

# Hard Start, Rough Idle, Camshaft Sensor or Misfire DTCs

**Service Category** Engine/Hybrid System

**Section** Engine Control

**Market** USA

Scion Supports  
 ASE Certification 

## Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2013	FR-S	

### **SUPERSESSION NOTICE**

The information contained in this bulletin supersedes SB No. S-SB-0033-13.

- **Parts Information and Repair Procedure sections have been updated.**

**Service Bulletin No. S-SB-0033-13 is Obsolete and any printed versions should be discarded. Be sure to review the entire content of this bulletin before proceeding.**

## Introduction

Some 2013 model year FR-S vehicles may exhibit intake and/or exhaust camshaft position sensor related and/or engine misfire DTCs (P0340, P0341, P0345, P0346, P0365, P0366, P0390, P0391, P0301, P0302, P0303, and P0304) due to the camshaft position sensor clearance being out of specification. In addition, some vehicles may also experience rough idle or extended cranking. This bulletin provides inspection and repair procedures to improve this condition.

## Production Change Information

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

MODEL	PRODUCTION CHANGE EFFECTIVE VIN
FR-S	JF1ZNAA1#D#721474

## Hard Start, Rough Idle, Camshaft Sensor or Misfire DTCs

### Warranty Information

OP CODE	DESCRIPTION	TIME	OFF	T1	T2
EG1311	R & R Shim Camshaft Sensor	0.6	SU003-00186	07	44

#### 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
SU003-00184	O-Ring Camshaft (Bank 1 Exhaust Only)	As Needed
SU003-00185	O-Ring Camshaft (All Others)	As Needed
SU003-04660	Repair Part Set* (Bank 1 Exhaust Only)	1
SU003-04600	Repair Part Set* (All Others)	1

\* Refer to the table below for the list of parts included in both Repair Part Sets (also called "Shim Kits").

SU003-04660	SU003-04600	CAM SENSOR MEASURED CLEARANCE (MM)	SHIM THICKNESS (MM)	TARGET GAP (MM)
PART NUMBER RH (B1) EXHAUST ONLY	PART NUMBER INTAKE AND LH (B2) EXHAUST ONLY			
10130-AA170	10130-AA070	0.45 – 0.55	0.8	1.25 – 1.35
10130-AA180	10130-AA080	0.56 – 0.65	0.7	1.26 – 1.35
10130-AA190	10130-AA090	0.66 – 0.75	0.6	1.26 – 1.35
10130-AA200	10130-AA100	0.76 – 0.85	0.5	1.26 – 1.35
10130-AA210	10130-AA110	0.86 – 0.95	0.4	1.26 – 1.35
10130-AA220	10130-AA120	0.96 – 1.05	0.3	1.26 – 1.35
10130-AA230	10130-AA130	1.06 – 1.15	0.2	1.26 – 1.35
10130-AA240	10130-AA140	1.16 – 1.25	0.1	1.26 – 1.35

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### Required Tools & Equipment

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
Techstream 2.0**	ADE	TS2UNIT	1
TIS Techstream		TSPKG1	
Techstream Lite		TSLITEDLR01	

\*\* Essential SST.

**NOTE**

- Only ONE of the Techstream units listed above is required.
- Software version 9.10.037 or later is required.
- Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.

REQUIRED EQUIPMENT	QTY
Digital Caliper with Depth Attachment	1

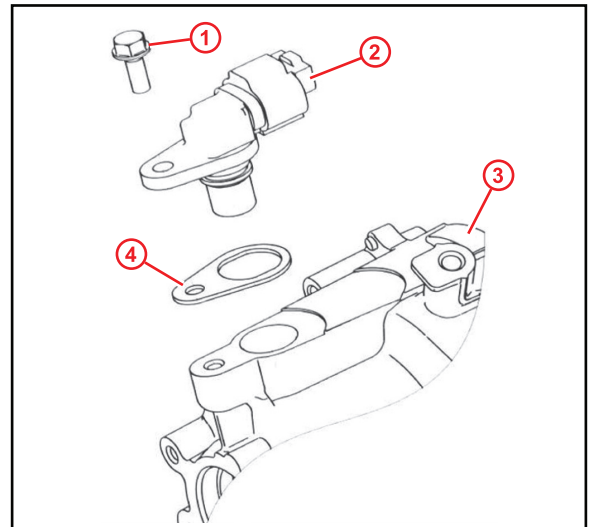
## Hard Start, Rough Idle, Camshaft Sensor or Misfire DTCs

### Inspection Procedure

1. Confirm MIL "ON" with camshaft sensor DTC as described in the Introduction.
2. Disconnect the negative (-) battery cable.
3. Proceed to the applicable Repair Procedure based on the DTC listed in the table below.

