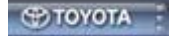


<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5LK
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): CYLINDER BLOCK: PRECAUTION; 2016 - 2019 MY Prius [11/2015 - ]		

## PRECAUTION

### HINT:

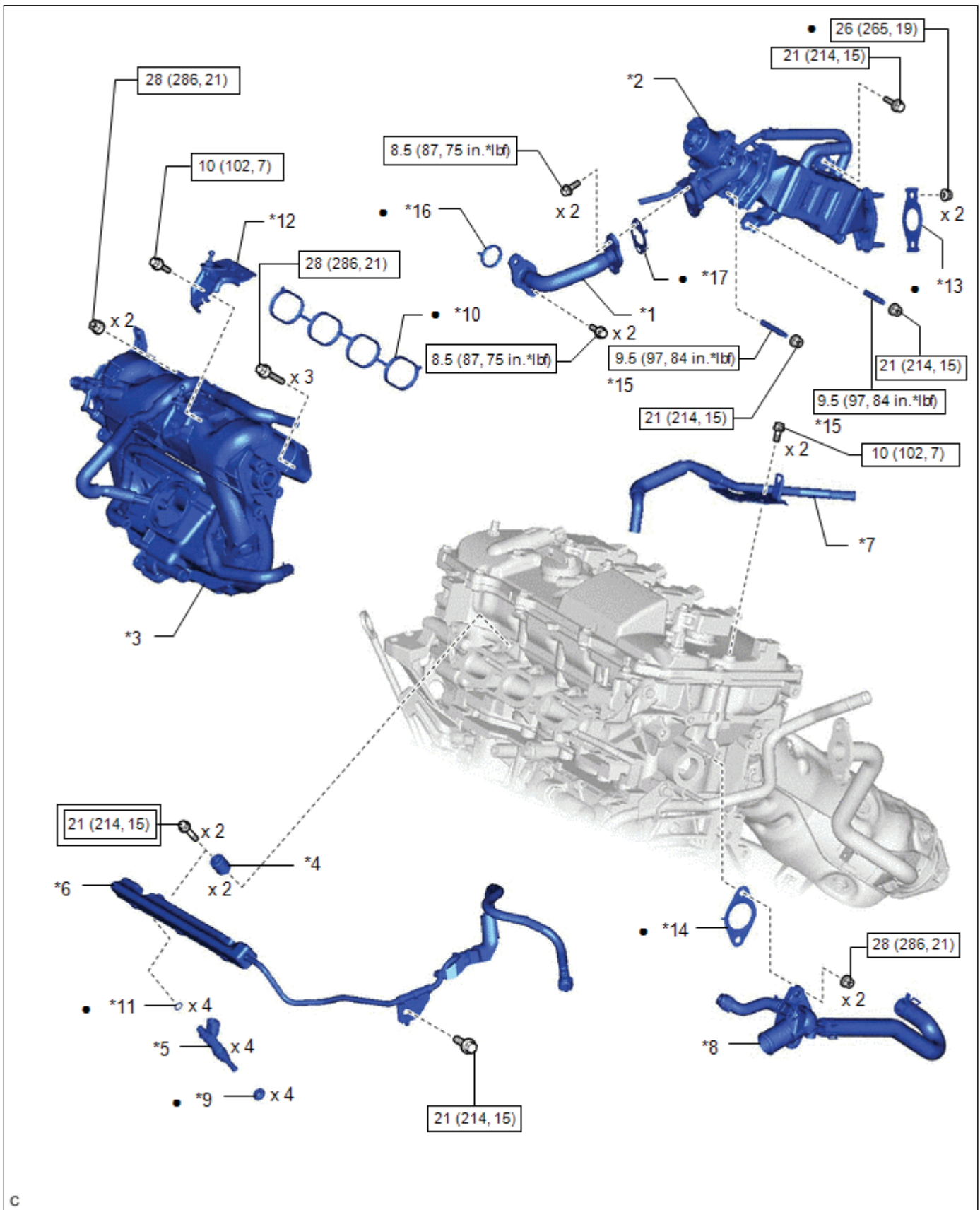
- Any digits beyond the 1/100 mm (1/1000 in.) place for standard, minimum and maximum values should be used as a reference only.
- When both standard and maximum or minimum values are listed for an inspection, use the standard value as a reference only and base any judgments on the maximum and minimum values.



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5L6
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD GASKET: COMPONENTS; 2016 - 2019 MY Prius [11/2015 - ]		



## [COMPONENTS](#)

## [ILLUSTRATION](#)

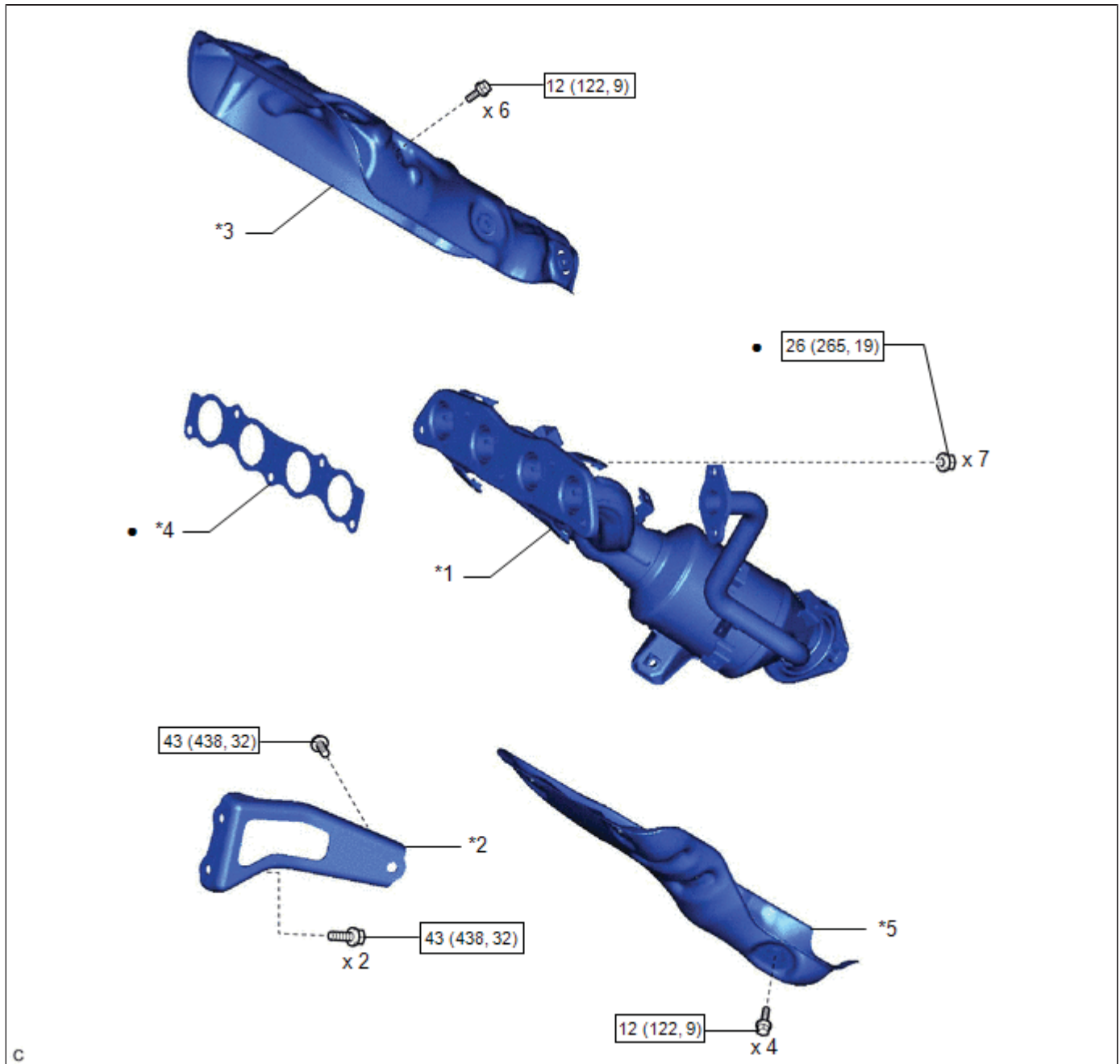



c

*1	EGR PIPE ASSEMBLY	*2	EGR VALVE ASSEMBLY WITH EGR COOLER
*3	INTAKE MANIFOLD	*4	NO. 1 DELIVERY PIPE SPACER
*5	FUEL INJECTOR ASSEMBLY	*6	FUEL DELIVERY PIPE SUB-ASSEMBLY
*7	FUEL VAPOR FEED PIPE	*8	WATER OUTLET

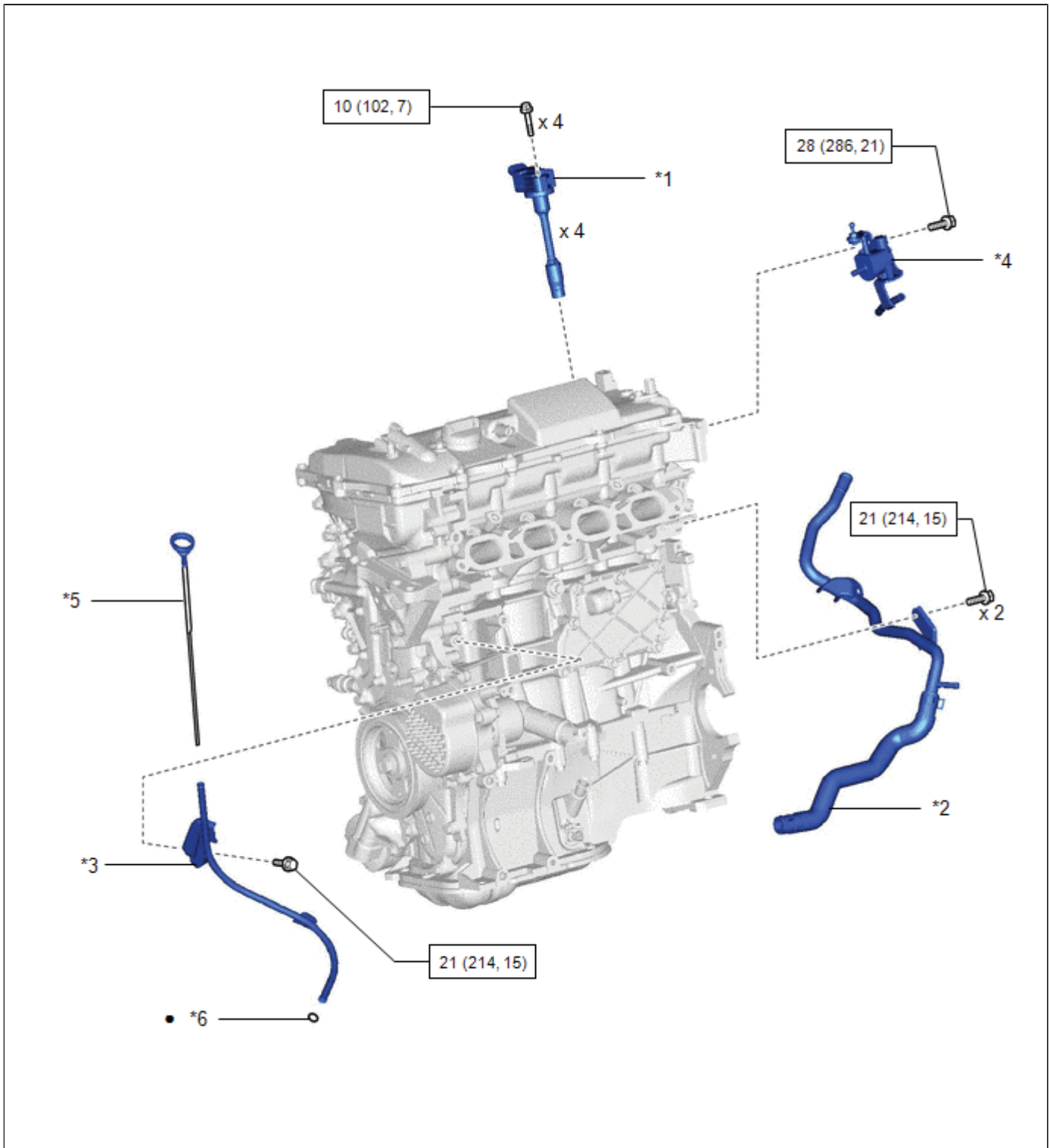
*9	INJECTOR VIBRATION INSULATOR	*10	NO. 1 INTAKE MANIFOLD TO HEAD GASKET
*11	O-RING	*12	WIRE HARNESS SUPPORT
*13	EGR COOLER GASKET	*14	WATER OUTLET GASKET
*15	STUD BOLT	*16	INLET EGR GASKET
*17	EGR PIPE GASKET	-	-
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
•	Non-reusable part	-	-

## ILLUSTRATION



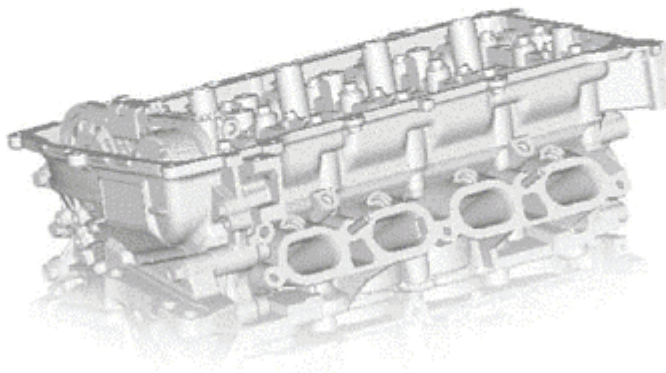
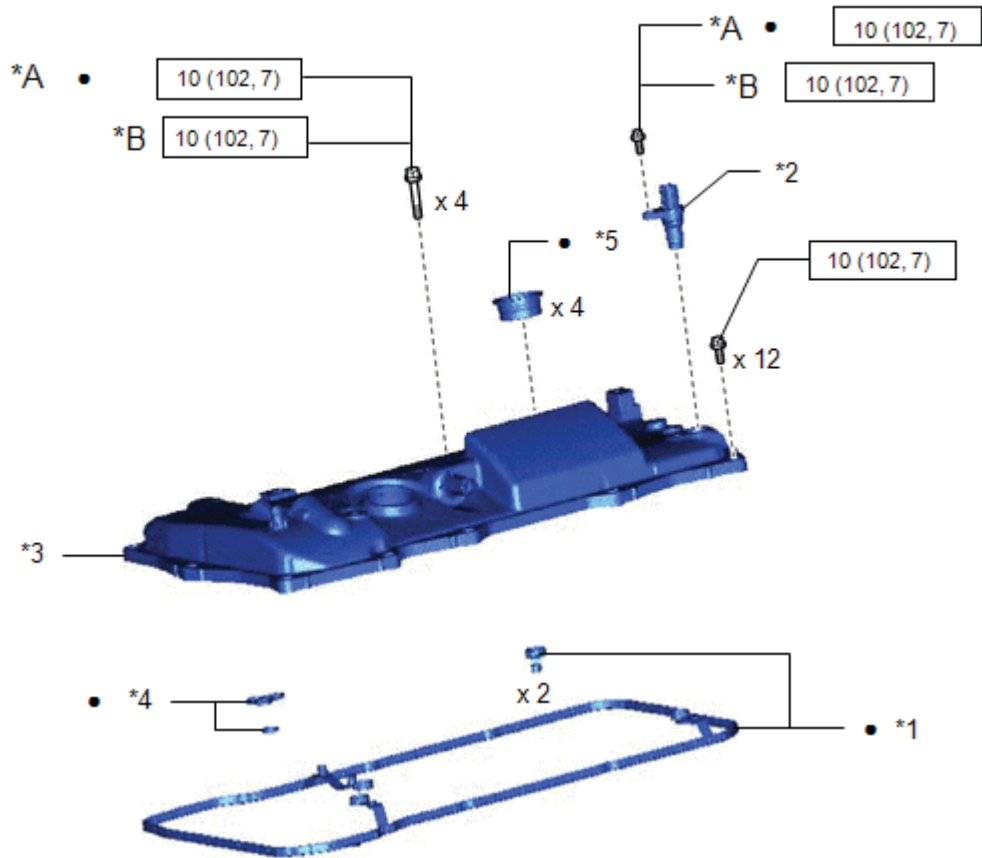
*1	EXHAUST MANIFOLD (TWC: Front Catalyst)	*2	MANIFOLD STAY
*3	NO. 1 EXHAUST MANIFOLD HEAT INSULATOR	*4	EXHAUST MANIFOLD GASKET
*5	NO. 2 EXHAUST MANIFOLD HEAT INSULATOR	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque	•	Non-reusable part

## ILLUSTRATION



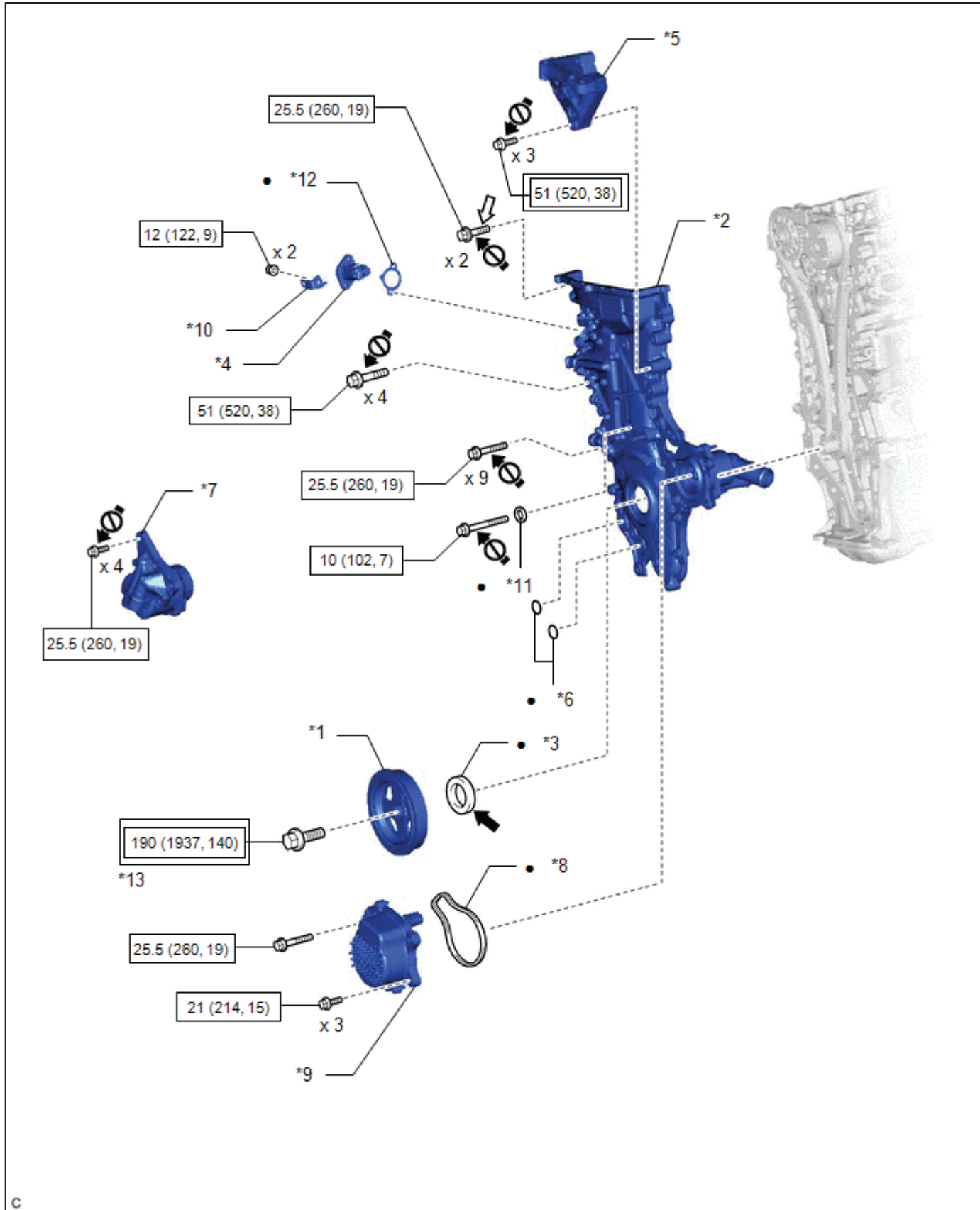
*1	IGNITION COIL ASSEMBLY	*2	NO. 6 WATER BY-PASS PIPE
*3	ENGINE OIL LEVEL DIPSTICK GUIDE	*4	PURGE VALVE (PURGE VSV)
*5	ENGINE OIL LEVEL DIPSTICK	*6	ENGINE OIL LEVEL DIPSTICK GUIDE O-RING
	N*m (kgf*cm, ft.*lbf): Specified torque	•	Non-reusable part

## ILLUSTRATION



*A	for Bolt with Adhesive	*B	except Bolt with Adhesive
*1	CYLINDER HEAD COVER GASKET	*2	CAMSHAFT POSITION SENSOR
*3	CYLINDER HEAD COVER SUB-ASSEMBLY	*4	GASKET
*5	SPARK PLUG TUBE GASKET	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque	•	Non-reusable part

# ILLUSTRATION



c






\*1

CRANKSHAFT PULLEY

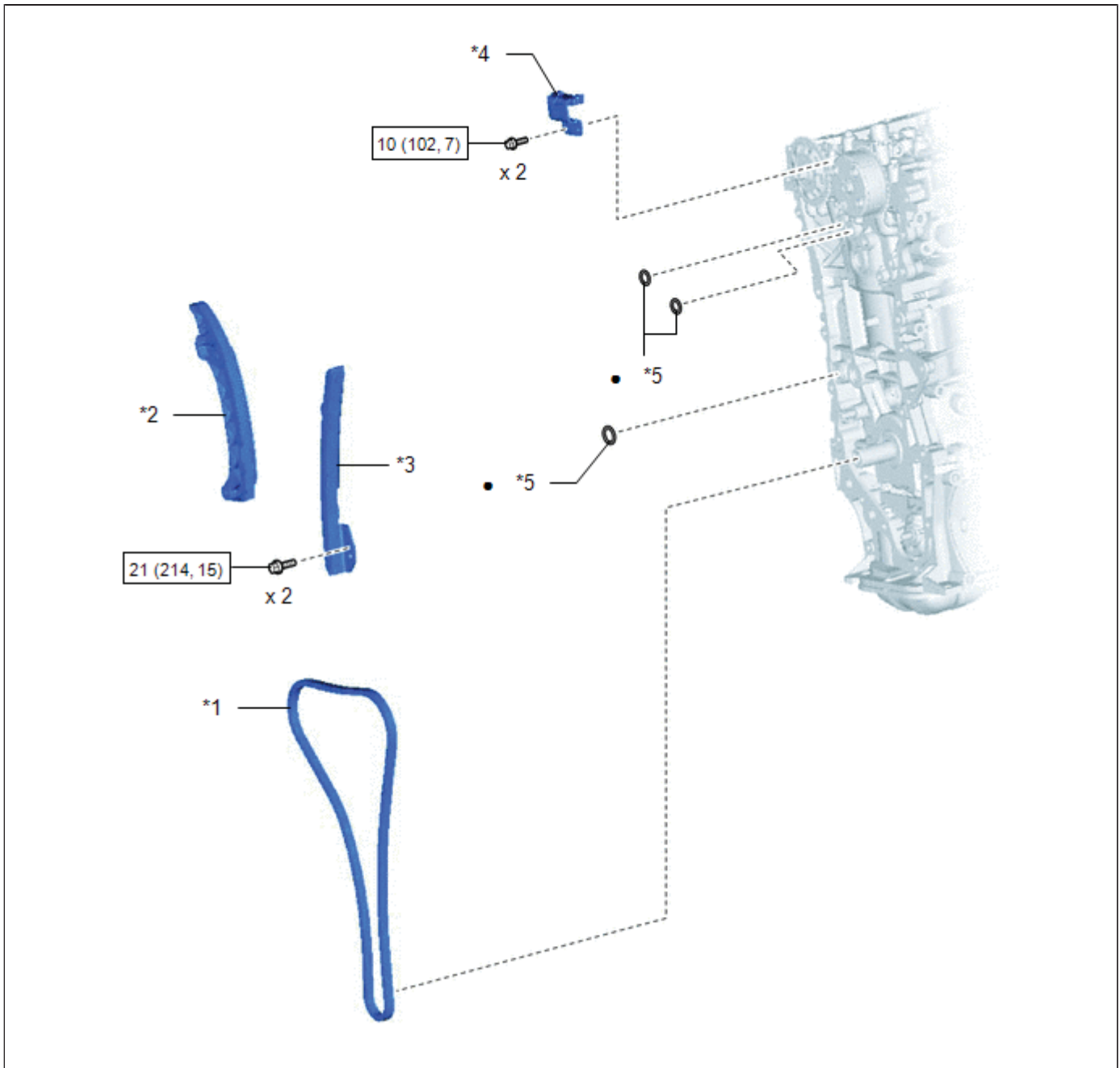
\*2

TIMING CHAIN COVER SUB-



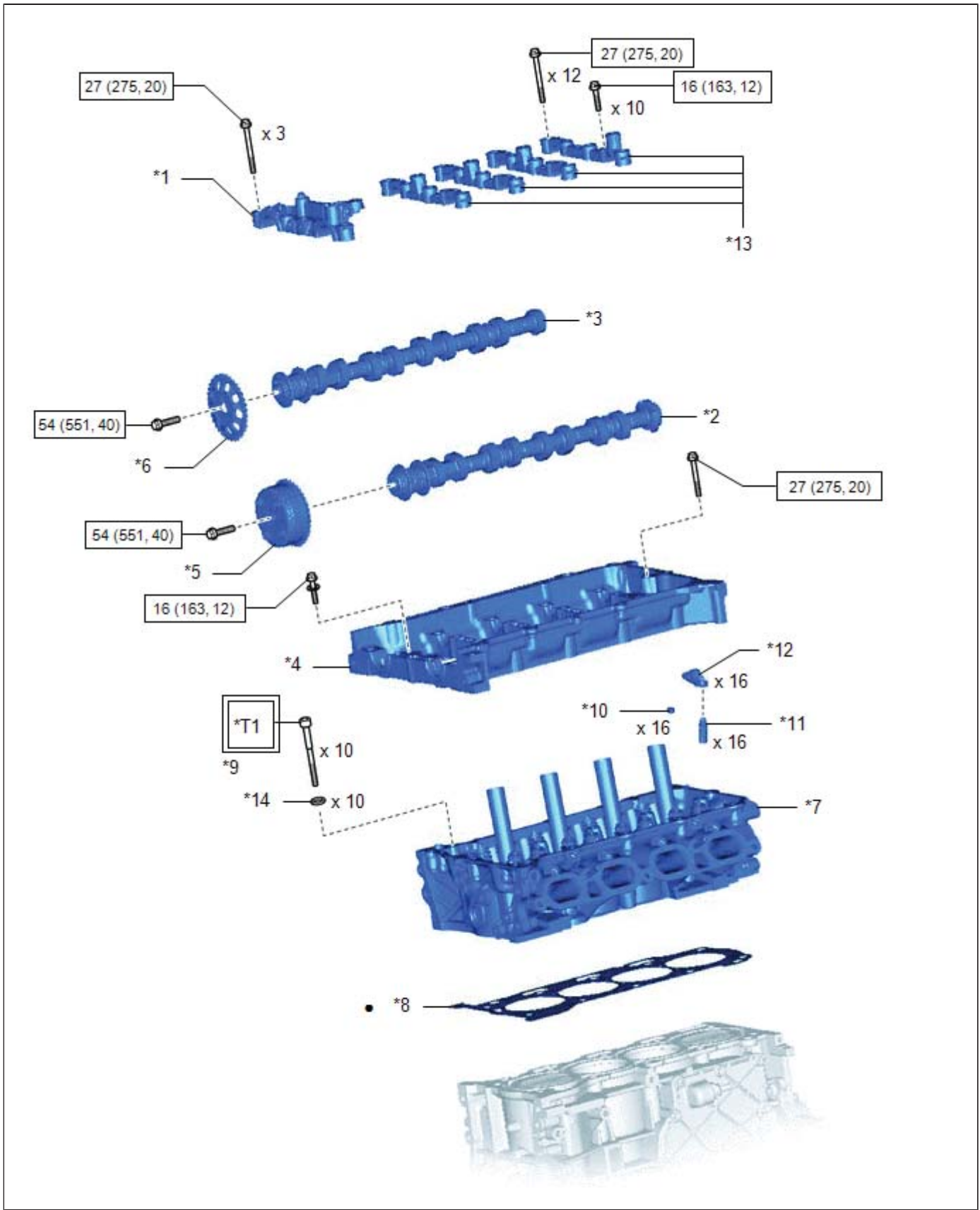
			ASSEMBLY
*3	TIMING CHAIN COVER OIL SEAL	*4	NO. 1 CHAIN TENSIONER ASSEMBLY
*5	ENGINE MOUNTING BRACKET RH	*6	OIL FILTER BRACKET O-RING
*7	OIL FILTER BRACKET	*8	WATER PUMP GASKET
*9	ENGINE WATER PUMP ASSEMBLY	*10	BRACKET
*11	SEAL WASHER	*12	GASKET
*13	CRANKSHAFT PULLEY SET BOLT	-	-
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
•	Non-reusable part		MP grease
	Adhesive 1324		Precoated part
	Do not apply lubricants to the threaded parts	-	-

## ILLUSTRATION





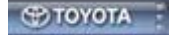
*1	CHAIN SUB-ASSEMBLY	*2	CHAIN TENSIONER SLIPPER
*3	NO. 1 CHAIN VIBRATION DAMPER	*4	NO. 2 CHAIN VIBRATION DAMPER
*5	O-RING	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque	•	Non-reusable part

## ILLUSTRATION



*1	NO. 1 CAMSHAFT BEARING CAP	*2	CAMSHAFT
*3	NO. 2 CAMSHAFT	*4	CAMSHAFT HOUSING SUB-ASSEMBLY
*5	CAMSHAFT TIMING GEAR ASSEMBLY	*6	CAMSHAFT TIMING SPROCKET
*7	CYLINDER HEAD SUB-ASSEMBLY	*8	CYLINDER HEAD GASKET

*9	CYLINDER HEAD SET BOLT	*10	VALVE STEM CAP
*11	VALVE LASH ADJUSTER ASSEMBLY	*12	NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY
*13	NO. 2 CAMSHAFT BEARING CAP	*14	CYLINDER HEAD SET PLATE WASHER
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
•	Non-reusable part	-	-
*T1	1st: 49 (500, 36) 2nd: Turn 90° 3rd: Turn 45°	-	-



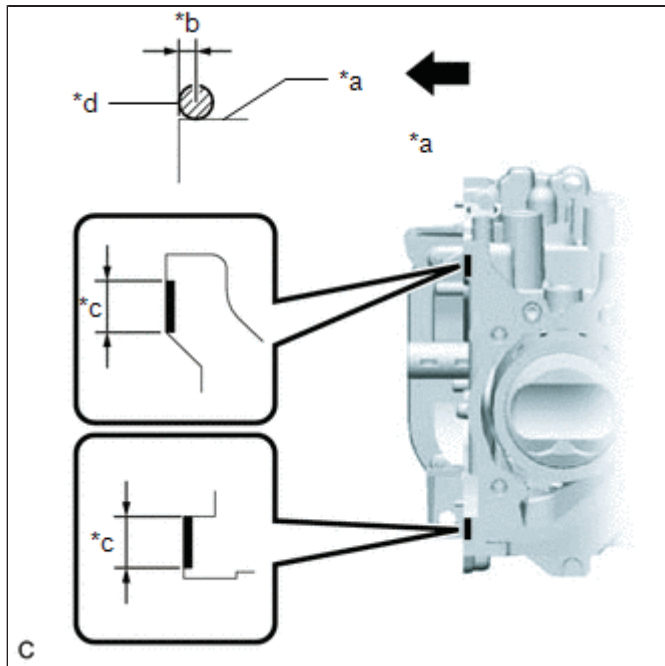
Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000S5L5
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - ]
Title: 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD GASKET: INSTALLATION; 2016 - 2019 MY Prius [11/2015 - ]		


## INSTALLATION

### PROCEDURE

#### 1. INSTALL CYLINDER HEAD GASKET

- (a) Remove any oil from the contact surfaces.
- (b) Apply seal packing to the cylinder block sub-assembly as shown in the illustration.

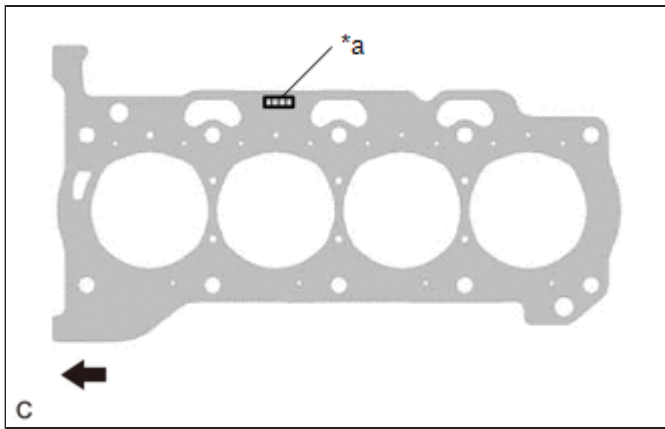



*a	Cylinder Block Sub-assembly
*b	3.0 to 5.0 mm (0.118 to 0.197 in.)
*c	10 to 15 mm (0.394 to 0.591 in.)
*d	Diameter 7.0 to 9.0 mm (0.276 to 0.354 in.)
	Front of Engine

#### NOTICE:

Install the cylinder head gasket within 3 minutes and tighten the cylinder head set bolts within 15 minutes of applying seal packing.

- (c) Place a new cylinder head gasket on the cylinder block sub-assembly as shown in the illustration.

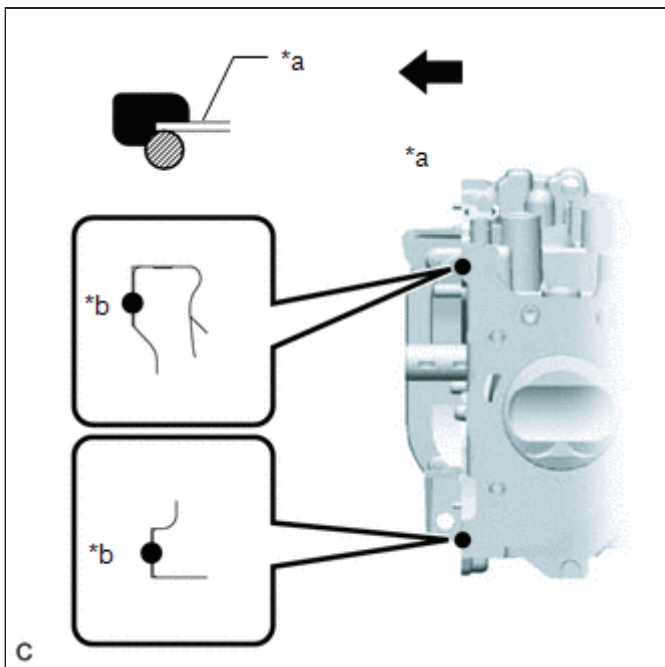



*a	Lot No.
	Front of Engine

**NOTICE:**

Make sure to install the cylinder head gasket in the correct direction.

(d) Apply seal packing to the cylinder head gasket as shown in the illustration.



*a	Cylinder Head Gasket
*b	Diameter 6 to 8 mm (0.236 to 0.315 in.)
	Front of Engine

**2. INSTALL CYLINDER HEAD SUB-ASSEMBLY**

Click here [INFO](#)

**3. INSTALL VALVE STEM CAP**

Click here [INFO](#)

#### 4. INSTALL VALVE LASH ADJUSTER ASSEMBLY

Click here [INFO](#)

#### 5. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

Click here [INFO](#)

#### 6. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY

Click here [INFO](#)

#### 7. INSTALL NO. 2 CAMSHAFT

Click here [INFO](#) [INFO](#)

#### 8. INSTALL CAMSHAFT

Click here [INFO](#)

#### 9. INSTALL CAMSHAFT BEARING CAP

Click here [INFO](#)

#### 10. INSTALL CAMSHAFT TIMING SPROCKET

Click here [INFO](#)

#### 11. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

Click here [INFO](#)

#### 12. SET NO. 1 CYLINDER TO TDC (COMPRESSION)

Click here [INFO](#)

#### 13. INSTALL CHAIN SUB-ASSEMBLY

##### HINT:

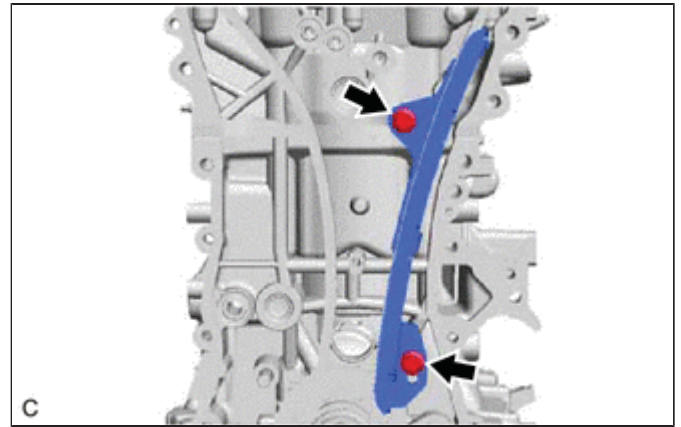
- Be sure to install the chain sub-assembly with the mark plates facing away from the engine assembly.
- The mark plate on the camshaft side is colored orange.
- The mark plate on the crankshaft side is colored pink.

(a) Temporarily install the crankshaft pulley set bolt to the crankshaft.

(b) Install the No. 1 chain vibration damper to the cylinder head sub-assembly and cylinder block sub-assembly with the 2 bolts.

##### Torque:

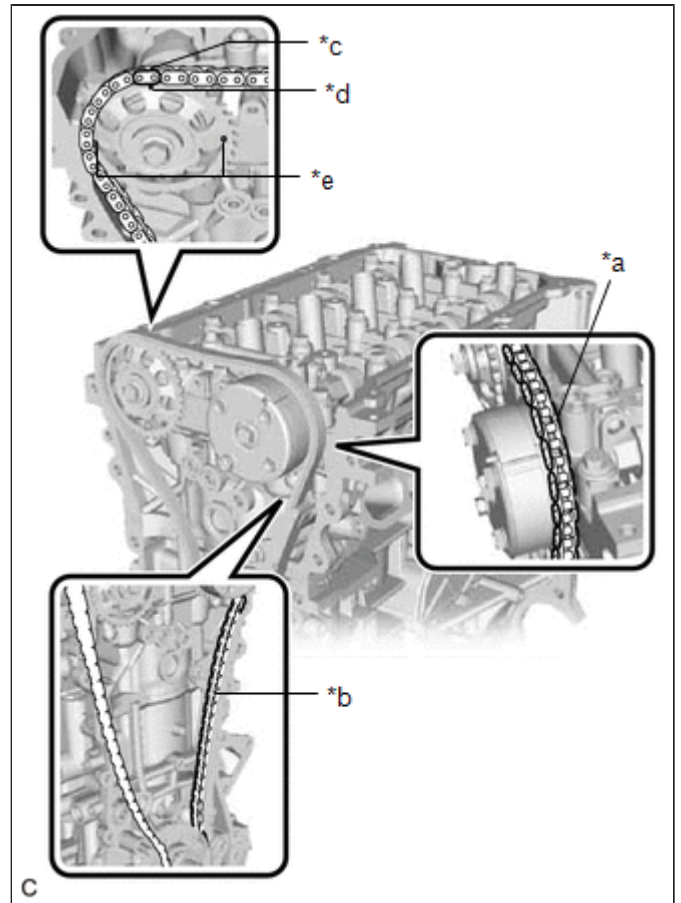
**21 N·m {214 kgf·cm, 15 ft·lbf}**



(c) Install the chain sub-assembly with the mark plates (orange) of the chain sub-assembly aligned with the timing mark (rectangle) as shown in the illustration.

**HINT:**

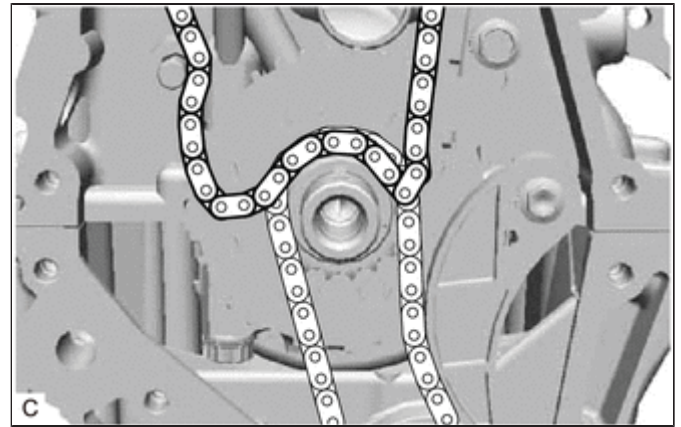
- There are 3 marks on the camshaft timing sprocket. Make sure to align the mark plate with the timing mark (rectangle).
- Do not pass the chain sub-assembly around the sprocket of the camshaft timing gear assembly. Only place it on the camshaft timing gear assembly.
- Pass the chain sub-assembly through the No. 1 chain vibration damper.



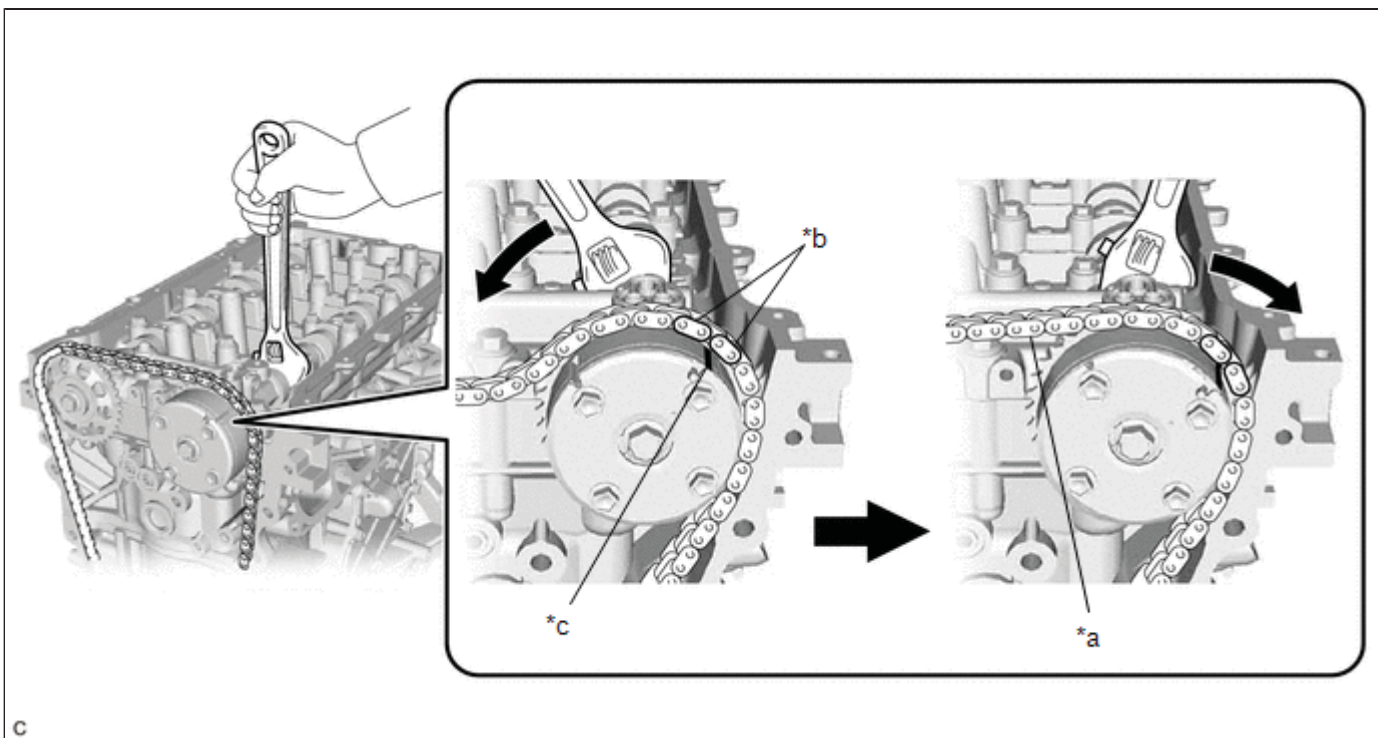
*a	Place the chain sub-assembly on the sprocket
*b	Pass the chain sub-assembly through the damper
*c	Mark Plate (Orange)
*d	Timing Mark (Rectangle)
*e	Mark (Circle)



(d) Place the chain sub-assembly on the crankshaft without passing it around the crankshaft.



(e) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly counterclockwise to align the mark plate (orange) with timing mark, and then install the chain sub-assembly.



c

*a	Tension the chain sub-assembly	*b	Mark Plate (Orange)
*c	Timing Mark	-	-

**HINT:**

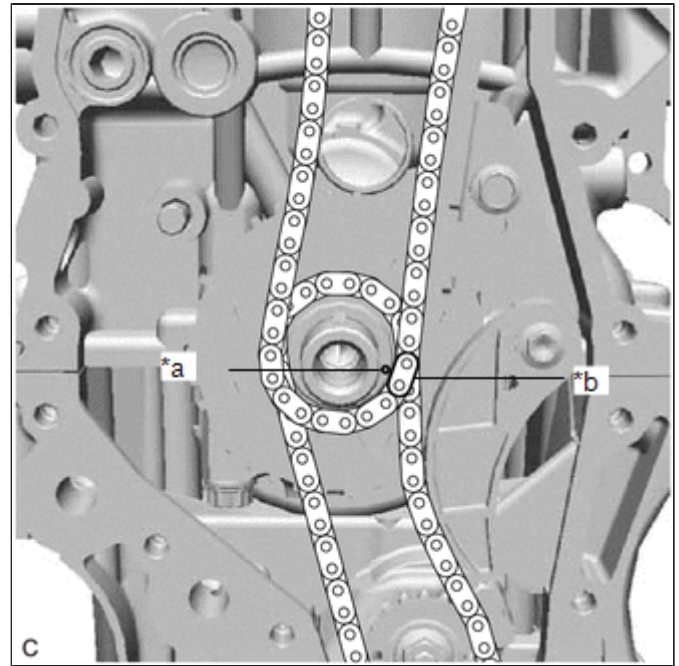
If the camshaft timing gear assembly cannot be positioned as shown in the illustration, using a wrench to hold the hexagonal portion of the camshaft, slightly rotate the camshaft timing gear assembly counterclockwise and then install the chain sub-assembly.

(f) Using a wrench to hold the hexagonal portion of the camshaft, slowly turn the camshaft timing gear assembly clockwise to tension the chain sub-assembly between the camshaft timing sprocket and camshaft timing gear assembly.

**HINT:**

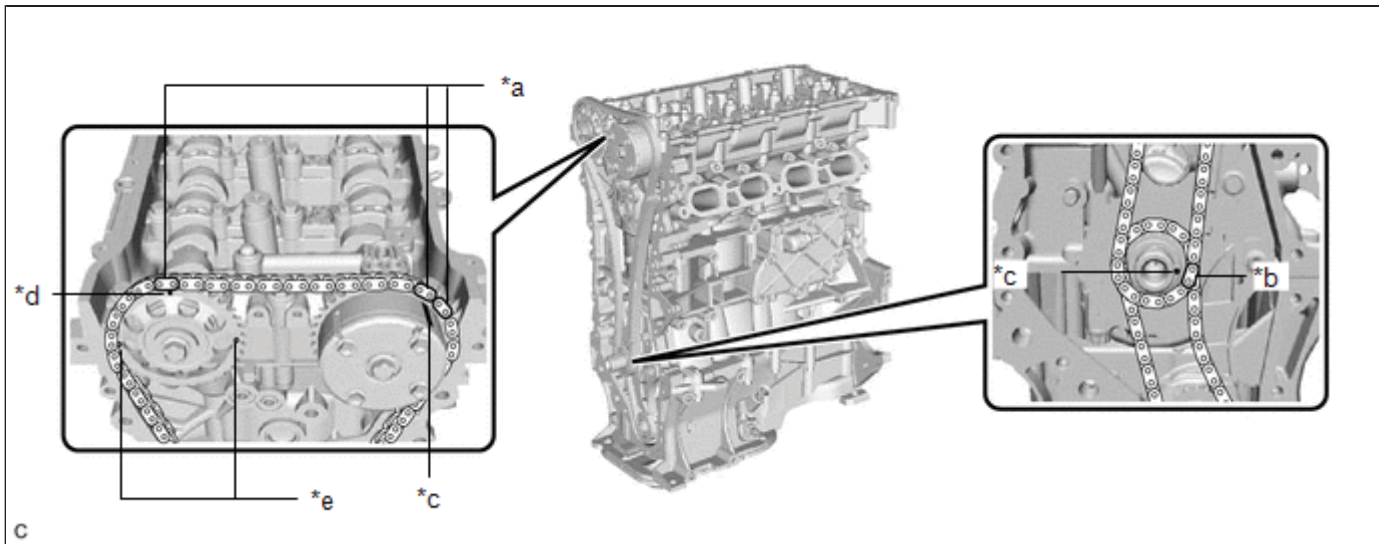
Make sure to turn the camshaft timing gear assembly slowly to prevent the camshaft timing sprocket from becoming misaligned.

(g) Align the mark plate (pink) with timing mark and install the chain sub-assembly to the crankshaft timing sprocket.



*a	Timing Mark
*b	Mark Plate (Pink)

(h) Check that each timing mark is at TDC (compression).



*a	Mark Plate (Orange)	*b	Mark Plate (Pink)
*c	Timing Mark	*d	Timing Mark (Rectangle)
*e	Mark (Circle)	-	-

**HINT:**

There are 3 marks on the camshaft timing sprocket. Make sure that the timing mark (rectangle) is at the top.

(i) Remove the crankshaft pulley set bolt from the crankshaft.

**14. INSTALL NO. 2 CHAIN VIBRATION DAMPER**

Click here [NFC](#)

## **15. INSTALL CHAIN TENSIONER SLIPPER**

Click here [INFO](#)

## **16. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY**

Click here [INFO](#)

## **17. INSTALL TIMING CHAIN COVER OIL SEAL**

Click here [INFO](#)

## **18. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY**

Click here [INFO](#)

## **19. INSTALL CRANKSHAFT PULLEY**

Click here [INFO](#)

## **20. INSTALL SPARK PLUG TUBE GASKET**

Click here [INFO](#)

## **21. INSTALL CYLINDER HEAD COVER GASKET**

Click here [INFO](#)

## **22. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY**

Click here [INFO](#)

## **23. INSTALL CAMSHAFT POSITION SENSOR**

Click here [INFO](#)

## **24. INSTALL IGNITION COIL ASSEMBLY**

Click here [INFO](#)

## **25. INSTALL FUEL INJECTOR ASSEMBLY**

Click here [INFO](#)

## **26. INSTALL NO. 1 DELIVERY PIPE SPACER**

Click here [INFO](#)

## **27. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY**

Click here [INFO](#)

## **28. INSTALL FUEL VAPOR FEED PIPE**

Click here [INFO](#)

## **29. INSTALL PURGE VALVE (PURGE VSV)**

Click here [INFO](#)

## **30. INSTALL NO. 6 WATER BY-PASS PIPE**

Click here [INFO](#)

### **31. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE**

Click here [INFO](#)

### **32. INSTALL ENGINE OIL LEVEL DIPSTICK**

Click here [INFO](#)

### **33. INSTALL INTAKE MANIFOLD**

Click here [INFO](#)

### **34. INSTALL EXHAUST MANIFOLD (TWC: Front Catalyst)**

Click here [INFO](#) [INFO](#)

### **35. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**

Click here [INFO](#) [INFO](#)

### **36. TEMPORARILY INSTALL EGR VALVE ASSEMBLY WITH EGR COOLER**

Click here [INFO](#)

### **37. TEMPORARILY INSTALL EGR PIPE ASSEMBLY**

Click here [INFO](#)

### **38. INSTALL EGR VALVE ASSEMBLY WITH EGR COOLER**

Click here [INFO](#)

### **39. INSTALL EGR PIPE ASSEMBLY**

Click here [INFO](#)

### **40. INSTALL WATER OUTLET**

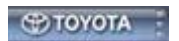
Click here [INFO](#)

### **41. INSTALL ENGINE HANGERS**

Click here [INFO](#) [INFO](#) [INFO](#)

### **42. REMOVE ENGINE FROM ENGINE STAND**

Click here [INFO](#) [INFO](#) [INFO](#)



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5L7
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD GASKET: REMOVAL; 2016 - 2019 MY Prius [11/2015 - ]		

## REMOVAL

## CAUTION / NOTICE / HINT

The necessary procedures (adjustment, calibration, initialization, or registration) that must be performed after parts are removed and installed, or replaced during cylinder head gasket removal/installation are shown below.

### Necessary Procedure After Parts Removed/Installed/Replaced

REPLACED PART OR PERFORMED PROCEDURE	NECESSARY PROCEDURE	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURE NOT PERFORMED	LINK
Auxiliary battery terminal is disconnected/reconnected	Memorize steering angle neutral point	Lane departure alert system (w/ Steering Control)	<a href="#">INFO</a>
		Intelligent clearance sonar system*1	
Simple advanced parking guidance system*1			
Pre-collision system			
	Initialize back door lock	Power door lock control system	<a href="#">INFO</a>
Replacement of inverter with converter assembly	Resolver learning	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<a href="#">INFO</a> for Nickel Metal Hydride Battery <a href="#">INFO</a> for Lithium-ion Battery
Replacement of ECM	Perform Vehicle Identification Number (VIN) registration	MIL comes on	<a href="#">INFO</a>
<ul style="list-style-type: none"> <li>• Replacement of throttle body assembly</li> <li>• Replacement of cylinder head sub-assembly</li> <li>• Replacement of camshaft (for intake or exhaust camshaft)</li> <li>• Replacement of camshaft timing gear assembly</li> <li>• Replacement of fuel injector assembly</li> <li>• Replacement of</li> </ul>	Inspection After Repair	<ul style="list-style-type: none"> <li>• Poor idle, etc.</li> <li>• Engine start function, etc.</li> </ul>	<a href="#">INFO</a>

<p>ignition coil assembly</p> <ul style="list-style-type: none"> <li>• Replacement of EGR valve assembly</li> <li>• Gas leak from exhaust system is repaired</li> </ul>			
<p>Suspension, tires, etc. (The vehicle height changes because of suspension or tire replacement)</p>	<ul style="list-style-type: none"> <li>• Ultrasonic sensor detection angle</li> <li>• Ultrasonic sensor detection angle registration</li> </ul>	<ul style="list-style-type: none"> <li>• Intelligent clearance sonar system</li> <li>• Simple advanced parking guidance system</li> </ul>	<p>INFO INFO</p>
<p>Front wheel alignment adjustment</p>	<ol style="list-style-type: none"> <li>1. Clear zero point calibration data.</li> <li>2. Perform yaw rate and acceleration sensor zero point calibration.</li> </ol>	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• ABS warning light illuminates</li> <li>• Brake warning light/yellow (minor malfunction) illuminates</li> <li>• Slip indicator light illuminates</li> <li>• VSC disabled or malfunctions</li> </ul>	<p>INFO INFO</p>
<p>Replacement of hybrid vehicle transaxle assembly</p>	<ul style="list-style-type: none"> <li>• Resolver learning</li> <li>• Initialize resolver</li> </ul>	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<p>INFO for Nickel Metal Hydride Battery</p> <p>INFO for Lithium-ion Battery</p>

\*1: When performing learning using the Techstream.

Click here [INFO](#) [INFO](#)

## PROCEDURE

### 1. INSTALL ENGINE TO ENGINE STAND

Click here [INFO](#) [INFO](#) [INFO](#)

### 2. REMOVE ENGINE HANGERS

Click here [INFO](#) [INFO](#) [INFO](#)

### 3. REMOVE WATER OUTLET

Click here [INFO](#)

### 4. REMOVE EGR PIPE ASSEMBLY

Click here [INFO](#)

## **5. REMOVE EGR VALVE ASSEMBLY WITH EGR COOLER**

Click here [INFO](#)

## **6. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**

Click here [INFO](#) [INFO](#)

## **7. REMOVE MANIFOLD STAY**

Click here [INFO](#) [INFO](#)

## **8. REMOVE EXHAUST MANIFOLD (TWC: Front Catalyst)**

Click here [INFO](#) [INFO](#)

## **9. REMOVE INTAKE MANIFOLD**

Click here [INFO](#)

## **10. REMOVE ENGINE OIL LEVEL DIPSTICK**

Click here [INFO](#)

## **11. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE**

Click here [INFO](#)

## **12. REMOVE NO. 6 WATER BY-PASS PIPE**

Click here [INFO](#)

## **13. REMOVE PURGE VALVE (PURGE VSV)**

Click here [INFO](#)

## **14. REMOVE FUEL VAPOR FEED PIPE**

Click here [INFO](#)

## **15. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY**

Click here [INFO](#) [INFO](#)

## **16. REMOVE NO. 1 DELIVERY PIPE SPACER**

Click here [INFO](#) [INFO](#)

## **17. REMOVE FUEL INJECTOR ASSEMBLY**

Click here [INFO](#) [INFO](#)

## **18. REMOVE IGNITION COIL ASSEMBLY**

Click here [INFO](#)

## **19. REMOVE CAMSHAFT POSITION SENSOR**

Click here [INFO](#)

## **20. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**

Click here [INFO](#)

### **21. REMOVE CYLINDER HEAD COVER GASKET**

Click here [INFO](#)

### **22. REMOVE SPARK PLUG TUBE GASKET**

Click here [INFO](#)

### **23. SET NO. 1 CYLINDER TO TDC (COMPRESSION)**

Click here [INFO](#)

### **24. REMOVE CRANKSHAFT PULLEY**

Click here [INFO](#)

### **25. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY**

Click here [INFO](#)

### **26. REMOVE TIMING CHAIN COVER OIL SEAL**

Click here [INFO](#)

### **27. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY**

Click here [INFO](#)

### **28. REMOVE CHAIN TENSIONER SLIPPER**

Click here [INFO](#)

### **29. REMOVE NO. 1 CHAIN VIBRATION DAMPER**

Click here [INFO](#)

### **30. REMOVE NO. 2 CHAIN VIBRATION DAMPER**

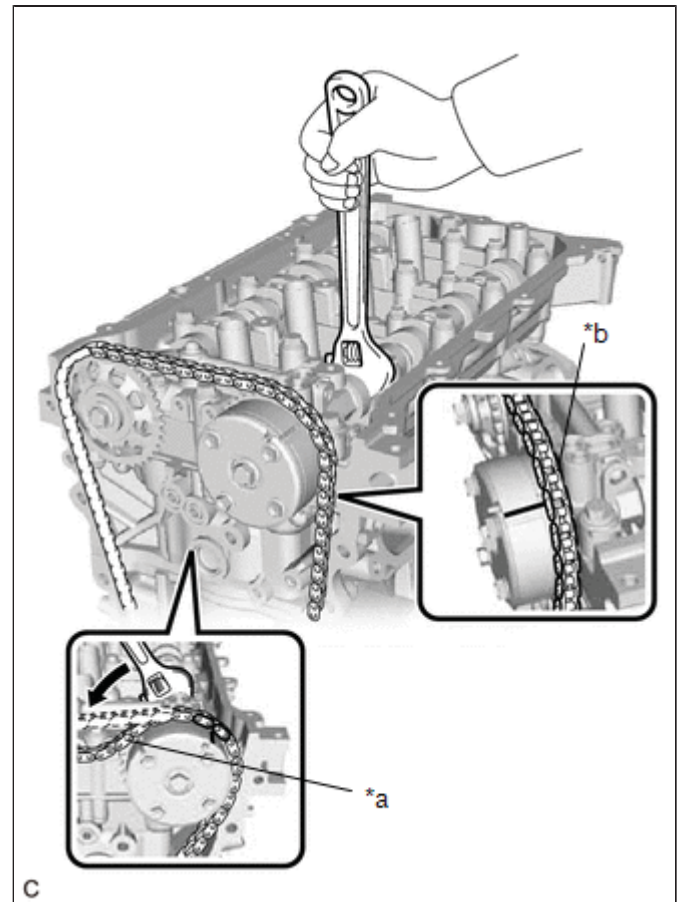
Click here [INFO](#)

### **31. REMOVE CHAIN SUB-ASSEMBLY**

(a) Using a wrench to hold the hexagonal portion of the



camshaft, turn the camshaft timing gear assembly counterclockwise to loosen the chain sub-assembly between the camshaft timing sprocket and camshaft timing gear assembly.



*a	Loosen the chain sub-assembly
*b	Place the chain sub-assembly on the non-toothed portion of camshaft timing gear assembly

(b) With the chain sub-assembly loosened, separate the chain sub-assembly from the teeth of the camshaft timing gear assembly and place it on the non-toothed portion of camshaft timing gear assembly.

(c) Turn the camshaft clockwise to return it to its original position and remove the chain sub-assembly.

### 32. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

Click here [INFO](#)

### 33. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

Click here [INFO](#)

### 34. REMOVE CAMSHAFT TIMING SPROCKET

Click here [INFO](#)

### 35. REMOVE CAMSHAFT BEARING CAP

Click here [INFO](#)

### 36. REMOVE CAMSHAFT

Click here [INFO](#)

### 37. REMOVE NO. 2 CAMSHAFT

Click here [INFO](#) [INFO](#)

### 38. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY

Click here [INFO](#)

### 39. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

Click here [INFO](#)

### 40. REMOVE VALVE LASH ADJUSTER ASSEMBLY

Click here [INFO](#)

### 41. REMOVE VALVE STEM CAP

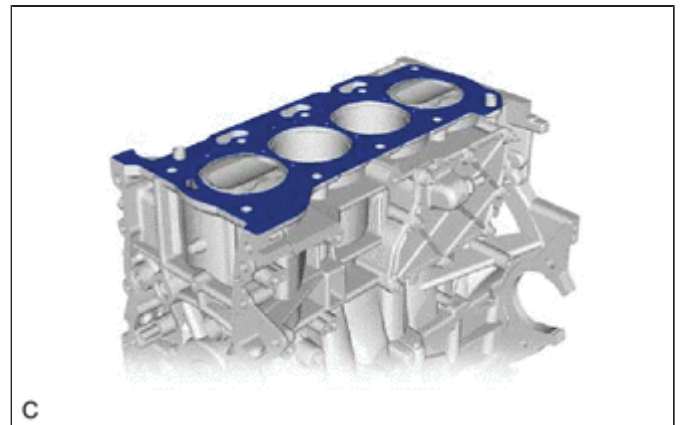
Click here [INFO](#)

### 42. REMOVE CYLINDER HEAD SUB-ASSEMBLY

Click here [INFO](#)

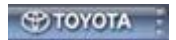
### 43. REMOVE CYLINDER HEAD GASKET

(a) Remove the cylinder head gasket from the cylinder block sub-assembly.



### 44. INSPECT CYLINDER HEAD SET BOLT

Click here [INFO](#)









<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5LC
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD: DISASSEMBLY; 2016 - 2019 MY Prius [11/2015 - ]		

## DISASSEMBLY

### CAUTION / NOTICE / HINT

The necessary procedures (adjustment, calibration, initialization, or registration) that must be performed after parts are removed and installed, or replaced during engine unit removal/installation are shown below.

