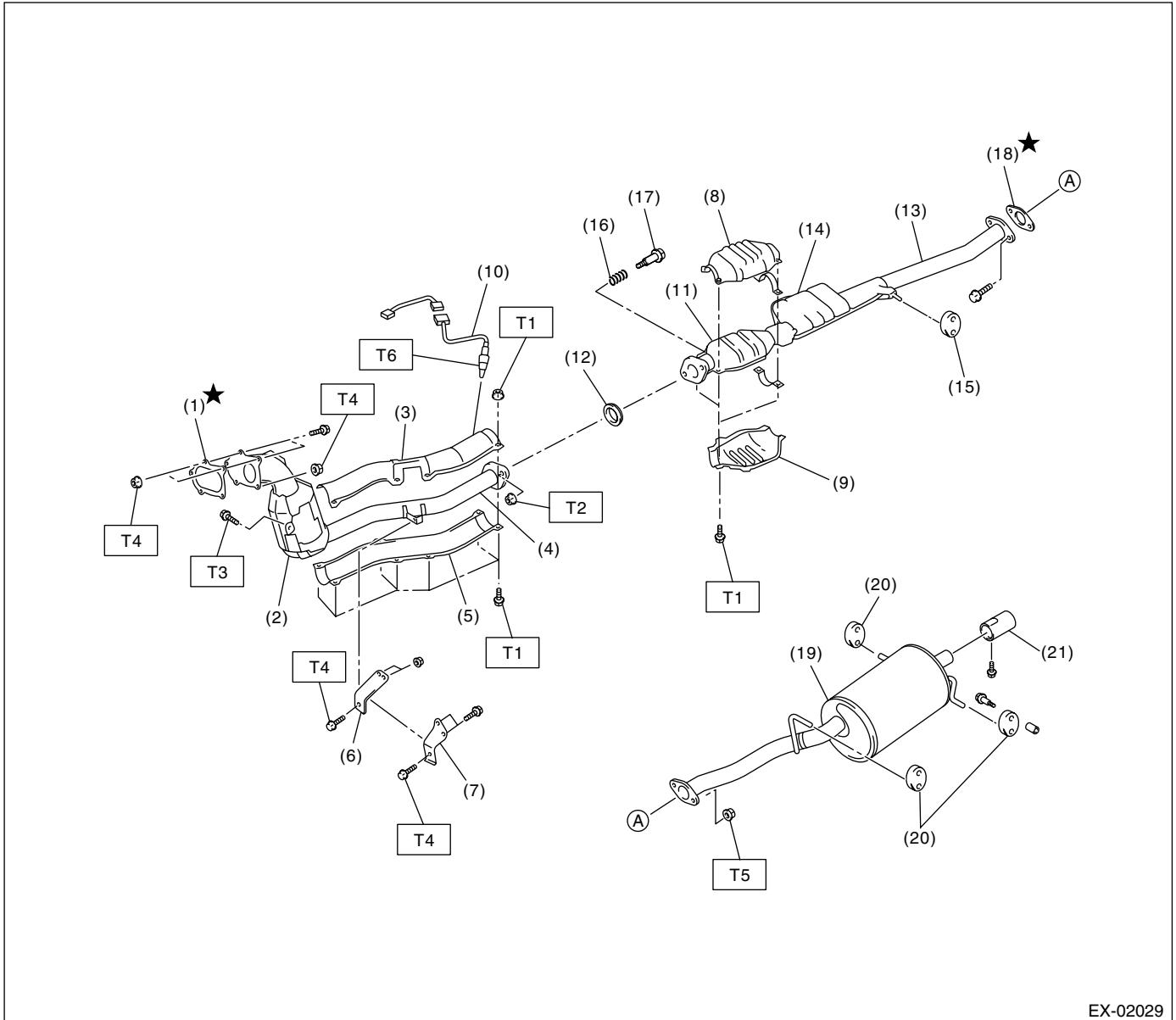
T6: <Ref. to FU(H4DOTC)-46, INSTALLATION, Rear Oxygen Sensor.>

EX(H4DOTC)-4

General Description

EXHAUST

• AUSTRALIA MODEL



EX-02029

- | | |
|--|-------------------------------|
| (1) Gasket | (10) Rear oxygen sensor |
| (2) Front catalytic converter | (11) Rear catalytic converter |
| (3) Upper center pipe cover | (12) Gasket |
| (4) Center exhaust pipe | (13) Rear exhaust pipe |
| (5) Center pipe lower cover | (14) Chamber |
| (6) Bracket (MT model) | (15) Cushion rubber |
| (7) Bracket (AT model) | (16) Spring |
| (8) Rear catalytic converter upper cover | (17) Bolt |
| (9) Rear catalytic converter lower cover | (18) Gasket |
| | (19) Muffler |
| | (20) Cushion rubber |

- (21) Muffler cutter

Tightening torque: N·m (kgf·m, ft·lb)

T1: 13 (1.3, 9.6)

T2: 18 (1.8, 13.0)

T3: 30 (3.1, 22.4)

T4: 35 (3.6, 26.0)

T5: 48 (4.9, 35.4)

T6: <Ref. to FU(H4DOTC)-46, INSTALLATION, Rear Oxygen Sensor.>

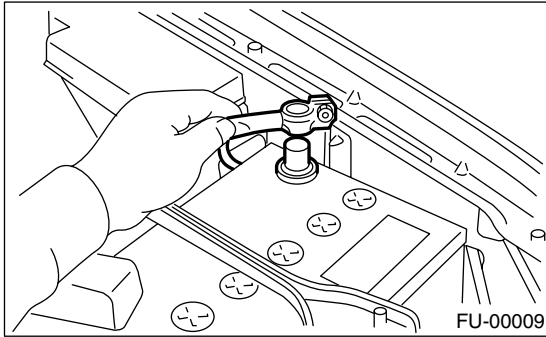
B: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Exhaust Pipe

A: REMOVAL

1) Disconnect the ground cable from battery.

