

**ATTENTION:**

GENERAL MANAGER ☐  
 PARTS MANAGER ☐  
 CLAIMS PERSONNEL ☐  
 SERVICE MANAGER ☐

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


**SUBARU**

QUALITY DRIVEN® SERVICE

**SERVICE BULLETIN**

**APPLICABILITY:** 2012 and 13MY Impreza and XV Crosstrek™ **NUMBER:** 11-125-12  
 Models Equipped With FB Engine **DATE:** 12/03/12

**SUBJECT:** DTCs P0365, P0366, P0390 and P0391  
 Misfire DTCs P0301, P0302, P0303 and P0304

**INTRODUCTION**

This Service Bulletin will provide an inspection and repair procedure for EXHAUST camshaft position and / or misfire-related DTCs for FB engine-equipped 2012 and later MY Impreza and XV Crosstrek models with FB engines. The camshaft position sensor clearance may be out of specification causing these condition(s) and one or more of the DTCs to set. 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.

**NOTE:** DTC P0366 and P0391 are not applicable to 2012MY vehicles.

**PART INFORMATION**

- Shim kit, 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).

**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

*continued...***CAUTION: VEHICLE SERVICING PERFORMED BY UNTRAINED PERSONS COULD RESULT IN SERIOUS INJURY TO THOSE PERSONS OR TO OTHERS.**

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.

**SUBARU OF AMERICA, INC. IS "ISO 14001 COMPLIANT"**

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.

## SPECIAL TOOLS

- Pulse/Analog Box, SDI Box and SSMIII
- Digital Caliper with depth attachment or 1" Depth Micrometer
- If you do not have the depth attachment for your digital caliper or a Depth Micrometer use a flat washer (outside diameter 25.5mm, inside diameter 11.1mm, 1.72mm thick or equivalent). The purpose of the flat washer is to provide a surface for the digital caliper to rest on while making the measurements.



Digital Caliper with Depth Attachment

## SERVICE PROCEDURE / INFORMATION

Check the waveforms of the EXHAUST camshaft position sensor (CPS) 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.

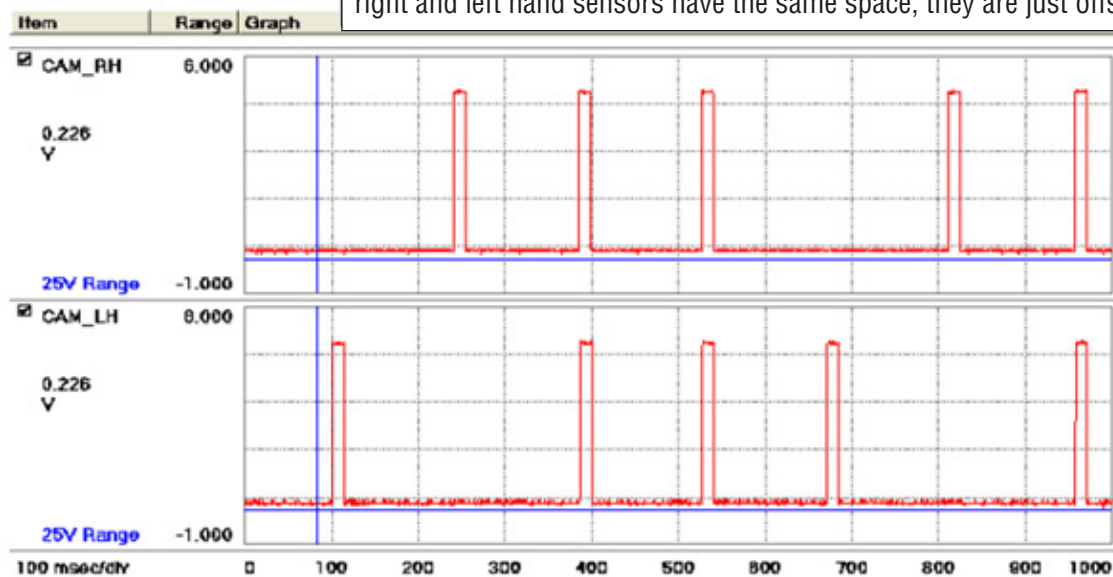
**IMPORTANT:** When back-probing the ECM connectors to attach the oscilloscope leads, refer to the wiring schematic for the specific DTC being diagnosed in the applicable Service Manual for proper connector and terminal locations.

