 HYUNDAI Technical Service Bulletin	GROUP CAMPAIGN	NUMBER 20-01-004H-2
	DATE NOVEMBER 2020	MODEL(S) APPLICABLE VEHICLES BELOW
SUBJECT: THETA GDI ENGINE DTC P1326 - ENGINE INSPECTION / REPLACEMENT (SERVICE CAMPAIGN T3G)		

This TSB supersedes TSB# 20-01-004H-1 to revise the Service Procedure, Parts and Warranty information.

★ IMPORTANT

***** Dealer Stock & Retail Vehicles *****


Dealers must perform this Service Campaign on all affected vehicles prior to customer retail delivery and whenever an affected vehicle is in the shop for any maintenance or repair.

Description: Applicable vehicles with 2.0L Turbo and 2.4L GDI engines may experience the Check Engine warning lamp illuminated with DTC P1326. Follow the procedure to inspect the vehicle and replace the engine or update the engine ECU software based on the inspection results.

Applicable Vehicles:

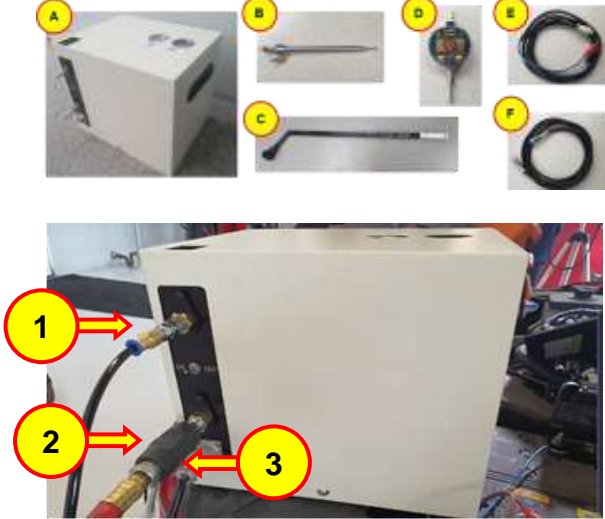

Certain 2011-2014 MY Sonata (YF) vehicles with 2.0L Turbo and 2.4L engines
 Certain 2015-2019 MY Sonata (LF) vehicles with 2.0L Turbo and 2.4L engines
 Certain 2013-2018 MY Santa Fe Sport (AN) vehicles with 2.0L Turbo and 2.4L engines
 Certain 2019 MY Santa Fe (TM) vehicles with 2.0L Turbo and 2.4L engines
 Certain 2014-2015 MY Tucson (LM) vehicles with 2.4L engines
 Certain 2018-2019 MY Tucson (TL) vehicles with 2.4L engines
 Certain 2019 MY Veloster N (JSN) vehicles with 2.0L Turbo engines

SST Information:

Part Name	Part Number / Figure	Note
Torque Wrench Socket	09314-3Q100-01	Only needed if engine replacement is required. Refer to TSB 19-FL-001H for the detailed usage instructions. Order replacements through Bosch at 1-866-539-4248.
Injector Combustion Seal Ring Installer	09353-2B000	
5 Quart Container	 ULINE S-22984	Required to drain oil if necessary. Order from ULINE at 800-295-5510 or ULINE.com. An alternative container can be used but it must have clear markings to indicate fluid levels in quarts (1-5 quarts) for PA Approval purposes.

Circulate To: General Manager, Service Manager, Parts Manager, Warranty Manager, Service Advisors, Technicians, Body Shop Manager, Fleet Repair

SST Information (cont.)

Part Name	Part Number / Figure	Note
<p>BEARING CLEARANCE TESTER SET (BEARING TOOL)</p>	 <p>(1) TEST HOSE (2) MAIN HOSE (3) POWER SUPPLY CABLE</p>	<p>One bearing tool provided to dealers. Additional units can be ordered.</p> <p>Confirm the following pressures meet requirements. The correct ranges for VC/AP air pressures are also indicated with red/blue decals on the gauges:</p> <p>Shop air supply: 0.36MPa (50 psi) minimum</p> <p>AP: 0.1 ~ 0.11MPa, VC: -73 ~ -83Kpa</p>  <p>For questions and troubleshooting on the bearing tool, contact GIT at 888-437-0308.</p>
	KQ231-2T110QQH	BEARING CLEARANCE TESTER SET (BEARING TOOL) (includes A - F)
	KQ231-2T100QQH	(A) BODY
	KQ231-2T101QQH	(B) SPARK PLUG ROD (CLEARANCE GAUGE)
	KQ231-2T102QQH	(C) CRANK ROTATOR TOOL
	KQ231-2T103QQH	(D) CLEARANCE GAUGE
	KQ231-2T104QQH	(E) POWER SUPPLY CABLE
	KQ231-2T105QQH	(F) TEST HOSE (AIR HOSE FOR CLEARANCE GAUGE)