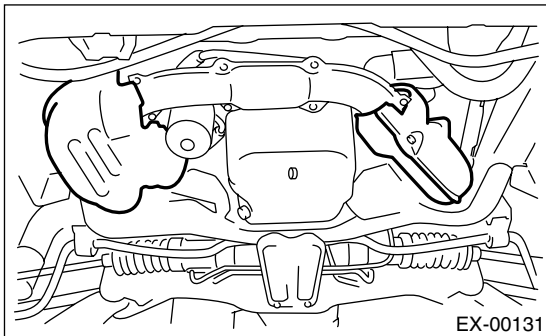


2) Remove the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-44, REMOVAL, Front Oxygen (A/F) Sensor.>

3) Remove the under cover.

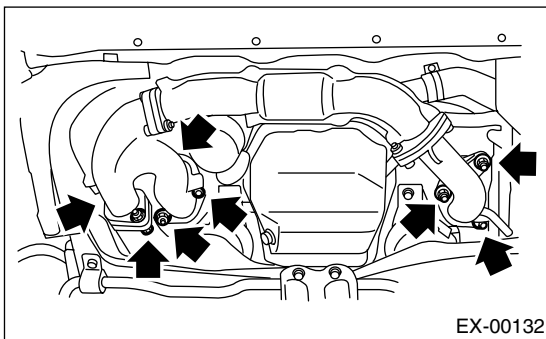
4) Remove the lower exhaust manifold cover (RH).

5) Remove the lower and upper exhaust manifold covers (LH).



6) Remove the bolts and nuts which hold the front exhaust pipe assembly to turbocharger joint pipe.

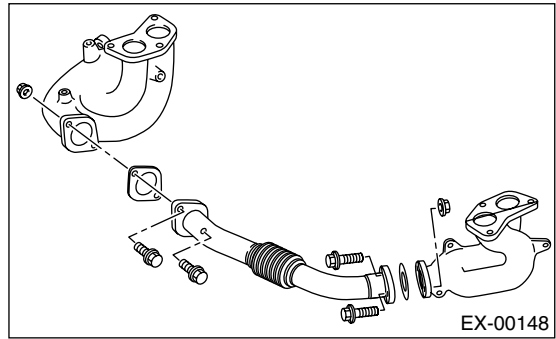
7) While holding the front exhaust pipe assembly with one hand, remove the nuts which hold the front exhaust pipe assembly to cylinder head exhaust port.



8) Remove the front exhaust pipe assembly.

9) Remove the covers from exhaust manifold and front exhaust pipe.

10) Separate the front exhaust pipe from exhaust manifolds.



B: INSTALLATION

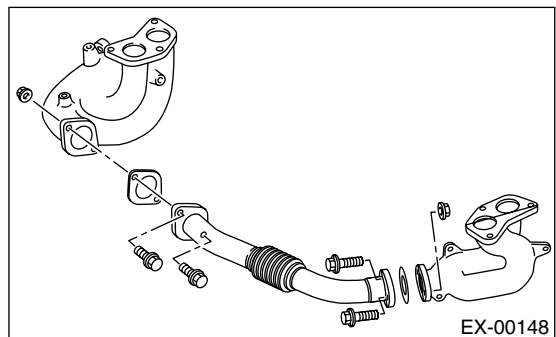
NOTE:

Replace the gaskets with new ones.

1) Assemble the front exhaust pipe and exhaust manifolds.

Tightening torque:

35 N·m (3.6 kgf-m, 26.0 ft-lb)



2) Install the front exhaust pipe covers.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

3) Install the upper exhaust manifold cover (RH).

Tightening torque:

19 N·m (1.9 kgf-m, 13.7 ft-lb)

4) Install the front exhaust pipe assembly.

Tightening torque:

35 N·m (3.6 kgf-m, 26.0 ft-lb)

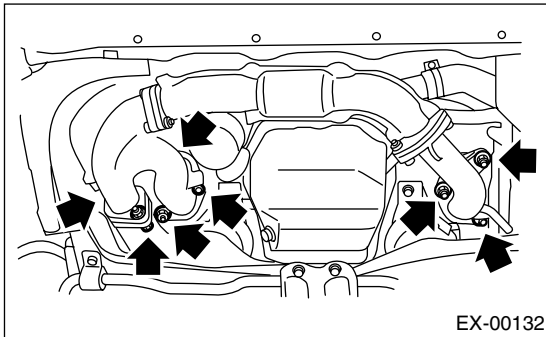
Front Exhaust Pipe

EXHAUST

5) Connect the exhaust manifold (RH) to turbo-charger joint pipe.

