

# 2ZR-FXE Engine Oil Consumption Repair Procedure

**Service Category** Engine/Hybrid System

**Section** Engine Mechanical

**Market** USA

Toyota Supports  
 ASE Certification 

## Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2010, 2012 - 2014	Prius PHV	
2012 - 2014	Prius V	
2010 - 2014	Prius	

## Introduction

### NOTE

Service Bulletin No. [T-SB-0168-16](#) "2ZR-FXE Engine Oil Consumption Inspection Procedure" **MUST** be performed **BEFORE** continuing with the procedure in this bulletin.

Some 2010 – 2014 model year Prius PHV, Prius V, and Prius vehicles equipped with the 2ZZ-FXE engine may exhibit engine oil consumption. The piston and piston ring assembly have been changed to reduce the potential for oil consumption. Follow the Repair Procedure in this bulletin to address this condition.

## Production Change Information

This bulletin applies to vehicles produced **BEFORE** the Production Change Effective VINs shown below.

MODEL	DRIVETRAIN	PRODUCTION CHANGE EFFECTIVE VIN
Prius	2ZR-FXE	JTDKN3DU#E0358779
		JTDKN3DU#E1791355
Prius PHV		JTDKN3DP#E3055768
Prius V		JTDZN3EU#E3339374
		JTDZN3EU#EJ001475

## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Warranty Information

OP CODE	DESCRIPTION	TIME	OFF	T1	T2
EG1633	R & R Piston and Ring Set	16.6	13101-37120	11	99

#### APPLICABLE WARRANTY

- This repair is covered under the Toyota Powertrain Warranty. This warranty is in effect for 60 months or 60,000 miles, whichever occurs first, from the vehicle's in-service date.
- Warranty application is limited to occurrence of the specified condition described in this bulletin.

### Parts Information

PART NUMBER		PART NAME	QTY
PREVIOUS	NEW		
13101-37120	13101-37240	Piston	4
13011-37110	13011-37260	Piston Ring Set	1
04111-37315		Gasket Kit	1
04152-37010	04152-YZZA6	Filter, Oil	1
90177-22001	90080-17238	Nut (Front Axle Shaft)	2
90521-33002	90080-52017	Ring, Hole Snap (for Front Drive Shafts)	2
90468-16029	90468-A0003	Pin, Cotter (Lower Ball Joint) for Prius, Prius PHV	2
95381-02525		Pin, Cotter (Lower Ball Joint) for Prius V	2
90468-16017		Pin, Cotter (Tie Rod)	2

#### Additional Parts: Only As Needed

PART NUMBER		PART NAME	QTY
13201-39185	13201-09A30	Rod Sub-Assy, Connecting	As Needed
13041-37010-0X	13041-0T010-0X	Bearing, Connecting Rod	
13265-22020		Bolt, Connecting Rod	
90910-02166	90910-A2011	Bolt, Cylinder Head	
90201-10344		Washer, Plate, Cylinder Head	
90501-35037	90501-A0005	Exhaust Compression Ring	

## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Required Tools & Equipment

REQUIRED TOOLS & MATERIAL	PART NUMBER	QUANTITY
ILSAC GF-4 Multi-grade SAE 0W-20	–	4.7 liters (5.0 US qts)
FIPG Sealant	00295-00103	As Needed
Super Long Life Coolant (SLLC)	00272-SLLC2	As Needed
Three Bond 1324	–	As Needed
Green Plastigage™	–	As Needed
Cylinder Ridge Reamer	–	1
Torque Wrench	–	1
Piston Ring Compressor	–	1
Piston Heater	–	1
Torque Yield Wrench	–	1
Piston Ring Expander	–	1
Caliper Gauge	–	1
Large Brass Punch	–	1
Engine Stand	–	1
Feeler Gauge	–	1
Precision Straight Edge	–	1
Thread Chaser	–	As Needed

SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
Gasket Seal Cutter*	09032-00100	1
Cylinder Head Bolt Wrench	09205-16011	1

\* Essential SST.

**NOTE**  
 Additional SSTs may be ordered by calling 1-800-933-8335.

## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Required Tools & Equipment (Continued)

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
Techstream 2.0*	ADE	TS2UNIT	1
Techstream Lite		TSLITEPDLR01	
Techstream Lite (Green Cable)		TSLP2DLR01	

\* Essential SST.

