March 19, 2024 Version 3

Safety Recall: 2017 and 2019 Ridgeline Connecting Rod Bearing

Supersedes 24-002 dated March 1, 2024, to revise the information.

AFFECTED VEHICLES

Year	Model	Trim Level	VIN Range
2017	Ridgeline	ALL	Check iN VIN status inquiry for eligibility
2019	Ridgeline	ALL	Check iN VIN status inquiry for eligibility

REVISION SUMMARY

This service bulletin has been revised extensively; American Honda recommends reading this bulletin in its entirety.

BACKGROUND

On November 9, 2023 American Honda announced a **STOP SALE** and **safety recall** for **c**ertain model year 2017 and 2019 Ridgeline units. These vehicles may have engines containing internal damage at the connecting rod bearings, possibly leading to engine failure. If an engine fails, the vehicle may lose motive power, increasing the risk of crash, fire, and resulting injury.

During engine manufacturing, some crankshafts may have been built with improper connecting rod journal dimensions, resulting in increased friction between the journals and their bearings. This increased friction could lead to accelerated engine deterioration and possible failure due to a lack of lubrication and excessive heat.

If this bulletin appears during an iN VIN status inquiry, the vehicle is subject to a safety recall. Any affected vehicles in your dealer inventory are on **STOP SALE** until further notice. Refrain from calling Tech Line for updates.

CUSTOMER NOTIFICATION

Owners of the affected vehicles have been sent a notification of this campaign. They were informed that due to a limited supply of parts (at this time) American Honda is prioritizing the repair of customer vehicles experiencing symptoms related to this recall.

When **adequate replacement parts** become available, American Honda will send a follow-up letter to customers instructing them to schedule an appointment for all vehicles affected by this recall. If a customer experiences the known symptoms associated with this **safety recall** (see CORRECTIVE ACTION), they are instructed to contact their local Honda dealer for the repair.

For any questions or concerns customers may have, you may have them contact American Honda's Customer Support & Campaign Center at **1-888-234-2138**.

The following suggested text should be included on any repair order for an already sold affected vehicle that comes in for service. This information should be printed out completely any time service is conducted on an affected vehicle, and the recall repair has not yet been completed. Depending on parts availability, the normal procedures under the *Service Operations Manual* (SOM) 7.2.1 will apply for this recall.

CUSTOMER INFORMATION: The information in this bulletin is intended for use only by skilled technicians who have the proper tools, equipment, and training to correctly and safely maintain your vehicle. These procedures should not be attempted by "do-it-yourselfers," and you should not assume this bulletin applies to your vehicle, or that your vehicle has the condition described. To determine whether this information applies, contact an authorized Honda automobile dealer.

Suggested Verbiage to be Included on the Repair Order

Customer was advised that:

The vehicle is subject to a recall affecting the connecting rod bearings. The parts necessary to complete the recall repair are currently limited. Vehicles with eligible VINs and the following symptom: an abnormal engine knocking noise or an abnormal engine knocking noise followed by a loss of power are eligible for immediate inspection. Once parts repair kits are available, if the vehicle has not been repaired, the registered owner of the vehicle will receive a notice to bring the vehicle in for a repair, regardless of symptom.

IMPORTANT NOTICE

Due to a limited parts inventory to complete the necessary repairs, dealers must prioritize which vehicles are inspected and repaired. A customer experiencing a symptom of an engine rod knock or a vehicle stall when driving should be inspected. Otherwise, advise the customer that parts are limited as described in the CUSTOMER NOTIFICATION section.

The self-study training module, *ENC65 Multiple Connecting Rod Repair with V-SMART*, is available on the Online University. Make sure to complete the module before starting the inspection procedure.

CORRECTIVE ACTION

Do an iN **VIN** status inquiry to make sure the vehicle is shown as eligible for an inspection. Removal of the connecting rod bearings and taking/sending photos via V-SMART for inspection by the Bearing Inspection Inquiry Team.

The technician will then create a Bearing Inspection Inquiry through iN and will receive a reference case number. This number must be used when contacting the Bearing Inspection Inquiry Team. This team will conduct a judgment and recommend the appropriate repair for the technician to complete.

In the event that parts are not available, the **STOP SALE** remains in effect for that vehicle. To see if a vehicle in inventory is affected by this safety recall, do a **VIN** status inquiry before selling it. Some vehicles affected by this campaign may be in your new or used vehicle inventory.

PARTS INFORMATION

Repair parts will be automatically allocated based on repair direction. Carefully review the **Repair Type** instructions emailed *after* submission of the inspection results to the Bearing Inspection Inquiry team.

REQUIRED MATERIALS

Part Name	Part Number	Quantity
0W-20 Full Synthetic Motor Oil	-	5.4 US qt
Hondabond HT Silicone Gasket	08718-0004	1

TOOL INFORMATION

Tool Name	Part Number	Quantity
V-SMART Phone	CDW5001003PK	1
Crank Angle Gauge, [GAUGE, CRANK ANGLE]	07AAJ-5G0A100	1
M8 Rod Holder, [HOLDER, M8 ROD]	07AAB-5G0A100	1
Piston Stopper, [STOPPER, PISTON]	07AAB-5G0A200	4 per vehicle
Bearing Photo Box, [BOX, BEARING PHOTO]	07AAK-5J2A200	1
Large Zip Tie	Commercially Available	2
Radiator Protector, [PROTECTOR, RADIATOR]	07AAK-5A2A100	1
Engine Stand	NRI178100	1
Load Leveler	NRI178115H	1
Lift Table	KLS6227500	1
Engine Hanger	VSB02C000041	1

NOTE: These tools have been auto-shipped to your dealer. There is no need to order at this time as quantities are limited. Contact the Special Tools Hotline **(833) 949-4672** and/or email special_tools@ahm.honda.com for information.

WARRANTY CLAIM INFORMATION

Important Notice: Warranty claim information extends across multiple pages; please select the correct table.

Connecting Rod Bearing Repair

INSPECTION A, plus repair

NOTE:

- For inspections that resulted in a repair, you will need to create **two repair lines** in the repair order- **one for inspection** and **one for repair**.
- Both repair lines must be done for completion of **this claim**.
- Enter the bearing part number(s) (provided by the Bearing Inquiry Team) under templates D.

Operation Number	Description	Flat Rate Time	Defect Code	Symptom Code	Template ID	Failed Part Number
1115G5	Inspection A- connecting rod bearings (includes photos)	1.2 hr	6JA00	YHR00	A24002A	13010-R9P-A00
1111ER	Replace connecting rod bearings (includes photos)	2.2 hr	6KC00	NH300	A24002D	13321-5J6-A01

INSPECTION B, plus repair

NOTE:

- For inspections that resulted in a repair, you will need to create **two repair lines** in the repair order- **one for inspection** and **one for repair**.
- Both repair lines must be done for completion of **this claim**.
- Enter the bearing part number(s) (provided by the Bearing Inquiry Team) under templates E.

1115G6	Inspection B – connecting rod bearings and main cap bearing (includes photos)	2.5 hr	6JA00	YHR00	A24002B	13050-R9P-A00
1111FM	Replace connecting rod bearings (includes photos)	2.2 hr	6KC00	NH300	A24002E	13341-R9P-A01

VIN and Engine Number Identification Query through V-SMART–No Repair

NOTE:

- No further warranty claim required; vehicle is considered fixed by **engine number verification**.
- Use only this labor operation if the engine number identification query through V-SMART was done and resulted in "*Engine Not Affected*."
- **Do not** use this warranty table for either **Inspection A** or **Inspection B**.
- The Bearing Inspection Inquiry Team **must still** be contacted to complete a claim; See step 13 of the V- SMART ENGINE NUMBER VERIFCATION section for more details.

1115G2	Inspect VIN/EIN - Engine not affected (Includes contacting the Bearing Inspection Inquiry Team)	0.3 hr	6KC00	NH300	A24002C	11200-5J6-A11

For repair method other than Connecting Rod Bearing replacement, the repair must be matched with the appropriate inspection and repair template to process the warranty claim.

INSPECTION A or B

NOTE:

- For inspections that resulted in a repair, you will need to create **two repair lines** in the repair order- **one for inspection** and **one for repair**.
- Both repair lines must be done for completion of **this claim**.

Operation Number	Description	Flat Rate Time	Defect Code	Symptom Code	Template ID	Failed Part Number
1115G5	Inspection A- connecting rod bearings (includes photos)	1.2 hr	6JA00	YHR00	A24002A	13010-R9P-A00
1115G6	Inspection B – connecting rod bearings and main cap bearing (includes photos)	2.5 hr	6JA00	YHR00	A24002B	13050-R9P-A00

Short Block Replacement

NOTE:

- For inspections that resulted in other than a connecting rod bearing replacement, you will need to create **a second repair line** in the repair order- **one for inspection** and **one for repair**.
- Based on the Bearing Inquiry Team's recommended repair, select the appropriate repair template below.
- Both repair lines must be done for completion of **this claim**.

2017 FWD

1111ES	Replace short block (includes alignment)	13.8 hr	6KC00	NH300	A24002F	13322-5J6-A01

2017 AWD

1111ES	Replace short block (includes alignment)	14.3 hr	6KC00	NH300	A24002G	13322-5J6-A01

2019 FWD

1111ES	Replace short block (includes alignment)	13.8 hr	6KC00	NH300	A24002H	13322-5J6-A01

2019 AWD

1111ES	Replace short block (includes alignment)	14.3 hr	6KC00	NH300	A24002J	13322-5J6-A01

Short Block Replacement with New Cylinder Heads

NOTE:

- For inspections that resulted in other than a connecting rod bearing replacement, you will need to create **a second repair line** in the repair order- **one for inspection** and **one for repair**.
- Based on the Bearing Inquiry Team's recommended repair, select the appropriate repair template below.
- Both repair lines must be done for completion of **this claim**.

2017 FWD

1111ET	Replace short block and cylinder heads (includes alignment)	13.8 hr	6KC00	NH300	A24002K	13323-5J6-A01

2017 AWD

1111ET	Replace short block and cylinder heads (includes alignment)	14.3 hr	6KC00	NH300	A24002L	13323-5J6-A01

2019 FWD

1111ET	Replace short block and cylinder heads (includes alignment)	13.8 hr	6KC00	NH300	A24002M	13323-5J6-A01

2019 AWD

1111ET	Replace short block and cylinder heads (includes alignment)	14.3 hr	6KC00	NH300	A24002N	13323-5J6-A01

Inspection Procedure for Complete Engine Failure

NOTE:

- For complete engine failure inspection, you will need to create **two repair lines** in the repair order- **one for inspection** and **one for repair**.
- Based on the Bearing Inquiry Team's recommended repair, **select inspection template P** and the appropriate repair template below.
- Both repair lines must be done for completion of **this claim**.

Operation Number	Description	Flat Rate Time	Defect Code	Symptom Code	Template ID	Failed Part Number
1115G7	Inspect for broken connecting rod only (includes photos)	0.5 hr	6JA00	YHR00	A24002P	11221-5G0-A00

2017 FWD

1111ET	Replace short block and cylinder heads (includes alignment)	13.8 hr	6KC00	NH300	A24002Q	13323-5J6-A01

2017 AWD

1111ET	Replace short block and cylinder heads (includes alignment)	14.3 hr	6KC00	NH300	A24002R	13323-5J6-A01

2019 FWD

1111ET	Replace short block and cylinder heads (includes alignment)	13.8 hr	6KC00	NH300	A24002S	13323-5J6-A01

2019 AWD

1111ET	Replace short block and cylinder heads (includes alignment)	14.3 hr	6KC00	NH300	A24002T	13323-5J6-A01

Skill Level: Repair Technician

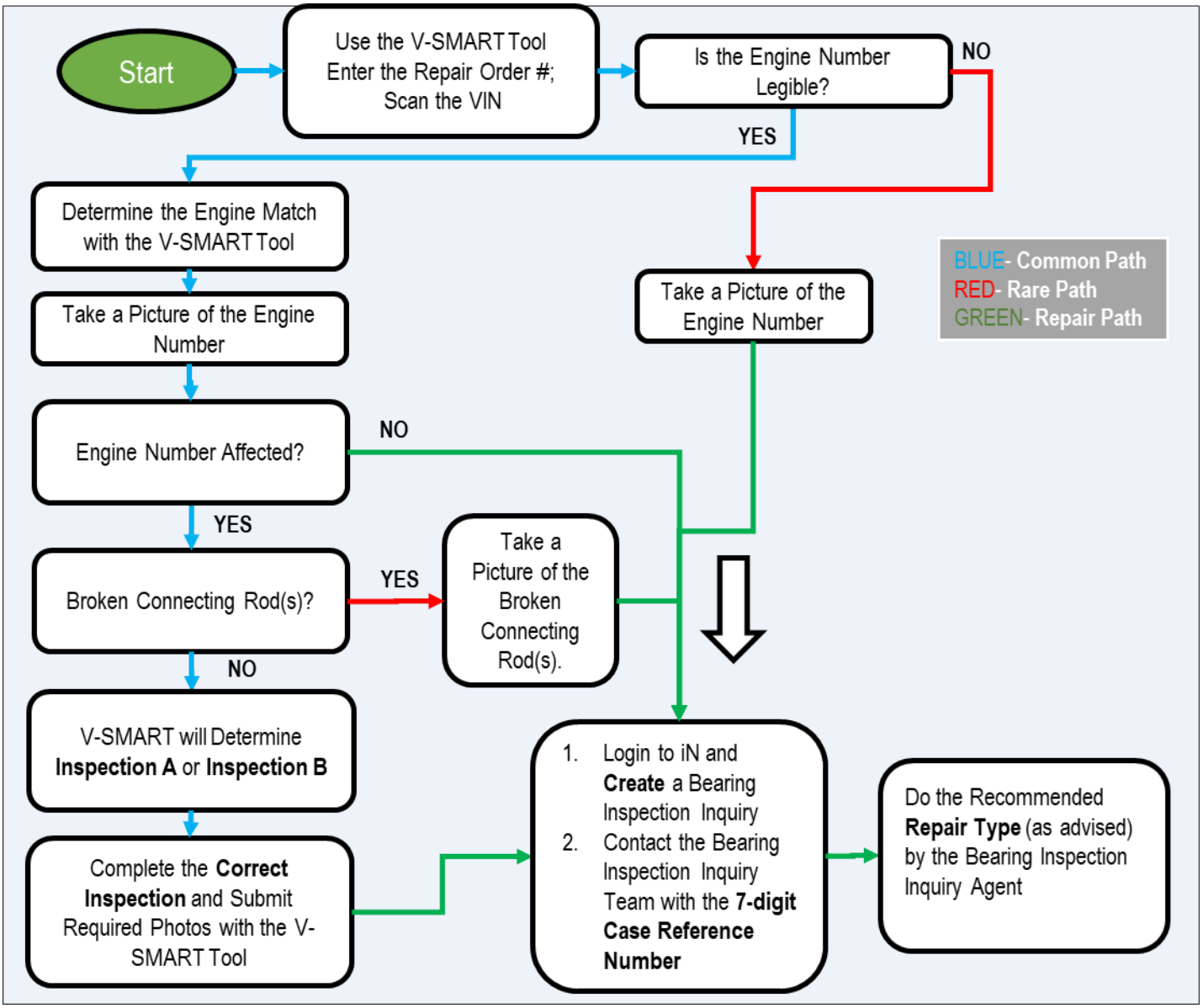
NOTE: Repair will require a special code that has been emailed by the Bearing Inspection Inquiry Team.

CONTENT REFERENCE

Important Notice

This information has been designed to work best when viewing through iN. It is strongly suggested (due to final page count and complexity) that the technician use iN to fully utilize this service bulletin's functions.

Furthermore, the technician is also advised to prepare their workstation for the tasks ahead. This includes: V-SMART phone fully charged, tools laid out, verify strong connection to Wi-Fi, and *access* to this service bulletin in its entirety via iN.



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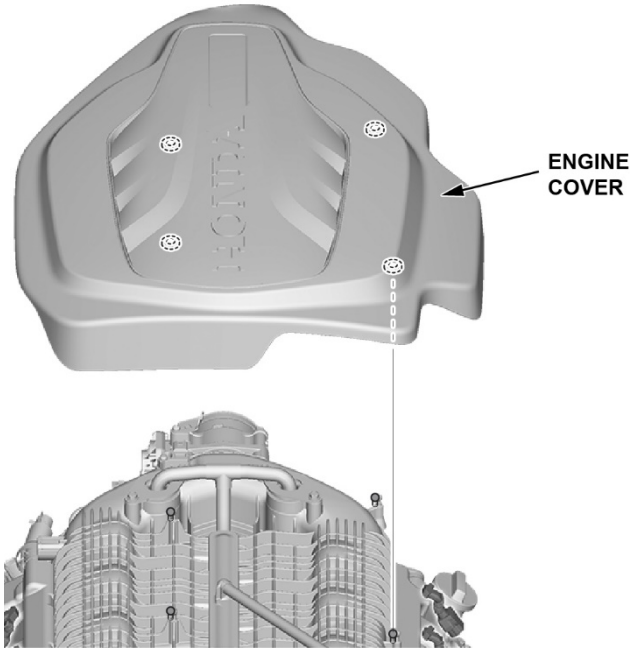
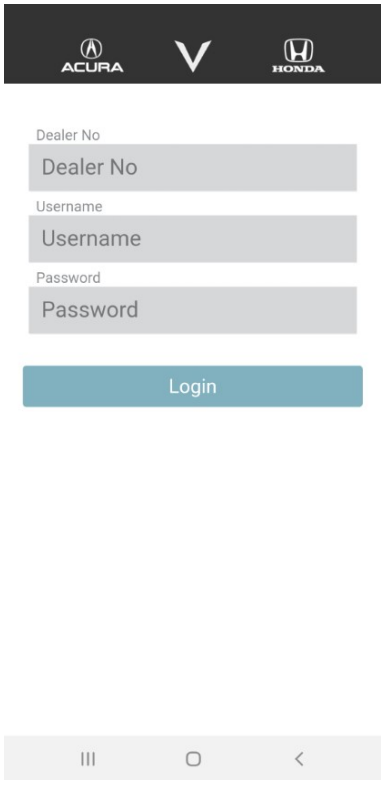
V-SMART ENGINE NUMBER VERIFICATION

NOTE: **DO NOT contact Tech Line for any inquiries to this safety recall. You must call the Bearing Inspection Inquiry Team at (800) 824-6632 (Select Option #9) for all inquiries and repair direction.**

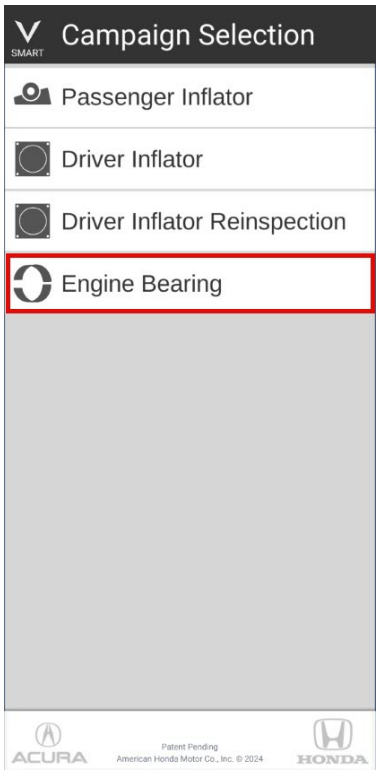
1. Remove the engine cover for better access to the engine number.



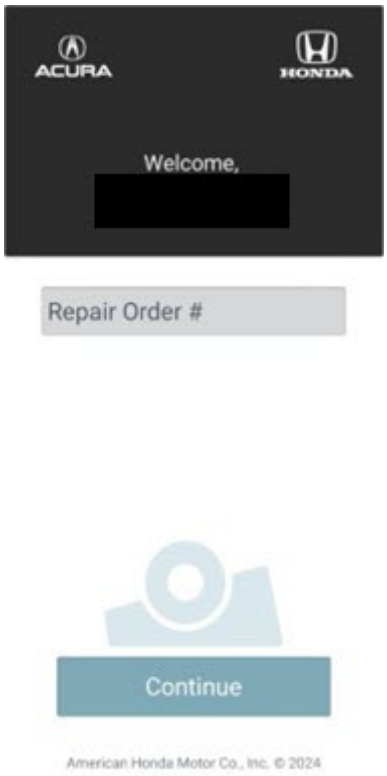
2. Log in to V-SMART application.
    1. Dealer Number
    2. User ID (iN login credentials)
    3. Password (iN login credentials)



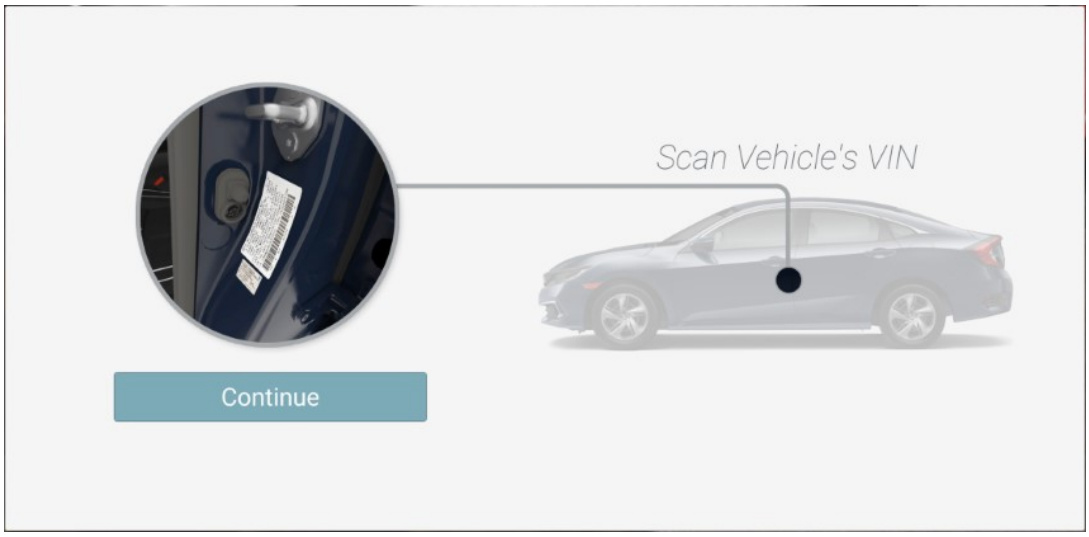
3. Select **Engine Bearing** from the campaign selection.



4. Enter the repair order number (RO#).

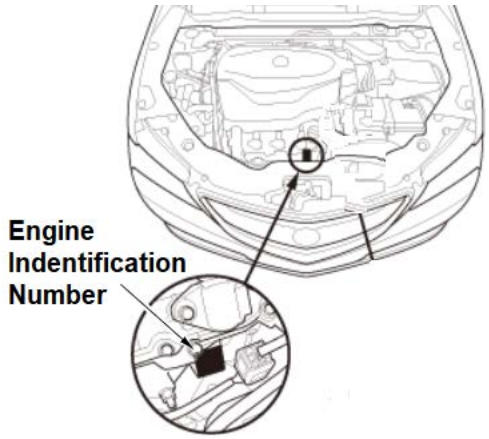


5. Scan the VIN on the driver's door jamb (the original engine identification number should appear).



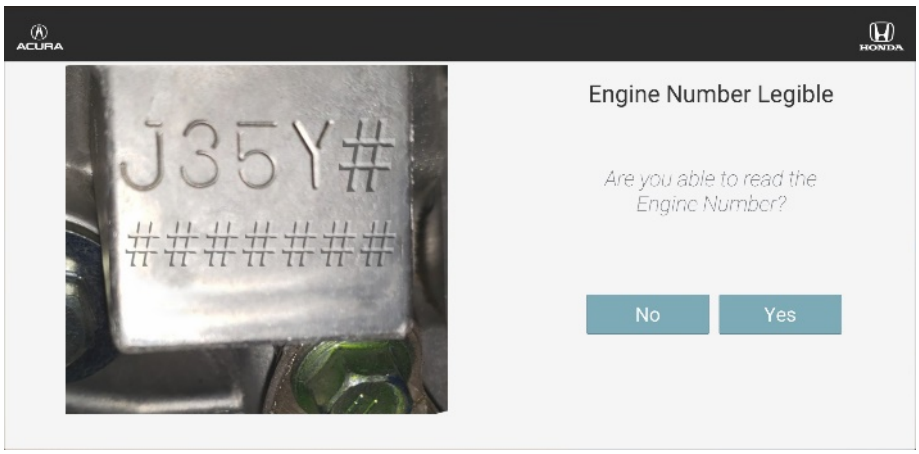
6. Locate the engine identification number.

   NOTE: If the number is not legible, clean the surface.

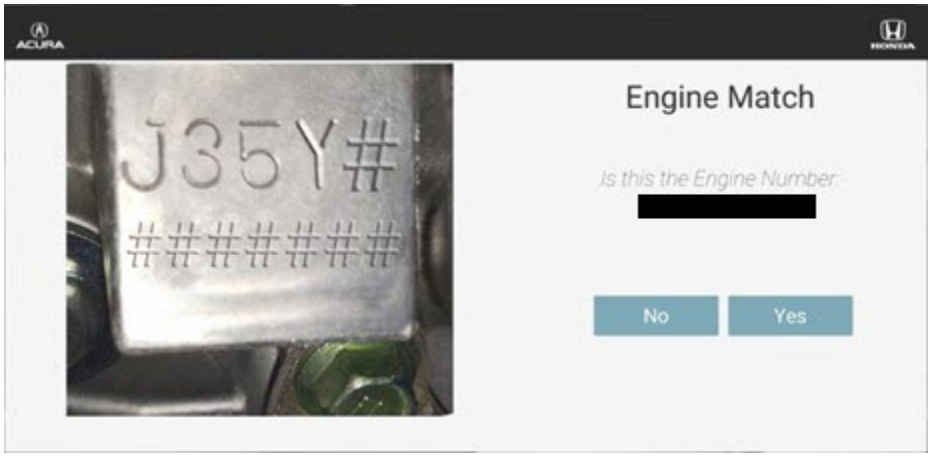


7. Verify that the engine number is legible.
   - **Yes—**Press **YES** and continue to the next step.
   - **No—**Press **NO** and you will be prompted to clean the area, then take a photo.

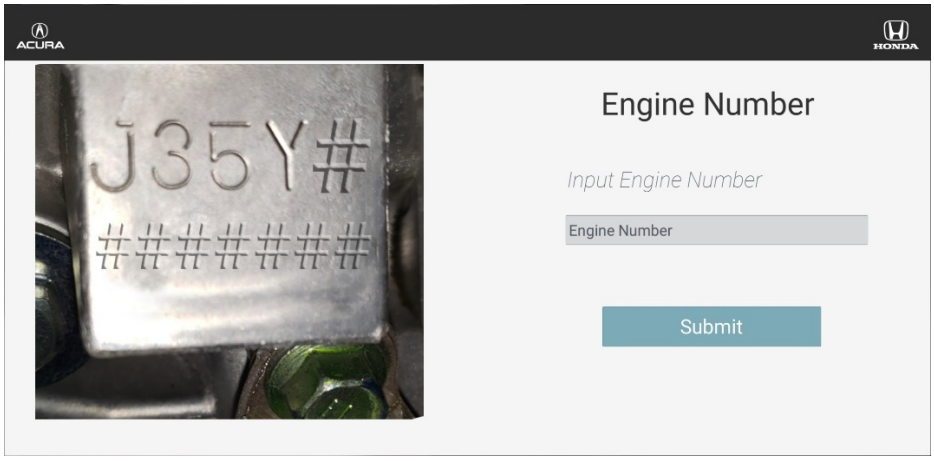
     NOTE: If the engine number cannot be read after cleaning, proceed to step 13 as necessary for information on creating a Bearing Inspection Inquiry and contacting the Bearing Inspection Inquiry Team.



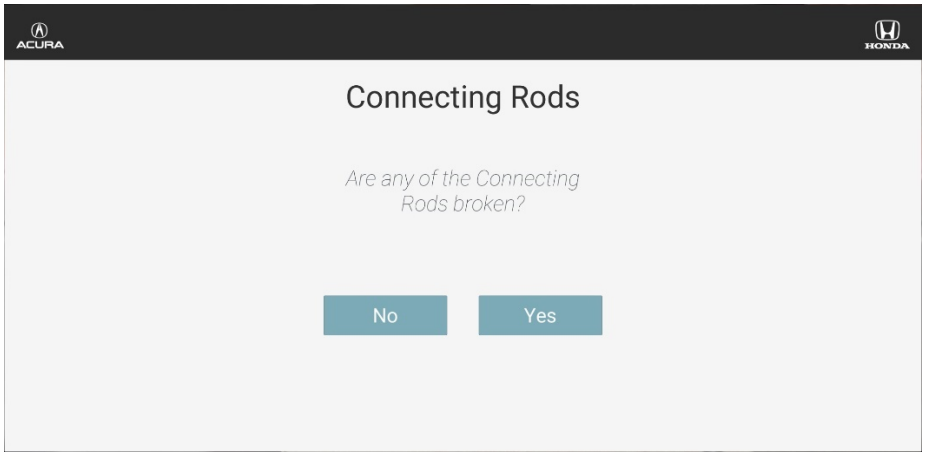
8. Does the engine number from the vehicle match the engine number on file?
   - **Yes—**-Press **YES**.



   - **No—**Manually enter the 12-digit engine number into the application.
     NOTE: Blank or incorrect numbers will not be accepted and will be rejected during the inquiry call.

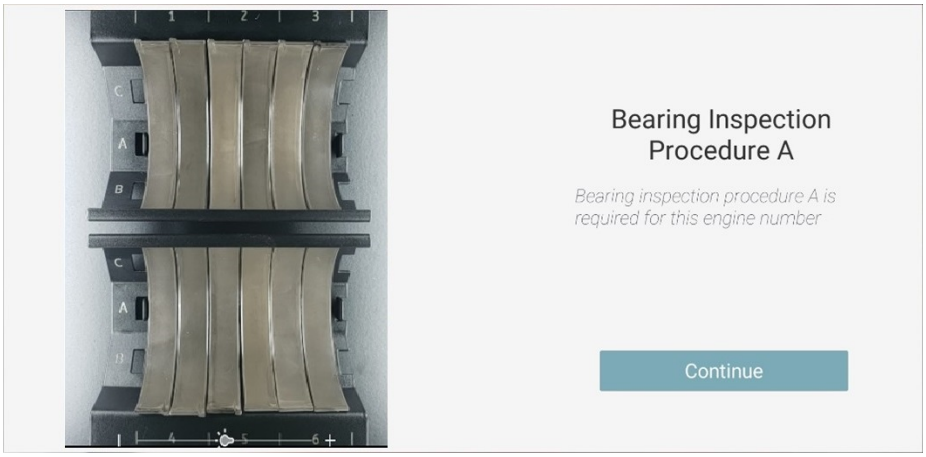


9. Answer the V-SMART tool's question: *Are any connecting rods broken*?
   - **Yes—**Follow the application's instructions.
     NOTE: Proceed to step 13 as necessary for information on creating a Bearing Inspection Inquiry and contacting the Bearing Inspection Inquiry Team.
   - **No—**Press **NO** and c**ontinue** to the next step in this bulletin.

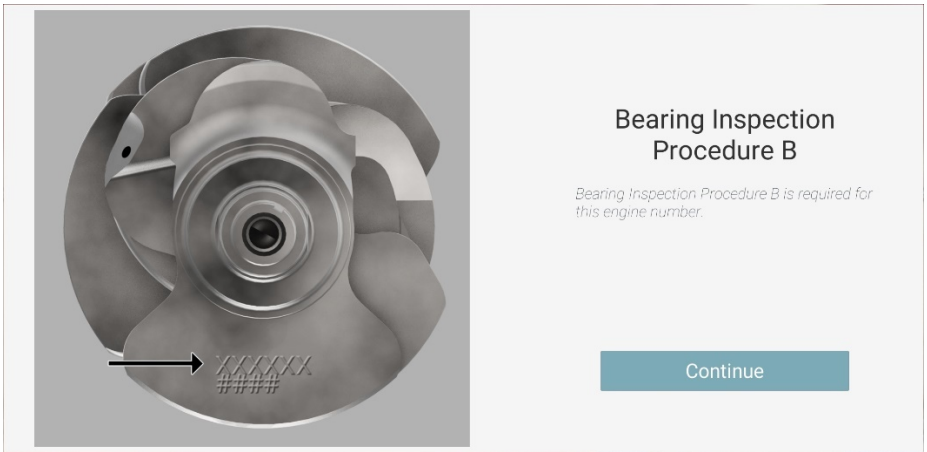


10. The V-SMART tool will direct you to either **INSPECTION A** or **INSPECTION B**. Follow the screen prompts and complete the correct inspection.

    - INSPECTION A: V-SMART Database contains engine build information.



    - INSPECTION B: V-SMART Database does not contain engine build information.



11. Sign out of the V-SMART application.

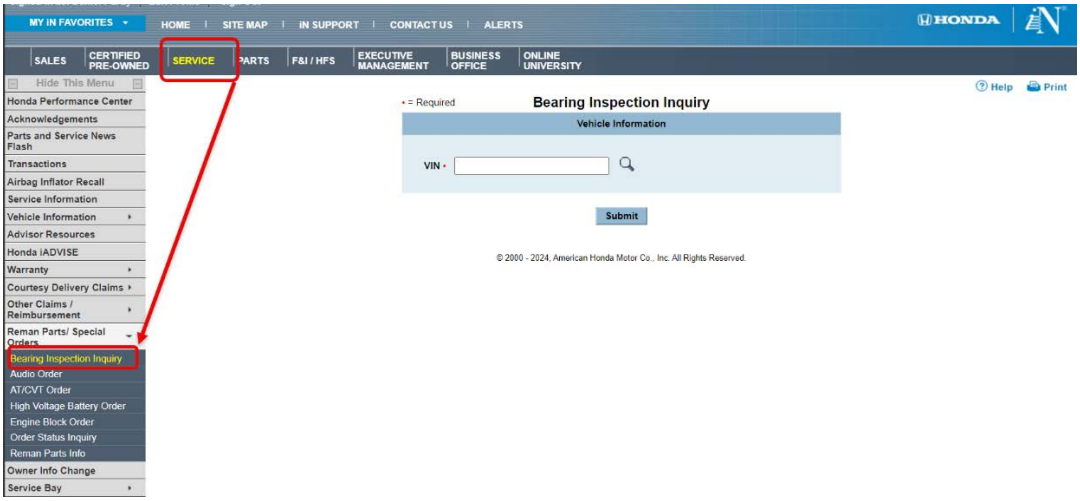
    NOTE: DO NOT contact Tech Line for any inquires to this safety recall. You must call the Bearing Inspection Inquiry Team at (800) 824-6632 (Select Option #9) for all inquiries and repair direction.

12. Proceed to either **INSPECTION A or INSPECTION B**, as directed by the V-SMART application.

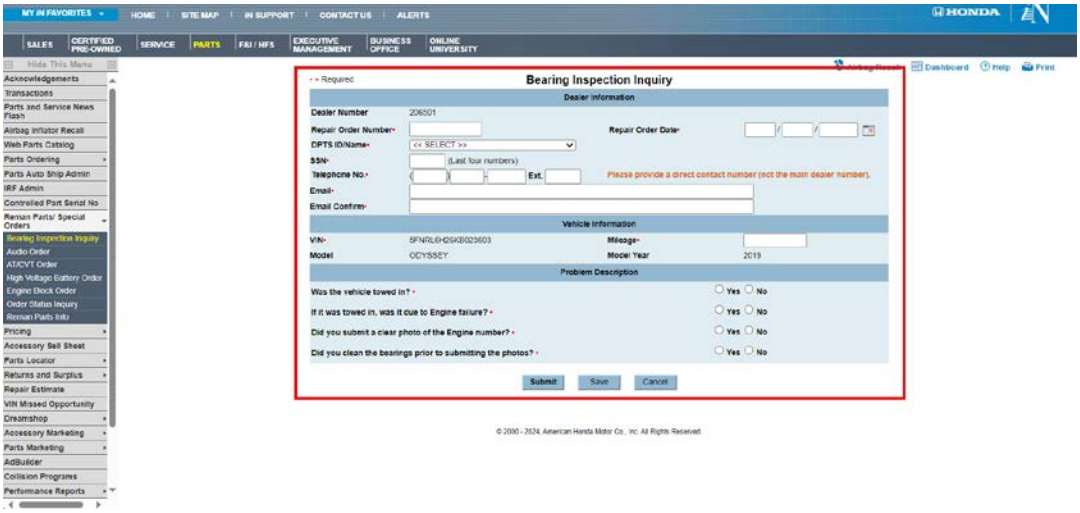
    NOTE:

    - Link to **INSPECTION A**, (Click HERE)
    - Link to **INSPECTION B**, (Click HERE)
    - Logging into the V-SMART application will always prompt the user to enter the RO# and scan/enter the VIN.
    - V-SMART Troubleshooting Hotline Number: **800-346-6327.**

13. Create a Bearing Inspection Inquiry.
    1. Log into iN.
    2. Select SERVICE > REMAN PARTS / SPECIAL ORDERS > BEARING INSPECTION INQUIRY
    3. Select the **BEARING INSPECTION INQUIRY**.
    4. Input the correct **VIN**.



    5. Input all vehicle information to create a case.



    6. A 7-digit case reference number will be generated.

       NOTE: Note this number on the RO for future reference.

    7. Call the **Bearing Inspection Inquiry Team** at **(800) 824-6632**. Press **9** to be routed to the correct department (**do not contact TECH LINE for this**). Give the answering agent the **7-digit reference number** for a repair direction.

       NOTE:

       - MAKING THE INCORRECT SELECTION WILL RESULT IN INCREASED WAIT TIMES.
       - **DO NOT contact Tech Line for any inquires to this safety recall. You must call the Bearing Inspection Inquiry Team at (800) 824-6632 (Select Option #9) for all inquiries and repair direction.**

    8. The bearing inspection agent will give the **Repair Direction**. You will receive instructions via email on the repair method that includes the unique warranty code and the bearing sizes with their specific locations, if applicable. Parts will be AUTO shipped to your dealership. Make sure to advise the parts department with a copy of the RO.

       NOTE: Link to CONTENT REFERENCE, (Click HERE).

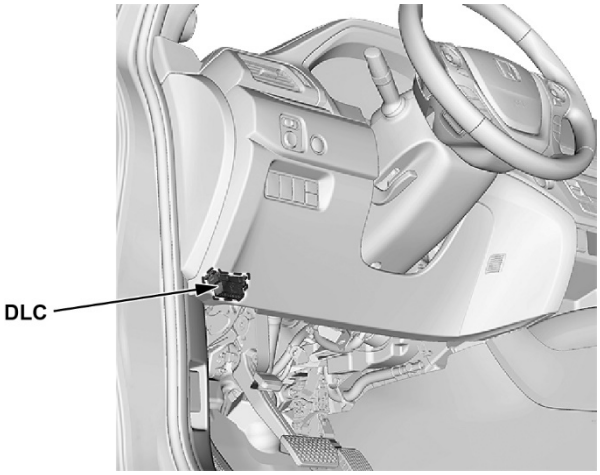
INSPECTION A

NOTE: DO NOT contact Tech Line for any inquires to this safety recall. You must call the Bearing Inspection Inquiry Team at (800) 824-6632 (Select Option #9) for all inquiries and repair direction.

1. Turn the steering wheel all the way to the right.
2. Relieve the fuel pressure.

   With the HDS:

   1. Connect an interface tool to the data link connector (DLC) located under the driver's side of the dashboard and launch i-HDS.



   2. Turn the vehicle to ON.
   3. From the Inspection Menu, select Fuel Pump OFF.
   4. Start the engine and let it idle until it stalls.