#### **Necessary Procedure After Parts Removed/Installed/Replaced**

REPLACED PART OR PERFORMED PROCEDURE	NECESSARY PROCEDURE	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURE NOT PERFORMED	LINK
Auxiliary battery terminal is disconnected/reconnected	Memorize steering angle neutral point	Lane departure alert system (w/ Steering Control)	
		Intelligent clearance sonar system*1	
Simple advanced parking guidance system*1			
Pre-collision system			
	Initialize back door lock	Power door lock control system	
Replacement of inverter with converter assembly	Resolver learning	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	 for Nickel Metal Hydride Battery  for Lithium-ion Battery
Replacement of ECM	Perform Vehicle Identification Number (VIN) registration	MIL comes on	
<ul style="list-style-type: none"> <li>• Replacement of throttle body assembly</li> <li>• Replacement of cylinder head sub-assembly</li> <li>• Replacement of camshaft (for intake or exhaust camshaft)</li> <li>• Replacement of camshaft timing gear assembly</li> <li>• Replacement of fuel injector assembly</li> <li>• Replacement of</li> </ul>	Inspection After Repair	<ul style="list-style-type: none"> <li>• Poor idle, etc.</li> <li>• Engine start function, etc.</li> </ul>	

<ul style="list-style-type: none"> <li>spark plug</li> <li>• Replacement of ignition coil assembly</li> <li>• Replacement of EGR valve assembly</li> <li>• Gas leak from exhaust system is repaired</li> <li>• Replacement of knock control sensor</li> </ul>			
<p>Suspension, tires, etc. (The vehicle height changes because of suspension or tire replacement)</p>	<ul style="list-style-type: none"> <li>• Ultrasonic sensor detection angle</li> <li>• Ultrasonic sensor detection angle registration</li> </ul>	<ul style="list-style-type: none"> <li>• Intelligent clearance sonar system</li> <li>• Simple advanced parking guidance system</li> </ul>	<a href="#">INFO</a> <a href="#">INFO</a>
<p>Front wheel alignment adjustment</p>	<ol style="list-style-type: none"> <li>1. Clear zero point calibration data.</li> <li>2. Perform yaw rate and acceleration sensor zero point calibration.</li> </ol>	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• ABS warning light illuminates</li> <li>• Brake warning light/yellow (minor malfunction) illuminates</li> <li>• Slip indicator light illuminates</li> <li>• VSC disabled or malfunctions</li> </ul>	<a href="#">INFO</a> <a href="#">INFO</a>
<p>Replacement of hybrid vehicle transaxle assembly</p>	<ul style="list-style-type: none"> <li>• Resolver learning</li> <li>• Initialize resolver</li> </ul>	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<a href="#">INFO</a> for Nickel Metal Hydride Battery <a href="#">INFO</a> for Lithium-ion Battery

\*1: When performing learning using the Techstream.

Click here [INFO](#) [INFO](#)

## PROCEDURE

### 1. REMOVE INTAKE VALVE

- (a) Using SST and wooden blocks, compress the inner compression spring and remove the 8 valve spring retainer locks.

**SST: 09202-70020**

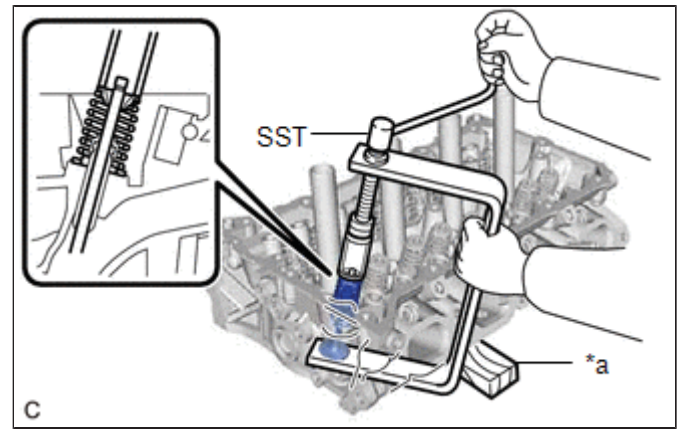
09202-01010

09202-01020

SST: 09202-00021

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.



*a	Wooden Block
----	--------------

- (b) Remove the 8 valve spring retainers, 8 inner compression springs and 8 intake valves from the cylinder head sub-assembly.

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.

**2. REMOVE EXHAUST VALVE**

- (a) Using SST and wooden blocks, compress the inner compression spring and remove the 8 valve spring retainers.

SST: 09202-70020

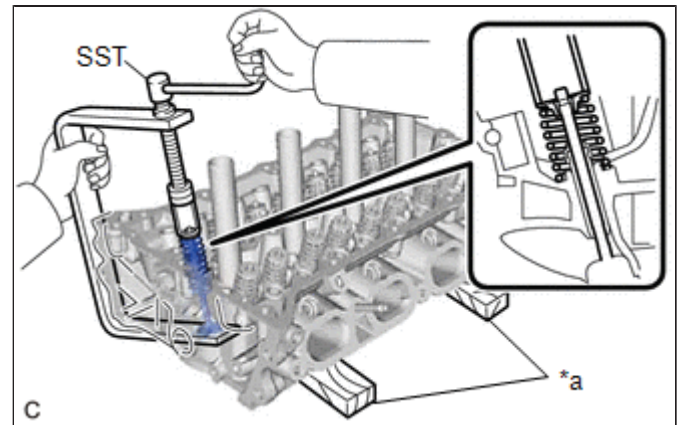
09202-01010

09202-01020

SST: 09202-00021

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.



*a	Wooden Block
----	--------------

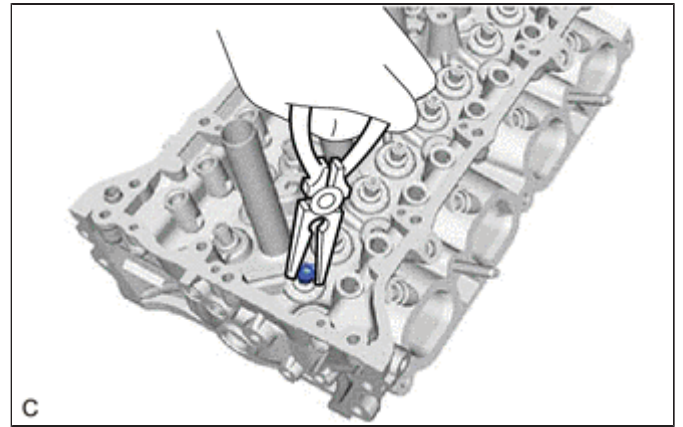
- (b) Remove the 8 valve spring retainers, 8 inner compression springs and 8 exhaust valves from the cylinder head sub-assembly.

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.

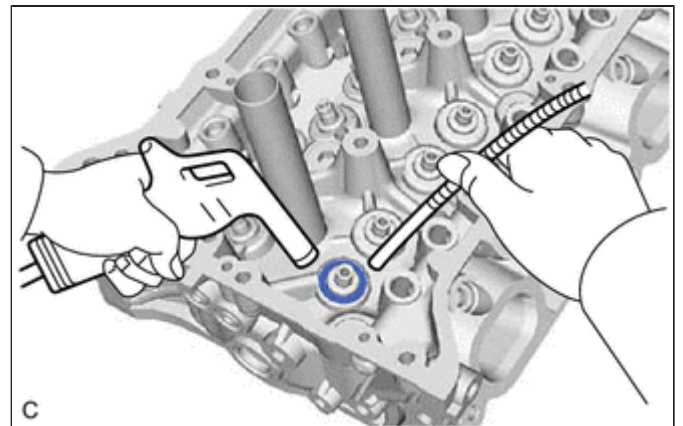
**3. REMOVE VALVE STEM OIL SEAL**

- (a) Using needle-nose pliers, remove the 16 valve stem oil seals.



#### 4. REMOVE VALVE SPRING SEAT

- (a) Using compressed air and a Magnet Hand, remove the 16 valve spring seats from the cylinder head sub-assembly by blowing air onto them.

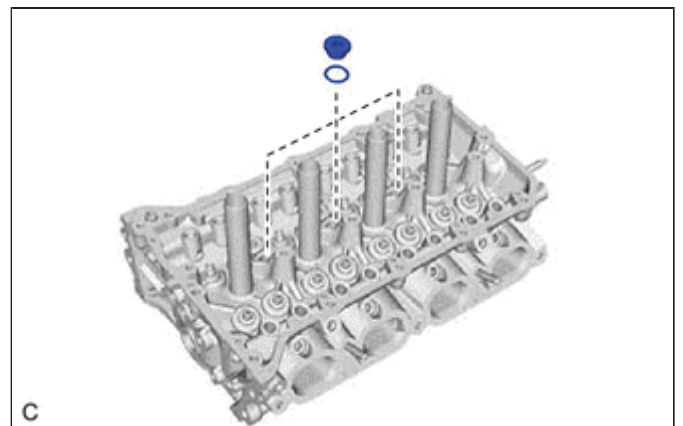


#### 5. REMOVE NO. 2 STRAIGHT SCREW PLUG

**NOTICE:**

If coolant leaks from the No. 2 straight screw plug or the No. 2 straight screw plug is corroded, replace it.

- (a) Using a 10 mm straight hexagon wrench, remove the 3 No. 2 straight screw plugs and 3 gaskets from the cylinder head sub-assembly.



Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000S5LA
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - ]
Title: 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD: INSPECTION; 2016 - 2019 MY Prius [11/2015 - ]		

## INSPECTION

## PROCEDURE

### 1. INSPECT CYLINDER HEAD SUB-ASSEMBLY FOR WARPAGE

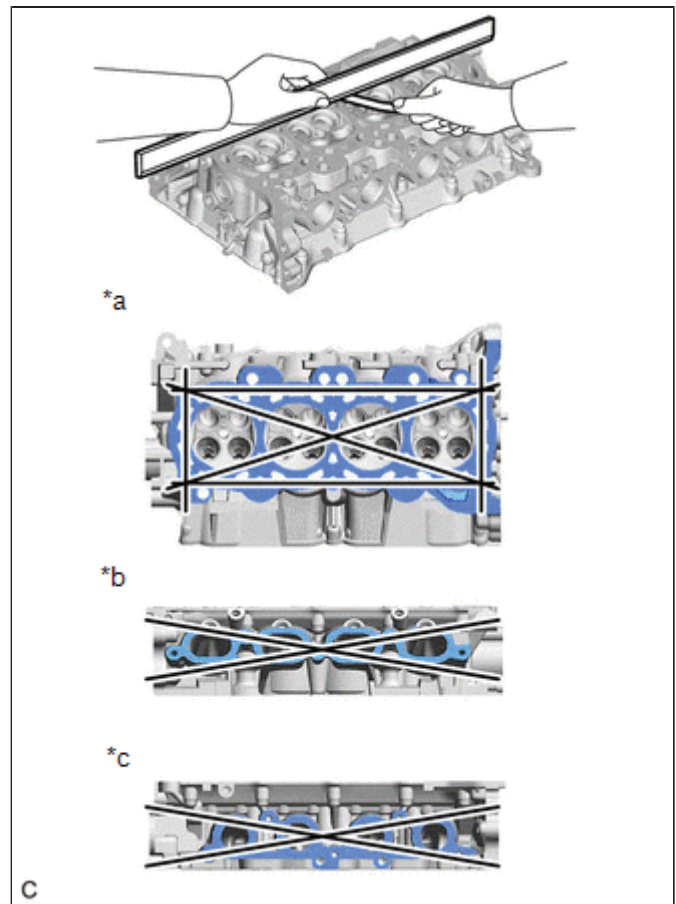
- (a) Using a precision straightedge and feeler gauge, check the surfaces which contact the cylinder head sub-assembly and manifold for warpage.

Maximum Warpage:

ITEM	SPECIFIED CONDITION
Bottom side	0.05 mm
Bottom side	0.00197 in.
Intake manifold side	0.10 mm
Intake manifold side	0.00394 in.
Exhaust manifold side	0.10 mm
Exhaust manifold side	0.00394 in.

#### HINT:

If the warpage is more than the maximum, replace the cylinder head sub-assembly.



*a	Bottom Side
*b	Intake Manifold Side
*c	Exhaust Manifold Side

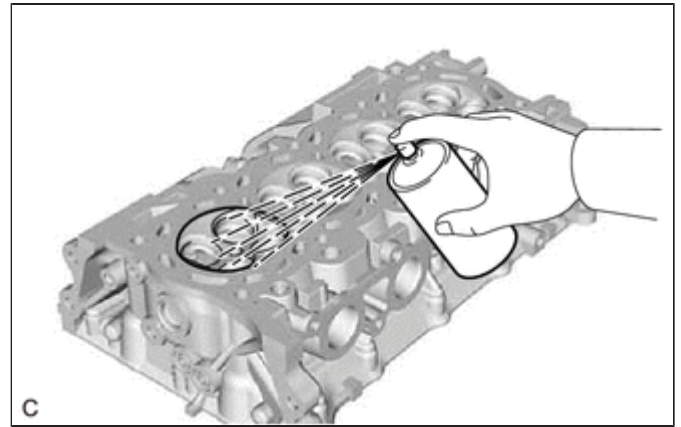
### 2. INSPECT CYLINDER HEAD SUB-ASSEMBLY FOR CRACKS

- (a) Using a dye penetrant, check the intake ports, exhaust ports and bottom surface of the cylinder head sub-assembly for cracks.



**HINT:**

If cracks are found, replace the cylinder head sub-assembly.



**3. INSPECT INTAKE VALVE**

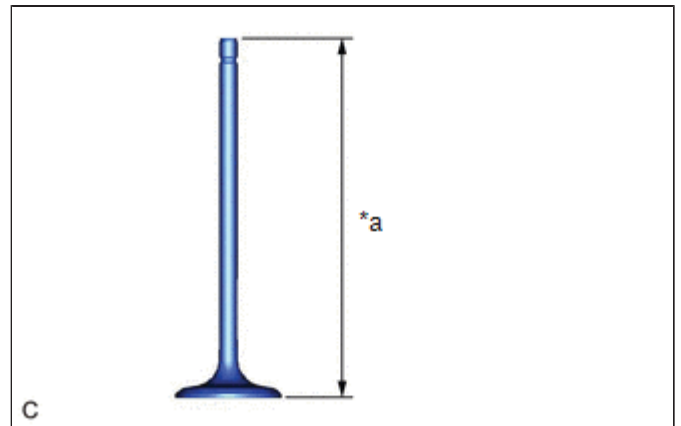
(a) Using a vernier caliper, measure the overall length of the intake valve.

Standard Overall Length:

MINIMUM OVERALL LENGTH	SPECIFIED CONDITION
108.84 mm	109.34 mm
4.29 in.	4.30 in.

**HINT:**

If the overall length is less than the minimum, replace the intake valve.



*a	Overall Length
----	----------------

(b) Using a micrometer, measure the diameter of the valve stem.

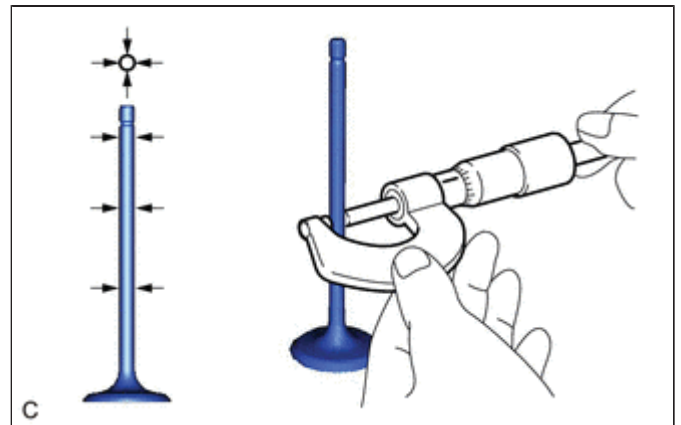
Standard Valve Stem Diameter:

SPECIFIED CONDITION
5.470 to 5.485 mm
0.215 to 0.216 in.

**HINT:**

If the valve stem diameter is not as specified, check the intake valve guide bush oil clearance.

[Click here](#)



(c) Using a vernier caliper, measure the valve head margin thickness.

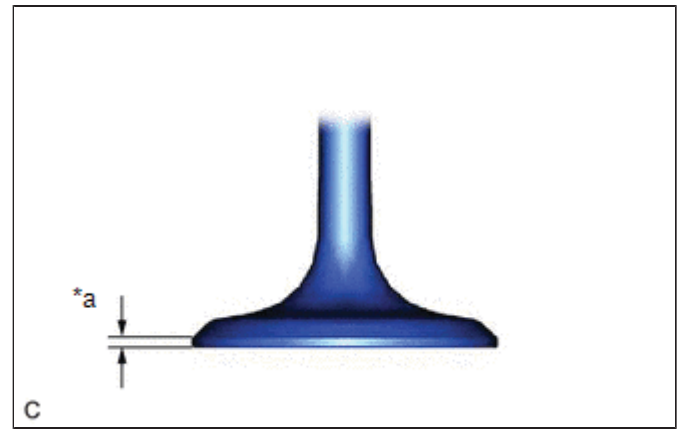


Standard Margin Thickness:

MINIMUM MARGIN THICKNESS	SPECIFIED CONDITION
0.5 mm	1.0 mm
0.0197 in.	0.0394 in.

**HINT:**

If the margin thickness is less than the minimum, replace the intake valve.



*a	Margin Thickness
----	------------------

**4. INSPECT EXHAUST VALVE**

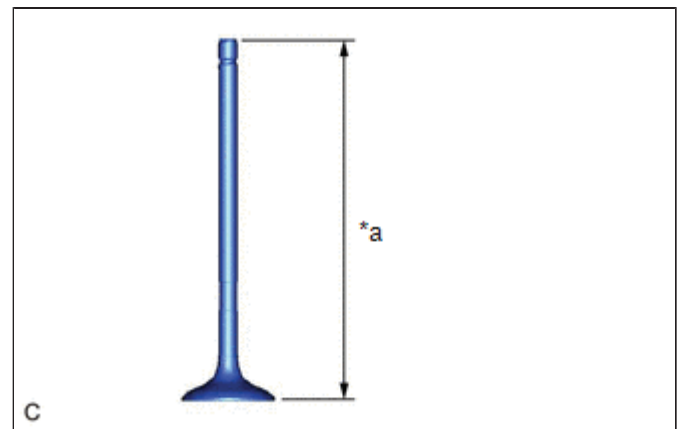
(a) Using a vernier caliper, measure the overall length of the exhaust valve.

Standard Overall Length:

MINIMUM OVERALL LENGTH	SPECIFIED CONDITION
107.75 mm	108.25 mm
4.24 in.	4.26 in.

**HINT:**

If the overall length is less than the minimum, replace the exhaust valve.



*a	Overall Length
----	----------------

(b) Using a micrometer, measure the diameter of the valve stem.

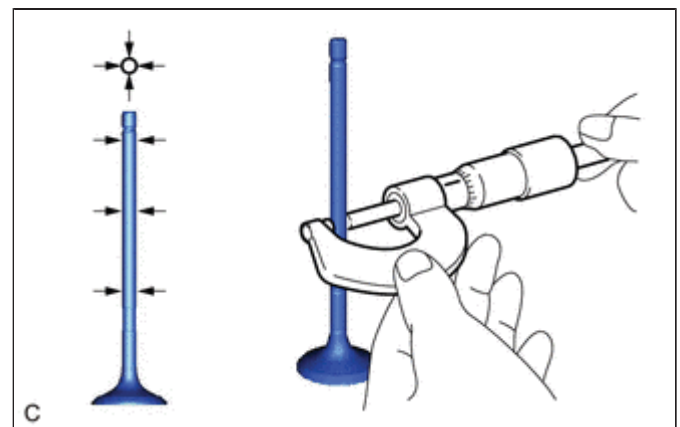
Standard Valve Stem Diameter:

SPECIFIED CONDITION
5.465 to 5.480 mm
0.215 to 0.216 in.

**HINT:**

If the valve stem diameter is not as specified, check the exhaust valve guide bush oil clearance.

[Click here](#)



(c) Using a vernier caliper, measure the valve head margin

thickness.

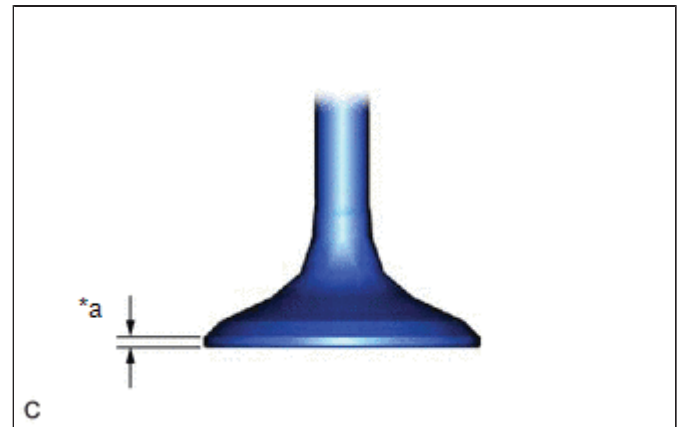
Standard Margin Thickness:

1.0 mm (0.0394 in.)

MINIMUM MARGIN THICKNESS	SPECIFIED CONDITION
0.5 mm	1.0 mm
0.0197 in.	0.0394 in.

**HINT:**

If the margin thickness is less than the minimum, replace the exhaust valve.



*a	Margin Thickness
----	------------------

**5. INSPECT INNER COMPRESSION SPRING**

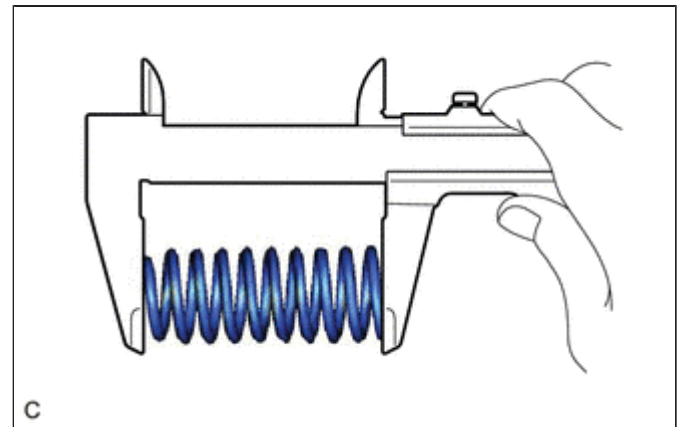
(a) Using a vernier caliper, measure the free length of the inner compression spring.

Standard Free Length:

58.52 mm (2.30 in.) or 58.90 mm (2.32 in.)

**NOTICE:**

Inner compression springs come in 2 different lengths. Make sure all inner compression springs are the same length when replacing them.



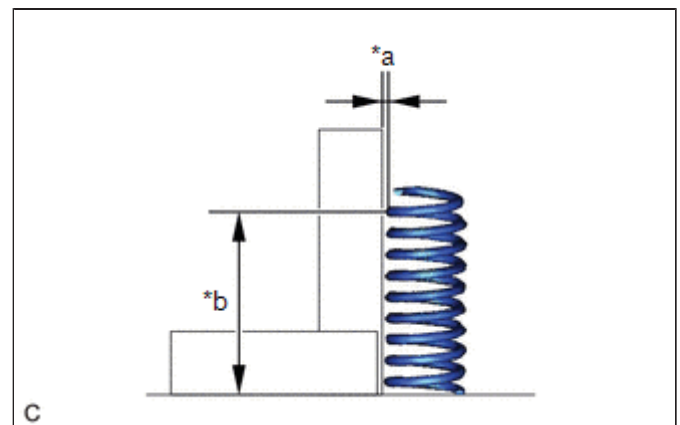
(b) Using a steel square, measure the angle of the inner compression spring.

Maximum Angle (Reference):

SPECIFIED CONDITION
2 °

**HINT:**

If the deviation is greater than the maximum, replace the inner compression spring.



*a	Angle
*b	40 mm (1.57 in.)

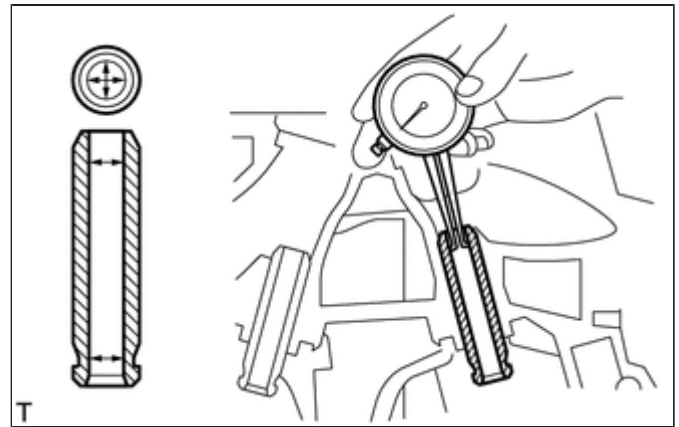
**6. INSPECT VALVE GUIDE BUSH OIL CLEARANCE**

(a) Using a caliper gauge, measure the inside diameter of the valve guide bush.

Standard Valve Guide Bush Inside Diameter:

2°

SPECIFIED CONDITION
5.510 to 5.530 mm
0.217 to 0.218 in.



(b) Subtract the valve stem diameter measurement from the valve guide bush inside diameter measurement.

Standard Oil Clearance:

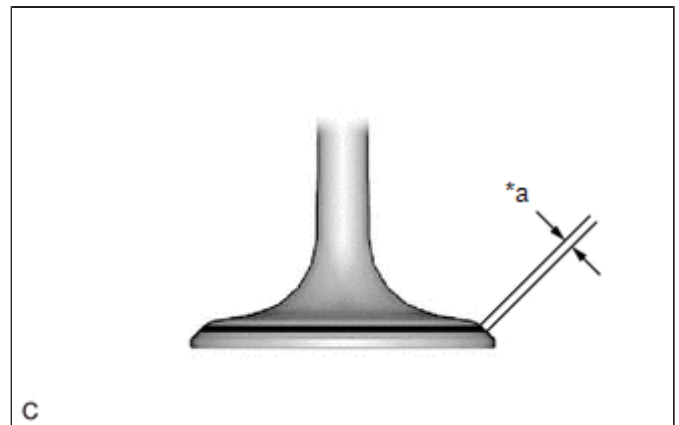
ITEM	MAXIMUM OIL CLEARANCE	SPECIFIED CONDITION
Intake	0.080 mm	0.025 to 0.060 mm
Intake	0.00315 in.	0.000984 to 0.00236 in.
Exhaust	0.085 mm	0.030 to 0.065 mm
Exhaust	0.00335 in.	0.00118 to 0.00256 in.

**HINT:**

- Oil clearance = Inside diameter - Valve stem diameter
- If the oil clearance is more than the maximum, replace the valve and valve guide bush.

**7. INSPECT VALVE SEATS**

(a) Apply a light coat of Prussian blue to the valve face.



*a	Width
----	-------

(b) Lightly press the valve face against the valve seat.

**NOTICE:**

Do not rotate the valve while pressing it.

(c) Check the valve face and valve seat.

(1) If Prussian blue appears 360° around the entire valve face, the valve face is concentric.

**HINT:**

If the valve face is not concentric, replace the valve.

(2) If Prussian blue appears 360° around the entire valve seat, the valve seat and valve face are concentric.

**HINT:**

If the valve face is not concentric, resurface the valve seat.

[Click here](#) 

(3) Measure the width of the contact area of the valve seat and valve face.

Standard Width:

ITEM	SPECIFIED CONDITION
Intake	1.0 to 1.4 mm
Intake	0.0394 to 0.0551 in.
Exhaust	1.0 to 1.4 mm
Exhaust	0.0394 to 0.0551 in.

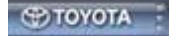


<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5LE
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 -     ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD: PRECAUTION; 2016 - 2019 MY Prius [11/2015 -     ]		

## **PRECAUTION**

### **HINT:**

- Any digits beyond the 0.01 mm (1/1000 in.) place for standard, minimum and maximum values should be used as a reference only.
- When both standard and maximum or minimum values are listed for an inspection, use the standard value as a reference only and base any judgments on the maximum and minimum values.



Last Modified: 01-14-2019

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Doc ID: RM100000000S5LD

Model Year Start: 2016

Model: Prius

Prod Date Range: [11/2015 - ]

Title: 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD: REASSEMBLY; 2016 - 2019 MY Prius [11/2015 - ]

## REASSEMBLY

### PROCEDURE

#### 1. INSTALL SPARK PLUG TUBE

##### HINT:

When using a new cylinder head sub-assembly, the spark plug tubes must be replaced.

- (a) Apply adhesive to a new spark plug tube as shown in the illustration.

Adhesive:

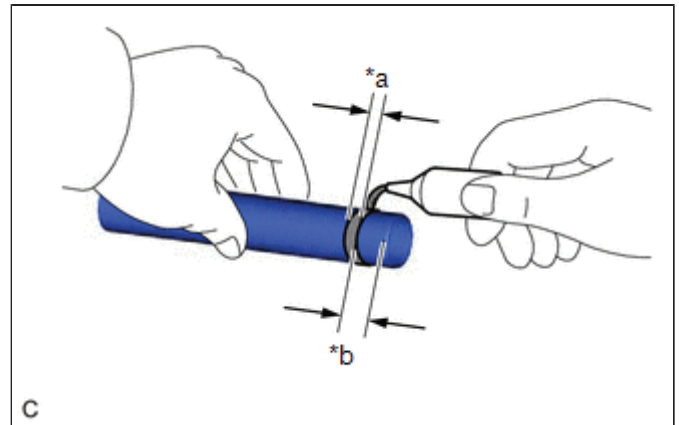
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

Standard Application Width:

1.0 to 3.0 mm (0.0394 to 0.118 in.)

##### NOTICE:

- Install the spark plug tube within 3 minutes of applying adhesive.
- Be careful not to deform the spark plug tube.
- Be careful not to expose the adhesive to engine oil for at least 1 hour after installing the spark plug tube.



*a	Application Width
*b	1.0 to 13.0 mm (0.0394 to 0.512 in.)

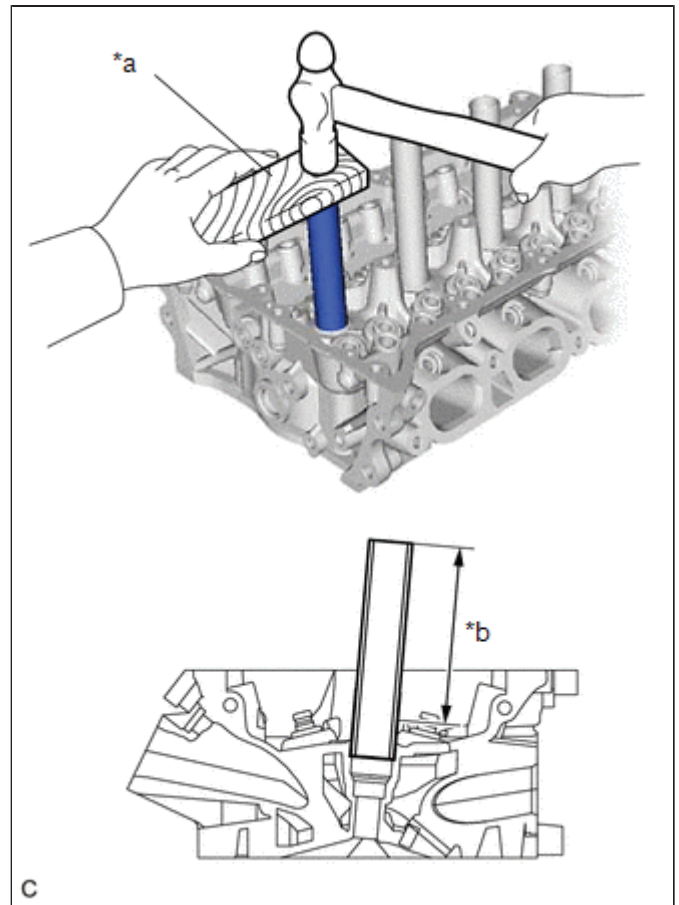
- (b) Using a wooden block and hammer, tap in the spark plug tube to the specified protrusion height.

Standard Protrusion Height:

122 mm (4.80 in.)

##### NOTICE:

To avoid tapping in the spark plug tube too far, measure the protrusion height while tapping it.



*a	Wooden Block
*b	Protrusion Height

## 2. INSTALL NO. 2 STRAIGHT SCREW PLUG

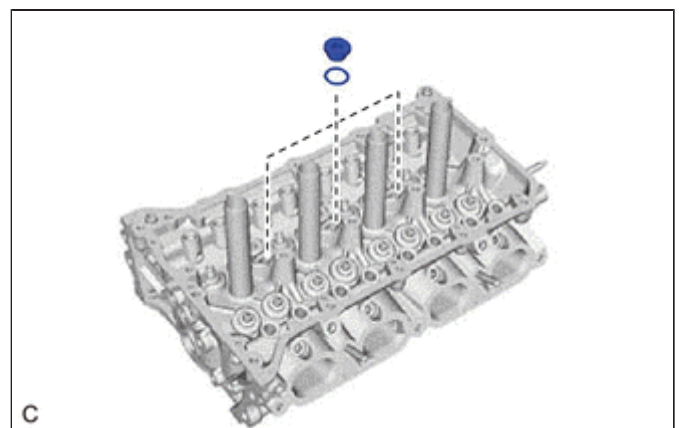
### HINT:

If coolant leaks from a No. 2 straight screw plug or a plug is corroded, replace it.

(a) Using a 10 mm straight hexagon wrench, install 3 new gaskets and the 3 No. 2 straight screw plugs to the cylinder head sub-assembly.

### Torque:

**44 N·m { 449 kgf·cm, 32 ft·lbf }**



## 3. INSTALL VALVE SPRING SEAT

(a) Install the 16 valve spring seats to the cylinder head sub-assembly.

#### 4. INSTALL VALVE STEM OIL SEAL

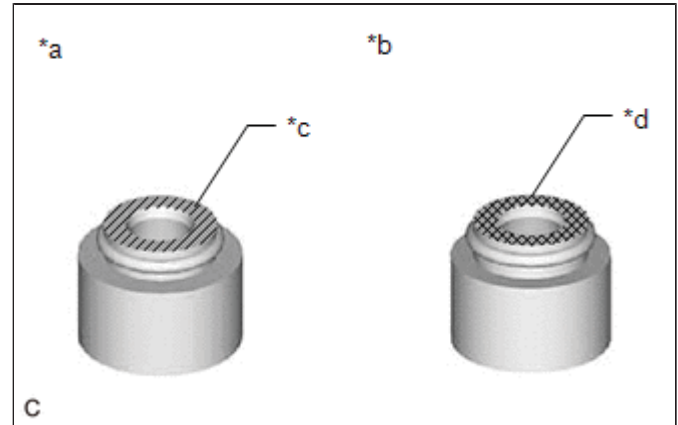
(a) Apply a light coat of engine oil to 16 new valve stem oil seals.

**NOTICE:**

Pay attention when installing the intake valve stem oil seals. For example, installing an intake side valve stem oil seal to the exhaust side or installing an exhaust side valve stem oil seal to the intake side can cause installation problems later.

**HINT:**

The intake valve stem oil seal is gray and the exhaust valve stem oil seal is black.



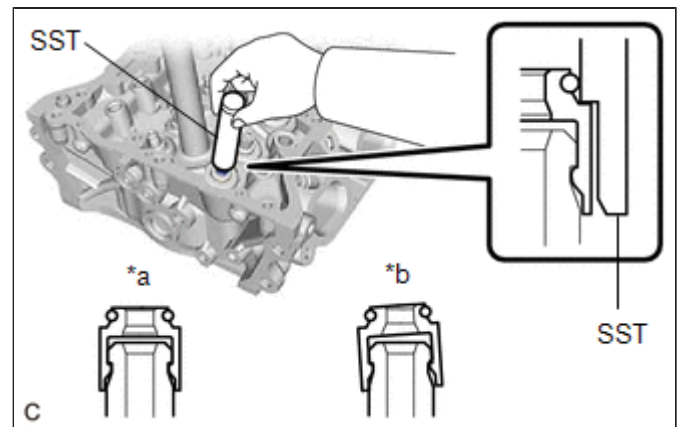
*a	Intake Side
*b	Exhaust Side
*c	Gray
*d	Black

(b) Using SST, push in the 16 valve stem oil seals.

**SST: 09201-41020**

**NOTICE:**

- Failure to use SST will cause the intake valve stem oil seal to be damaged or improperly seated.
- Do not push in the intake valve stem oil seals at an angle.

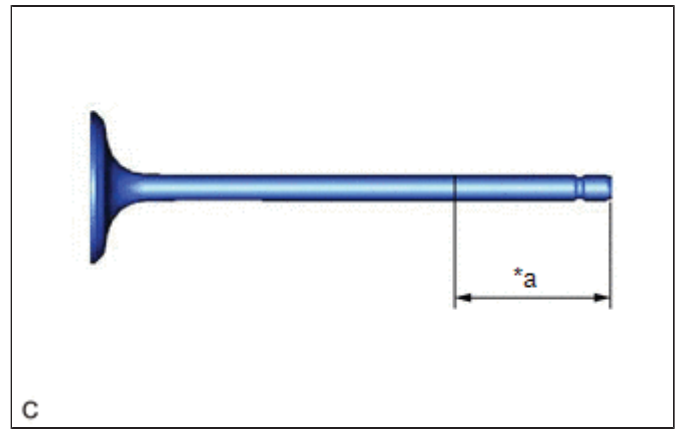


*a	Correct
*b	Incorrect

#### 5. INSTALL EXHAUST VALVE

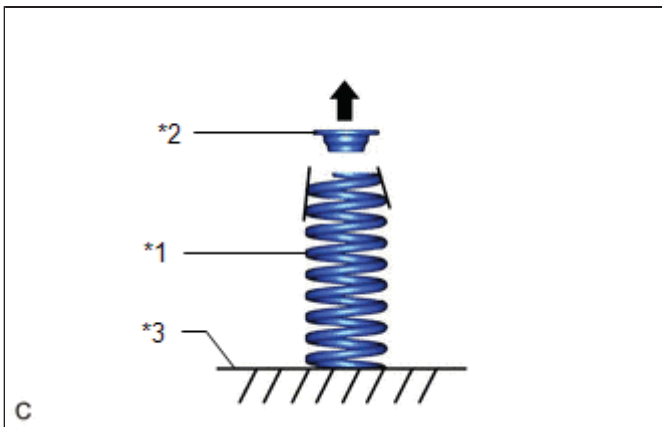
(a) Sufficiently apply engine oil to the tip area of the exhaust valve shown in the illustration.






*a	30 mm (1.18 in.) or more
----	--------------------------

(b) Install the 8 exhaust valves, 8 inner compression springs and 8 valve spring retainers to the cylinder head sub-assembly.



*1	Inner Compression Spring
*2	Valve Spring Retainer
*3	Cylinder Head Sub-assembly
	Top Side

**NOTICE:**

- Install the inner compression spring with its tapered side facing upward (towards the valve spring retainer).
- Install the same parts in the same combination to their original locations.

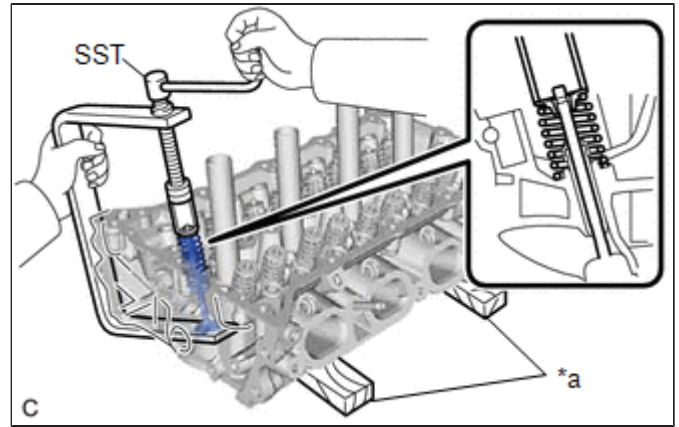
(c) Using SST and wooden blocks, compress the inner compression spring and install the 8 valve spring retainer locks.

**SST: 09202-70020**

09202-01010

09202-01020

SST: 09202-00021

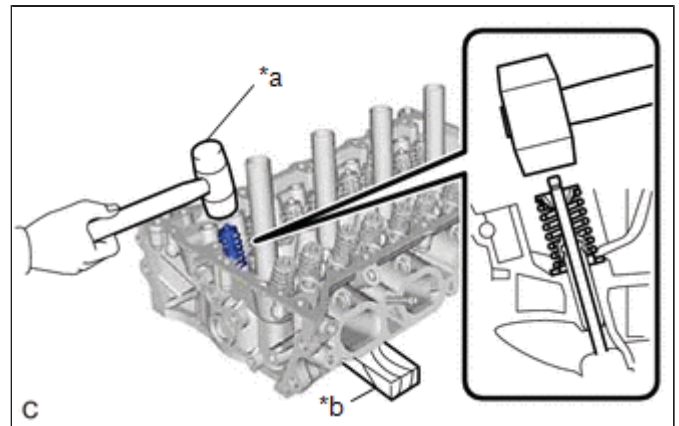


*a	Wooden Block
----	--------------

(d) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

**NOTICE:**

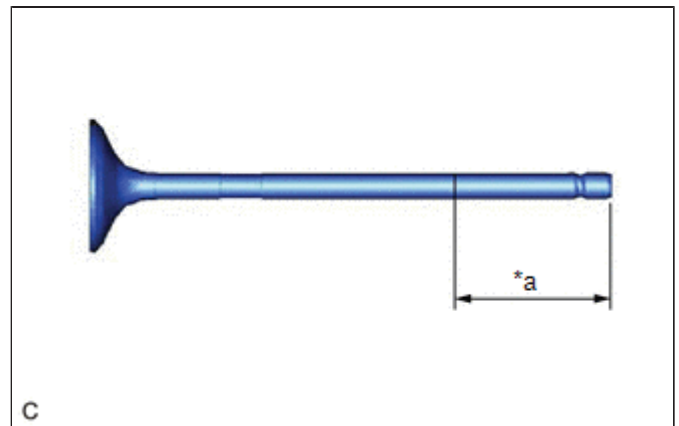
- Be careful not to damage the valve stem tip.
- Be careful not to damage the valve spring retainer.



*a	Plastic Hammer
*b	Wooden Block

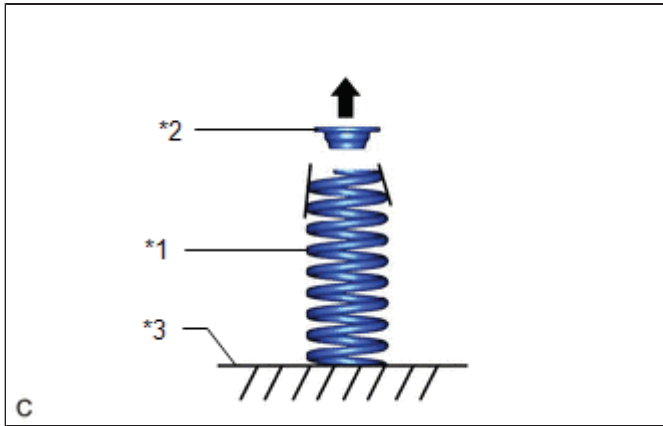
**6. INSTALL INTAKE VALVE**


(a) Sufficiently apply engine oil to the tip area of the intake valve shown in the illustration.



*a	30 mm (1.18 in.) or more
----	--------------------------

(b) Install the 8 intake valves, 8 inner compression springs and 8 valve spring retainers to the cylinder head sub-assembly.



*1	Inner Compression Spring
*2	Valve Spring Retainer
*3	Cylinder Head Sub-assembly
	Top Side

**NOTICE:**

- Install the inner compression spring with its tapered side facing upward (towards the valve spring retainer).
- Install the same parts in the same combination to their original locations.

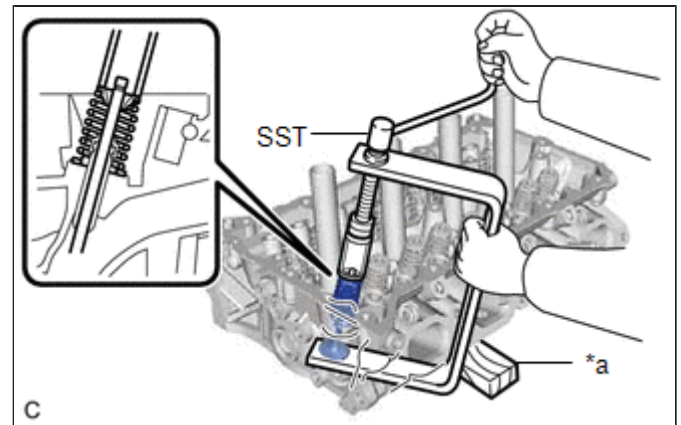
(c) Using SST and wooden blocks, compress the inner compression spring and install the 8 valve spring retainers.

**SST: 09202-70020**

09202-01010

09202-01020

**SST: 09202-00021**

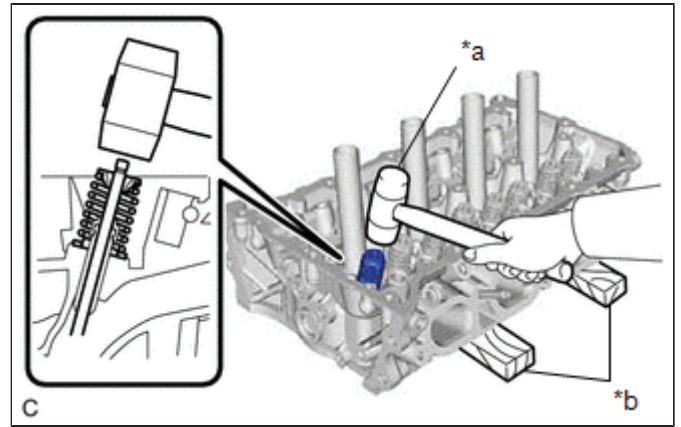


*a	Wooden Block
----	--------------

(d) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

**NOTICE:**

- Be careful not to damage the valve stem tip.
- Be careful not to damage the valve spring retainer.



*a	Plastic Hammer
*b	Wooden Block



Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000S5L8
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - ]
Title: 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD: REPAIR; 2016 - 2019 MY Prius [11/2015 - ]		

## REPAIR

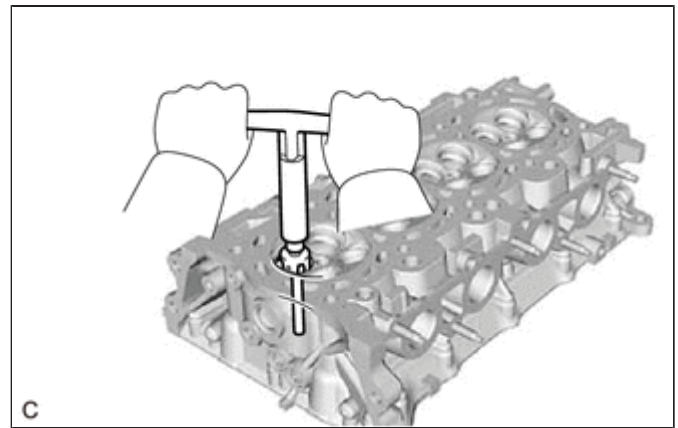
### PROCEDURE

#### 1. REPAIR VALVE SEAT

**NOTICE:**

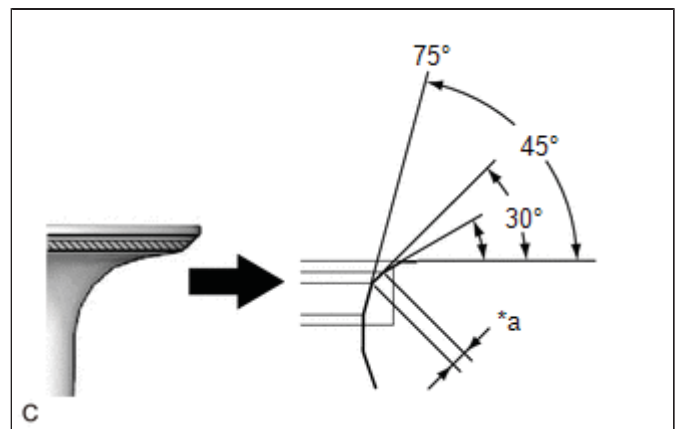
- Repair the valve seat while checking the seating position.
- Release the cutter gradually to make the valve seat smooth.

(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the standard.



(b) Using 30° and 75° cutters, resurface the valve seat so that the valve contacts the entire circumference of the valve seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the valve seat.

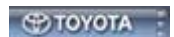
Standard Valve Seat Width:  
1.0 to 1.4 mm (0.0394 to 0.0551 in.)



*a	Valve Seat Width
----	------------------

(c) Hand lap the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.



Last Modified: 01-14-2019	6.8: 8.0.48	Doc ID: RM100000000S5L9
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - ]
Title: 2ZR-FXE (ENGINE MECHANICAL): CYLINDER HEAD: REPLACEMENT; 2016 - 2019 MY Prius [11/2015 - ]		

## REPLACEMENT

## PROCEDURE

### 1. REPLACE RING PIN

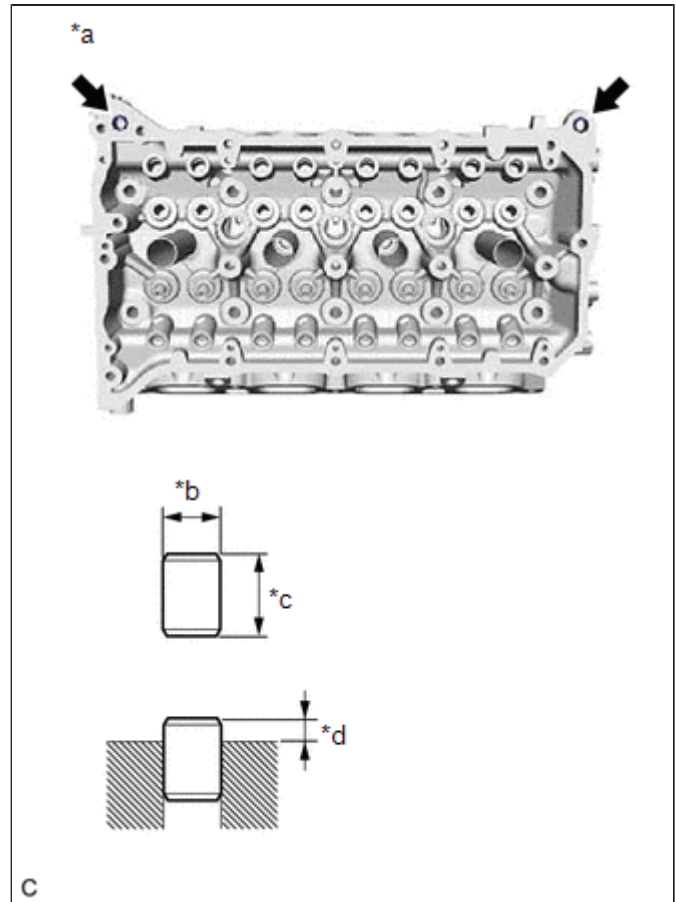
**HINT:**

It is not necessary to remove the ring pins unless they are being replaced.

(a) Using a plastic hammer, tap in 2 new ring pins to the cylinder head sub-assembly.

Standard Ring Pin:

ITEM	HEIGHT	WIDTH	PROTRUSION
Ring pin	11.7 to 12.3 mm (0.461 to 0.484 in.)	12.0 mm (0.472 in.)	6.5 to 7.5 mm (0.256 to 0.295 in.)



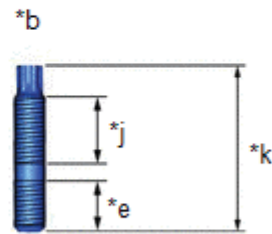
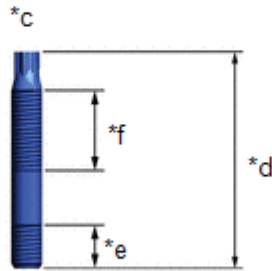
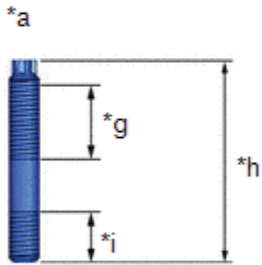
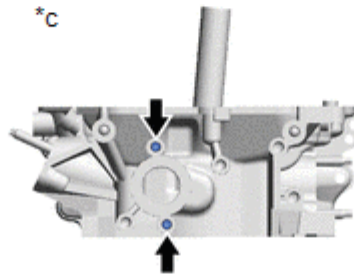
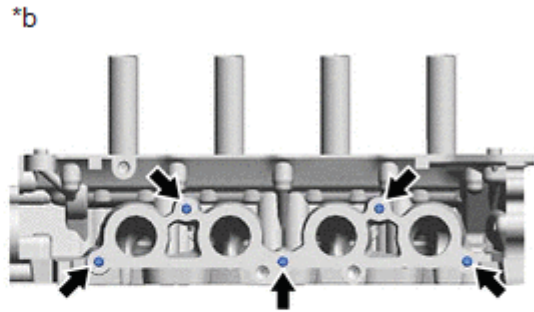
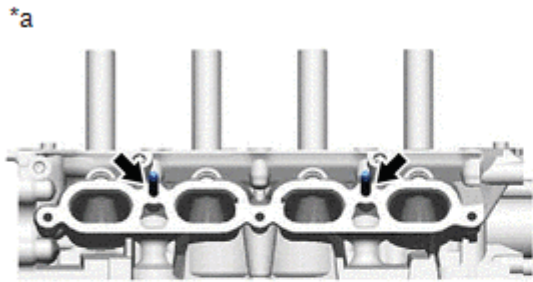
*a	Top Side
*b	Width
*c	Height
*d	Protrusion Height

### 2. REPLACE STUD BOLT

**HINT:**

If a stud bolt is deformed or its threads are damaged, replace it.

(a) Using E7 and E8 "TORX" socket wrenches, install the 9 stud bolts to the cylinder head sub-assembly.



c

*a	Intake Manifold Side	*b	Exhaust Manifold Side
*c	Cylinder Head Rear Side	*d	55 mm (2.17 in.)
*e	13 mm (0.512 in.)	*f	26 mm (1.02 in.)
*g	32 mm (1.26 in.)	*h	48 mm (1.89 in.)
*i	12 mm (0.472 in.)	*j	22 mm (0.866 in.)
*k	42 mm (1.65 in.)	-	-

**Torque:**

**9.5 N·m { 97 kgf·cm, 84 in·lbf }**

**3. REPLACE INTAKE VALVE GUIDE BUSH**

(a) Heat the cylinder head sub-assembly to between 80 and 100°C (176 and 212°F).

(b) Place the cylinder head sub-assembly on wooden blocks.

**CAUTION:**

Be sure to wear protective gloves.

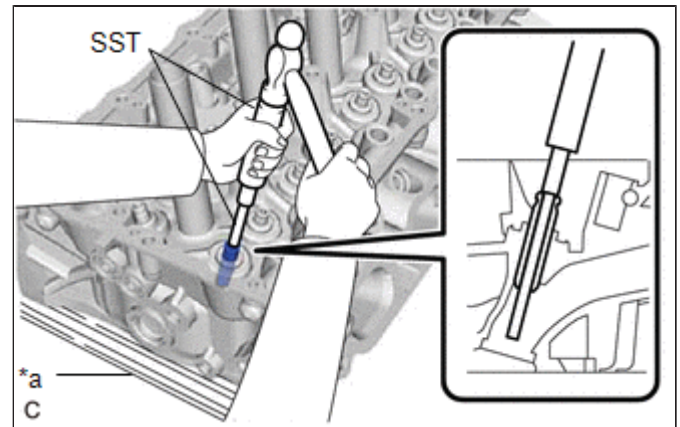
(c) Using SST and a hammer, tap out the intake valve guide bush.

**SST: 09201-10000**

09201-01050

**SST: 09950-70010**

09951-07100



*a	Wooden Block
----	--------------

(d) Using a caliper gauge, measure the intake valve guide bush bore diameter of the cylinder head sub-assembly.

Standard Intake Valve Guide Bush Bore Diameter:

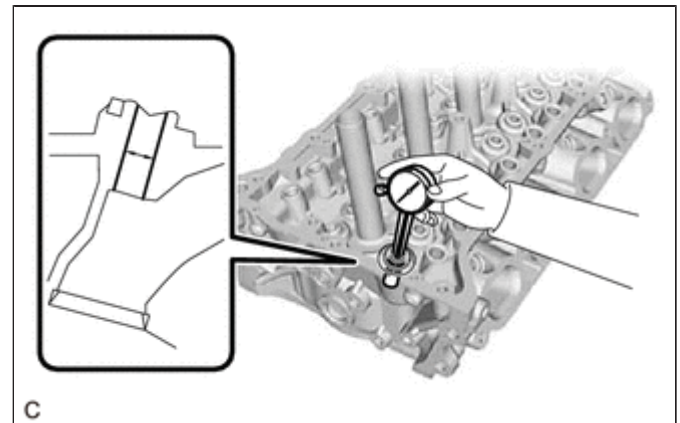
10.285 to 10.306 mm (0.40492 to 0.40575 in.)

New Guide Bush Selection Chart:

BUSH SIZE	BUSH BORE DIAMETER
STD	10.333 to 10.344 mm (0.40681 to 0.40724 in.)
O/S 0.05	10.383 to 10.394 mm (0.40878 to 0.40921 in.)

**HINT:**

- If the intake valve guide bush bore diameter is more than 10.306 mm (0.40575 in.), machine the intake valve guide bush bore to a dimension of 10.335 to 10.356 mm (0.40689 to 0.40772 in.) to install an O/S 0.05 intake valve guide bush.
- If the intake valve guide bush bore diameter of the cylinder head sub-assembly is more than 10.356 mm (0.40772 in.), replace the cylinder head sub-assembly.



(e) Heat the cylinder head sub-assembly to between 80 and 100°C (176 and 212°F).

(f) Place the cylinder head sub-assembly on wooden blocks.

**CAUTION:**

Be sure to wear protective gloves.

(g) Using SST and a hammer, tap in a new intake valve guide bush to the specified protrusion height.

**SST: 09201-10000**

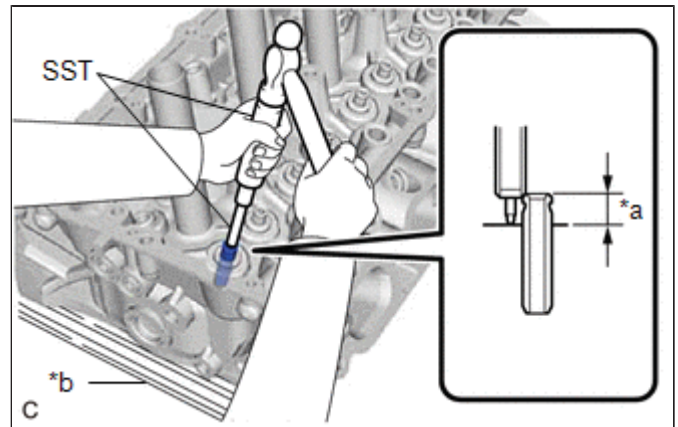
09201-01050

**SST: 09950-70010**

09951-07100



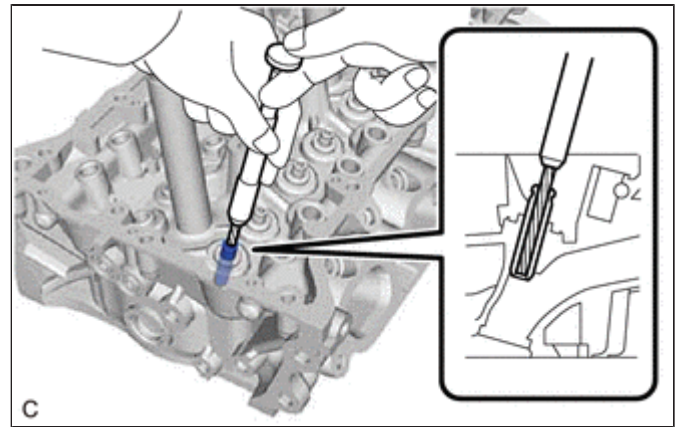
Standard Protrusion Height:  
9.9 to 10.3 mm (0.390 to 0.406 in.)



*a	Protrusion Height
*b	Wooden Block

(h) Using a sharp 5.5 mm reamer, ream the intake valve guide bush to obtain the specified oil clearance.

Standard Oil Clearance:  
0.025 to 0.060 mm (0.000984 to 0.00236 in.)



#### 4. REPLACE EXHAUST VALVE GUIDE BUSH

- (a) Heat the cylinder head sub-assembly to between 80 and 100°C (176 and 212°F).
- (b) Place the cylinder head sub-assembly on wooden blocks.

**CAUTION:**

Be sure to wear protective gloves.

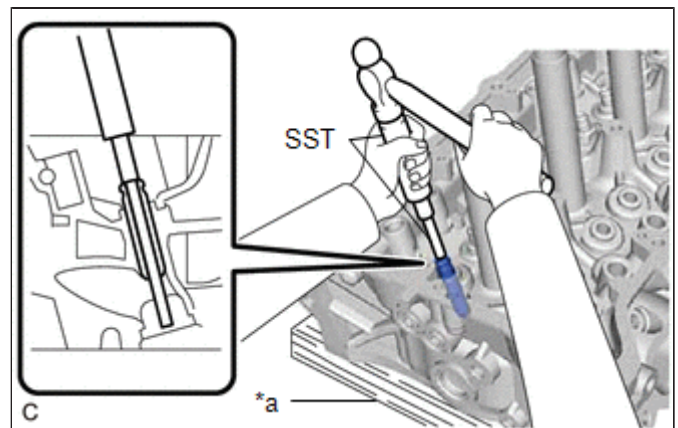
(c) Using SST and a hammer, tap out the exhaust valve guide bush.

**SST: 09201-10000**

09201-01050

**SST: 09950-70010**

09951-07100



*a	Wooden Block
----	--------------

(d) Using a caliper gauge, measure the exhaust valve guide bush bore diameter of the cylinder head sub-assembly.

Standard Exhaust Valve Guide Bush Bore Diameter:

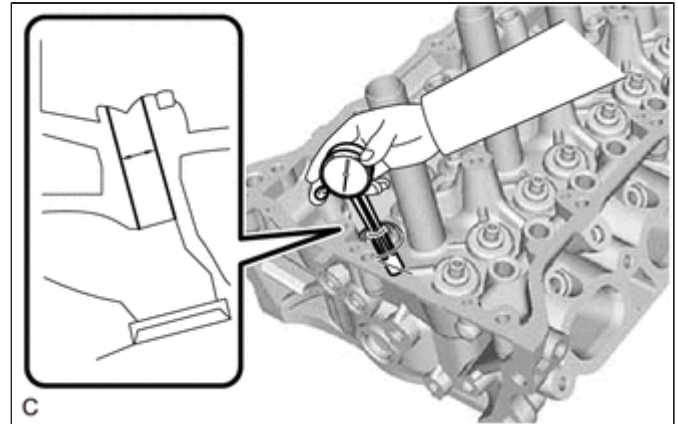
10.285 to 10.306 mm (0.40492 to 0.40575 in.)

New Guide Bush Selection Chart:

BUSH SIZE	BUSH BORE DIAMETER
STD	10.333 to 10.344 mm (0.40681 to 0.40724 in.)
O/S 0.05	10.383 to 10.394 mm (0.40878 to 0.40921 in.)

**HINT:**

- If the exhaust valve guide bush bore diameter is more than 10.306 mm (0.40575 in.), machine the exhaust valve guide bush bore to a dimension of 10.335 to 10.356 mm (0.40689 to 0.40772 in.) to install an O/S 0.05 exhaust valve guide bush.
- If the exhaust valve guide bush bore diameter of the cylinder head sub-assembly is more than 10.356 mm (0.40772 in.), replace the cylinder head sub-assembly.



(e) Heat the cylinder head sub-assembly to between 80 and 100°C (176 and 212°F).

(f) Place the cylinder head sub-assembly on wooden blocks.

**CAUTION:**

Be sure to wear protective gloves.

(g) Using SST and a hammer, tap in a new exhaust valve guide bush to the specified protrusion height.

