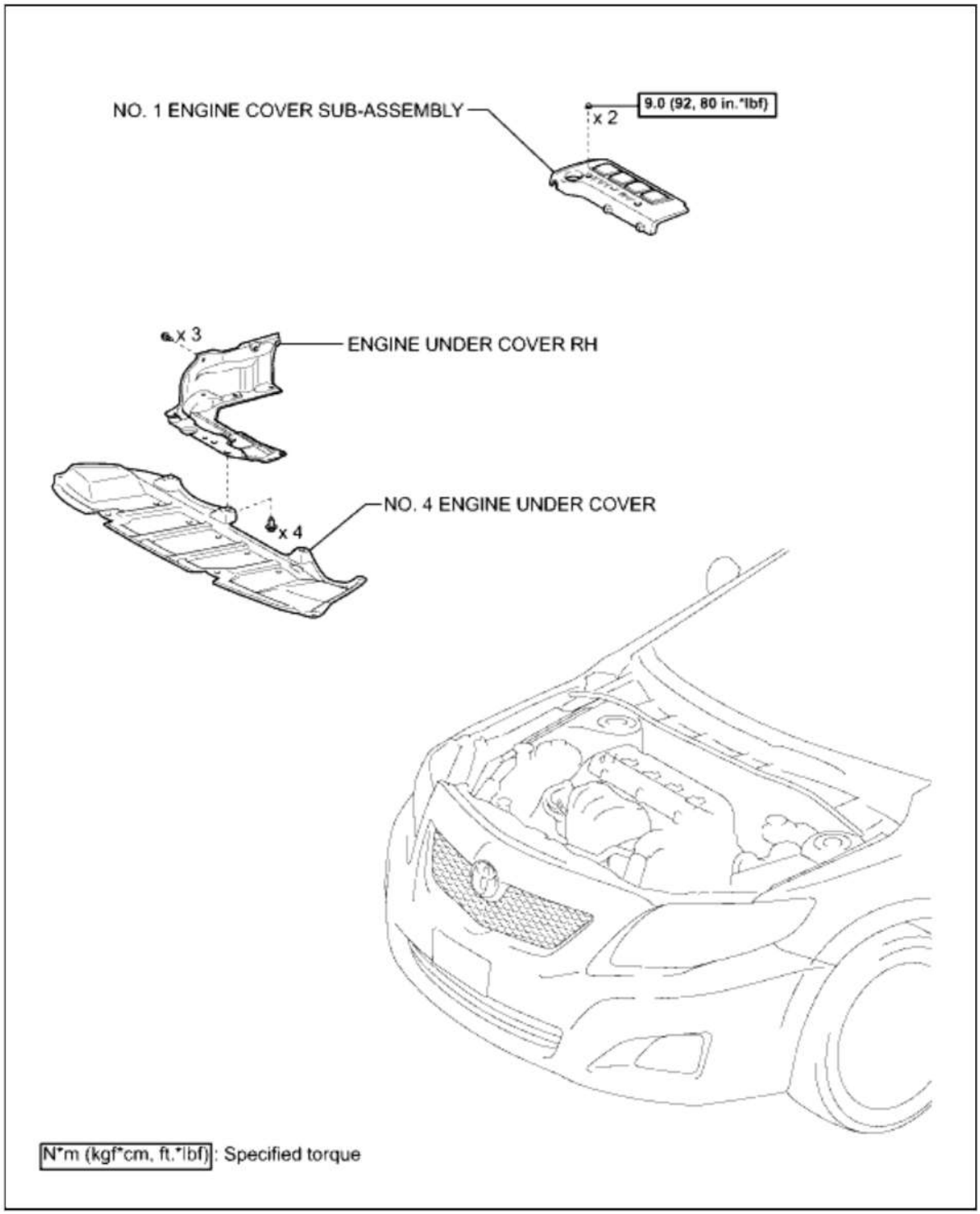
Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000032YD008X
Title: 2AZ-FE ENGINE MECHANICAL: CAMSHAFT: COMPONENTS (2010 Corolla)		

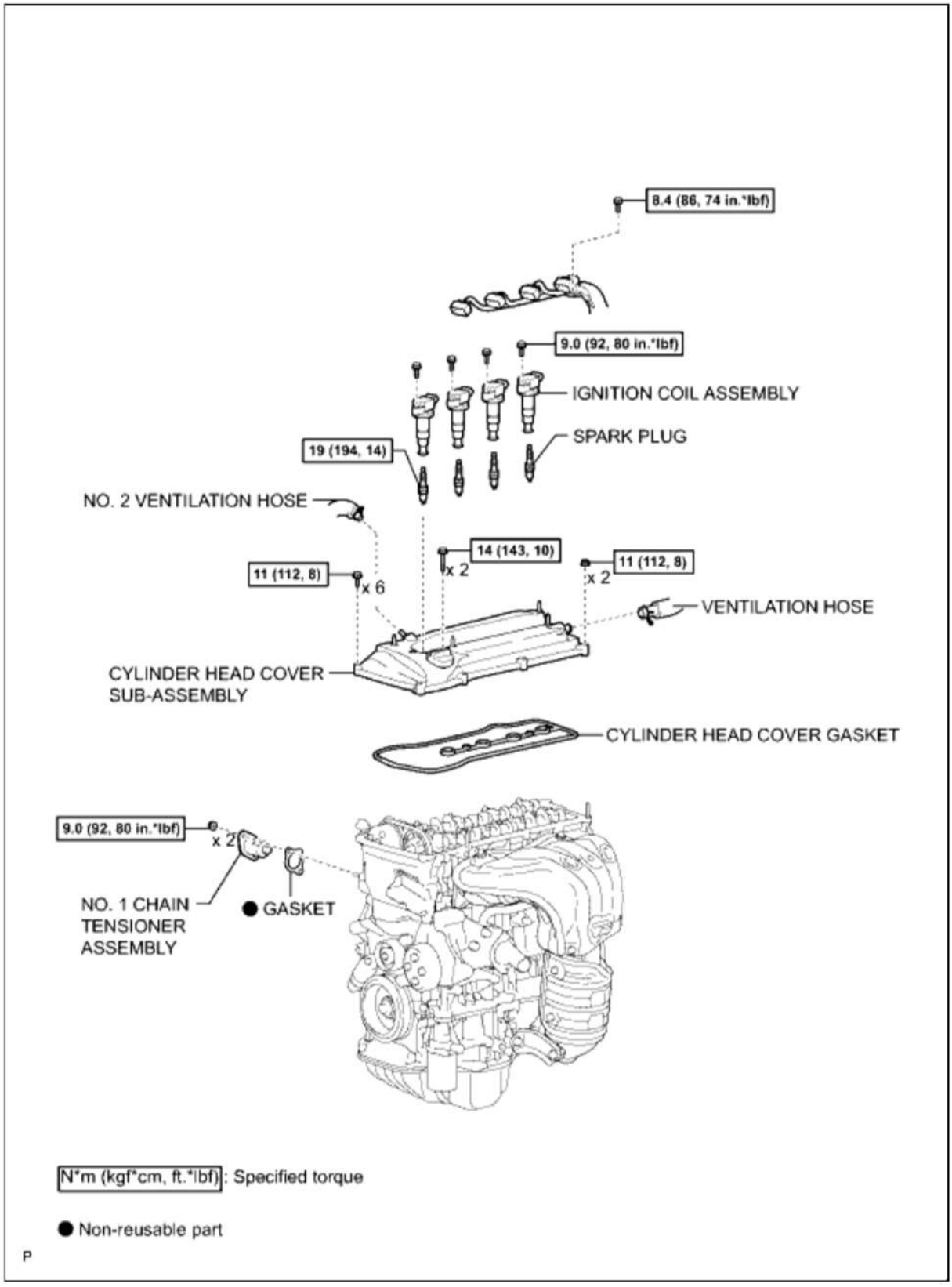
COMPONENTS

ILLUSTRATION



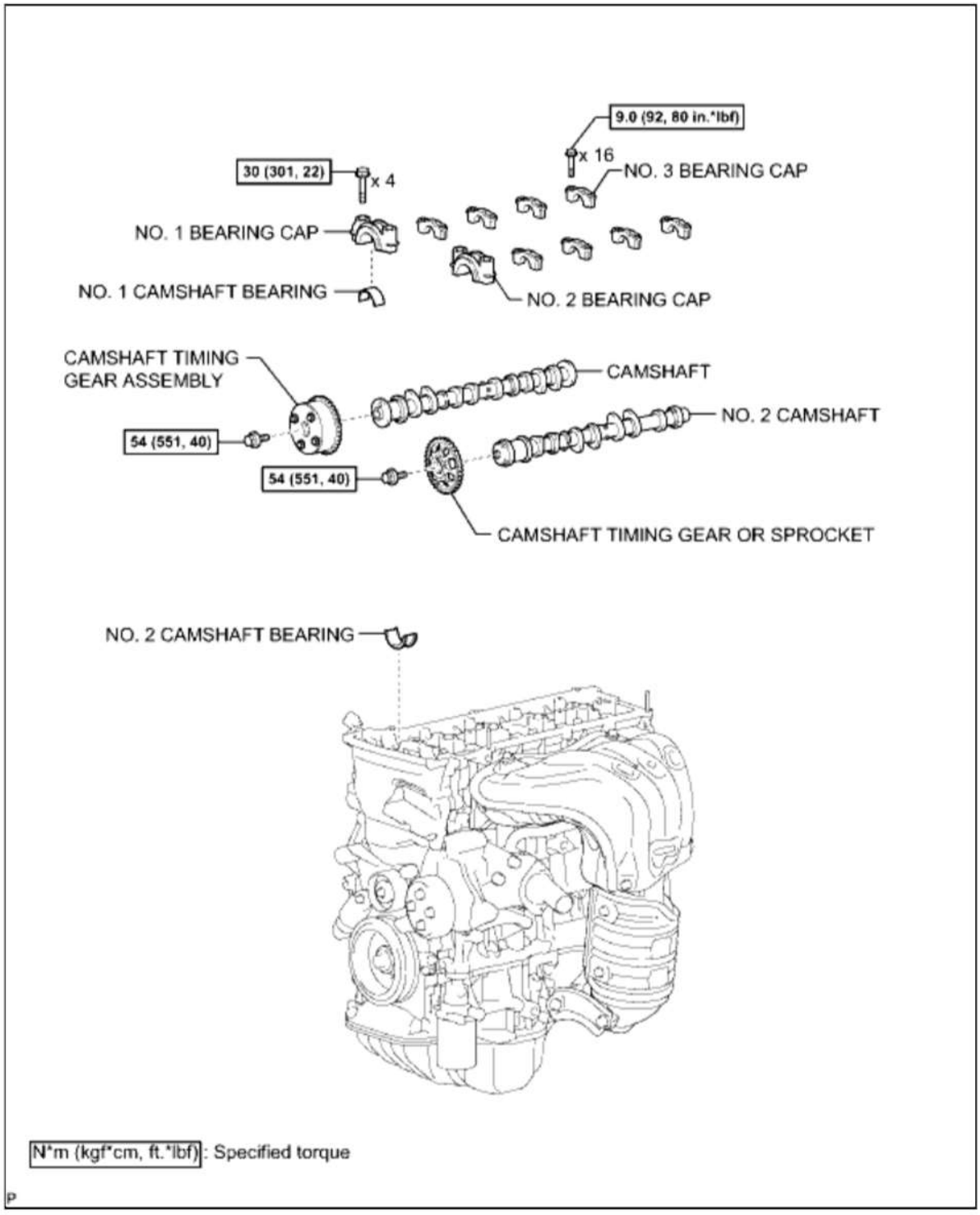
cardiagn.com

ILLUSTRATION



cardiagn.com

ILLUSTRATION



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000003 2Z3008X
Title: 2AZ-FE ENGINE MECHANICAL: CAMSHAFT: REMOVAL (2010 Corolla)		

REMOVAL

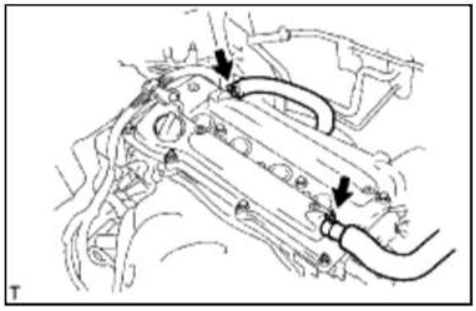
1. REMOVE ENGINE UNDER COVER RH

2. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY INFO

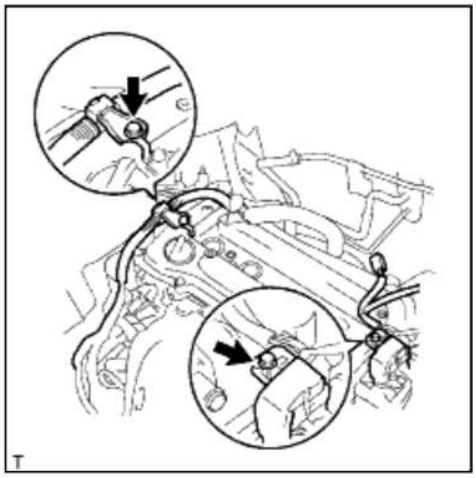
3. REMOVE IGNITION COIL ASSEMBLY INFO

4. REMOVE SPARK PLUG INFO

5. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY



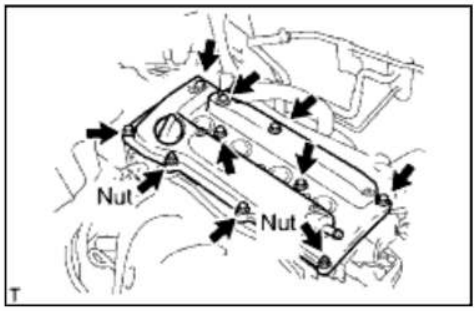
(a) Remove the 2 ventilation hoses from the cylinder head cover sub-assembly.



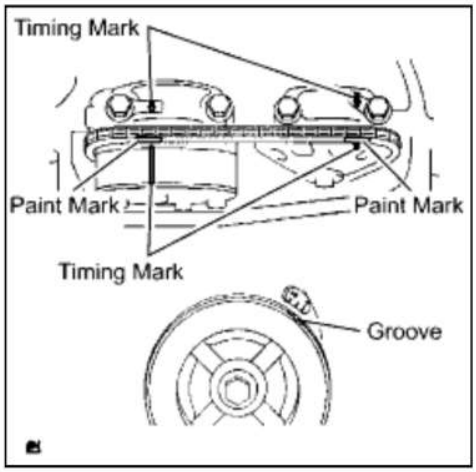
(b) Remove the 2 bolts and separate the 2 wire harness brackets.

(c) Remove the 8 bolts and 2 nuts, then remove the cylinder head cover sub-assembly and gasket.

cardiagn.com



6. SET NO. 1 CYLINDER TO TDC/COMPRESSION



(a) Turn the crankshaft pulley until the groove and the timing mark "0" on the timing chain cover are aligned.

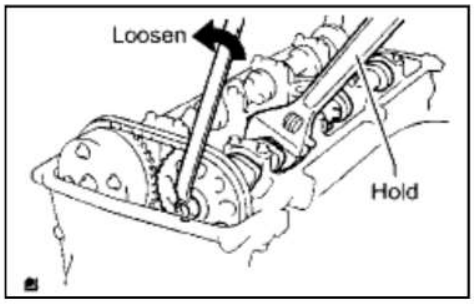
(b) Check that each timing mark on the camshaft timing gear and sprocket is aligned with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration.

If not, turn the crankshaft pulley 1 revolution (360°) to align the timing marks as illustrated.

(c) Place paint marks on the chain in alignment with the timing marks on the camshaft timing gear and camshaft timing sprocket.

7. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

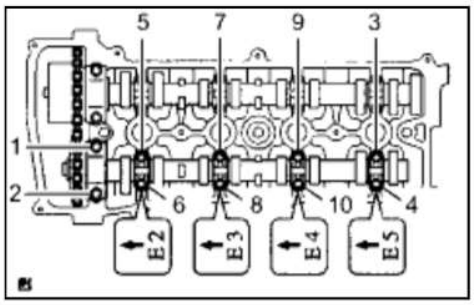
8. LOOSEN CAMSHAFT TIMING GEAR OR SPROCKET



(a) While holding the No. 2 camshaft with a wrench, loosen the No. 2 camshaft timing set bolt.

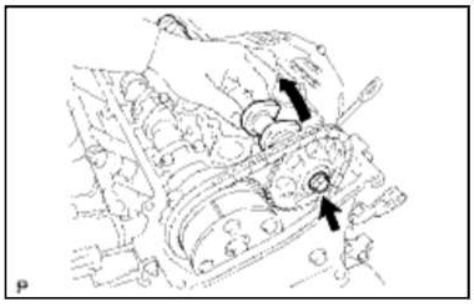
cardiagn.com

9. REMOVE NO. 2 CAMSHAFT



(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

(b) Remove the 5 bearing caps.

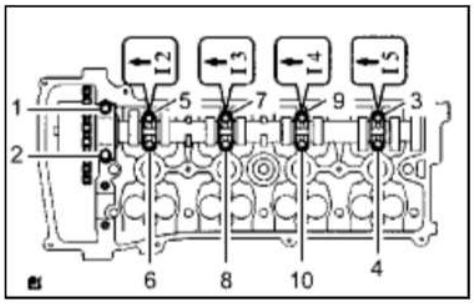


(c) While holding the No. 2 camshaft by hand, remove the camshaft timing sprocket set bolt.

(d) Remove the camshaft timing sprocket from the No. 2 camshaft with the timing chain wrapped on the sprocket.

(e) Remove the camshaft timing sprocket from the timing chain.

10. REMOVE CAMSHAFT



(a) In several steps, uniformly loosen and remove the 10 bearing caps bolts in the sequence shown in the illustration.

(b) Remove the 5 bearing caps.

(c) Remove the camshaft and camshaft timing gear assembly while holding the timing chain by hand.

(d) Support the timing chain with a string to prevent it from slipping off the crankshaft sprocket as shown in the

cardiagn.com

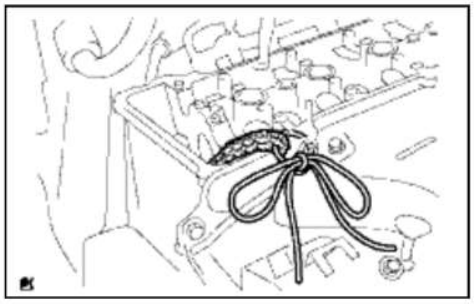
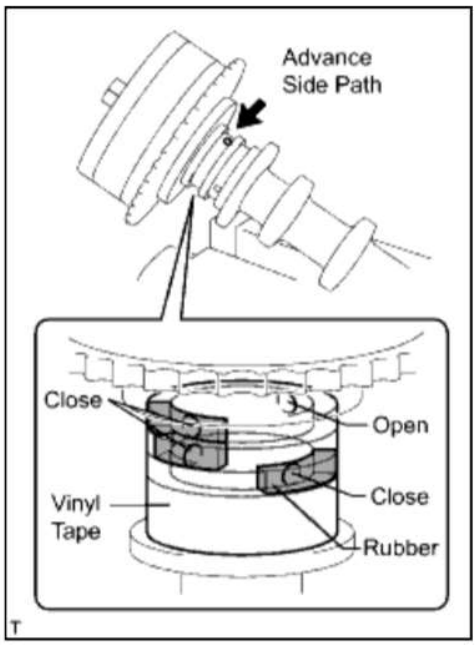


illustration.

NOTICE:

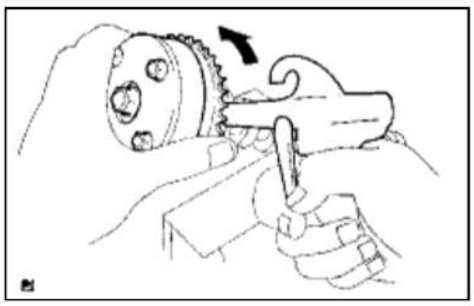
Be careful not to drop anything inside the timing chain cover.

11. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY



(a) Clamp the camshaft in a vise, and make sure that the camshaft timing gear assembly does not rotate.

(b) Cover all the oil path with vinyl tape except the advance side path shown in the illustration.



(c) Apply air pressure of 150 kPa (1.5 kgf/cm2, 22 psi) to the oil path, then turn the camshaft timing gear assembly to the advance direction (counterclockwise) by hand.

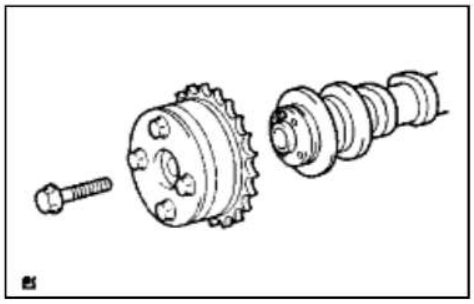
CAUTION:

Cover the paths with a piece of cloth to avoid oil splashes.

HINT:

Depending on the air pressure, the camshaft timing gear assembly may turn to the advance side without applying force by hand. Also, if the pressure is difficult to apply because of air leakage from a path, the lock pin may be difficult to release.

cardiagn.com



(d) Remove the flange bolt of the camshaft timing gear.

NOTICE:

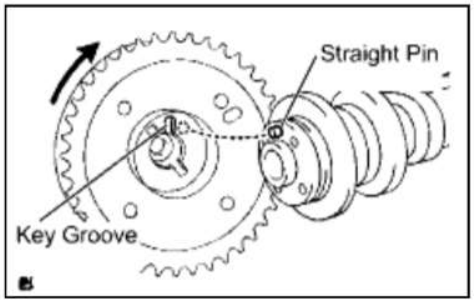
- Be sure not to remove the other 4 bolts.
- When reusing the camshaft timing gear, release the straight pin lock first, then install the gear.

cardiagn.com

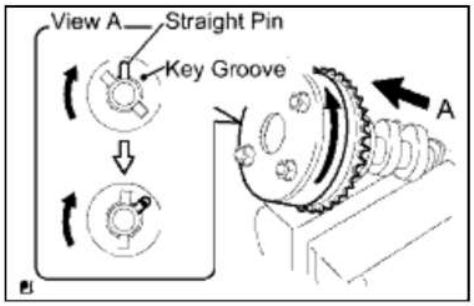
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000032Z4008X
Title: 2AZ-FE ENGINE MECHANICAL: CAMSHAFT: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY



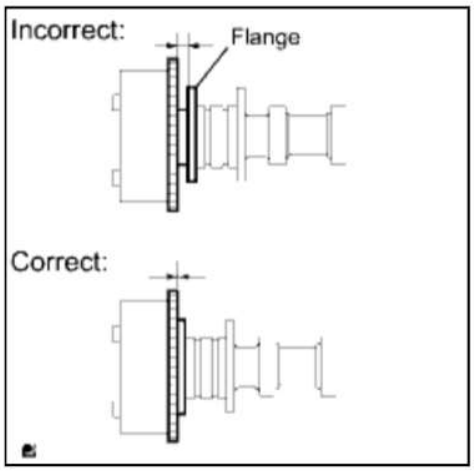
(a) Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.



(b) Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.

NOTICE:

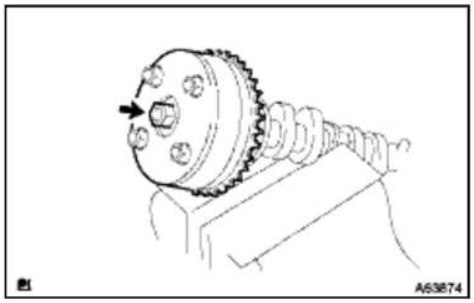
Be sure not to turn the camshaft timing gear to the retard direction (clockwise).



(c) Check that there is no clearance between the timing gear and camshaft flange.

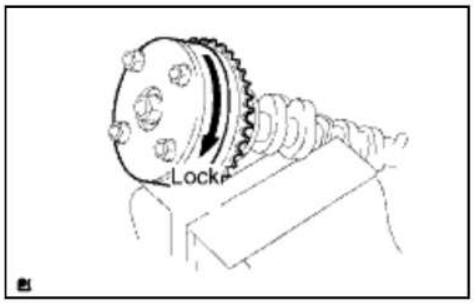
(d) Tighten the flange bolt with the camshaft timing gear

cardiagn.com



assembly fixed in place.

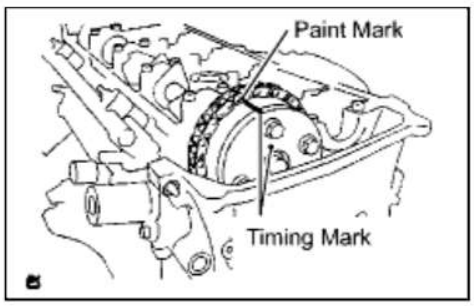
Torque: 54 N·m (551 kgf·cm, 40ft·lbf)



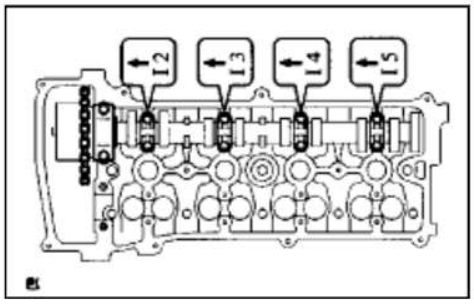
(e) Check that the camshaft timing gear assembly can move to the retard direction (clockwise) and is locked in the most retarded position.

2. INSTALL CAMSHAFT

(a) Apply a light coat of engine oil to the journal portion of the camshaft.



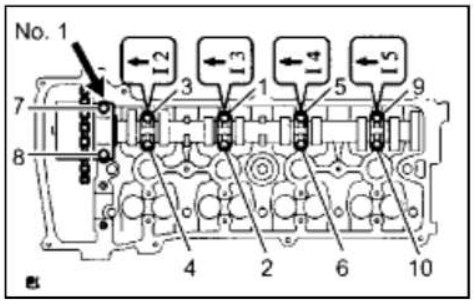
(b) Install the timing chain onto the camshaft timing gear with the paint mark aligned with the timing mark on the camshaft timing gear as shown in the illustration.



(c) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.

(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

cardiagn.com

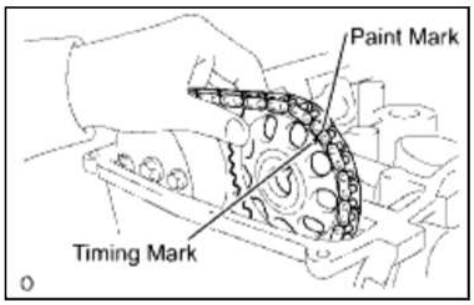


(e) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

No. 1 bearing - Torque: 30 N·m (301 kgf·cm, 22ft·lbf)

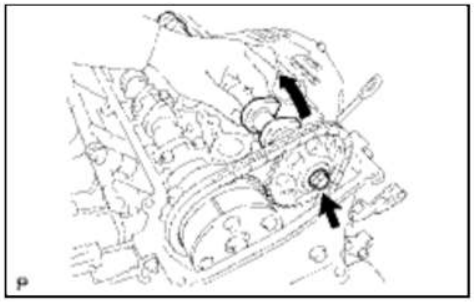
No. 3 bearing - Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

3. INSTALL NO. 2 CAMSHAFT

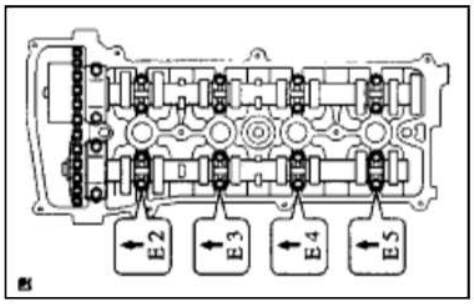


(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.

(b) Put the No. 2 camshaft on the cylinder head with the paint mark on the chain aligned with the timing mark on the camshaft timing sprocket.



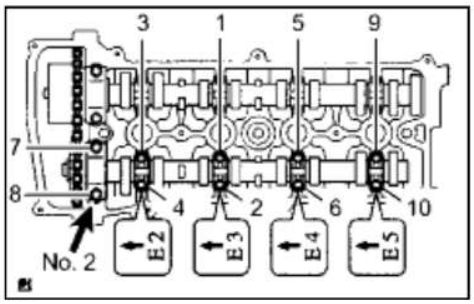
(c) While holding the No. 2 camshaft by hand, temporarily tighten the camshaft timing sprocket set bolt.



(d) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

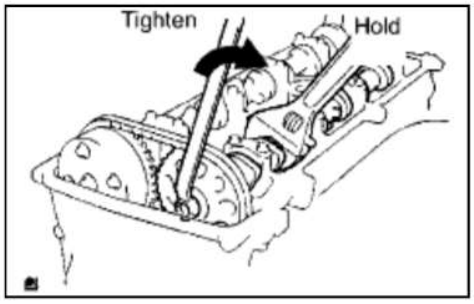
cardiagn.com

(e) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



(f) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

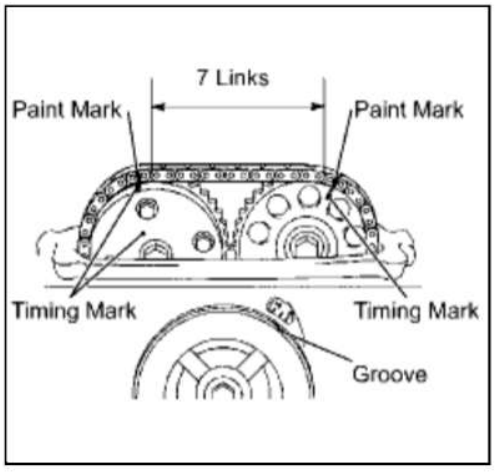
No. 2 bearing - Torque: 30 N·m (301 kgf·cm, 22ft·lbf)
No. 3 bearing - Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)



(g) While holding the camshaft with a wrench, tighten the camshaft timing sprocket set bolt.

Torque: 54 N·m (551 kgf·cm, 40ft·lbf)

NOTICE:
Be careful not to damage the valve lifter.

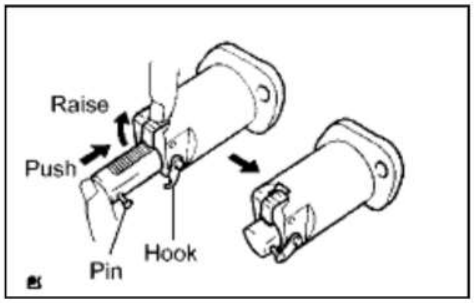


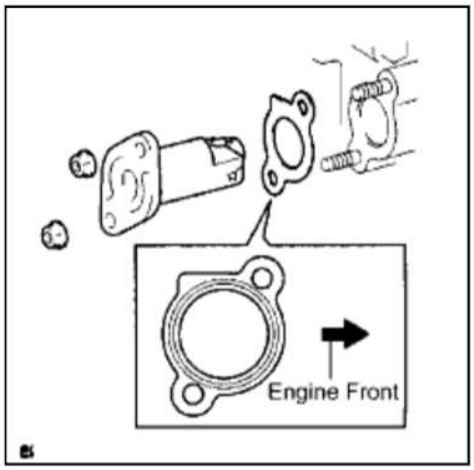
(h) Check that the paint marks on the chain are aligned with the timing marks on the camshaft timing gear and camshaft timing sprocket. Also, check that the crankshaft pulley groove is aligned with the timing mark "0" on the timing mark chain cover.

4. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

(a) Release the ratchet pawl, then fully push in the plunger and set the hook to the pin so that the plunger is in the position shown in the illustration.

cardiagn.com



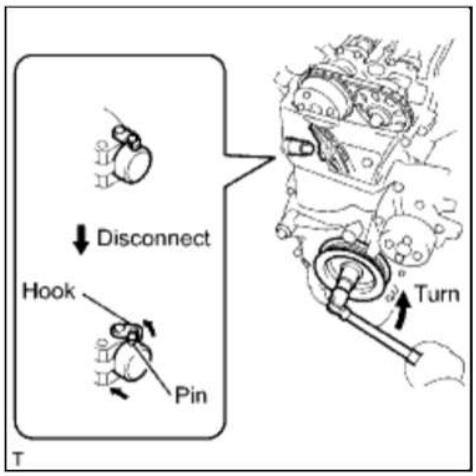


(b) Install a new gasket and the chain tensioner with the 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

NOTICE:

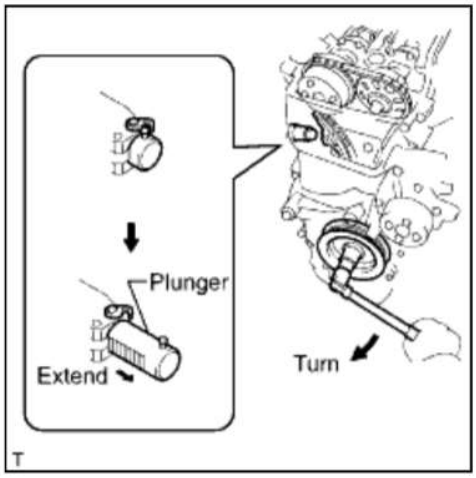
When installing the chain tensioner, set the hook again if the hook releases the plunger.



(c) Turn the crankshaft counterclockwise, then disconnect the hook from the pin.

(d) Turn the crankshaft clockwise, then check that the plunger is extended.

cardiagn.com



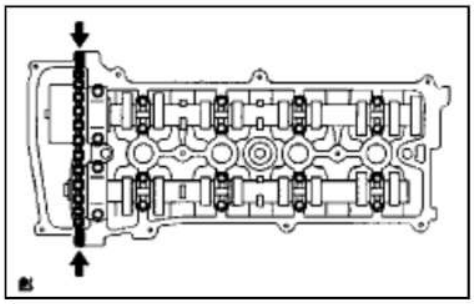
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

6. CHECK VALVE CLEARANCE INFO

7. ADJUST VALVE CLEARANCE INFO

8. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Remove any old packing material from the contact surface.



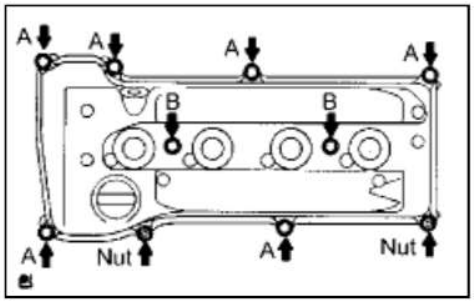
(b) Apply seal packing to the 2 locations shown in the illustration.

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTICE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.



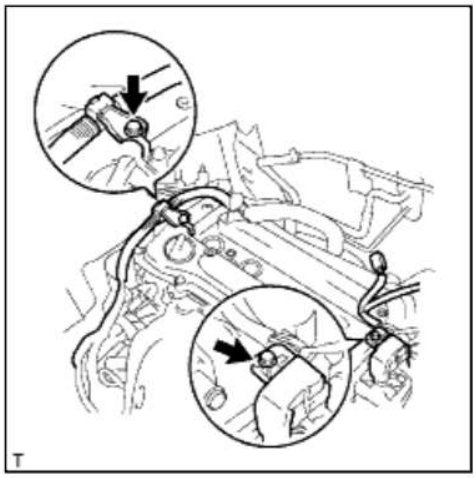
(c) Install the cylinder head cover gasket and sub-assembly with the 8 bolts and 2 nuts.

Bolt A - Torque: 11 N·m (112 kgf·cm, 8ft·lbf)

Bolt B - Torque: 14 N·m (143 kgf·cm, 10ft·lbf)

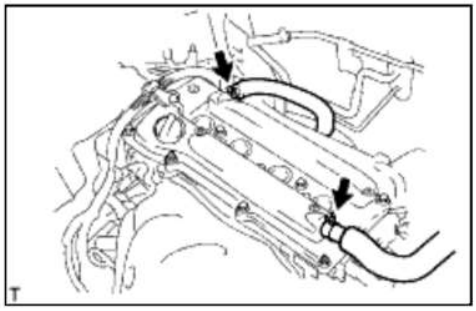
Nut - Torque: 11 N·m (112 kgf·cm, 8ft·lbf)

cardiagn.com



(d) Install the 2 engine wire harness brackets with the 2 bolts.

Torque: 8.4 N·m (86 kgf·cm, 74in·lbf)



(e) Connect the 2 ventilation hoses to the cylinder head cover.

9. INSTALL SPARK PLUG INFO

10. INSTALL IGNITION COIL ASSEMBLY INFO

11. INSPECT FOR OIL LEAK

12. INSPECT IGNITION TIMING INFO

13. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY INFO

14. INSTALL ENGINE UNDER COVER RH

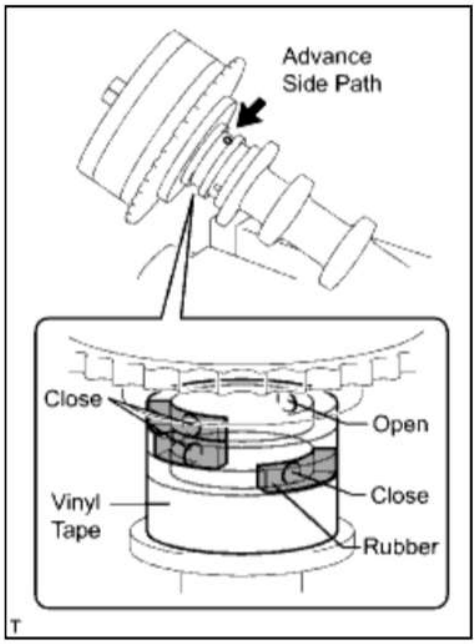
cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000033RO008X
Title: 2AZ-FE ENGINE MECHANICAL: CAMSHAFT: INSPECTION (2010 Corolla)		

INSPECTION

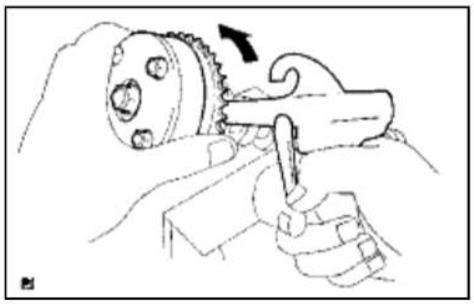
1. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Install the camshaft timing gear assembly INFO .



(b) Clamp the camshaft in a vise, and make sure that the camshaft timing gear assembly does not rotate.

(c) Cover all the oil paths with vinyl tape except the advance side path shown in the illustration.



(d) Apply air pressure of 150 kPa (1.5 kgf/cm2, 22 psi) to the oil path

CAUTION:

Cover the paths with a piece of cloth to avoid oil splashes.

(e) Check that the camshaft timing gear revolves in the advance direction (counterclockwise) by hand.

HINT:

Depending on the air pressure, the camshaft timing gear may turn to the advance side without applying force by hand. Also, if enough air pressure cannot be applied because of air leakage from the path, releasing the lock

cardiagn.com

pin may be difficult.

(f) Check for smooth rotation.

(1) Turn the camshaft timing gear within its movable range (21°) 2 or 3 times, but do not turn it to the most retarded position. Make sure that the gear turns smoothly.

NOTICE:

Do not use air pressure to perform the smooth rotation check.

(g) Check the lock in the most retarded position.

(1) Confirm that the camshaft timing gear is locked at the most retarded position.

(h) Remove the camshaft timing gear assembly INFO .

