

## B2 ENGINE MECHANICAL

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# B2-1

## ■ 1KR

### 1 CYLINDER HEAD GASKET

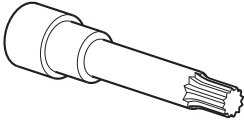
#### 1-1 REMOVAL AND INSTALLATION

##### WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.

#### 1-1-1 ARTICLES TO BE PREPARED

##### SST

Shape	Part No.	Part name
	09043-97401-000	Wrench,double hexagon

##### Instrument

Torque wrench

##### Lubricant,adhesive,others

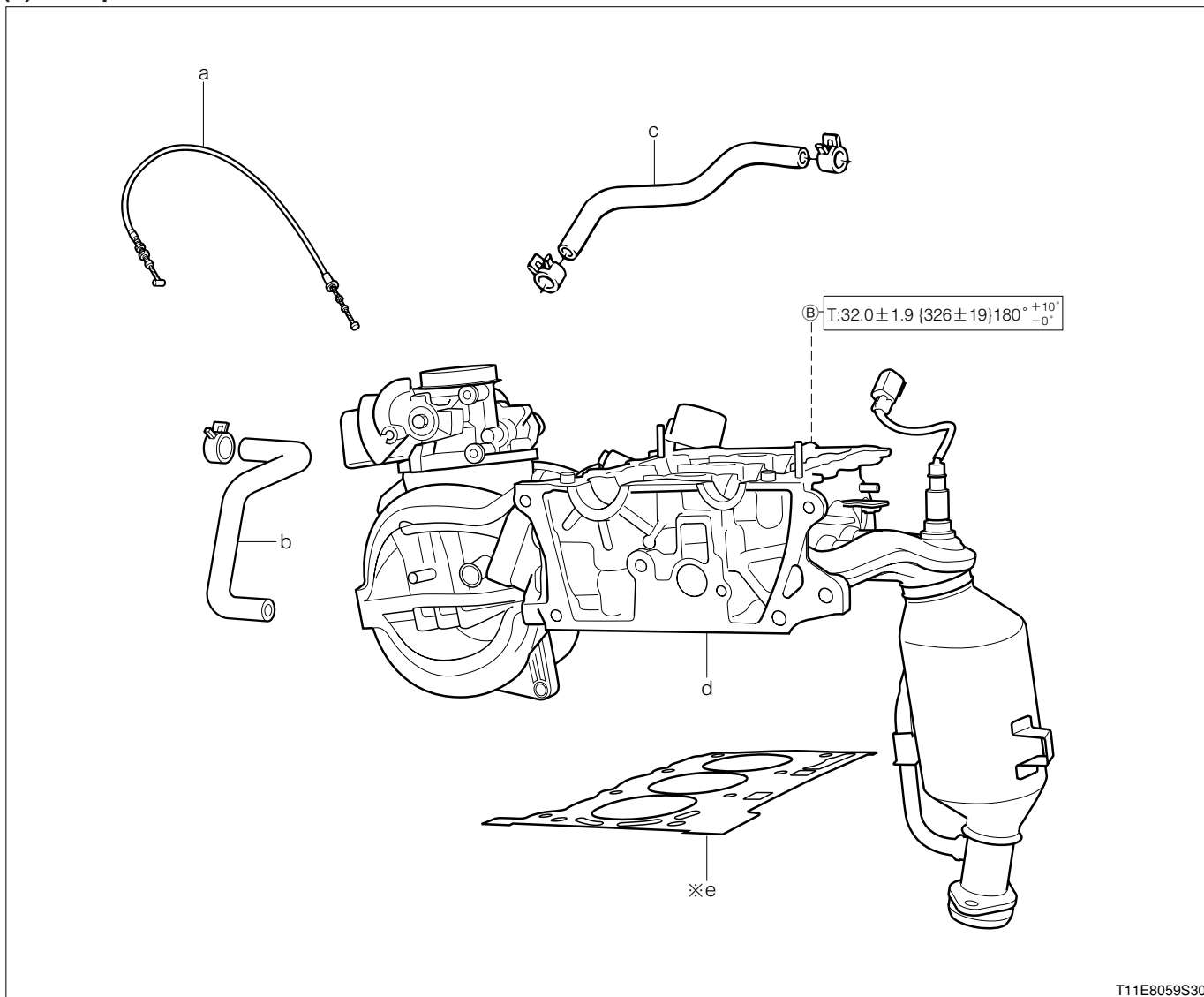
Engine oil

#### 1-1-2 OPERATION BEFORE REMOVAL

- 1.Drain the engine oil.  
Refer to Page B5-3.
- 2.Drain the coolant.
- 3.Remove the engine Ay.  
Refer to Page B2-21.
- 4.Remove the air cleaner hose No.1.  
Refer to Page B3-1.
- 5.Remove the air cleaner Ay W/element.  
Refer to Page B3-1.
- 6.Remove the exhaust manifold stay.  
Refer to Page B4-1.
- 7.Remove the oil pan Ay.  
Refer to Page B5-9.
- 8.Remove the timing chain Ay.  
Refer to Page B2-5.
- 9.Remove the camshaft Ay.  
Refer to Page B2-11.
- 10.Remove each connector, clamp and hose.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E8059S30

※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

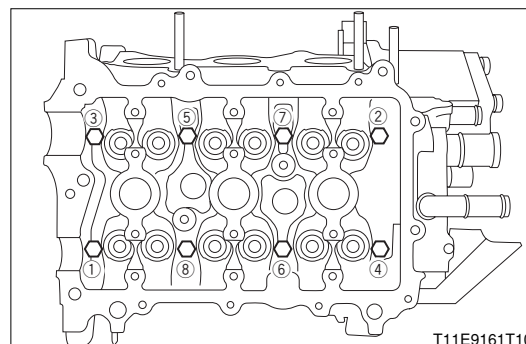
- ▲ 1 a Cable Ay, accelerator control
- ▲ 2 b Hose, booster vacuum
- 3 c Hose, water No.1
- ▼ ▲ 4 d Cylinder head Ay (With intake manifold & exhaust manifold)
- ▲ 5 e Gasket, cylinder head

1-1-4 POINTS OF REMOVAL

(1) Head Ay, cylinder

1.Remove the head Ay together with the intake manifold Ay and the exhaust manifold converter S/A by removing the attaching bolts in the sequence shown in the right figure, using the SST.

SST: 09043-97401-000



T11E9161T10

## 1-1-5 POINTS OF INSTALLATION

### CAUTION

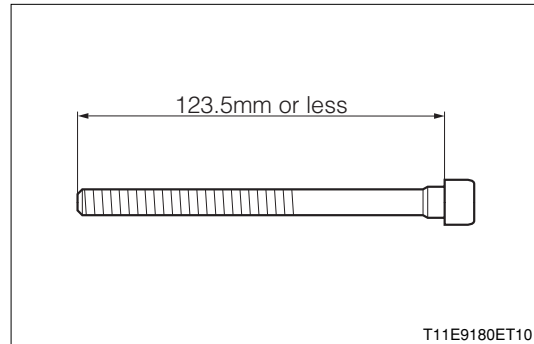
- Never use fire during the work.
- Wear safety goggles during the cleaning so as to protect your eyes.

### (1) Head Ay, cylinder/Gasket cylinder head

1. Install the gasket to head Ay.

- (1) Measure the nominal length of the cylinder head bolt shown in the figure on the right. Replace any cylinder head bolt if it is beyond the application limits.

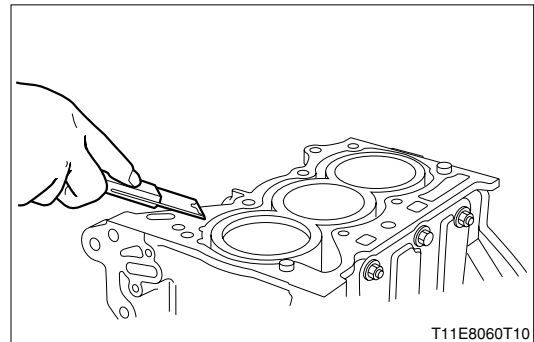
**ALLOWABLE LIMIT: 123.5mm**



- (2) Clean the gasket mounting surface of the cylinder block Ay and cylinder head Ay and completely remove foreign objects, oil, etc., using a scraper.

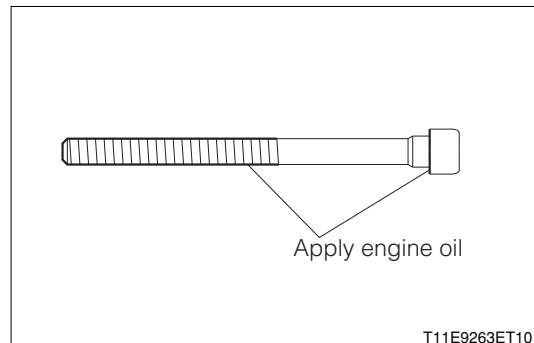
### CAUTION

- Be very careful not to allow scraping debris of the gasket to fall into the water jacket and oil hole. Remove when dropped.



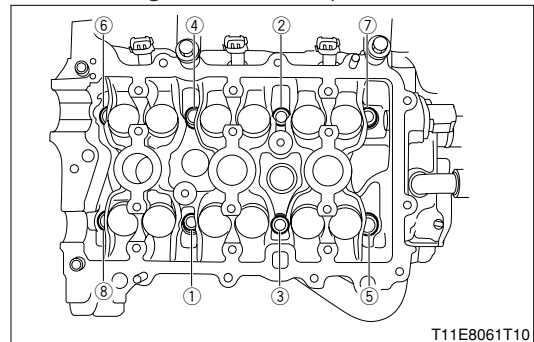
- (3) Mount a plate washer to the head Ay. Apply engine oil to the threaded portion of the bolts and seating surface on the bolt side. Then, perform the assembling operations.

**LUBRICANT: Engine oil**



- (4) To assemble the cylinder head Ay, tighten the bolts over 2 or 3 stages in the sequence shown in the figure on the right, using the SST. Then, tighten them to the specified torque.

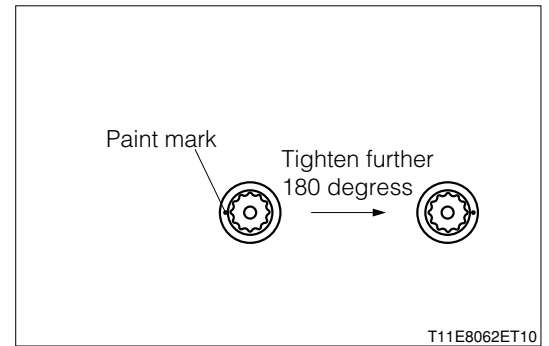
**SST: 09043-97401-000**



- (5) After tightening to the specified torque, retighten them  $180^{\pm 10}$  degrees in the same sequence.

**NOTE**

- It is recommended to put a paint mark on the top of the head bolts in the same direction. After tightening 180 degrees in the sequence above, ensure that all the bolt marks, which have been turned 180 degrees, are facing the same direction.



**(2) Hose, booster vacuum**

1. Install the vacuum booster hose.  
Refer to Page E1-36.

**(3) Cable Ay, accelerator control**

1. Install the accelerator control Cable Ay.  
Refer to Page B3-3.

**1-1-6 OPERATION AFTER INSTALLATION**

1. Install each connector, clamp and hose.
2. Install the camshaft Ay.  
Refer to Page B2-11.
3. Install the timing chain Ay.  
Refer to Page B2-5.
4. Install the oil pan Ay.  
Refer to Page B5-9.
5. Install the exhaust manifold stay.  
Refer to Page B3-9.
6. Install the air cleaner Ay W/element.  
Refer to Page B3-1.
7. Install the air cleaner hose No.1.  
Refer to Page B3-1.
8. Install the engine Ay.  
Refer to Page B2-21.
9. Replenish the engine oil.  
Refer to Page B5-3.
10. Replenish the coolant.
11. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.  
Refer to Page B1-1.


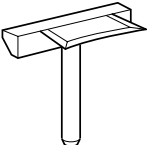
# B2-5

## 2 TIMING CHAIN

### 2-1 REMOVAL AND INSTALLATION

#### 2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09223-87202-000	Replacer,crankshaft front oil seal
	09032-00100-000	Cutter,oil pan seal

Hexagonal rod wrench(Width across flats:2.5mm)

#### Instrument

Torque wrench

#### Lubricant,adhesive,others

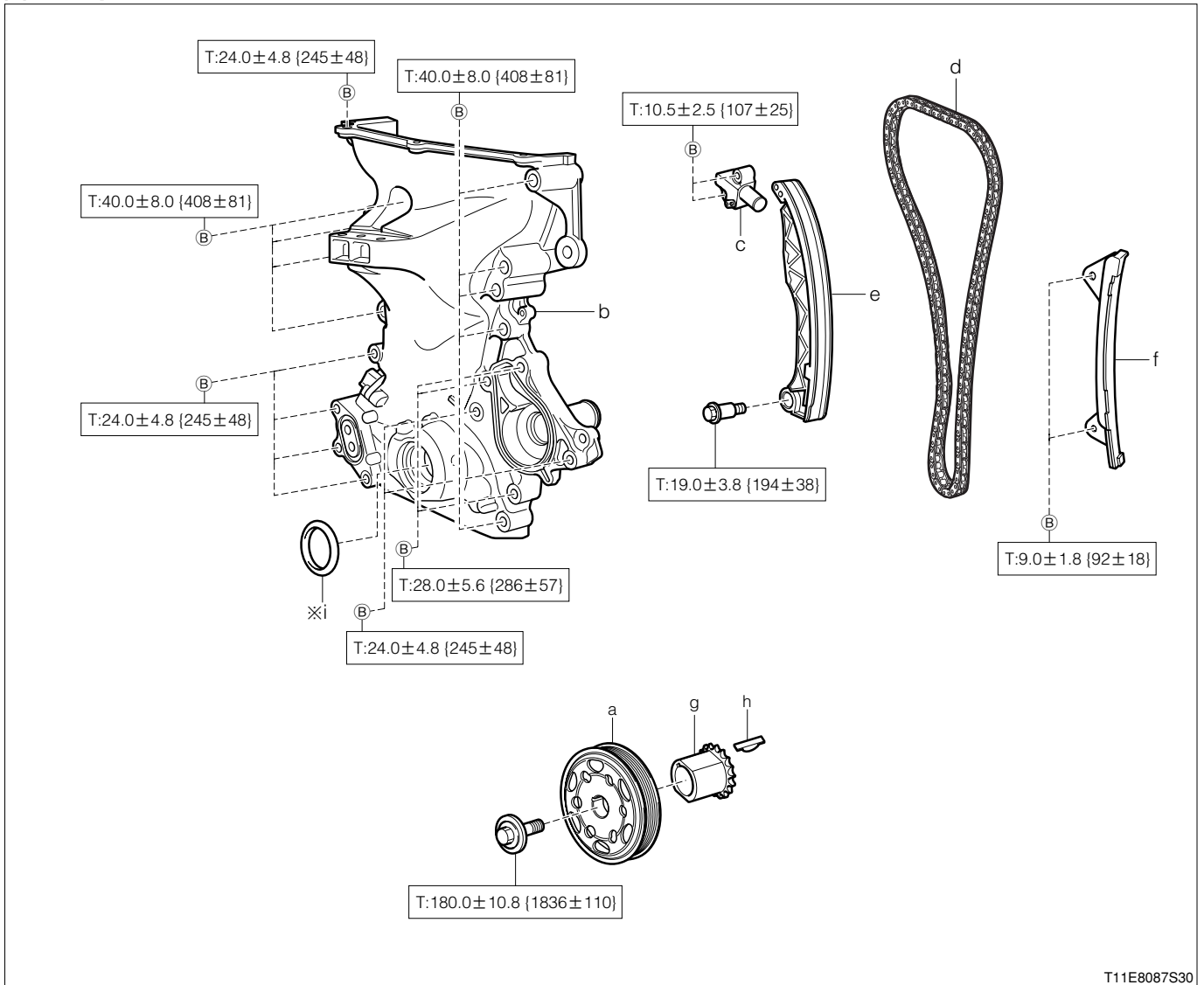
Engine oil,Three Bond1207B,Three Bond1207C

#### 2-1-2 OPERATION BEFORE REMOVAL

- 1.Drain the engine oil.  
Refer to Page B5-3.
- 2.Remove the air cleaner Ay W/element.  
Refer to Page B3-1.
- 3.Remove the engine Ay.  
Refer to Page B2-21.
- 4.Remove the water pump Ay.  
Refer to Page B6-3.
- 5.Remove the coil Ay, W/ignitor.  
Refer to Page B10-2.
- 6.Remove the cylinder head cover.  
Refer to Page B2-11.
- 7.Remove the oil filter Ay W/bracket.  
Refer to Page B5-9.
- 8.Remove the oil pan Ay.  
Refer to Page B5-9.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E8087S30

※:Non - reusable parts

Unit:N·m{kgf·cm}

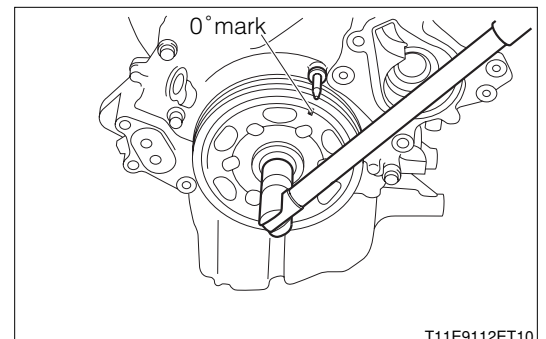
(2) Removal and installation procedures

- |     |   |                               |     |                               |
|-----|---|-------------------------------|-----|-------------------------------|
| ▼   | 1 | a Pulley Ay, crankshaft       | 6   | f Guide, timing chain         |
| ▼ ▲ | 2 | b Cover Ay, timing gear       | 7   | g Sprocket, crankshaft timing |
| ▲   | 3 | c Tensioner S/A, Timing chain | 8   | h Key, woodruff               |
| ▼ ▲ | 4 | d Chain, timing               | ▲ 9 | i Seal, type T oil            |
|     | 5 | e Arm, timing chain tension   |     |                               |

2-1-4 POINTS OF REMOVAL

(1) Pulley Ay, crankshaft

1. Turn the pulley Ay in the normal direction, until the timing mark (0 degrees) of the pulley Ay is aligned with the timing pointer of the timing chain cover Ay. (Set the No.1 cylinder to the top dead center under the compression stroke.)