**SST: 09201-10000**

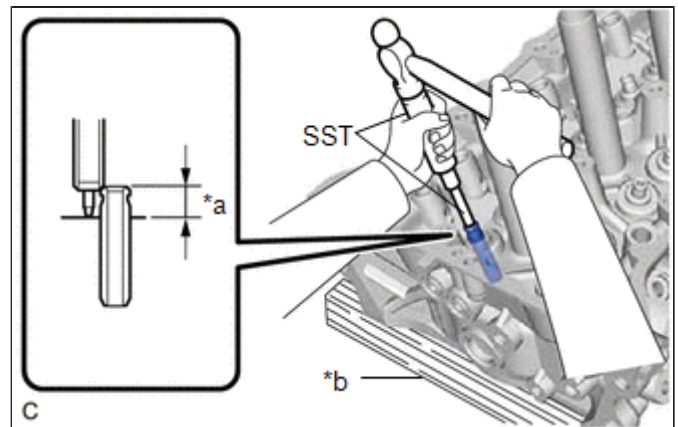
09201-01050

**SST: 09950-70010**

09951-07100

Standard Protrusion Height:

11.15 to 11.55 mm (0.439 to 0.455 in.)

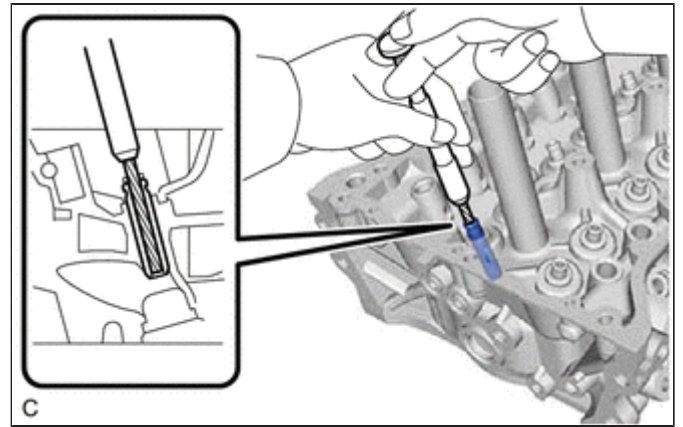


*a	Protrusion Height
*b	Wooden Block

(h) Using a sharp 5.5 mm reamer, ream the exhaust valve guide bush to obtain the specified oil clearance.

Standard Oil Clearance:

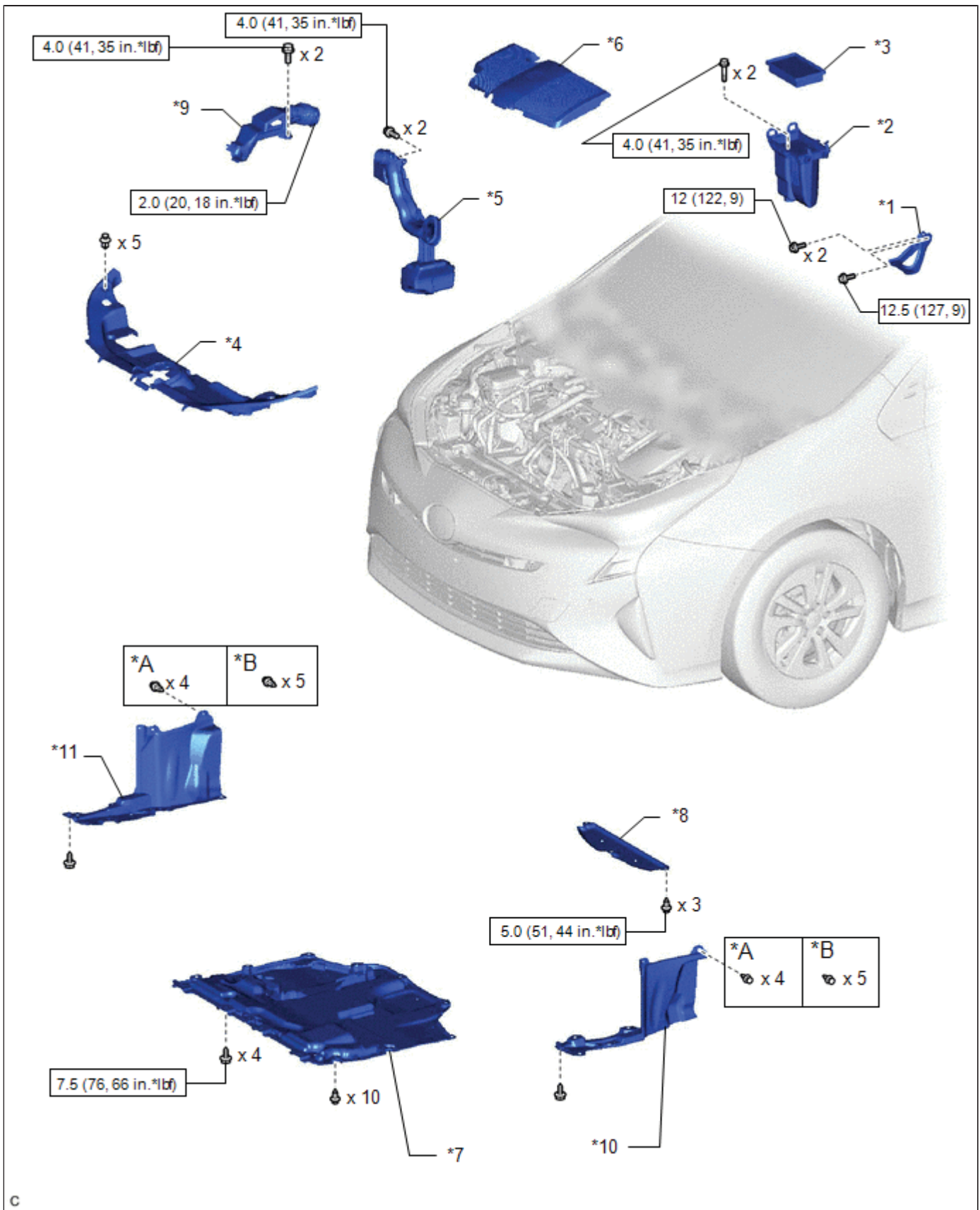
0.030 to 0.065 mm (0.00118 to 0.00256 in.)



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3T
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - 12/2018]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE ASSEMBLY: COMPONENTS; 2016 - 2018 MY Prius [11/2015 - 12/2018]		


## [COMPONENTS](#)

## [ILLUSTRATION](#)



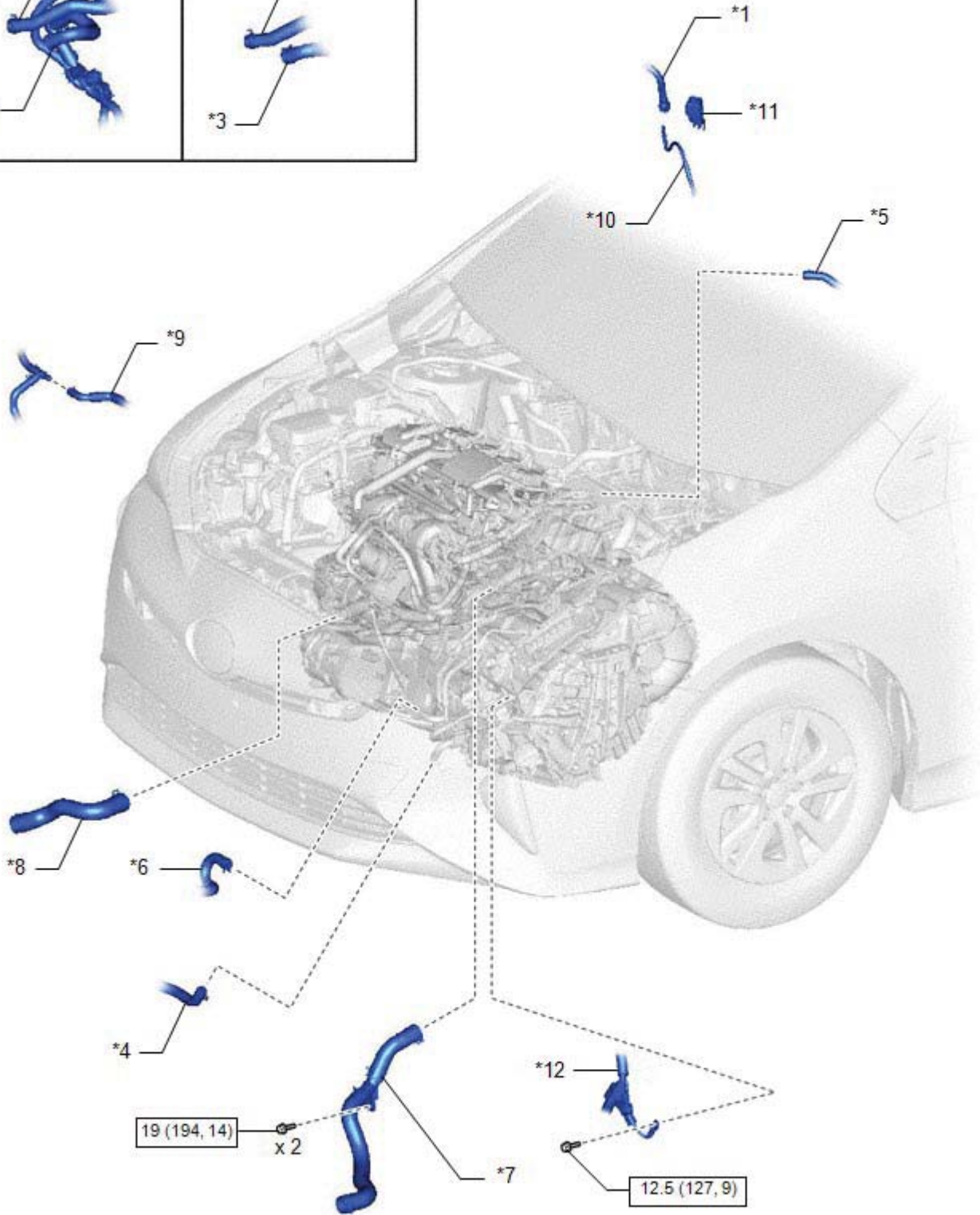
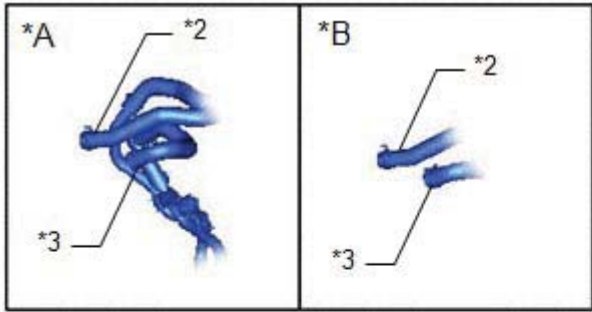
c

*A	except Rough Road Area Specification Vehicles	*B	for Rough Road Area Specification Vehicles
*1	AIR CLEANER BRACKET	*2	AIR CLEANER CASE SUB-ASSEMBLY
*3	AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY	*4	RADIATOR SUPPORT OPENING COVER

*5	INLET NO. 1 AIR CLEANER	*6	NO. 1 ENGINE COVER SUB-ASSEMBLY
*7	NO. 1 ENGINE UNDER COVER	*8	NO. 2 ENGINE UNDER COVER
*9	INLET NO. 2 AIR CLEANER	*10	REAR MOTOR UNDER COVER LH
*11	REAR MOTOR UNDER COVER RH	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque	-	-


**ILLUSTRATION**



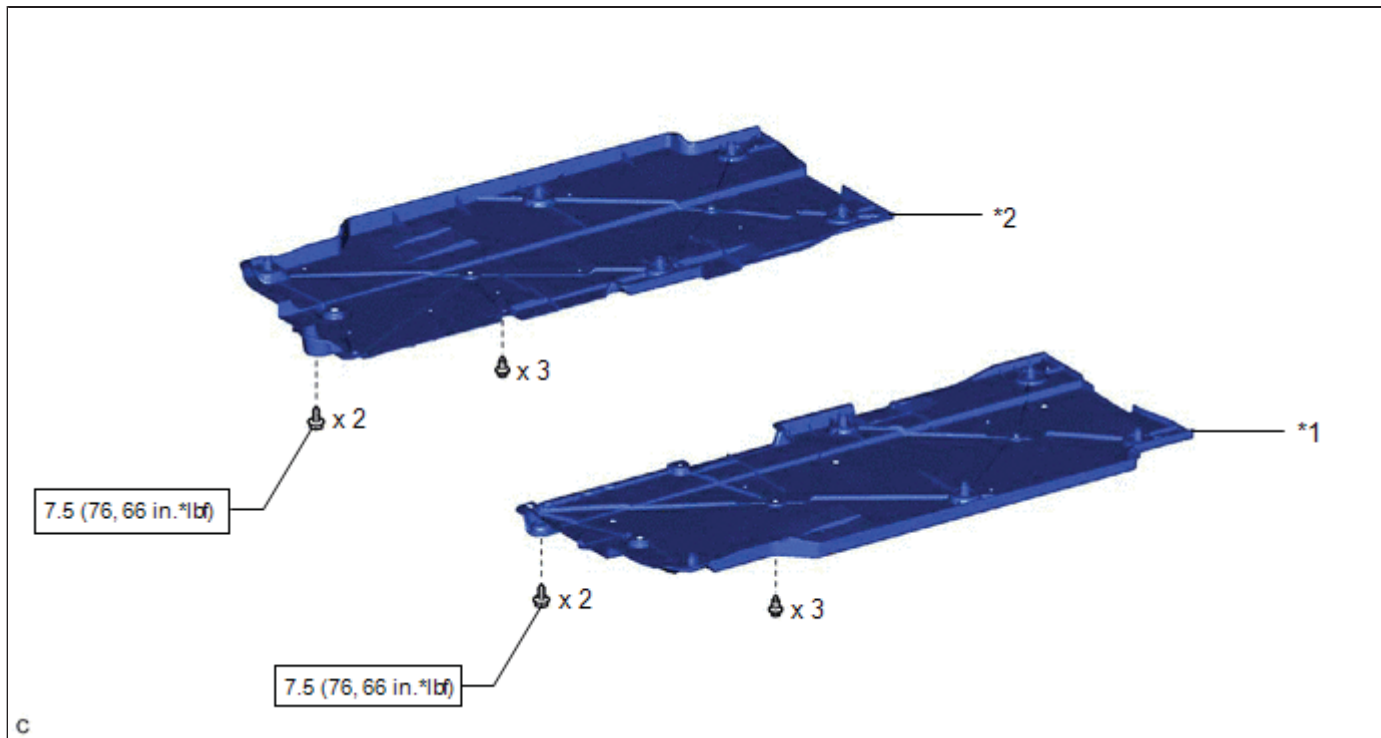



c

*A	w/ Exhaust Heat Recirculation System	*B	w/o Exhaust Heat Recirculation System
*1	FUEL TUBE SUB-ASSEMBLY	*2	INLET HEATER WATER HOSE A

*3	OUTLET HEATER WATER HOSE E	*4	INLET HYBRID RADIATOR HOSE
*5	NO. 1 FUEL VAPOR FEED HOSE	*6	OUTLET NO. 1 HYBRID WATER PUMP HOSE
*7	NO. 3 RADIATOR HOSE	*8	NO. 2 RADIATOR HOSE
*9	NO. 8 WATER BY-PASS HOSE	*10	FUEL PIPE
*11	NO. 1 FUEL PIPE CLAMP	*12	NO. 3 ENGINE WIRE
	N*m (kgf*cm, ft.*lbf): Specified torque	-	-

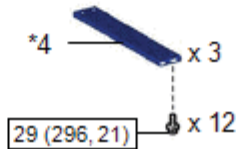
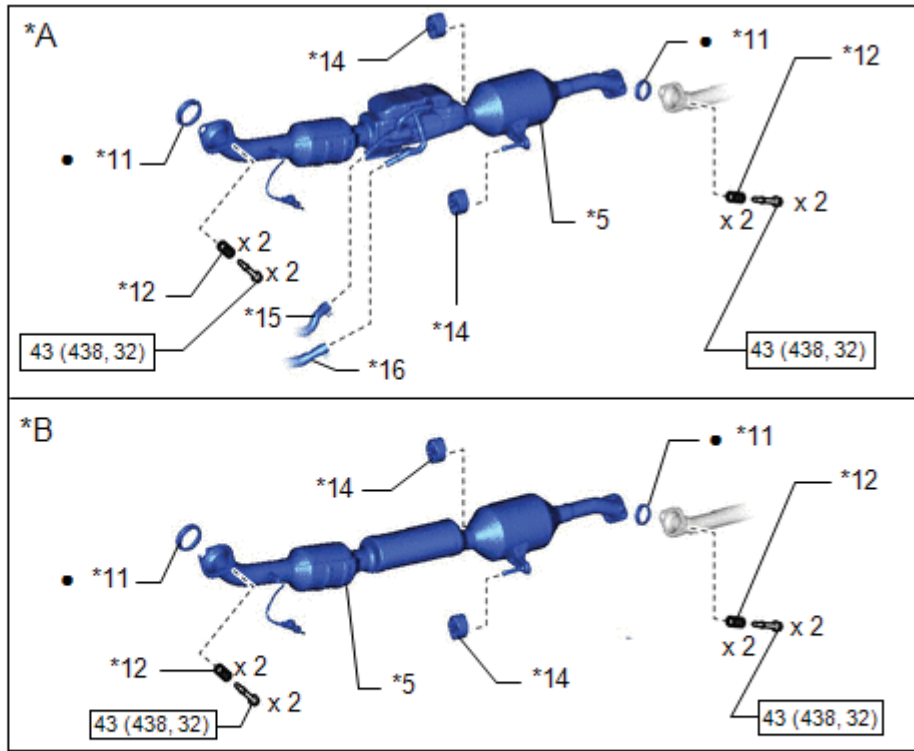
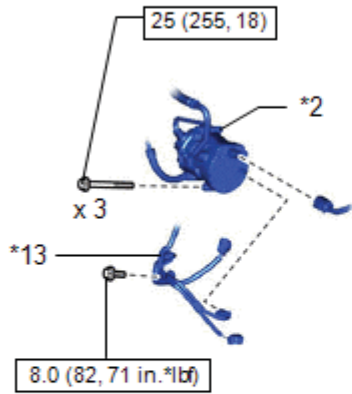
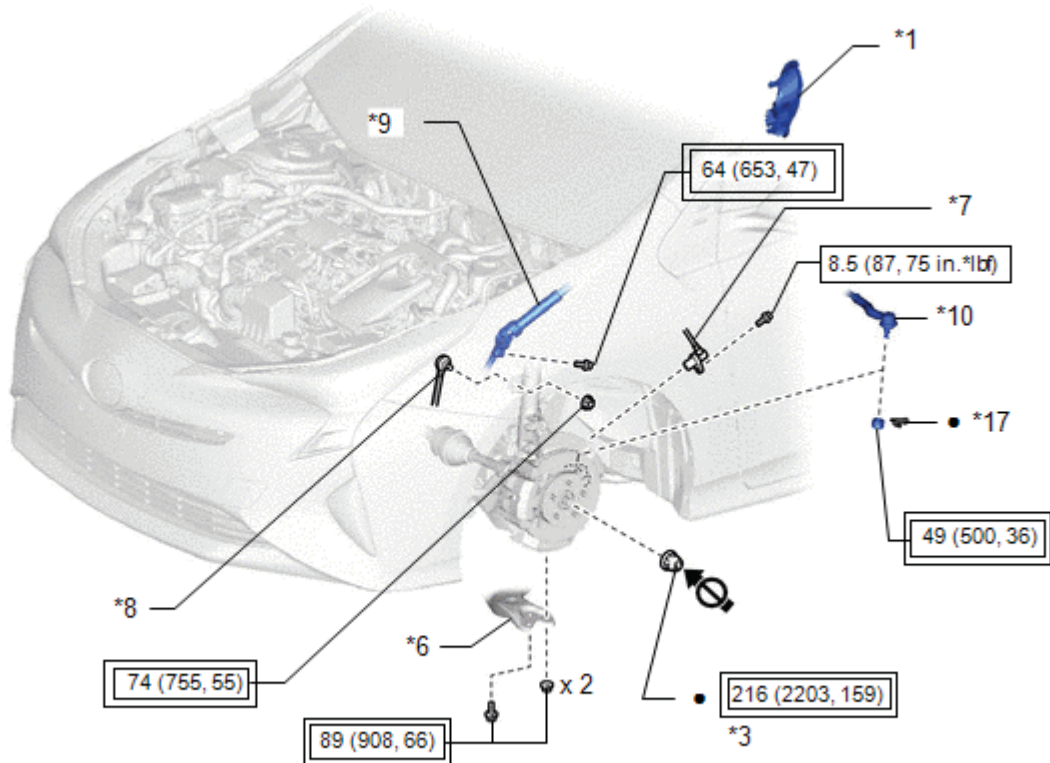
## ILLUSTRATION



*1	FRONT FLOOR COVER LH	*2	FRONT FLOOR COVER RH
	N*m (kgf*cm, ft.*lbf): Specified torque	-	-




## ILLUSTRATION



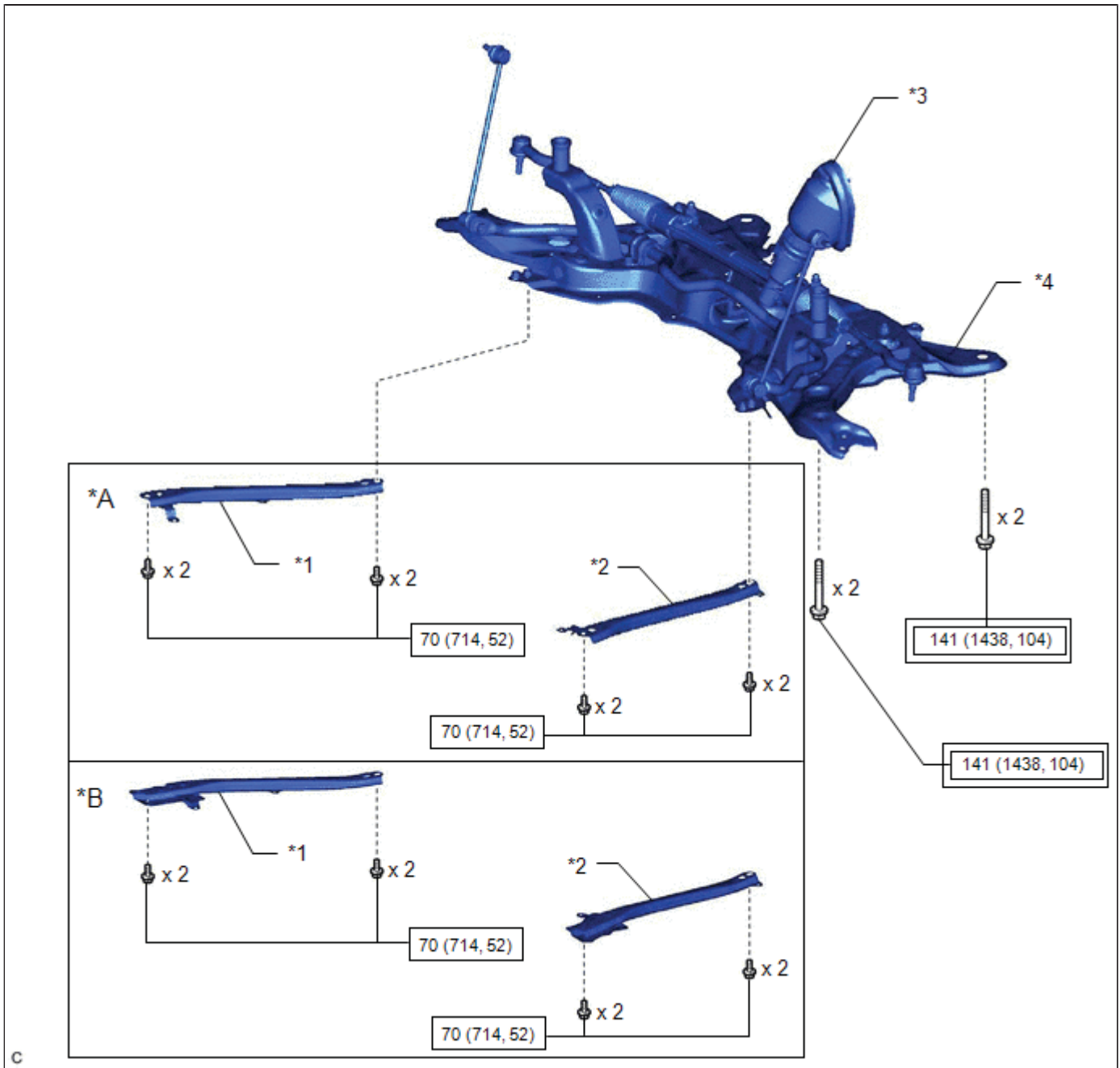




c

*A	w/ Exhaust Heat Recirculation System	*B	w/o Exhaust Heat Recirculation System
*1	COLUMN HOLE COVER SILENCER SHEET	*2	COMPRESSOR WITH MOTOR ASSEMBLY

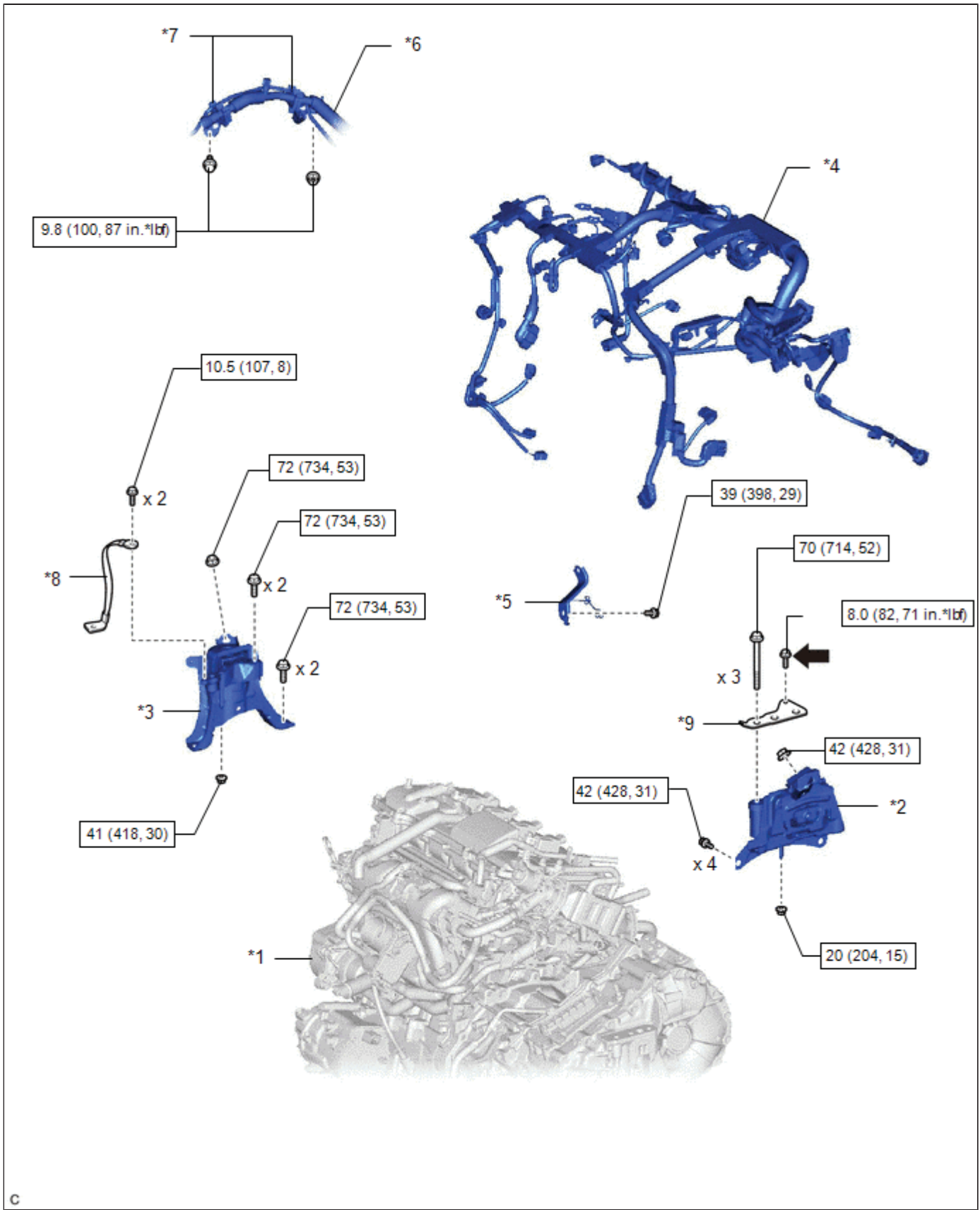
*3	FRONT AXLE SHAFT NUT LH	*4	FRONT CENTER FLOOR BRACE
*5	FRONT EXHAUST PIPE ASSEMBLY (TWC: Rear Catalyst)	*6	FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH
*7	FRONT SPEED SENSOR LH	*8	FRONT STABILIZER LINK ASSEMBLY LH
*9	NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY	*10	TIE ROD END SUB-ASSEMBLY LH
*11	EXHAUST PIPE GASKET	*12	COMPRESSION SPRING
*13	BRACKET	*14	EXHAUST PIPE SUPPORT
*15	OUTLET HEATER WATER HOSE C	*16	OUTLET HEATER WATER HOSE B
*17	COTTER PIN	-	-
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
•	Non-reusable part		Do not apply lubricants to the threaded parts

## ILLUSTRATION





*A	except Rough Road Area Specification Vehicles	*B	for Rough Road Area Specification Vehicles
*1	REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH	*2	REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH
*3	NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY	*4	FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque

## ILLUSTRATION

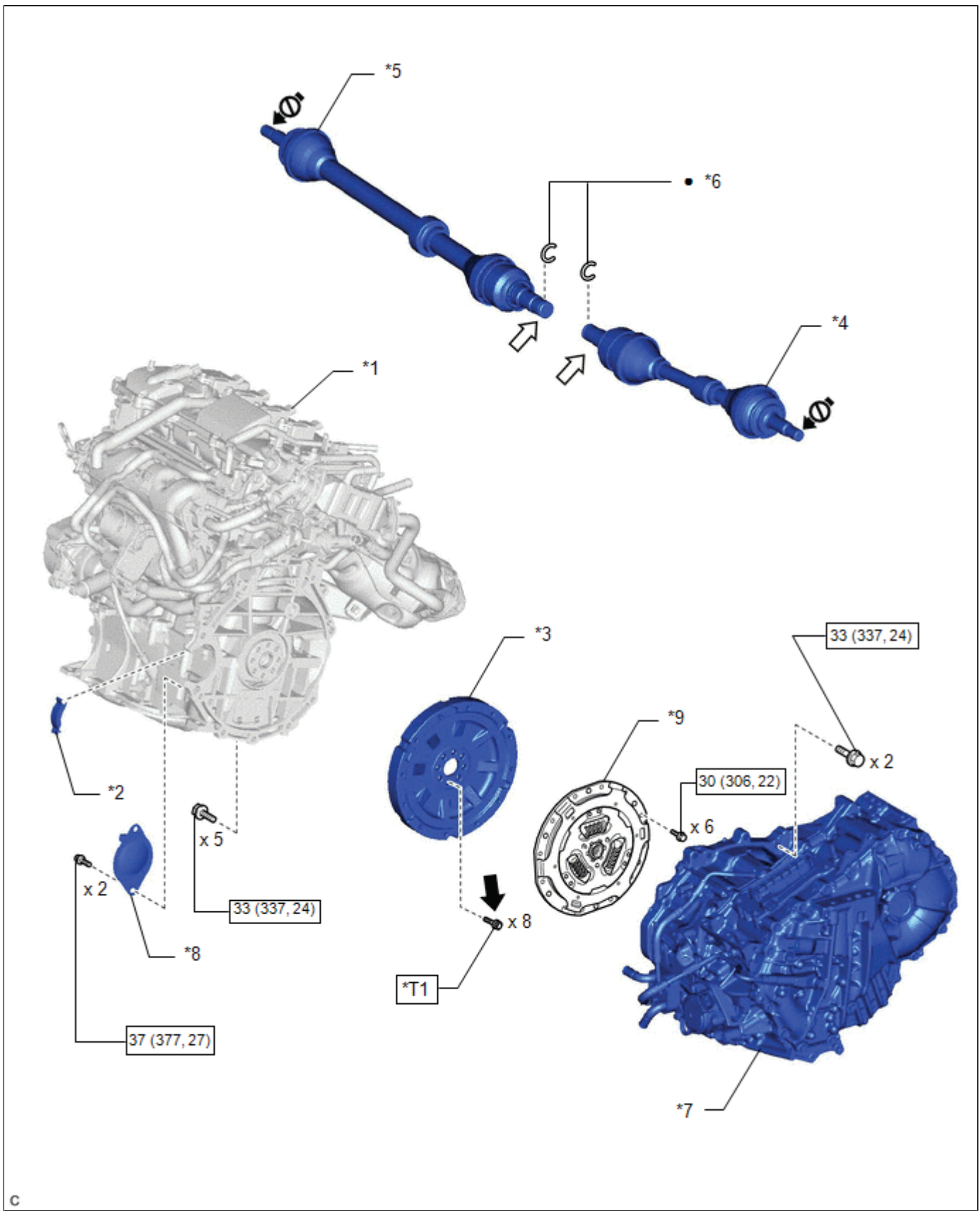


c

*1	ENGINE ASSEMBLY WITH TRANSAXLE	*2	ENGINE MOUNTING INSULATOR LH
*3	ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH	*4	ENGINE WIRE





*5	WIRE HARNESS CLAMP BRACKET	*6	AIR CONDITIONER TUBE AND ACCESSORY ASSEMBLY
*7	COOLER BRACKET	*8	NO. 2 EARTH WIRE
*9	NO. 2 ENGINE MOUNTING STAY LH	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque		Adhesive 1324
	Precoated part	-	-

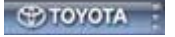
## ILLUSTRATION



c

*1	ENGINE ASSEMBLY	*2	FLYWHEEL HOUSING SIDE COVER
*3	FLYWHEEL SUB-ASSEMBLY	*4	FRONT DRIVE SHAFT ASSEMBLY LH

*5	FRONT DRIVE SHAFT ASSEMBLY RH	*6	FRONT DRIVE SHAFT HOLE SNAP RING
*7	HYBRID VEHICLE TRANSAXLE ASSEMBLY	*8	STARTER HOLE INSULATOR
*9	TRANSMISSION INPUT DAMPER ASSEMBLY	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque	•	Non-reusable part
	Do not apply lubricants to the threaded parts		Adhesive 1324
	ATF WS		Precoated part
*T1	1st: 49 (500, 36) 2nd: Turn 90°	-	-



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3R
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - 08/2016]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE ASSEMBLY: INSTALLATION; 2016 MY Prius [11/2015 - 08/2016]		

## INSTALLATION

### CAUTION / NOTICE / HINT

#### **CAUTION:**

- The engine assembly with transaxle is very heavy. Be sure to follow the procedure described in the repair manual, or the engine lifter may suddenly drop or the engine assembly with transaxle may fall off the engine lifter.
- To prevent burns, do not touch the engine, exhaust manifold or other high temperature components while the engine is hot.

## PROCEDURE

### **1. INSTALL ENGINE HANGERS**

Click here [INFO](#)

### **2. REMOVE ENGINE ASSEMBLY FROM ENGINE STAND**

- (a) Remove the engine assembly from the engine stand.

### **3. INSTALL FLYWHEEL SUB-ASSEMBLY**

Click here [INFO](#)

### **4. INSTALL TRANSMISSION INPUT DAMPER ASSEMBLY**

Click here [INFO](#)

### **5. INSTALL ENGINE ASSEMBLY**

Click here [INFO](#)

### **6. INSTALL ENGINE WIRE**

- (a) Install the engine wire to the engine assembly with transaxle.

### **7. INSTALL FLYWHEEL HOUSING SIDE COVER**

Click here [INFO](#)

### **8. INSTALL STARTER HOLE INSULATOR**

Click here [INFO](#)

### **9. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH**

#### **HINT:**

Perform this procedure only when replacement of the engine mounting insulator sub-assembly RH is necessary.



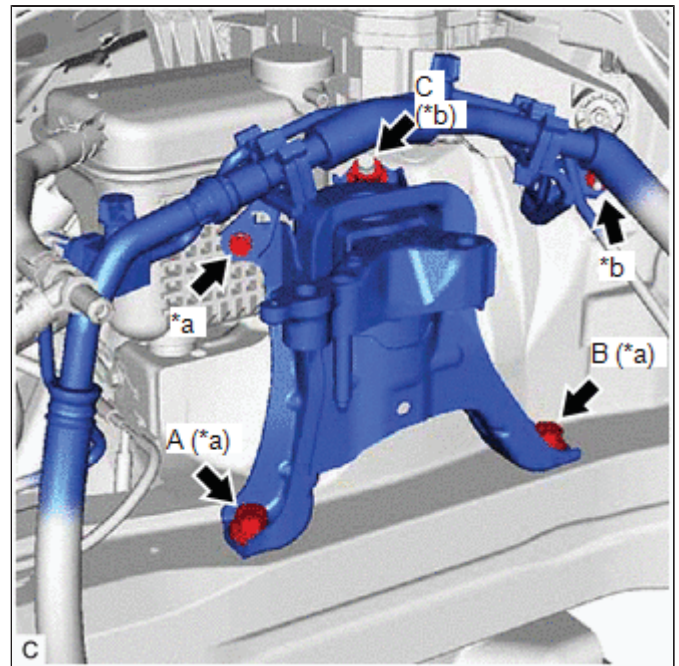
(a) Install the engine mounting insulator sub-assembly RH with the 2 bolts and nut.

**Torque:**

**72 N·m { 734 kgf·cm, 53 ft·lbf }**

**NOTICE:**

Temporarily tighten the bolt (A), and then fully tighten the 2 bolts and nut in the order of (B), (A), and (C).



*a	Bolt
*b	Nut

(b) Connect the 2 cooler brackets to the engine mounting insulator sub-assembly RH with the bolt and nut.

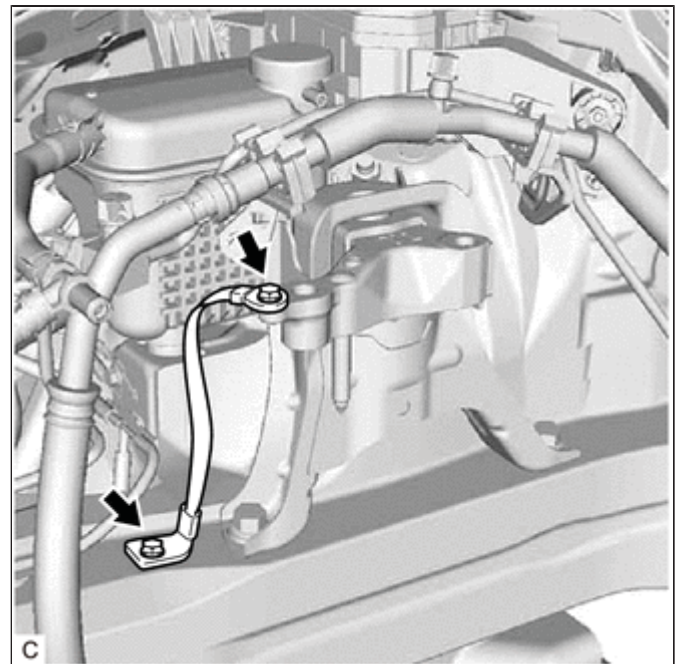
**Torque:**

**9.8 N·m { 100 kgf·cm, 87 in·lbf }**

(c) Install the No. 2 earth wire to the engine mounting insulator sub-assembly RH and vehicle body with the 2 bolts.

**Torque:**

**10.5 N·m { 107 kgf·cm, 8 ft·lbf }**



## 10. INSTALL ENGINE MOUNTING INSULATOR LH

**HINT:**

Perform this procedure only when replacement of the engine mounting insulator LH is necessary.

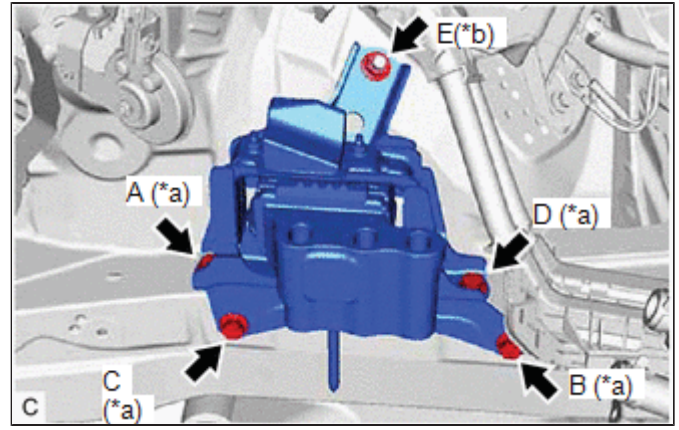
- (a) Install the engine mounting insulator LH with the 4 bolts and nut.

**Torque:**

**42 N·m { 428 kgf·cm, 31 ft·lbf }**

**NOTICE:**

Temporarily tighten the bolt (A), and then fully tighten the 4 bolts and nut in the order of (B), (C), (D), (A) and (E).



*a	Bolt
*b	Nut

**11. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**

- (a) Using height adjustment attachments and plate lift attachments to keep the engine assembly with transaxle and front suspension crossmember sub-assembly level, set an engine lifter underneath the engine assembly with transaxle and front suspension crossmember sub-assembly.

**NOTICE:**

- Do not perform any procedures while the engine assembly is suspended because doing so may cause the engine assembly to drop, resulting in injury. However, the engine assembly needs to be suspended when it is installed to or removed from an engine stand.
- To prevent the engine assembly from unexpectedly moving, securely support the engine assembly until it is secured to an engine stand.

- (b) Remove the 2 bolts, No. 1 engine hanger and No. 2 engine hanger.  
 (c) Install the wiring harness clamp bracket to the cylinder head sub-assembly with the bolt.

**Torque:**

**39 N·m { 398 kgf·cm, 29 ft·lbf }**

- (d) Engage the 3 clamps.  
 (e) Operate the engine lifter and install the engine assembly with transaxle to the vehicle.

**CAUTION:**

Do not raise the engine assembly with transaxle more than necessary. If the engine is raised excessively, the vehicle may also be lifted up.

**NOTICE:**

- Make sure that the engine assembly with transaxle is clear of all wiring and hoses.
- While raising the engine assembly with transaxle into the vehicle, do not allow it to contact the vehicle.

- (f) Connect the front suspension crossmember sub-assembly to the vehicle with the 4 bolts.

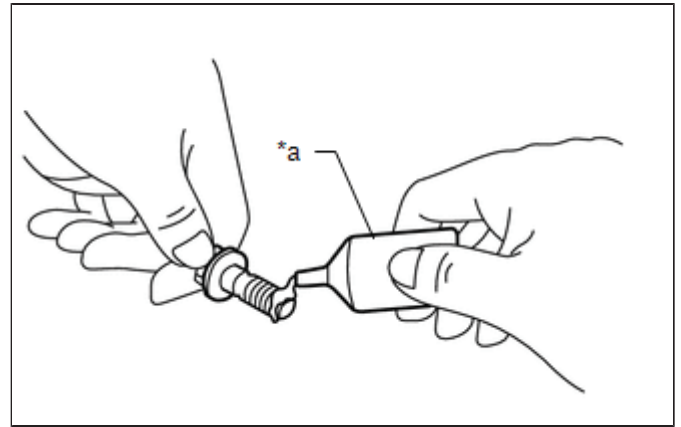
**Torque:**

**141 N·m { 1438 kgf·cm, 104 ft·lbf }**

(g) Apply adhesive to 2 or 3 threads at the end of each of the bolt.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

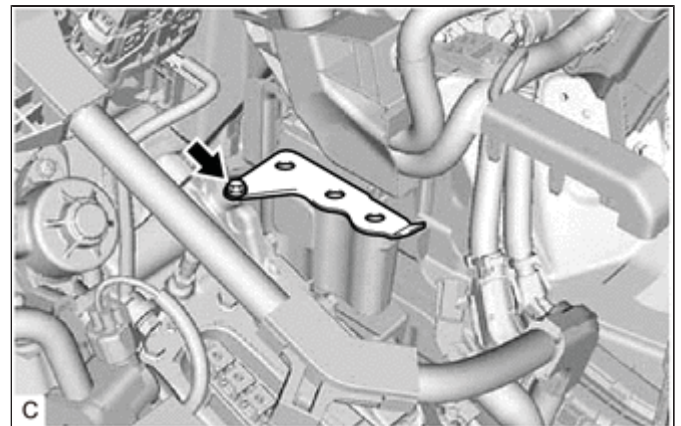


*a	Adhesive
----	----------

(h) Install the No. 2 engine mounting stay LH with the bolt.

**Torque:**

**8.0 N·m { 82 kgf·cm, 71 in·lbf }**



(i) Connect the engine mounting insulator LH to the hybrid vehicle transaxle assembly with the 3 bolts and nut.

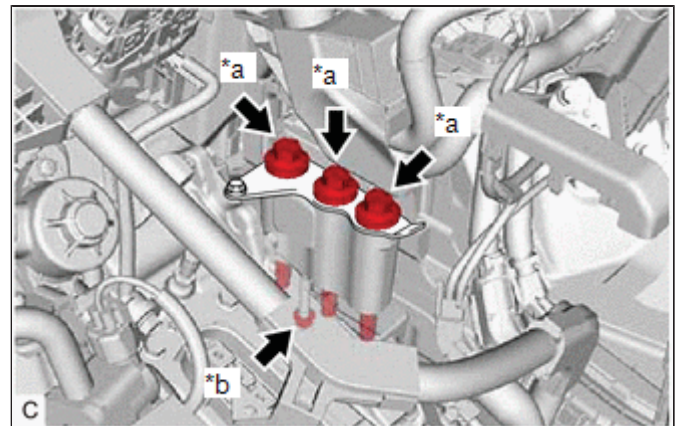
**Torque:**

**Bolt :**

**70 N·m { 714 kgf·cm, 52 ft·lbf }**

**Nut :**

**20 N·m { 204 kgf·cm, 15 ft·lbf }**

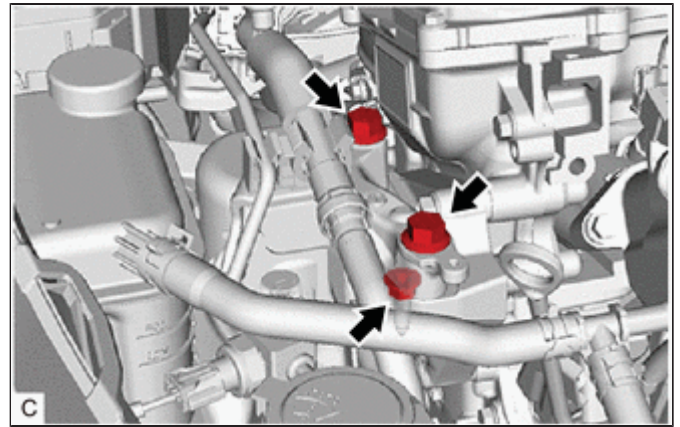


*a	Bolt
*b	Nut

- (j) Connect the engine mounting insulator sub-assembly RH to the engine mounting bracket RH with the 2 bolts.

**Torque:**

**72 N·m { 734 kgf·cm, 53 ft·lbf }**



- (k) Install the nut.

**Torque:**

**41 N·m { 418 kgf·cm, 30 ft·lbf }**

## 12. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH

Click here [INFO](#)

## 13. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH

**HINT:**

Use the same procedure as for the LH side.

## 14. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING

Click here [INFO](#)

## 15. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

Click here [INFO](#)

## 16. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

**HINT:**

Use the same procedure as for the LH side.

## 17. CONNECT FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH

Click here [INFO](#)

## 18. CONNECT FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH

**HINT:**

Use the same procedure as for the LH side.

## 19. INSTALL FRONT STABILIZER LINK ASSEMBLY LH

Click here [INFO](#)

## 20. INSTALL FRONT STABILIZER LINK ASSEMBLY RH

**HINT:**

Use the same procedure as for the LH side.

## 21. CONNECT TIE ROD END SUB-ASSEMBLY LH

Click here [INFO](#)

## 22. CONNECT TIE ROD END SUB-ASSEMBLY RH

### HINT:

Use the same procedure as for the LH side.

## 23. INSTALL FRONT SPEED SENSOR LH

Click here [INFO](#)

## 24. INSTALL FRONT SPEED SENSOR RH

### HINT:

Use the same procedure as for the LH side.

## 25. INSTALL FRONT AXLE SHAFT NUT LH

Click here [INFO](#)

## 26. INSTALL FRONT AXLE SHAFT NUT RH

### HINT:

Use the same procedure as for the LH side.

## 27. INSTALL FRONT EXHAUST PIPE ASSEMBLY (TWC: Rear Catalyst)

Click here [INFO](#)

## 28. INSTALL FRONT CENTER FLOOR BRACE

Click here [INFO](#)

## 29. INSTALL FRONT FLOOR COVER LH

Click here [INFO](#)

## 30. INSTALL FRONT FLOOR COVER RH

### HINT:

Use the same procedure as for the LH side.

## 31. CONNECT NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY

Click here [INFO](#)

## 32. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY

Click here [INFO](#)

## 33. INSTALL COLUMN HOLE COVER SILENCER SHEET

Click here [INFO](#)

## 34. CONNECT NO. 3 ENGINE WIRE

(a) Connect the No. 3 engine wire to hybrid vehicle transaxle assembly with the bolt.

### Torque:

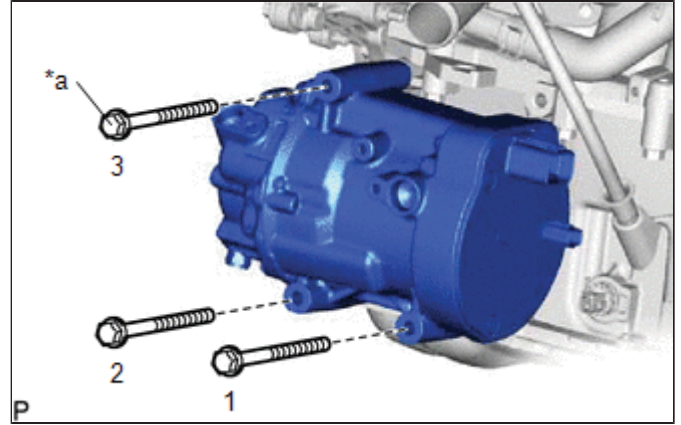
12.5 N·m { 127 kgf·cm, 9 ft·lbf }

(b) Engage the clamp.



### 35. INSTALL COMPRESSOR WITH MOTOR ASSEMBLY

(a) Temporarily install the compressor with motor assembly with the bolt (A).



*a	Bolt (A)
----	----------

(b) Install the compressor with motor assembly with the 3 bolts.

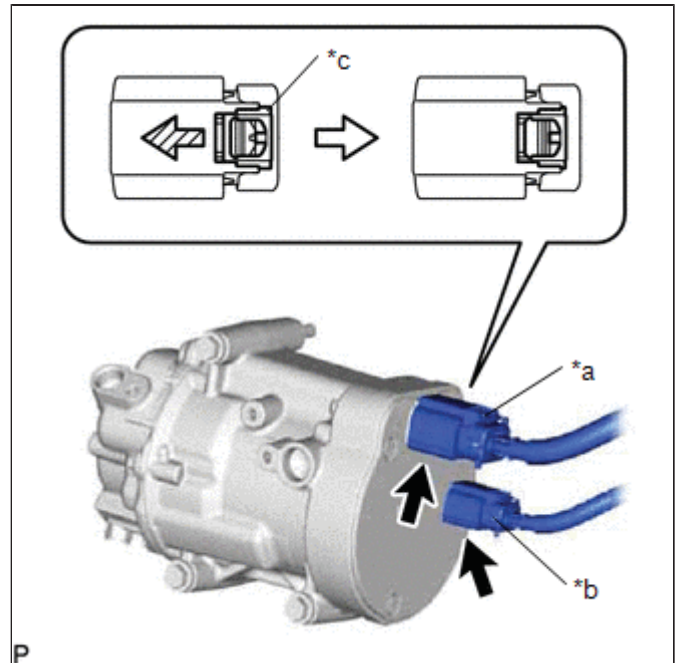
**Torque:**

**25 N·m { 255 kgf·cm, 18 ft·lbf }**

**HINT:**

Tighten the 3 bolts in the order shown in the illustration.

(c) Connect connector (B).



*a	Connector (A)
*b	Connector (B)
*c	Green-colored Lock

(d) Connect connector (A) and slide the green-colored lock as shown in the illustration to lock it securely.

**CAUTION:**

Make sure to wear insulating gloves.

**NOTICE:**

Make sure that the connector is connected securely.

(e) Connect the bracket with the bolt.

**Torque:**

8.0 N·m {82 kgf·cm, 71 in·lbf}

**36. CONNECT OUTLET NO. 1 HYBRID WATER PUMP HOSE**

(a) Connect the outlet No. 1 hybrid water pump hose to the motor cooling cooler and slide the clip to secure it.

**37. CONNECT INLET HYBRID RADIATOR HOSE**

(a) Connect the inlet hybrid radiator hose to the motor cooling cooler and slide the clip to secure it.

**38. CONNECT FUEL TUBE SUB-ASSEMBLY**

Click here [INFO](#)

**39. CONNECT NO. 1 FUEL VAPOR FEED HOSE**

(a) Connect the No. 1 fuel vapor feed hose to the fuel vapor feed pipe and slide the clip to secure it.

**40. CONNECT INLET HEATER WATER HOSE A**

(a) Connect the inlet heater water hose A to the EGR valve assembly and slide the clip to secure it.

**41. CONNECT OUTLET HEATER WATER HOSE E**

(a) Connect the outlet heater water hose E to the No. 1 water by-pass pipe and slide the clip to secure it.

**42. CONNECT NO. 2 RADIATOR HOSE**

(a) Connect the No. 2 radiator hose to the water inlet sub-assembly and slide the clip to secure it.

**43. CONNECT NO. 3 RADIATOR HOSE**

(a) Connect the No. 3 radiator hose to the water outlet and slide the clip to secure it.

(b) Install the 2 bolts to the hybrid vehicle transaxle assembly.

**Torque:**

19 N·m {194 kgf·cm, 14 ft·lbf}

**44. INSTALL INVERTER WITH CONVERTER ASSEMBLY**

Click here [INFO](#)

**45. INSTALL INLET NO. 1 AIR CLEANER**

Click here [INFO](#)

**46. INSTALL AIR CLEANER BRACKET**

Click here [INFO](#)

**47. INSTALL AIR CLEANER CASE SUB-ASSEMBLY**

Click here [INFO](#)

**48. INSTALL AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**

Click here [INFO](#)

#### **49. INSTALL THROTTLE BODY ASSEMBLY**

Click here [INFO](#)

#### **50. INSTALL INLET NO. 2 AIR CLEANER**

Click here [INFO](#)

#### **51. INSTALL RADIATOR SUPPORT OPENING COVER**

Click here [INFO](#)

#### **52. CONNECT NO. 8 WATER BY-PASS HOSE**

(a) Connect the No. 8 water by-pass hose to the No. 2 water by-pass hose assembly and slide the clip to secure it.

#### **53. ADD ENGINE OIL**

Click here [INFO](#)

#### **54. ADD HYBRID TRANSAXLE FLUID**

Click here [INFO](#)

#### **55. ADD ENGINE COOLANT (for Engine)**

Click here [INFO](#)

#### **56. CHECK ENGINE OIL LEVEL**

Click here [INFO](#)

#### **57. INSPECT HYBRID TRANSAXLE FLUID**

Click here [INFO](#)

#### **58. INSPECT FOR COOLANT LEAK (for Inverter)**

Click here [INFO](#)

#### **59. INSPECT FOR COOLANT LEAK (for Engine)**

Click here [INFO](#)

#### **60. INSPECT FOR FUEL LEAK**

Click here [INFO](#)

#### **61. INSPECT FOR OIL LEAK**

Click here [INFO](#)

#### **62. INSPECT FOR EXHAUST GAS LEAK**

Click here [INFO](#)

#### **63. INSTALL NO. 2 ENGINE UNDER COVER**

(a) Install the No. 2 engine under cover with the 3 bolts.

**Torque:**



5.0 N·m { 51 kgf·cm, 44 in·lbf }

#### 64. INSTALL REAR MOTOR UNDER COVER LH

- (a) except Rough Road Area Specification Vehicles:
- (1) Install the rear motor under cover LH with the 4 clips and screw.
- (b) for Rough Road Area Specification Vehicles:
- (1) Install the rear motor under cover LH with the 5 clips and screw.

#### 65. INSTALL REAR MOTOR UNDER COVER RH

- (a) except Rough Road Area Specification Vehicles:
- (1) Install the rear motor under cover RH with the 4 clips and screw.
- (b) for Rough Road Area Specification Vehicles:
- (1) Install the rear motor under cover RH with the 5 clips and screw.

#### 66. INSTALL NO. 1 ENGINE UNDER COVER

- (a) Install the No. 1 engine under cover with the 10 clips and 4 bolts.

**Torque:**

7.5 N·m { 76 kgf·cm, 66 in·lbf }

#### 67. INSTALL FRONT WHEELS

Click here [INFO](#)

#### 68. INSPECT IGNITION TIMING

Click here [INFO](#)

#### 69. INSPECT ENGINE IDLE SPEED

Click here [INFO](#)

#### 70. INSPECT CO/HC

Click here [INFO](#)

#### 71. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

Click here [INFO](#)

#### 72. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY

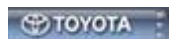
- (a) Engage the 3 clips to install the No. 1 engine cover sub-assembly.

**NOTICE:**

- Be sure to engage the clips securely.
- Do not apply excessive force or hit the No. 1 engine cover sub-assembly to engage the clips. This may cause the No. 1 engine cover sub-assembly to break.

#### 73. CHECK SPEED SENSOR SIGNAL

Click here [INFO](#)



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3S
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - 08/2016]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE ASSEMBLY: REMOVAL; 2016 MY Prius [11/2015 - 08/2016]		

## REMOVAL

## CAUTION / NOTICE / HINT

The necessary procedures (adjustment, calibration, initialization, or registration) that must be performed after parts are removed and installed, or replaced during engine assembly removal/installation are shown below.

### Necessary Procedure After Parts Removed/Installed/Replaced

REPLACED PART OR PERFORMED PROCEDURE	NECESSARY PROCEDURE	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURE NOT PERFORMED	LINK
Auxiliary battery terminal is disconnected/reconnected	Memorize steering angle neutral point	Lane departure alert system (w/ Steering Control)	<a href="#">INFO</a>
		Intelligent clearance sonar system*1	
Simple advanced parking guidance system*1			
Pre-collision system			
	Initialize back door lock	Power door lock control system	<a href="#">INFO</a>
Replacement of inverter with converter assembly	Resolver learning	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<a href="#">INFO</a> for Nickel Metal Hydride Battery <a href="#">INFO</a> for Lithium-ion Battery
Replacement of ECM	Perform Vehicle Identification Number (VIN) registration	MIL comes on	<a href="#">INFO</a>
<ul style="list-style-type: none"> <li>• Replacement of throttle body assembly</li> <li>• Replacement of engine assembly</li> <li>• Gas leak from exhaust system is repaired</li> </ul>	Inspection After Repair	<ul style="list-style-type: none"> <li>• Poor idle, etc.</li> <li>• Engine start function, etc.</li> </ul>	<a href="#">INFO</a>
Suspension, tires, etc. (The vehicle height changes because of suspension or tire replacement)	<ul style="list-style-type: none"> <li>• Ultrasonic sensor detection angle</li> <li>• Ultrasonic sensor detection angle registration</li> </ul>	<ul style="list-style-type: none"> <li>• Intelligent clearance sonar system</li> <li>• Simple advanced parking guidance system</li> </ul>	<a href="#">INFO</a>

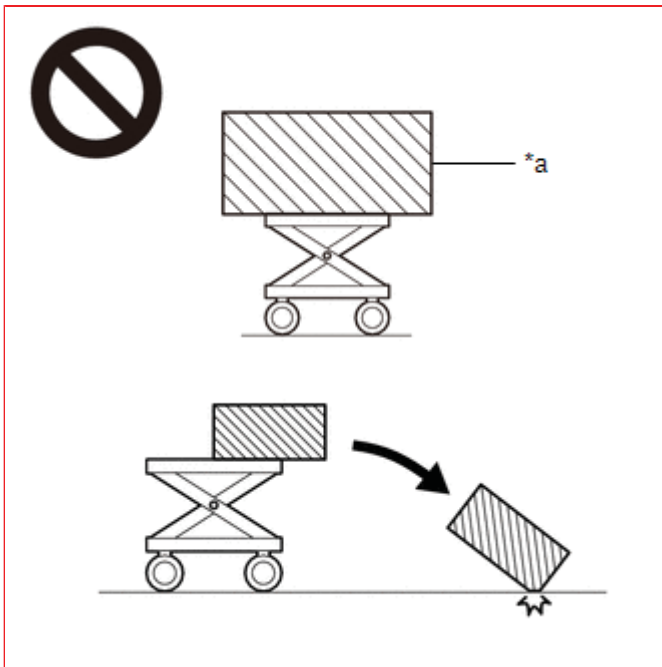
Front wheel alignment adjustment	<ol style="list-style-type: none"> <li>1. Clear zero point calibration data.</li> <li>2. Perform yaw rate and acceleration sensor zero point calibration.</li> </ol>	<p>DTCs are stored</p> <ul style="list-style-type: none"> <li>• ABS warning light illuminates</li> <li>• Brake warning light/yellow (minor malfunction) illuminates</li> <li>• Slip indicator light illuminates</li> <li>• VSC disabled or malfunctions</li> </ul>	<p style="text-align: center;"><b>INFO</b></p>
Replacement of hybrid vehicle transaxle assembly	<ul style="list-style-type: none"> <li>• Resolver learning</li> <li>• Initialize resolver</li> </ul>	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<p><b>INFO</b> for Nickel Metal Hydride Battery</p> <p><b>INFO</b> for Lithium-ion Battery</p>

\*1: When performing learning using the Techstream.

Click here **INFO**

**CAUTION:**

- The engine assembly with transaxle is very heavy. Be sure to follow the procedure described in the repair manual, or the engine lifter may suddenly drop or the engine assembly with transaxle may fall off the engine lifter.



*a	An Object Exceeding Weight Limit of Engine Lifter
----	---

- To prevent burns, do not touch the engine, exhaust manifold or other high temperature components while the engine



is hot.

## **PROCEDURE**

### **1. PRECAUTION**

#### **CAUTION:**

The vehicle has a hybrid system that operates at voltages up to 650 V. The hybrid system uses an HV battery that contains an electrolyte which is a strong alkali solution that includes potassium hydroxide. Be sure to follow the instructions in this manual to handle the system correctly. Failure to do so may result in serious injury or electrocution.

[Click here](#) **INFO**

#### **NOTICE:**

After turning the power switch off, waiting time may be required before disconnecting the cable from the negative (-) auxiliary battery terminal. Therefore, make sure to read the disconnecting the cable from the negative (-) auxiliary battery terminal notices before proceeding with work.

[Click here](#) **INFO**

### **2. DISCHARGE FUEL SYSTEM PRESSURE**

[Click here](#) **INFO**

### **3. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**

### **4. SECURE STEERING WHEEL**

[Click here](#) **INFO**

### **5. REMOVE FRONT WHEELS**

[Click here](#) **INFO**

### **6. REMOVE NO. 1 ENGINE UNDER COVER**

(a) Remove the 10 clips, 4 bolts and No. 1 engine under cover.

### **7. REMOVE REAR MOTOR UNDER COVER LH**

(a) except Rough Road Area Specification Vehicles:

(1) Remove the 4 clips, screw and rear motor under cover LH.

(b) for Rough Road Area Specification Vehicles:

(1) Remove the 5 clips, screw and rear motor under cover LH.