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

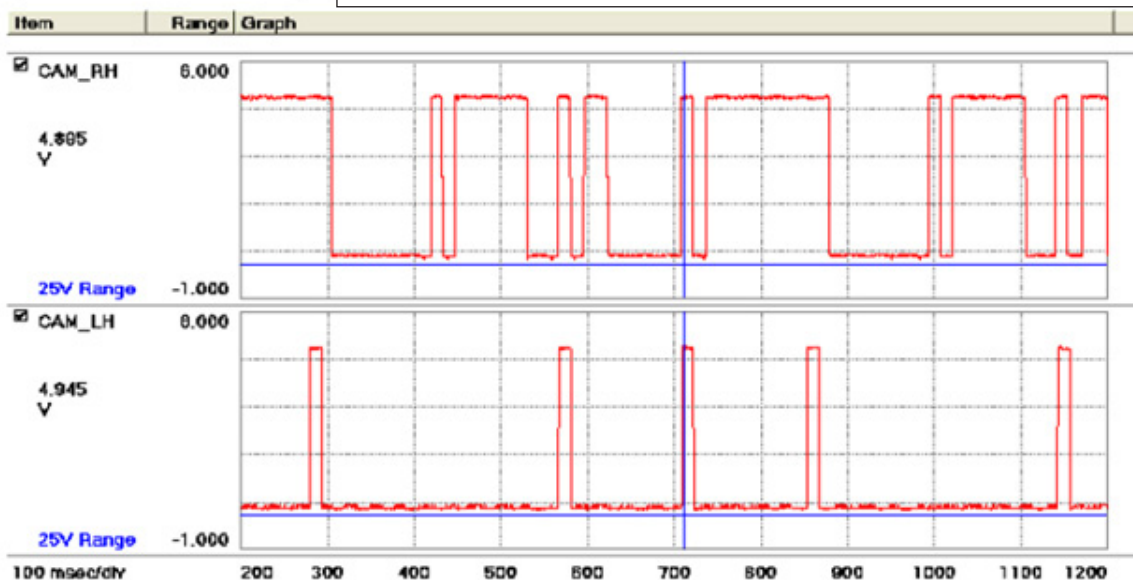
Normal Waveform  
(Normal Pulse)

This example shows a normal reading during the cranking cycle. You will see three peaks equally spaced, then a longer space. Note that the right and left hand sensors have the same space, they are just offset.



Abnormal Waveform  
(abnormal pulse)

This example shows the right hand sensor has an abnormal reading during the cranking cycle compared to the left hand sensor.