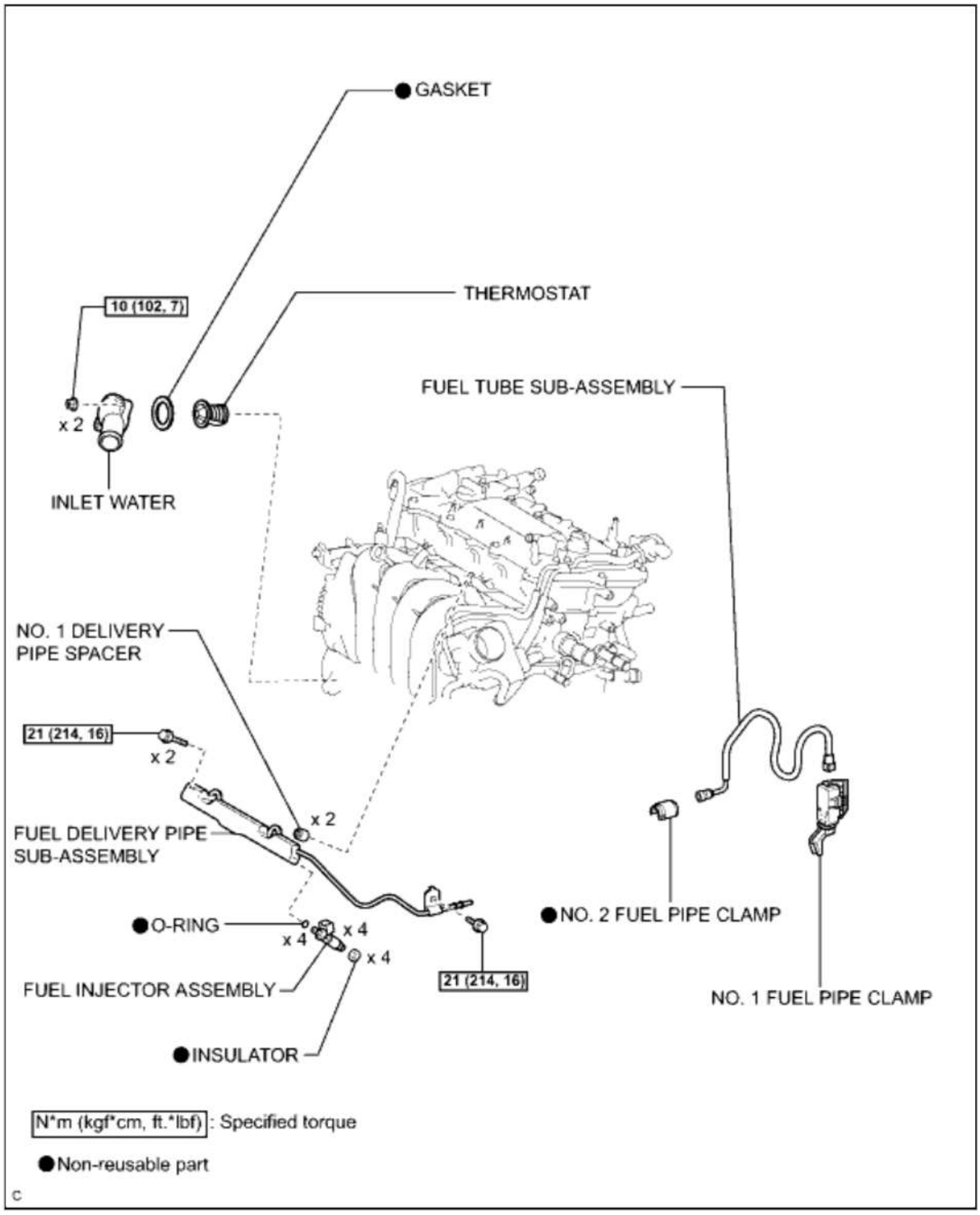


cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000034QB008X
Title: 2ZR-FE ENGINE MECHANICAL: CAMSHAFT: COMPONENTS (2010 Corolla)		

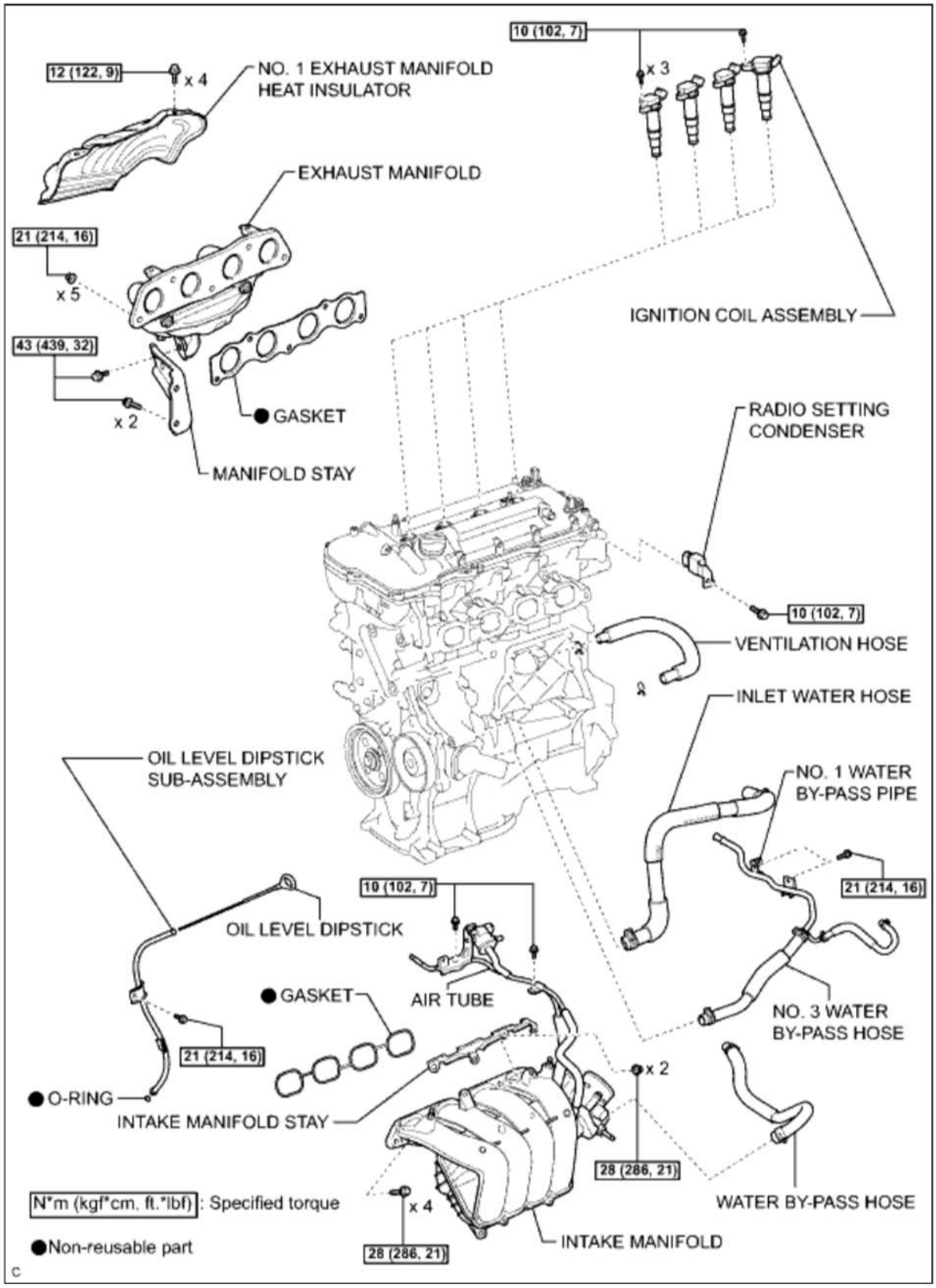
COMPONENTS

ILLUSTRATION



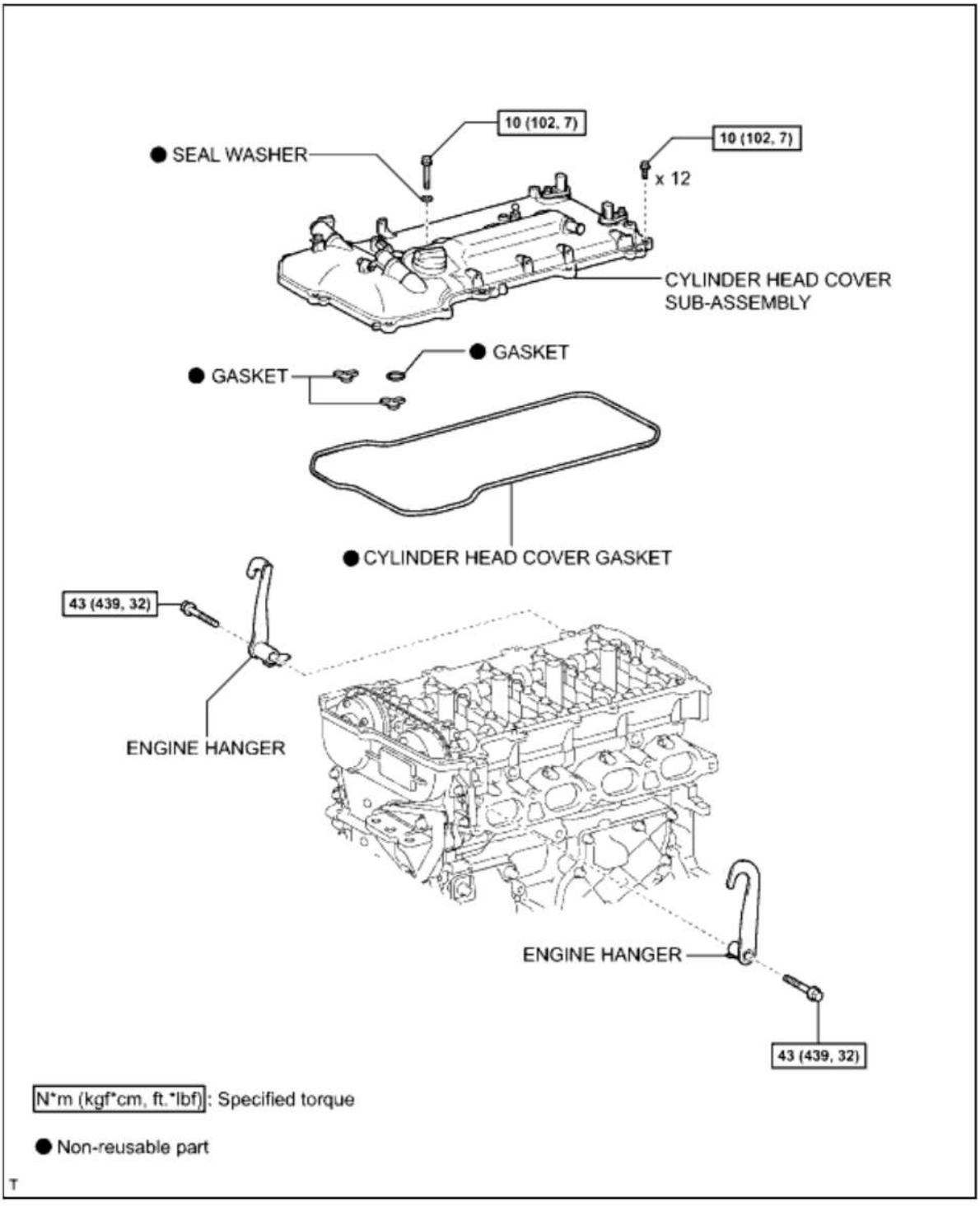
cardiagn.com

ILLUSTRATION



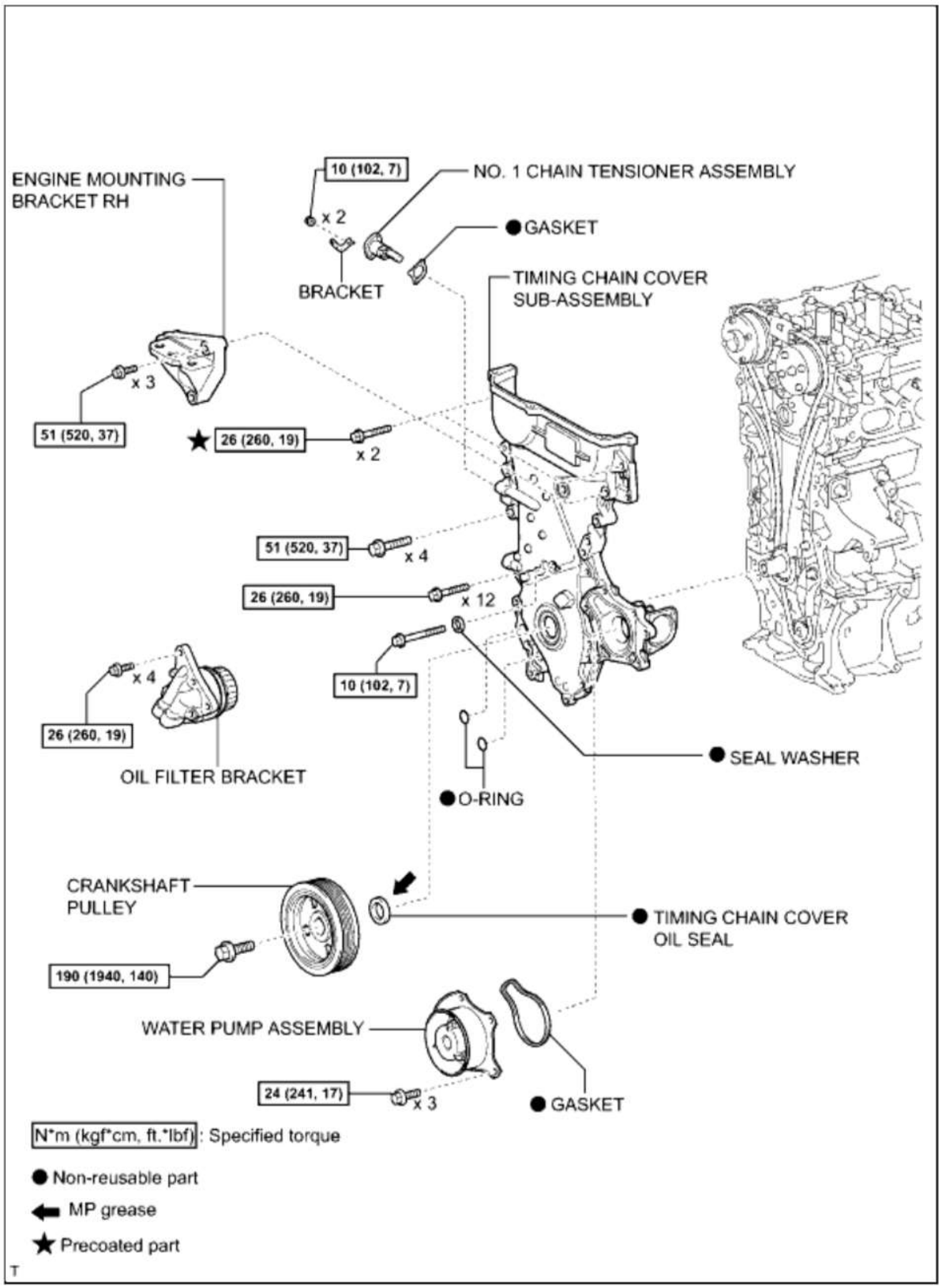
cardiagn.com

ILLUSTRATION



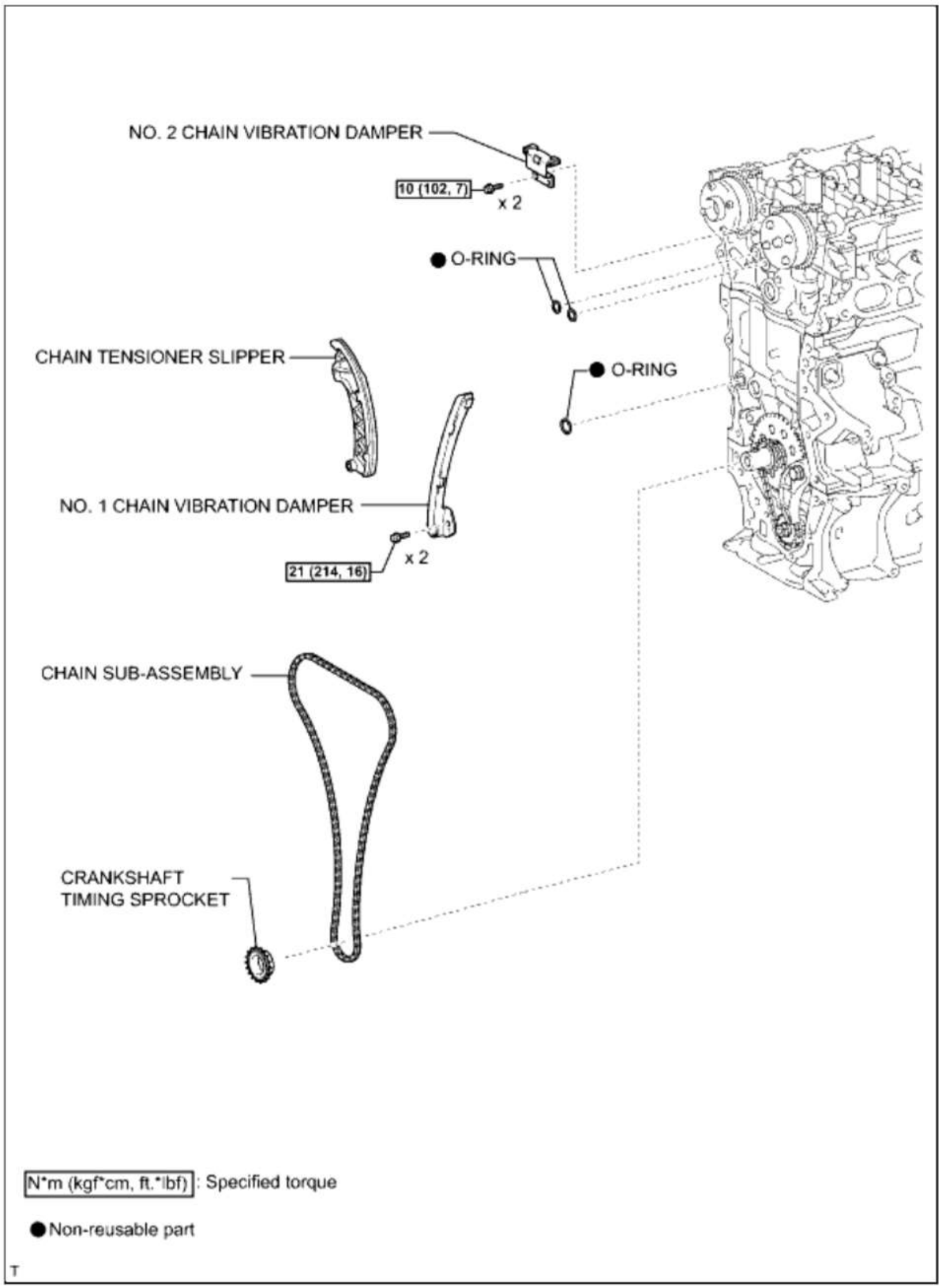
ILLUSTRATION

cardiagn.com



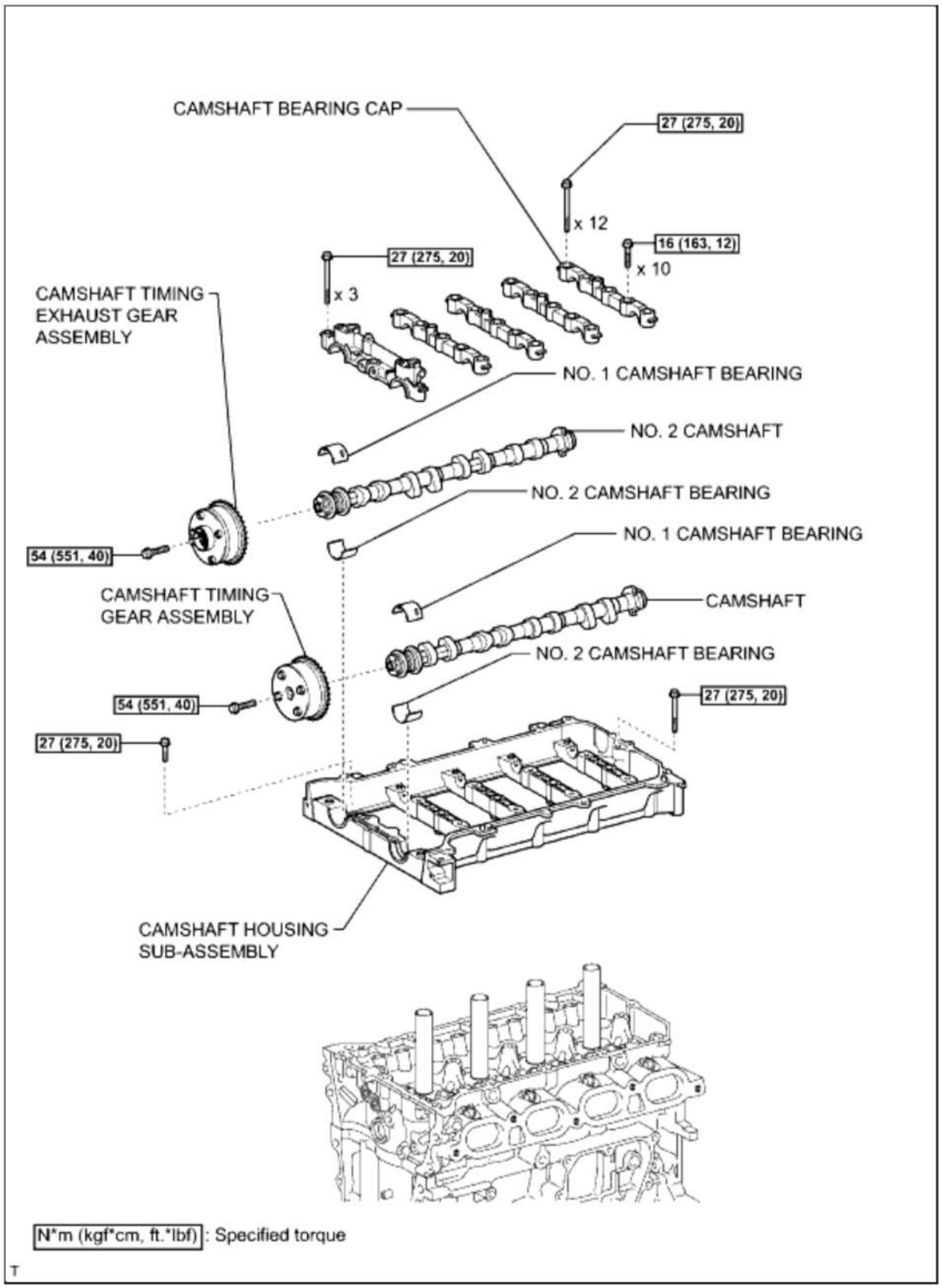
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027I901HX
Title: 2ZR-FE ENGINE MECHANICAL: CAMSHAFT: INSTALLATION (2010 Corolla)		

INSTALLATION

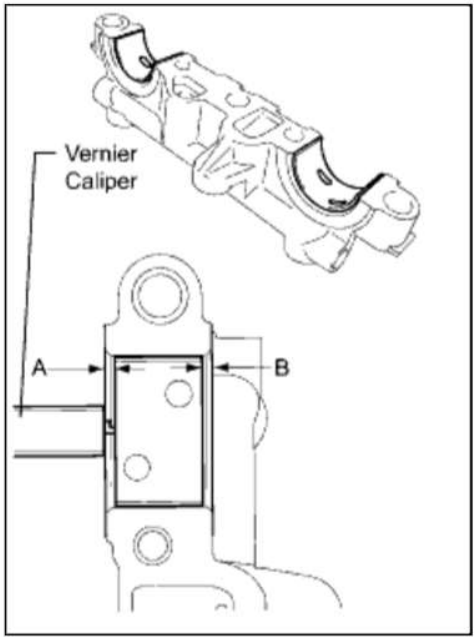
1. INSTALL VALVE LASH ADJUSTER ASSEMBLY

2. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

3. INSTALL NO. 1 CAMSHAFT BEARING

(a) Clean both surfaces of the bearings.

(b) Install the 2 No. 1 camshaft bearings.



(c) Using a vernier caliper, measure the distance between the bearing cap edge and the camshaft bearing edge.

Dimension (A - B):
0.7 mm (0.0276 in.) or less

NOTICE:

Position the bearings to the center of the bearing cap by measuring dimensions A and B.

4. INSTALL NO. 2 CAMSHAFT BEARING

(a) Clean both surfaces of the bearings.

(b) Install the 2 No. 2 camshaft bearings.

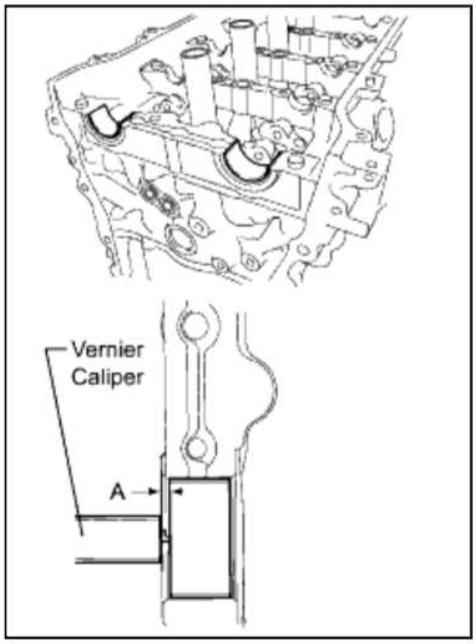
(c) Using a vernier caliper, measure the distance between the bearing cap edge and the camshaft bearing edge.

Dimension (A):
1.05 to 1.75 mm (0.0413 to 0.0689 in.)

NOTICE:

Position the bearings to the center of the bearing cap by measuring dimension A.

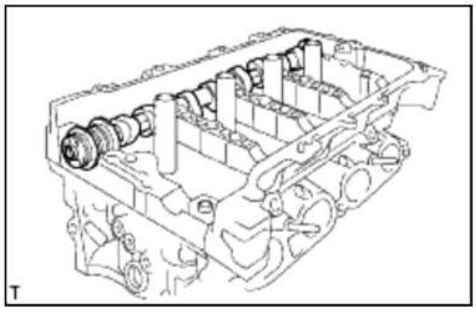
cardiagn.com



5. INSTALL NO. 2 CAMSHAFT

(a) Clean the camshaft journals.

(b) Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.



(c) Install the No. 2 camshaft to the camshaft housing.

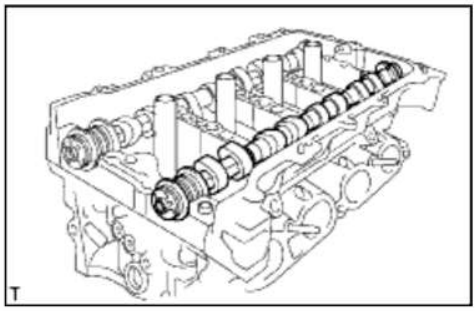
6. INSTALL CAMSHAFT

(a) Clean the camshaft journals.

(b) Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.

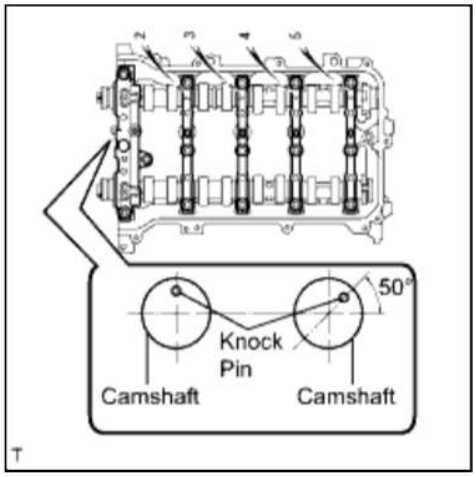
(c) Install the camshaft to the camshaft housing.

cardiagn.com



7. INSTALL CAMSHAFT BEARING CAP

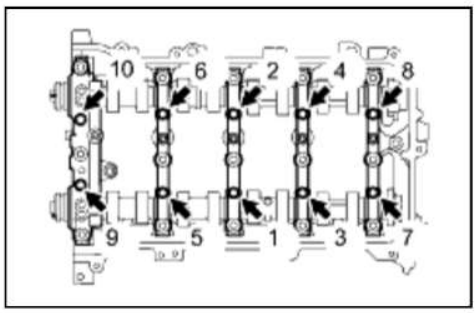
(a) Apply engine oil to the camshaft journals, camshaft housings and bearing caps.



(b) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

HINT:

Make sure that the knock pin of the camshaft is positioned as shown in the illustration.



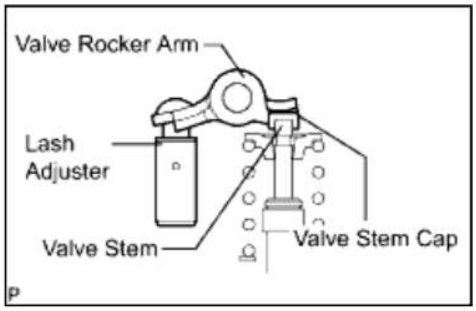
(c) Tighten the 10 bolts in the order shown in the illustration.

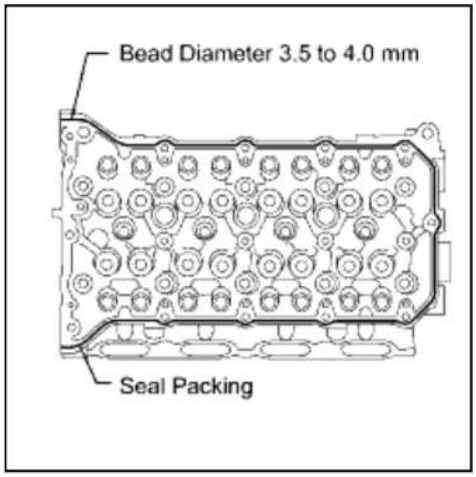
Torque: 16 N·m (163 kgf·cm, 12ft·lbf)

8. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY

(a) Make sure that the valve rocker arm is installed as shown in the illustration.

cardiagn.com





(b) Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:

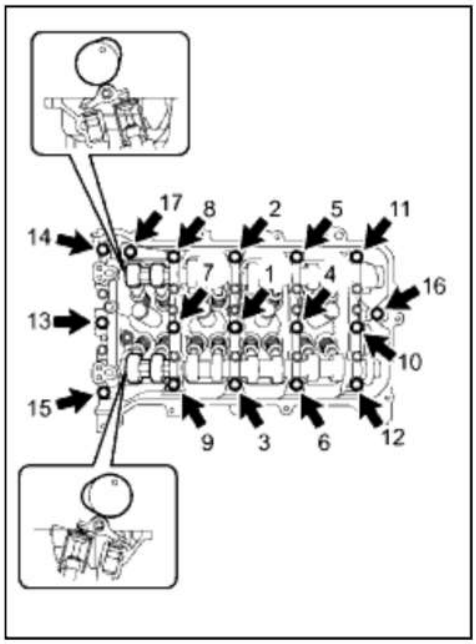
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Bead diameter:

3.5 to 4.0 mm (0.138 to 0.158 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the camshaft housing sub-assembly within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing.



(c) Set the camshaft and No. 2 camshaft as shown in the illustration.

(d) Install the camshaft housing and tighten the 17 bolts in the order shown in the illustration.

Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

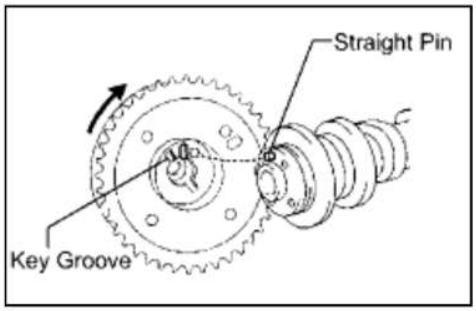
cardiagn.com

NOTICE:

- After installing the camshaft housing, make sure that the cam lobes are positioned as shown in the illustration.
- If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.
- If the camshaft housing is removed because any of the bolts are loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.
- After installing the camshaft housing, wipe off any seal packing that seeped out from between the housing and the cylinder head.

9. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

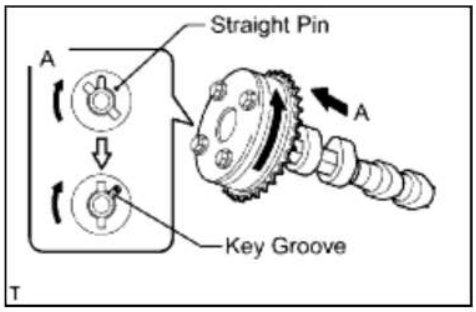
(a) Check that the knock pin is installed on the camshaft.



(b) Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.

NOTICE:

Do not forcefully push in the camshaft timing gear assembly. This may cause the camshaft knock pin tip to damage the installation surface of the camshaft timing gear assembly.



(c) Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.

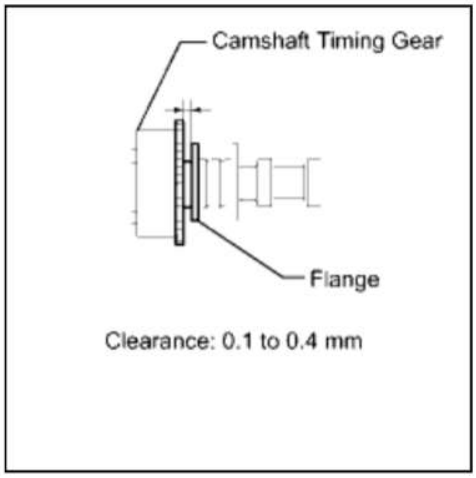
NOTICE:

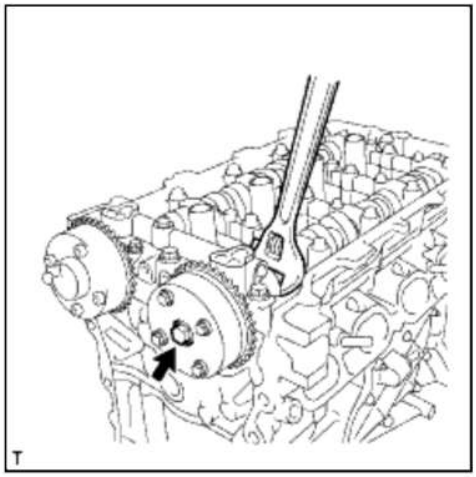
Do not turn the camshaft timing gear in the retard direction (clockwise).

(d) Measure the clearance between the gear and the camshaft flange.

Clearance:
0.1 to 0.4 mm (0.004 to 0.016 in.)

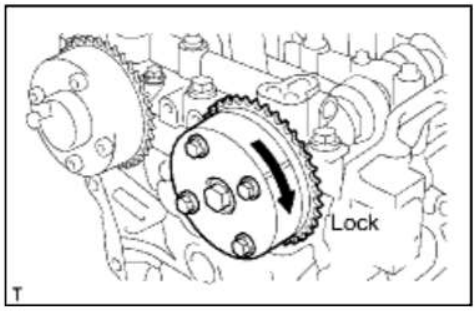
cardiagn.com





(e) Tighten the flange bolt with the camshaft timing gear secured in place.

Torque: 54 N·m (551 kgf·cm, 40ft·lbf)



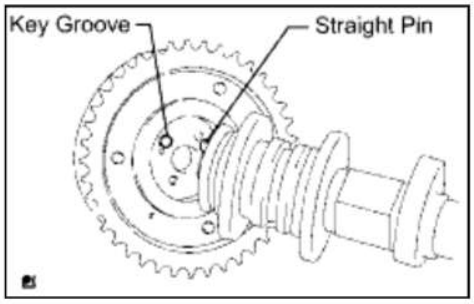
(f) Check that the camshaft timing gear can move in the retard direction (clockwise) and is locked in the most retarded position.

10. INSTALL CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

(a) Check that the knock pin is installed on the camshaft.

(b) Put the camshaft timing exhaust gear and camshaft together by aligning the key groove and straight pin.

cardiagn.com

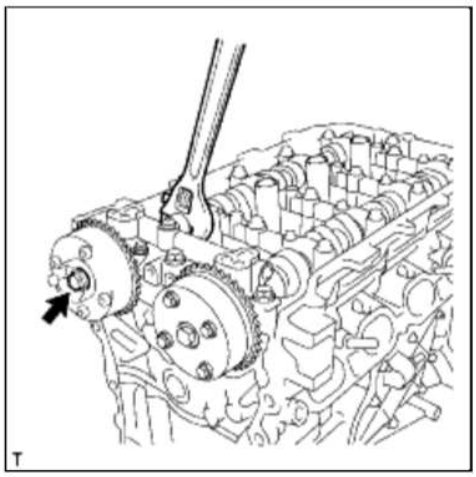


(c) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.

NOTICE:

Be sure not to turn the camshaft timing exhaust gear in the retard direction (clockwise).

(d) Check that there is no clearance between the gear and the camshaft flange.



(e) Tighten the flange bolt with the camshaft timing exhaust gear secured.

Torque: 54 N·m (551 kgf·cm, 40ft·lbf)

(f) Check the camshaft timing exhaust gear lock.

(1) Make sure that the camshaft timing exhaust gear is locked.

11. INSTALL NO. 1 CHAIN VIBRATION DAMPER INFO

12. INSTALL NO. 2 CHAIN VIBRATION DAMPER INFO

13. INSTALL CHAIN SUB-ASSEMBLY INFO

14. INSTALL CHAIN TENSIONER SLIPPER INFO

15. INSTALL TIMING CHAIN COVER OIL SEAL INFO

16. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY INFO

17. INSTALL CRANKSHAFT PULLEY INFO

18. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY INFO

cardiagn.com

19. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

20. INSTALL RADIO SETTING CONDENSER INFO

21. INSTALL THERMOSTAT INFO

22. INSTALL INLET WATER INFO

23. INSTALL INLET WATER HOSE INFO

24. INSTALL WATER BY-PASS HOSE INFO

25. INSTALL NO. 1 WATER BY-PASS PIPE INFO

26. CONNECT NO. 3 WATER BY-PASS HOSE

27. INSTALL VENTILATION HOSE INFO

28. INSPECT EXHAUST MANIFOLD INFO

29. INSTALL EXHAUST MANIFOLD INFO

30. INSTALL MANIFOLD STAY INFO

31. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

32. INSTALL OIL LEVEL DIPSTICK SUB-ASSEMBLY INFO

33. INSTALL IGNITION COIL ASSEMBLY INFO

34. INSTALL FUEL INJECTOR ASSEMBLY INFO

35. INSTALL NO. 1 DELIVERY PIPE SPACER INFO

36. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

37. INSTALL FUEL TUBE SUB-ASSEMBLY INFO

38. INSTALL INTAKE MANIFOLD INFO

39. REMOVE ENGINE STAND INFO

40. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO .



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IB01HX
Title: 2ZR-FE ENGINE MECHANICAL: CAMSHAFT: REMOVAL (2010 Corolla)		

REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO .

2. INSTALL ENGINE STAND INFO

3. REMOVE INTAKE MANIFOLD INFO

4. REMOVE FUEL TUBE SUB-ASSEMBLY INFO

5. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

6. REMOVE FUEL INJECTOR ASSEMBLY INFO

7. REMOVE IGNITION COIL ASSEMBLY INFO

8. REMOVE OIL LEVEL DIPSTICK SUB-ASSEMBLY INFO

9. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

10. REMOVE MANIFOLD STAY INFO

11. REMOVE EXHAUST MANIFOLD INFO

12. REMOVE VENTILATION HOSE INFO

13. DISCONNECT NO. 3 WATER BY-PASS HOSE INFO

14. REMOVE NO. 1 WATER BY-PASS PIPE INFO

15. REMOVE WATER BY-PASS HOSE INFO

16. REMOVE INLET WATER HOSE INFO

17. REMOVE INLET WATER INFO

18. REMOVE THERMOSTAT INFO

19. REMOVE RADIO SETTING CONDENSER INFO

20. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

21. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

22. REMOVE CRANKSHAFT PULLEY INFO

23. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

cardiagn.com

24. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY INFO

25. REMOVE TIMING CHAIN COVER OIL SEAL INFO

26. REMOVE CHAIN TENSIONER SLIPPER INFO

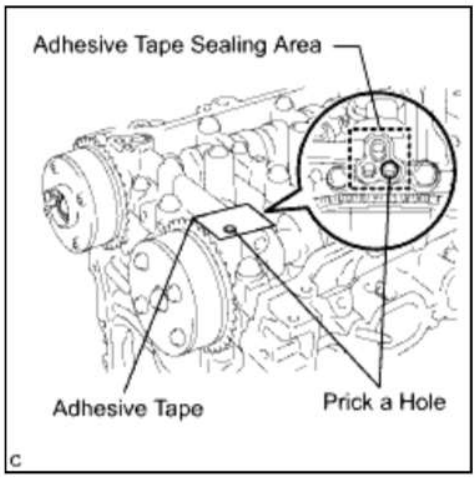
27. REMOVE NO. 1 CHAIN VIBRATION DAMPER INFO

28. REMOVE CHAIN SUB-ASSEMBLY INFO

29. REMOVE NO. 2 CHAIN VIBRATION DAMPER INFO

30. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Inspect the lock of the camshaft timing gear.

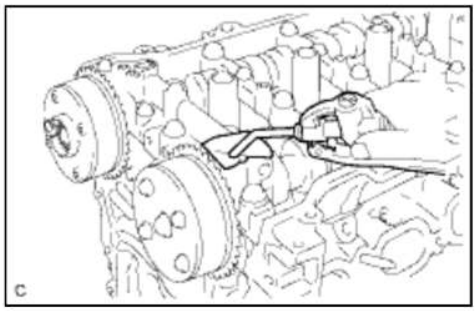


(b) After cleaning and degreasing the VVT oil hole on the intake side of the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

NOTICE:

Be sure to cover the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

(c) Prick a hole in the tape covering the oil hole as shown in the illustration. (Procedure A)



(d) Apply approximately 150 kPa (1.5 kgf/cm2, 22 psi) of air pressure to the hole pricked in procedure A to release the lock pin.

NOTICE:

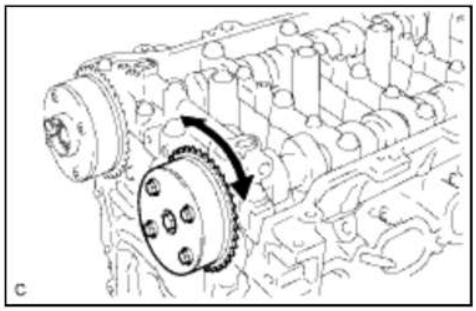
- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.

(e) Forcibly turn the camshaft timing gear assembly in the advance direction (counterclockwise).

HINT:

Depending on the air pressure applied, the camshaft timing gear assembly may turn in the advance direction without assistance by hand.

cardiagn.com

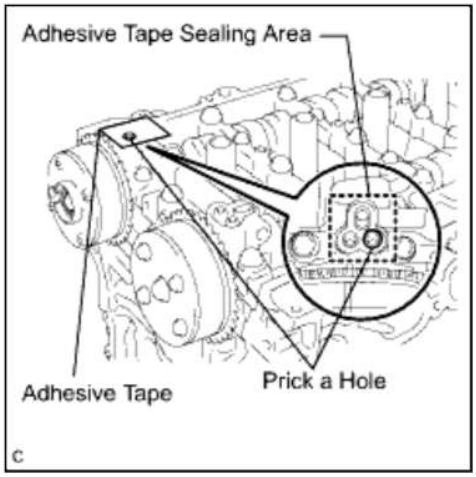


(f) Turn the camshaft timing gear assembly within its movable range (26.5 to 28.5°) 2 or 3 times without turning it to the most retarded position. Make sure that the camshaft timing gear assembly turns smoothly.

(g) Remove the adhesive tape from the No. 1 camshaft bearing cap.

31. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

(a) Check the lock of the camshaft timing exhaust gear.

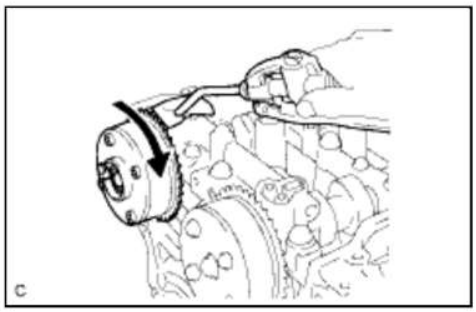


(b) After cleaning and degreasing the VVT oil hole on the exhaust side of the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

NOTICE:

Be sure to cover the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

(c) Prick a hole in the tape covering the oil hole as shown in the illustration. (Procedure B)



(d) Apply approximately 200 kPa (2.0 kgf/cm2, 28 psi) of air pressure to the hole pricked in procedure B to release the lock pin.

NOTICE:

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a shop rag or a piece of cloth when applying air pressure to prevent oil from spraying.

(e) Using a screwdriver with its tip wrapped with tape, forcibly turn the camshaft timing exhaust gear in the retard direction (clockwise).

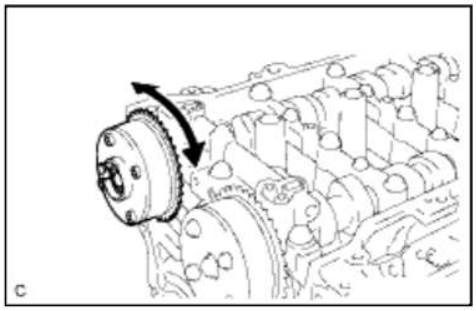
NOTICE:

- Be sure to keep the camshaft timing exhaust gear in the retard direction using a screwdriver. If

cardiagn.com

the gear is released, it will return to the most advanced position automatically due to force from the spring.

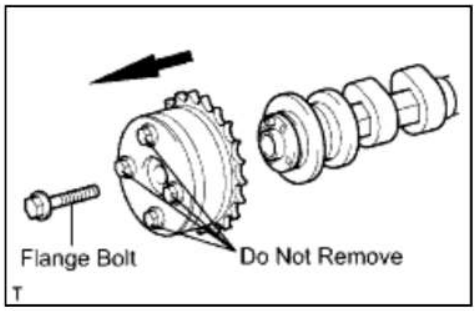
- Do not damage the camshaft timing exhaust gear.



(f) Using a screwdriver with its tip wrapped with tape, turn the camshaft timing exhaust gear within its movable range (19 to 21°) 2 or 3 times without turning it to the most advanced position. Make sure that the camshaft timing exhaust gear turns smoothly.

(g) Remove the adhesive tape from the No. 1 camshaft bearing cap.

32. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

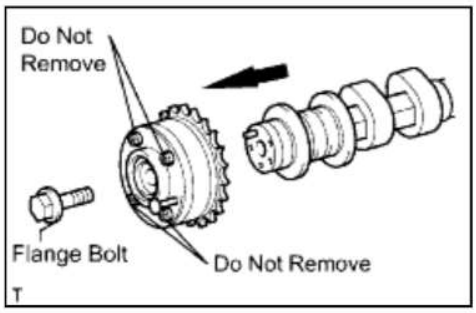


(a) Remove the flange bolt while holding the hexagonal portion of the camshaft, then remove the camshaft timing gear assembly.