### **8. REMOVE REAR MOTOR UNDER COVER RH**

(a) except Rough Road Area Specification Vehicles:

(1) Remove the 4 clips, screw and rear motor under cover RH.

(b) for Rough Road Area Specification Vehicles:

(1) Remove the 5 clips, screw and rear motor under cover RH.

## 9. REMOVE NO. 2 ENGINE UNDER COVER

(a) Remove the 3 bolts and No. 2 engine under cover.

## 10. DRAIN ENGINE OIL

Click here [INFO](#)

## 11. DRAIN ENGINE COOLANT (for Engine)

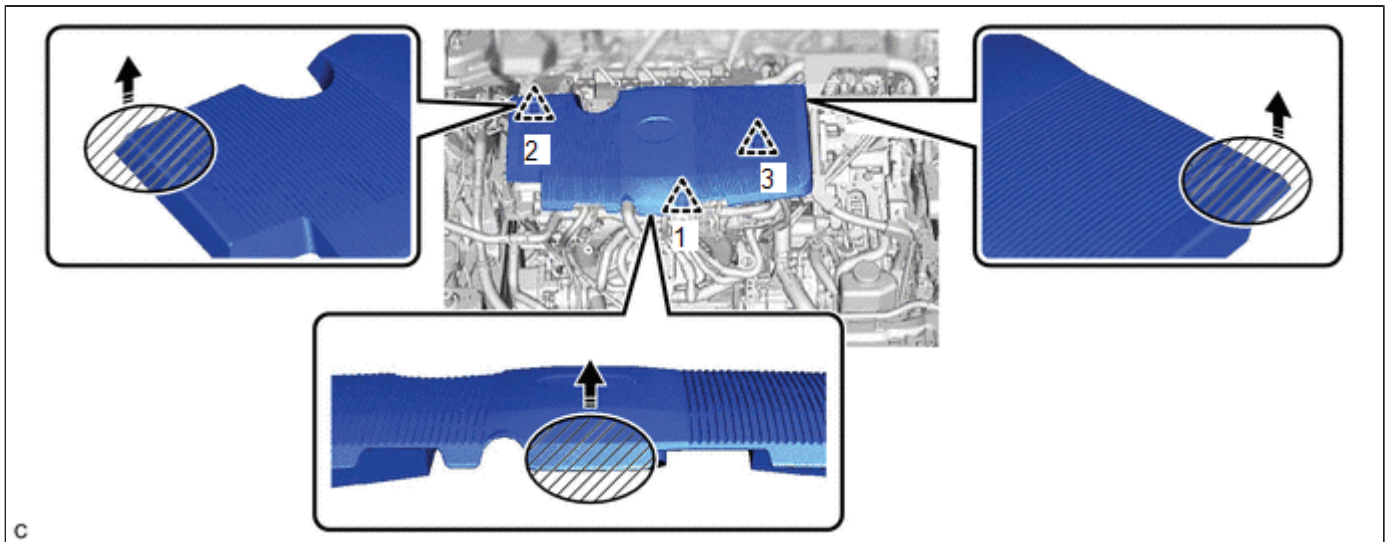
Click here [INFO](#)

## 12. DRAIN HYBRID TRANSAXLE FLUID



Click here [INFO](#)

## 13. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY

(a) Disengage the 3 clips in the order shown in the illustration to remove the No. 1 engine cover sub-assembly.



c

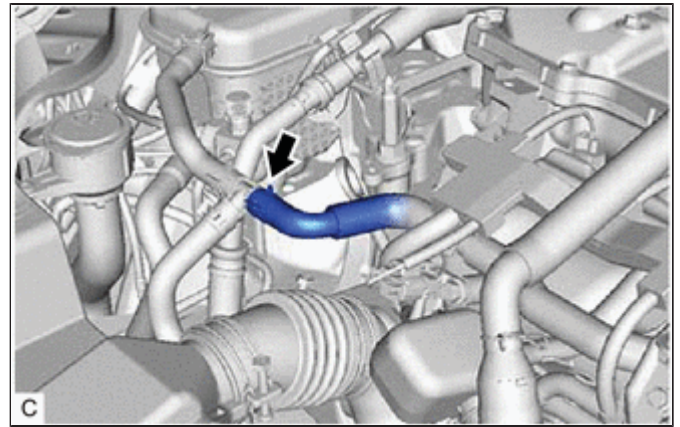
	Areas to be Held when Lifting No. 1 Engine Cover Sub-assembly		Remove in this Direction
---	---	---	--------------------------

### NOTICE:

- Pull the No. 1 engine cover sub-assembly straight up to remove. Attempting to pull the No. 1 engine cover sub-assembly forward or attempting to pull it up by holding the left and right sides may cause the No. 1 engine cover sub-assembly to break.
- If the clips are not disengaged in the order shown in the illustration, the No. 1 engine cover sub-assembly may be damaged.

## 14. DISCONNECT NO. 8 WATER BY-PASS HOSE

- (a) Slide the clip and disconnect the No. 8 water by-pass hose from the No. 2 water by-pass hose assembly.



## 15. REMOVE RADIATOR SUPPORT OPENING COVER

Click here [INFO](#)

## 16. REMOVE INLET NO. 2 AIR CLEANER

Click here [INFO](#)

## 17. REMOVE THROTTLE BODY ASSEMBLY

Click here [INFO](#)

## 18. REMOVE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

Click here [INFO](#)

## 19. REMOVE AIR CLEANER CASE SUB-ASSEMBLY

Click here [INFO](#)

## 20. REMOVE AIR CLEANER BRACKET

Click here [INFO](#)

## 21. REMOVE INLET NO. 1 AIR CLEANER

Click here [INFO](#)

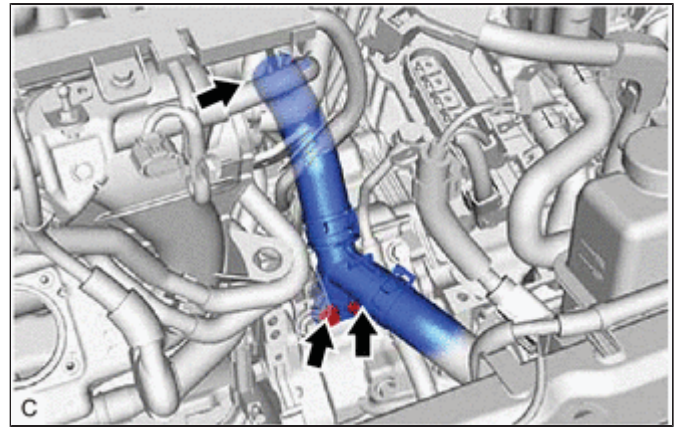
## 22. REMOVE INVERTER WITH CONVERTER ASSEMBLY

Click here [INFO](#)

## 23. DISCONNECT NO. 3 RADIATOR HOSE

- (a) Remove the 2 bolts from the hybrid vehicle transaxle assembly.

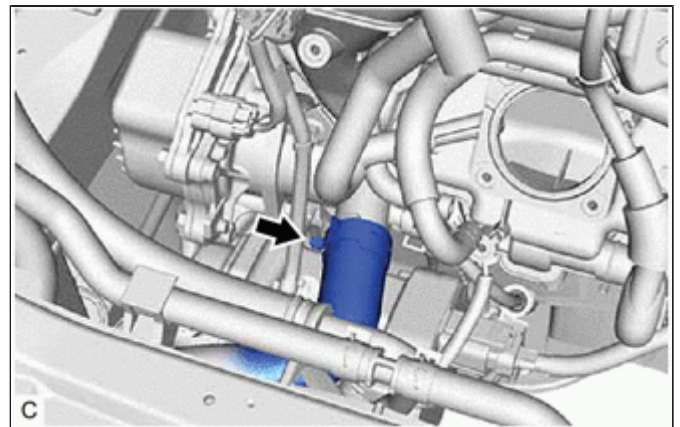




(b) Slide the clip and disconnect the No. 3 radiator hose from the water outlet.

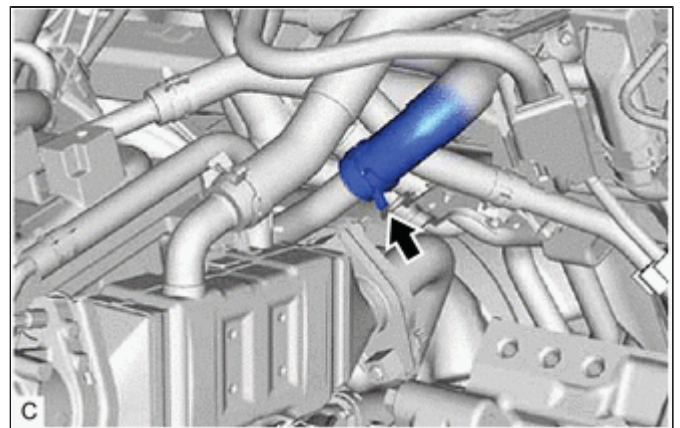
#### 24. DISCONNECT NO. 2 RADIATOR HOSE

(a) Slide the clip and disconnect the No. 2 radiator hose from the water inlet sub-assembly.



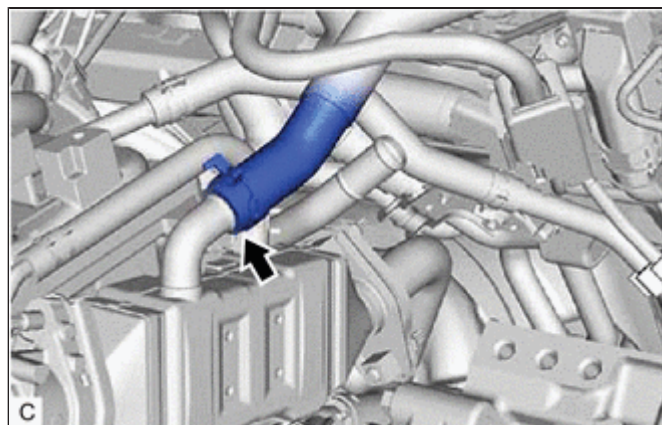
#### 25. DISCONNECT OUTLET HEATER WATER HOSE E

(a) Slide the clip and disconnect the outlet heater water hose E from the No. 1 water by-pass pipe.



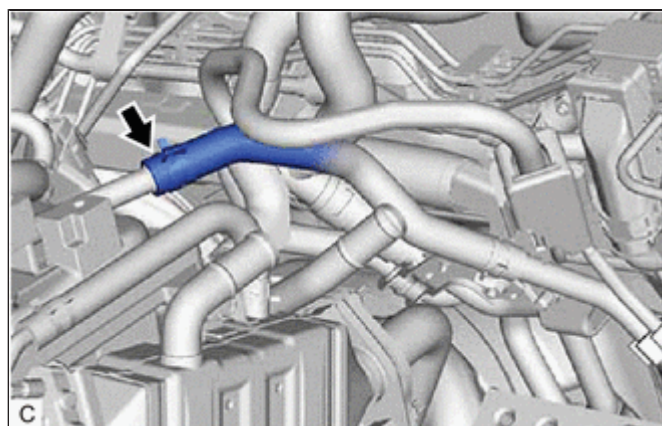
#### 26. DISCONNECT INLET HEATER WATER HOSE A

- (a) Slide the clip and disconnect the inlet heater water hose A from the EGR valve assembly.



## 27. DISCONNECT NO. 1 FUEL VAPOR FEED HOSE

- (a) Slide the clip and disconnect the No. 1 fuel vapor feed hose from the fuel vapor feed pipe.

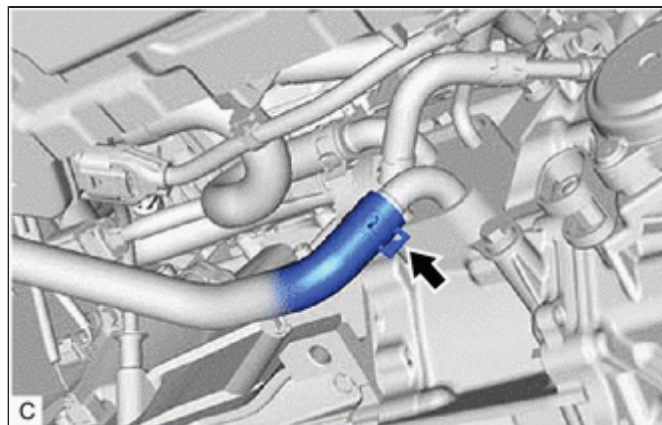


## 28. DISCONNECT FUEL TUBE SUB-ASSEMBLY

Click here [INFO](#)

## 29. DISCONNECT INLET HYBRID RADIATOR HOSE

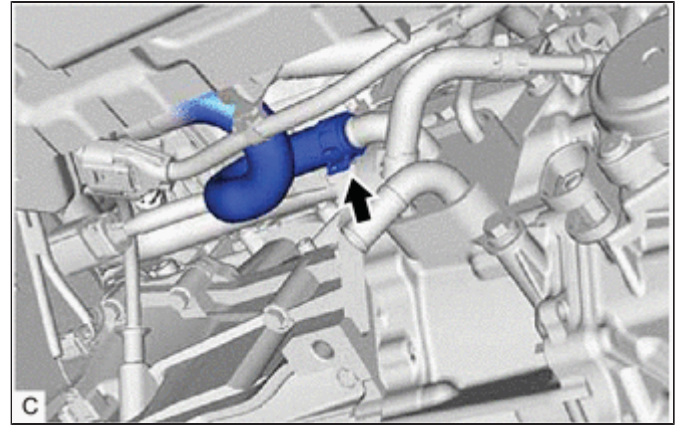
- (a) Slide the clip and disconnect the inlet hybrid radiator hose from the motor cooling cooler.



## 30. DISCONNECT OUTLET NO. 1 HYBRID WATER PUMP HOSE

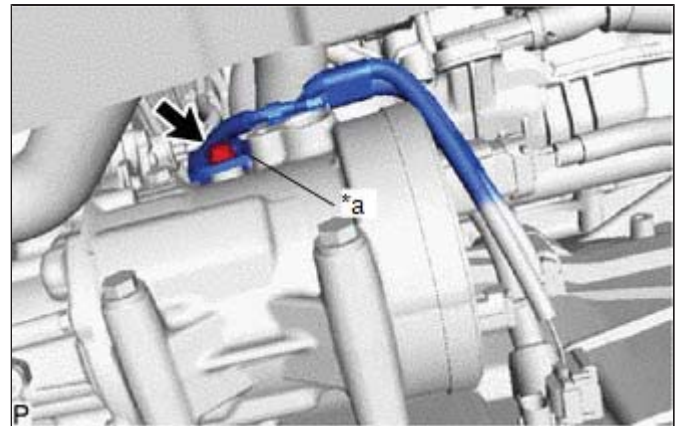


- (a) Slide the clip and disconnect the outlet No. 1 hybrid water pump hose from the motor cooling cooler.



### 31. SEPARATE COMPRESSOR WITH MOTOR ASSEMBLY

- (a) Remove the bolt and disconnect the bracket.



*a	Bracket
----	---------

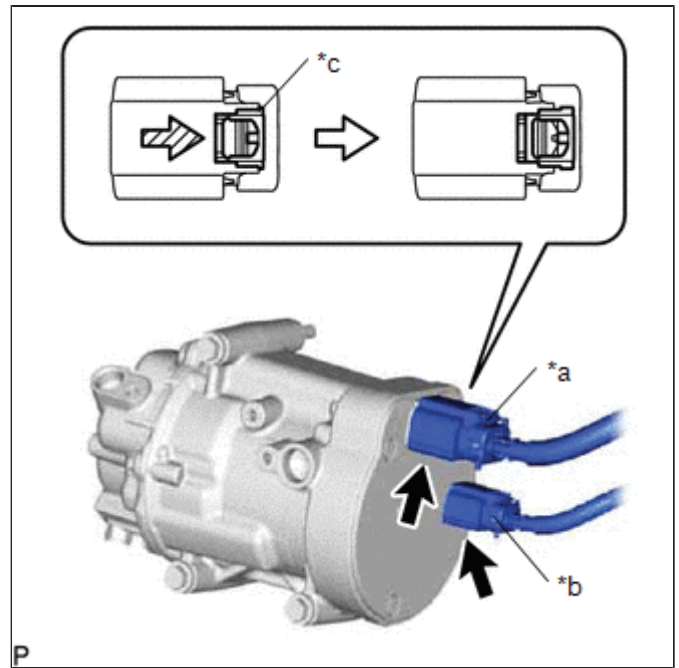
- (b) Using a screwdriver, slide the green-colored lock of the connector (A) as shown in the illustration to release it and disconnect the connector.

**CAUTION:**

Make sure to wear insulated gloves.

**NOTICE:**

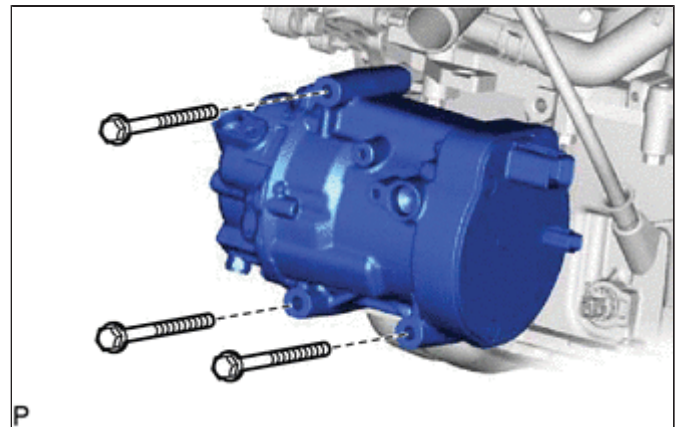
Insulate the disconnected terminals and connector with insulating tape.



*a	Connector (A)
*b	Connector (B)
*c	Green-colored Lock

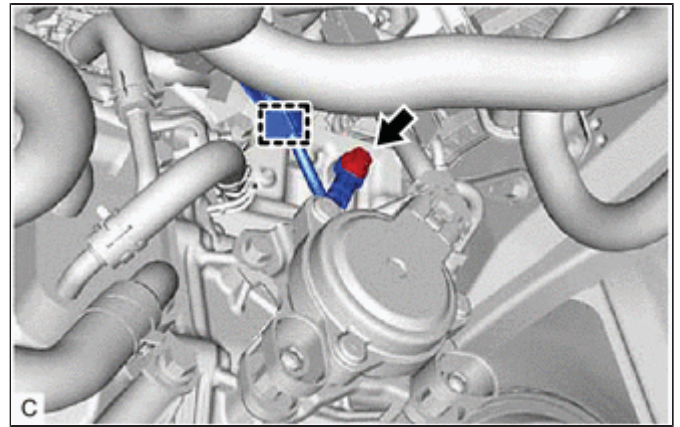
(c) Disconnect the connector (B).

(d) Remove the 3 bolts and separate the compressor with motor assembly.



### 32. DISCONNECT NO. 3 ENGINE WIRE

(a) Disengage the clamp.



(b) Remove the bolt and disconnect the No. 3 engine wire from the hybrid vehicle transaxle assembly.

### 33. REMOVE COLUMN HOLE COVER SILENCER SHEET

Click here [INFO](#)

### 34. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY

Click here [INFO](#)

### 35. SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY

Click here [INFO](#)

### 36. REMOVE FRONT FLOOR COVER LH

Click here [INFO](#)

### 37. REMOVE FRONT FLOOR COVER RH

#### HINT:

Use the same procedure as for the LH side.

### 38. REMOVE FRONT CENTER FLOOR BRACE

Click here [INFO](#)

### 39. REMOVE FRONT EXHAUST PIPE ASSEMBLY (TWC: Rear Catalyst)

Click here [INFO](#)

### 40. REMOVE FRONT AXLE SHAFT NUT LH

Click here [INFO](#)

### 41. REMOVE FRONT AXLE SHAFT NUT RH

#### HINT:

Use the same procedure as for the LH side.

### 42. SEPARATE FRONT SPEED SENSOR LH

Click here [INFO](#)

### 43. SEPARATE FRONT SPEED SENSOR RH

**HINT:**

Use the same procedure as for the LH side.

**44. SEPARATE TIE ROD END SUB-ASSEMBLY LH**

Click here [INFO](#)

**45. SEPARATE TIE ROD END SUB-ASSEMBLY RH**

**HINT:**

Use the same procedure as for the LH side.

**46. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH**

Click here [INFO](#)

**47. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**

**HINT:**

Use the same procedure as for the LH side.

**48. SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH**

Click here [INFO](#)

**49. SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH**

**HINT:**

Use the same procedure as for the LH side.

**50. SEPARATE FRONT DRIVE SHAFT ASSEMBLY LH**

Click here [INFO](#)

**51. SEPARATE FRONT DRIVE SHAFT ASSEMBLY RH**

**HINT:**

Use the same procedure as for the LH side.

**52. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH**

Click here [INFO](#)

**53. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH**

**HINT:**

Use the same procedure as for the LH side.

**54. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING**

Click here [INFO](#)

**55. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH**

Click here [INFO](#)

**56. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH**

**HINT:**

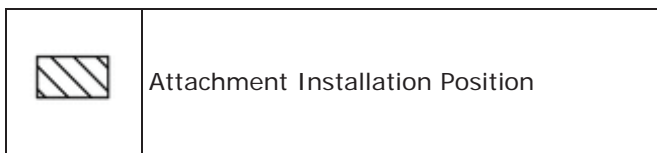
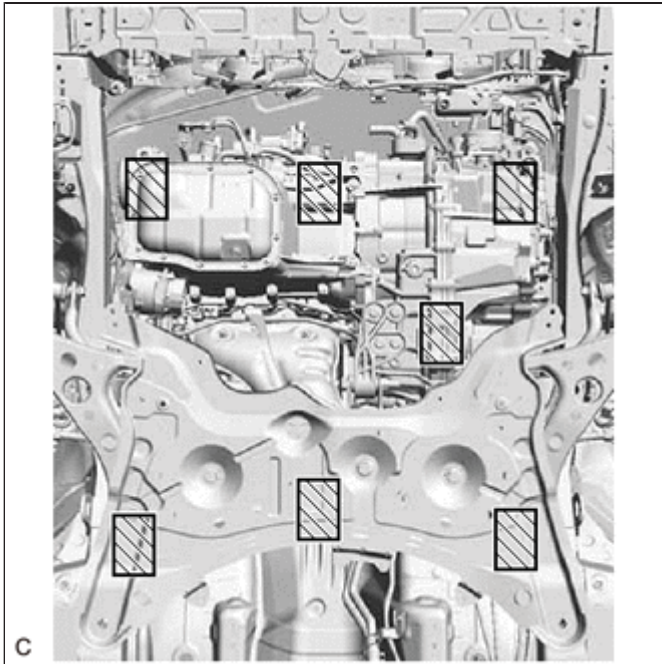
Use the same procedure as for the LH side.

## 57. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

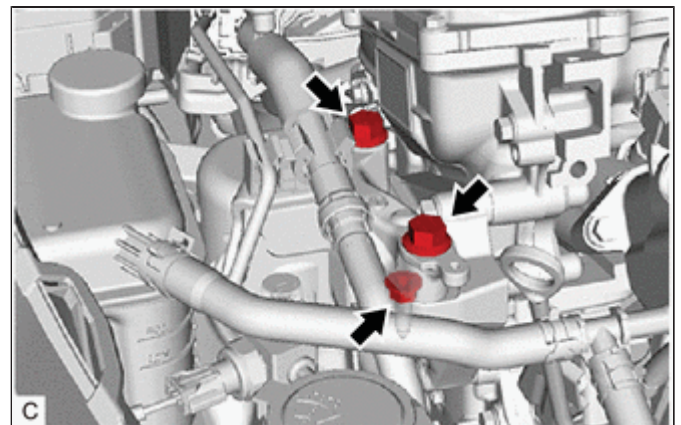
- (a) Place height adjustment attachments and plate lift attachments in the positions shown in the illustration and set an engine lifter underneath the engine assembly with transaxle and front suspension crossmember sub-assembly.

### NOTICE:

- Using height adjustment attachments and plate lift attachments, keep the engine assembly with transaxle and front suspension crossmember sub-assembly level.
- Do not perform any procedures while the engine assembly is suspended because doing so may cause the engine assembly to drop, resulting in injury. However, the engine assembly needs to be suspended when it is installed to or removed from an engine stand.



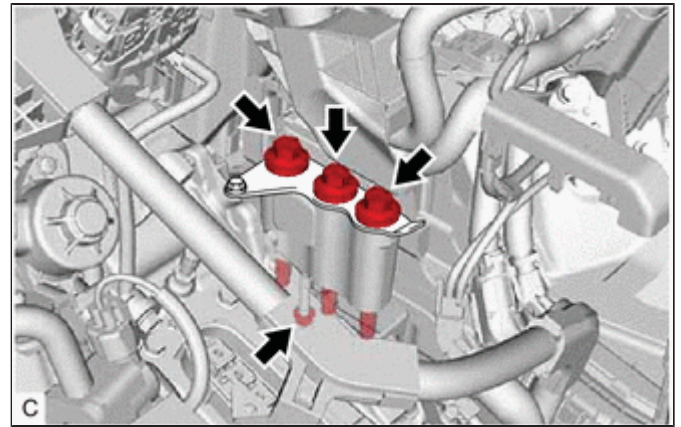
- (b) Remove the nut.



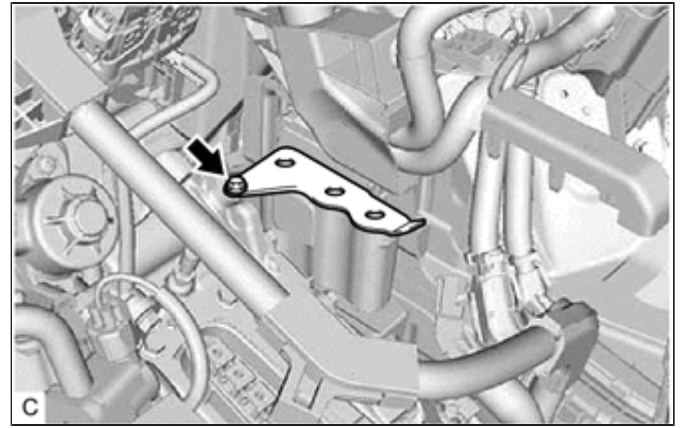
- (c) Remove the 2 bolts and separate the engine mounting insulator sub-assembly RH from the engine mounting bracket RH.



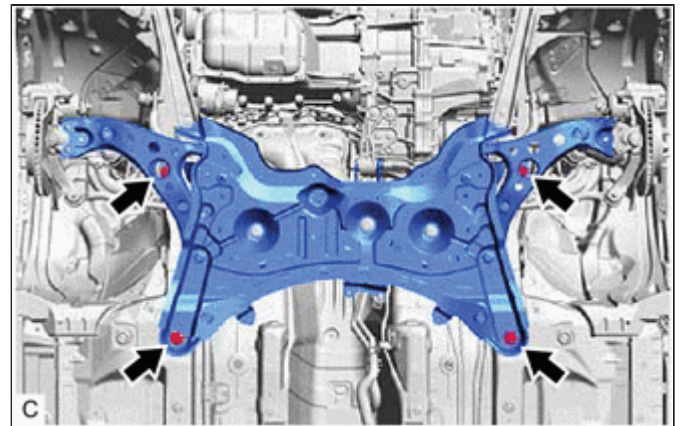
- (d) Remove the 3 bolts and nut and separate the engine mounting insulator LH from the hybrid vehicle transaxle assembly.



- (e) Remove the bolt and No. 2 engine mounting stay LH.



- (f) Remove the 4 bolts and separate the front suspension crossmember sub-assembly from the vehicle body.



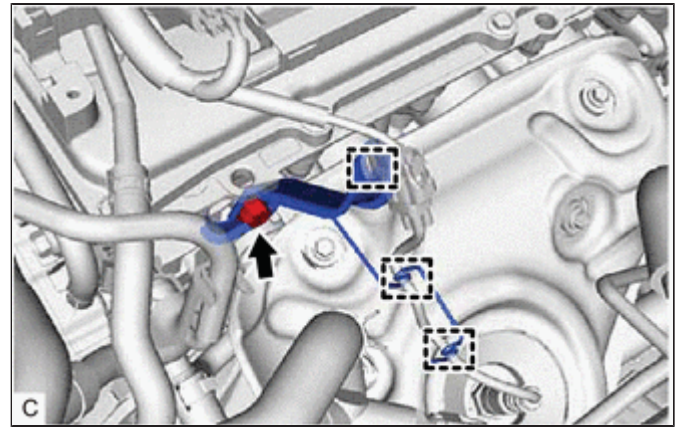
- (g) Operate the engine lifter to remove the engine assembly with transaxle from the vehicle body.

**NOTICE:**

- Make sure that the engine assembly with transaxle is clear of all wiring and hoses.
- While lowering the engine assembly with transaxle from the vehicle, do not allow it to contact the vehicle body.

**58. REMOVE WIRING HARNESS CLAMP BRACKET**

(a) Disengage the 3 clamps.



(b) Remove the bolt and wiring harness clamp bracket from the cylinder head sub-assembly.

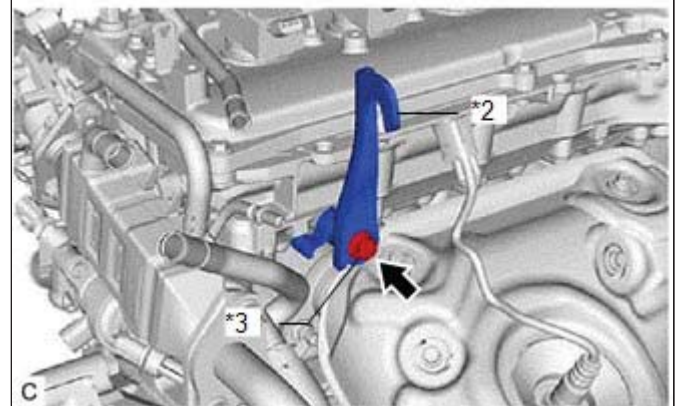
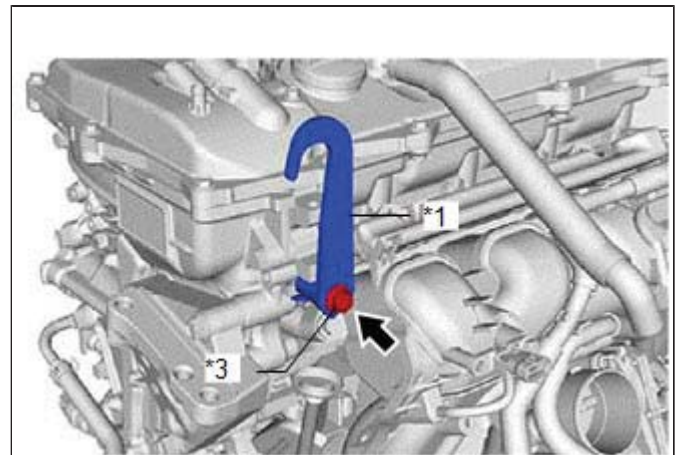
### 59. INSTALL ENGINE HANGERS

(a) Install the No. 1 engine hanger and No. 2 engine hanger with the 2 bolts.

**Torque:**

**43 N·m { 438 kgf·cm, 32 ft·lbf }**

No. 1 Engine Hanger	12281-37021
No. 2 Engine Hanger	12282-37011
Bolt	91552-81050



*1	No. 1 Engine Hanger
*2	No. 2 Engine Hanger
*3	Bolt

(b) Using an engine sling device and engine lifter, secure the engine assembly with transaxle.

**NOTICE:**

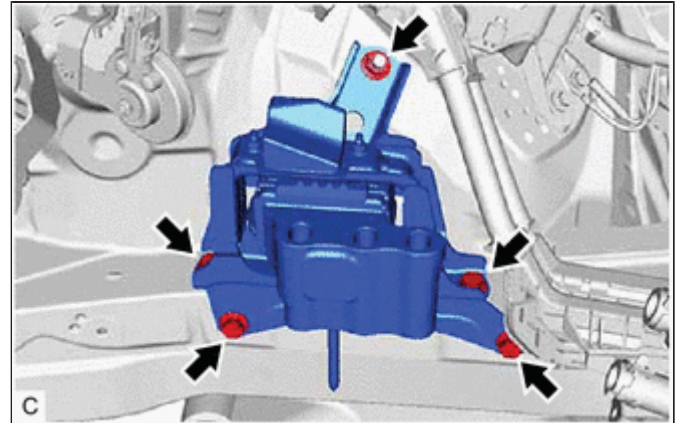
- Adjust the angle of the sling device carefully to prevent damage or deformation to the engine hangers or engine assembly.
- Do not perform any procedures while the engine assembly is suspended because doing so may cause the engine assembly to drop, resulting in injury. However, the engine assembly needs to be suspended when it is installed to or removed from an engine stand.

## 60. REMOVE ENGINE MOUNTING INSULATOR LH

### HINT:

Perform this procedure only when replacement of the engine mounting insulator LH is necessary.

- (a) Remove the 4 bolts, nut and engine mounting insulator LH from the vehicle body.

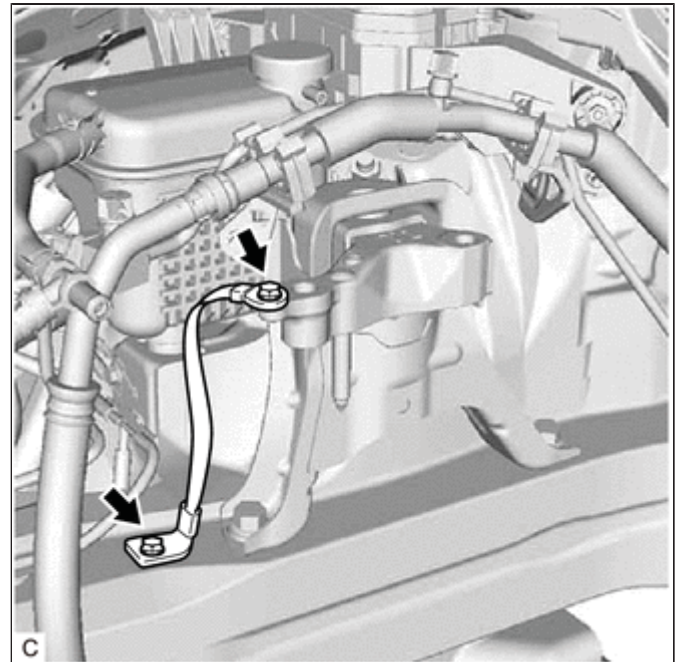


## 61. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH

### HINT:

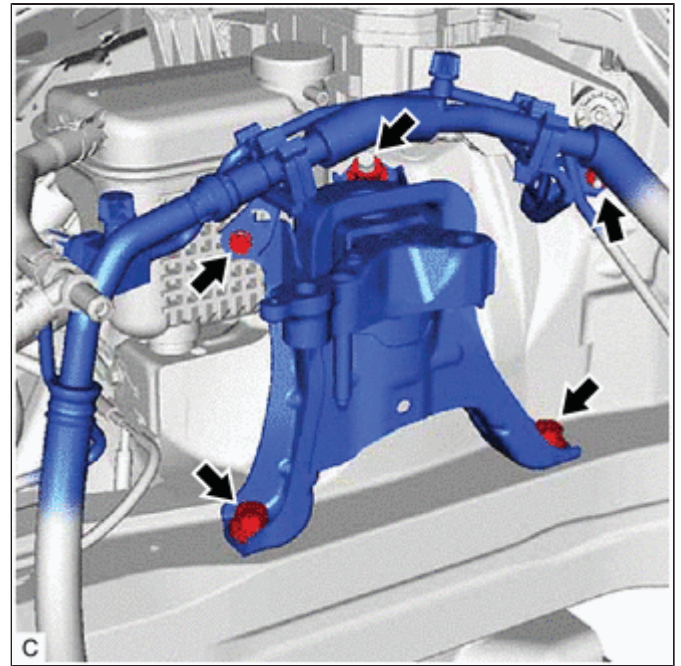
Perform this procedure only when replacement of the engine mounting insulator sub-assembly RH is necessary.

- (a) Remove the 2 bolts and No. 2 earth wire from the engine mounting insulator sub-assembly RH and vehicle body.





(b) Remove the bolt, nut and disconnect the 2 cooler brackets.



(c) Remove the 2 bolts, nut and engine mounting insulator sub-assembly RH from the vehicle body.

## 62. REMOVE STARTER HOLE INSULATOR

Click here [INFO](#)

## 63. REMOVE FLYWHEEL HOUSING SIDE COVER

Click here [INFO](#)

## 64. REMOVE ENGINE WIRE

(a) Remove the engine wire from the engine assembly with transaxle.

## 65. REMOVE ENGINE ASSEMBLY

Click here [INFO](#)

## 66. REMOVE TRANSMISSION INPUT DAMPER ASSEMBLY

Click here [INFO](#)

## 67. REMOVE FLYWHEEL SUB-ASSEMBLY

Click here [INFO](#)

## 68. INSTALL ENGINE ASSEMBLY TO ENGINE STAND

(a) Install the engine assembly to an engine stand.

### NOTICE:

- Adjust the angle of the sling device carefully to prevent the engine assembly or engine hangers from deforming or becoming damaged.
- Servicing an engine assembly while it is hanging is dangerous. This can be done only when installing/removing the engine assembly to/from an engine stand.

## 69. REMOVE ENGINE HANGERS

(a) Remove the 2 bolts, No. 1 engine hanger and No. 2 engine hanger.



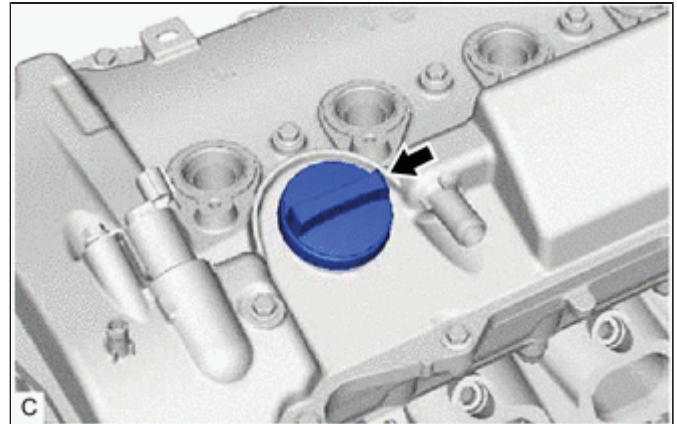
<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5LL
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE UNIT: DISASSEMBLY; 2016 - 2019 MY Prius [11/2015 - ]		

## DISASSEMBLY

### PROCEDURE

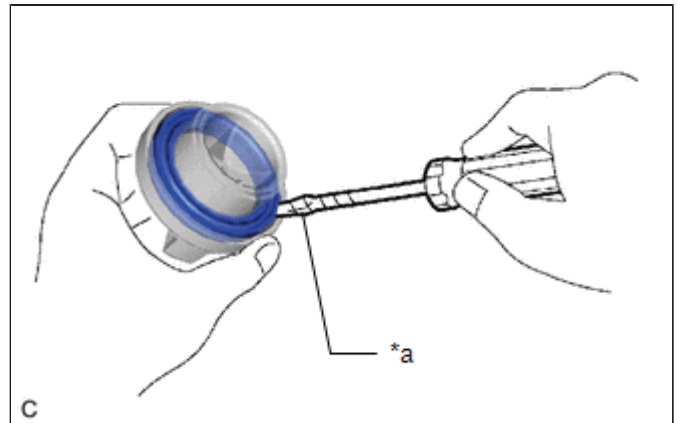
#### 1. REMOVE OIL FILLER CAP SUB-ASSEMBLY

- (a) Remove the oil filler cap sub-assembly from the cylinder head cover sub-assembly.



#### 2. REMOVE OIL FILLER CAP GASKET

- (a) Using a screwdriver with its tip wrapped with protective tape, remove the oil filler cap gasket from the oil filler cap sub-assembly.



*a	Protective Tape
----	-----------------

#### 3. REMOVE SPARK PLUG

Click here [INFO](#)

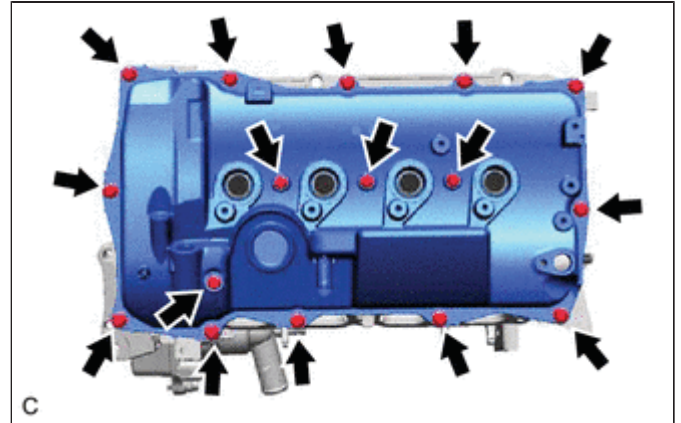
#### 4. REMOVE CAMSHAFT POSITION SENSOR

Click here [INFO](#)

#### 5. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

## 6. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

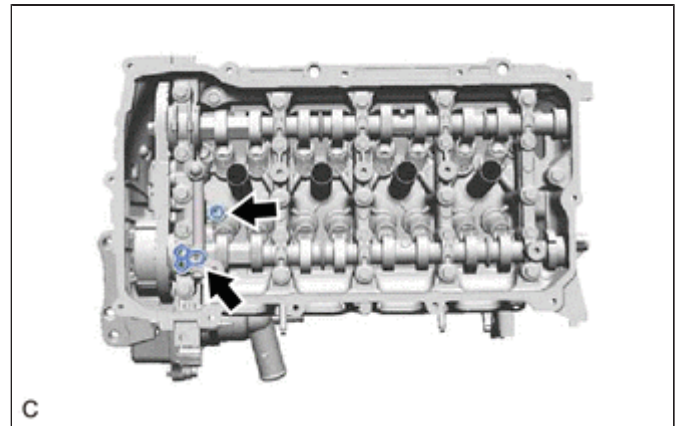
(a) Remove the 16 bolts and cylinder head cover sub-assembly from the camshaft housing sub-assembly.



(b) Remove the 2 gaskets from the camshaft bearing cap.

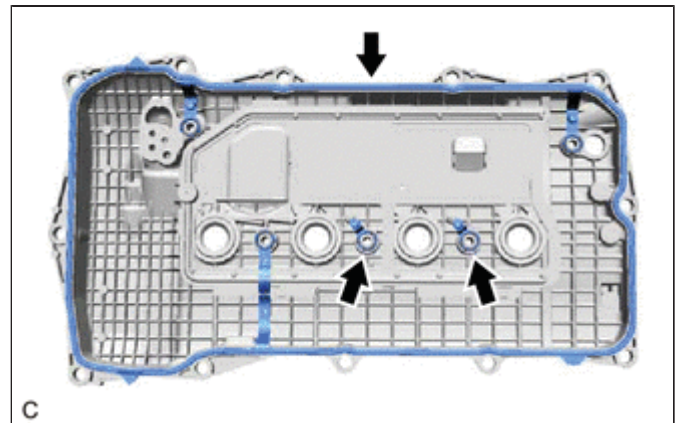
### NOTICE:

As the gaskets may stick to the cylinder head cover sub-assembly, be careful not to drop any of the gaskets into the engine when removing the cylinder head cover sub-assembly.



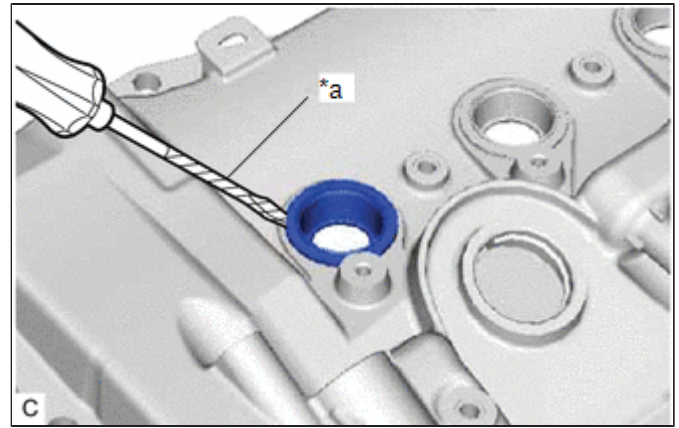
## 7. REMOVE CYLINDER HEAD COVER GASKET

(a) Remove the 3 cylinder head cover gaskets from the cylinder head cover sub-assembly.



## 8. REMOVE SPARK PLUG TUBE GASKET

- (a) Using a screwdriver as shown in the illustration, deform each spark plug tube gasket inwards and remove the 4 spark plug tube gaskets from the cylinder head cover sub-assembly.



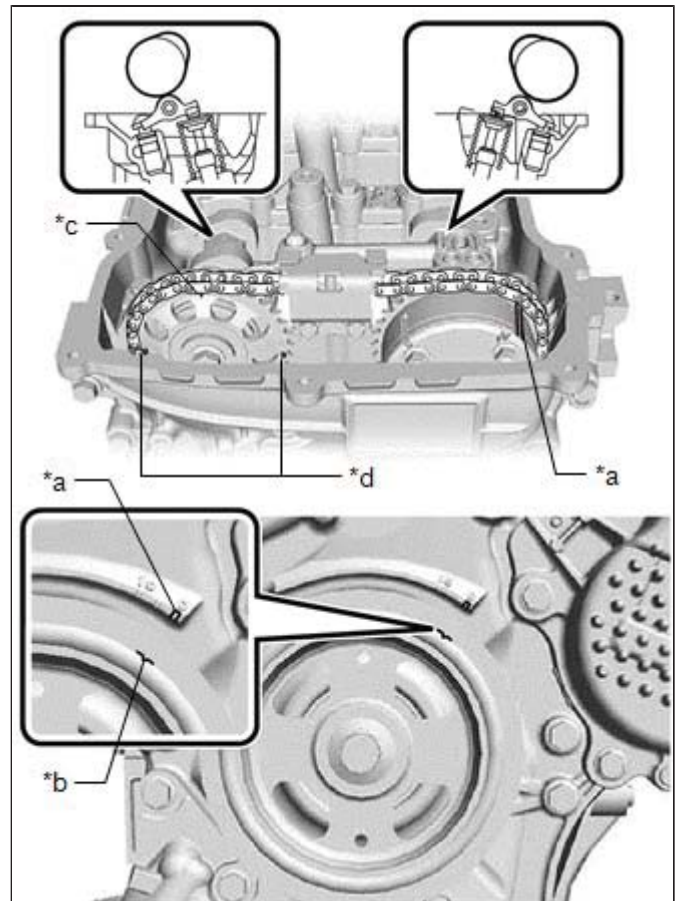
*a	Protective Tape
----	-----------------

## 9. SET NO. 1 CYLINDER TO TDC (COMPRESSION)

- (a) Turn the crankshaft pulley until its timing notch is aligned with timing mark "0" of the timing chain cover sub-assembly.

### HINT:

There are 3 marks on the camshaft timing sprocket. Make sure that the timing mark (rectangle) is at the top.



*a	Timing Mark
*b	Timing Notch
*c	Timing Mark (Rectangle)
*d	Mark (Circle)

- (b) Check that the timing marks on both the camshaft timing sprocket and camshaft timing gear assembly are facing



upward as shown in the illustration.

**HINT:**

If not, turn the crankshaft 1 complete revolution (360°) and align the timing marks as shown in the illustration.

**10. REMOVE CRANKSHAFT PULLEY**

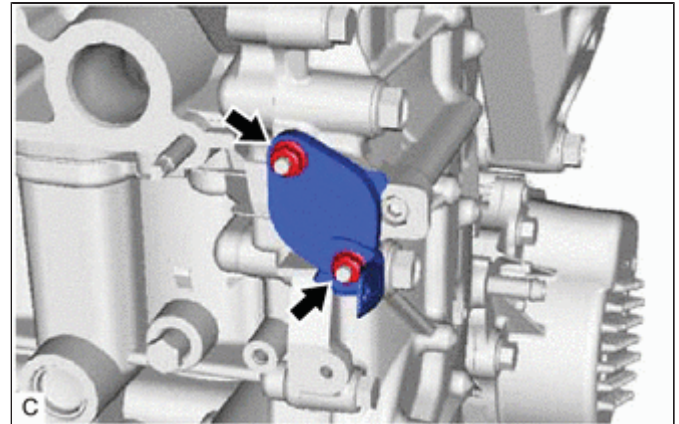
Click here [INFO](#)

**11. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY**

(a) Remove the 2 nuts, bracket, No. 1 chain tensioner assembly and gasket from the timing chain cover sub-assembly.

**NOTICE:**

Do not turn the crankshaft without the No. 1 chain tensioner assembly installed.



**12. REMOVE CRANKSHAFT POSITION SENSOR**

Click here [INFO](#)

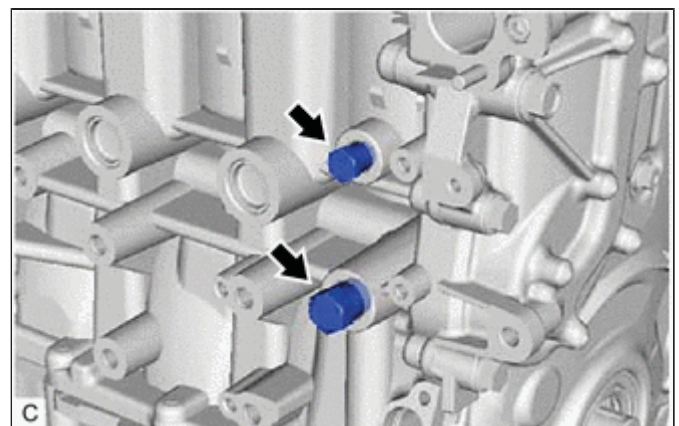
**13. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY**

Click here [INFO](#)

**14. REMOVE NO. 1 TAPER SCREW PLUG**

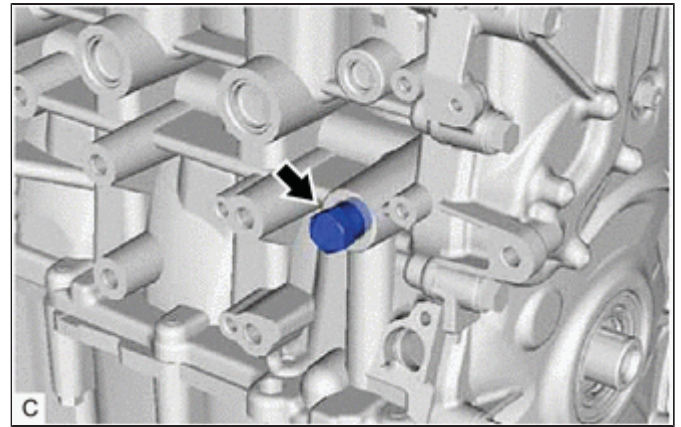
(a) Type A:

(1) Remove the 2 No. 1 taper screw plugs from the cylinder block sub-assembly.



(b) Type B:

(1) Remove the No. 1 taper screw plug.



### 15. REMOVE KNOCK CONTROL SENSOR

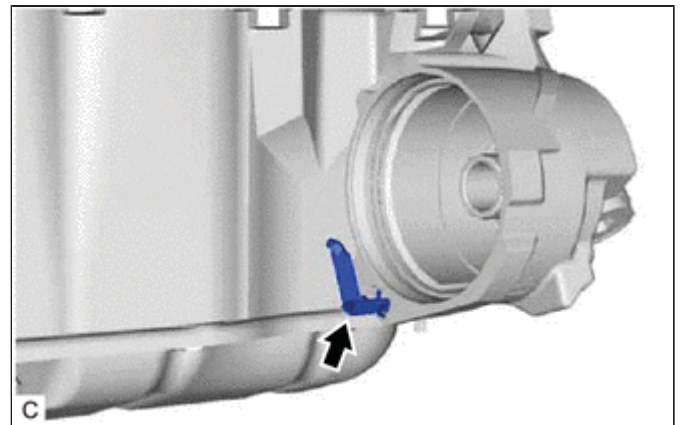
Click here [INFO](#)

### 16. REMOVE OIL FILTER

Click here [INFO](#) [INFO](#)

### 17. REMOVE OIL FILTER BRACKET CLIP

(a) Remove the oil filter bracket clip from the oil filter bracket.



### 18. REMOVE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY

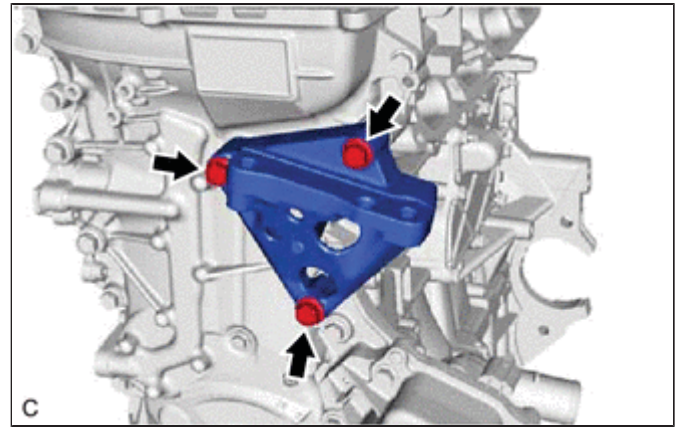
Click here [INFO](#)

### 19. REMOVE TIMING CHAIN COVER OIL SEAL

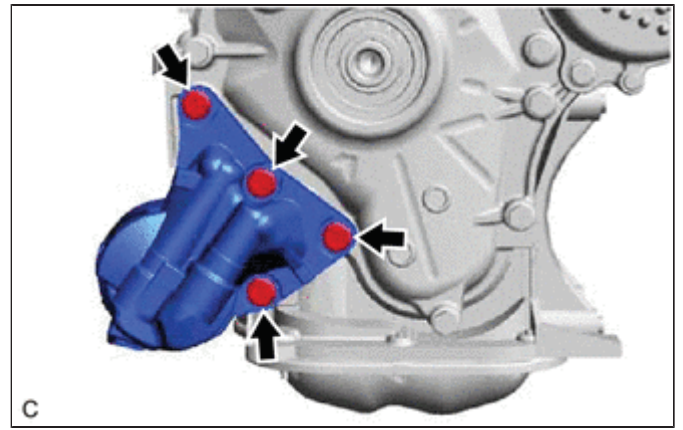
Click here [INFO](#)

### 20. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY

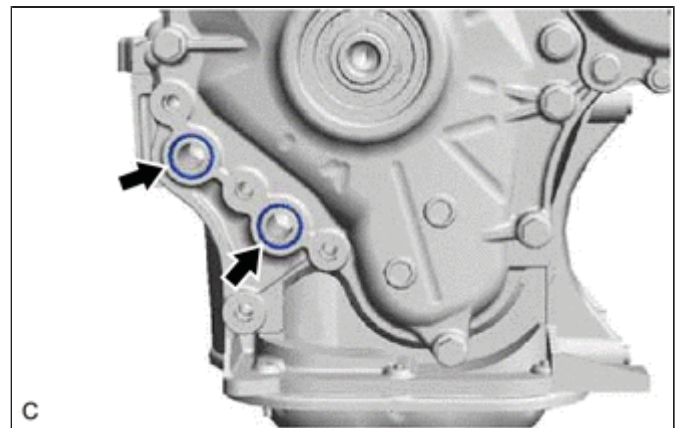
(a) Remove the 3 bolts and engine mounting bracket RH from the timing chain cover sub-assembly.



(b) Remove the 4 bolts and oil filter bracket from the timing chain cover sub-assembly.

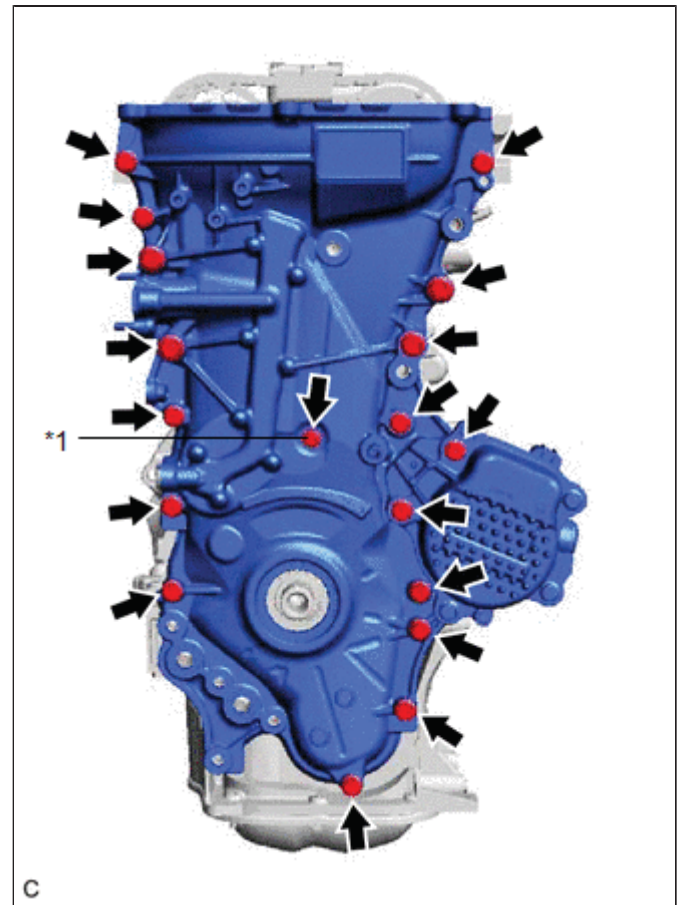


(c) Remove the 2 oil filter bracket O-rings from the timing chain cover sub-assembly.





(d) Remove the 18 bolts and seal washer from the timing chain cover sub-assembly.

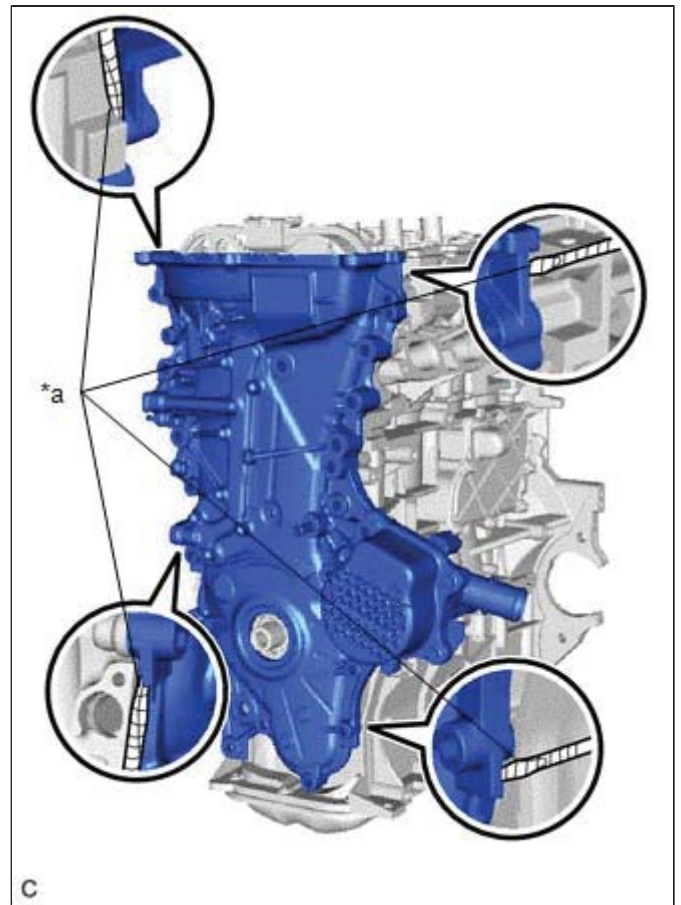


*1	Seal Washer
----	-------------

(e) Remove the timing chain cover sub-assembly by prying between the timing chain cover sub-assembly and cylinder head sub-assembly, camshaft housing sub-assembly, cylinder block sub-assembly and stiffening crankcase assembly with a screwdriver with its tip wrapped with protective tape.

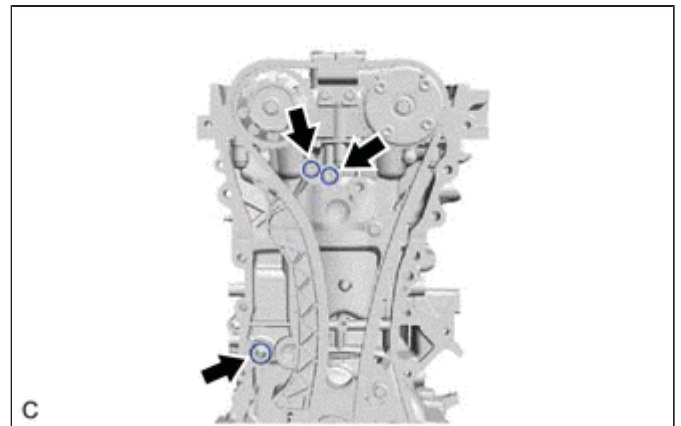
**NOTICE:**

Be careful not to damage the contact surfaces of the cylinder head sub-assembly, camshaft housing sub-assembly, cylinder block sub-assembly, stiffening crankcase assembly and timing chain cover sub-assembly.

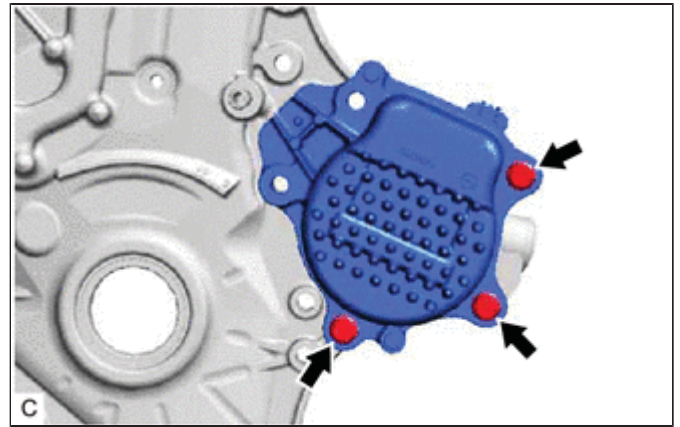


*a	Protective Tape
----	-----------------

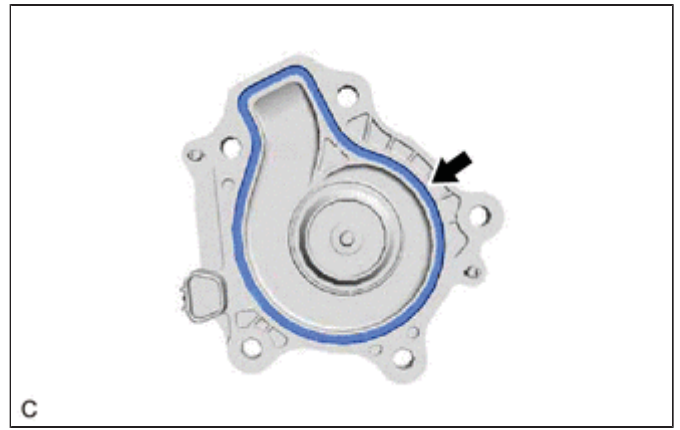
(f) Remove the 3 O-rings from the cylinder head sub-assembly and cylinder block sub-assembly.



(g) Remove the 3 bolts and engine water pump assembly from the timing chain cover sub-assembly.

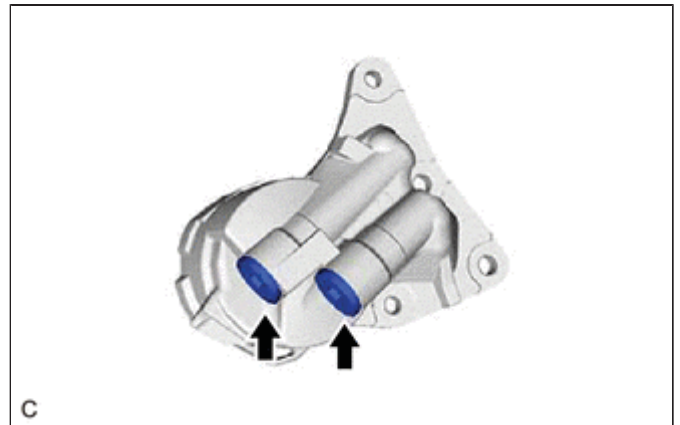


(h) Remove the gasket from the engine water pump assembly.



