	GROUP	MODEL
	SST	Applicable Models For BCT
	NUMBER	DATE
	067 (Rev 1, 11/04/2021)	March 2020

TECHNICAL SERVICE BULLETIN

SUBJECT: BEARING CLEARANCE TESTER (BCT) PROCEDURES

This bulletin provides information regarding test procedure of the Bearing Clearance Tester (BCT) Special Service Tool (SST). The SST comes pre-calibrated from the supplier however, in some cases, due to variable shop compressor air pressure, the SST may need to be re-calibrated to ensure that the tool provides accurate readings when testing the engine rod bearing wear. The calibration and BCT measuring point maintenance is included in this bulletin. Follow the procedure outlined in this publication to perform the BCT procedure for the applicable engines listed below:

NOTICE

It is recommended that the SST is always connected to a known good air supply that is consistently providing the same air pressure to the SST when using. Switching the SST to multiple different locations is not recommended for this reason. Do not use a portable air compressor ever.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

ADDITION OF BLUE LOCTITE TO BCT MEASURING POINT

This outline provides information regarding the application of Loctite® Threadlocker Blue 242 to the dial gauge 'measuring point' end included in the Engine Bearing Clearance Tester (BCT) kit SST KQ231 2T110QQK. This extra step helps reduce the possibility of the measuring point tip loosening on the dial gauge due to repeated use. If measuring tip comes loose, inaccurate BCT measuring readings will result.

This tool remedy should only need to be performed once.

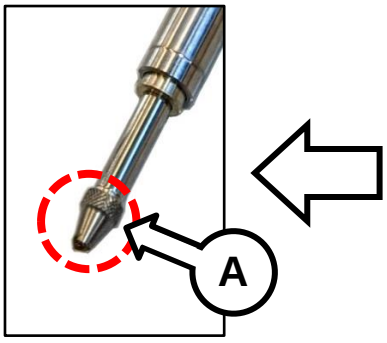

Probe Rod

Instructions:

1. Unscrew the 'measuring point' end (A) from the base of the dial gauge.
2. Apply one drop of blue Loctite® to the threaded end of the 'measuring point'.
3. Reinstall the 'measuring point' end back onto the dial gauge finger tight.
4. Fully insert the dial gauge into the probe rod.
5. Secure the gauge to the probe rod by tightening the locking wing nut by hand.
6. Test gauge operation by pressing the lower bar of the probe rod inward and verify the gauge readings correspond with the movement

(BCT) Dial Gauge

Measuring Point (A)



Loctite® Threadlocker

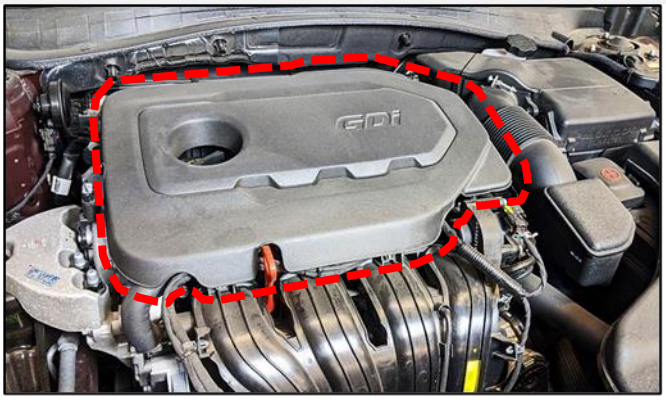
For replacement parts, contact Snap-On Tools at (888) 542-1011.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

BCT Procedure (THETA GDI Engines):

1. Open the hood and remove the cover.

Bearing Clearance Test Video

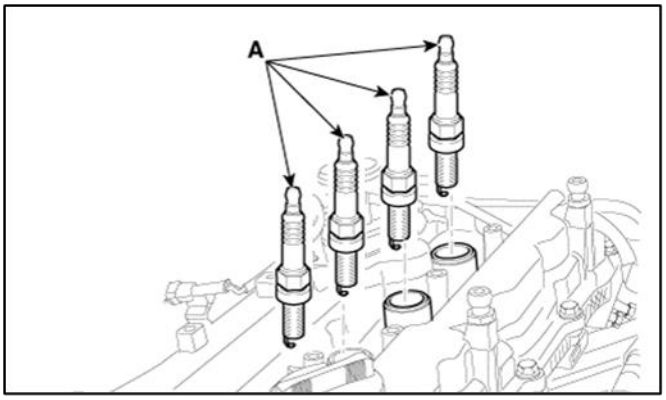


IMPORTANT

Have the SST Engine Bearing Clearance kit ready. Place it on a table/cart next to the vehicle and use a fender cover. Use air gun to blow off any debris from the engine top area.

For troubleshooting assistance, contact the GITA Support Line at: (888) 542-4371.

2. Remove the four (4) spark plugs (A) by referring to the "Maintenance → Power Train → Spark Plug → Repair procedures (Replacement)" in the applicable Shop Manual on KGIS.

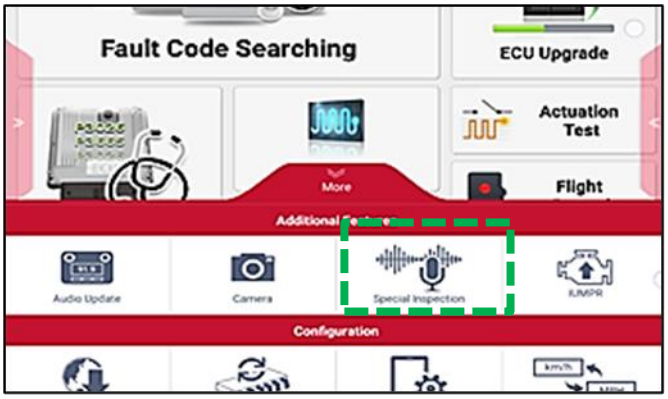


3a. Using KDS, connect the VCI-II to the vehicle's OBD-II port.

3b. Turn the ignition to **'ON'**.

3c. On the KDS screen, select **'Special Inspection'** on the bottom tab of the Home screen.

3d. Select the applicable vehicle model/year.



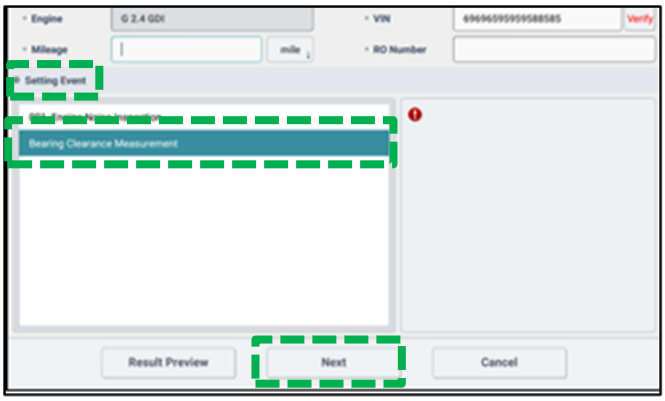
The **VIN** is recognized automatically and will populate the **'Model'** and **'Year'**.

4a. Enter the vehicle information: the vehicle mileage and RO number.

4b. Select **'Verify'** to confirm the automatically detected VIN.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

5. Under "Setting Event", select **'Bearing Clearance Measurement'** and then select **'Next'**.

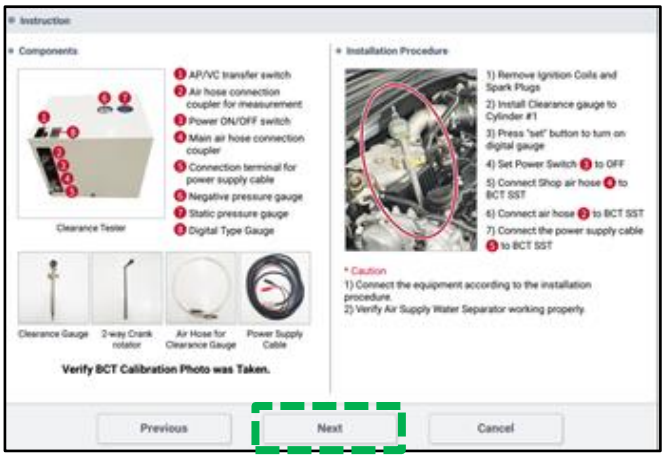


⚠ CAUTION

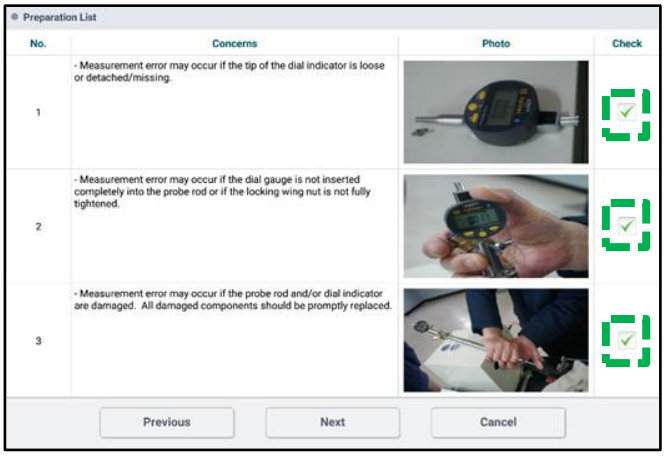
DO NOT attempt to start the engine at any time as damage to the SST and/or engine may occur.

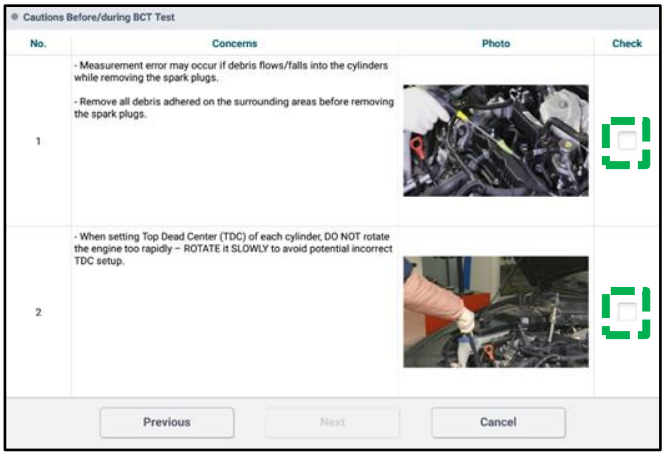
Review the 'Components' & 'Installation Procedure' displayed on the KDS.