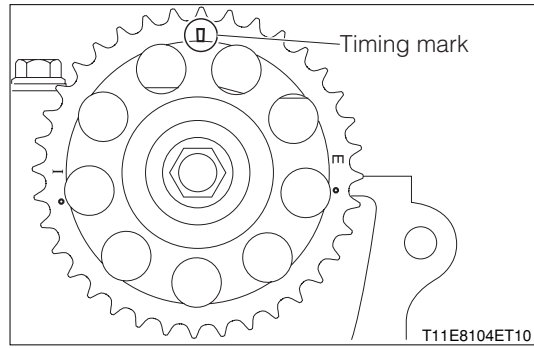


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# B2-7

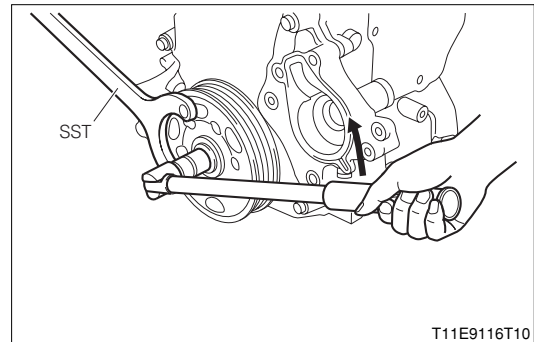
2.Ensure that the timing mark of the camshaft timing sprocket is at the top position.

If the timing mark is not at the top position, turn the pulley Ay once so that the timing mark comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



3.While preventing rotation, using the SST, remove the pulley Ay.

SST: 09278-87201-000



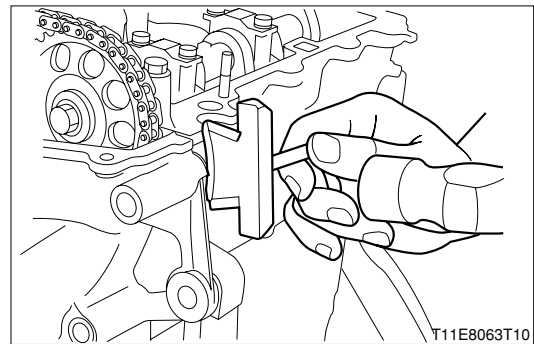
## (2) Cover Ay, timing chain

- 1.Remove the attaching bolts and nuts of the cover Ay.
- 2.Remove the cover Ay by inserting the SST between the cover Ay and the cylinder head Ay.

SST: 09032-00100-000

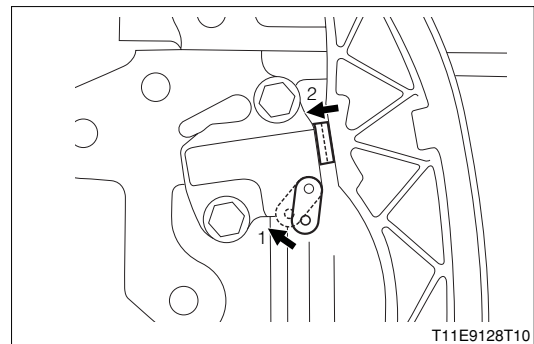
### CAUTION

- Be very careful not to scratch the joint surface.



## (3) Chain, timing

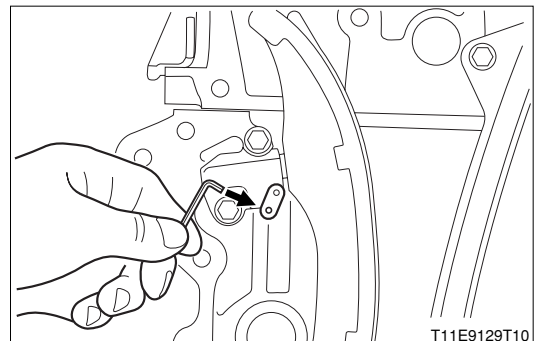
- 1.With the lock released by moving the stopper plate of the timing chain tensioner S/A clockwise, insert a plunger as far as it will go.



- 2.With the plunger locked, insert a hexagonal wrench into the hole of the stopper plate and the lower part of the timing chain tensioner S/A. (The plunger will be locked.)

TOOL: Hexagon rod wrench (Width across flats: 2.5mm)

- 3.Remove the timing chain tensioner S/A by removing the bolts and nuts.
- 4.Remove the chain.





**2-1-5 POINTS OF INSTALLATION**

**(1) Seal, type T oil**

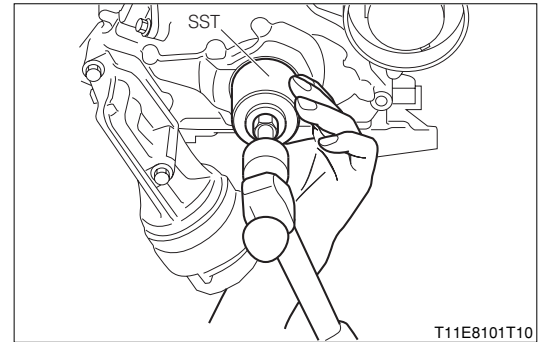
1. Install the seal to the timing chain cover Ay in the sequence shown below.

- (1) Apply engine oil to the lip section of the seal.
- (2) Drive the seal vertically, using the SST.

**SPECIFIED VALUE: Press-fitting amount**

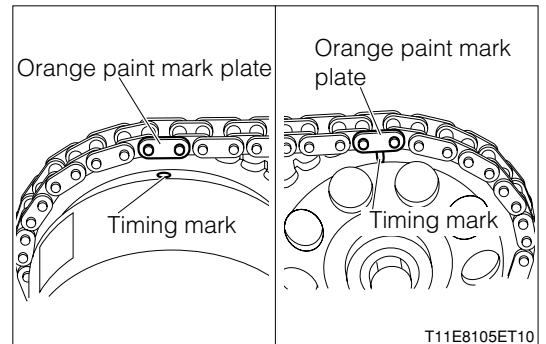
Protruding amount from end surface  
of timing chain cover Ay  
Within 0.5mm  
Press-fitting depth from end surface  
of timing chain cover Ay  
Within 1mm

SST: 09223-87202-000

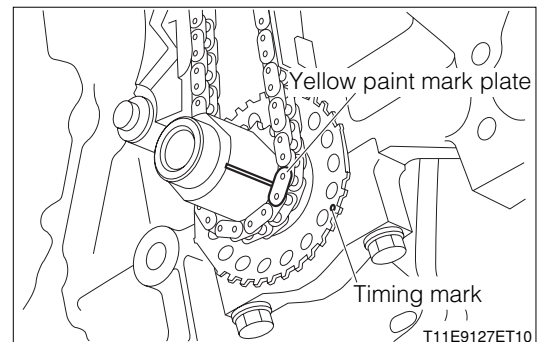


**(2) Chain, timing**

- 1. Install the timing chain tension arm and timing chain guide.
- 2. During the installation, align the two orange mark plates of the chain with the timing mark of the camshaft timing sprocket as shown in the figure.

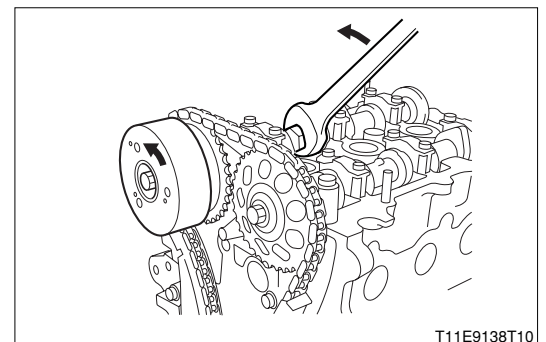


- 3. During the installation, align the yellow mark plate of the chain with the timing mark of the crankshaft timing sprocket.

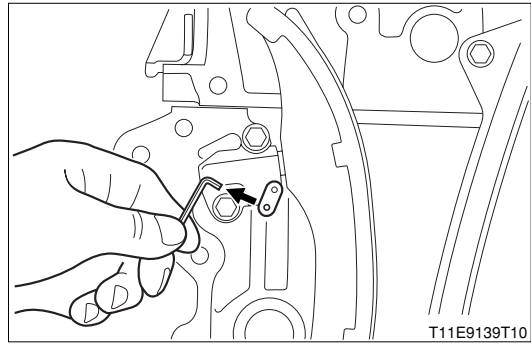


**(3) Tensioner S/A, timing chain**

- 1. Slightly turn the camshaft counterclockwise (Reverse rotation), using the hexagonal section of the camshaft, so as to give a slack to the chain at the tensioner side. Under this state, install the tensioner.

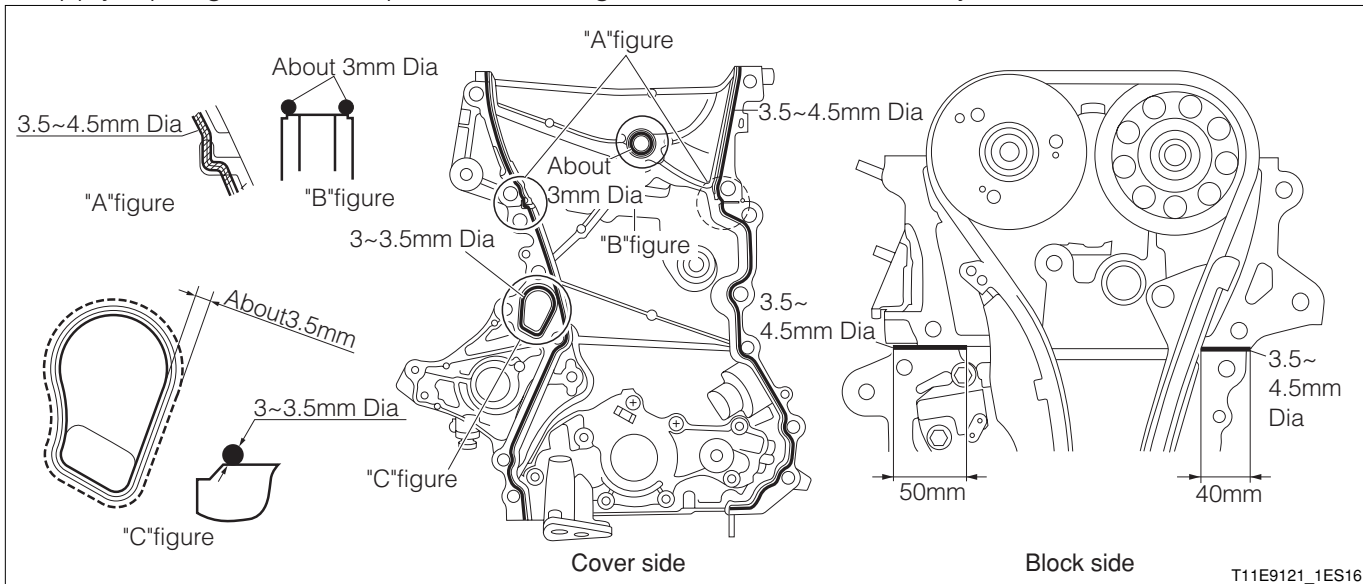


2. Pull out the hexagonal rod wrench of the tensioner and turn the crankshaft two turns to move the chain tensioner Ay.



#### (4) Cover Ay, timing chain

1. Assemble the timing chain cover gasket to the cover Ay.
2. Apply liquid gasket to the position in the figure and install the cover Ay.



**ADHESIVE:** Three Bond1207C / Apply to the points in the figure C at the cover side as shown in the figure.

**ADHESIVE:** Three Bond1207B / Apply to the points in the figures A and B at the cover side as shown in the figure and at the block side.

#### CAUTION

- Completely remove foreign matters and oil from the installation surface.
- Perform the assembling within three minutes after application of the liquid gasket.

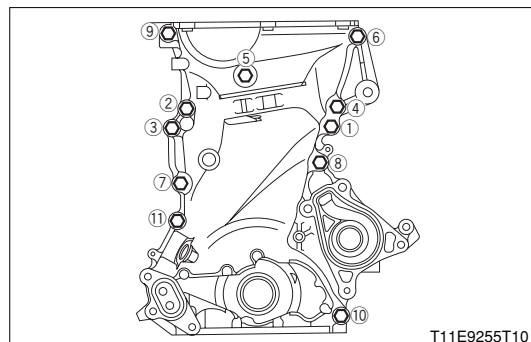
3. Tighten the bolts in the sequence shown in the figure.

#### CAUTION

- Perform the assembling within three minutes after application of the liquid gasket.

(1) Wipe off any liquid gasket that has oozed out.

**SPECIFIED VALUE:** Permissible oozing amount: within 1.5mm



**2-1-6 OPERATION AFTER INSTALLATION**

1. Install the oil pan Ay.  
Refer to Page B5-9.
  
2. Install the oil filter Ay W/bracket.  
Refer to Page B5-9.
  
3. Install the cylinder head cover.  
Refer to Page B2-11.
  
4. Install the coil Ay, W/ignitor.  
Refer to Page B10-2.
  
5. Install the water pump Ay.  
Refer to Page B6-3.
  
6. Install the engine Ay.  
Refer to Page B2-21.
  
7. Install the air cleaner Ay W/element.  
Refer to Page B3-1.
  
8. Replenish the coolant.
9. Replenish the engine oil.  
Refer to Page B5-3.
  
10. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.  
Refer to Page B1-1.

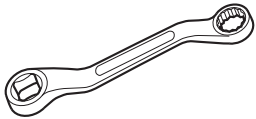
# B2-11

## 3 CAMSHAFT

### 3-1 REMOVAL AND INSTALLATION

#### 3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09249-B1010-000	Adaptor,torque wrench

Tool

Hexagonal rod wrench(Width across flats:2.5mm),Hexagon wrench (Width across flats : 10mm )

Instrument

Torque wrench

Lubricant,adhesive,others

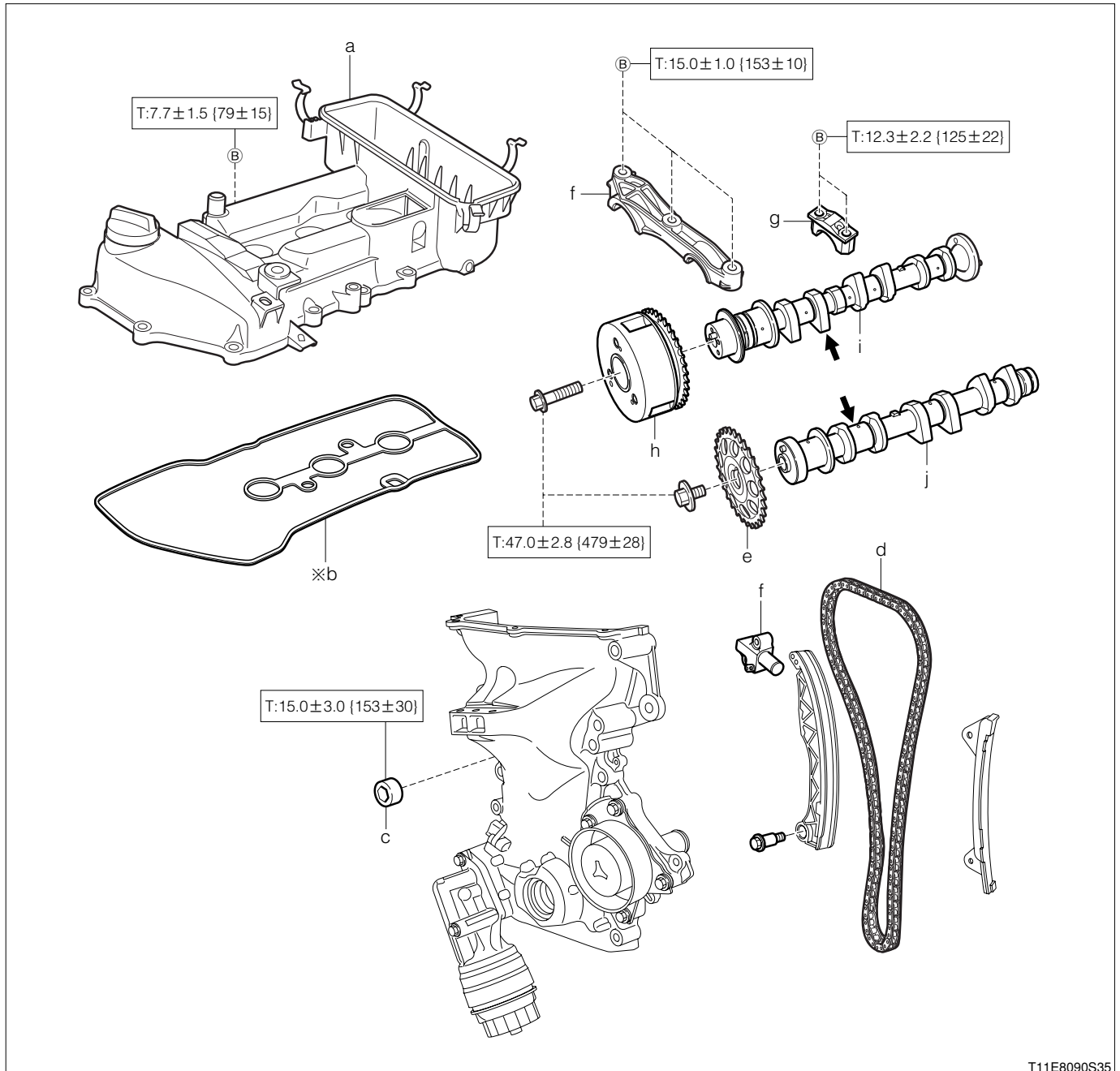
Engine oil,Three Bond1324,Three Bond1207B

#### 3-1-2 OPERATION BEFORE REMOVAL

- 1.Remove the negative (-) terminal of the battery.  
Refer to Page J5-3.
- 2.Remove the air cleaner Ay W/element.  
Refer to Page B3-1.
- 3.Remove the V-ribbed belt  
Refer to Page B1-5.
- 4.Remove the coil Ay, W/ignitor.  
Refer to Page B10-2.