Tightening torque:

35 N·m (3.6 kgf-m, 26.0 ft-lb)



6) Install the upper and lower exhaust manifold covers (LH).

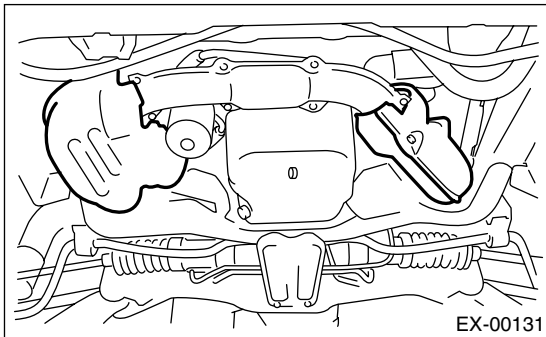
Tightening torque:

19 N·m (1.9 kgf-m, 13.7 ft-lb)

7) Install the lower exhaust manifold cover (RH).

Tightening torque:

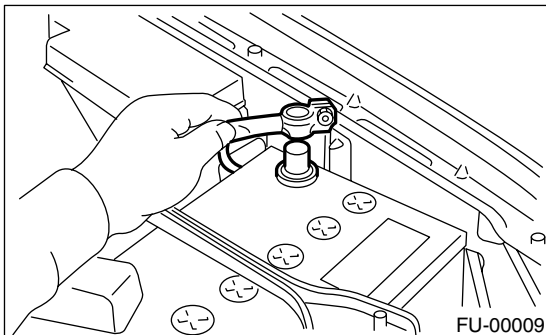
19 N·m (1.9 kgf-m, 13.7 ft-lb)



8) Install the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-44, INSTALLATION, Front Oxygen (A/F) Sensor.>

9) Install the under cover.

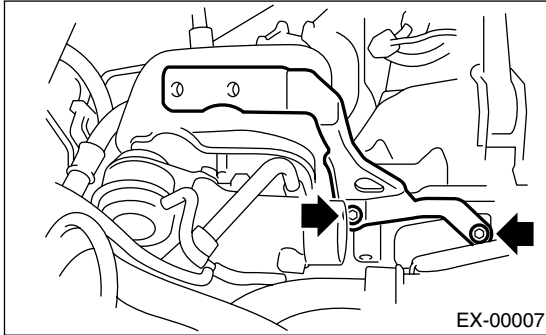
10) Connect the battery ground cable to battery.



3. Center Exhaust Pipe

A: REMOVAL

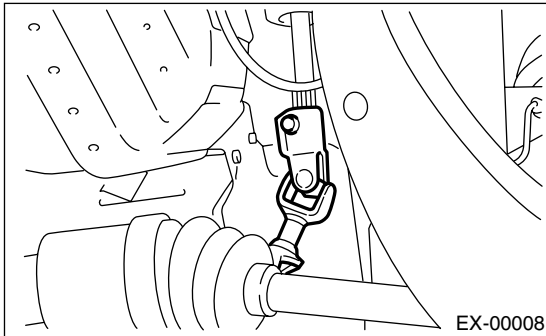
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the intercooler. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 4) Remove the intercooler bracket.



- 5) Lift-up the vehicle.
- 6) Remove the under cover.
- 7) Remove the universal joint bolts and then remove the universal joint (RHD model).

CAUTION:

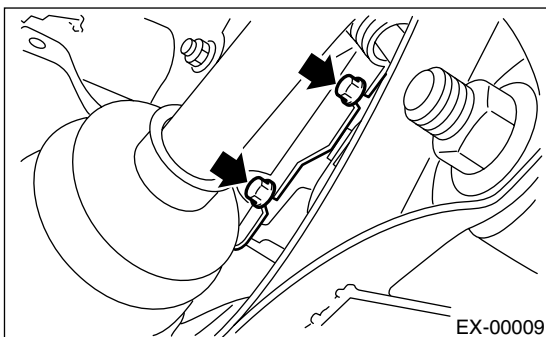
Scribe alignment marks on the universal joint so that it can be reassembled at the original serration.



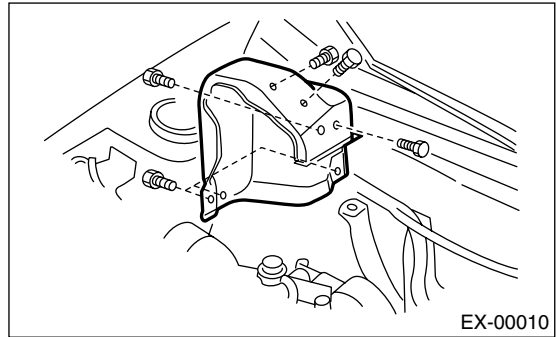
- 8) Remove the bolts which install the lower side of turbocharger upper cover.

CAUTION:

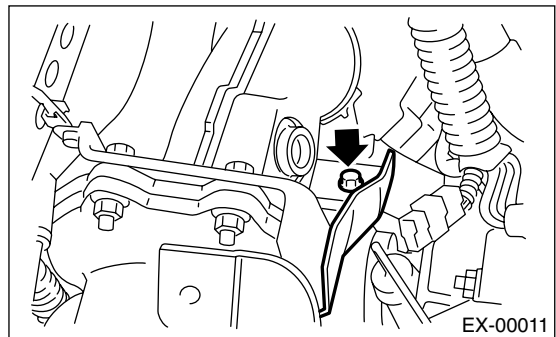
Be careful, the turbocharger and exhaust pipe are hot.