Part Information:

- 1) Order the required parts based on the vehicle inspection results. Refer to Page 4.
- 2) Refer to TSB # 20-01-024H-1 (or latest revision) for parts information
- 3) Refer to HMA Warranty Policy prior to ordering a reman engine. A standard service engine or QQH engine is required in certain cases.

Warranty Information:

- 1) The Campaign 953 Engine ECM Update is only required if new software is available. In this case, choose one of the following methods:
 - A) Select a Campaign T3G Op Code with the ECM update included if available OR
 - B) Submit a separate campaign claim for the ECM update using Campaign 953 op codes (in addition to submitting applicable T3G op code)
- 2) Refer to TSB # 20-01-024H-1 (or latest revision) for OP Codes
- 3) Campaign T3G OP codes for engine replacement should only be used if engine replacement is deemed necessary by the service procedure in this TSB. General engine replacement for conditions outside of those contained in this TSB are not covered by Campaign T3G.

Engine Oil Maintenance Information

Poor oil maintenance reduces the engine oil lubrication and cooling capacities. As a result, internal engine parts can be damaged resulting in abnormal wear to internal engine parts, excessive carbon deposits, sludge, and other various conditions. An inspection for these conditions and others may be required prior to engine approval.

NOTICE

Engine oil is used to lubricate, cool, and operate various engine parts. Engine oil changes and engine oil level checks are required on a regular basis for all engines.

Engine oil level checks and top-ups are recommended if they are needed prior to the end of an oil change interval.



