

**ATTENTION:**

- GENERAL MANAGER
- PARTS MANAGER
- CLAIMS PERSONNEL
- SERVICE MANAGER

IMPORTANT - All Service Personnel Should Read and Initial in the boxes provided, right.




QUALITY DRIVEN® SERVICE

**SERVICE BULLETIN**

**APPLICABILITY:** 2013MY Legacy and Outback Models Equipped With 2.5L FB Engine      **NUMBER:** 11-122-12  
**DATE:** 11/02/12

**SUBJECT:** Difficulty Starting, Rough Idle, Cam Position or Misfire DTCs  
 DTCs P0340, 341, 345 or 346, P0301, 302, 303 or 304

**INTRODUCTION**

This bulletin will provide an inspection and repair procedure for camshaft position-related and/or engine misfire DTCs for 2.5L FB engine-equipped 2013MY Legacy and Outback models. In addition to a Check Engine light coming on, there may or may not be customer concerns of rough idle, extended cranking or no start. The camshaft position sensor clearance may be out of specification causing these condition(s) and one or more of the DTCs to set.

**PART INFORMATION**

- Repair Part Set - 8 Shims/Spacers, p.n. 10130AA060, contains 8 cam position sensor shims, 0.1 to 0.8mm in thickness.
- Camshaft position sensor o-ring, p.n. 13099AA050 (one time use item - lubricate prior to use).

**NOTE:** The part numbers shown below are for reference only and cannot be ordered individually. If a shim is required, the shim kit must be ordered.

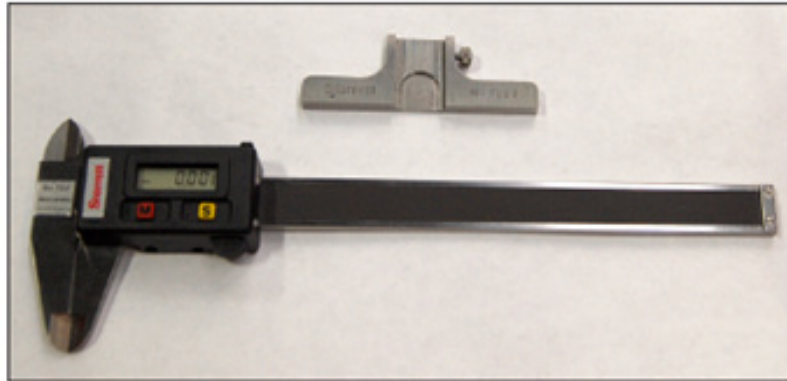
PART NUMBER	CLEARANCE (MM)	SHIM THICKNESS (MM)	TARGET GAP (MM)
10130AA070	0.45 – 0.55	0.8	1.25 – 1.35
10130AA080	0.56 – 0.65	0.7	1.26 – 1.35
10130AA090	0.66 – 0.75	0.6	1.26 – 1.35
10130AA100	0.76 – 0.85	0.5	1.26 – 1.35
10130AA110	0.86 – 0.95	0.4	1.26 – 1.35
10130AA120	0.96 – 1.05	0.3	1.26 – 1.35
10130AA130	1.06 – 1.15	0.2	1.26 – 1.35
10130AA140	1.16 – 1.25	0.1	1.26 – 1.35

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<p><b>CAUTION: VEHICLE SERVICING PERFORMED BY UNTRAINED PERSONS COULD RESULT IN SERIOUS INJURY TO THOSE PERSONS OR TO OTHERS.</b></p> <p>Subaru Service Bulletins are intended for use by professional technicians ONLY. They are written to inform those technicians of conditions that may occur in some vehicles, or to provide information that could assist in the proper servicing of the vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do the job correctly and safely. If a condition is described, DO NOT assume that this Service Bulletin applies to your vehicle, or that your vehicle will have that condition.</p>	<p><b>SUBARU OF AMERICA, INC. IS "ISO 14001 COMPLIANT"</b></p> <p>The international standard for excellence in Environmental Management Systems. Please recycle or dispose of automotive products in a manner that is friendly to our environment and in accordance with all local, state and federal laws and regulations.</p>
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## SPECIAL TOOLS REQUIRED

- Pulse/Analog Box, SDI Box and SSMIII
- Digital Caliper with depth attachment
- Flat washer, outside diameter 25.5mm, inside diameter 11.1mm, 7.72mm thick (or equivalent size). The purpose of the flat washer is to provide a surface for the caliper to rest on while making the measurements. **NOTE:** If you have the depth attachment for your digital caliper, the washer will not be needed.