#### NOTE

- Only ONE of the Techstream units listed above is required.
- Software version 11.20.019 or later is required.
- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.

### Repair Procedure

#### NOTE

Removal and replacement of automatic transmission fluid is unnecessary and is NOT covered under this bulletin.

1. Remove the engine assembly.

Refer to the Technical Information System (TIS), applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Assembly: Removal”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Assembly: Removal”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Assembly: Removal”*

2. Remove the intake manifold.

Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Intake/Exhaust – “2ZR-FXE Intake/Exhaust: Intake Manifold: Removal”*

## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Intake/Exhaust – “2ZR-FXE Intake/Exhaust: Intake Manifold: Removal”*
  - [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Intake/Exhaust – “2ZR-FXE Intake/Exhaust: Intake Manifold: Removal”*
3. Disassemble the engine.  
Refer to TIS, applicable model and model year Repair Manual:
- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Unit: Disassembly”*
  - [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Unit: Disassembly”*
  - [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Unit: Disassembly”*
4. Remove the cylinder head.  
Refer to TIS, applicable model and model year Repair Manual:
- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Head Gasket: Removal”*
  - [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Head Gasket: Removal”*
  - [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Head Gasket: Removal”*

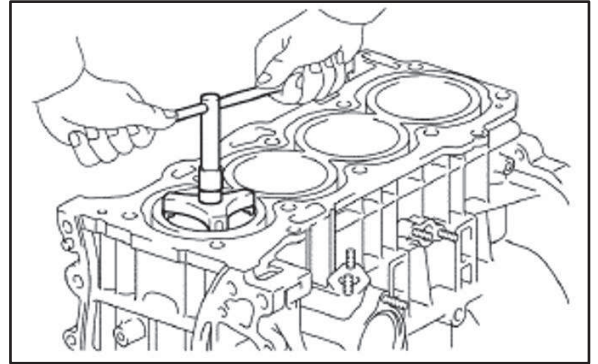
## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

5. Remove the pistons from the connecting rods.
  - A. Remove the piston sub-assemblies with connecting rod.
    - (1) Using a ridge reamer, remove ALL the carbon from the top of the cylinder.

**Figure 1.**

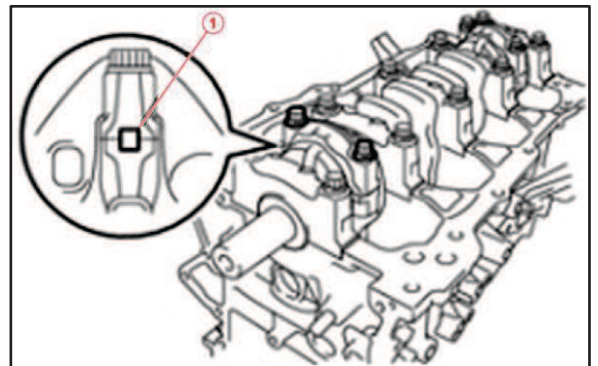


- (2) Check that the matchmarks on the connecting rod and cap are aligned to ensure correct reassembly.

**HINT**

The matchmarks on the connecting rods and caps are provided for ensuring correct reassembly.

**Figure 2.**



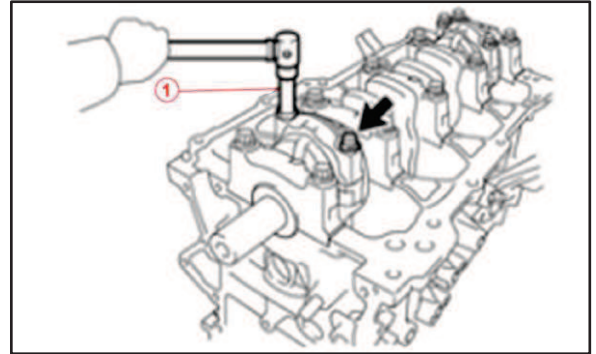
<b>1</b>	Matchmark
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## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Repair Procedure (Continued)

- (3) Using SST 09205-16011, uniformly loosen the 2 bolts.

