

**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)**

# INTAKE (INDUCTION)

# *IN(H4DOTC)*

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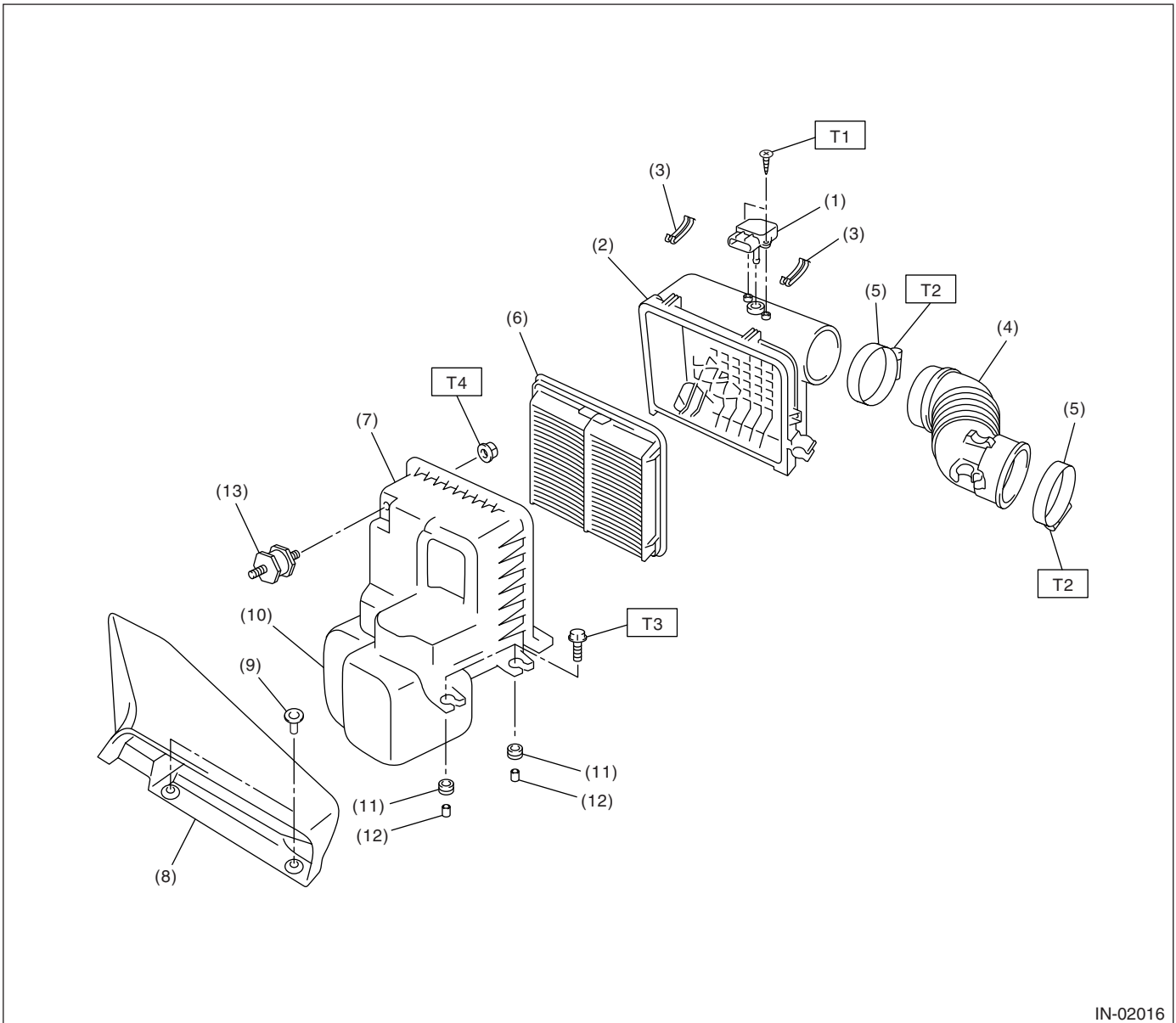
# General Description

INTAKE (INDUCTION)

## 1. General Description

### A: COMPONENT

#### 1. AIR CLEANER



IN-02016

- |   |                              |
|---|------------------------------|
| (1) Mass air flow and intake air temperature sensor | (7) Air cleaner case (front) |
| (2) Air cleaner case (rear)                         | (8) Air intake duct          |
| (3) Clip  | (9) Clip                     |
| (4) Air intake boot                                 | (10) Resonator chamber       |
| (5) Clamp   | (11) Cushion                 |
| (6) Air cleaner element                             | (12) Spacer                  |
|   | (13) Cushion                 |