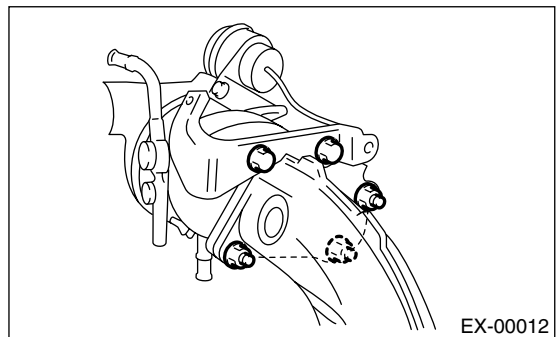
- 9) Lower the vehicle.
- 10) Remove the turbocharger upper cover.



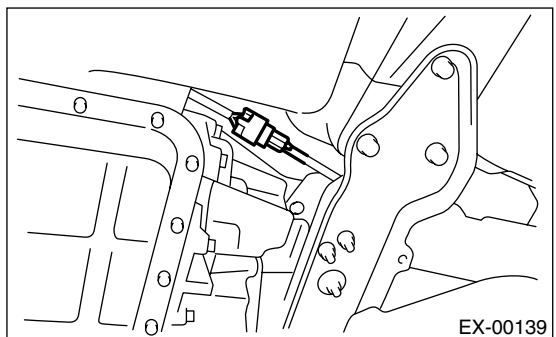
- 11) Remove the bolts which install the lower upper side of turbocharger upper cover, and remove it.



- 12) Separate the center exhaust pipe from turbocharger.



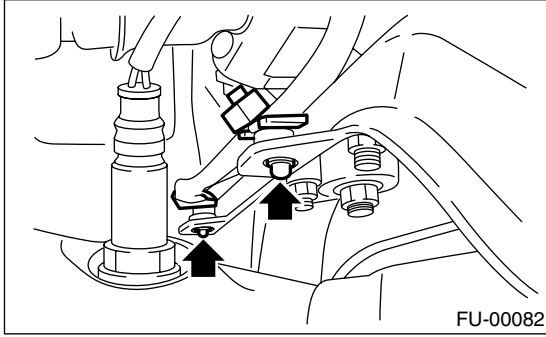
- 13) Lift-up the vehicle.
- 14) Disconnect the connector from rear oxygen sensor.



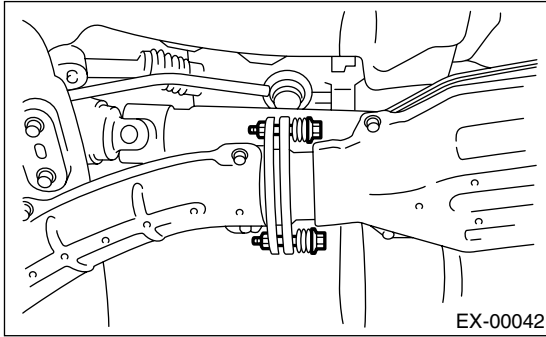
Center Exhaust Pipe

EXHAUST

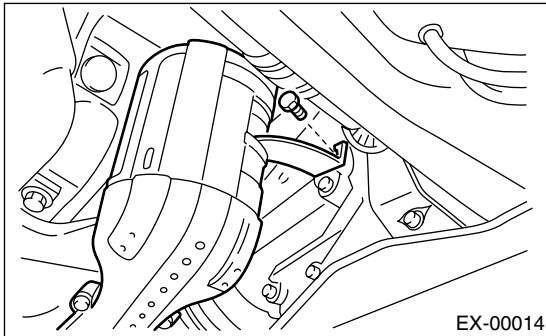
15) Vertically draw out the clip from crossmember.



16) Separate the center exhaust pipe from rear exhaust pipe.



17) Remove the bolt which holds the center exhaust pipe bracket to transmission.

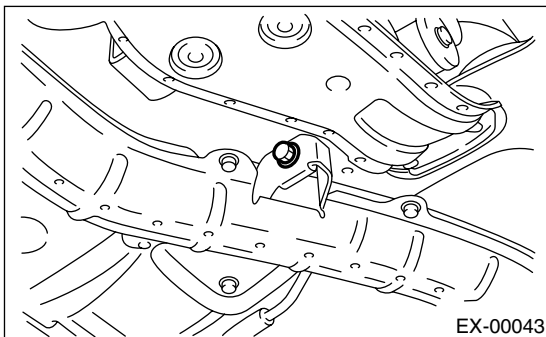


18) Remove the intercooler bracket.

19) Remove the bolt which holds the center exhaust pipe to hanger bracket.

CAUTION:

Be careful not to pull down the center exhaust pipe.



20) Remove the center exhaust pipe.