**Figure 3.**



<b>1</b>	<b>SST</b>
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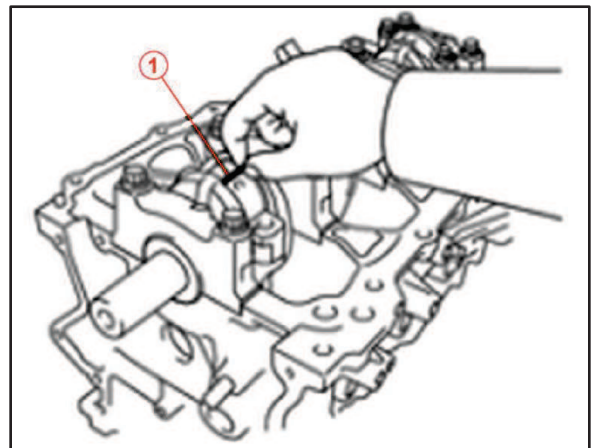
- (4) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by moving the connecting rod cap right and left.

**HINT**

**Keep the lower bearing inserted in the connecting rod cap.**

- (5) Inspect the connecting rod oil clearance.
- a. Clean the crank pin and bearing.
  - b. Check the crank pin and bearing for pitting and scratches.
  - c. Lay a strip of Plastigage™ on the crank pin.

**Figure 4.**



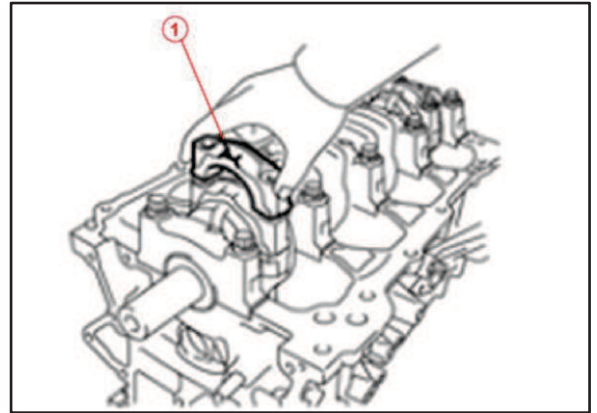
<b>1</b>	<b>Plastigage™</b>
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## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Repair Procedure (Continued)

- d. Check that the front mark of the connecting rod cap is facing forward.

**Figure 5.**



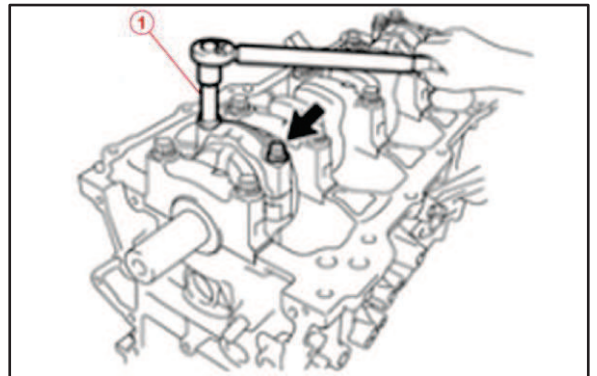
<b>1</b>	Front Mark
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- e. Install and alternately tighten the bolts of the connecting rod cap in several steps.  
**Torque: 20 N\*m (204 kgf\*cm, 15 ft\*lbf)**  
**SST: 09205-16011**

**NOTE**

The connecting cap bolts should be tightened in 2 progressive steps.

**Figure 6.**



<b>1</b>	SST
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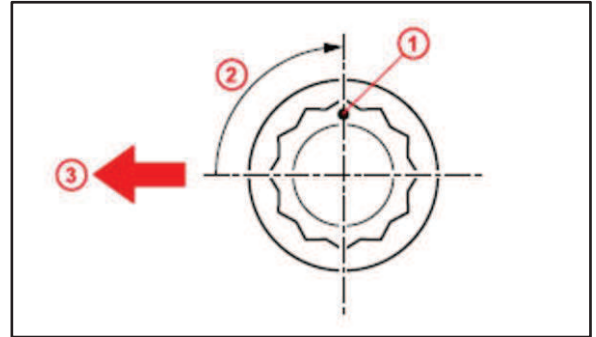
## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

- f. Mark the front of the connecting rod cap bolts with paint.  
Retighten the cap bolts by 90° as shown.