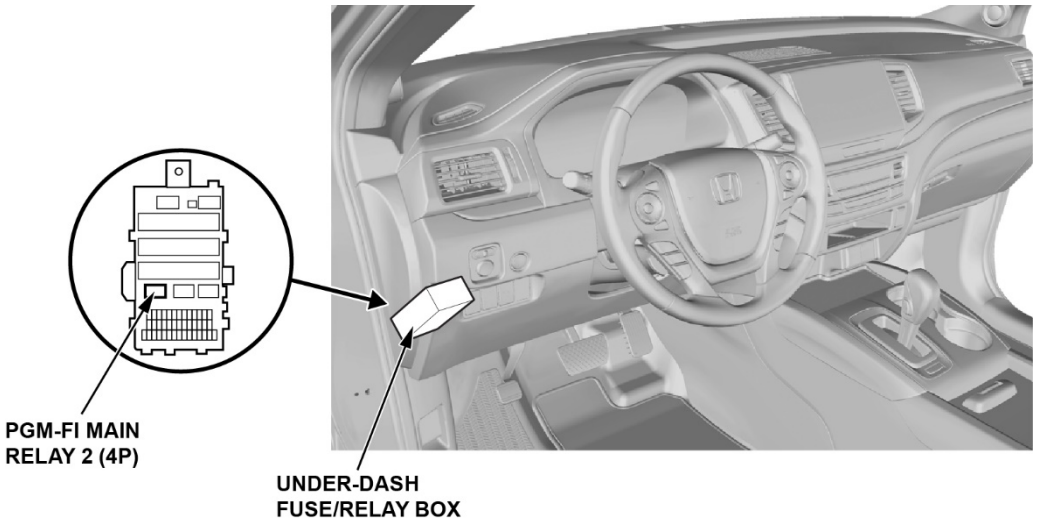
      NOTE:

      - Do not allow the engine to idle above 1,000 rpm or the PCM will continue to operate the fuel pump.
      - A Pending or Confirmed DTC may be set during this procedure. Check for DTCs and clear them as needed.

   5. Turn the vehicle to OFF.

   Without the HDS:

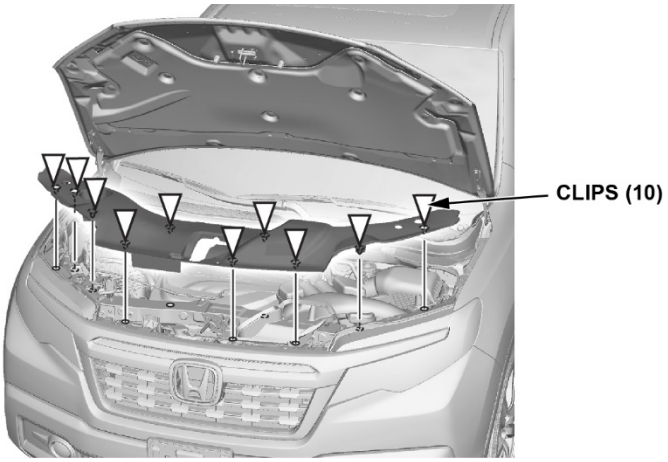
   1. Remove the PGM-FI main relay 2 from the under-dash fuse/relay box.



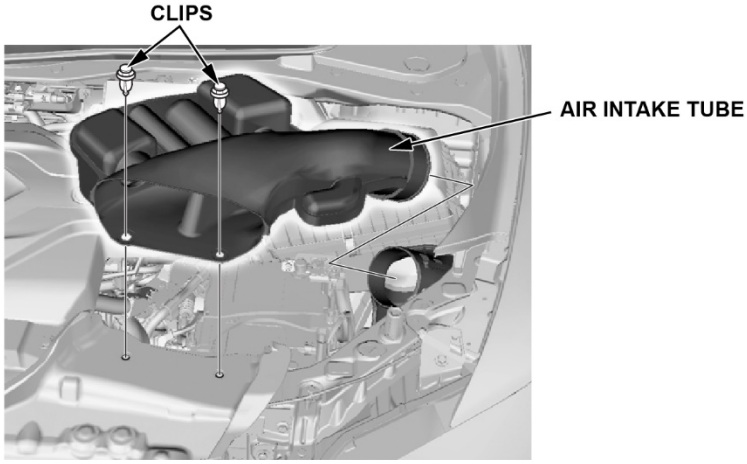
   2. Start the engine and let it idle until it stalls.
   3. Turn the vehicle to OFF.

4. Install the PGM-FI main relay 2.

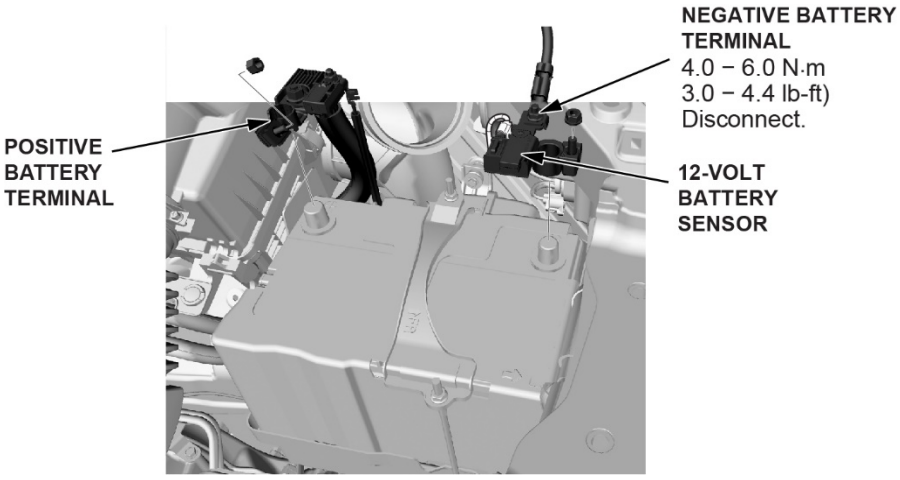
3. Remove the front bulkhead cover.



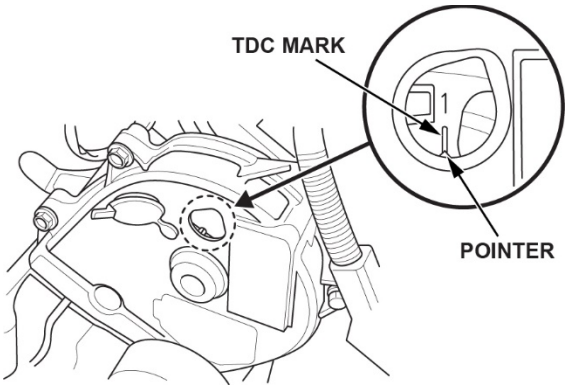
4. Remove the air intake tube.



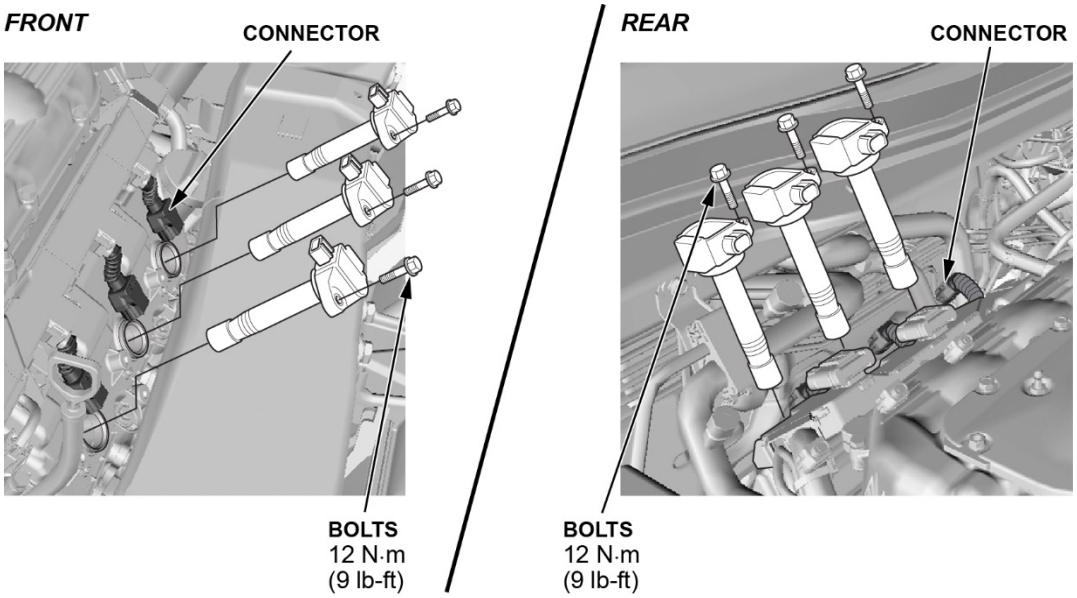
5. Disconnect the 12-volt battery.



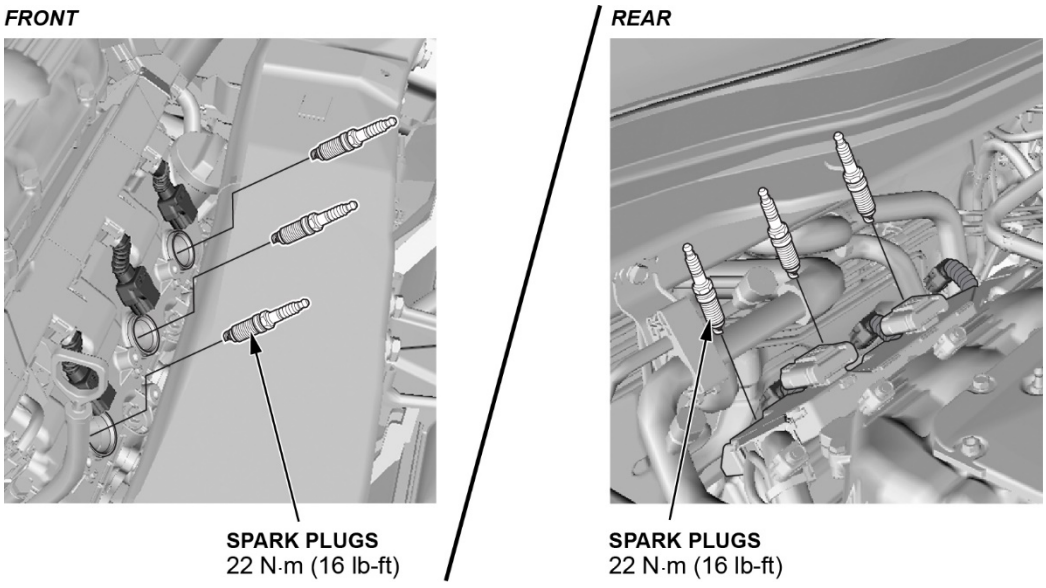
6. Remove the oil dipstick.
7. Set cylinder #1 to top dead center (TDC). Align the pointer on the front upper cover with the No. 1 piston TDC mark on the front camshaft pulley.



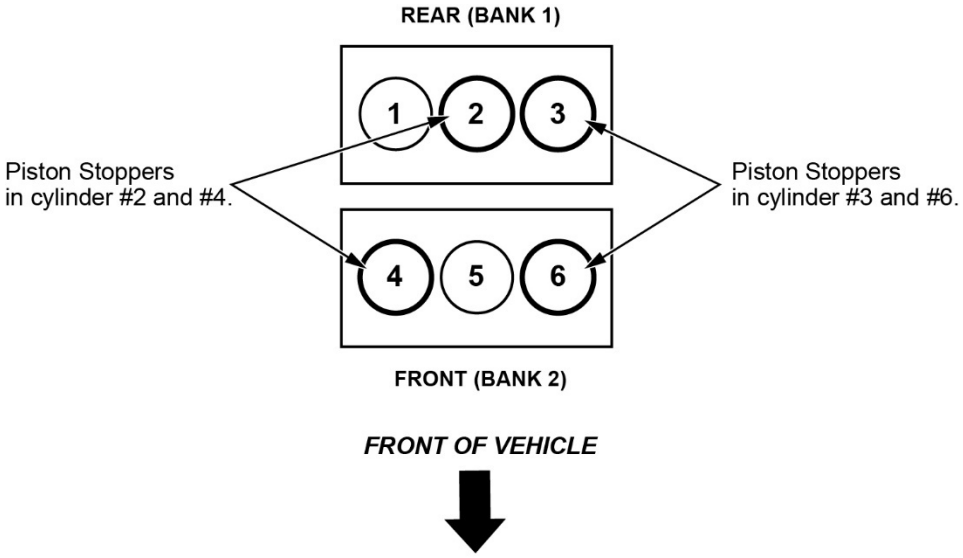
8. Disconnect and remove the coil packs.

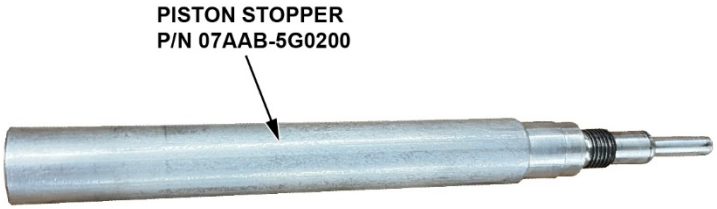


9. Remove the spark plugs.

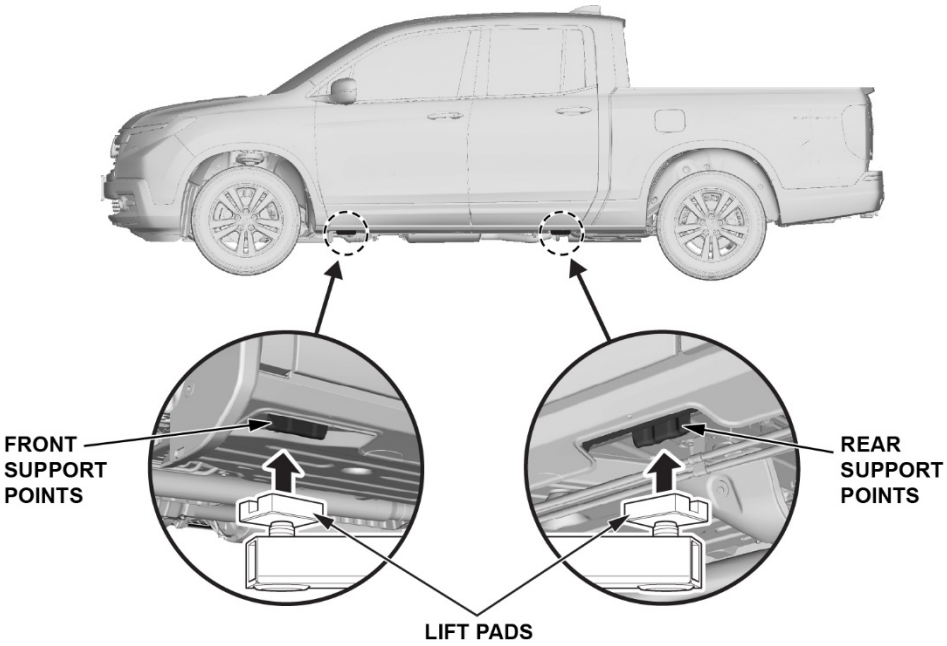


10. Install piston stoppers in cylinders 2, 3, 4, 6.



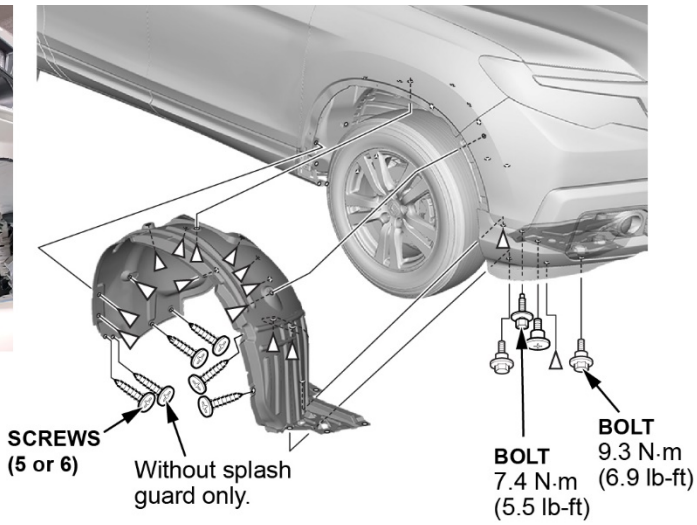


11. Raise the vehicle.

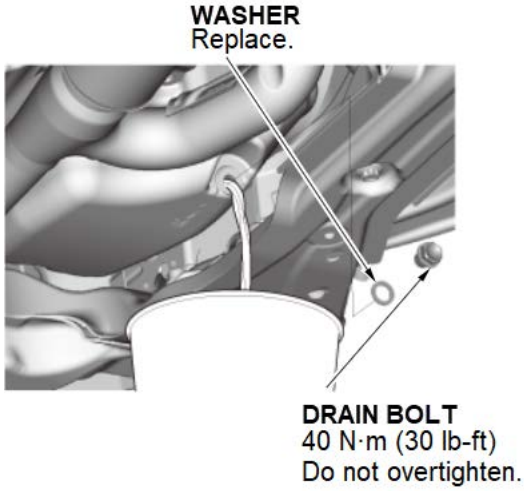


12. Remove the passenger side front wheel.

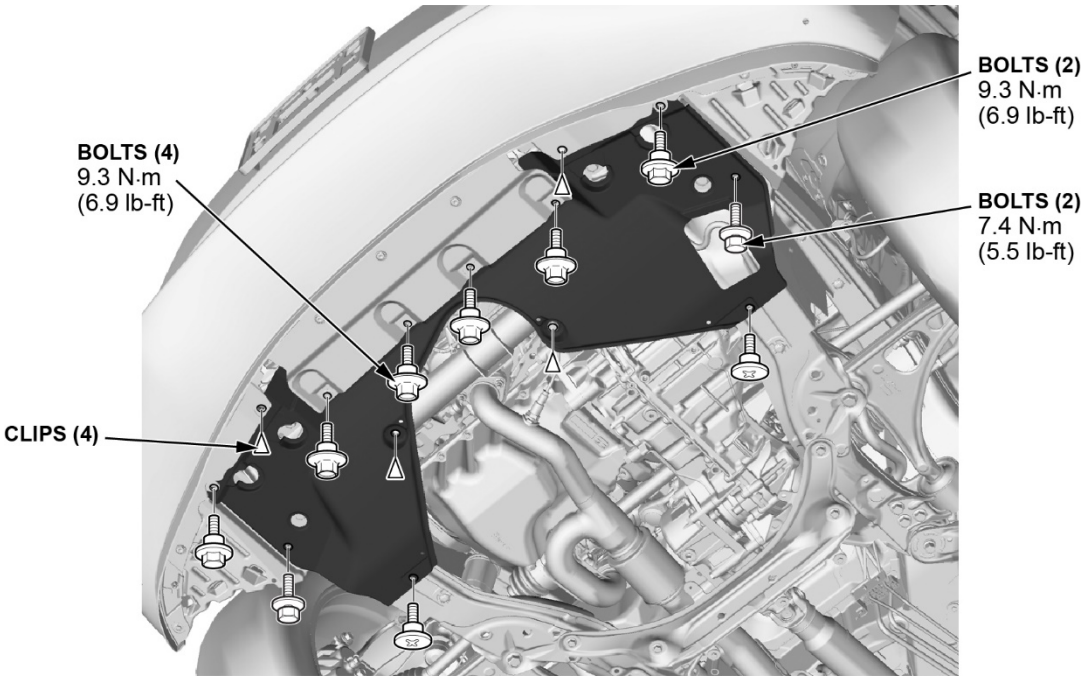
13. Pull back the fender liner to gain access to the crank pulley.



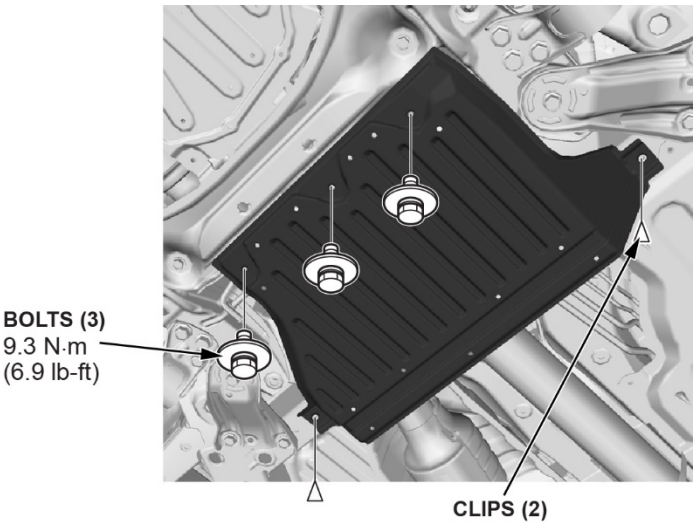
14. Drain the engine oil.



15. Remove the splash shield.



16. Remove the engine undercover.



17. With cylinder 1 at TDC, mark the crankshaft pulley with a vertical line at the 6 o'clock position.

CRANKSHAFT PULLEY
Mark with a vertical line
from the 6 o'clock position.

18. Attach the crank angle gauge to the crankshaft balancer pulley with **position #1** on the crank angle gauge aligned at the 6 o'clock position.

Click here to view video: ► PLAY VIDEO

NOTE: The back of the gauge is magnetic and will hold onto the pulley.

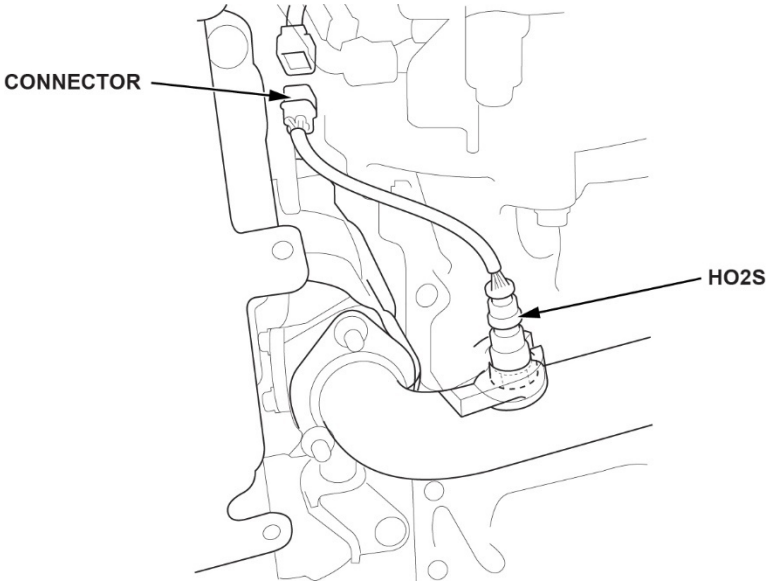
CRANK ANGLE GAUGE
P/N 07AAJ-5G0A100

19. Attach a large, commercially available zip tie to the subframe below the crankshaft pulley. The zip tie will be a **reference indicator** for a correct crank angle gauge position.
    - Make sure it is pointing up at the 6 o'clock position on the pulley.
    - The zip tie should extend roughly **8" to 12"** over the subframe.

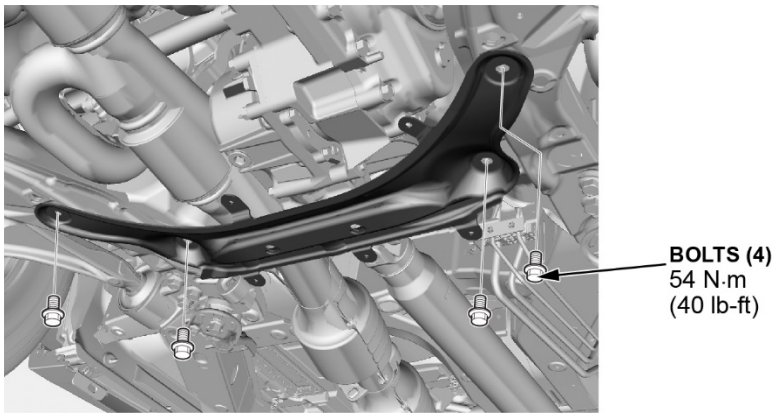
ZIP TIE
Attach a zip tie to the frame and line up as shown.

20. Unplug the front bank 2 oxygen sensor.

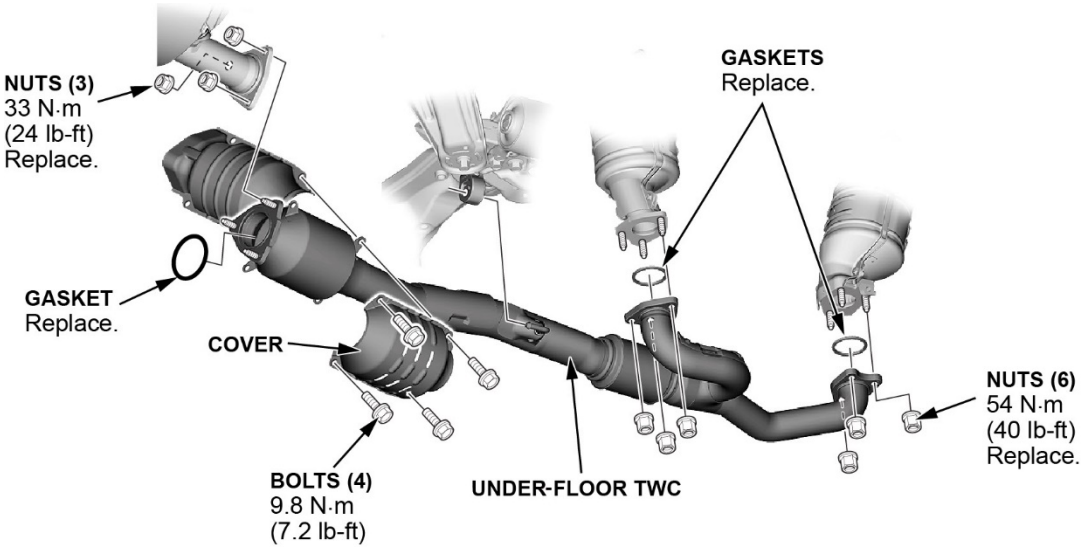
    NOTE: Exhaust may be hot.



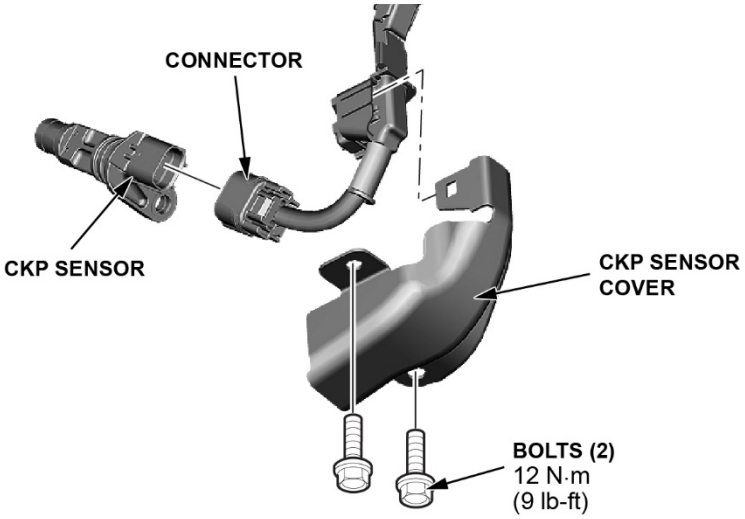
21. Remove the sub frame stiffener plate.



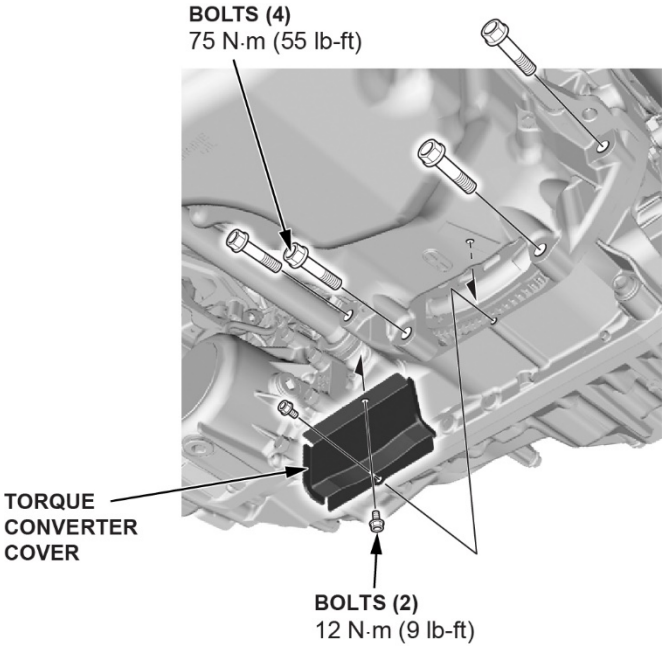
22. Remove the under-floor TWC (A-pipe).



23. Remove the CKP sensor cover, then disconnect the CKP sensor.



24. Remove the torque converter cover and the four lower transmission mounting bolts.



25. Remove the engine oil pan.

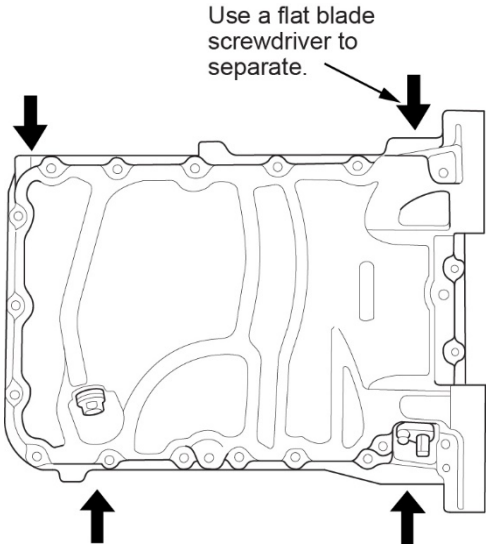
⚠ CAUTION

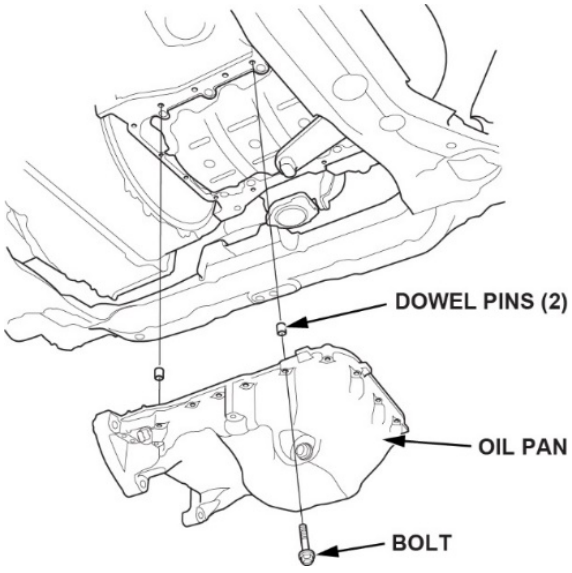
Hot engine oil may continue to drip from the engine which can cause burns or eye damage. Wear proper protective equipment and eyewear to avoid injury.

NOTE:

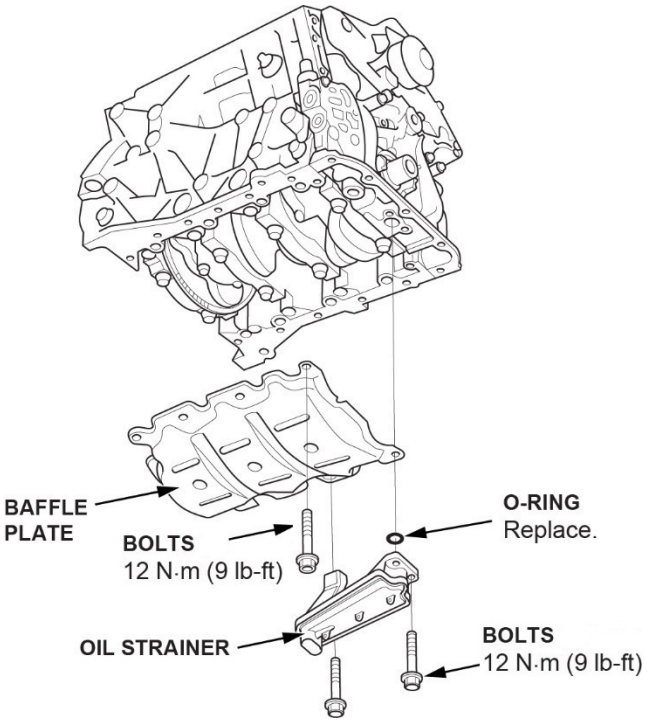
Remove the bolts securing the oil pan.

Use a flat blade screwdriver to separate the oil pan from the engine block.





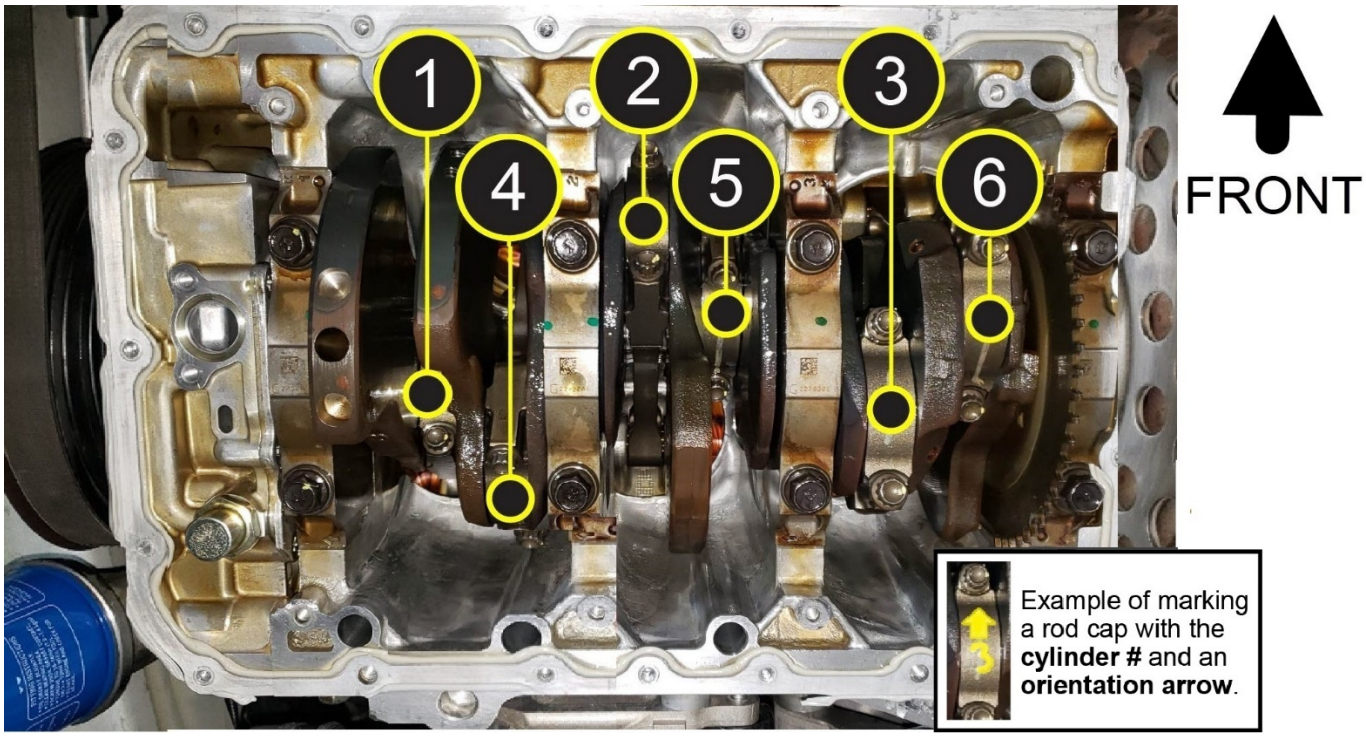
26. Remove the oil strainer and baffle plate.



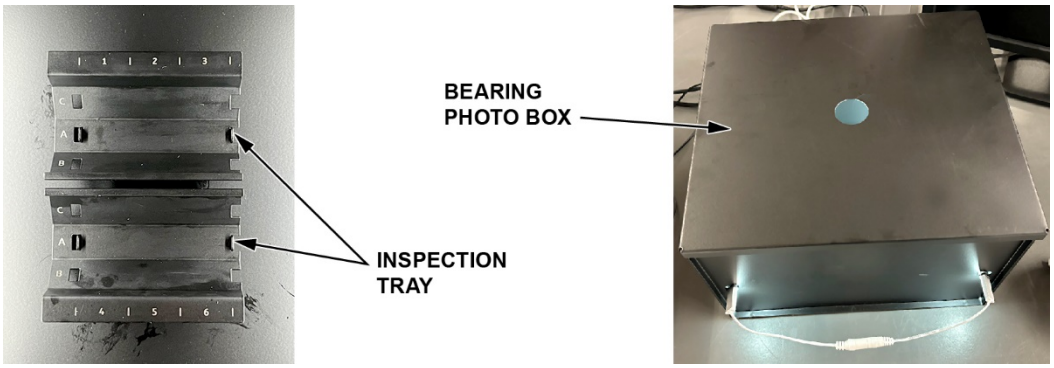
27. Clean and label each connecting rod cap with a paint marker (or otherwise suitable marking instrument) prior to removal. Make sure each rod cap has both the **cylinder #** and an **orientation arrow** pointing to the front of the vehicle.

    NOTE:

    - Do not confuse the existing marking on the side of the connecting rod and rod cap with the cylinder number. These are manufacturing marks referring to the size of the rod.
    - Installing a rod cap incorrectly will result in engine knock and/or engine failure.



28. Make sure the Bearing Photo Box (Tool Number: 07AAK-5J2A200) and Inspection Trays are available for use.



29. Make sure the **cylinder 1** is at TDC, **(position #1)**.

30. Remove the **connecting rod bearing cap and lower bearing** for **cylinders 1,3,5, and 6**.

Step/Crankshaft Position	Cylinder 1 Bearing Cap and Lower Bearings	Cylinder 3 Bearing Cap and Lower Bearings	Cylinder 5 Bearing Cap and Lower Bearings	Cylinder 6 Bearing Cap and Lower Bearings
#1/At TDC	**Remove**	**Remove**	**Remove**	**Remove**

Click here to view video: ► PLAY VIDEO

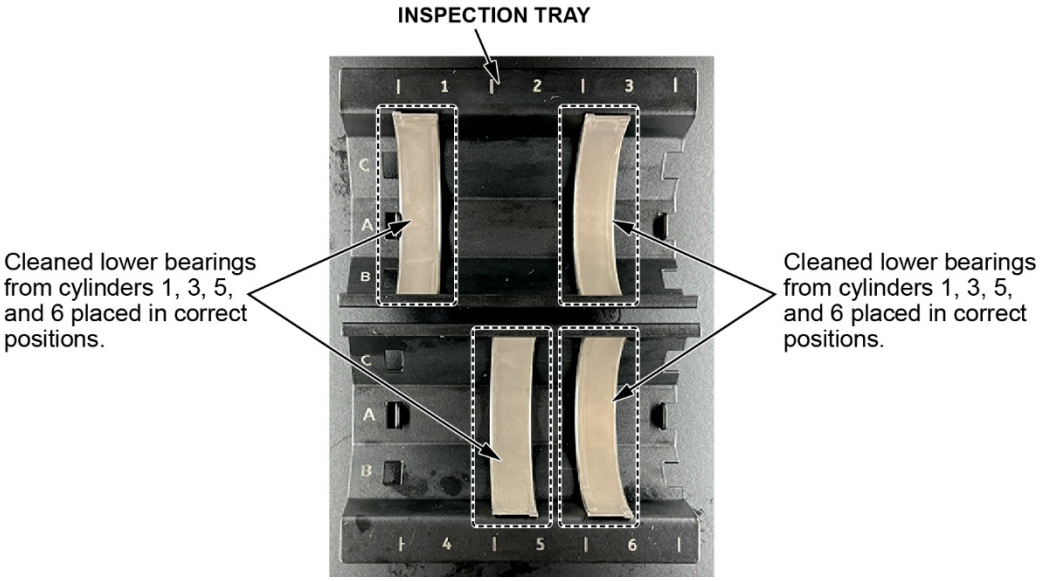
NOTE:

- Follow the removal of the connecting rod bearing steps precisely to prevent damage to the crankshaft journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearings with a clean shop towel after removal. There should be no oil residue remaining. **Do not use solvents.**

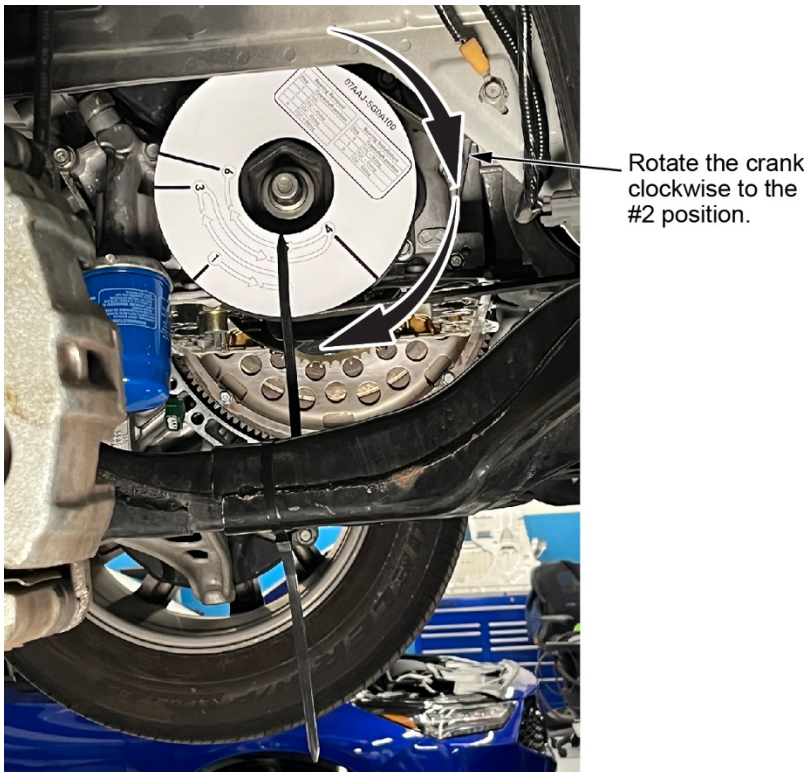
31. Place the removed lower bearings from **cylinders 1,3,5, and 6** into the inspection tray.