6. Select 'Next'.

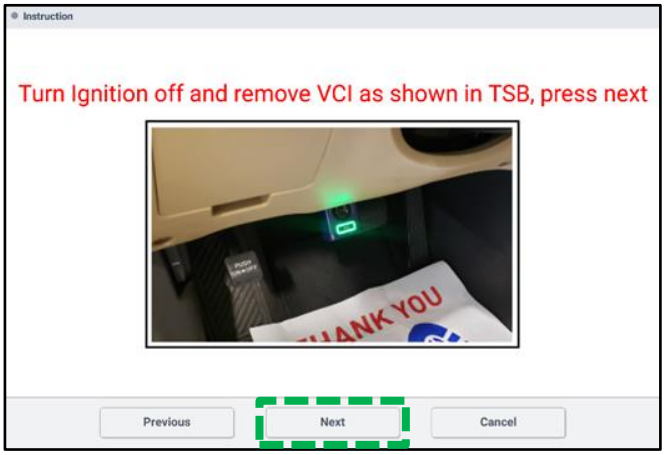


7. Follow the preparation guidance on KDS and select the check boxes.



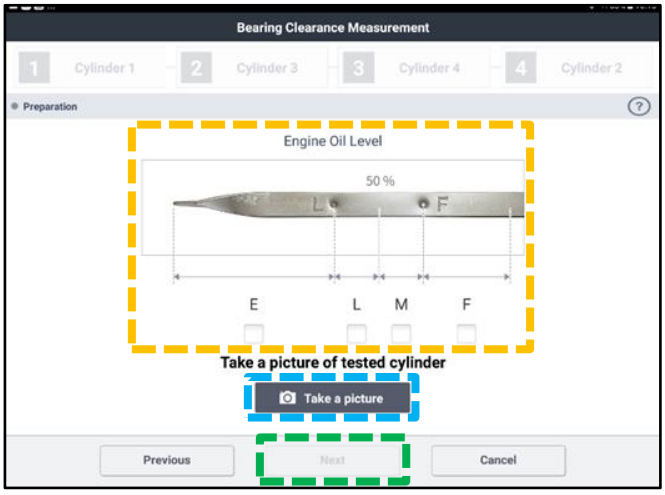


8. Turn ignition off and remove the VCI. And then select 'Next'.



NOTE: After the KDS disconnects Bluetooth with VCI, the KDS can easily connects the Bluetooth with dial gauge inserted to probe rod.

9. The KDS will prompt to check the crankcase oil level and to select the appropriate check box on the screen. Take a picture and select **'Next'**.

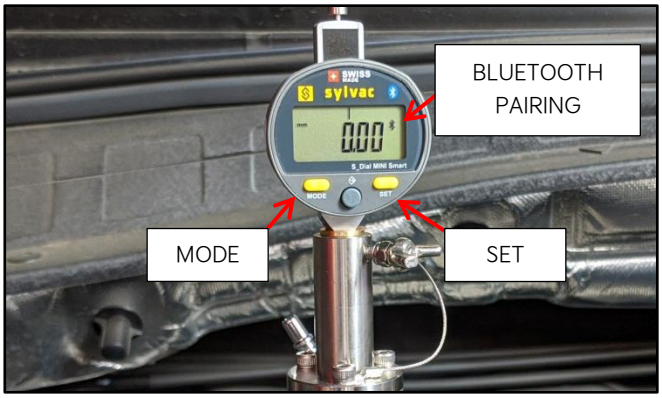


10. Turn the Dial Gauge 'ON' by pressing the **'SET'** button.

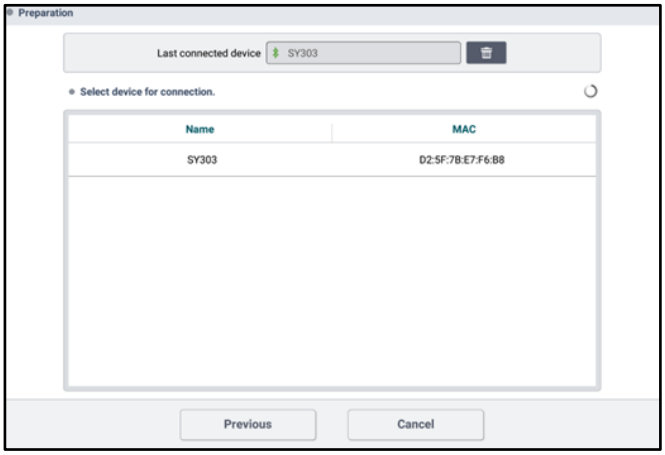
Reset the Bluetooth connection by pressing both the **'MODE'** and **'SET'** buttons simultaneously and holding for two (2) seconds.

Bluetooth icon will blink to indicate pairing mode

Refer to PS711 for Dial Gauge battery replacement for connection issues.



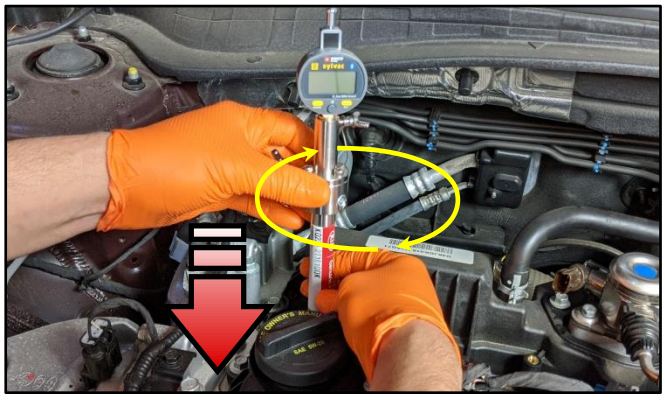
11. Pair the Dial Gauge Bluetooth by selecting the device displayed on the screen:
Device name is SY303.



IMPORTANT

If the KDS is unable to locate the Dial Indicator Bluetooth device, select 'Previous' and reset/repeat step 10. Ensure no other Bluetooth devices are near the KDS and Dial Gauge.

12. Carefully, insert the assembled SST Probe Rod and Dial Gauge into the Cylinder 1 spark plug hole and carefully turn the SST Crankshaft Rotator by hand clockwise until hand tight.

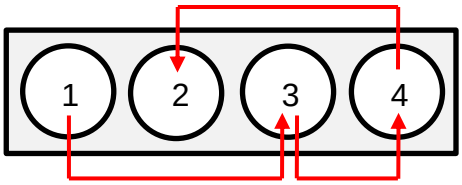


CAUTION

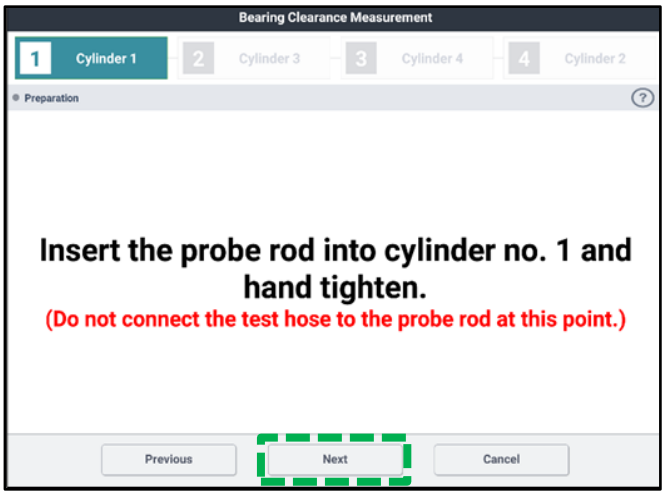
Damage to cylinder head can occur if spark plug hole is cross-threaded. DO NOT use a wrench to tighten the SST rod.

NOTICE

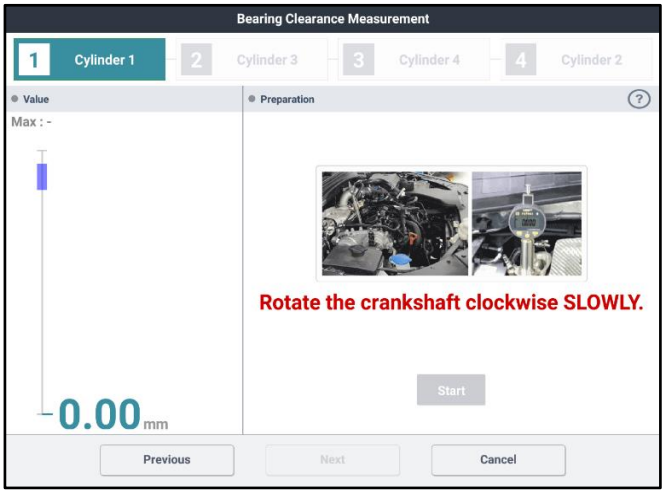
The procedure outlined in this bulletin follows the engine's firing order sequence (1, 3, 4, 2).



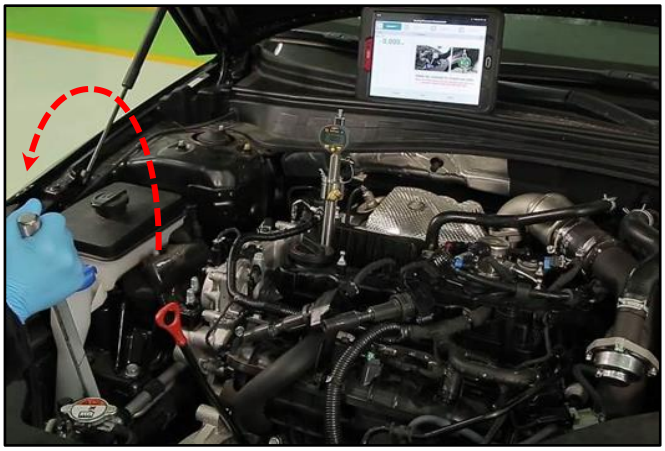
13. Begin with Cylinder #1, select 'Next'.



14. Follow the instruction on the KDS and set the cylinder to TDC.



15. Using the supplied SST Crank Rotator Wrench, slowly turn the crankshaft pulley clockwise at least one cycle.



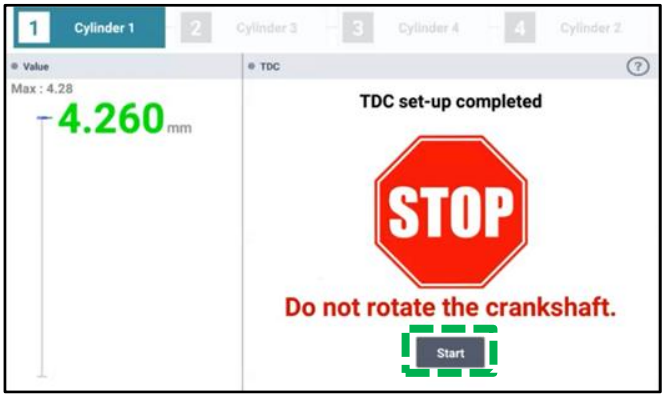
16. TDC is found when the "Max Value" is reached and/or SST probe rod reaches its highest point. When the value begins to decrease, stop turning the crank.