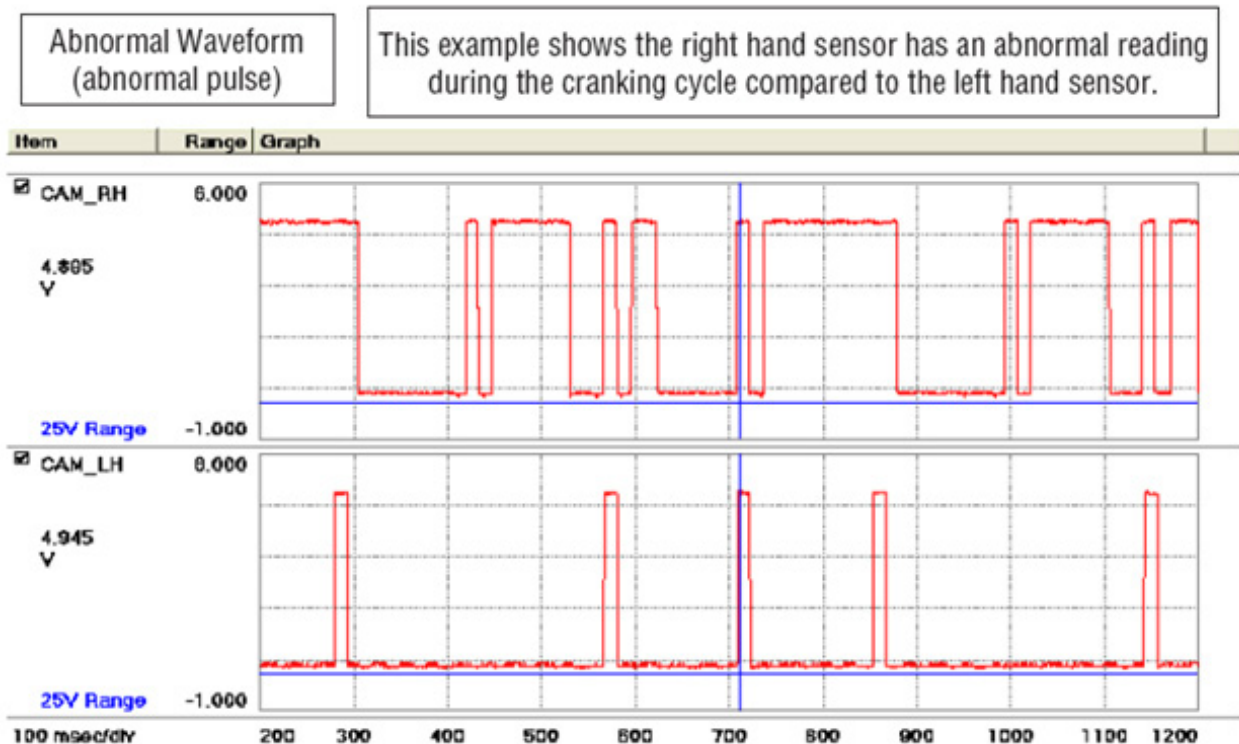
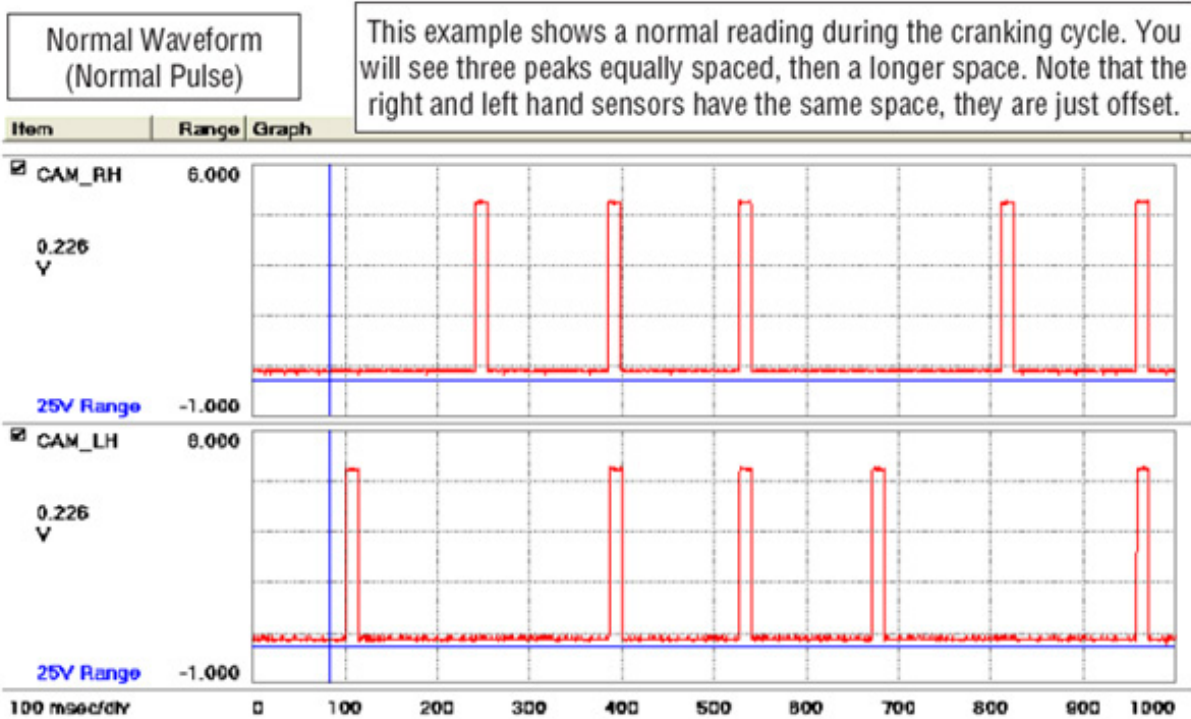
## SERVICE PROCEDURE / INFORMATION