NOTE:

- Thoroughly clean the bearings with a clean shop towel prior to placing the bearing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



32. Rotate the crankshaft clockwise to the **#2 position** (TDC +45°).



33. Remove the **cylinder 2 connecting rod bearing cap and lower bearing**.

Step/Crankshaft Position	Cylinder 2 Bearing Cap and Lower Bearings
#2/TDC +45°	**Remove**

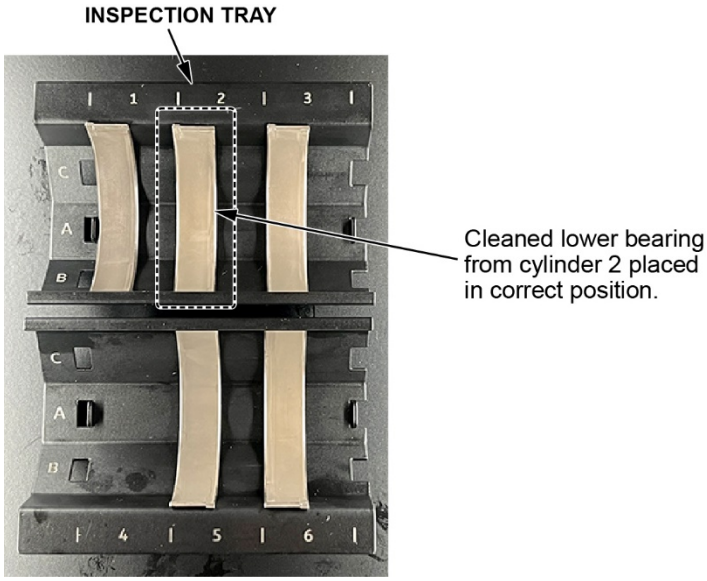
NOTE:

- Follow the removal of the connecting rod bearing steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.

34. Place the removed lower bearing from **cylinder 2** into the inspection tray.

NOTE:

- Follow the removal of the connecting rod bearing steps precisely to prevent damage to the crank journal and connecting rods.
- Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



35. Remove the **cylinder 2 upper connecting rod bearing**.

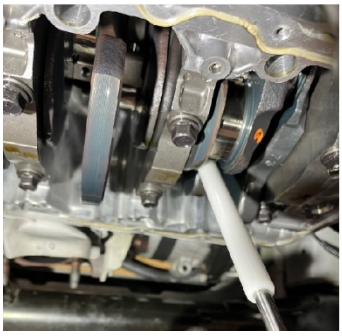
Step/Crankshaft Position	Cylinder 2 Upper Bearing
#2/TDC +45°	Remove

NOTE:

- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.
- Use the rod holder tool as needed, hand tighten only.

Click here to view video: ▶ PLAY VIDEO

EXAMPLE OF USING THE M8 ROD HOLDER TOOL

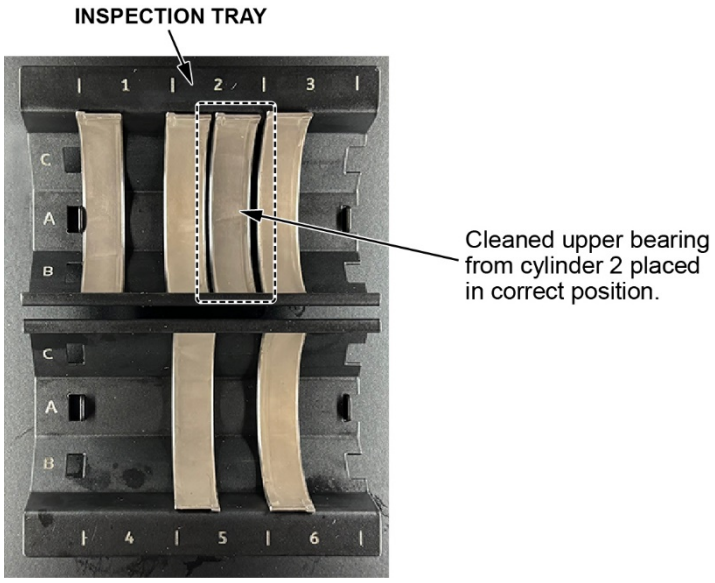


1. Thread the M8 rod holder tool into the connecting rod bolt hole.
2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
5. Using the M8 rod holder tool, carefully push the connecting rod back up until it contacts the piston stopper.
6. Remove the M8 rod holder tool.
7. Thoroughly clean the bearing with a clean shop towel to remove all oil residue. **Do not use any solvents**.

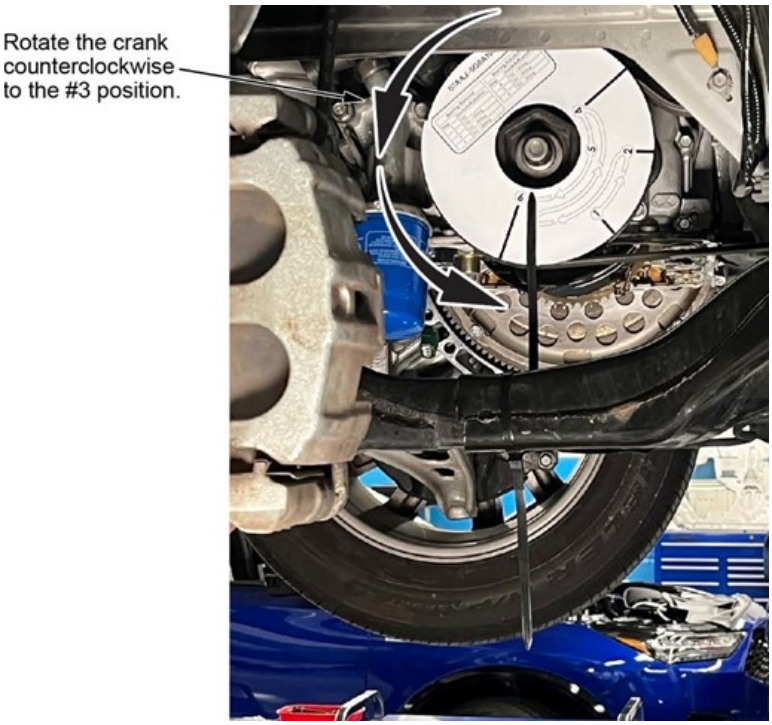
36. Place the removed **upper bearing** from **cylinder 2** into the inspection tray.

    NOTE:

    - Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
    - **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



37. Rotate the crankshaft counterclockwise to the **#3 position** (TDC -45°).



38. Remove the **cylinder 4 connecting rod bearing cap and lower bearing**.

Step/Crankshaft Position	Cylinder 4 Rod Cap and Lower Bearing
#3/TDC -45°	Remove

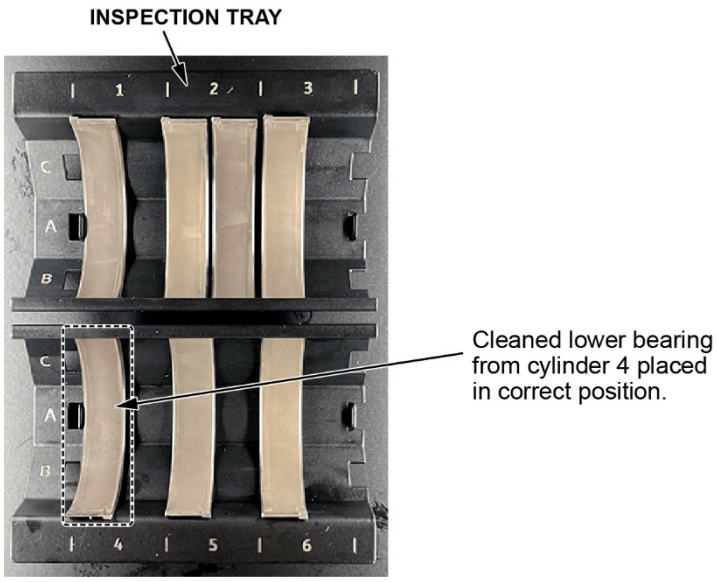
NOTE:

- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.

39. Place the removed **lower bearing** from **cylinder 4** into the inspection tray.

NOTE:

- Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



40. Remove the **cylinder 3 upper connecting rod bearing**.

Step/Crankshaft Position	Cylinder 3 Upper Bearing	Cylinder 4 Upper Bearing
#3/TDC -45°	**Remove**	**Remove**

NOTE:

- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents.**
- Use the rod holder tool as needed, hand tighten only.

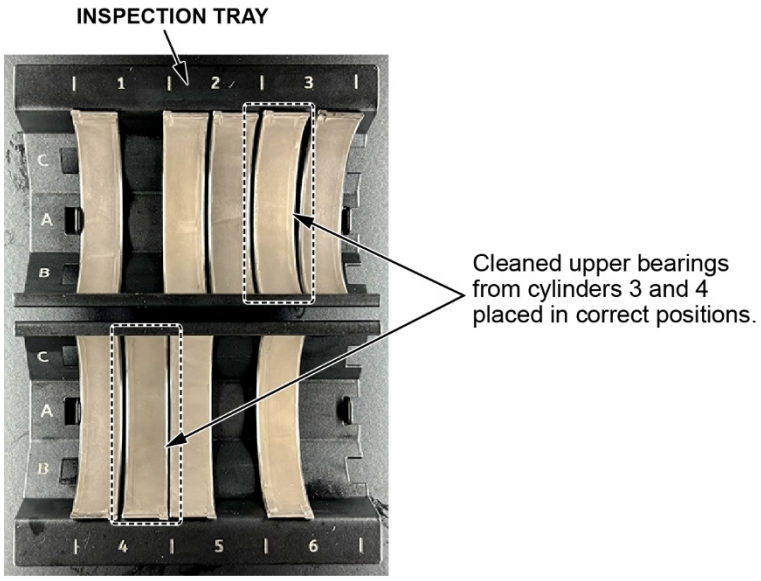
1. Thread the M8 rod holder tool into the connecting rod bolt hole.
2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
5. Using the M8 rod holder tool, carefully push the connecting rod back up until it contacts the piston stopper.
6. Remove the M8 rod holder tool.
7. Thoroughly clean the bearing with a clean shop towel to remove all oil residue. **Do not use solvent**.

41. Remove **the cylinder 4 upper connecting rod bearing**.
    1. Thread the M8 rod holder tool into the connecting rod bolt hole.
    2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
    3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
    4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
    5. Leave the **cylinder 4** connecting rod in the lower position, **do not** push back up.
    6. Remove the M8 rod holder tool.
    7. Thoroughly clean the bearing with a clean shop towel to remove all oil residue. **Do not use solvent**.

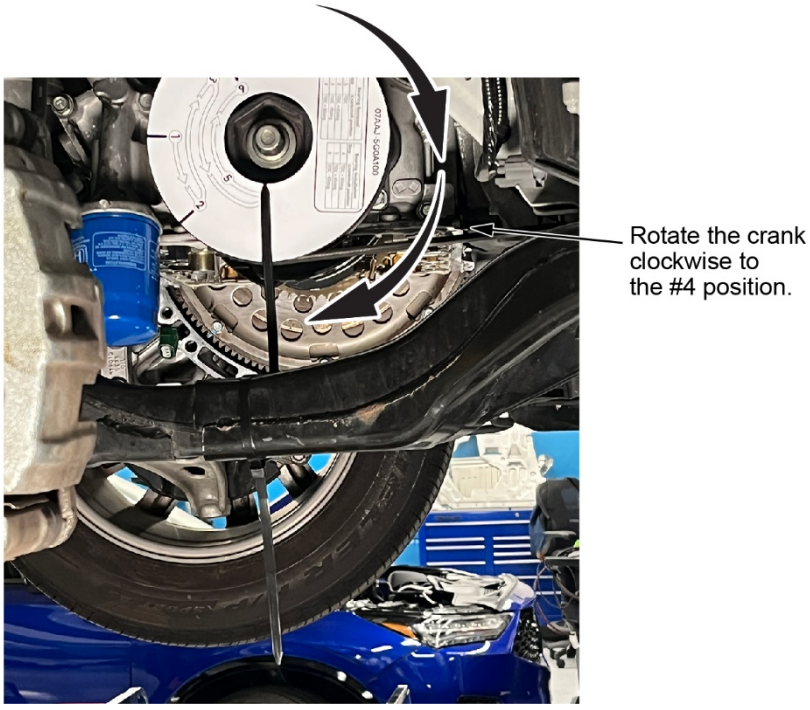
42. Place the removed **upper bearings** from **cylinder 3 and 4** into the inspection tray.

    NOTE:

    - Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not** use any solvents.
    - **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



43. Rotate the crankshaft clockwise to the **#4 position** (TDC +90°).



44. Remove the **upper bearing from cylinders 1, 5, and 6**.

Step/Crankshaft Position	Cylinder 1 Upper Bearing	Cylinder 5 Upper Bearing	Cylinder 6 Upper Bearing
#4/TDC +90°	**Remove**	**Remove**	**Remove**

NOTE:

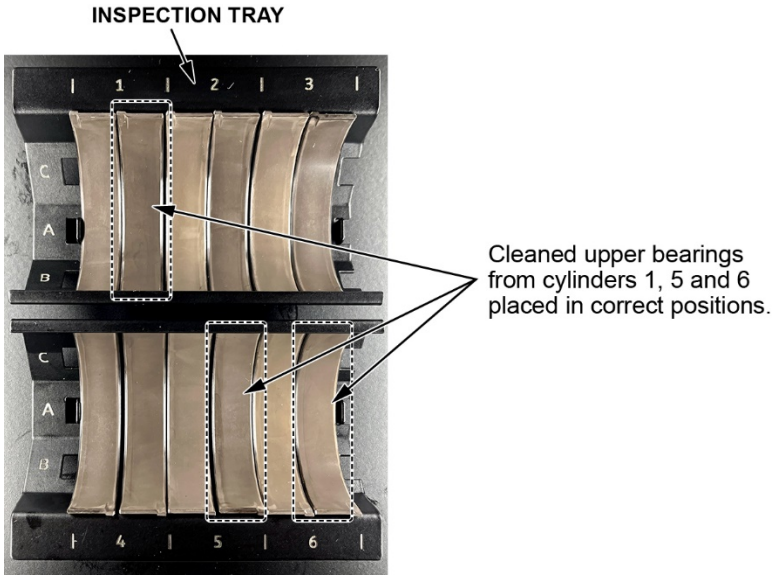
- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.
- Use the rod holder tool as needed, hand tighten only.

1. Thread the M8 rod holder tool into the connecting rod bolt hole.
2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
5. Using the M8 rod holder tool, carefully push the connecting rod back up until it contacts the piston stopper.
6. Remove the M8 rod holder tool.
7. Thoroughly clean the bearings with a clean shop towel to remove all oil residue. **Do not use any solvents**.

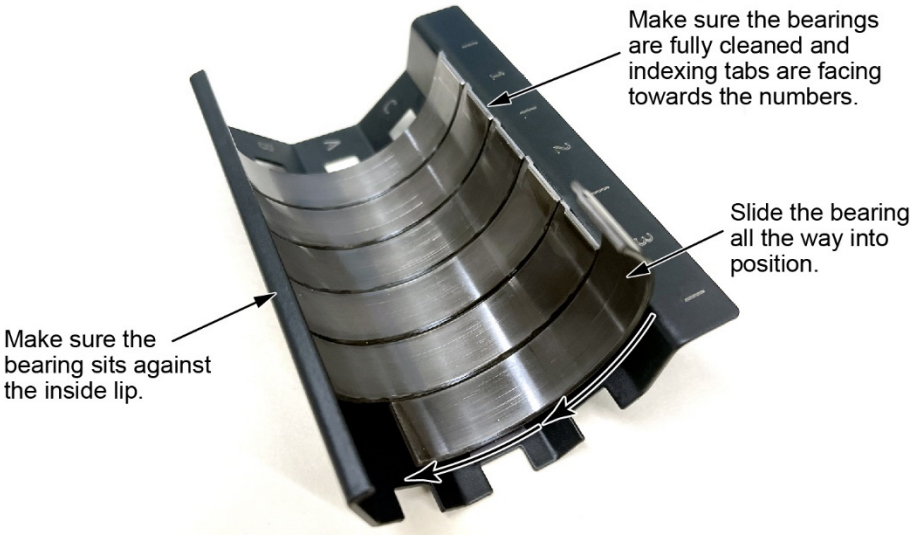
45. Place the removed **upper bearings** from **cylinders 1, 5, and 6** into the inspection tray.

NOTE:

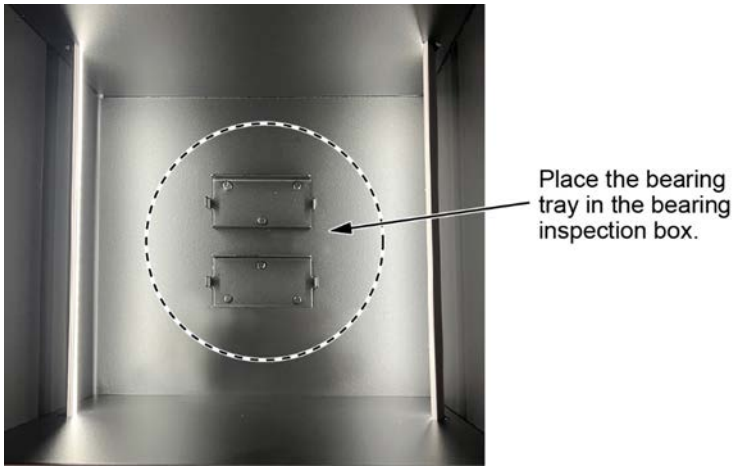
- Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



46. Make sure the bearings are fully seated and level with the edge of the inspection tray.
    - The bearing's indexing tab should be lined up at the numbers.
    - The flat edge of the bearing should be inside the lip.
    - All bearings should be fully seated.



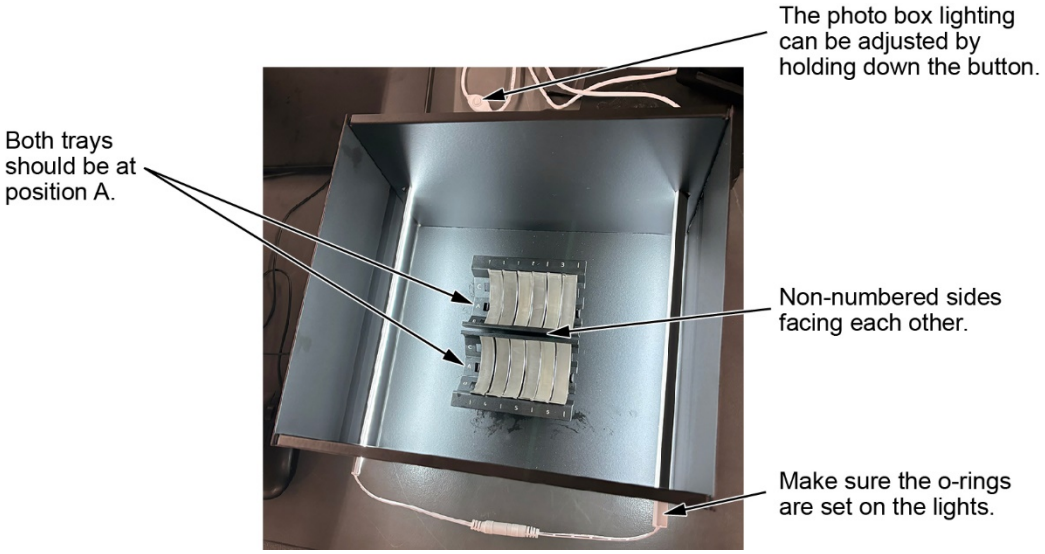
47. Remove the bearing photo box cover and place the bearing organizers in the bearing photo box.



48. Confirm the following is ready on the bearing photo box:

    NOTE: The lighting can be adjusted with a long hold on the button.

    - Lights at the brightest setting.
    - Both bearing trays in position A with non-numbered sides facing each other.
    - The O-rings are set on the lights to prevent an outside light source.



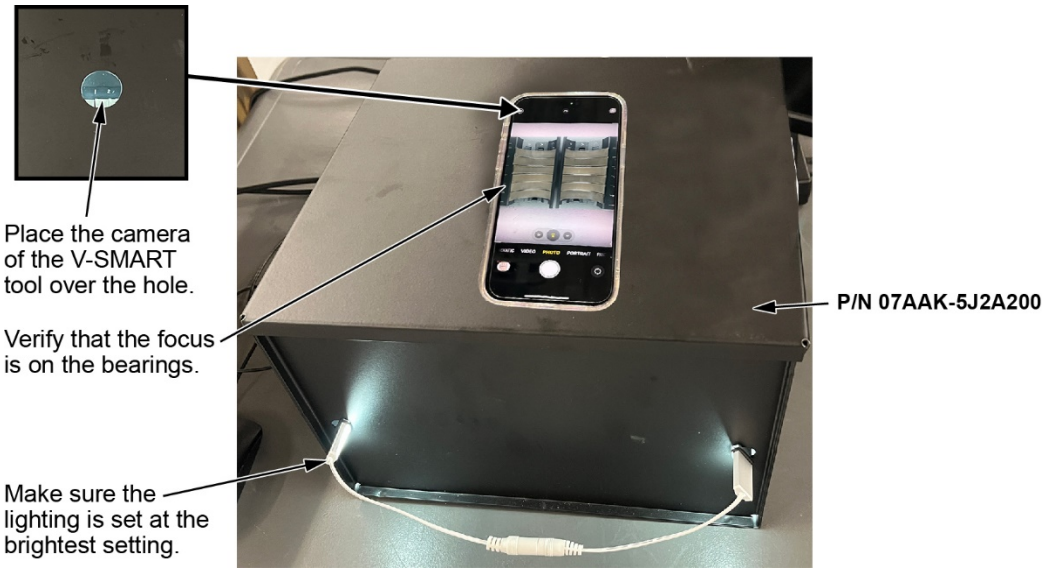
49. Login to the V-SMART application.

    NOTE: Scanning the VIN will return to where you left off.

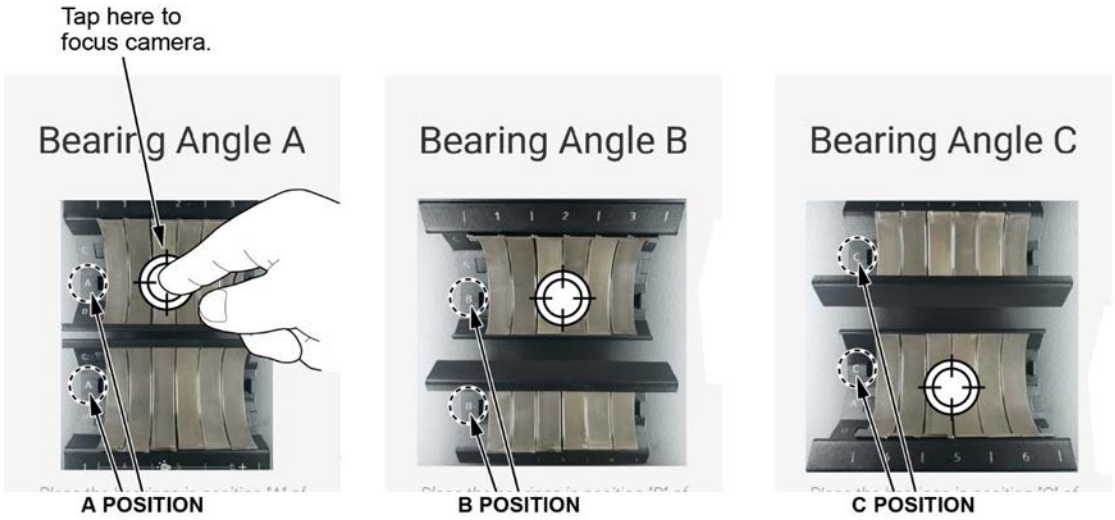
50. Using the V-SMART application, follow the instructions on the application to take bearing photos in positions A, B, and C. Follow the prompts when submitting the photos.

    NOTE:

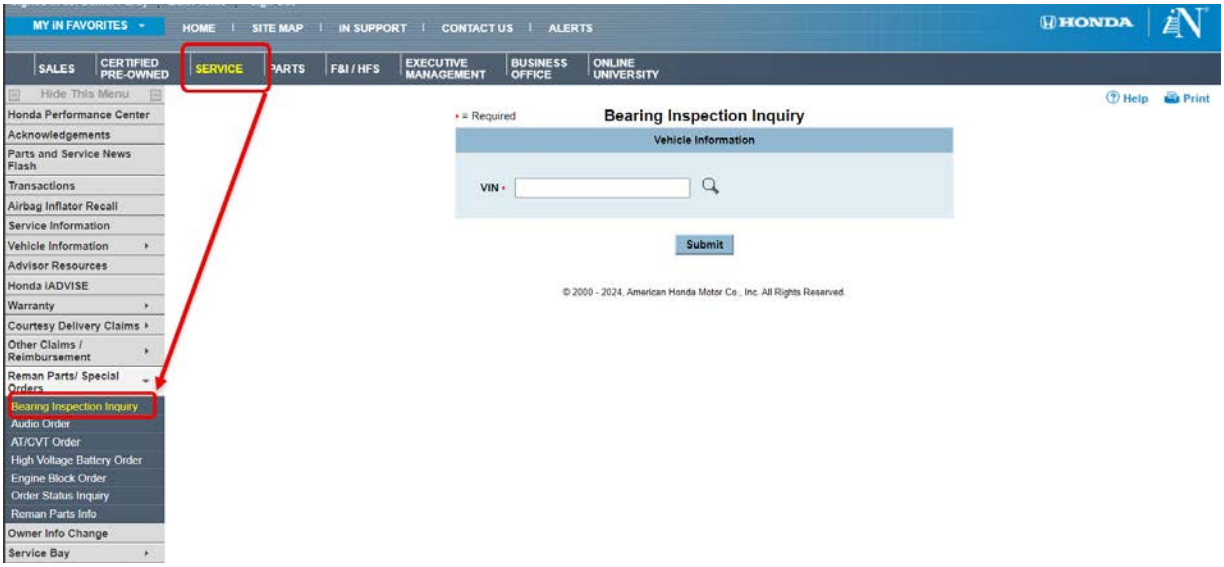
    - Use the camera tap focus for a clear image.
    - Any unclear images will not be accepted.
    - Follow the V-SMART tool prompts after photo submission.



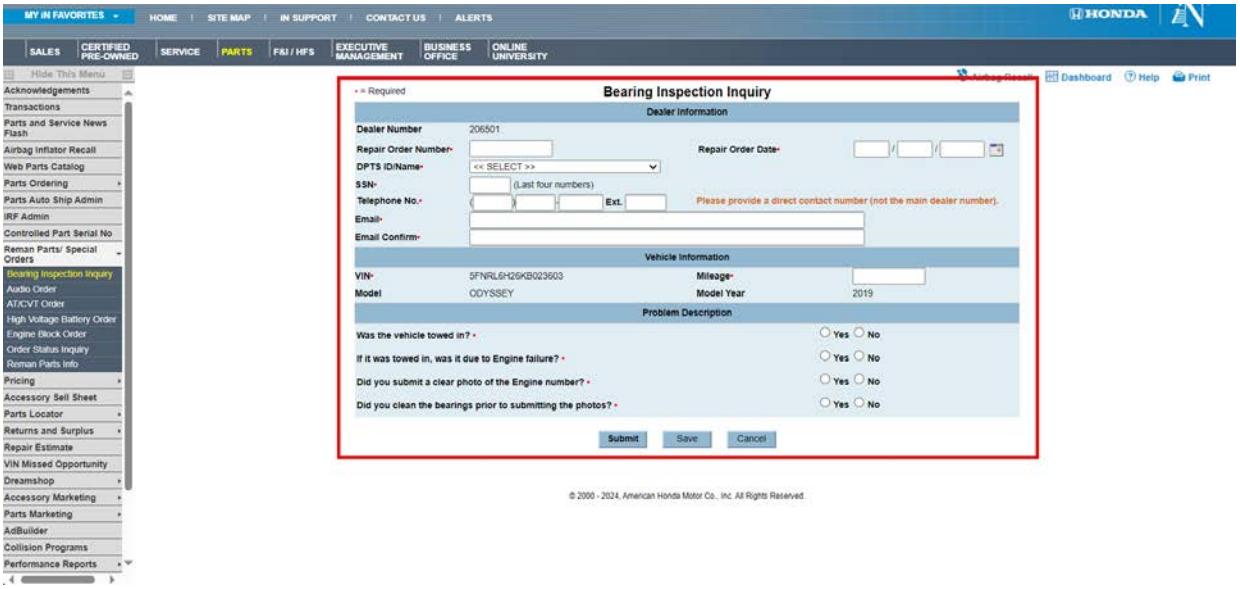
When taking the photos:



51. Create a Bearing Inspection Inquiry.
    1. Log into iN.
    2. Select **SERVICE > REMAN PARTS / SPECIAL ORDERS > BEARING INSPECTION INQUIRY**
    3. Select the **BEARING INSPECTION INQUIRY**.
    4. Input the correct VIN.



    5. Input all vehicle information (including the correct VIN) to create a case.



    6. A **7-digit case reference number** will be generated.
    7. Call the **Bearing Inspection Inquiry Team** at **(800) 824-6632**. Press **9** to be routed to the correct department (**do not contact TECH LINE for this**). Give the answering agent the **7-digit reference number** for repair direction.

       NOTE: MAKING THE INCORRECT SELECTION WILL RESULT IN INCREASED WAIT TIMES.

52. The bearing inspection agent will give the **Repair Direction**. You will receive instructions via email on the repair method that includes the unique warranty code and the bearing sizes with their specific locations, if applicable. Parts will be AUTO shipped to your dealership. Make sure to advise the parts department with a copy of the RO.

    NOTE: Link to CONTENT REFERENCE, (Click HERE).

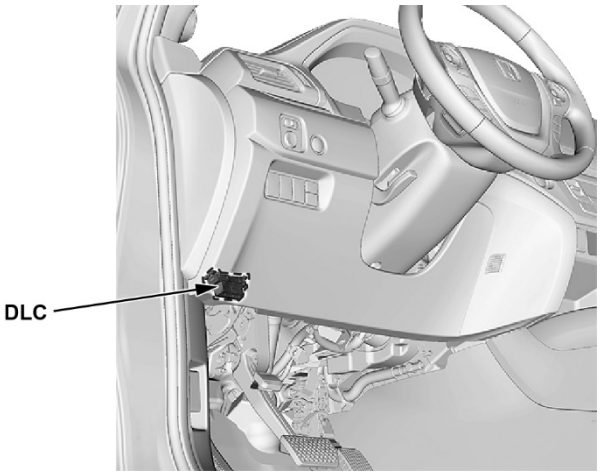
INSPECTION B

NOTE: DO NOT contact Tech Line for any inquiries to this safety recall. You must call the Bearing Inspection Inquiry Team at (800) 824-6632 (Select Option #9) for all inquiries and repair direction.

1. Turn the steering wheel all the way to the right.
2. Relieve the fuel pressure.

   With the i-HDS:

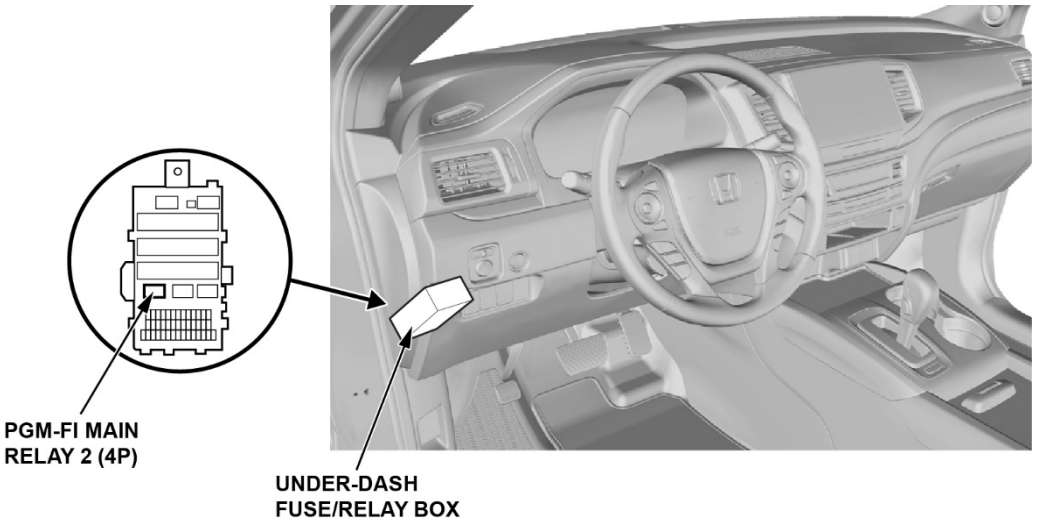
   1. Connect an interface tool to the data link connector (DLC) located under the driver's side of the dashboard and launch i-HDS.



   2. Turn the vehicle to ON.
   3. Select the **PGM-FI** system on the i-HDS.
   4. Select **FUEL PUMP OFF** from the **Inspection Menu** and follow the on screen instructions.

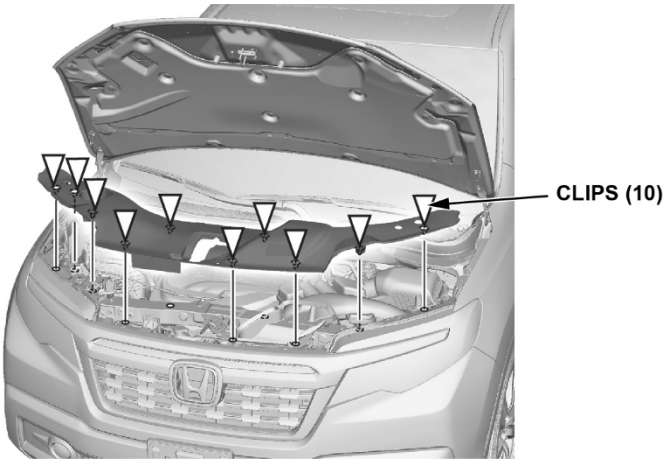
   Without the i-HDS:

   1. Remove the PGM-FI main relay 2 from the under-dash fuse/relay box.

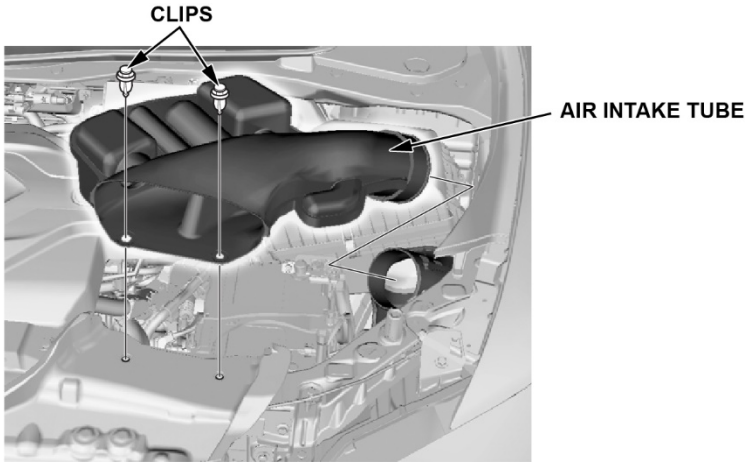


   2. Start the engine and let it idle until it stalls.
   3. Turn the vehicle to OFF.
   4. Install the PGM-FI main relay 2.

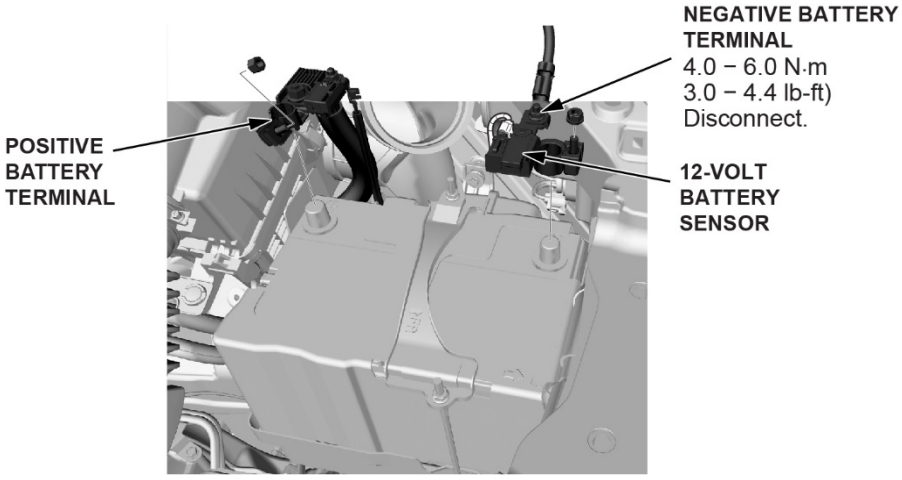
3. Remove the front bulkhead cover.



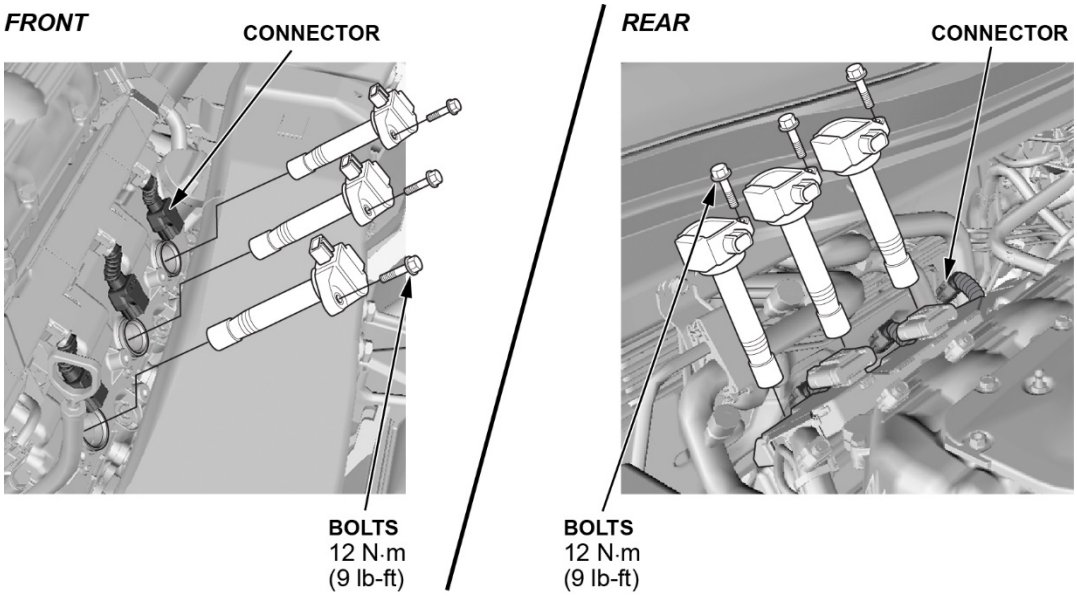
4. Remove the air intake tube.