**Tightening torque: N·m (kgf·m, ft·lb)**

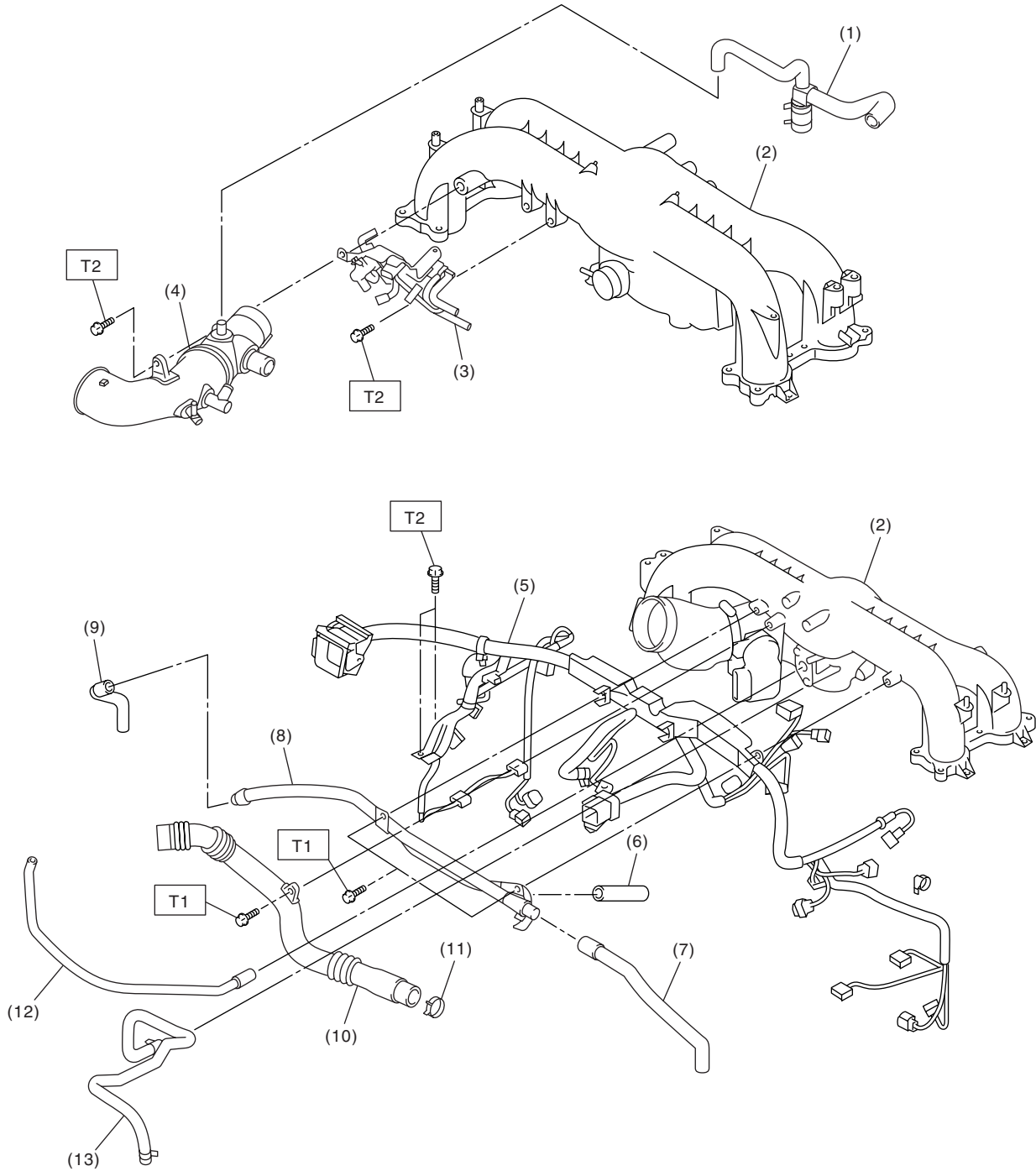
**T1: 1.0 (0.10, 0.74)**

**T2: 2.5 (0.25, 1.8)**

**T3: 6.0 (0.61, 4.4)**

**T4: 7.5 (0.76, 5.5)**

## 2. INTAKE DUCT



IN-00214

- |                                 |                       |                         |
|---------------------------------|-----------------------|-------------------------|
| (1) PCV hose ASSY               | (7) Vacuum hose       | (13) Brake booster hose |
| (2) Intake manifold             | (8) PCV pipe          |                         |
| (3) Solenoid valve bracket ASSY | (9) Vacuum hose       |                         |
| (4) Intake duct                 | (10) Air by-pass pipe |                         |
| (5) Engine harness ASSY         | (11) Clamp            |                         |
| (6) Vacuum hose                 | (12) Vacuum hose      |                         |