Check the waveforms of the camshaft position sensor using the Pulse/Analog Box, SDI Box and the oscilloscope function of the SSMIII. For detailed information and instructions, refer to the applicable Service Manual, SSMIII User's Guide and Subaru Diagnostic System (SDS). The "Help" function will allow you to access the tutorial information if needed.

**IMPORTANT:** When back-probing the ECM connectors to attach the oscilloscope leads, refer to the wiring schematic for the specific DTC being diagnosed in the applicable Service Manual for proper connector and terminal locations.

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The following illustrations show a normal oscilloscope pattern followed by an abnormal pattern.

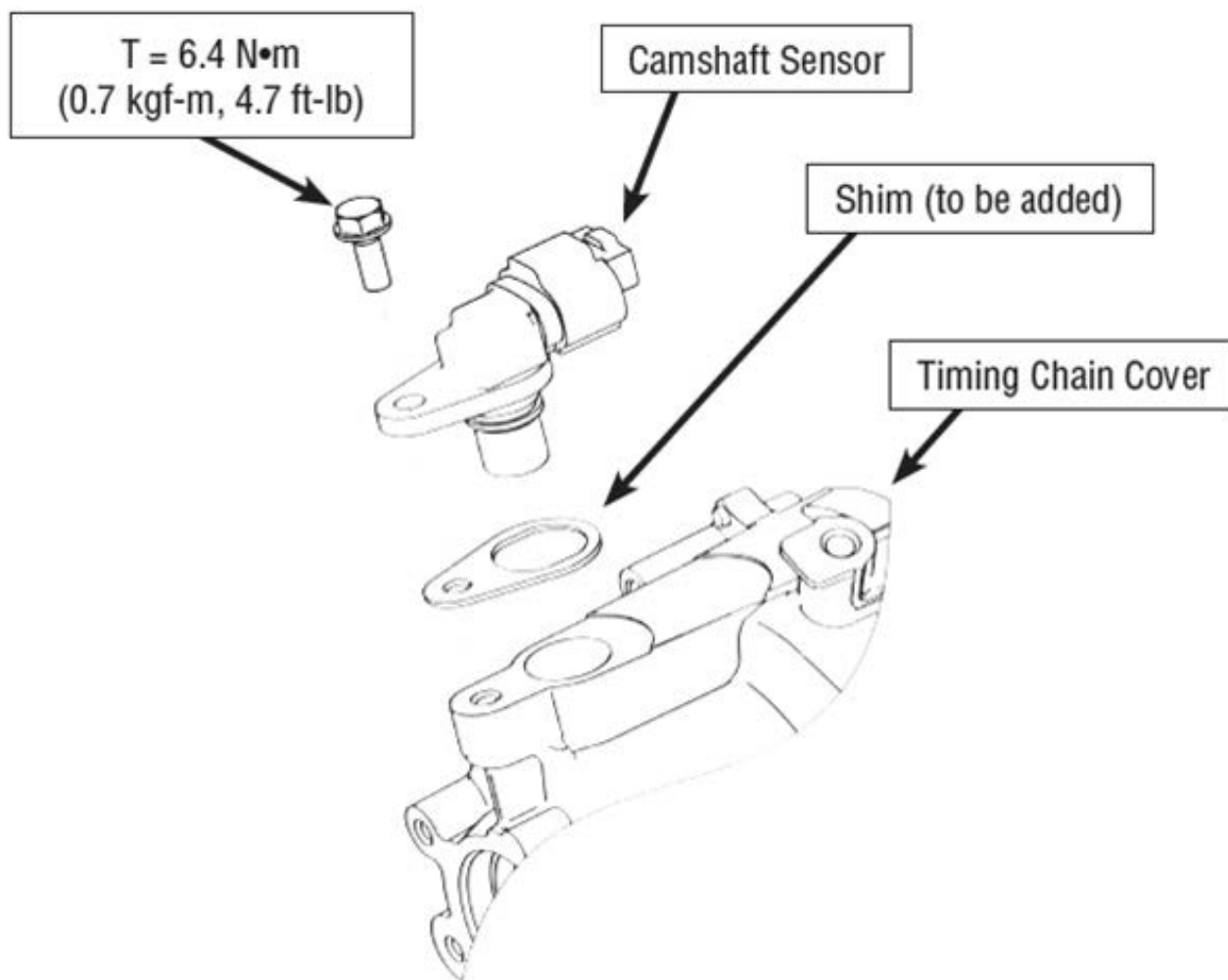


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If an abnormal pattern is verified similar to those shown in the illustration above, measure the clearance between the end of the camshaft position sensor and the sensor plate using