Piston Ring Deposits

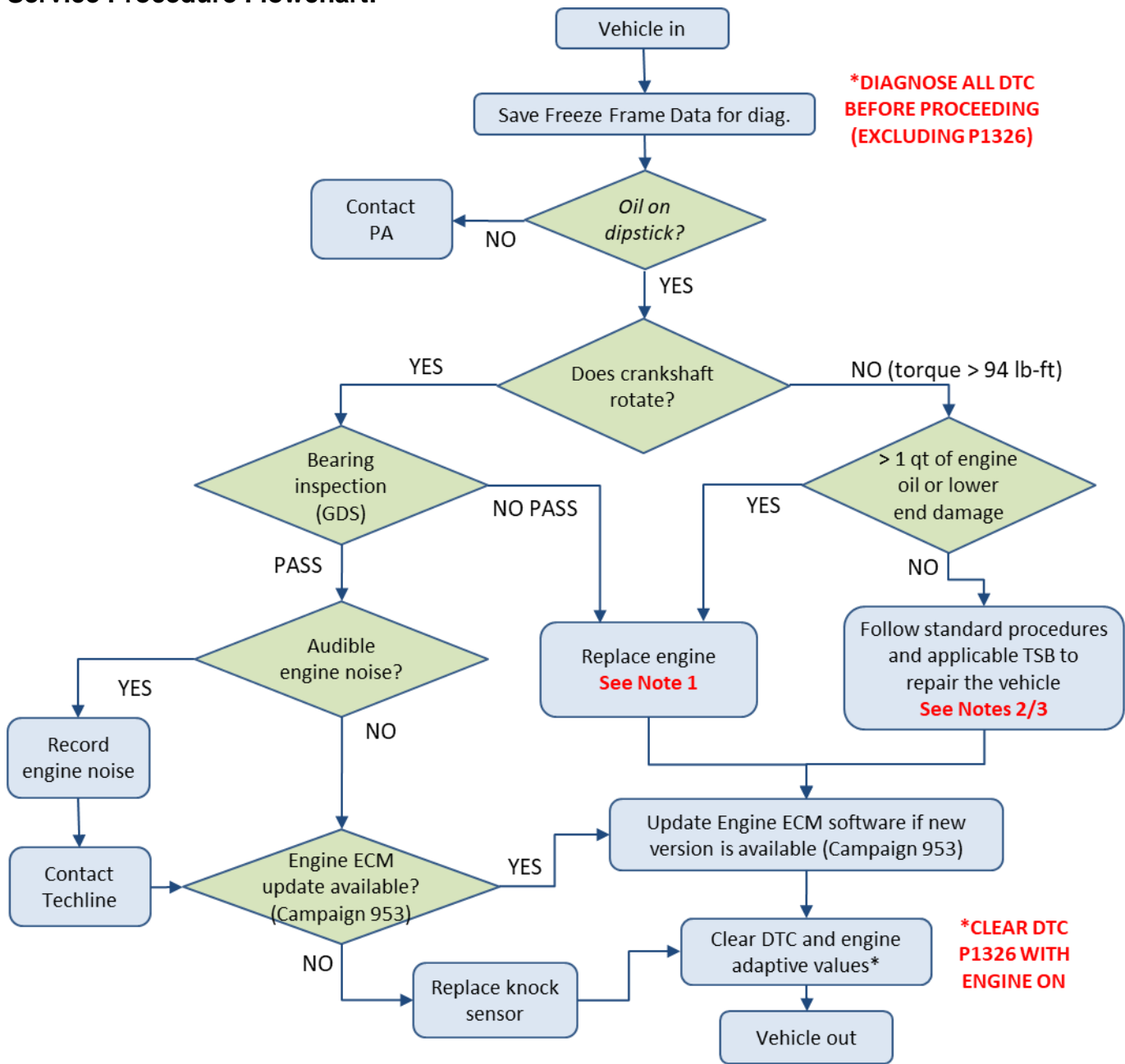


Oil Sludge



Excessive Wear

Service Procedure Flowchart:



NOTES:

- 1) PA Approval is **required** for engine replacement. Submit pictures/video using STUI on the GDS per the Service Procedure.
 - Crankshaft torque measurements/video
 - Picture of drained oil amount or engine oil dipstick
 - Engine oil maintenance and towing records
 - Other documentation as requested
- 2) If additional diagnosis is required to determine the appropriate repair:
 - Refer to standard engine diagnosis procedures for engine noise, oil consumption, oil leak, others.
 - Follow other applicable TSB to repair the vehicle.
- 3) When the engine oil level is < 1 qt
 - The oil level is below 'L' on the dipstick (or no oil on dipstick)
 - The Oil Pressure Warning Light is ON and visible to the driver

Service Procedure:

1. Save all Freeze Frame Data for diagnosis purposes. Diagnose all DTCs before proceeding (excluding P1326).
2. Check for any engine oil on the engine oil dipstick. Using STUI on the GDS, take and submit a picture of the dipstick with the VIN in the background of the photo (RO or last 6 digits written on paper). VIN must be legible.

Engine oil on the dipstick:

Continue with the Engine Rotation Check

No engine oil on dipstick:

Contact Warranty Prior Approval (PA)

Engine Rotation Check:

1. Rotate the crankshaft with the crank rotator SST. Measure the force required to turn the crankshaft with a torque wrench if it doesn't turn easily with the SST. If the SST or shop tools do not fit the specific vehicle type, remove the front passenger wheel and wheel liner or underbody tray as needed to rotate the crankshaft.

If the crankshaft rotates normally:

- Proceed to bearing inspection.

If the force required to turn the crankshaft is greater than 94 lb-ft, save the torque value for records and:

- **If there is NO lower end damage:**
 - Follow the oil drain procedure
- **If there is lower end damage:**
 - Using STUI in the GDS, submit a picture of the damage with the VIN in the background of the photo (RO or last 6 digits written on paper). VIN must be legible.
 - Continue with the engine replacement procedure
 - Finish the flowchart on Page 4.

NOTICE

PA Approval is required for engine replacement. Contact PA and refer to the Dealer Best Practices guide for the latest requirements for engine approval.

1) A video of the engine rotation check may be required. Video should include:

- VIN Number (label on door jamb)
- Attempt to rotate the crankshaft

2) Save the crankshaft torque value

3) A picture of the lower end damage is required if present

Additional documentation may be required.