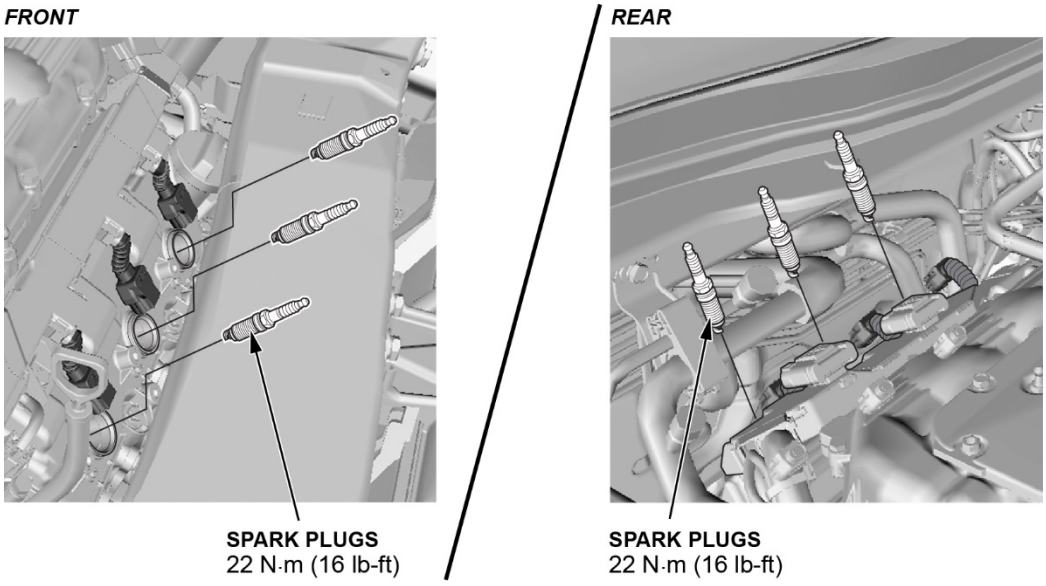
5. Disconnect the 12-volt battery.



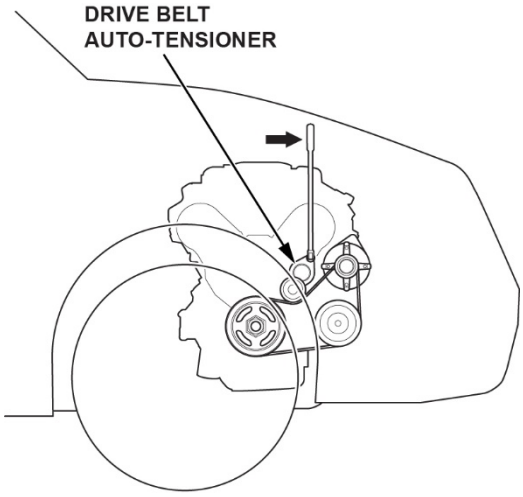
6. Remove the oil dipstick.
7. Disconnect and remove the coil packs.



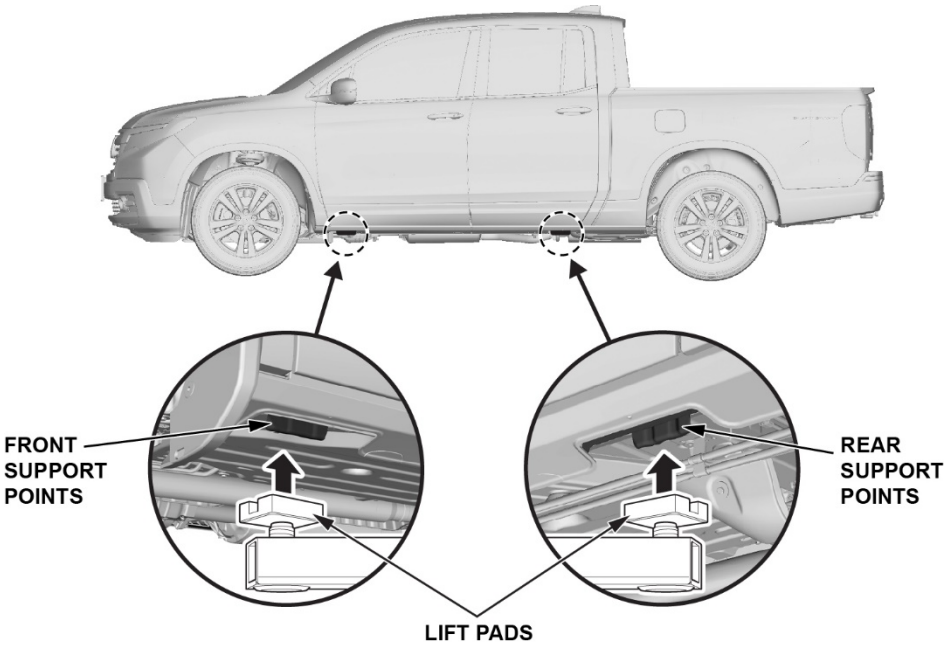
8. Remove the spark plugs.



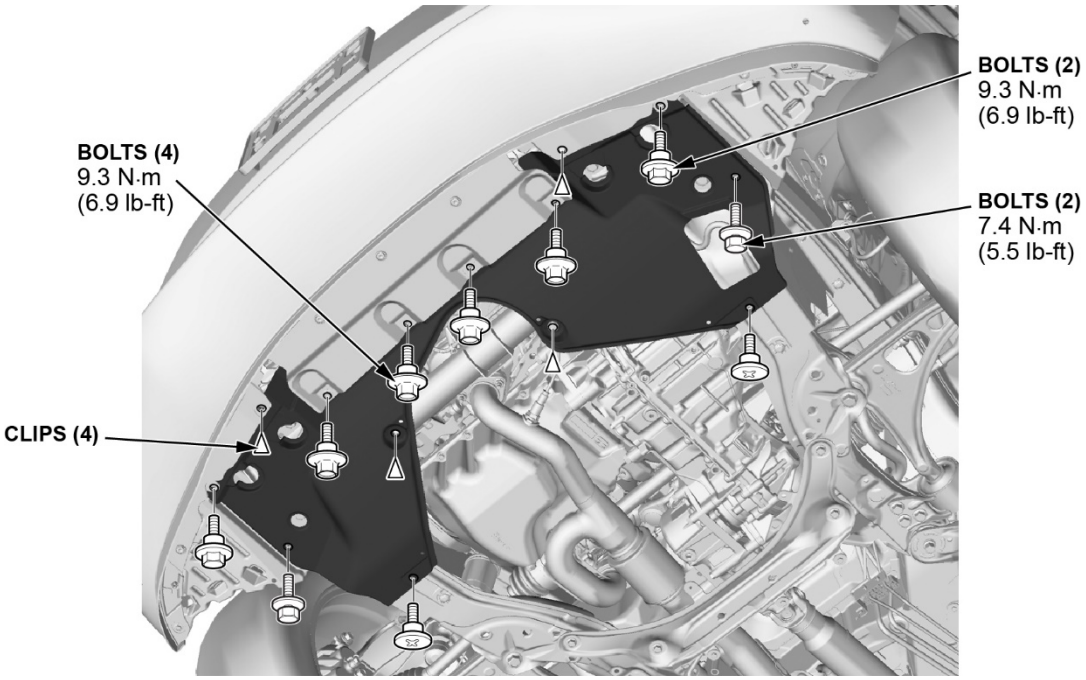
9. Remove the drive belt.



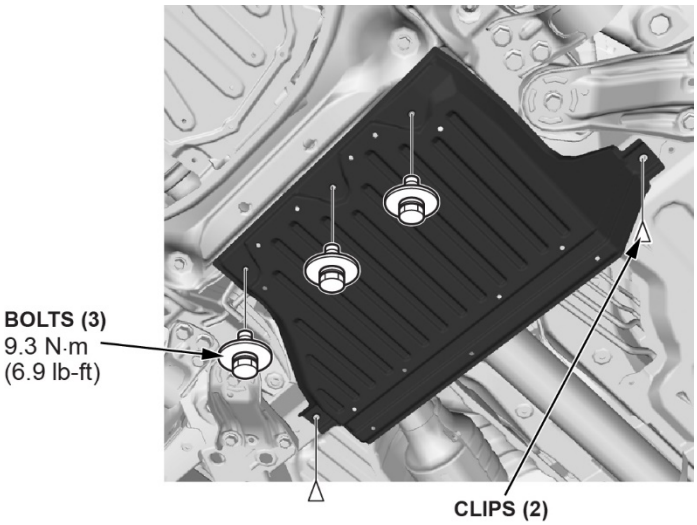
10. Raise the vehicle.



11. Remove the splash shield.



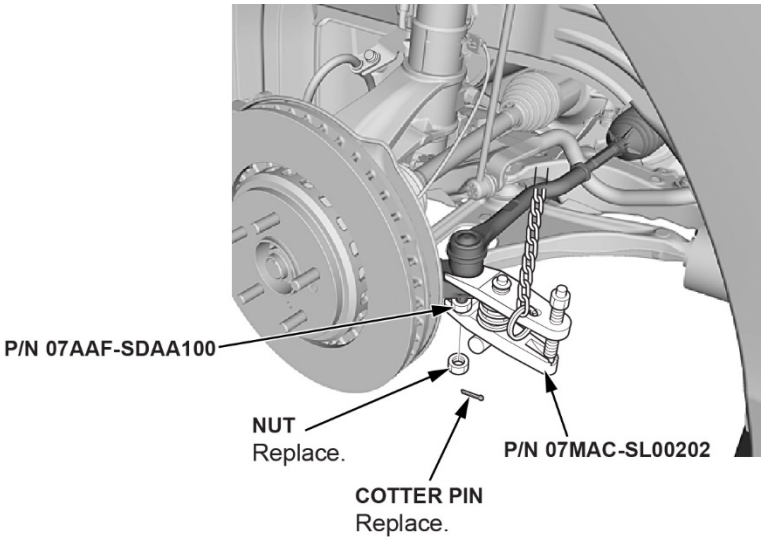
12. Remove the engine undercover.



13. Remove the passenger side front wheel.

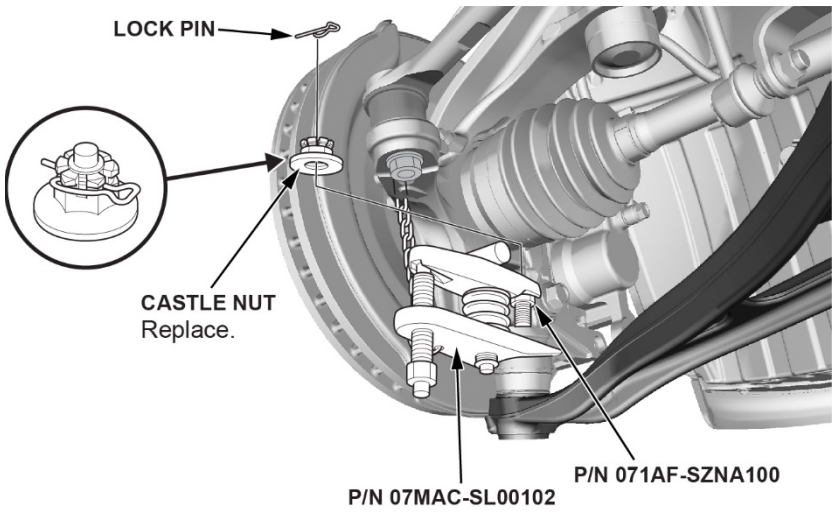
14. Separate the passenger's side tie rod ball joint:
    1. Remove the cotter pin.
    2. Remove the nut.
    3. Disconnect the tie rod end ball joint from the knuckle using the ball joint thread protector and the ball joint remover.

       NOTE: Be careful not to damage the ball joint boot when installing the ball joint remover.

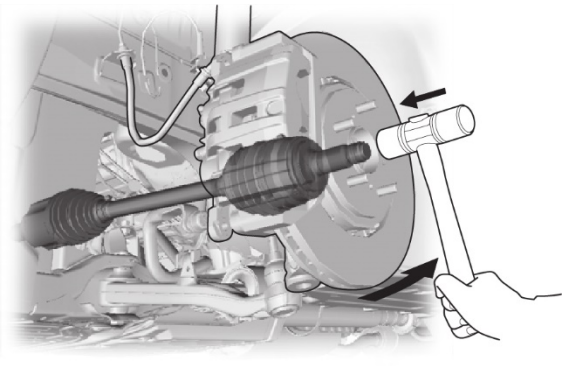


15. Separate the passenger's side lower knuckle ball joint.
    1. Remove the lock pin.
    2. Remove the castle nut.
    3. Disconnect the lower arm ball joint from the knuckle using the ball joint thread protector and the ball joint remover.

       NOTE: Be careful not to damage the ball joint boot when installing the ball joint remover.

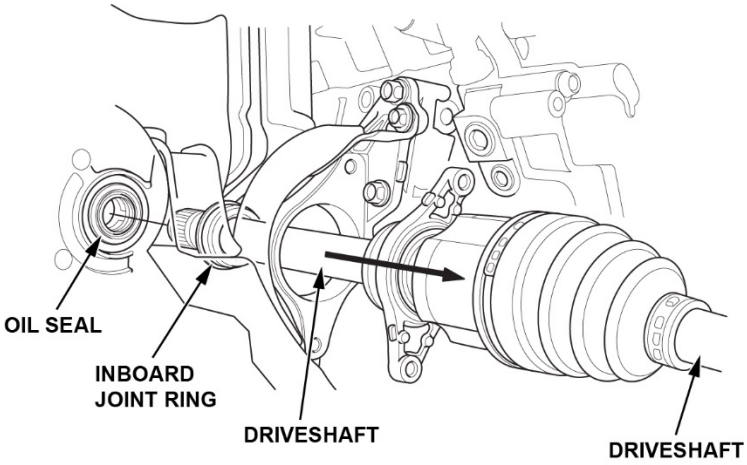


16. Remove the passenger side driveshaft:
    4. Remove the front spindle nut.
    5. Pull the knuckle outward and separate the outboard joint from the front hub using a soft face hammer.

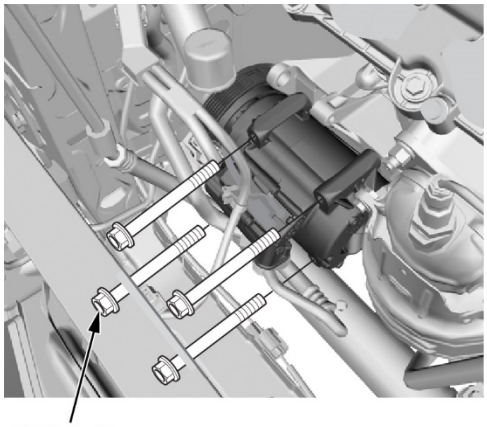


    6. Remove the driveshaft as an assembly.

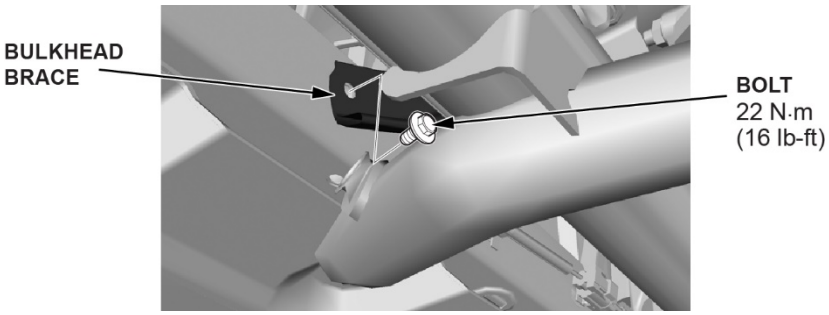
       NOTE:
       - Do not pull on the driveshaft, or the inboard joint may come apart.
       - Pull the inboard joint straight out to avoid damaging the oil seal.
       - Be careful not to damage the inboard joint ring.



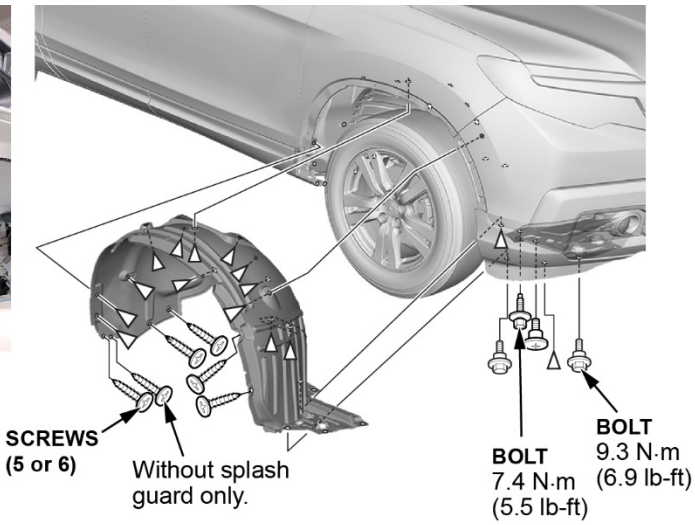
17. Remove the lower mounting bolts of the A/C compressor.



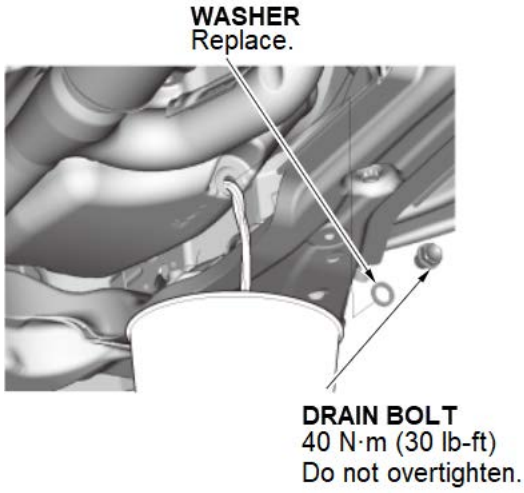
18. Remove the lower bolt of the bulkhead brace.



19. Pull back the passenger fender liner to gain access to the crankshaft pulley.

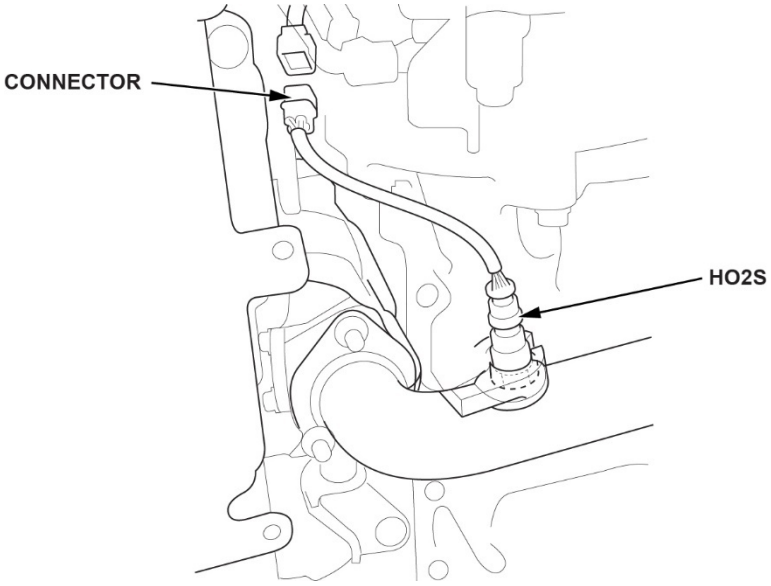


20. Drain the engine oil.

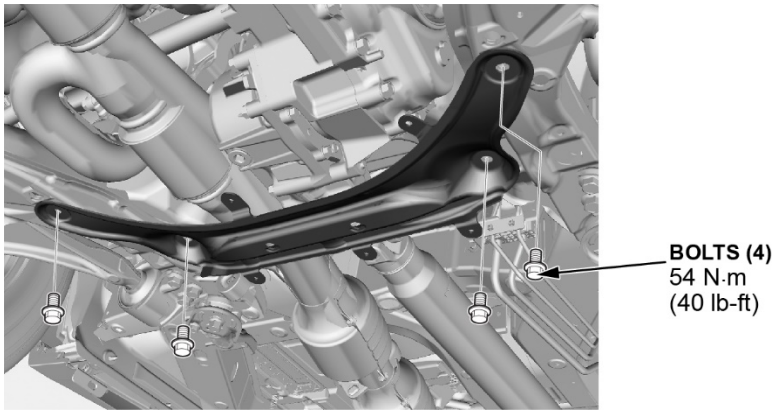


21. Unplug the bank 2 oxygen sensor.

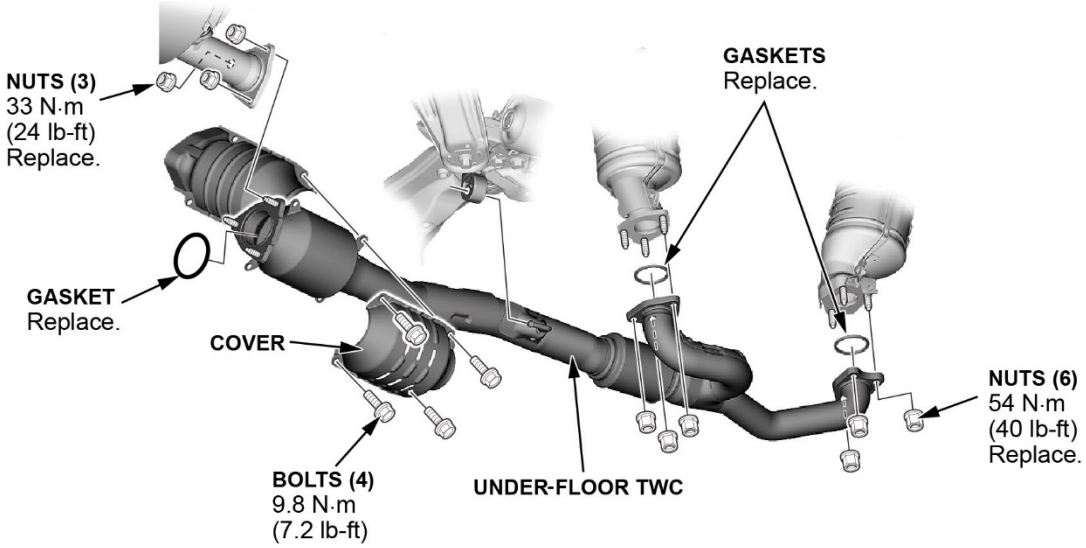
    NOTE: Exhaust may be HOT.



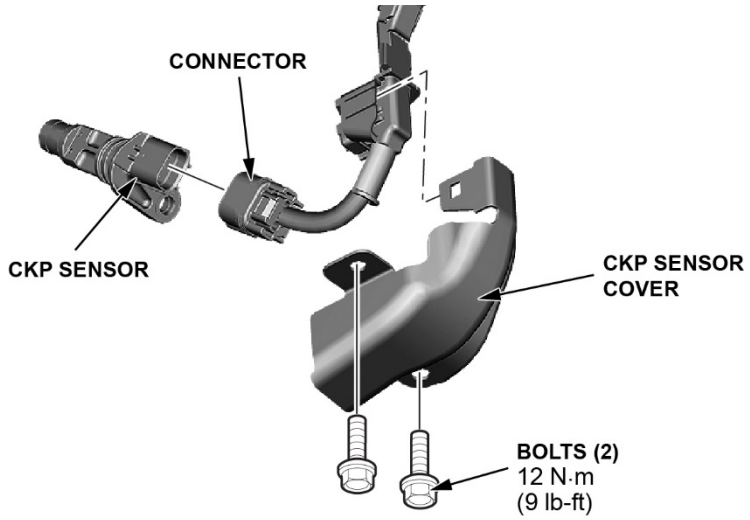
22. Remove the subframe stiffener plate.



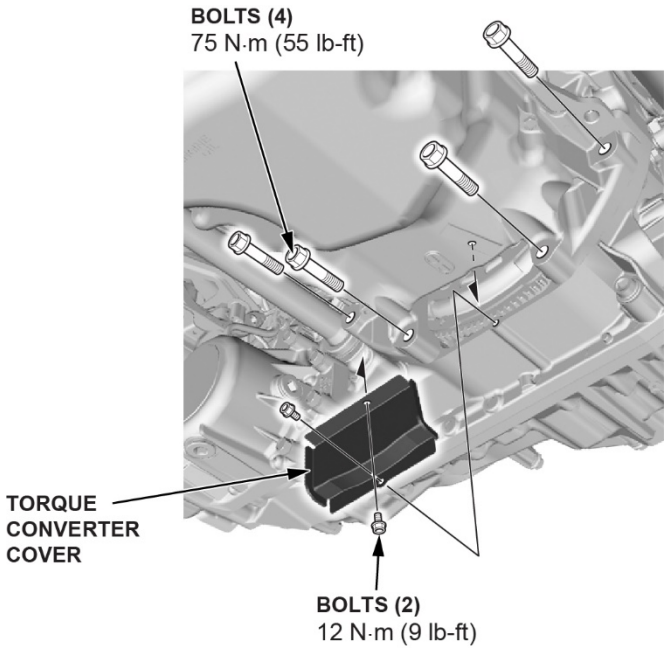
23. Remove the under-floor TWC (A-pipe).



24. Remove the CKP sensor cover, then disconnect the CKP sensor.

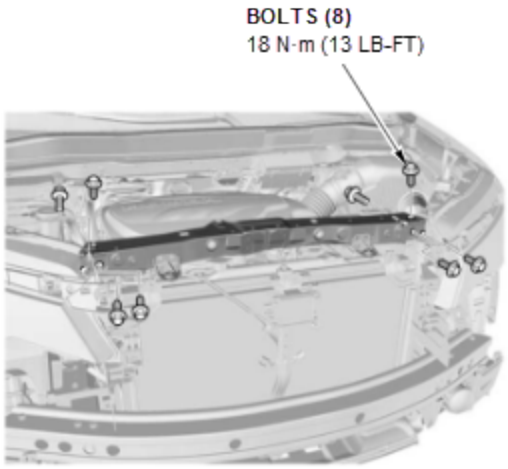


25. Remove the torque converter cover and the four lower transmission mounting bolts.

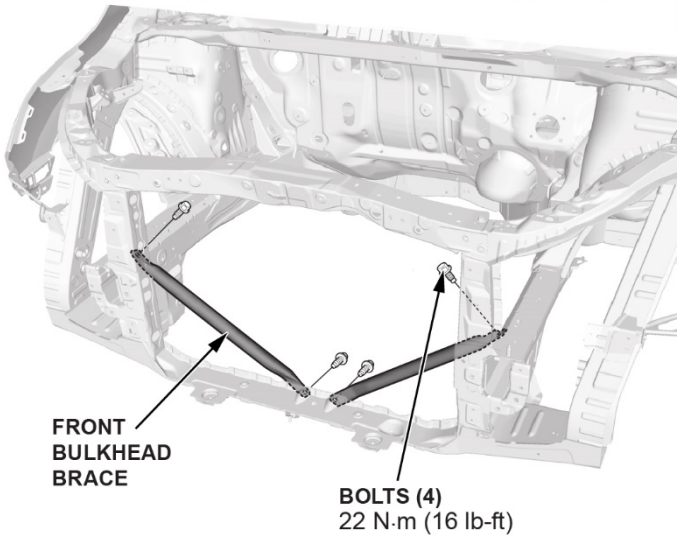


26. Lower the vehicle.

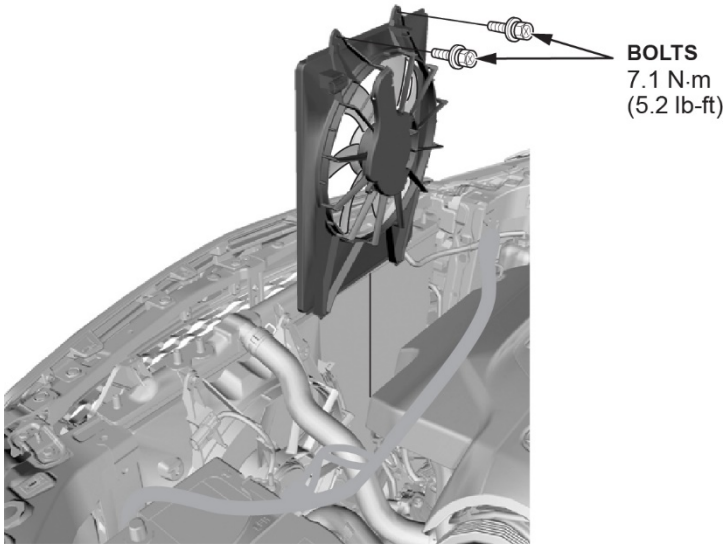
27. Remove the bulkhead.



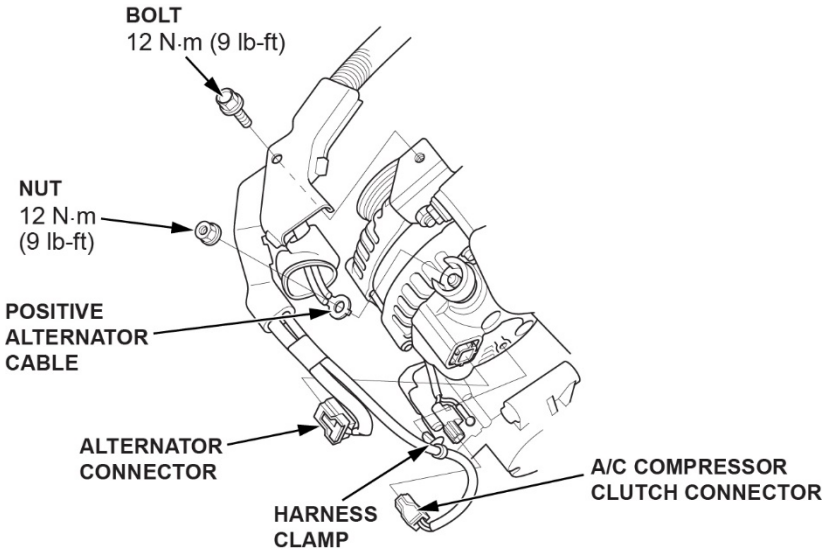
28. Remove the passenger's side bulkhead brace.



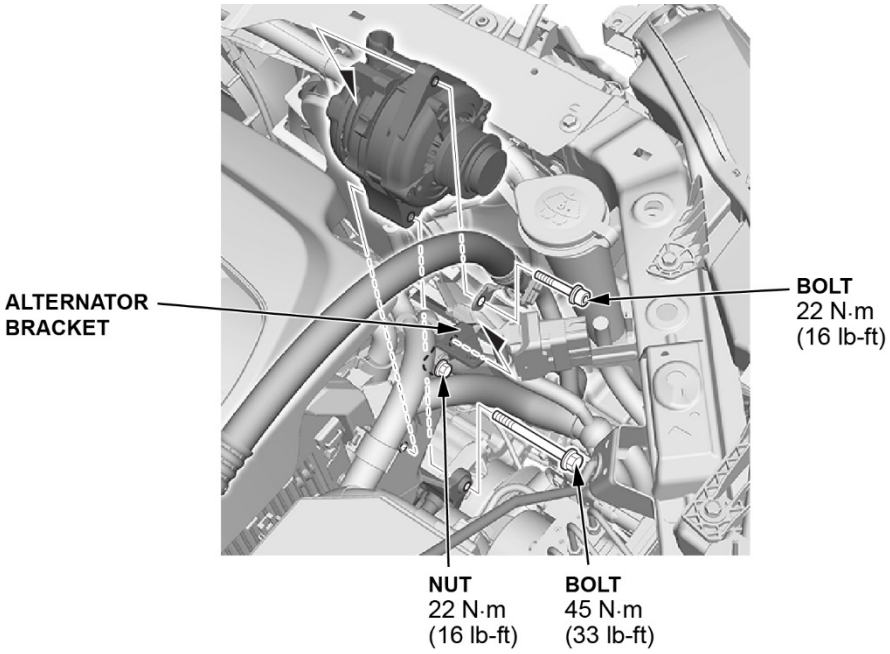
29. Disconnect and remove the condenser fan.



30. Disconnect the alternator:
    1. Disconnect the positive alternator cable, the alternator conector, and the A/C compressor clutch connector.
    2. Remove the harness clamp and bolt.



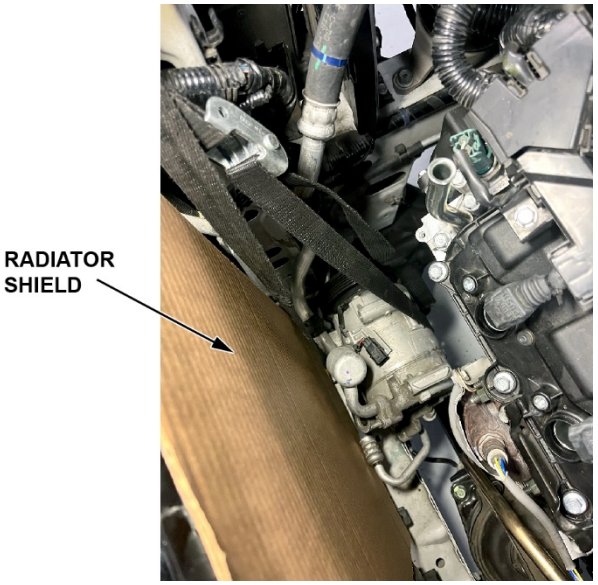
31. Remove the alternator.



32. Install the radiator shield to protect the radiator.

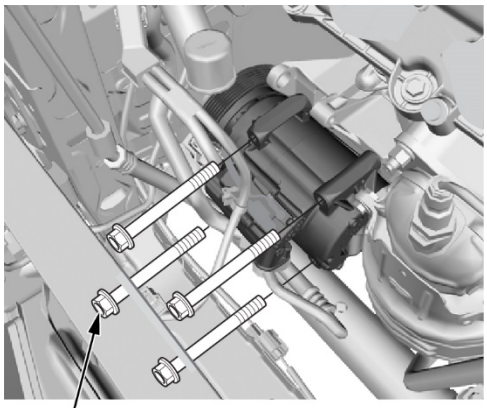
NOTE:

- A suitable radiator shield could be as simple as a clean piece of carddboard.
    b. Make sure the shield covers the entire radiator surface that was exposed with the fan removed.

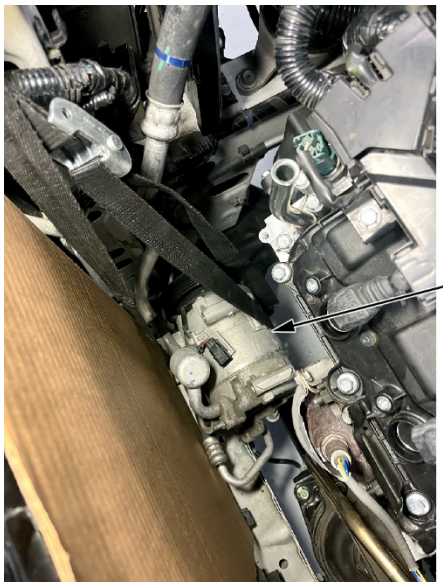


33. Remove the upper A/C compressor mounting bolts and move the A/C compressor forward to rest on the bulkhead frame by the radiator and secure with a strap.

    NOTE: Do not disconnect the A/C hoses.

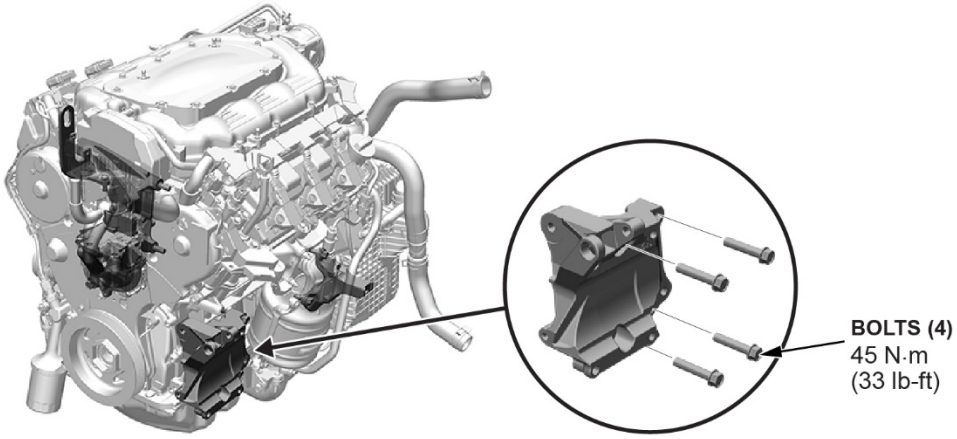


BOLTS (4)
22 N·m (16 lb-ft)



SECURED COMPRESSOR

34. Raise the vehicle.
35. Remove the A/C compressor bracket leaving the drive belt auto tensioner attached.



BOLTS (4)
45 N·m
(33 lb-ft)

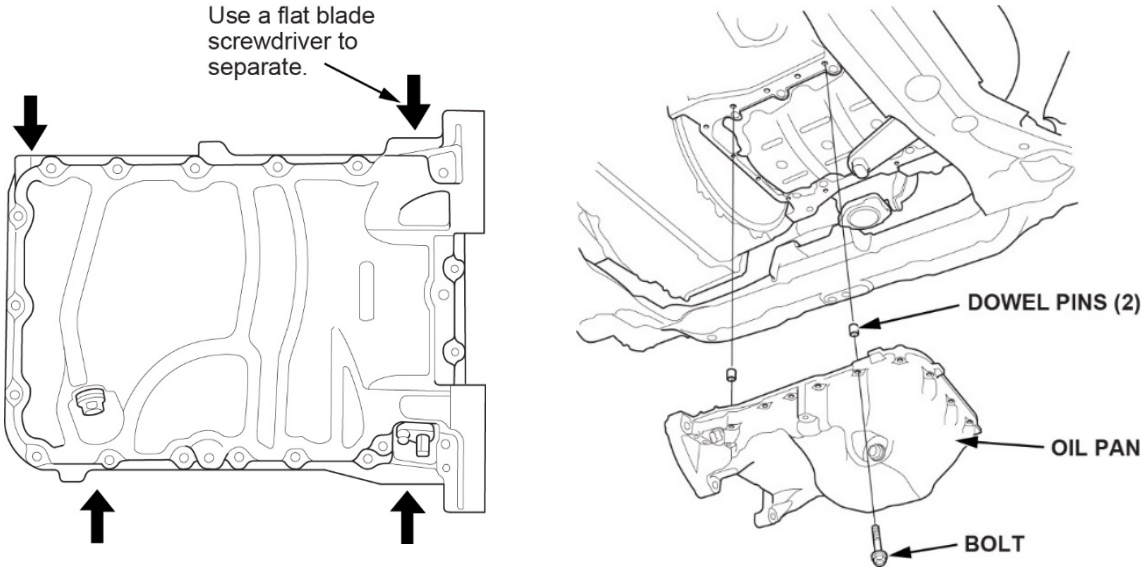
36. Remove the engine oil pan.

⚠ CAUTION

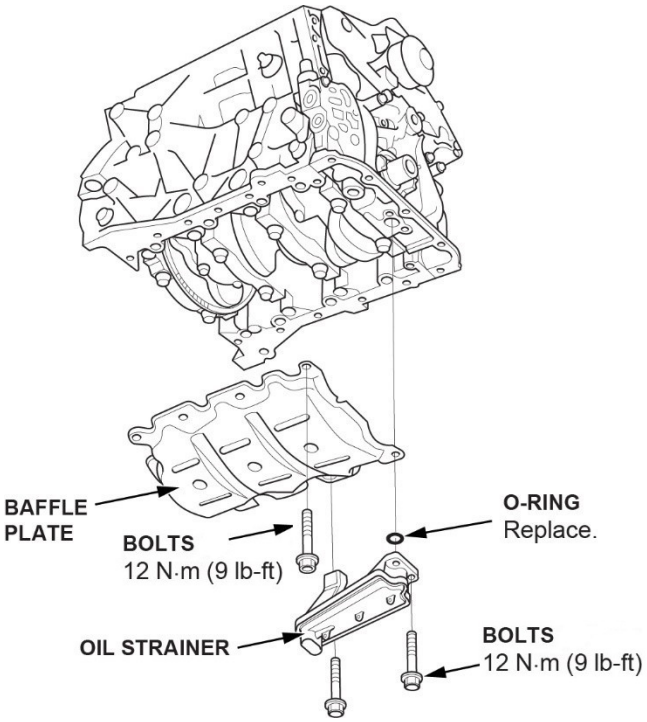
Hot engine oil may continue to drip from the engine which can cause burns or eye damage. Wear proper protective equipment and eyewear to avoid injury.