## 3-1-3 REMOVAL AND INSTALLATION PROCEDURES

### (1) Components



T11E8090S35

➔: Engine oil

Unit: N·m{kgf·cm}

※: Non-reusable parts

### (2) Removal and installation procedures

- |       |   |                             |        |   |  |
|-------|---|-----------------------------|--------|---|--|
| ▲ 1   | a | Cover, cylinder head        | ▼ ▲ 6  | f | Cap, camshaft bearing No.1                     |
| ▼ ▲ 2 | b | Gasket, cylinder head cover | ▼ ▲ 7  | g | Cap, camshaft bearing No.2                     |
| ▼ ▲ 3 | c | Plug, service hole screw    | ▲ 8    | h | Sprocket Ay, camshaft timing (DVVT controller) |
| ▲ 4   | d | Chain, timing               | ▼ ▲ 9  | i | Camshaft Ay, No.1                              |
| ▼ ▲ 5 | e | Sprocket, camshaft timing   | ▼ ▲ 10 | j | Camshaft Ay No.2                               |

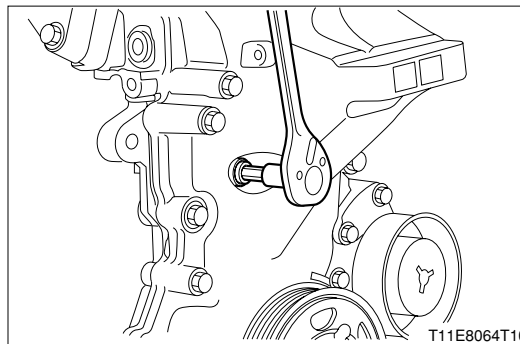
# B2-13

## 3-1-4 POINTS OF REMOVAL

### (1) Plug, service hole screw

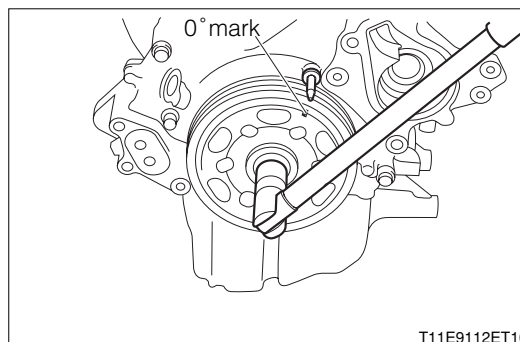
1.Remove the plugs, using a hexagon wrench.

TOOL: Hexagon wrench (Width across flats : 10mm )



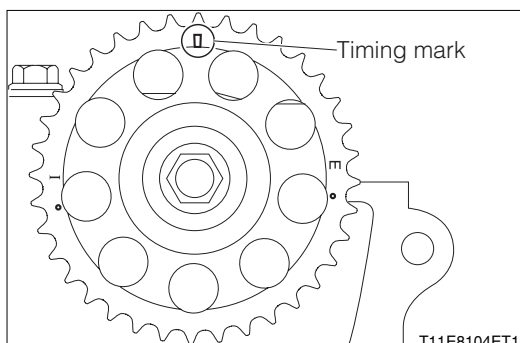
### (2) Sprocket, camshaft timing

1.Turn the pulley Ay in the normal direction, until the timing mark (0 degrees) of the pulley Ay is aligned with the timing pointer of the timing chain cover Ay. (Set the No.1cylinder to the top dead center under the compression stroke.)



2.Ensure that the sprocket is at the top position.

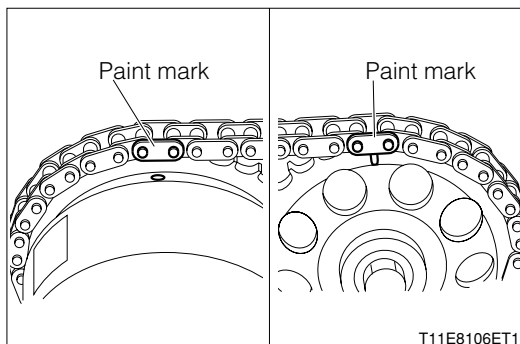
If the timing mark is not at the top position, turn the pulley Ay once so that the timing mark comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



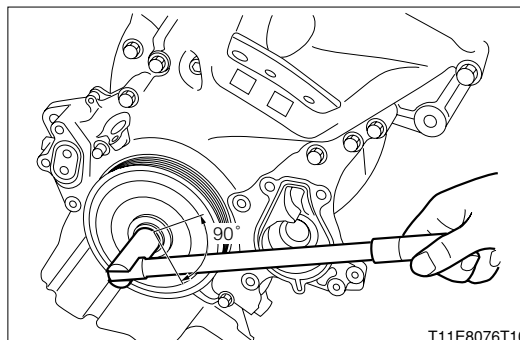
3.Put a paint mark on each plate of the timing chain that is aligned with the mating marks of the sprocket and camshaft timing sprocket Ay (DVVT controller).

#### NOTE

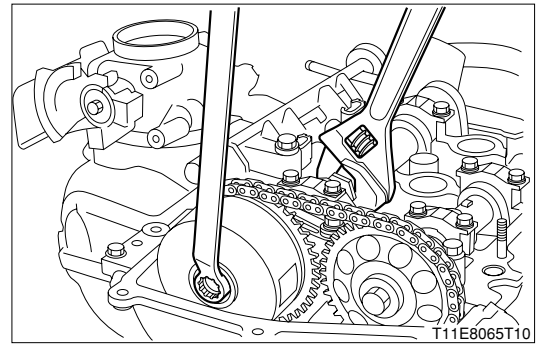
- The timing chain has two orange mark plates and one yellow mark plate. Therefore, in cases where the orange mark plates are aligned with the cam sprocket side and the yellow mark plate with the crankshaft side, the above operation is not required.



4.Turn the crankshaft 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when removing the camshaft Ay.



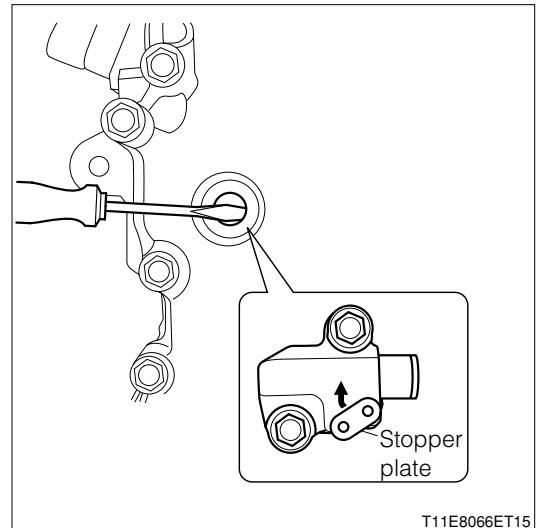
5. Loosen the attaching bolts of the sprocket Ay using the hexagonal section provided for servicing of the camshaft.



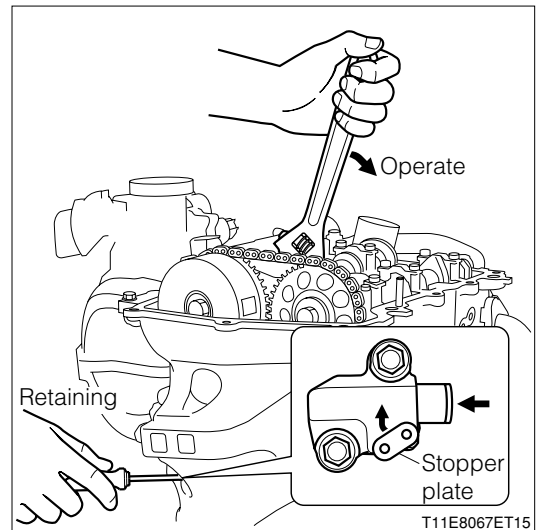
6. Move the stopper plate of the timing chain tensioner S/A from the plug in the clockwise direction, using a flat screwdriver. Then, maintain the released condition.

**NOTE**

- By this operation, the plunger of the timing chain tensioner S/A will be unlocked.
- If any difficulty is encountered in releasing the lock of the stopper plate, slightly turn it in a right-and-left direction, using the hexagonal section provided for servicing of the camshaft Ay.



7. Slightly turn the camshaft Ay clockwise (Normal direction), using the hexagonal section provided for servicing of the camshaft Ay, so that the timing chain pushes the plunger section of the timing chain tensioner S/A.



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8. While maintaining the above condition, remove the flat screwdriver from the plug and insert a hexagonal wrench into the hole of the stopper plate.

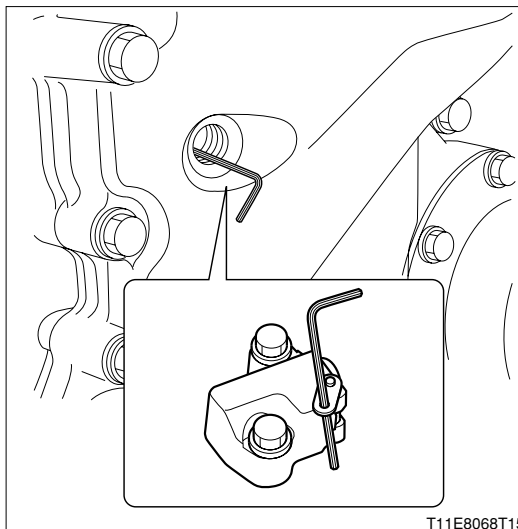
TOOL: Hexagonal rod wrench (Width across flats: 2.5mm)

### CAUTION

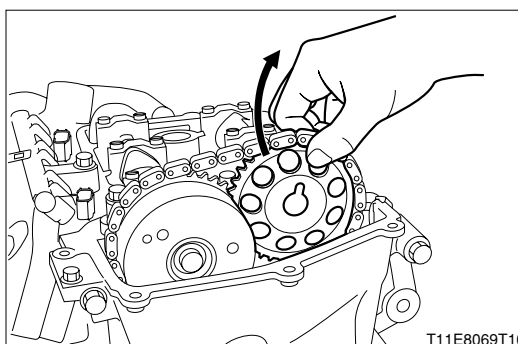
- Maintain the camshaft Ay using the hexagonal section for servicing.
- Secure the hexagonal wrench so that it would not come out by means of a tape or the like.

### NOTE

- By this operation, the plunger of the timing chain tensioner S/A will be held in a pushed state.

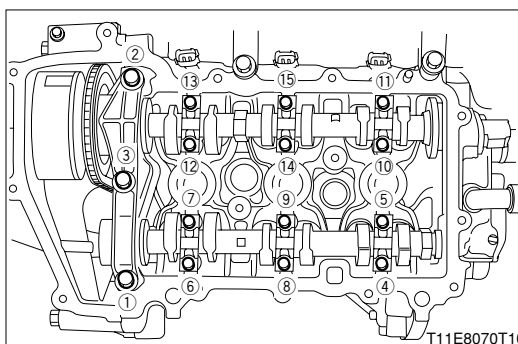


9. Remove the sprocket from the No.2 camshaft Ay.



### (3) Camshaft bearing No.1/No.2 caps

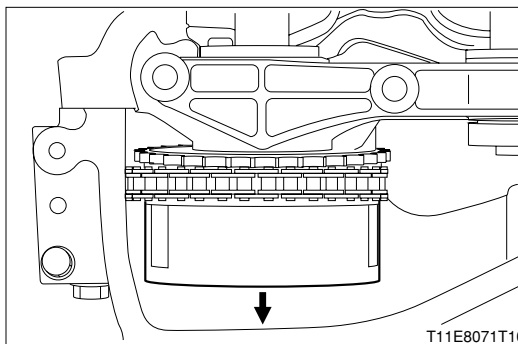
1. Remove the bolts in the sequence shown in the right figure.



2. Remove the camshaft bearing cap No.1/No.2.

- (1) Slide the camshaft timing sprocket to the engine front side until the camshaft bearing No.1 cap is pulled out.

- (2) Remove the camshaft bearing cap No.1/No.2.



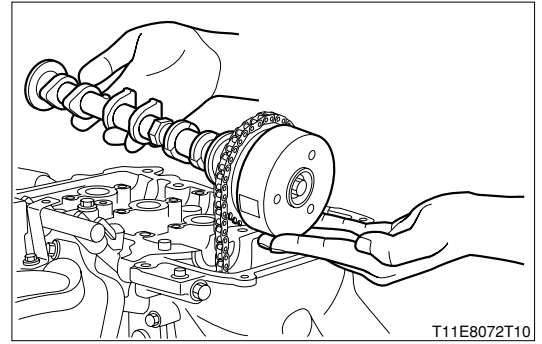


## (4) Camshaft Ay, No.1/No.2

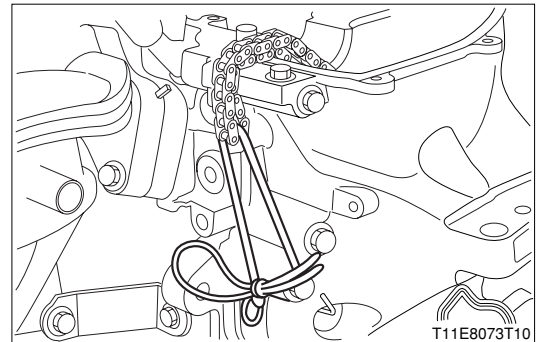
1. Remove the camshaft Ay, No.1/No.2.

### NOTE

- Remove the No.1 camshaft Ay together with the camshaft timing sprocket.
- Also, during the installation, temporarily assemble the camshaft timing sprocket to the No.1 camshaft Ay.



2. After removing the camshaft Ay, hold the timing chain by a cord, etc. so that it would not fall.



## 3-1-5 INSPECTION

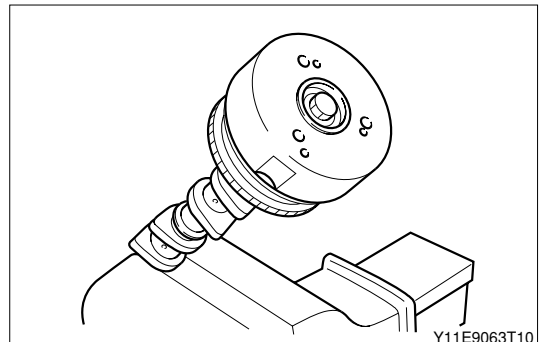
### (1) Check of camshaft timing sprocket Ay

#### CAUTION

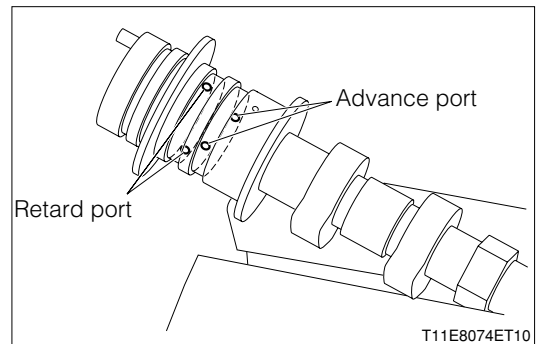
- Do not disassemble the camshaft timing sprocket Ay (DVVT controller).

1. Secure the hexagonal section provided for servicing the No.1 camshaft assembly to a vice.

2. Install the camshaft timing sprocket Ay and tighten the attaching bolts to the specified torque.



3. Hold one of the two advanced timing side ports (The figure on the right) of the No.1 camshaft Ay with your fingers or block the advanced timing side port by a tape, etc.



4. Using an air tool, apply air pressure through another port at the timing advance side.

**CAUTION**

- Care must be exercised as to splashing oil.

**NOTE**

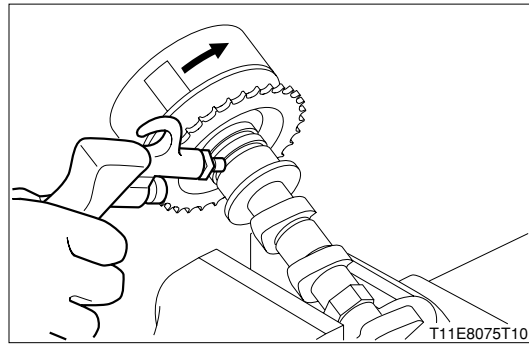
- The most retard timing lock is disengaged.

5. At this time, ensure that the most retard timing angle lock of the camshaft timing sprocket Ay is disengaged and the camshaft timing sprocket Ay can be freely moved by the hand without any binding in the range of about 30 degrees.

**CAUTION**

- The camshaft timing sprocket Ay is locked when it comes at the most retard angle position.

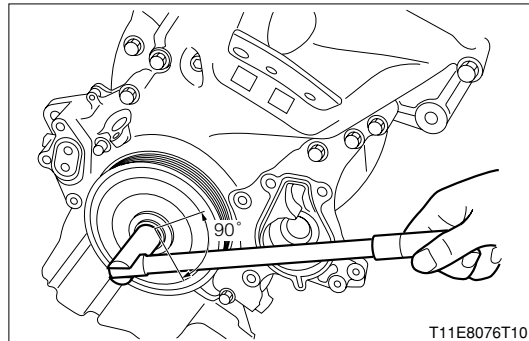
6. After the inspection, lock the camshaft timing sprocket Ay at the most retard timing position.



### 3-1-6 POINTS OF INSTALLATION

#### (1) Camshaft Ay, No.1/No.2

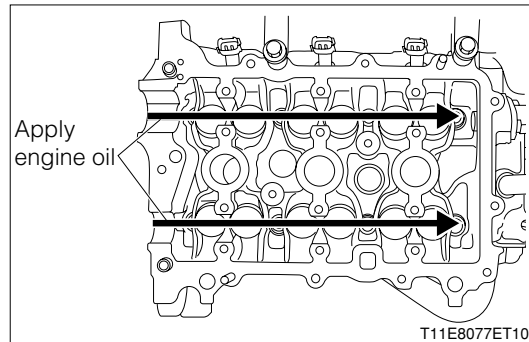
1. Turn the crankshaft about 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when installing the camshaft.



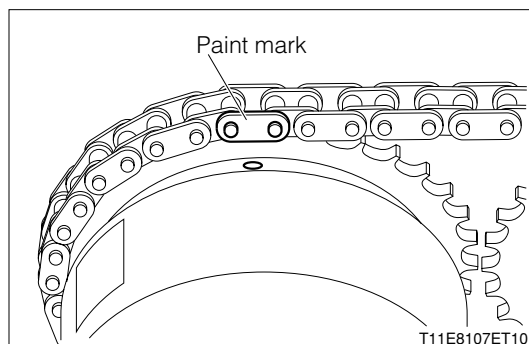
2. Install the camshaft Ay, No.1/No.2.

- (1) Apply engine oil to each of cam sections of the camshaft Ay, journal sections of the cylinder head Ay and the top of the valve lifter.

**LUBRICANT:** Engine oil



- (2) Perform the installation in such a way that the timing mark of the camshaft timing sprocket Ay (DVVT controller) and the paint mark of the timing chain are aligned with the timing mark that has been applied during the removal operation.



(3) Set the No.1 camshaft Ay so that the cam noses of the No.1 cylinder and No.3 cylinder may press the valve lifters.