B: INSTALLATION

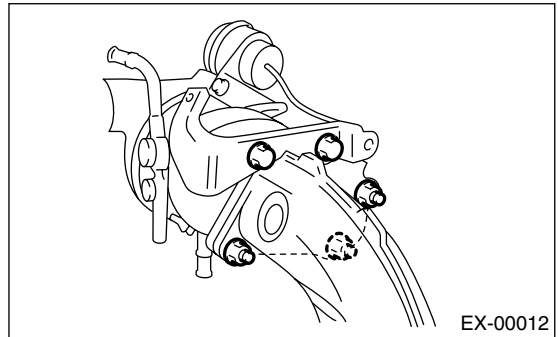
NOTE:

Replace the gaskets with new ones.

- 1) Install the center exhaust pipe and temporarily tighten the bolt which holds the center exhaust pipe to hanger bracket.
- 2) Temporarily tighten the bolt which holds the center pipe to transmission.
- 3) Connect the center exhaust pipe to turbocharger.

Tightening torque:

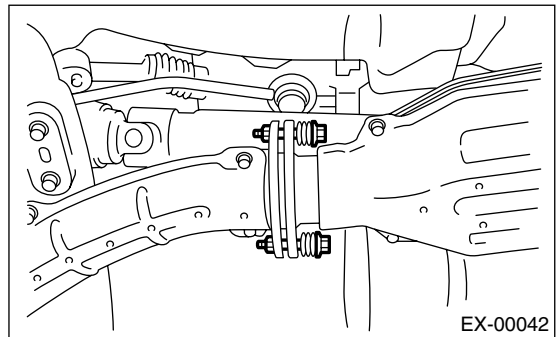
35 N·m (3.6 kgf-m, 26.0 ft-lb)



4) Install the center exhaust pipe to rear exhaust pipe.

Tightening torque:

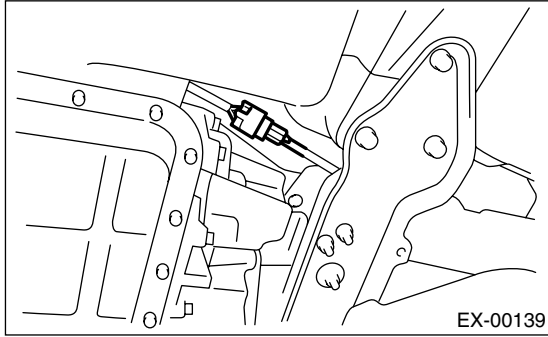
18 N·m (1.8 kgf-m, 13.0 ft-lb)



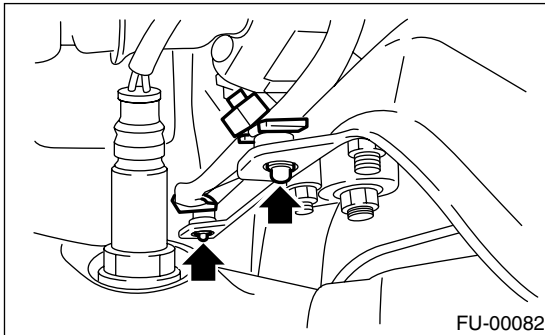
Center Exhaust Pipe

EXHAUST

5) Connect the connector to rear oxygen sensor.

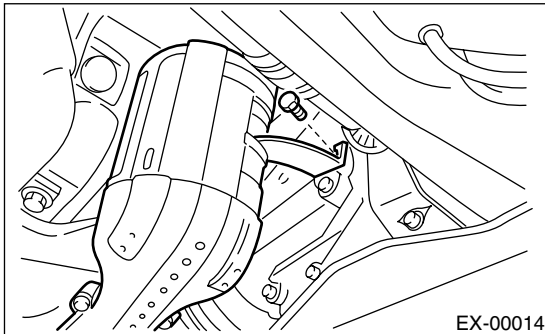


6) Secure the clip on crossmember.



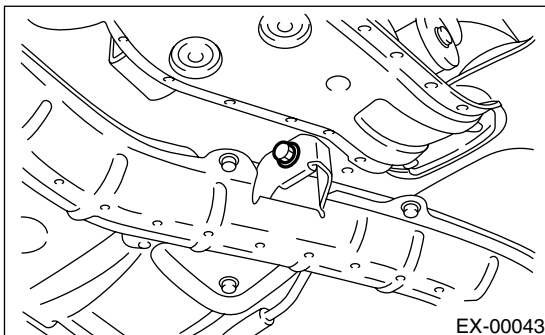
7) Tighten the bolt which holds the center exhaust pipe bracket to transmission.

Tightening torque:
30 N-m (3.1 kgf-m, 22.4 ft-lb)



8) Tighten the bolt which holds the center exhaust pipe to hanger bracket.

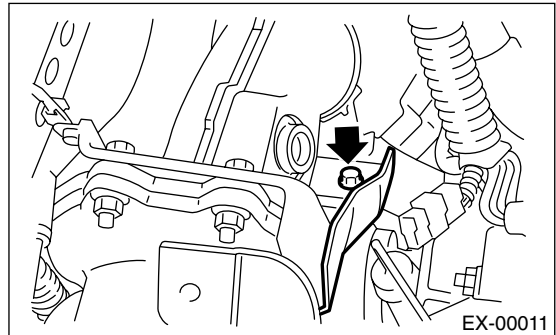
Tightening torque:
35 N-m (3.6 kgf-m, 26.0 ft-lb)



9) Lower the vehicle.