**Figure 7.**



<b>1</b>	<b>Paint Mark</b>
<b>2</b>	<b>90°</b>
<b>3</b>	<b>Engine Front</b>

- g. Remove the 2 bolts and connecting rod cap.

## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Repair Procedure (Continued)

- h. Measure the Plastigage™ at its widest point.

**Standard Oil Clearance: 0.014 to 0.038 mm (0.000551 to 0.00150 in.)**

**Maximum Oil Clearance: 0.070 mm (0.00276 in.)**

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

**NOTE**

Completely remove the Plastigage™ after the measurement.

**NOTICE**

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, or 3 mark on its surface.

**Standard Connecting Rod Large End Bore Diameter:**

MARK	SPECIFIED CONDITION
1	47.000 to 47.008 mm (1.85039 to 1.85071 in.)
2	47.009 to 47.016 mm (1.85074 to 1.85102 in.)
3	47.017 to 47.024 mm (1.85106 to 1.85133 in.)

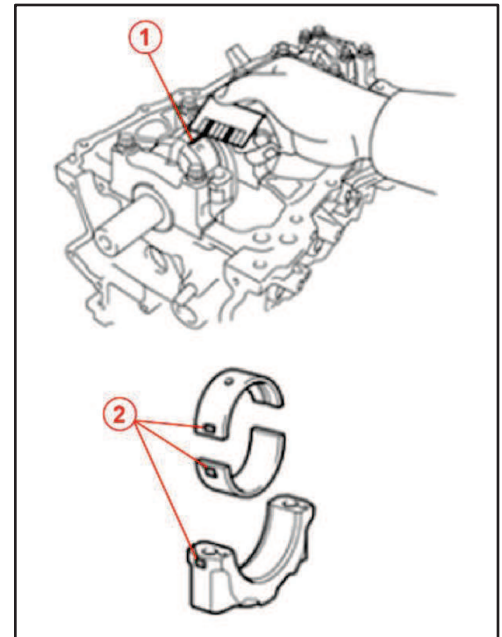
**Standard Connecting Rod Bearing Thickness:**

MARK	SPECIFIED CONDITION
1	1.489 to 1.493 mm (0.05862 to 0.05878 in.)
2	1.494 to 1.497 mm (0.05882 to 0.05894 in.)
3	1.498 to 1.501 mm (0.05898 to 0.05909 in.)

**Standard Crankshaft Pin Diameter:**

MARK	SPECIFIED CONDITION
1	43.992 to 44.000 mm (1.7320 to 1.7323 in.)
2	
3	

**Figure 8.**



1	Plastigage™
2	1, 2, or 3 Mark

## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

- (6) Push the piston, connecting rod assembly, and upper bearing through the top of the cylinder block.

**HINT**

- Keep the bearing, connecting rod, and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

- (7) Repeat for the other 3 piston/connecting rod assemblies.

- B. Remove the connecting rod bearings.

**HINT**

Arrange the removed parts in the correct order.

- C. Inspect the cylinder bore for abnormal damage.

Visually check the cylinder bore for the presence of crosshatch.

- If the cylinder bore has visible crosshatch, the cylinder block is OK to re-use.
- Confirm that ONLY light vertical marks are present, if any.

**NOTE**

- It is normal for an in-service block to have light markings present from carbon and should NOT be interpreted as excessive cylinder wall scratches.
- ONLY replace the short block if multiple, severe scratches are present.
- Do NOT hone the cylinder walls.

- D. Using a screwdriver, pry out the 2 piston pin snap rings.

**HINT**

If necessary, sublet the following specialized and precision operations to a local engine machining shop.