Set the No.2 camshaft Ay so that the cam noses of the No.1 cylinder and No.2 cylinder may press the valve lifters.

**NOTE**

- The timing mark of the camshaft timing sprocket and the camshaft timing sprocket Ay (DVVT controller) would come to the top position.

**(2) Cap, camshaft bearing No.1/No.2**

1.Set the camshaft bearing No.1/No.2 caps. Then, tighten the attaching bolts to the specified torque in the sequence shown in the right figure.

**CAUTION**

- The front marks (Arrow marks) indicated on the top of camshaft bearing No.1/No.2 caps are facing towards the engine front side.
- Refer to the following table for the installation positions of the stamped No.'s indicated on the top of the camshaft bearing No.1/No.2 caps.

Installation positions of camshaft bearing No.2 cap

Stamping No.	Installation position	
	Intake/exhaust	Cylinder No.
I2	Intake side	Cylinder No.1
I3		Cylinder No.2
I4		Cylinder No.3
E2	Exhaust side	Cylinder No.1
E3		Cylinder No.2
E4		Cylinder No.3

**(3) Sprocket Ay, camshaft timing (DVVT controller)**

1.Tighten the sprocket Ay attaching bolts, by means of the SST, using the hexagonal section provided for servicing of the No.1 camshaft Ay,  
SST: 09249-B1010-000

**NOTE**

- To perform the tightening operation by extending the overall length, using a torque wrench in combination with the SST, determine the torque wrench readings by using the calculation formula.

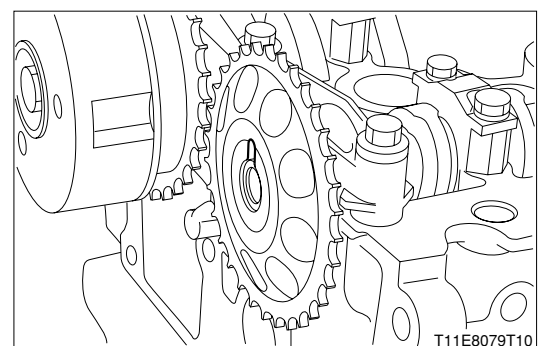
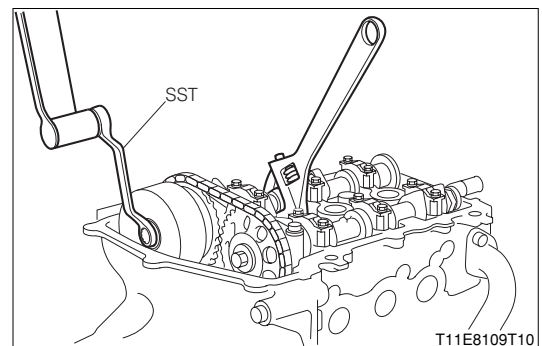
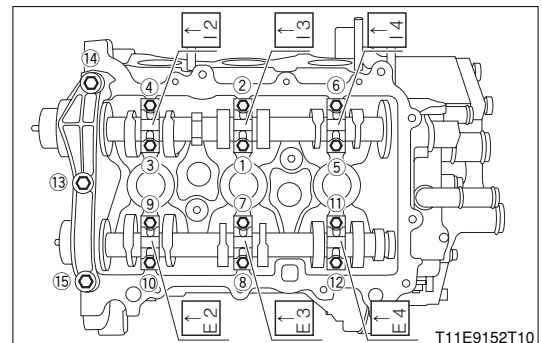
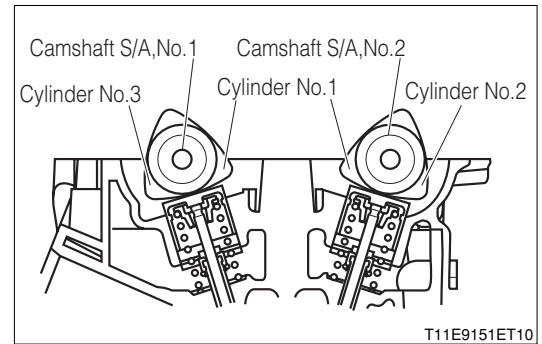
Refer to Page A1-8.

**(4) Sprocket, camshaft timing**

1.Perform the assembling in such a way that the knock pin of the No.2 camshaft Ay would fit into the groove.

**NOTE**

- The mating mark of the gears would face exactly upward.



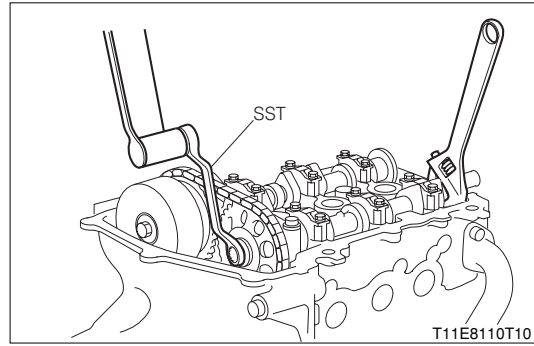
2. Tighten the sprocket attaching bolts by means of the SST, using the hexagonal section provided for servicing of the No.2 camshaft Ay.

SST: 09249-B1010-000

**NOTE**

- To perform the tightening operation by extending the overall length, using a torque wrench in combination with the SST, determine the torque wrench readings by using the calculation formula.

Refer to Page A1-8.

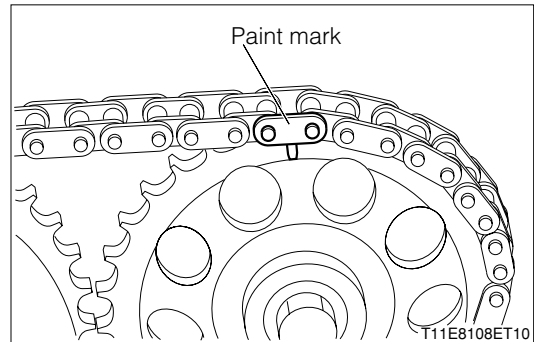


**(5) Chain, timing**

1. Perform the installation in such a way that the timing mark of the camshaft timing sprocket Ay and the paint mark of the timing chain are aligned with the timing mark that has been applied during the removal operation.
2. Pull out the hexagonal wrench from the timing chain tensioner S/A.

**NOTE**

- Slightly turn the camshaft Ay counterclockwise (Reverse rotation), using the hexagonal section provided for servicing of the camshaft Ay, so as to give a slack to the chain at the timing chain tensioner S/A side. Under this state, remove the hexagonal wrench.



**(6) Plug, service hole screw**

1. Clean the plugs and the bolt holes of the timing chain cover Ay. Then, apply liquid gasket to the threaded portion of the plugs before the installation.

ADHESIVE: Three Bond1324

TOOL: Hexagon wrench (Width across flats : 10mm )

**(7) Cover, cylinder head**

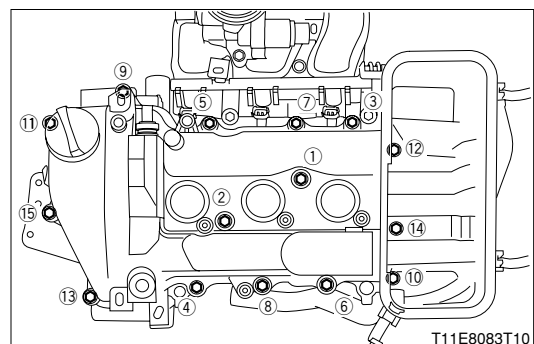
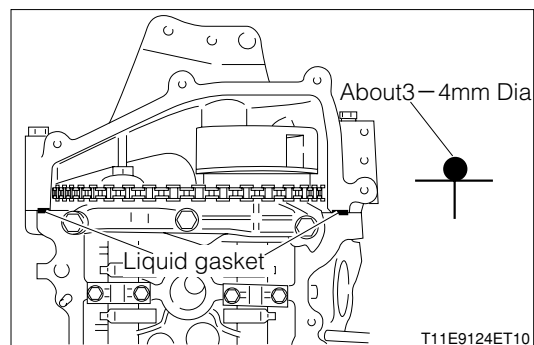
1. Clean the cylinder head cover, cylinder head Ay and timing chain cover Ay.
2. Insert the cylinder head cover gasket to the gasket groove and central boss of the coil Ay with ignitor.
3. Apply liquid gasket to the mating surfaces of the cylinder head Ay and the timing chain cover Ay, as shown in the figure.

The guide of the application amount is about  $3.5 \pm 0.5$ mm Dia.

ADHESIVE: Three Bond1207B

4. The cover Ay attaching bolts should be assembled in the sequence shown in the right figure within three minutes after application of the liquid gasket.

After tightening all bolts to the specified torque, ensure again that the bolts ① and ② are tightened to the specified torque.



**3-1-7 OPERATION AFTER INSTALLATION**

1. Install the coil Ay, W/ignitor.

Refer to Page B10-2.

2. Install the V-ribbed belt and adjust the tension.

Refer to Page B1-5.

3. Install the air cleaner Ay W/element.

Refer to Page B3-1.

4. Connect the negative (-) terminal of the battery.

Refer to Page J5-3.

5. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.

Refer to Page B1-1.

# B2-21

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## 4 ENGINE ASSY

### 4-1 REMOVAL AND INSTALLATION

#### WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.
- When the oil is hot, do not remove the drain plug or oil cooler hose.

#### 4-1-1 ARTICLES TO BE PREPARED

##### Instrument

Torque wrench
---------------

##### Lubricant, adhesive, others

Engine hanger No.1 (Replacement parts), Engine hanger No.2 (Replacement parts), Engine hanger attaching bolt (Replacement parts), Wooden block
--

**4-1-2 OPERATION BEFORE REMOVAL**

1.Remove the fuel pressure.

Refer to Page B7-1.

2.Remove the battery and battery carrier.

Refer to Page J5-3.

3.Disconnect the engine wire from the fuel injection computer Ay, and pull it into the engine compartment.

4.Disconnect the hose leading to the charcoal canister Ay.

(1) RHD vehicles

Refer to Page B9-1.

(2) LHD vehicles

Refer to Page B9-2.

5.Disconnect the vacuum hose Ay from the brake booster Ay.

Refer to Page E1-36.

6.Disconnect the accelerator control cable Ay at the throttle body side.

7.Remove the front bumper cover.

Refer to Page I2-2.

8.Remove the front bumper reinforcement S/A and hood lock support.

Refer to Page I1-1.

9.Remove the air cleaner cap S/A and air cleaner No.1 hose.

Refer to Page B3-1.

10.Remove the wheel disc. (Front)

Refer to Page C3-3.

11.Remove the engine undercover RH and engine undercover LH.

12.Drain the coolant.

13.Disconnect the water hose No.1 and water hose No.2 from the heater radiator Ay.

Refer to Page K1-11.

14.Remove the radiator Ay together with the oil cooler hose.

Refer to Page B6-5.

**CAUTION**

- Suspend the cooler condenser Ay on the vehicle side, using a cord, etc., without cutting its piping.

15.Remove the front exhaust pipe Ay.

Refer to Page B4-3.

16.Remove the V-ribbed belt

Refer to Page B1-5.

## **B2-23**

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17.Remove the front drive shaft Ay RH and front drive shaft Ay LH.

Refer to Page D2-8.

18.Disconnect the transmission control cable Ay from the transaxle.

Refer to Page F3-34.

19.Remove the floor shift ay, transmission.

Refer to Page F2-15.

20.Disconnect the fuel hose from the fuel delivery pipe Ay.

Refer to Page B7-11.

21.Remove the compressor Ay W/magnet clutch.

Refer to Page K1-22.

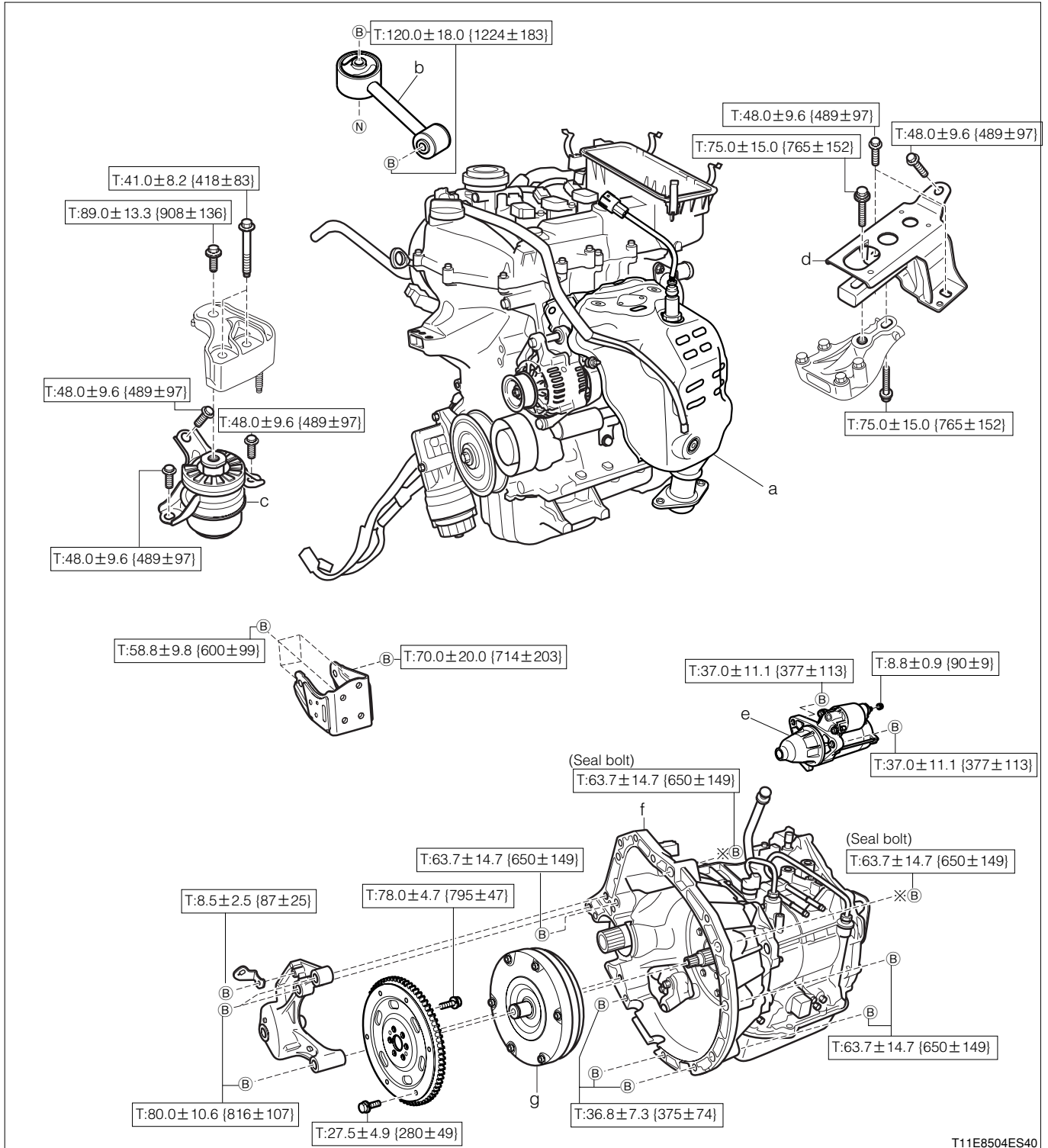
(1) Remove the compressor Ay by removing the attaching bolts of the compressor Ay without disconnecting its piping.

(2) Suspend the compressor Ay on the vehicle side, using a cord, etc.



4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E8504ES40

※:Non - reusable parts

Unit:N·m{kgf·cm}

Illust : automatic transaxle Ay

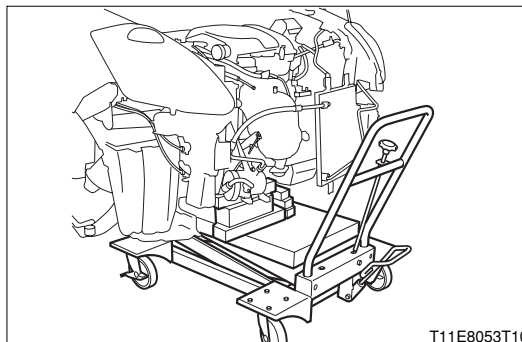
## (2) Removal and installation procedures

- ▼ ▲ 1 a Engine Ay, w/transaxle Ay, automatic
- ▼ ▲ 2 b Rod S/A, engine mounting control
- ▼ ▲ 3 c Insulator S/A, engine mounting, RH
- ▼ ▲ 4 d Insulator S/A, engine mounting, LH
- ▼ ▲ 5 e Starter Ay
- ▼ ▲ 6 f Transfer Ay
- ▼ ▲ 7 g Converter Ay, torque

### 4-1-4 POINTS OF REMOVAL

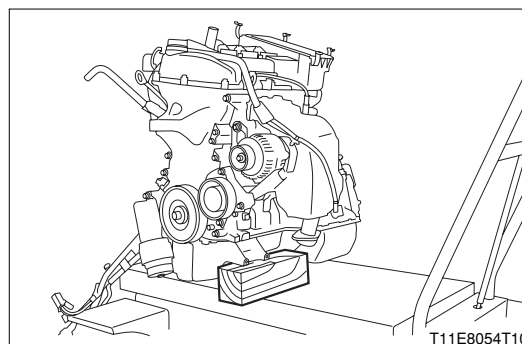
#### (1) Engine Ay,W/ transaxle Ay(A/T,M/T)

1.Set the engine lifter at the position shown in the figure.



2.With wooden blocks or the like, support the engine assembly transaxle assembly(A/T,M/T) in such a way that their balance is well kept.

- (1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine block Ay.



#### CAUTION

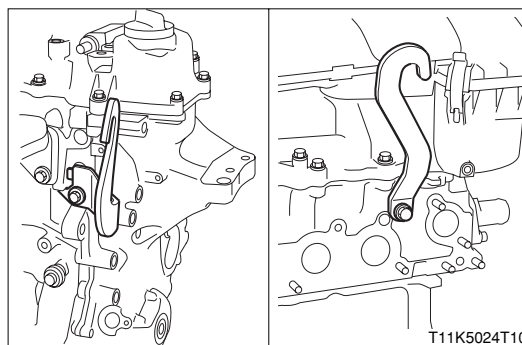
- Do not apply wooden blocks to the crankshaft pulley.

3.Install the engine hanger in the position shown in the right figure.

#### NOTE

- The engine hangers No.1 and No.2 and bolts with washers are supplied parts.