DTC	BANK	CONDITION	SHIM KIT P/N	O-RING P/N	REPAIR PROCEDURE		
P0340	B1 Intake	Circuit	SU003-04600	SU003-00185	Intake Camshaft Position Sensor		
P0341		Circuit/Performance					
P0345	B2 Intake	Circuit					
P0346		Circuit/Performance					
P0390	B2 Exhaust	Circuit			SU003-04660	SU003-00184	Exhaust Camshaft Position Sensor
P0391		Circuit/Performance					
P0365	B1 Exhaust	Circuit					
P0366		Circuit/Performance					

Figure 1.



1	Torque = 6.4 N*m (0.7 kgf*m, 4.7 ft*lbf)
2	Camshaft Sensor
3	Timing Chain Cover
4	Shim (to Be Added)

## Hard Start, Rough Idle, Camshaft Sensor or Misfire DTCs

### Repair Procedure: Intake Camshaft Position Sensor

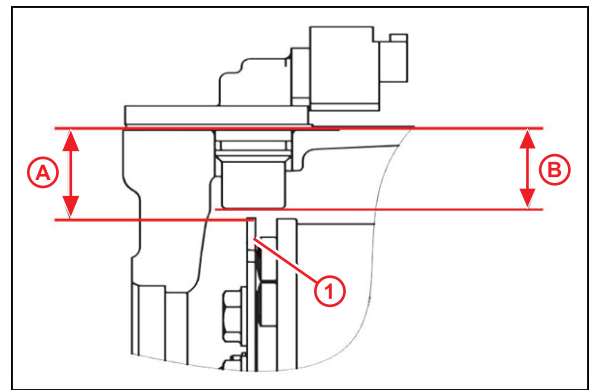
1. Remove applicable camshaft sensor.

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

- 2013 FR-S:  
*Engine/Hybrid System – Engine Control – “FA20 Engine Control: Camshaft Position Sensor: [Removal](#)”*

2. Take measurement “A” (top of timing chain cover to camshaft position sensor plate) on the 3 sections of the sensor plate (at approximately 70° apart) and record the readings.

Figure 2.



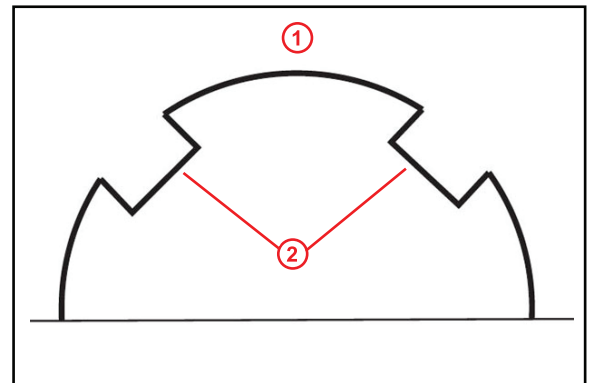
<b>A</b>	Top of Timing Chain Cover to Camshaft Position Sensor Plate
<b>B</b>	Camshaft Position Sensor Mating Surface to Bottom of Sensor
<b>1</b>	Camshaft Position Sensor Plate

- A. Take measurement “A” and record the reading.

**NOTE**

When measuring “A” make sure you are measuring the outside diameter or “top” of the sensor plate, and NOT in the notch as shown in Figure 3. Be sure to record all measurements.

Figure 3.



<b>1</b>	Top of Sensor Plate (Measure at this Point)
<b>2</b>	Notch (Do NOT Measure at this Point)

## Hard Start, Rough Idle, Camshaft Sensor or Misfire DTCs

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### Repair Procedure: Intake Camshaft Position Sensor (Continued)

Figure 4.



- B. Using a breaker bar and 22 mm socket, place the socket on the crankshaft pulley bolt and rotate the engine clockwise approximately 70°. Keep in mind NOT to measure the notches as described in Figure 3.

**NOTICE**

Do NOT rotate the engine counterclockwise, doing so will loosen the crankshaft pulley bolt. If the engine is accidentally turned counterclockwise, make sure the bolt is re-torqued following the proper procedure in the applicable Repair Manual.