**Figure 9.**



## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Repair Procedure (Continued)

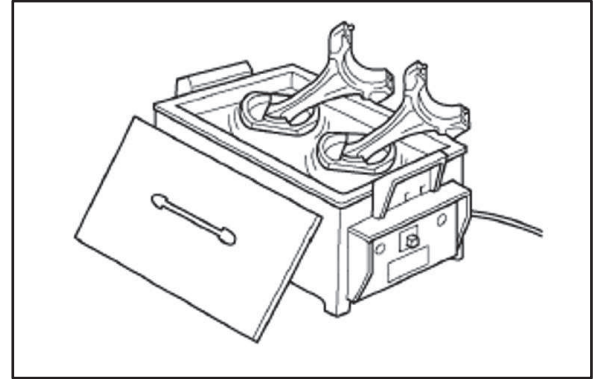
E. Remove the piston.

- (1) Gradually heat the piston to approximately 176° to 194°F (80° to 90°C).

**HINT**

If necessary, sublet the following specialized and precision operations to a local engine machining shop.

**Figure 10.**

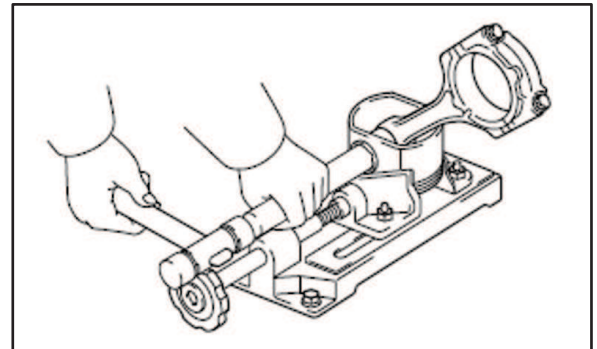


- (2) Using a plastic hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

**NOTICE**

- The piston, pin and connecting rod are a matched set.
- Arrange the piston, pins, rings, and connecting rods, and bearings in the correct order.

**Figure 11.**



Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Block: Disassembly”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Block: Disassembly”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Block: Disassembly”*

## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

6. Inspect the connecting rod and bearings to determine if parts are suitable for re-use.

**HINT**

If necessary, sublet the following specialized and precision operations to a local engine machining shop.

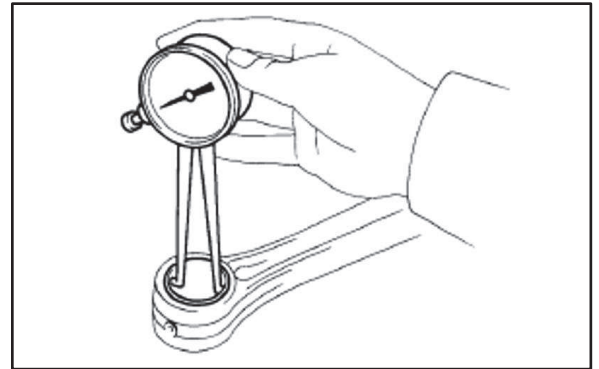
- A. Using a caliper gauge, measure the connecting rod small end bore diameter.

**Standard Connecting Rod Small End Bore Diameter: 20.012 to 20.021 mm (0.78787 to 0.78823 in.)**

Ensure the connecting rod small end bore diameter measurement is within specification for the piston bore diameter.

Replace the connecting rod.

**Figure 12.**



- B. Inspect the connecting rod bolt.

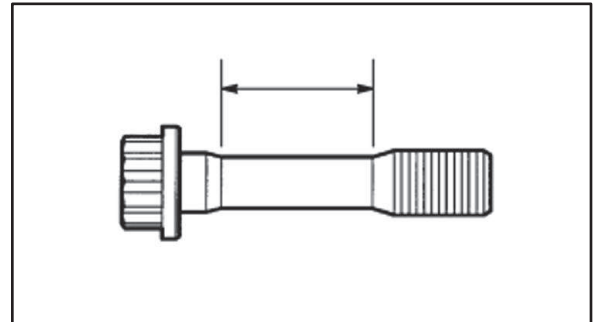
Using vernier calipers, measure the tension portion diameter of the bolt.

**Standard diameter: 6.6 to 6.7 mm (0.260 to 0.264 in.)**

**Minimum diameter: 6.4 mm (0.252 in.)**

If the diameter is less than the minimum, replace the connecting rod bolt.