**Tightening torque: N·m (kgf·m, ft·lb)**

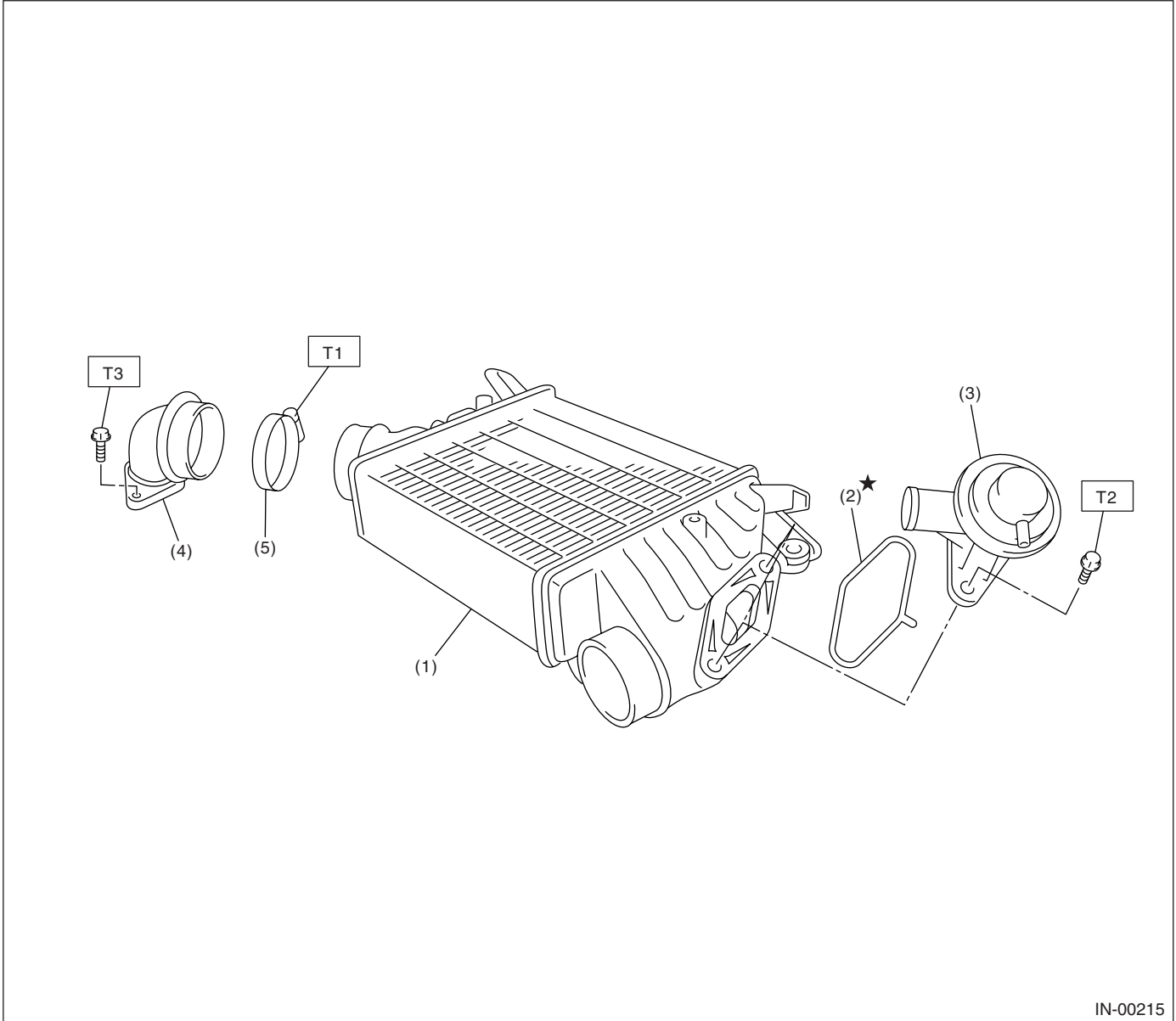
**T1: 6.5 (0.66, 4.8)**

**T2: 19 (1.9, 13.7)**

# General Description

INTAKE (INDUCTION)

## 3. INTERCOOLER



IN-00215

- (1) Intercooler
- (2) Gasket
- (3) Air by-pass valve

- (4) Intake duct
- (5) Clamp

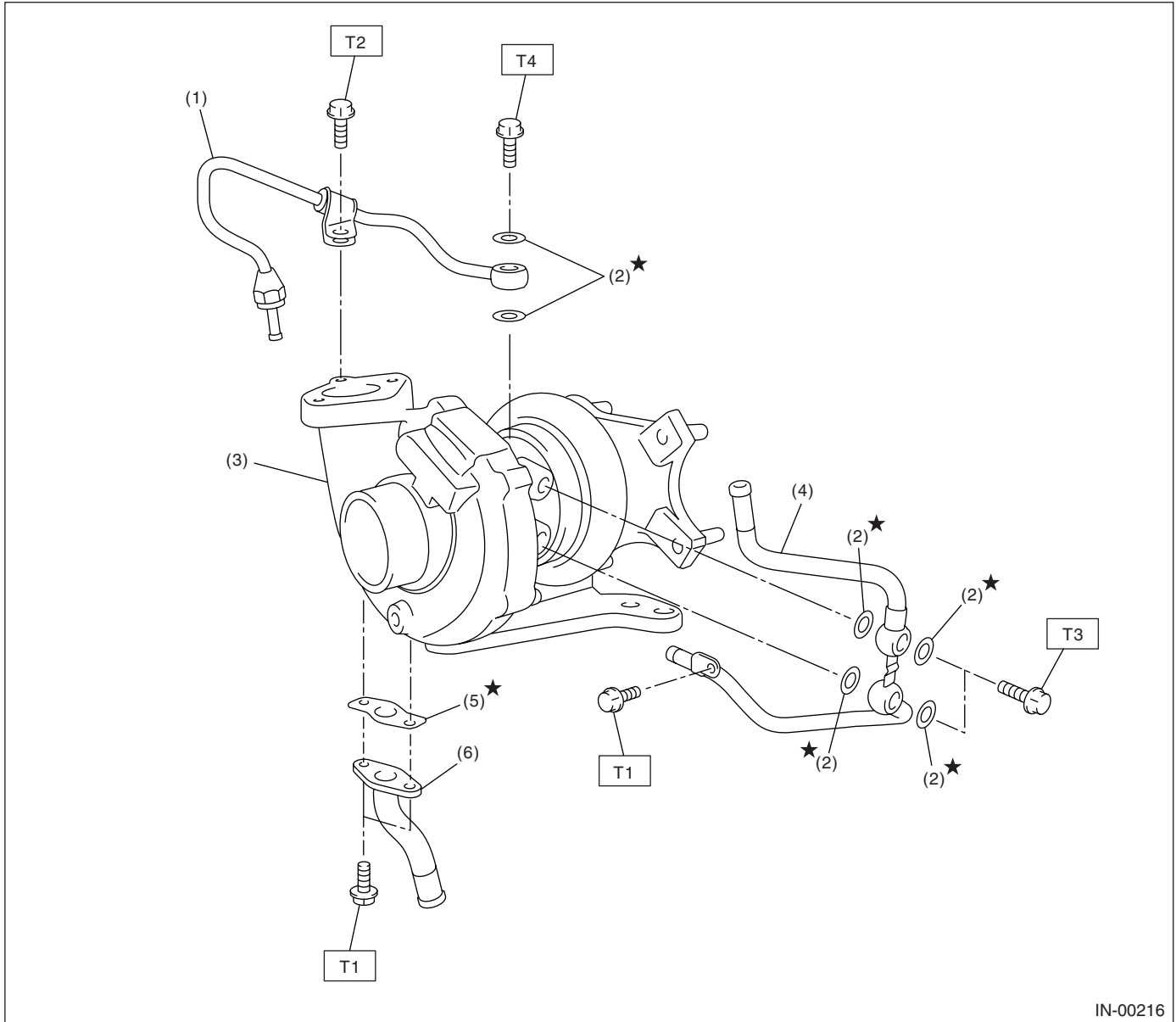
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 3.0 (0.3, 2.2)**