the following procedure. If the oscilloscope pattern is normal, refer to the applicable Service Manual for additional troubleshooting and diagnostic procedures.

**The specified clearance is 1.3 +/- .05mm (1.25 to 1.35mm or .049" to .053").**

- Record radio station presets (and navigation system favorites if applicable).
- Disconnect the negative battery cable.
- Remove the camshaft position sensor from the timing chain cover using the procedure in the applicable Service Manual.



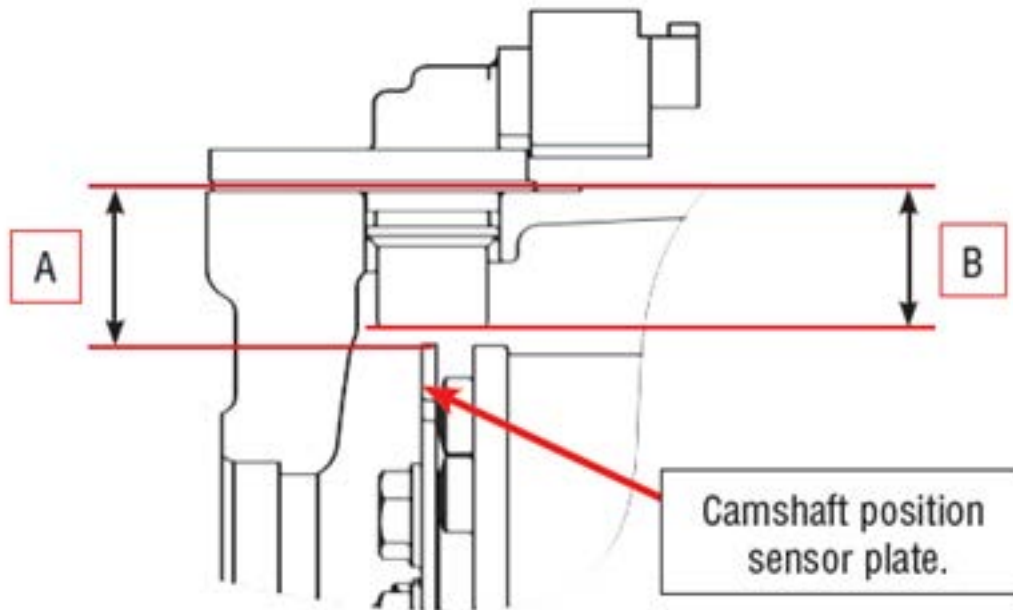
**Component Overview**

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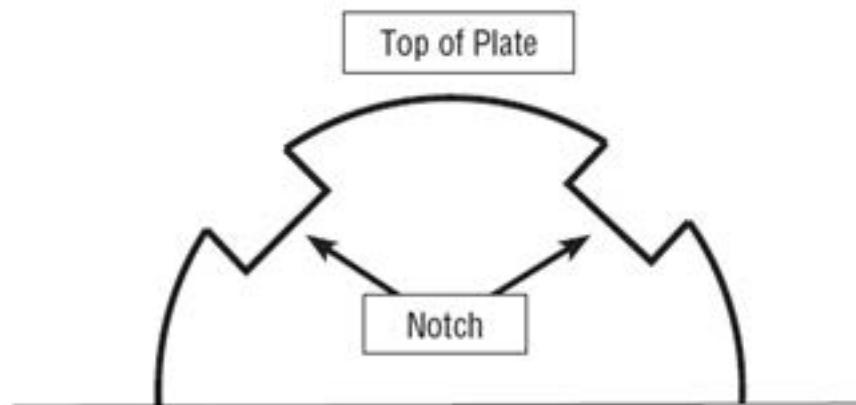
**MEASUREMENTS:**

**A**= Top surface of the timing chain cover to camshaft sensor plate

**B**= Camshaft Position Sensor mating surface to the bottom of the sensor



**NOTE:** When measuring “A”, make sure you are measuring to the outside diameter or “top” of the sensor plate and not to the bottom of a notch as shown below. Be sure to record all measurements.