**Figure 13.**



## 2ZR-FXE Engine Oil Consumption Repair Procedure

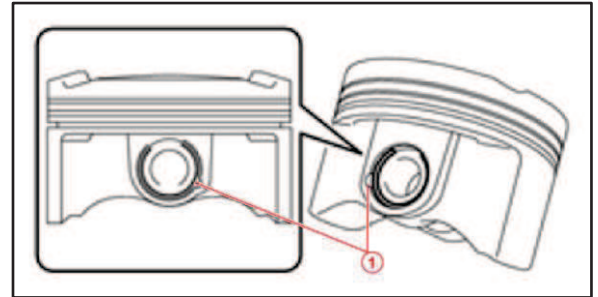
### Repair Procedure (Continued)

- Using a screwdriver, install a NEW snap ring at one end of the piston pin hole.

**HINT**

Make sure that the end gap of the snap ring is NOT aligned with the pin hole cutout portion of the piston.

**Figure 14.**



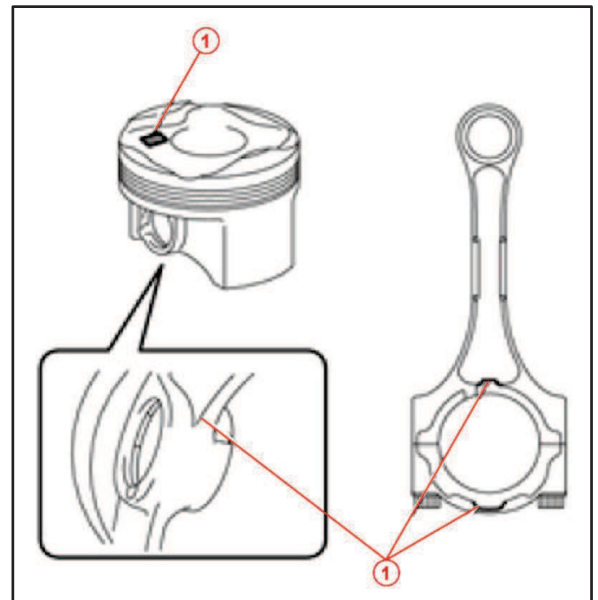
**1** Service Hole

- Gradually heat the piston to approximately 80° to 90°C (176° to 194°F).
- Align the front marks of the piston and connecting rod, insert the connecting rod into the piston, and then push in the piston pin with your thumb until the pin comes into contact with the snap ring.

**HINT**

The piston and pin are a matched set.

**Figure 15.**



**1** Front Mark

- Using a screwdriver, install a NEW snap ring on the other end of the piston pin hole.

**HINT**

Make sure that the end gap of the snap ring is NOT aligned with the pin hole cutout portion of the piston.

## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

11. Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

**Figure 16.**

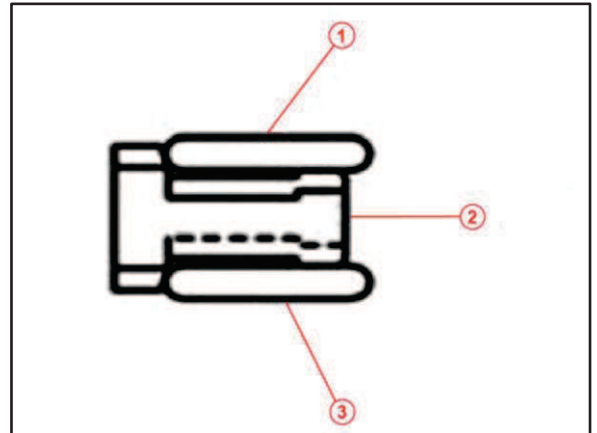


12. Install the NEW Piston Rings Set.

**NOTE**

3 piece oil control ring installation procedure is NOT included in the Repair Manual. Follow the steps below to install the piston rings and refer to the Repair Manual for ALL other reassembly steps.