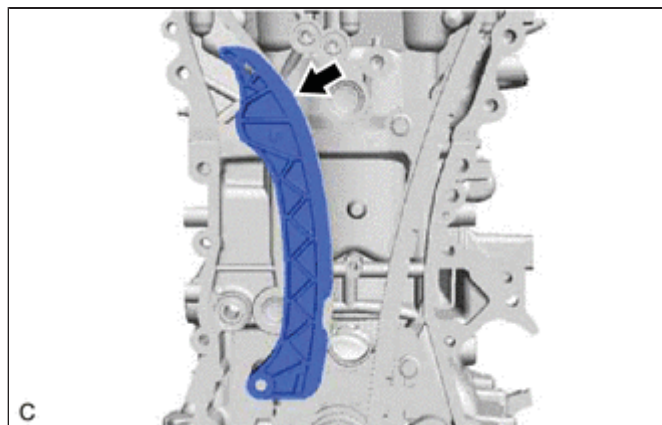
## 21. REMOVE OIL FILTER BRACKET WITH HEAD STRAIGHT SCREW PLUG

(a) Using a 10 mm hexagon socket wrench, remove the 2 oil filter bracket with head straight screw plugs and 2 gaskets from the oil filter bracket.



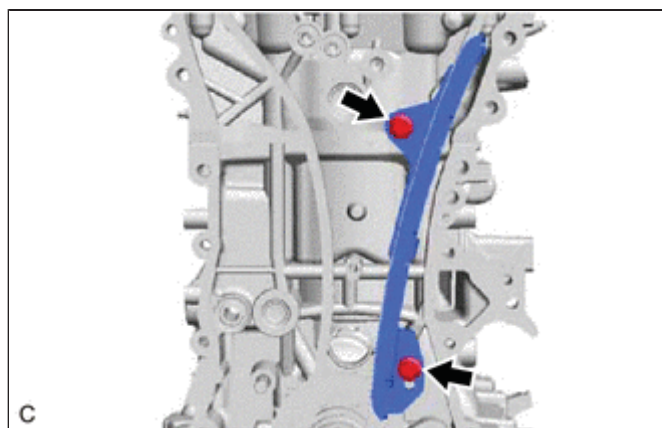
## 22. REMOVE CHAIN TENSIONER SLIPPER

- (a) Remove the chain tensioner slipper from the cylinder block sub-assembly.



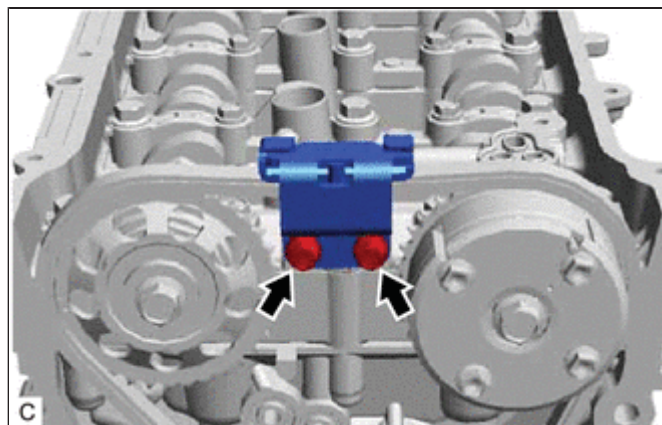
### 23. REMOVE NO. 1 CHAIN VIBRATION DAMPER

- (a) Remove the 2 bolts and No. 1 chain vibration damper from the cylinder block sub-assembly and cylinder head sub-assembly.



### 24. REMOVE NO. 2 CHAIN VIBRATION DAMPER

- (a) Remove the 2 bolts and No. 2 chain vibration damper from the camshaft housing sub-assembly.

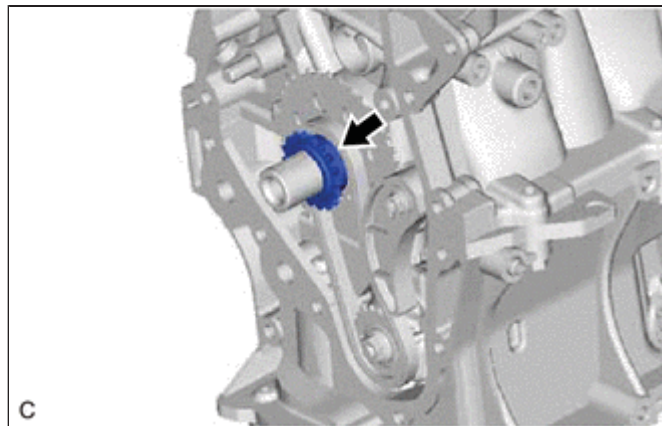


### 25. REMOVE CHAIN SUB-ASSEMBLY

Click here [INFO](#)

### 26. REMOVE CRANKSHAFT TIMING SPROCKET

- (a) Remove the crankshaft timing sprocket from the crankshaft.



## 27. REMOVE NO. 2 CHAIN SUB-ASSEMBLY

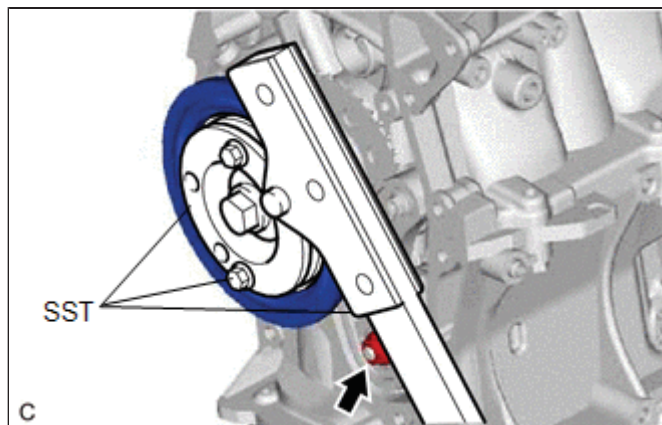
- (a) Temporarily install the crankshaft pulley with the crankshaft pulley set bolt.

- (b) Using SST, hold the crankshaft pulley. Then remove the oil pump drive shaft gear nut.

**SST: 09213-58014**

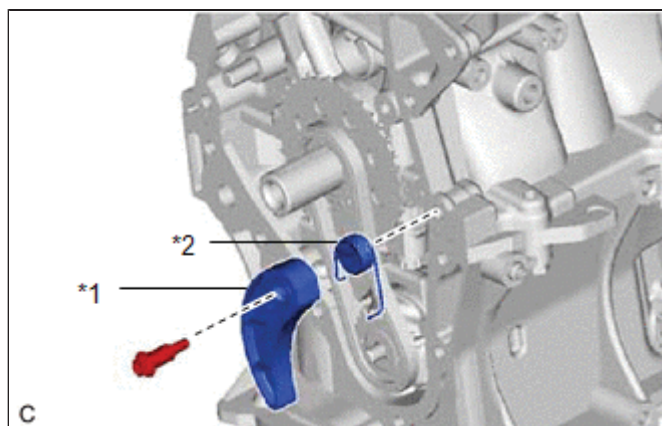
91551-80840

**SST: 09330-00021**



- (c) Remove SST, the crankshaft pulley set bolt and crankshaft pulley.

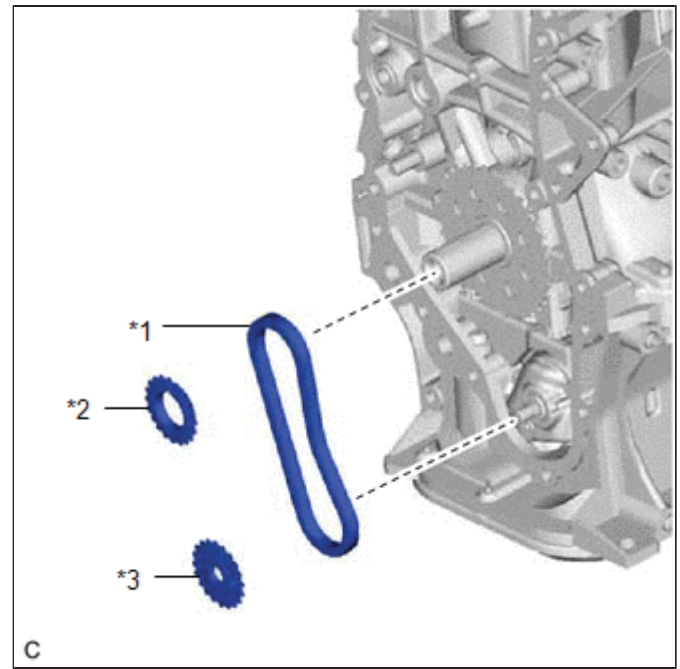
- (d) Remove the bolt, chain tensioner plate and chain damper spring.



*1	Chain Tensioner Plate
*2	Chain Damper Spring



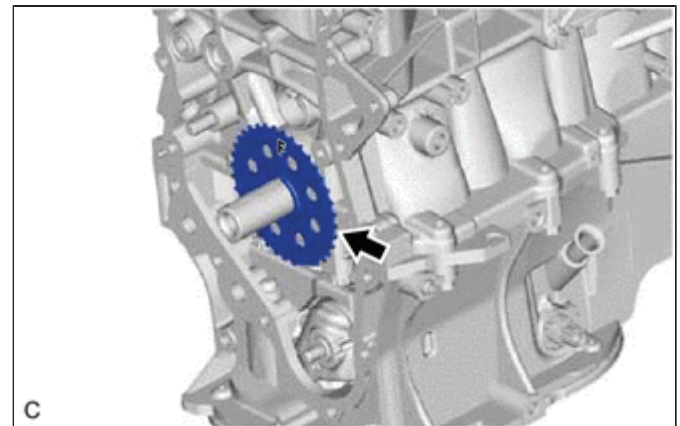
(e) Remove the oil pump drive gear, oil pump drive shaft gear and No. 2 chain sub-assembly.



*1	No. 2 Chain Sub-assembly
*2	Oil Pump Drive Gear
*3	Oil Pump Drive Shaft Gear

## 28. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE

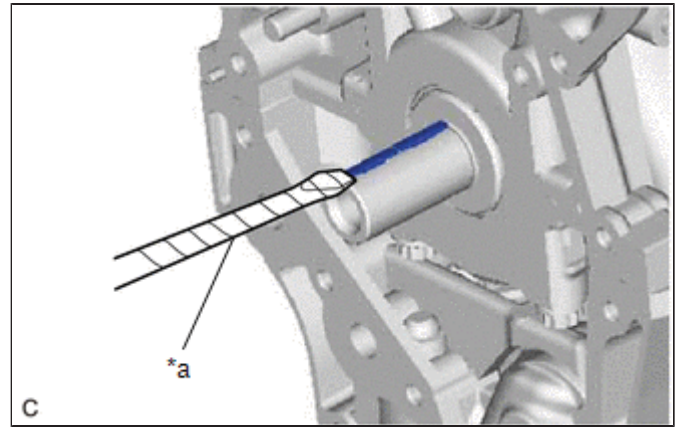
(a) Remove the No. 1 crankshaft position sensor plate from the crankshaft.



## 29. REMOVE CRANKSHAFT TIMING GEAR KEY

(a) Using a screwdriver with its tip wrapped with protective

tape, remove the 2 crankshaft timing gear keys from the crankshaft.



*a	Protective Tape
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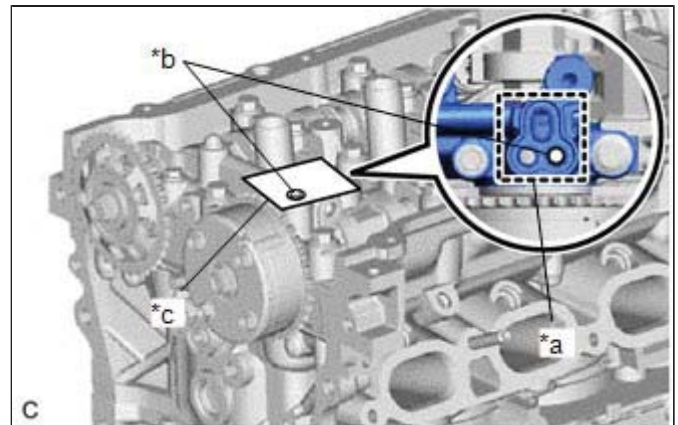
### 30. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Check the lock of the camshaft timing gear assembly.

(b) After cleaning the VVT oil hole in the intake side of the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

**NOTICE:**

Be sure to cover the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.



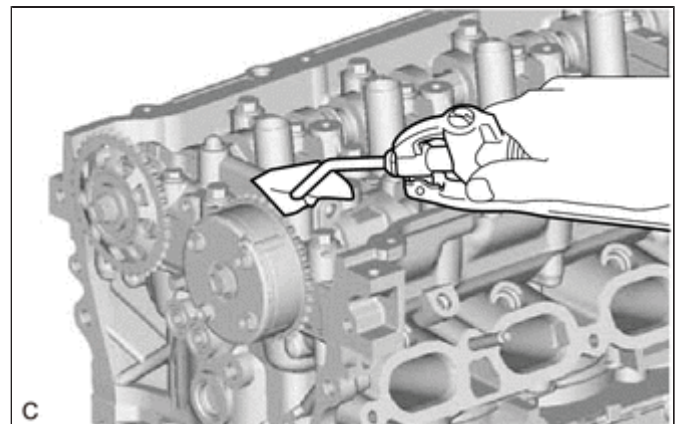
*a	Adhesive Tape Sealing Area
*b	Prick a hole
*c	Adhesive Tape

(c) Prick a hole in the tape covering the oil hole as shown in the illustration. (Procedure A)

(d) Apply approximately 150 kPa (1.5 kgf/cm<sup>2</sup>, 22 psi) of air pressure to the hole pricked in procedure A to release the lock pin.

**NOTICE:**

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.



(e) Forcibly turn the camshaft timing gear assembly in the advance direction (counterclockwise).

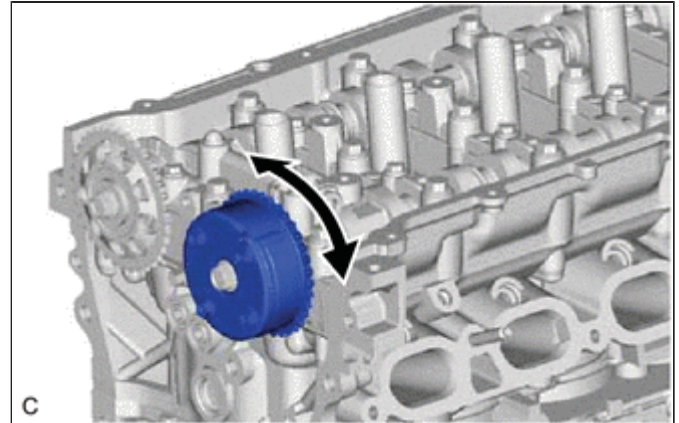
**HINT:**

Depending on the air pressure applied, the camshaft timing gear assembly may turn in the advance direction without assistance.

(f) Turn the camshaft timing gear assembly within its movable range (30 to 32°) 2 or 3 times without turning it to the most retarded position. Make sure that the camshaft timing gear assembly turns smoothly.

**NOTICE:**

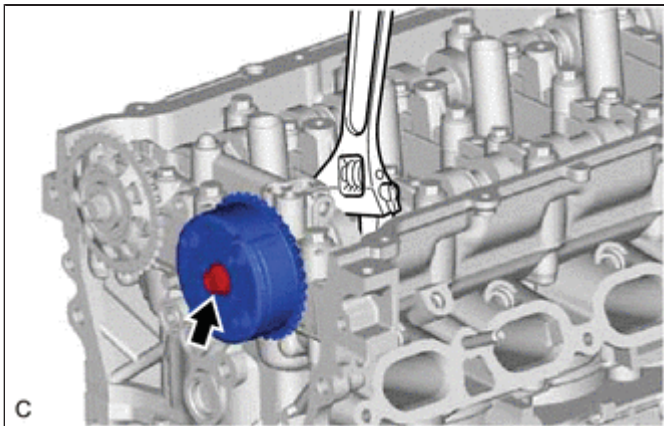
- Do not lock the camshaft timing gear assembly.
- If camshaft timing gear assembly is locked, release the lock pin again.



(g) Remove the adhesive tape from the No. 1 camshaft bearing cap.

**31. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY**

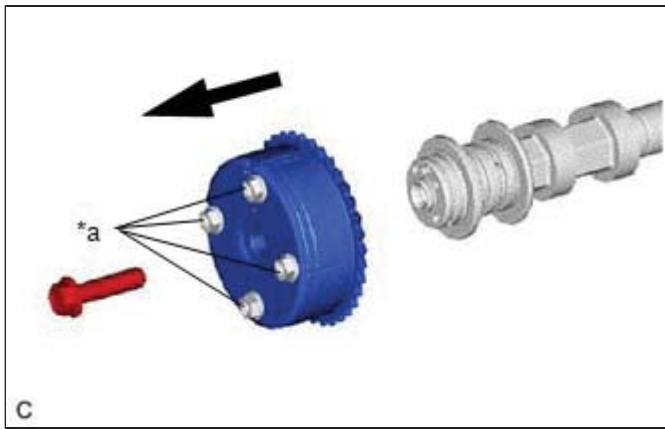
(a) Using a wrench to hold the hexagonal portion of the camshaft, remove the bolt and camshaft timing gear assembly.



**NOTICE:**

- Before removing the camshaft timing gear assembly, make sure that the lock pin has been released.
- Be sure not to remove the other 4 bolts.
- Keep the camshaft timing gear assembly horizontal while removing it from the camshaft.

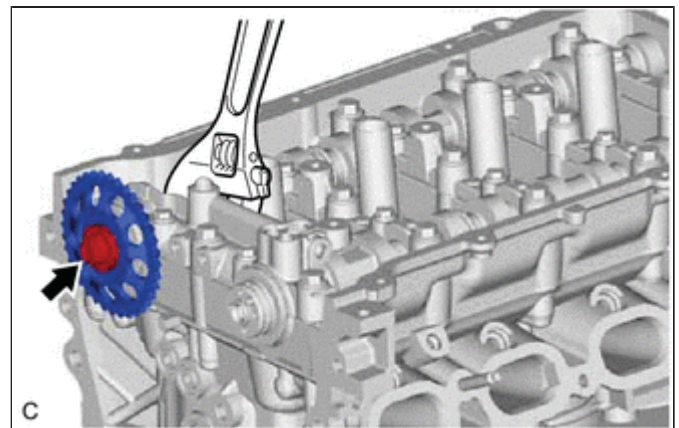




*a	Do Not Remove
----	---------------

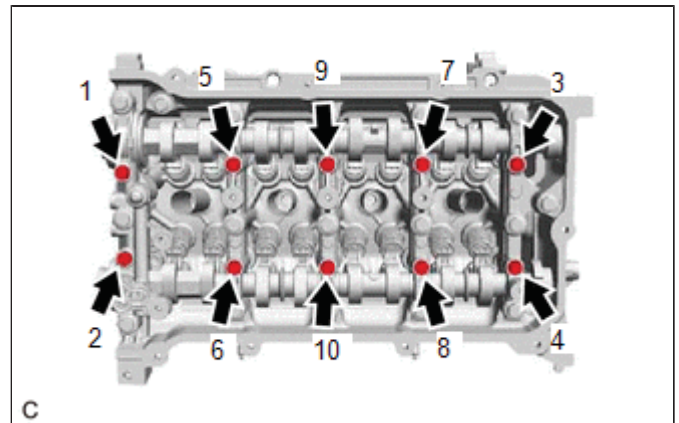
### 32. REMOVE CAMSHAFT TIMING SPROCKET

(a) Using a wrench to hold the hexagonal portion of the No. 2 camshaft, remove the bolt and camshaft timing sprocket.



### 33. REMOVE CAMSHAFT BEARING CAP

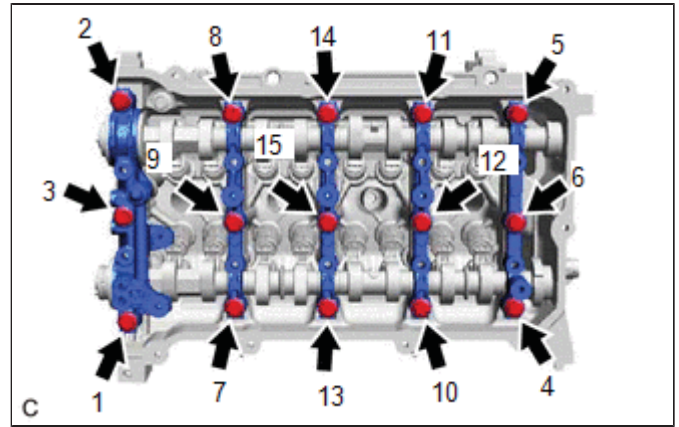
(a) Uniformly loosen and remove the 10 bolts in the order shown in the illustration.



(b) Uniformly loosen and remove the 15 bolts in the order shown in the illustration.

**NOTICE:**

Make sure that the camshaft and No. 2 camshaft remain level while uniformly loosening the bolts.



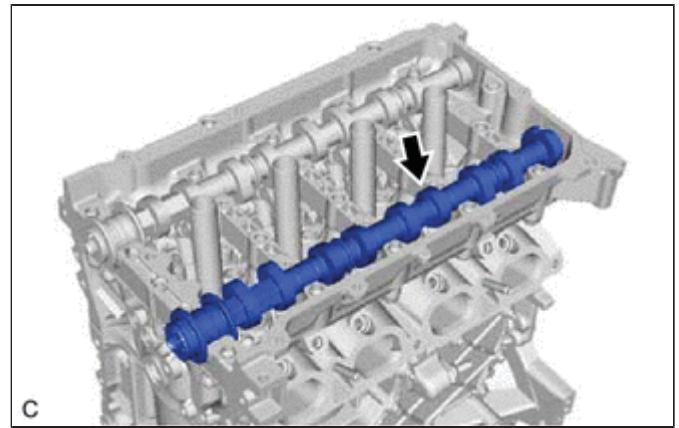
(c) Remove the 5 camshaft bearing caps.

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.

**34. REMOVE CAMSHAFT**

(a) Remove the camshaft from the camshaft housing sub-assembly.



**35. REMOVE NO. 2 CAMSHAFT**

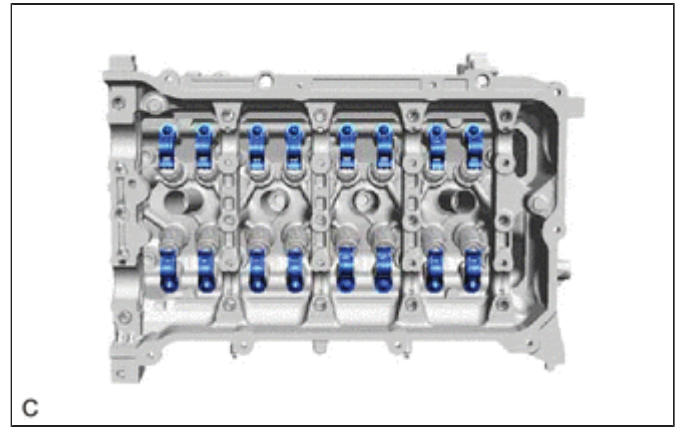
Click here [INFO](#) [INFO](#)

**36. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**

(a) Remove the 16 No. 1 valve rocker arm sub-assemblies from the cylinder head sub-assembly.

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.

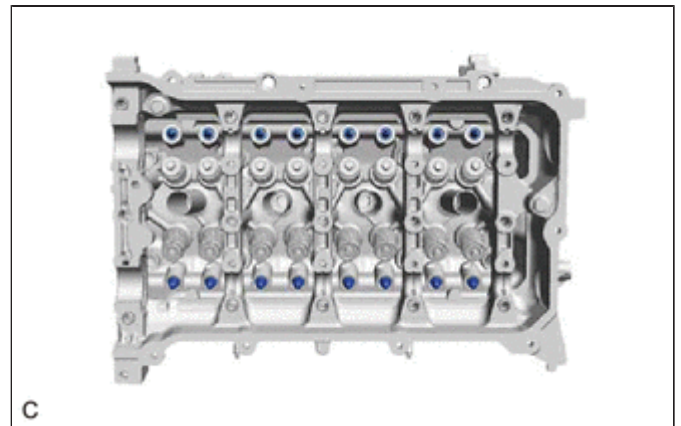


### 37. REMOVE VALVE LASH ADJUSTER ASSEMBLY

- (a) Remove the 16 valve lash adjuster assemblies from the cylinder head sub-assembly.

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.

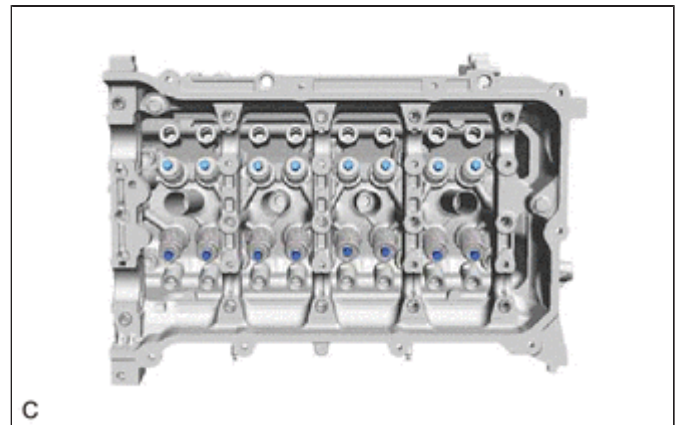


### 38. REMOVE VALVE STEM CAP

- (a) Remove the 16 valve stem caps from the cylinder head sub-assembly.

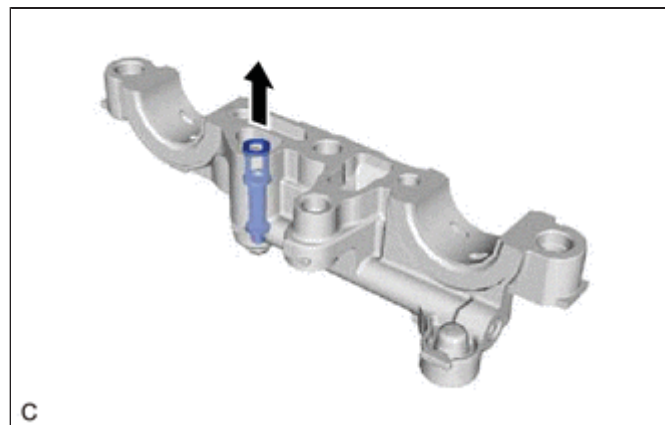
**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.



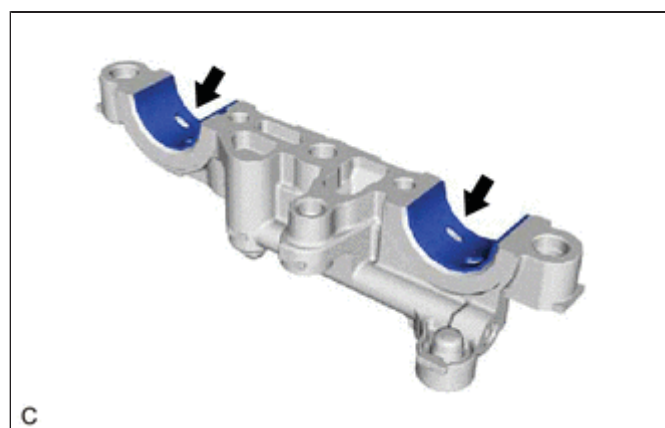
### 39. REMOVE OIL CONTROL VALVE FILTER

- (a) Remove the oil control valve filter from the No. 1 camshaft bearing cap.



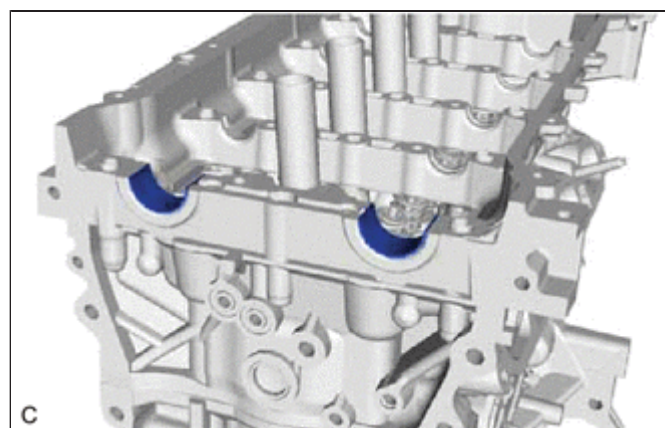
#### 40. REMOVE NO. 1 CAMSHAFT BEARING

- (a) Remove the 2 No. 1 camshaft bearings from the No. 1 camshaft bearing cap.



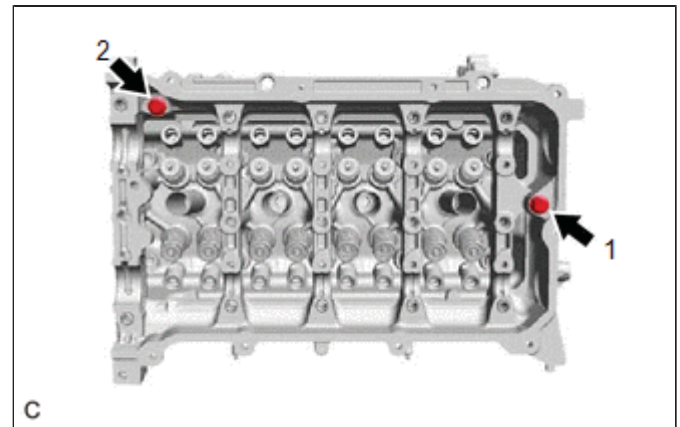
#### 41. REMOVE NO. 2 CAMSHAFT BEARING

- (a) Remove the 2 No. 2 camshaft bearings from the camshaft housing sub-assembly.



#### 42. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY

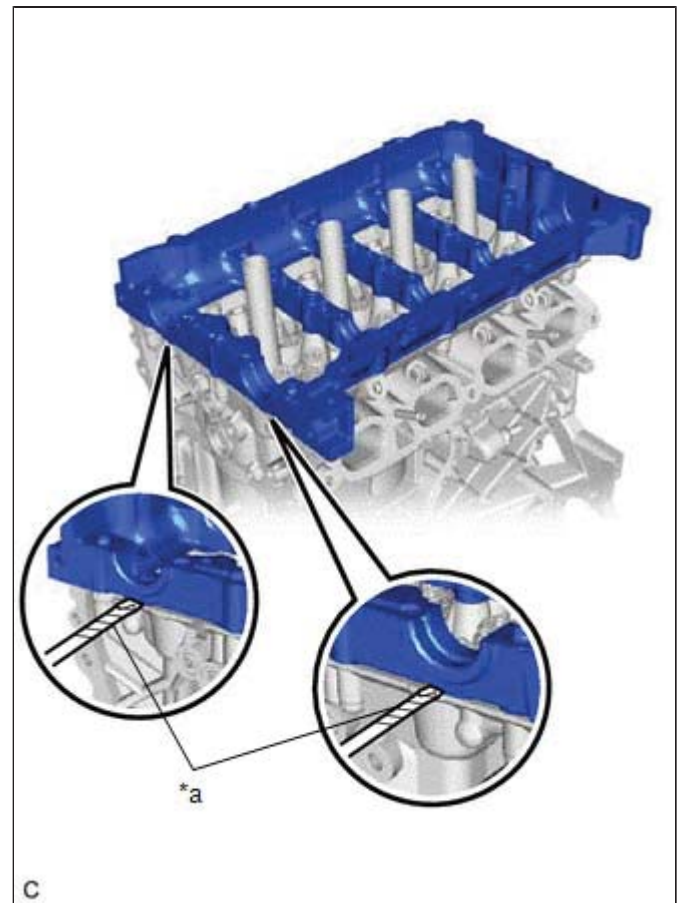
- (a) Remove the 2 bolts from the camshaft housing sub-assembly.



- (b) Remove the camshaft housing sub-assembly by prying between the cylinder head sub-assembly and camshaft housing sub-assembly with a screwdriver with its tip wrapped with protective tape.

**NOTICE:**

Be careful not to damage the contact surfaces of the cylinder head sub-assembly and camshaft housing sub-assembly.



*a	Protective Tape
----	-----------------

### 43. REMOVE CYLINDER HEAD SUB-ASSEMBLY

- (a) Using a 10 mm bi-hexagon socket wrench, uniformly loosen and remove the 10 cylinder head set bolts and 10 cylinder head set plate washers in several steps in the order shown in the illustration.

**NOTICE:**

- Do not drop the cylinder head set plate washers into the

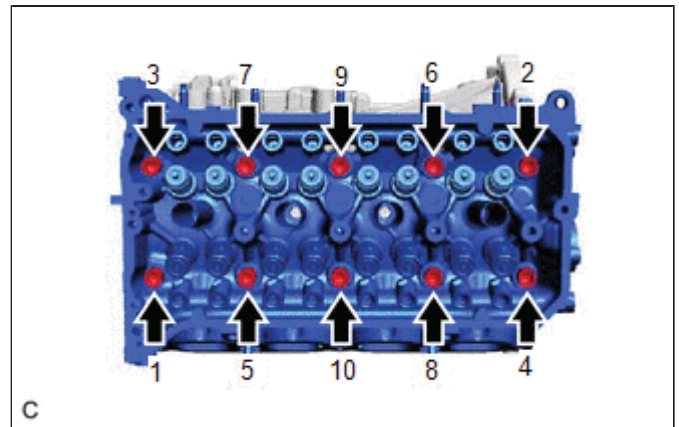


cylinder head sub-assembly.

- Removing the cylinder head set bolts in the incorrect order may cause warpage or cracking of the cylinder head sub-assembly.

**HINT:**

Arrange the removed parts in such a way that they can be reinstalled to their original locations.



(b) Remove the cylinder head sub-assembly from the cylinder block sub-assembly.

#### 44. REMOVE CYLINDER HEAD GASKET

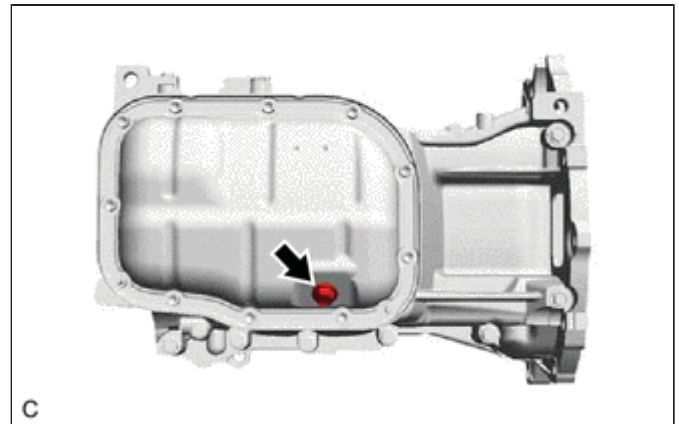
Click here [INFO](#)

#### 45. REMOVE PCV VALVE (VENTILATION VALVE SUB-ASSEMBLY)

Click here [INFO](#)

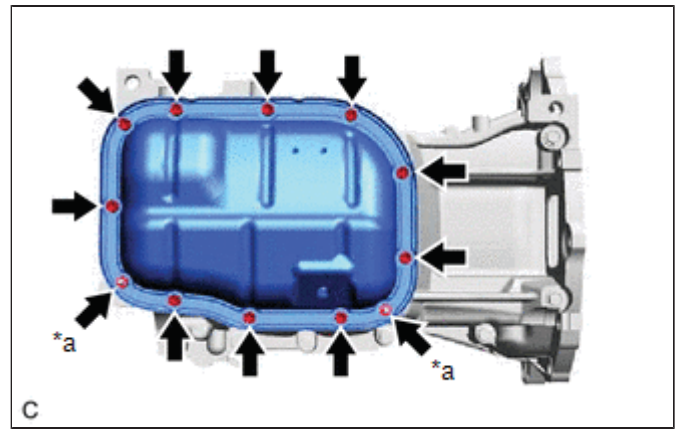
#### 46. REMOVE OIL PAN DRAIN PLUG

(a) Remove the oil pan drain plug and gasket from the No. 2 oil pan sub-assembly.



#### 47. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY

(a) Remove the 10 bolts and 2 nuts from the No. 2 oil pan sub-assembly.

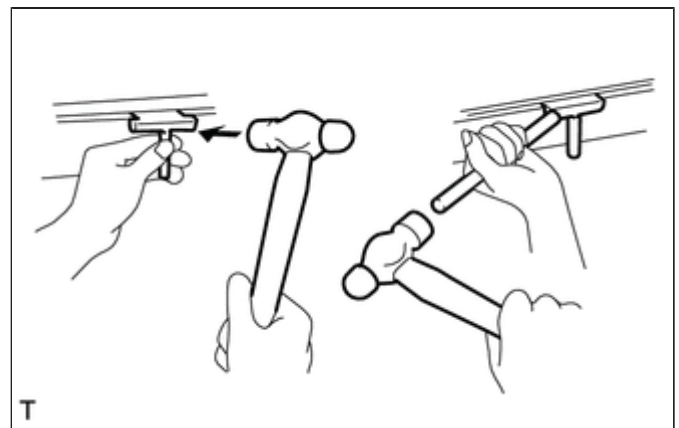


*a	Nut
----	-----

(b) Insert the blade of an oil pan seal cutter between the stiffening crankcase assembly and No. 2 oil pan sub-assembly. Cut through the applied sealer and remove the No. 2 oil pan sub-assembly.

**NOTICE:**

- Be careful not to damage the surface of the No. 2 oil pan sub-assembly which contacts the stiffening crankcase assembly.
- Be careful not to damage the flange of the stiffening crankcase assembly.



**48. REMOVE ENGINE OIL LEVEL SENSOR**

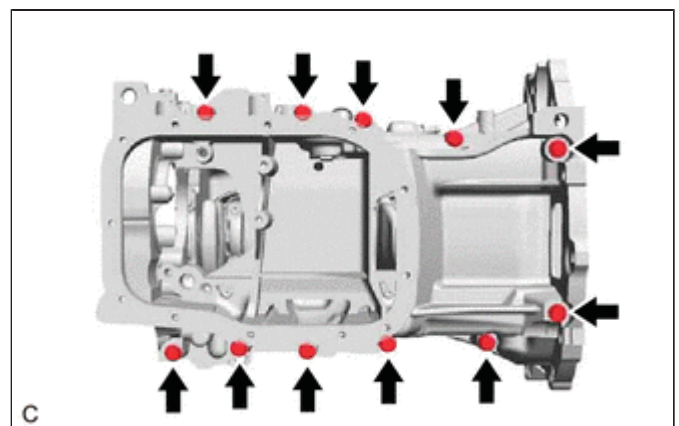
Click here [INFO](#)

**49. REMOVE OIL PUMP ASSEMBLY**

Click here [INFO](#)

**50. REMOVE STIFFENING CRANKCASE ASSEMBLY**

(a) Uniformly loosen and remove the 11 bolts from the stiffening crankcase assembly.

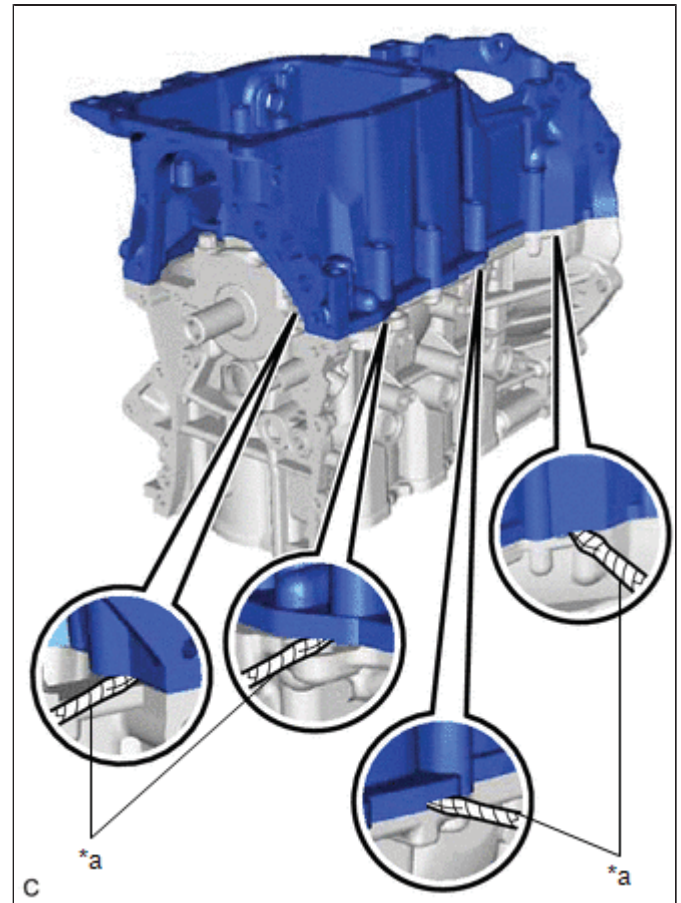




- (b) Remove the stiffening crankcase assembly by prying between the stiffening crankcase assembly and cylinder block sub-assembly with a screwdriver with its tip wrapped with protective tape.

**NOTICE:**

Be careful not to damage the contact surfaces of the stiffening crankcase assembly and cylinder block sub-assembly.



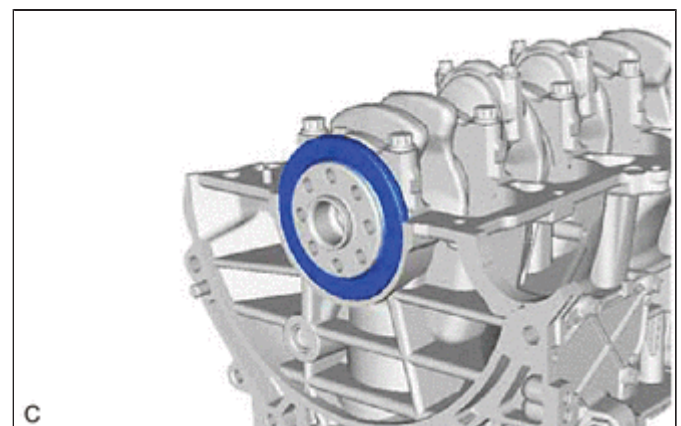
*a	Protective Tape
----	-----------------

## 51. REMOVE REAR ENGINE OIL SEAL

- (a) Remove the rear engine oil seal from the cylinder block sub-assembly.

**NOTICE:**

Be careful not to damage the crankshaft.



## 52. REMOVE STUD BOLT

**NOTICE:**

If a stud bolt is deformed or its threads are damaged, replace it.

## 53. REMOVE RING PIN

### NOTICE:

It is not necessary to remove ring pins unless they are being replaced.



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RHMR
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE UNIT: INSTALLATION; 2016 - 2019 MY Prius [11/2015 - ]		

## [INSTALLATION](#)

### [PROCEDURE](#)

#### **1. INSTALL IGNITION COIL ASSEMBLY**

Click here [INFO](#)

#### **2. INSTALL VENTILATION HOSE**

(a) Install the ventilation hose to the PCV valve (ventilation valve sub-assembly) and slide the clip to secure it.

#### **3. INSTALL FUEL INJECTOR ASSEMBLY**

Click here [INFO](#)

#### **4. INSTALL NO. 1 DELIVERY PIPE SPACER**

Click here [INFO](#)

#### **5. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY**

Click here [INFO](#)

#### **6. INSTALL FUEL VAPOR FEED PIPE**

(a) Install the fuel vapor feed pipe to cylinder head cover sub-assembly with the 2 bolts.

**Torque:**

**10 N·m {102 kgf·cm, 7 ft·lbf}**

#### **7. INSTALL PURGE VALVE (PURGE VSV)**

Click here [INFO](#)

#### **8. INSTALL NO. 6 WATER BY-PASS PIPE**

(a) Install the No. 1 water by-pass pipe to the cylinder head sub-assembly with the 2 bolts.

**Torque:**

**21 N·m {214 kgf·cm, 15 ft·lbf}**

(b) Connect the No. 1 water by-pass pipe to the water inlet sub-assembly and slide the clip to secure it.

#### **9. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE**

Click here [INFO](#)

#### **10. INSTALL ENGINE OIL LEVEL DIPSTICK**

Click here [INFO](#)

#### **11. INSTALL INTAKE MANIFOLD**

Click here [INFO](#)

#### **12. CONNECT VENTILATION HOSE**

Click here [INFO](#)

### 13. INSTALL EXHAUST MANIFOLD (TWC: Front Catalyst)

Click here [INFO](#) [INFO](#)

### 14. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

Click here [INFO](#) [INFO](#)

### 15. TEMPORARILY INSTALL EGR VALVE ASSEMBLY WITH EGR COOLER

- (a) Install a new EGR cooler gasket.
- (b) Using an E8 "TORX" socket wrench, temporarily install the EGR valve assembly with EGR cooler with the 2 stud bolts.

**Torque:**

**9.5 N·m { 97 kgf·cm, 84 in·lbf }**

- (c) Temporarily install the bolt and 4 nuts.

### 16. TEMPORARILY INSTALL EGR PIPE ASSEMBLY

- (a) Install new inlet EGR gasket and EGR pipe gasket.
- (b) Temporarily install the EGR pipe assembly with the 4 bolts.

### 17. INSTALL EGR VALVE ASSEMBLY WITH EGR COOLER

- (a) Tighten the bolt and 4 nuts.

**Torque:**

**Nut (A) :**

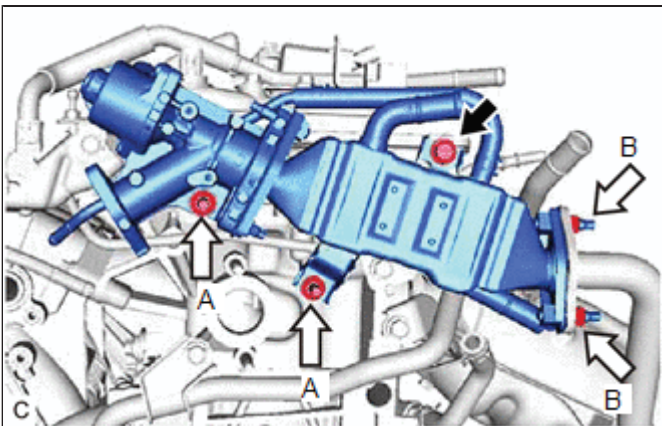
**21 N·m { 214 kgf·cm, 15 ft·lbf }**



**Nut (B) :**

**26 N·m { 265 kgf·cm, 19 ft·lbf }**

**Bolt :**

**21 N·m { 214 kgf·cm, 15 ft·lbf }**



	Bolt
	Nut

### 18. INSTALL EGR PIPE ASSEMBLY

(a) Tighten the bolt and 4 bolts.

**Torque:**

**8.5 N·m { 87 kgf·cm, 75 in·lbf }**

## **19. INSTALL WATER OUTLET**

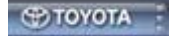
(a) Install the water outlet and a new water outlet gasket to the cylinder head sub-assembly with the 2 nuts.

**Torque:**

**28 N·m { 286 kgf·cm, 21 ft·lbf }**

(b) Connect the No. 9 water by-pass hose to the purge valve and slide the clip to secure it.

(c) Connect the No. 4 water by-pass hose to the EGR valve assembly with EGR cooler and slide the clip to secure it.

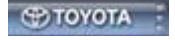


<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RHMO
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE UNIT: PRECAUTION; 2016 - 2019 MY Prius [11/2015 - ]		

## PRECAUTION

### HINT:

- Any digits beyond the 0.01 mm (1/1000 in.) place for standard, minimum and maximum values should be used as a reference only.
- When both standard and maximum or minimum values are listed for an inspection, use the standard value as a reference only and base any judgments on the maximum and minimum values.



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000S5LN
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): ENGINE UNIT: REASSEMBLY; 2016 - 2019 MY Prius [11/2015 - ]		

## REASSEMBLY

### PROCEDURE

#### 1. INSTALL STIFFENING CRANKCASE ASSEMBLY

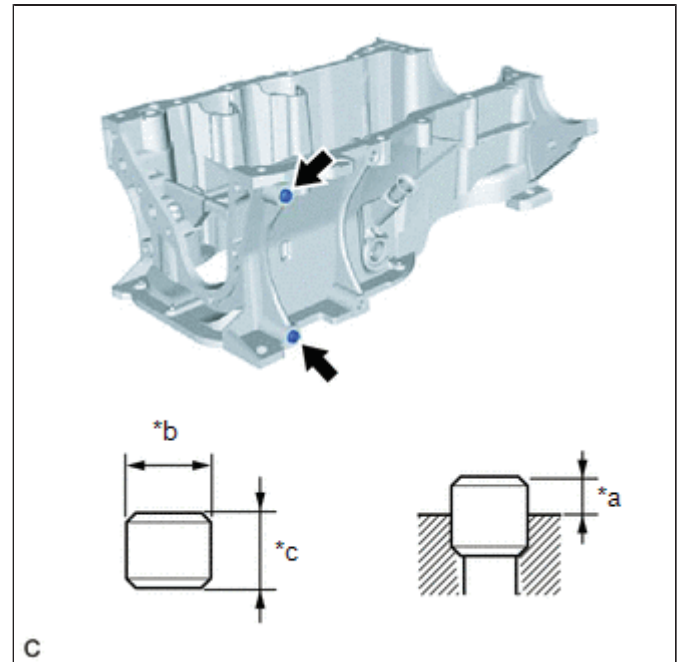
##### NOTICE:

It is not necessary to remove ring pins unless they are being replaced.

(a) Using a plastic hammer, tap 2 new ring pins into the stiffening crankcase assembly.

Standard Ring Pin:

ITEM	PROTRUSION HEIGHT	HEIGHT	WIDTH
Ring pin	4.0 mm (0.157 in.)	8.0 mm (0.315 in.)	11 mm (0.433 in.)



*a	Protrusion Height
*b	11 mm
*c	8 mm

(b) Apply seal packing as shown in the illustration.

Seal Packing:

Toyota Genuine Seal Packing Black, Three bond 1207B or equivalent

Standard Seal Packing Diameter:

AREA	SPECIFIED CONDITION
Continuous Line	2.0 to 3.0 mm (0.0787 to 0.118 in.)
(A)	4.5 to 5.5 mm (0.177 to 0.217 in.)

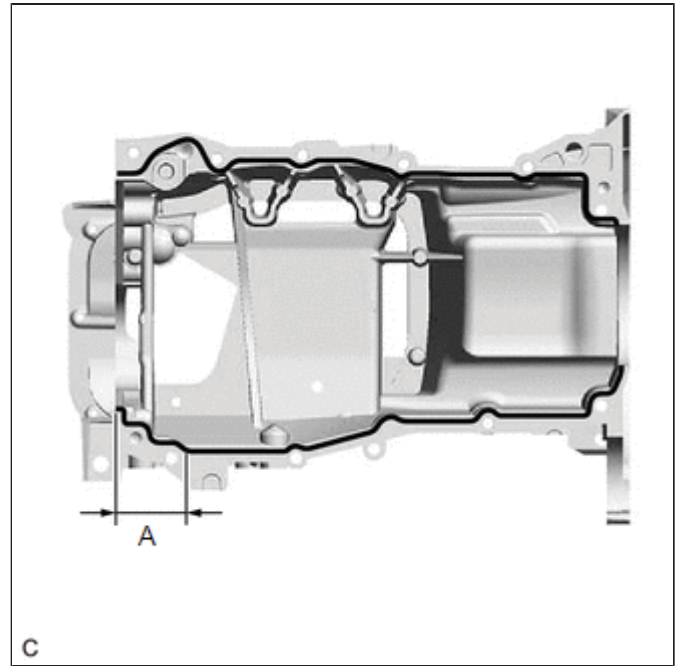
Application Length (A):




56 mm (2.20 in.)

**NOTICE:**

- Remove any oil from the contact surfaces.
- Install the stiffening crankcase assembly within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installing the stiffening crankcase assembly.



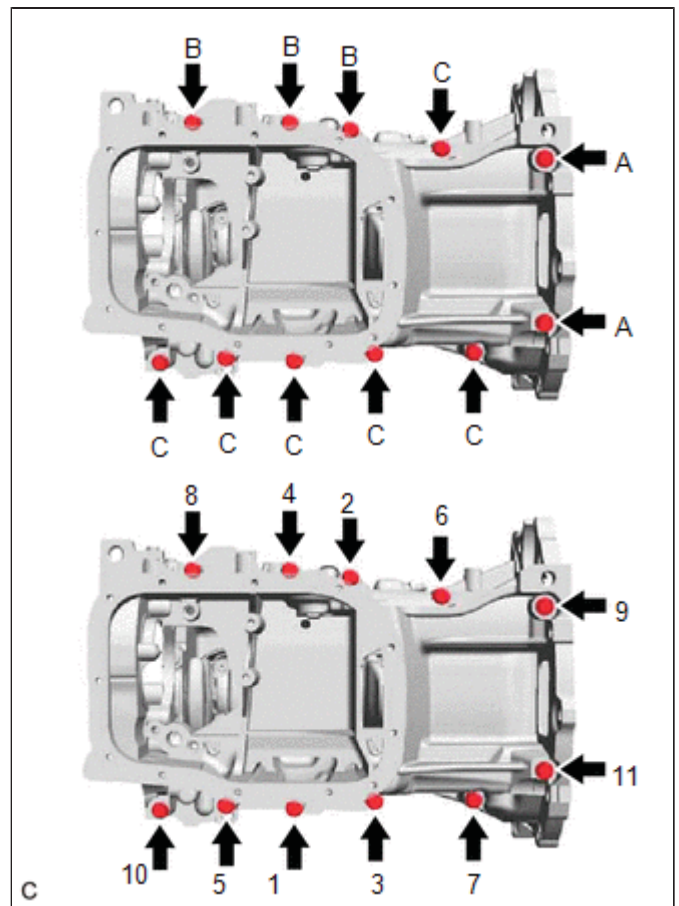
(c) Install the stiffening crankcase assembly with the 11 bolts in the order shown in the illustration.

**Torque:**

**21 N·m {214 kgf·cm, 15 ft·lbf}**

Bolt Length:

ITEM	SPECIFIED CONDITION
Bolt (A)	138 mm (5.43 in.)
Bolt (B)	35 mm (1.38 in.)
Bolt (C)	70 mm (2.76 in.)



(d) Recheck the torque for the bolts (1) and (2).

**Torque:**

**21 N·m {214 kgf·cm, 15 ft·lbf}**

(e) Wipe off any excess seal packing with a clean piece of cloth.

## 2. INSTALL OIL PUMP ASSEMBLY

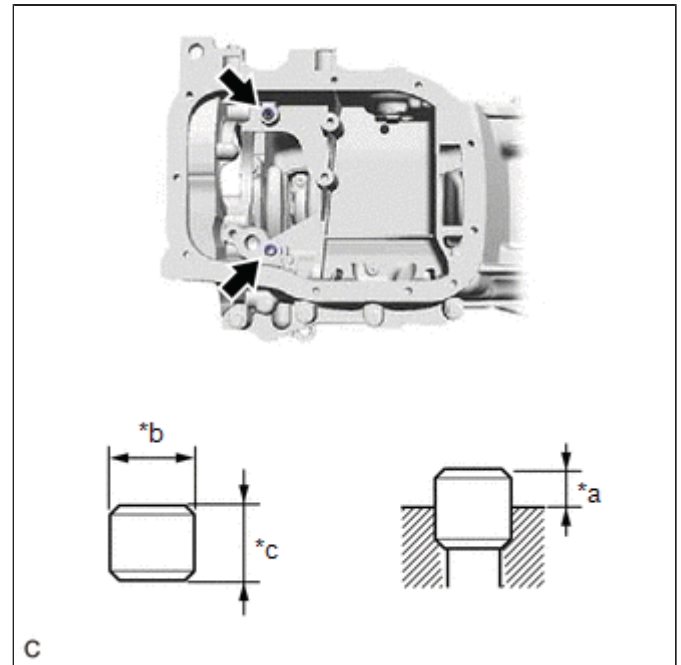
### NOTICE:

It is not necessary to remove ring pins unless they are being replaced.

(a) Using a plastic hammer, tap 2 new ring pins into the stiffening crankcase assembly.

Standard Ring Pin:

ITEM	PROTRUSION HEIGHT	HEIGHT	WIDTH
Ring pin	3.0 mm (0.118 in.)	8.0 mm (0.315 in.)	11 mm (0.433 in.)



*a	Protrusion Height
*b	11 mm
*c	8 mm

(b) Install the oil pump assembly.

Click here [INFO](#)

## 3. INSTALL ENGINE OIL LEVEL SENSOR

Click here [INFO](#)

## 4. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY

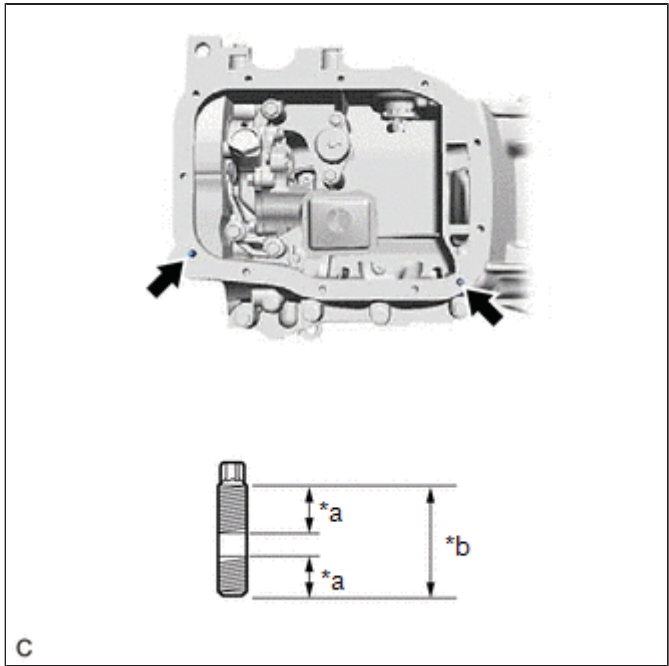
### NOTICE:

If a stud bolt is deformed or its threads are damaged, replace it.

(a) Using an E6 "TORX" socket wrench, install the 2 stud bolts as shown in the illustration.

**Torque:**

**5.0 N·m {51 kgf·cm, 44 in·lbf}**



*a	9 mm (0.354 in.)
*b	19 mm (0.748 in.)

(b) Remove any remaining seal packing.

**NOTICE:**

- Remove any oil from the contact surfaces.
- Install the No. 2 oil pan sub-assembly within 3 minutes and tighten the bolts within 10 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the No. 2 oil pan sub-assembly.
- Keep the contact surfaces of the stiffening crankcase assembly and No. 2 oil pan sub-assembly free of oil.

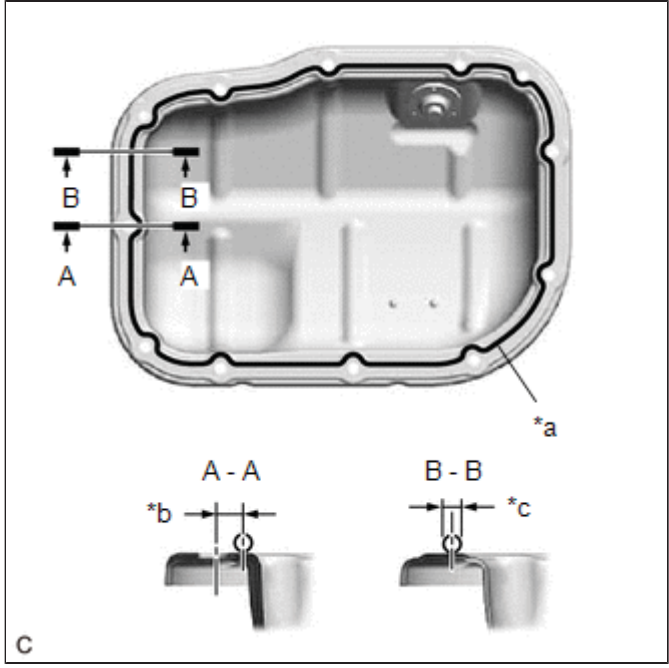
(c) Apply seal packing in a continuous line as shown in the illustration.

**Seal Packing:**

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

**Application Specification:**

AREA	SEAL PACKING DIAMETER	DISTANCE FROM CENTER OF BOLT HOLE TO CENTER OF SEAL PACKING
(A) - (A)	3.0 to 4.5 mm (0.118 to 0.177 in.)	6.0 mm (0.236 in.)
(B) - (B)		-



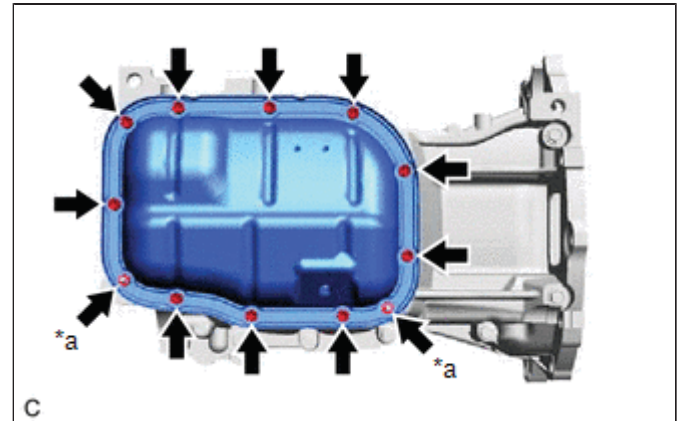
*a	Seal Packing
----	--------------

*b	6.0 mm
*c	3.0 to 4.5 mm

(d) Install the No. 2 oil pan sub-assembly to the stiffening crankcase assembly with the 10 bolts and 2 nuts.

**Torque:**

**10 N·m { 102 kgf·cm, 7 ft·lbf }**



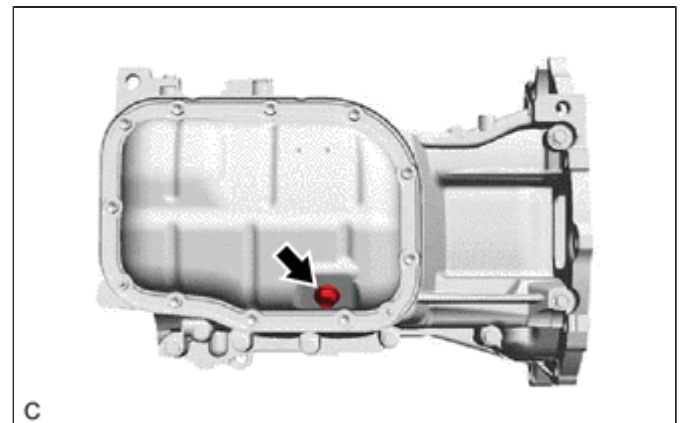
*a	Nut
----	-----

## 5. INSTALL OIL PAN DRAIN PLUG

(a) Install a new gasket and oil pan drain plug to the No. 2 oil pan sub-assembly.

**Torque:**

**37 N·m { 377 kgf·cm, 27 ft·lbf }**



## 6. INSTALL REAR ENGINE OIL SEAL

Click here [INFO](#)

## 7. INSTALL PCV VALVE (VENTILATION VALVE SUB-ASSEMBLY)

Click here [INFO](#)

## 8. INSTALL CYLINDER HEAD GASKET

Click here [INFO](#)

## 9. INSTALL CYLINDER HEAD SUB-ASSEMBLY

### HINT:

The cylinder head set bolts are tightened in 3 progressive steps.

- (a) Clean the cylinder block sub-assembly and cylinder head sub-assembly with solvent.
- (b) Place the cylinder head sub-assembly on the cylinder block sub-assembly.

