HYUNDAI Technical Service Bulletin	GROUP **CAMPAIGN**	NUMBER **21-01-066H**
	DATE **NOVEMBER 2021**	MODEL(S) **APPLICABLE VEHICLES BELOW**

SUBJECT: THETA GDI ENGINE DTC P1326 - ENGINE INSPECTION / REPLACEMENT (SERVICE CAMPAIGN T3G)

This TSB supersedes TSB 20-01-004H-3 to update the Service Procedure Flowchart and Service Procedure contents to reflect various process revisions.

★ 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 T-GDI and 2.4L GDI engines may experience the Check Engine warning lamp illuminated with DTC P1326 and/or engine may exhibit Abnormal Noise or No Crank/No Start condition. Follow the procedure to inspect the vehicle and replace the engine or update the engine ECU software based on the inspection results.

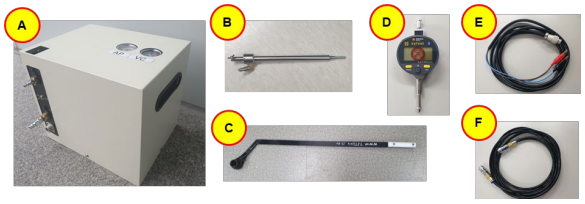
Applicable Vehicles:
Certain 2011-2014 MY Sonata (YF) vehicles with 2.0L Turbo and 2.4L engines
Certain 2015-2019 MY Sonata (LF) vehicles with 2.0L Turbo and 2.4L engines
Certain 2013-2018 MY Santa Fe Sport (AN) vehicles with 2.0L Turbo and 2.4L engines
Certain 2019 MY Santa Fe (TM) vehicles with 2.0L 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

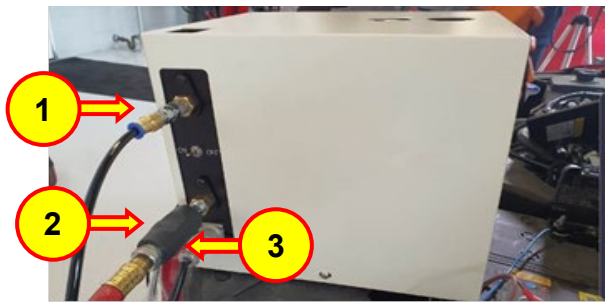
SST Information:

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 for oil drain, 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 (1-4 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.)

<table>
<tr><th>Part Name</th><th>Part Number / Figure</th><th>Note</th></tr>
<tr><td rowspan="2">BEARING CLEARANCE TESTER SET (BEARING TOOL)</td><td> 



(1) TEST HOSE (2) MAIN HOSE
(3) POWER SUPPLY CABLE

One BEARING CLEARANCE TESTER SET provided to dealers. (Additional units can be ordered.)</td><td>Confirm the shop air pressure and AP/VC pressures on the bearing tool meet requirements:

Shop air supply:
50 psi minimum

➢ AP: 0.1 ~ 0.11MPa
➢ VC (Digital): -.073 ~ -.083MPa
➢ VC (Dial): -73 ~ -83kPa
(Refer to TSB 21-GI-009H or later for calibration procedure)
 

[Digital Type] [Dial Type]

For Bearing Clearance Tester software related issues, contact GITA at: 888-437-0308
For Bearing Clearance Tester hardware related issues, refer to HTSS: “Fix it Right” under Symptom “SST – Other”</td></tr>
<tr><td>KQ231-2T112QQH</td><td>BEARING CLEARANCE TESTER SET (BEARING TOOL) (includes A - F)</td></tr>
<tr><td colspan="3">For complete details related to Bearing Clearance Test SST components, refer to TSB 21-EM-004H-1 BEARING CLEARANCE TEST SERVICE PROCEDURE.</td></tr>
</table>

Optional Tool:

Part Name	Part Number / Figure	Note
17 mm 12-Point Metric Flank Drive® Reversible Ratcheting Box/ Speed Open-End Combination Wrench	(Snap-on) SRXRM17 	For unfastening torque converter bolts to separate engine/trans between bellhousing if engine cannot rotate.

Parts Information:
NOTE: Use the **Service Process Results Worksheet** in the following page as a guide to determine the appropriate Part Number(s).

1. Order the required parts based on the vehicle inspection results outlined in the Service Procedure Flowchart. (Use the **Service Process Results Worksheet** in the following page as a guide to determine the appropriate part numbers.)
2. Refer to **TSB 21-01-067H** (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:
NOTE: Use the **Service Process Results Worksheet** in the following page as a guide to determine the appropriate Op Code.

1. The Campaign 953 Engine ECM Update is only required if new software is available.
   - Please submit a separate campaign claim for the ECM update using Campaign op codes.
     - These op codes are identified in the tables of **TSB 21-01-067H** with an asterisk (*).
2. Refer to **TSB 21-01-067H** (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.
   - Refer to **Prior Approval Submission Documentation** at last page for checklist of PA items.
   - General engine replacement for conditions outside of those contained in this TSB are not covered by Campaign T3G.