**Figure 17.**



<b>1</b>	Upper Oil Ring Side Rail
<b>2</b>	Oil Ring Expander
<b>3</b>	Lower Oil Ring Side Rail

## 2ZR-FXE Engine Oil Consumption Repair Procedure

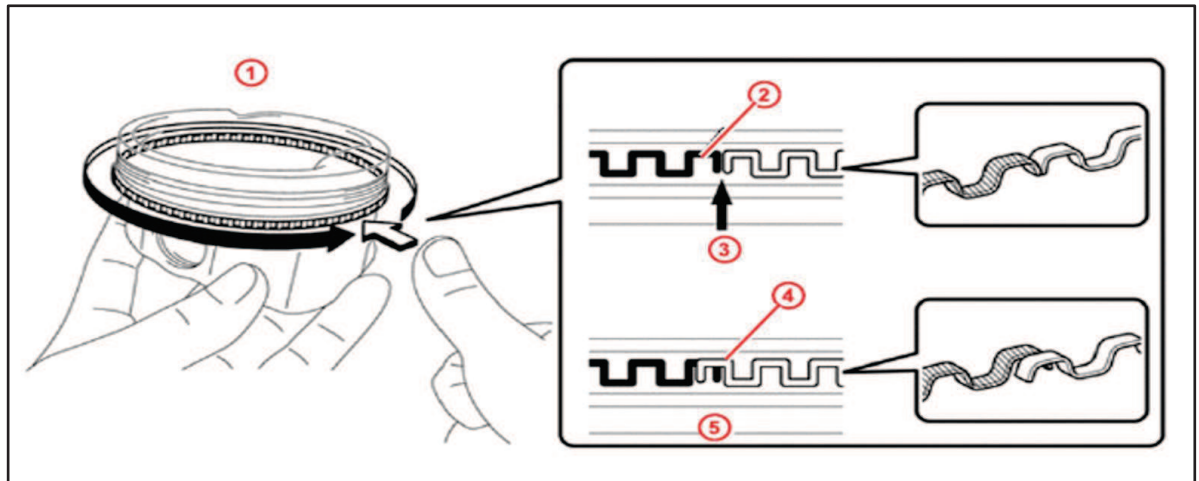
### Repair Procedure (Continued)

- A. Install the oil ring expander and 2 oil ring side rails by hand.

**NOTE**

When installing the oil expander ring, do NOT overlap the ends.

Figure 18.



1	Push Oil Ring Expander Surface Into Piston With Thumb
2	Normal Condition
3	Align End of Ring

4	NG Condition
5	Do NOT Overlap



## 2ZR-FXE Engine Oil Consumption Repair Procedure

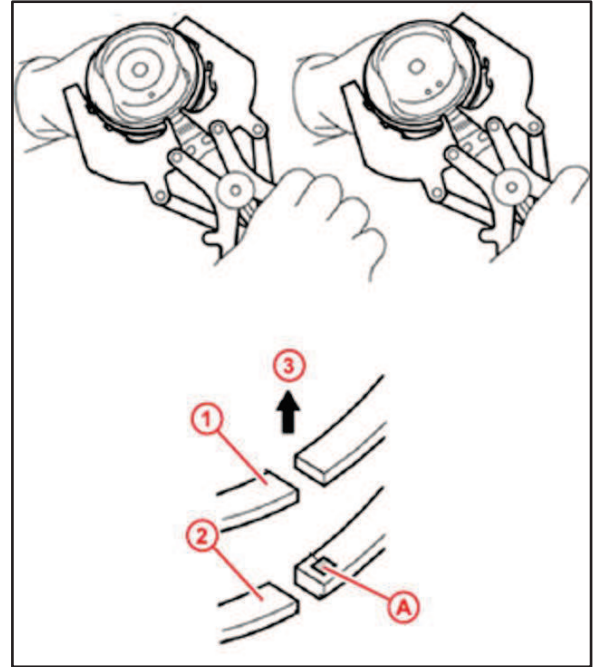
### Repair Procedure (Continued)

- B. Using a piston ring expander, install the No. 1 compression ring and No. 2 compression ring with the code mark positioned as shown.

**NOTE**

Install the No. 2 compression ring with the code mark facing upward.