NOTICE:

- Before removing the camshaft timing gear, make sure that the lock pin has been released.
- Be sure not to remove the other 4 bolts.
- Keep the camshaft timing gear assembly horizontal while removing it from the camshaft.

33. REMOVE CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY



(a) Remove the flange bolt while holding the hexagonal portion of the camshaft, then remove the camshaft timing exhaust gear assembly.

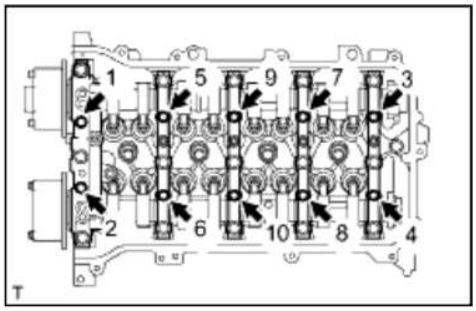
NOTICE:

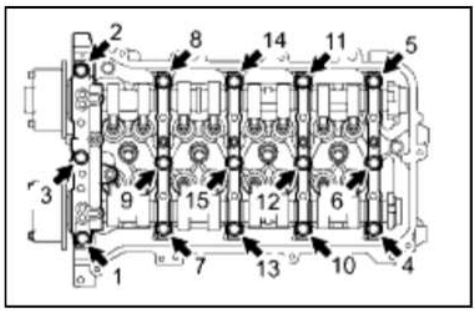
- Be sure not to remove the other 4 bolts.
- Keep the camshaft timing exhaust gear assembly horizontal while removing it from the camshaft.

34. REMOVE CAMSHAFT BEARING CAP

(a) Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

cardiagn.com





(b) Uniformly loosen and remove the 15 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

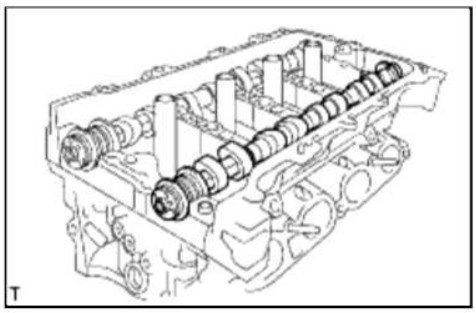
Uniformly loosen the bolts while keeping the camshaft level.

(c) Remove the 5 bearing caps.

HINT:

Arrange the removed parts in the correct order.

35. REMOVE CAMSHAFT

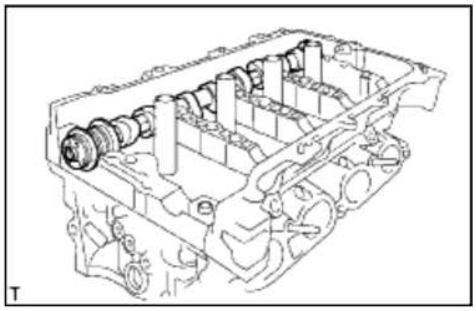


(a) Remove the camshaft.

36. REMOVE NO. 2 CAMSHAFT

(a) Remove the No. 2 camshaft.

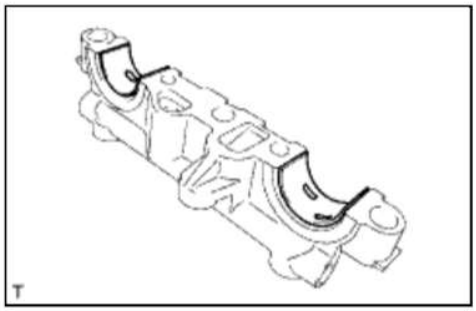
cardiagn.com



37. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

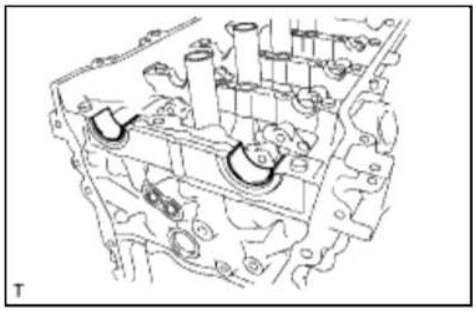
38. REMOVE VALVE LASH ADJUSTER ASSEMBLY INFO

39. REMOVE NO. 1 CAMSHAFT BEARING



(a) Remove the 2 No. 1 camshaft bearings.

40. REMOVE NO. 2 CAMSHAFT BEARING

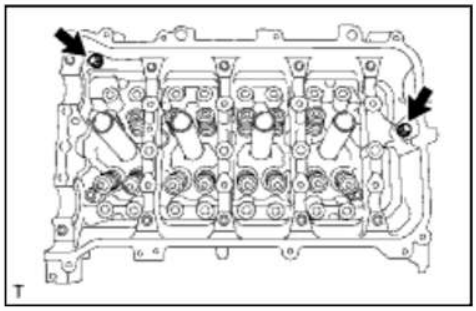


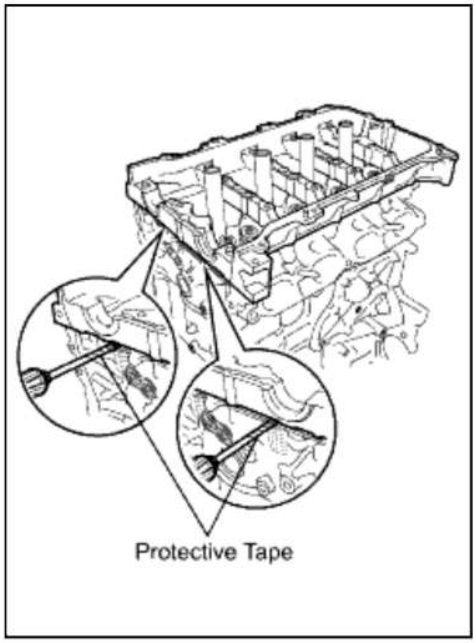
(a) Remove the 2 No. 2 camshaft bearings.

41. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY

(a) Remove the 2 bolts.

cardiagn.com





(b) Remove the camshaft housing by prying between the cylinder head and camshaft housing with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

Tape the screwdriver tip before use.

42. INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

43. INSPECT VALVE LASH ADJUSTER ASSEMBLY INFO

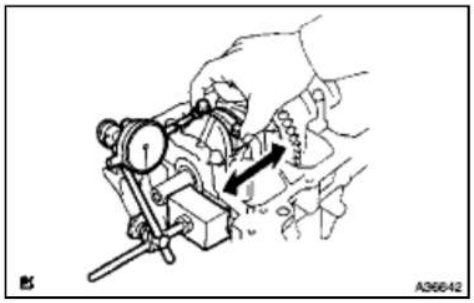
cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000026TQ019X
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER BLOCK: INSPECTION (2010 Corolla)		

INSPECTION

1. INSPECT CONNECTING ROD THRUST CLEARANCE

(a) Install the connecting rod cap INFO .



(b) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

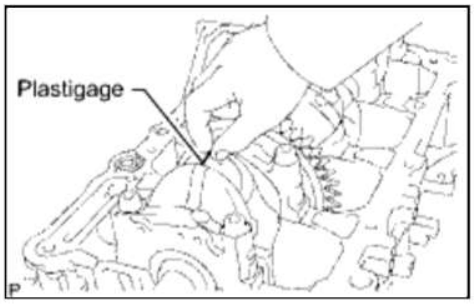
Standard thrust clearance:
0.160 to 0.362 mm (0.00630 to 0.0143 in.)
Maximum thrust clearance:
0.362 mm (0.0143 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.

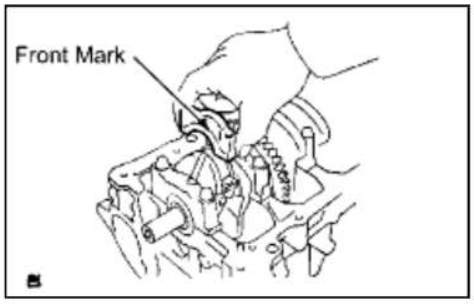
2. INSPECT CONNECTING ROD OIL CLEARANCE

(a) Clean the crank pin and bearing.

(b) Check the crank pin and bearing for pitting and scratches.



(c) Lay a strip of Plastigage on the crank pin.



(d) Check that the front mark of the connecting rod cap is facing forward.

cardiagn.com

(e) Install the connecting rod cap INFO .

NOTICE:

Do not turn the crankshaft.

(f) Remove the 2 bolts and connecting rod cap INFO .

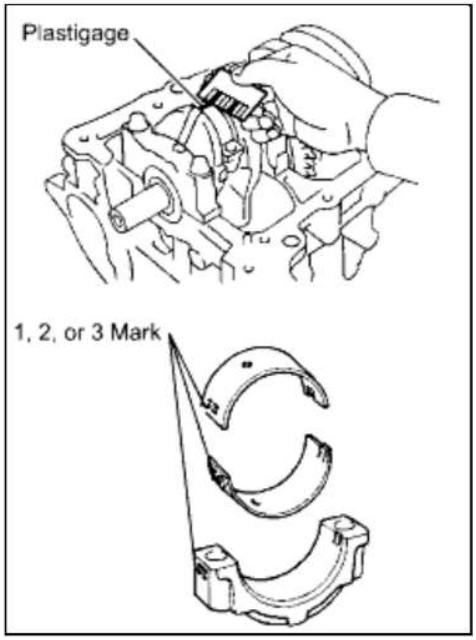
(g) Measure the Plastigage at its widest point.

Standard oil clearance:
0.024 to 0.048 mm (0.000945 to 0.00189 in.)
Maximum oil clearance:
0.063 mm (0.00248 in.)

NOTICE:

Completely remove the Plastigage after the measurement.

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.



HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, or 3 mark on its surface.

Standard Connecting Rod Large End Bore Diameter:

MARK	SPECIFIED CONDITION
Mark 1	51.000 to 51.007 mm (2.0079 to 2.0082 in.)
Mark 2	51.008 to 51.013 mm (2.0082 to 2.0084 in.)
Mark 3	51.014 to 51.020 mm (2.0084 to 2.0087 in.)

Standard Connecting Rod Bearing Thickness:

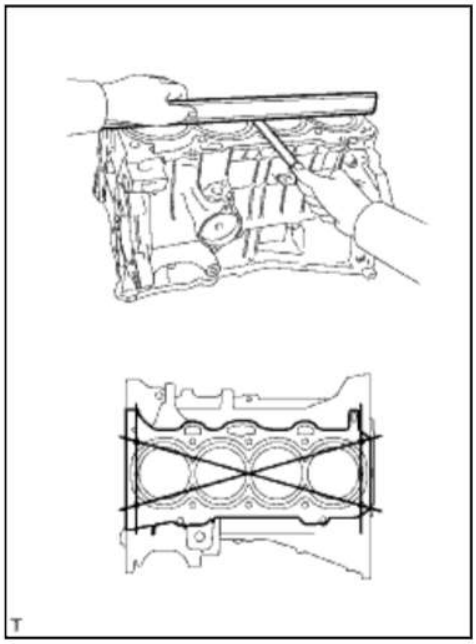
MARK	SPECIFIED CONDITION
Mark 1	1.485 to 1.488 mm (0.0585 to 0.0586 in.)
Mark 2	1.489 to 1.491 mm (0.0586 to 0.0587 in.)
Mark 3	1.492 to 1.494 mm (0.0587 to 0.0588 in.)

Standard crankshaft pin diameter:
47.990 to 48.000 (1.8894 to 1.8898 in.)

3. INSPECT CYLINDER BLOCK FOR WARPAGE

(a) Using a precision straightedge and feeler gauge, measure the warpage of the surface that contacts the cylinder head

cardiagn.com

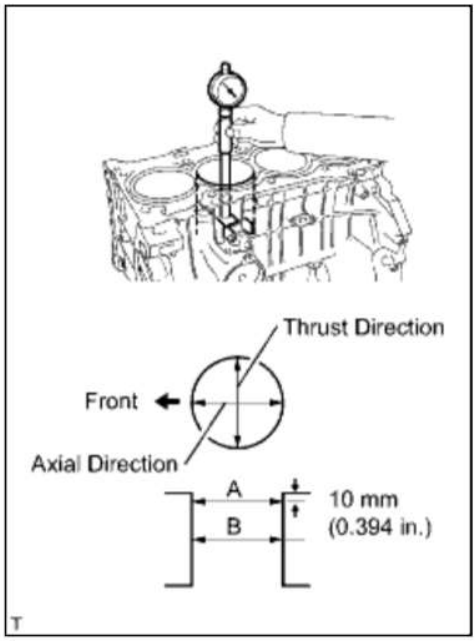


gasket.

Maximum warpage:
0.05 mm (0.00197 in.)

If the warpage is greater than the maximum, replace the cylinder block.

4. INSPECT CYLINDER BORE



(a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

Standard diameter:
88.500 to 88.513 mm (3.4843 to 3.4847 in.)
Maximum diameter:
88.613 mm (3.4887 in.)

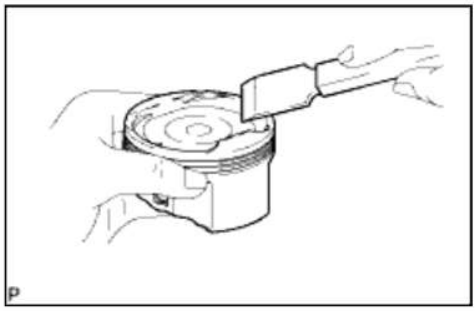
If the average diameter of the 4 positions is greater than the maximum, replace the cylinder block.

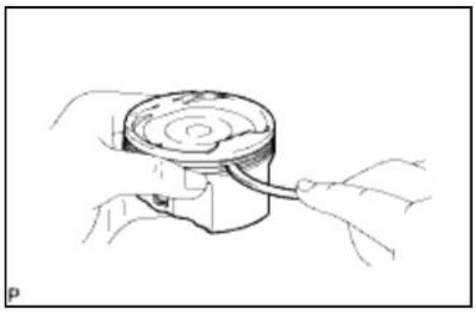
5. INSPECT PISTON

(a) Using a gasket scraper, remove the carbon from the top of the piston.

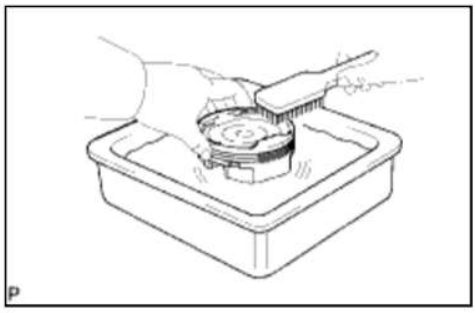
NOTICE:
Do not damage the piston.

cardiagn.com





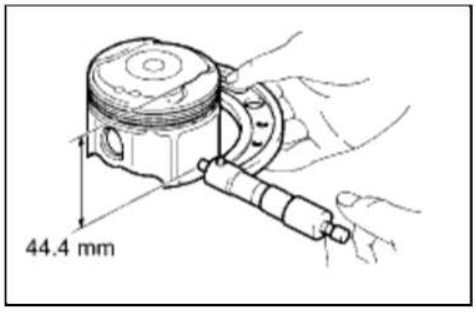
(b) Using a groove cleaning tool or a broken ring, clean the piston ring grooves.



(c) Using a brush and solvent, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



(d) Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at the piston 44.4 mm (1.748 in.) from the piston head.

Standard piston diameter:

88.469 to 88.479 mm (3.4830 to 3.4834 in.)

If the diameter is not as specified, replace the piston.

6. INSPECT PISTON OIL CLEARANCE

(a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

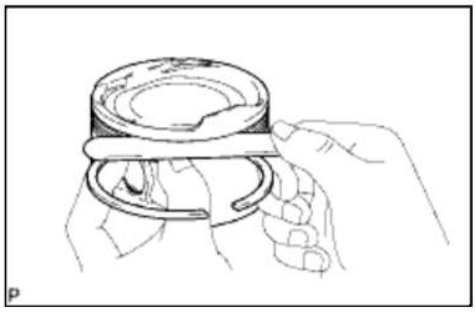
0.021 to 0.044 mm (0.000827 to 0.00173 in.)

cardiagn.com

Maximum oil clearance:
0.10 mm (0.00394 in.)

If the oil clearance is greater than the maximum, replace all the pistons. If necessary, replace the cylinder block.

7. INSPECT RING GROOVE CLEARANCE



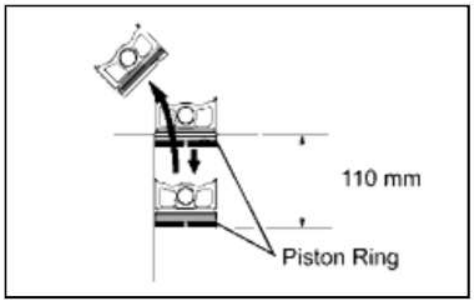
(a) Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

Standard Ring Groove Clearance:

ITEM	SPECIFIED CONDITION
No. 1 Ring	0.020 to 0.070 mm (0.000787 to 0.00276 in.)
No. 2 Ring	0.020 to 0.060 mm (0.000787 to 0.00236 in.)
Oil Ring	0.020 to 0.070 mm (0.000787 to 0.00276 in.)

If the groove clearance is not as specified, replace the piston.

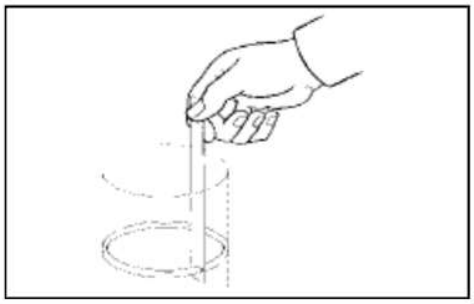
8. INSPECT PISTON RING END GAP



(a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.

(b) Using a feeler gauge, measure the end gap.

Standard End Gap:



ITEM	SPECIFIED CONDITION
No. 1 Ring	0.24 to 0.31 mm (0.00945 to 0.0122 in.)
No. 2 Ring	0.33 to 0.43 mm (0.0130 to 0.0169 in.)
Oil Ring	0.10 to 0.30 mm (0.00394 to 0.0118 in.)

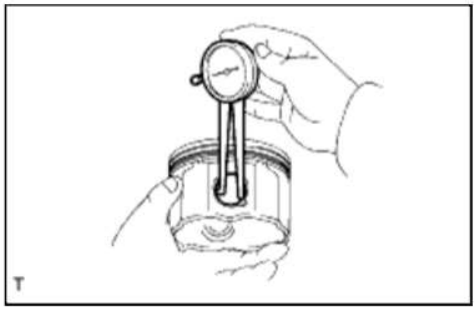
Maximum End Gap:

cardiagn.com

ITEM	SPECIFIED CONDITION
No. 1 Ring	0.31 mm (0.0122 in.)
No. 2 Ring	0.43 mm (0.0169 in.)
Oil Ring	0.30 mm (0.0118 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum with a new piston ring, replace the cylinder block.

9. INSPECT PISTON PIN OIL CLEARANCE

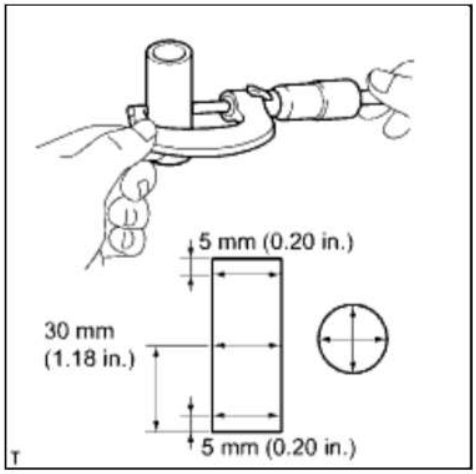


(a) Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter:
22.001 to 22.010 mm (0.8662 to 0.8665 in.)
:

ITEM	SPECIFIED CONDITION
A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
B	22.005 to 22.007 mm (0.8663 to 0.8664 in.)
C	22.008 to 22.010 mm (0.8665 to 0.8665 in.)

If the diameter is not as specified, replace the piston.



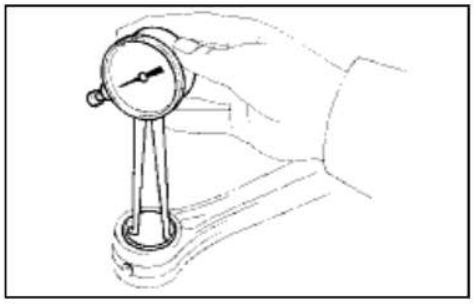
(b) Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter:
21.997 to 22.006 mm (0.8660 to 0.8664 in.)
:

ITEM	SPECIFIED CONDITION
A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)

If the diameter is not as specified, replace the piston pin.

cardiagn.com

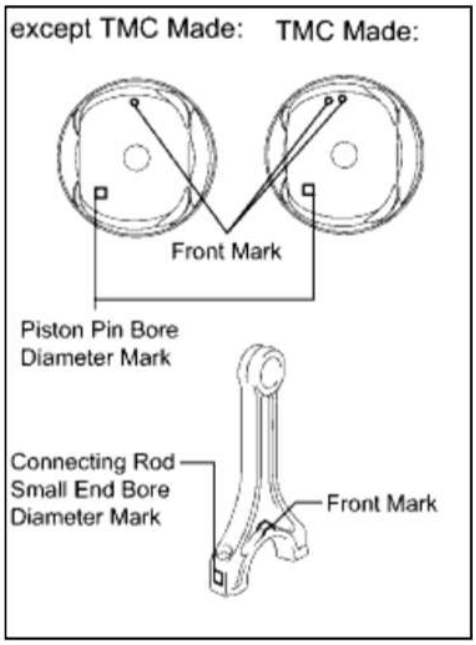


(c) Using a caliper gauge, measure the connecting rod small end bore diameter.

Standard connecting rod small end bore diameter:
22.005 to 22.014 mm (0.8663 to 0.8667 in.)
:

ITEM	SPECIFIED CONDITION
A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)

If the diameter is not as specified, replace the connecting rod.



(d) Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

Standard oil clearance:
0.001 to 0.007 mm (0.00004 to 0.0003 in.)
Maximum oil clearance:
0.010 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the piston and piston pin as a set.

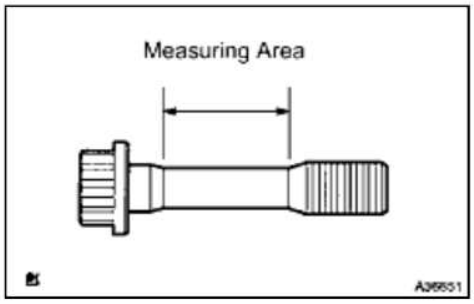
(e) Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance:
0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance:
0.011 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.

10. INSPECT CONNECTING ROD BOLT

cardiagn.com



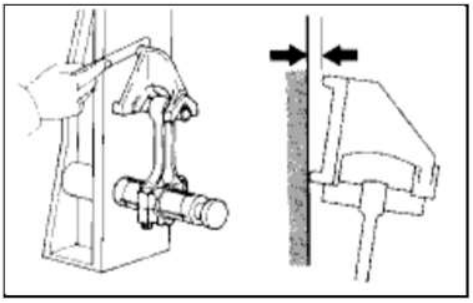
(a) Using a vernier caliper, measure the tension portion diameter of the bolt.

Standard diameter:
7.2 to 7.3 mm (0.283 to 0.287 in.)
Minimum diameter:
7.0 mm (0.276 in.)

If the diameter is less than the minimum, replace the connecting rod bolt.

11. INSPECT CONNECTING ROD SUB-ASSEMBLY

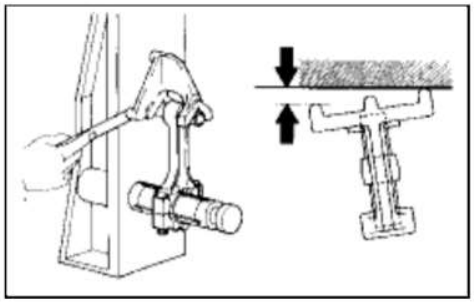
(a) Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.



(1) Check for misalignment.

Maximum misalignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the misalignment is greater than the maximum, replace the connecting rod.



(2) Check for twist.

Maximum twist:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the twist is greater than the maximum, replace the connecting rod.

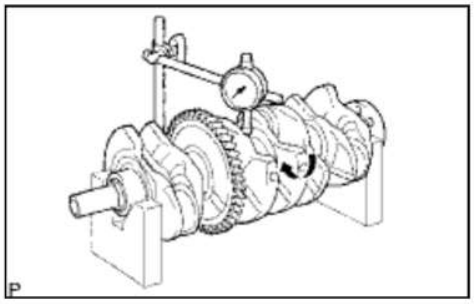
12. INSPECT CRANKSHAFT

(a) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

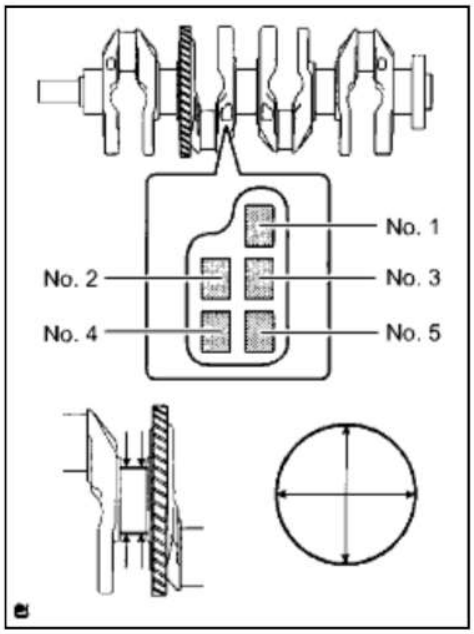
Maximum circle runout:
0.03 mm (0.0012 in.)

If the circle runout is greater than the maximum, replace

cardiagn.com



the crankshaft.



(b) Using a micrometer, measure the diameter of each main journal.

Standard diameter:
54.988 to 55.000 mm (2.1649 to 2.1654 in.)

If the diameter is not as specified, check the crankshaft oil clearance.

(c) Check each main journal for taper and distortion as shown in the illustration.

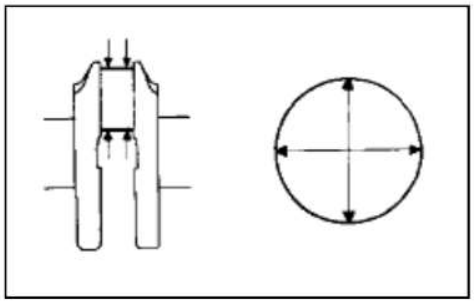
Maximum taper and distortion:
0.003 mm (0.0001 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

Standard Diameter (Reference):

MARK	SPECIFIED CONDITION
0	54.999 to 55.000 mm (2.16531 to 2.16535 in.)
1	54.997 to 54.998 mm (2.16523 to 2.16527 in.)
2	54.995 to 54.996 mm (2.16515 to 2.16519 in.)
3	54.993 to 54.994 mm (2.16507 to 2.16511 in.)
4	54.991 to 54.992 mm (2.16500 to 2.16503 in.)
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

cardiagn.com



(d) Using a micrometer, measure the diameter of each crank pin.

Standard diameter:
47.990 to 48.000 mm (1.8894 to 1.8898 in.)

If the diameter is not as specified, check the connecting rod oil clearance.

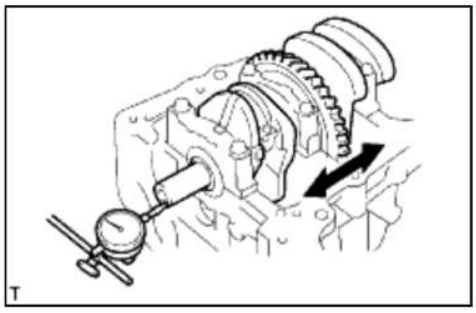
(e) Inspect each crank pin for taper and distortion as shown in the illustration.

Maximum taper and distortion:
0.003 mm (0.000118 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

13. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Install the main bearing cap INFO .



(b) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.04 to 0.24 mm (0.00157 to 0.00945 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)

If the thrust clearance is greater than the maximum, replace the thrust washers as a set.

HINT:

The thrust washer thickness is 1.93 to 1.98 mm (0.0760 to 0.0780 in.).

14. INSPECT CRANKSHAFT OIL CLEARANCE

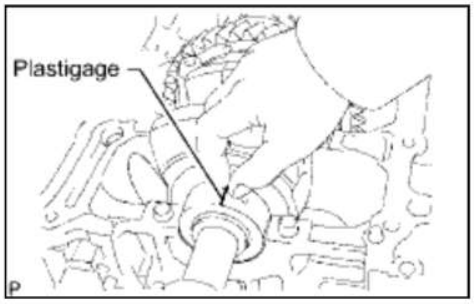
(a) Check the crank journal and bearing for pitting and scratches.

(b) Install the crankshaft bearing INFO .

(c) Place the crankshaft on the cylinder block.

(d) Lay a strip of Plastigage across each journal.

cardiagn.com



(e) Examine the front marks and numbers and install the bearing caps on the cylinder block.

HINT:

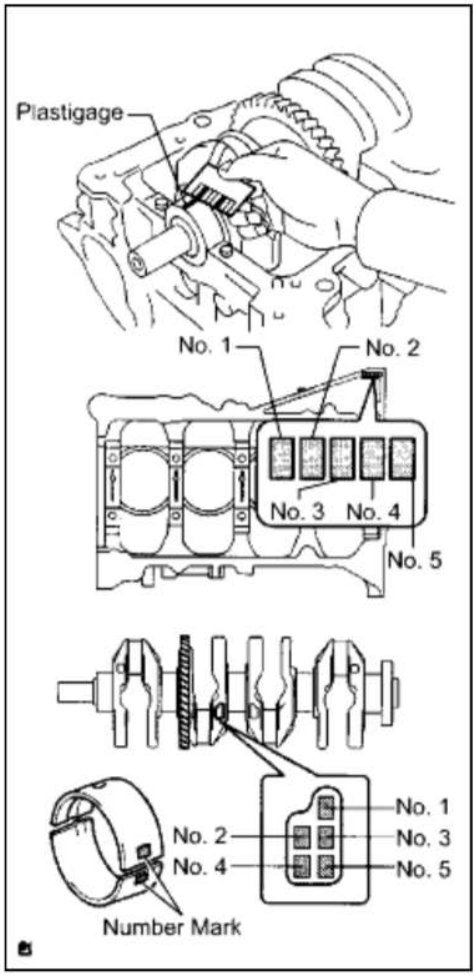
A number is marked on each main bearing cap to indicate the installation position.

(f) Install the main bearing caps INFO .

NOTICE:

Do not turn the crankshaft.

(g) Remove the main bearing caps INFO .



(h) Measure the Plastigage at its widest point.

Standard oil clearance:
0.017 to 0.040 mm (0.000669 to 0.00157 in.)
Maximum oil clearance:
0.060 mm (0.00236 in.)

NOTICE:

Remove the Plastigage completely after the measurement.

If the oil clearance is greater than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.

HINT:

- If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.
- EXAMPLE: Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

Cylinder block + Crankshaft	0 to 2	3 to 5	6 to 8	9 to 11
Bearing to be used	"1"	"2"	"3"	"4"

cardiagn.com

Standard Cylinder Block Journal Bore Diameter:

MARK	SPECIFIED CONDITION
0	59.000 to 59.002 mm (2.32283 to 2.32291 in.)
1	59.003 to 59.004 mm (2.32295 to 2.32299 in.)
2	59.005 to 59.006 mm (2.32303 to 2.32307 in.)
3	59.007 to 59.009 mm (2.32311 to 2.32318 in.)
4	59.010 to 59.011 mm (2.32322 to 2.32326 in.)
5	59.012 to 59.013 mm (2.32330 to 2.32334 in.)
6	59.014 to 59.016 mm (2.32338 to 2.32346 in.)

Standard Crankshaft Journal Diameter:

MARK	SPECIFIED CONDITION
0	54.999 to 55.000 mm (2.16531 to 2.16535 in.)
1	54.997 to 54.998 mm (2.16523 to 2.16527 in.)
2	54.995 to 54.996 mm (2.16515 to 2.16519 in.)
3	54.993 to 54.994 mm (2.16507 to 2.16511 in.)
4	54.991 to 54.992 mm (2.16500 to 2.16504 in.)
5	54.988 to 54.990 mm (2.16488 to 2.16496 in.)

Standard Bearing Center Wall Thickness:

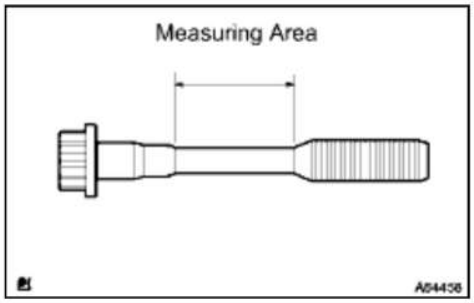
MARK	SPECIFIED CONDITION
1	1.993 to 1.996 mm (0.078464 to 0.078583 in.)
2	1.997 to 1.999 mm (0.078622 to 0.078701 in.)
3	2.000 to 2.002 mm (0.078740 to 0.078819 in.)
4	2.003 to 2.005 mm (0.078858 to 0.078937 in.)

cardiagn.com

15. INSPECT CRANKSHAFT BEARING CAP SET RING PIN

(a) Using a vernier caliper, measure the tension portion diameter of the bolts.

Standard diameter:
7.5 to 7.6 mm (0.295 to 0.299 in.)
Minimum diameter:
7.5 mm (0.295 in.)



If the diameter is less than the minimum, replace the bolt.

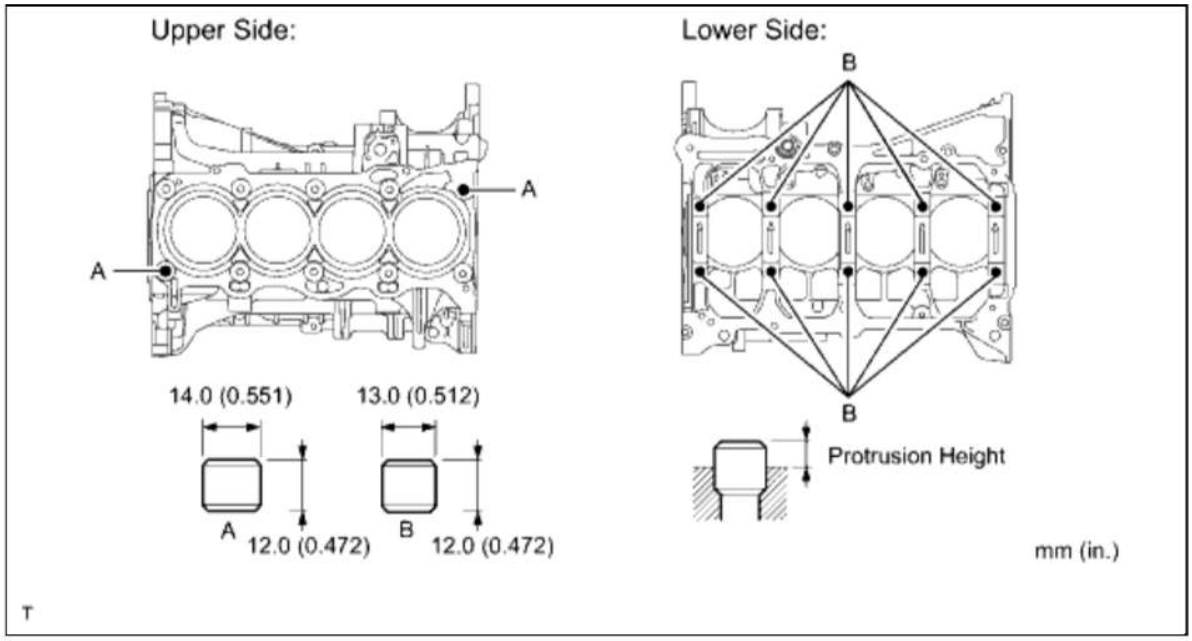
cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000224E00CX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER BLOCK: REASSEMBLY (2010 Corolla)		

REASSEMBLY

1. INSTALL RING PIN

(a) Using a plastic hammer, tap in the ring pins.



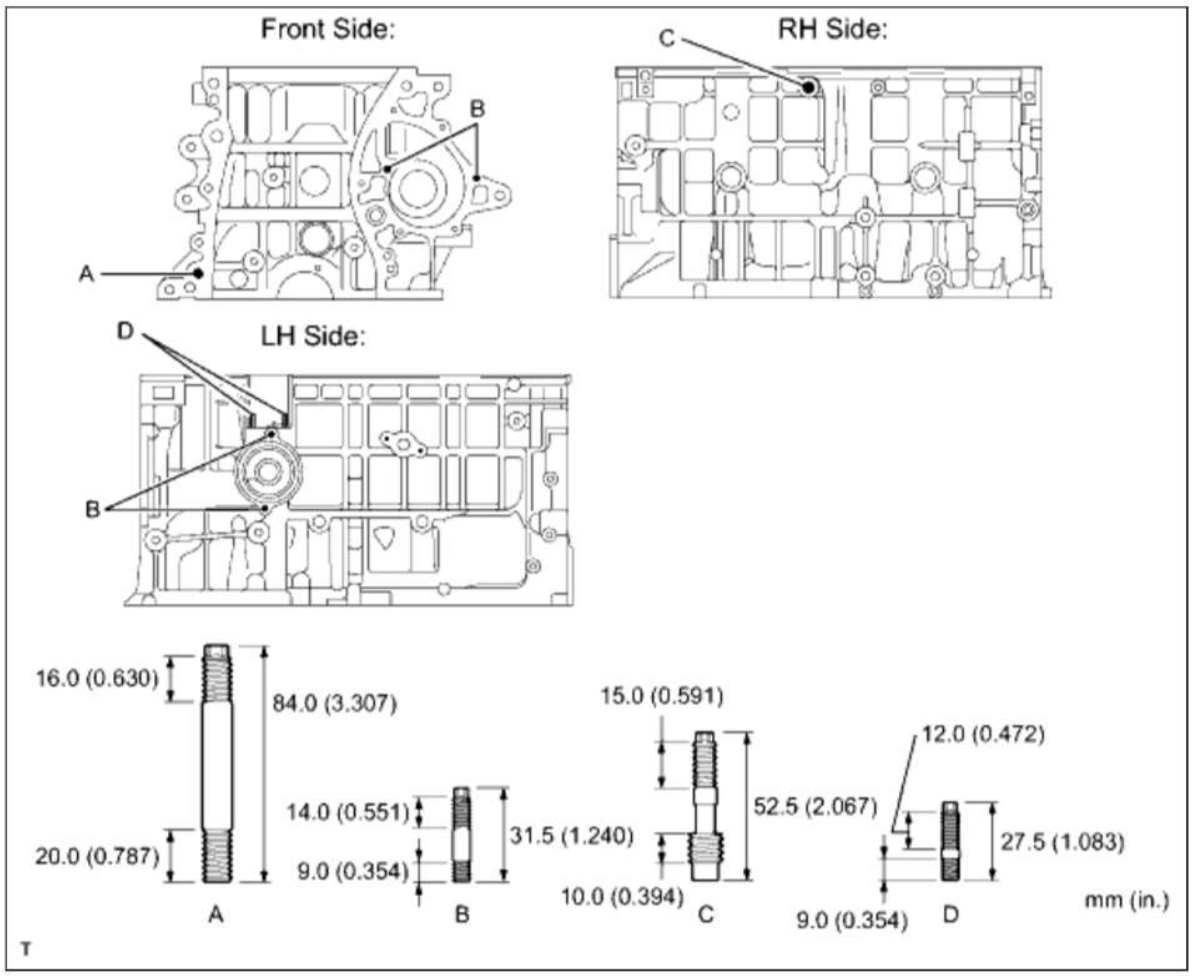
Standard Protrusion:

ITEM	PROTRUSION
A	6 mm (0.236 in.)
B	5 mm (0.197 in.)

2. INSTALL STUD BOLT

(a) Install the stud bolts as shown in the illustration.

cardiagn.com

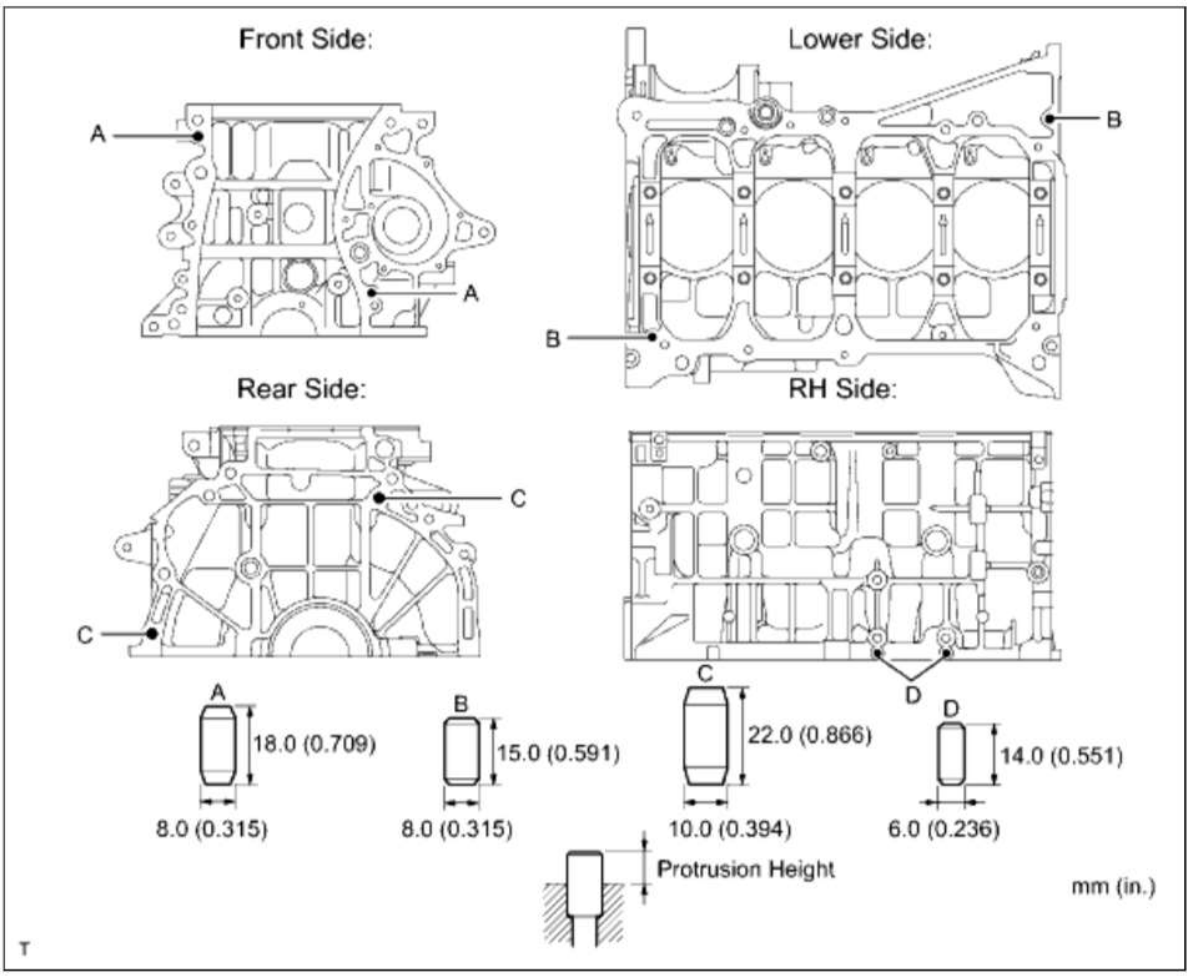


Stud Bolt A - Torque: 22 N·m (220 kgf·cm, 16ft·lbf)
Stud Bolt B - Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)
Stud Bolt C - Torque: 9.5 N·m (97 kgf·cm, 84in·lbf)
Stud Bolt D - Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

3. INSTALL STRAIGHT PIN

(a) Using a plastic hammer, tap in the straight pins.

cardiagn.com



Standard Protrusion:

ITEM	PROTRUSION
A	8 mm (0.315 in.)
B	7.5 mm (0.295 in.)
C	12 mm (0.472 in.)
D	5 mm (0.197 in.)