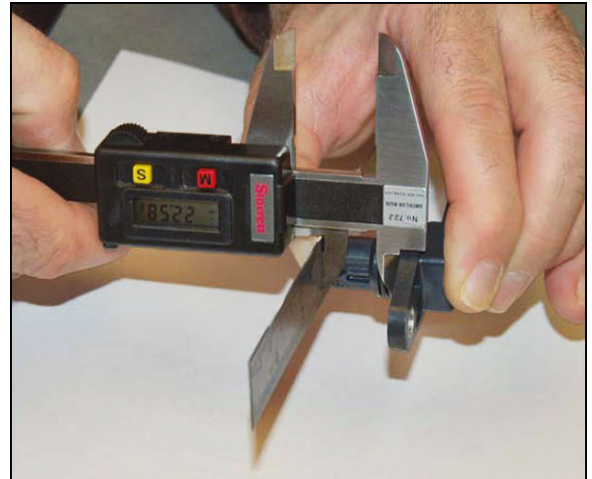
- C. Use the smallest of the 3 measurements and record the result.

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### Repair Procedure: Intake Camshaft Position Sensor (Continued)

3. Take measurement "B" (camshaft position sensor mating surface to the bottom of the sensor, refer to Figure 2) and record the readings.

Figure 5.



**NOTE**

When taking measurement "B" use a flat steel ruler, or equivalent, along with the Digital Caliper.

- A. Measure the distance between the camshaft position sensor mounting surface and the bottom of the sensor as shown.

**NOTE**

The specified clearance is 1.3 +/- 0.05 mm (1.25 to 1.35 mm or 0.049 to 0.053 in.).

**Example calculation:**

- A = Top of timing chain cover to camshaft position sensor plate
- B = Camshaft position sensor mating surface to the bottom of the sensor
- A = 23.70 mm
- B = 22.58 mm
- A - B = 1.12 mm (clearance)

In this example a 0.2 mm shim is required.

- B. Select appropriate shim and go to step 4.

**NOTE**

Select **ONLY 1** shim. Do **NOT** stack shims.

4. Install the NEW O-Ring Camshaft (one time use item).

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

- 2013 FR-S:  
*Engine/Hybrid System – Engine Control – "FA20 Engine Control: Camshaft Position Sensor: [Installation](#)"*

5. Reinstall the camshaft position sensor and shim.

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### Repair Procedure: Intake Camshaft Position Sensor (Continued)

6. Tighten the sensor retaining bolt.  
**Torque: 6.4 N\*m (0.7 kgf\*cm, 4.7 ft\*lbf)**
7. Reconnect the sensor engine wiring harness connector.
8. Reconnect the negative (-) battery cable to complete the repair.
9. Clear the ECM memory before returning the vehicle to the customer.
10. Confirm repair by test driving the vehicle and confirm that the DTCs do NOT reset.

### Repair Procedure: Exhaust Camshaft Position Sensor

Use the following procedure if your DTC pertains to the exhaust side sensor.

**Figure 6.**



**1** Camshaft Position Sensor Harness Connector

1. Confirm DTC pertains to the exhaust side camshaft sensor (see DTC chart in the Inspection Procedure to determine which Shim Kit and O-ring to use).
2. Remove the applicable sensor from the timing cover and install a 0.2 mm thick shim from the applicable kit. If the DTC returns, use the next thicker shim (0.3 mm) and repeat as needed increasing the shim thickness 0.1 mm at a time.

**NOTE**

Select **ONLY 1 shim**. Do **NOT** stack shims.



## Hard Start, Rough Idle, Camshaft Sensor or Misfire DTCs

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### Repair Procedure: Exhaust Camshaft Position Sensor (Continued)

3. Install the NEW O-Ring Camshaft (one time use item).

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

- 2013 FR-S:  
*Engine/Hybrid System – Engine Control – “FA20 Engine Control: Camshaft Position Sensor: [Installation](#)”*

4. Reinstall the camshaft position sensor and shim.
5. Tighten the sensor retaining bolt.  
**Torque: 6.4 N\*m (0.7 kgf\*cm, 4.7 ft\*lbf)**
6. Reconnect the sensor engine wiring harness connector.
7. Reconnect the negative (–) battery cable to complete the repair.
8. Clear the ECM memory before returning the vehicle to the customer.
9. Confirm repair by test driving the vehicle and confirm that the DTCs do NOT reset.