**NOTICE:**

- Remove any oil from the contact surface of the cylinder head sub-assembly.
- Place the cylinder head sub-assembly on the cylinder block sub-assembly gently in order not to damage the gasket with the bottom of the cylinder head sub-assembly.

- (c) Install the 10 cylinder head set plate washers to the 10 cylinder head set bolts.
- (d) Apply a light coat of engine oil to the threads and under the heads of the cylinder head set bolts.
- (e) Step 1:

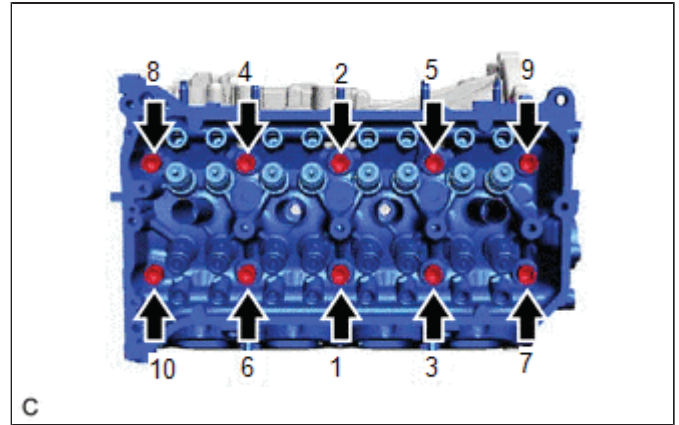
(1) Using a 10 mm bi-hexagon socket wrench, install and uniformly tighten the 10 cylinder head set bolts in several steps in the order shown in the illustration.

**Torque:**

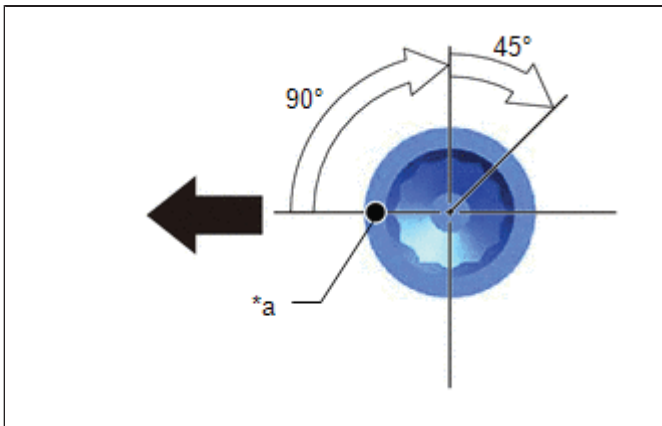
**49 N·m { 500 kgf·cm, 36 ft·lbf }**


**NOTICE:**

Do not drop the cylinder head set plate washers for the cylinder head set bolts into the cylinder head sub-assembly.



- (f) Step 2:



*a	Paint Mark
	Front of Engine

- (1) Mark each cylinder head set bolt head with paint as shown in the illustration.
- (2) Tighten the cylinder head set bolts 90° in the order shown in step 1.
- (g) Step 3:
  - (1) Tighten the cylinder head set bolts another 45° in the order shown in step 1.
- (h) Check that the paint marks are now at a 135° angle.

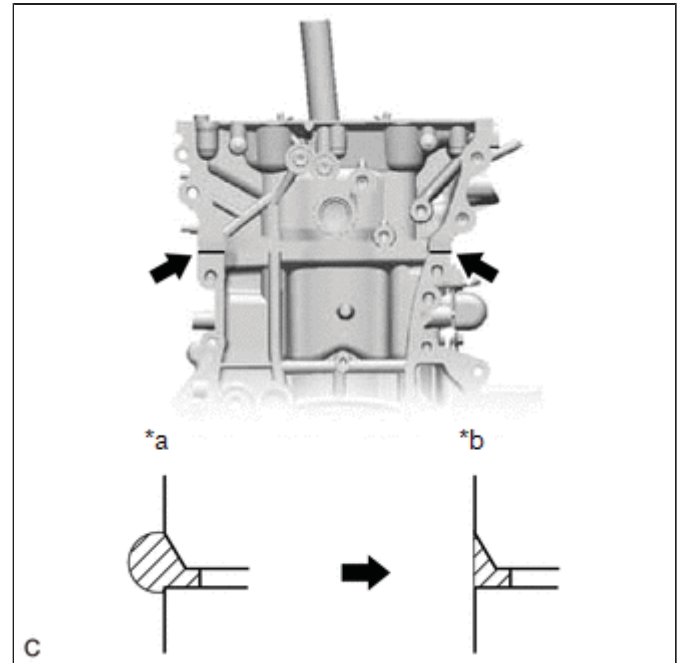
**NOTICE:**

Do not add engine oil for at least 2 hours after installing the cylinder head sub-assembly.

- (i) After tightening the cylinder head set bolts, wipe off any seal packing that seeped out from the contact surfaces between the cylinder head sub-assembly and cylinder block sub-assembly.

**NOTICE:**

- Be sure to wipe off the seal packing from inside to outside, parallel to the joint line.
- Be sure to avoid clogging the bolt holes when wiping off the seal packing.



*a	Before Wiping Off
*b	After Wiping Off

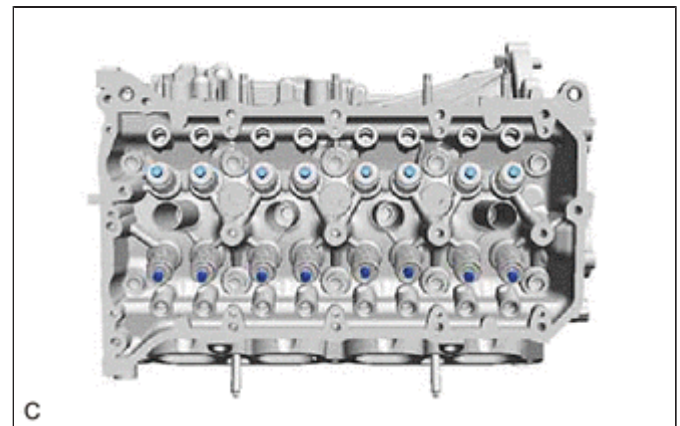
**10. INSTALL VALVE STEM CAP**

- (a) Apply a light coat of engine oil to the valve stem ends.

- (b) Install the 16 valve stem caps to the cylinder head sub-assembly.

**NOTICE:**

- Install each part to its original location.
- Do not drop the valve stem caps into the cylinder head sub-assembly.



**11. INSTALL VALVE LASH ADJUSTER ASSEMBLY**

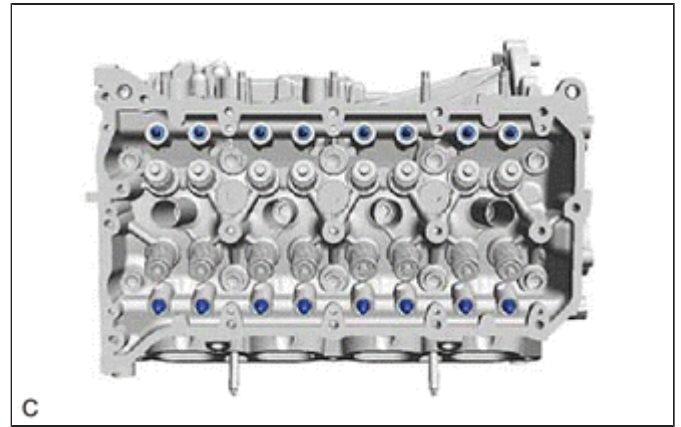
- (a) Inspect the 16 valve lash adjuster assemblies before installing them.

Click here [INFO](#)

(b) Install the 16 valve lash adjuster assemblies to the cylinder head sub-assembly.

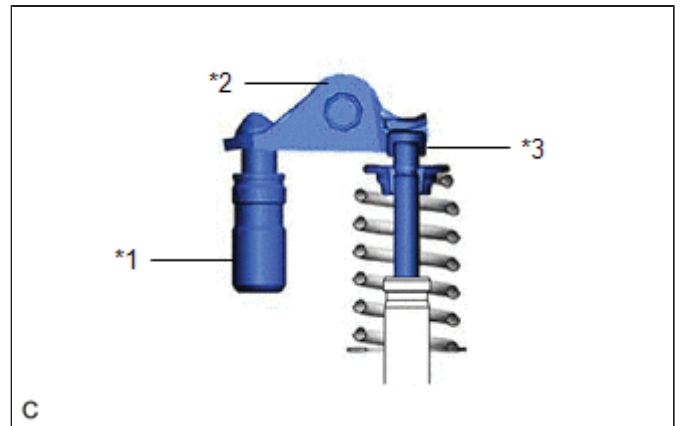
**NOTICE:**

Install each part to its original location.



**12. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**

(a) Apply engine oil to the tips of the valve lash adjuster assemblies and valve stem caps.



* 1	Valve Lash Adjuster Assembly
* 2	No. 1 Valve Rocker Arm Sub-assembly
* 3	Valve Stem Cap

(b) Install the 16 No. 1 valve rocker arm sub-assemblies as shown in the illustration.

**NOTICE:**

Install each part to its original location.

**13. INSTALL RING PIN**

**NOTICE:**

It is not necessary to remove ring pins unless they are being replaced.

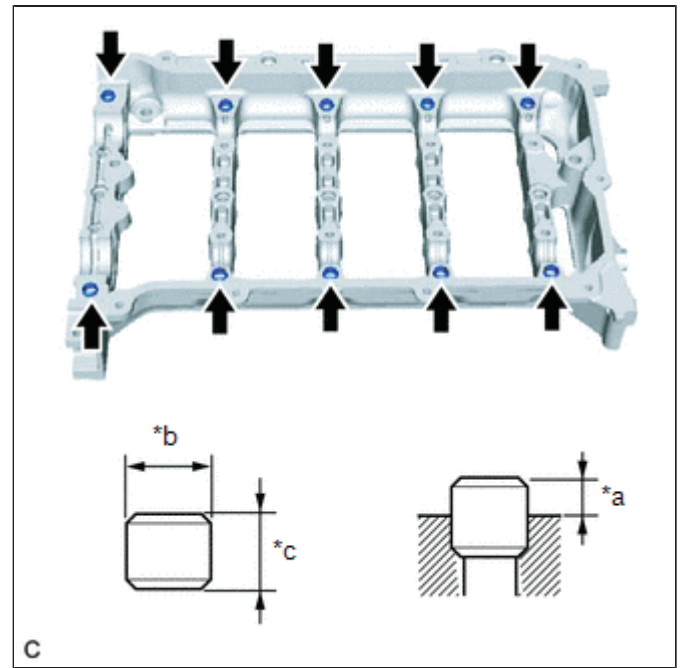
(a) Using a plastic hammer, tap 10 new ring pins into the



camshaft housing sub-assembly.

Standard Ring Pin:

ITEM	PROTRUSION HEIGHT	HEIGHT	WIDTH
Ring pin	3.0 mm (0.118 in.)	13 mm (0.512 in.)	20 mm (0.787 in.)



*a	Protrusion Height
*b	20 mm
*c	13 mm

#### 14. INSTALL NO. 1 CAMSHAFT BEARING

- (a) Clean both surfaces of the No. 1 camshaft bearings.
- (b) Install the 2 No. 1 camshaft bearings.

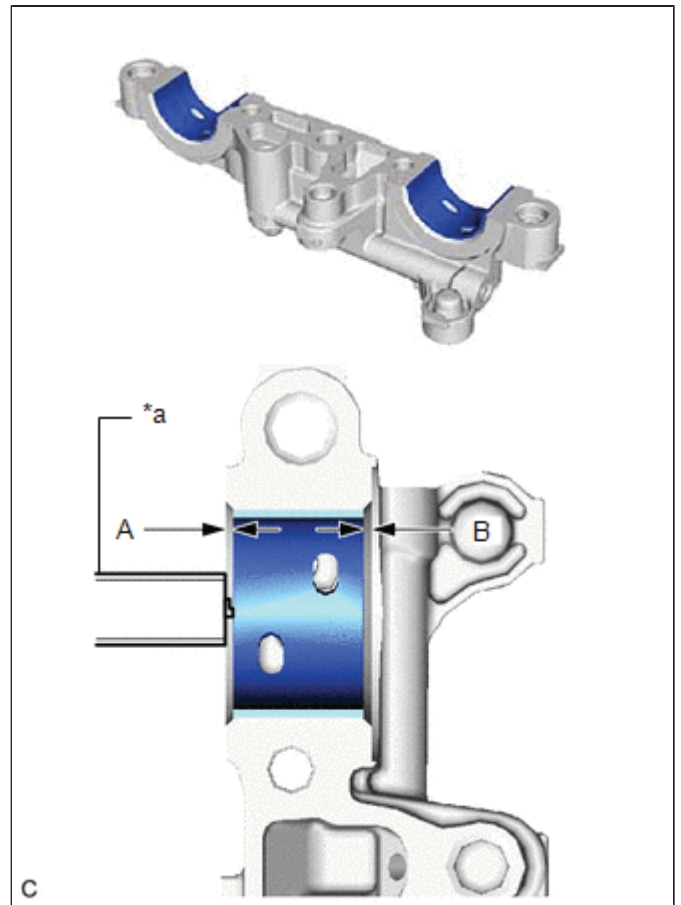
- (c) Using a vernier caliper, measure the distance between the No. 1 camshaft bearing cap edge and the No. 1 camshaft bearing edge.

Standard Dimension (A) - (B):

0.7 mm (0.0276 in.) or less

#### NOTICE:

Position the No. 1 camshaft bearings to the center of the camshaft bearing cap by measuring dimensions (A) and (B).



*a	Vernier Caliper
----	-----------------

## 15. INSTALL NO. 2 CAMSHAFT BEARING

- (a) Clean both surfaces of the No. 2 camshaft bearings.
- (b) Install the 2 No. 2 camshaft bearings.

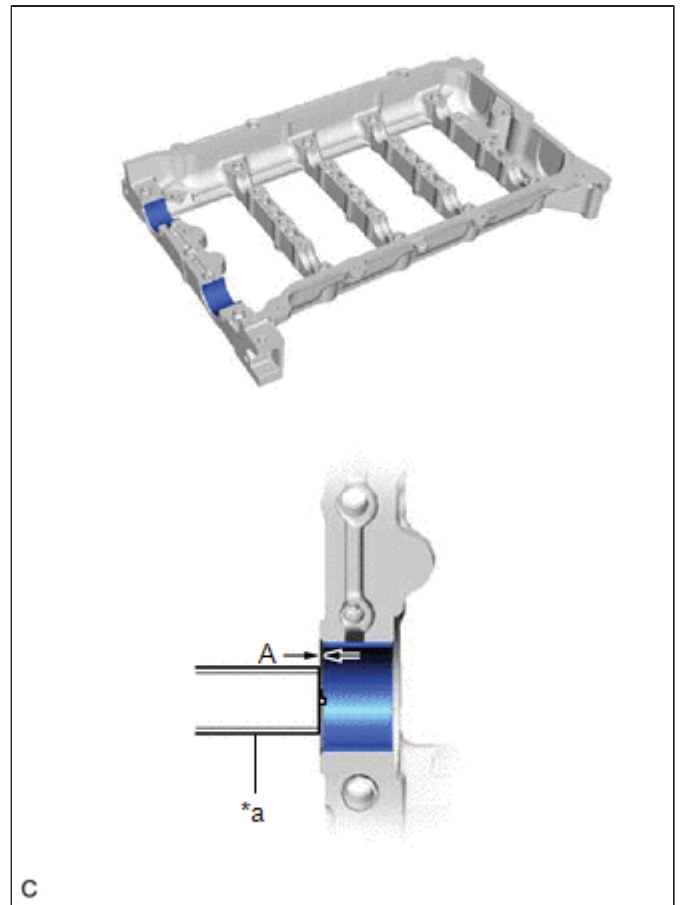
(c) Using a vernier caliper, measure the distance between the camshaft housing sub-assembly edge and the No. 2 camshaft bearing edge.

Dimension (A):

1.05 to 1.75 mm (0.0413 to 0.0689 in.)

### NOTICE:

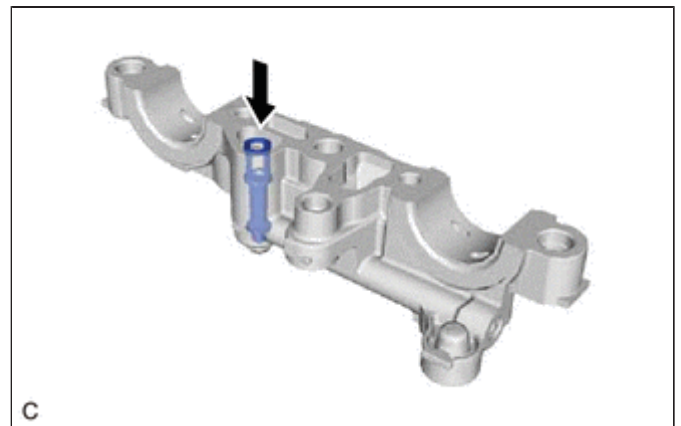
Position the No. 2 camshaft bearings to the center of the camshaft housing sub-assembly by measuring dimension (A).



*a	Vernier Caliper
----	-----------------

## 16. INSTALL OIL CONTROL VALVE FILTER

(a) Check that no foreign matter is on the mesh of the oil control valve filter.



(b) Install the oil control valve filter.

### NOTICE:

Do not touch the mesh when installing the oil control valve filter.

## 17. INSTALL NO. 2 CAMSHAFT

Click here [INFO](#) [INFO](#)

## 18. INSTALL CAMSHAFT

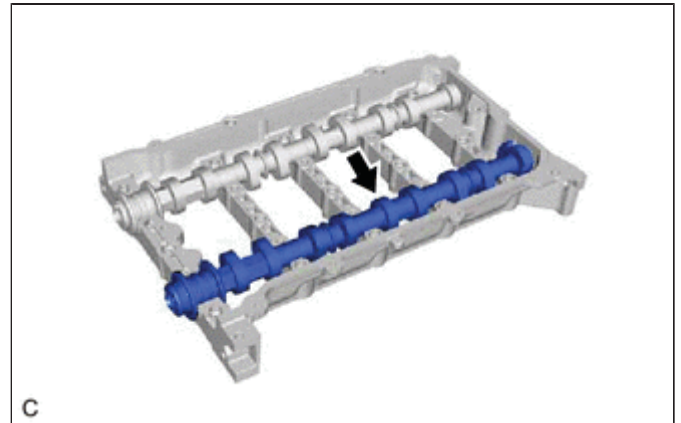
### HINT:

Perform Inspection After Repair after replacing the camshaft.

[Click here](#) **INFO**

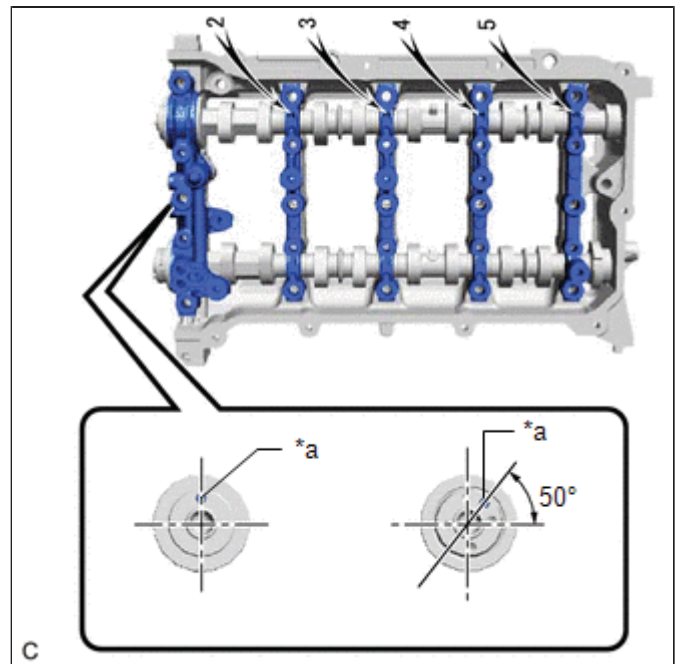
- (a) Clean the camshaft journals.
- (b) Apply a light coat of engine oil to the camshaft journals, camshaft housing sub-assembly and camshaft bearing caps.

- (c) Install the camshaft to the camshaft housing sub-assembly.



## 19. INSTALL CAMSHAFT BEARING CAP

- (a) Confirm the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

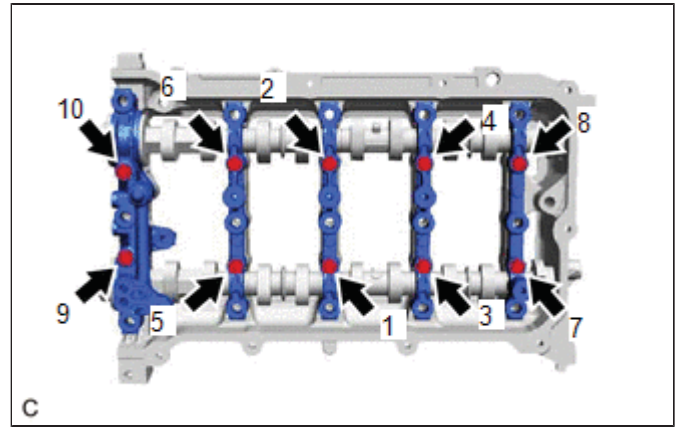


*a	Knock Pin
----	-----------

(b) Tighten the 10 bearing cap bolts in the order shown in the illustration.

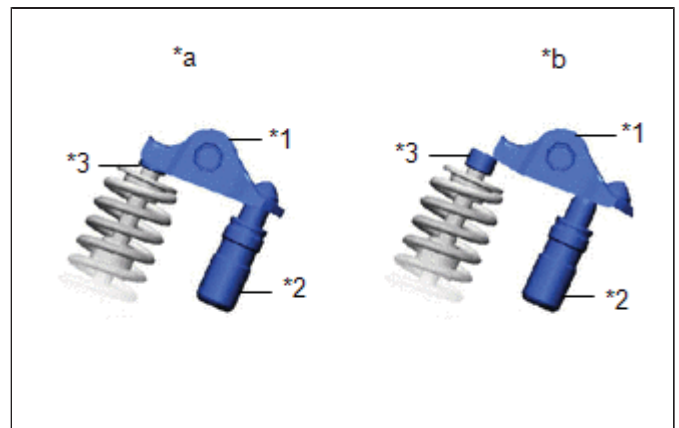
**Torque:**

**16 N·m { 163 kgf·cm, 12 ft·lbf }**



## 20. SET NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

(a) Make sure that the No. 1 valve rocker arm sub-assemblies are installed as shown in the illustration.



*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Lash Adjuster Assembly
*3	Valve Stem Cap
*a	Correct
*b	Incorrect

## 21. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY

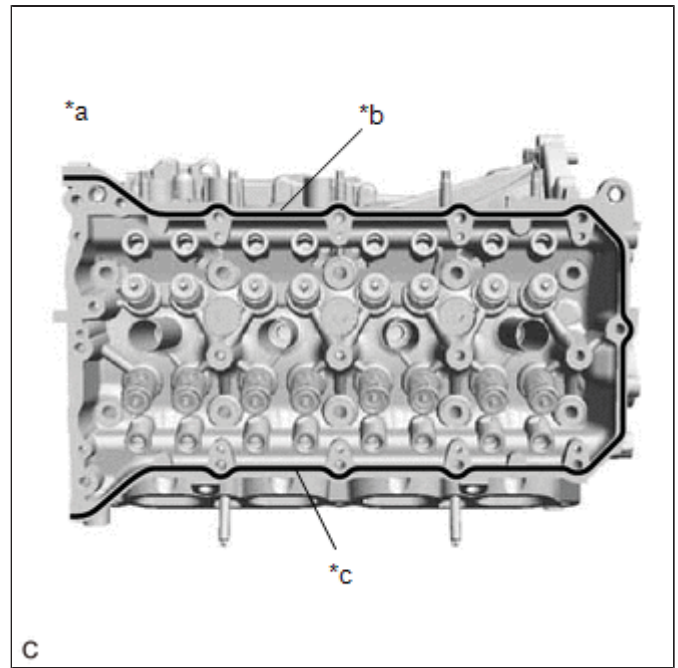
(a) Apply seal packing in a continuous line as shown in the illustration.

Seal Packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

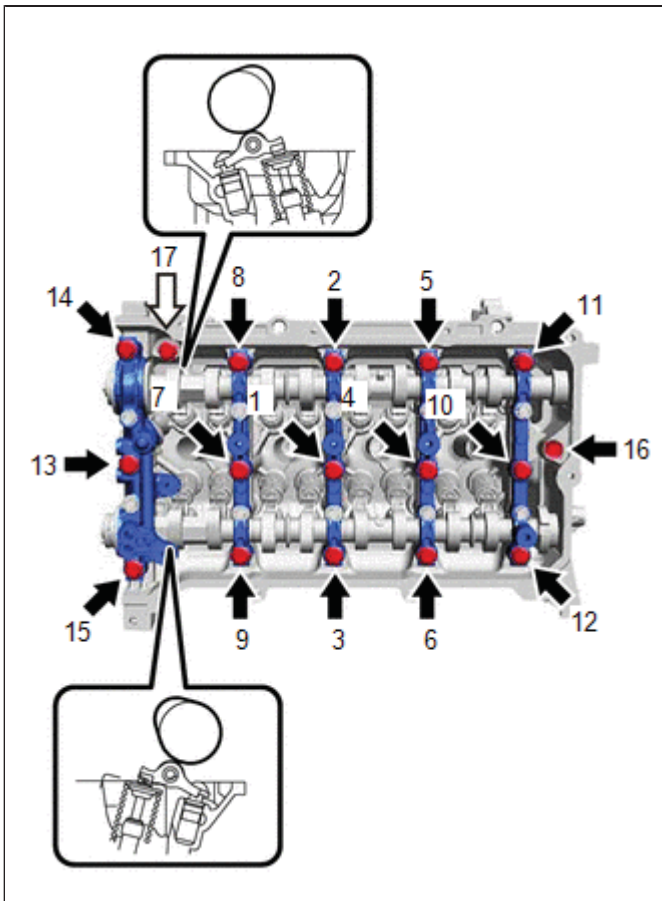
**NOTICE:**



- Remove any oil from the contact surfaces.
- Install the camshaft housing sub-assembly within 3 minutes and tighten the bolts within 10 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installation.



*a	Cylinder Head Sub-assembly Upper Side
*b	Seal Packing
*c	3.5 to 4.0 mm (0.138 to 0.157 in.)

(b) Set the camshaft and No. 2 camshaft as shown in the illustration.



	Bolt (A)
	Bolt (B)

(c) Install the camshaft housing sub-assembly with the 17 bolts and tighten them in the order shown in the illustration.

**Torque:**

**Bolt (A) :**

**27 N·m { 275 kgf·cm, 20 ft·lbf }**

**Bolt (B) :**

**16 N·m { 163 kgf·cm, 12 ft·lbf }**

**NOTICE:**

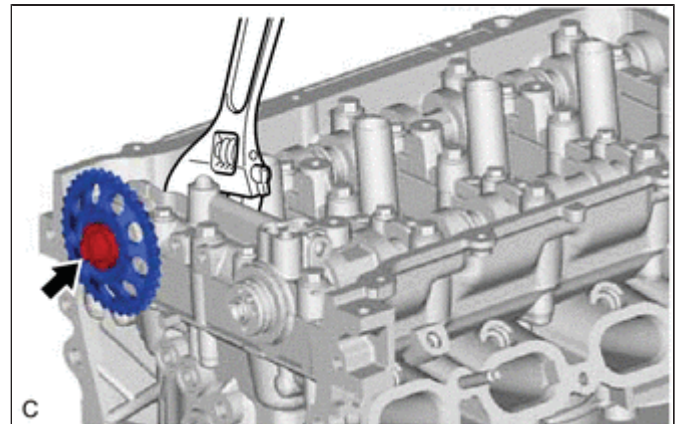
- After installing the camshaft housing sub-assembly, make sure that the cam lobes are positioned as shown in the illustration.
- If it is necessary to loosen any of the bolts during installation, remove the camshaft housing sub-assembly, clean the installation surfaces, and reapply seal packing.
- If it is necessary to remove the camshaft housing sub-assembly during installation, make sure that the previously applied seal packing does not enter any oil passages.
- After installing the camshaft housing sub-assembly, wipe off any seal packing that seeped out from between the camshaft housing sub-assembly and cylinder head sub-assembly.

**22. INSTALL CAMSHAFT TIMING SPROCKET**

(a) Using a wrench to hold the hexagonal portion of the No. 2 camshaft, tighten the bolt.

**Torque:**

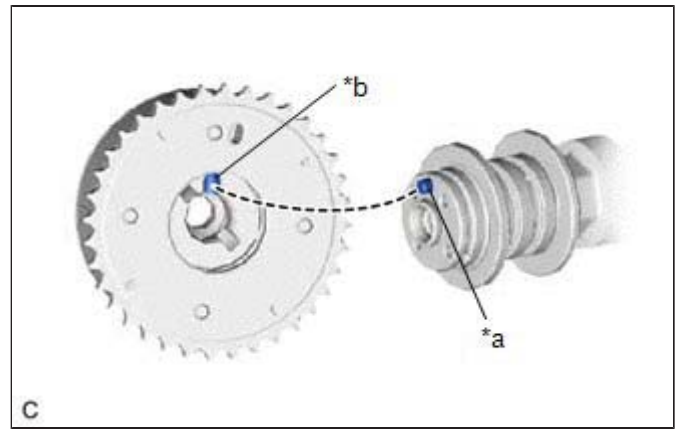
**54 N·m { 551 kgf·cm, 40 ft·lbf }**



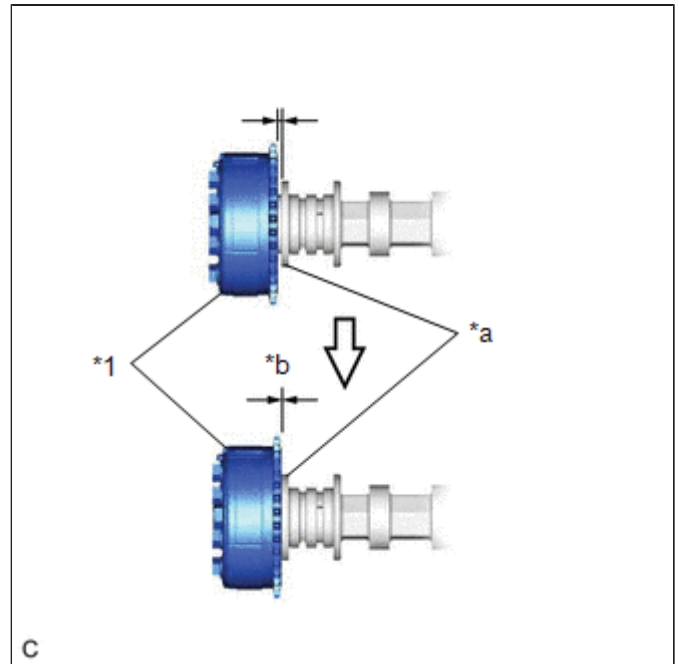
**23. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY**

(a) Align and fit the knock pin of the camshaft to the knock pin hole of the camshaft timing gear assembly.





*a	Knock Pin
*b	Key Groove



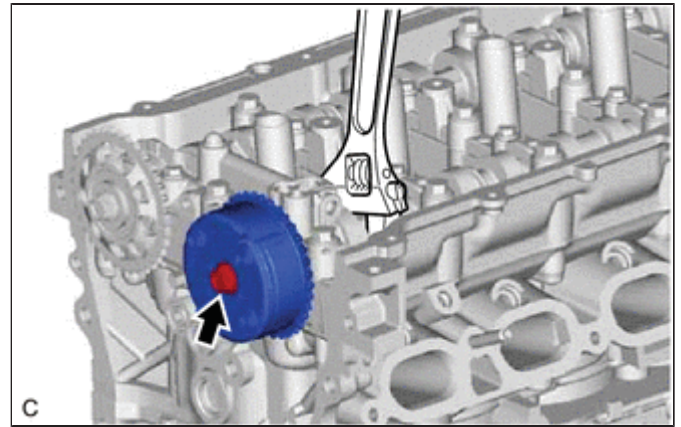
*1	Camshaft Timing Gear Assembly
*a	Camshaft Flange
*b	No Gap

(b) Check that there is no gap between the camshaft timing gear assembly and camshaft flange.

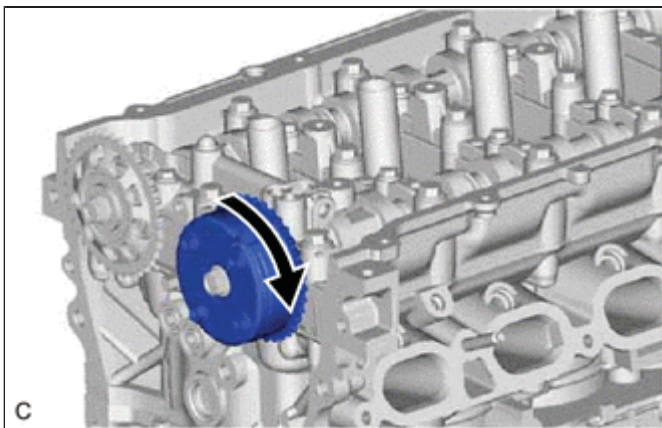
(c) Using a wrench to hold the hexagonal portion of the camshaft, tighten the bolt.

**Torque:**

**54 N·m { 551 kgf·cm, 40 ft·lbf }**



(d) Check that the camshaft timing gear assembly can move in the retard direction (clockwise) and locks in the most retarded position.

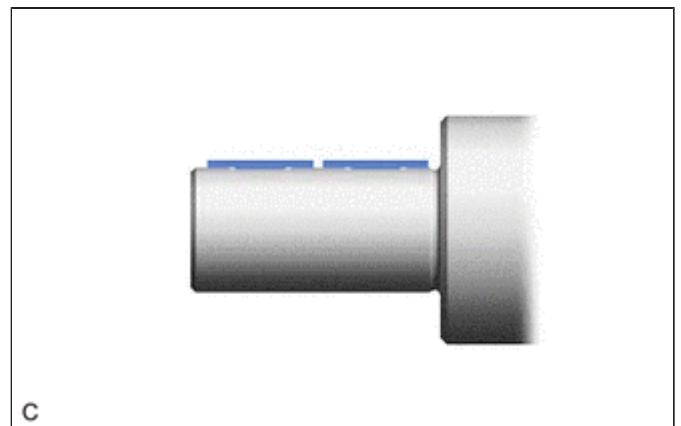


#### 24. INSTALL CRANKSHAFT TIMING GEAR KEY

(a) Using a plastic hammer, tap in the 2 crankshaft timing gear keys.

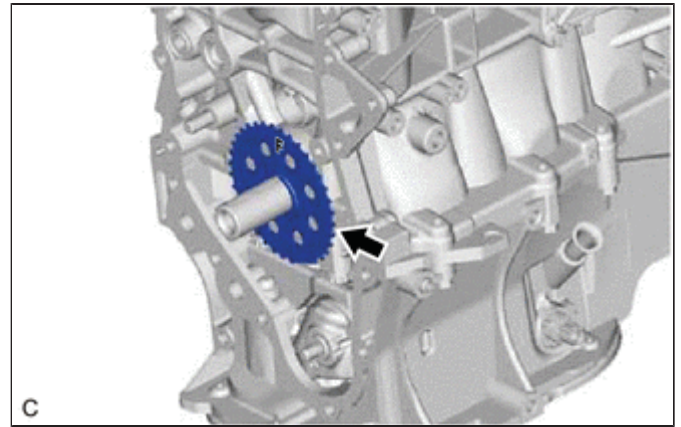
**HINT:**

Tap in the crankshaft timing gear keys until they contact the crankshaft as shown in the illustration.



#### 25. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE

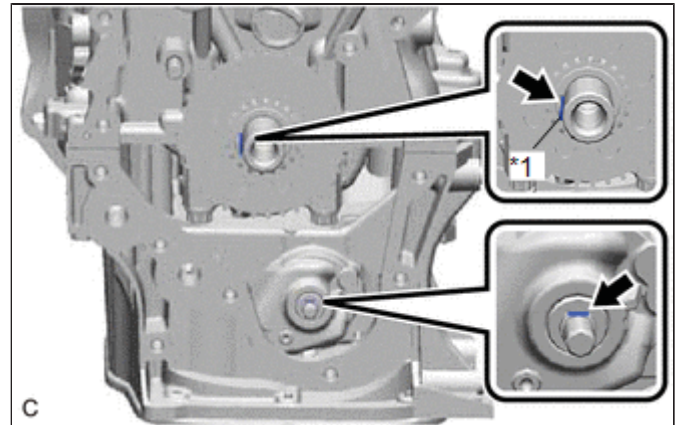
- (a) Install the No. 1 crankshaft position sensor plate to the crankshaft with the "F" mark facing forward.



## 26. INSTALL NO. 2 CHAIN SUB-ASSEMBLY

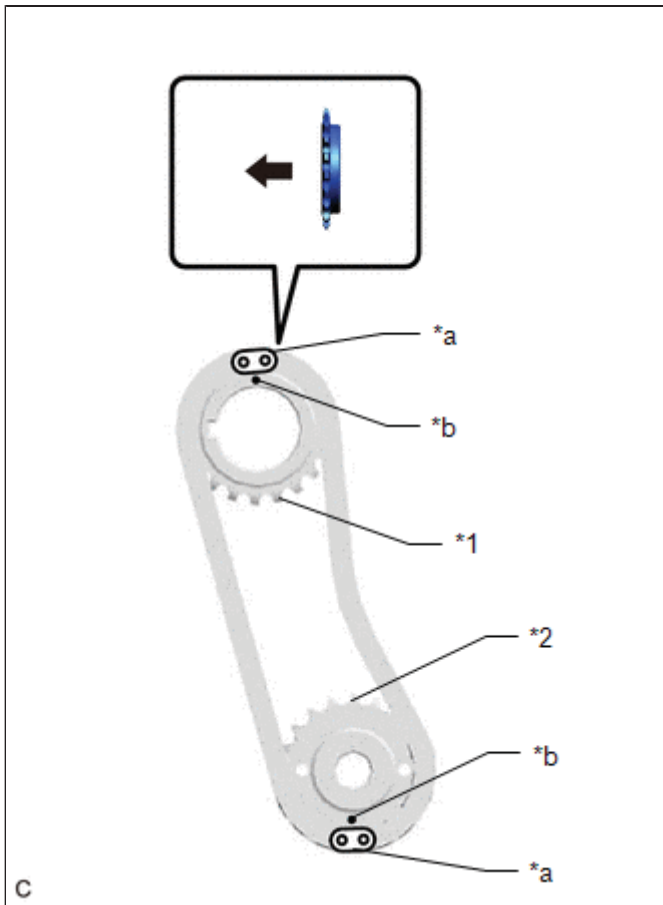
- (a) Temporarily install the crankshaft pulley set bolt to the crankshaft.


- (b) Set the crankshaft timing gear keys as shown in the illustration.



*1	Crankshaft Timing Gear Key
----	----------------------------

- (c) Turn the oil pump drive shaft so that the flat face is facing upward.
- (d) Remove the crankshaft pulley set bolt from the crankshaft.
- (e) Align the mark plates (yellow) with the timing mark of the oil pump drive gear and oil pump drive shaft gear as shown in the illustration.



*1	Oil Pump Drive Gear
*2	Oil Pump Drive Shaft Gear
*a	Mark Plate (Yellow)
*b	Timing Mark
	Front of Engine

**HINT:**

Make sure the mark plates (yellow) of the No. 2 chain sub-assembly are facing away from the engine assembly.

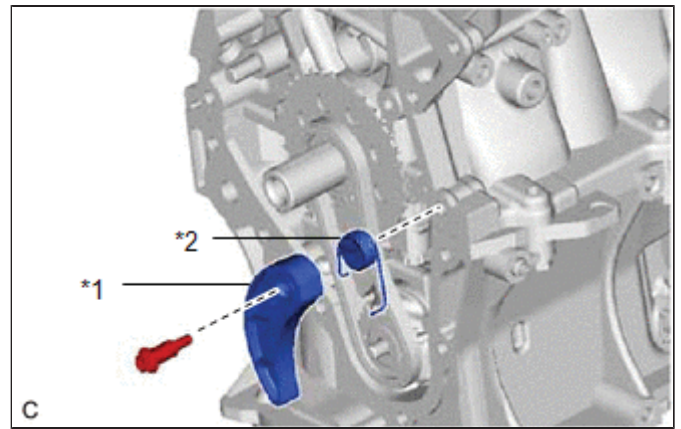
(f) With the No. 2 chain sub-assembly placed around the oil pump drive gear and oil pump drive shaft gear, install the oil pump drive gear to the crankshaft and temporarily install the oil pump drive shaft gear to the oil pump drive shaft.

(g) Temporarily install the oil pump drive shaft gear nut.

(h) Install the chain damper spring to the chain tensioner plate, and then install the chain tensioner plate with the bolt.

**Torque:**

**10 N·m { 102 kgf·cm, 7 ft·lbf }**



*1	Chain Tensioner Plate
*2	Chain Damper Spring

(i) Temporarily install the crankshaft pulley to the crankshaft with the crankshaft pulley set bolt.

(j) Using SST, hold the crankshaft pulley and tighten the oil pump drive shaft gear nut.

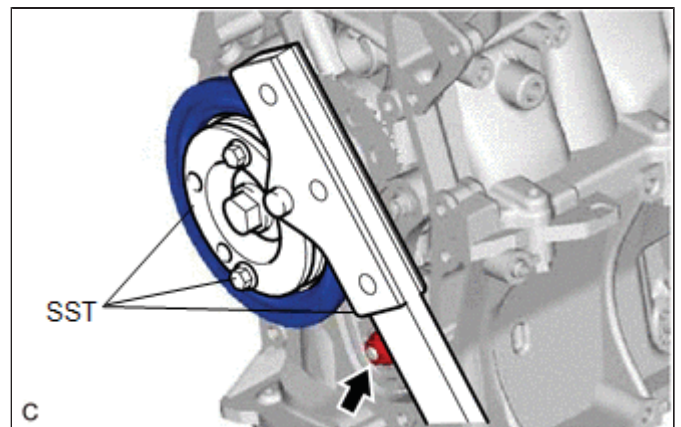
**SST: 09213-58014**

91551-80840

**SST: 09330-00021**

**Torque:**

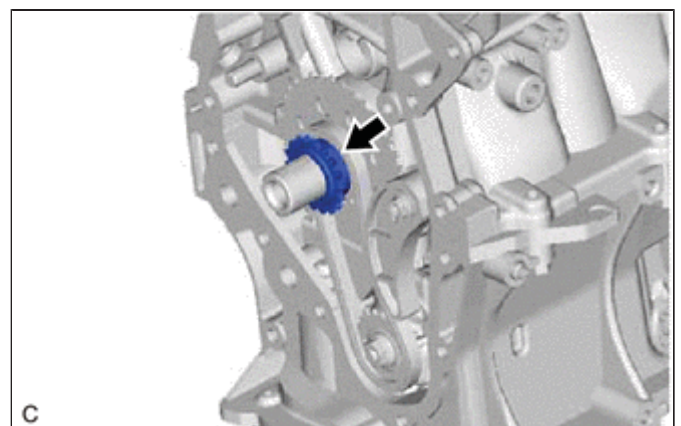
**28 N·m {286 kgf·cm, 21 ft·lbf}**



(k) Remove SST, the crankshaft pulley set bolt and crankshaft pulley.

## 27. INSTALL CRANKSHAFT TIMING SPROCKET

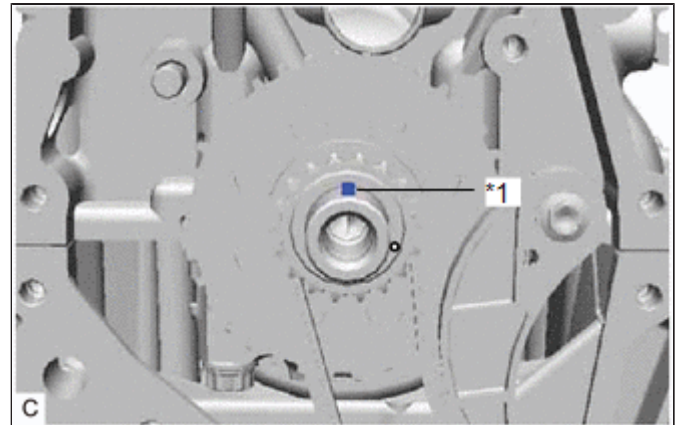
(a) Install the crankshaft timing sprocket to the crankshaft.



## 28. SET NO. 1 CYLINDER TO TDC (COMPRESSION)

(a) Temporarily install the crankshaft pulley set bolt to the crankshaft.

(b) Turn the crankshaft clockwise until the crankshaft timing gear key is facing upward.

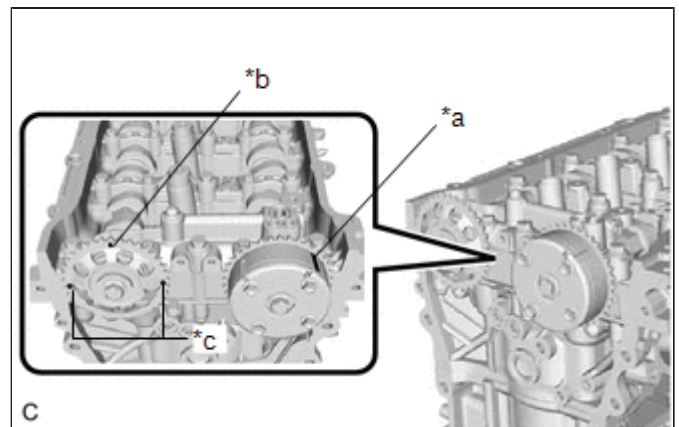


*1	Crankshaft Timing Gear Key
----	----------------------------

(c) Check that the timing marks on the camshaft timing gear assembly and camshaft timing sprocket are aligned as shown in the illustration.

### HINT:

There are 3 marks on the camshaft timing sprocket. Make sure that the timing mark (rectangle) is at the top.



*a	Timing Mark
*b	Timing Mark (Rectangle)
*c	Mark (Circle)

(d) Remove the crankshaft pulley set bolt from the crankshaft.

## 29. INSTALL CHAIN SUB-ASSEMBLY

Click here [INFO](#)

## 30. INSTALL NO. 2 CHAIN VIBRATION DAMPER

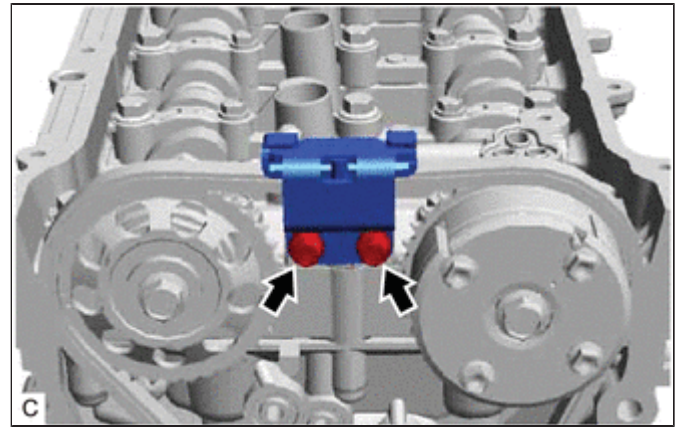
(a) Install the No. 2 chain vibration damper to the camshaft



housing sub-assembly with the 2 bolts.

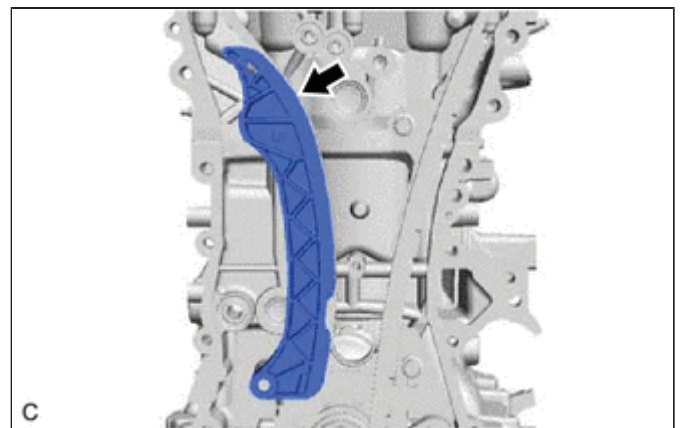
**Torque:**

**10 N·m { 102 kgf·cm, 7 ft·lbf }**



### 31. INSTALL CHAIN TENSIONER SLIPPER

(a) Install the chain tensioner slipper to the cylinder block sub-assembly.

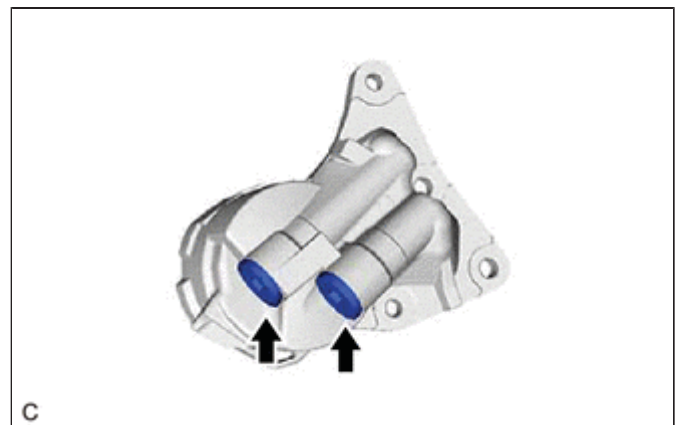


### 32. INSTALL OIL FILTER BRACKET WITH HEAD STRAIGHT SCREW PLUG

(a) Using a 10 mm hexagon socket wrench, install 2 new gaskets and the 2 oil filter bracket with head straight screw plugs to the oil filter bracket.

**Torque:**

**44 N·m { 449 kgf·cm, 32 ft·lbf }**



### 33. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

**NOTICE:**

If the stud bolts are deformed or the threads are damaged, replace them.

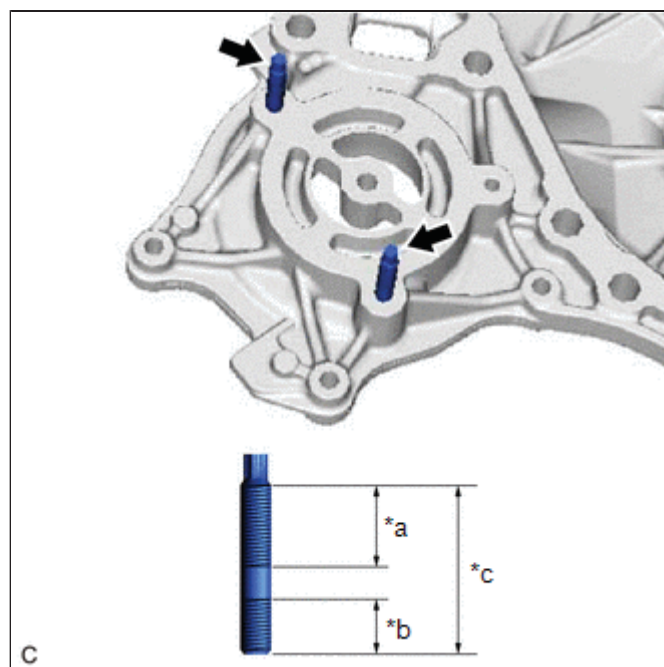
(a) Type A:



(1) Using an E6 "TORX" socket wrench, install the 2 stud bolts as shown in the illustration.

**Torque:**

**5.0 N·m {51 kgf·cm, 44 in·lbf}**

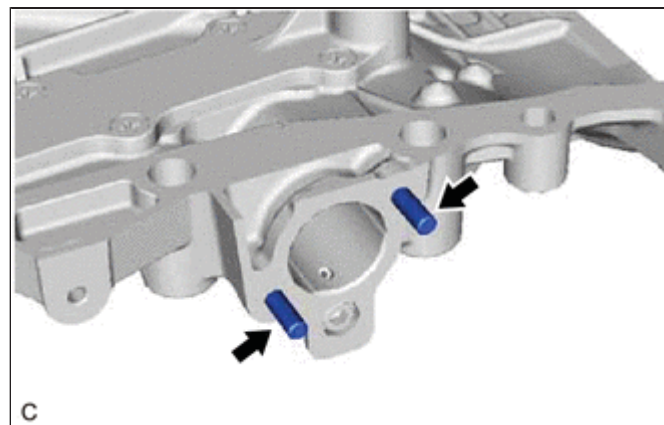


*a	21 mm (0.827 in.)
*b	9 mm (0.354 in.)
*c	34 mm (1.34 in.)

(b) Install the 2 stud bolts as shown in the illustration.

**Torque:**

**5.0 N·m {51 kgf·cm, 44 in·lbf}**

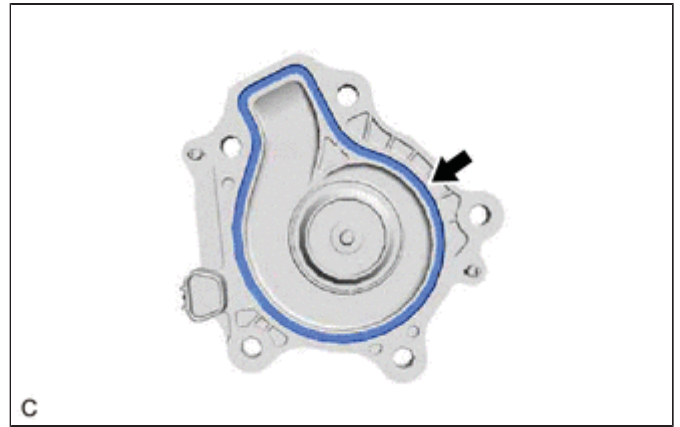


(c) Remove any remaining seal packing.

(d) Install a new gasket to the engine water pump assembly.

**HINT:**

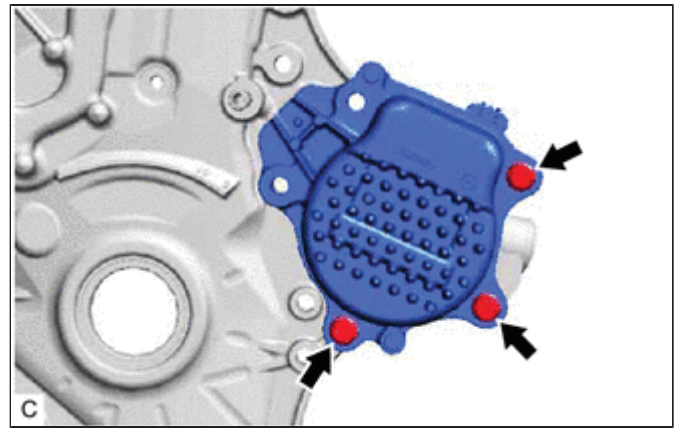
Be sure to clean the contact surfaces.



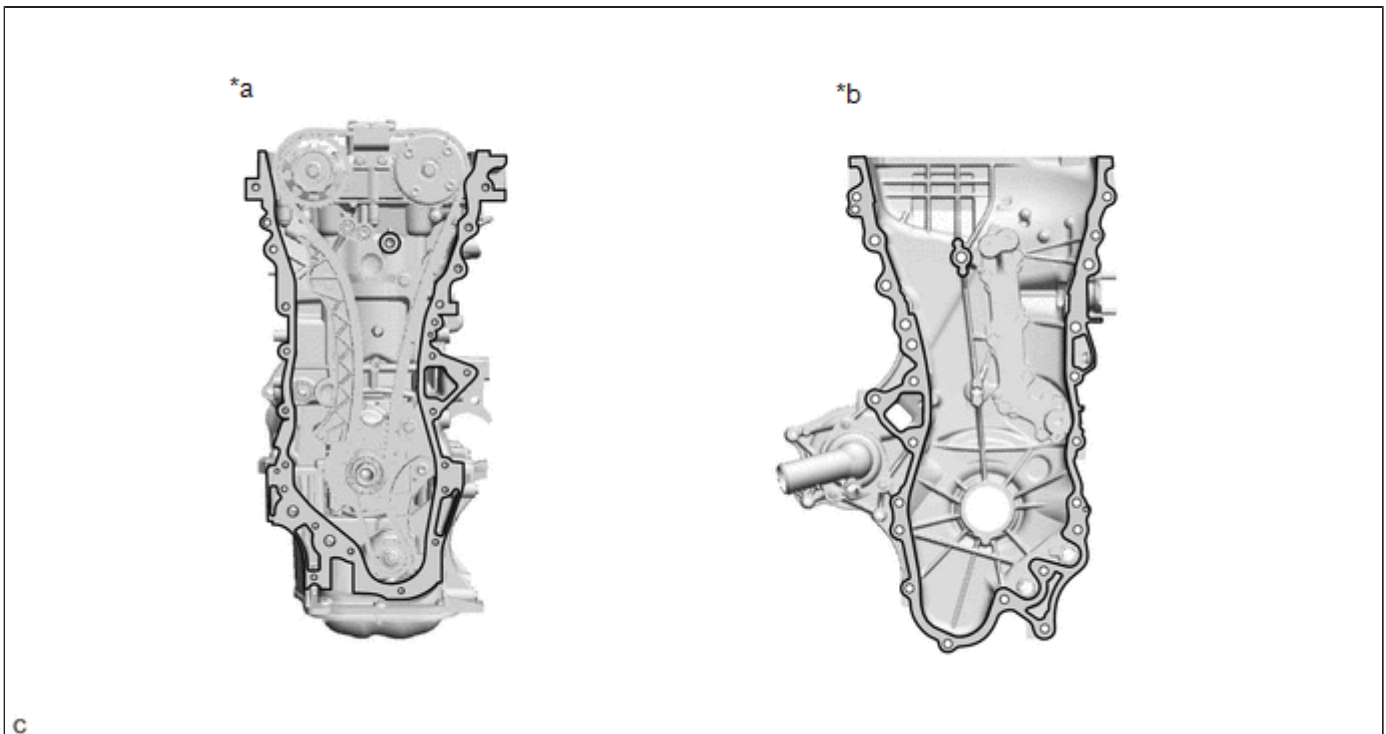
(e) Install the engine water pump assembly to the timing chain cover sub-assembly with the 3 bolts.


**Torque:**

**21 N·m { 214 kgf·cm, 15 ft·lbf }**

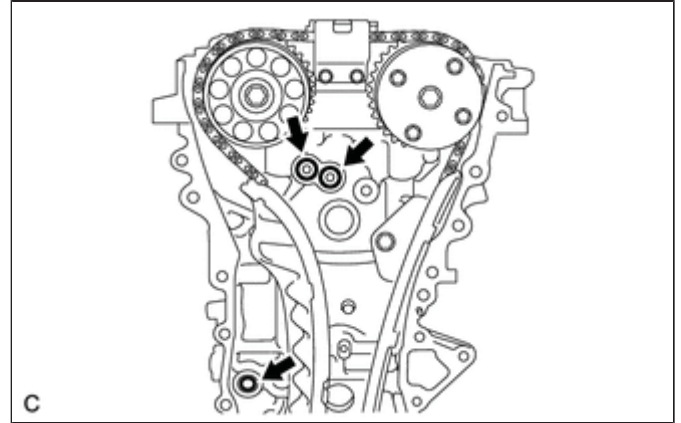


(f) Clean the contact surfaces of the timing chain cover sub-assembly, camshaft housing sub-assembly, cylinder head sub-assembly, cylinder block sub-assembly and stiffening crankcase assembly, and confirm that no oil, moisture, or other foreign matter is on the surfaces.



*a	Cylinder Head Sub-assembly and Cylinder Block Sub-assembly Side	*b	Timing Chain Cover Sub-assembly Side
	Clean and degrease	-	-

(g) Install 3 new O-rings to the cylinder head sub-assembly and cylinder block sub-assembly.



(h) Apply seal packing to the engine unit as shown in the illustration.

Seal Packing:

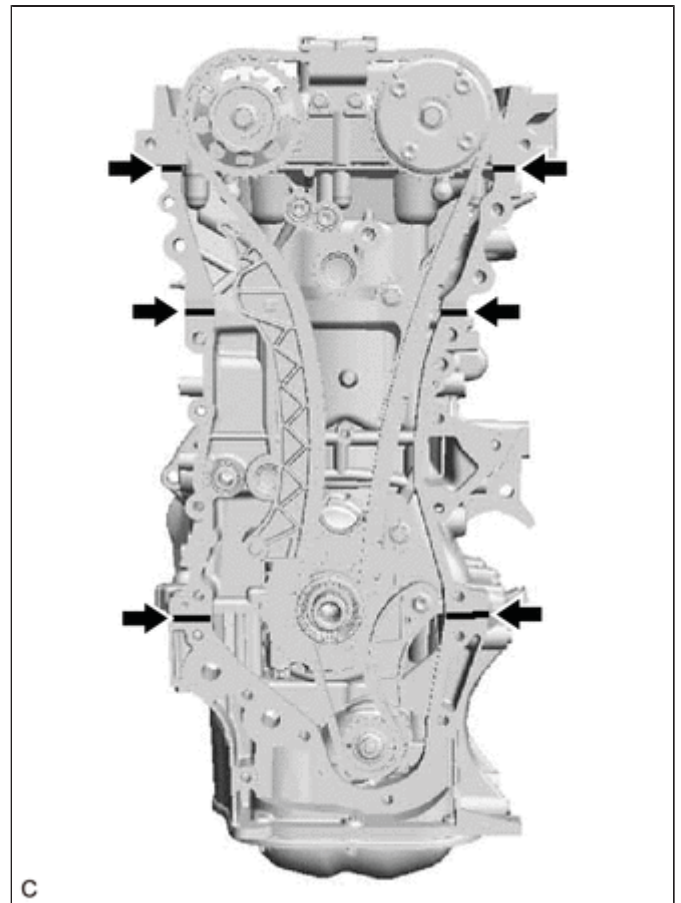
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Seal Packing Diameter:

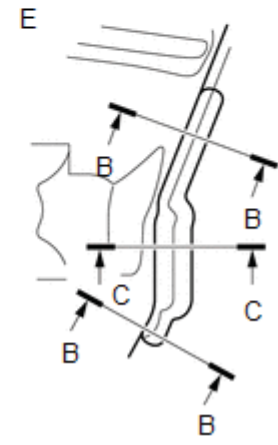
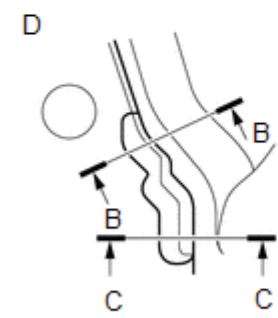
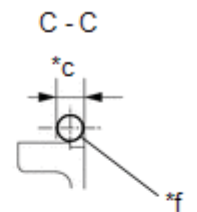
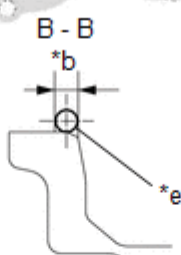
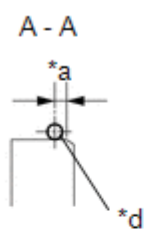
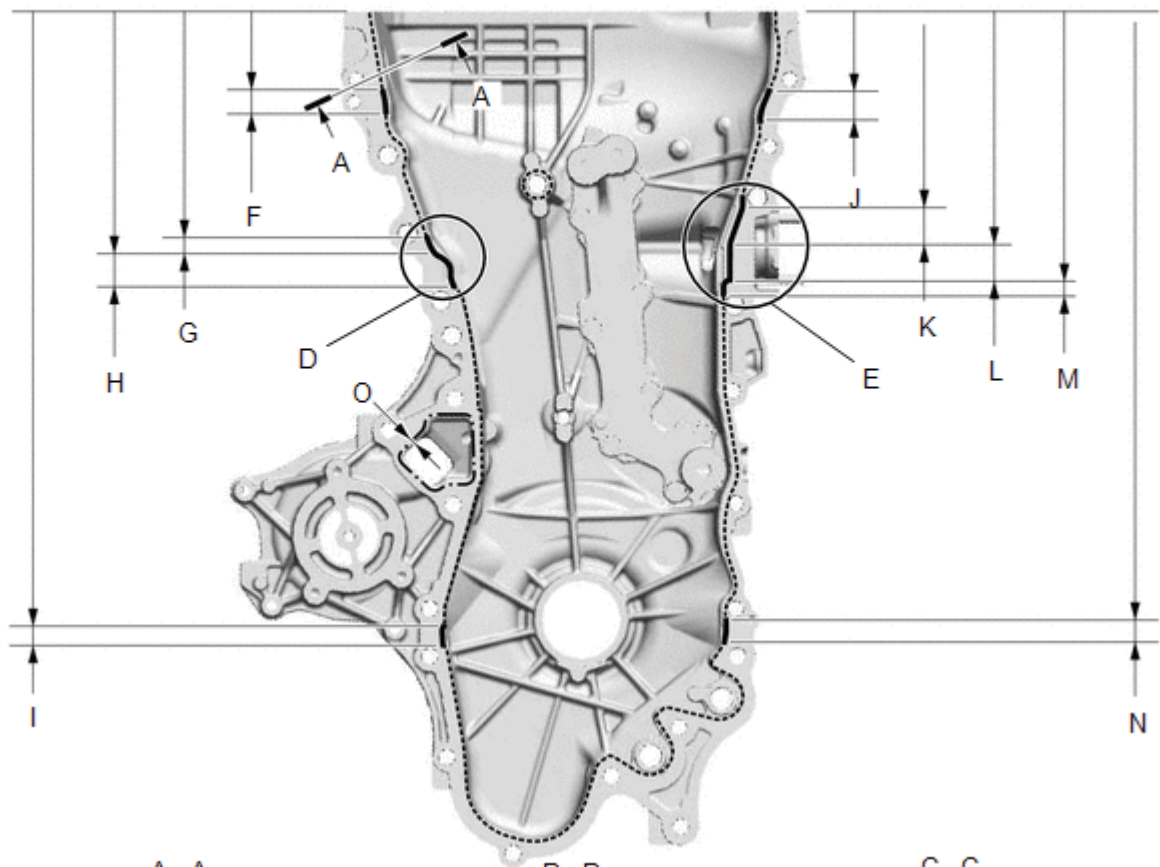
5.0 mm (0.197 in.)