TIGHTENING TORQUE:  $28.0 \pm 8.4\text{N} \cdot \text{m}$   
{ $286 \pm 85\text{kgf} \cdot \text{cm}$ }



#### (2) Rod S/A, engine mounting control. (2WD vehicles)

1.Remove the Rod S/A.  
Refer to Page B12-7.

#### (3) Rod S/A, engine mounting control.

1.Remove the Rod S/A.  
Refer to Page B12-7.

#### (4) Insulator S/A, engine mounting, RH

1.Remove the insulator S/A.  
Refer to Page B12-1.

#### CAUTION

- Make sure that the engine assembly is supported in a well balanced way during the removal.

**(5) Insulator S/A, engine mounting, LH**

1. Remove the insulator S/A.  
Refer to Page B12-4.

**CAUTION**

- Make sure that the engine assembly is supported in a well balanced way during the removal.

**(6) Engine Ay, W/ transaxle Ay(A/T,M/T)**

1. By operating the engine lifter, remove the engine assembly with the transaxle assembly installed to it.

**CAUTION**

- Make sure that no connectors or hoses are left connected or that they are not interfering with other parts during the removal.
- Perform the removal in such a way that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment.

**NOTE**

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

**(7) Starter Ay**

1. Remove the starter Ay  
Refer to Page B11-2.

**(8) Transaxle Ay(A/T,M/T)**

1. Remove the transaxle Ay from the engine Ay.  
Refer to Page F3-12.

**(9) Converter Ay, torque**

1. Remove the torque converter Ay.  
Refer to Page F3-12.

**4-1-5 POINTS OF INSTALLATION****(1) Converter Ay, torque**

1. Install the torque converter Ay.  
Refer to Page F3-12.

**(2) Transaxle Ay(A/T,M/T)**

1. Install the transaxle Ay to the engine Ay.  
Refer to Page F3-12.

**(3) Starter Ay**

1. Install the starter Ay.  
Refer to Page B11-2.

## (4) Engine Ay, W/ transaxle Ay(A/T,M/T)

1.Support the engine Ay with the transaxle Ay, using wooden blocks, etc., in a such a way that their balance is well kept.

- (1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine.

### CAUTION

- Do not apply wooden blocks to the crankshaft pulley.

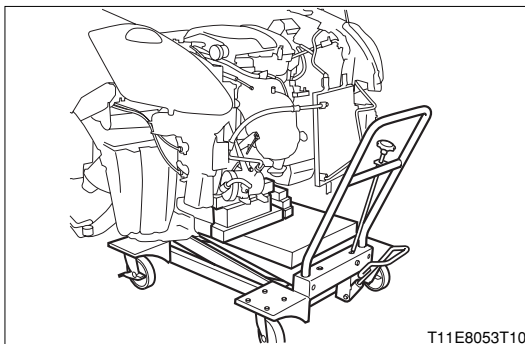
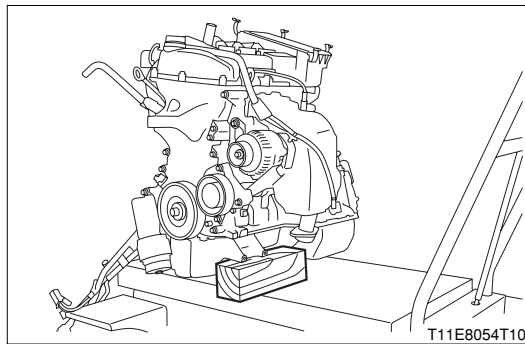
2.By operating the engine lifter, lift the engine assembly together with the transaxle assembly to the vehicle mounting position.

### NOTE

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

### CAUTION

- Perform the installation in such a way that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment.



## (5) Insulator S/A, engine mounting, LH

1.Install the insulator S/A.  
Refer to Page B12-4.

## (6) Insulator S/A, engine mounting, RH

1.Install the insulator S/A.  
Refer to Page B12-1.

## (7) Rod S/A, engine mounting control. (2WD vehicles)

1.Install the Rod S/A.  
Refer to Page B12-7.

## (8) Rod S/A, engine mounting control.

1.Install the Rod S/A.  
Refer to Page B12-7.

## (9) Engine Ay, W/transaxle Ay, automatic

- 1.Install each harness, connector and clamp.
- 2.Route the engine wire in the vehicle interior to connect it to the fuel injection computer Ay.
- 3.Install the earth wires of the engine section and transaxle case section.

## (10) Engine Ay, W/ transaxle Ay(A/T,M/T)

- 1.Install each harness, connector and clamp.
- 2.Route the engine wire in the vehicle interior to connect it to the fuel injection computer Ay.
- 3.Install the earth wires of the engine section and transaxle case section.

**4-1-6 OPERATION AFTER INSTALLATION**

1. Install the compressor assembly. Adjust the V-belt tension.  
Refer to Page K1-22.
2. Install the transmission control cable Ay to the transaxle.  
Refer to Page F3-34.
3. Install the front drive shaft Ay RH and front drive shaft Ay LH.  
Refer to Page D2-8.
4. Install the front exhaust pipe Ay.  
Refer to Page B4-3.
5. Install the radiator Ay together with the oil cooler hose to the vehicle.  
Refer to Page B6-5.
6. Connect the fuel hose to the fuel delivery pipe Ay.  
Refer to Page B7-11.
7. Connect the water hose No.1 and water hose No.2 to the heater radiator Ay.  
Refer to Page K1-11.  
  
Refer to Page K1-19.
8. Install the engine undercover RH and engine undercover LH.
9. Install the wheel disc. (Front)  
Refer to Page C3-3.
10. Install the air cleaner cap S/A and air cleaner hose No.1.  
Refer to Page B3-1.
11. Install the front bumper reinforcement S/A and hood lock support.  
Refer to Page I1-1.
12. Install the front bumper cover.  
Refer to Page I2-2.
13. Remove the floor shift ay, transmission.  
Refer to Page F2-15.
14. Install the accelerator control cable Ay to the throttle body Ay.  
Refer to Page B3-3.
15. Install the brake booster Ay to the vacuum hose Ay.  
Refer to Page E1-36.
16. Connect the hose leading to the charcoal canister Ay.  
(1) RHD vehicles  
Refer to Page B9-1.

## **B2-29**

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(2) LHD vehicles

Refer to Page B9-2.

17. Connect the harness wire at the vehicle side and the engine side.

18. Install the battery and battery carrier.

Refer to Page J5-3.

19. Fill cooling water.

20. Remove the engine hanger.

21. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.

Refer to Page B1-1.

**■ K3****1 CYLINDER HEAD GASKET****1-1 REMOVAL AND INSTALLATION****WARNING**

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.

**1-1-1 ARTICLES TO BE PREPARED****Tool**

Hexagon wrench (Width across flats : 8mm )
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**Instrument**

Torque wrench
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**Lubricant, adhesive, others**

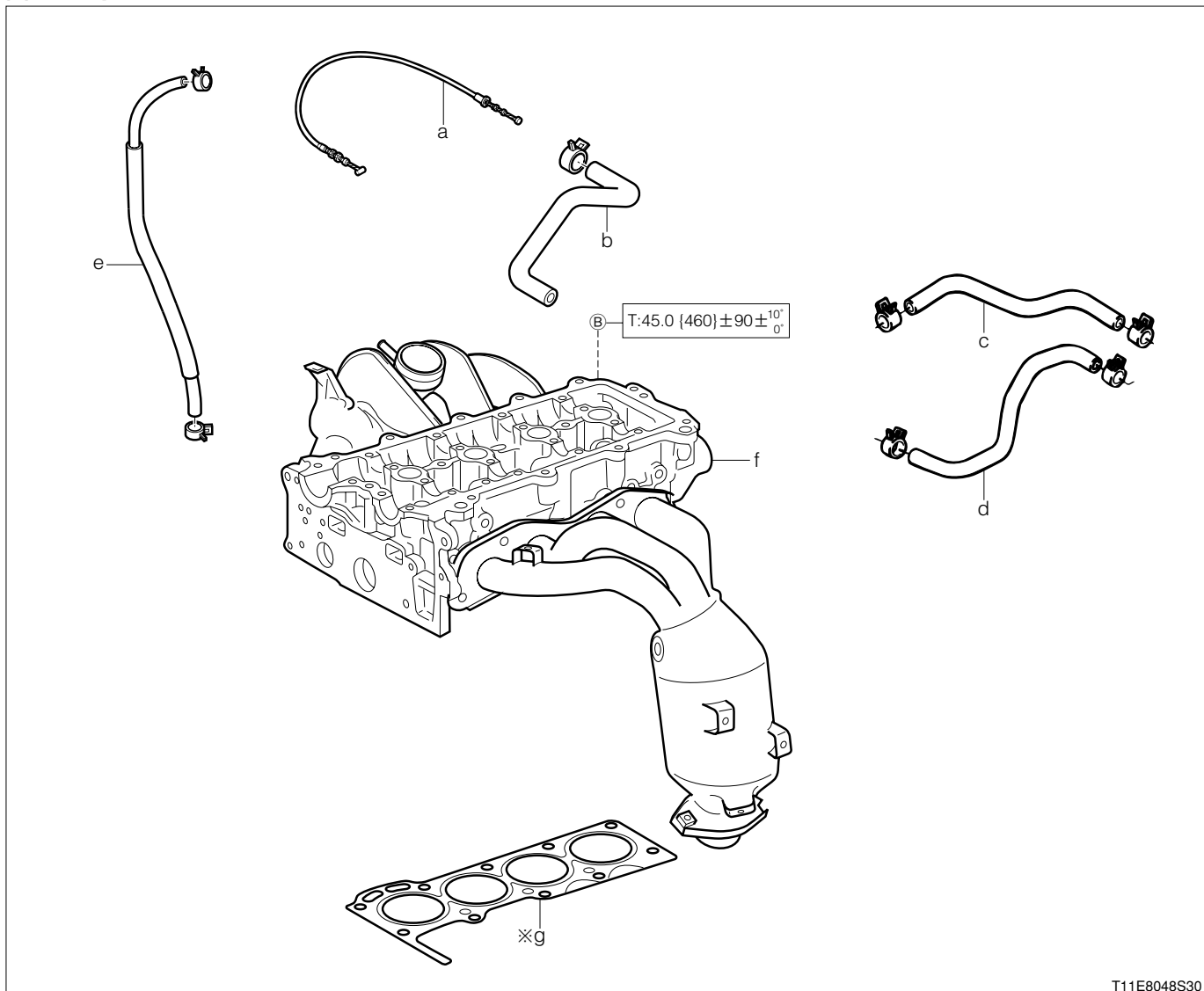
Engine oil, Three Bond1207B
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**1-1-2 OPERATION BEFORE REMOVAL**

1. Drain the engine oil.  
Refer to Page B5-14.
2. Drain the coolant.
3. Remove the engine Ay.  
Refer to Page B2-49.
4. Remove the hose, air cleaner No. 1.  
Refer to Page B3-9.
5. Remove the air cleaner Ay W/element.  
Refer to Page B3-9.
6. Remove the exhaust manifold stay.  
Refer to Page B4-4.
7. Remove the oil pan Ay.  
Refer to Page B5-22.
8. Remove the timing chain Ay.  
Refer to Page B2-35.
9. Remove the camshaft Ay.  
Refer to Page B2-41.
10. Remove each connector, clamp and hose.

## 1-1-3 REMOVAL AND INSTALLATION PROCEDURES

### (1) Components



T11E8048S30

※:Non - reusable parts

Unit:N·m{kgf·cm}

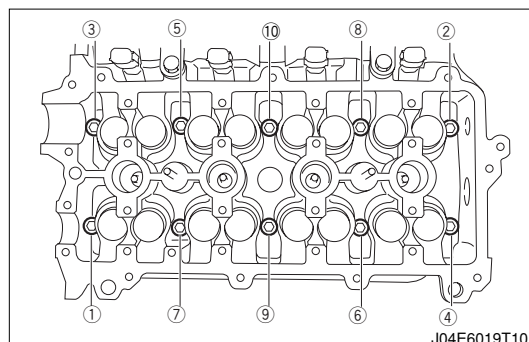
### (2) Removal and installation procedures

- |     |                                 |       |  |
|-----|---------------------------------|-------|--|
| ▲ 1 | a Cable Ay, accelerator control | ▼ ▲ 6 | f Cylinder head Ay (With intake manifold & exhaust manifold) |
| 2   | b Hose, booster vacuum          | ▲ 7   | g Gasket, cylinder head                                      |
| 3   | c Hose, water No.1              |       |  |
| 4   | d Hose, water No.2              |       |  |
| 5   | e Hose, fuel                    |       |  |

### 1-1-4 POINTS OF REMOVAL

#### (1) Head Ay, cylinder

1.Remove head Ay together with the intake manifold Ay and the exhaust manifold Ay by removing the attaching bolts in the sequence shown in the right figure.



J04E6019T10



## 1-1-5 POINTS OF INSTALLATION

### CAUTION

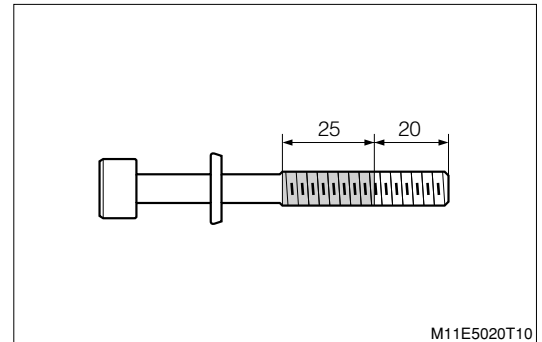
- Never use fire during the work.
- Wear safety goggles during the cleaning so as to protect your eyes.

### (1) Head Ay, cylinder/gasket cylinder head

1. Install the gasket to head Ay.

- (1) Measure the diameter of the threaded portion at several points of the shaded sections of the cylinder head bolt, as shown in the right figure, using a micrometer. Replace the cylinder head bolt if it is beyond the application limits.

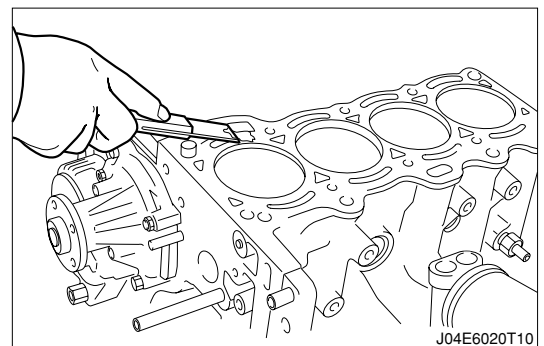
ALLOWABLE LIMIT: 8.75mm



- (2) Clean the gasket mounting surface of the cylinder block Ay and head Ay, using a scraper. Completely remove foreign objects, oil, etc.

### CAUTION

- Be very careful not to allow scraping debris of the gasket to fall into the water jacket and oil hole. Remove when dropped.

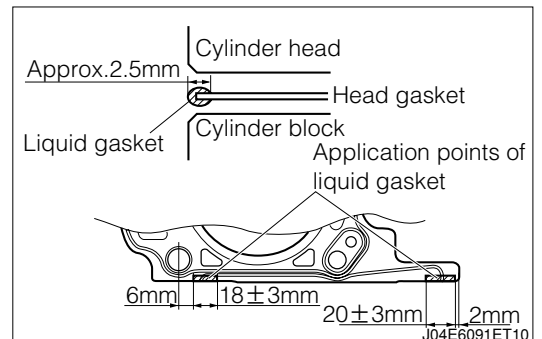


- (3) Apply liquid gasket, following the procedures in the right figure. Then, set the head Ay.

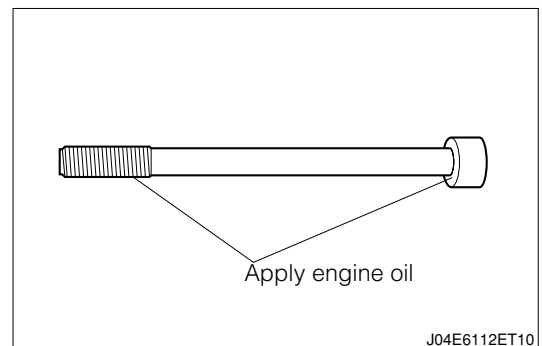
### CAUTION

- Assemble the head Ay within 15 minutes after application of the liquid gasket.
- Care must be exercised so that the valve lifter will not drop off from the head Ay.

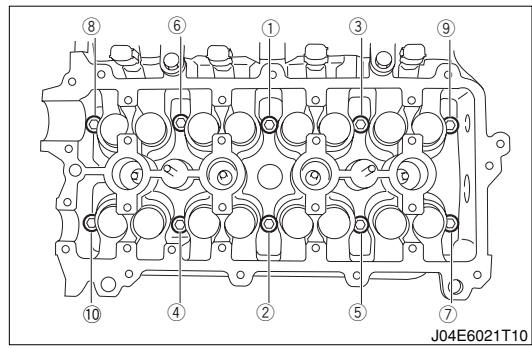
ADHESIVE: Three Bond1207B



- (4) Assemble a plate washer to the head Ay. Then, apply engine oil to the threaded portion of the bolts and seating surface on the bolt side. Then, perform the assembling operations.



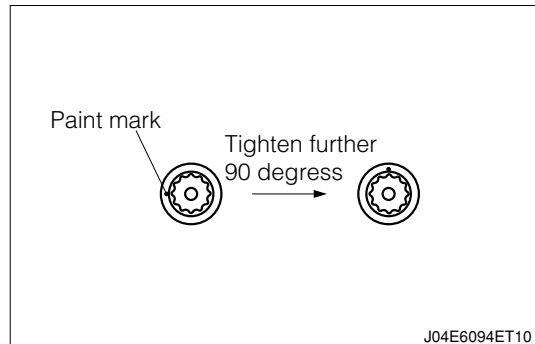
- (5) To assemble the cylinder head Ay, tighten the bolts over 2 or 3 stages in the sequence shown in the diagram on the right. Then, tighten them to the specified torque.



- (6) After tightening to the specified torque, retighten them  $90^{+10}$  degrees in the same sequence.

**NOTE**

- It is recommended to put a paint mark on the top of the head bolts in the same direction. After tightening 90 degrees in the sequence above, ensure that all the bolt marks, which have been turned 90 degrees, are facing the same direction.