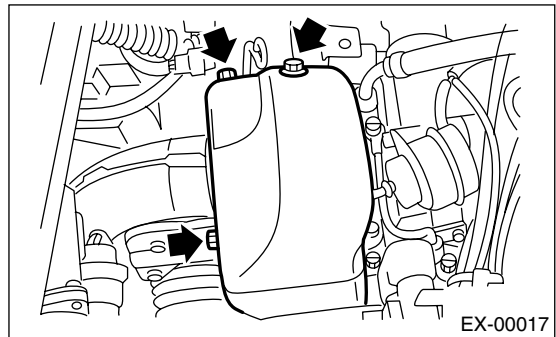
10) Place the turbocharger lower cover, and tighten the bolts which install the upper side of lower cover.

Tightening torque:
7.4 N-m (0.75 kgf-m, 5.4 ft-lb)



11) Place the turbocharger upper cover, and tighten the bolts which install the upper side of upper cover.

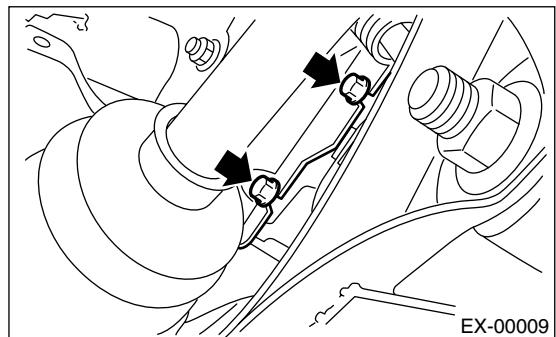
Tightening torque:
7.4 N-m (0.75 kgf-m, 5.4 ft-lb)



12) Lift-up the vehicle.

13) Tighten the bolts which install the under side of turbocharger upper cover.

Tightening torque:
7.4 N-m (0.75 kgf-m, 5.4 ft-lb)



Center Exhaust Pipe

EXHAUST

- 14) Install the universal joint (RHD model).
 - (1) Align the bolt hole on long yoke side of universal joint with the cutout at serrated section of shaft end, and insert the universal joint.
 - (2) Align the bolt hole on short yoke side of universal joint with the cutout at serrated section of gearbox assembly. Lower the universal joint completely.
 - (3) Temporarily tighten the bolt on short yoke side. Raise the universal joint to make sure the bolt is properly passing through the cutout at serrated section.
 - (4) Tighten the bolt on long yoke side, then that on the short yoke side.

Tightening torque:

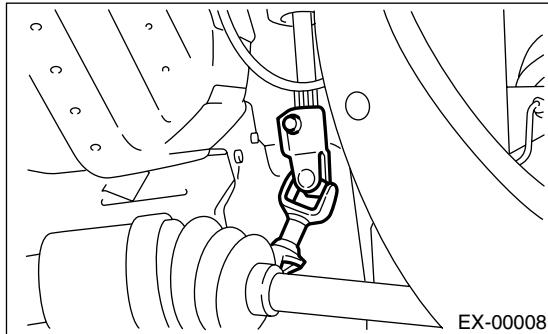
24 N·m (2.4 kgf·m, 17.4 ft·lb)

CAUTION:

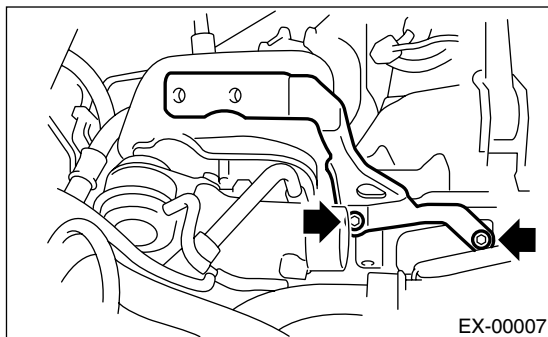
- Make sure that the universal joint bolts are tightened through notches in shaft serration.
- Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:

More than 15 mm (0.59 in)



- 15) Install the under cover.
- 16) Lower the vehicle.
- 17) Install the intercooler bracket.

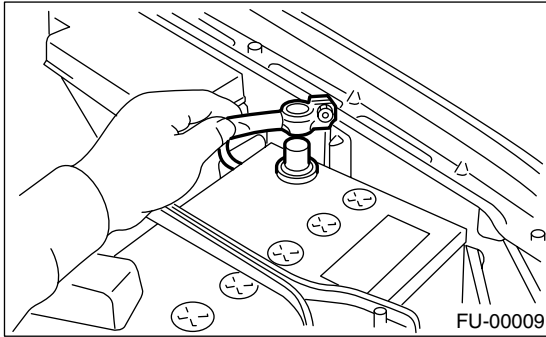


- 18) Install the intercooler. <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>
- 19) Align the center of roll connector. <Ref. to AB-11, ROLL CONNECTOR, INSPECTION, Inspection Locations After a Collision.>