Select **'Next'** on the KDS screen.

If TDC setup is completed successfully (TDC value varies by the engine and vehicle):

- **DO NOT** turn the crankshaft rotator.
- **DO NOT** select Start at this time.

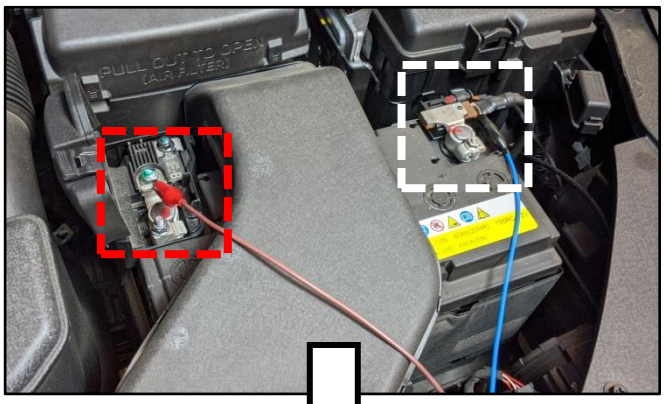
Select **'Start'** to begin test.

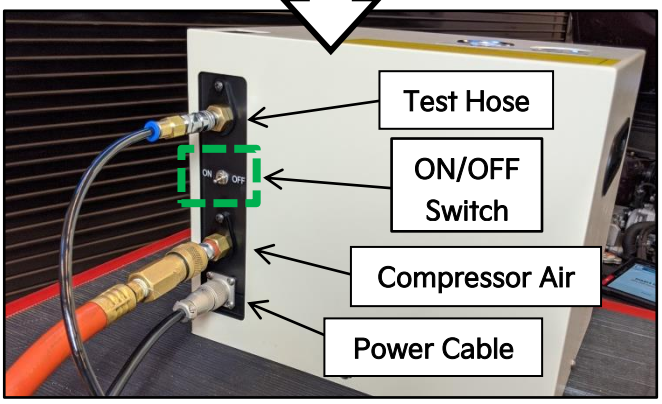


17. Connect the following three (3) items to the SST Bearing Tester Box:

    - Power Cable (12V)
    - Air Compressor Hose
    - Test Hose

    Note: The 12V power cable has red (+) and black (-) connector clamp ends, however are interchangeable.





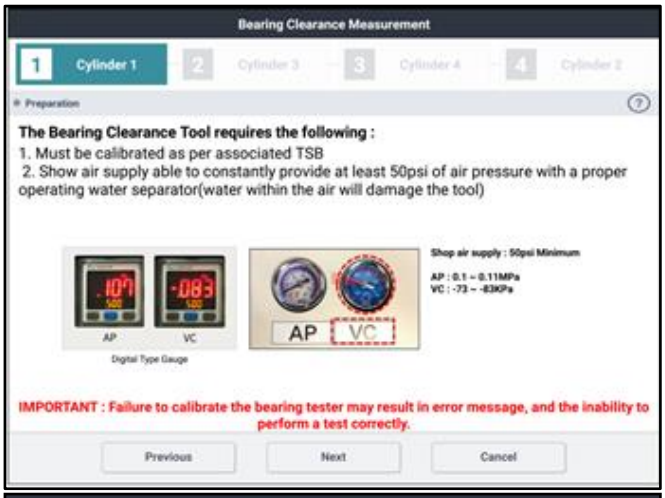
18. Turn the Bearing Clearance Tester power switch to the **'ON'** position.

19. Set the 'AP/VC' switch to the **AP** position.

20. Gauges should read as follows:

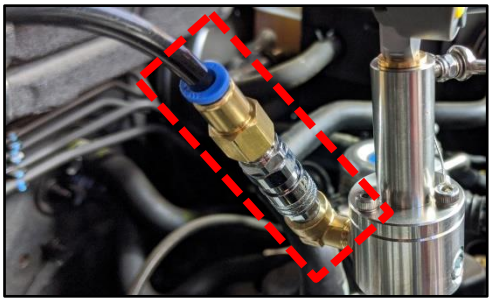
    AP (Pressure) Gauge: (0.1 ~ .011MPa)
    VC (Vacuum) Gauge: (-73 ~ -83kPa)

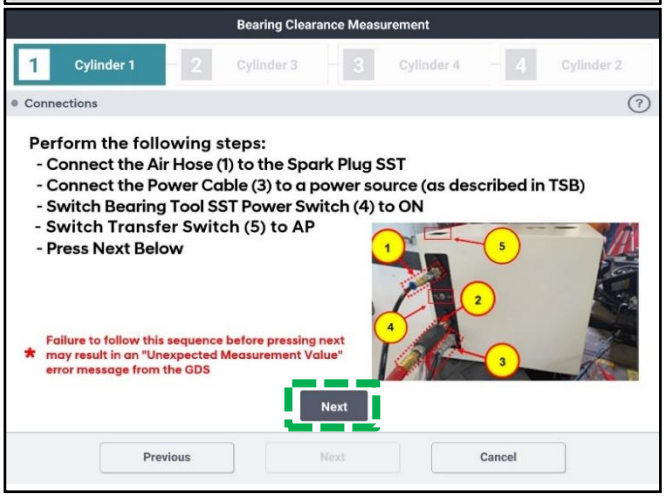
    NOTE: If the gauges do not read within specification, calibration of the SST box is required.

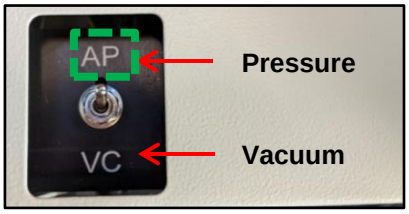


21. Select **'Next'**.

    - DO NOT turn the crankshaft rotator in any direction until instructed to do so on KDS.







22. Select **'Next'**.

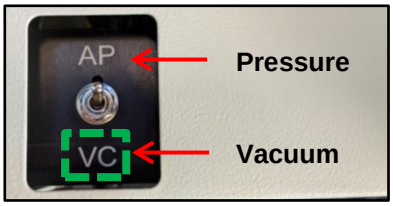
- **DO NOT** turn the crankshaft rotator in any direction until instructed to do so on KDS.

Wait about 5 seconds, the value will be set at zero.

NOTICE

If TDC is NOT found, the KDS may display a message that the cylinder was on the exhaust stroke. If so, repeat steps 21-22.

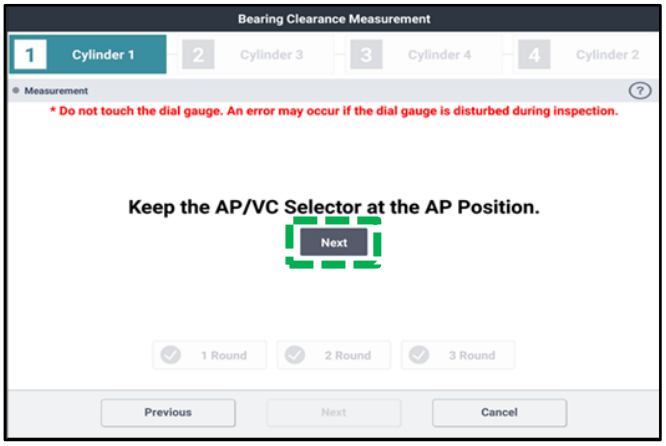
23. The KDS screen will prompt to change the **'AP/VC'** switch to the **'VC'** position.

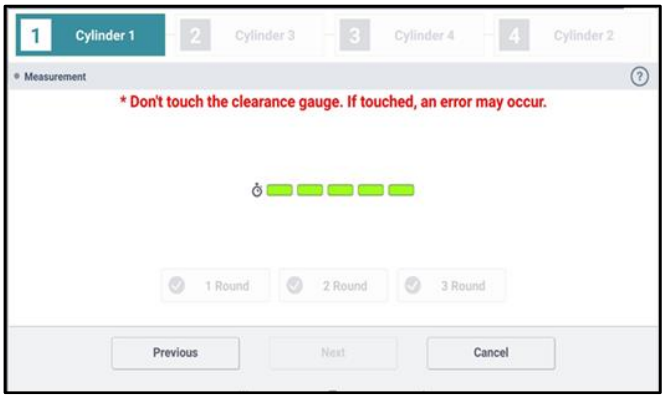


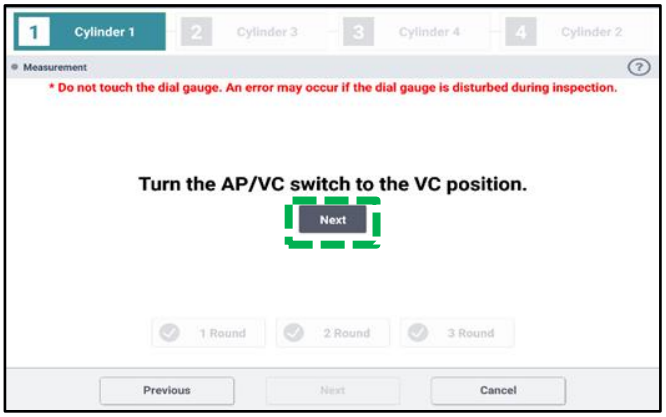
24. 'Take a picture' of the tested cylinder.

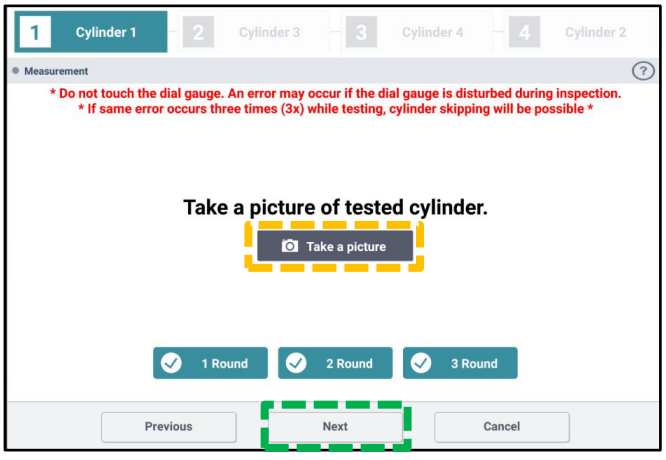
25. Select **'Next'** to complete. There are three (3x) rounds per cylinder to complete.

Note: Refer to Page 11 for 'NOTICE' Pop-Up messages that may display during test.