**(2) Cable Ay, accelerator control**

1. Install the accelerator control Cable Ay.  
Refer to Page B3-11.

**1-1-6 OPERATION AFTER INSTALLATION**

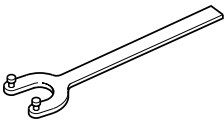

1. Install each connector, clamp and hose.
2. Install the camshaft Ay.  
Refer to Page B2-41.
3. Install the timing chain Ay.  
Refer to Page B2-35.
4. Install the oil pan Ay.  
Refer to Page B5-22.
5. Install the exhaust manifold stay.  
Refer to Page B4-4.
6. Install the air cleaner Ay W/element.  
Refer to Page B3-9.
7. Install the hose, air cleaner No.1.  
Refer to Page B3-9.
8. Install the engine Ay.  
Refer to Page B2-49.
9. Replenish the engine oil.  
Refer to Page B5-14.
10. Replenish the coolant.
11. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.  
Refer to Page B1-17.

## 2 TIMING CHAIN

### 2-1 REMOVAL AND INSTALLATION

#### 2-1-1 ARTICLES TO BE PREPARED

##### SST

Shape	Part No.	Part name
	09278-87201-000	Tool,timing belt pulley holding
	09223-87202-000	Replacer,crankshaft front oil seal

##### Tool

Hexagonal rod wrench(Width across flats:2.5mm)

##### Instrument

Torque wrench

##### Lubricant,adhesive,others

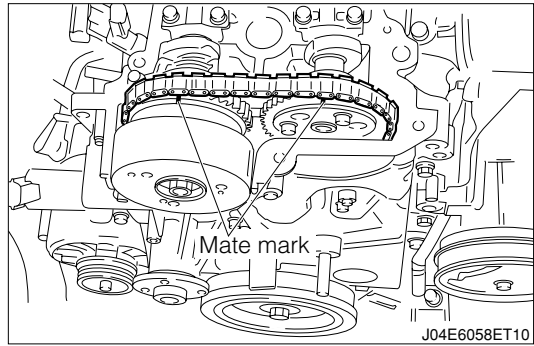
Engine oil,Three Bond1207B

#### 2-1-2 OPERATION BEFORE REMOVAL

- 1.Drain the engine oil.  
Refer to Page B5-14.
- 2.Remove the air cleaner Ay W/element.  
Refer to Page B3-9.
- 3.Remove the engine Ay.  
Refer to Page B2-49.
- 4.Remove the water pump pully.  
Refer to Page B6-11.
- 5.Remove the coil Ay, W/ignitor.  
Refer to Page B10-6.
- 6.Remove the cylinder head cover.  
Refer to Page B2-41.
- 7.Remove the oil pan Ay.  
Refer to Page B5-22.

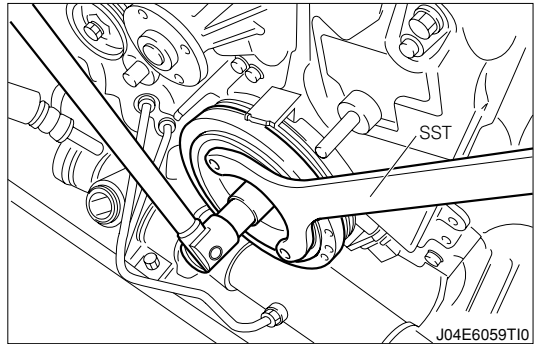


2.Ensure that the mating mark of the camshaft timing sprocket is at the top position. If it is not at the top position, turn the crankshaft S/A once so that it comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



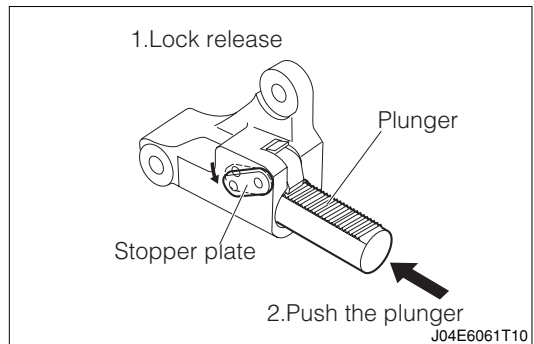
3.While preventing rotation, using the SST, remove the pulley Ay.

SST: 09278-87201-000



## (2) Chain, timing

1.Move the stopper plate of the timing chain tensioner S/A downward and push in the plunger as far as it will go with the lock released.

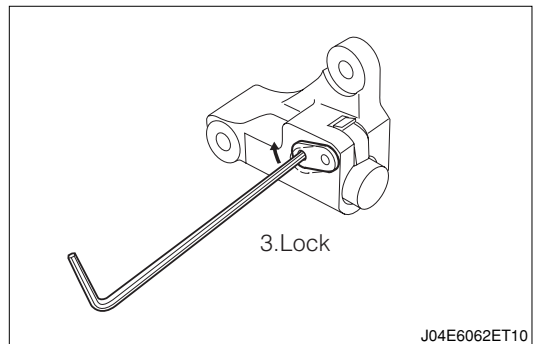


2.With the plunger locked, align the stopper plate and the hole of the timing chain tensioner S/A and insert a hexagonal wrench. (The plunger will be locked.)

TOOL: Hexagonal rod wrench(Width across flats:2.5mm)

3.Remove the timing chain tensioner S/A by removing the bolts and nuts.

4.Remove the chain.



## 2-1-5 POINTS OF INSTALLATION

### (1) Seal, type T oil

1.Install the seal to the timing chain cover Ay, following the procedure given below.

(1) Apply engine oil to the lip section of the seal.

(2) Press-fit the seal vertically, using the SST and bolts.

**SPECIFIED VALUE: Press-fitting amount**

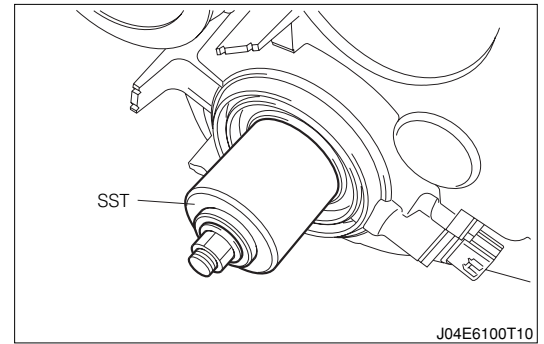
Protruding amount from end surface  
of timing chain cover Ay

Within 0.5mm

Press-fitting depth from end surface  
of timing chain cover Ay

Within 1mm

SST: 09223-87202-000



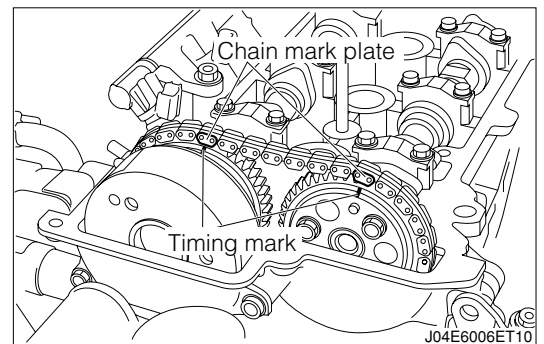
## (2) Chain, timing

1. Install the chain while aligning the mark plate (Gold) of the chain with the mating mark, as shown in the right figure.

2. Install the timing chain tensioner S/A.

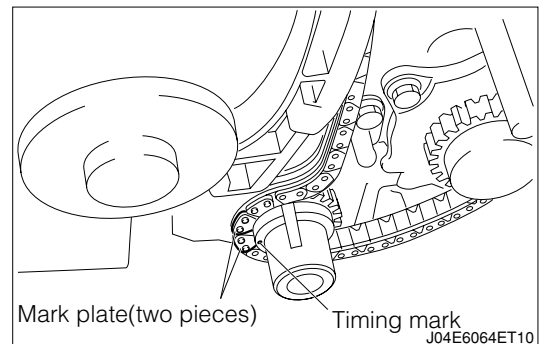
(1) Slightly turn the camshaft Ay counterclockwise (Reverse direction), using the hexagonal section of the camshaft Ay, so as to give a slack to the chain at the timing chain tensioner S/A side. Under this state, install the timing chain tensioner S/A.

(2) Pull out the hexagonal wrench of the timing chain tensioner S/A.



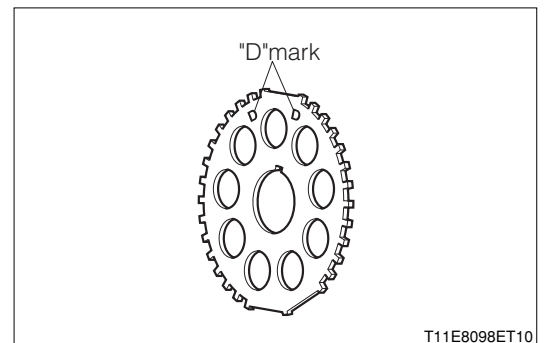
### NOTE

- Tension is applied on the chain.



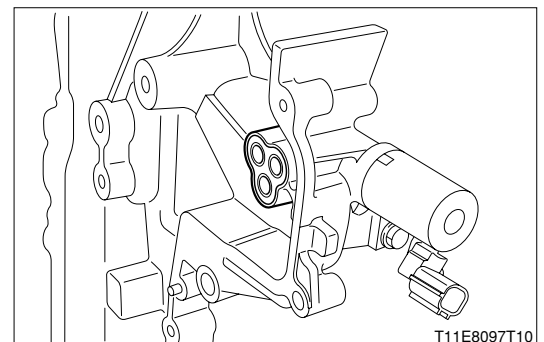
## (3) Plate, crank angle sensor

1. Install the plate in such a way that the D mark will come to the front.

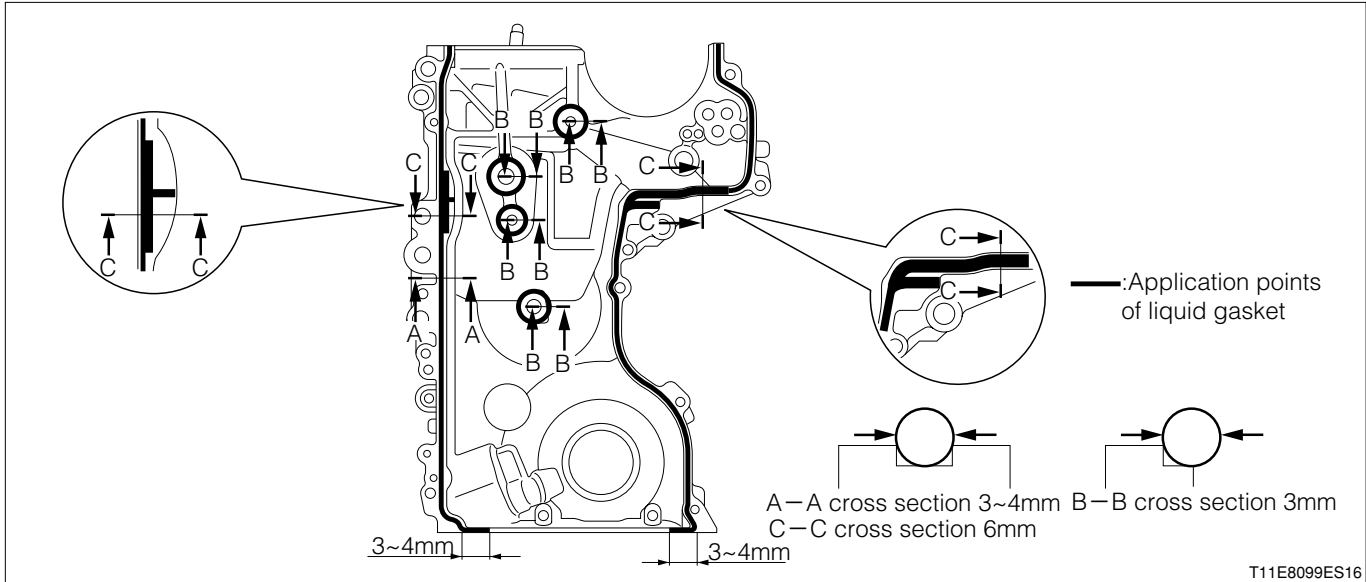


## (4) Cover Ay, timing chain

1. Assemble the timing chain cover gasket to the cover.



2. Apply liquid gasket to the position in the following figure and install the cover Ay.



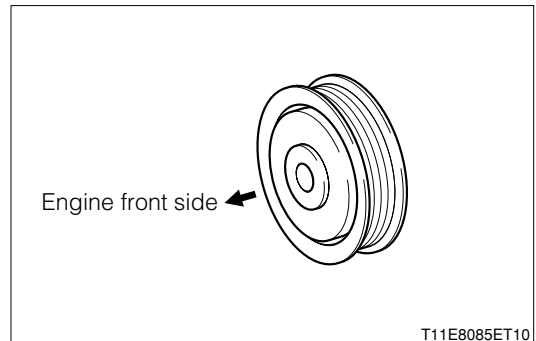
ADHESIVE: Three Bond1207B

### CAUTION

- Completely remove foreign matters and oil off from the installation surface.
- Perform the assembling within three minutes after application of the liquid gasket.

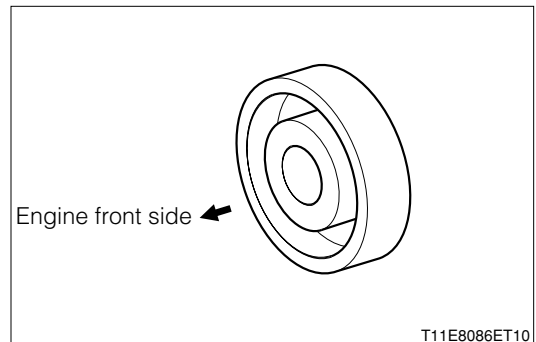
### (5) Pulley Ay, idler

1. Assemble the pulley Ay in such a way that the side at which the dust seal (Silver plate) is provided comes to the outside of the engine.



### (6) Pulley S/A idler No.1

1. Assemble the pulley S/A in such a way that the recessed section comes to the outside of the engine.





**2-1-6 OPERATION AFTER INSTALLATION**

1. Install the oil pan Ay.  
Refer to Page B5-22.
  
2. Install the cylinder head cover Ay.  
Refer to Page B2-35.
  
3. Install the coil Ay, W/ignitor.  
Refer to Page B10-6.
  
4. Install the water pump pully.  
Refer to Page B6-11.
  
5. Install the engine Ay.  
Refer to Page B2-49.
  
6. Install the air cleaner Ay W/element.  
Refer to Page B3-9.
  
7. Replenish the coolant.
8. Replenish the engine oil.  
Refer to Page B5-14.
  
9. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.  
Refer to Page B1-17.

# B2-41

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## 3 CAMSHAFT

### 3-1 REMOVAL AND INSTALLATION

#### 3-1-1 ARTICLES TO BE PREPARED

##### Tool

Hexagonal rod wrench(Width across flats:2.5mm),Hexagon wrench (Width across flats : 10mm )

##### Instrument

Torque wrench

##### Lubricant,adhesive,others

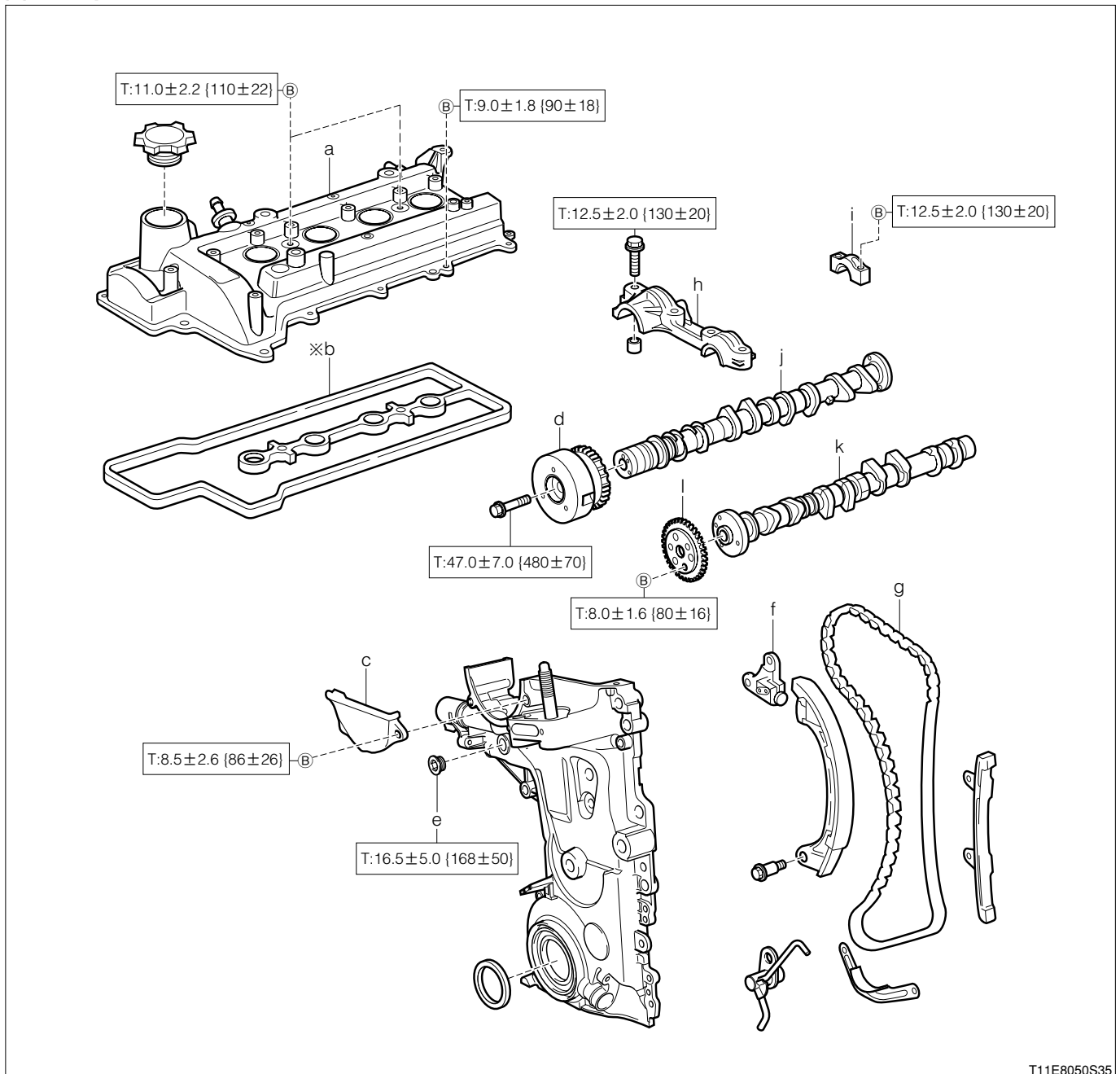
Engine oil,Three Bond1324,Three Bond1207B

#### 3-1-2 OPERATION BEFORE REMOVAL

- 1.Remove the negative (-) terminal of the battery.  
Refer to Page J5-3.
- 2.Remove the air cleaner Ay W/element.  
Refer to Page B3-9.
- 3.Remove the V-ribbed belt  
Refer to Page B1-21.
- 4.Remove the coil Ay, W/ignitor.  
Refer to Page B10-6.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E8050S35

※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

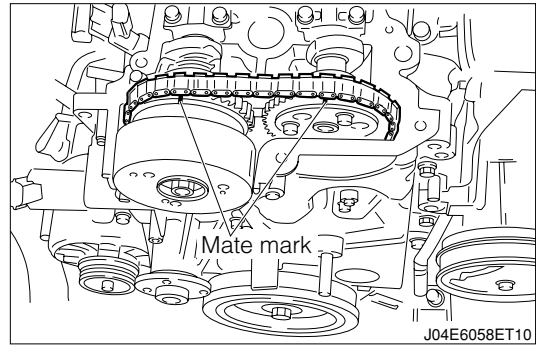
- |       |   |                             |       |   |                            |
|-------|---|-----------------------------|-------|---|----------------------------|
| ▲ 1   | a | Cover, cylinder head        | ▲ 7   | g | Chain, timing              |
| 2     | b | Gasket, cylinder head cover | ▼ ▲ 8 | h | Cap, camshaft bearing No.1 |
| 3     | c | Cover, timing chain No.2    | ▼ ▲ 9 | i | Cap, camshaft bearing No.2 |
| ▼ ▲ 4 | d | Sprocket, camshaft timing   | ▲ 10  | j | Camshaft Ay, No.1          |
| ▼ ▲ 5 | e | Plug, service hole screw    | ▲ 11  | k | Camshaft Ay No.2           |
| 6     | f | Tensioner S/A, timing chain | 12    | l | Sprocket, camshaft timing  |

3-1-4 POINTS OF REMOVAL

(1) Sprocket, camshaft timing

1. Turn the crankshaft Ay in the normal direction, until the timing mark of the crankshaft pulley Ay is aligned with the indicator of the timing chain cover Ay. (Set the No.1 cylinder to the top dead center.)