Engine Oil Maintenance Information

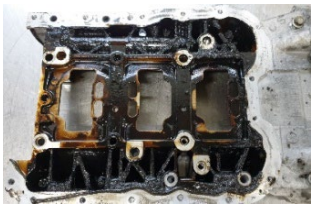
Poor oil maintenance reduces the engine oil lubrication and cooling capacities. As a result, internal engine parts can be damaged resulting in abnormal wear to internal engine parts, excessive carbon deposits, sludge, and other various conditions. An inspection for these conditions and others may be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



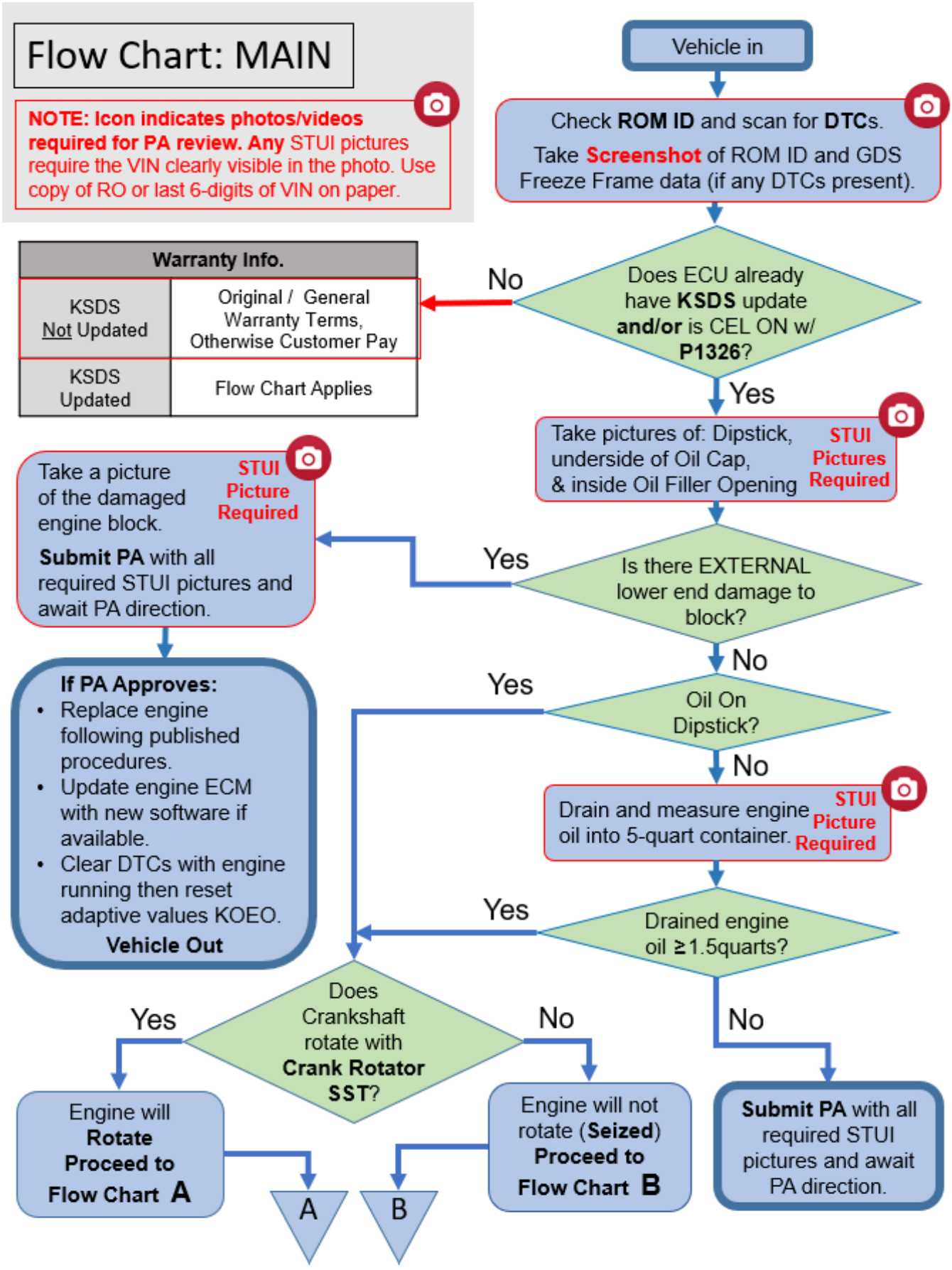
Oil Sludge

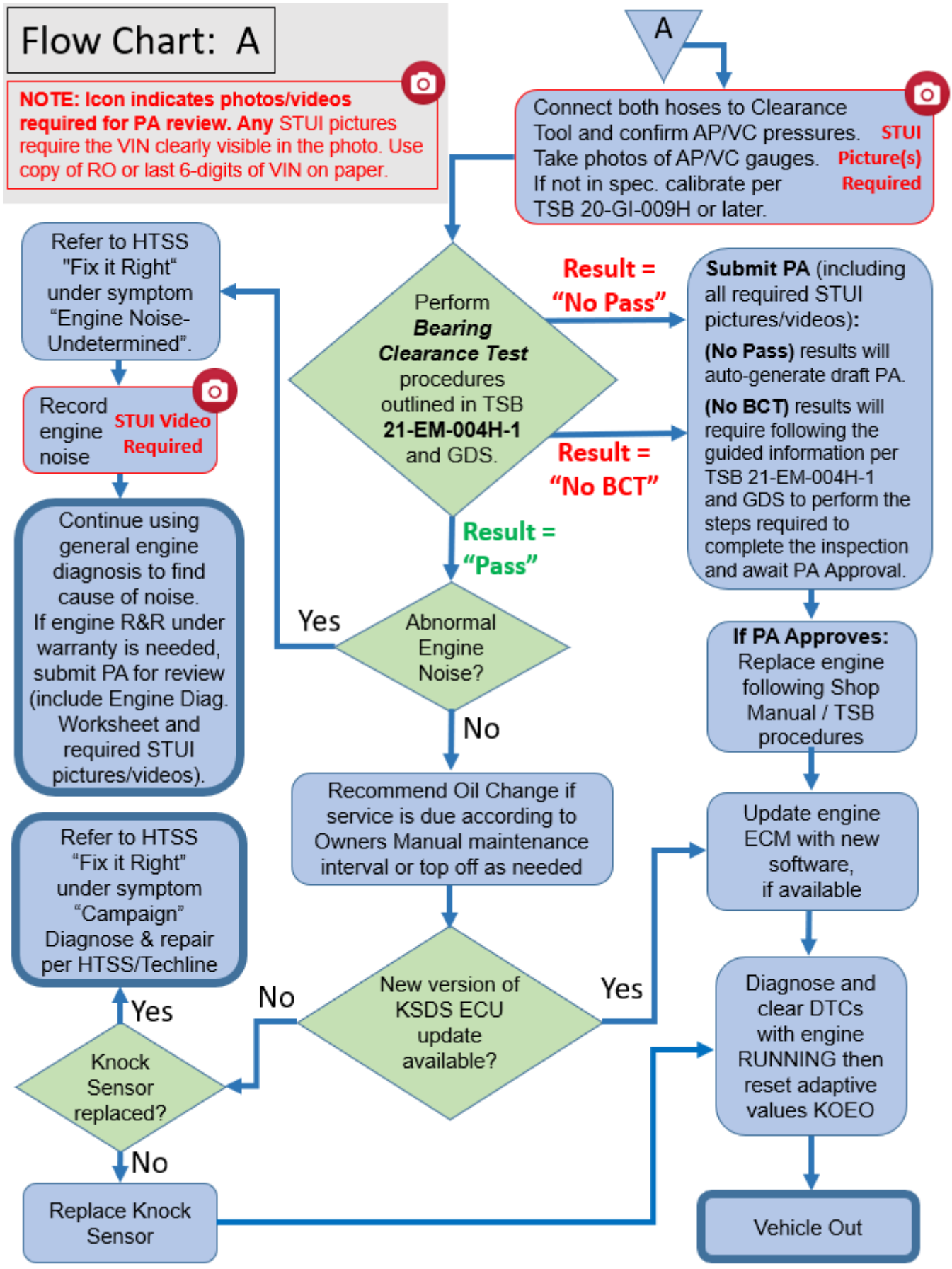
Excessive Wear

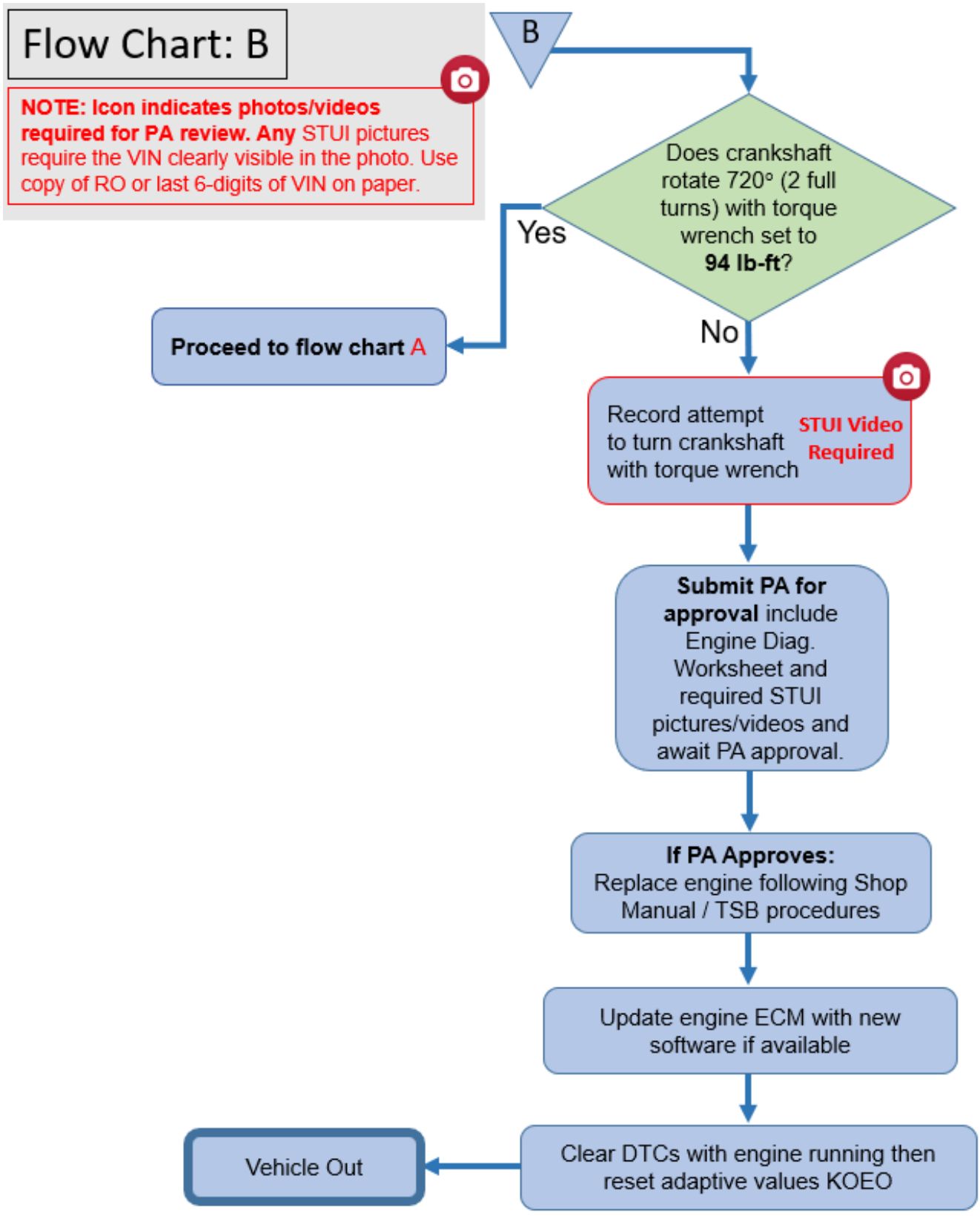
Service Process Results Worksheet: (Print copies of the form below in this page for multiple uses.)

6-Digit VIN:	Repair Order #:				
Options / Tests / Procedures	**(Circle ALL Vehicle Options / Test Results / Performed Procedures That Apply)**				
Vehicle Model Year	11	12	13	14	15
	16	17	18	19	
Vehicle Model Type	SONATA			SANTA FE SPORT	
	TUCSON			VELOSTER N	
Vehicle Engine Size	2.4L			2.0T	
Smart Cruise Control (SCC)	Yes			No	
All Wheel Drive (AWD)	Yes			No	
ECU already has KSDS Update and/or CEL ON w/ P1326	Yes			No	