- Remove the bolts securing the oil pan.
- Use a flat blade screwdriver to separate the oil pan from the engine block.

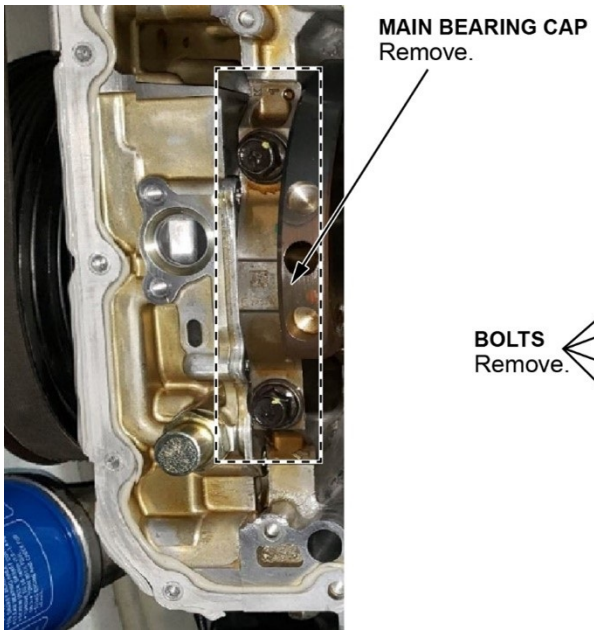
37. Using a flat blade screwdriver, separate the oil pan from the engine block in the places shown.



38. Remove the oil strainer and baffle plate.



39. Remove the #1 main bearing cap.

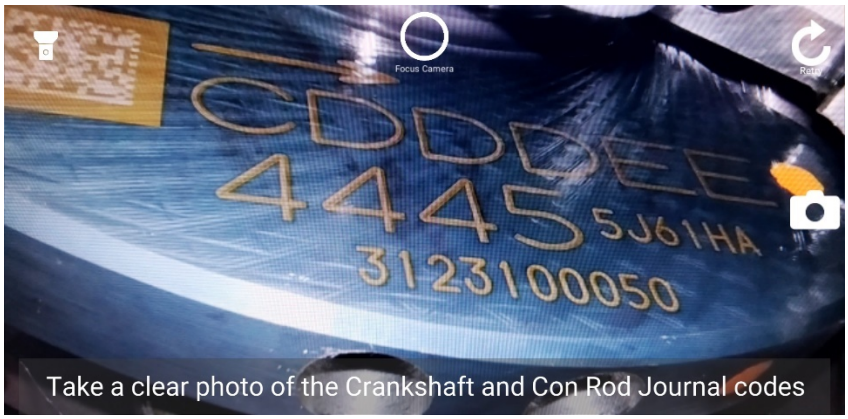


40. Login to the V-SMART application.

41. Enter the connecting rod journal codes.

42. Enter the crankshaft journal codes.

43. Take a picture of the code on the crankshaft counterweight with the V-SMART tool.

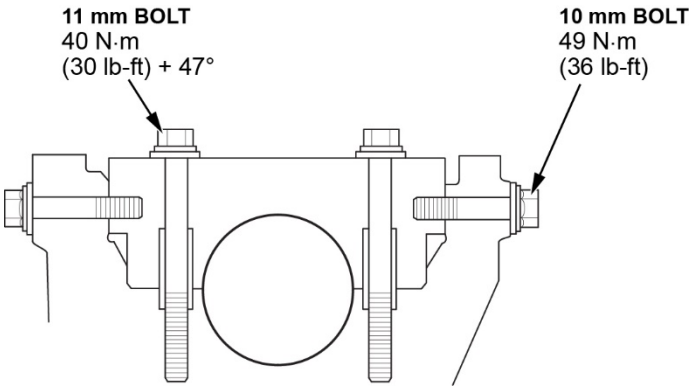


44. Reinstall the #1 main bearing cap.

NOTE:

- Apply new engine oil to the bolt threads and flanges.
- Do not rotate the crankshaft during inspection.

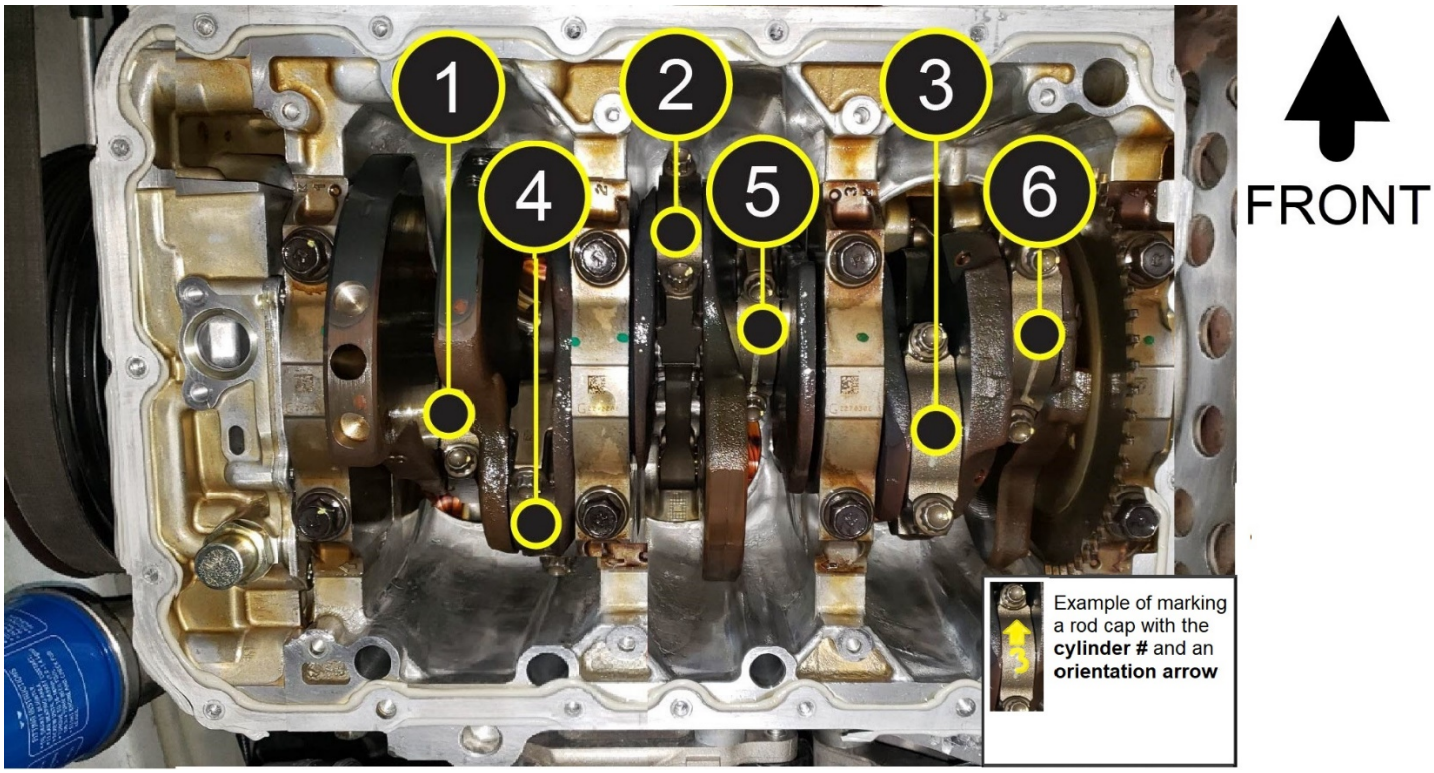
7. Torque the 2 vertical bolts to **40 N·m (30 lb-ft).**
8. Torque the 2 horizontal bolts to **49 N·m (36 lb-ft).**
9. Torque the 2 vertical bolts again an additional **47°.**



45. Clean and label each connecting rod cap with a paint marker (or otherwise suitable marking instrument) prior to removal. Make sure each rod cap has both the **cylinder #** and an **orientation arrow** pointing to the front of the vehicle.

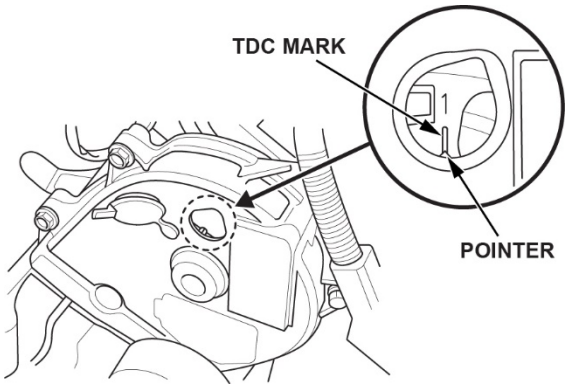
    NOTE:

    - Do not confuse the existing marking on the side of the connecting rod and rod cap with the cylinder number. These are manufacturing marks referring to the size of the rod.
    - Installing a rod cap incorrectly will result in engine knock and/or engine failure.

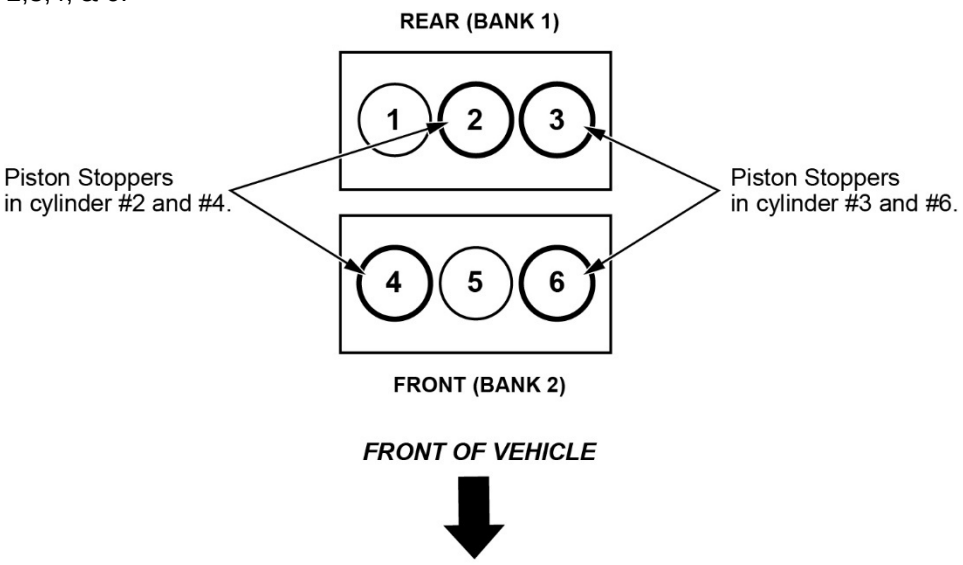


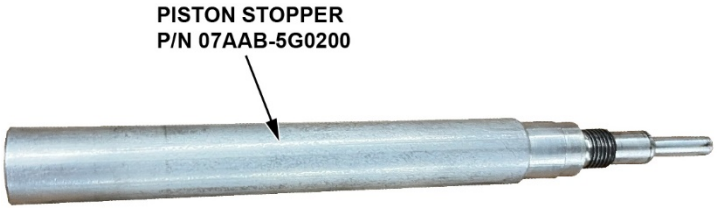
46. Make sure you are still logged in to the V-SMART tool and follow the screen commands.
47. Rotate the engine to take pictures of all the connecting rod numbers.
    1. Rotate crank 240° clockwise for pictures of **connecting rods 1,4,5 and 6**. Enter the values and pictures into V-SMART as directed.
    2. Rotate the crankshaft approximately 120° clockwise until the **cylinder 3** rod is visible. Enter the value and take a picture as directed by V-SMART.
    3. Rotate the crankshaft approximately 120° clockwise until the **cylinder 2** rod is visible. Enter the value and take a picture as directed by V-SMART.
    4. Rotate the crankshaft approximately 240° clockwise until cylinder 1 is back at TDC.

48. Confirm cylinder #1 is at top dead center (TDC). Align the pointer on the front upper cover with the No. 1 Piston TDC mark on the front camshaft pulley.



49. Install piston stoppers into cylinders 2,3,4, & 6.





50. With cylinder 1 at TDC, mark the crankshaft pulley with a vertical line at the 6 o'clock position.

CRANKSHAFT PULLEY
Mark with a vertical line
from the 6 o'clock position.

51. Attach the crank angle gauge to the crankshaft pulley with position #1 correctly aligned at the 6 o'clock position.

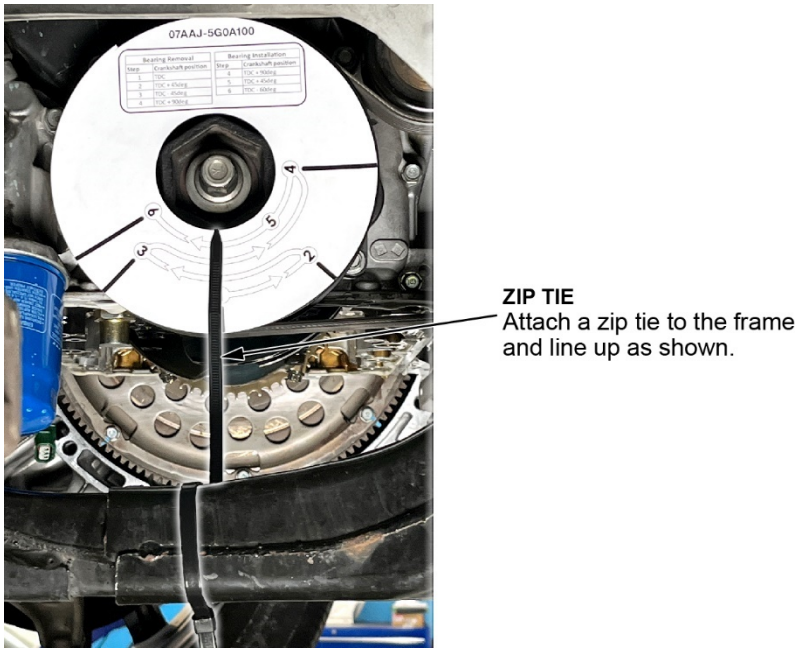
Click here to view video: ► PLAY VIDEO

CRANK ANGLE GAUGE
P/N 07AAJ-5G0A100

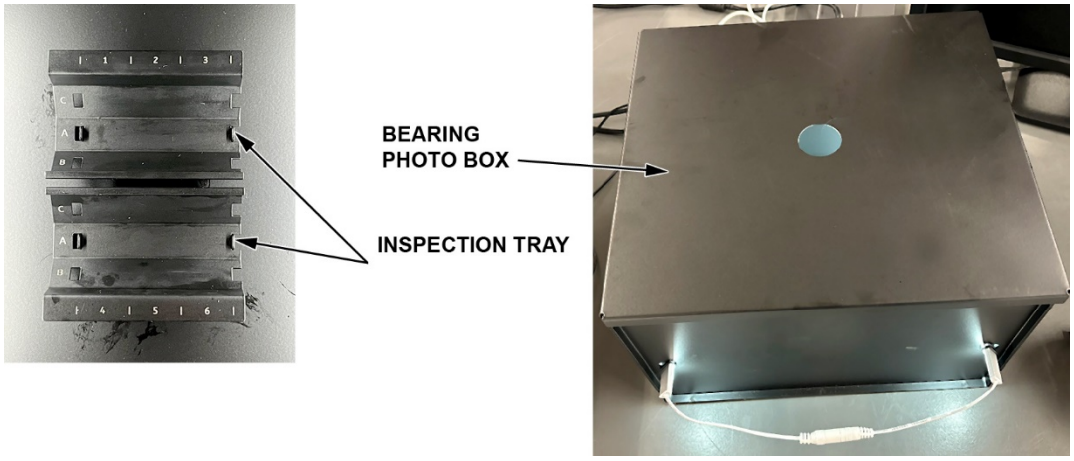
52. Attach a large, commercially available zip tie to the subframe below the crankshaft pulley. The zip tie will be a **reference indicator** for a correct timing wheel position.

    NOTE:

    - Make sure it is pointing up at the 6 o'clock position on the pulley.
    - The zip tie should extend roughly 8" to 12" over the subframe.



53. Make sure Bearing Photo Box (Tool Number: 07AAK-5J2A200) and Inspection Trays are available for use.



54. Make sure the **cylinder 1** is at TDC (**position #1**).

55. Remove the **connecting rod bearing cap and lower bearing** for **cylinders 1,3,5, and 6**.

Step/Crankshaft Position	Cylinder 1 Bearing Cap and Lower Bearings	Cylinder 3 Bearing Cap and Lower Bearings	Cylinder 5 Bearing Cap and Lower Bearings	Cylinder 6 Bearing Cap and Lower Bearings
#1/At TDC	**Remove**	**Remove**	**Remove**	**Remove**

Click here to view video: ► PLAY VIDEO

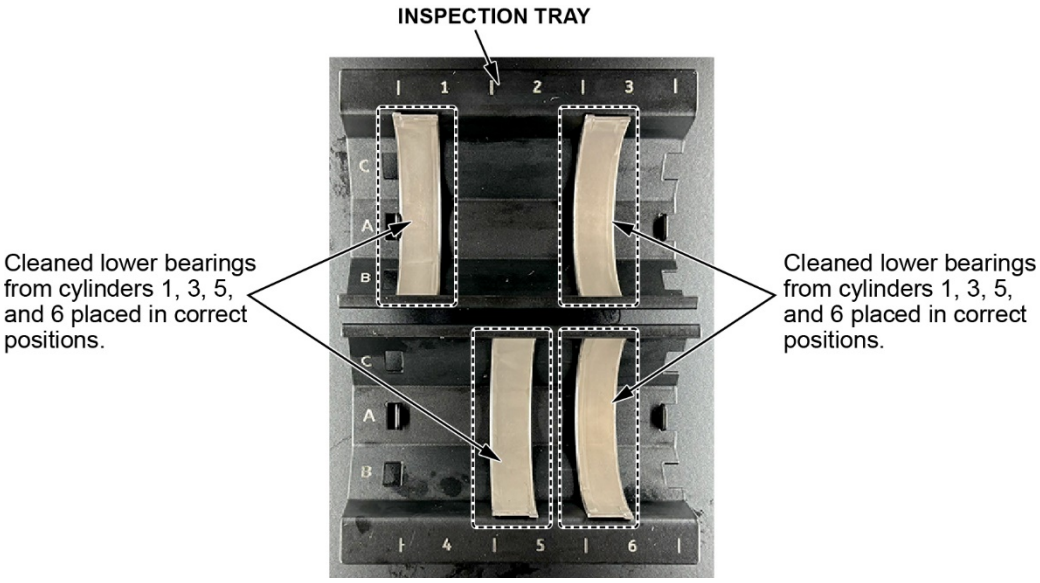
NOTE:

- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.

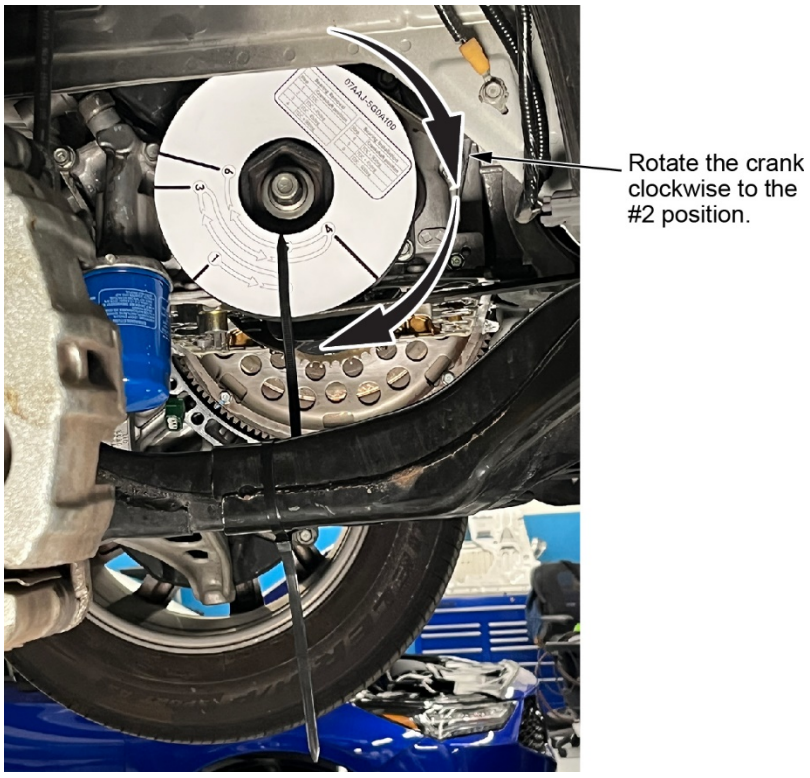
56. Place the removed lower bearings from **cylinders 1,3,5, and 6** into the inspection tray.

    NOTE:

    - Thoroughly clean the bearings with a clean shop towel prior to placing the bearing in the inspection tray. No oil should be present. **Do not use any solvents**.
    - **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



57. Rotate the crankshaft clockwise to the **#2 position** (TDC +45°).



58. Remove the **rod bearing cap and lower bearing** from **cylinder 2**.

Step/Crankshaft Position	Cylinder 2 Bearing Cap and Lower Bearings
#2/TDC +45°	**Remove**

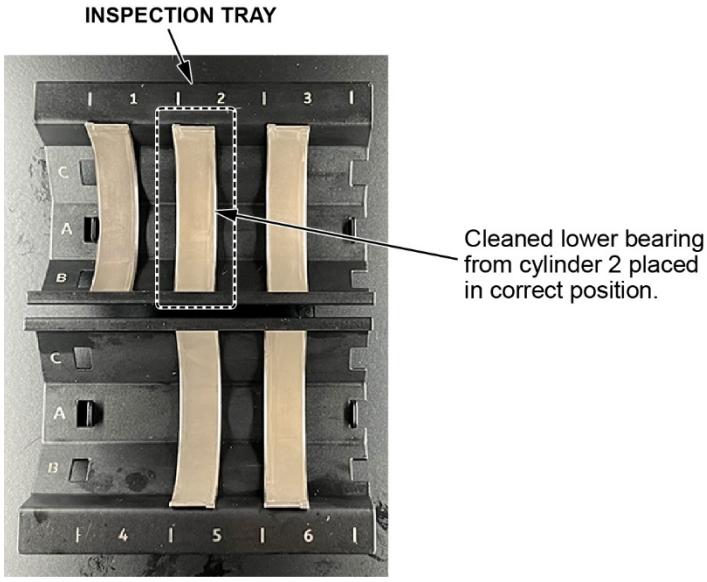
NOTE:

- Follow the removal of the connecting rod bearing steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not** use any solvents.

59. Place the removed lower bearing from **cylinder 2** into the inspection tray.

NOTE:

- Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



60. Remove the **cylinder 2 upper connecting rod bearing**.

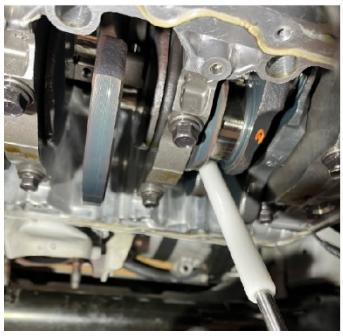
Step/Crankshaft Position	Cylinder 2 Upper Bearing
#2/TDC +45°	Remove

Click here to view video: ► PLAY VIDEO

NOTE:

- Follow the removal of the connecting rod bearing steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.

EXAMPLE OF USING THE M8 ROD HOLDER TOOL

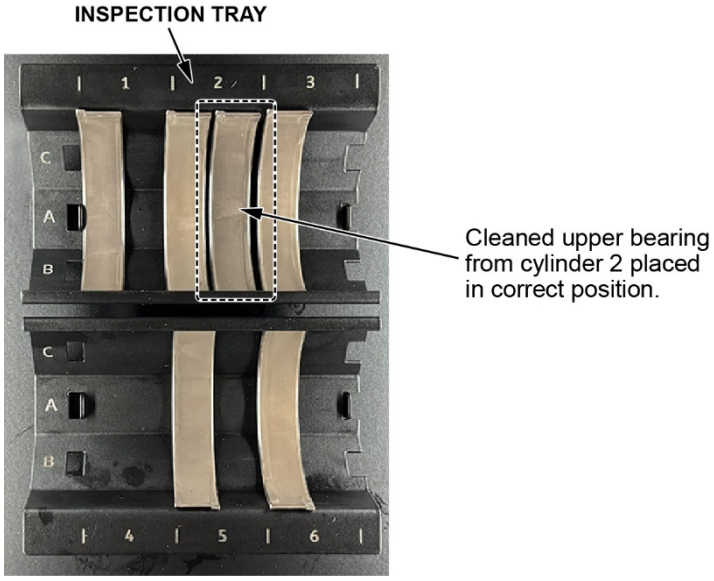


1. Thread the M8 rod holder tool into the connecting rod bolt hole.
2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
5. Using the M8 rod holder tool, carefully push the connecting rod back up until it contacts the piston stopper.
6. Remove the M8 rod holder tool.
7. Thoroughly clean the bearing with a clean shop towel to remove all oil residue. **Do not use any solvents**.

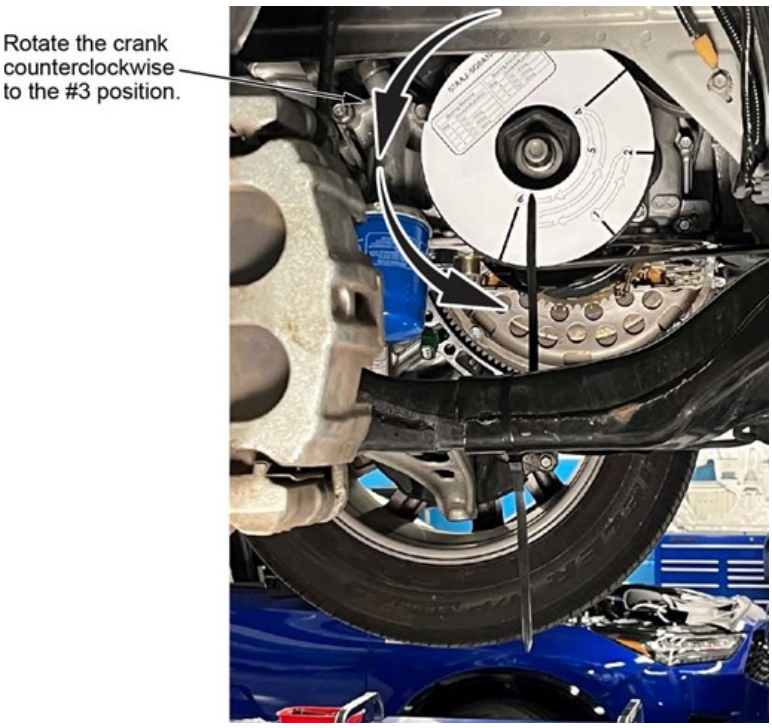
61. Place the removed **upper bearing** from **cylinder 2** into the inspection tray.

    NOTE:

    - Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
    - **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



62. Rotate the crankshaft counterclockwise to the **#3 position** (TDC -45°).



63. Remove the **rod bearing cap and lower bearing** from **cylinder 4**.

Step/Crankshaft Position	Cylinder 4 Rod Cap and Lower Bearing
#3/TDC -45°	Remove

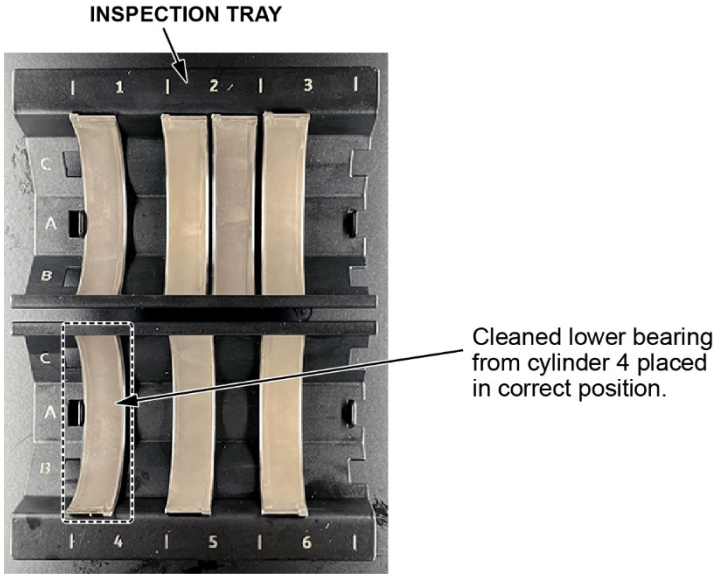
NOTE:

- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.

64. Place the removed **lower bearing** from **cylinder 4** into the inspection tray.

NOTE:

- Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



65. Remove the **cylinder 3 upper connecting rod bearing**.

Step/Crankshaft Position	Cylinder 3 Upper Bearing	Cylinder 4 Upper Bearing
#3/TDC -45°	**Remove**	**Remove**

NOTE:

- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.

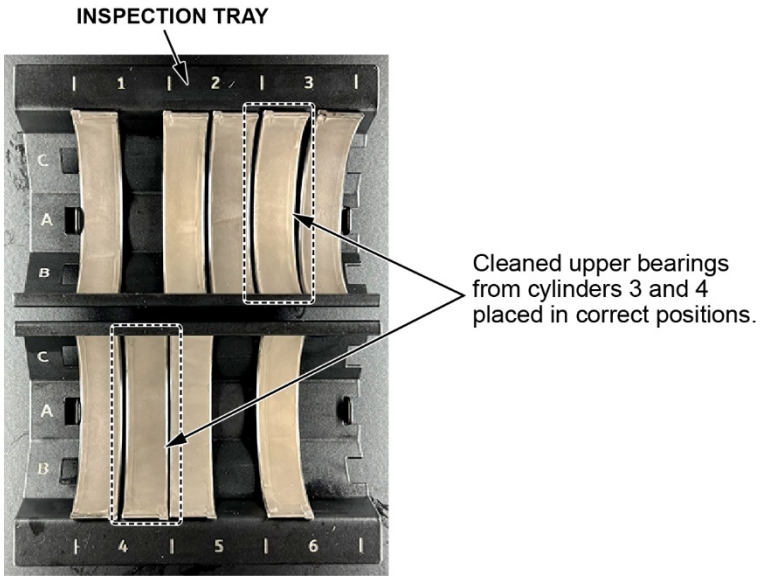
1. Thread the rod holder tool into the connecting rod bolt hole.
2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
5. Using the M8 rod holder tool, carefully push the connecting rod back up until it contacts the piston stopper.
6. Remove the M8 rod holder tool.
7. Thoroughly clean the bearing with a clean shop towel to remove all oil residue. **Do not use any solvents**.

66. Remove **the cylinder 4 upper connecting rod bearing**.
    1. Thread the rod holder tool into the connecting rod bolt hole.
    2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
    3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
    4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
    5. Leave the **cylinder 4** connecting rod in the lower position, **do not** push back up.
    6. Remove the M8 rod holder tool.
    7. Thoroughly clean the bearing with a clean shop towel to remove all oil residue. **Do not use any solvents**.

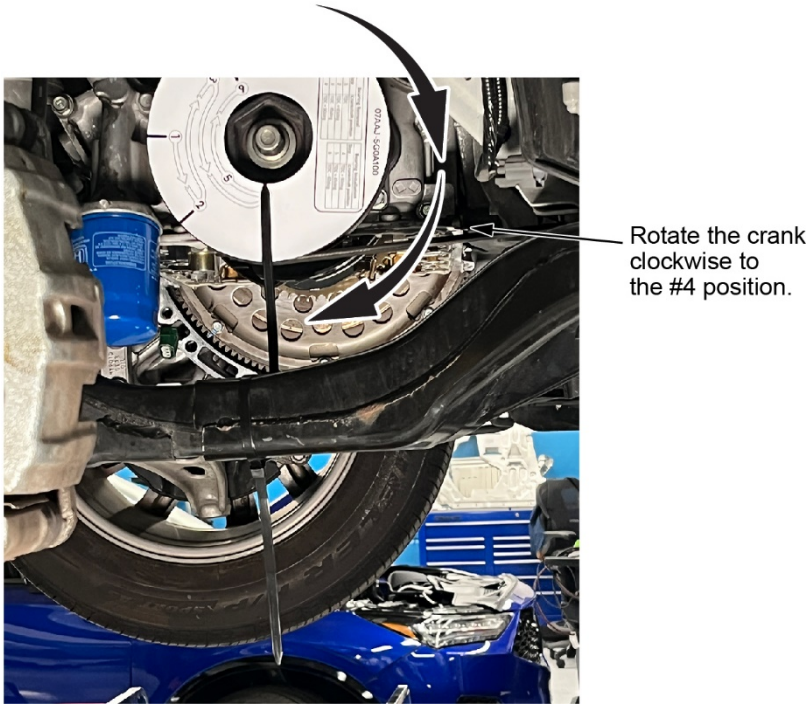
67. Place the removed **upper bearings** from **cylinder 3 and 4** into the inspection tray.

    NOTE:

    - Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
    - **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



68. Rotate the crankshaft clockwise to the **#4 position** (TDC +90°).



69. Remove the **upper bearing from cylinders 1, 5, and 6**.

Step/Crankshaft Position	Cylinder 1 Upper Bearing	Cylinder 5 Upper Bearing	Cylinder 6 Upper Bearing
#4/TDC +90°	**Remove**	**Remove**	**Remove**

NOTE:

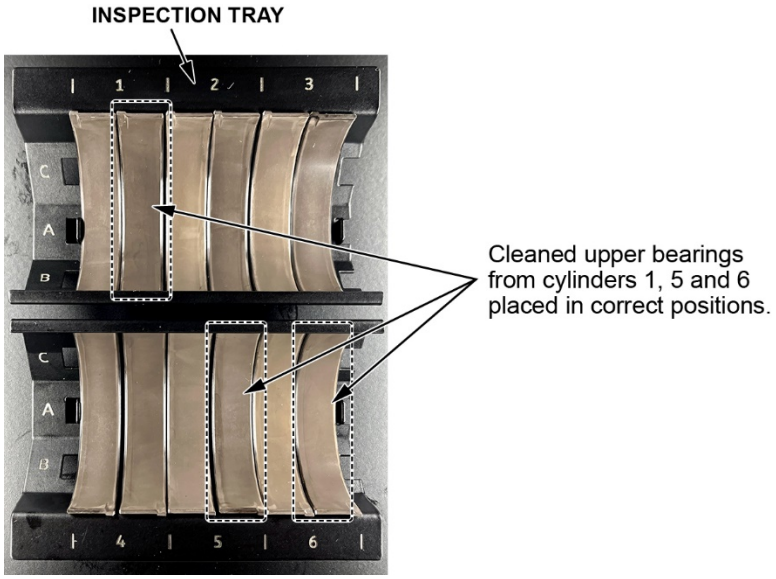
- Follow the removal of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.
- The next steps involve manually moving the piston/rod assemblies while disconnected from the crankshaft. Moving the piston/rod assembly too far in either direction can damage the piston and/or oil jet.
- Thoroughly clean the bearing with a clean shop towel after removal. No oil should be present. **Do not use any solvents**.
- Use the rod holder tool as necessary, hand tighten only.

1. Thread the rod holder tool into the connecting rod bolt hole.
2. Carefully push the connecting rod up until the connecting rod clears the crankshaft journal.
3. Swing the connecting rod to the side, then pull down just enough to gain access to the upper bearing.
4. Remove the upper bearing by sliding it to the side until it releases from the connecting rod.
5. Using the rod holder tool, carefully push the connecting rod back up until it contacts the piston stopper.
6. Remove the rod holder tool.
7. Thoroughly clean the bearings with a clean shop towel to remove all oil residue. **Do not use any solvents**.

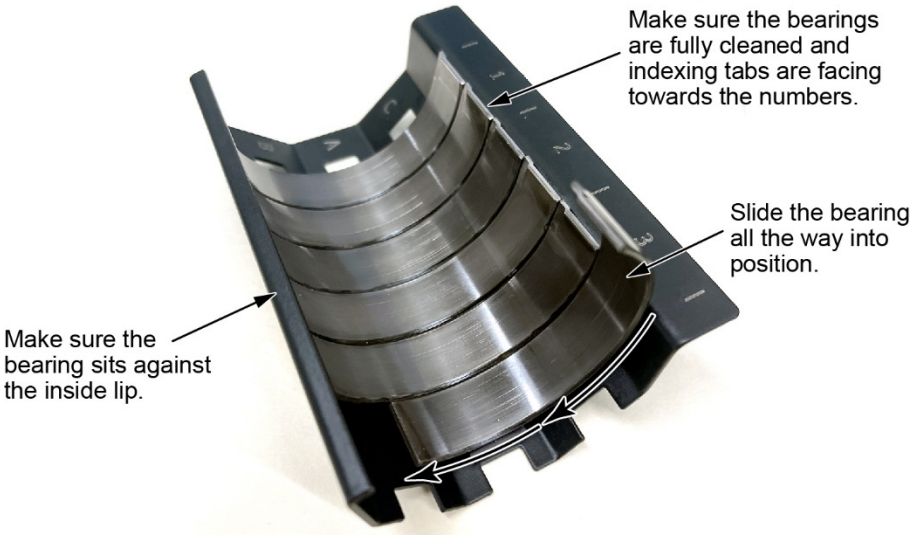
70. Place the removed **upper bearings** from **cylinders 1, 5, and 6** into the inspection tray.

NOTE:

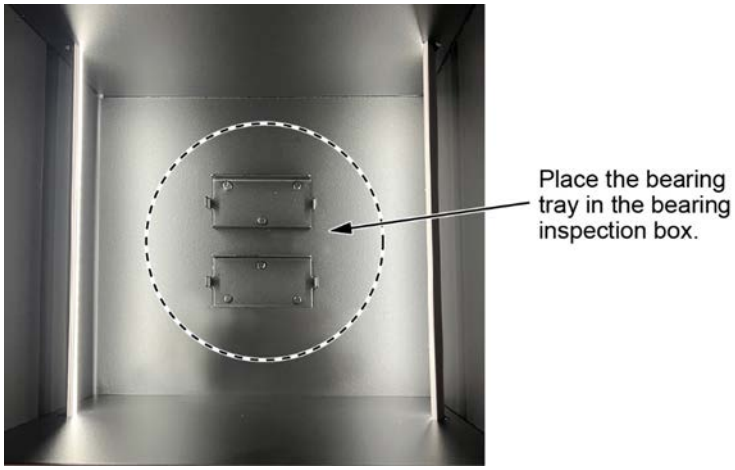
- Thoroughly clean the bearing with a clean shop towel prior to placing in the inspection tray. No oil should be present. **Do not use any solvents**.
- **Place** the removed bearings into the inspection tray at the correct position. For example, the **cylinder 1 bearings** should be in the **#1 slot** in the **tray**. **Upper and lower bearing** arrangement in the tray **does not matter**.



71. Make sure the bearings are fully seated and level with the edge of the inspection tray.
    - The bearing's indexing tab should be lined up at the numbers.
    - The flat edge of the bearing should be inside the lip.
    - All bearings should be fully seated.