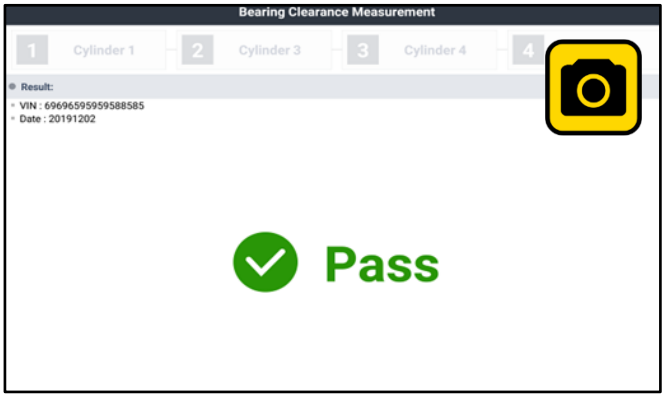




26. If the test result displays **"PASS"**, capture the screen image/screenshot for record keeping.

Select **'Finish'**.

- Re-install all removed parts in the reverse order of removal
- Check ECU version



27. If the test result displays **"NO PASS"**, capture the screen image/screenshot for record keeping. Then proceed to replace the engine assembly per the instructions.

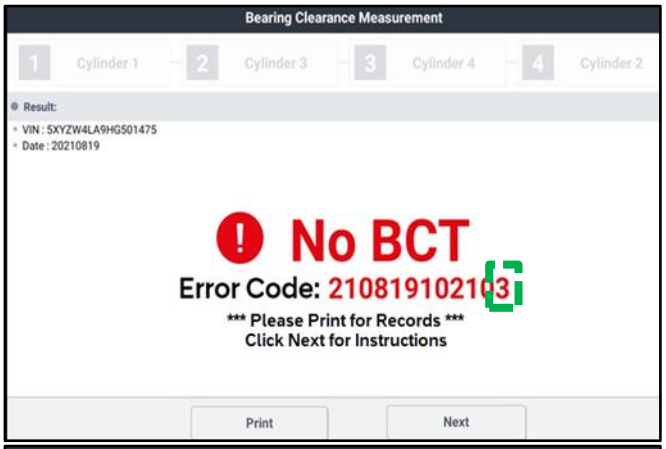
Select **'Finish'**.

ⓘ IMPORTANT

Save a copy of the screenshot for your records. It may be required to submit with a PWA. Attach to the RO hard copy.

28. If the test results in a **"No BCT"**, check the last number of error code for the suspected cause below.

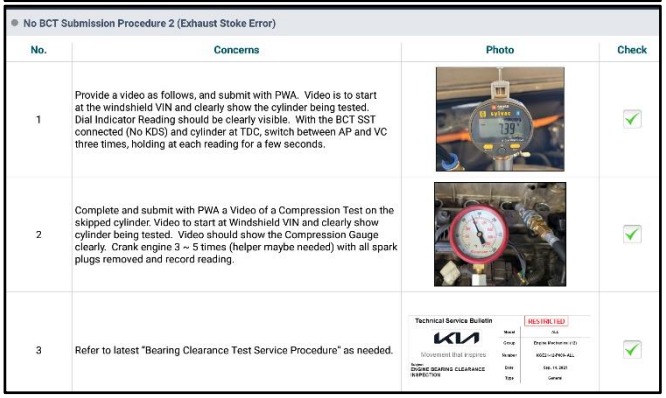
1. Unexpected Measurement
2. Exhaust Stroke
3. TDC Setting
4. Clearance Deviation is too Large
5. TDC Height
6. Range Exceed



PROVIDE A VIDEO

Follow the instructions on KDS and select the check boxes as required.

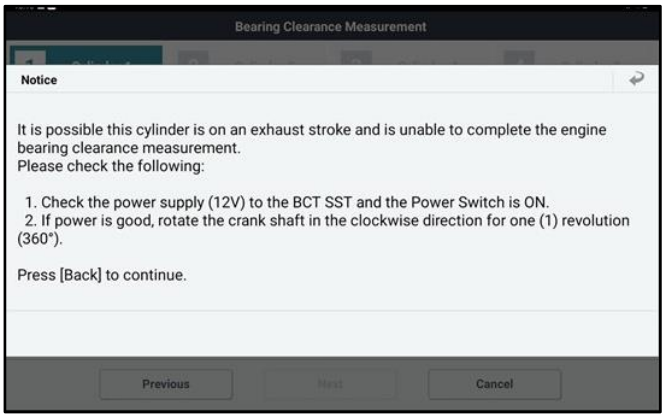
Note: Refer to VID052 (Compression Test) on Tech Toolbox.



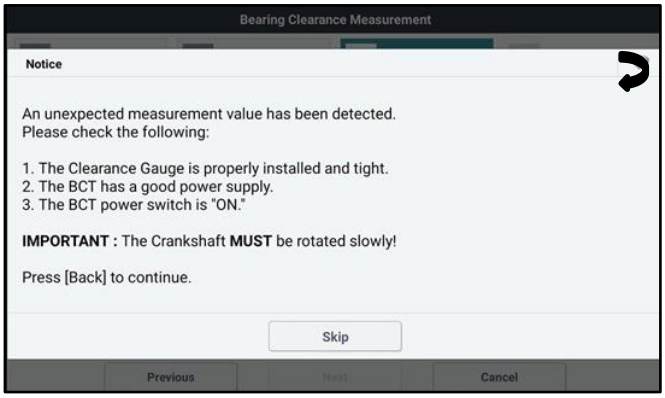
NOTICE 'POP-UP' messages:

BCT procedure does not proceed during a cylinder test:

If the bearing measurement value does not change when the 'AP/VC' is switched or the "Unable to measure" message appears on the KDS screen, rotate the crankshaft further as the exhaust valves could be open. Set the crankshaft to TDC again. Ensure the test hose is disconnected from the clearance gauge SST when setting TDC.



If an error occurs, the pop-up message shown on the right will display. Select the back '↩' icon to go back and do the test again.



If the same error occurs three times (3X's) while testing, then a "Skip" button will display as shown. Select the **'Skip'** button and proceed to the next cylinder.

Possible Errors :

1. Exhaust Stroke
2. TDC Height Setting
3. Unexpected Measurement
4. TDC Setting
5. Clearance Deviation
6. Range Exceeded

Guidance for Engine R&R Processing for No-BCT:

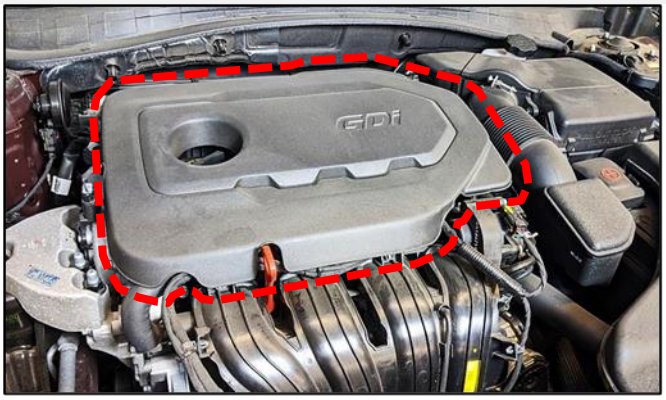
* Priority: P1326 ON → Engine Noise → Error Code
* For cases without Error Codes #1-#6: Open a Tech-line case online for further instructions → NA/Engine TFT will investigate the problematic vehicles and determine the next step including proper processing methods.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

BCT Procedure (THETA, GAMMA, and NU MPI Engines):

1. Open the hood and remove the cover.

Bearing Clearance Test Video



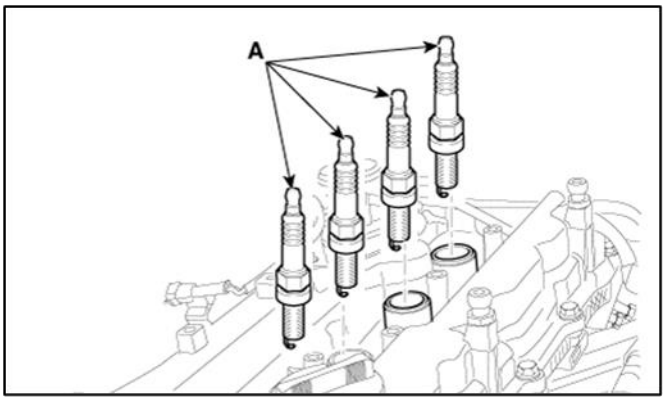
ⓘ IMPORTANT

Have the SST Engine Bearing Clearance kit ready. Place it on a table/cart next to the vehicle and use a fender cover. Use air gun to blow off any debris from the engine top area.

For troubleshooting assistance, contact the GITA Support Line at: (888) 542-4371.

2. Remove the four (4) spark plugs (A) by referring to the "Maintenance → Power Train → Spark Plug → Repair procedures (Replacement)" in the applicable Shop Manual on KGIS.

Tightening torque for Spark Plugs: 10.9 - 18.0 lb.ft (14.7 - 24.5 N.m, 1.5 - 2.5 kgf.m)

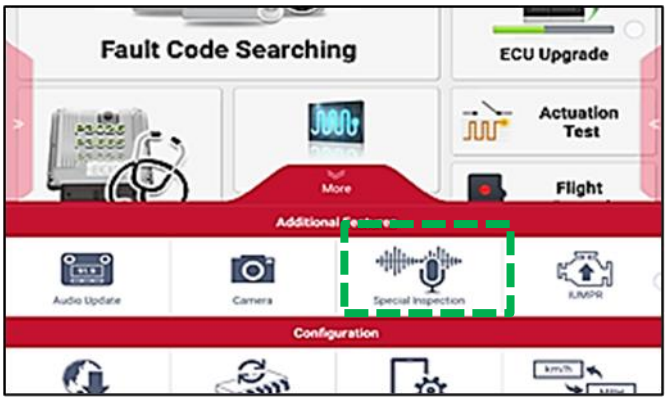


3a. Using KDS, connect the VCI-II to the vehicle's OBD-II port.

3b. Turn the ignition to **'ON'**.

3c. On the KDS screen, select **'Special Inspection'** on the bottom tab of the Home screen.

3d. Select the applicable vehicle model/year.



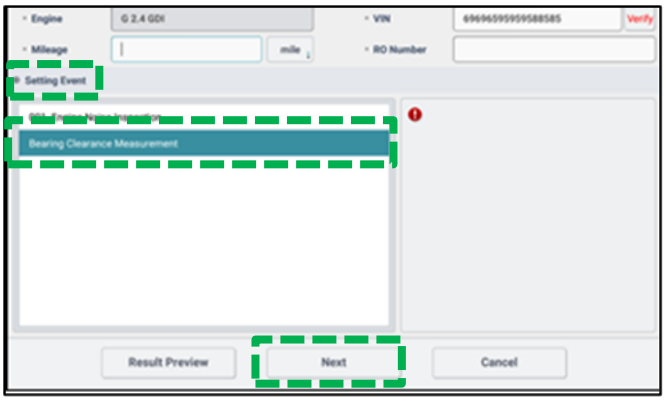
The **VIN** is recognized automatically and will populate the **'Model'** and **'Year'**.