**NOTICE:**

Install the timing chain cover sub-assembly within 3 minutes and tighten the bolts within 10 minutes of applying seal packing.



(i) Apply seal packing to the timing chain cover sub-assembly in a continuous line as shown in the illustration.



c

*a	2.5 mm	*b	5.0 mm
*c	7.5 mm	*d	2.5 to 3.5 mm
*e	4.5 to 5.5 mm	*f	7.0 to 8.0 mm

Seal Packing:

ITEM	SEAL PACKING
Dashed line	Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Continuous line	
Alternate long and short dashed line	Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent

Application Specification:

AREA	SEAL PACKING DIAMETER	DISTANCE FROM EDGE OF COVER TO:	SEAL PACKING APPLICATION LENGTH	DISTANCE FROM TOP OF COVER TO TOP OF SEAL PACKING
Dashed line	2.5 to 3.5 mm (0.0984 to 0.138 in.)	Center of seal packing 2.5 mm (0.0984 in.)	-	-
Continuous line	4.5 to 5.5 mm (0.177 to 0.217 in.) or 7.0 to 8.0 mm (0.276 to 0.315 in.)	-	-	-
Alternate long and short dashed line	4.0 mm (0.157 in.)	Center of seal packing 3.0 mm (0.118 in.)	-	-
(A) - (A)	2.5 to 3.5 mm (0.0984 to 0.138 in.)	Center of seal packing 2.5 mm (0.0984 in.)	-	-
(B) - (B)	4.5 to 5.5 mm (0.177 to 0.217 in.)	Opposite edge of seal packing 5.0 mm (0.197 in.)	-	-
(C) - (C)	7.0 to 8.0 mm (0.276 to 0.315 in.)	Opposite edge of seal packing 7.5 mm (0.295 in.)	-	-
(F)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	15.5 mm (0.610 in.)	50.4 mm (1.98 in.)
(G)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	10.3 mm (0.406 in.)	143.1 mm (5.63 in.)
(H)	7.0 to 8.0 mm (0.276 to 0.315 in.)	-	19.5 mm (0.768 in.)	153.4 mm (6.04 in.)
(I)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	16.0 mm (0.630 in.)	385.8 mm (1.27 ft.)
(J)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	18.6 mm (0.732 in.)	51.4 mm (2.02 in.)
(K)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	25.3 mm (0.996 in.)	121.9 mm (4.80 in.)
			25.8 mm (1.02 in.)	

(L)	7.0 to 8.0 mm (0.276 to 0.315 in.)	-	in.)	147.2 mm (5.80 in.)
(M)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	5.1 mm (0.201 in.)	173.0 mm (6.81 in.)
(N)	4.5 to 5.5 mm (0.177 to 0.217 in.)	-	14.6 mm (0.575 in.)	385.8 mm (1.27 ft.)
(O)	4.0 mm (0.157 in.)	Center of seal packing 3.0 mm (0.118 in.)	-	-

**NOTICE:**

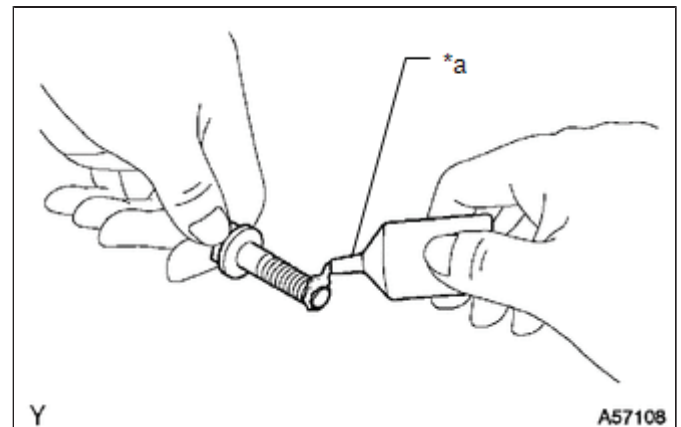
Install the timing chain cover sub-assembly within 3 minutes and tighten the bolts within 10 minutes of applying seal packing.

(j) Clean the bolts and their installation holes.

(k) Apply adhesive to 5 and a half threads or more of the end of the 2 bolts (E).

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



*a	Adhesive
----	----------

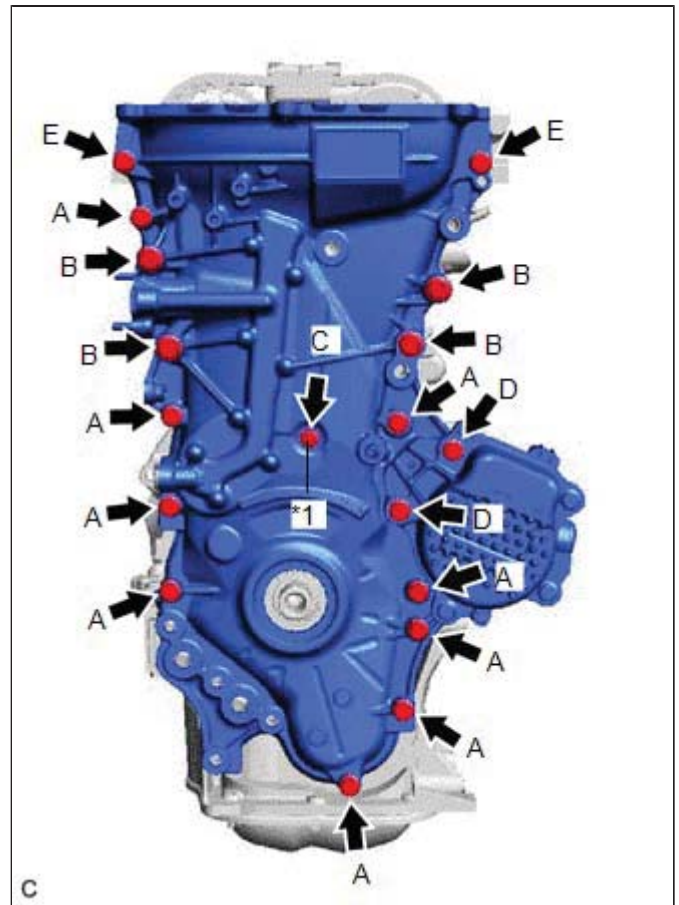
(l) Temporarily install the timing chain cover sub-assembly with the 18 bolts and a new seal washer.

Bolt Length:

ITEM	LENGTH
Bolt (A), (E)	35 mm (1.38 in.)
Bolt (B), (D)	55 mm (2.17 in.)
Bolt (C)	40 mm (1.57 in.)


**NOTICE:**

Make sure that there is no oil on the threads of the bolts.



*1	Seal Washer
----	-------------

(m) Temporarily install the engine mounting bracket RH to the timing chain cover sub-assembly with the 3 bolts.

Bolt Length:

ITEM	LENGTH
Bolt	80 mm (3.15 in.)

**NOTICE:**

Make sure that there is no oil on the threads of the bolts.

(n) Install 2 new oil filter bracket O-rings to the timing chain cover sub-assembly.

(o) Temporarily install the oil filter bracket to the timing chain cover sub-assembly with the 4 bolts.

Bolt Length:

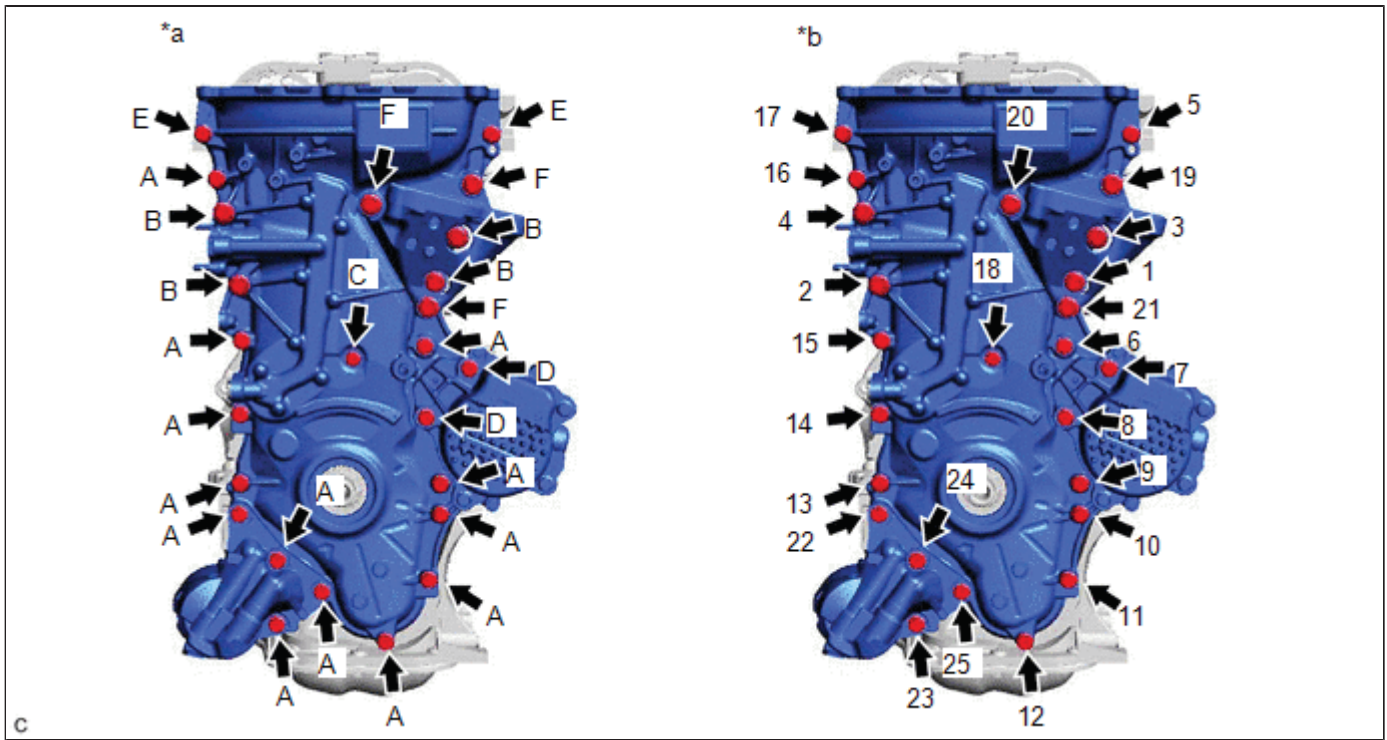
ITEM	LENGTH
Bolt	35 mm (1.38 in.)

**NOTICE:**

Make sure that there is no oil on the threads of the bolts.

(p) Fully tighten the 25 bolts in the order shown in the illustration.





*a	Torque	*b	Bolt Tightening Order
----	--------	----	-----------------------

**Torque:**

**Bolt (A), (D), (E) :**

25.5 N·m { 260 kgf·cm, 19 ft·lbf }

**Bolt (B), (F) :**

51 N·m { 520 kgf·cm, 38 ft·lbf }

**Bolt (C) :**

10 N·m { 102 kgf·cm, 7 ft·lbf }

**NOTICE:**

- Tighten the bolts within 10 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installation.
- Do not start the engine for at least 2 hours after installation.

**34. INSTALL TIMING CHAIN COVER OIL SEAL**

Click here [INFO](#)

**35. INSTALL WATER INLET WITH THERMOSTAT SUB-ASSEMBLY**

Click here [INFO](#)

**36. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY**

Click here [INFO](#)

**37. INSTALL KNOCK CONTROL SENSOR**

Click here [INFO](#)

**38. INSTALL NO. 1 TAPER SCREW PLUG**

(a) Type A:

(1) Apply adhesive to 2 or 3 threads of the No. 1 taper screw plug, and install the No. 1 taper screw plug (A).

**Torque:**

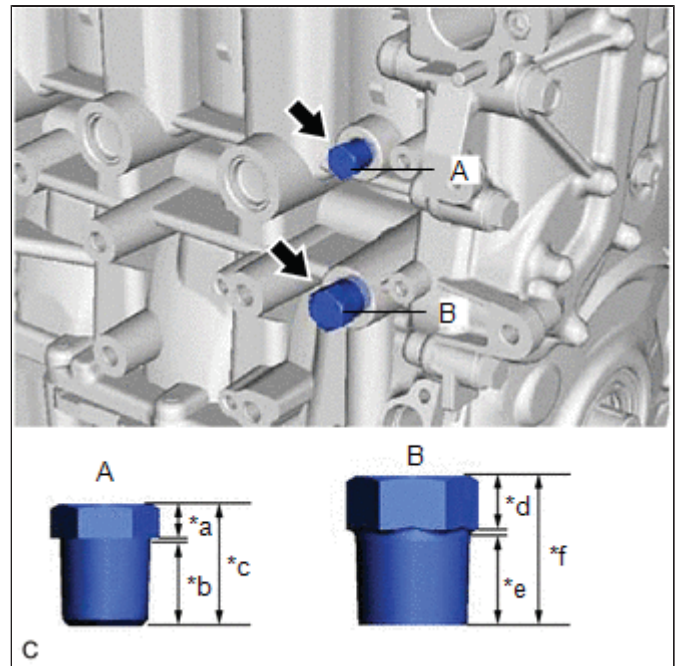
**25 N·m { 255 kgf·cm, 18 ft·lbf }**

Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

**NOTICE:**

- Install the No. 1 taper screw plug within 3 minutes of applying adhesive.
- Do not start the engine for at least 1 hour after installing the No. 1 taper screw plug.



*a	5.0 mm (0.197 in.)
*b	11 mm (0.433 in.)
*c	18 mm (0.709 in.)
*d	8.0 mm (0.315 in.)
*e	12.5 mm (0.492 in.)
*f	22 mm (0.866 in.)

(2) Apply adhesive to 2 or 3 threads of the No. 1 taper screw plug, and install the No. 1 taper screw plug (B).

**Torque:**

**43 N·m { 438 kgf·cm, 32 ft·lbf }**

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

**NOTICE:**

- Install the No. 1 taper screw plug within 3 minutes of applying adhesive.
- Do not start the engine for at least 1 hour after installing the No. 1 taper screw plug.

(b) Type B:

(1) Apply adhesive to 2 or 3 threads of the No. 1 taper screw plug, and install the No. 1 taper screw plug.

**Torque:**

**43 N·m { 438 kgf·cm, 32 ft·lbf }**

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

**NOTICE:**

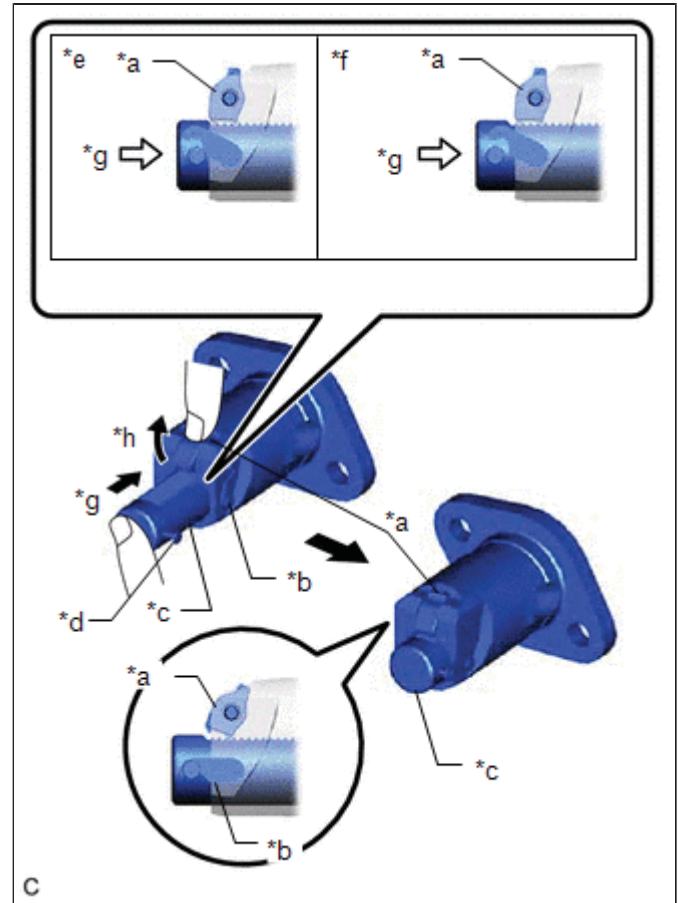
- Install the No. 1 taper screw plug within 3 minutes of applying adhesive.
- Do not start the engine for at least 1 hour after installing the No. 1 taper screw plug.

**39. INSTALL CRANKSHAFT POSITION SENSOR**

Click here [MFC](#)

**40. INSTALL CRANKSHAFT PULLEY**

### 41. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY



(a) Raise the cam, then fully push in the plunger and engage the hook with the pin so that the plunger is in the position shown in the illustration.

**NOTICE:**

Make sure that the cam engages with the first tooth of the plunger to allow the hook to pass over the pin.

*a	Cam
*b	Hook
*c	Plunger
*d	Pin
*e	Correct
*f	Incorrect
*g	Push
*h	Raise

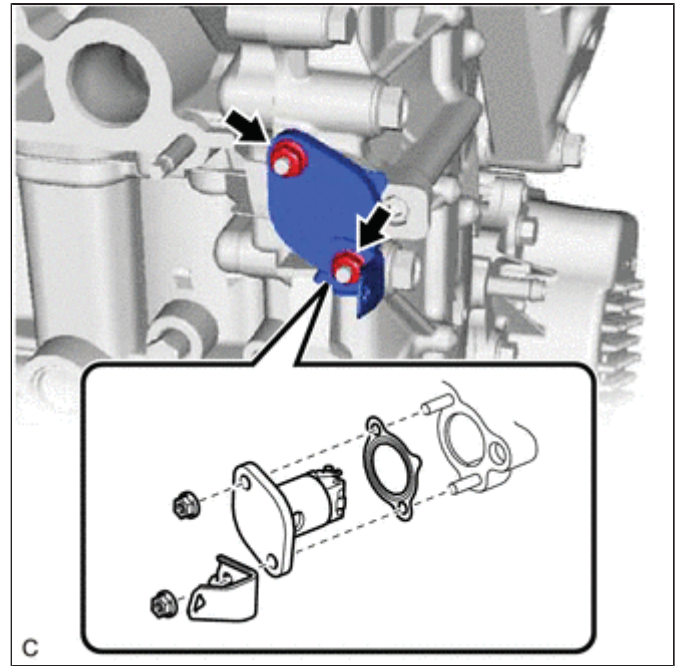
(b) Install a new gasket, the bracket and No. 1 chain tensioner assembly to the timing chain cover sub-assembly with the 2 nuts.

**Torque:**

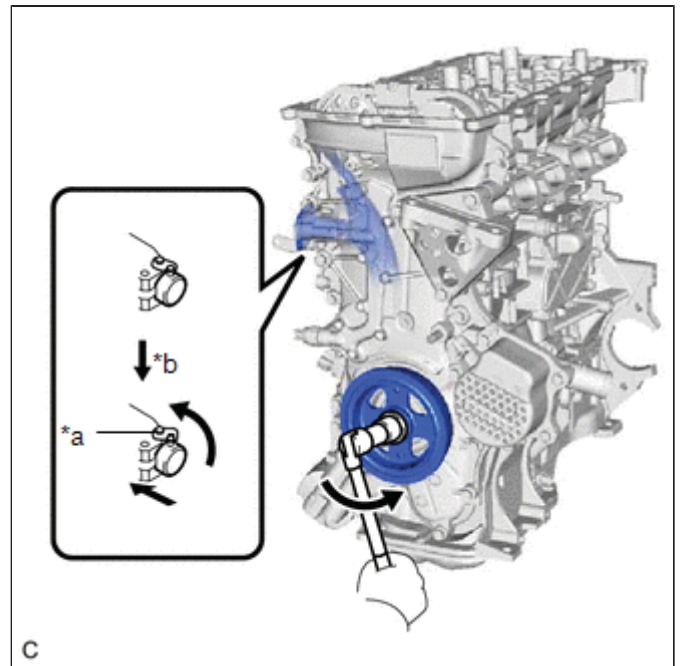
12 N·m { 122 kgf·cm, 9 ft·lbf }

**NOTICE:**

If the hook releases the plunger while the No. 1 chain tensioner assembly is being installed, set the hook again.

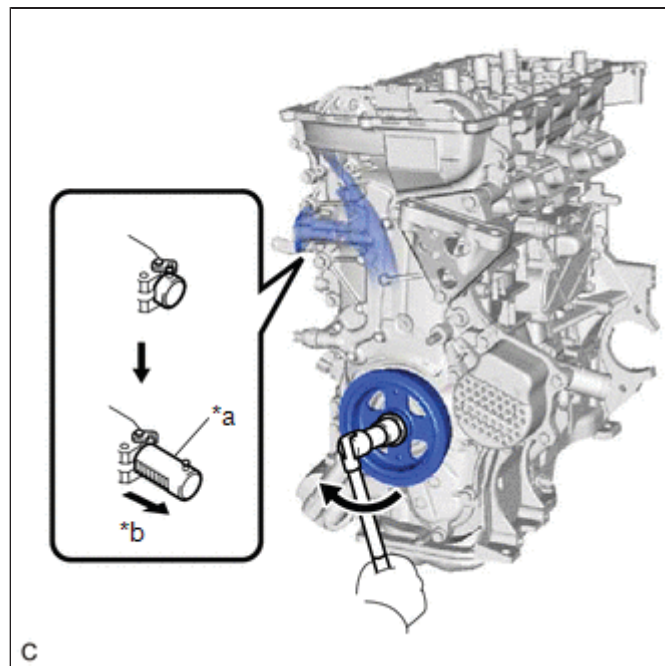


(c) Rotate the crankshaft counterclockwise slightly and check that the hook is released.



*a	Hook
*b	Release

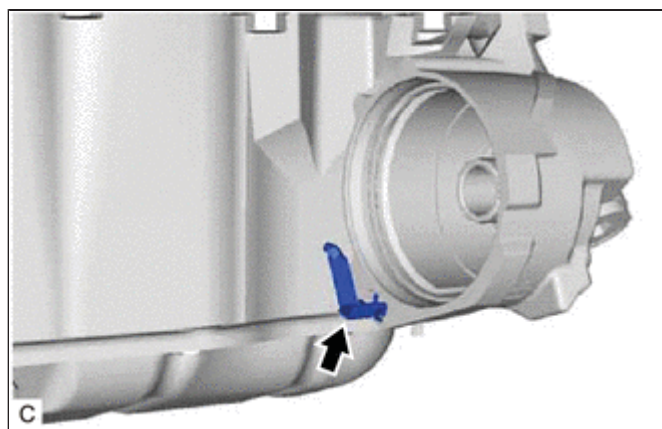
(d) Turn the crankshaft clockwise and check that the plunger is extended.



*a	Plunger
*b	Plunger is extended

#### 42. INSTALL OIL FILTER BRACKET CLIP

(a) Install the oil filter bracket clip to the oil filter bracket.



#### 43. INSTALL OIL FILTER

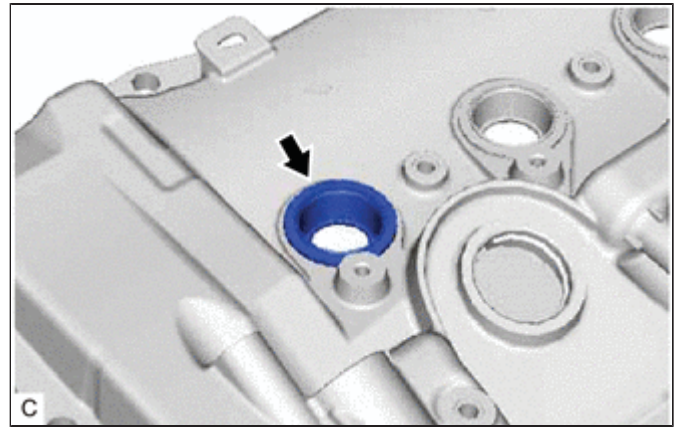
Click here [INFO](#) [INFO](#)

#### 44. INSTALL SPARK PLUG TUBE GASKET

(a) Install 4 new spark plug tube gaskets to the cylinder head



cover sub-assembly.

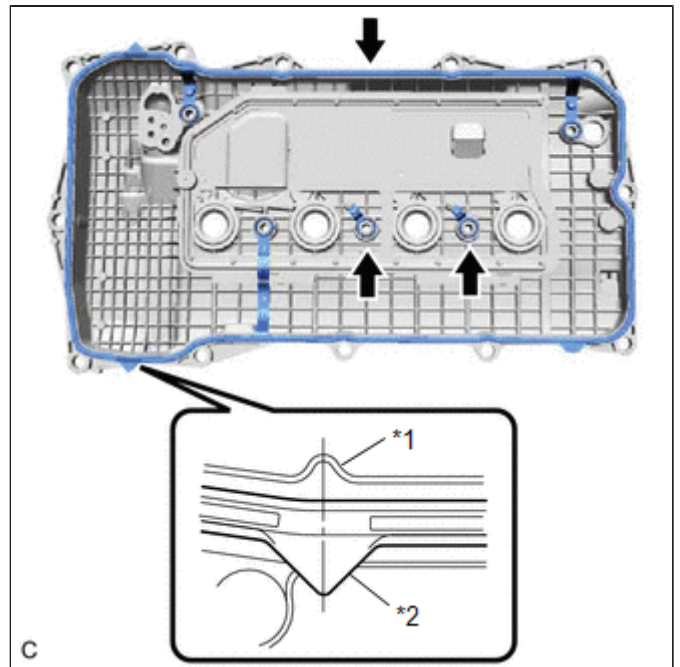


#### 45. INSTALL CYLINDER HEAD COVER GASKET

(a) Install 3 new cylinder head cover gaskets to the cylinder head cover sub-assembly.

**NOTICE:**

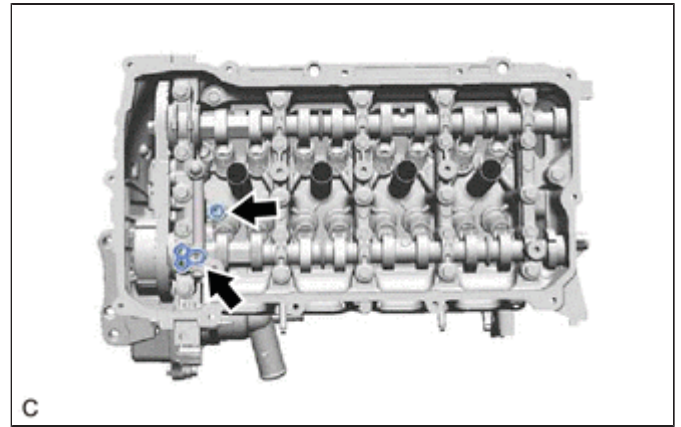
- Remove any oil from the contact surfaces.
- Misalignment between the center of the cylinder head cover sub-assembly rib and the center of the cylinder head gasket tab should be 4.0 mm (0.157 in.) or less.



*1	Cylinder Head Cover Sub-assembly
*2	Cylinder Head Cover Gasket

#### 46. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Install 2 new gaskets as shown in the illustration.



(b) Apply seal packing as shown in the illustration.

Seal Packing:

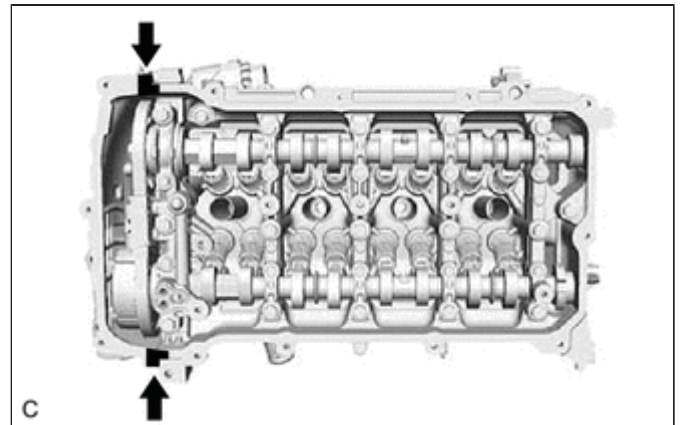
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Standard Diameter:

4.0 mm (0.157 in.)

**NOTICE:**

- Remove any oil from the contact surfaces.
- Install the cylinder head cover sub-assembly within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installation.



(c) Apply a light coat of engine oil to the O-ring of the camshaft position sensor.

**NOTICE:**

If reusing a camshaft position sensor, check the O-ring.

(d) for Bolt with Adhesive:

(1) Temporarily install the camshaft position sensor to the cylinder head cover sub-assembly with a new bolt.

**NOTICE:**

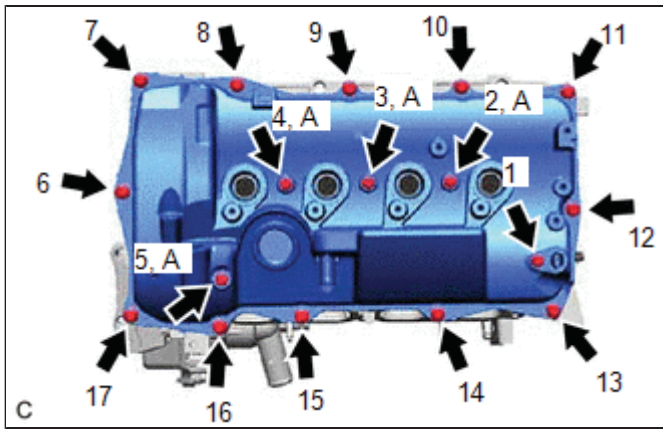
- Make sure that the O-ring is not cracked or moved out of place when installing the camshaft position sensor.
- If a camshaft position sensor has been struck or dropped, replace it.

(2) Install the cylinder head cover sub-assembly with the 4 bolts (A) and 13 bolts in the order shown in the illustration.

**Torque:**

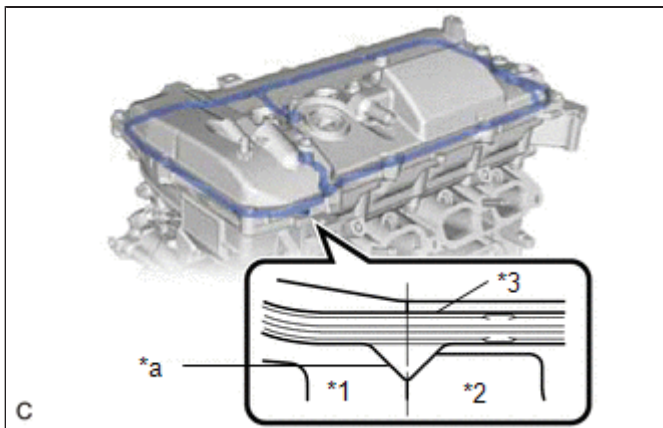
**10 N·m {102 kgf·cm, 7 ft·lbf}**





**NOTICE:**

Misalignment between the contact surfaces of the timing chain cover sub-assembly and camshaft housing sub-assembly and the center of the cylinder head cover gasket tab should be 4.0 mm (0.157 in.) or less.



*1	Timing Chain Cover Sub-assembly
*2	Camshaft Housing Sub-assembly
*3	Cylinder Head Cover Gasket
*a	Projection

(e) except Bolt with Adhesive:

(1) Temporarily install the camshaft position sensor to the cylinder head cover sub-assembly with the bolt.

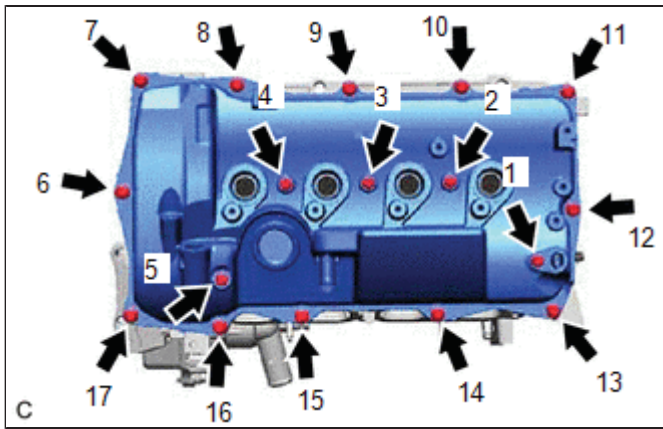
**NOTICE:**

- Make sure that the O-ring is not cracked or moved out of place when installing the camshaft position sensor.
- If a camshaft position sensor has been struck or dropped, replace it.

(2) Install the cylinder head cover sub-assembly with the 17 bolts in the order shown in the illustration.

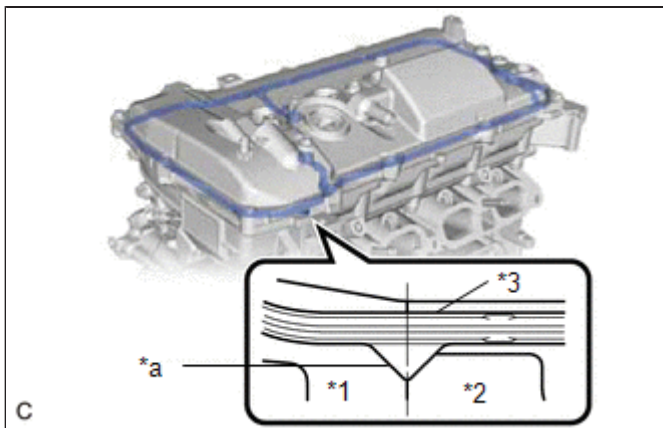
**Torque:**

**10 N·m {102 kgf·cm, 7 ft·lbf}**



**NOTICE:**

Misalignment between the contact surfaces of the timing chain cover sub-assembly and camshaft housing sub-assembly and the center of the cylinder head cover gasket tab should be 4.0 mm (0.157 in.) or less.



*1	Timing Chain Cover Sub-assembly
*2	Camshaft Housing Sub-assembly
*3	Cylinder Head Cover Gasket
*a	Projection

**47. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

Click here [INFO](#)

**48. INSTALL CAMSHAFT POSITION SENSOR**

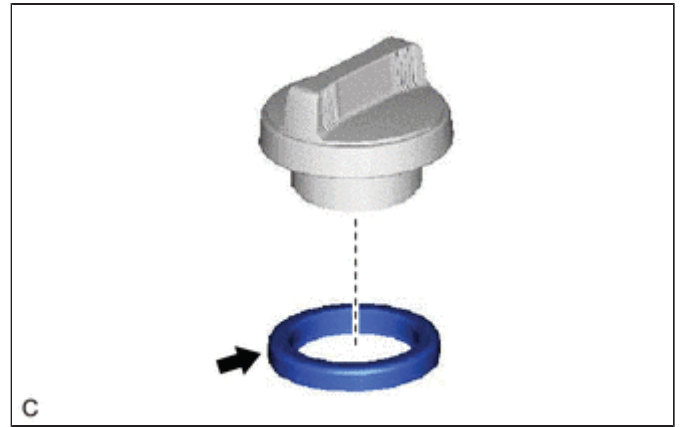
Click here [INFO](#)

**49. INSTALL SPARK PLUG**

Click here [INFO](#)

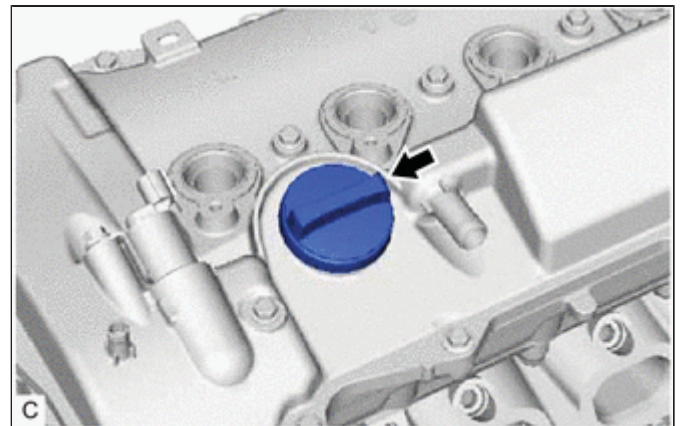
**50. INSTALL OIL FILLER CAP GASKET**

(a) Install the oil filler cap gasket to the oil filler cap sub-assembly.



## 51. INSTALL OIL FILLER CAP SUB-ASSEMBLY

(a) Install the oil filler cap sub-assembly to the cylinder head cover sub-assembly.



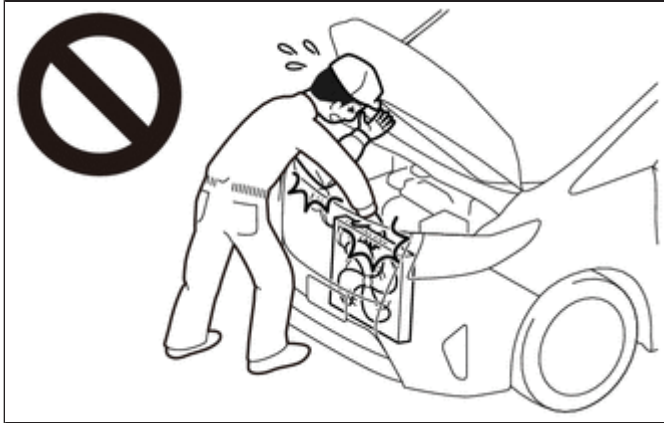
Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000RH3K
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - 08/2016]
Title: 2ZR-FXE (ENGINE MECHANICAL): ENGINE: ON-VEHICLE INSPECTION; 2016 MY Prius [11/2015 - 08/2016]		

## ON-VEHICLE INSPECTION

### CAUTION / NOTICE / HINT

#### **CAUTION:**

To prevent injury due to contact with an operating cooling fan, keep your hands and clothing away from the cooling fans when working in the engine compartment with the engine running or the power switch on (IG).



## PROCEDURE

### **1. INSPECT ENGINE COOLANT (for Engine)**

Click here [INFO](#)

### **2. INSPECT ENGINE OIL**

Click here [INFO](#)

### **3. CHECK AUXILIARY BATTERY**

Click here [INFO](#)

### **4. INSPECT SPARK PLUG**

Click here [INFO](#)

### **5. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**

- (a) Remove the air cleaner filter element sub-assembly.
- (b) Visually check that the air cleaner filter element sub-assembly is not damaged or excessively oily. If necessary, replace the air cleaner filter element sub-assembly.

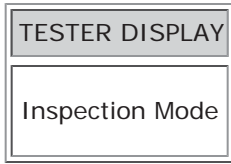
#### **HINT:**

- If there is any dirt or clogs in the air cleaner filter element sub-assembly, clean it with compressed air.
  - If any dirt or clogs remain even after cleaning the air cleaner filter element sub-assembly with compressed air, replace it.
- (c) Install the air cleaner filter element sub-assembly.

## 6. INSPECT VALVE LASH ADJUSTER ASSEMBLY NOISE

(a) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**



(b) Rev up the engine several times. Check that the engine does not emit unusual noises.

(c) If unusual noises occur, warm up the engine and idle it for 30 minutes or more, then perform the inspection.

### HINT:

If any defects or problems are found during the inspection, perform valve lash adjuster assembly inspection.

Click here [INFO](#)

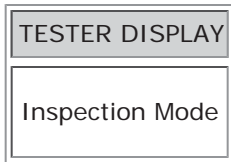
## 7. INSPECT IGNITION TIMING

### NOTICE:

- Check the ignition timing with the cooling fans off.
- Turn off all electrical systems and the A/C.
- When checking the ignition timing, the transaxle should be in park.

(a) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**

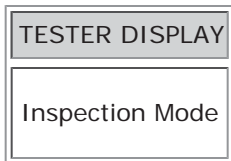


(b) Warm up and stop the engine.

(c) Connect the Techstream to the DLC3.

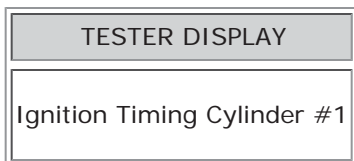
(d) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**



(e) Enter the following menus: Powertrain / Engine / Data List / Ignition Timing Cylinder #1.

**Powertrain > Engine > Data List**



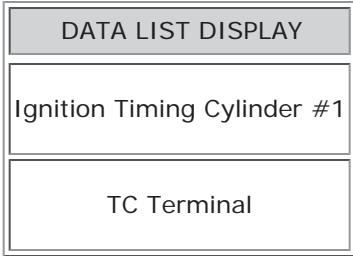
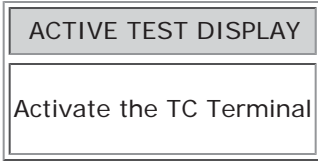
Standard Ignition Timing:

8 to 24° BTDC at idle

(f) Check that the ignition timing advances immediately when the engine speed is increased.

(g) Enter the following menus: Powertrain / Engine / Active Test / Activate the TC Terminal / ON.

**Powertrain > Engine > Active Test**



(h) Monitor Ignition Timing Cylinder #1 of the Data List.

Standard Ignition Timing:

8 to 12° BTDC at idle

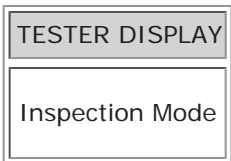
## 8. INSPECT ENGINE IDLE SPEED

### NOTICE:

- Check the engine idle speed with the cooling fans off.
- Turn off all electrical systems and the A/C.
- When checking the engine idle speed, the transaxle should be in park.

(a) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**



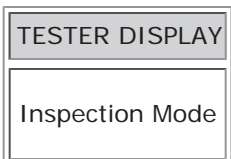
(b) Warm up and stop the engine.

(c) When using the Techstream:

(1) Connect the Techstream to the DLC3.

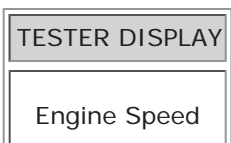
(2) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**



(3) Enter the following menus: Powertrain / Engine / Data List / Engine Speed.

**Powertrain > Engine > Data List**



(4) Read the value displayed on the Techstream.

Standard Idle Speed:  
950 to 1050 rpm

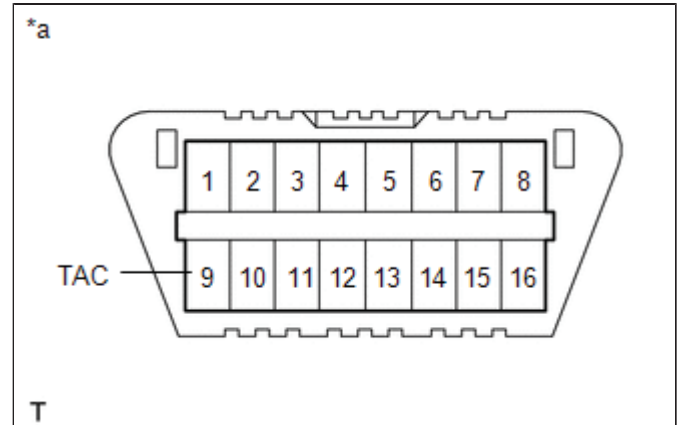
(d) When not using the Techstream:

(1) Using SST, connect a tachometer probe to terminal 9 (TAC) of the DLC3.

**SST: 09843-18030**

**NOTICE:**

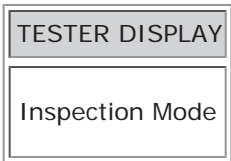
Be sure to connect the tachometer probe to the correct terminal. Connecting to the wrong terminal may result in damage to electrical components.



*a	DLC3
----	------

(2) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**



(3) Inspect the engine idle speed.

Standard Idle Speed:

CONDITION	SPECIFIED CONDITION
Idling	950 to 1050 rpm

(4) Disconnect the tachometer probe from terminal 9 (TAC) of the DLC3.

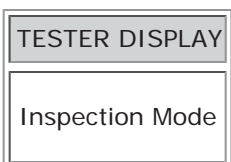
## 9. INSPECT COMPRESSION

**NOTICE:**

Keep the spark plug holes free of foreign matter when measuring the compression pressure.

(a) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**





- (b) Warm up and stop the engine.
- (c) Check for DTCs.

**HINT:**

[Click here](#) 

- (d) Remove the 4 spark plugs.

**NOTICE:**

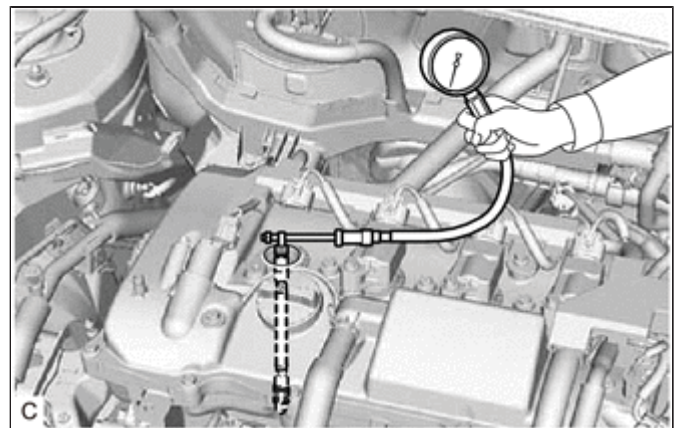
DTCs will be stored if the inspection is performed with the ignition coil assembly connectors disconnected. Make sure that the ignition coil assembly connectors are connected during the inspection.

**HINT:**

[Click here](#) 

- (e) Check the cylinder compression pressure.

- (1) Insert a compression gauge into the spark plug hole.



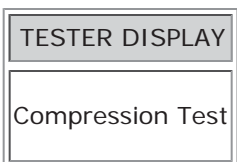
- (2) Connect the Techstream to the DLC3.
- (3) Turn the power switch on (IG).
- (4) Turn the Techstream on.

**NOTICE:**

Check the HV battery voltage in the Data List to ensure that the battery is fully charged.

- (5) Enter the following menus: Powertrain / Hybrid Control / Active Test / Compression Test / ON.

**Powertrain > Hybrid Control > Active Test**



- (6) Depress and hold the brake pedal, and turn the power switch on (READY). Then check the compression pressure.

Standard Compression Pressure:

ITEM	MINIMUM COMPRESSION PRESSURE	SPECIFIED CONDITION
Cylinder 1	617 kPa	813 kPa
Cylinder 1	6.3 kgf/cm <sup>2</sup>	8.3 kgf/cm <sup>2</sup>

Cylinder 1	89.5 psi	118 psi
Cylinder 2	617 kPa	813 kPa
Cylinder 2	6.3 kgf/cm <sup>2</sup>	8.3 kgf/cm <sup>2</sup>
Cylinder 2	89.5 psi	118 psi
Cylinder 3	617 kPa	813 kPa
Cylinder 3	6.3 kgf/cm <sup>2</sup>	8.3 kgf/cm <sup>2</sup>
Cylinder 3	89.5 psi	118 psi
Cylinder 4	617 kPa	813 kPa
Cylinder 4	6.3 kgf/cm <sup>2</sup>	8.3 kgf/cm <sup>2</sup>
Cylinder 4	89.5 psi	118 psi
Pressure Difference between Each Cylinder	-	100 kPa or less
Pressure Difference between Each Cylinder	-	1.0 kgf/cm <sup>2</sup> or less
Pressure Difference between Each Cylinder	-	15 psi or less

#### NOTICE:

- Inspect all cylinders in the same way.
- Measure the compression pressure as quickly as possible.
- Noise may be emitted from the hybrid vehicle transaxle assembly. However, this is not a malfunction.

(7) If the cylinder compression pressure is low, pour a small amount of engine oil into the cylinder through the spark plug hole inspect it again.

#### HINT:

- If adding oil increases the compression pressure, the piston rings and/or cylinder bore may be worn or damaged.
- If the compression pressure stays low, a valve may be stuck or seated improperly, or there may be leaks in the cylinder head gasket.

(f) Install the 4 spark plugs.

#### HINT:

[Click here](#) 

(g) Clear the DTCs.

#### NOTICE:

After performing the inspection, clear the DTCs and confirm that DTCs are not stored again or that the normal system code is output if using a check wire.

#### HINT:

[Click here](#) 

## 10. INSPECT CO/HC

#### HINT:

This check determines whether or not the idle CO/HC complies with regulations.

(a) Put the engine in inspection mode.

**Powertrain > Hybrid Control > Utility**



- (b) Run the engine at 2500 rpm for approximately 180 seconds.
- (c) Insert a CO/HC meter testing probe at least 40 cm (1.31 ft.) into the tailpipe during idle.
- (d) Immediately check the CO/HC concentration at idle and then at an engine speed of 2500 rpm.

- HINT:**
- When performing a 2 mode test (with the engine idling/running at 2500 rpm), the measurement procedures are determined by applicable local regulations.
  - If the CO/HC concentration does not comply with the regulations, perform troubleshooting in the order given below.
- (1) Check for DTCs.

**HINT:**  
[Click here](#) 

(2) See the following table for possible causes, then inspect the applicable parts and repair them if necessary.

CO	HC	PROBLEM	CAUSE
Normal	High	Rough idle	<ol style="list-style-type: none"> <li>1. Faulty ignition:                             <ul style="list-style-type: none"> <li>◦ Incorrect valve timing</li> <li>◦ Fouled, shorted or improperly gapped spark plugs</li> </ul> </li> <li>2. Incorrect valve clearance (valve lash adjuster assembly)</li> <li>3. Leaks in intake or exhaust valves</li> <li>4. Leaks in cylinders</li> <li>5. Faulty EGR</li> </ol>
Low	High	Rough idle (Fluctuating HC reading)	<ol style="list-style-type: none"> <li>1. Vacuum leaks:                             <ul style="list-style-type: none"> <li>◦ PCV hoses</li> <li>◦ Intake manifold</li> <li>◦ Throttle with motor body assembly</li> </ul> </li> <li>2. Lean mixture causing misfire</li> <li>3. Faulty EGR</li> </ol>
High	High	Rough idle (Black smoke from exhaust)	<ol style="list-style-type: none"> <li>1. Restricted air cleaner filter element sub-assembly</li> <li>2. Plugged PCV valve</li> <li>3. Faulty SFI systems:                             <ul style="list-style-type: none"> <li>◦ Fuel pressure regulator assembly</li> <li>◦ Engine coolant temperature sensor</li> <li>◦ Mass air flow meter sub-assembly</li> <li>◦ ECM</li> <li>◦ Fuel injector assemblies</li> <li>◦ Throttle position sensor (built into throttle with motor body assembly)</li> </ul> </li> <li>4. Faulty EGR</li> </ol>



Last Modified: 01-14-2019

6.8:8.0.48

Doc ID: RM100000000RH3M

Model Year Start: 2016

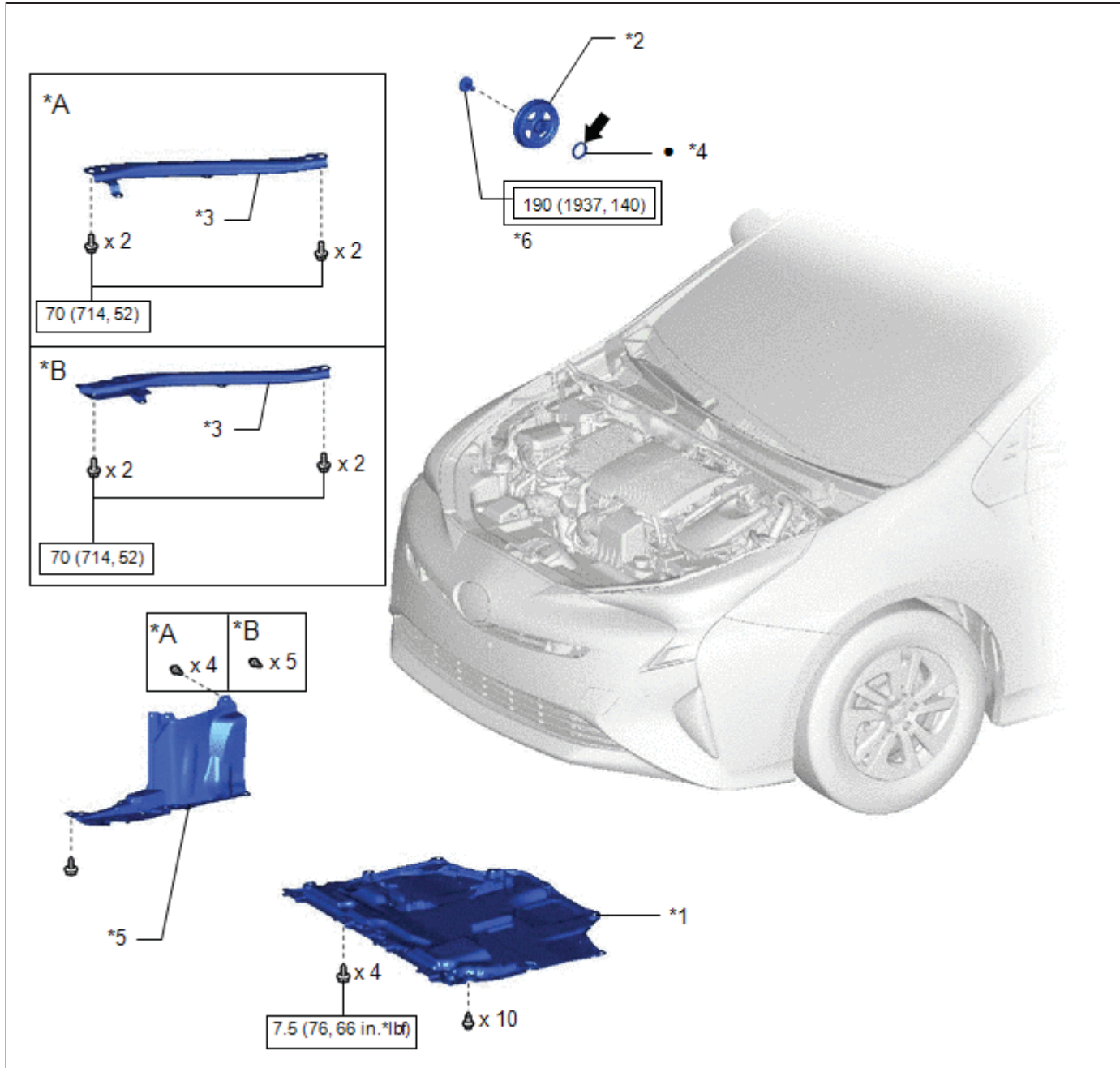
Model: Prius

Prod Date Range: [11/2015 - ]




Title: 2ZR-FXE (ENGINE MECHANICAL): FRONT CRANKSHAFT OIL SEAL: COMPONENTS; 2016 - 2019 MY Prius [11/2015 - ]

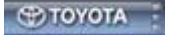
## COMPONENTS

## ILLUSTRATION



*A	except Rough Road Area Specification Vehicles	*B	for Rough Road Area Specification Vehicles
*1	NO. 1 ENGINE UNDER COVER	*2	CRANKSHAFT PULLEY
*3	REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH	*4	TIMING CHAIN COVER OIL SEAL

*5	REAR MOTOR UNDER COVER RH	*6	CRANKSHAFT PULLEY SET BOLT
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
<ul style="list-style-type: none"> <li data-bbox="142 325 159 346">•</li> </ul>	Non-reusable part		MP grease



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3L
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): FRONT CRANKSHAFT OIL SEAL: INSTALLATION; 2016 - 2019 MY Prius [11/2015 - ]		

## INSTALLATION

### PROCEDURE

#### 1. INSTALL TIMING CHAIN COVER OIL SEAL

(a) Apply MP grease to the lip of a new timing chain cover oil seal.

**NOTICE:**

Keep the lip free from foreign matter.

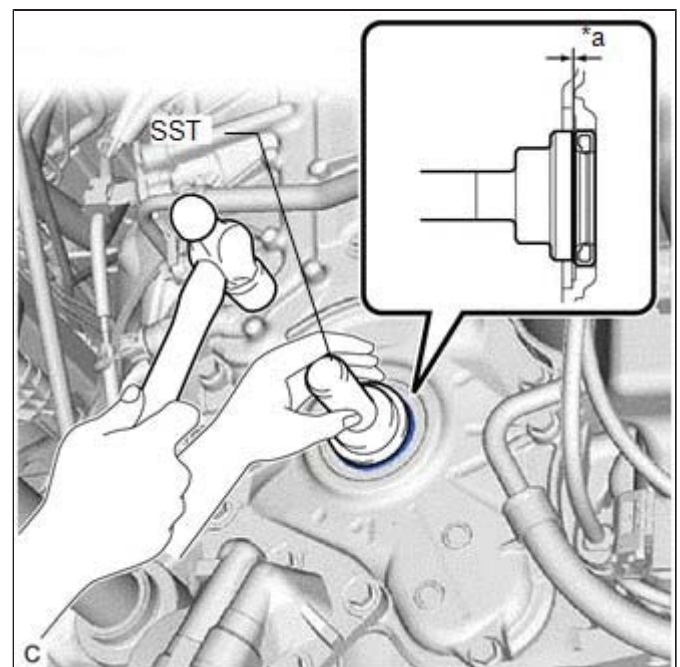
(b) Using SST and a hammer, tap in the timing chain cover oil seal until its surface is flush with the timing chain cover assembly edge.

**SST: 09223-22010**

Timing Chain Oil Seal Tap in Depth:  
-1.0 to 1.0 mm (-0.0394 to 0.0394 in.)

**NOTICE:**

- Keep the lip free from foreign matter.
- Do not tap in the timing chain cover oil seal at an angle.



*a	Tap in Depth
----	--------------

#### 2. INSTALL CRANKSHAFT PULLEY

(a) Align the crankshaft timing gear key with the crankshaft pulley set key groove of the crankshaft pulley.

(b) Using SST to hold the crankshaft pulley in place, tighten the crankshaft pulley set bolt.

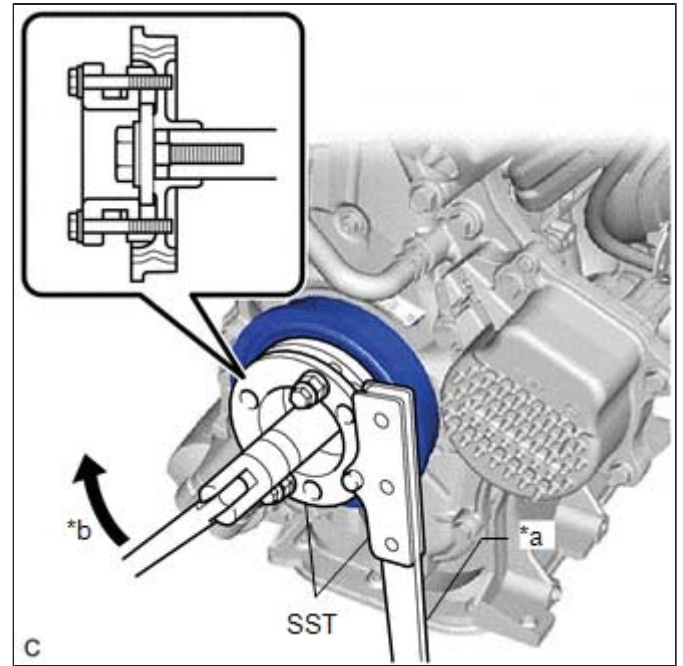
SST: 09213-58014

91551-80840

SST: 09330-00021

Torque:

190 N·m { 1937 kgf·cm, 140 ft·lbf }



*a	Hold
*b	Turn

### 3. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH

Click here [INFO](#) [INFO](#)

### 4. INSPECT FOR OIL LEAK

Click here [INFO](#) [INFO](#)

### 5. INSTALL REAR MOTOR UNDER COVER RH

Click here [INFO](#) [INFO](#) [INFO](#)

### 6. INSTALL NO. 1 ENGINE UNDER COVER

Click here [INFO](#) [INFO](#) [INFO](#)

### 7. INSTALL FRONT WHEEL RH

Click here [INFO](#) [INFO](#)





<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3N
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): FRONT CRANKSHAFT OIL SEAL: REMOVAL; 2016 - 2019 MY Prius [11/2015 - ]		

## REMOVAL

### PROCEDURE

#### 1. REMOVE FRONT WHEEL RH

Click here [INFO](#) [INFO](#)

#### 2. REMOVE NO. 1 ENGINE UNDER COVER

Click here [INFO](#) [INFO](#) [INFO](#)

#### 3. REMOVE REAR MOTOR UNDER COVER RH

Click here [INFO](#) [INFO](#) [INFO](#)

#### 4. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH

Click here [INFO](#) [INFO](#)

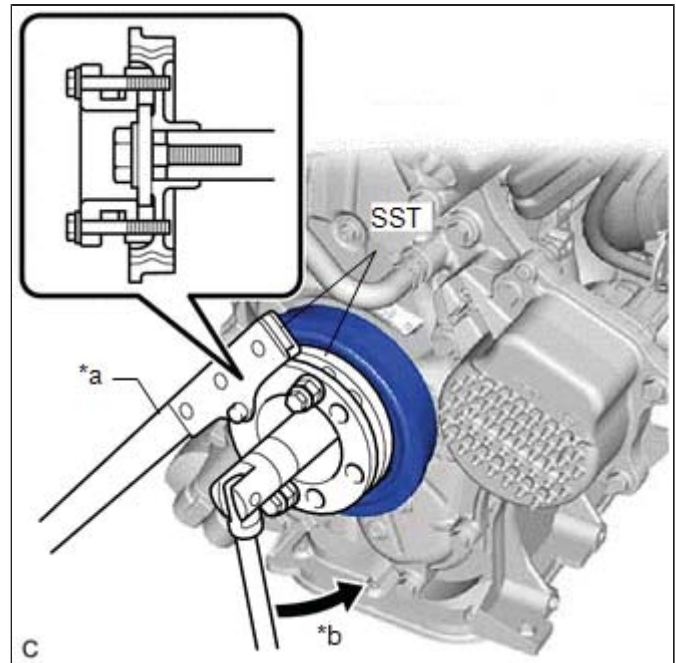
#### 5. REMOVE CRANKSHAFT PULLEY

(a) Using SST to hold the crankshaft pulley, loosen the crankshaft pulley set bolt. Further loosen the crankshaft pulley set bolt until 2 or 3 threads remain screwed into the crankshaft.