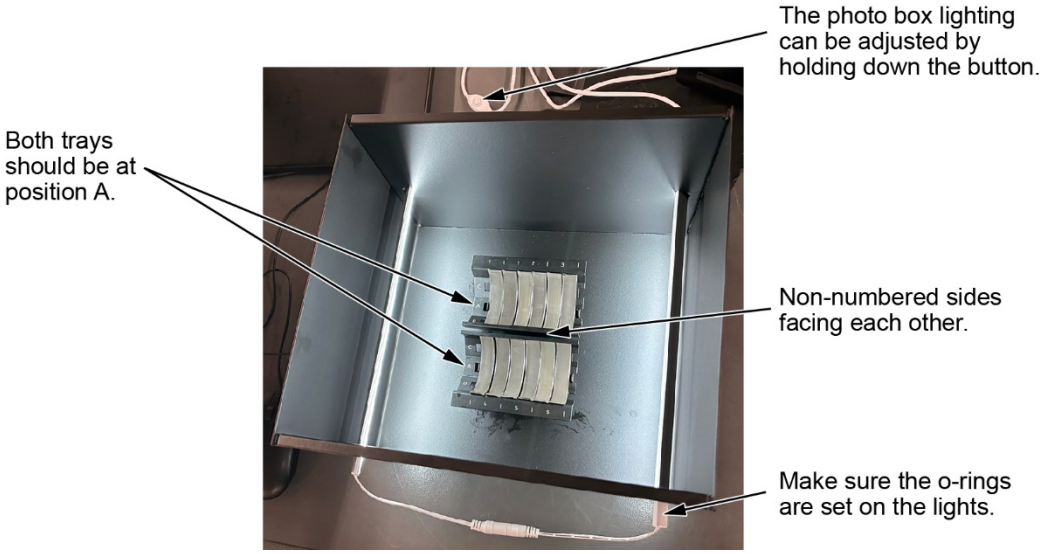
72. Remove the photo box cover and place the inspection trays into the bearing photo box.



73. Confirm the following is ready on the bearing photo box:

    NOTE: The lighting can be adjusted with a long hold on the button.

    - Lights at the brightest setting.
    - Both bearing trays in position A with non-numbered sides facing each other.
    - The O-rings are set on the lights to prevent an outside light source.



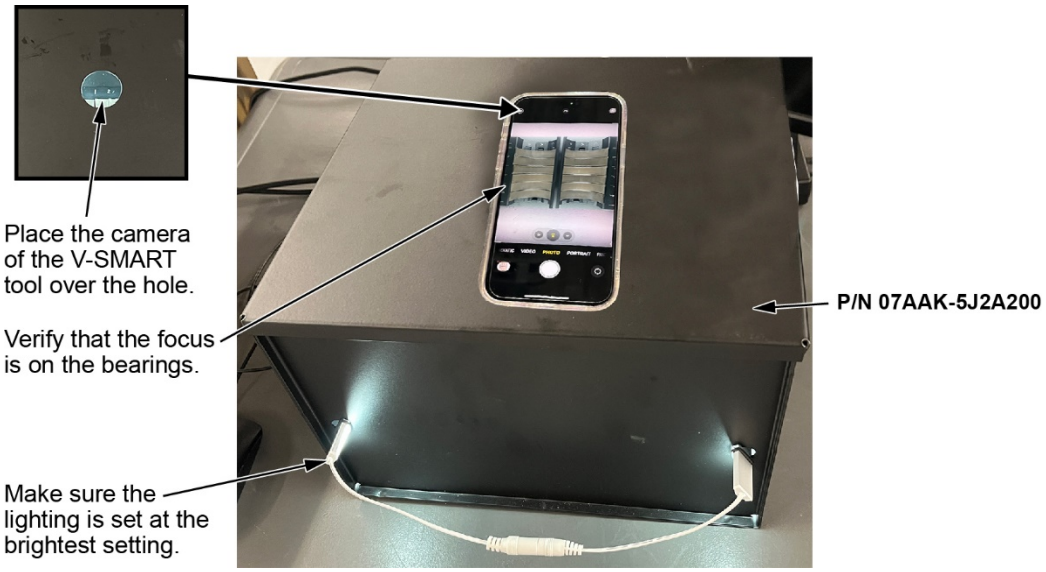
74. Login to the V-SMART application.

    NOTE: Scanning the VIN will return to where you left off.

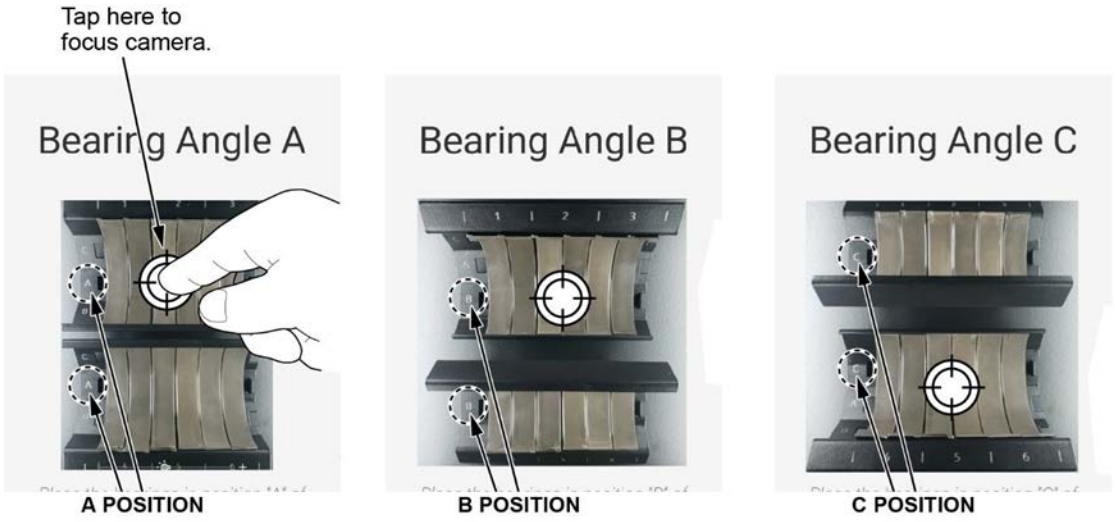
75. Using the V-SMART application, follow the instructions on the application to take bearing photos in positions A, B, and C. Follow the prompts when submitting the photos.

    NOTE:

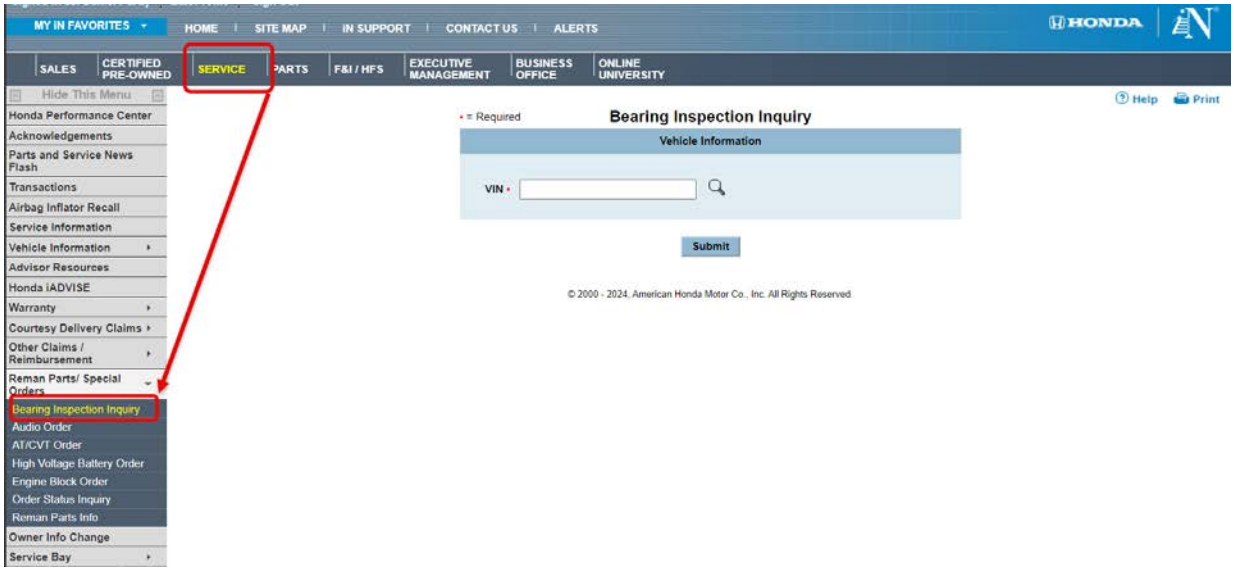
    - Use the camera tap focus for a clear image.
    - Any unclear images will not be accepted.
    - Follow the V-SMART tool prompts after photo submission.



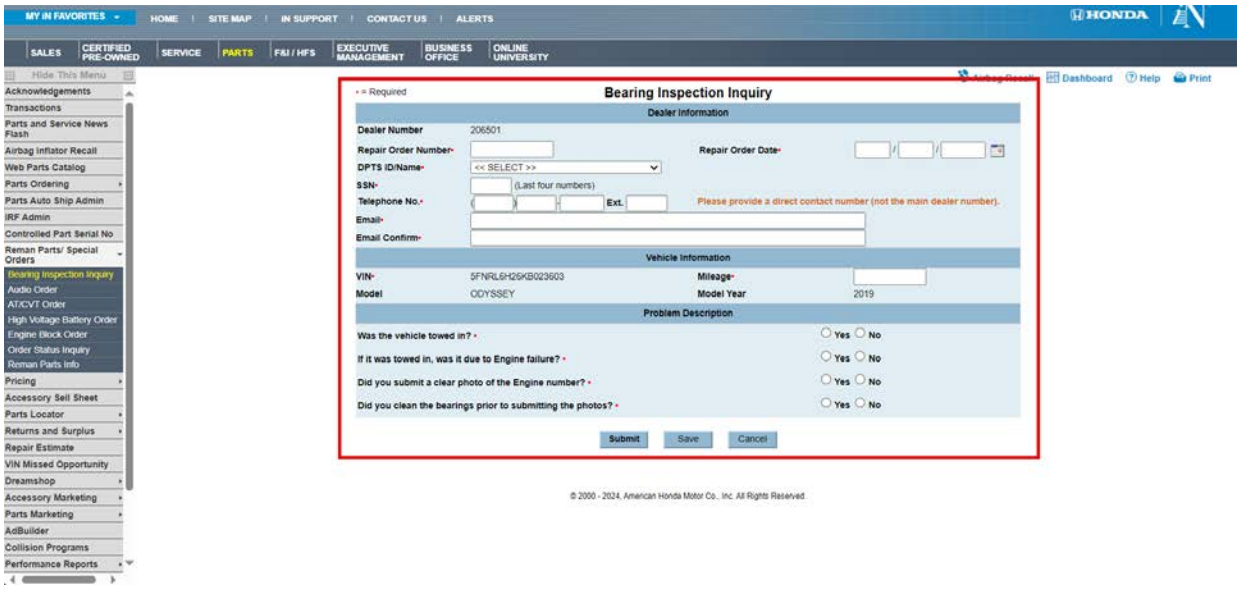
When taking the photos:



76. Create a Bearing Inspection Inquiry.
    1. Log into iN.
    2. Select **SERVICE > REMAN PARTS / SPECIAL ORDERS > BEARING INSPECTION INQUIRY.**
    3. Select the **BEARING INSPECTION INQUIRY**.
    4. Input the correct VIN.



    5. Input all vehicle information (including the correct VIN) to create a case.



77. A **7-digit case reference number** will be generated.
78. Call the **Bearing Inspection Inquiry Team** at **(800) 824-6632**. Press **9** to be routed to the correct department (**do not contact TECH LINE for this**). Give the answering agent the **7-digit reference number** for repair direction.

NOTE: MAKING THE INCORRECT SELECTION WILL RESULT IN INCREASED WAIT TIMES.

79. The bearing inspection agent will give the **Repair Direction**. You will receive instructions via email on the repair method that includes the unique warranty code and the bearing sizes with their specific locations, if applicable. Parts will be AUTO shipped to your dealership. Make sure to advise the parts department with a copy of the RO.

    NOTE: Link to CONTENT REFERENCE, (Click HERE).

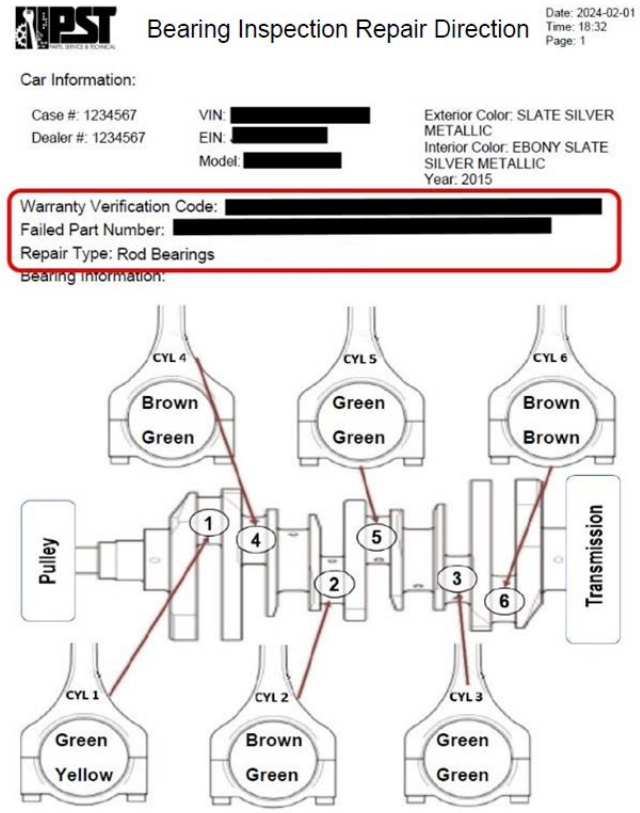
REPAIR #1 INSTALL RECOMMENDED BEARINGS

NOTE: DO NOT contact Tech Line for any inquiries to this safety recall. You must call the Bearing Inspection Inquiry Team at (800) 824-6632 (Select Option #9) for all inquiries and repair direction.

1. Follow the **Repair Type** instructions on the emailed Bearing Selection Results sheet. Make sure the VIN sheet matches the vehicle.

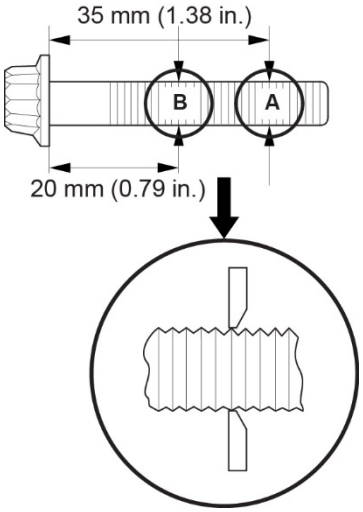
   NOTE:

   - Follow the **Repair Type** instructions exactly as recommended.
   - Use the **Warranty Verification Code** for the warranty claim.



2. Inspect the connecting rod bolts:
   - Measure the diameter of each connecting rod bolt at point A and point B.
   - Calculate the difference in diameter between point A and point B.

     Difference in diameter specification: 0–0.1 mm (0–0.004 in)
   - If the difference in diameter is out of tolerance, replace the connecting rod bolt.



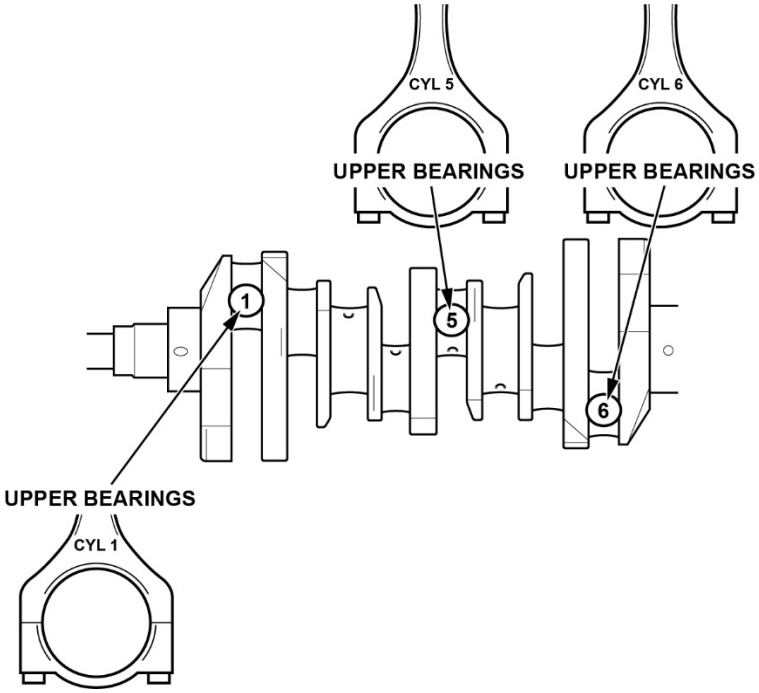
3. Apply a light coating of oil to all connecting rod journals.

4. While the crankshaft is still at crank angle gauge **position #4** (TDC +90°), install the **upper bearing** to the connecting rod for **cylinders 1, 5, and 6.**

   NOTE:

   - Make sure the bearing indexing tabs are properly oriented during installation.
   - Follow the install of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.

Step/Crankshaft Position	Cylinder 1 Upper bearings	Cylinder 5 Upper bearings	Cylinder 6 Upper bearings
#4/TDC +90°	**Install**	**Install**	**Install**

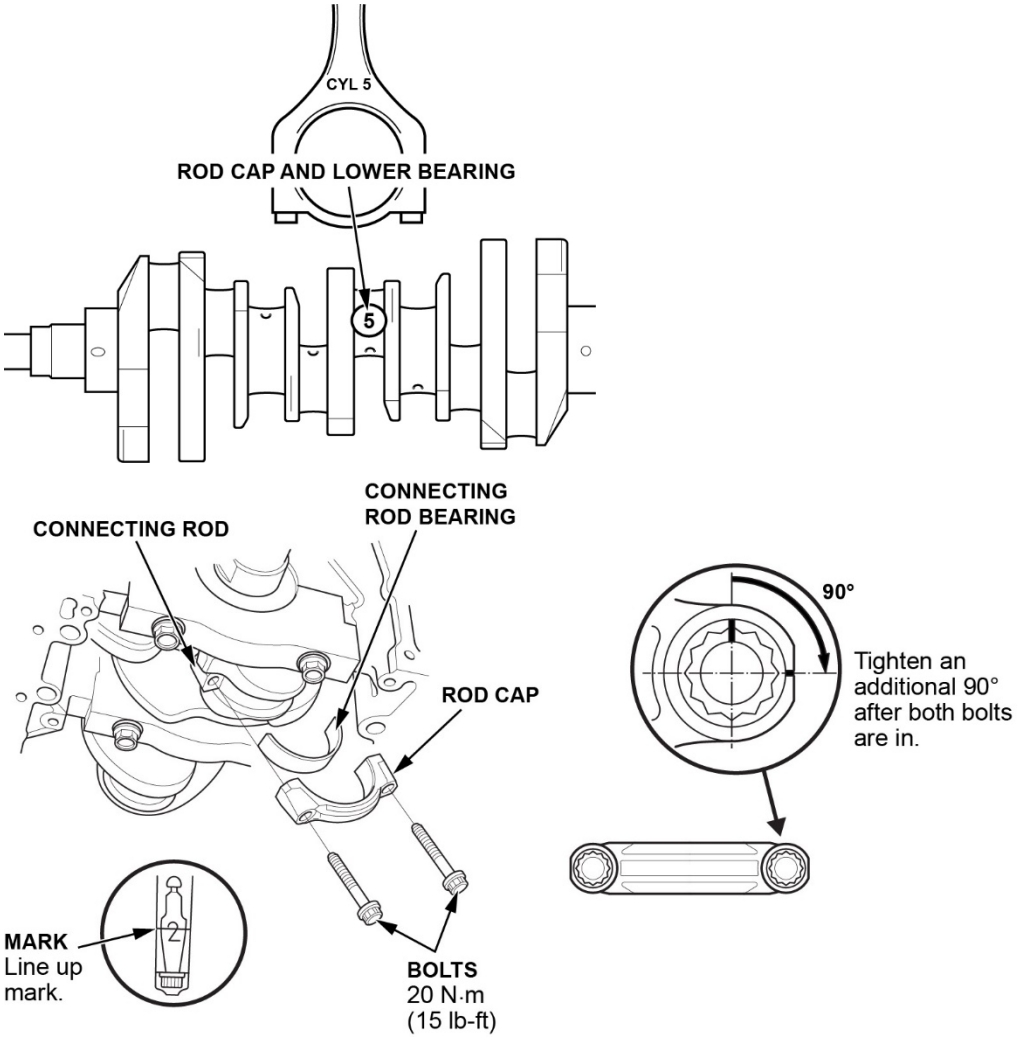


5. Install the connecting rod cap and lower bearing to the connecting rod for cylinder 5.

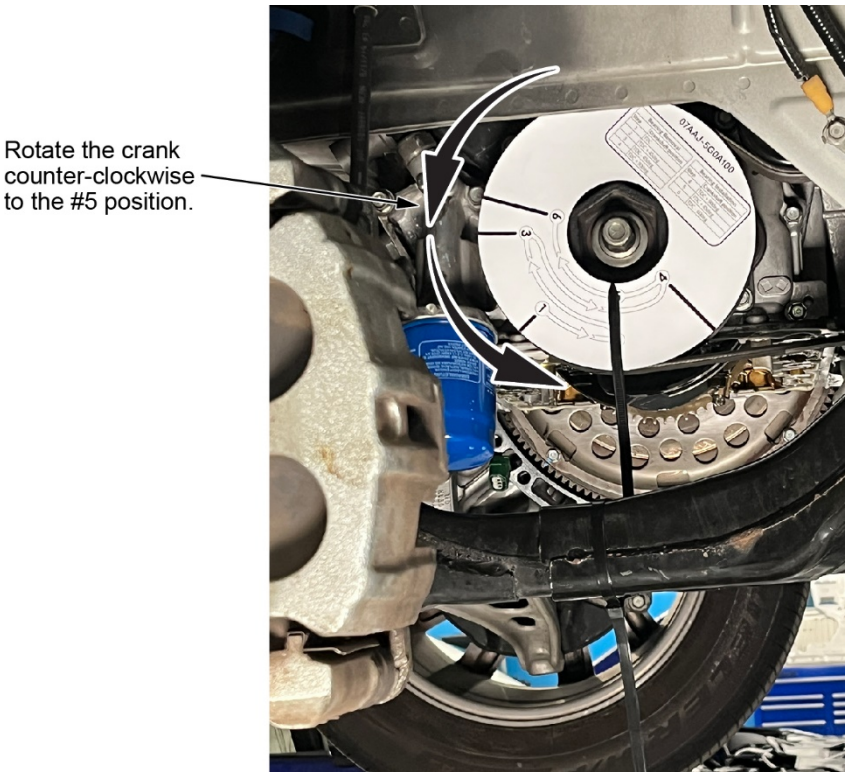
   NOTE:

   - Make sure the bearing indexing tabs are properly oriented during installation.
   - Apply new engine oil to the bolt threads and bolt flanges.
   - If you tightened the connecting rod bolt beyond the specified angle, remove and inspect the connecting rod bolt. Do not loosen it back to the specified angle.
   - Use a commercially available torque angle meter.
   - Use the M8 Rod Holder tool as needed, this includes resting against the journal as a guide.
   - Follow the install of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.

Step/Crankshaft Position	Cylinder 5 Rod Cap and Lower Bearing
#4/TDC +90°	Install



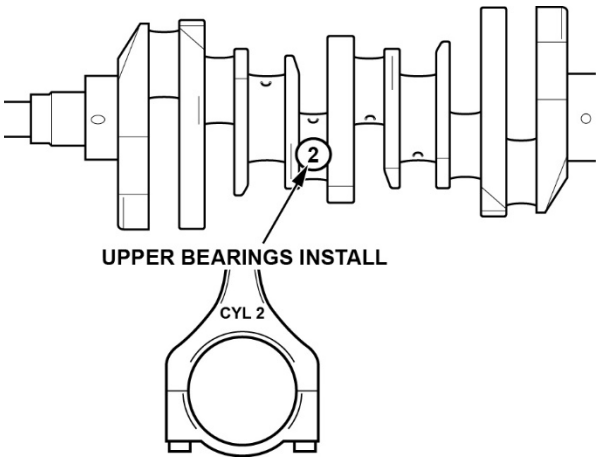
6. Rotate the crankshaft counterclockwise to crank angle gauge **position #5** (TDC +45°).



7. Install the **upper bearing** to the connecting rod for **cylinder 2.**

Step/Crankshaft Position	Cylinder 2 Upper Bearings
#5/TDC +45°	Install

- Follow the install of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.

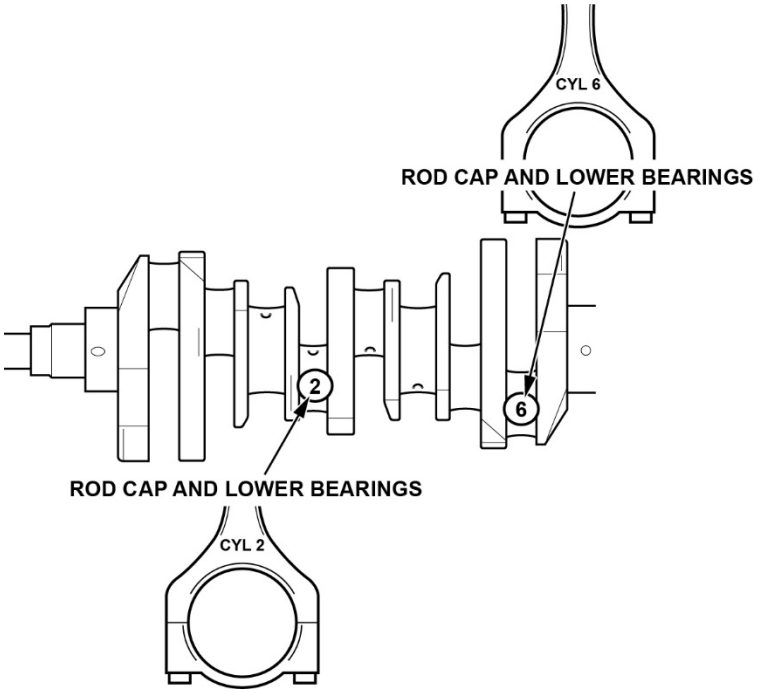


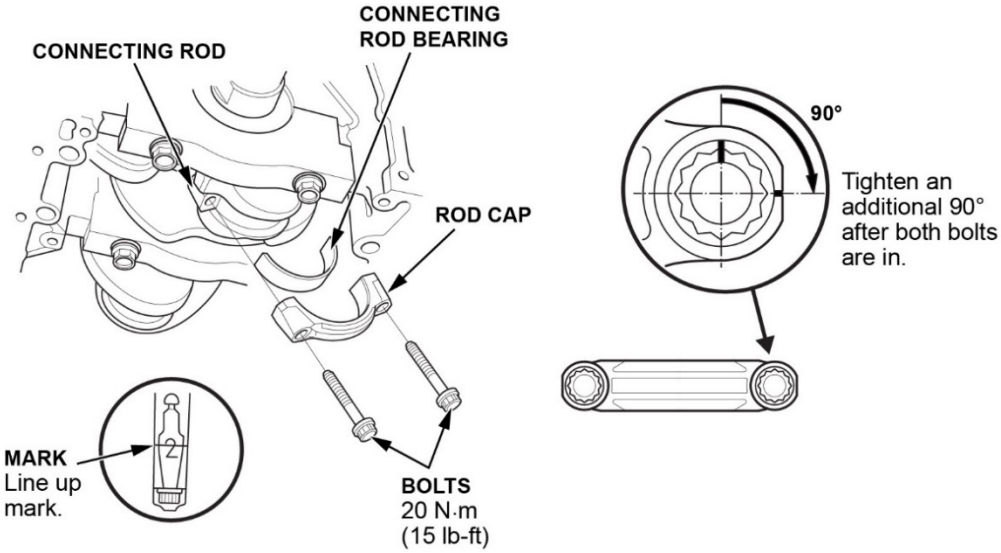
8. Without moving the crank, install the **rod cap and lower bearing** to the connecting rod **for cylinders 2 and 6**.

   NOTE:

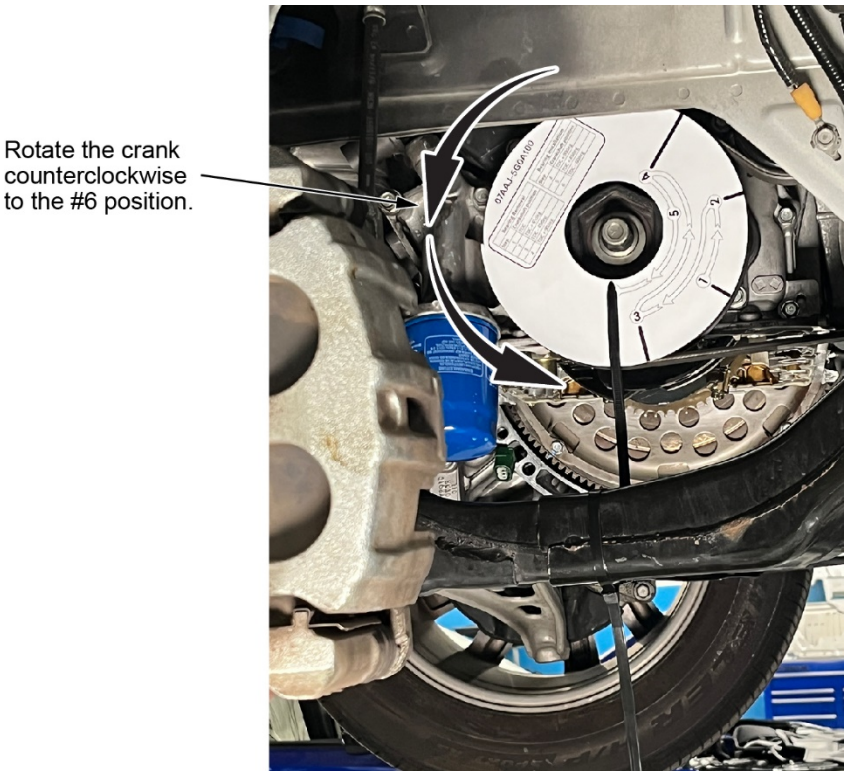
   - Make sure the bearing indexing tabs are properly oriented during installation.
   - Apply new engine oil to the bolt threads and bolt flanges.
   - If you tightened the connecting rod bolt beyond the specified angle, remove and inspect the connecting rod bolt. Do not loosen it back to the specified angle.
   - Use a commercially available torque angle meter.
   - Use the M8 Rod Holder tool as needed, this includes resting against the journal as a guide.
   - Follow the install of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.

Step/Crankshaft Position	Cylinder 2 Rod Cap and Lower Bearings	Cylinder 6 Rod Cap and Lower Bearings
#5/TDC +45°	Install	Install





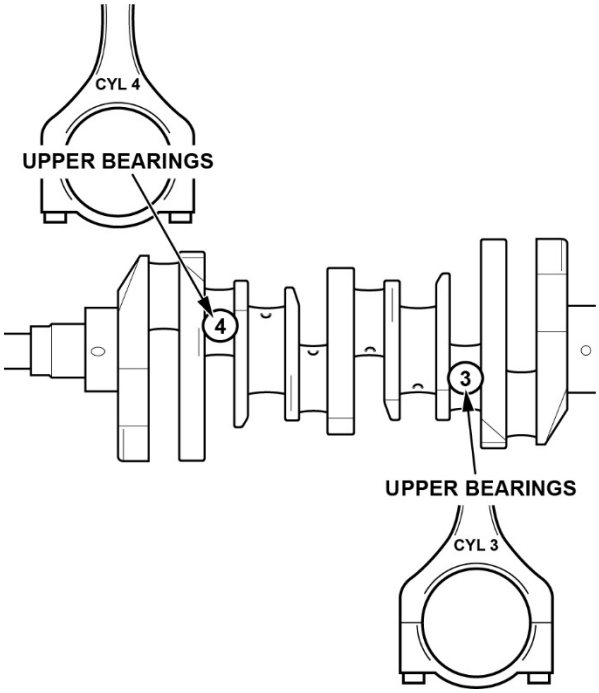
9. Rotate the crankshaft counterclockwise to crank angle gauge **position #6** (TDC -60°).



10. Install the **upper bearings** to the connecting rods for **cylinders 3 and 4**.

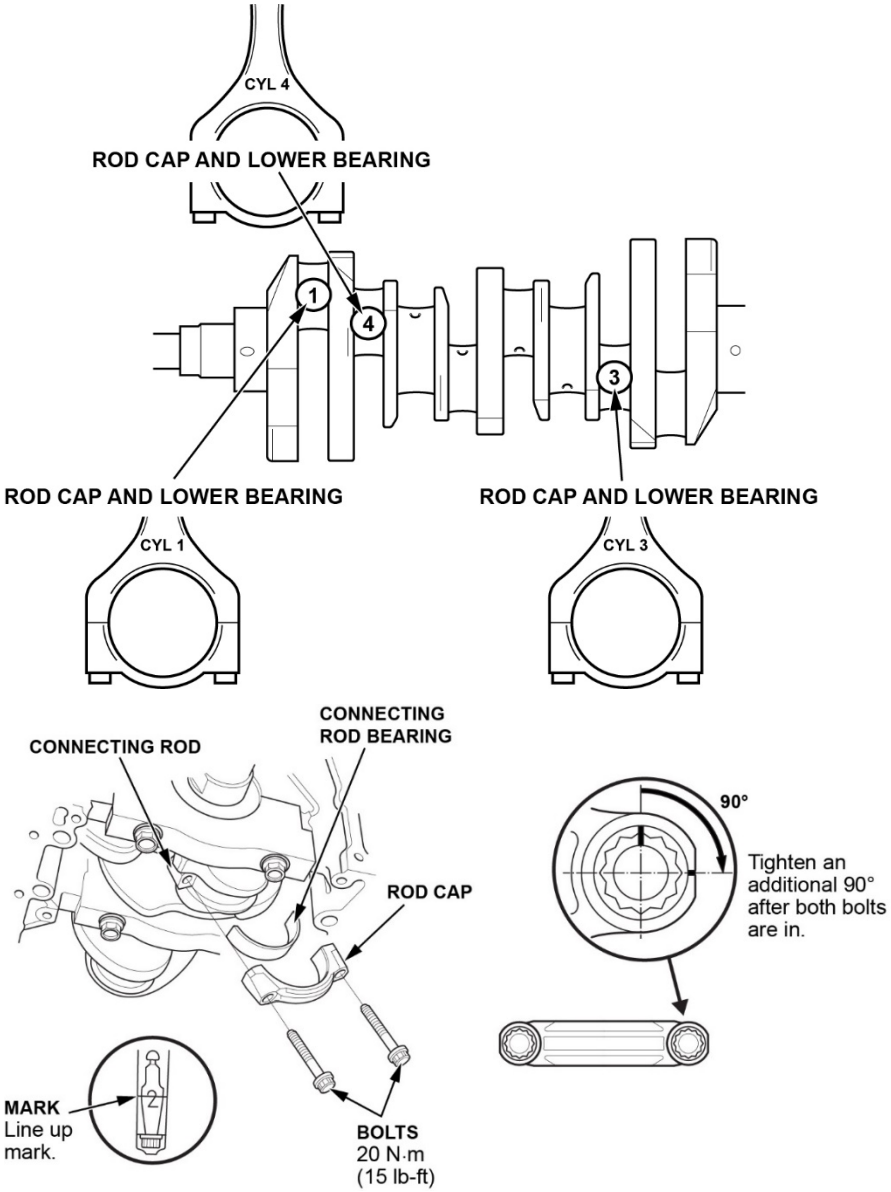
Step/Crankshaft Position	Cylinder 3 Upper Bearings	Cylinder 4 Upper Bearings
#6/TDC -60°	Install	Install

- Follow the install of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.

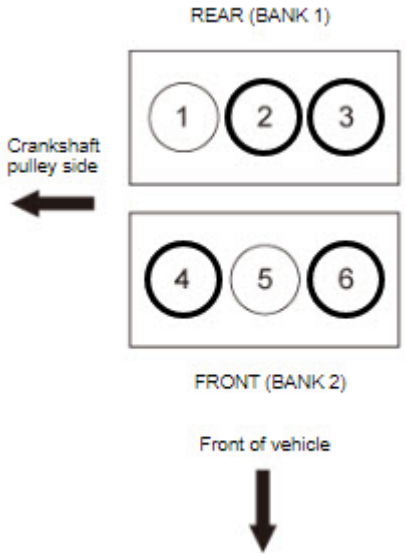


11. Without rotating the crank, install the **rod caps and lower bearings** to the connecting rod **for cylinder 1, 3, and 4.**
    - Make sure the bearing indexing tabs are properly oriented during installation.
    - Apply new engine oil to the bolt threads and bolt flanges.
    - If you tightened the connecting rod bolt beyond the specified angle, remove and inspect the connecting rod bolt. Do not loosen it back to the specified angle.
    - Use a commercially available torque angle meter.
    - Use the M8 Rod Holder tool as needed, this includes resting against the journal as a guide.
    - Follow the install of the connecting rod steps precisely to prevent damage to the crank journal and connecting rods.

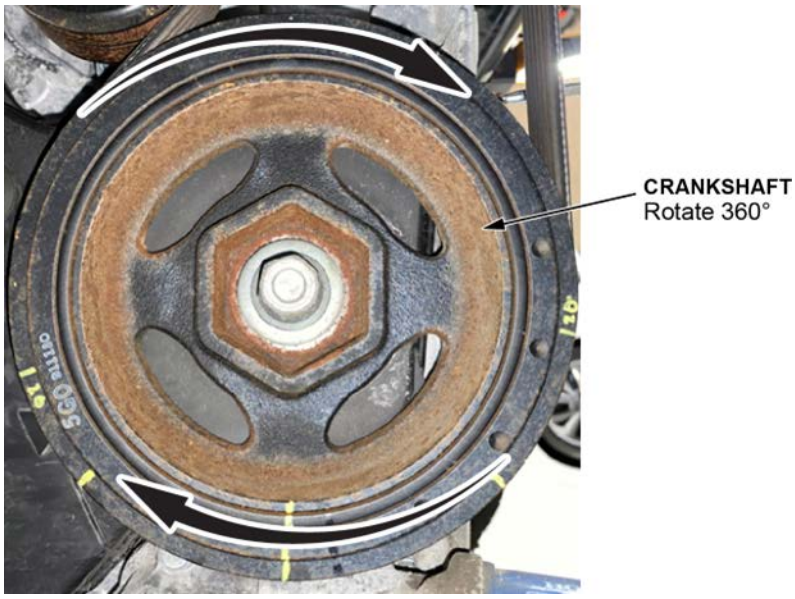
Step/Crankshaft Position	Cylinder 1 Rod Cap and Lower Bearings	Cylinder 3 Rod Cap and Lower Bearings	Cylinder 4 Rod Cap and Lower Bearings
#6/TDC -60°	Install	Install	Install



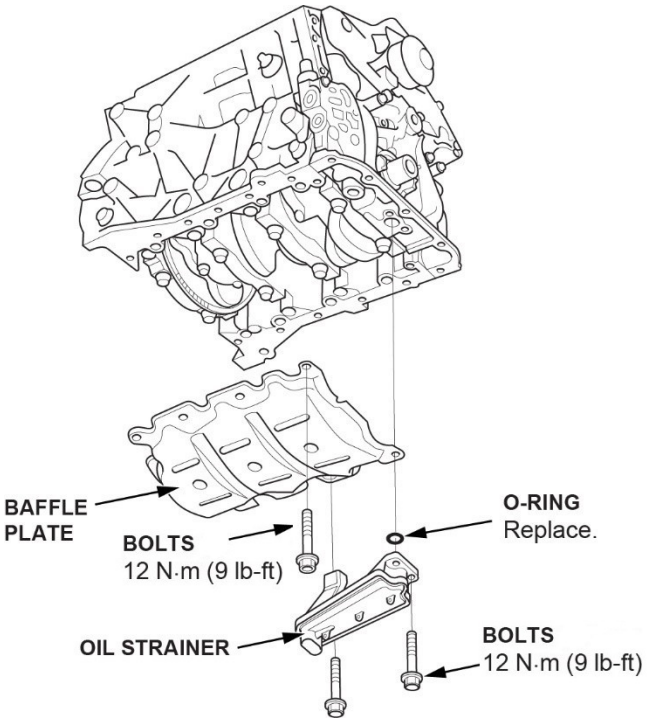
12. Remove the crank angle gauge and zip tie.
13. Lower the vehicle and remove the piston stoppers.