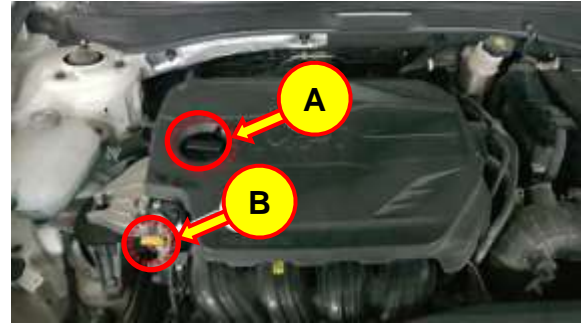
Use STUI on the GDS to take and submit pictures and videos.

NOTICE

If other engine accessory components are seized, remove the engine accessory belt prior to completing the engine rotation check.

Oil Drain Procedure:

1. Remove the engine oil filler cap (A) and engine oil level gauge (B).



2. Lift up the vehicle and remove the oil drain plug (C).



3. Drain the engine oil into a container. The 1 quart level should be clearly marked and visible on the container. Using STUI in the GDS, take and submit a picture of the oil container with the 1 quart level clearly visible and the VIN in the background of the photo (RO or last 6 digits written on paper) for records, if needed. VIN must be legible.

NOTICE

PA Approval is required for engine replacement. Contact PA and refer to the Dealer Best Practices guide for the latest requirements for engine approval.

If more than 1 quart of engine oil remains:

- Continue with the engine replacement procedure
- Follow the flowchart on Page 4 to complete the procedure.

If less than 1 quart of engine oil remains:

- Refer to standard engine diagnosis procedures for engine noise, oil consumption, oil leak, others.
- Follow other applicable TSB to repair the vehicle.
- Continue with the flowchart on Page 4 to complete the procedure.



Bearing Inspection:

1. Connect the main hose (shop air supply) and test hose to the bearing tool. The other end of the test hose should be disconnected.

Confirm the shop air pressure and VC/AP pressures on the bearing tool meet requirements. The correct ranges for VC/AP air pressures are also indicated with red/blue decals on the gauges. Using STUI in the GDS, take and submit a picture of the gauges with the pressure levels clearly visible and the VIN in the background of the photo (RO or last 6 digits written on paper) for records.

Shop air supply:
0.36MPa (50 psi) minimum

AP: 0.1 ~ 0.11MPa,
VC: -73 ~ -83Kpa

NOTICE

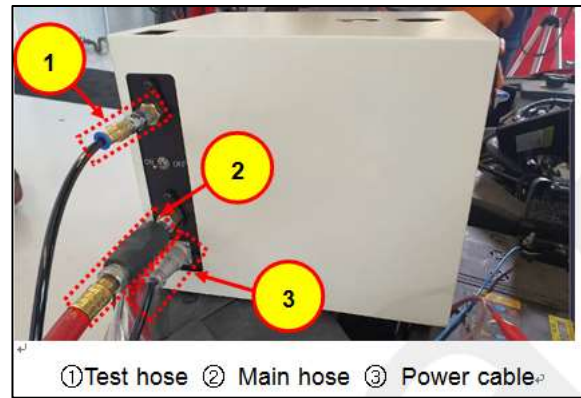
Do not use a portable air compressor.

NOTICE

For questions and troubleshooting on the bearing tool, contact GIT at 888-437-0308.

2. Remove the engine cover and the 4 ignition coils.

Tightening Torque (ignition coils):
9.8 - 11.8 N·m (1.0 - 1.2 kgf·m, 7.2 - 8.7 lb·ft)



3. Remove the 4 spark plugs.

Tightening Torque:

14.7 - 24.5 N·m

(1.5 - 2.5 kgf·m, 10.9 - 18.0 lb·ft)



4. Insert the spark plug rod SST (A) into Cylinder #1 spark plug hole and turn until hand tight. Insert the clearance gauge SST into the spark plug rod and tighten using the thumb screw.



NOTICE

DO NOT use a wrench.
DO NOT connect the test air hose.