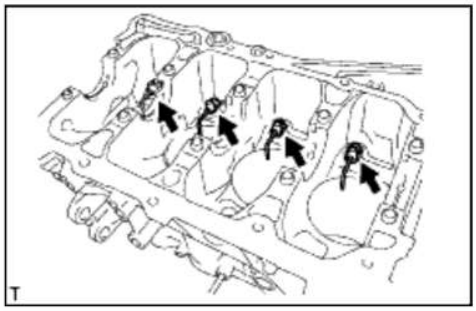
4. INSPECT CRANKSHAFT OIL CLEARANCE INFO

5. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY

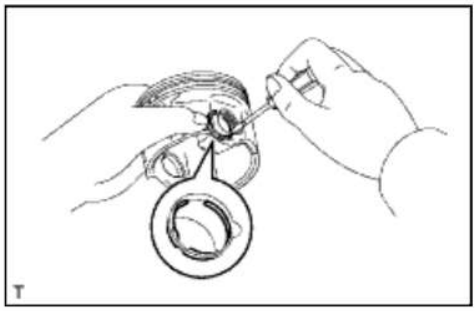
(a) Using a 5 mm hexagon wrench, install the oil nozzles with the bolts.

Torque: 7.0 N·m (71 kgf·cm, 62in·lbf)

cardiagn.com



6. INSTALL PISTON

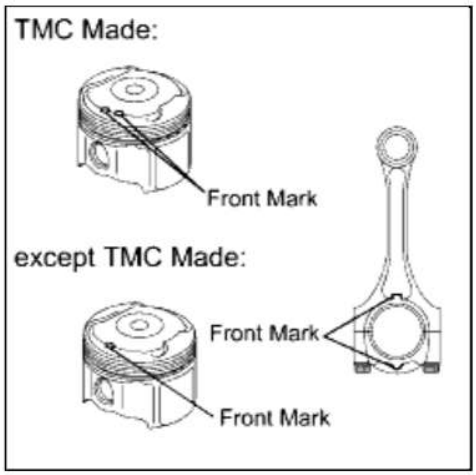


(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.

HINT:

Make sure that the end gap on the snap ring is not aligned with the pin hole cutout portion of the piston.

(b) Gradually heat the piston to approximately 80 to 90 °C (176 to 194°F).



(c) Align the front marks on the piston and connecting rod, and push in the piston with a thumb.

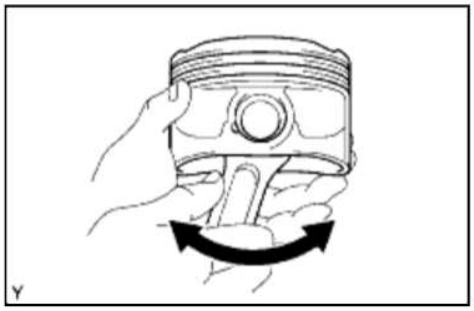
(d) Using a screwdriver, install a new snap ring on the other end of the piston pin hole.

HINT:

Make sure that the end gap on the snap ring is not aligned with the pin hole cutout portion of the piston.

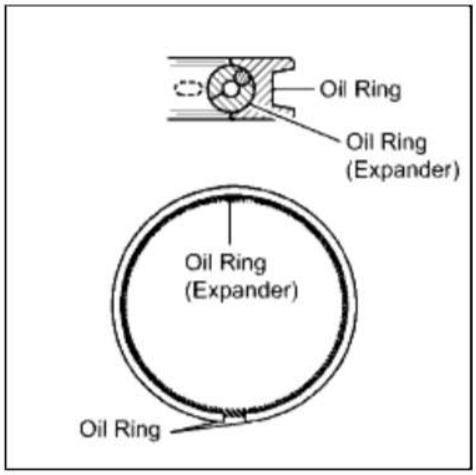
(e) Check the fitting condition between the piston and piston

cardiagn.com



pin by trying to move the piston back and forth on the piston pin.

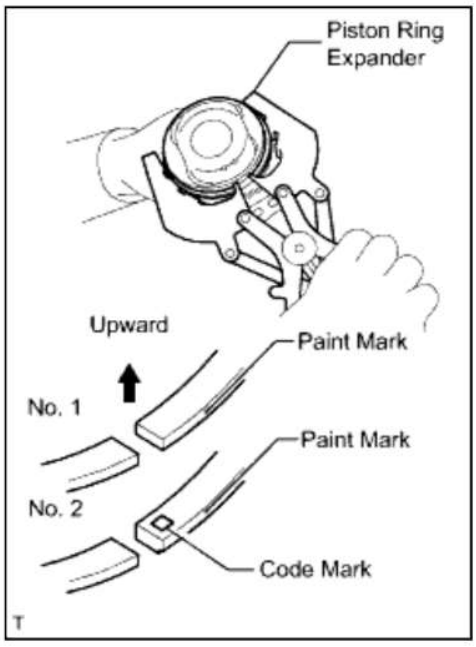
7. INSTALL PISTON RING SET



(a) Install the oil ring expander and oil ring rail by hand.

NOTICE:

- Install the expander and oil ring so that their ring ends are at opposite sides.
- Securely install the expander into the inner groove of the oil ring.



(b) Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.

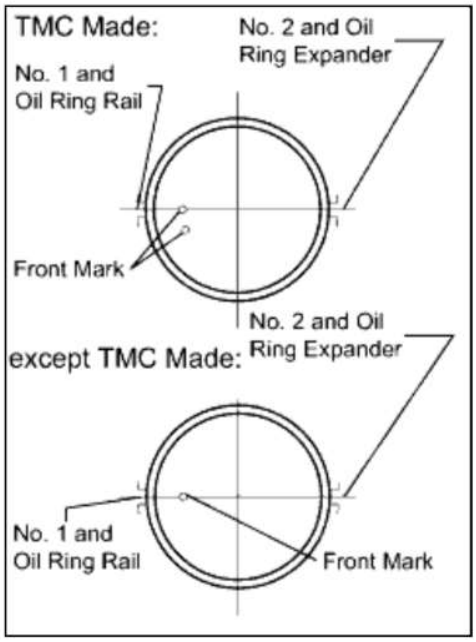
NOTICE:

Install compression ring No. 2 with the code mark (2N or 2A) facing upward.

HINT:

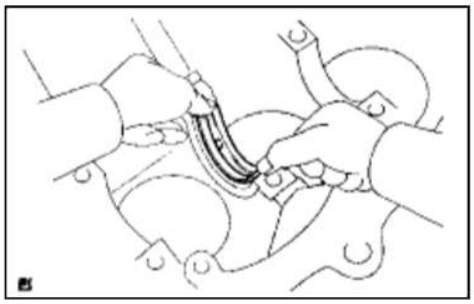
Supply part compression springs (No. 1 and No. 2) do not have paint marks.

cardiagn.com



(c) Position the piston rings so that the ring ends are as shown in the illustration.

8. INSTALL CRANKSHAFT BEARING

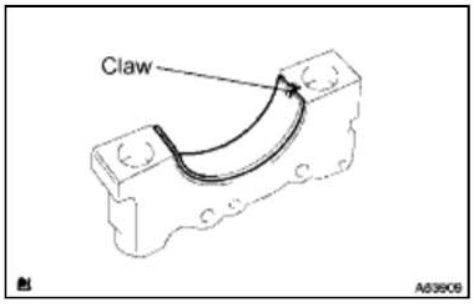


(a) Install the upper bearing with an oil groove on the cylinder block.

NOTICE:

Do not apply engine oil to the bearing inner surface or bearing cap contact surfaces.

9. INSTALL NO. 2 CRANKSHAFT BEARING



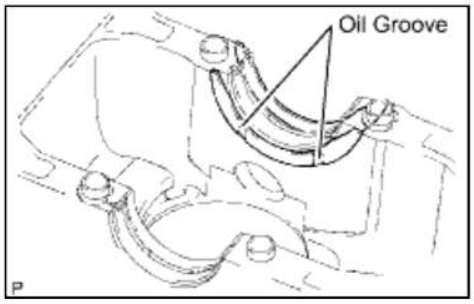
(a) Install the No. 2 crankshaft bearing on the bearing cap.

NOTICE:

Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oils.

10. INSTALL UPPER CRANKSHAFT THRUST WASHER

cardiagn.com



(a) Install the 2 thrust washers under the No. 3 journal of the cylinder block with the oil grooves facing outward.

NOTICE:

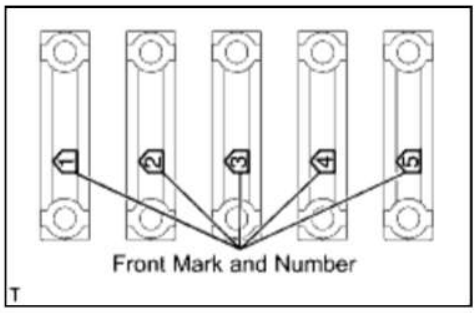
Make sure to install the proper thrust washers.

(b) Apply engine oil to the crankshaft thrust washers.

11. INSTALL CRANKSHAFT

(a) Apply engine oil to the upper bearings and place the crankshaft on the cylinder block.

(b) Apply engine oil to the lower bearings.



(c) Examine the front marks and install the bearing caps on the cylinder block.

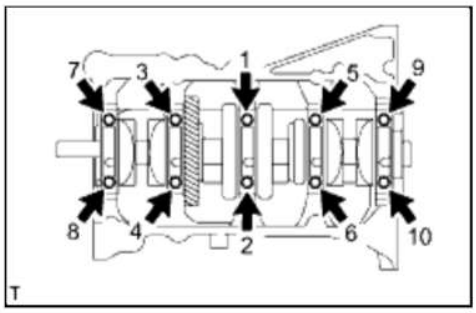
(d) Apply a light coat of engine oil to the threads and under the bearing cap bolts.

(e) Install the crankshaft bearing cap bolts.

NOTICE:

The main bearing cap bolts are tightened in 2 progressive steps.

(f) Step 1

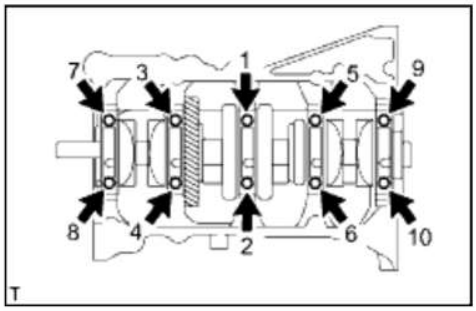


(1) Install and uniformly tighten the 10 main bearing cap bolts in the sequence shown in the illustration.

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

(2) Retighten the 10 main bearing cap bolts in the

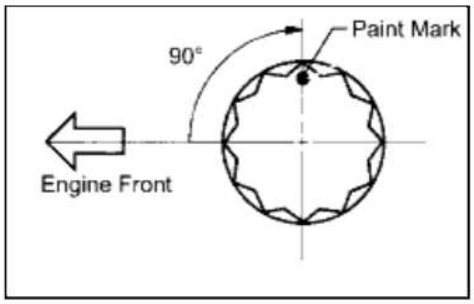
cardiagn.com



sequence shown in the illustration.

Torque: 40 N·m (408 kgf·cm, 30ft·lbf)

(g) Step 2



(1) Mark the front of the bearing cap bolts with paint.

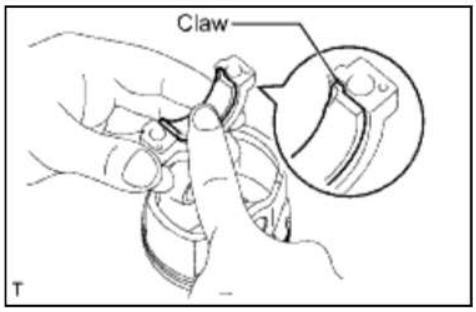
(2) Retighten the bearing cap bolts 90° in the numerical order shown in the illustration.

(h) Check that the paint mark is now at a 90° angle to the front.

(i) Check that the crankshaft turns smoothly.

(j) Check the crankshaft thrust clearance INFO .

12. INSTALL CONNECTING ROD BEARING



(a) Align the bearing claw with the groove on the connecting rod or connecting cap.

NOTICE:

Do not apply engine oil to the bearing inner surface or connecting rod contact surface.

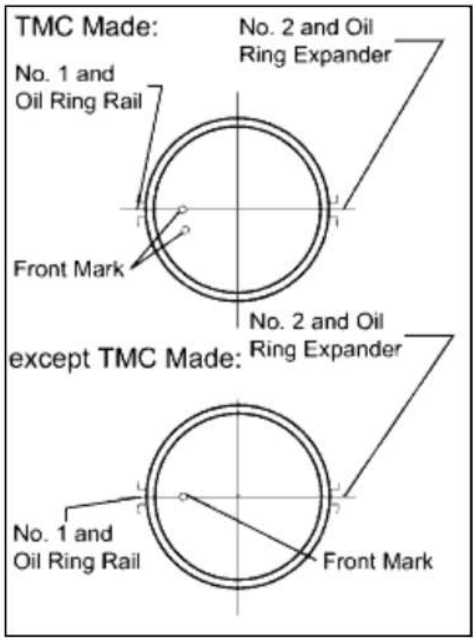
13. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

NOTICE:

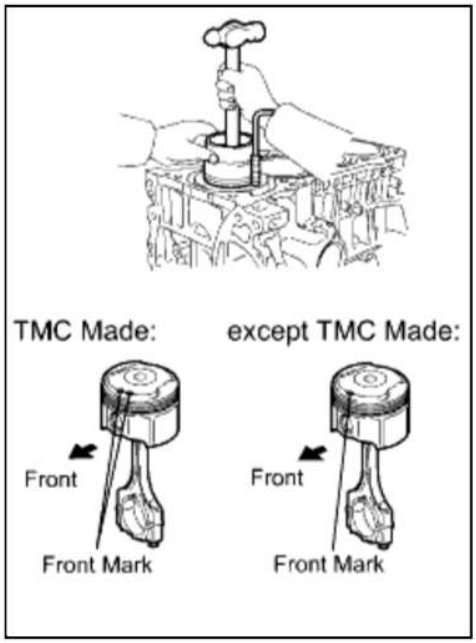
The connecting rod cap bolts are tightened in 2 progressive steps.

(a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of connecting rod bearings.

cardiagn.com



(b) Check the position of the piston ring ends.



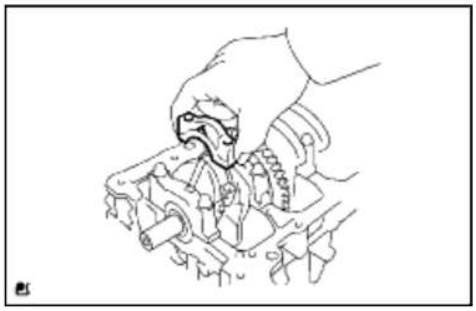
(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

NOTICE:

Match the numbered connecting rod cap with the connecting rod.

(d) Check that the protrusion on the connecting rod cap is facing in the correct direction.

cardiagn.com



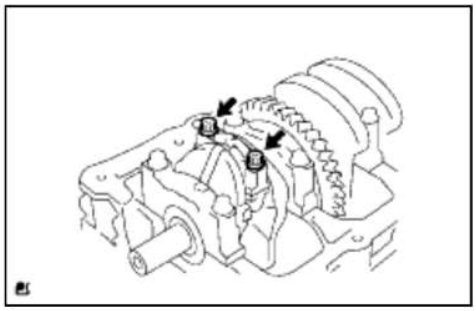
(e) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.

(f) Install the connecting cap bolts.

NOTICE:

The connecting cap bolts should be tightened in 2 progressive steps.

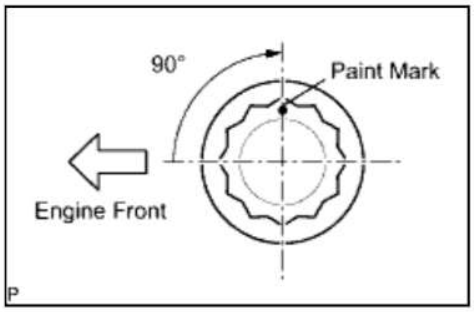
(g) Step 1



(1) Install and alternately tighten the bolts of the connecting rod cap in several steps.

Torque: 25 N·m (250 kgf·cm, 18ft·lbf)

(h) Step 2



(1) Mark the front of the connecting rod cap bolts with paint.

(2) Retighten the cap bolts 90° as shown in the illustration.

(i) Check that the crankshaft turns smoothly.

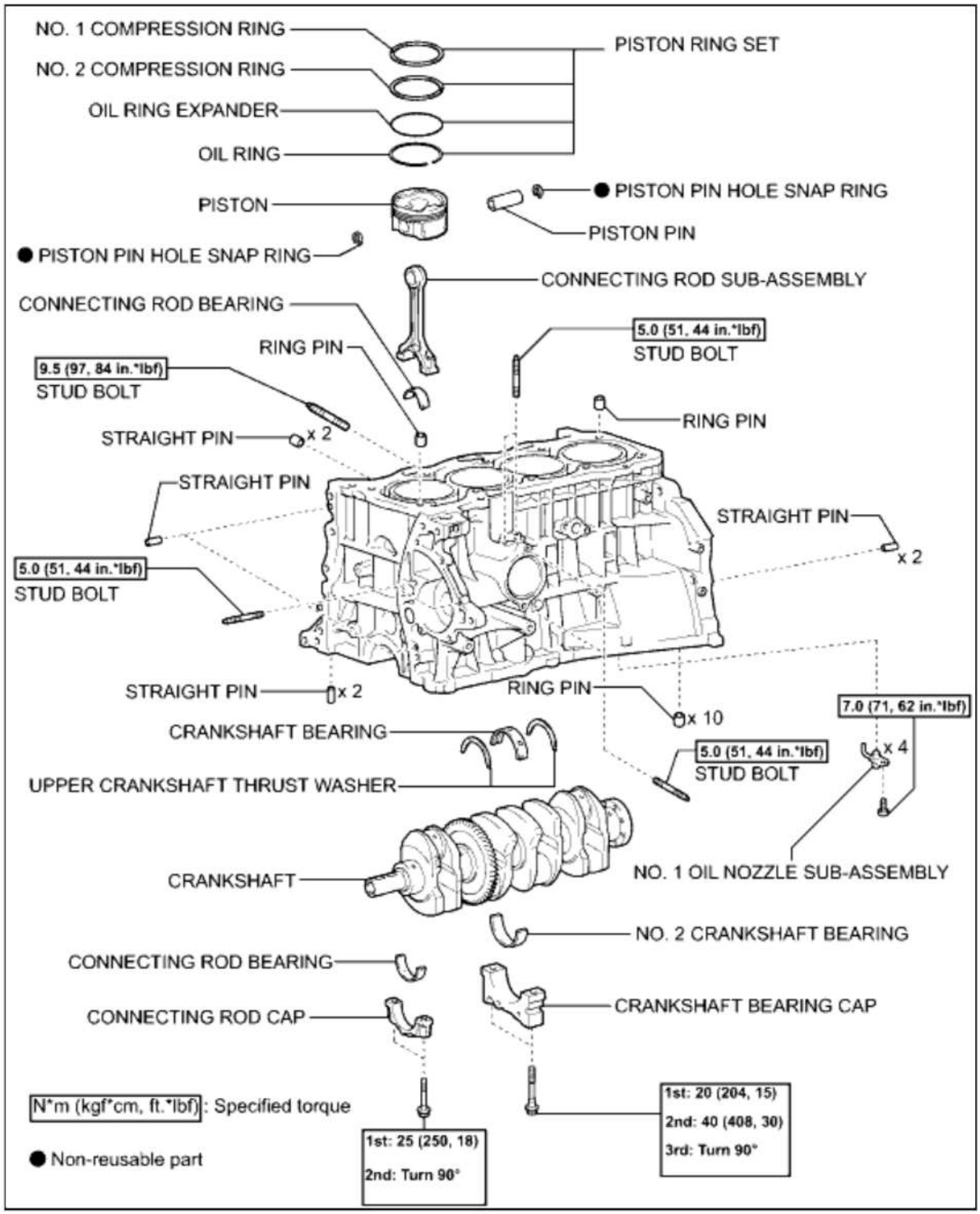
(j) Check the connecting rod thrust clearance INFO .

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000224C00CX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER BLOCK: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION



cardiagn.com



cardiagn.com

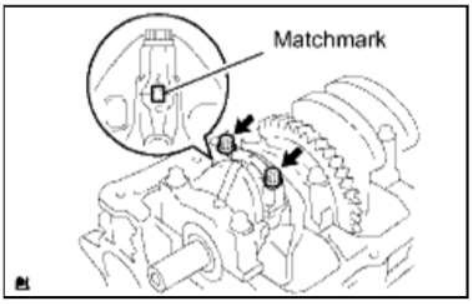
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000224D00CX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER BLOCK: DISASSEMBLY (2010 Corolla)		

DISASSEMBLY

1. INSPECT CONNECTING ROD THRUST CLEARANCE INFO

2. INSPECT CONNECTING ROD OIL CLEARANCE INFO

3. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD



(a) Check that the matchmarks on the connecting rod and cap are aligned to ensure the correct reassembly.

HINT:

The matchmarks on the connecting rods and caps are provided for ensuring the correct reassembly.



(b) Using a 12 mm socket wrench, uniformly loosen and remove the 2 bolts.

(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:

Keep the lower bearing inserted in the connecting rod cap.

(d) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

cardiagn.com

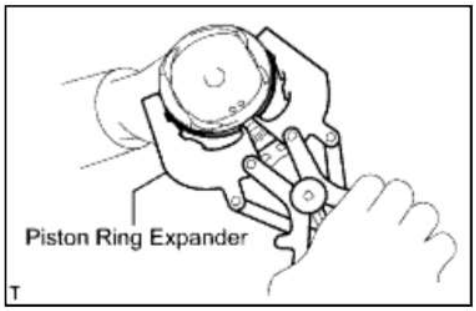
4. REMOVE CONNECTING ROD BEARING

(a) Remove the connecting rod bearings.

HINT:

Arrange the removed parts in the correct order.

5. REMOVE PISTON RING SET



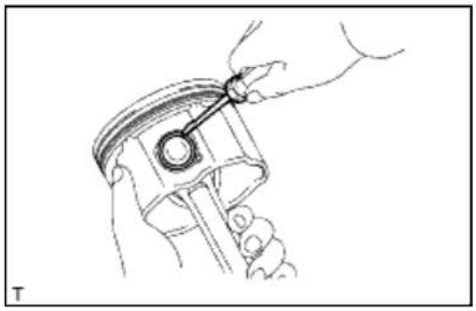
(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the oil ring rail and oil ring expander by hand.

HINT:

Arrange the removed parts in the correct order.

6. REMOVE PISTON PIN HOLE SNAP RING

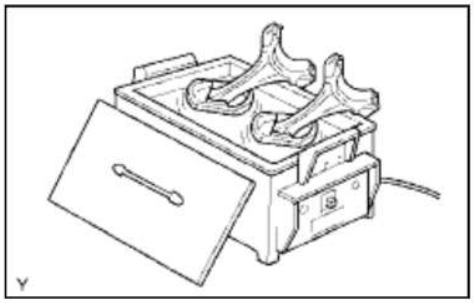


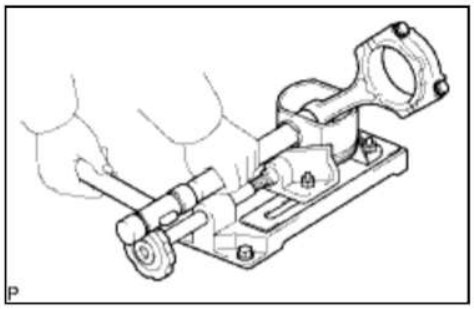
(a) Using a screwdriver, pry out the 2 snap rings.

7. REMOVE PISTON

(a) Gradually heat the piston to between 80 and 90°C (176 and 194°F).

cardiagn.com





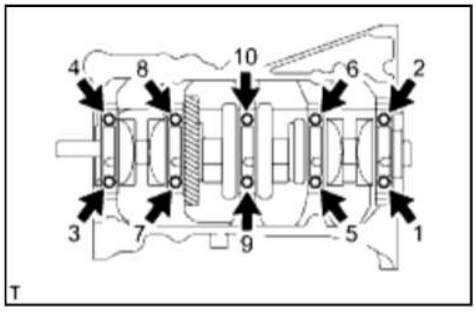
(b) Using a plastic hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:

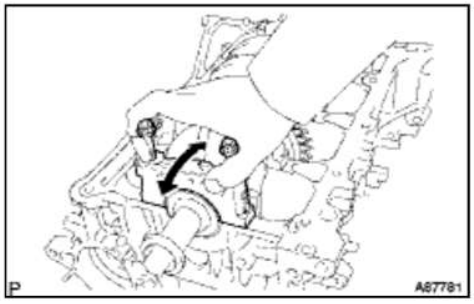
- The piston and pin are a matched set.
- Arrange the pistons, pin, rings, connecting rods and bearings in the correct order.

8. INSPECT CRANKSHAFT THRUST CLEARANCE

9. REMOVE CRANKSHAFT



(a) Uniformly loosen and remove the 10 main bearing cap bolts in the sequence shown in the illustration.



(b) Use 2 removed main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.

NOTICE:

Insert the bolts into one of the caps. Ease the cap out by gently pulling up and applying force toward the front and back side of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.

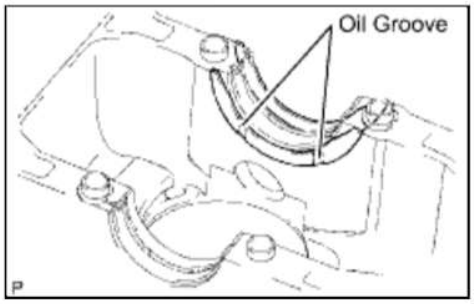
HINT:

- Keep the lower bearing and main bearing cap.
- Arrange the main bearing caps in the correct order.

cardiagn.com

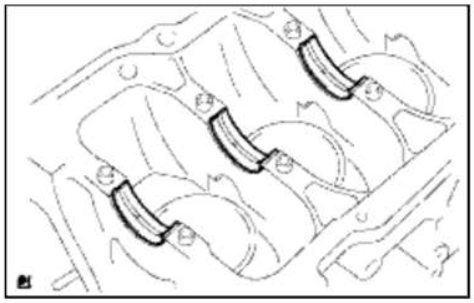
(c) Lift out the crankshaft.

10. REMOVE UPPER CRANKSHAFT THRUST WASHER



(a) Remove the upper thrust washers from the cylinder block.

11. REMOVE CRANKSHAFT BEARING

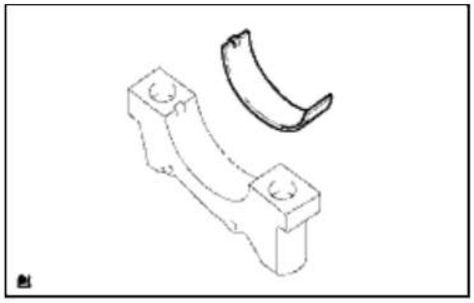


(a) Remove the 5 crankshaft bearings from the cylinder block.

HINT:

Arrange the removed parts in the correct order.

12. REMOVE NO. 2 CRANKSHAFT BEARING



(a) Remove the 5 No. 2 crankshaft bearings from the 5 main bearing caps.

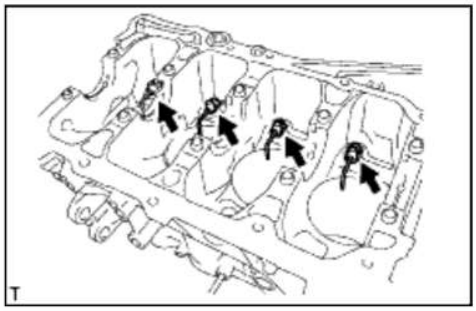
HINT:

Arrange the removed parts in the correct order.

13. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Using a 5 mm hexagon wrench, remove the bolts and oil nozzles.

cardiagn.com



14. REMOVE STUD BOLT

15. REMOVE RING PIN

16. REMOVE STRAIGHT PIN

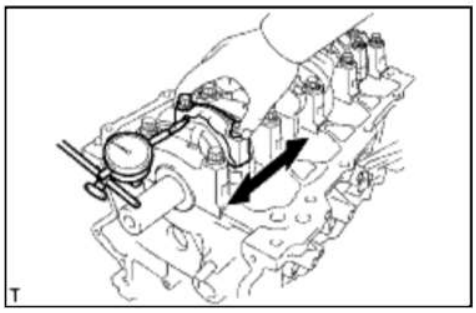
cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA201UX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER BLOCK: INSPECTION (2010 Corolla)		

INSPECTION

1. INSPECT CONNECTING ROD THRUST CLEARANCE

(a) Install the connecting rod cap INFO .



(b) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

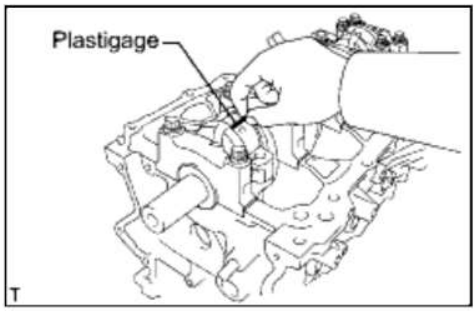
Standard thrust clearance:
0.160 to 0.342 mm (0.0063 to 0.0135 in.)
Maximum thrust clearance:
0.342 mm (0.0135 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.

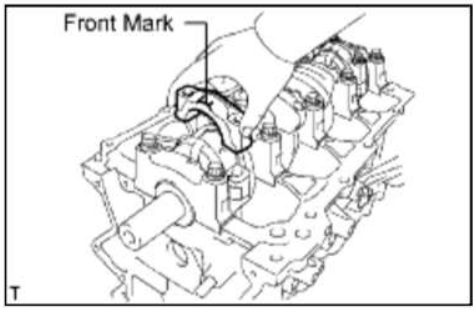
2. INSPECT CONNECTING ROD OIL CLEARANCE

(a) Clean the crank pin and bearing.

(b) Check the crank pin and bearing for pitting and scratches.



(c) Lay a strip of Plastigage on the crank pin.



(d) Check that the front mark of the connecting rod cap is facing forward.

cardiagn.com

(e) Install the connecting rod cap INFO .

NOTICE:

Do not turn the crankshaft.

(f) Remove the 2 bolts and connecting rod cap INFO .

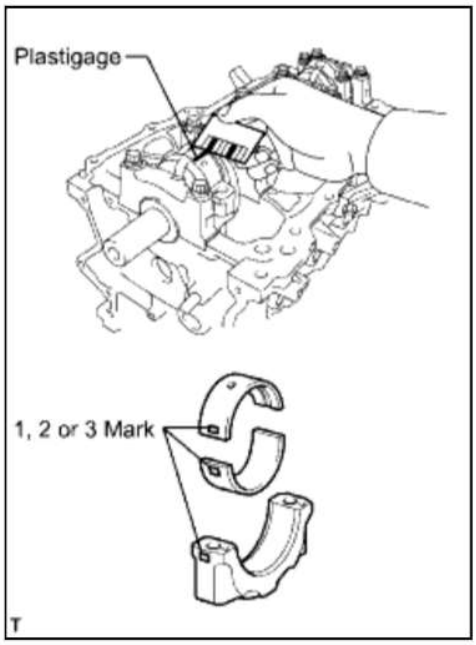
(g) Measure the Plastigage at its widest point.

Standard oil clearance:
0.030 to 0.062 mm (0.0012 to 0.0024 in.)
Maximum oil clearance:
0.07 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

NOTICE:

Completely remove the Plastigage after the measurement.



HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each standard bearing thickness is indicated by a 1, 2, or 3 mark on its surface.

Standard Connecting Rod Large End Bore Diameter:

MARK	SPECIFIED CONDITION
Mark 1	47.000 to 47.008 mm (1.8504 to 1.8507 in.)
Mark 2	47.009 to 47.016 mm (1.8507 to 1.8510 in.)
Mark 3	47.017 to 47.024 mm (1.8511 to 1.8513 in.)

Standard Connecting Rod Bearing Thickness:

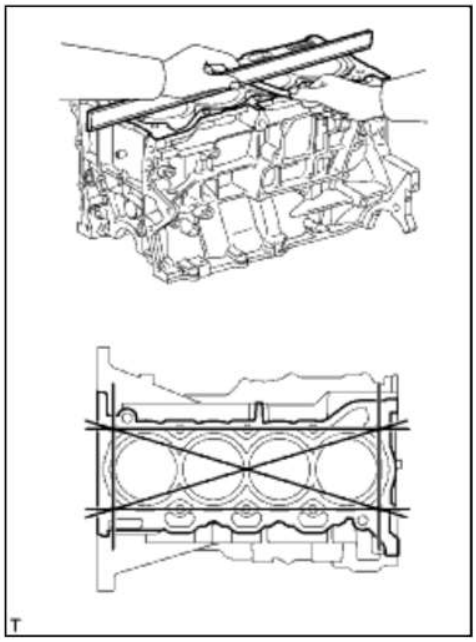
MARK	SPECIFIED CONDITION
Mark 1	1.489 to 1.493 mm (0.0586 to 0.0588 in.)
Mark 2	1.494 to 1.497 mm (0.0588 to 0.0589 in.)
Mark 3	1.498 to 1.501 mm (0.0590 to 0.0591 in.)

Standard Crankshaft Pin Diameter:

MARK	SPECIFIED CONDITION
Mark 1,2,3	43.992 to 44.000 mm (1.7320 to 1.7323 in.)

3. INSPECT CYLINDER BLOCK FOR WARPAGE

cardiagn.com

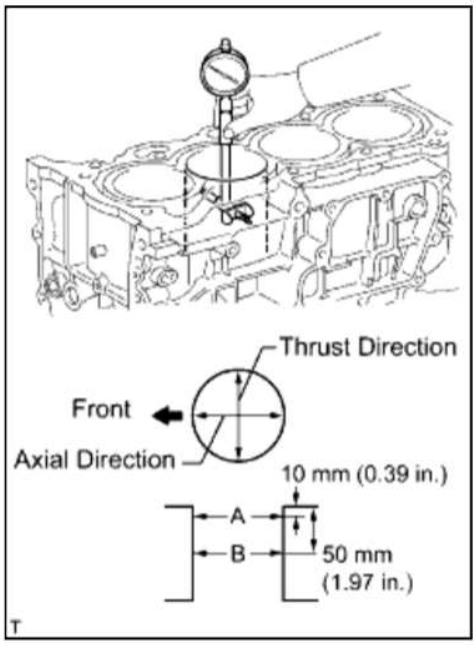


(a) Using a precision straightedge and feeler gauge, measure the warpage of the surface that is in contact with the cylinder head gasket.

Maximum warpage:
0.05 mm (0.0020 in.)

If the warpage is greater than the maximum, replace the cylinder block.

4. INSPECT CYLINDER BORE



(a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in both thrust and axial directions.

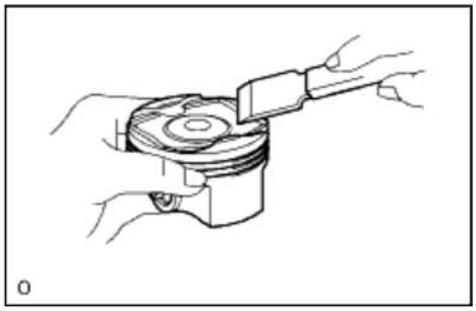
Standard diameter:
80.500 to 80.513 mm (3.1693 to 3.1698 in.)
Maximum diameter:
80.633 mm (3.1745 in.)

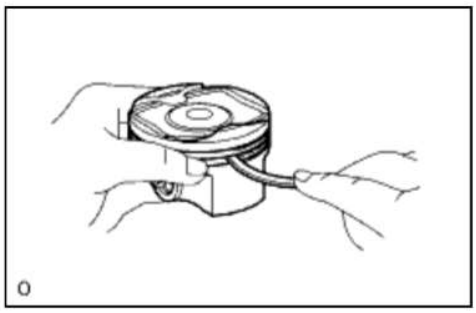
If the average diameter of the 4 positions is greater than the maximum, replace the cylinder block.

5. INSPECT PISTON

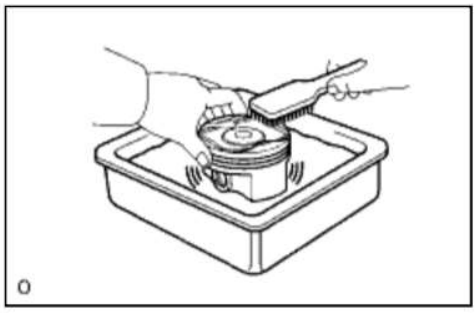
(a) Using a gasket scraper, remove the carbon from the top of the piston.

cardiagn.com





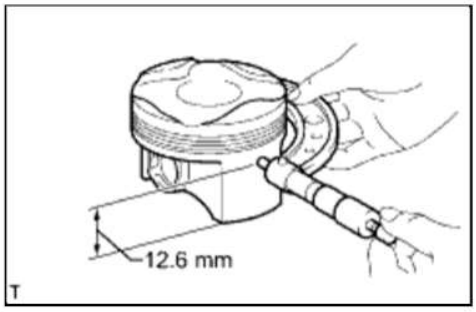
(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(c) Using a brush and solvent, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



(d) Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at a point 12.6 mm (0.4961 in.) from the piston head.

Standard piston diameter:

80.461 to 80.471 mm (3.1677 to 3.1681 in.)

If the diameter is not as specified, replace the piston.

6. INSPECT PISTON OIL CLEARANCE

(a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

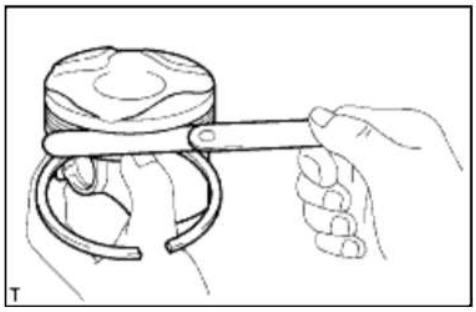
0.029 to 0.052 mm (0.0011 to 0.0020 in.)

cardiagn.com

Maximum oil clearance:
0.09 mm (0.0035 in.)

If the oil clearance is greater than the maximum, replace all the pistons. If necessary, replace the cylinder block.

7. INSPECT RING GROOVE CLEARANCE



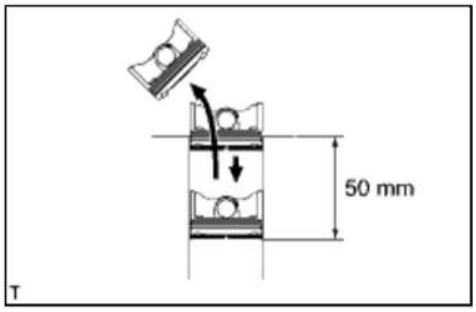
(a) Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

Standard Ring Groove Clearance:

ITEM	SPECIFIED CONDITION
No. 1 Ring	0.02 to 0.07 mm (0.0008 to 0.0028 in.)
No. 2 Ring	0.02 to 0.06 mm (0.0008 to 0.0024 in.)
Oil Ring	0.02 to 0.065 mm (0.0008 to 0.0026 in.)

If the groove clearance is not as specified, replace the piston.

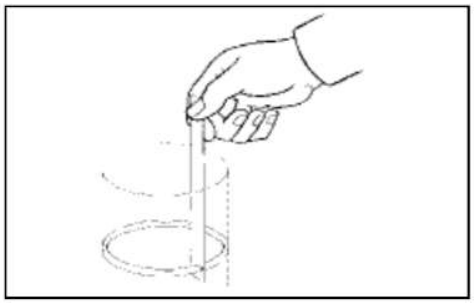
8. INSPECT PISTON RING END GAP



(a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 50 mm (1.97 in.) from the top of the cylinder block.

(b) Using a feeler gauge, measure the end gap.

Standard End Gap:



ITEM	SPECIFIED CONDITION
No. 1 Ring	0.2 to 0.3 mm (0.0079 to 0.0118 in.)
No. 2 Ring	0.3 to 0.5 mm (0.0118 to 0.0197 in.)
Oil Ring	0.1 to 0.4 mm (0.0039 to 0.0157 in.)

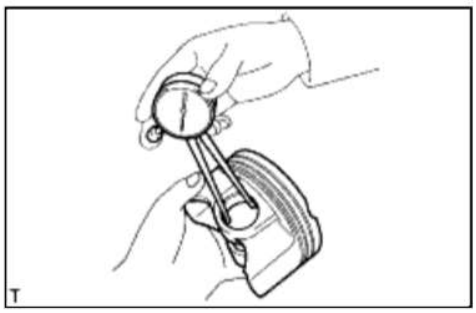
Maximum End Gap:

cardiagn.com

ITEM	SPECIFIED CONDITION
No. 1 Ring	0.5 mm (0.0197 in.)
No. 2 Ring	0.7 mm (0.0276 in.)
Oil Ring	0.7 mm (0.0276 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum, even with a new piston ring, replace the cylinder block.

9. INSPECT PISTON PIN OIL CLEARANCE

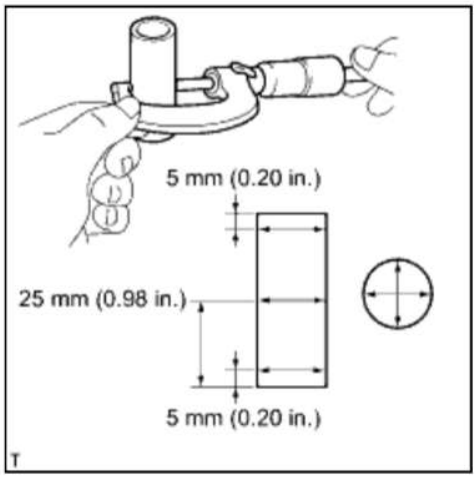


(a) Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter:
20.006 to 20.015 mm (0.7876 to 0.7880 in.)

ITEM	SPECIFIED CONDITION
A	20.006 to 20.009 mm (0.7876 to 0.7878 in.)
B	20.010 to 20.012 mm (0.7878 to 0.7879 in.)
C	20.013 to 20.015 mm (0.7879 to 0.7880 in.)

If the diameter is not as specified, replace the piston.



(b) Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter:
20.004 to 20.013 mm (0.7876 to 0.7879 in.)

ITEM	SPECIFIED CONDITION
A	20.004 to 20.007 mm (0.7876 to 0.7877 in.)
B	20.008 to 20.010 mm (0.7877 to 0.7878 in.)
C	20.011 to 20.013 mm (0.7878 to 0.7879 in.)