External Lower End Damage To the Block	Yes			No	
Oil On Dipstick	Yes			No	
No Oil Found On Dipstick: Oil Drain Procedure Required →				Drained Engine Oil at 1.5 Quarts (or higher)	
				Yes	No
Crank Rotation (w/ 94 lb-ft. or less)	Yes			No	
Bearing Clearance Test Performed	Yes	No			
Bearing Clearance Test Result	BCT ***PASS***		BCT ***NO PASS***	***NO BCT***	
Abnormal Engine Noise	Yes			No	
Knock Sensor Replaced (in this Repair Order)	Yes			No	
Replaced Engine (in this Repair Order)	Yes	NEW		No	
		REMAN			
ECM Newly Updated* (in this Repair Order) *Submit separate 953 campaign claim	Yes			No	
Referred to HTSS Diagnostics	Yes			No	

Service Procedure Flowchart:




Flow Chart: A
NOTE: Icon indicates photos/videos required for PA review. Any STUI pictures require the VIN clearly visible in the photo. Use copy of RO or last 6-digits of VIN on paper.
A
Connect both hoses to Clearance Tool and confirm AP/VC pressures. Take photos of AP/VC gauges. If not in spec. calibrate per TSB 20-GI-009H or later.
STUI Picture(s) Required
Perform Bearing Clearance Test procedures outlined in TSB 21-EM-004H-1 and GDS.
Result = "No Pass"
Result = "No BCT"
Result = "Pass"
Submit PA (including all required STUI pictures/videos):
(No Pass) results will auto-generate draft PA.
(No BCT) results will require following the guided information per TSB 21-EM-004H-1 and GDS to perform the steps required to complete the inspection and await PA Approval.
Refer to HTSS "Fix it Right" under symptom "Engine Noise-Undetermined".
Record engine noise
STUI Video Required
Continue using general engine diagnosis to find cause of noise. If engine R&R under warranty is needed, submit PA for review (include Engine Diag. Worksheet and required STUI pictures/videos).
Abnormal Engine Noise?
Yes
No
If PA Approves: Replace engine following Shop Manual / TSB procedures
Recommend Oil Change if service is due according to Owners Manual maintenance interval or top off as needed
Update engine ECM with new software, if available
Refer to HTSS "Fix it Right" under symptom "Campaign" Diagnose & repair per HTSS/Techline
New version of KSDS ECU update available?
Yes
No
Knock Sensor replaced?
Yes
No
Diagnose and clear DTCs with engine RUNNING then reset adaptive values KOEO
Replace Knock Sensor
Vehicle Out