5. Connect the GDS to the vehicle and turn the ignition 'ON'.

6. Swipe up on the 'More' tab at the bottom of the GDS home screen. Select the 'Special Inspection' function.

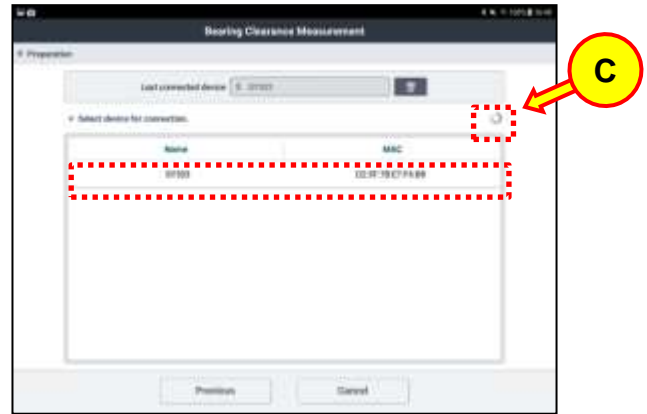


7. Select 'Bearing Clearance Measurement' on the GDS.

8. Enter the vehicle info into the GDS as prompted then select 'Next'.

9. Connect the GDS to the clearance gauge SST (gauge) via Bluetooth:

- Press the “Set” button (B) on the gauge to turn it on.
- Press the “Set” (B) and “Mode” buttons at the same time for about 4 sec until the “reset” message is displayed.
- Select the gauge in the list of devices on the GDS. Select the ‘Refresh’ icon (C) if the gauge doesn’t appear automatically.



NOTICE

If more than one device appears in the list of devices, there is another device in range. Move away from the other device to pair the gauge.

10. Turn the ignition ‘OFF’ and remove the VCI.

11. Follow the instructions on the GDS to start the test and select ‘Next’.

NOTICE

Do NOT connect the test hose to the clearance gauge yet.



12. To find TDC compression (TDC), rotate the crankshaft with the crank rotator SST at least one cycle (1/2 turn). If the SST does not fit the specific vehicle type, remove the front passenger wheel and wheel liner or underbody tray as needed to rotate the crankshaft using standard shop tools.

Monitor the value on GDS screen or the clearance gauge SST while turning the wrench. Turn the wrench slowly as the value reaches a max/min value. When the value changes direction (increasing → decreasing or decreasing → increasing), stop turning the crank.



If TDC is difficult to find, refer to the shop manual: Engine Mechanical System > Timing System > Timing chain.

NOTICE

Ensure the test hose is disconnected from the clearance gauge when finding TDC.

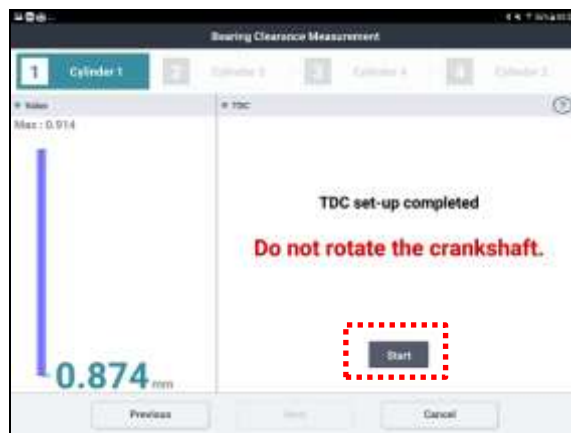
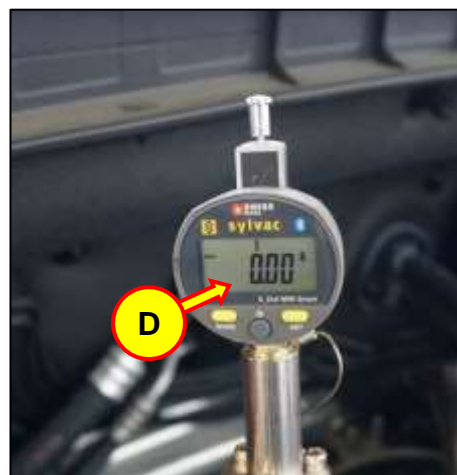
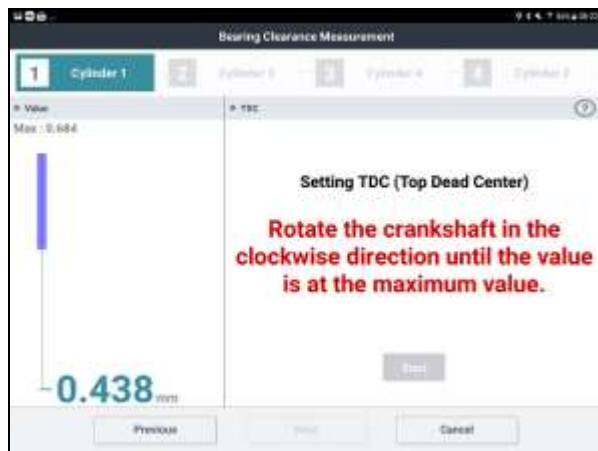
13. Select 'Next' when TDC is found.