4. Enter the vehicle information: the vehicle mileage and RO number.

5. Select **'Verify'** to confirm the automatically detected VIN.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

6. Under "Setting Event", select **'Bearing Clearance Measurement'** and then select **'Next'**.



7. Turn the ignition to **'OFF'** and remove the VCI-II after verifying the VIN on KDS.

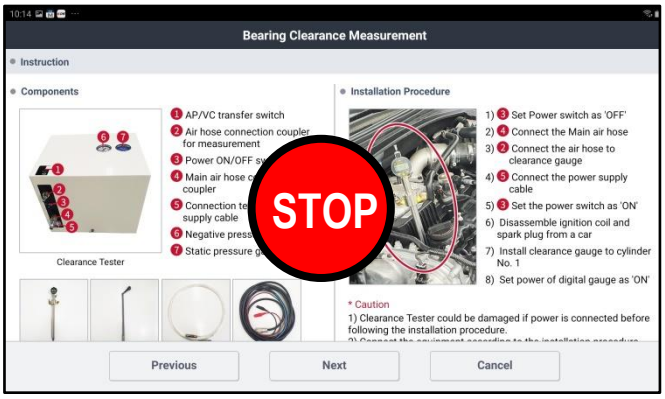
⚠ CAUTION

DO NOT attempt to start the engine at any time as damage to the SST and/or engine may occur.

8. STOP on this screen, proceed to step 7 first before continuing to KDS.

ⓘ IMPORTANT

DO NOT select 'Next' at this time. Proceed to steps 7 - 9 first and continue with KDS as instructed after installing the SST components.

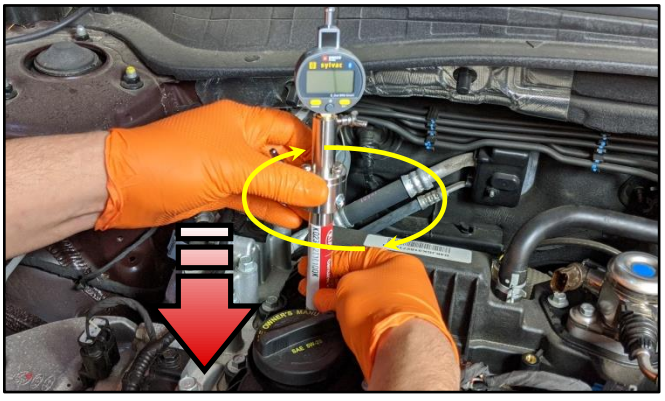


9. Install the Dial Gauge fully into the Probe Rod and secure together by hand tightening the locking wingnut.

10. Carefully, insert the assembled SST Probe Rod and Dial Gauge into the Cylinder 1 spark plug hole and **carefully** turn the SST Crankshaft Rotator **by hand** clockwise until hand tight.

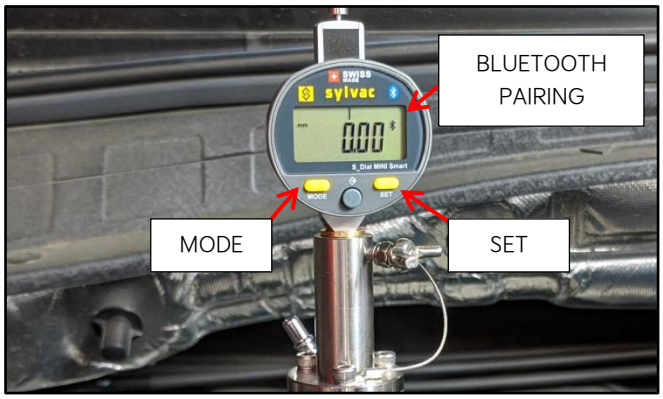
⚠ CAUTION

Damage to cylinder head can occur if spark plug hole is cross-threaded. DO NOT use a wrench to tighten the SST rod.



SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

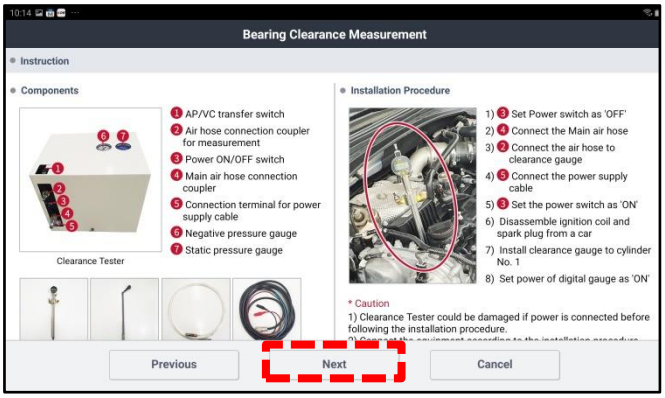
11. Turn the Dial Gauge 'ON' by pressing the **'SET'** button.



12. Reset the Bluetooth connection by pressing both the **'MODE'** and **'SET'** buttons simultaneously and holding for two (2) seconds.

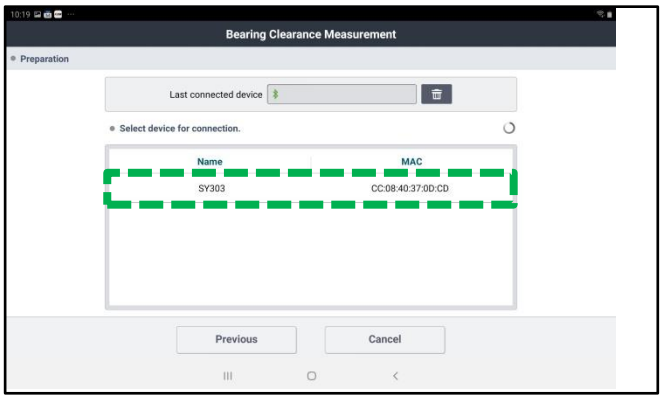
    Bluetooth icon will blink to indicate pairing mode ᛒ. Refer to PS711 for Dial Gauge battery replacement for connection issues.

13. Using the KDS, select **'Next'** on the screen to proceed and begin Top Dead Center (TDC) setup on the KDS.



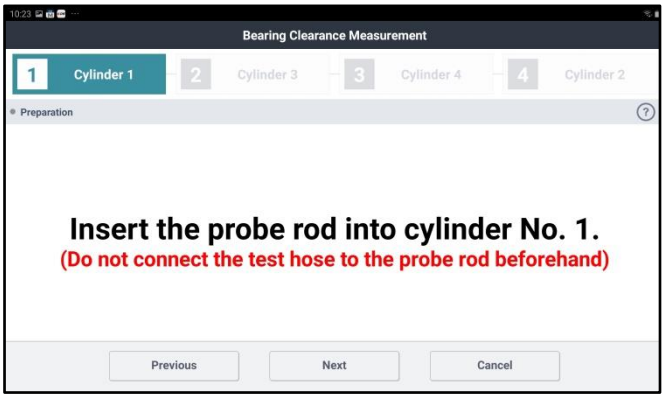
> **NOTICE**
>
> **Follow the test procedure and sequence as outlined in this bulletin. DO NOT skip any steps.**

14. Pair the Dial Gauge Bluetooth by selecting the device displayed on the screen:
    Device name is SY303.



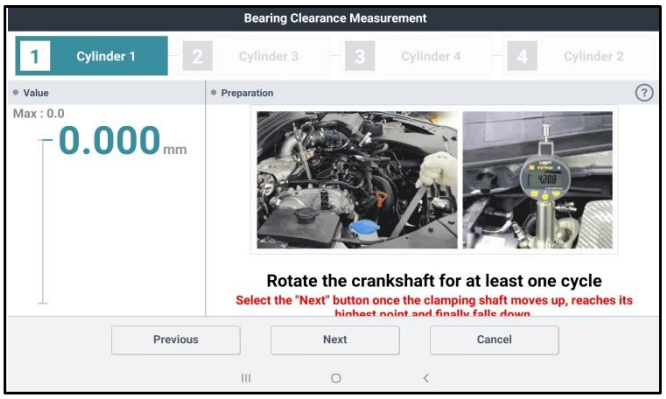
> **IMPORTANT**
>
> **If the KDS is unable to locate the Dial Indicator Bluetooth device, select 'Previous' and reset/repeat steps 9 - 10. Ensure no other Bluetooth devices are near the KDS and Dial Gauge.**

15. Once the Dial Gauge is paired to the KDS, the shown screen will appear instructing to insert probe rod into Cylinder 1.



> **NOTICE**
>
> **If the probe rod is already inserted into Cylinder 1 from step 8, disregard this message.**

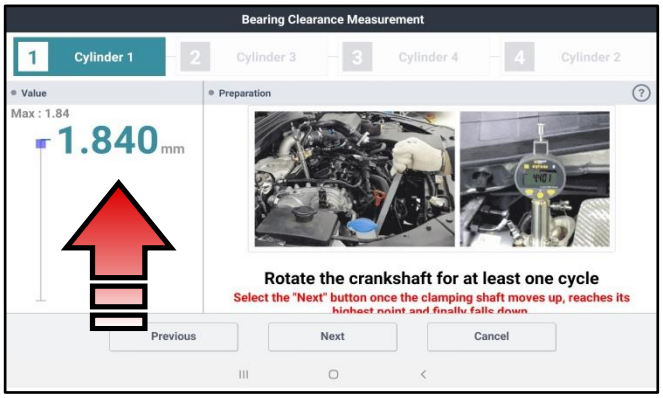
16. Insert the SST Crankshaft Rotator and turn the crankshaft clockwise as instructed on the KDS screen.



NOTICE

Removal of inner wheel liner and the use of general tools may be required to access and rotate the crank bolt on some 2.0L T-GDI engine models.

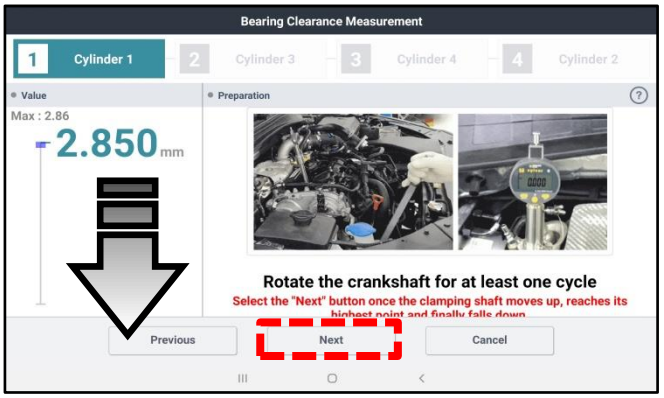
17. Initially, the **"Value" 'Max'** reading may not register when rotating crankshaft. Continue to rotate the crankshaft slowly.