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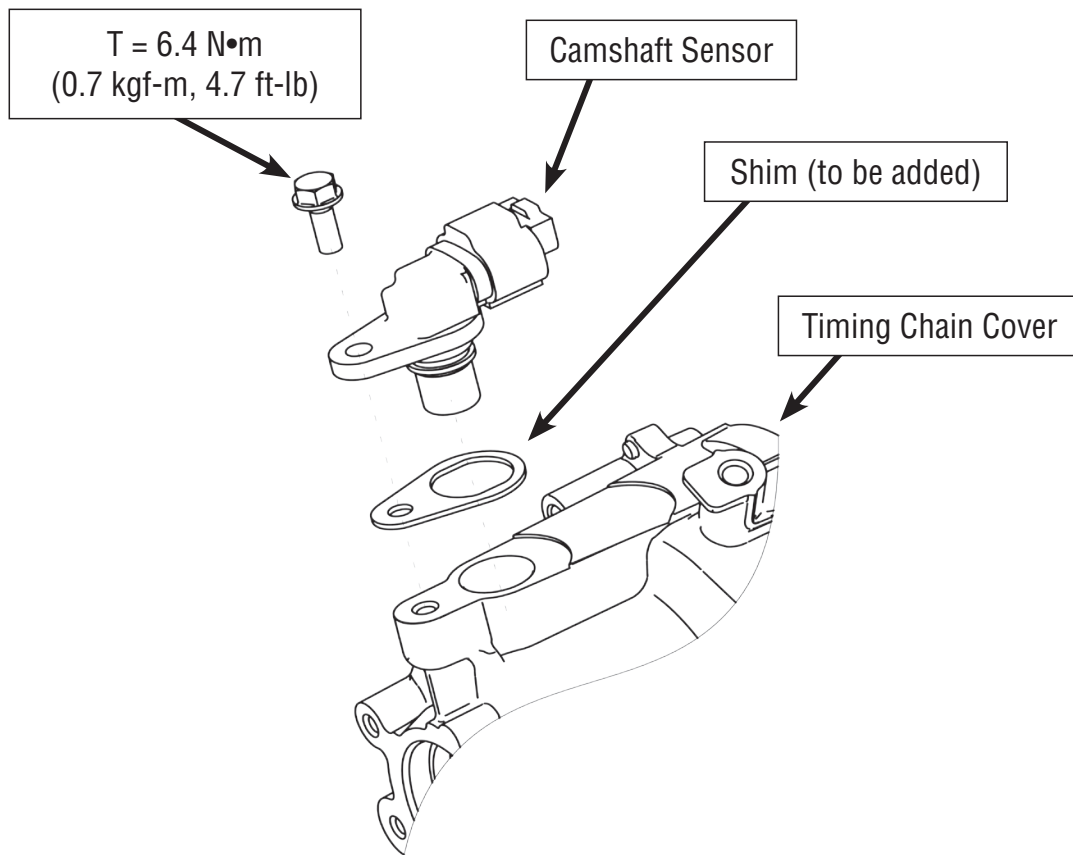
If an abnormal pattern is verified similar to those shown in the illustration above, measure the clearance between the end of the exhaust camshaft position sensor and the sensor plate using the following procedure.

If the oscilloscope pattern is normal, refer to the applicable Service Manual for additional troubleshooting and diagnostic procedures.

## MEASUREMENT PROCEDURE

**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.
- Raise the vehicle on a lift and remove the engine under-guard.
- Remove the exhaust camshaft position sensor from the timing chain cover using the procedure in the applicable Service Manual.



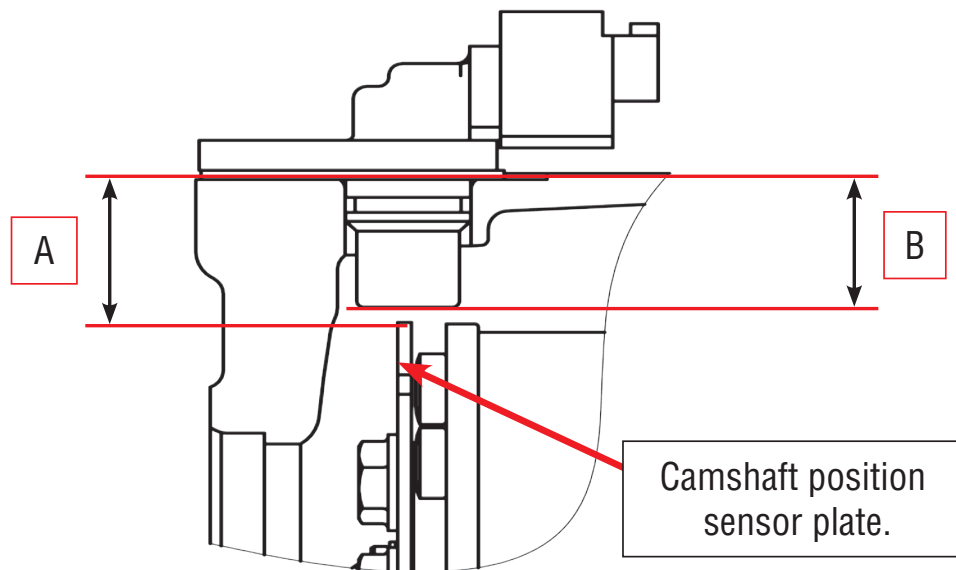
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## COMPONENT OVERVIEW