TDC is found when the maximum value is reached on the clearance gauge SST (D). The value is also displayed on the GDS.

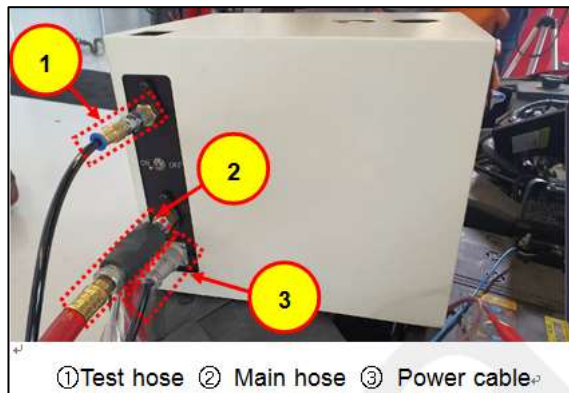
14. Select 'Start' and proceed directly to the next step below. Do not turn the crank rotator SST until instructed to do so.

NOTICE

The value at TDC varies depending on the specific vehicle and engine type.



15. Connect the test hose (1) to the spark plug rod SST and the power cable (3) to the bearing tool SST as shown.



16. Connect the SST power cables to the vehicle's 12V battery. Turn the bearing tool SST power switch 'ON'.

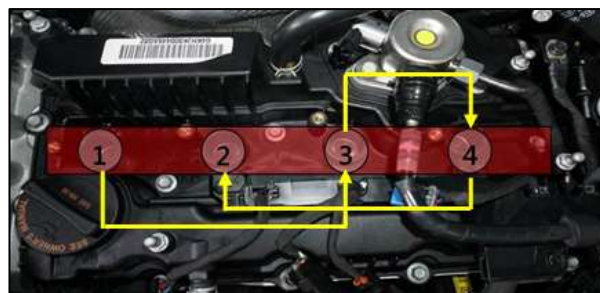


17. Locate the AP/VC switch on the bearing tool SST and switch it to the AP Position.



18. Follow the instructions on the GDS to test each cylinder. Cylinder #1 is checked first.

The cylinders will be checked per the engine's firing order : #1→#3→#4→#2.



19. On the bearing tool SST, change the AP/VC switch to the VC position when instructed by the GDS.

NOTICE

If the bearing measurement value does not change when the AP/VC is switched or the “Unable to measure” message appears on the GDS, rotate the crankshaft further as the exhaust valves could be open. Set the crankshaft to TDC again (Step 11).

Ensure the test hose is disconnected from the clearance gauge SST when finding TDC.



20. Continue following the instructions on the GDS to complete the bearing inspection. Check the engine oil level and select the level in the GDS.



21. If the test result is “PASS”:

- Save a screenshot of the results screen.
- If there is audible engine noise:
 - 1) Using STUI on the GDS, record and submit a video of the engine noise 1-2 ft above the valve cover. Include the VIN label on door jamb in the beginning of the video.
 - 2) Call Techline
 - 3) Follow the flowchart on Page 4 to complete the procedure
- If there is no audible engine noise:
 - 1) Follow the flowchart on Page 4 to complete the procedure.
- Reinstall all components in the reverse order of removal.
- Check for DTCs and perform the appropriate diagnostic service. Ensure no warning lights are present to complete the procedure.



If the test result is “NO PASS”:

- Save a screenshot of the results screen.
- Continue to the engine replacement procedure.
- Follow the flowchart on Page 4 to complete the procedure.
- Check for DTCs and perform the appropriate diagnostic service. Ensure no warning lights are present to complete the procedure.

**NOTICE**

PA Approval is required for engine replacement. Contact PA and refer to the Dealer Best Practices guide for the latest requirements for engine approval.

Engine Replacement:

1. Continue with engine replacement if necessary according to the flowchart on Page 4.
2. Follow the applicable shop manual to remove the engine from the vehicle. The specific method for removal varies by model.

Shop Manual Section Location:

- Engine Mechanical >
- Engine And Transaxle Assembly >
- Engine And Transaxle Assembly >
- Repair Procedures

NOTICE

PA Approval is required for engine replacement. Crankshaft torque checks, pictures of lower end damage, towing records and other documentation may be required.