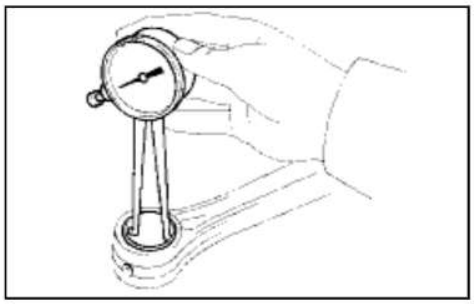
If the diameter is not as specified, replace the piston pin.

(c) Using a caliper gauge, measure the connecting rod small

cardiagn.com

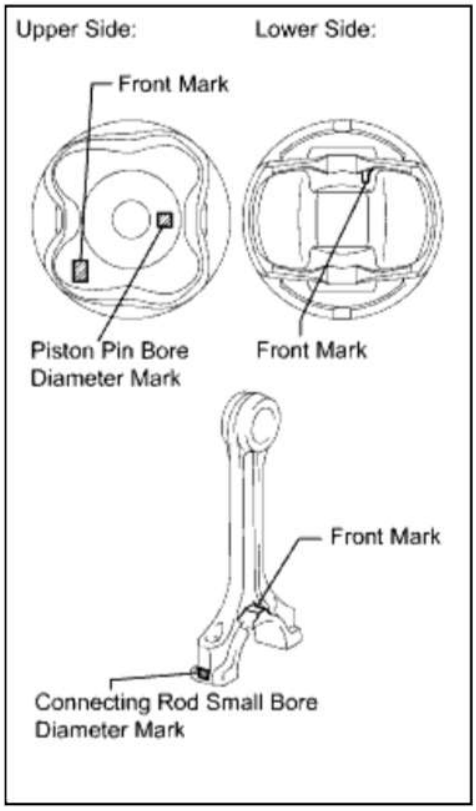
end bore diameter.

Standard connecting rod small end bore diameter:
20.012 to 20.021 mm (0.7879 to 0.7882 in.)



ITEM	SPECIFIED CONDITION
A	20.012 to 20.015 mm (0.7879 to 0.7880 in.)
B	20.016 to 20.018 mm (0.7880 to 0.7881 in.)
C	20.019 to 20.021 mm (0.7881 to 0.7882 in.)

If the diameter is not as specified, replace the connecting rod.



(d) Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

Standard oil clearance:
-0.001 to 0.005 mm (-0.00004 to 0.0002 in.)
Maximum oil clearance:
0.010 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the piston and piston pin as a set.

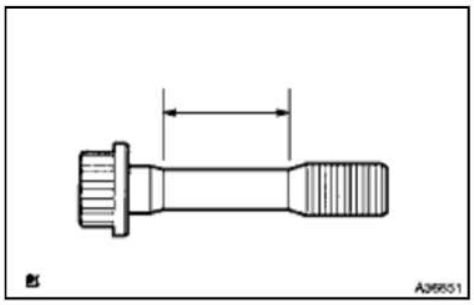
(e) Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance:
0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance:
0.014 mm (0.0006 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.

cardiagn.com

10. INSPECT CONNECTING ROD BOLT



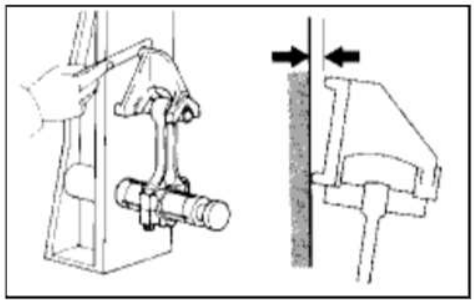
(a) Using a vernier caliper, measure the tension portion diameter of the bolt.

Standard diameter:
6.6 to 6.7 mm (0.2598 to 0.2638 in.)
Minimum diameter:
6.4 mm (0.2520 in.)

If the diameter is less than the minimum, replace the connecting rod bolt.

11. INSPECT CONNECTING ROD SUB-ASSEMBLY

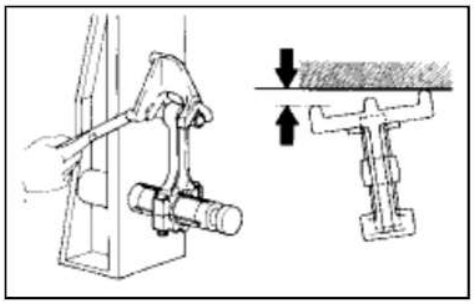
(a) Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.



(1) Check for misalignment.

Maximum misalignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the misalignment is greater than the maximum, replace the connecting rod.



(2) Check for twist.

Maximum twist:
0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

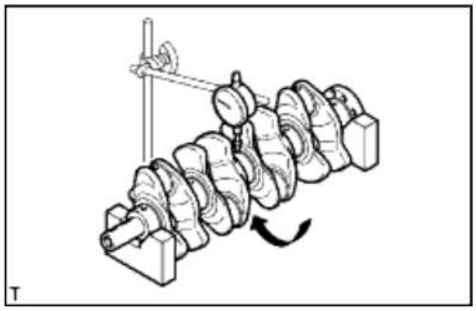
If the twist is greater than the maximum, replace the connecting rod.

12. INSPECT CRANKSHAFT

(a) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

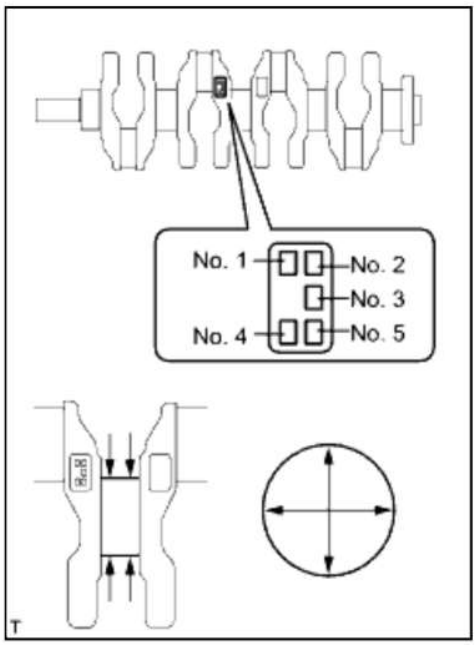
Maximum circle runout:

cardiagn.com



0.03 mm (0.0012 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.



(b) Using a micrometer, measure the diameter of each main journal.

Standard diameter:
47.988 to 48.000 mm (1.8893 to 1.8898 in.)

If the diameter is not as specified, check the crankshaft oil clearance.

(c) Check each main journal for taper and distortion as shown in the illustration.

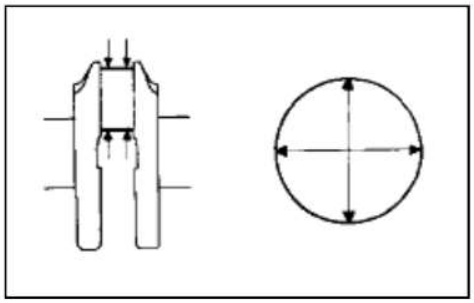
Maximum taper and distortion:
0.004 mm (0.0002 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

Standard Diameter (Reference):

MARK	SPECIFIED CONDITION
0	47.999 to 48.000 mm (1.8897 to 1.8898 in.)
1	47.997 to 47.998 mm (1.8896 to 1.8897 in.)
2	47.995 to 47.996 mm (1.8896 to 1.8896 in.)
3	47.993 to 47.994 mm (1.8895 to 1.8895 in.)
4	47.991 to 47.992 mm (1.8894 to 1.8894 in.)
5	47.988 to 47.990 mm (1.8893 to 1.8894 in.)

cardiagn.com



(d) Using a micrometer, measure the diameter of each crank pin.

Standard diameter:
43.992 to 44.000 mm (1.7320 to 1.7323 in.)

If the diameter is not as specified, check the connecting rod oil clearance.

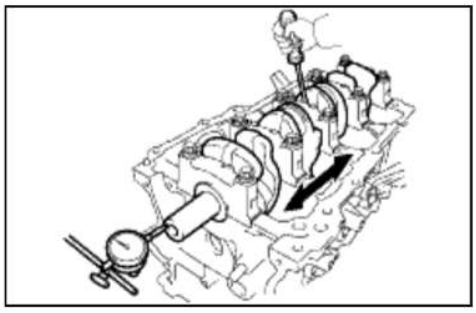
(e) Inspect each crank pin for taper and distortion as shown in the illustration.

Maximum taper and distortion:
0.004 mm (0.0002 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

13. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Install the main bearing cap INFO .



(b) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.04 to 0.14 mm (0.0016 to 0.0055 in.)
Maximum thrust clearance:
0.18 mm (0.0071 in.)

If the thrust clearance is greater than the maximum, replace the thrust washers as a set.

HINT:

The thrust washer thickness is 2.43 to 2.48 mm (0.0957 to 0.0976 in.).

14. INSPECT CRANKSHAFT OIL CLEARANCE

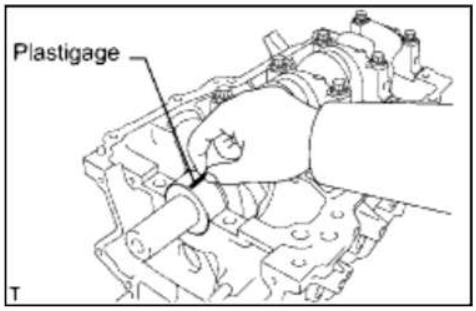
(a) Check the crank journal and bearing for pitting and scratches.

(b) Install the crankshaft bearing INFO .

(c) Place the crankshaft on the cylinder block.

(d) Lay a strip of Plastigage across each journal.

cardiagn.com



(e) Examine the front marks and numbers and install the bearing caps on the cylinder block.

HINT:

A number is marked on each main bearing cap to indicate the installation position.

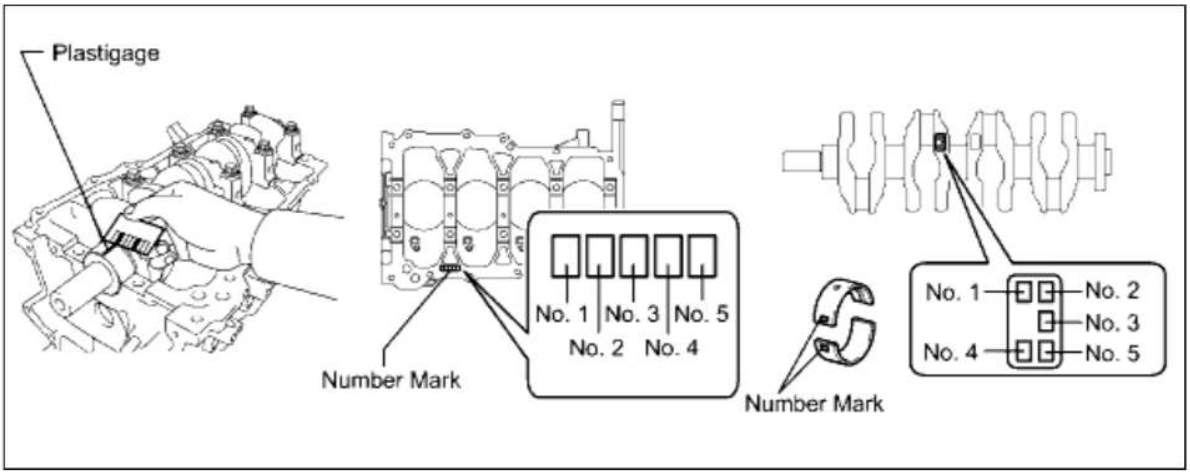
(f) Install the main bearing cap INFO .

NOTICE:

Do not turn the crankshaft.

(g) Remove the main bearing caps INFO .

(h) Measure the Plastigage at its widest point.



Standard oil clearance:
0.016 to 0.039 mm (0.0006 to 0.0015 in.)
Maximum oil clearance:
0.050 mm (0.0020 in.)

If the oil clearance is greater than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.

NOTICE:

Remove the Plastigage completely after the measurement.

HINT:

- If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number

cardiagn.com

according to the chart below. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.

- EXAMPLE: Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

Cylinder block + Crankshaft	0 to 2	3 to 5	6 to 8	9 to 11
Bearing to be used	"1"	"2"	"3"	"4"

Standard Cylinder Block Journal Bore Diameter:

MARK	SPECIFIED CONDITION
0	52.000 to 52.003 mm (2.0472 to 2.0474 in.)
1	52.003 to 52.005 mm (2.04736 to 2.04744 in.)
2	52.005 to 52.007 mm (2.0474 to 2.0475 in.)
3	52.007 to 52.010 mm (2.0475 to 2.0476 in.)
4	52.010 to 52.012 mm (2.0476 to 2.0477 in.)
5	52.012 to 52.014 mm (2.0477 to 2.0478 in.)
6	52.014 to 52.016 mm (2.0478 to 2.0479 in.)

Standard Crankshaft Journal Diameter:

MARK	SPECIFIED CONDITION
0	47.999 to 48.000 mm (1.8897 to 1.8898 in.)
1	47.997 to 47.998 mm (1.8896 to 1.8897 in.)
2	47.995 to 47.996 mm (1.88956 to 1.88960 in.)
3	47.993 to 47.994 mm (1.8895 to 1.8895 in.)
4	47.991 to 47.992 mm (1.8894 to 1.8894 in.)
5	47.988 to 47.990 mm (1.8893 to 1.8894 in.)

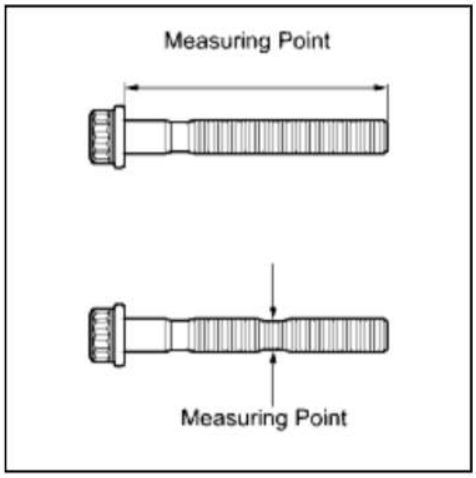
Standard Bearing Center Wall Thickness:

MARK	SPECIFIED CONDITION
1	1.994 to 1.997 mm (0.0785 to 0.0786 in.)
2	1.998 to 2.000 mm (0.07866 to 0.07874 in.)
3	2.001 to 2.003 mm (0.0788 to 0.0789 in.)
4	2.004 to 2.006 mm (0.0789 to 0.0790 in.)

15. INSPECT CYLINDER HEAD SET BOLT

(a) Using a vernier caliper, measure the tension portion

cardiagn.com



diameter of the bolts.

Standard bolt length:
84.3 to 85.7 mm (3.3189 to 3.3740 in.)
Maximum bolt length:
86.7 mm (3.4134 in.)

If the bolt length is greater than the maximum, replace the bolt.

(b) Using a vernier caliper, measure the minimum diameter of the elongated thread at the measuring point.

Standard outside diameter:
9.77 to 9.96 mm (0.3846 to 0.3921 in.)
Minimum outside diameter:
9.1 mm (0.3583 in.)

HINT:

Using a straightedge, visually check thinner areas of the threaded part of the crankshaft bearing cap bolt.

If the diameter is less than the minimum, replace the bolt.

16. INSPECT NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Check the oil nozzles for damage or clogging.

HINT:

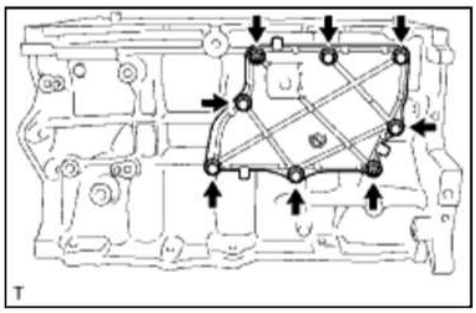
If there is damage or clogging, replace the oil nozzle.

cardiagn.com

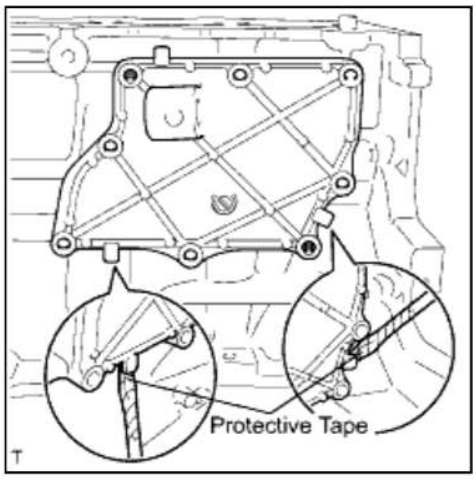
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA302PX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER BLOCK: DISASSEMBLY (2010 Corolla)		

DISASSEMBLY

1. REMOVE NO. 1 VENTILATION CASE



(a) Remove the 6 bolts and 2 nuts.



(b) Remove the No. 1 ventilation case by prying between the No. 1 ventilation case and cylinder block with a screwdriver as shown in the illustration.

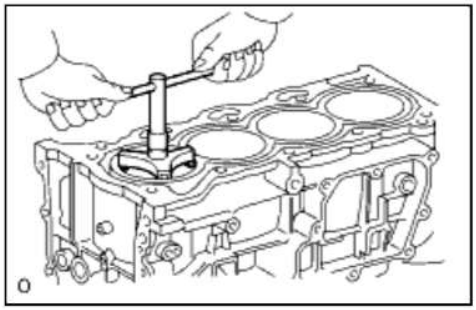
NOTICE:

Be careful not to damage the contact surfaces of the cylinder block and No. 1 ventilation case.

HINT:

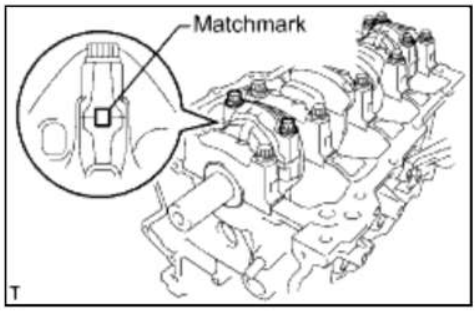
Tape the screwdriver tip before use.

2. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD



(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

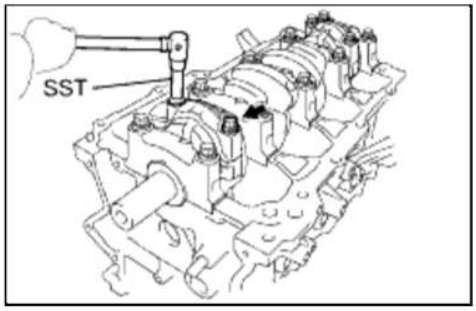
cardiagn.com



(b) Check that the matchmarks on the connecting rod and cap are aligned to ensure correct reassembly.

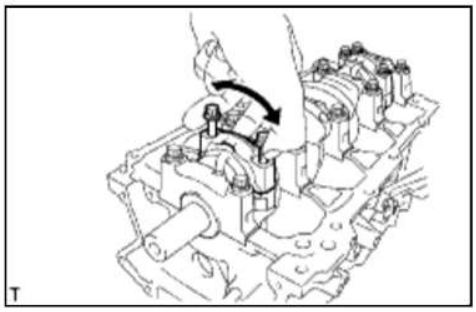
HINT:

The matchmarks on the connecting rods and caps are provided to ensure correct reassembly.



(c) Using SST, uniformly loosen the 2 bolts.

SST: 09205-16010



(d) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:

Keep the lower bearing inserted in the connecting rod cap.

(e) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearing, connecting rod and cap as a set.
- Arrange the piston and connecting rod assemblies in the correct order.

3. REMOVE CONNECTING ROD BEARING

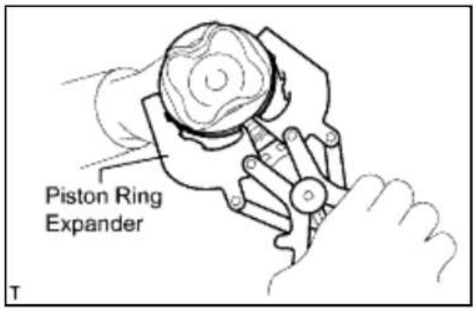
(a) Remove the connecting rod bearings.

HINT:

Arrange the removed parts in the correct order.

4. REMOVE PISTON RING SET

cardiagn.com



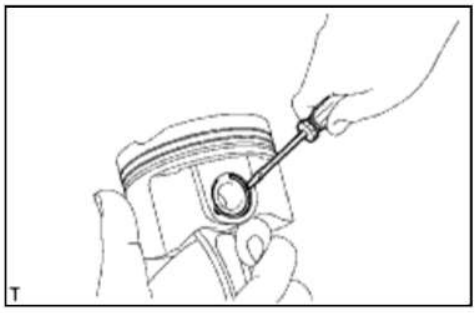
(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the oil ring rail and oil ring expander by hand.

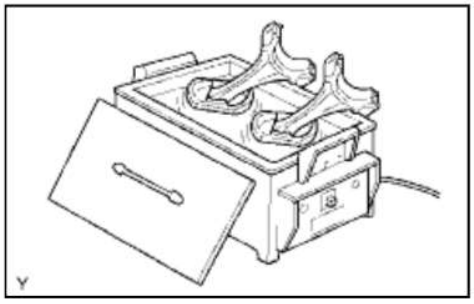
HINT:

Arrange the removed parts in the correct order.

5. REMOVE PISTON



(a) Using a screwdriver, pry out the 2 snap rings.



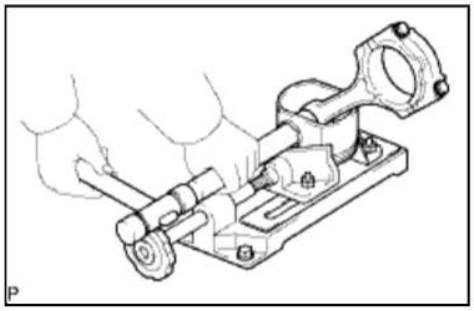
(b) Gradually heat each piston to approximately 80 to 90°C (176 to 194°F).

(c) Using a plastic hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

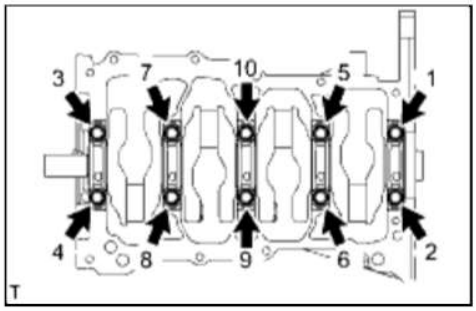
HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

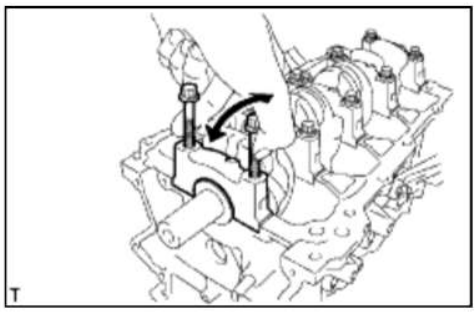
cardiagn.com



6. REMOVE CRANKSHAFT



(a) Uniformly loosen and remove the 10 main bearing cap bolts in the sequence shown in the illustration.



(b) Use 2 removed main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.

NOTICE:

Insert the bolts into the caps in turn. Ease the cap out by gently pulling up and applying force toward the front and back sides of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.

HINT:

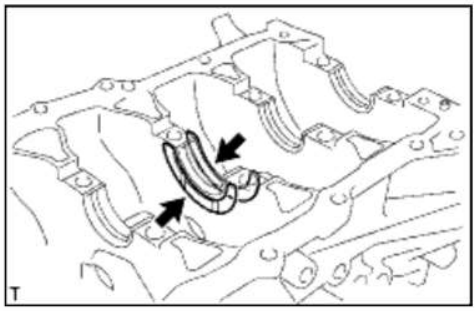
- Keep the lower bearing and main bearing cap as a set.
- Arrange the main bearing caps in the correct order.

(c) Lift out the crankshaft.

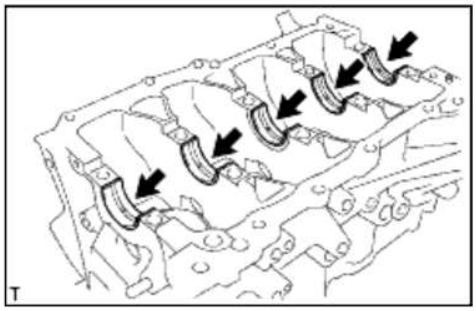
7. REMOVE UPPER CRANKSHAFT THRUST WASHER

(a) Remove the upper crankshaft thrust washers from the cylinder block.

cardiagn.com



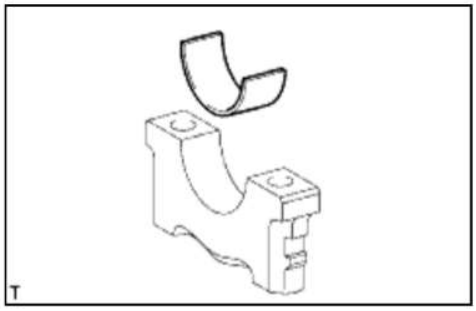
8. REMOVE CRANKSHAFT BEARING



(a) Remove the 5 upper main bearings from the cylinder block.

HINT:

Arrange the bearings in the correct order.

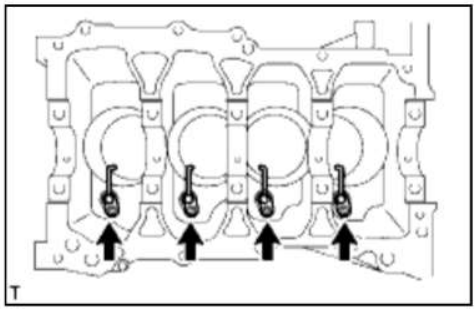


(b) Remove the 5 lower main bearings from the 5 main bearing caps.

HINT:

Arrange the bearings in the correct order.

9. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY



(a) Using a 5 mm socket hexagon wrench, remove the bolts and oil nozzles.

cardiagn.com

10. CLEAN CYLINDER BLOCK

NOTICE:

If the cylinder is washed at high temperature, the cylinder liner will stick out beyond the cylinder block. Always wash the cylinder block at a temperature of 45°C (113°F) or less.

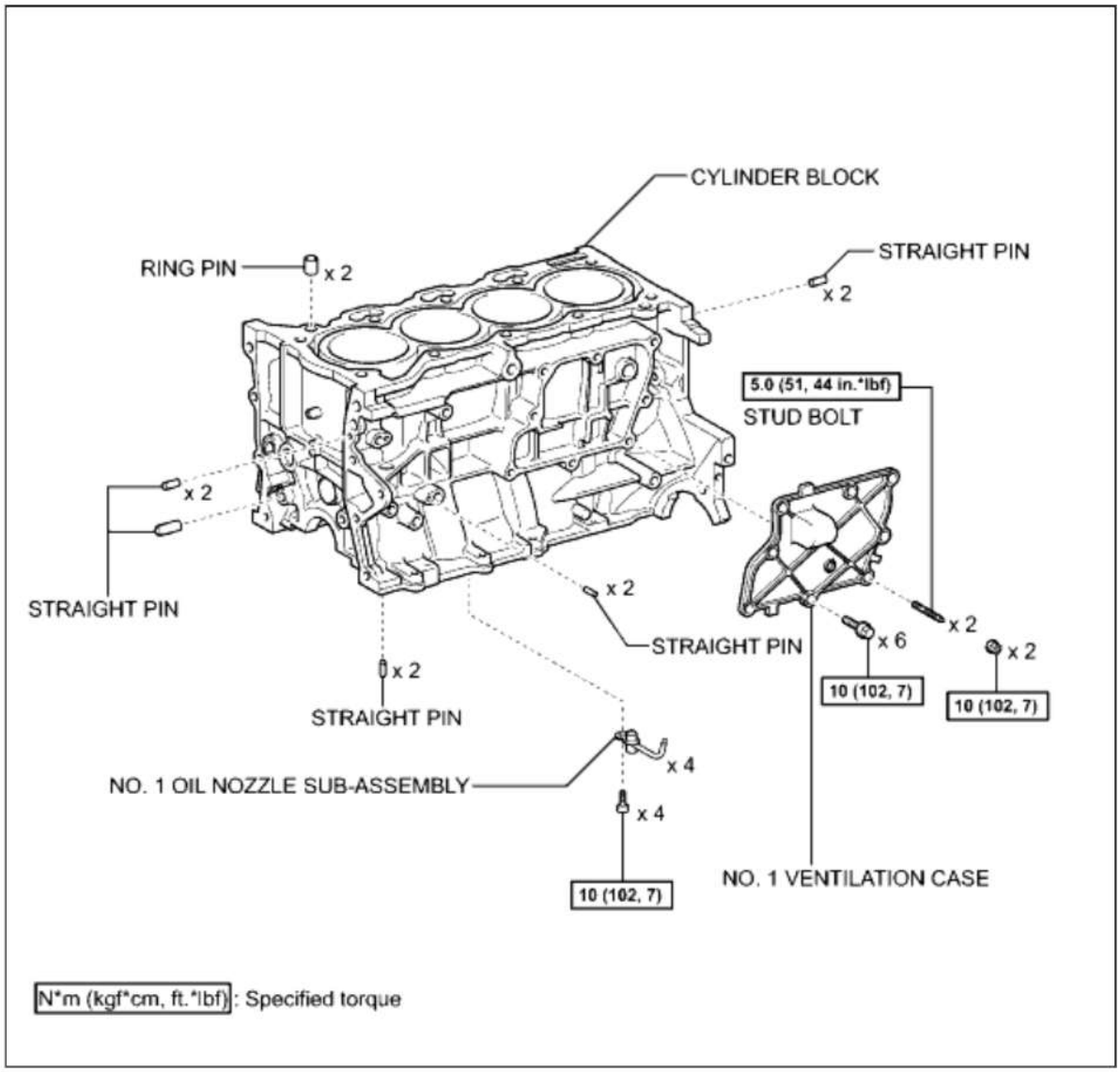


cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA700QX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER BLOCK: COMPONENTS (2010 Corolla)		

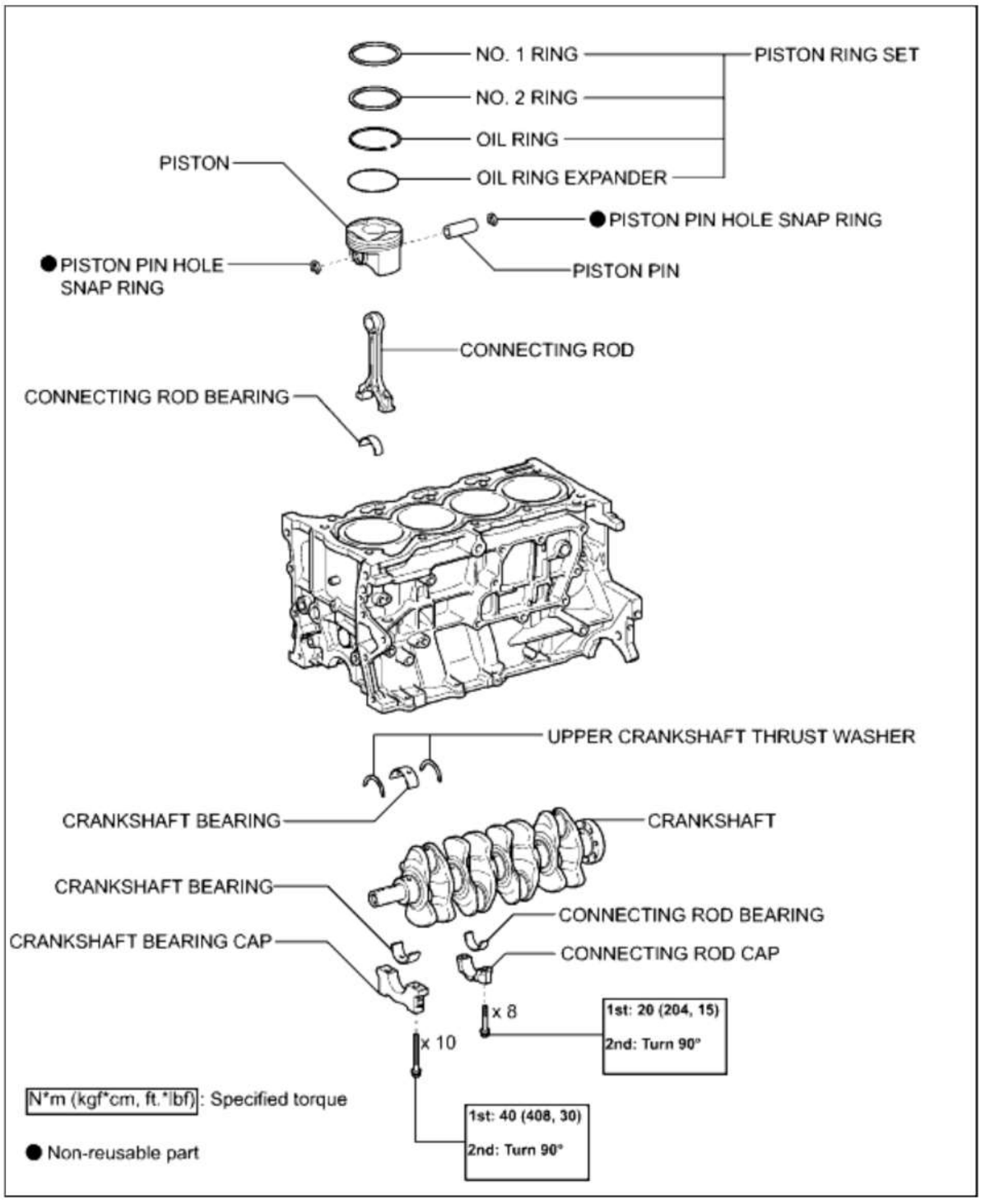
COMPONENTS

ILLUSTRATION



ILLUSTRATION

cardiagn.com

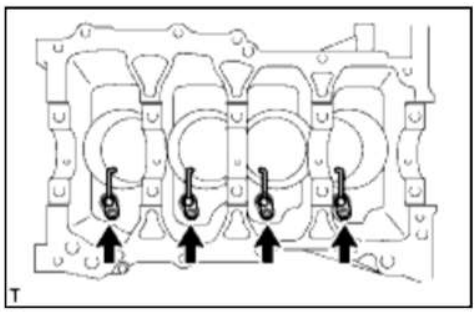


cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA402QX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER BLOCK: REASSEMBLY (2010 Corolla)		

REASSEMBLY

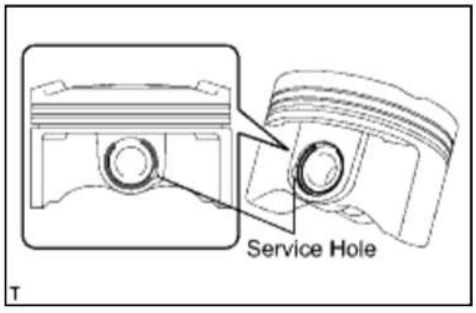
1. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY



(a) Using a 5 mm socket hexagon wrench, install the oil nozzles with the bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

2. INSTALL PISTON



(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.

HINT:

Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

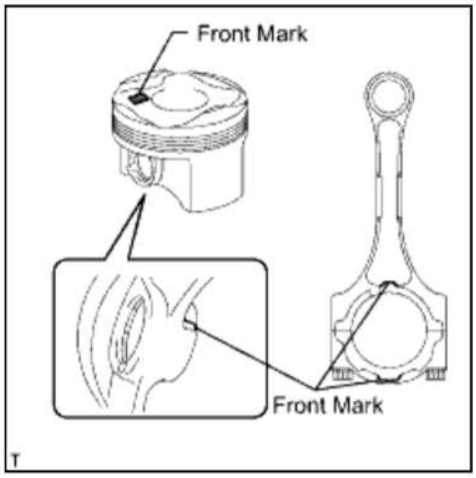
(b) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).

(c) Align the front marks of the piston and connecting rod, and push in the piston with your thumb.

HINT:

The piston and pin are a matched set.

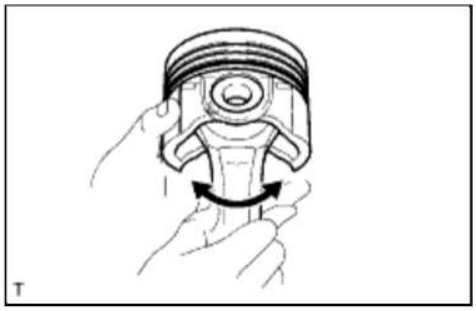
cardiagn.com



(d) Using a screwdriver, install a new snap ring on the other end of the piston pin hole.

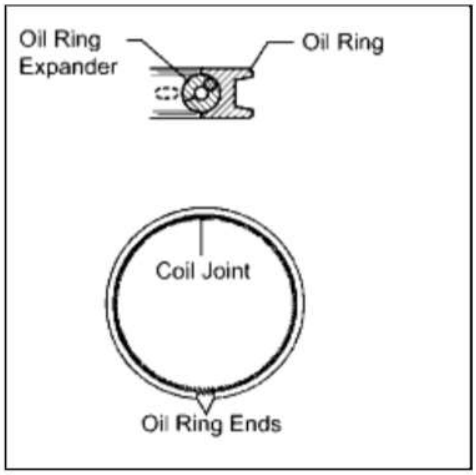
HINT:

Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



(e) Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

3. INSTALL PISTON RING SET

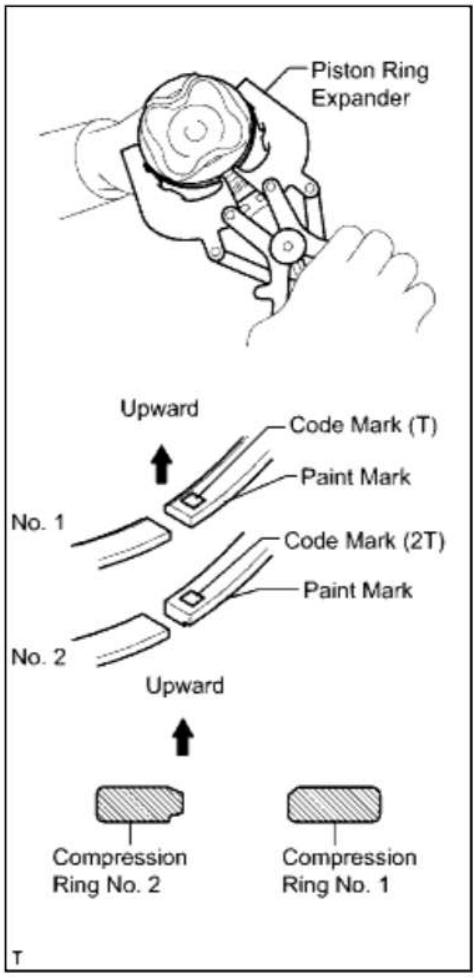


(a) Install the oil ring expander and oil ring rail by hand.

NOTICE:

- Install the expander and oil ring so that their ring ends are at opposite sides.
- Securely install the expander to the inner groove of the oil ring.

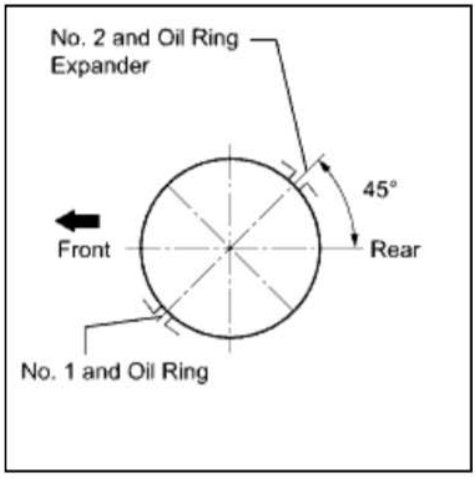
cardiagn.com



(b) Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.

NOTICE:

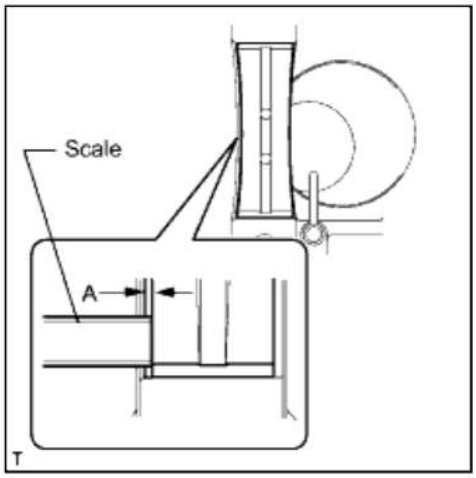
- Install the compression ring No. 1 with the code mark (T) facing upward.
- Install the compression ring No. 2 with the code mark (2T) facing upward.
- Paint marks can only be checked on new piston rings. When reusing piston rings, check each piston ring profile in order to install them into the correct positions.



(c) Position the piston rings so that the ring ends are as shown in the illustration.

4. INSTALL CRANKSHAFT BEARING

cardiagn.com



(a) Install the upper bearing (for except No. 3 journal).

(1) Install the upper bearing with an oil groove on the cylinder block.

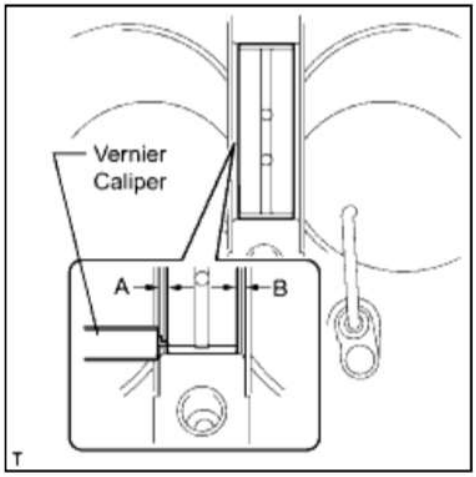
(2) Using a scale, measure the distance between the cylinder block edge and the upper bearing edge.

NOTICE:

Do not apply engine oil to the bearing inner surface or journal contact surfaces.

Dimension (A):

0.5 to 1.0 mm (0.020 to 0.039 in.)



(b) Install the upper bearing (for No. 3 journal).

(1) Install the upper bearing with an oil groove on the cylinder block.

(2) Using a vernier caliper, measure the distance between the cylinder block edge and the upper bearing edge.

NOTICE:

Do not apply engine oil to the bearing inner surface or journal contact surfaces.

Dimension (A - B):

0.5 mm (0.0197 in.) or less

(c) Install the lower bearing.

(1) Install the lower bearing onto the bearing cap.

(2) Using a vernier caliper, measure the distance between the bearing cap edge and the lower bearing edge.