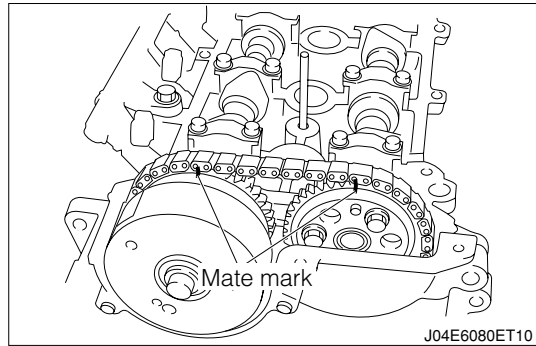
2.Ensure that the timing mark of the sprocket is at the top position. If it is not at the top position, turn the crankshaft Ay once so that it comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



3.Put a paint mark on each plate of the timing chain that is aligned with the mating marks of the sprocket and camshaft timing sprocket.

**NOTE**

- The timing chain is assembled with gold mark plates at three places. When the gold mark plates and the mating marks of each of the timing sprocket and timing gear are aligned with each other, the above operation is not required.



4.Turn the crankshaft 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when removing the camshaft Ay.

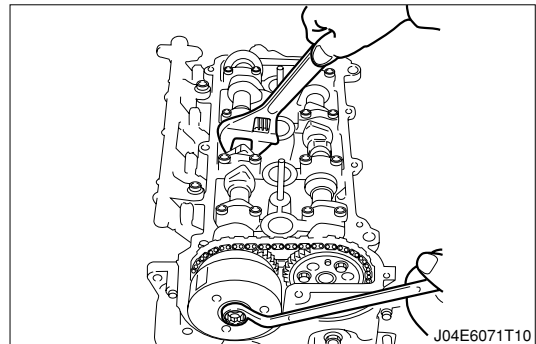
5.Loosen the sprocket attaching bolts, using the hexagonal section provided for servicing of the camshaft.

**CAUTION**

- Here, just loosen the bolts and do not remove the bolts and sprocket.

**NOTE**

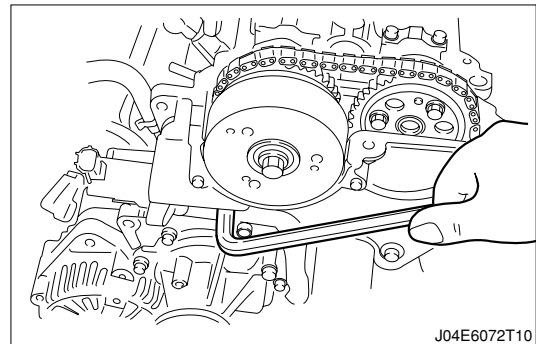
- The timing chain and sprocket will interfere with each other if the bolts are loosened after the timing chain has been removed. Therefore, loosen the bolts in advance.



**(2) Plug, service hole screw**

1.Remove the plugs using a hexagon wrench.

TOOL: Hexagon wrench (Width across flats : 10mm)

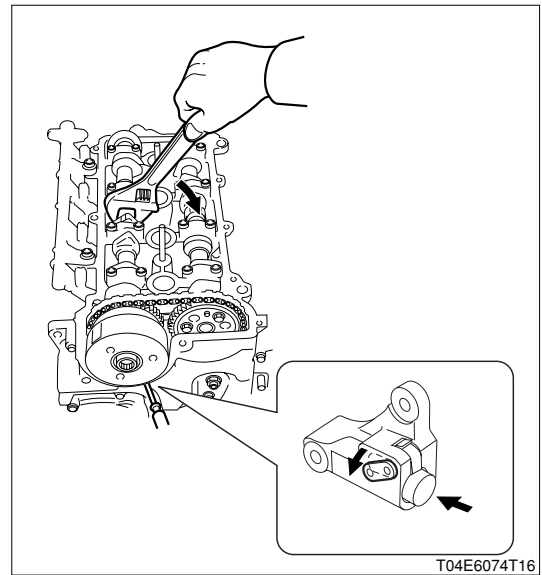
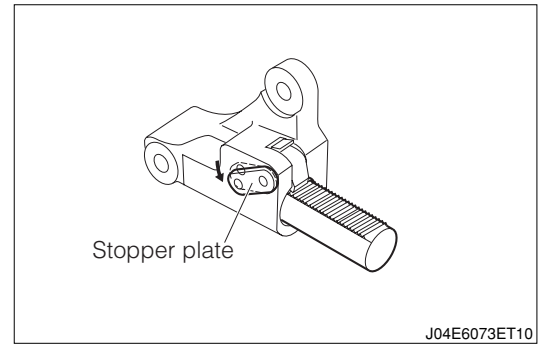


2. Move the stopper plate of the timing chain tensioner S/A downward from the service hose screw plug, using a flat screwdriver. Then, maintain the released condition.

**NOTE**

- By this operation, the plunger of the timing chain tensioner S/A will be unlocked.
- If any difficulty is encountered in releasing the lock of the stopper plate, slightly turn it in a right-and-left direction, using the hexagonal section provided for servicing of the camshaft Ay.

3. Slightly turn the camshaft Ay clockwise (Normal direction), using the hexagonal section provided for servicing of the camshaft Ay, so that the timing chain pushes the plunger section of the timing chain tensioner S/A.



4. While maintaining the above condition, remove the flat screwdriver from the plug and align the stopper plate with the hole of the timing chain tensioner S/A. Then, insert a hexagonal wrench.

TOOL: Hexagonal rod wrench (Width across flats: 2.5mm)

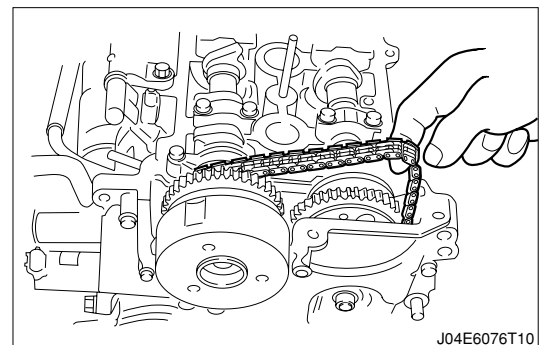
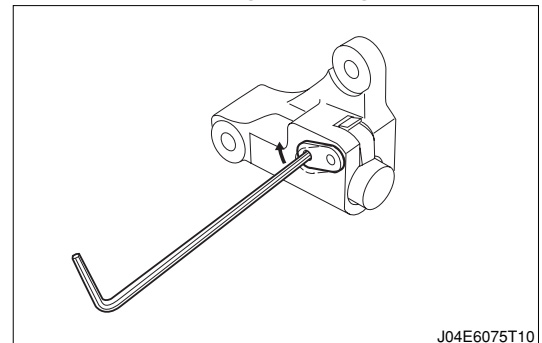
**CAUTION**

- Maintain the camshaft Ay using the hexagonal section for servicing.
- Secure the hexagonal wrench so that it would not come out by means of a tape or the like.

**NOTE**

- By this operation, the plunger of the timing chain tensioner S/A will be held in a pushed state.

5. Remove the timing chain from the camshaft timing sprocket.



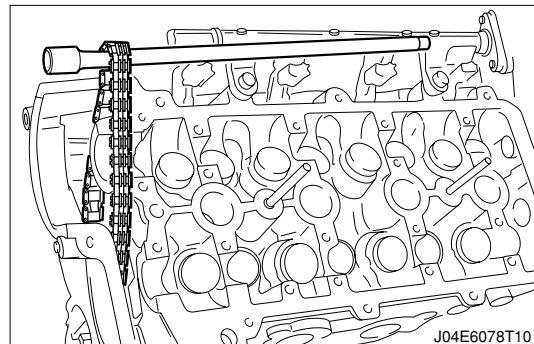
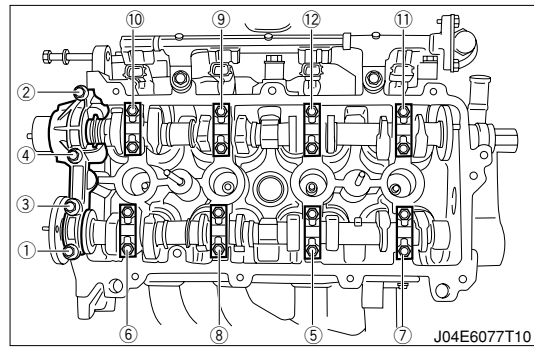
## (3) Camshaft bearing No.1/No.2 caps

1. Remove the bolts in the sequence shown in the right figure and remove the camshaft bearing No.1/No.2 caps.

### NOTE

- The bolts of the camshaft bearing cap No.2 may be removed from either side.
- When the removal of either the camshaft Ay No.1 or No.2 is needed, first remove the camshaft bearing cap No.1 attaching bolts in the sequence of ①-④. Then, remove the camshaft bearing cap No.2 of the camshaft Ay that needs to be removed in the sequence shown in the figure.

2. After the removal of the camshaft Ay, hold the timing chain by inserting a rod, etc. so that the timing chain will not fall.



## 3-1-5 INSPECTION

### (1) Camshaft timing sprocket check

#### CAUTION

- Do not disassemble the camshaft timing sprocket (DVVT controller).

1. Secure the hexagonal section provided for servicing the No.1 camshaft assembly to a vice.
2. Temporarily tighten the attaching bolts of the camshaft timing sprocket.
3. Hold one of the two advanced timing side ports (The figure on the right) of the No.1 camshaft Ay with your fingers or block the advanced timing side port by a tape, etc.
4. Apply air pressure to the other advanced timing side port using air tools.

#### CAUTION

- Care must be exercised as to splashing oil.

#### NOTE

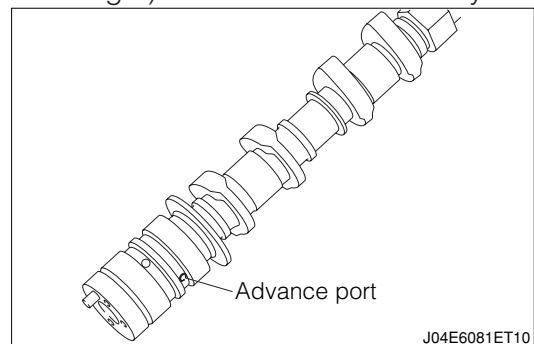
- The most retard timing lock is disengaged.

5. At this time, ensure that the most retard timing angle lock of the camshaft timing sprocket is disengaged and the camshaft timing sprocket can be freely moved by the hand without any binding in the range of about 30 degrees.

#### CAUTION

- The camshaft timing sprocket is locked when it comes at the most retard angle position.

6. After the inspection, lock the camshaft timing sprocket at the most retard timing position. Then, remove the bolts and camshaft timing sprocket.



### 3-1-6 POINTS OF INSTALLATION

#### (1) Camshaft Ay, No.1/No.2

1. Turn the crankshaft about 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when installing the camshaft.

2. Install the camshaft Ay, No.1/No.2.

(1) Apply engine oil to each of the cam sections of the camshaft Ay, journal sections of the cylinder head Ay and the top of the valve lifter.

LUBRICANT: Engine oil

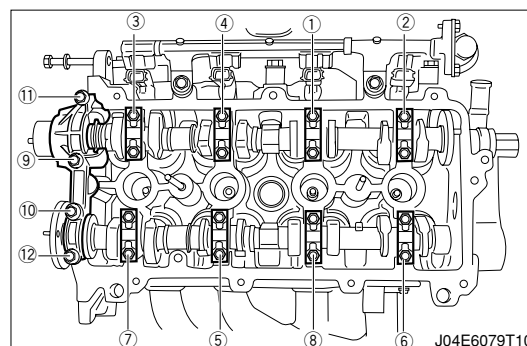
(2) Set the No.1 camshaft Ay so that the cam noses of the No.3 cylinder and No.4 cylinder may press the valve lifters. Also, set the No.2 camshaft Ay so that the cam noses of the No.2 cylinder and No.4 cylinder may press the valve lifters.

#### (2) Cap, camshaft bearing No.1/No.2

1. Set the camshaft bearing No.1/No.2 caps and tighten the attaching bolts to the specified torque in the sequence shown in the right figure.

#### CAUTION

- The front marks (Arrow marks) indicated on the top of the camshaft bearing No.1/No.2 caps are facing towards the engine front side.
- Refer to the following table for the installation positions of the stamped No.'s indicated on the top of the camshaft bearing No.1/No.2 caps.



Installation positions of camshaft bearing No.1/No.2 caps

Stamping No.	Installation position	
	Intake/exhaust	Cylinder No.
I1	Intake side	Cylinder No.1
I2		Cylinder No.2
I3		Cylinder No.3
I4		Cylinder No.4
E1	Exhaust side	Cylinder No.1
E2		Cylinder No.2
E3		Cylinder No.3
E4		Cylinder No.4

#### (3) Sprocket, camshaft timing

1. Install the sprocket. (DVVT controller)

(1) Apply engine oil to the installation surface with the No.1 camshaft Ay.

LUBRICANT: Engine oil

(2) Perform the insertion in such a way that the knock pin on the forward end of the No.1 camshaft Ay will fit into the knock hole of the sprocket.

#### CAUTION

- After the insertion, slightly turn the sprocket to ensure that the knock has been fitted securely.
- It should be noted that the seal section of the end surface of the sprocket may be scratched if the sprocket is turned while it is strongly pressed under a condition that the knock is not fitted.



## (4) Chain, timing

1. Install the chain.

### NOTE

- Perform the installation in such a way that the mating mark of the camshaft timing sprocket is aligned with the mating mark applied during the removal of the chain.

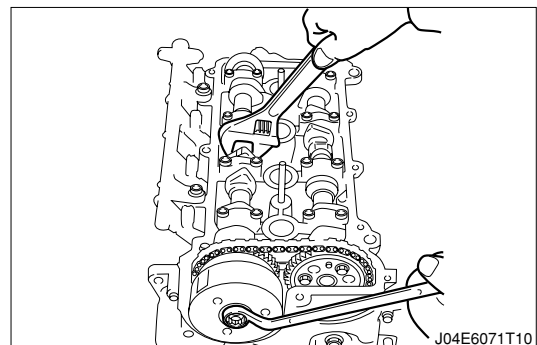
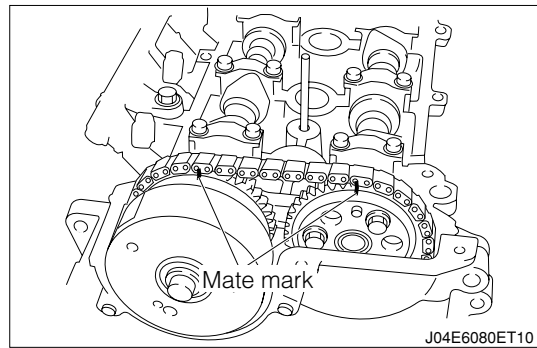
### NOTE

- Install the chain to either of the camshaft Ay in advance. Turn it in a right-and-left direction, using the hexagonal section provided for servicing of the camshaft Ay, so that the mating mark of the other camshaft timing sprocket is aligned with the mating mark of the chain.

(1) Pull out the hexagonal wrench from the timing chain tensioner S/A.

### NOTE

- Slightly turn the camshaft Ay counterclockwise (Reverse rotation), using the hexagonal section provided for servicing of the camshaft Ay, so as to give a slack to the chain at the timing chain tensioner side. Under this state, pull out the hexagonal wrench.
- (2) Tighten the camshaft timing sprocket attaching bolts to the specified torque, using the hexagonal section provided for servicing of the camshaft Ay.



## (5) Plug, service hole screw

1. Clean the plugs and the bolt holes of the timing chain cover Ay. Then, apply liquid gasket to the threaded portion of the plugs and perform the installation.