14. Raise the vehicle.
15. Rotate the crankshaft **360 degrees** to check for binding of rod bearings.

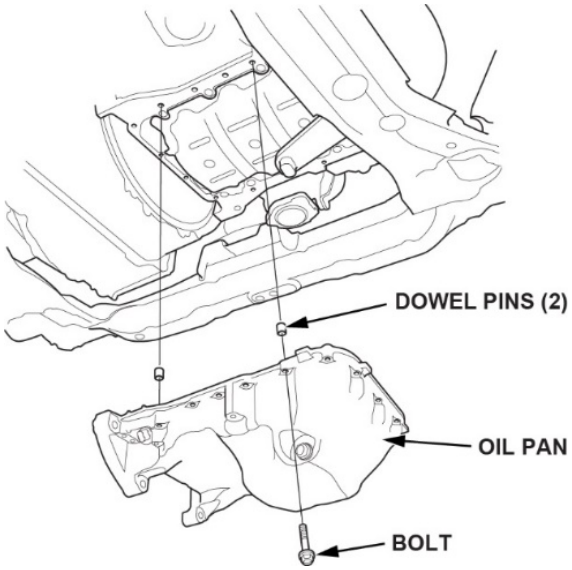


16. Install the baffle plate and oil strainer.



17. Install the engine oil pan.
    1. Remove all of the old liquid gasket from the oil pan mating surfaces, the bolts, and the bolt holes.
    2. Clean and dry the oil pan mating surfaces.
    3. Apply liquid gasket to the oil pan mating surface of the engine block and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

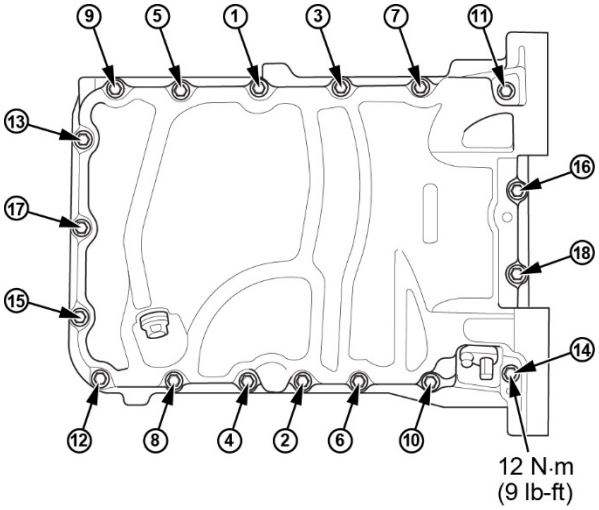
       NOTE: If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.
    4. Install the dowel pins.
    5. Install the oil pan.



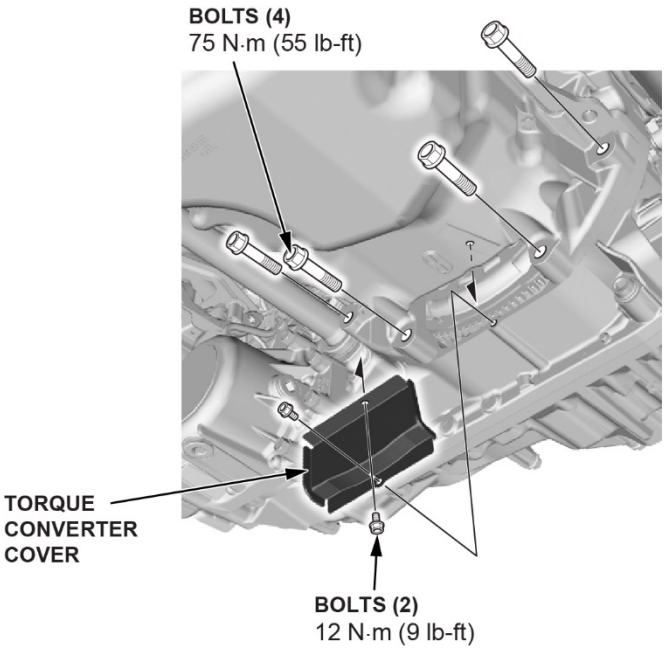
18. Tighten the bolts in **three steps**; tighten the bolts until the bolts sit on the oil pan, tighten the bolts until the gasket is compressed, torque the bolts to **12 N·m (9 lb-ft)**. Follow the sequence shown.

    NOTE:

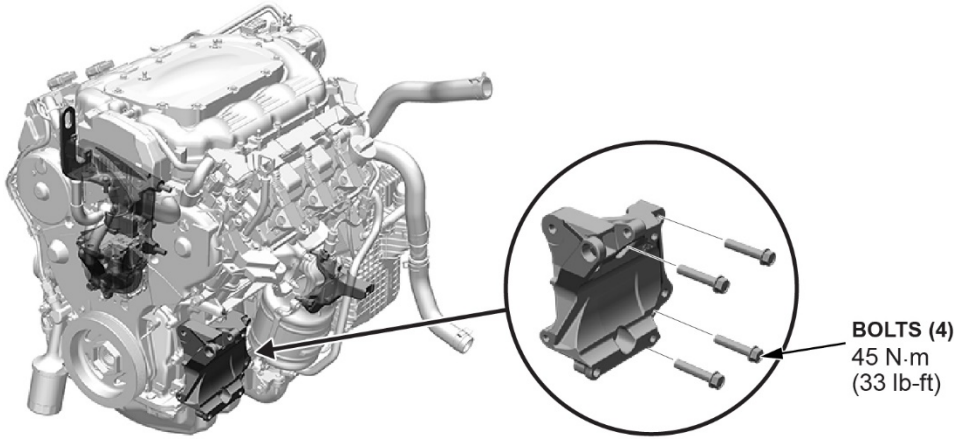
    - Wait at least **30 minutes** before filling the engine with oil.
    - Do not run the engine for at least **3 hours** after installing the oil pan.



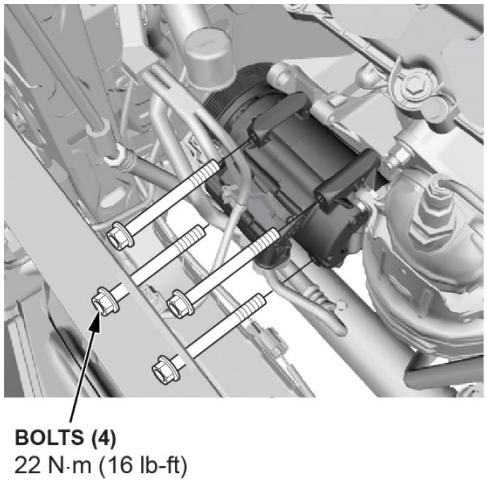
19. Install the lower transmission assembly mounting bolts and torque to **75 N·m (55 lb-ft)**, then install the torque converter cover and torque to **12 N·m (9 lb-ft)**.



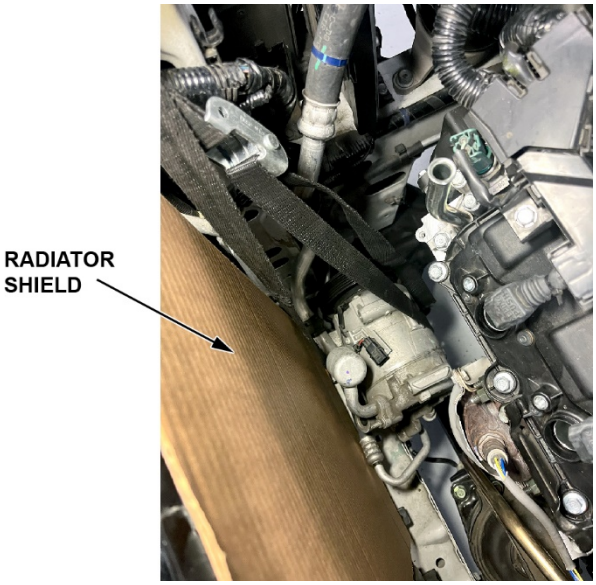
20. **INSPECTION B ONLY**: Install the A/C compressor bracket with tensioner pulley attached.



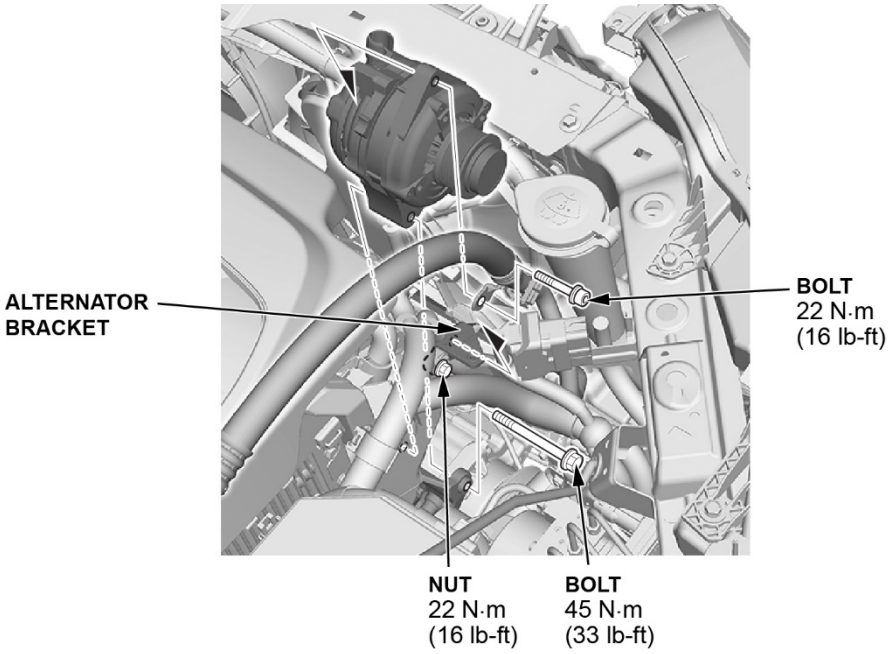
21. Lower the vehicle.
22. **INSPECTION B ONLY**: Install the A/C compressor with the upper mounting bolts.



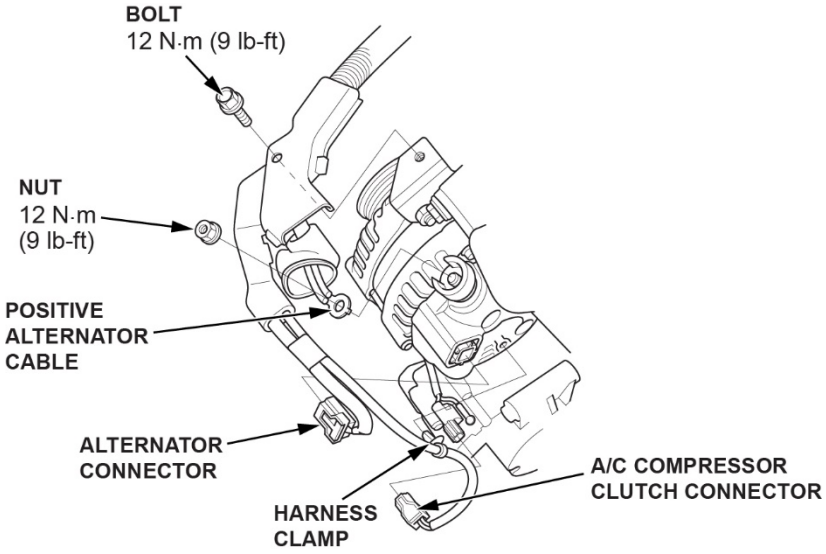
23. **INSPECTION B ONLY**: Remove the radiator shield.



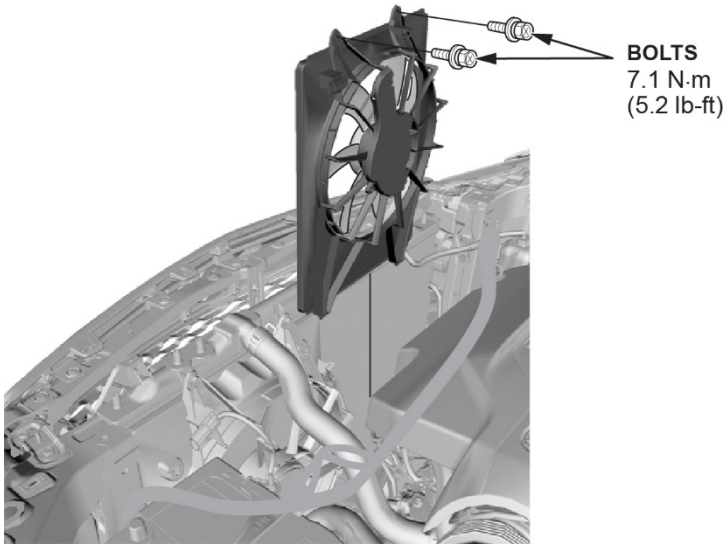
24. **INSPECTION B ONLY**: Install the alternator.



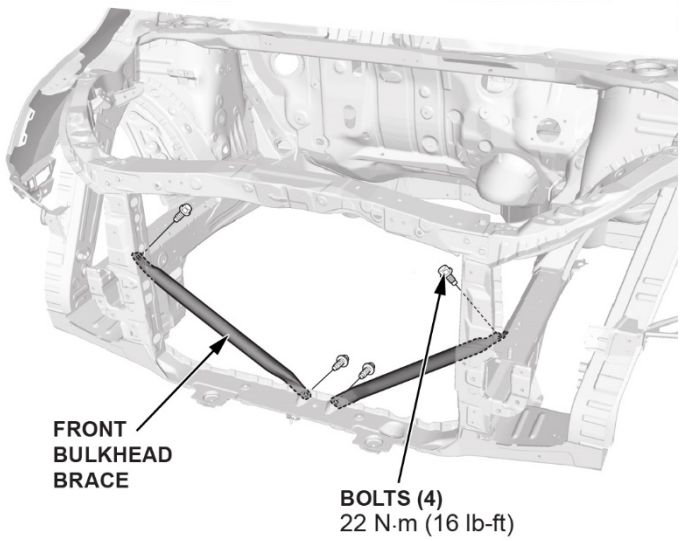
25. **INSPECTION B ONLY**: Connect the A/C compressor clutch connector, the alternator connector, and the positive alternator cable. Then install the harness clamp and bolt.



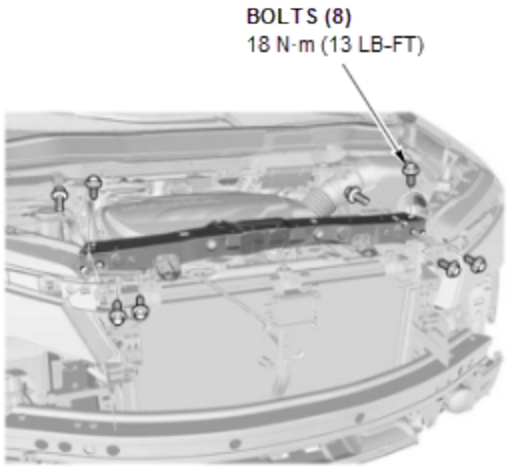
26. **INSPECTION B ONLY**: Install the condenser fan and reconnect the wiring.



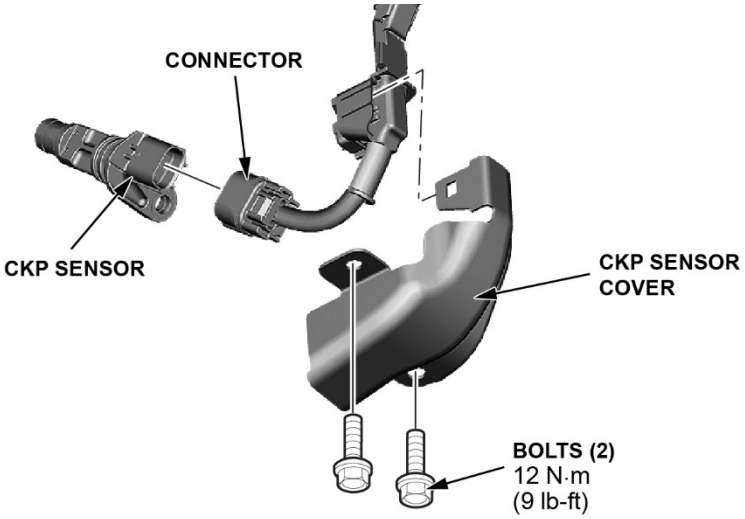
27. **INSPECTION B ONLY**: Install the passenger's side bulkhead brace and upper bolt.



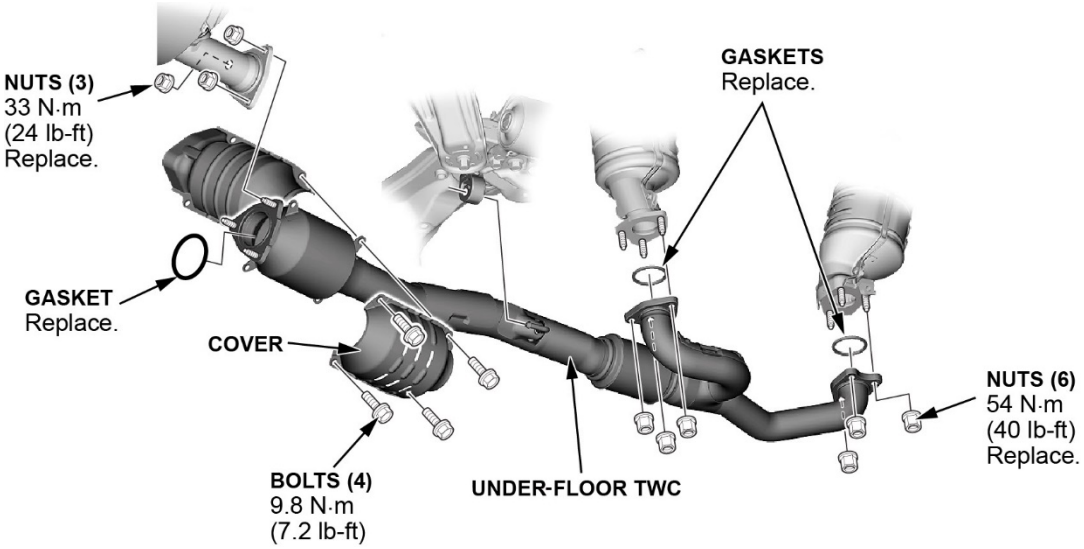
28. **INSPECTION B ONLY**: Install the bulkhead.



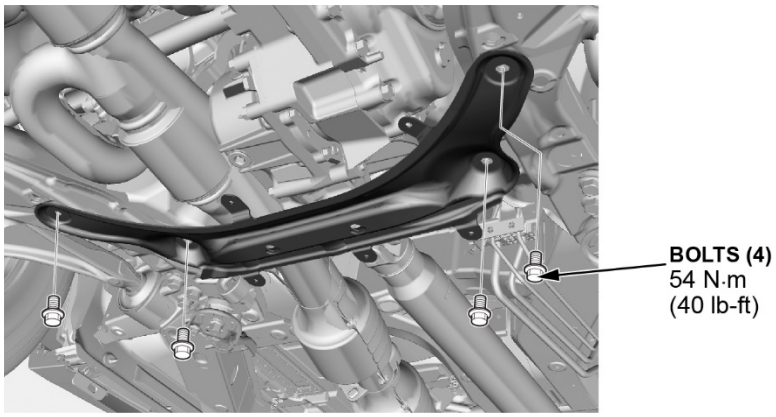
29. Raise the vehicle.
30. Reconnect the CKP sensor, then install the CKP sensor cover.



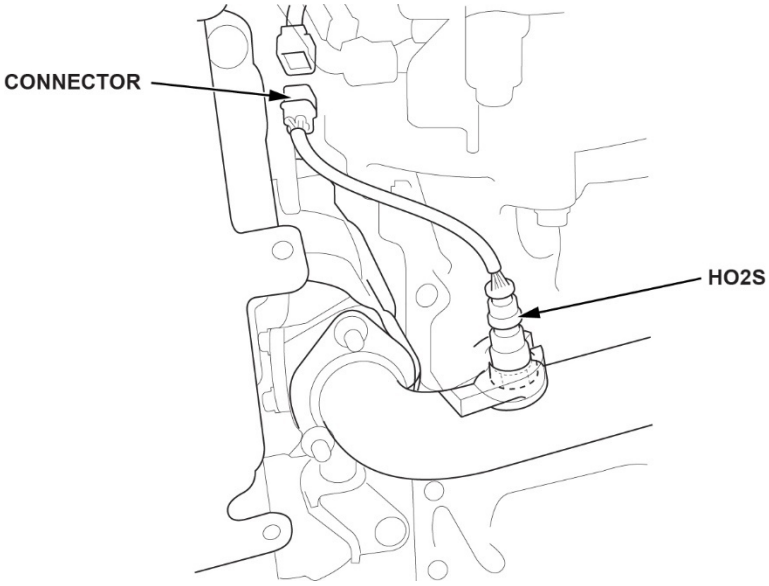
31. Install the under-floor TWC (A-pipe).



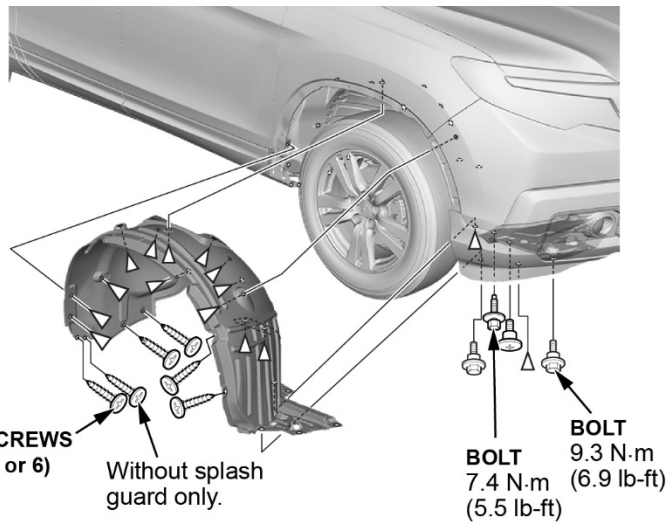
32. Install the subframe stiffener plate.



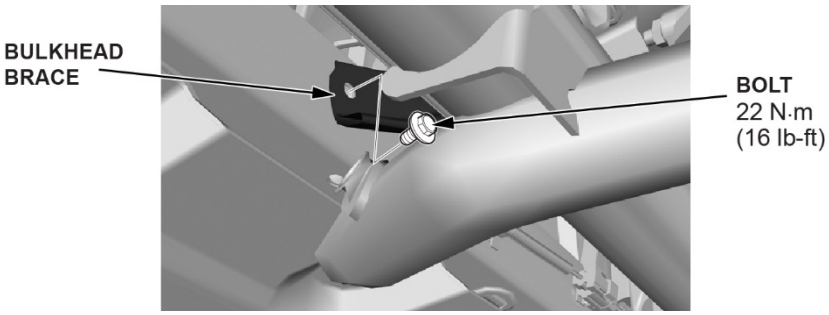
33. Reconnect the bank 2 oxygen sensor.



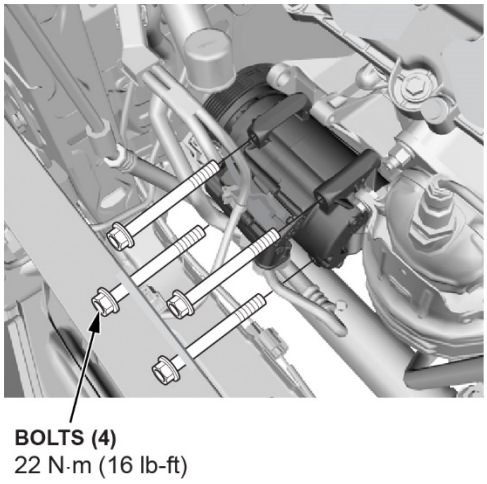
34. Install the passenger side fender liner.



35. **INSPECTION B ONLY**: Install the bulkhead brace lower bolt.



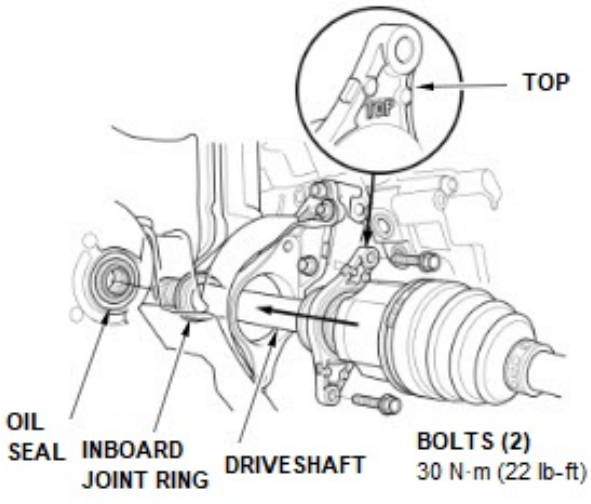
36. **INSPECTION B ONLY**: Install the lower A/C Compressor bolts and torque to **22 N·m (16lb-ft).**



37. **INSPECTION B ONLY**: Install the passenger's side driveshaft.

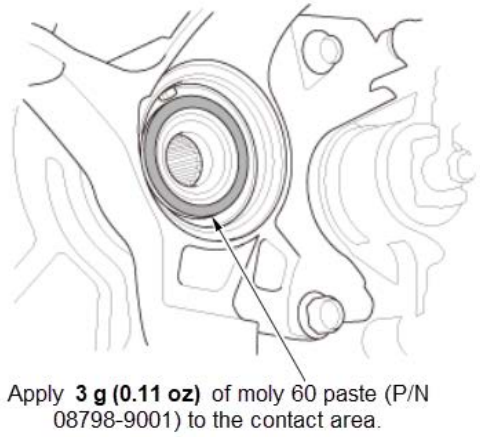
NOTE:

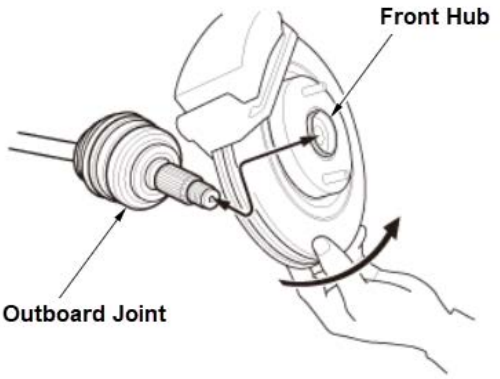
- Insert the driveshaft horizontally to prevent damaging the oil seal.
- Be careful not to damage the inboard joint ring.
- Make sure to set the TOP mark of the driveshaft bearing bracket to the upper side when you install it.



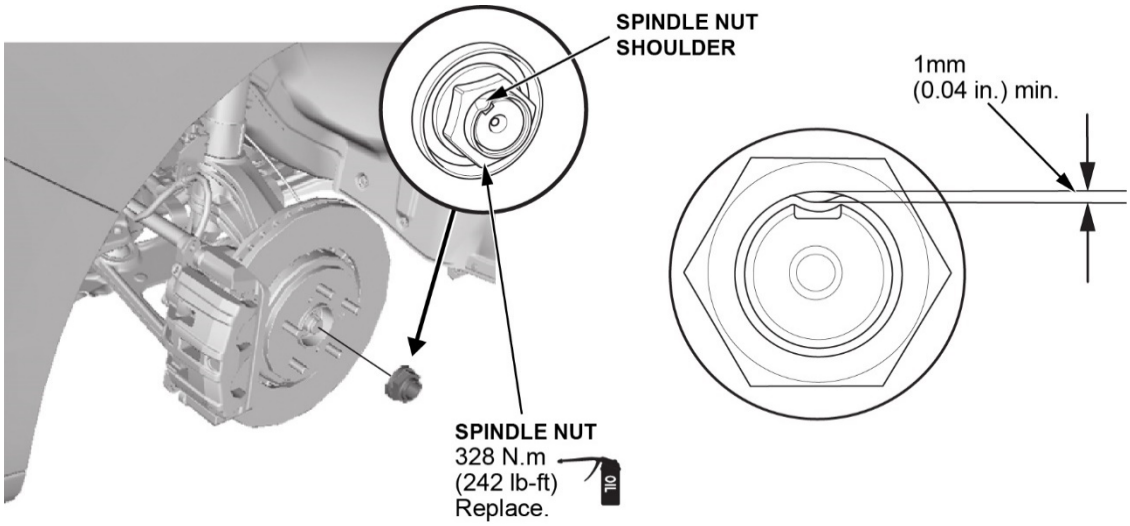
38. Connect the outboard joint.

- Apply about **3.0 g** of molybdenum grease to the contact area of the outboard joint and the front wheel bearing.
- Install the outboard joint into the front hub on the knuckle.

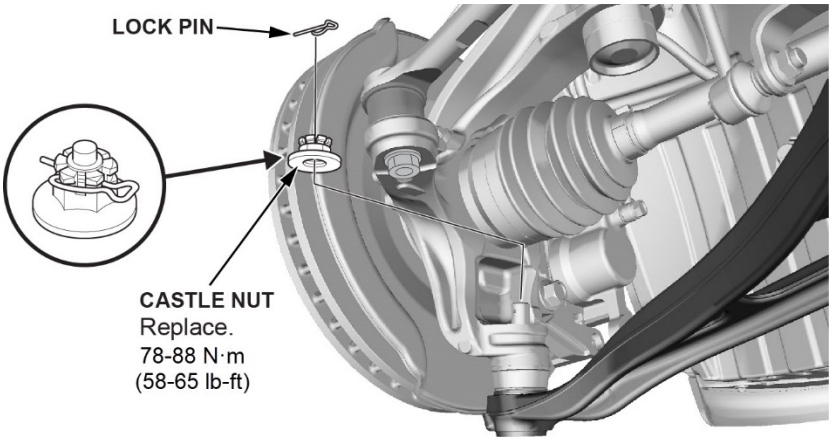




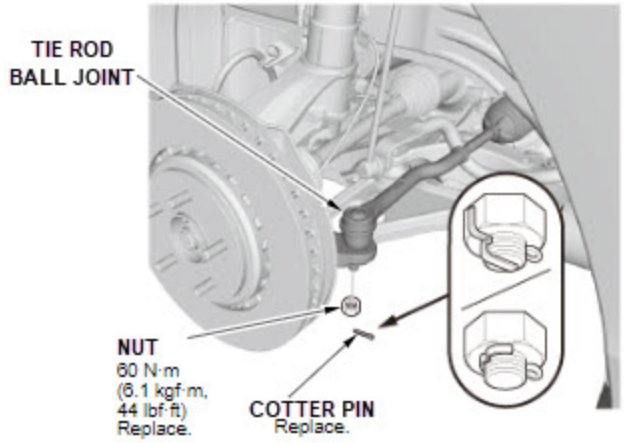
39. Install the new spindle nut.
    - Apply a small amount of engine oil to the seating surface of the new spindle nut.
    - Install the spindle nut and torque to specification.
    - Use a drift to stake the spindle nut shoulder against the driveshaft.
    - Be careful not to make a crack on the spindle nut when staking.



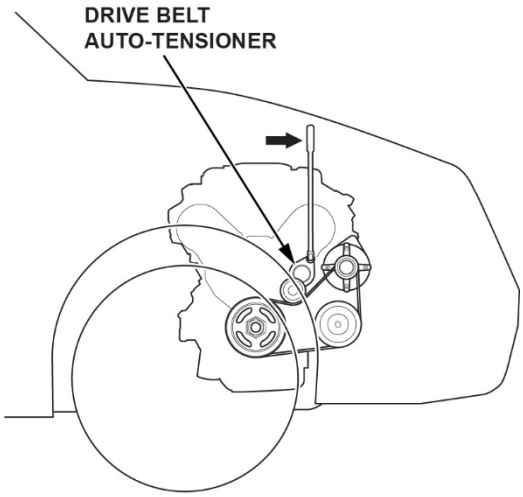
40. Connect the passenger's side lower knuckle ball joint.



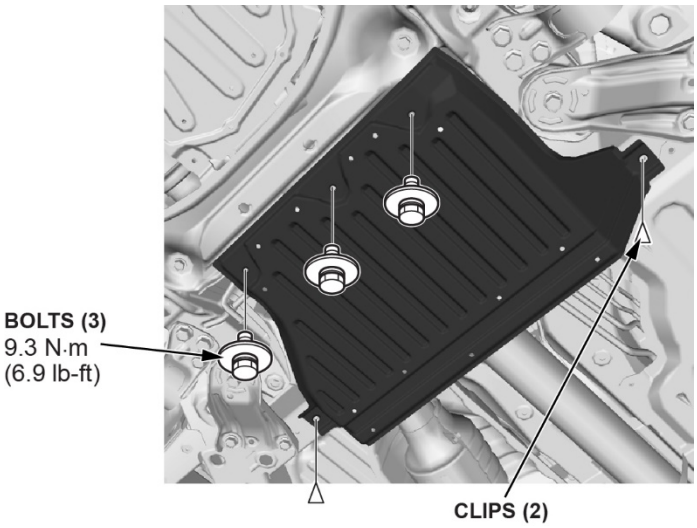
41. Connect the passenger's side tie rod ball joint.



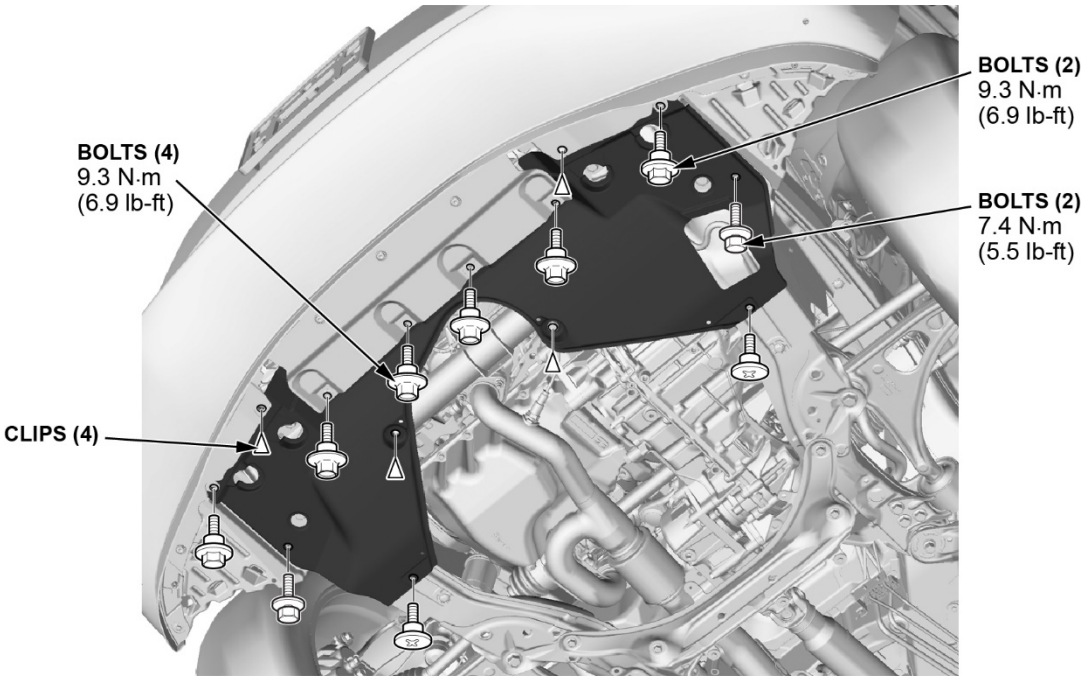
42. **INSPECTION B ONLY**: Install the drive belt.



43. Install the passenger's side front wheel. Torque wheel nuts to **127 N·m (94 lb-ft)** after installation.
44. Install the engine undercover.

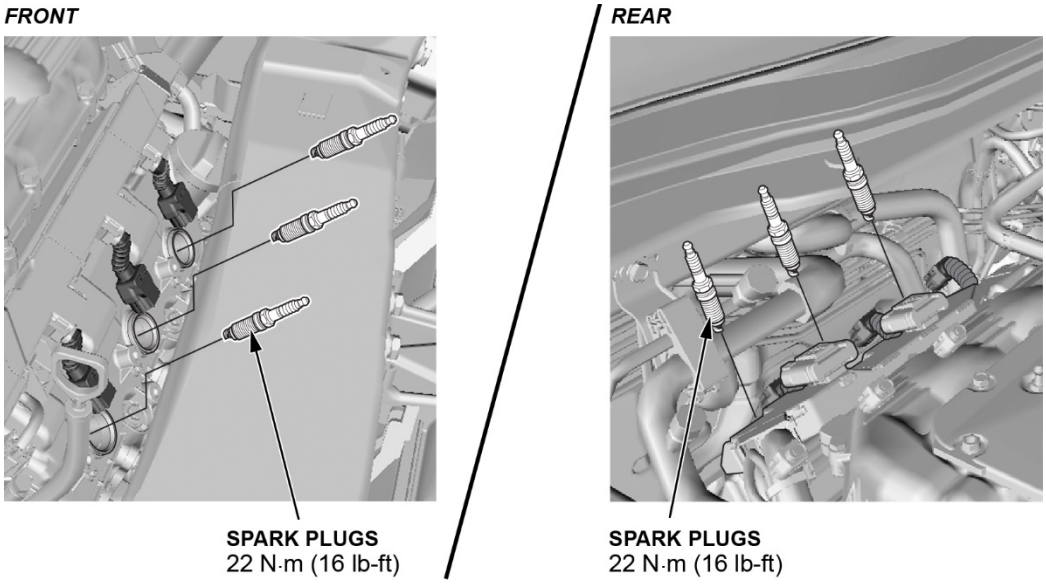


45. Install the splash shield.

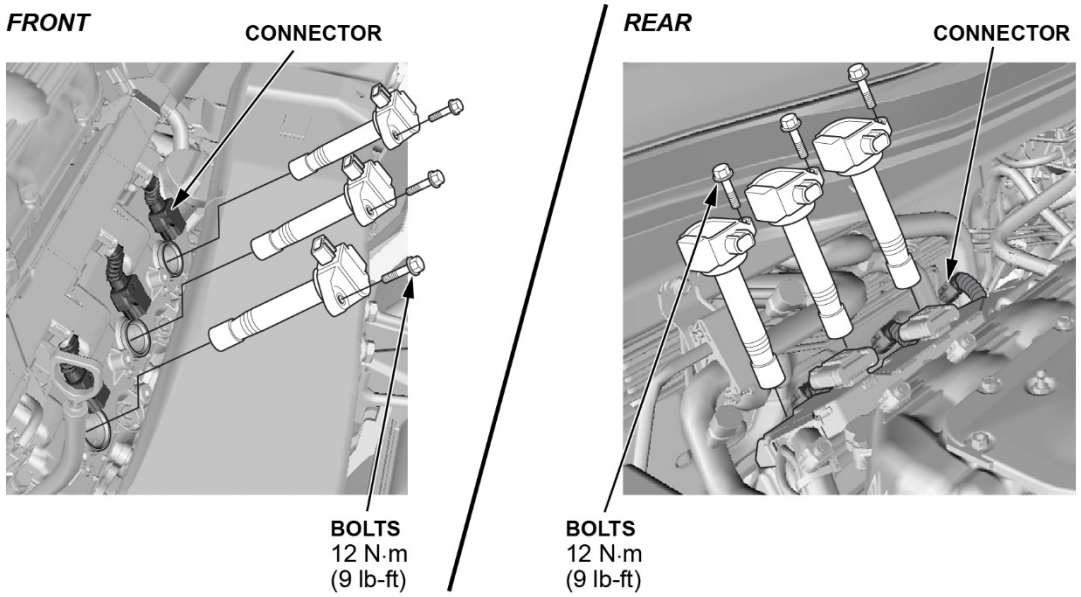


46. Lower the vehicle.

47. Install the spark plugs.



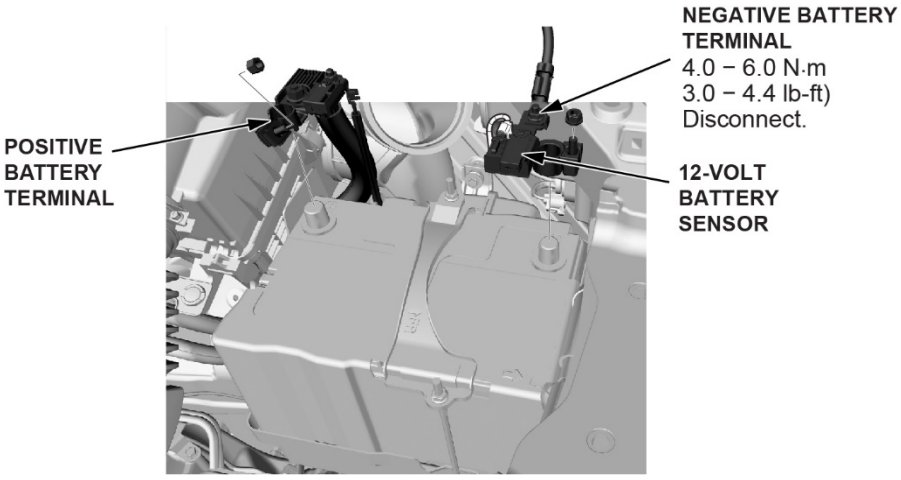
48. Install and connect the coil packs.