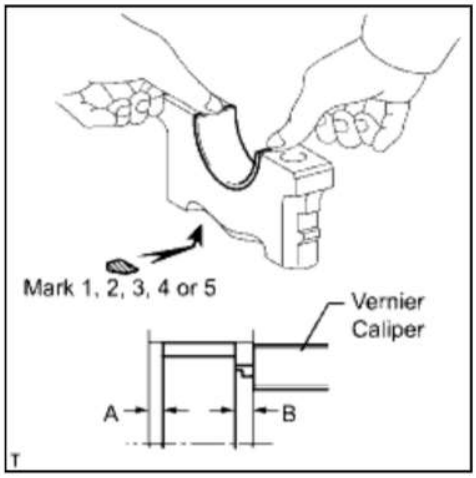
Dimension (A - B):

0.5 mm (0.0197 in.) or less

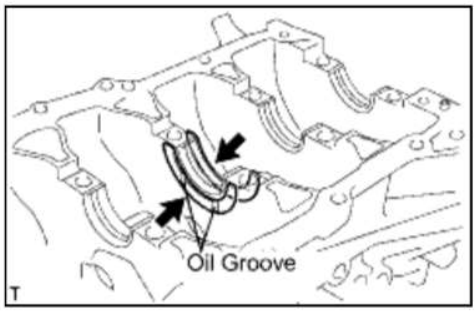
NOTICE:

Do not apply engine oil to the bearing inner surface or bearing cap contact surfaces.

cardiagn.com



5. INSTALL UPPER CRANKSHAFT THRUST WASHER



(a) Install the 2 thrust washers under the No. 3 journal of the cylinder block with the oil grooves facing outward.

(b) Apply engine oil to the crankshaft thrust washer.

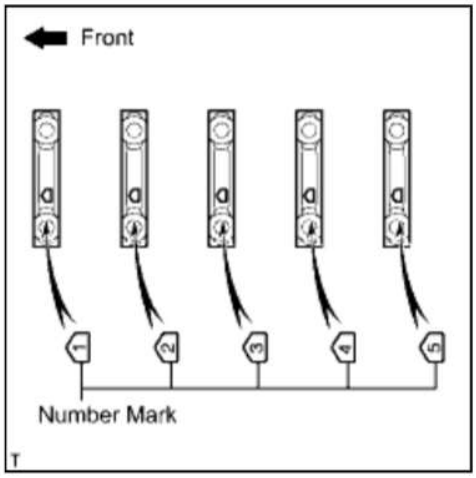
6. INSTALL CRANKSHAFT

(a) Apply engine oil to the upper bearing and install the crankshaft on the cylinder block.

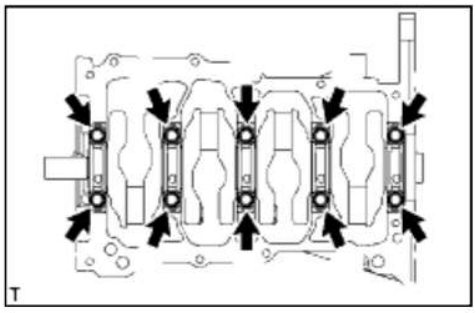
(b) Apply engine oil to the lower bearing.

(c) Examine the number marks and install the bearing caps on the cylinder block.

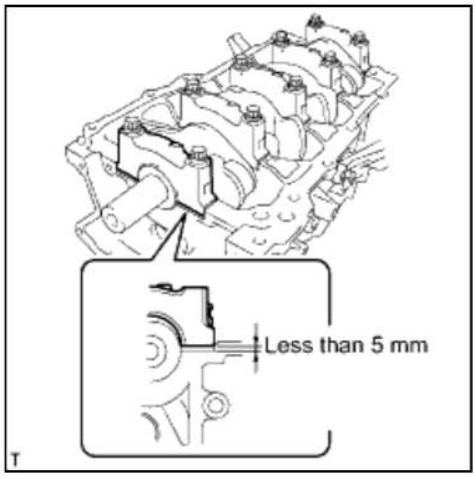
cardiagn.com



(d) Apply a light coat of engine oil to the threads and under the bearing cap bolts.



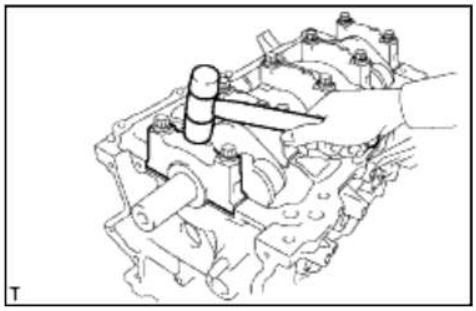
(e) Temporarily install the 10 main bearing cap bolts.



(f) Insert the main bearing cap by hand until the clearance between the main bearing cap and the cylinder block is less than 5 mm (0.20 in.) using the 2 internal bearing cap bolts as guides.

(g) Using a plastic hammer, lightly tap the bearing cap to ensure a proper fit.

cardiagn.com

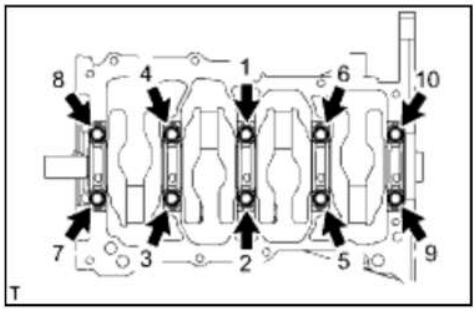


(h) Install the crankshaft bearing cap bolts.

NOTICE:

Tighten the main bearing cap bolts in 2 progressive steps.

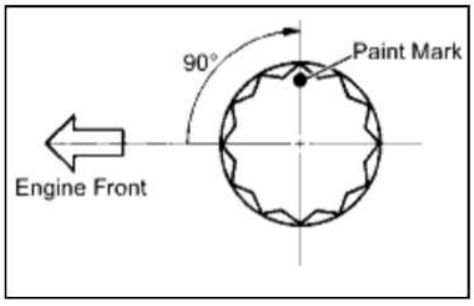
(i) Step 1



(1) Install and uniformly tighten the 10 main bearing cap bolts in the sequence shown in the illustration.

Torque: 40 N·m (408 kgf·cm, 30ft·lbf)

(j) Step 2



(1) Mark the front of the bearing cap bolts with paint.

(2) Further tighten the bearing cap bolts an additional 90° in the numerical order shown in the previous illustration.

(k) Check that the paint mark is now at a 90° angle to the front.

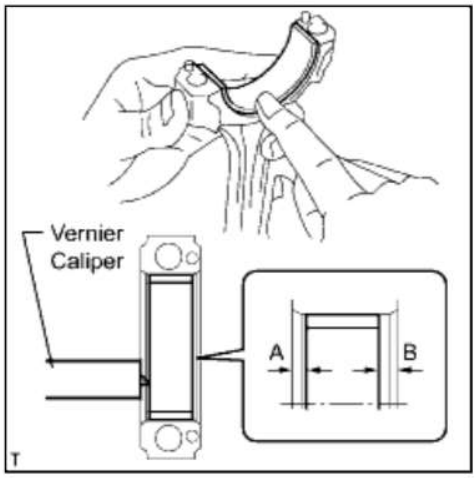
(l) Check that the crankshaft turns smoothly.

(m) Check the crankshaft thrust clearance INFO .

7. INSTALL CONNECTING ROD BEARING

(a) Install the connecting rod bearing to the connecting rod and bearing cap.

cardiagn.com



(b) Using a vernier caliper, measure the distance between the connecting rod and bearing cap edges and the connecting rod bearing edge.

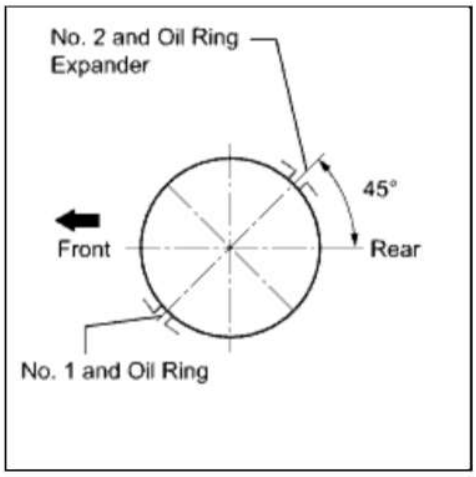
Dimension (A - B):
0.7 mm (0.0276 in.) or less

NOTICE:

Do not apply engine oil to the bearing inner surface or connecting rod contact surfaces.

8. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

(a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of the connecting rod bearings.



(b) Position the piston rings so that the ring ends are as shown in the illustration.

NOTICE:

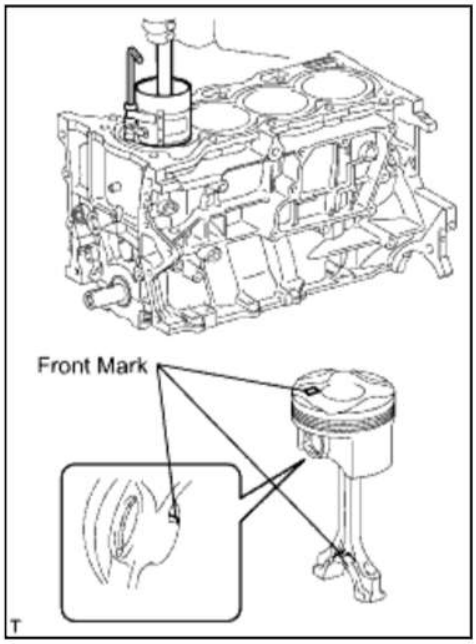
Do not align the ring ends.

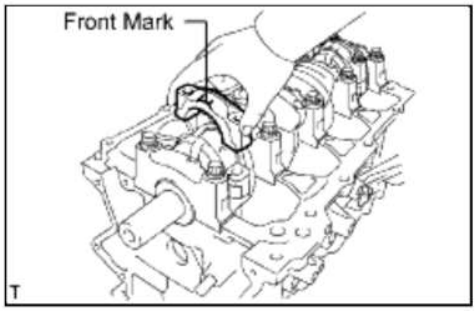
(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assembly into the cylinder with the front mark of the piston facing forward.

NOTICE:

- When inserting the piston with connecting rod, do not allow it to make contact with the oil nozzle.
- Match the numbered connecting rod cap with the connecting rod.

cardiagn.com





(d) Check that the protrusion of the connecting rod cap is facing in the correct direction.

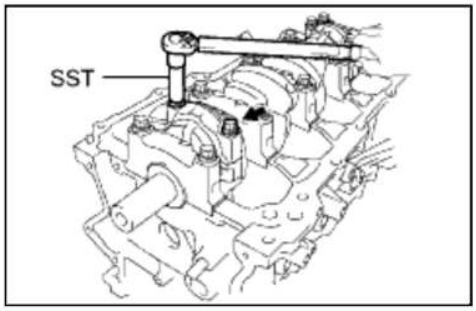
(e) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.

(f) Install the connecting rod cap bolts.

NOTICE:

Tighten the connecting rod cap bolts in 2 progressive steps.

(g) Step 1



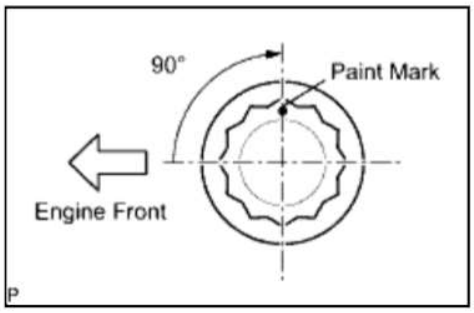
(1) Using SST, install and alternately tighten the bolts of the connecting rod cap in several steps.

SST: 09205-16010

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

cardiagn.com

(h) Step 2



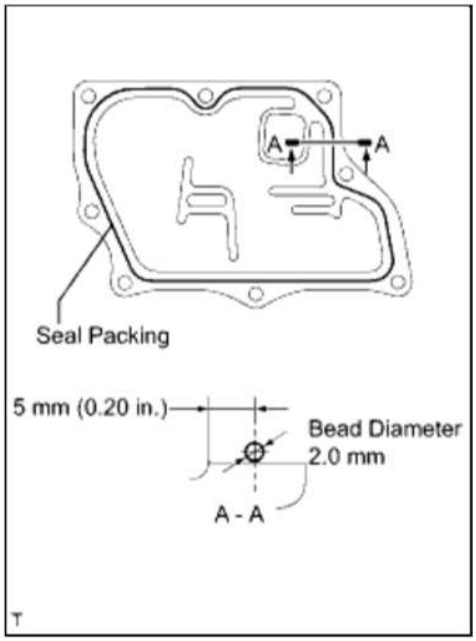
(1) Mark the front of the connecting rod cap bolts with paint.

(2) Further tighten the cap bolts an additional 90° as shown in the illustration.

(i) Check that the crankshaft turns smoothly.

(j) Check the connecting rod thrust clearance INFO .

9. INSTALL NO. 1 VENTILATION CASE



(a) Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Bead diameter:
2.0 mm (0.0787 in.)

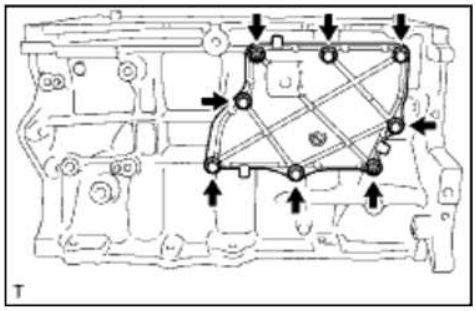
NOTICE:

- Remove any oil from the contact surface.
- Install the No. 1 ventilation case within 3 minutes and tighten the bolts and nuts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing.

(b) Install the No. 1 ventilation case with the 6 bolts and 2 nuts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA101QX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER BLOCK: REPLACEMENT (2010 Corolla)		

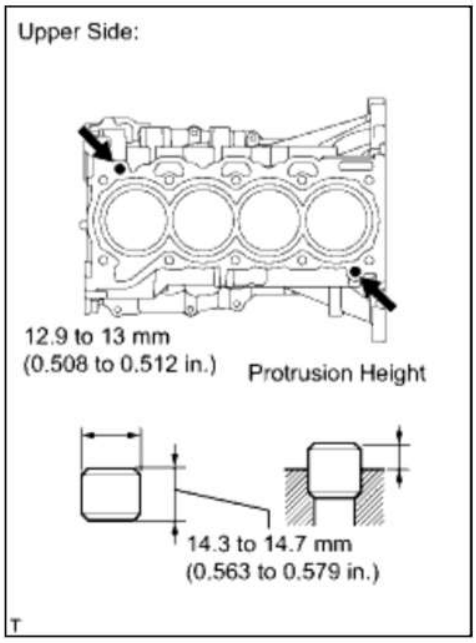
REPLACEMENT

1. REPLACE RING PIN

NOTICE:

It is not necessary to remove the ring pins unless they are being replaced.

(a) Remove the ring pins.



(b) Using a plastic hammer, tap in the ring pins.

Standard protrusion:
7.5 to 8.5 mm (0.295 to 0.335 in.)

2. REPLACE STUD BOLT

NOTICE:

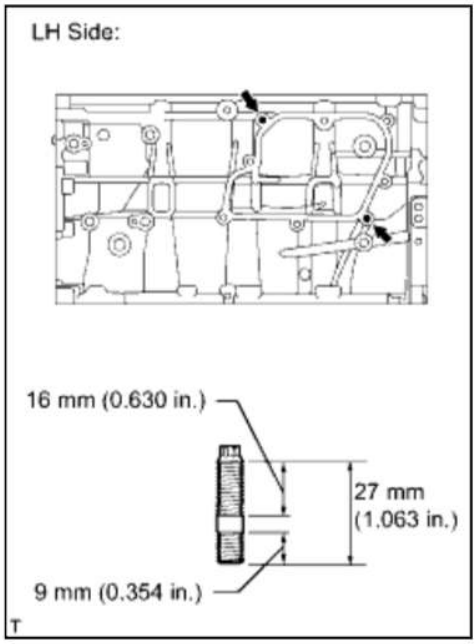
If any of the stud bolts is deformed or the threads are damaged, replace it.

(a) Remove the stud bolts.

(b) Using a "TORX" socket E6, install the stud bolts as shown in the illustration.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

cardiagn.com



3. REPLACE STRAIGHT PIN

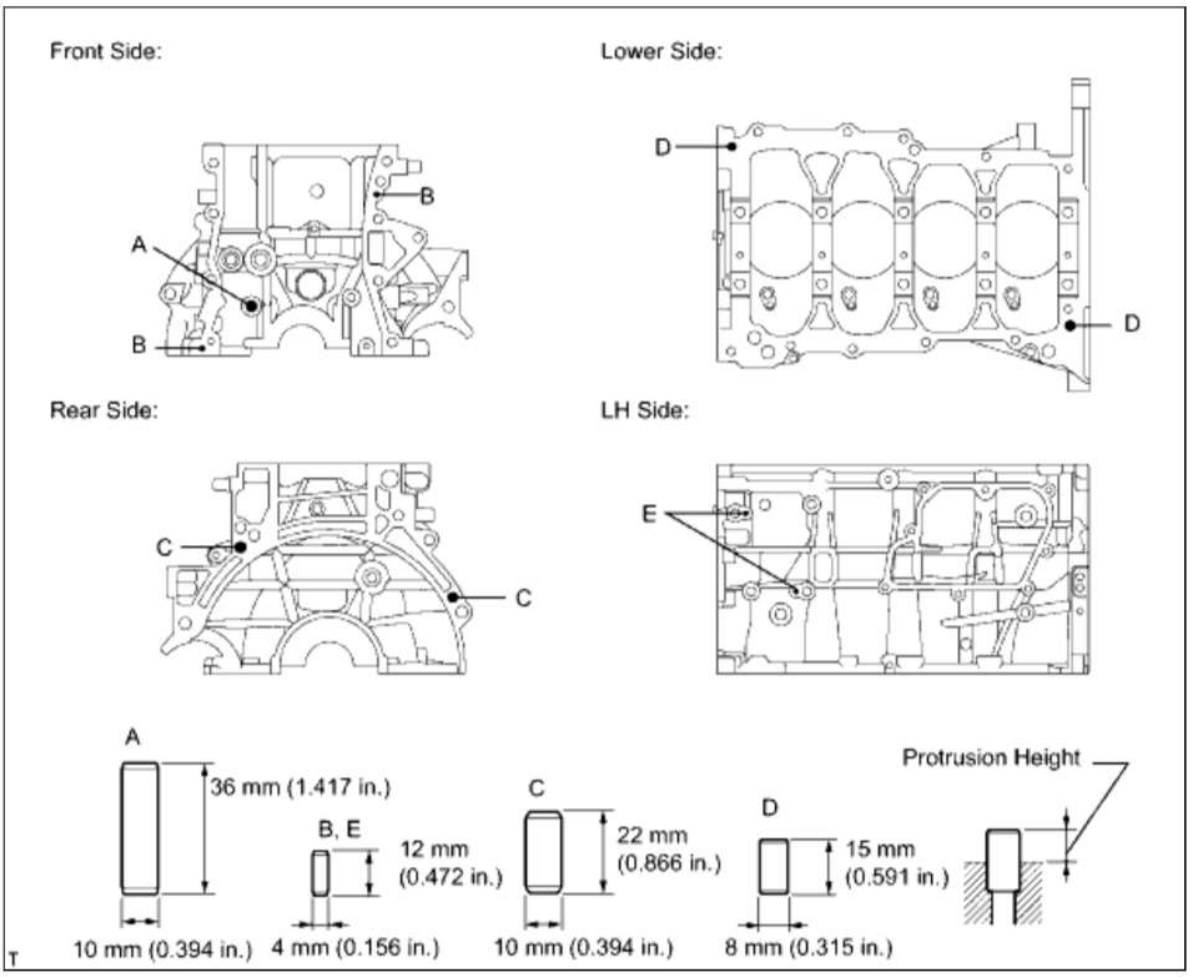
NOTICE:

It is not necessary to remove the straight pins unless they are being replaced.

(a) Remove the straight pins.

(b) Using a plastic hammer, tap in the straight pins.

cardiagn.com



Standard Protrusion:

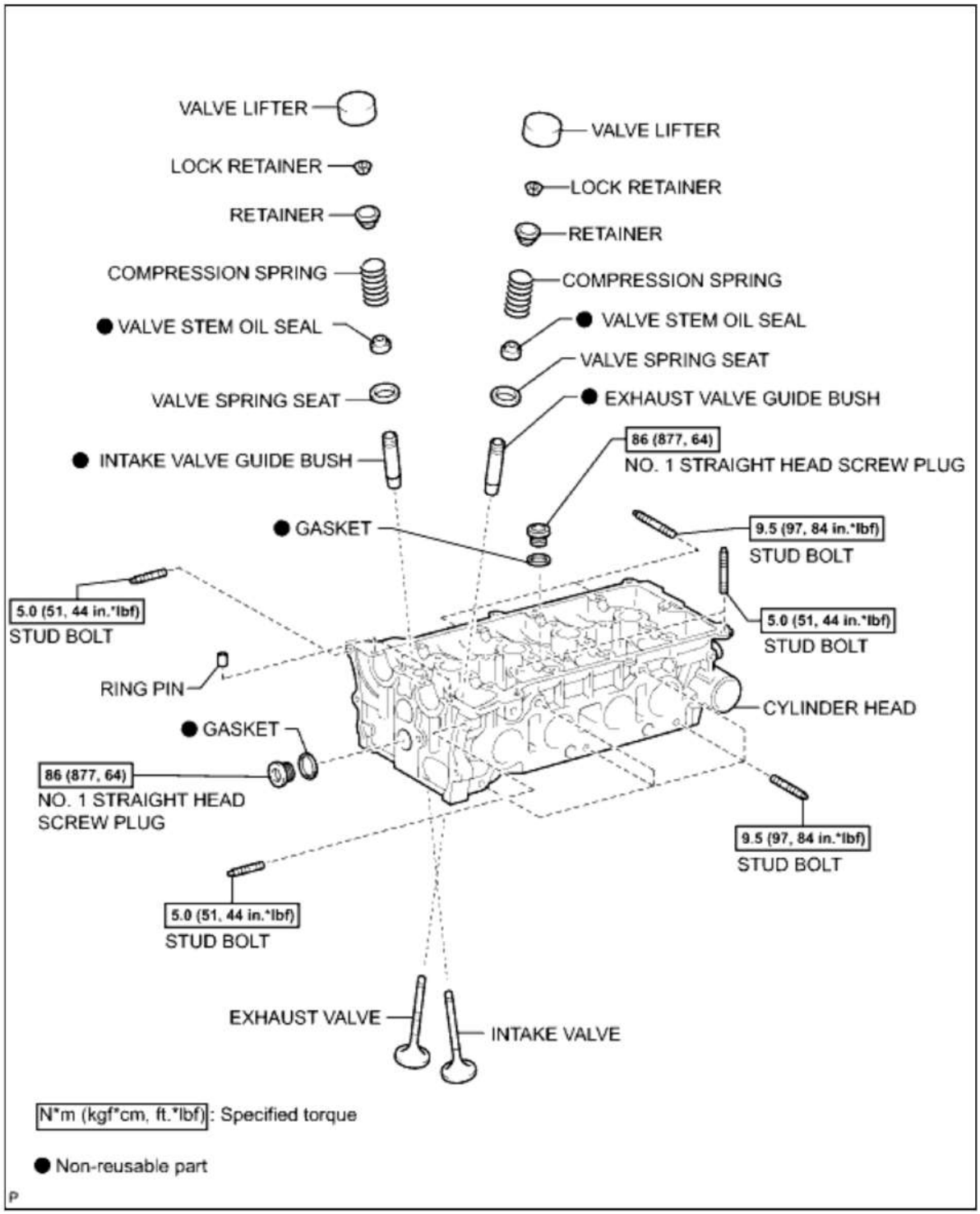
ITEM	PROTRUSION
Pin A	18.5 to 19.5 mm (0.729 to 0.768 in.)
Pin B	5.0 to 7.0 mm (0.197 to 0.276 in.)
Pin C	11 to 13 mm (0.433 to 0.512 in.)
Pin D	5.0 to 7.0 mm (0.197 to 0.276 in.)
Pin E	5.0 to 6.0 mm (0.197 to 0.236 in.)

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000000224900BX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION



cardiagn.com

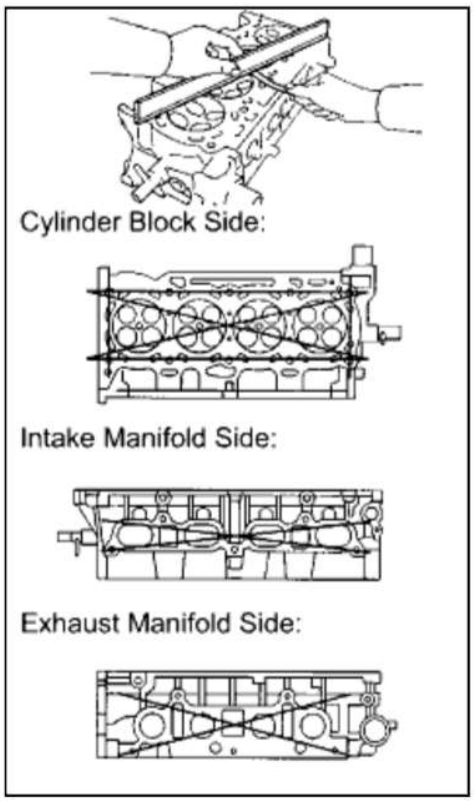


cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000000YIC012X
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD: INSPECTION (2010 Corolla)		

INSPECTION

1. INSPECT CYLINDER HEAD FOR WARPAGE



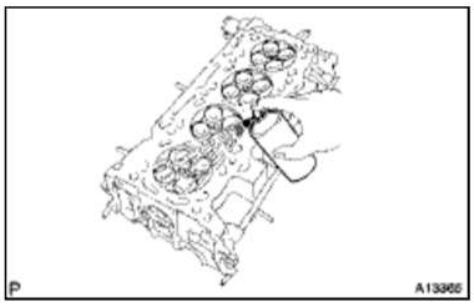
(a) Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

Maximum Warpage:

ITEM	SPECIFIED CONDITION
Cylinder block side	0.08 mm (0.00315 in.)
Intake manifold side	0.08 mm (0.00315 in.)
Exhaust manifold side	0.08 mm (0.00315 in.)

If the warpage is greater than the maximum, replace the cylinder head.

2. INSPECT CYLINDER HEAD FOR CRACKS



(a) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks.

If cracked, replace the cylinder head.

3. INSPECT CAMSHAFT THRUST CLEARANCE

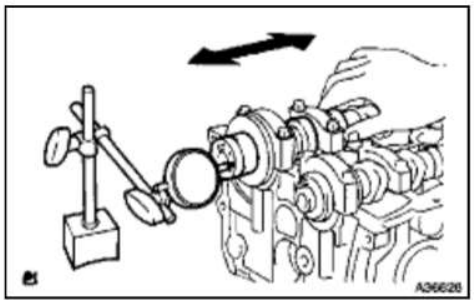
(a) Install the camshafts INFO .

cardiagn.com

(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard Thrust Clearance:

ITEM	SPECIFIED CONDITION
Intake	0.040 to 0.095 mm (0.00157 to 0.00374 in.)
Exhaust	0.090 to 0.145 mm (0.00354 to 0.00570 in.)



Maximum Thrust Clearance:

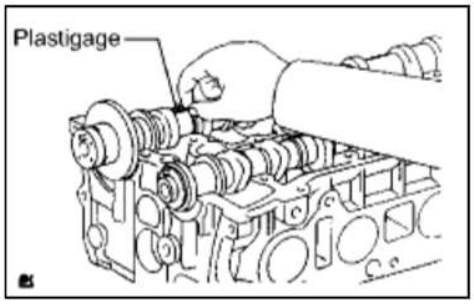
ITEM	SPECIFIED CONDITION
Intake	0.110 mm (0.00433 in.)
Exhaust	0.150 mm (0.00591 in.)

If the thrust clearance is greater than the maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.

4. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the cylinder head.



(c) Lay a strip of Plastigage across each of the camshaft journals.

(d) Install the bearing caps INFO .

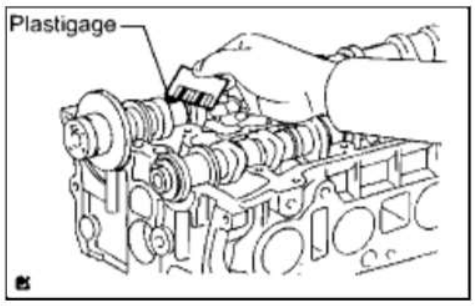
NOTICE:

Do not turn the camshaft.

(e) Remove the bearing caps INFO .

(f) Measure the Plastigage at its widest point.

cardiagn.com



Standard Oil Clearance:

ITEM	SPECIFIED CONDITION
Camshaft No. 1 journal bearing mark 1	0.007 to 0.038 mm (0.000276 to 0.00150 in.)
Camshaft No. 1 journal bearing mark 2	0.008 to 0.038 mm (0.000315 to 0.00150 in.)
Camshaft No. 1 journal bearing mark 3	0.008 to 0.038 mm (0.000315 to 0.00150 in.)
Camshaft other journals	0.025 to 0.062 mm (0.000984 to 0.00244 in.)
No. 2 camshaft No. 1 journal	0.040 to 0.072 mm (0.00157 to 0.00283 in.)
No. 2 camshaft other journals	0.025 to 0.062 mm (0.000984 to 0.00244 in.)

Maximum Oil Clearance:

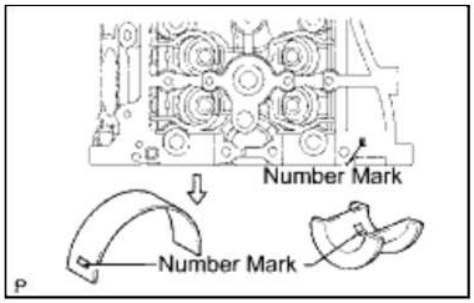
ITEM	SPECIFIED CONDITION
Intake	0.070 mm (0.00276 in.)
Exhaust	0.100 mm (0.00394 in.)

NOTICE:

Completely remove the Plastigage after the inspection.

- If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the cylinder head.
- If the oil clearance on the camshaft No. 1 journal is greater than the maximum, choose a new bearing and install it.

(1) Check the number mark shown in the illustration.



Cylinder Head Journal Bore Diameter:

MARK 1	MARK 2	MARK 3
40.000 to 40.009 mm (1.5748 to 1.5752 in.)	40.010 to 40.017 mm (1.5752 to 1.5755 in.)	40.018 to 40.025 mm (1.5755 to 1.5758 in.)

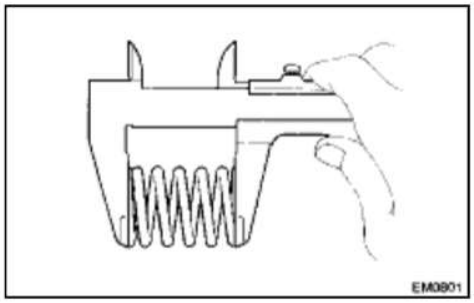
Standard Bearing Center Wall Thickness:

cardiagn.com

MARK 1	MARK 2	MARK 3
2.000 to 2.004 mm (0.0787 to 0.0789 in.)	2.005 to 2.008 mm (0.0789 to 0.0791 in.)	2.009 to 2.012 mm (0.0791 to 0.0792 in.)

Camshaft journal diameter:
35.971 to 35.985 mm (1.4162 to 1.4167 in.)

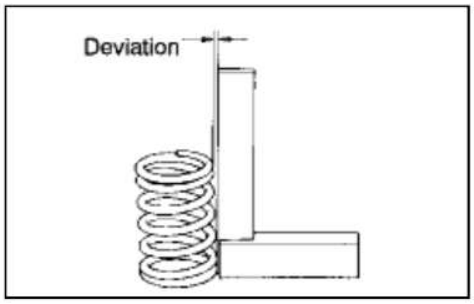
5. INSPECT INNER COMPRESSION SPRING



(a) Using a vernier caliper, measure the free length of the valve spring.

Free length:
47.43 mm (1.867 in.)

If the free length is not as specified, replace the valve spring.

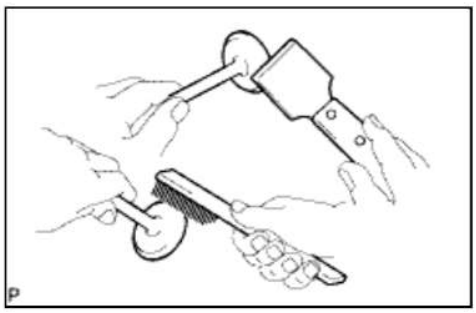


(b) Using a steel set square, measure the deviation of the valve spring.

Maximum deviation:
1.6 mm (0.063 in.)

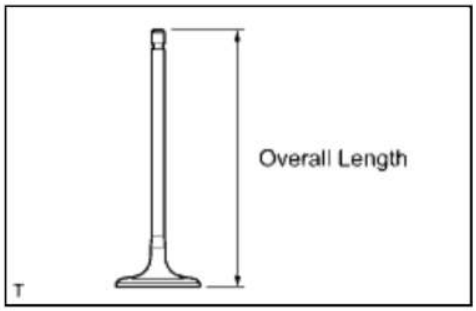
If the deviation is greater than the maximum, replace the valve spring.

6. INSPECT INTAKE VALVE



(a) Using a gasket scraper, scrape off any carbon on the valve head.

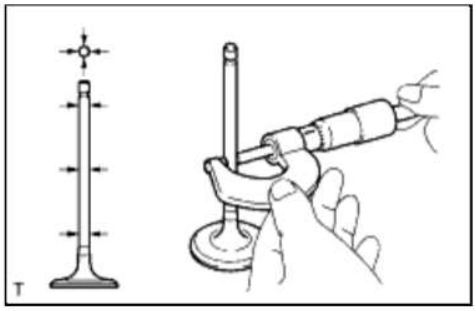
cardiagn.com



(b) Using a vernier caliper, measure the overall length of the valve.

Standard overall length:
101.71 mm (4.0043 in.)
Minimum overall length:
101.21 mm (3.9846 in.)

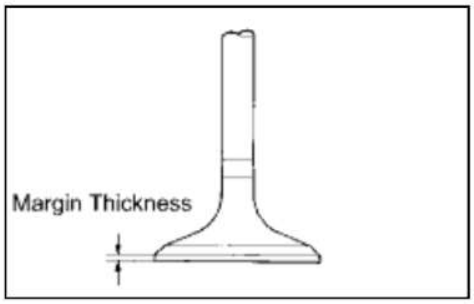
If the overall length is less than the minimum, replace the valve.



(c) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:
5.470 to 5.485 mm (0.2154 to 0.2159 in.)

If the valve stem is not as specified, check the oil clearance.

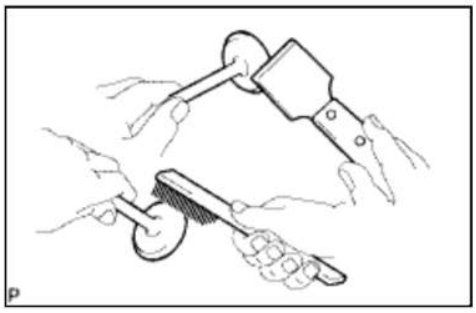


(d) Using a vernier caliper, measure the valve head margin thickness.

Standard margin thickness:
1.05 to 1.45 mm (0.0413 to 0.0571 in.)
Minimum margin thickness:
0.50 mm (0.0197 in.)

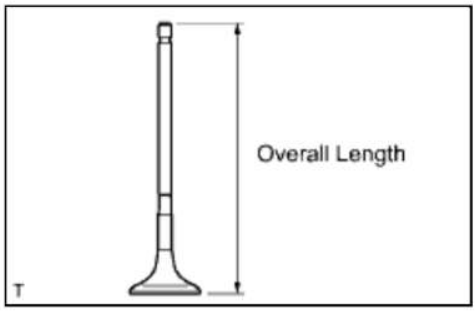
If the margin thickness is less than the minimum, replace the valve.

7. INSPECT EXHAUST VALVE



(a) Using a gasket scraper, scrape off any carbon on the valve head.

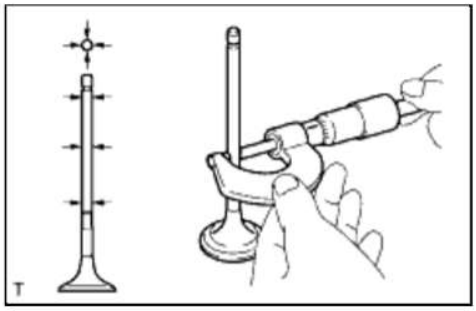
cardiagn.com



(b) Using a vernier caliper, measure the overall length of the valve.

Standard overall length:
101.15 mm (3.9823 in.)
Minimum overall length:
100.70 mm (3.9646 in.)

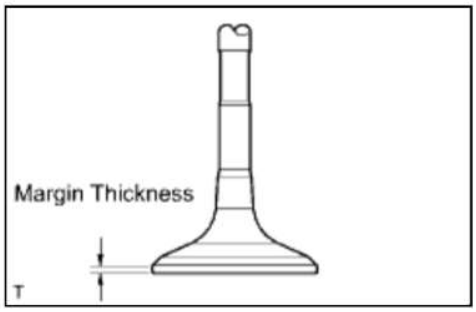
If the overall length is less than the minimum, replace the valve.



(c) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:
5.465 to 5.480 mm (0.2152 to 0.2157 in.)

If the valve stem is not as specified, check the oil clearance.

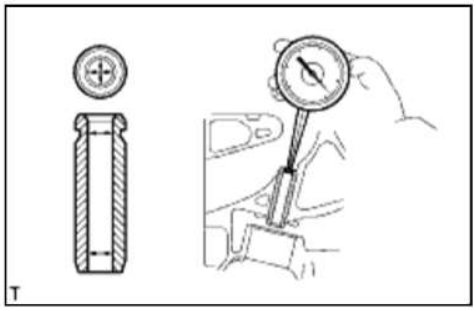


(d) Using a vernier caliper, measure the valve head margin thickness.

Standard margin thickness:
1.20 to 1.60 mm (0.0472 to 0.0630 in.)
Minimum margin thickness:
0.50 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

8. INSPECT INTAKE VALVE GUIDE BUSH



(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

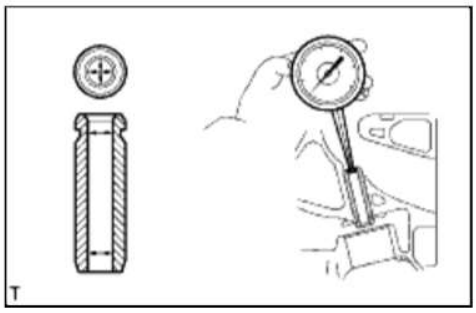
(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

cardiagn.com

Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Maximum oil clearance:
0.090 mm (0.0035 in.)

If the clearance is greater than the maximum, replace the valve and guide bush.

9. INSPECT EXHAUST VALVE GUIDE BUSH



(a) Using a caliper gauge, measure the inside diameter of the guide bush.

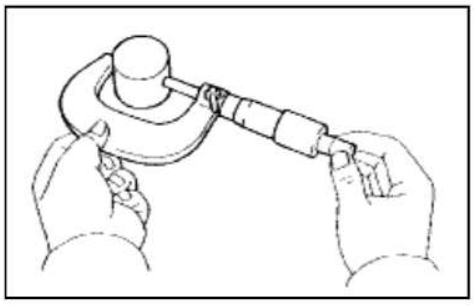
Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

(b) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)
Maximum oil clearance:
0.095 mm (0.0037 in.)

If the clearance is greater than the maximum, replace the valve and guide bush.

10. INSPECT VALVE LIFTER



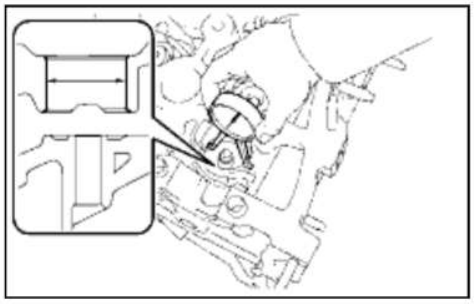
(a) Using a micrometer, measure the lifter diameter.

Lifter diameter:
30.966 to 30.976 mm (1.2191 to 1.2195 in.)

(b) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Standard lifter bore diameter:
31.009 to 31.025 mm (1.2208 to 1.2215 in.)

cardiagn.com

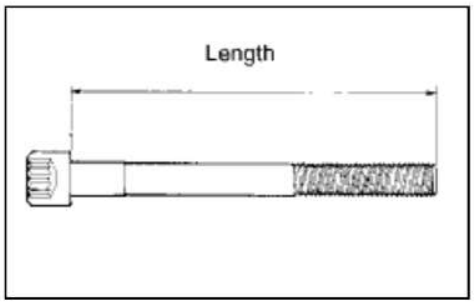


(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

Standard oil clearance:
0.033 to 0.059 mm (0.00130 to 0.00232 in.)
Maximum oil clearance:
0.079 mm (0.00311 in.)

If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.

11. INSPECT CYLINDER HEAD SET BOLT



(a) Using a vernier caliper, measure the length of the head bolts from the seat to the end.

Standard bolt length:
141.3 to 142.7 mm (5.563 to 5.618 in.)
Maximum bolt length:
144.2 mm (5.677 in.)

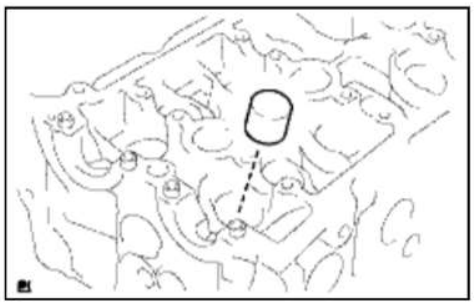
If the bolt length is greater than the maximum, replace the cylinder head set bolt.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000224A00BX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD: DISASSEMBLY (2010 Corolla)		

DISASSEMBLY

1. REMOVE VALVE LIFTER

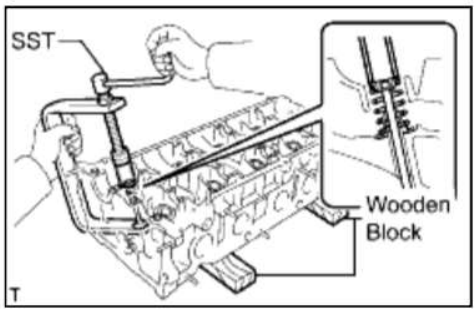


(a) Remove the 16 valve lifters from the cylinder head.

HINT:

Arrange the valve lifters in the correct order.

2. REMOVE INTAKE VALVE



(a) Using SST and wooden blocks, remove the 16 retainer locks.

SST: 09202-70020

09202-00010

(b) Remove the 8 retainers, compression springs and intake valves.

HINT:

Arrange the removed parts in the correct order.

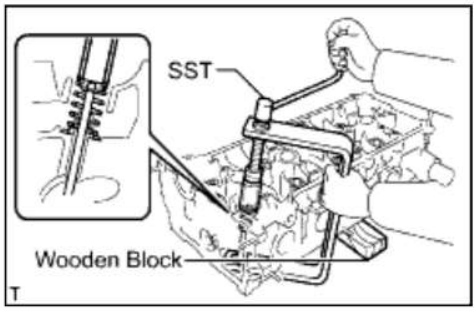
3. REMOVE EXHAUST VALVE

(a) Using SST and wooden blocks, remove the 16 retainer locks.