**T2: 6.5 (0.66, 4.8)**

**T3: 16 (1.6, 11.6)**

## 4. TURBOCHARGER



IN-00216

- |                    |                     |
|--------------------|---------------------|
| (1) Oil inlet pipe | (4) Water pipe      |
| (2) Metal gasket   | (5) Gasket          |
| (3) Turbocharger   | (6) Oil outlet pipe |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 4.7 (0.48, 3.5)**

**T2: 5.0 (0.51, 3.7)**

**T3: 23 (2.3, 17.0)**

**T4: 16 (1.6, 11.8)**

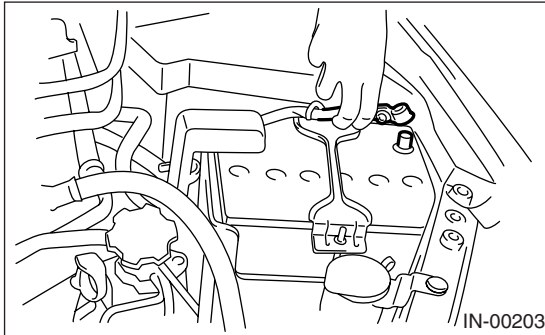
#### **B: CAUTION**

- Wear work 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 and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, 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 rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

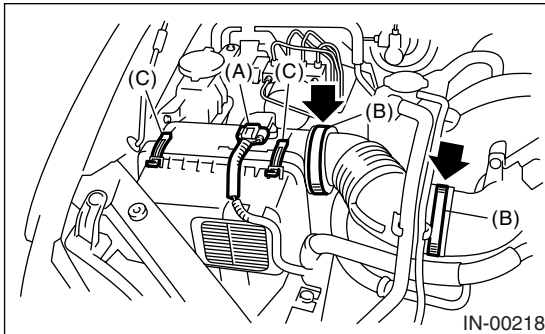
## 2. Air Cleaner Element

### A: REMOVAL

- 1) Disconnect the ground cable from battery.



- 2) Disconnect the connector (A) from mass air flow sensor.
- 3) Loosen the clamps (B) which connect air intake boot to intake duct.
- 4) Remove the clips (C) from air cleaner case.



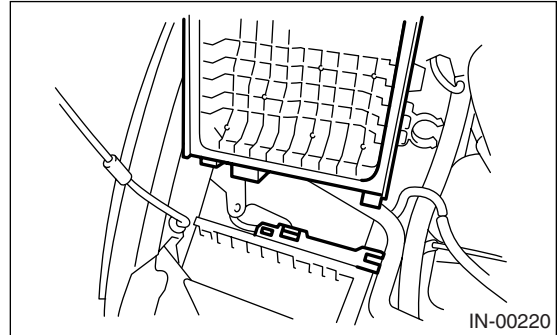
- 5) Remove the air cleaner case (rear) and air intake boot.
- 6) Remove the air cleaner element.

### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

When installing the air cleaner case (rear), align the protrusion part of air cleaner case (rear) to the hole of air cleaner case (front).



### C: INSPECTION

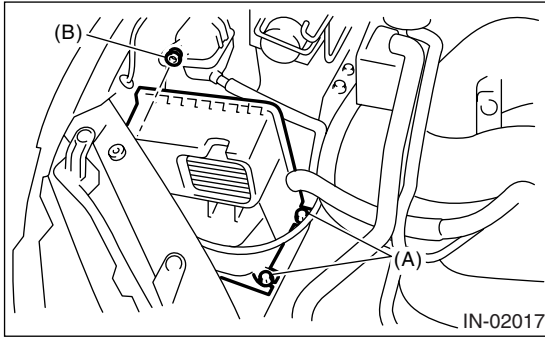
Replace if excessively damaged or dirty.