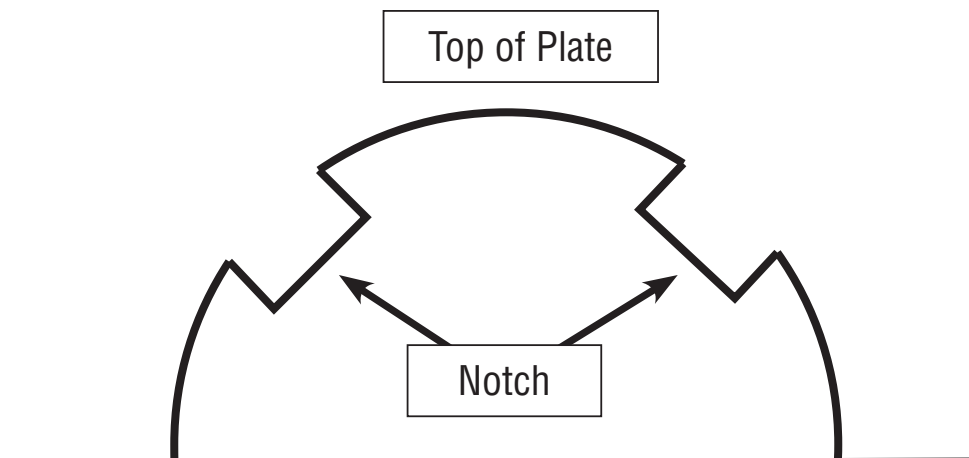
### Measurements

A = Top of timing chain cover to camshaft position sensor plate

B = Camshaft position sensor mating surface to the bottom of the sensor

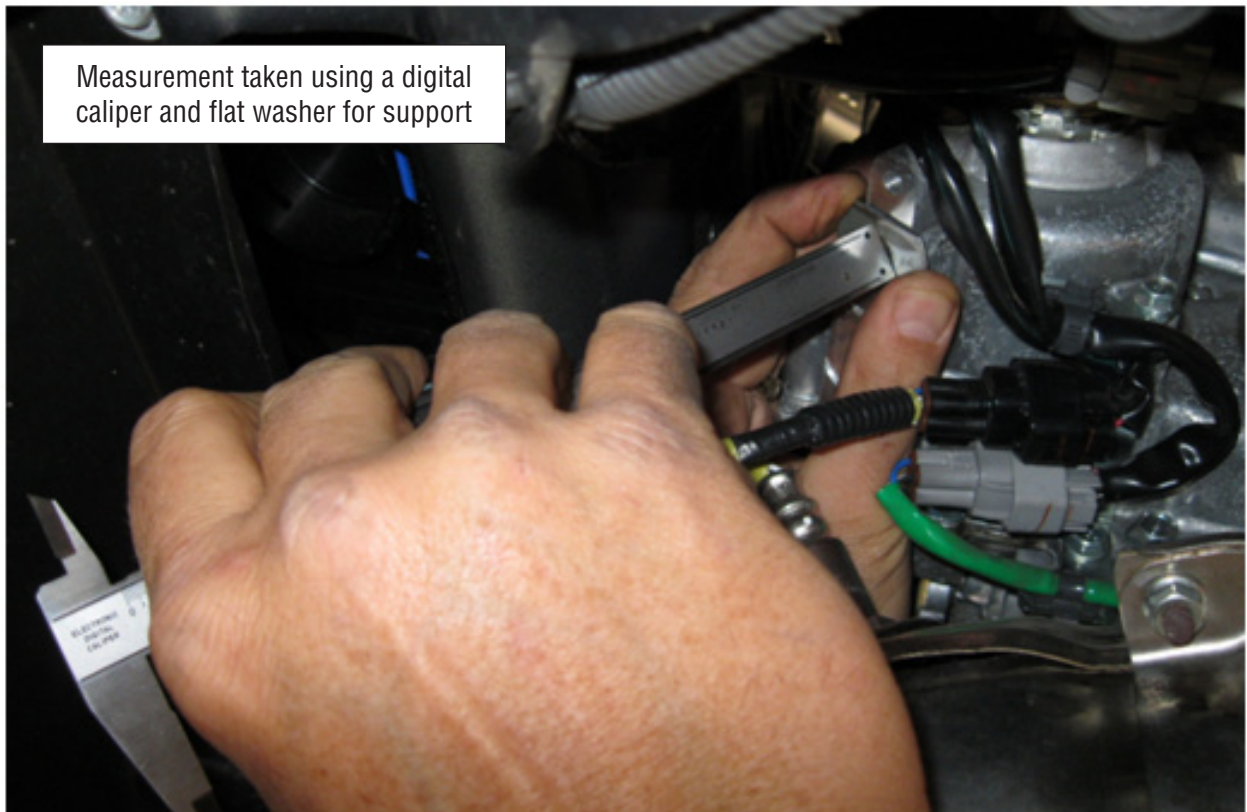


**NOTE:** When measuring “A”, make sure you are measuring to the outside diameter or “top” of the sensor plate and not to the bottom of a notch as shown below. Be sure to record all measurements.



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Measurement taken using a digital caliper and flat washer for support

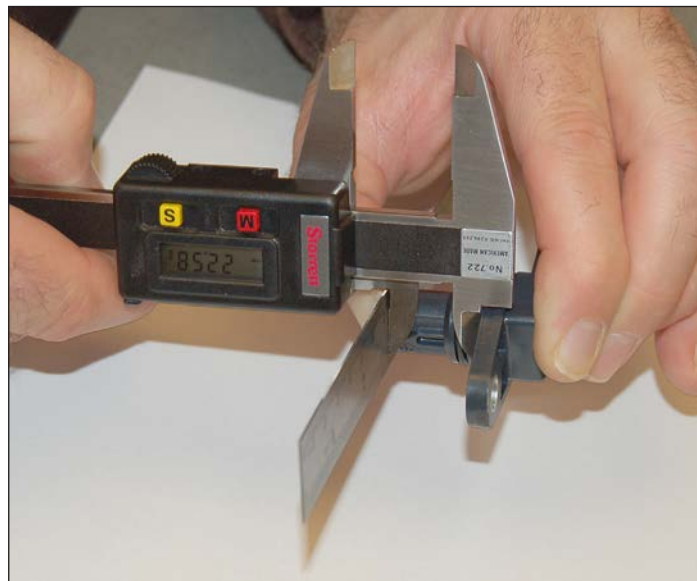
**IMPORTANT:** When using the flat washer for support, make sure it is fully seated on the machined surface of the timing cover as shown in the photo below or your measurements will not be accurate.



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1. Take a measurement and record the reading.
2. Using a 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, doing so will loosen the crankshaft pulley bolt. If the engine is accidentally turned counter-clockwise make sure the bolt is re-torqued to proper specification when completed.
3. Take a measurement and record the reading.
4. Rotate the engine **clockwise** approximately 70°.
5. Take a measurement and record the reading.
6. Use the smallest of three measurements and record the result.

**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.

*continued...*

**IMPORTANT:** If applicable, 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" dimension)

A = Top of timing chain cover to camshaft position 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:**

- Install a new camshaft position sensor o-ring (one time use item).
- Reinstall the camshaft position sensor and shim.
- Torque the sensor retaining bolt to 6.4 Nm (4.7 ft. lbs. or 56.4 inch-pounds).
- Reconnect the sensor engine wiring harness connector.
- Reconnect the negative battery cable and 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.

Labor Description	Labor Operation#	Fail Code	Labor Time
Exhaust Cam Sensor Measurement & Shim Installation	A817-213	UKM-20	0.6