SST: 09202-70020

09202-00010

cardiagn.com

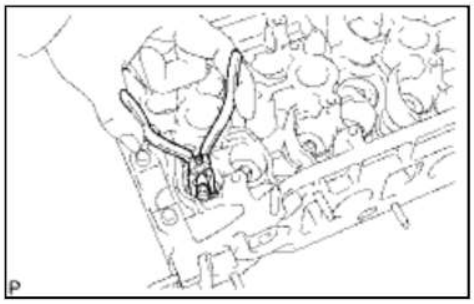


(b) Remove the 8 retainers, compression springs and exhaust valves.

HINT:

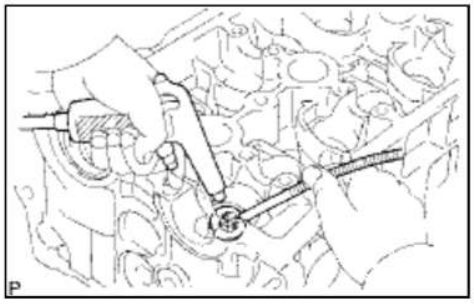
Arrange the removed parts in the correct order.

4. REMOVE VALVE STEM OIL SEAL



(a) Using needle nose pliers, remove the oil seals.

5. REMOVE VALVE SPRING SEAT



(a) Using compressed air and a magnetic pick-up tool, remove the valve spring seats by blowing air onto them.

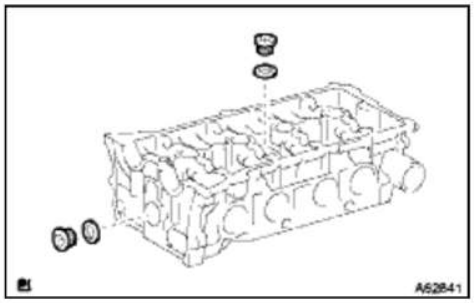
6. REMOVE NO. 1 STRAIGHT HEAD SCREW PLUG

(a) Using a 14 mm straight hexagon wrench, remove the 2 screw plugs and 2 gaskets.

NOTICE:

If water leaks from the straight screw plug or the plug is

cardiagn.com



corroded, replace it.

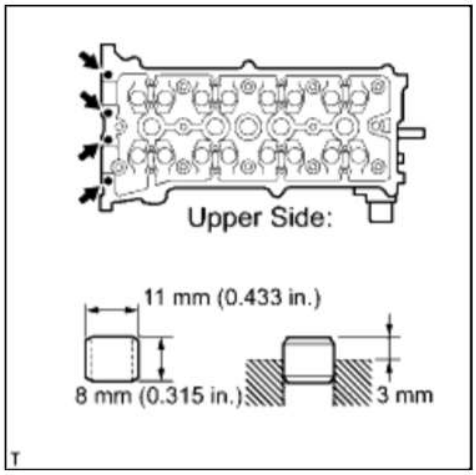
7. REMOVE STUD BOLT

8. REMOVE RING PIN

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000224B00BX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD: REASSEMBLY (2010 Corolla)		

REASSEMBLY



1. INSTALL RING PIN

(a) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

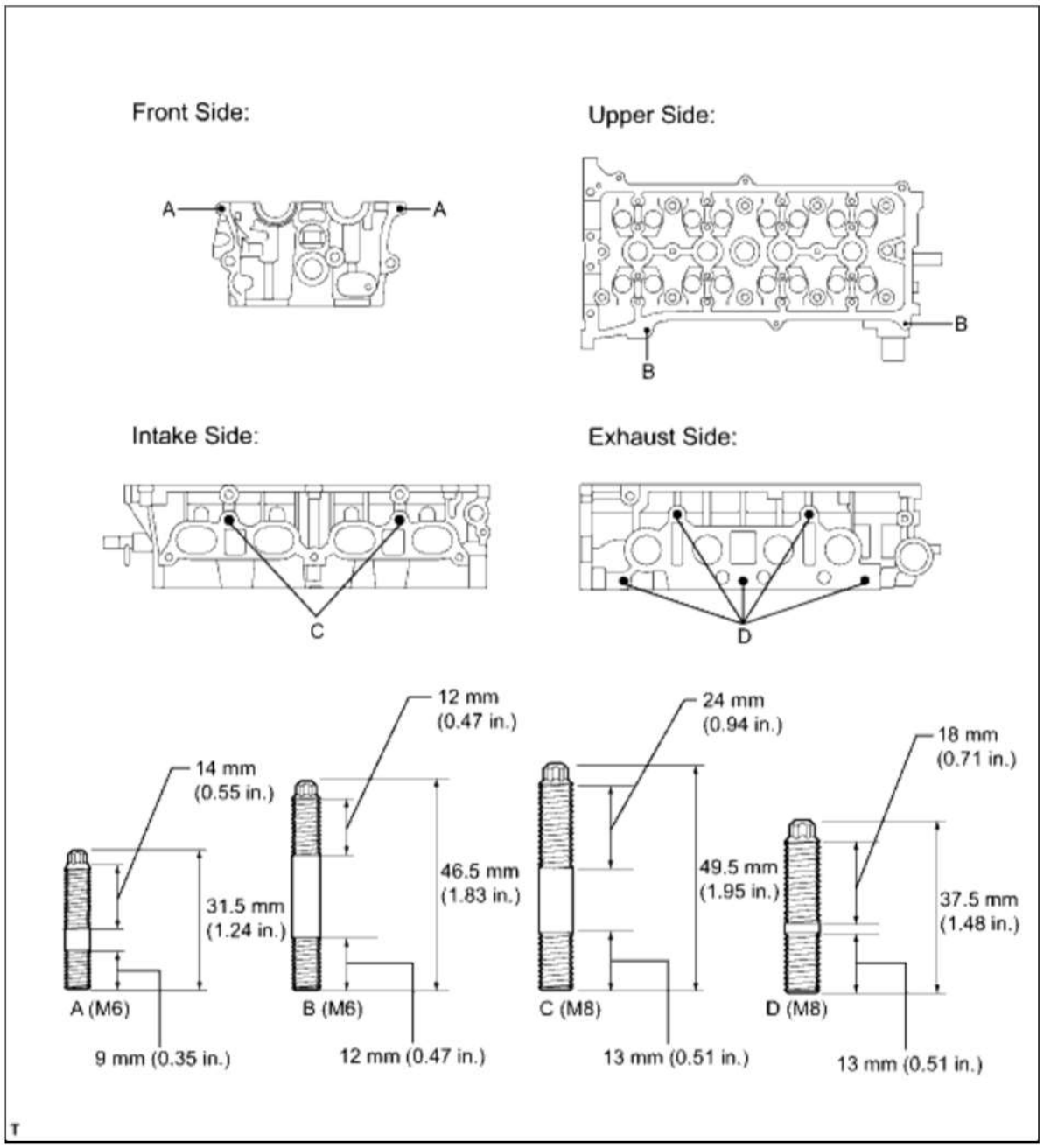
Protrusion height:
3 mm (0.118 in.)

2. INSTALL STUD BOLT

NOTICE:
If any stud bolt is deformed or the threads are damaged, replace it.

(a) Using E5 and E7 "TORX" sockets, install the stud bolts.

cardiagn.com



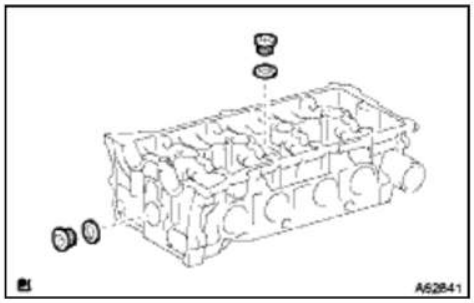
Bolt A - Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)
Bolt B - Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)
Bolt C - Torque: 9.5 N·m (97 kgf·cm, 84in·lbf)
Bolt D - Torque: 9.5 N·m (97 kgf·cm, 84in·lbf)

3. INSTALL NO. 1 STRAIGHT HEAD SCREW PLUG

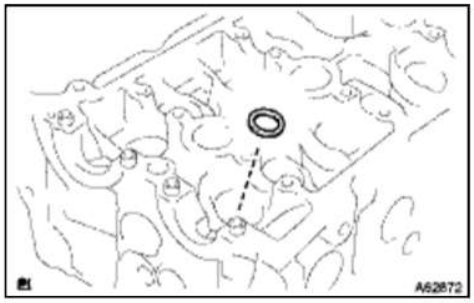
(a) Using a 14 mm straight hexagon wrench, install 2 new gaskets and the 2 straight screw plugs.

Torque: 86 N·m (877 kgf·cm, 64ft·lbf)

cardiagn.com

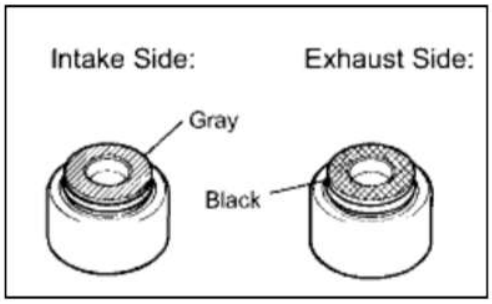


4. INSTALL VALVE SPRING SEAT



(a) Install the valve spring seats into the cylinder head.

5. INSTALL VALVE STEM OIL SEAL



(a) Apply a light coat of engine oil to a new oil seal.

NOTICE:

Pay close attention when installing the intake and exhaust oil seals. Installing the intake oil seal into the exhaust side or installing the exhaust oil seal into the intake side may cause installation problems later.

HINT:

The intake valve oil seal is gray and the exhaust valve oil seal is black.

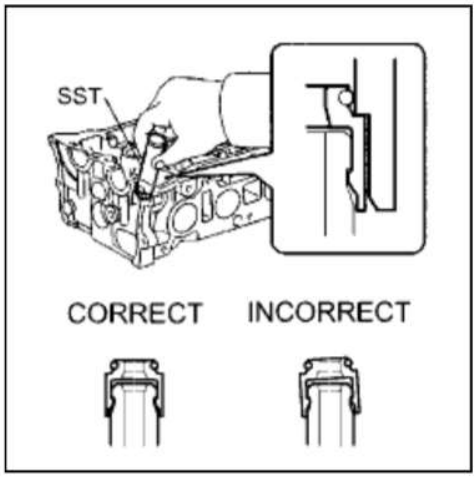
(b) Using SST, push in the oil seal.

SST: 09201-41020

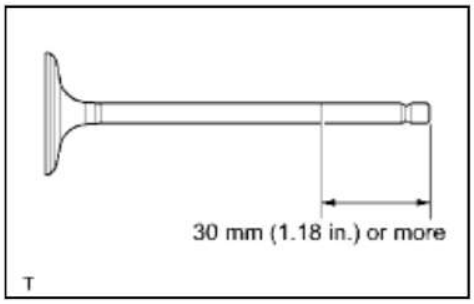
NOTICE:

Failure to use SST will cause the seal to be damaged or improperly seated.

cardiagn.com



6. INSTALL INTAKE VALVE

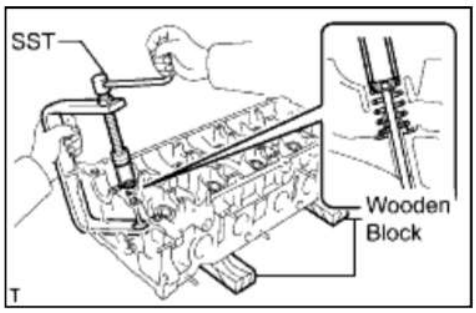


(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST: 09202-70020

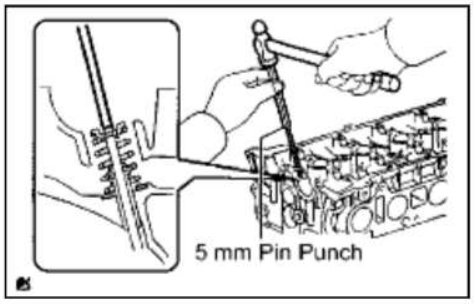
09202-00010

(d) Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

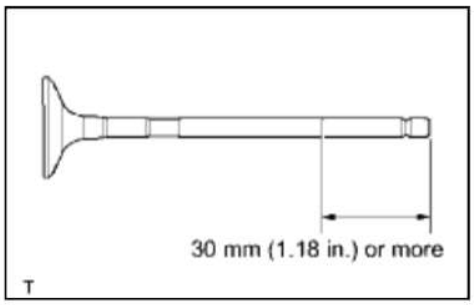
NOTICE:

Be careful not to damage the valve stem tip.

cardiagn.com



7. INSTALL EXHAUST VALVE

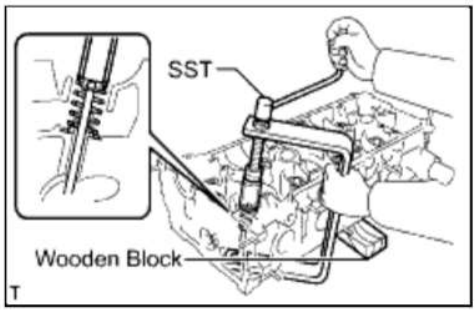


(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST: 09202-70020

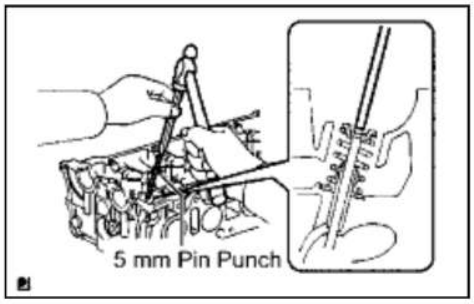
09202-00010

(d) Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

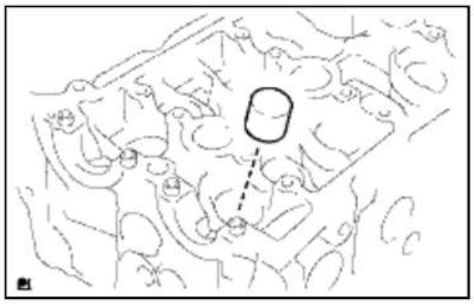
Be careful not to damage the valve stem tip.

cardiagn.com



8. INSTALL VALVE LIFTER

(a) Apply a light coat of engine oil.



(b) Assemble the valve lifter and the tip of the valve stem.

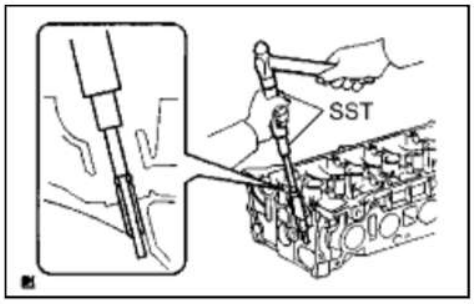
NOTICE:

Install the same parts in the same combination to the original locations.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000033OR006X
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD: REPLACEMENT (2010 Corolla)		

REPLACEMENT



1. REMOVE INTAKE VALVE GUIDE BUSH

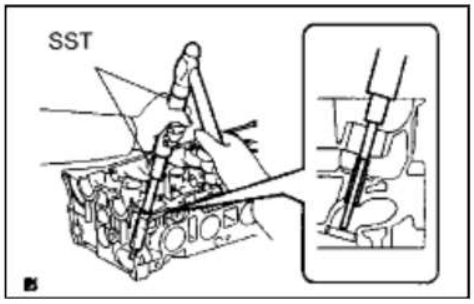
(a) Heat the cylinder head to 80 to 100°C (176 to 212 °F).

(b) Place the cylinder head on wooden blocks.

(c) Using SST and a hammer, tap out the guide bush.

SST: 09202-70020

09202-00010



2. REMOVE EXHAUST VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212 °F).

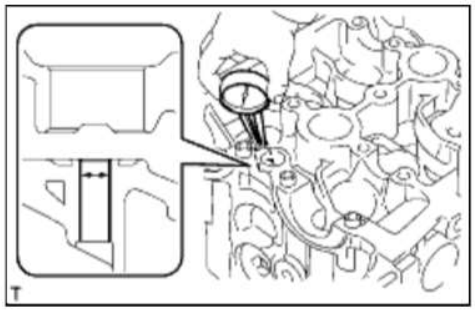
(b) Place the cylinder head on wooden blocks.

(c) Using SST and a hammer, tap out the guide bush.

SST: 09202-70020

09202-00010

3. INSTALL INTAKE VALVE GUIDE BUSH



(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a New Guide Bush (STD or O/S 0.05):

BUSH SIZE	BUSH BORE DIAMETER

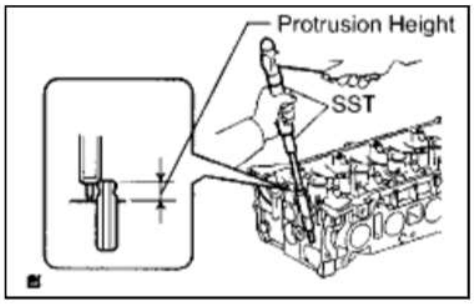
cardiagn.com

BUSH SIZE	BUSH BORE DIAMETER
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the cylinder head bush bore diameter is greater than 10.306 mm (0.4057 in.), machine the bush bore to a dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) and install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(b) Heat the cylinder head to 80 to 100°C (176 to 212 °F).

(c) Place the cylinder head on wooden blocks.



(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

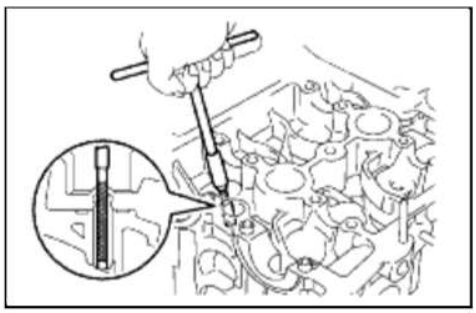
SST: 09201-10000

09201-01050

SST: 09950-70010

09951-07100

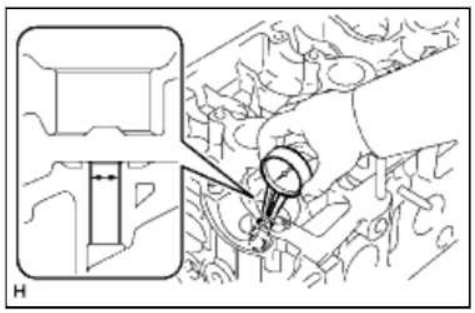
Protrusion height:
9.6 to 10.0 mm (0.3779 to 0.3937 in.)



(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)

4. INSTALL EXHAUST VALVE GUIDE BUSH



(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Cylinder bore diameter:

cardiagn.com

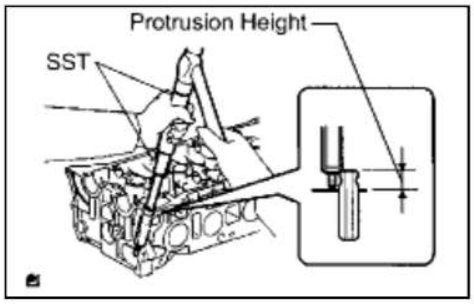
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a New Guide Bush (STD or O/S 0.05):

BUSH SIZE	BUSH BORE DIAMETER
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the cylinder head bush bore diameter is greater than 10.306 mm (0.4057 in.), machine the bush bore to a dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) and install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(b) Heat the cylinder head to 80 to 100°C (176 to 212 °F).

(c) Place the cylinder head on wooden blocks.



(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

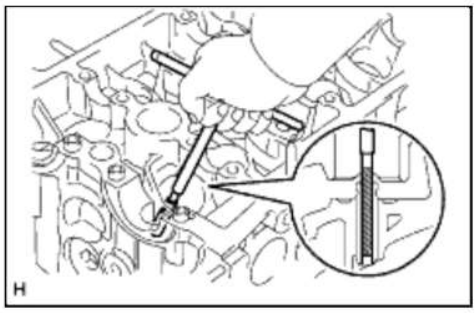
SST: 09201-10000

09201-01050

SST: 09950-70010

09951-07100

Protrusion height:
9.6 to 10.0 mm (0.3779 to 0.3937 in.)



(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

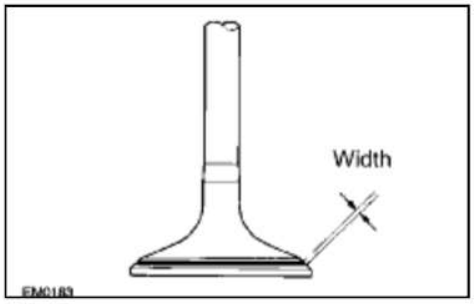
Standard oil clearance:
0.030 to 0.065 mm (0.00118 to 0.00256 in.)

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000033OS006X
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD: REPAIR (2010 Corolla)		

REPAIR

1. INSPECT VALVE SEATS



(a) Apply a light coat of prussian blue to the valve face.

(b) Lightly press the valve face against the valve seat.

(c) Check the valve face and valve seat according to the following procedure:

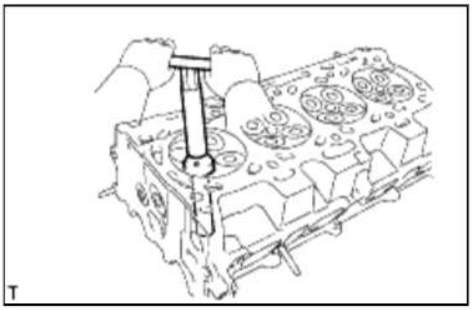
(1) If prussian blue appears 360° around the valve face, the valve face is concentric. If not, replace the valve.

(2) If prussian blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.

(3) Check that the valve seat contact is in the middle of the valve face with the width between 1.0 to 1.4 mm (intake side (0.039 to 0.055 in.)).

(4) Check that the valve face width is between 1.2 to 1.6 mm (Exhaust side (0.047 to 0.063 in.)).

2. REPAIR VALVE SEATS



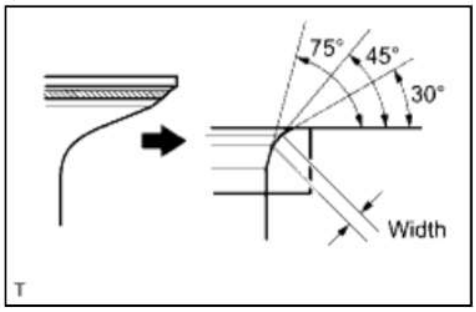
NOTICE:

- Repair the seat while checking the seating position.
- Keep the lip free from foreign matter.

(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.

(b) Using 30° to 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and

cardiagn.com



the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Valve Seat Width:

ITEM	SPECIFIED CONDITION
Intake Side	1.0 to 1.4 mm (0.039 to 0.055 in.)
Exhaust Side	1.2 to 1.6 mm (0.047 to 0.063 in.)

(c) Handrub the valve and valve seat with an abrasive compound.

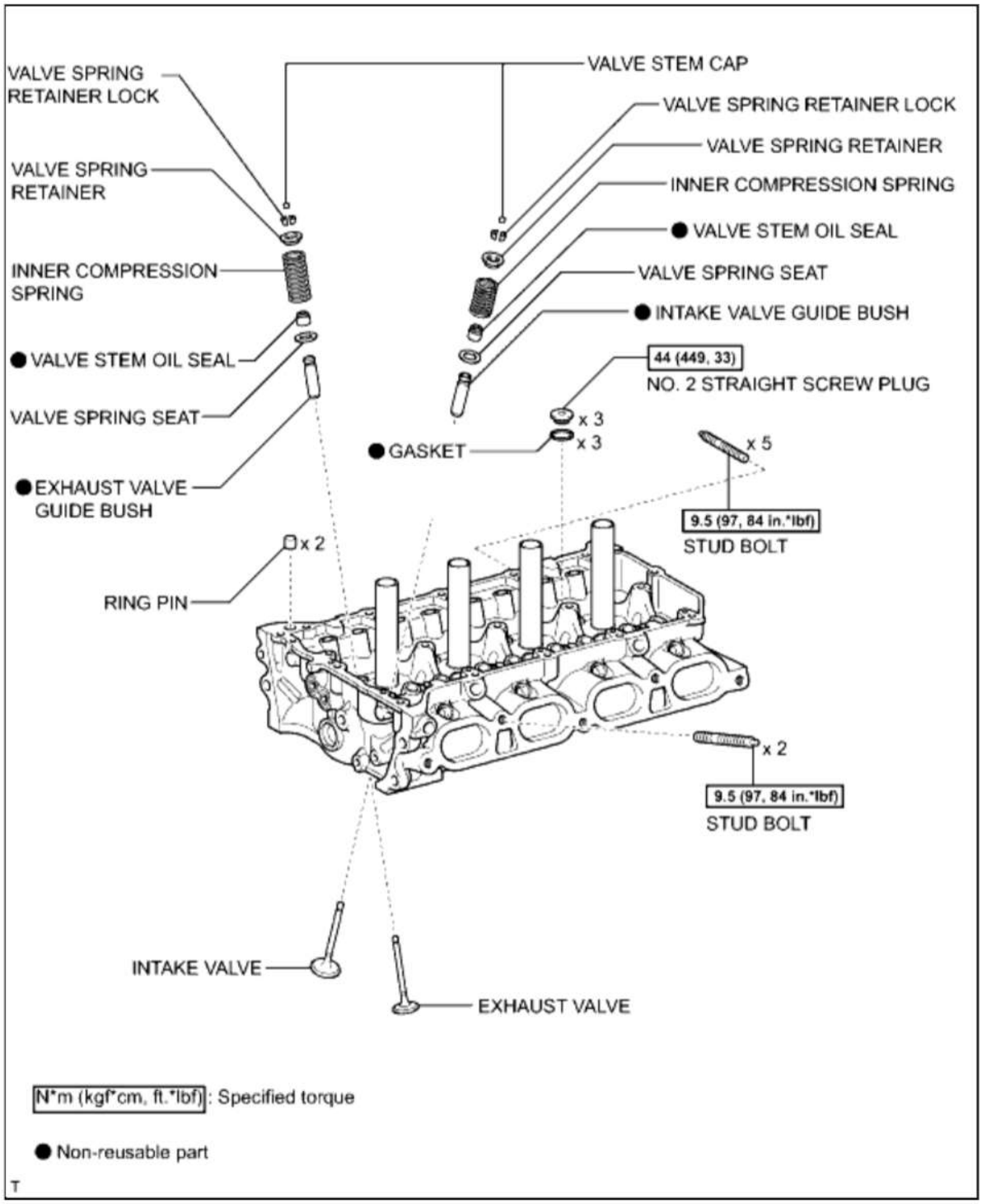
(d) Check the valve seating position.

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA600WX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION



cardiagn.com

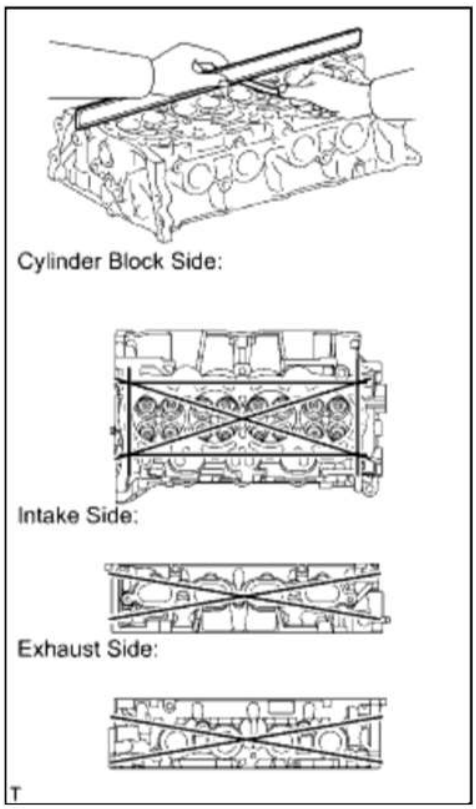


cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA201TX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD: INSPECTION (2010 Corolla)		

INSPECTION

1. INSPECT CYLINDER HEAD FOR FLATNESS



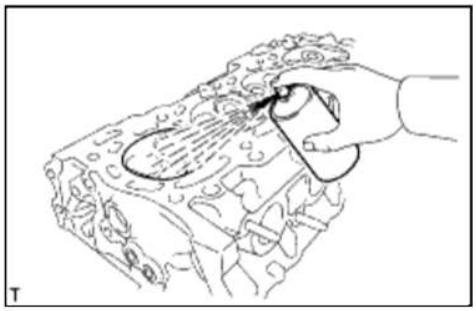
(a) Using a precision straight edge and a feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

Maximum Warpage:

ITEM	SPECIFIED CONDITION
Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.10 mm (0.0039 in.)
Exhaust manifold side	0.10 mm (0.0039 in.)

If the warpage is greater than the maximum, replace the cylinder head.

2. INSPECT CYLINDER HEAD FOR CRACKS

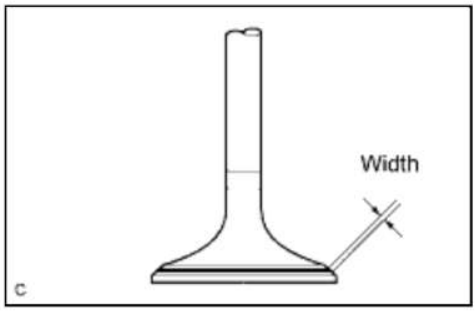


(a) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks.

If cracked, replace the cylinder head.

3. INSPECT VALVE SEATS

cardiagn.com



(a) Apply a light coat of Prussian blue to the valve face.

(b) Lightly press the valve face against the valve seat.

(c) Check the valve face and valve seat according to the following procedure:

(1) If Prussian blue appears 360° around the valve face, the valve face is concentric. If not, replace the valve.

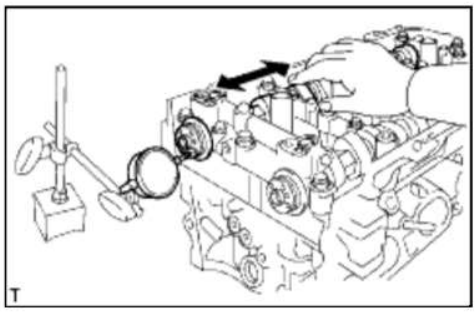
(2) If Prussian blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.

(3) Check that the valve seat contact is in the middle of the valve face with the valve seat width between 1.0 and 1.4 mm (Intake side (0.039 to 0.055 in.)).

(4) Check that the valve seat contact is in the middle of the valve face with the valve seat width between 1.0 and 1.4 mm (Exhaust side (0.039 to 0.055 in.)).

4. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshafts INFO .



(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard Thrust Clearance:

ITEM	SPECIFIED CONDITION
Intake	0.06 to 0.155 mm (0.0024 to 0.0061 in.)
Exhaust	0.06 to 0.155 mm (0.0024 to 0.0061 in.)

Maximum Thrust Clearance:

ITEM	SPECIFIED CONDITION
Intake	0.17 mm (0.0067 in.)
Exhaust	0.17 mm (0.0067 in.)

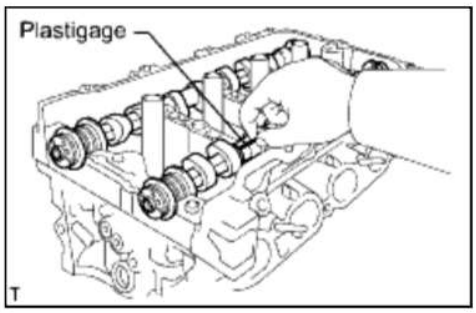
If the thrust clearance is greater than the maximum, replace the camshaft housing. If the thrust surface is damaged, replace the camshaft.

5. INSPECT CAMSHAFT OIL CLEARANCE

cardiagn.com

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the camshaft housing.



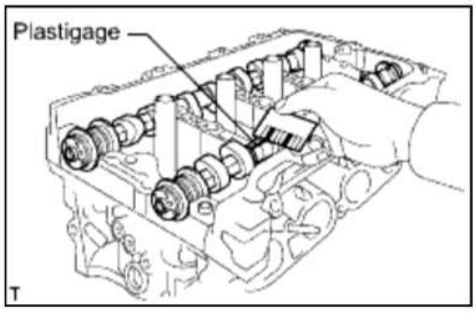
(c) Lay a strip of Plastigage across each of the camshaft journals.

(d) Install the bearing caps INFO .

NOTICE:

Do not turn the camshaft.

(e) Remove the bearing caps INFO .



(f) Measure the Plastigage at its widest point.

Standard Oil Clearance:

ITEM	SPECIFIED CONDITION
Camshaft No. 1 journal	0.030 to 0.063 mm (0.0012 to 0.0025 in.)
Camshaft other journals	0.035 to 0.072 mm (0.0014 to 0.0028 in.)

Maximum Oil Clearance:

ITEM	SPECIFIED CONDITION
Camshaft No. 1 journal	0.085 mm (0.0033 in.)
Camshaft other journals	0.09 mm (0.0035 in.)

NOTICE:

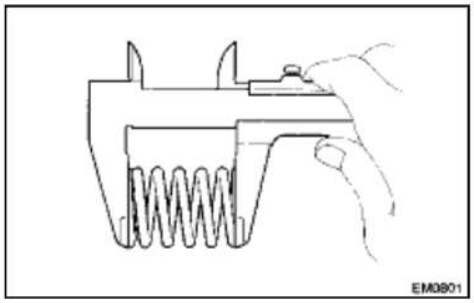
Completely remove the Plastigage after the inspection.

If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the cylinder head.

6. INSPECT COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the

cardiagn.com

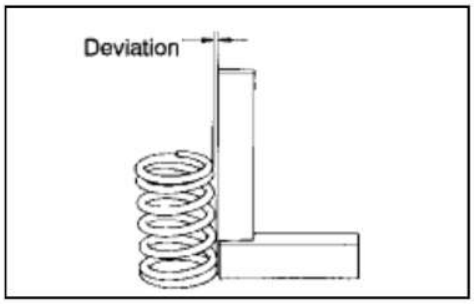


valve spring.

Free length:

53.36 mm (2.1008 in.)

If the free length is not as specified, replace the valve spring.



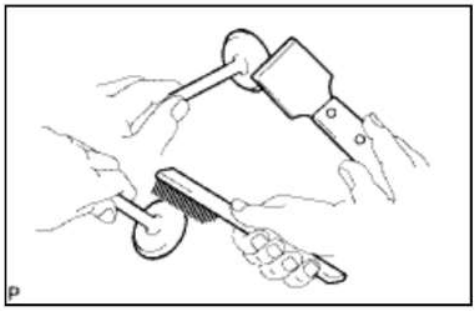
(b) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:

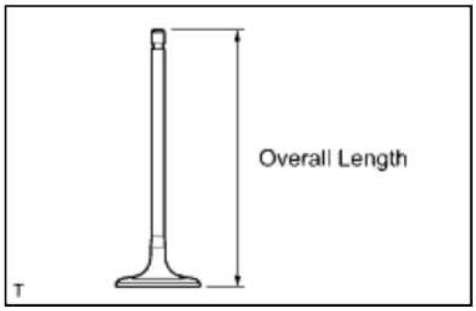
1.0 mm (0.0394 in.)

If the deviation is greater than the maximum, replace the valve spring.

7. INSPECT INTAKE VALVE



(a) Using a gasket scraper and wire brush, scrape off any carbon on the valve head.



(b) Using a vernier caliper, measure the overall length of the valve.

Standard overall length:

109.34 mm (4.3047 in.)

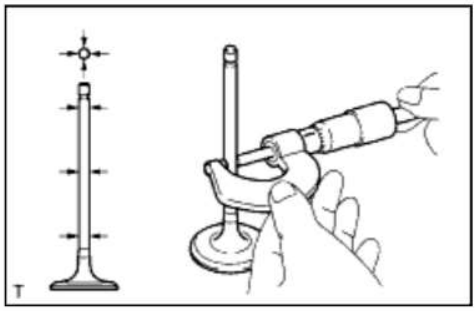
Minimum overall length:

108.84 mm (4.2850 in.)

If the overall length is less than the minimum, replace the valve.

(c) Using a micrometer, measure the diameter of the valve

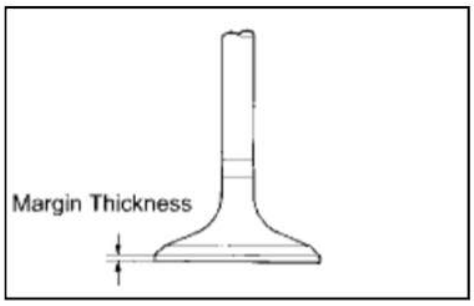
cardiagn.com



stem.

Valve stem diameter:
5.470 to 5.485 mm (0.2154 to 0.2159 in.)

If the valve stem diameter is not as specified, check the oil clearance.

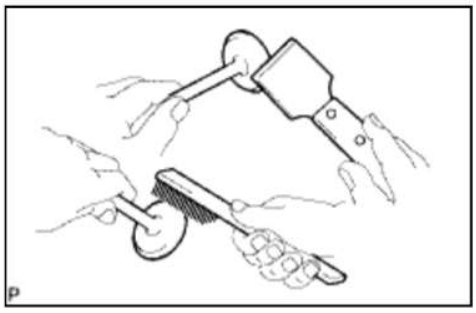


(d) Using a vernier caliper, measure the valve head margin thickness.

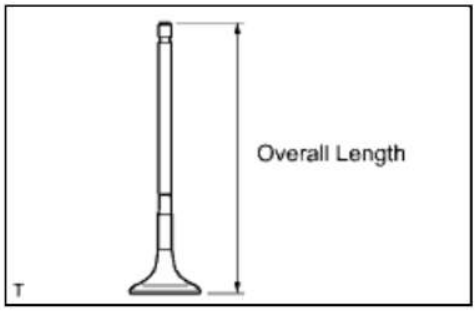
Standard margin thickness:
1.0 mm (0.0394 in.)
Minimum margin thickness:
0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

8. INSPECT EXHAUST VALVE



(a) Using a gasket scraper and wire brush, scrape off any carbon on the valve head.



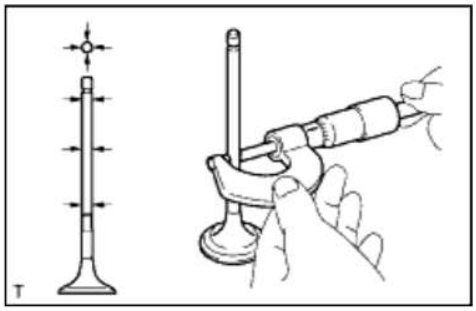
(b) Using a vernier caliper, measure the overall length of the valve.

Standard overall length:
108.25 mm (4.2618 in.)
Minimum overall length:
107.75 mm (4.2421 in.)

If the overall length is less than the minimum, replace the valve.

(c) Using a micrometer, measure the diameter of the valve

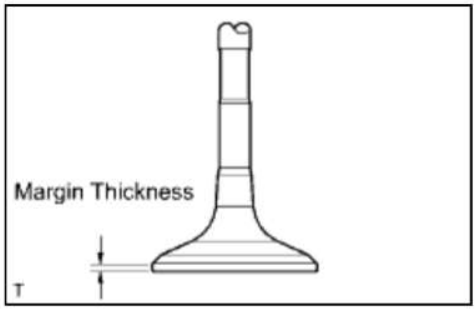
cardiagn.com



stem.

Valve stem diameter:
5.465 to 5.480 mm (0.2152 to 0.2157 in.)

If the valve stem diameter is not as specified, check the oil clearance.

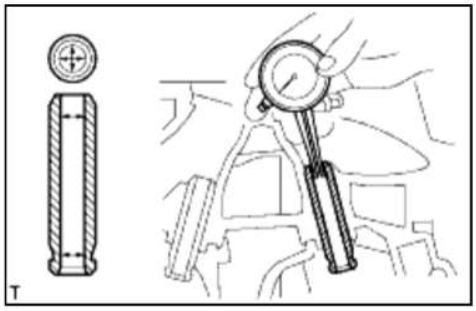


(d) Using a vernier caliper, measure the valve head margin thickness.

Standard margin thickness:
1.01 mm (0.0398 in.)
Minimum margin thickness:
0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

9. INSPECT VALVE GUIDE BUSH OIL CLEARANCE



(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard Oil Clearance:

ITEM	SPECIFIED CONDITION
Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum Oil Clearance:

ITEM	SPECIFIED CONDITION

cardiagn.com

ITEM	SPECIFIED CONDITION
Intake	0.080 mm (0.0031 in.)
Exhaust	0.085 mm (0.0033 in.)

If the clearance is greater than the maximum, replace the valve and guide bush.

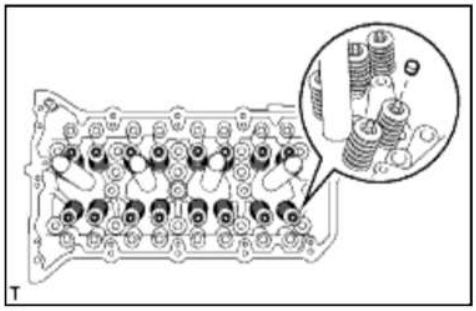


cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA302OX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD: DISASSEMBLY (2010 Corolla)		

DISASSEMBLY

1. REMOVE VALVE STEM CAP

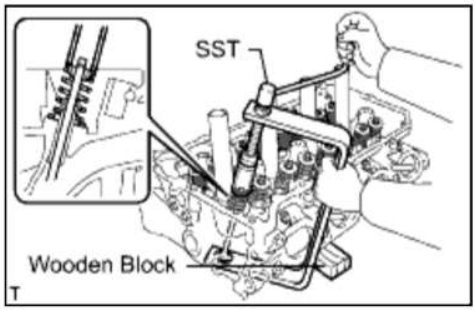


(a) Remove the valve stem caps from the cylinder head.

HINT:

Arrange the removed parts in the correct order.

2. REMOVE INTAKE VALVE



(a) Using SST and wooden blocks, compress and remove the valve retainer locks.

SST: 09202-70020

09202-00010

HINT:

Arrange the removed parts in the correct order.

(b) Remove the retainer, valve spring and valve.

HINT:

Arrange the removed parts in the correct order.

3. REMOVE EXHAUST VALVE

(a) Using SST and wooden blocks, compress and remove the valve retainer locks.

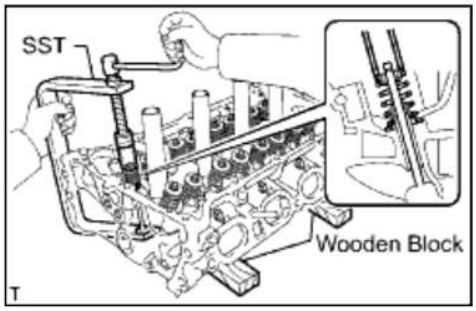
SST: 09202-70020

09202-00010

HINT:

Arrange the removed parts in the correct order.

cardiagn.com

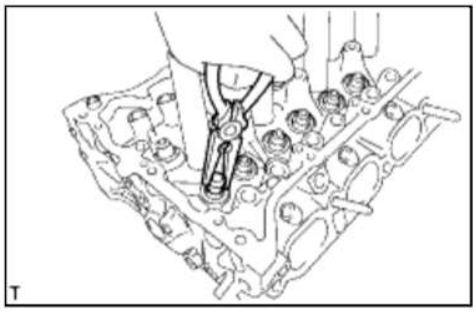


(b) Remove the retainer, valve spring and valve.