## 3. Air Cleaner Case

### A: REMOVAL

- 1) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
- 2) Remove the air cleaner element.  
<Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner Element.>
- 3) Remove the bolts (A) and nut (B) which install air cleaner case (front) on the body.



- 4) Remove the air cleaner case (front).

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**Bolt: 6.0 N·m (0.61 kgf-m, 4.4 ft-lb)**

**Nut: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**

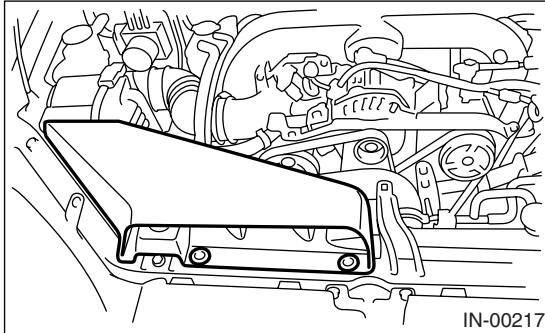
### C: INSPECTION

Check for cracks or loose connections.

## 4. Air Intake Duct

### A: REMOVAL

Remove the clips which install the air intake duct on the front side of body.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Check for cracks or loose connection.
- 2) Inspect that no foreign objects in the air intake duct.

### **5. Resonator Chamber**

#### **A: REMOVAL**

Refer to “Air Cleaner Case” for removal procedure because the resonator chamber forms a single unit with air cleaner case. <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>

#### **B: INSTALLATION**

Refer to “Air Cleaner Case” for installation procedure because the resonator chamber forms a single unit with air cleaner case. <Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Case.>

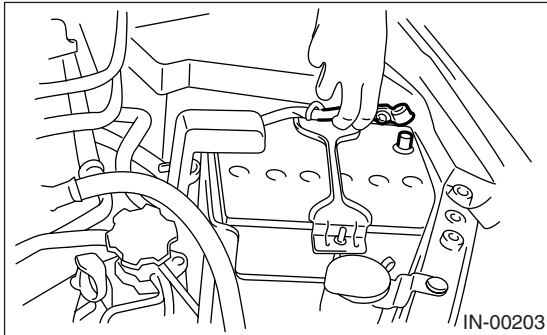
#### **C: INSPECTION**

Check for cracks or loose connections.

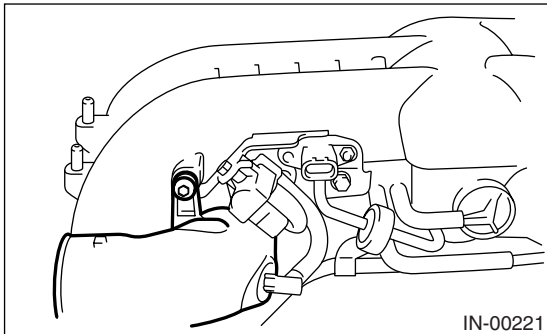
## 6. Intake Duct

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.



- 3) Remove the intake manifold.  
<Ref. to FU(H4DOTC)-13, REMOVAL, Intake Manifold.>
- 4) Remove the sensor, engine harness and fuel pipe attached to the intake manifold. <Ref. to FU(H4DOTC)-17, DISASSEMBLY, Intake Manifold.>
- 5) Remove the intake duct from intake manifold.

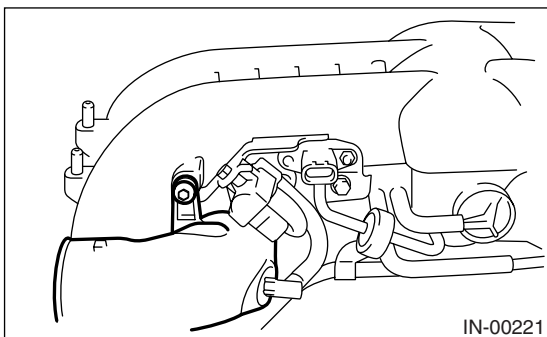


### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**19 N·m (1.9 kgf·m, 13.7 ft·lb)**