ADHESIVE: Three Bond1324

TIGHTENING TORQUE:  $16.5 \pm 4.9 \text{ N} \cdot \text{m}$  { $170 \pm 50 \text{ kgf} \cdot \text{cm}$ }

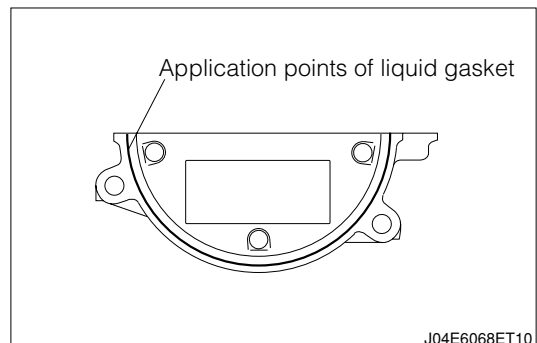
TOOL: Hexagon wrench (Width across flats : 10mm)

2. Apply liquid gasket to the position in the right figure and install timing chain No.2 cover.

ADHESIVE: Three Bond1207B

### CAUTION

- Completely remove foreign matters and oil off from the installation surface.
- Perform the installation within three minutes after application of the liquid gasket.





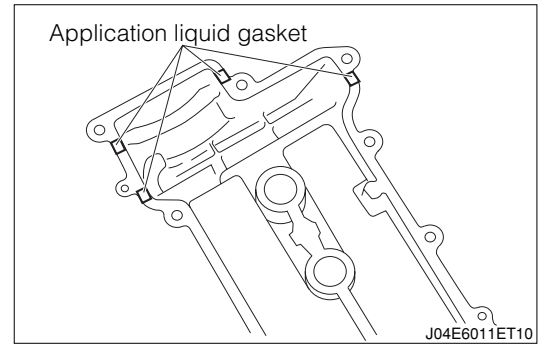
**(6) Cover, cylinder head**

1. Set the cylinder head cover gasket in the gasket groove of the cover and insert the cylinder head cover gasket to the center boss.

**SPECIFIED VALUE:** Inserting amount 2–5mm

2. Apply liquid gasket to the cylinder head cover gasket at the positions shown in the right figure. The guide of the application amount is about 5 mm Dia. × 2mm in height.

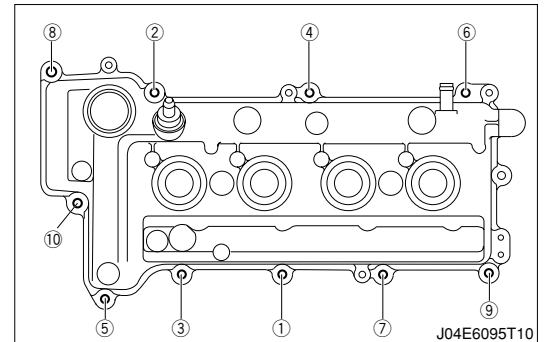
**ADHESIVE:** Three Bond1207B



3. Assemble the cover attaching bolts in the sequence shown in the right figure.
4. Install the cover attaching nuts (Two sections) with a seal washer interposed.

**CAUTION**

- Install the seal washer with the white color facing upwards.

**3-1-7 OPERATION AFTER INSTALLATION**

1. Install the coil Ay, W/ignitor.  
Refer to Page B10-6.
2. Install the V-ribbed belt and adjust the tension.  
Refer to Page B1-22.
3. Install the air cleaner Ay W/element.  
Refer to Page B3-9.
4. Connect the negative (-) terminal of the battery.  
Refer to Page J5-3.

## 4 ENGINE ASSY

### 4-1 REMOVAL AND INSTALLATION

#### WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.
- When the oil is hot, do not remove the drain plug or oil cooler hose.

#### 4-1-1 ARTICLES TO BE PREPARED

##### Instrument

Torque wrench
---------------

##### Lubricant, adhesive, others

Engine hanger No.1 (Replacement parts), Engine hanger No.2 (Replacement parts), Engine hanger attaching bolt (Replacement parts), Wooden block
--

**4-1-2 OPERATION BEFORE REMOVAL**

1.Remove the fuel pressure.

Refer to Page B7-13.

2.Remove the battery and battery carrier.

Refer to Page J5-3.

3.Disconnect the engine wire from the fuel injection computer Ay, and pull it into the engine compartment.

4.Disconnect the hose leading to the charcoal canister Ay.

(1) RHD vehicles

Refer to Page B9-1.

(2) LHD vehicles

Refer to Page B9-2.

5.Disconnect the vacuum hose Ay from the brake booster Ay.

Refer to Page E1-36.

6.Disconnect the accelerator control cable Ay at the throttle body side.

7.Remove the front bumper cover.

Refer to Page I2-2.

8.Install the front bumper reinforcement S/A and hood lock support.

Refer to Page I1-1.

9.Remove the air cleaner cap S/A and air cleaner No.1 hose.

Refer to Page B3-9.

10.Remove the wheel disc. (Front)

Refer to Page C3-3.

11.Remove the engine undercover RH and engine undercover LH.

12.Drain the coolant.

13.Disconnect the water hose No.1 and water hose No.2 from the heater radiator Ay.

Refer to Page K1-11.

14.Remove the radiator Ay together with the oil cooler hose.

Refer to Page B6-13.

**CAUTION**

- Suspend the cooler condenser Ay on the vehicle side, using a cord, etc., without cutting its piping.

15.Remove the front exhaust pipe Ay.

Refer to Page B4-6.

16.Remove the V-ribbed belt

Refer to Page B1-22.

## B2-51

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17.Remove the front drive shaft Ay RH and front drive shaft Ay LH.

Refer to Page D2-8.

18.Disconnect the transmission control cable Ay from the transaxle.

Refer to Page F3-34.

19.Disconnect the fuel hose from the fuel delivery pipe Ay.

Refer to Page B7-23.

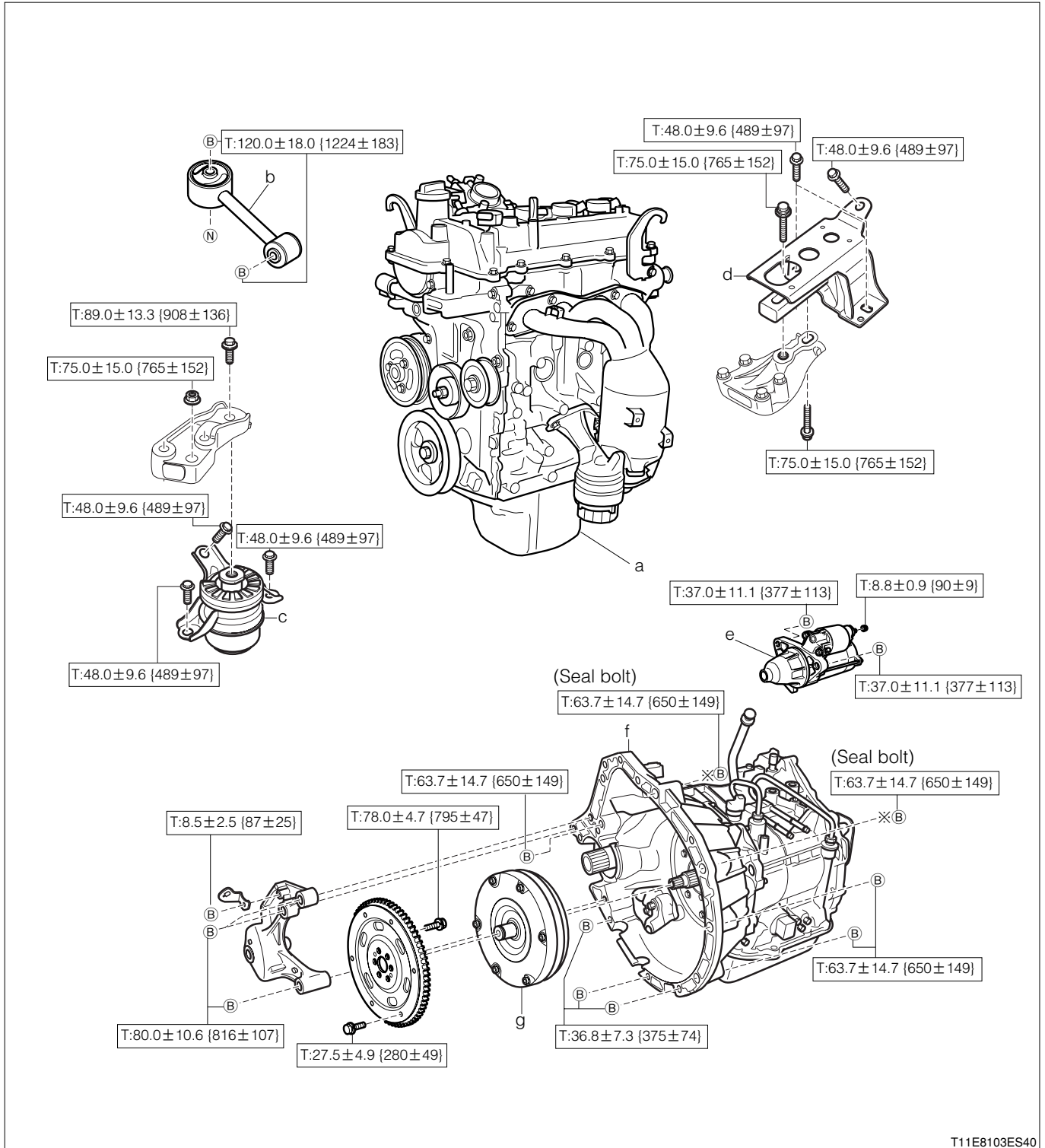
20.Remove the compressor Ay W/magnet clutch.

(1) Remove the compressor Ay by removing the attaching bolts of the compressor Ay without disconnecting its piping.

(2) Suspend the compressor Ay on the vehicle side, using a cord, etc.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E8103ES40

※:Non - reusable parts

Unit:N·m(kgf·cm)

Illust : automatic transaxle Ay

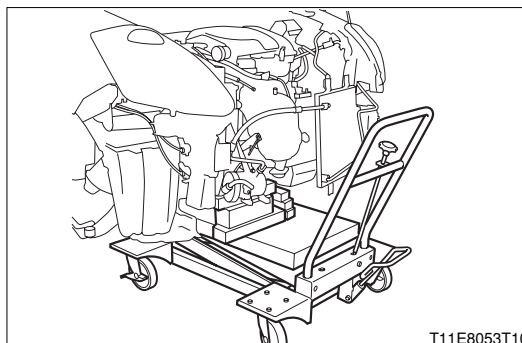
## (2) Removal and installation procedures

- |       |                                      |       |                           |
|-------|--------------------------------------|-------|---------------------------|
| ▼ ▲ 1 | a Engine Ay, W/transaxle Ay(A/T,M/T) | ▼ ▲ 6 | f Transaxle Ay, automatic |
| ▼ ▲ 2 | b Rod S/A, engine mounting control.  | ▼ ▲ 7 | g Converter Ay, torque    |
| ▼ ▲ 3 | c Insulator S/A, engine mounting, RH |       |                           |
| ▼ ▲ 4 | d Insulator S/A, engine mounting, LH |       |                           |
| ▼ ▲ 5 | e Starter Ay                         |       |                           |

### 4-1-4 POINTS OF REMOVAL

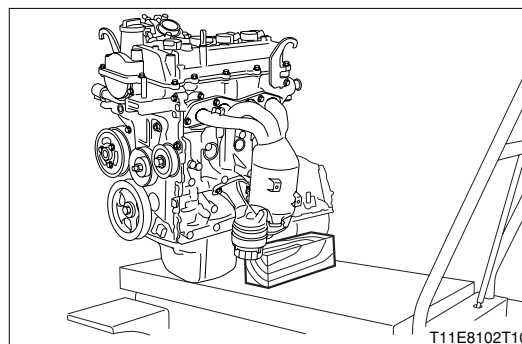
#### (1) Engine Ay, W/ transaxle Ay(A/T,M/T)

1. Set the engine lifter at the position shown in the figure.



2. With wooden blocks or the like, support the engine assembly W/transaxle assembly(A/T,M/T) in such a way that their balance is well kept.

(1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine block Ay.



#### CAUTION

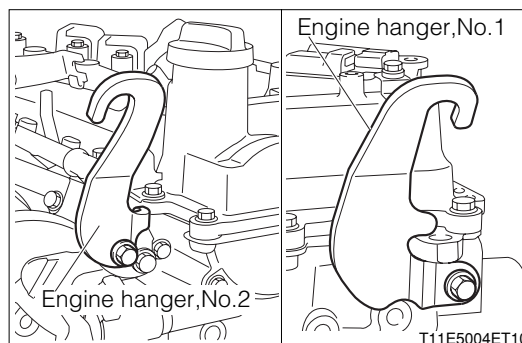
- Do not apply wooden blocks to the crankshaft pulley.

3. Install the engine hanger in the position shown in the right figure.

#### NOTE

- The engine hangers No.1 and No.2 and bolts with washers are supplied parts.

TIGHTENING TORQUE:  $24.0 \pm 4.8 \text{ N} \cdot \text{m}$  { $245 \pm 49 \text{ kgf} \cdot \text{cm}$ }



#### (2) Rod S/A, engine mounting control.

1. Remove the Rod S/A.  
Refer to Page B12-7.

#### (3) Insulator S/A, engine mounting, RH

1. Remove the insulator S/A.  
Refer to Page B12-1.

#### CAUTION

- Make sure that the engine Ay is supported in a well balanced way during the removal.

**(4) Insulator S/A, engine mounting, LH**

1. Remove the insulator S/A.  
Refer to Page B12-4.

**CAUTION**

- Make sure that the engine Ay is supported in a well balanced way during the removal.

**(5) Engine Ay, W/ transaxle Ay(A/T,M/T)**

1. By operating an engine lifter, remove the engine Ay from the vehicle with the transaxle Ay installed to it.

**CAUTION**

- Perform the removal, making sure that no connectors or hoses are left connected or that they are not interfering with other parts.
- Perform the removal, while exercising care so that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment.

**NOTE**

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

**(6) Starter Ay**

1. Remove the starter Ay  
Refer to Page B11-8.

**(7) Transaxle Ay(A/T,M/T)**

1. Remove the transaxle Ay from the engine Ay.  
Refer to Page F3-12.

**(8) Converter Ay, torque**

1. Remove the torque converter Ay.  
Refer to Page F3-12.

**4-1-5 POINTS OF INSTALLATION****(1) Converter Ay, torque**

1. Install the torque converter Ay.  
Refer to Page F3-12.

**(2) Transaxle Ay(A/T,M/T)**

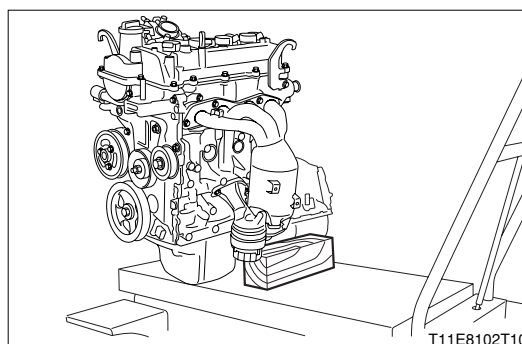
1. Install the transaxle Ay to the engine Ay.  
Refer to Page F3-12.

**(3) Engine Ay, W/transaxle Ay(A/T,M/T)**

1. Support the engine Ay with the transaxle Ay, using wooden blocks, etc., in a such a way that their balance is well kept.
  - (1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine.

**CAUTION**

- Do not apply wooden blocks to the crankshaft pulley.



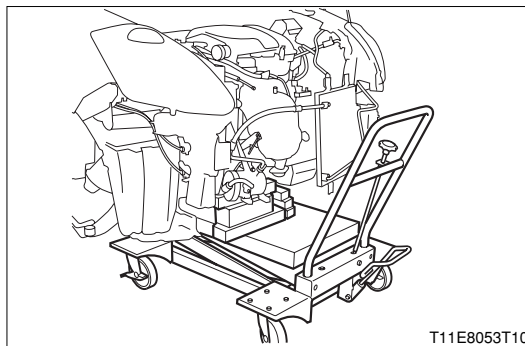
2. By operating the engine lifter, lift the engine assembly together with the transaxle assembly to the vehicle mounting position.

**NOTE**

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

**CAUTION**

- Perform the installation in such a way that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment



**(4) Starter Ay**

1. Install the starter Ay.  
Refer to Page B11-8.

**(5) Insulator S/A, engine mounting, LH**

1. Install the insulator S/A.  
Refer to Page B12-4.

**(6) Insulator S/A, engine mounting, RH**

1. Install the insulator S/A.  
Refer to Page B12-1.

**(7) Rod S/A, engine mounting control. (2WD vehicles)**

1. Install the Rod S/A.  
Refer to Page B12-7.

**(8) Engine Ay, W/transaxle Ay(A/T,M/T)**

1. Install each harness, connector and clamp.
2. Route the engine wire in the vehicle interior to connect it to the fuel injection computer Ay.
3. Install the earth wires of the engine section and transaxle case section.



**4-1-6 OPERATION AFTER INSTALLATION**

1. Install the compressor assembly. Adjust the V-belt tension.  
Refer to Page K1-22.
2. Install the front suspension crossmember S/A.  
Refer to Page C1-17.
3. Install the compressor Ay W/magnet clutch.  
Refer to Page K1-22.
4. Install the transmission control cable Ay to the transaxle.  
Refer to Page F3-34.
5. Install the front drive shaft Ay RH and front drive shaft Ay LH.  
Refer to Page D2-8.
6. Install the front exhaust pipe Ay.  
Refer to Page B4-6.
7. Install the radiator Ay together with the oil cooler hose to the vehicle.  
Refer to Page B6-13.
8. Connect the fuel hose to the fuel delivery pipe Ay.  
Refer to Page B7-23.
9. Connect the water hose No.1 and water hose No.2 to the heater radiator Ay.  
Refer to Page K1-11.  
  
Refer to Page K1-19.
10. Install the engine undercover RH and engine undercover LH.
11. Install the wheel disc. (Front)  
Refer to Page C3-3.
12. Install the air cleaner cap S/A and air cleaner hose No.1.  
Refer to Page B3-9.
13. Install the front bumper reinforcement S/A and hood lock support.  
Refer to Page I1-1.
14. Install the front bumper cover.  
Refer to Page I2-2.
15. Install the accelerator control cable Ay to the throttle body Ay.  
Refer to Page B3-11.
16. Install the brake booster Ay to the vacuum hose Ay.  
Refer to Page E1-36.

17. Connect the hose leading to the charcoal canister Ay.

(1) RHD vehicles

Refer to Page B9-1.

(2) LHD vehicles

Refer to Page B9-2.

18. Connect the harness wire at the vehicle side and the engine side.

19. Install the battery and the battery carrier.

Refer to Page J5-3.

20. Fill cooling water.

21. Remove the engine hanger.

22. Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.

Refer to Page B1-17.