IMPORTANT

Monitor the displayed reading on the KDS screen/gauge. Turn the crankshaft slowly as the value starts to increase.

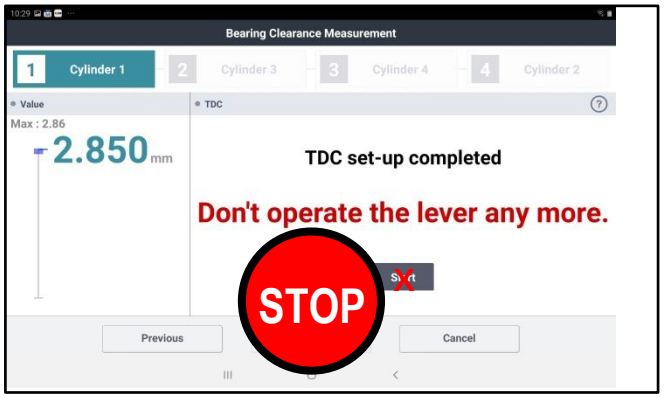
18. Once the **'Max'** value is reached (sample shows Max: 2.86mm), continue to turn just past the 'Max' value reading **and** STOP rotating the crankshaft (sample shows 2.850mm value decreasing).



Note: The KDS may prompt to rotate the crankshaft 'counterclockwise' if needed.

Select **'Next'**.

19. If TDC setup is completed successfully:



- DO NOT turn the crankshaft rotator.
- DO NOT select Start at this time.

STOP on this screen, proceed to step 20 to setup and connect the Engine Bearing Clearance Tester before continuing to the KDS.

NOTICE

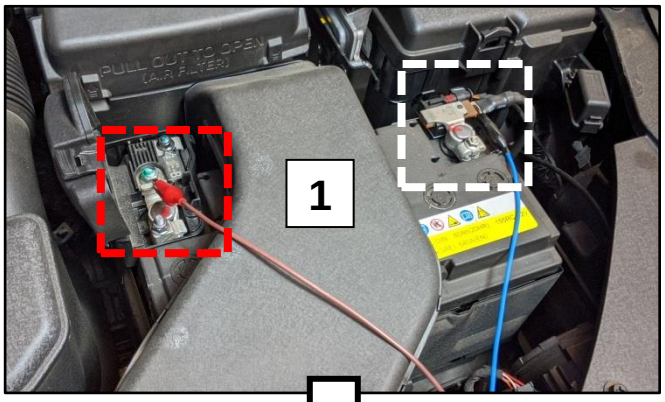
If TDC is NOT found, the KDS may display a message that the cylinder was on the exhaust stroke. If so, repeat steps 13-16.

20. Prepare to setup the Engine Bearing Clearance Tester and components.

ⓘ IMPORTANT

DO NOT place the SST box over any paper work (ex. RO) as there is a water drain hole located underneath the box. Ensure that the compressed air supply provides consistent adequate air pressure. DO NOT use a portable compressor. Always handle the SST box with care, DO NOT hit, drop, and expose to high heat sources or moisture. Do not remove the cover (unless calibration is necessary).

21. Connect the following three (3) items to the SST Bearing Tester Box:

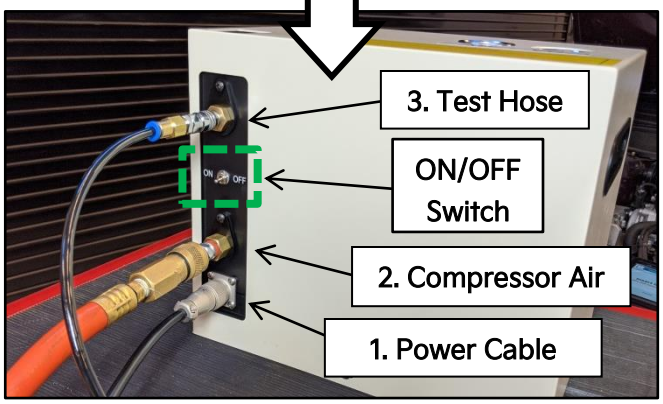


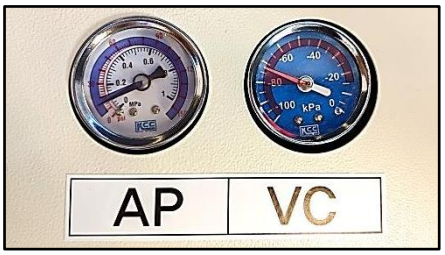
1. Power Cable (12V)
2. Air Compressor Hose
3. Test Hose

Note: The 12V power cable has red (+) and black (-) connector clamp ends.

22. Turn the Bearing Clearance Tester power switch to the 'ON' position. Gauges should read as follows:

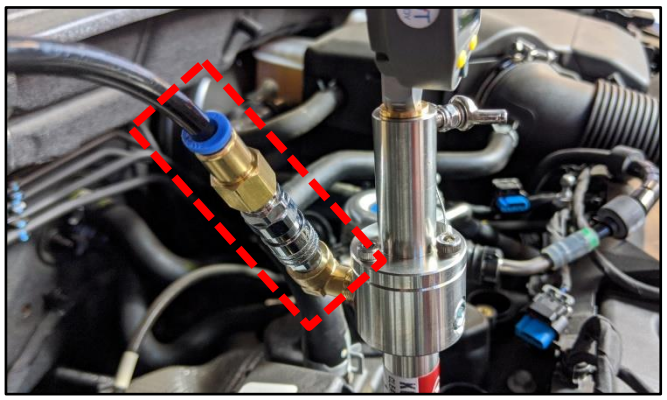
AP (Pressure) Gauge: (0.1 ~ .011MPa)
VC (Vacuum) Gauge: (-73 ~ -83kPa)





If the gauges do not read within specification, calibration of the SST box is required. Refer to Page 20 for details.

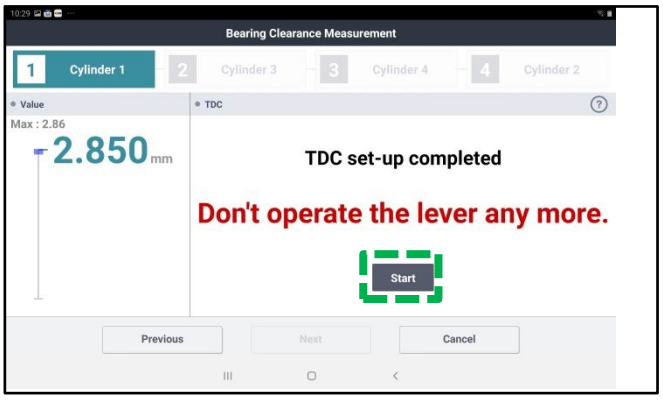
23. Carefully, insert and connect the other end of the Test Hose to the Probe Rod fitting.



ⓘ IMPORTANT

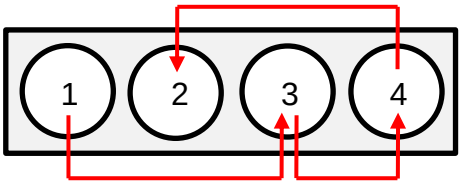
DO NOT touch or turn the Crank Rotator in any direction until instructed to do so on the KDS.

24. Select **'Start'**.

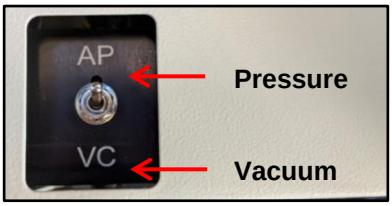


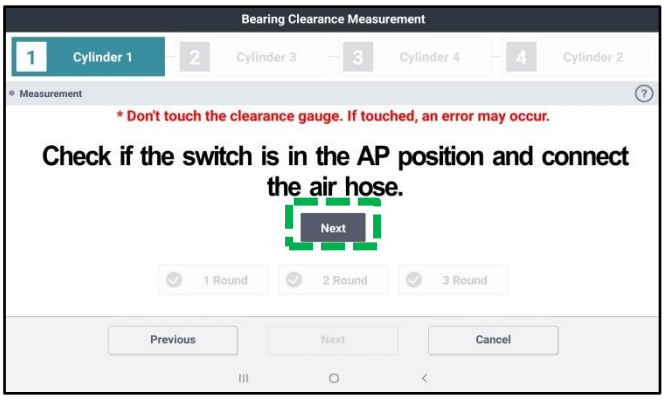
NOTICE

The procedure outlined in this bulletin follows the engine's firing order sequence (1, 3, 4, 2).



25. Locate the **'AP/VC'** switch on top of the Bearing Clearance Tester Box and switch it to the **'AP'** position. Select **'Next'** to begin Cylinder 1 bearing clearance test.



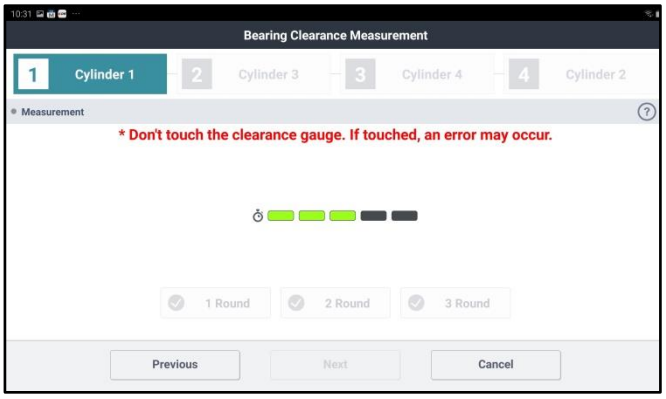


NOTICE

26. **The toggle switch has a 3-way operation. The center is neutral. Always toggle past neutral.**

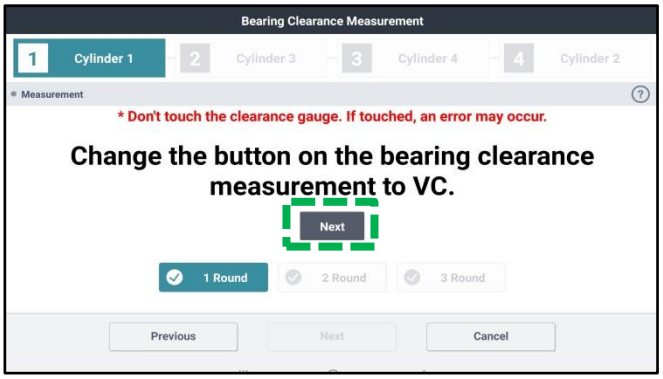
IMPORTANT

DO NOT touch or turn the Crankshaft Rotator in any direction until instructed to do so via KDS. DO NOT touch the clearance gauge, if touched, an error may occur.