Flow Chart: B
NOTE: Icon indicates photos/videos required for PA review. Any STUI pictures require the VIN clearly visible in the photo. Use copy of RO or last 6-digits of VIN on paper.
B
Does crankshaft rotate 720° (2 full turns) with torque wrench set to 94 lb-ft?
Yes
Proceed to flow chart A
No
Record attempt to turn crankshaft with torque wrench
STUI Video Required
Submit PA for approval include Engine Diag. Worksheet and required STUI pictures/videos and await PA approval.
If PA Approves:
Replace engine following Shop Manual / TSB procedures
Update engine ECM with new software if available
Clear DTCs with engine running then reset adaptive values KOEO
Vehicle Out

Service Procedure: (Refer to the QR link for additional video information →)

Hyundai Service Learning - Campaign T3G Updated Flowchart

Initial Inspection:

1. Scan for DTC P1326 using the GDS.
   - If DTC P1326 (or any other code) is present, take screenshot of Freeze Frame data for PA using GDS screen capture if any DTCs are present and proceed to Step 2.

2. Take pictures of the dipstick, engine oil filler cap, and inside the valve cover oil filler opening.
   - Using STUI on the GDS, take and submit pictures of the following with the VIN in the background of the photo (RO or last 6 digits written on paper). **VIN must be legible.**

Oil filler cap: Clear view of cap underside	**Oil filler opening:** Clear view inside opening.
	

NOTE: If no oil can be measured on the dipstick and no external lower end damage is found in step 3 below, then perform Oil Drain Procedure in the following page.

3. Check for any external lower end damage to the cylinder block.
   - **If there is external lower end damage:**
     - Using STUI in the GDS, submit at least one 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.**
     - Submit Warranty Prior Approval (PA) and await PA approval.

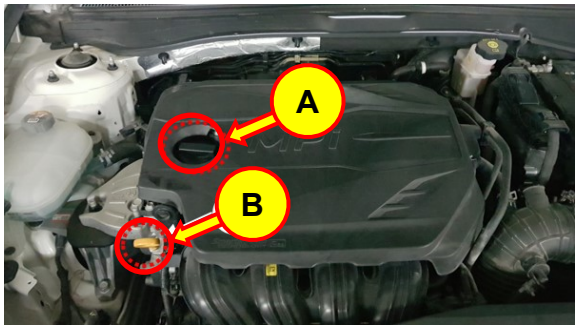
NOTICE

PA Approval is required for engine replacement. Submit PA and refer to the Dealer Best Practices guide for the latest requirements for engine approval.
- **A picture of the lower end damage is required if present.**

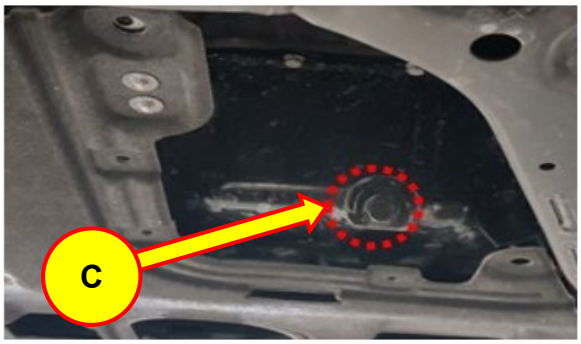
Additional documentation may be required:
- **Refer to Prior Approval Submission Documentation at last page for PA required items.**
- **Use STUI feature on the GDS to take and submit pictures.**

Oil Drain Procedure: (*If no oil on dipstick*)

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

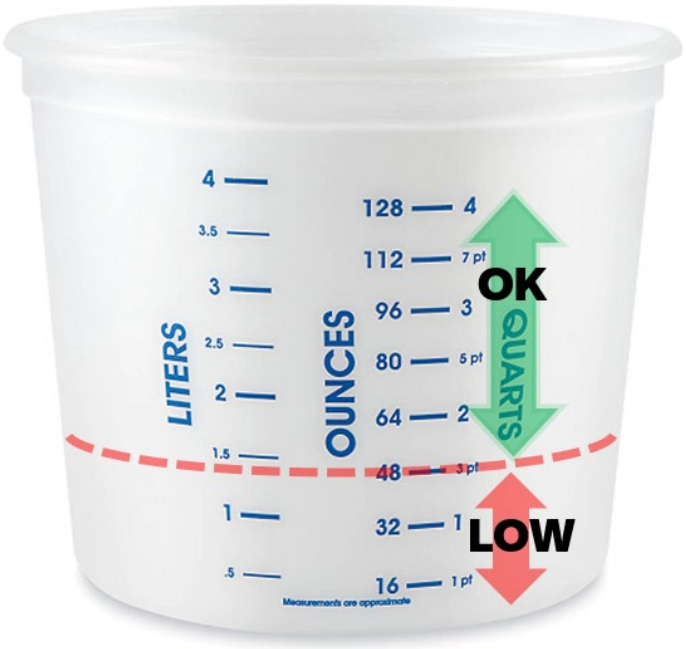


2. Lift up the vehicle and remove the oil drain plug (C).



3. Drain the engine oil into a container.
The **1.5-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 drained oil 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.**