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Measurement taken using digital caliper with depth attachment.



Measurement taken using digital caliper with washer.

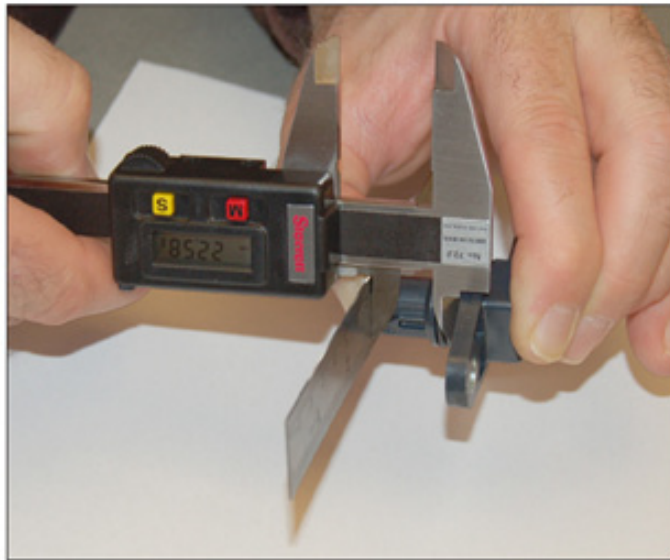


**IMPORTANT:** When using the flat washer, make sure the washer is fully seated on the machined surface of the timing cover or your measurements will not be accurate.

1. Take a measurement and record the reading
2. Using the breaker bar and 22mm socket, place the socket on the crankshaft pulley bolt and rotate the engine clockwise approximately 70°. **CAUTION:** Do not rotate the engine counter-clockwise as doing so may loosen the crankshaft pulley bolt. If the engine is accidentally turned counter-clockwise, make sure the crankshaft pulley bolt is re-torqued to proper specifications.
3. Take a second measurement and record the reading.
4. Rotate the engine clockwise approximately 70° again.
5. Take a third measurement and record the reading.
6. Use the smallest of the three measurements for the “A” value of your shim thickness calculation.

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When taking measurement “B”, use a flat steel ruler or equivalent.



Measure the camshaft position sensor mating surface (the area that sits flush on the timing chain cover) to the bottom of the sensor and record measurement.

**IMPORTANT:** Be sure to account for the thickness of the flat washer when performing your calculations to determine the required shim thickness.

**The specified clearance is 1.3 +/- .05mm (1.25 to 1.35mm or .049” to .053”).**

Example calculation (the 1.72mm thickness of the flat washer is subtracted from “A” measurement):

**A**= Top surface of the timing chain cover to camshaft sensor plate

**B**= Camshaft Position Sensor mating surface to the bottom of the sensor

$$A) 25.42 - 1.72 = 23.70$$

$$A = 23.70$$

$$B = 22.58$$

$$A - B = 1.12 \text{ (clearance)}$$

In this example a 0.2 shim is required.

CLEARANCE (MM)	SHIM THICKNESS (MM)	TARGET GAP (MM)
1.06 – 1.15	0.2	1.26 – 1.35

After the correct shim is selected:

- Replace the camshaft position sensor o-ring (one time use item - lubricate prior to use).
- Reinstall the camshaft position sensor and shim.
- Torque the sensor's retaining bolt to 6.4 Nm (4.7 ft. lbs. or 56.4 inch-pounds).
- Reconnect the sensor's engine wiring harness connector.
- Reset the radio station presets (and navigation system favorites if applicable).
- Road test the vehicle to confirm the repairs are complete.

## **WARRANTY / CLAIM INFORMATION**

For vehicles within the Basic New Car Limited Warranty period, this repair may be claimed using the following information.

<b>LABOR DESCRIPTION</b>	<b>LABOR OPERATION #</b>	<b>FAIL CODE</b>	<b>LABOR TIME</b>
<b>Cam Sensor Measurement &amp; Shim Installation</b>	<b>A817-211</b>	<b>UKM-20</b>	<b>0.5</b>