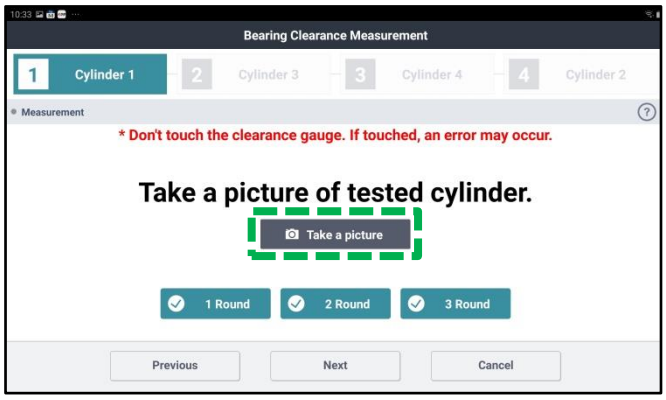
27. The KDS screen will prompt to change the **'AP/VC'** switch to the **'VC'** position.

Select **'Next'** to complete. There are three (3x) rounds per cylinder to complete.



SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

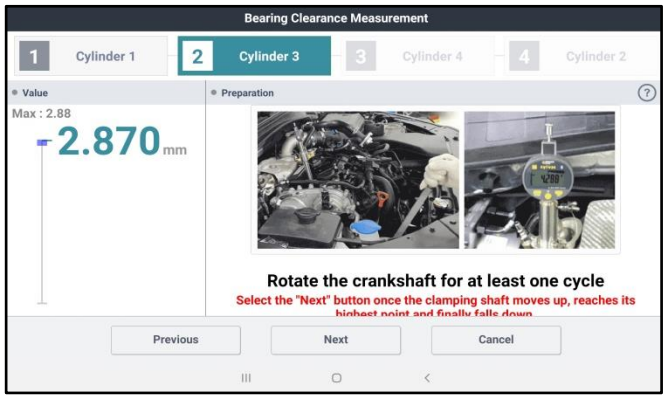
28. Once Cylinder 1 test is completed, the KDS will prompt to take a picture of the tested cylinder. Select **'Take a picture'**.



29. Carefully remove the Test Hose and the Probe Rod from Cylinder 1.

The KDS will request to insert the Probe Rod into Cylinder 3 and prompt to find TDC again. **Repeat steps 16-19**.

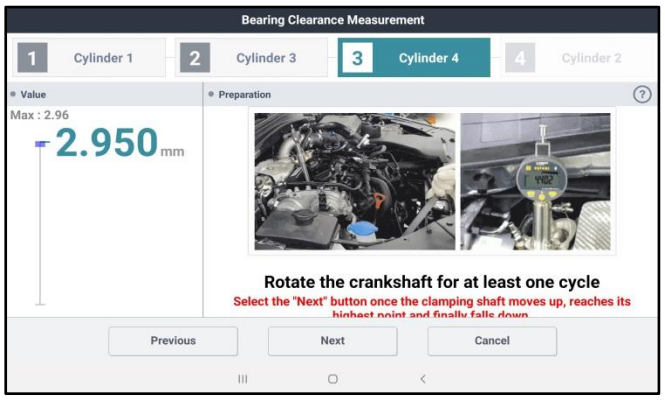
Repeat steps 23-28 to test Cylinder 3 and switching from **'AP → VC'** and take cylinder photo.



30. Carefully remove the Test Hose and the Probe Rod from Cylinder 3.

The KDS will request to insert the Probe Rod into Cylinder 4 and prompt to find TDC again. **Repeat steps 16-19**.

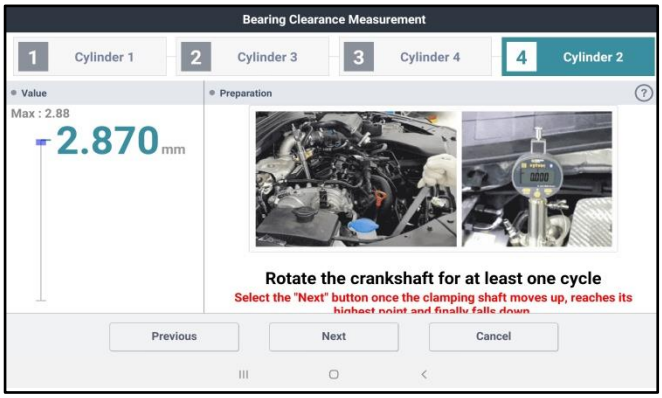
Repeat steps 23-28 to test Cylinder 4 and switching from **'AP → VC'** and take cylinder photo.



31. Carefully remove the Test Hose and the Probe Rod from Cylinder 4.

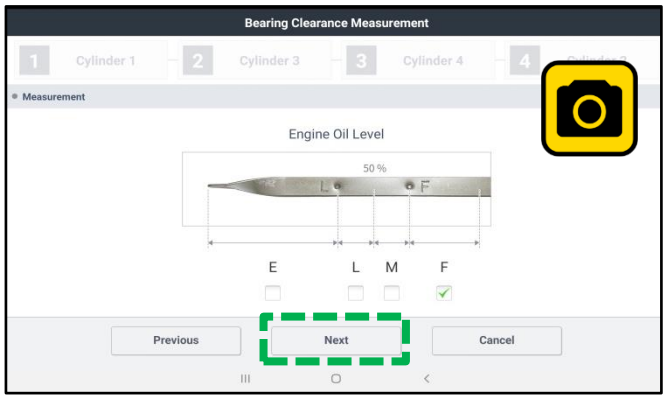
The KDS will request to insert the Probe Rod into Cylinder 2 and prompt to find TDC again. **Repeat steps 13-16**.

Repeat steps 23-28 to test Cylinder 4 and switching from **'AP → VC'** and take cylinder photo.

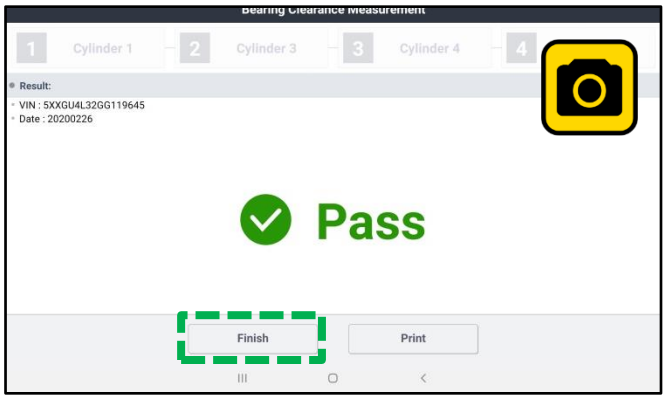


SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

After completing the test of all four (4) cylinders, the KDS will prompt to check the crankcase oil level and to select the appropriate check box on the screen. Select **'Next'**.



If the test result displays **"PASS"**, capture the screen image/screenshot for record keeping.

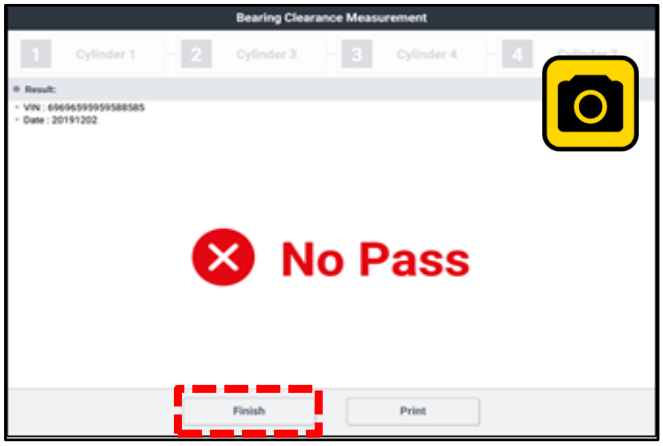


Select **'Finish'**.

- Re-install all removed parts in the reverse order of removal

No further action is required

If the test result displays **"NO PASS"**, capture the screen image/screenshot for record keeping. Then proceed to replace the engine assembly per the instructions.



Select **'Finish'**.
Replace the engine assembly.

ⓘ IMPORTANT

Save a copy of the screenshot for your records. It may be required to submit with a PWA. Attach to the RO hard copy.

NOTICE

If the KDS is not connected to the internet, up to five (5) results will stay pending in the queue until the KDS is reconnected with the "Special Inspection" application open, before a sixth (6th) test can be conducted.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

Calibration Procedure:

ⓘ IMPORTANT

Before starting, ensure that the SST has no power cable or air hoses attached and that the power switch is in the 'OFF' position. Follow the calibration procedure as outlined in this bulletin. Failure to do so will result in an unsuccessful calibration.

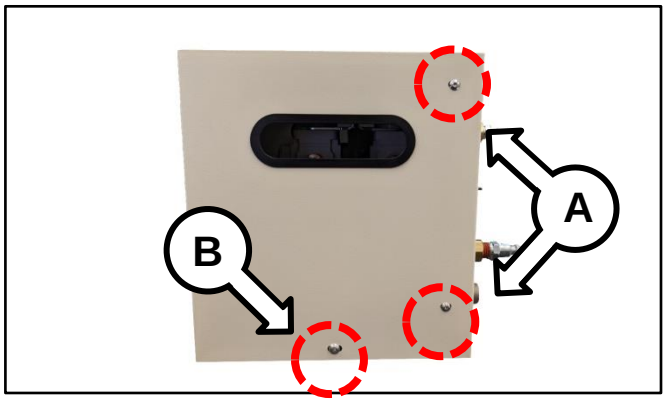
NOTICE

Do not open the SST unless it is for calibration purposes. For assistance, contact the GITA Support Line at (888) 542-4371.

1. Remove the SST cover's two (2) hex side screws (A) on one side and the four (4) hex bottom screws (B) located on the bottom four sides of the SST.

   Two (2) screws (A): 2.5mm hex
   Four (4) screws (B): 3.0mm hex

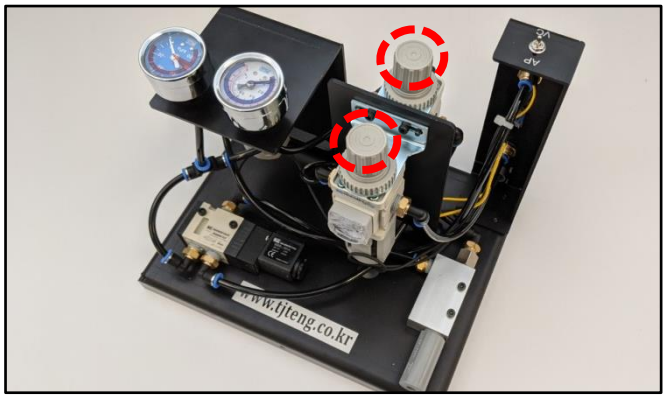
   Six (6) hex screws total.