- **If measured drained oil is <u>at or higher</u> than 1.5-quart line:**
  - Follow the Engine Rotation Check in the following page.
- **If measured drained oil is <u>below</u> the 1.5-quart line:**
  - Submit PA with all required STUI pictures and await further directions.



Engine Rotation Check:

1. Rotate the crankshaft with the crank rotator SST.

- If the crankshaft cannot be turned with a moderate force, then measure the force required to turn the crankshaft with a torque wrench.
- 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.

NOTICE

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

- **If the crankshaft normally rotates up to 2 full turns (720°):**
  - Proceed to Bearing Inspection in the following page and follow the procedure sequence in **Flow Chart A**.
- **If the force required for rotating the crankshaft is greater than 94 lb-ft., documentation through STUI video is required.**
  - Follow the procedure sequence in **Flow Chart B** to complete the crank rotation inspection.

NOTICE

PA Approval is required for engine replacement. Submit PA and refer to the Dealer Best Practices guide for the latest requirements for engine approval.
1) If engine does not rotate normally, a STUI video including the following is required:
- **VIN Plate (at windshield or on door jamb)**
- **Attempt to rotate the crankshaft with a torque wrench set to 94 lb-ft.**

2) Save the crankshaft rotation torque value.

Additional documentation may be required:
- **Refer to Prior Approval Submission Documentation at last page for PA required items.**
- **Use STUI feature on the GDS to take and submit pictures and videos.**

Bearing Inspection:

Refer to TSB 21-EM-004H-1 to perform "BEARING CLEARANCE TEST SERVICE PROCEDURE".

- **If the test result is "Pass":**
  - Save a screenshot of the results screen.
  - 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.
  - Refer to Campaign 953 to update the Engine ECM if new software is available.
  - Use appropriate Op Code for "ENGINE INSPECTION" to complete the inspection procedure.

- **If the test result is "No Pass":**
  - Save a screenshot of the results screen.
  - Submit PA for engine replacement approval.
  - Follow the remaining steps of this TSB to replace the engine (upon PA approval).
  - Check for DTCs and perform the appropriate diagnostic service. Ensure no warning lights are present to complete the procedure.
  - Refer to Campaign 953 to update the Engine ECM if new software is available.
  - Use appropriate Op Code for "ENGINE INSPECTION" to complete the inspection procedure and then submit PA for engine replacement.
    - Use appropriate Op Code for the engine replacement operation portion.

- **If the test result is "No BCT":**
  - This screen may result if one or more cylinders were skipped in the BCT Process.
  - Save a screenshot of the results screen.
  - Record Error Code Number on Repair Order.
  - Follow "Skipped Cylinder STUI Video Submission" steps on page 10 of **TSB 21-EM-004H-1** (or later) for recording appropriate STUI video of Skipped Cylinder Test.
  - Submit PA for engine replacement approval.
  - Follow the remaining steps of this TSB to replace the engine (upon PA approval).
  - Check for DTCs and perform the appropriate diagnostic service. Ensure no warning lights are present to complete the procedure.
  - Refer to Campaign 953 to update the Engine ECM if new software is available.
  - Use appropriate Op Code for "ENGINE INSPECTION" to complete the inspection procedure and then submit PA for engine replacement.
    - Use appropriate Op Code for the engine replacement operation portion.

Engine Replacement:

1. Continue with engine replacement (if necessary) according to the Service Procedure Flowchart.

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**

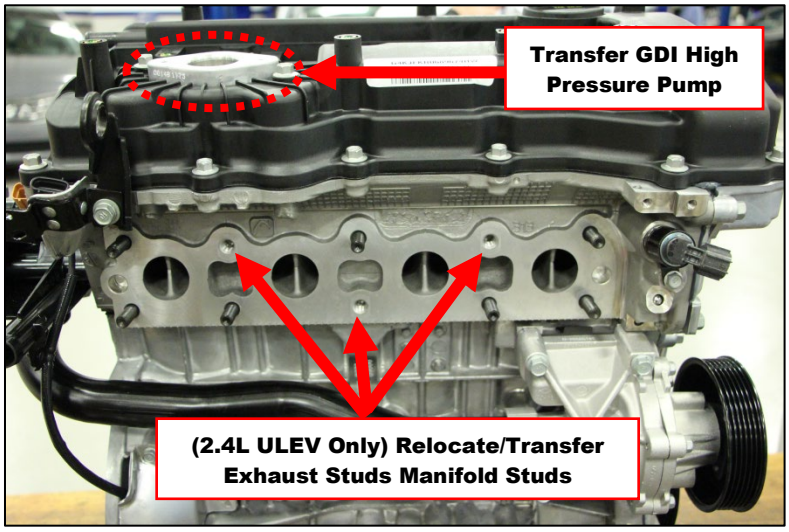
NOTICE

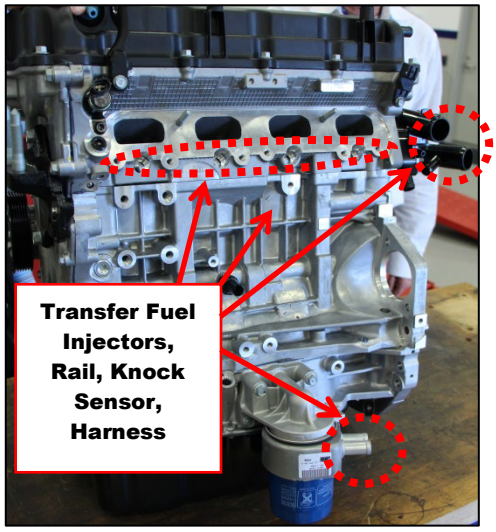
Record the audio station presets (XM, AM, FM, etc.) prior to disconnecting the battery.

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

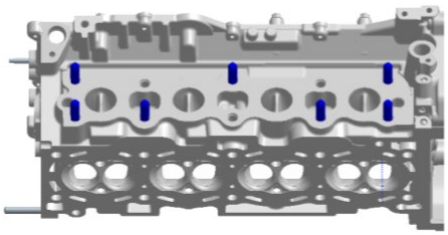
NOTICE

Take special care of the original engine parts that will be required for reinstallation on to the replacement engine.



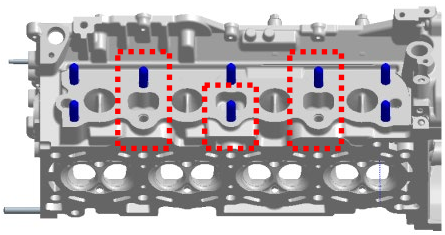


4. **(For 2.4L with ULEV / FED emissions only)** 2.4L replacement engines are produced with the exhaust manifold studs configured for SULEV / CAL emissions package.
   - ❖ Two exhaust studs must be relocated on the new engine and 1 exhaust stud must be transferred from the old engine.
     - ○ Use a commercially available stud removal tool or use the double-nut technique to complete this step.



SULEV / CAL Spec

ULEV / FED Spec



Exhaust Stud Position Relocation Information

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

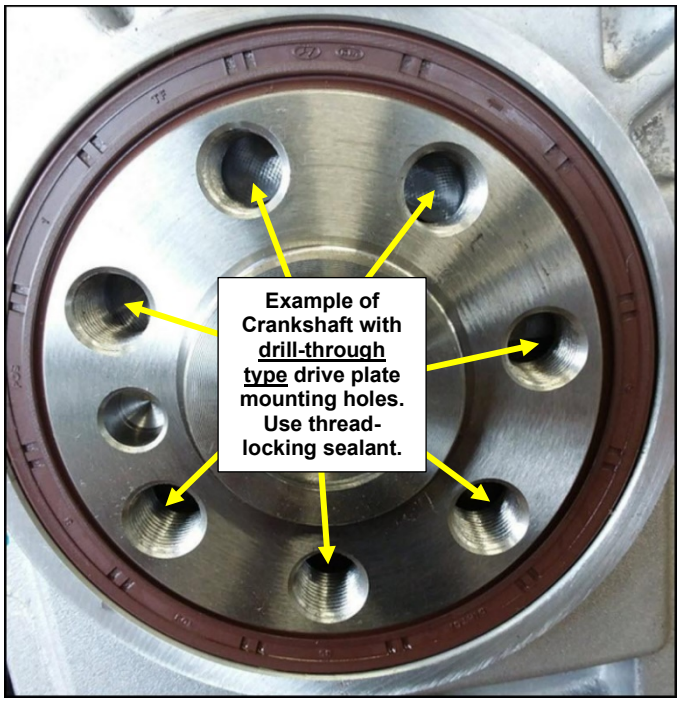
***Knock Sensor Fastener Tightening torque**:*
21Nm (15.5lb-ft)

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.