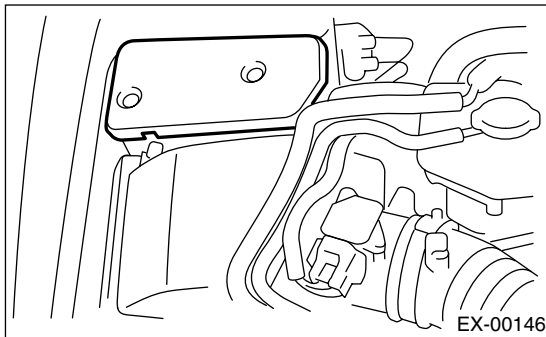
4. Joint Pipe

A: REMOVAL

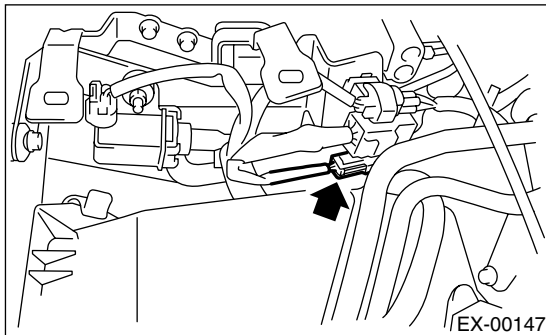
1) Disconnect the ground cable from battery.



2) Remove the solenoid valve cover.



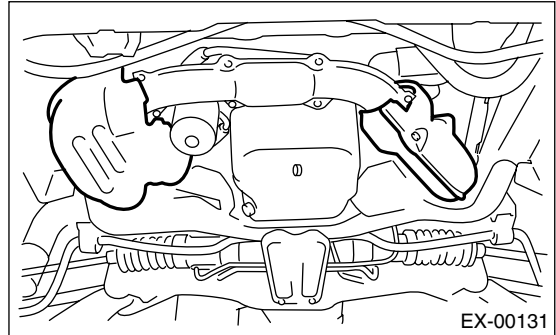
3) Disconnect the exhaust temperature sensor connector.



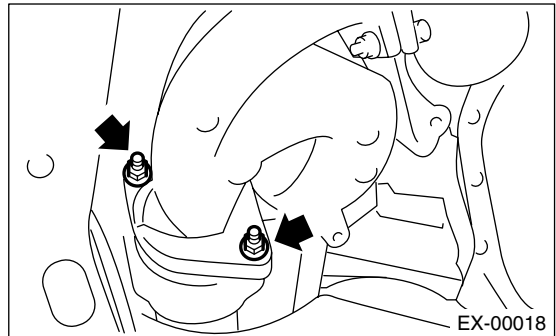
4) Remove the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-44, REMOVAL, Front Oxygen (A/F) Sensor.>

5) Remove the under cover.

6) Remove the lower exhaust manifold cover (RH).



7) Remove the nuts which hold the front exhaust manifold to joint pipe.



8) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>

9) Remove the turbocharger. <Ref. to IN(H4DOTC)-12, REMOVAL, Turbocharger.>

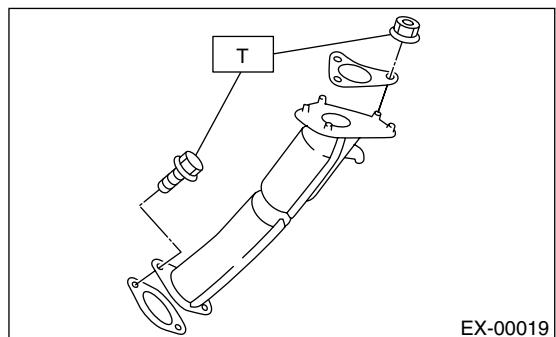
10) Take off the joint pipe in the upward direction.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

T: 35 N·m (3.6 kgf-m, 26.0 ft-lb)



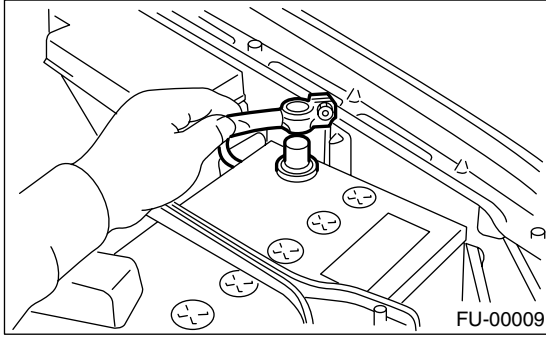
Rear Exhaust Pipe

EXHAUST

5. Rear Exhaust Pipe

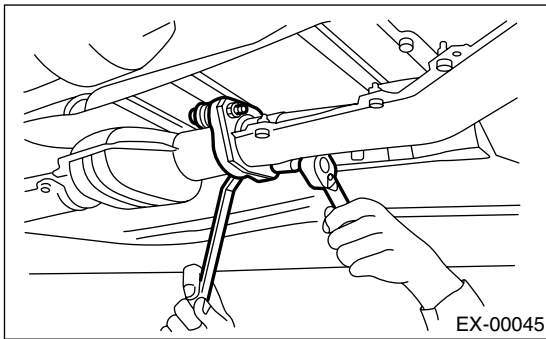
A: REMOVAL

- 1) Disconnect the ground cable from battery.



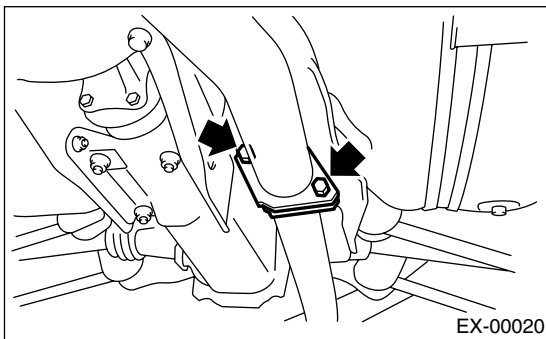
- 2) Lift-up the vehicle.
- 3) Separate the rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.