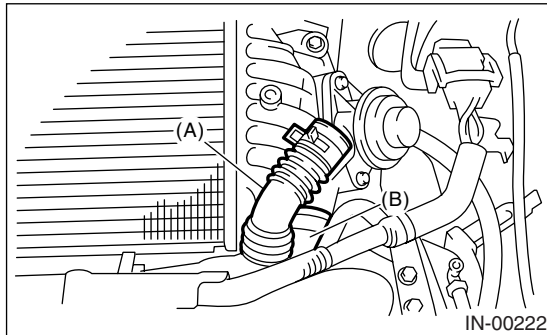
# Intercooler

## INTAKE (INDUCTION)

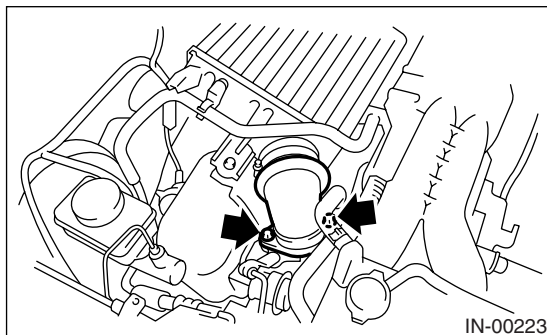
### 7. Intercooler

#### A: REMOVAL

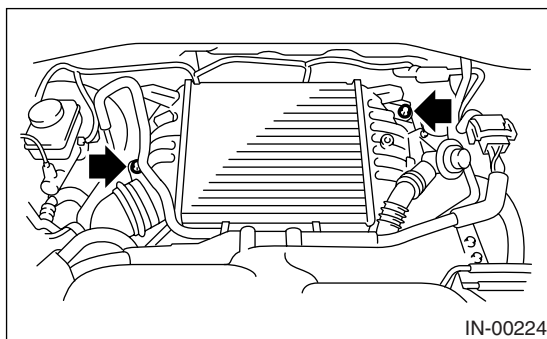
- 1) Remove the collector cover.
- 2) Loosen the clamp, and then remove the air by-pass pipe (A) from air by-pass valve.
- 3) Loosen the clamp, and then remove the intake duct (B) from intercooler.



- 4) Remove the bolts which secure intake duct to turbocharger.



- 5) Remove the bolts which secure intercooler to bracket, and then remove the intercooler.

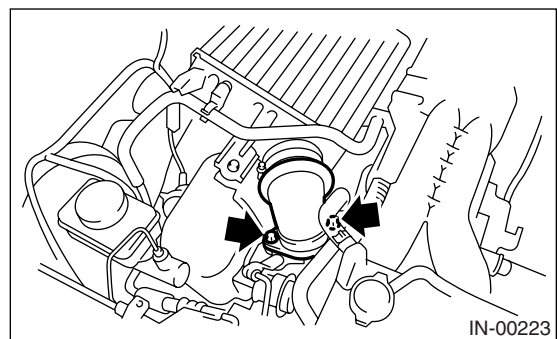
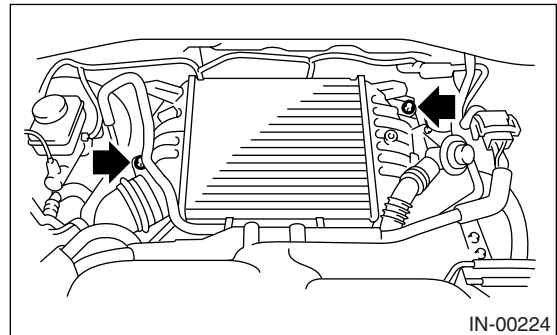


#### B: INSTALLATION

Install in the reverse order of removal.

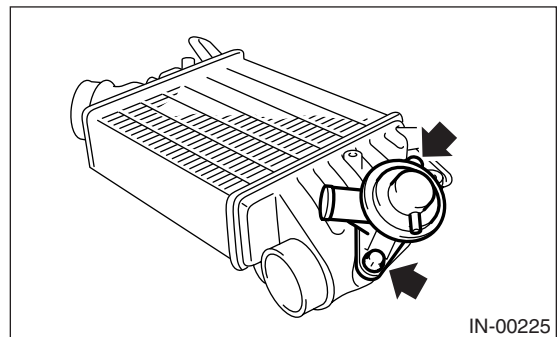
#### Tightening torque:

**16 N·m (1.6 kgf-m, 11.6 ft-lb)**



#### C: DISASSEMBLY

- 1) Remove the intake ducts from intercooler.
- 2) Remove the air by-pass valve from intercooler.

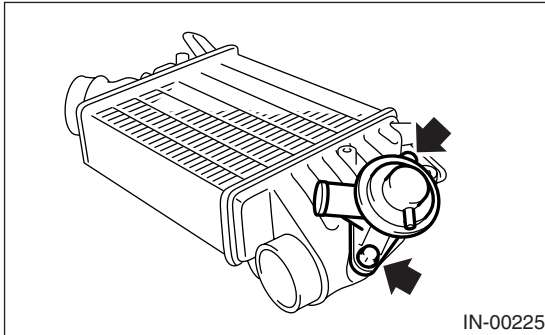


## D: ASSEMBLY

Assemble in the reverse order of disassembly.

**Tightening torque:**

**6.5 N·m (0.66 kgf-m, 4.8 ft-lb)**



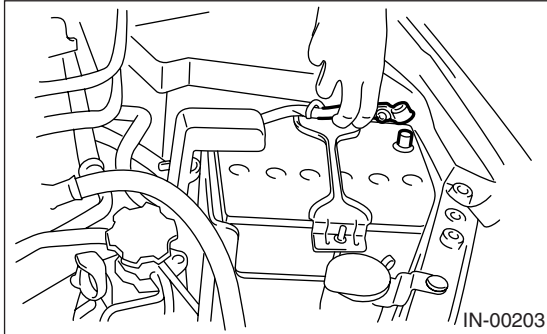
# Turbocharger

## INTAKE (INDUCTION)

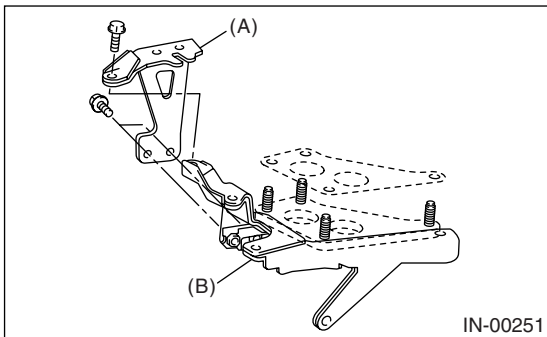
### 8. Turbocharger

#### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Remove the collector cover.
- 3) Disconnect the ground cable from battery.