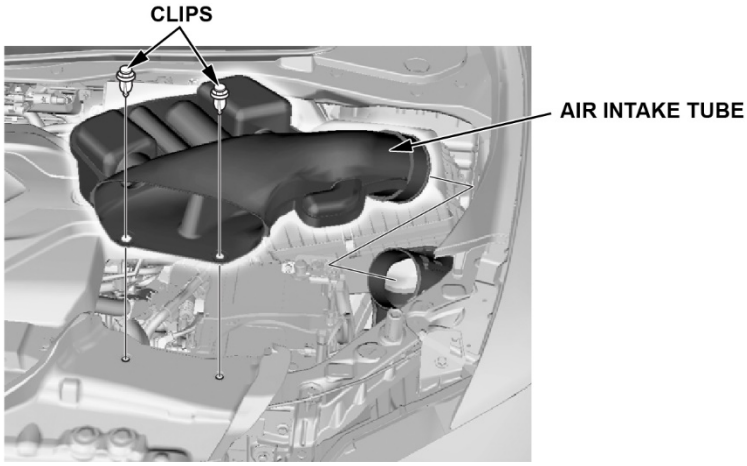
49. Install the oil dipstick.
50. Refill the engine with recommended engine oil.
    1. Install the new drain bolt washer and drain bolt and torque to 40 N·m (30 lb-ft)..
    2. Refill with engine oil.

    Capacity

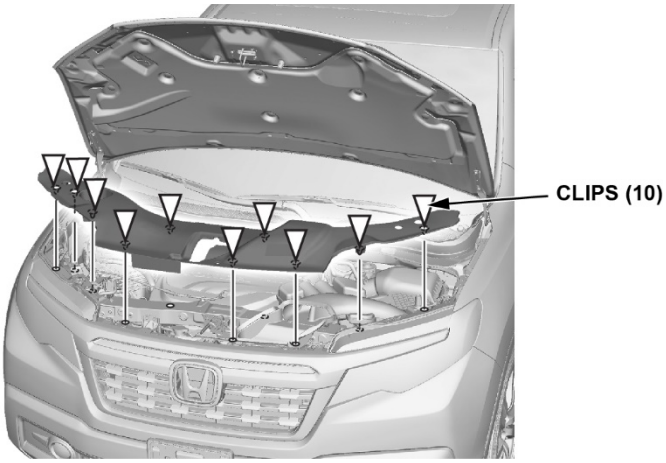
    At Oil Change – 5.1L (5.4 US qt)
51. Connect the 12-volt battery.



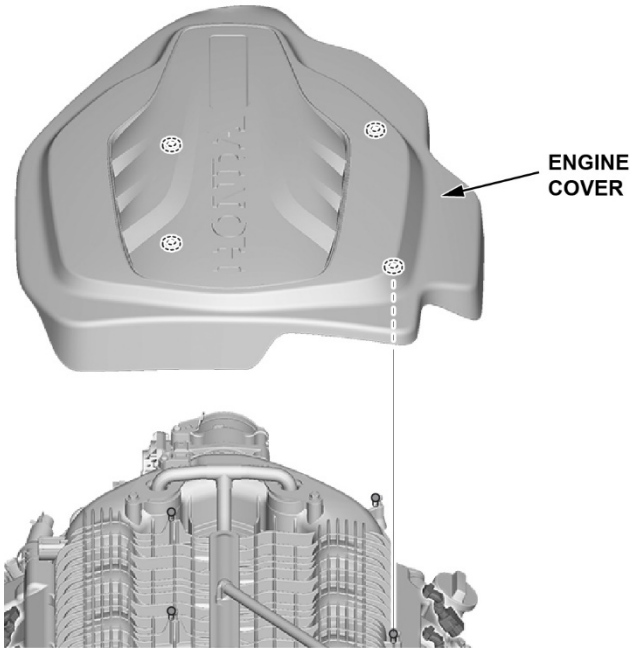
52. Install the air intake tube.



53. Install the front bulkhead cover.



54. Install the engine cover.



55. Make sure the vehicle has sat for at least **3 hours** from the time the oil pan was reinstalled.

    Note: This is to make sure the sealant on the oil pan has completely cured.

56. Connect to the i-HDS.
57. Do a PCM reset.
    1. Select the PGM-FI system with the-i-HDS.
    2. Reset the PCM with the i-HDS while the engine is stopped.
    3. Turn the vehicle to the OFF (LOCK) mode.
    4. Turn the vehicle to the ON mode and wait **30 seconds**.
    5. Turn the vehicle to the OFF (LOCK) mode and disconnect the i-HDS from the DLC.
58. Do the CKP Pattern clear and learn.
    1. Turn the vehicle to ON mode, but do not start the engine.
    2. Connect the i-HDS to the DLC located under the driver's side of the dashboard.
    3. Select CRANK PATTERN in the ADJUSTMENT MENU with the i-HDS.
    4. Select CRANK PATTERN CLEAR with the i-HDS, and clear the CKP pattern.
    5. Select CRANK PATTERN LEARNING with the i-HDS, and follow the screen prompts.
    6. Turn the vehicle to the OFF (LOCK) mode.
    7. Jump the SCS line with the i-HDS.
    8. Wait **60 seconds** and exit the SCS mode with the i-HDS.
59. Do the Idle Speed Inspection.

    NOTE: If the idle speed is not within specification, do the *PCM Idle Learn Procedure* in the service manual.

    1. Start the engine and place the vehicle in PARK or NEUTRAL.
    2. Hold the engine speed **without load** at **3,000 rpm** until the radiator fan comes on, then let it idle.
    3. Check the idle speed under no load conditions: headlights, blower fan, radiator fan, audio system, and A/C off.

       Idle Speed at No Load Should Be:

       Engine: 680 ± 50 rpm in PARK or NEUTRAL
    4. Let the engine idle for 1 minute with a high electrical load (A/C on, temperature set to max cool, blower fan on high, headlights on high beam).

       Idle speed at High Load Should Be:

       Engine: 680 ± 50 rpm in PARK or NEUTRAL

58. Do the VSA Sensor Neutral Position Memorization procedure.

    NOTE: Do not press the brake pedal during this procedure.

    1. Park the vehicle on a flat and level surface.
    2. Make sure the steering wheel is straight ahead.
    3. Select **VSA ADJUSTMENT** in the i-HDS.
    4. Select **ALL SENSORS**, and follow the screen prompts.
59. Do the Steering Angle Sensor Neutral Position.
    1. Select **EPS ADJUSTMENT** on the i-HDS.
    2. Select **EPS STEERING ANGLE SENSOR VALUE CLEAR**, and follow the screen prompts.
60. Exit the i-HDS, **REPAIR #1** is complete.

REPAIR #2 SHORT BLOCK REPLACEMENT

1. Disconnect the steering joint.
   NOTE: *Steering Joint Disconnection and Reconnection* (Click Here)
2. Remove the air intake tube and filter box.
   NOTE: Air Cleaner Removal and Installation (Click Here)
3. Disconnect and remove the 12-volt battery.
   NOTE: 12 Volt Battery Terminal Disconnection and Reconnection (Click Here)
4. Unbolt and disconnect the battery cables at the UHFB and at positive terminal.
   NOTE: Step 36, *Engine Removal and Installation* (Click Here)
5. Disconnect the shift cable at the transmission.
   NOTE: Step 6, Shift Cable Removal and Installation (Click Here)
6. Disconnect the brake booster vacuum hose and EVAP hose.
   NOTE: Step 11, *Engine Removal and Installation* (Click Here)
7. Disconnect the PCM and engine connector.
   NOTE: Step 8, *Engine Removal and Installation* (Click Here)
8. Lift the vehicle.
9. Remove the front wheels **127 N·m (94 lb-ft)**.
10. Move the driver's side fender liner as needed.
11. **AWD**-Remove the propeller shaft.
    NOTE: Propeller Shaft Removal and Installation (Click Here)
12. Drain coolant.
    NOTE: *Coolant Replacement* (Click Here)
13. Remove the transmission ground cable.
    NOTE: Step 47, *Engine Removal and Installation* (Click Here)
14. Disconnect the front and rear active mount connectors.
    NOTE: See steps 31 & 32, *Automatic Transmission Removal and Installation* (Click Here)
15. Remove the torque converter bolts.
    NOTE: *Automatic Transmission removal and Installation* (Click Here)
16. Remove the upper stabilizer link nuts.
    NOTE: *Front Stabilizer Link Removal and Installation* (Click Here)
17. Loosen the 2 lower condenser bolts.
18. **If not removed during inspection B**, remove the lower bolts for the bulkhead braces.
    NOTE: *Front Bulkhead Brace Removal and Installation* (Click Here)
19. Lower the vehicle.
20. Remove the front bulkhead.
    NOTE: *Radiator and A/C Condenser Fan, Motor, and Shroud Removal and Installation* (Click Here)

21. Disconnect the radiator and heater hoses from the engine.

    NOTE: Step 8, Water Passage Removal and Installation (Click Here)

22. Disconnect the ATF warmer lower hose on the engine side.

    NOTE: Step 5, ATF Warmer Removal and Installation (Click Here)

23. **If not removed during inspection B**, remove the bulkhead brace.

    NOTE: *Front Bulkhead Brace Removal and Installation* (Click Here)

24. Disconnect the fans and ECT, then remove the radiator **with the fans and hoses attached**.

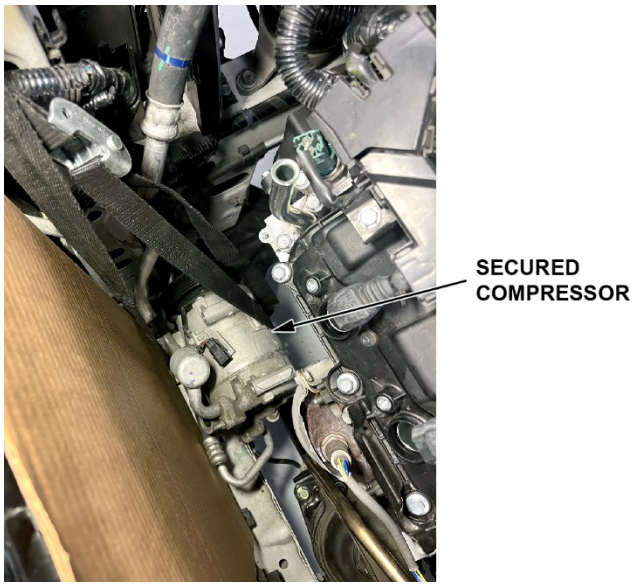
25. **If not removed during inspection B**, remove the accessory drive belt.

    NOTE: *Drive Belt Removal, Installation, and Inspection* (Click Here)

26. **If not removed during inspection B**, disconnect and remove the alternator.

    NOTE: *Alternator Removal and Installation* (Click Here)

27. **If not removed during inspection B**, Unbolt the A/C compressor and move it forward to rest on the core support, leaving the lines attached.



28. Disconnect the ATF cooler lines from the transmission (if AWD).

    NOTE*: ATF Hose Removal and Installation* (Click Here)

29. Unbolt the side engine mount bracket.

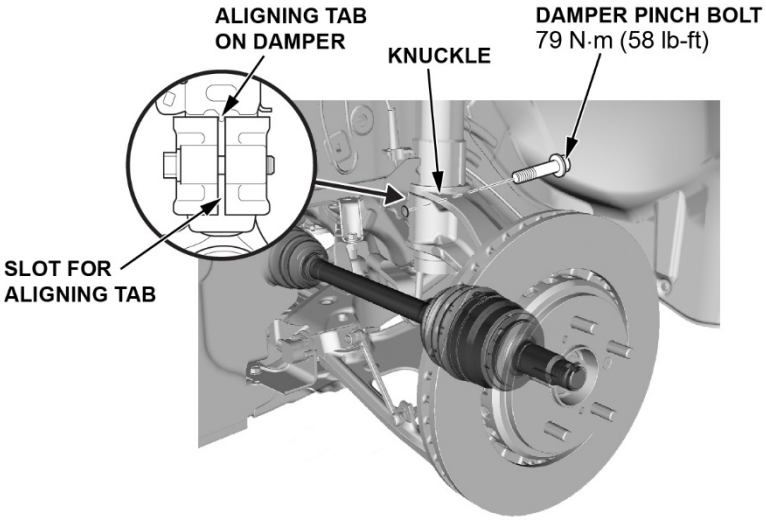
    NOTE: *Side Engine Mount Removal and installation* (Click Here)

30. Disconnect the fuel line at the high-pressure fuel pump.

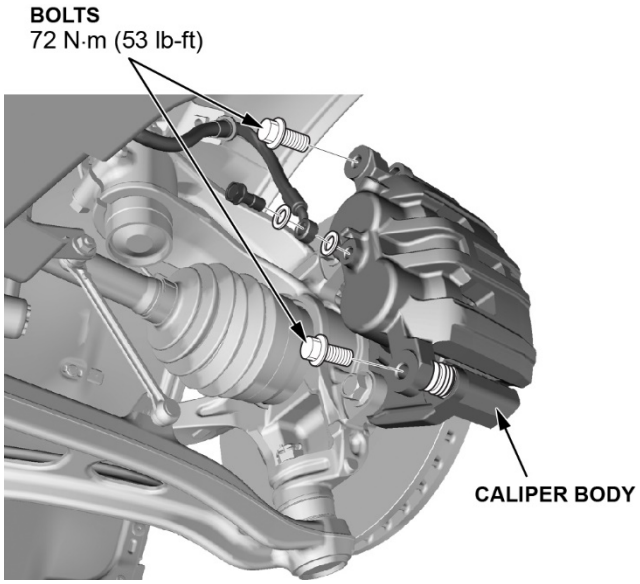
    NOTE:

    - *Fuel Line/Quick-Connect Fitting Precautions* (Click Here)
    - *Steps 4-5, High Pressure Fuel Pump Removal and Installation (Click Here)*

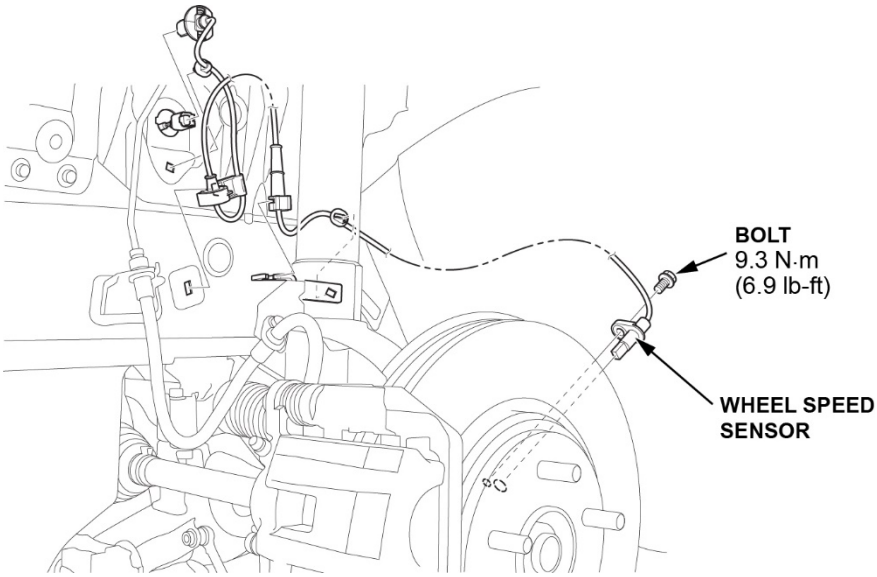
31. Raise the vehicle to waist height.
32. Remove the pinch bolt for the knuckle and damper (both sides).



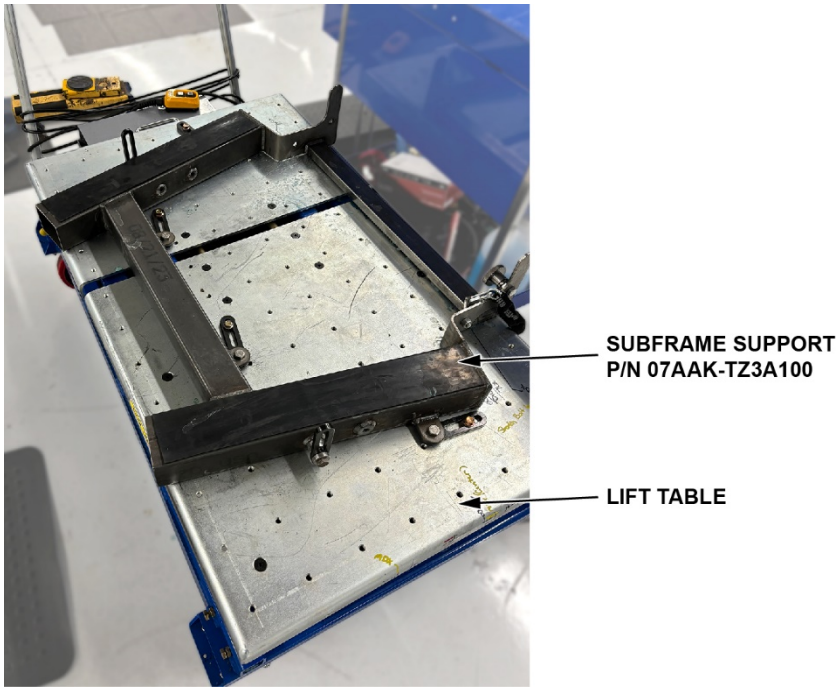
33. Leaving the brake line attached, unbolt the brake caliper at the bracket and hang it on the spring with an S-hook (both sides).



34. Remove the wheel speed sensor from the knuckle.



35. Set the lift table under the subframe with the subframe attachment.



36. Raise the lift table until it contacts the subframe.
37. Unbolt the subframe.

    NOTE: *Subframe Removal and Installation* (Click Here)
38. Lower the lift table with the subframe, engine, knuckles, and transmission assemblies.

    NOTE: Lower the table and/or raise the vehicle to clear the powertrain from the chassis.
39. Remove the rear (bank 1) catalytic converter.

    NOTE: Step 8, *Warm Up TWC Removal and Installation* (Click Here)

40. **If not removed during inspection B**, remove the passenger's side axle nut.
41. **If not removed during inspection B,** remove the passenger's side driveshaft with the intermediate shaft as an assembly.

    NOTE: Steps 7-8, *Front Driveshaft Removal and Installation* (Click Here)
42. Remove the driveshaft support base.

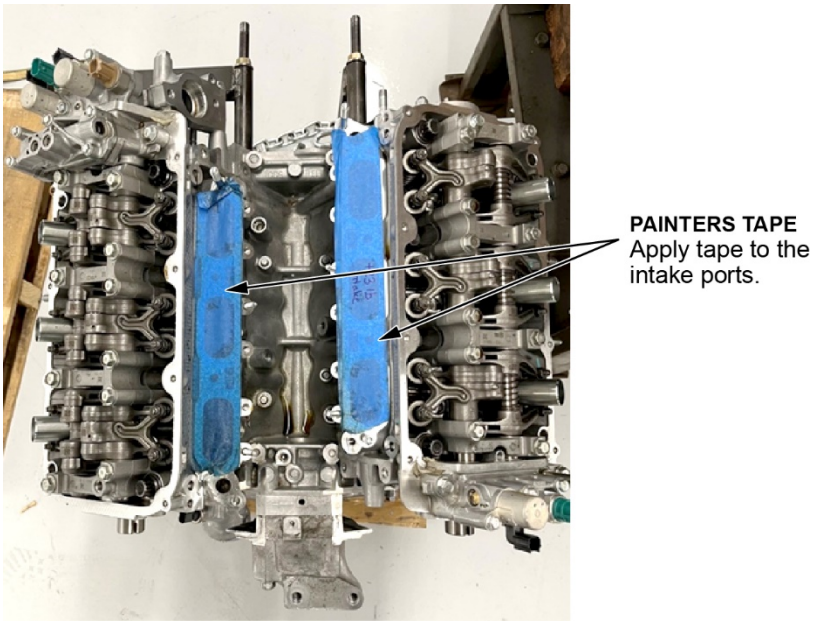
    NOTE: Step 9, *Front Driveshaft Removal and Installation* (Click Here)
43. Unbolt the EGR pipe from the coolant crossover pipe.

    NOTE: *EGR Pipe Removal and Installation* (Click Here)
44. Remove front bank catalytic converter with the EGR pipe attached.

    NOTE: Step 7, *Warm Up TWC Removal and Installation* (Click Here)
45. Remove the Injector Control Module from the original engine.

    NOTE: *Injector Control Module Removal and Installation* (Click Here)
46. Remove the intake manifold, then remove the intake manifold base.

    NOTE: *Intake Manifold Removal and Installation* (Click Here)
47. Disconnect the engine harness from the engine side sensors and coils, then separate it from the engine and lay it over the transmission.
48. Cover the intake ports with painter's tape.



49. Remove the fuel joint pipe (do not reuse), then remove the high-pressure fuel pump.

    NOTE: Step 4, *High Pressure Fuel Pump Removal and Installation* (Click Here)
50. **If new cylinder heads are being installed based on direction from the Bearing Inspection Team**, disconnect the fuel rail pressure sensor, then remove the fuel rails with the injectors attached.

    NOTE:

    - If the original heads are not being replaced, do not remove the fuel rails.
    - *Injector Removal and Installation* (Click Here)
51. Disconnect and remove the starter.

    NOTE: *Starter Removal, Installation, and Test* (Click Here)
52. Remove the CKP sensor with a new O-ring.

    NOTE: *CKP Sensor Removal and Installation* (Click Here)

53. Remove the water passage with EGR valve and the coolant connecting pipe.

    NOTE: *Water Passage Removal and Installation* (Click Here)

54. Remove the injector control module bracket.

    NOTE: Step 13, *Cylinder Head Removal and Installation* (Click Here)

55. Remove the injector sub-harness with the knock sensors.

    NOTE: *Knock Sensor 1 (Bank 1) and Knock Sensor 2 (Bank 2) Removal and Installation* (Click Here)

56. Remove the cylinder head covers.

    NOTE: *Cylinder Head Cover Removal and Installation* (Click Here)

57. Remove the crankshaft pulley.

    NOTE: *Crankshaft Pulley Removal and Installation* (Click Here)

58. Remove the timing belt covers, timing belt, and idler pulley.

    NOTE: *Timing Belt Removal, Installation, and Inspection* (Click Here)

59. Remove the lower half of the side engine mount bracket from the old engine. Transfer the foam insulator from the original bracket to the new bracket (if applicable).

    NOTE: *Timing Belt Removal, Installation, and Inspection* (Click Here)

60. Remove the Timing Belt Drive Pulley.

    NOTE: *Timing Belt Drive Pulley Removal and Installation* (Click Here)

61. Remove the timing belt auto-tensioner and compress the tensioner to install the locking pin.

    NOTE: *Timing Belt Auto-Tensioner Removal and Installation* (Click Here)

62. Remove the timing belt adjuster and collar.

    NOTE: *Timing Belt Adjuster Removal and Installation*. (Click Here)

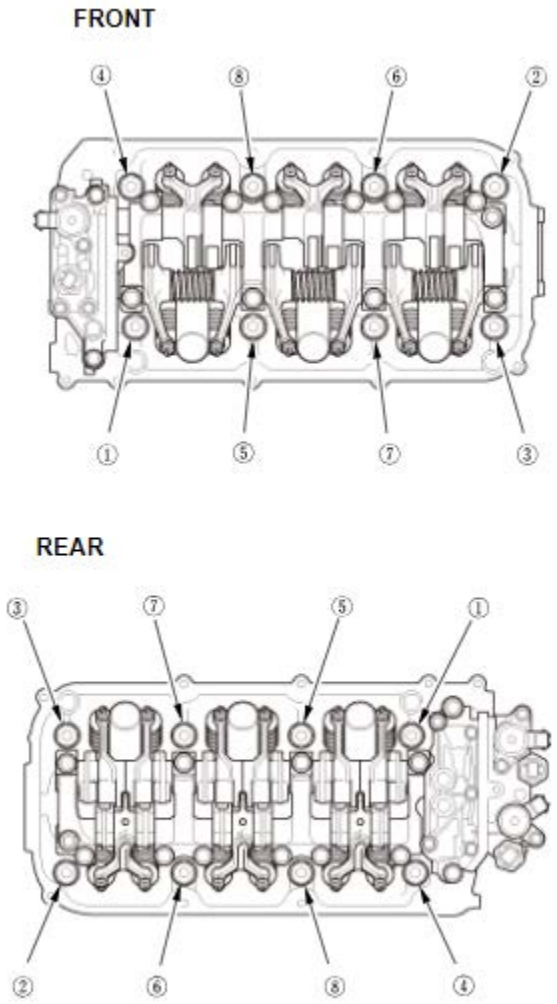
63. Remove the camshaft pulleys and camshaft pulley back covers.

    NOTE: *Camshaft Pulley Removal and Installation* (Click Here)

64. **If new cylinder heads are being installed, use new bolts and skip this step**. Remove the cylinder head bolts and measure for stretch.

    NOTE:

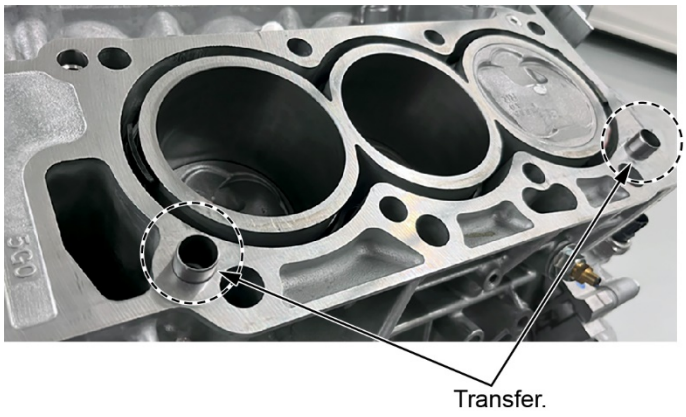
    - To prevent warpage, loosen the bolts in sequence 1/3 turn at a time. Repeat until all bolts are loosened.
    - *Cylinder Head Removal and Installation* (Click Here)



65. **If new cylinder heads are being installed, skip this step** Lift the heads off the original engine block.

66. Mount the new engine block assembly to an engine stand.

67. Transfer the dowel pins to the new engine block.



68. Position a new head gasket on the new engine block.

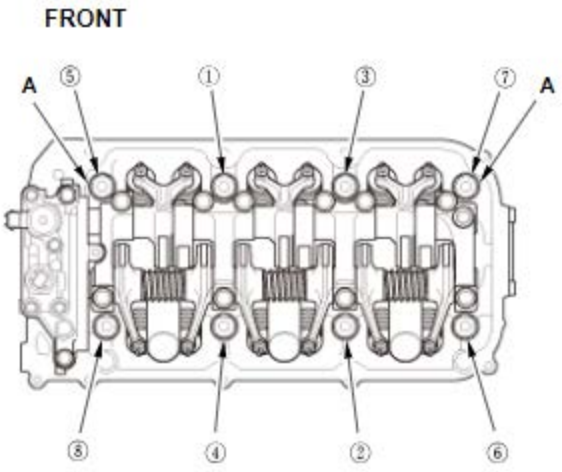
69. Set the cylinder heads on the new head gasket. (Original or new cylinder heads is based on direction from the Bearing Inspection Team.)

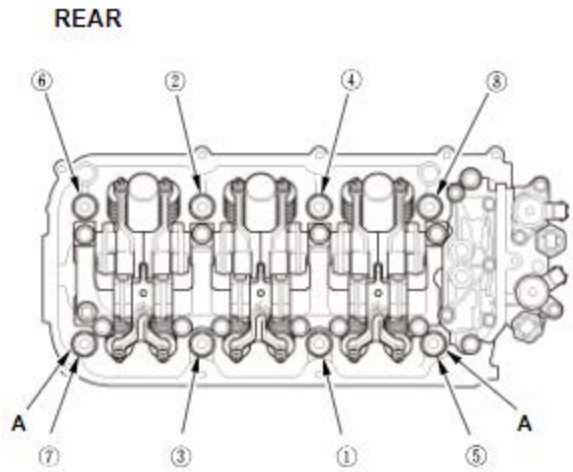
70. Coat the cylinder head bolts in new engine oil and install by hand.

71. Torque the cylinder head bolts to specification.

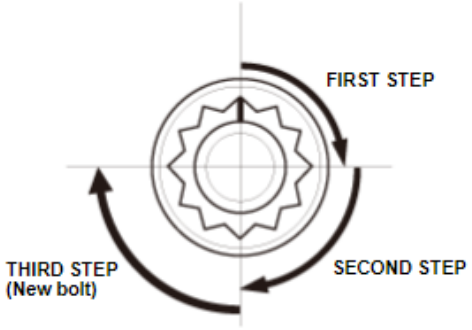
    NOTE:

    - Torque the cylinder head bolts in sequence to 30 N·m (22 lb-ft) using a beam-type torque wrench.
    - When using a preset click-type torque wrench, be sure to tighten slowly and do not overtighten.
    - If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.
    - Be sure to install the 188 mm long head bolt (A) in the location shown.





72. After torquing, tighten all the cylinder head bolts in steps:
    1. Tighten each bolt 90° using the sequence shown above.
    2. Tighten each bolt an additional 90° using the sequence shown above.
    3. **If new head bolts are being installed**, tighten an additional 90° using the sequence shown above.

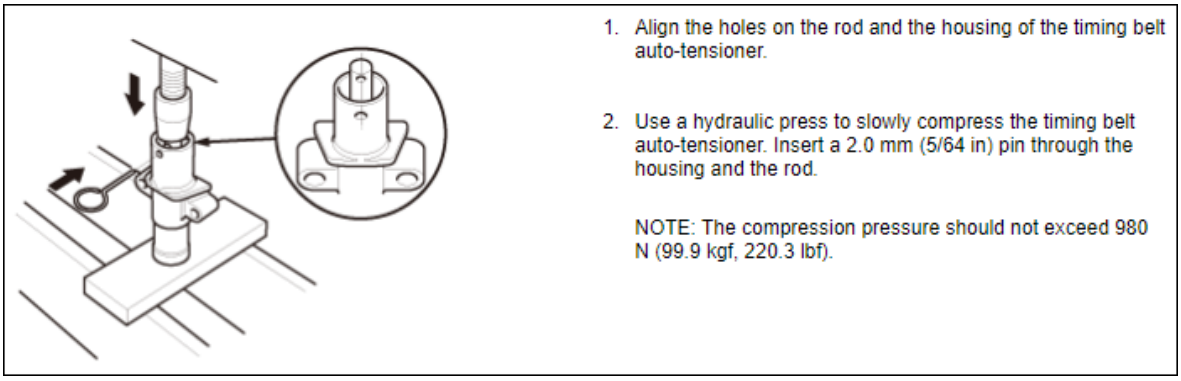


73. Install the camshaft pulley back covers and camshaft pulleys onto new cylinder heads, if cylinder heads are being replaced..

    NOTE: *Camshaft Pulley Removal and Installation* (Click Here)

74. Install the timing belt auto-tensioner (Make sure the tensioner has been reset before installation).

    NOTE: *Timing Belt Auto-Tensioner Removal and Installation* (Click Here)



1. Align the holes on the rod and the housing of the timing belt auto-tensioner.
2. Use a hydraulic press to slowly compress the timing belt auto-tensioner. Insert a 2.0 mm (5/64 in) pin through the housing and the rod.

   NOTE: The compression pressure should not exceed 980 N (99.9 kgf, 220.3 lbf).

75. Install the timing belt drive pulley and key.

    NOTE: *Timing Belt Drive Pulley Removal and Installation* (Click Here)

76. Install the timing belt adjuster pulley and collar.

    NOTE: *Timing Belt Adjuster Removal and Installation* (Click Here)

77. Install the timing belt idler pulley and timing belt.

    NOTE: *Timing Belt Removal, Installation, and Inspection* (Click Here)

78. Install the lower half of the side engine mount bracket.

    NOTE: *Timing Belt Removal, Installation, and Inspection* (Click Here)

79. Install the timing belt guide plate and timing belt covers.

    NOTE: *Timing Belt Removal, Installation, and Inspection* (Click Here)

80. Install the crankshaft pulley.

    NOTE:

    - Torque to **65 N·m (48 lb-ft)**
    - Tighten an **additional 60°**
    - *Crankshaft Pulley Removal and Installation* (Click Here)

81. Check the valve clearance.

    NOTE: *Valve Clearance Adjustment* (Click Here)

82. Inspect the cylinder head cover gaskets and spark plug tube seals and replace as needed. Install the cylinder head covers.

    NOTE: *Cylinder Head Cover Removal and Installation* (Click Here)

83. Install the spark plugs and ignition coils.

    NOTE: *Ignition Coil and Spark Plug Removal and Installation* (Click Here)

84. Transfer the A/C compressor bracket to the new engine block and torque bolts to **45 N·m (33 lb-ft)**.

    NOTE: *Engine Removal and Installation* (Click Here)

85. Install the knock sensors and position the injector sub-harness.

    NOTE: *Knock Sensor 1 (Bank 1) and Knock Sensor 2 (Bank 2) Removal and Installation* (Click Here)

86. Secure the injector harness and torque the harness holder bolts to **12 N·m (9 lb-ft),** then install the injector control module bracket and torque the mounting bolts to **22 N·m (16 lb-ft).**

    NOTE: *Cylinder Head Removal and Installation* (Click Here)

87. Install the coolant connecting pipe with new O-rings.

    NOTE: *Water Passage Removal and Installation* (Click Here)

88. Install the valley seal.

89. **Only if new cylinder heads are being installed**, remove the fuel injectors from the fuel rails and replace the fuel injector seals and O-rings, then reinstall the fuel injectors into the fuel rails with new injector clips.

    NOTE: *Injector Removal and Installation* (Click Here)

90. **Only if new cylinder heads are being installed**, Install the fuel injector/fuel rail assemblies on the new cylinder heads.

    NOTE: *Injector Removal and Installation* (Click Here)

91. Install the water passage with new gaskets.

    NOTE: *Water Passage Removal and Installation* (Click Here)

92. Install the high-pressure fuel pump and new joint pipe, then install the fuel pump cover.

    NOTE: *High Pressure Fuel Pump Removal and Installation* (Click Here)

93. Install the spark plugs and ignition coils.

    NOTE: Ignition Coil and Spark Plug Removal and Installation (Click Here)

94. Install the engine support bracket to the original engine.

95. Remove the rear engine mount stopper. Loosen the upper bolt and the 4 bolts on the engine mount bracket.

    NOTE: See Installation step 1, *Engine Removal and Installation* (Click Here)

96. Attach the engine hoist to the engine support bracket, then raise the hoist enough to take the weight off the front and rear engine mounts.

97. Unbolt the front engine mount and bracket.

    NOTE: See Installation step 1, *Engine Removal and Installation* (Click Here)

98. Lift the engine and slowly separate the engine from the transmission.

    NOTE: Make sure the torque converter stays on the transmission.

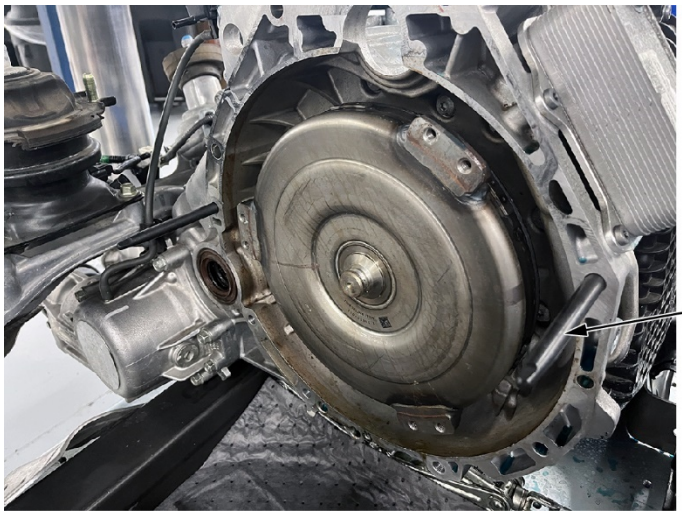
99. Transfer the drive plate from the original engine to the new engine.

    NOTE: *Drive Plate Removal and Installation* (Click Here)

100. The original engine is no longer needed.

101. Install the engine support hanger to the new engine.

102. Install the transmission alignment pins into the transmission housing, one on either side of the transmission housing to guide the engine.



103. Mate the new engine to the transmission and install the mounting bolts.

    NOTE:

    - Install 2 new upper mounting bolts until snug.
    - Install 2 lower transmission bolts until snug.
    - Remove the transmission alignment pins.
    - Install the remaining transmission mounting bolts.
    - Torque the transmission mounting bolts to specification:
        - Upper transmission mounting bolts - **64 N·m (47 lb-ft).**
        - Lower transmission mounting bolts – **75 N·m (55 lb-ft)**.

104. Install the rear engine mount.

    NOTE: *Rear Engine Mount Removal and Installation* (Click Here)

105. Install the starter.

    NOTE: *Starter Removal, Installation, and Performance Test* (Click Here)

106. Install the transmission warmer hoses.

    NOTE: *ATF Warmer Removal and Installation* (Click Here)

107. Install the bracket on the transmission for the harness.
108. Lay the engine harness over the engine, then connect to the sensors and coils.
109. Install the harness brackets to bank 1 and bank 2 cylinder head covers.
110. Install the front (bank 2) warm up catalyst with the EGR pipe.

    NOTE: *Warm Up TWC Removal and Installation* (Click Here)

111. Install the front driveshaft support base.

    NOTE: *Front Driveshaft Removal and Installation* (Click Here)

112. Install the rear (bank 1) warm up catalyst.

    NOTE: *Warm Up TWC Removal and Installation* (Click Here)

113. Install the front and rear engine mount stops.

    NOTE:

    - *Front Engine Mount Removal and Installation* (Click Here)
    - *Rear Engine Mount Removal and Installation* (Click Here)

114. Install the intake manifold base.

    NOTE:

    - Tighten the bolts in 3 steps:
        1. Tighten the bolts/nuts until the bolts/nuts sit on the intake manifold base.
        2. Tighten the bolts/nuts until the gasket is compressed.
        3. Tighten the bolts/nuts to **22 N·m (16 lb-ft).**
    - Always use new gaskets.
    - *Intake Manifold Removal and Installation* (Click Here)

115. Install the injector control module.

    NOTE: Injector Control Module Removal and Installation (Click Here)

116. Install intake manifold with new gaskets and seals.

    NOTE:

    - Tighten the bolts in 3 steps:
        1. Tighten the bolts/nuts until the bolts/nuts sit on the intake manifold base.
        2. Tighten the bolts/nuts until the gasket is compressed.
        3. Tighten the bolts/nuts to **22 N·m (16 lb-ft).**
    - Always use new gaskets.
    - *Intake Manifold Removal and Installation* (Click Here)

117. Reinstall the remaining parts in the reverse order of removal.
118. Refill the engine with recommended engine oil.
    1. Install the new drain bolt washer and drain bolt and torque to 40 N·m (30 lb-ft).
    2. Refill with engine oil.

    Capacity

    At Oil Change with Filter: 5.4L (5.7 US qt)

119. Refill the engine with coolant.

    Capacity

    After Engine Overhaul: 8.9L (2.35 US gal)

120. Do the PCM reset.

    NOTE: *PCM Reset* (Click Here)

121. Do the CKP Pattern Learn

    NOTE: *CKP Pattern Clear/CKP Pattern Learn Procedure* (Click Here)

122. Do the Idle Speed Inspection

    NOTE: *Idle Speed Inspection* (Click Here)

123. Do the Ignition Timing Inspection

    NOTE*: Ignition Timing Inspection* (Click Here)

124. Do the wheel alignment check.

    NOTE: *Wheel Alignment* (Click Here)

125. Do the Steering Angle Sensor Neutral Position Clear.

    NOTE: *Steering Angle Sensor Neutral Position Clear* (Click Here)