Contact PA and refer to the Dealer Best Practices guide for the latest requirements for engine approval.

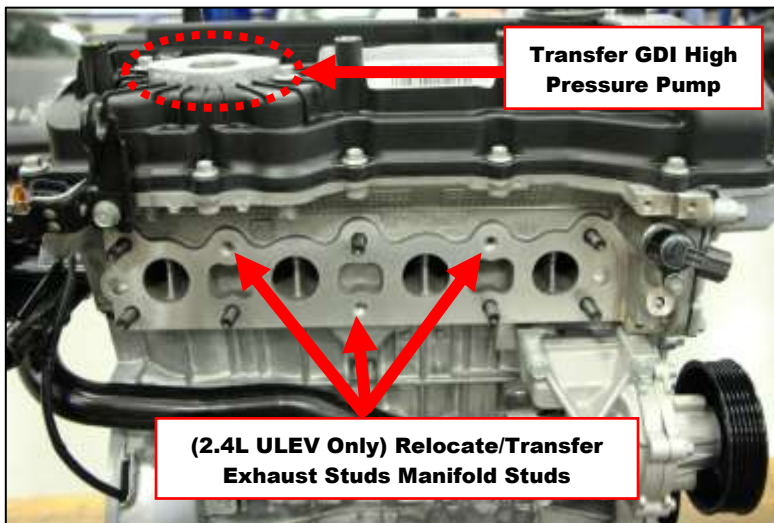
NOTICE

Record the audio station presets (XM, AM, FM, etc) prior to disconnecting the battery.

3. Certain replacement engines must be prepared prior to installation. Some components from the existing engine must be transferred to the new engine.

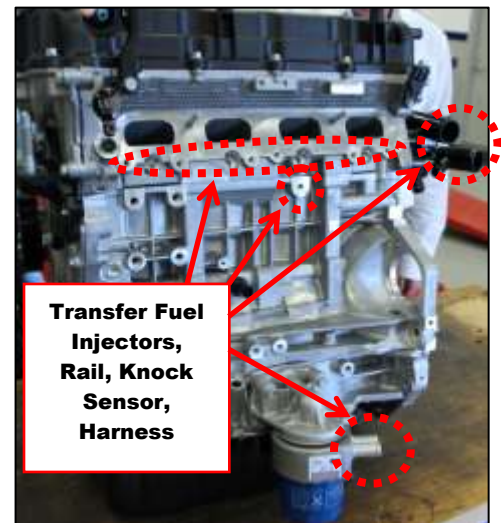
NOTICE

Be careful to reserve the vehicle's original parts for reinstallation on the replacement engine.



Transfer GDI High Pressure Pump

(2.4L ULEV Only) Relocate/Transfer Exhaust Studs Manifold Studs



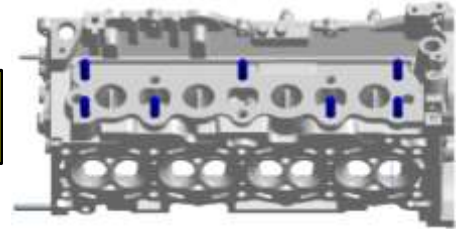
Transfer Fuel Injectors, Rail, Knock Sensor, Harness

4. **For 2.4L with ULEV / FED emissions only**
 2.4L replacement engines are produced with the exhaust manifold studs configured for SULEV / CAL emissions package.

Two exhaust studs must be relocated on the new engine and 1 exhaust stud must be transferred from the old engine.

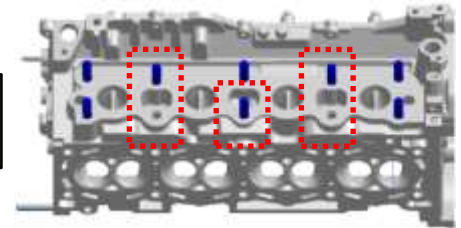
- Use a commercially available stud removal tool or use the double-nut technique to complete this step.

SULEV / CAL Spec



Exhaust Stud Position Relocation Information

ULEV / FED Spec



5. Remove and reinstall the engine knock sensor from the old engine to the new engine.

Knock Sensor Fastener
Tightening torque: 21Nm (15.5lb-ft)

NOTICE

Ensure the knock sensor is torqued to specification using a torque wrench. Improper installation can result in DTC codes.