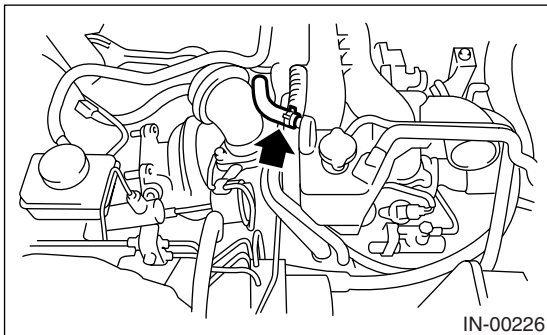


- 4) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
- 5) Remove the intercooler bracket RH.
- 6) Remove the linear motion mounting. <Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>
- 7) Remove the linear motion mounting bracket.

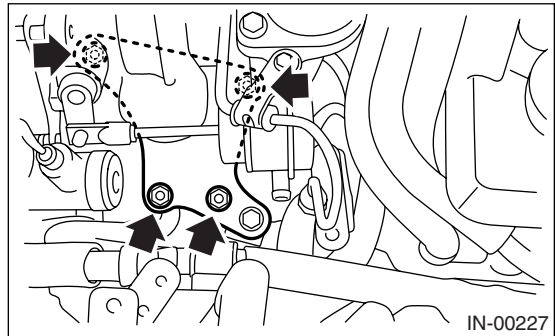


- (A) Linear motion mounting bracket  
(B) Turbocharger bracket

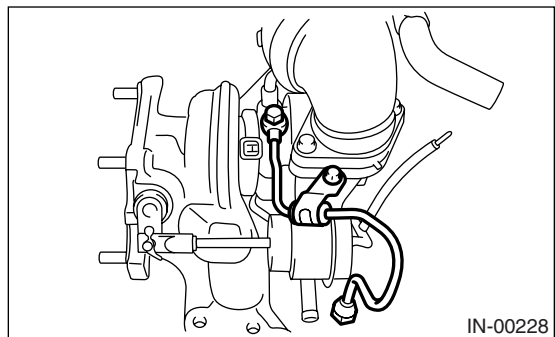
- 8) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>
- 9) Lower the vehicle.
- 10) Disconnect the engine coolant hose which is connected to coolant filler tank.



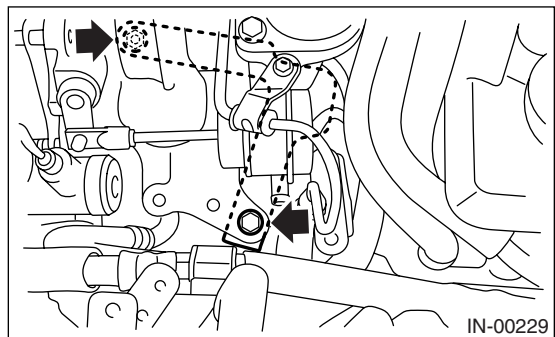
- 11) Separate the turbocharger joint pipe from turbocharger.



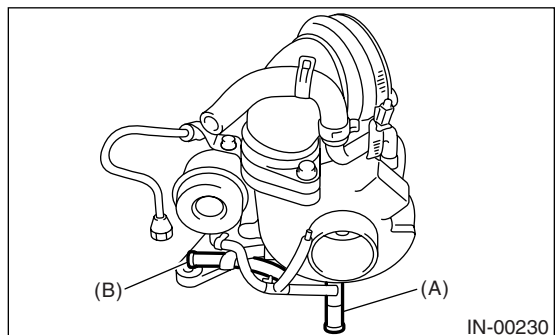
- 12) Remove the bolts which secure oil pipe bracket to turbocharger.
- 13) Remove the oil inlet pipe from turbocharger.



- 14) Remove the bolts which secure turbocharger to bracket.



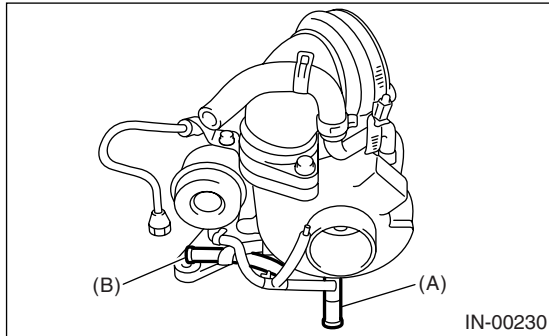
- 15) Disconnect the hoses from the oil outlet pipe (A) and coolant pipe (B) located under the turbocharger.



- 16) Take out the turbocharger from engine compartment.

## B: INSTALLATION

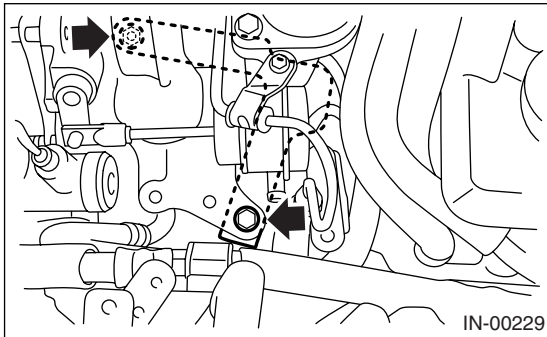
1) Connect the hoses to the oil outlet pipe (A) and coolant pipe (B) located under the turbocharger.