**Figure 19.**



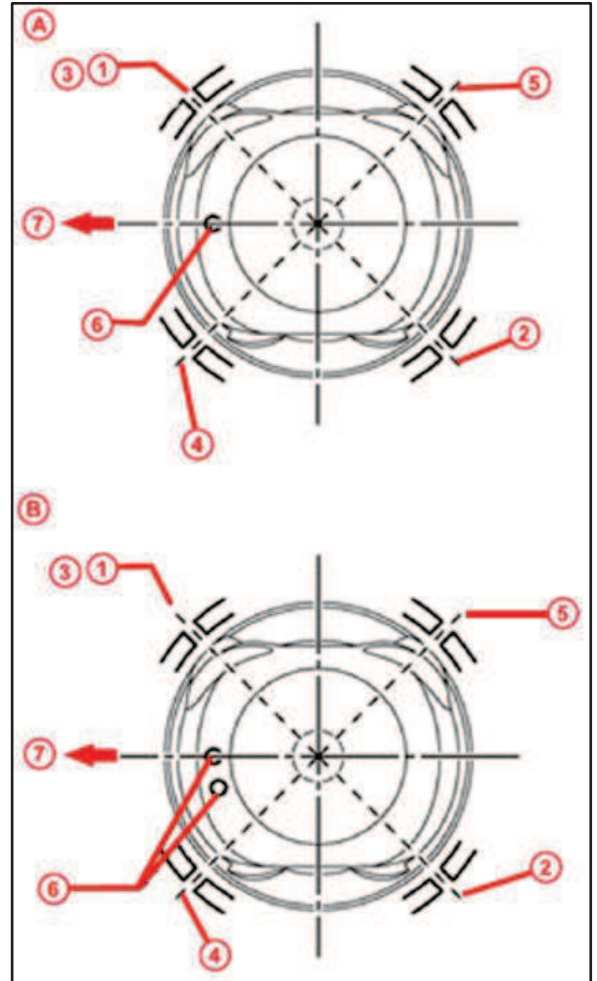
<b>A</b>	Code Mark
<b>1</b>	No. 1 Compression Ring
<b>2</b>	No. 2 Compression Ring
<b>3</b>	Upward

## 2ZR-FXE Engine Oil Consumption Repair Procedure

### Repair Procedure (Continued)

- C. Position the piston rings so that the ends are as shown.

**Figure 20.**



<b>A</b>	TMC Made
<b>B</b>	TMMK Made
<b>1</b>	No. 1 Compression Ring
<b>2</b>	No. 2 Compression Ring
<b>3</b>	Oil Ring Expander
<b>4</b>	Upper Side Rail – Oil Control Ring
<b>5</b>	Lower Side Rail – Oil Control Ring
<b>6</b>	Front Mark
<b>7</b>	Front Side

## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

13. Reassemble the cylinder block.

Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Block: Reassembly”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Block: Reassembly”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Block: Reassembly”*

14. Install the cylinder head.

Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Head Gasket: Installation”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Head Gasket: Installation”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Cylinder Head Gasket: Installation”*

15. Reassemble the engine.

Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Unit – “2ZR-FXE Engine Mechanical: Engine Unit: Reassembly”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Unit – “2ZR-FXE Engine Mechanical: Engine Unit: Reassembly”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Unit – “2ZR-FXE Engine Mechanical: Engine Unit: Reassembly”*

## 2ZR-FXE Engine Oil Consumption Repair Procedure

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### Repair Procedure (Continued)

16. Install the intake manifold.

Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Intake/Exhaust – “2ZR-FXE Intake/Exhaust: Intake Manifold: Installation”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Intake/Exhaust – “2ZR-FXE Intake/Exhaust: Intake Manifold: Installation”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Intake/Exhaust – “2ZR-FXE Intake/Exhaust: Intake Manifold: Installation”*

17. Install the engine assembly.

Refer to TIS, applicable model and model year Repair Manual:

- [2010](#) / [2011](#) / [2012](#) / [2013](#) / [2014](#) Prius:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Assembly: Installation”*
- [2010](#) / [2012](#) / [2013](#) / [2014](#) Prius PHV:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Assembly: Installation”*
- [2012](#) / [2013](#) / [2014](#) Prius V:  
*Engine/Hybrid System – Engine Mechanical – “2ZR-FXE Engine Mechanical: Engine Assembly: Installation”*

18. Perform Health Check using Techstream and test drive the vehicle to confirm normal operation.