- 4) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.



- 5) Remove the rear exhaust pipe.

B: INSTALLATION

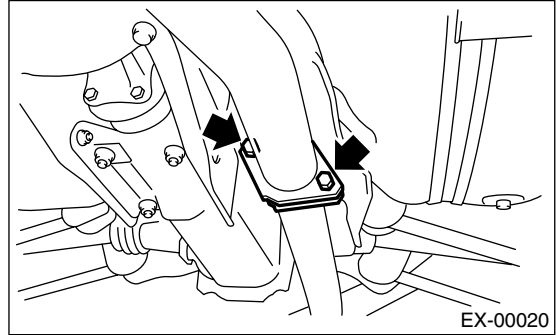
NOTE:

Replace the gaskets with new ones.

- 1) Install the rear exhaust pipe to muffler.

Tightening torque:

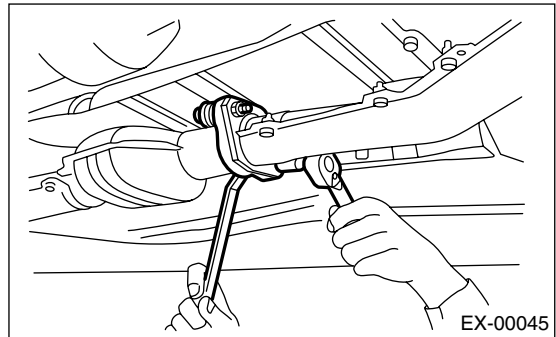
48 N·m (4.9 kgf-m, 35.4 ft-lb)



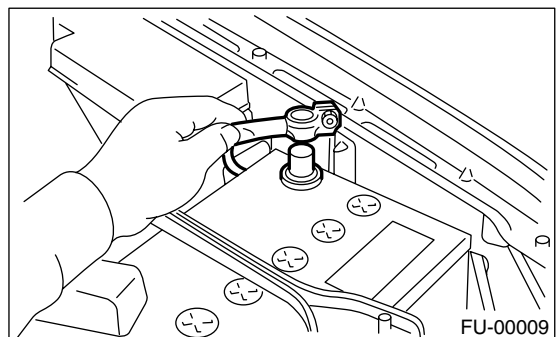
- 2) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- 3) Lower the vehicle.
- 4) Connect the battery ground cable to battery.



C: INSPECTION

- 1) Make sure there are no exhaust leaks from connections and welds.
- 2) Make sure there are no holes or rusting.
- 3) Make sure the cushion rubber is not worn or cracked.

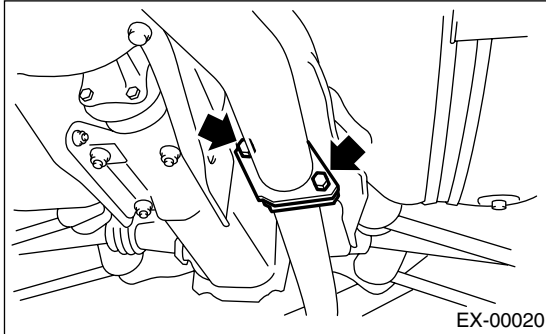
6. Muffler

A: REMOVAL

1) Separate the muffler from rear exhaust pipe.

CAUTION:

Be careful, the exhaust pipe is hot.



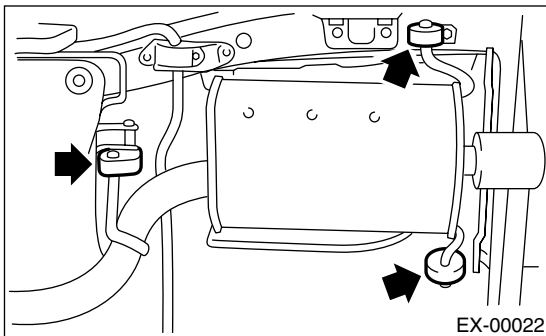
2) Remove the rubber cushions, and detach the muffler.

CAUTION:

Be careful not to drop the muffler during removal.

NOTE:

To facilitate removal, apply a coat of spray type lubricant to the mating area of rubber cushions in advance.



B: INSTALLATION

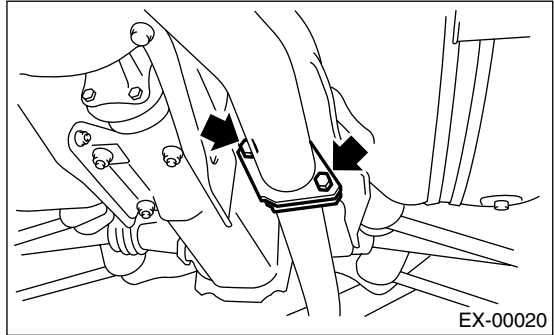
Install in the reverse order of removal.

NOTE:

Replace the gasket with a new one.

Tightening torque:

48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION

- 1) Make sure there are no exhaust leaks from connections and welds.
- 2) Make sure there are no holes or rusting.
- 3) Make sure the cushion rubber is not worn or cracked.

Muffler

EXHAUST