2) Install the turbocharger to bracket.

**Tightening torque:**

**33 N·m (3.4 kgf-m, 24.6 ft-lb)**

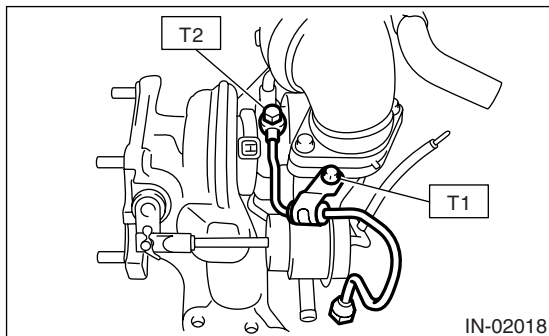


3) Install the oil inlet pipe to turbocharger.

**Tightening torque:**

**T1: 5.0 N·m (0.51 kgf-m, 3.7 ft-lb)**

**T2: 16 N·m (1.6 kgf-m, 11.6 ft-lb)**



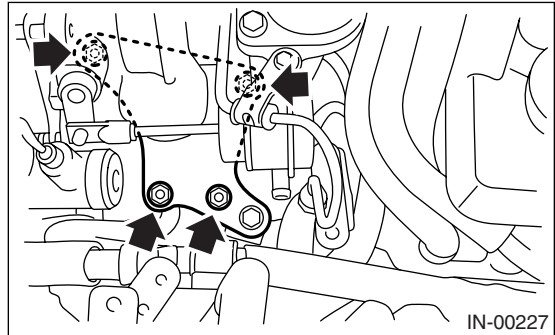
4) Install the joint pipe to turbocharger.

**NOTE:**

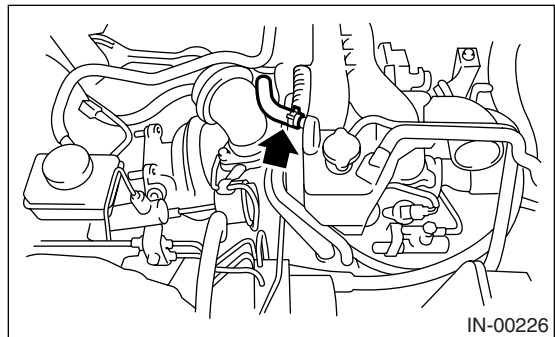
Use a new gasket.

**Tightening torque:**

**35 N·m (3.6 kgf-m, 25.8 ft-lb)**



5) Connect the engine coolant hose which is connected to the coolant filler tank.

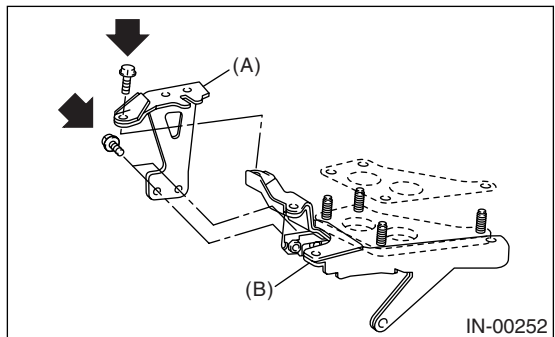


6) Lift-up the vehicle.

7) Install the center exhaust pipe.

<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.>

8) Install the linear motion mounting bracket.



(A) Linear motion mounting bracket

(B) Turbocharger bracket

**Tightening torque:**

**40 N·m (4.1 kgf-m, 29.5 ft-lb)**

9) Install the linear motion mounting.

<Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>

10) Install the intercooler bracket RH.

11) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

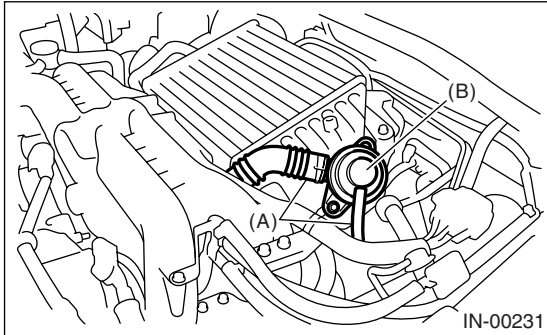
12) Install the collector cover.



## 9. Air By-pass Valve

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the air by-pass hose (A) from air by-pass valve.
- 3) Remove the air by-pass valve (B) from intercooler.

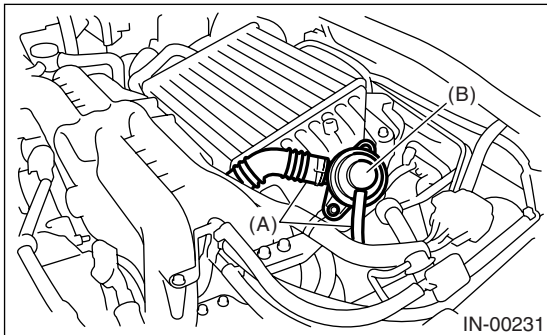


### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**6.5 N·m (0.66 kgf-m, 4.8 ft-lb)**



- (A) Air by-pass hose
- (B) Air by-pass valve