6. **If 21101-2GK70QQA engine is used:**

- Install the oil filler cap from the old engine to the new one.
- Install the drive plate/flywheel on the new engine using new bolts (QTY 7).

Drive Plate Tightening torque :
 111.7 ~ 127.5 Nm (86.8 ~ 94.1 lb-ft)



7. Follow the published procedure outlined in **TSB 19-FL-001H** to remove and reinstall the following GDI high pressure fuel system components from the existing engine to the new engine:

- GDI High Pressure Pump
- Fuel Injectors (4)
- Fuel Rail

The corresponding Service Kits will supply the required new parts per TSB 19-FL-001H to complete the transfer of the above existing parts.

8. Install the new oil cooler hoses if applicable.

9. Reconnect and reinstall the engine front harness.

10. Follow the published Service Information from the applicable **Shop Manual** to reinstall the Sub Engine Assembly.

Shop Manual Section Location:

Engine Mechanical >
 Engine And Transaxle Assembly >
 Engine And Transaxle Assembly >
Repair Procedures

NOTICE

Be sure to replace the following newly supplied parts from the Service Kit:

- Oil Level Rod & Oil Level Guide Assy.
- Intake Manifold Gaskets (4)
- Exhaust Manifold Gasket
- Fuel Pipe Assembly
- (2.0T Only) Turbo Oil Feed Hose & Pipe
- (2.0T Only) Turbo Oil Drain Gasket (2)
- (2.0T Only) Oil Drain Gasket
- (2.0T Only) Gasket (2)

CAUTION

Follow TSB 19-FL-001H carefully and replace the following newly supplied parts from the Service Kits:

- Mounting flange O-ring (for High Pressure Pump)
- O-rings, Backup Rings, Washer Seals, Combustion Seal Rings, and clips (for Fuel Injectors)
- Fuel Pipe (between High Pressure Pump and Fuel Rail)

In addition, the Service Kits include (1) Exhaust Pipe Gasket. Install this new gasket when attaching the front and center muffler assemblies together during the engine installation.

NOTICE

If the torque converter has moved from the fully inserted position, carefully push inward and rotate the torque converter until the converter is recessed approximately 5/16" - 9/16" (8 -14 mm) into the transaxle case when reinstalling the automatic transaxle.

Check the depth of the torque converter to confirm it's fully installed in the transmission otherwise the oil pump may be damaged resulting in transmission failure.



11. Connect the (2) oil coolant hoses between the oil cooler and the water temperature control assembly.
 - Fill the cooling system with 50/50 ~ 70/30 (Water/Anti-Freeze) coolant mixture.
12. Fill the engine crankcase:
 - Add 5.8 quarts for the **initial dry fill** of the engine.
 - With the fuel system disabled temporarily, crank the engine for several seconds to prime the lubrication system prior to starting the engine.

Recommended Oil Specifications:

For all models excluding Veloster N (JSN):

- 5W30 Full Synthetic type with API SN/SN+/SP, ILSAC GF4/GF5 or higher service grade
 - Pennzoil Platinum 5W30 Full Synthetic SN PLUS or Quaker State Full Synthetic 5W-30 Motor Oil w/Dexos or other equivalent if not available

For Veloster N (JSN):

- 0W30 (or 5W30 if not available) Full Synthetic type with SN/SN+/SP, ILSAC GF4/5 or higher grade
 - Pennzoil Platinum Euro LX 0W-30 Full Synthetic or other equivalent if not available

13. Start the engine to warm it up and begin the cooling system air bleeding process.
 - Check for any leaks during this time.
 - After the engine has warmed up to normal operating temperature, turn the engine off, wait a few minutes, and then **adjust the engine oil level to near the “F” mark as shown.**



14. Refer to Campaign 953 to update the Engine ECM if new software is available.
15. When all fluids have been fully filled and all work quality checks are completed:
 - Set the customer's audio station presets.
 - Relearn the Steering Angle Sensor using the GDS.
 - **Clear DTC P1326 with engine ON.** P1326 may reset if it's not cleared with the Engine ON. Then check for other DTCs and perform the appropriate diagnostic service. Ensure no warning lights are present.
 - **Reset the engine adaptive values** using the GDS.
 - Perform a short road test to confirm normal vehicle drivability.

NOTICE

- **Clear DTC P1326 with engine ON. P1326 may reset if not cleared with the engine ON.**
- **Reset engine adaptive values**