7. Inspect inside the drive plate mounting holes at the crankshaft flange to determine whether it is **drill-through** type or **pocket** type.
   - **If crankshaft is drill-through type**, then follow the *NOTICE* below to **apply thread-locking sealant** to all the threads of the drive plate bolts before tightening.
   - ***Drive Plate Tightening torque**:*
     111.7 ~ 127.5 Nm (86.8 ~ 94.1 lb-ft)

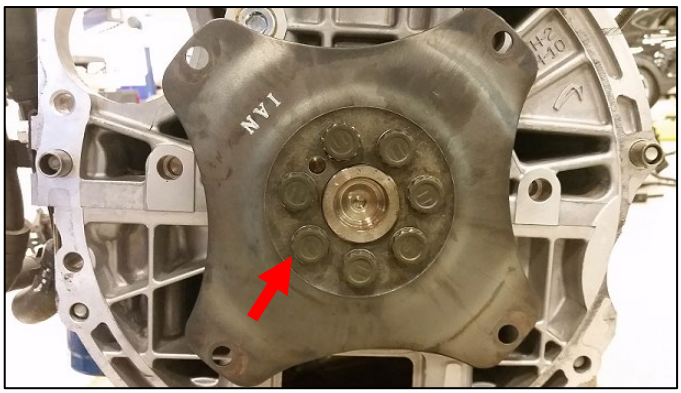


NOTICE

If the crankshaft has drill-through type drive plate mounting holes, then thread-locking sealant must be used to prevent any oil seepage through the (7) drive plate bolts.
- **Apply on all threads a low/medium strength thread-locking adhesive that seals fasteners and are tolerant to engine oil.**

  [Suggested Products] ThreeBond 2403, LOCTITE 200, LOCTITE 204, LOCTITE 243 (or equivalent)

- **Be sure to lightly brush all the bolt threads free of debris/residue and clean off any oil prior to applying the thread-locking sealant for installation.**



8. 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.

⚠ 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.

9. Install the new oil cooler hoses if applicable.

10. Reconnect and reinstall the engine front harness.

11. 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)**

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.

12. 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.

13. 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):
            - 5W-30 Full Synthetic type with API SN/SN+/SP, ILSAC GF4/GF5 or higher service grade
        - For Veloster N (JSN):
            - 0W-30 (or 5W30 if not available) Full Synthetic type with SN/SN+/SP, ILSAC GF4/5 or higher grade

14. 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**.

15. Refer to Campaign 953 to update the Engine ECM if new software is available.

16. 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 running. 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 running.**
- **Reset engine adaptive values.**

Prior Approval Submission Documentation:

- Refer to chart below for items needed for submissions based on condition.

	No Oil On Dipstick w/ Drained Engine **Oil Measured Less Than 1.5 Quarts**	**External Damage** or **Cannot Rotate Crankshaft** @94lb-ft	Bearing Clearance Test (BCT) **"No Pass"**	Bearing Clearance Test **"Pass"** with Engine Knocking Concern	Bearing Clearance Test **"No BCT"** Result w/ Additional Steps
Repair Order	✓	✓	✓	✓	✓
Engine Diagnosis Worksheet	✓	✓	✓	✓	✓
Towing Invoice	*If Applicable*	*If Available*	*If Available*	*If Applicable*	*If Applicable*
GDS DTC Freeze Frame Screen Print	✓	✓	✓	✓	✓
One Bearing Test Result Uploaded	N/A	N/A	✓	✓	✓
BCT Calibration Photo	N/A	N/A	✓	✓	✓
Photo of Oil Dipstick	✓	✓	✓	✓	✓
Photo of Oil Cap	✓	✓	✓	✓	✓
Photo of Oil Fill Hole	✓	✓	✓	✓	✓
Photo of Oil Drain Measurement	✓	*If No External Damage and No Oil On Dipstick*	*If No Oil On Dipstick*	*If No Oil On Dipstick*	*If No Oil On Dipstick*
Crank Rotation Video	N/A	*If Crankshaft Cannot Rotate*	N/A	N/A	N/A
Engine Noise Video	N/A	N/A	N/A	✓	N/A
Photo of Cylinder Block Damage	N/A	*If Applicable*	N/A	N/A	N/A
"No BCT" Error Code	N/A	N/A	N/A	N/A	✓
STUI Video of Skipped Cylinder Test	N/A	N/A	N/A	N/A	Per "No BCT" Result → **AP/VC** or **Compression** measurement
Copy of Maintenance Records	*If Requested by PA*	*If Requested by PA*	*If Requested by PA*	*If Requested by PA*	*If Requested by PA*
Photo of Valvetrain	*If Requested by PA*	*If Requested by PA*	*If Requested by PA*	*If Requested by PA*	*If Requested by PA*
Photo of Accident Damage	*If Applicable*	*If Applicable*	*If Applicable*	*If Applicable*	*If Applicable*

Proper Photos / Videos:

- VIN in view when photo is taken of the item in question. **(Windshield or doorjamb VIN Plate)**
  - **Exception:** For oil Measurement photo, a Repair Order in photo will suffice.
- Photo taken with clear focus, showing the item being presented.
- BCT Connection Calibration Test - show connections and gauges clearly (up to two photos)
- Crank Rotation Video, Engine Noise Video, Skipped Cylinder AP/VC checking, or Skipped

Cylinder Compression test need to start at the Window VIN Plate and move to the Front of engine showing no crankshaft movement or noise (as applicable) in a continuous video beginning to end.

- ***Returned engines may be inspected by WTC for a seized condition***

Media Submission Process:

- ❖ All photos / videos will be submitted via Single Technician User Interface (STUI). (See Page 4 of Tech Net Times Vol 30 Issue 7 for additional details.)