**SST: 09213-58014**

91551-80840

**SST: 09330-00021**



*a	Hold
*b	Turn

(b) Using SST and the crankshaft pulley set bolt, remove the crankshaft pulley and crankshaft pulley set bolt.

**SST: 09950-50013**

09951-05010

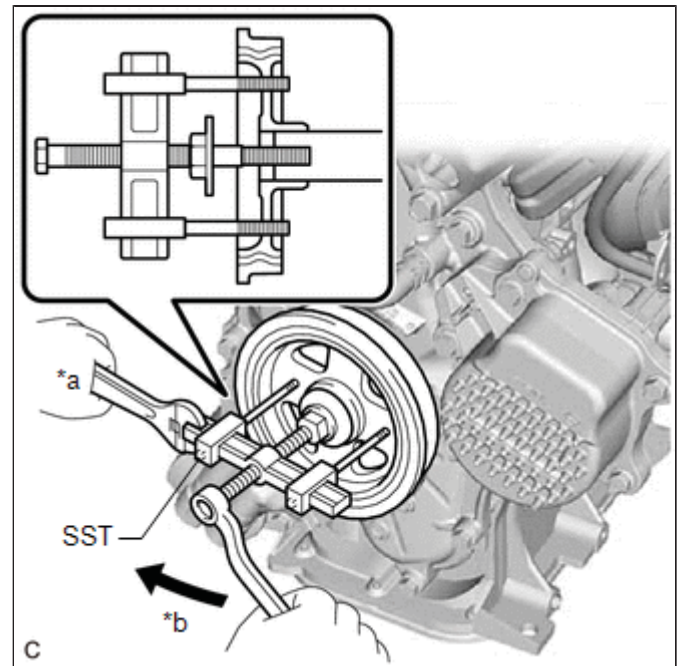
09952-05010

09953-05020

09954-05021

**HINT:**

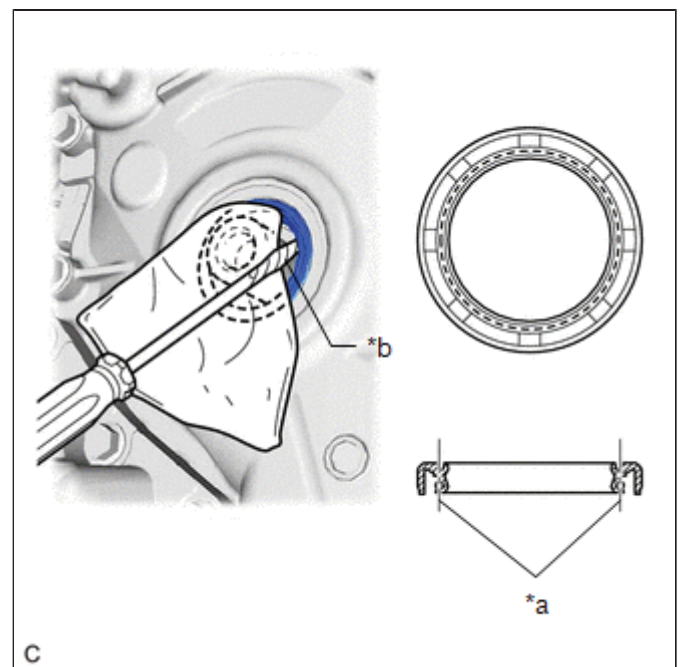
Apply lubricant to the threads and end of SST.



*a	Hold
*b	Turn

**6. REMOVE TIMING CHAIN COVER OIL SEAL**

(a) Using a knife, cut through the lip of the timing chain cover oil seal.



*a	Cut Position
*b	Protective Tape

(b) Using a screwdriver with its tip wrapped with protective tape, pry out the timing chain cover oil seal.

**NOTICE:**

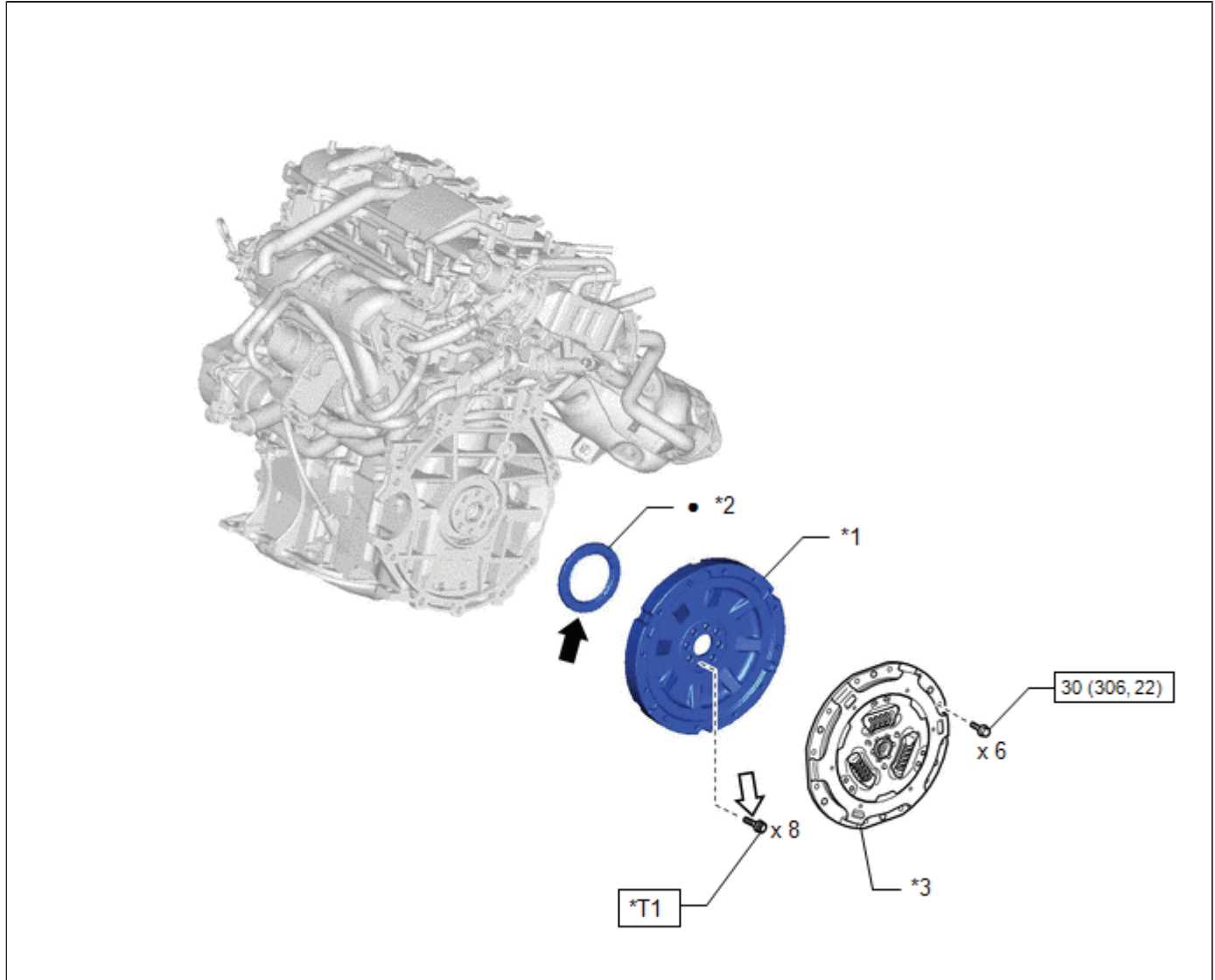
After removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.





Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000RH30
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - ]
Title: 2ZR-FXE (ENGINE MECHANICAL): REAR CRANKSHAFT OIL SEAL: COMPONENTS; 2016 - 2019 MY Prius [11/2015 - ]		

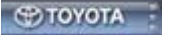
## COMPONENTS

## ILLUSTRATION



*1	FLYWHEEL SUB-ASSEMBLY	*2	REAR ENGINE OIL SEAL
*3	TRANSMISSION INPUT DAMPER ASSEMBLY	-	-
	N*m (kgf*cm, ft.*lbf): Specified torque	•	Non-reusable part

	MP grease		Adhesive 1324
	Precoated part	-	-
*T1	1st: 49 (500, 36) 2nd: Turn 90°	-	-



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3Q
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): REAR CRANKSHAFT OIL SEAL: INSTALLATION; 2016 - 2019 MY Prius [11/2015 - ]		

## INSTALLATION

### PROCEDURE

#### 1. INSTALL REAR ENGINE OIL SEAL

(a) Using height adjustment attachments and plate lift attachments, place the engine assembly on a flat level surface.

##### **NOTICE:**

- Using height adjustment attachments and plate lift attachments, keep the engine assembly horizontal.
- To prevent the oil pan sub-assembly from deforming, do not place any attachments under the oil pan sub-assembly of the engine assembly.
- Using an engine sling device and engine lift, secure the engine assembly before servicing.

(b) Apply MP grease to the lip of a new rear engine oil seal.

##### **NOTICE:**

Keep the lip free from foreign matter.

(c) Using SST and a hammer, tap in the rear engine oil seal.

**SST: 09223-15030**

**SST: 09950-70010**

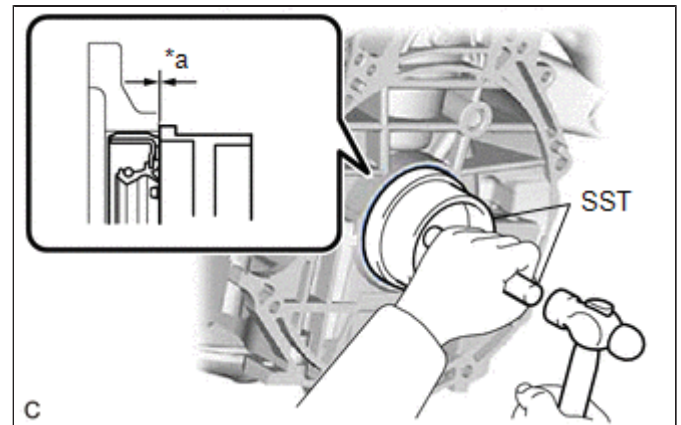
09951-07100

Rear Engine Oil Seal Tap in Depth:

-1.0 to 1.0 mm (-0.0394 to 0.0394 in.)

##### **NOTICE:**

- Keep the lip free from foreign matter.
- Do not tap in the rear engine oil seal at an angle.



*a	Tap in Depth
----	--------------

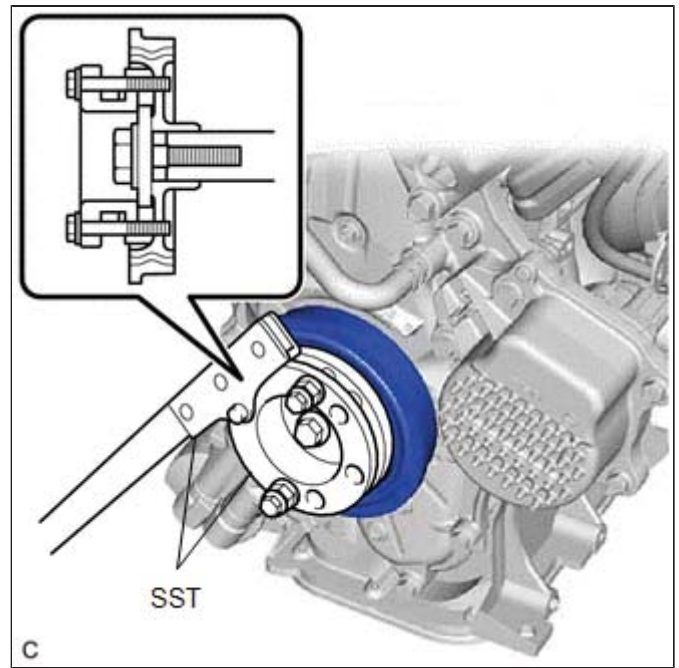
#### 2. INSTALL FLYWHEEL SUB-ASSEMBLY

(a) Using SST, hold the crankshaft pulley.

**SST: 09213-58014**

91551-80840

SST: 09330-00021

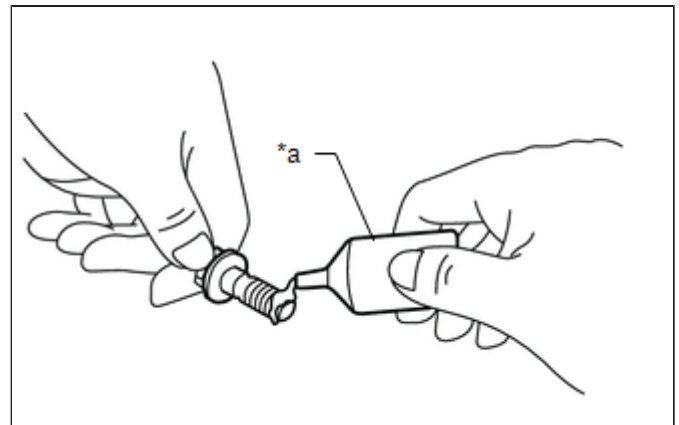


(b) Clean the 8 bolts and 8 bolt holes.

(c) Apply adhesive to 2 or 3 threads at the end of each of the 8 bolts.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



*a	Adhesive
----	----------

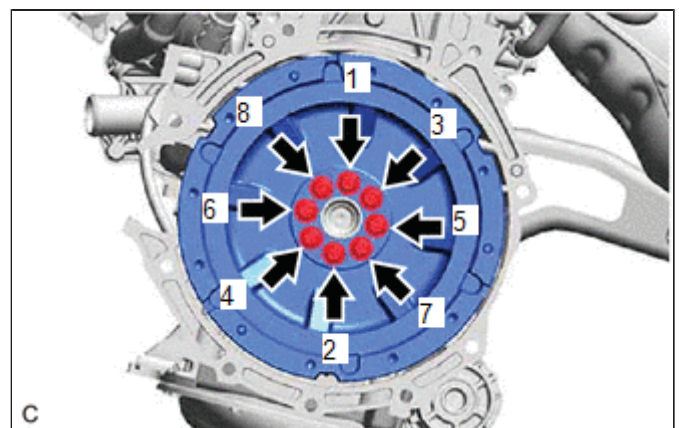
(d) Install and uniformly tighten the 8 bolts in several steps in the order shown in the illustration.

Torque:

49 N·m { 500 kgf·cm, 36 ft·lbf }

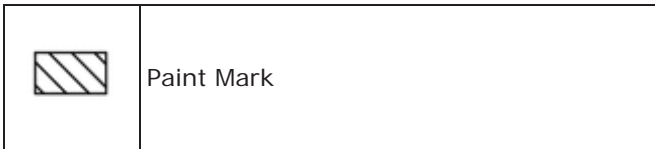
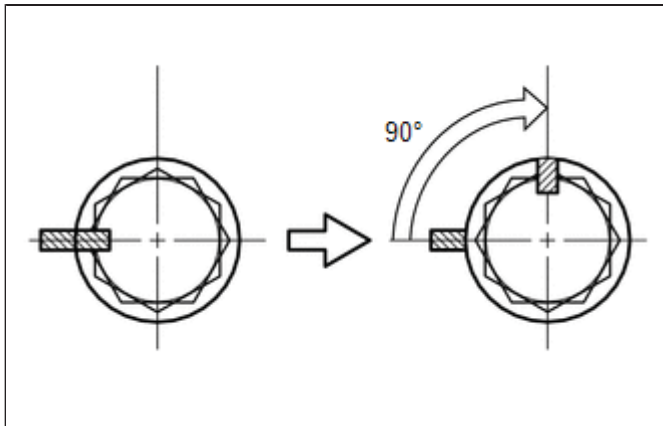
**NOTICE:**

Do not start the engine for at least 1 hour after installing the flywheel sub-assembly.





(e) Mark each bolt head with paint as shown in the illustration.



(f) Tighten the 8 bolts by 90° in the same order.

(g) Check that the paint marks are now at a 90° angle.

(h) Check that the crankshaft turns smoothly.

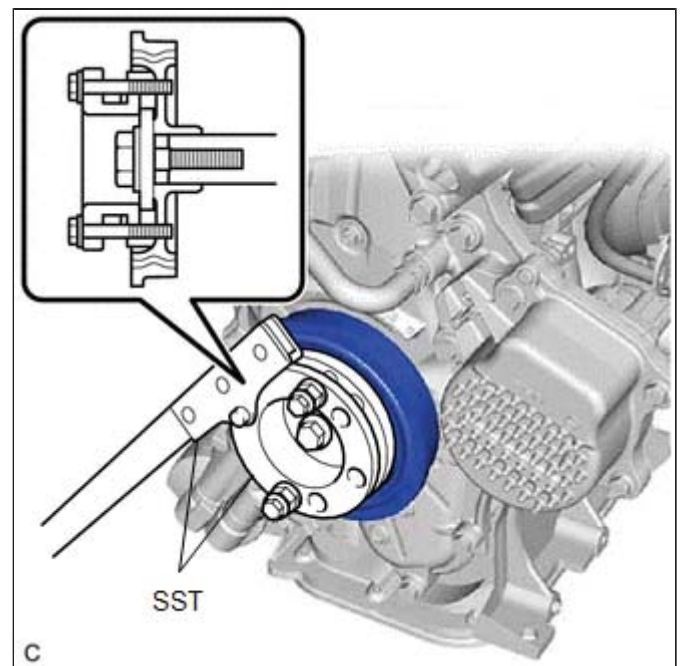
### 3. INSTALL TRANSMISSION INPUT DAMPER ASSEMBLY

(a) Using SST, hold the crankshaft pulley.

**SST: 09213-58014**

91551-80840

**SST: 09330-00021**



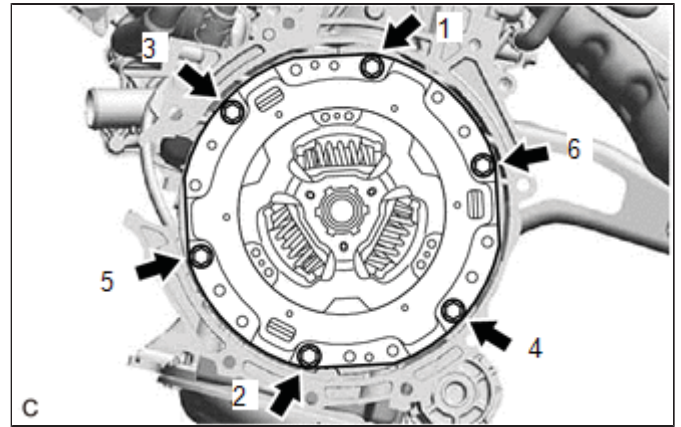
(b) Install the transmission input damper assembly to the flywheel sub-assembly with the 6 bolts. Uniformly tighten the 6 bolts in the order shown in the illustration.

**Torque:**

30 N·m { 306 kgf·cm, 22 ft·lbf }

**NOTICE:**

- Make sure that there is no oil on the transmission input damper assembly or flywheel sub-assembly.
- Make sure to install the transmission input damper assembly in the correct direction.
- Do not allow grease to contact the splines of the transmission input damper assembly or the input shaft.



#### 4. INSTALL ENGINE ASSEMBLY

Click here [INFO](#) [INFO](#)



<b>Last Modified:</b> 01-14-2019	6.8:8.0.48	<b>Doc ID:</b> RM100000000RH3P
<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - ]
<b>Title:</b> 2ZR-FXE (ENGINE MECHANICAL): REAR CRANKSHAFT OIL SEAL: REMOVAL; 2016 - 2019 MY Prius [11/2015 - ]		

## REMOVAL

## CAUTION / NOTICE / HINT

The necessary procedures (adjustment, calibration, initialization, or registration) that must be performed after parts are removed and installed, or replaced during rear crankshaft oil seal removal/installation are shown below.

### Necessary Procedure After Parts Removed/Installed/Replaced

REPLACED PART OR PERFORMED PROCEDURE	NECESSARY PROCEDURE	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURE NOT PERFORMED	LINK
Auxiliary battery terminal is disconnected/reconnected	Memorize steering angle neutral point	Lane departure alert system (w/ Steering Control)	<a href="#">INFO</a>
		Intelligent clearance sonar system*1	
Simple advanced parking guidance system*1			
Pre-collision system			
	Initialize back door lock	Power door lock control system	<a href="#">INFO</a>
Replacement of inverter with converter assembly	Resolver learning	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<a href="#">INFO</a> for Nickel Metal Hydride Battery <a href="#">INFO</a> for Lithium-ion Battery
Replacement of ECM	Perform Vehicle Identification Number (VIN) registration	MIL comes on	<a href="#">INFO</a>
<ul style="list-style-type: none"> <li>• Replacement of throttle body assembly</li> <li>• Replacement of engine assembly</li> <li>• Gas leak from exhaust system is repaired</li> </ul>	Inspection After Repair	<ul style="list-style-type: none"> <li>• Poor idle, etc.</li> <li>• Engine start function, etc.</li> </ul>	<a href="#">INFO</a>
Suspension, tires, etc. (The vehicle height changes because of suspension or tire replacement)	<ul style="list-style-type: none"> <li>• Ultrasonic sensor detection angle</li> <li>• Ultrasonic sensor detection angle registration</li> </ul>	<ul style="list-style-type: none"> <li>• Intelligent clearance sonar system</li> <li>• Simple advanced parking guidance system</li> </ul>	<a href="#">INFO</a> <a href="#">INFO</a>

Front wheel alignment adjustment	<ol style="list-style-type: none"> <li>1. Clear zero point calibration data.</li> <li>2. Perform yaw rate and acceleration sensor zero point calibration.</li> </ol>	<p>DTCs are stored</p> <ul style="list-style-type: none"> <li>• ABS warning light illuminates</li> <li>• Brake warning light/yellow (minor malfunction) illuminates</li> <li>• Slip indicator light illuminates</li> <li>• VSC disabled or malfunctions</li> </ul>	<p><a href="#">INFO</a> <a href="#">INFO</a></p>
Replacement of hybrid vehicle transaxle assembly	<ul style="list-style-type: none"> <li>• Resolver learning</li> <li>• Initialize resolver</li> </ul>	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<p><a href="#">INFO</a> for Nickel Metal Hydride Battery</p> <p><a href="#">INFO</a> for Lithium-ion Battery</p>

\*1: When performing learning using the Techstream.

Click here [INFO](#)

## PROCEDURE

### 1. REMOVE ENGINE ASSEMBLY

Click here [INFO](#) [INFO](#)

### 2. REMOVE TRANSMISSION INPUT DAMPER ASSEMBLY

(a) Using height adjustment attachments and plate lift attachments, place the engine assembly on a flat level surface.

#### NOTICE:

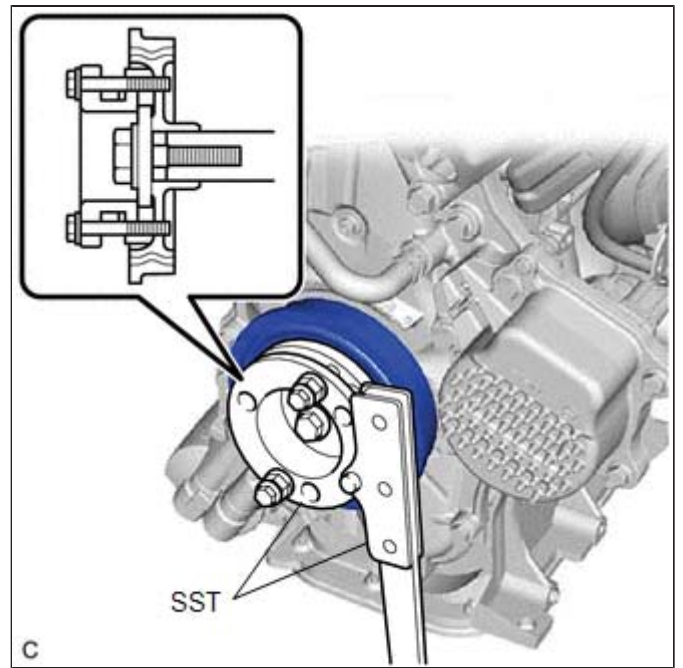
- Using height adjustment attachments and plate lift attachments, keep the engine assembly horizontal.
- To prevent the oil pan sub-assembly from deforming, do not place any attachments under the oil pan sub-assembly of the engine assembly.
- Using an engine sling device and engine lift, secure the engine assembly before servicing.

(b) Using SST, hold the crankshaft pulley.

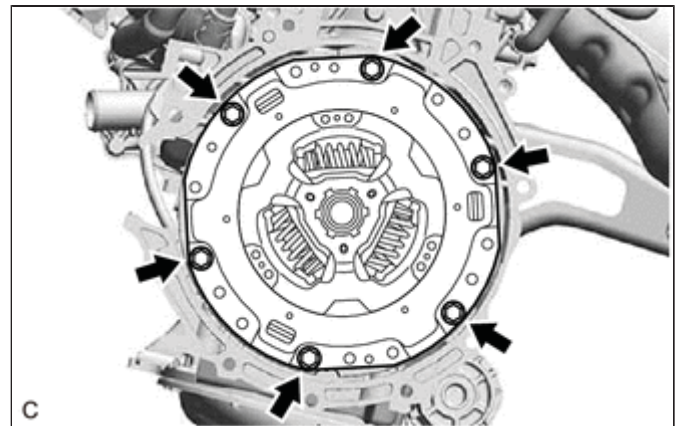
**SST: 09213-58014**

91551-80840

**SST: 09330-00021**



(c) Remove the 6 bolts and transmission input damper assembly from the flywheel sub-assembly.



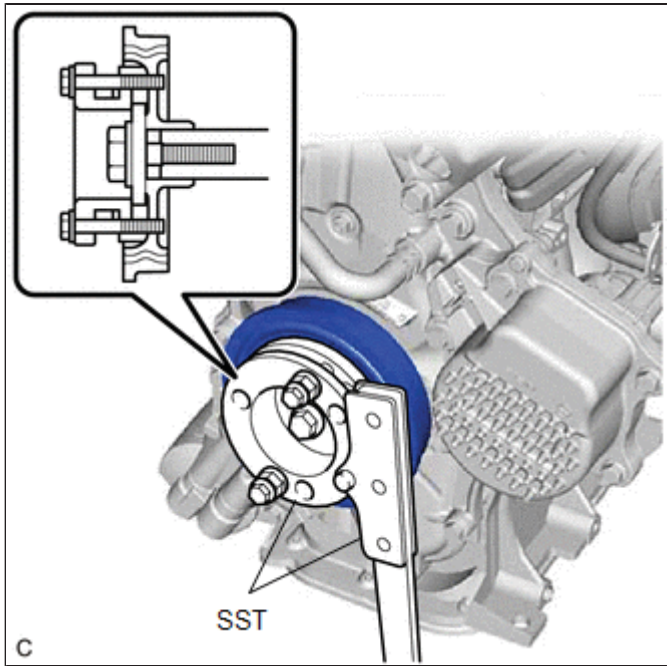
### 3. REMOVE FLYWHEEL SUB-ASSEMBLY

(a) Using SST, hold the crankshaft pulley.

**SST: 09213-58014**

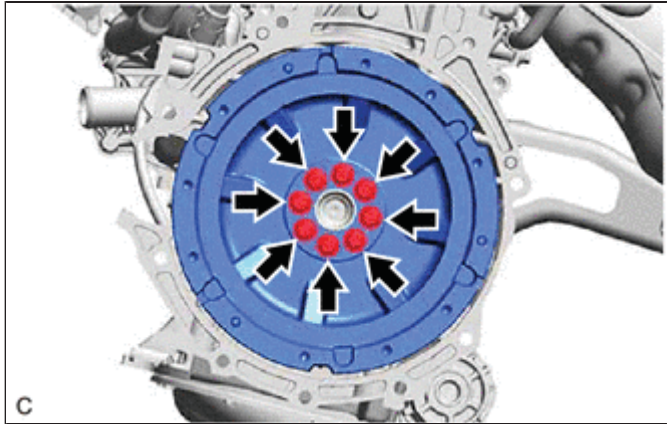
91551-80840

**SST: 09330-00021**



c

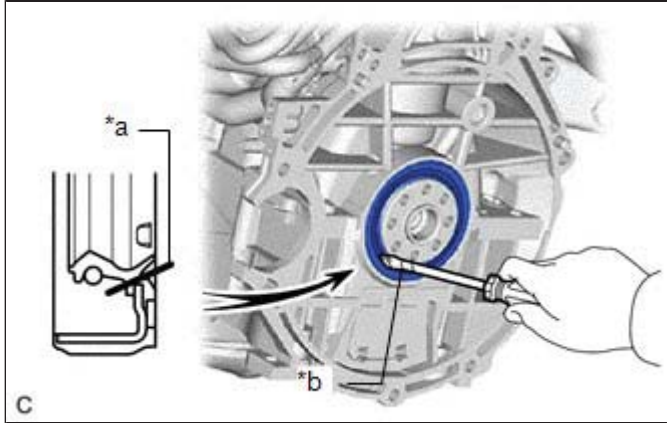
(b) Remove the 8 bolts and flywheel sub-assembly from the crankshaft.



c

**4. REMOVE REAR ENGINE OIL SEAL**

(a) Using a knife, cut through the lip of the rear engine oil seal.



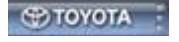
c

*a	Cut Position
----	--------------

(b) Using a screwdriver with its tip wrapped with protective tape, pry out the rear engine oil seal.

**NOTICE:**

Be careful not to damage the crankshaft.





Last Modified: 01-14-2019

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Doc ID: RM100000000RPY9

Model Year Start: 2016

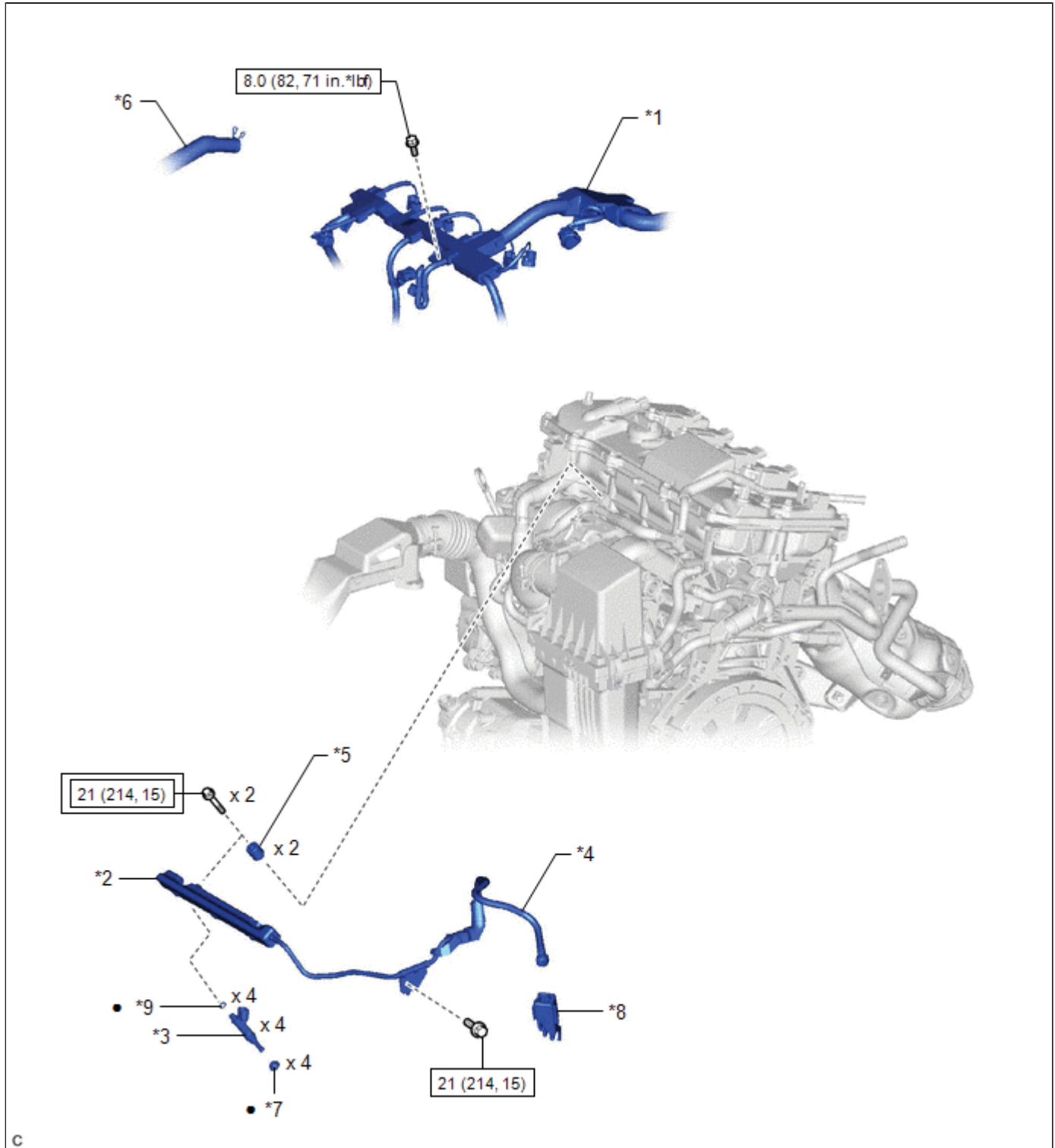
Model: Prius

Prod Date Range: [11/2015 - ]



Title: 2ZR-FXE (FUEL): FUEL INJECTOR: COMPONENTS; 2016 - 2019 MY Prius [11/2015 - ]

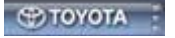
## COMPONENTS

## ILLUSTRATION



*1	ENGINE WIRE	*2	FUEL DELIVERY PIPE SUB-ASSEMBLY
----	-------------	----	---------------------------------

*3	FUEL INJECTOR ASSEMBLY	*4	FUEL TUBE SUB-ASSEMBLY
*5	NO. 1 DELIVERY PIPE SPACER	*6	NO. 2 VENTILATION HOSE
*7	INJECTOR VIBRATION INSULATOR	*8	FUEL PIPE CLAMP
*9	O-RING	-	-
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping" : N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
•	Non-reusable part	-	-



Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000RPY8
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - 12/2018]
Title: 2ZR-FXE (FUEL): FUEL INJECTOR: INSPECTION; 2016 - 2018 MY Prius [11/2015 - 12/2018]		

## INSPECTION

## PROCEDURE

### 1. INSPECT FUEL INJECTOR ASSEMBLY

(a) Check the resistance.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



[Click Location & Routing\(C14,C15,C16,C17\)](#)

[Click Connector\(C14\)](#)

[Click Connector\(C15\)](#)

[Click Connector\(C16\)](#)

[Click Connector\(C17\)](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
C14-1 - C14-2	20°C (68°F)	11.6 to 12.4 Ω
C15-1 - C15-2	20°C (68°F)	11.6 to 12.4 Ω
C16-1 - C16-2	20°C (68°F)	11.6 to 12.4 Ω
C17-1 - C17-2	20°C (68°F)	11.6 to 12.4 Ω

If the result is not as specified, replace the fuel injector assembly.

(b) Check the operation.

#### CAUTION:

Perform the inspection in a well-ventilated area.

Do not perform the inspection near an open flame.

(1) Connect SST (fuel tube connector) to SST (hose) with SST (hose band), and then connect them to the fuel pipe (vehicle side).

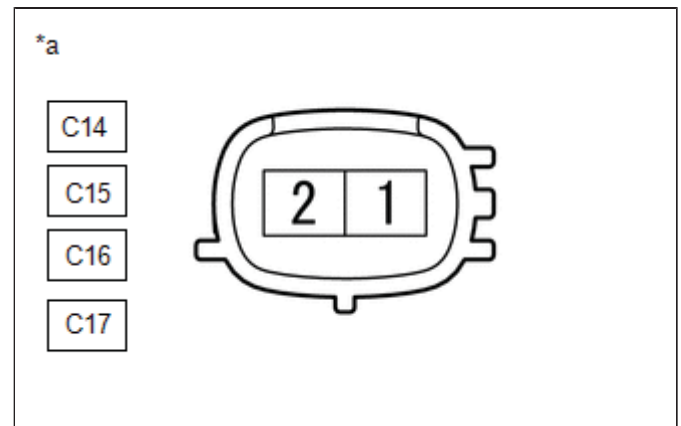
**SST: 09268-31014**

09268-41700

95336-08070

**SST: 09268-00010**

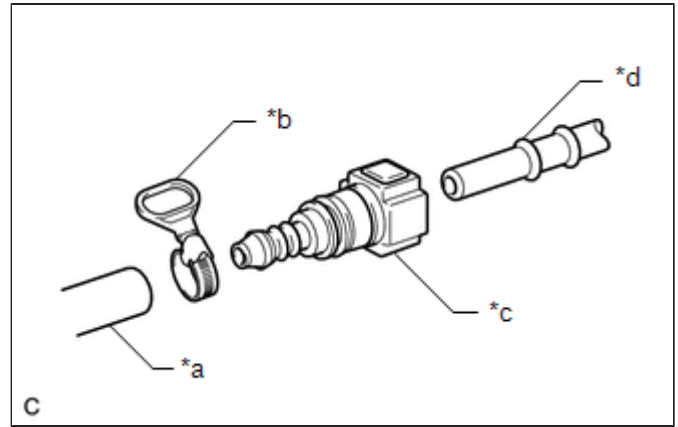
09268-00030



*a	Component without harness connected (Fuel Injector Assembly)
----	--

**NOTICE:**

Make sure the SST (fuel tube connector) O-rings are not damaged and are free of foreign matter as they are used to seal the connections between SST (fuel tube connector) and the fuel pipe (vehicle side).



*a	SST (Hose)
*b	SST (Hose Band)
*c	SST (Fuel Tube Connector)
*d	Fuel Pipe (Vehicle Side)

(2) Apply a light coat of gasoline to a new O-ring, and then install the O-ring to the fuel injector assembly.

(3) Connect SST (adapter) and SST (hose) to the fuel injector assembly, and hold the fuel injector assembly and union with SST (clamp).

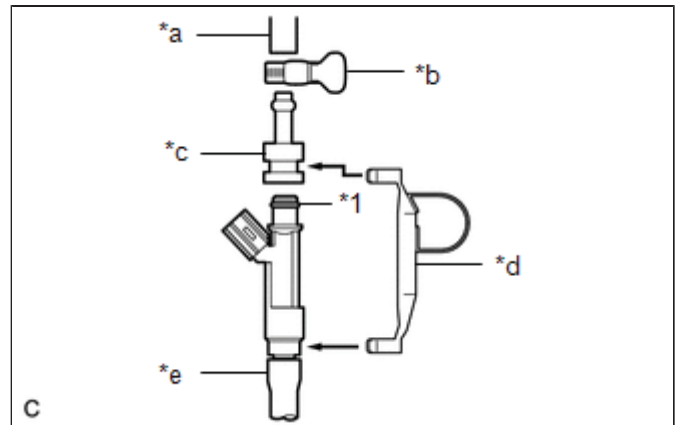
**SST: 09268-31014**

09268-41110

09268-41410

09268-41700

95336-08070



*1	O-ring
*a	SST (Hose)
*b	SST (Hose Band)
*c	SST (Adapter)
*d	SST (Clamp)
*e	Vinyl Tube

(4) Install a vinyl tube to the fuel injector assembly.

**CAUTION:**

Install a suitable vinyl tube to the fuel injector assembly to prevent fuel from spraying.

(5) Tie SST (clamp) and SST (adapter) together with SST

(tie band) as shown in the illustration.

**SST: 09268-31014**

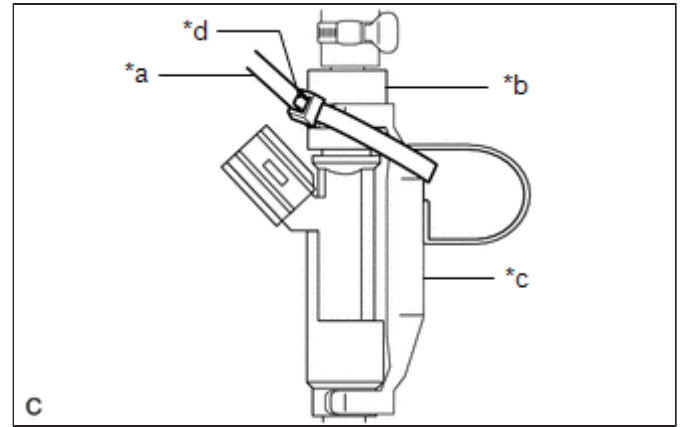
09268-41800

**NOTICE:**

- As SST (tie band) does not completely prevent SST (clamp) from becoming loose, do not subject the parts to any impacts while using them.
- Before using SST (tie band), make sure that there is no wear, damage or cracks. If there are any abnormalities, replace SST (tie band).

**HINT:**

When removing SST (tie band), disengage the lock.



*a	SST (Tie Band)
*b	SST (Adapter)
*c	SST (Clamp)
*d	Lock

(6) Check that SST (clamp) and SST (adapter) cannot be easily separated.

(7) Set the fuel injector assembly in a graduated cylinder.

(8) Operate the fuel pump with filter assembly.

Click here [INFO](#)

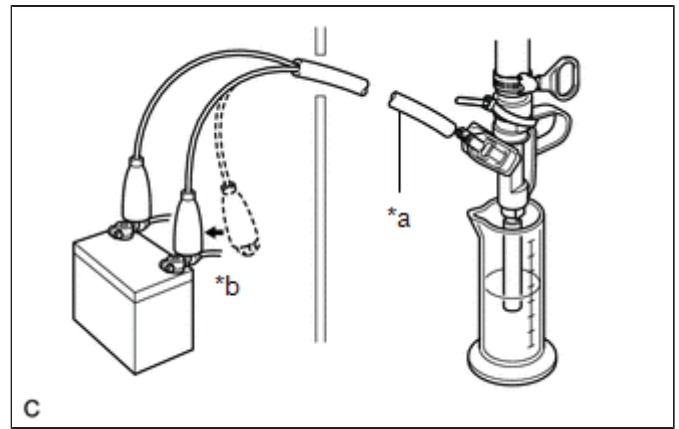
(9) Connect SST (EFI inspection wire H) to the fuel injector assembly and auxiliary battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each fuel injector assembly 2 or 3 times.

**SST: 09842-30080**

Standard Injection Volume:

ITEM	AUXILIARY BATTERY CONNECTION	CONDITION	SPECIFIED CONDITION
No. 1 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	60 to 73 cc
No. 1 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	3.7 to 4.5 cu.in.
No. 2 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	60 to 73 cc
No. 2 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	3.7 to 4.5 cu.in.

No. 3 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	60 to 73 cc
No. 3 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	3.7 to 4.5 cu.in.
No. 4 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	60 to 73 cc
No. 4 Fuel Injector Assembly	Positive (+) auxiliary battery terminal - Negative (-) auxiliary battery terminal	Per 15 seconds	3.7 to 4.5 cu.in.
Difference between Each Fuel Injector Assembly	-	-	13 cc or less
Difference between Each Fuel Injector Assembly	-	-	0.8 cu.in. or less



*a	SST (EFI Inspection Wire H)
*b	Connect

**NOTICE:**

- Make sure that SST (EFI inspection wire H) is securely connected.
- Always switch the voltage on and off at the auxiliary battery side, not the fuel injector assembly side.

If the result is not as specified, replace the fuel injector assembly.

(c) Check for leaks.

(1) Disconnect SST (EFI inspection wire H) from the auxiliary battery and check for fuel leaks from the fuel injector assembly.

Standard Fuel Drop:

1 drop or less per 25 minutes

If the result is not as specified, replace the fuel injector assembly.

(2) Check for fuel leaks.

Click here [INFO](#)



Last Modified: 01-14-2019	6.8:8.0.48	Doc ID: RM100000000RPY7
Model Year Start: 2016	Model: Prius	Prod Date Range: [11/2015 - ]
Title: 2ZR-FXE (FUEL): FUEL INJECTOR: INSTALLATION; 2016 - 2019 MY Prius [11/2015 - ]		

## INSTALLATION

### PROCEDURE

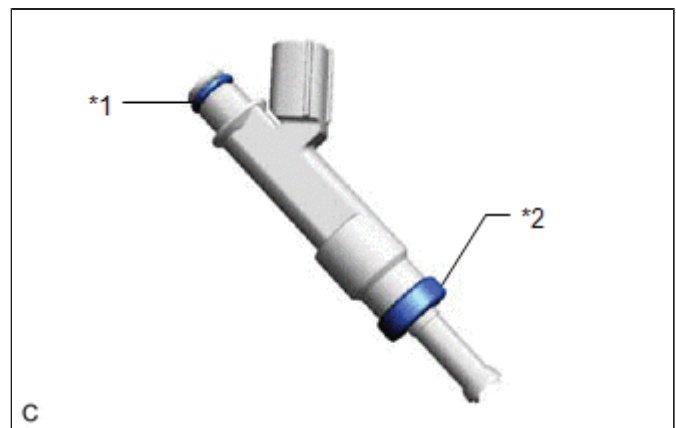
#### 1. INSTALL FUEL INJECTOR ASSEMBLY

**HINT:**

Perform "Inspection After Repair" after replacing a fuel injector assembly.

Click here [INFO](#)

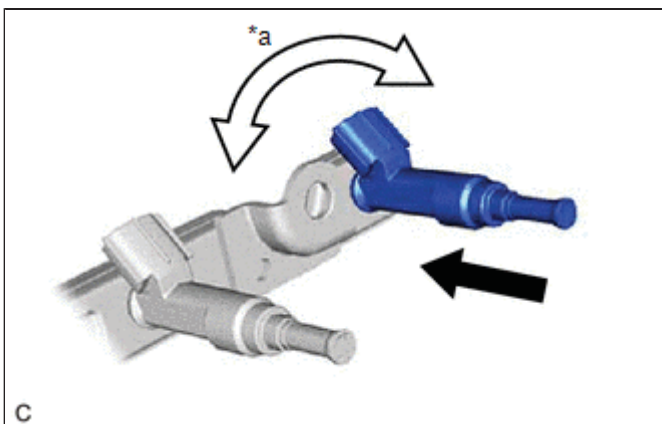
(a) Apply a light coat of gasoline or spindle oil to new injector vibration insulators and new O-rings, and then install one to each fuel injector assembly.



*1	O-ring
*2	Injector Vibration Insulator

(b) Apply a light coat of gasoline or spindle oil where the fuel delivery pipe sub-assembly contacts each O-ring.

(c) While turning the fuel injector assembly left and right, install it to the fuel delivery pipe sub-assembly.



*a	Turn
	Push



**NOTICE:**

- Do not damage the fuel injector assembly or O-ring.
- Make sure that the O-ring is not twisted or moved out of place when installing the fuel injector assembly.
- After installing each fuel injector assembly, check that it turns smoothly. If not, replace the O-ring with a new one.

**HINT:**

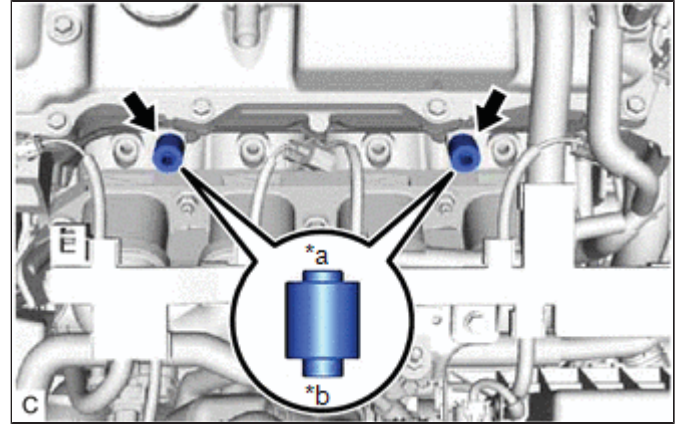
Use the same procedure to install the other fuel injector assemblies.

**2. INSTALL NO. 1 DELIVERY PIPE SPACER**

- (a) Install the 2 No. 1 delivery pipe spacers to the cylinder head sub-assembly.

**NOTICE:**

Install the No. 1 delivery pipe spacers in the correct direction.



*a	Fuel Delivery Pipe Sub-assembly Side
*b	Cylinder Head Sub-assembly Side

**3. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY**

- (a) Install the fuel delivery pipe sub-assembly with the 4 fuel injector assemblies with the 2 bolts.

**Torque:**

21 N·m {214 kgf·cm, 15 ft·lbf}

**NOTICE:**

- Be careful not to drop the fuel injector assemblies when installing the fuel delivery pipe sub-assembly.
- Check that the fuel injector assemblies turn smoothly after installing the fuel delivery pipe sub-assembly.

- (b) Install the clamp of the fuel delivery pipe sub-assembly to the cylinder head sub-assembly with the bolt.

**Torque:**

21 N·m {214 kgf·cm, 15 ft·lbf}

**4. CONNECT FUEL TUBE SUB-ASSEMBLY**

- (a) Connect the fuel tube sub-assembly to the fuel pipe.

Click here [INFO](#) [INFO](#)

- (b) Install the fuel pipe clamp to the fuel tube connector and close the cover of the fuel pipe clamp.

**5. CONNECT ENGINE WIRE**

- (a) Engage the clamp to connect the engine wire.  
(b) Install the bolt.

**Torque:**

8.0 N·m {82 kgf·cm, 71 in·lbf}

(c) Connect the 4 fuel injector assembly connectors.

## 6. CONNECT NO. 2 VENTILATION HOSE

(a) Connect the No. 2 ventilation hose to the cylinder head cover sub-assembly and slide the clip to secure it.

## 7. INSTALL EGR PIPE WITH COOLER SUB-ASSEMBLY

Click here [INFO](#)

## 8. CONNECT CABLE TO NEGATIVE AUXILIARY BATTERY TERMINAL

### NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected.

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## 9. INSPECT FOR FUEL LEAK

Click here [INFO](#) [INFO](#)

## 10. PERFORM INITIALIZATION

(a) Perform "Inspection After Repair" after replacing a fuel injector assembly.

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<b>Model Year Start:</b> 2016	<b>Model:</b> Prius	<b>Prod Date Range:</b> [11/2015 - 12/2018]
<b>Title:</b> 2ZR-FXE (FUEL): FUEL INJECTOR: REMOVAL; 2016 - 2018 MY Prius [11/2015 - 12/2018]		

## REMOVAL

## CAUTION / NOTICE / HINT

The necessary procedures (adjustment, calibration, initialization or registration) that must be performed after parts are removed and installed, or replaced during fuel injector assembly removal/installation are shown below.

### Necessary Procedures After Parts Removed/Installed/Replaced

REPLACED PART OR PERFORMED PROCEDURE	NECESSARY PROCEDURE	EFFECT/INOPERATIVE FUNCTION WHEN NECESSARY PROCEDURE NOT PERFORMED	LINK
Auxiliary battery terminal is disconnected/reconnected	Memorize steering angle neutral point	Lane departure alert system (w/ Steering Control)	<a href="#">INFO</a>
		Intelligent clearance sonar system*1	
		Simple advanced parking guidance system*1	
		Pre-collision system	
	Initialize back door lock	Power door lock control system	<a href="#">INFO</a>
Replacement of inverter with converter assembly	Resolver learning	<ul style="list-style-type: none"> <li>• DTCs are stored</li> <li>• Slight vibration at a vehicle speed of 5 km/h (3 mph) or less</li> <li>• Shock or vibration during acceleration</li> </ul>	<a href="#">INFO</a> for Nickel Metal Hydride Battery <a href="#">INFO</a> for Lithium-ion Battery
Replacement of ECM	Perform Vehicle Identification Number (VIN) registration	MIL comes on	<a href="#">INFO</a>
<ul style="list-style-type: none"> <li>• Replacement of fuel injector assembly</li> <li>• Gas leak from exhaust system is repaired</li> </ul>	Inspection After Repair	<ul style="list-style-type: none"> <li>• Poor idle, etc.</li> <li>• Engine start function, etc.</li> </ul>	<a href="#">INFO</a>

\*1: When performing learning using the Techstream.

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## PROCEDURE

### 1. PRECAUTION

#### NOTICE:

After turning the power switch off, waiting time may be required before disconnecting the cable from the negative (-)

auxiliary battery terminal. Therefore, make sure to read the disconnecting the cable from the negative (-) auxiliary battery terminal notices before proceeding with work.

Click here [INFO](#) [INFO](#)

## 2. DISCHARGE FUEL SYSTEM PRESSURE

Click here [INFO](#)

## 3. DISCONNECT CABLE FROM NEGATIVE AUXILIARY BATTERY TERMINAL

### NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected.

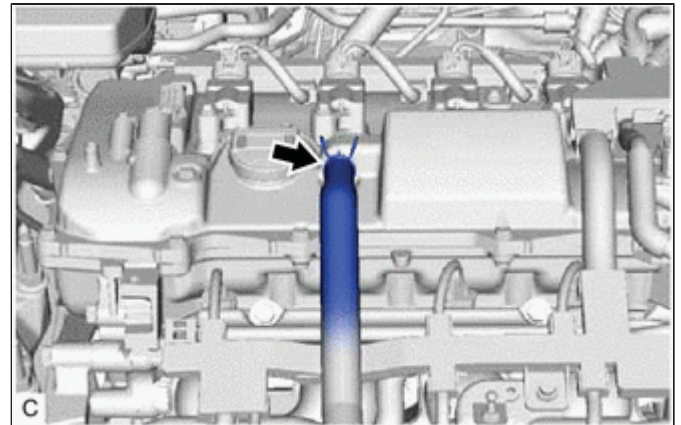
Click here [INFO](#) [INFO](#)

## 4. REMOVE EGR PIPE WITH COOLER SUB-ASSEMBLY

Click here [INFO](#)

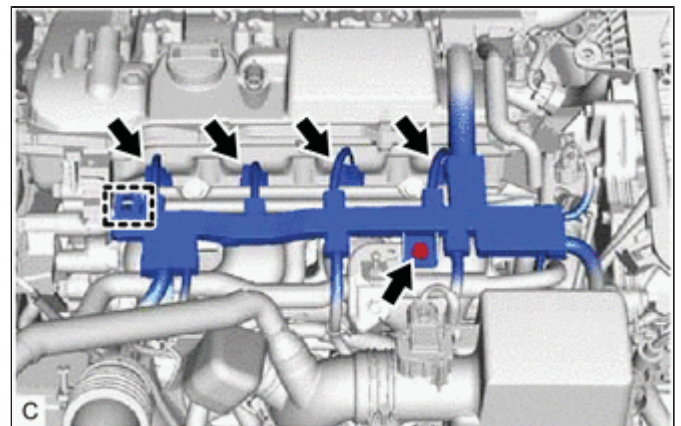
## 5. DISCONNECT NO. 2 VENTILATION HOSE

- (a) Slide the clip and disconnect the No. 2 ventilation hose from the cylinder head cover sub-assembly.



## 6. DISCONNECT ENGINE WIRE

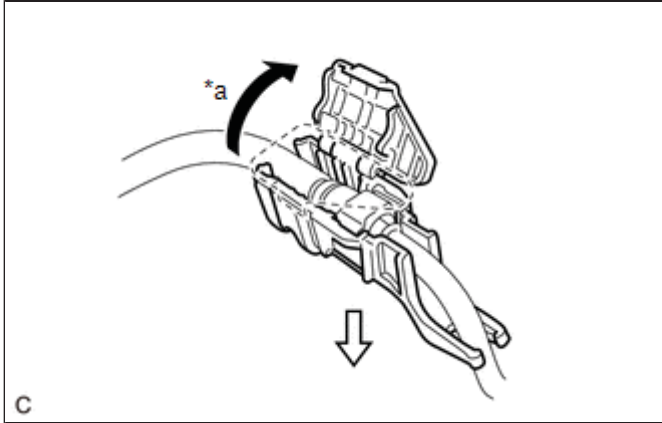
- (a) Disconnect the 4 fuel injector assembly connectors.




- (b) Remove the bolt.  
(c) Disengage the clamp to disconnect the engine wire.

## 7. DISCONNECT FUEL TUBE SUB-ASSEMBLY

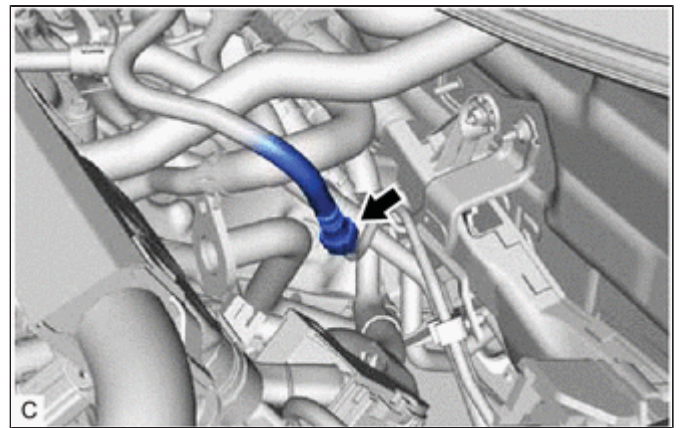
(a) Open the cover of the fuel pipe clamp and remove the fuel pipe clamp from the fuel tube connector.



*a	Open
	Pull

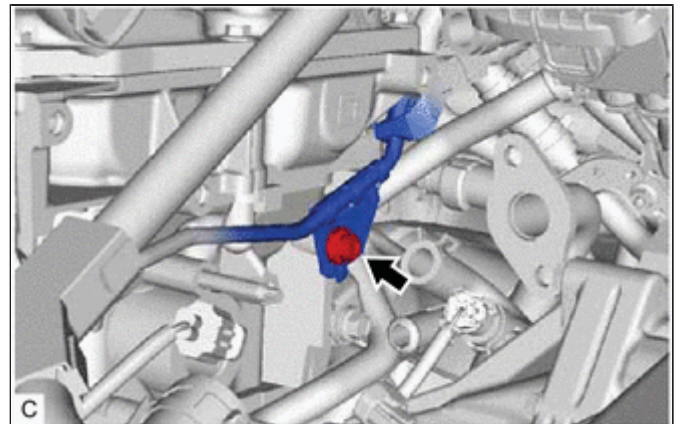
(b) Disconnect the fuel tube sub-assembly from the fuel pipe.

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## 8. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY

(a) Remove the bolt to separate the clamp of the fuel delivery pipe sub-assembly from the cylinder head sub-assembly.

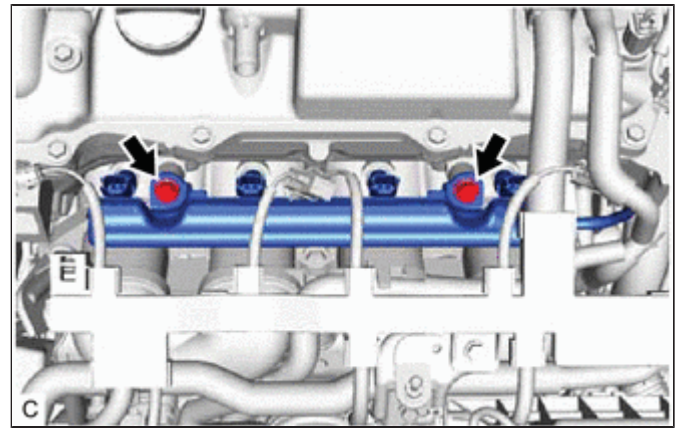




- (b) Remove the 2 bolts and fuel delivery pipe sub-assembly with the 4 fuel injector assemblies.

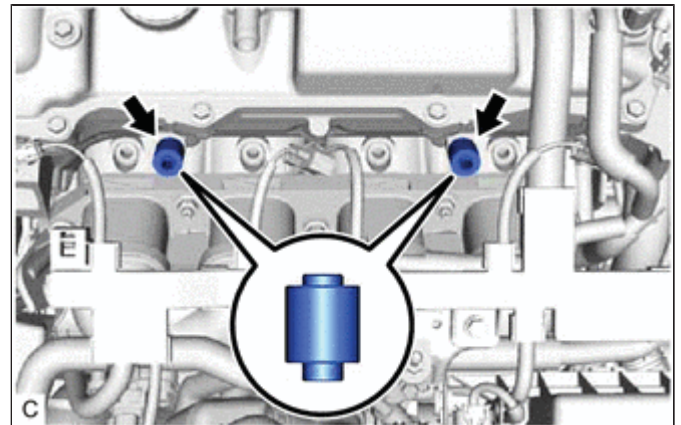
**NOTICE:**

Be careful not to drop the fuel injector assemblies when removing the fuel delivery pipe sub-assembly.



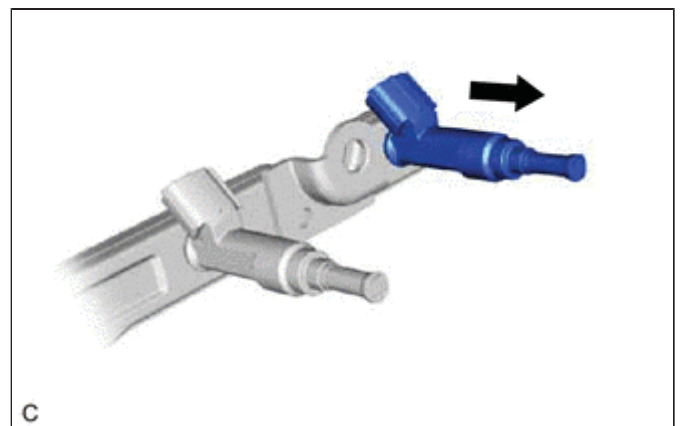
**9. REMOVE NO. 1 DELIVERY PIPE SPACER**

- (a) Remove the 2 No. 1 delivery pipe spacers from the cylinder head sub-assembly.

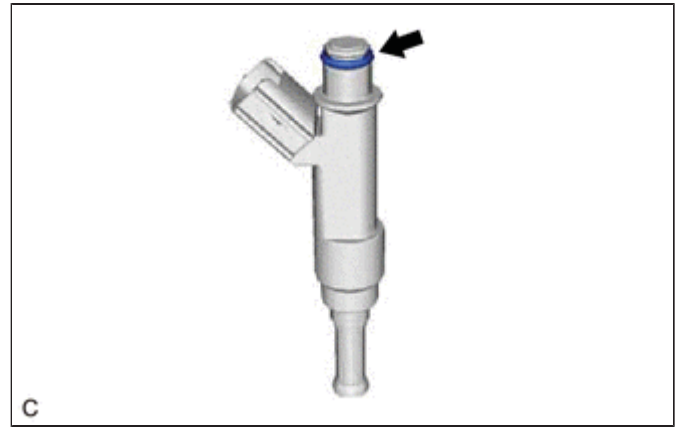


**10. REMOVE FUEL INJECTOR ASSEMBLY**

- (a) Pull the 4 fuel injector assemblies out of the fuel delivery pipe sub-assembly.



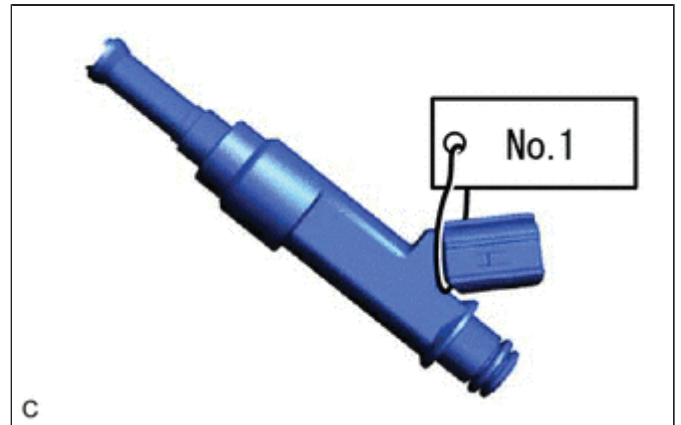
(b) Remove the O-ring from each fuel injector assembly.



(c) Attach a tag or label with the corresponding cylinder number to each fuel injector assembly so that they can be installed to their original locations.

**NOTICE:**

Cover the fuel injector assemblies with plastic bags to prevent damage and contamination.



(d) Remove the 4 injector vibration insulators from the cylinder head sub-assembly.