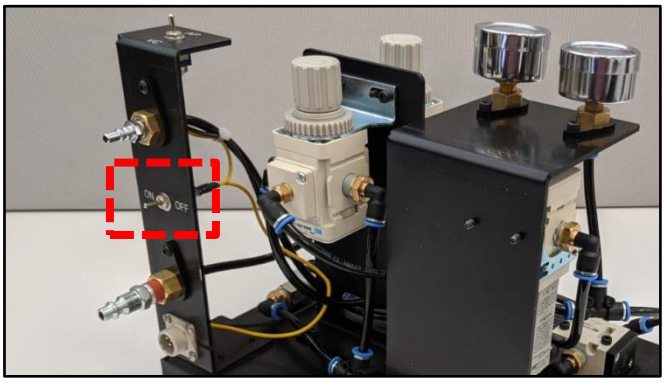
2. Lift up to remove the SST cover to access the internal adjustments for calibration purposes only.

   NOTICE

   Only adjust the knobs described in this bulletin. Do not touch any other component(s).

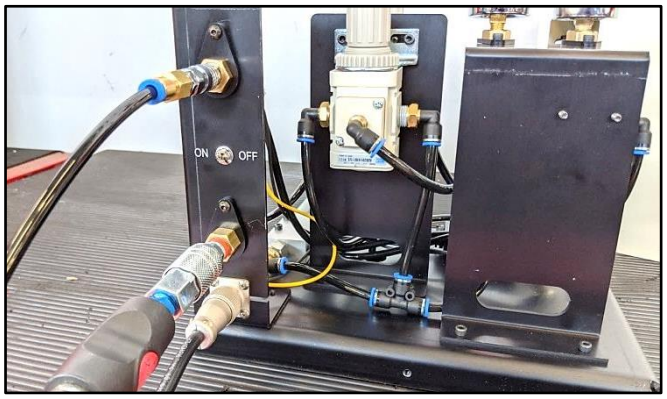


3. Ensure that the power switch is in the 'OFF' position.



SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

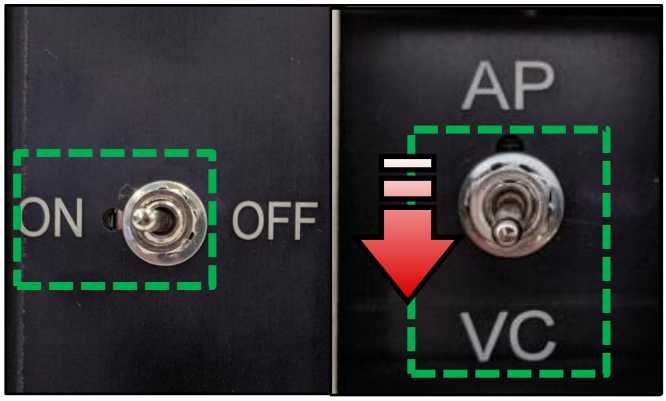
4. Follow the order of the power cable and air hose connections as follows:



DO NOT change the order below.

1. Connect the main air compressor hose to the SST.
2. Connect the 12V power cable to a good battery power source.
3. Connect the test hose to the SST. (Connecting the dial gauge/probe rod is not required)

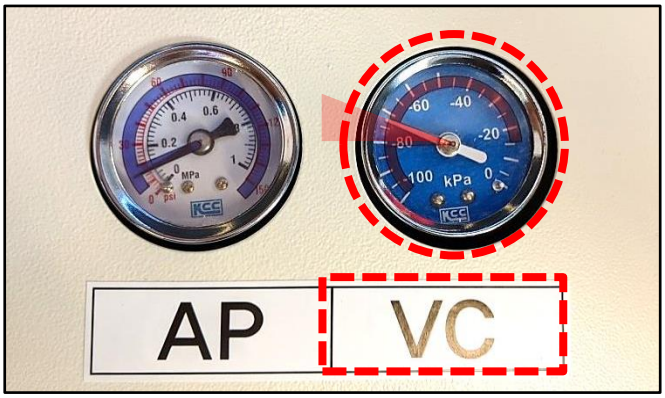
5. Switch the SST power switch to the **'ON'** position.



Then switch the **AP/VC** switch to the **'VC'** position.

AP: Pressure
VC: Vacuum

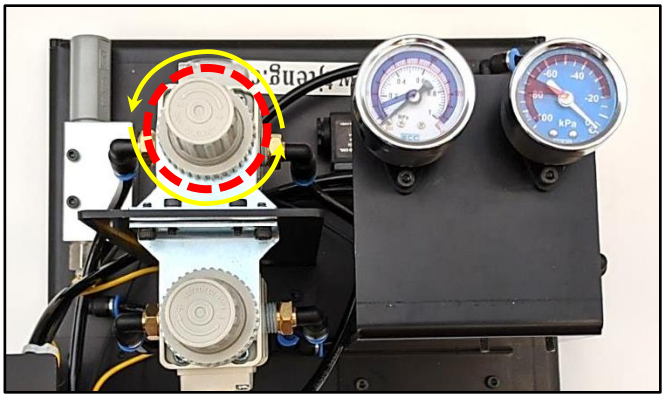
6a. Check the **'VC'** gauge and confirm that the reading is between -73 ~ -83kPa.



Note: The gauge has a red overlay decal to show highlight the recommended setting.

6b. **If the gauge is reading within the recommended specification**, proceed to step 7.

6c. **If the gauge does not read within specification,** adjust it by pulling the knob shown and then **decrease (-)** or **increase (+)** as needed.



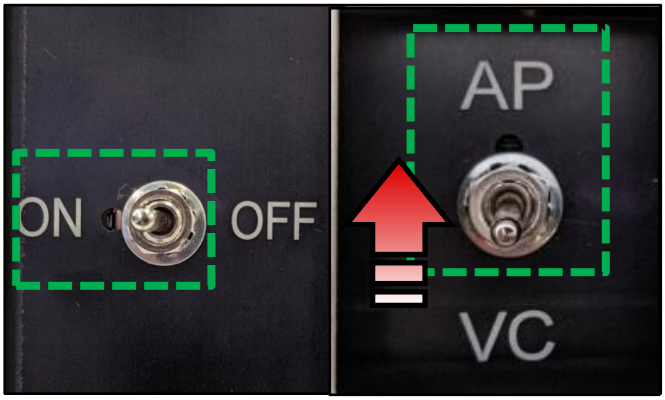
Be sure to push the knob downward to lock it after setting.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

7a. Keep the SST power switch in the **'ON'** position.

Switch the **AP/VC** switch to the **'AP'** position.

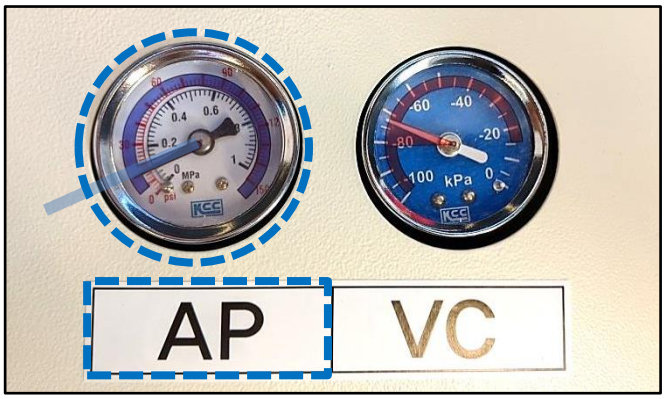
AP: Pressure
VC: Vacuum



7b. Check the **'AP'** gauge and confirm that the reading is between 0.1 ~ .011MPa.

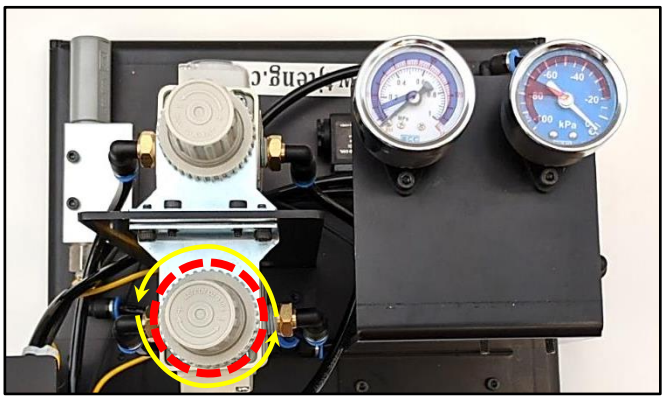
Note: The gauge has a blue overlay decal to show highlight the recommended setting.

7c. **If the gauge is reading within the recommended specification**, proceed to step 8.



7d. **If the gauge does not read within specification**, adjust it by pulling the knob shown and then **decrease (-)** or **increase (+)** as needed.

Be sure to push the knob downward to lock after setting.



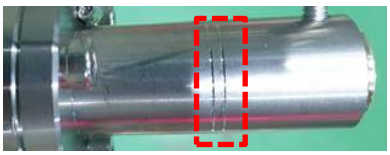
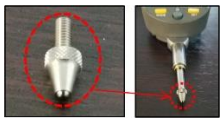
8. The calibration procedure is now complete. Shut the SST to the **'OFF'** position.

9. Remove the 12v power cable first from the power source and then disconnect the air hoses.

10. Re-install the SST cover in the reverse order of removal.
DO NOT overtighten the cover retaining screws.

SUBJECT: BEARING CLEARANCE TESTER PROCEDURES

REQUIRED TOOL (INDIVIDUAL COMPONENTS):

Tool Name	Figure	Comments
Engine Bearing Clearance Tester (Body Only)	KQ231 2T110QQK	
Probe Rod (M12 for GDI and Theta II MPI Hybrid engines)	KQ231 2T101QQK	
Probe Rod (M14 for MPI engines)	KQ231 2T107QQK	
Crankshaft Rotator	KQ231 2T102QQK	
Dial Gauge	KQ231 2T103QQK	
Dial Gauge Tip	KQ231 2T109QQK	
Power Cable	KQ231 2T104QQK	
BCT Kit	KQ231 2T100QQK	
Small Air Port Adapter	KQ231 2T108QQK	

For troubleshooting assistance, contact the GITA Support Line at (888) 542-4371.
For replacement parts, contact Snap-On Tools at (888) 542-1011.