HINT:

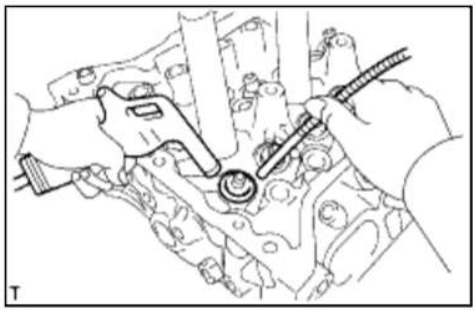
Arrange the removed parts in the correct order.

4. REMOVE VALVE STEM OIL SEAL



(a) Using needle-nose pliers, remove the oil seals.

5. REMOVE VALVE SPRING SEAT



(a) Using compressed air and a magnetic pick-up tool, remove the valve spring seats by blowing air onto them.

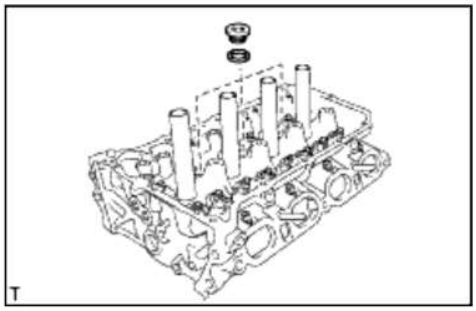
6. REMOVE NO. 2 STRAIGHT SCREW PLUG

(a) Using a 10 mm straight hexagon wrench, remove the 3 screw plugs and 3 gaskets.

NOTICE:

If water leaks from any of the straight screw plugs or if a plug

cardiagn.com



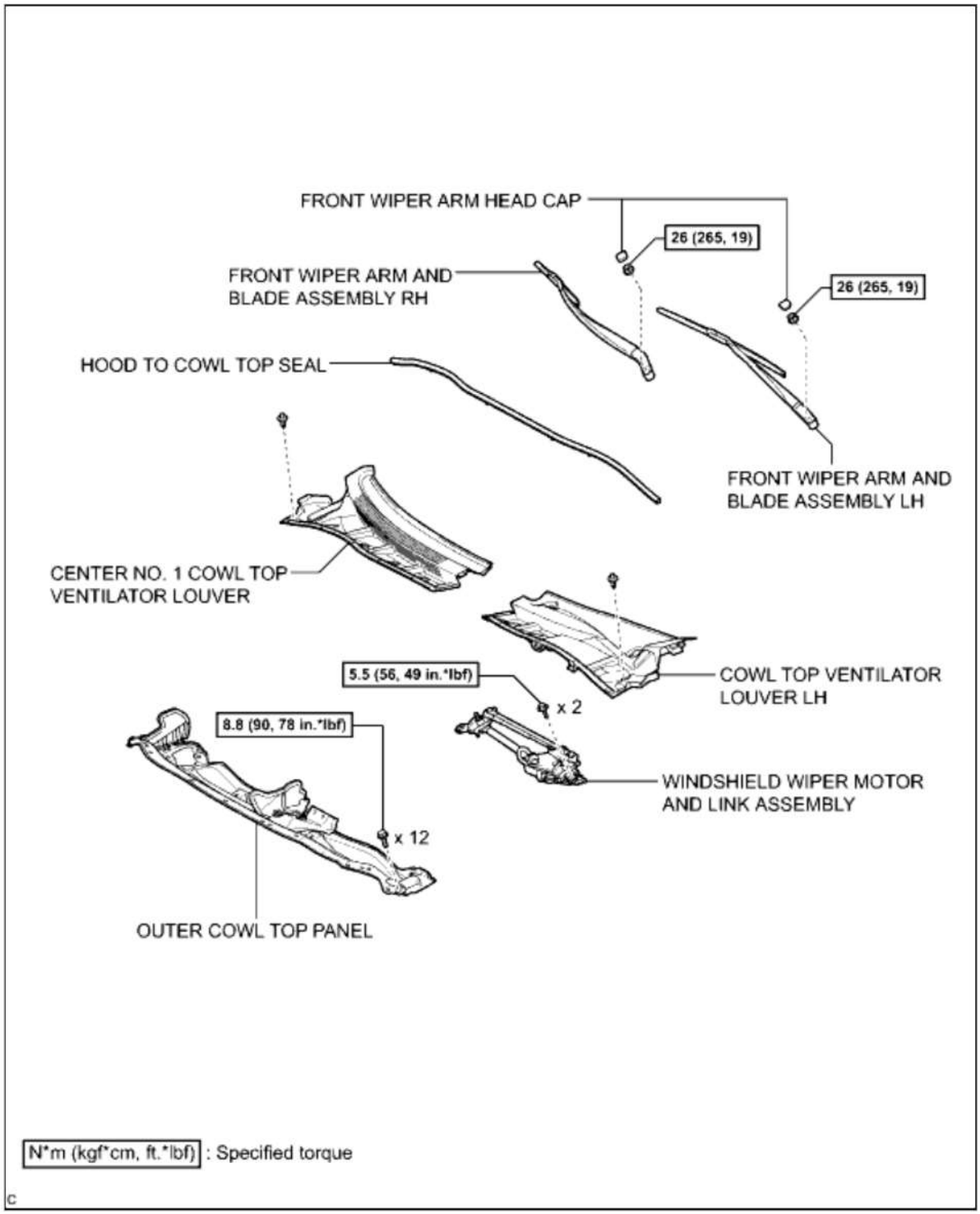
is corroded, replace it.

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001R3P00NX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD GASKET: COMPONENTS (2010 Corolla)		

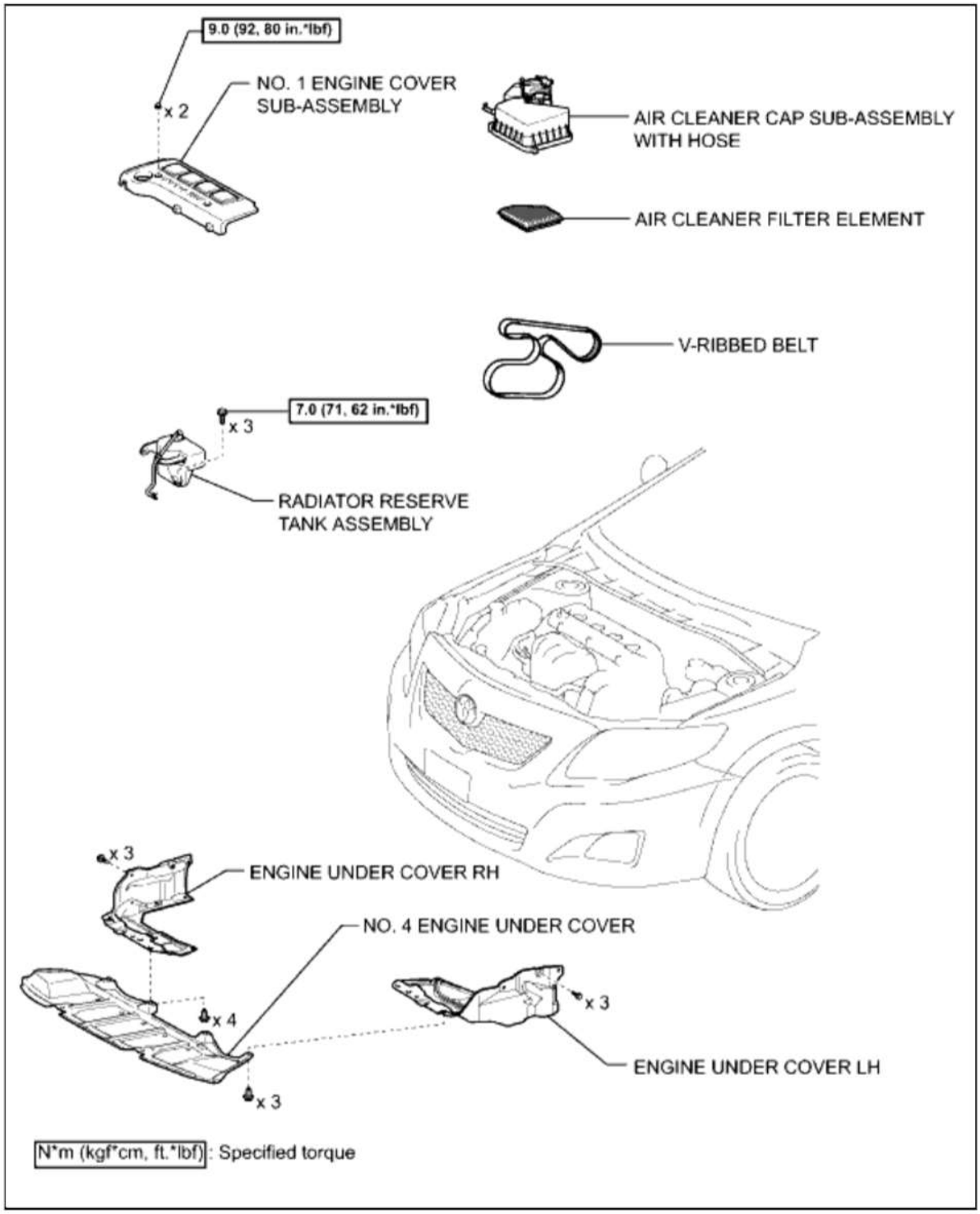
COMPONENTS

ILLUSTRATION



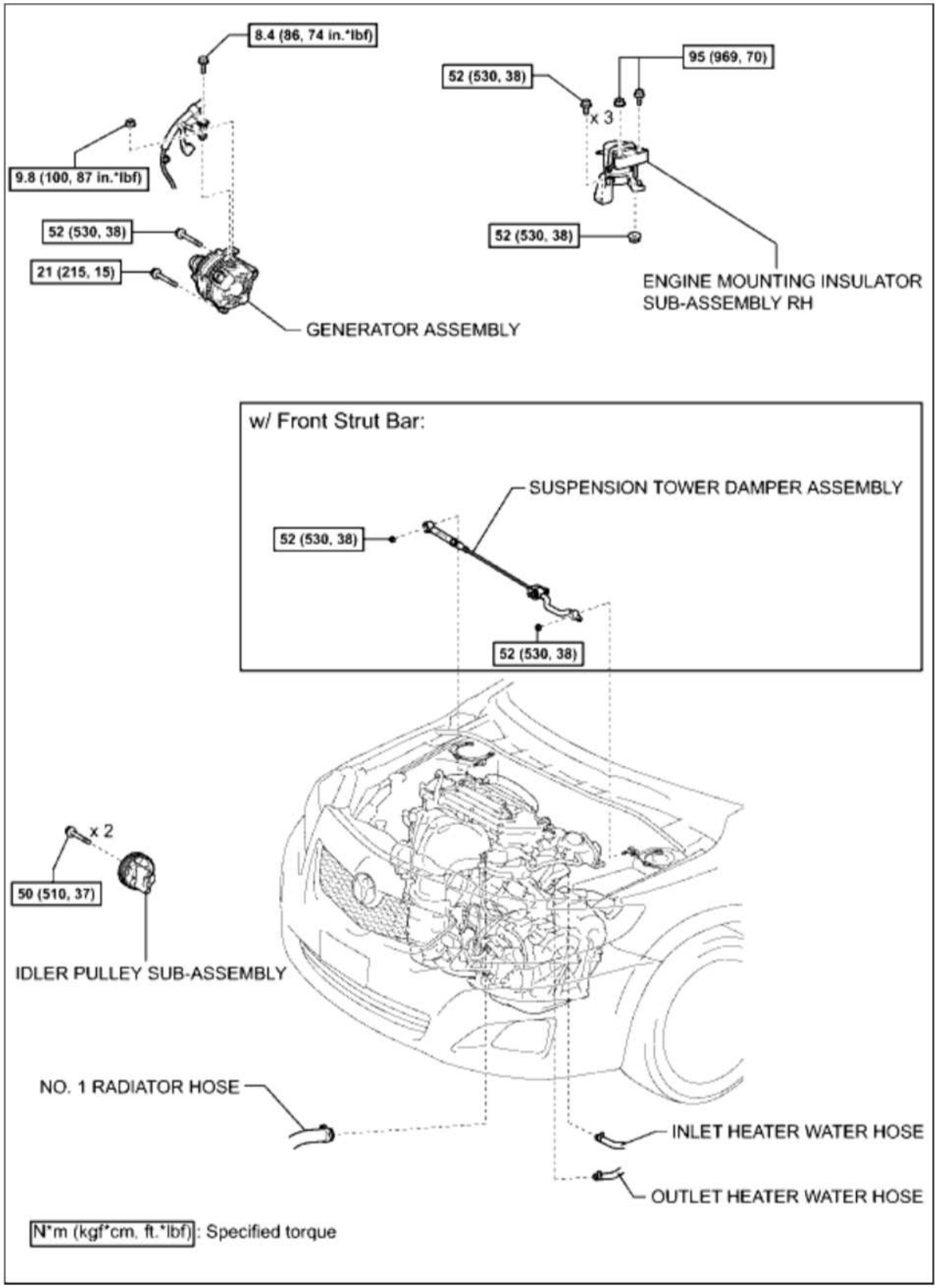
cardiagn.com

ILLUSTRATION



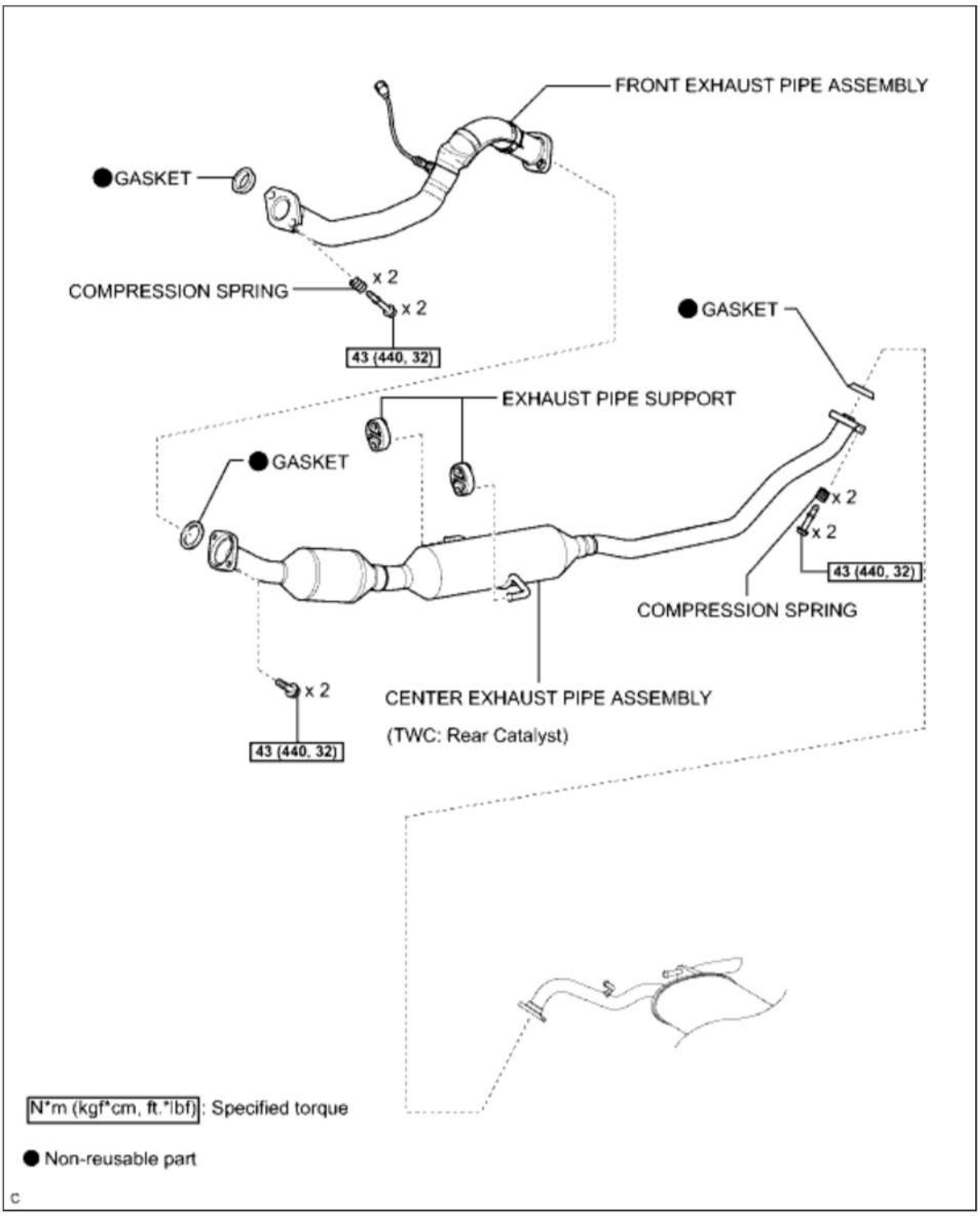
ILLUSTRATION

cardiagn.com



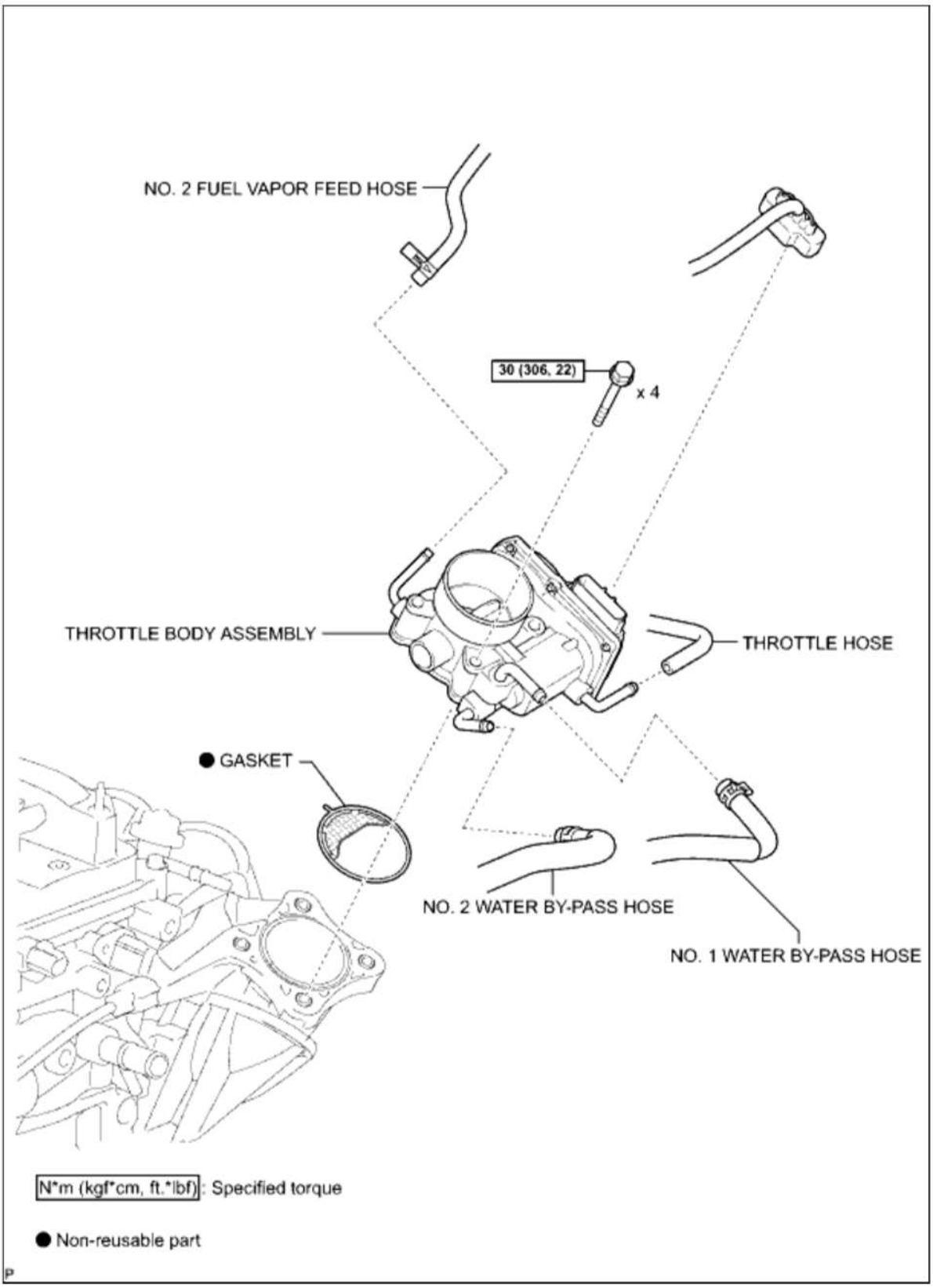
ILLUSTRATION

cardiagn.com



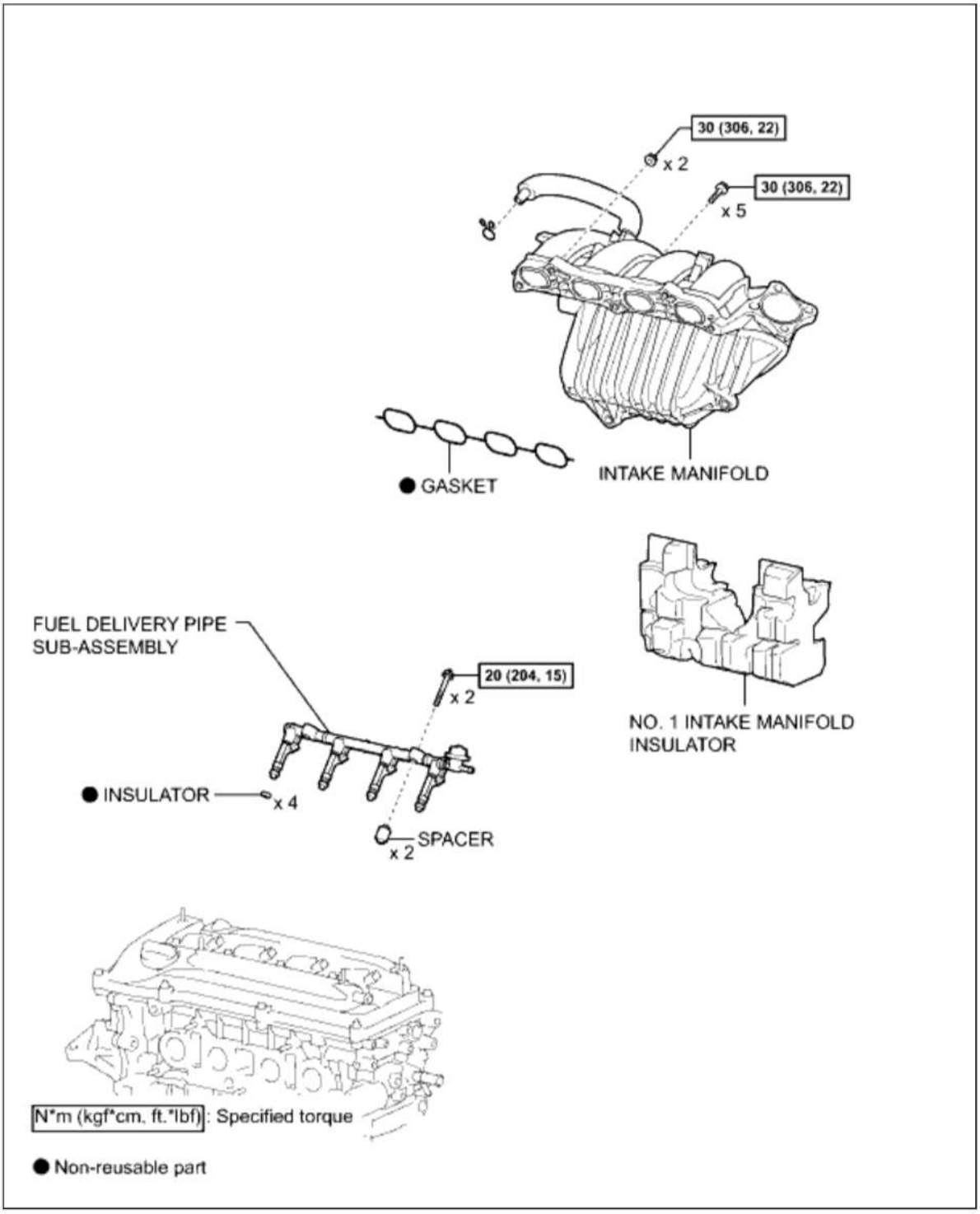
ILLUSTRATION

cardiagn.com



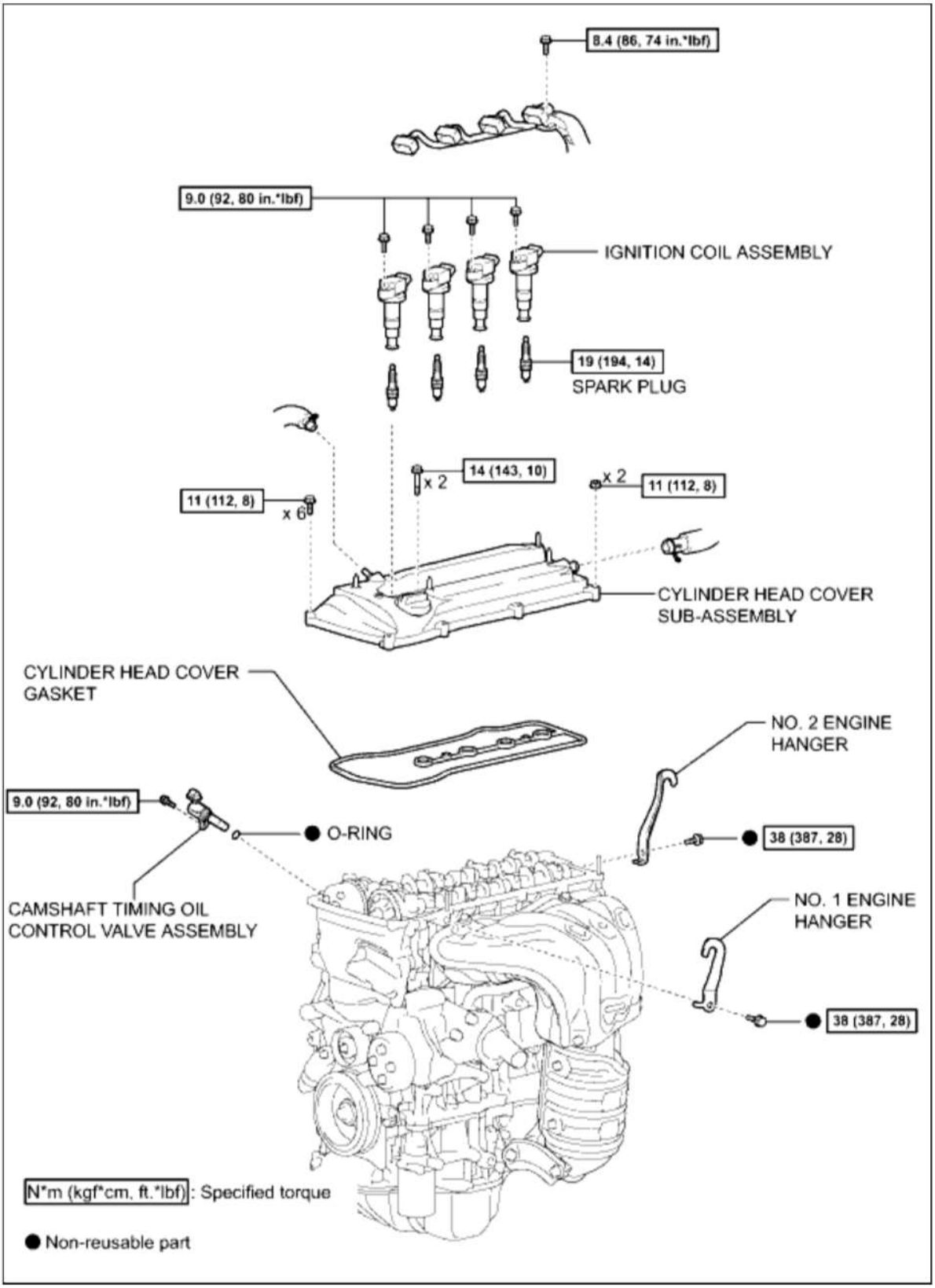
ILLUSTRATION

cardiagn.com



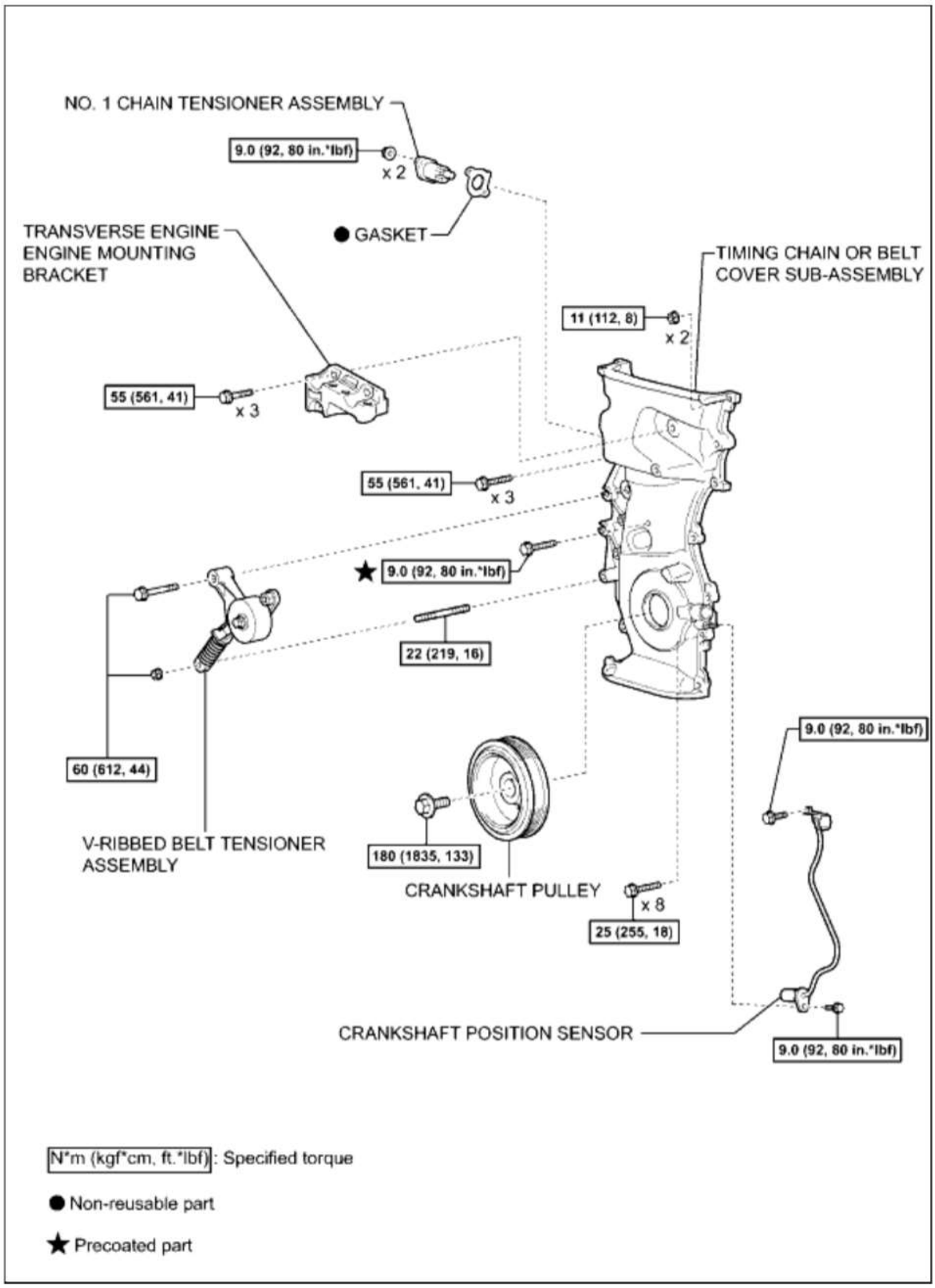
ILLUSTRATION

cardiagn.com



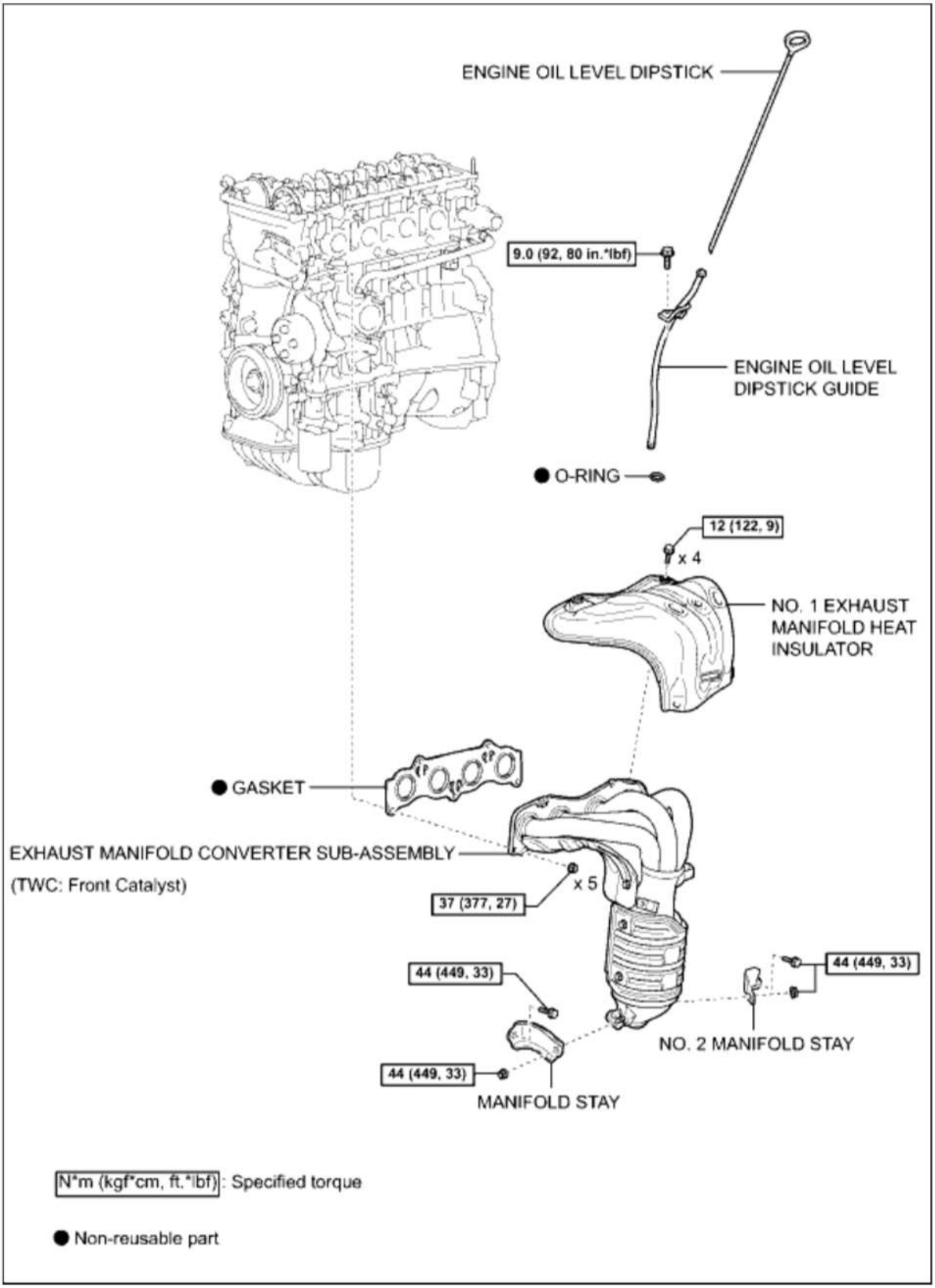
ILLUSTRATION

cardiagn.com



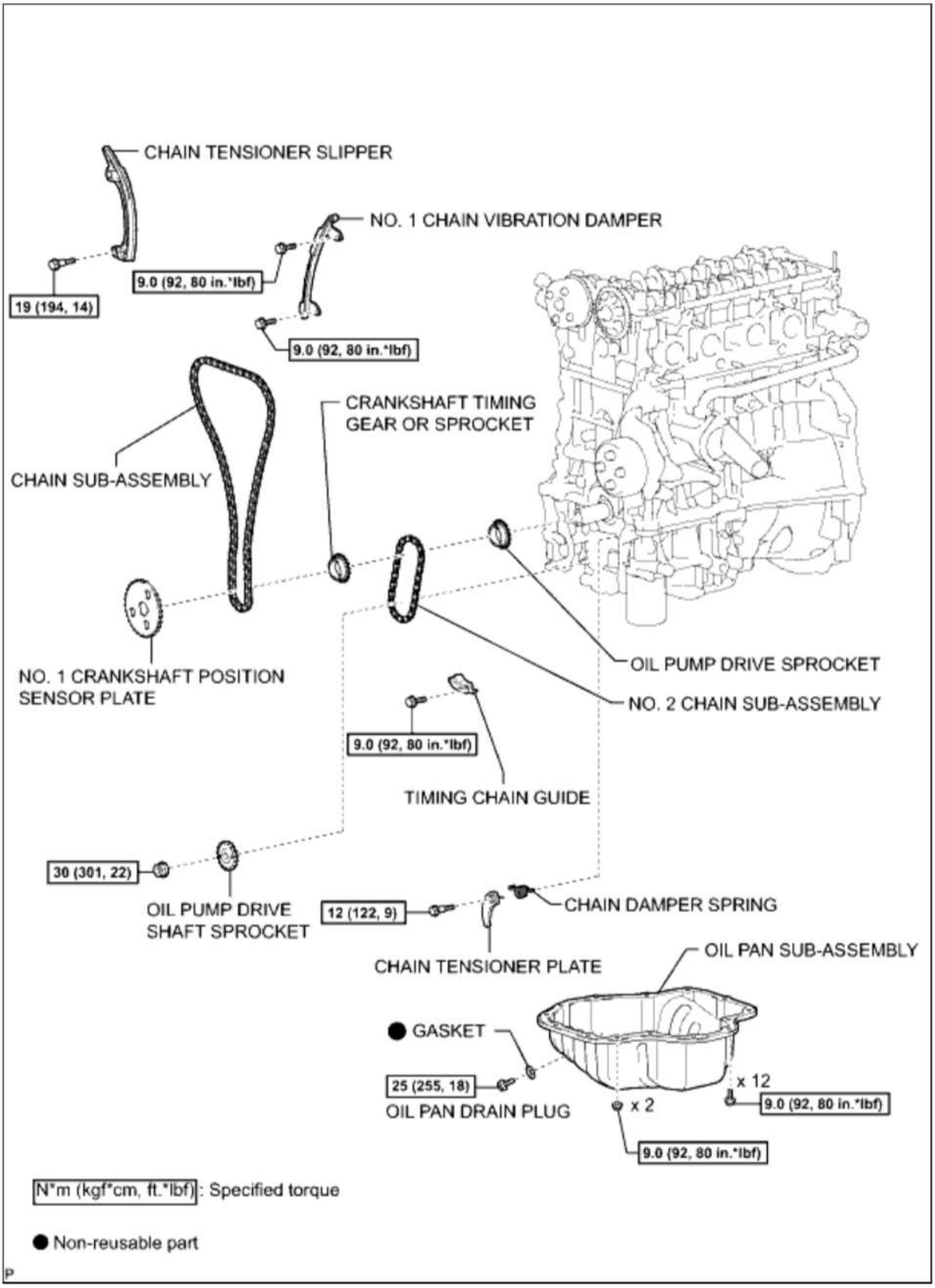
ILLUSTRATION

cardiagn.com



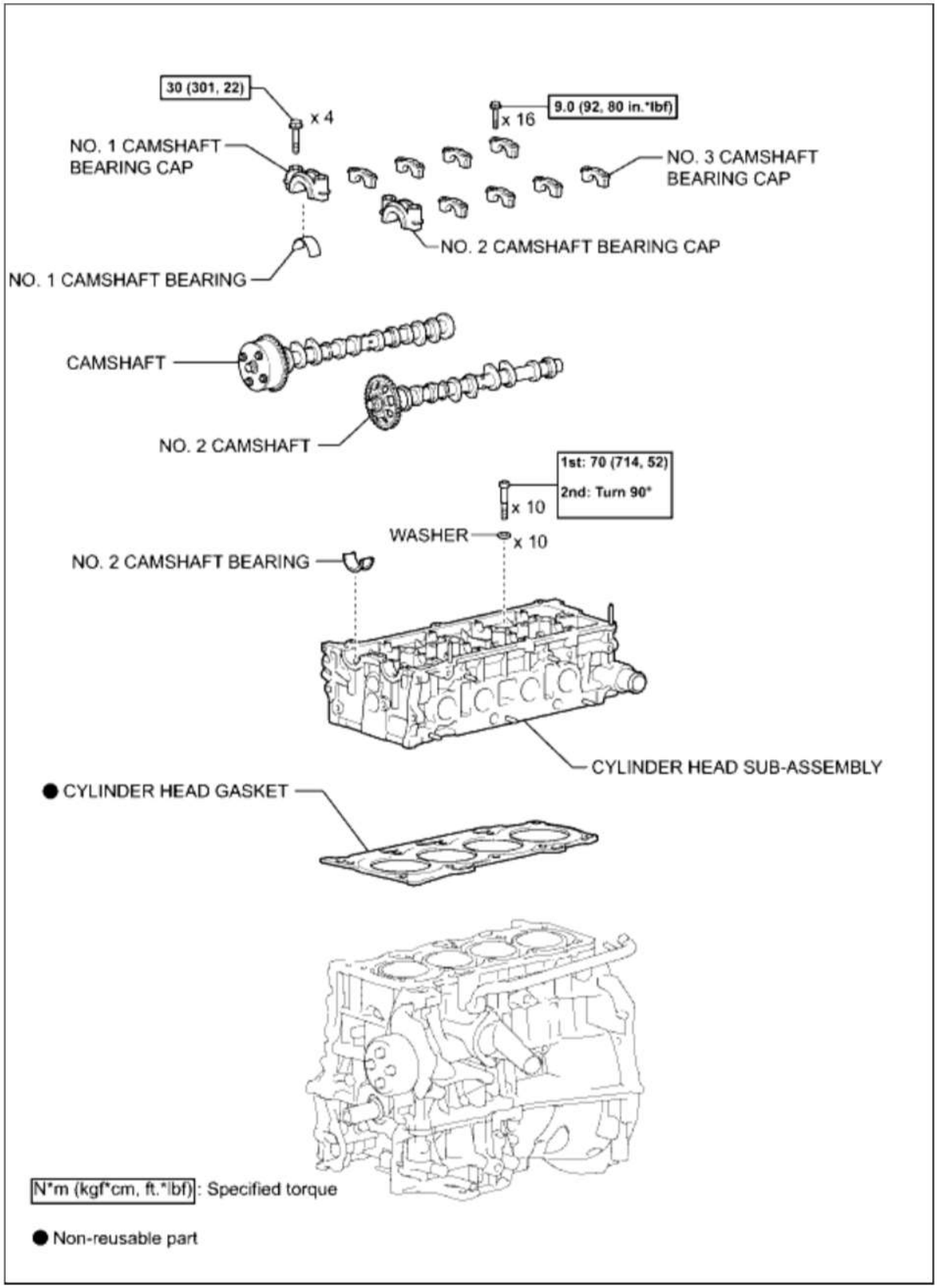
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com



cardiagn.com

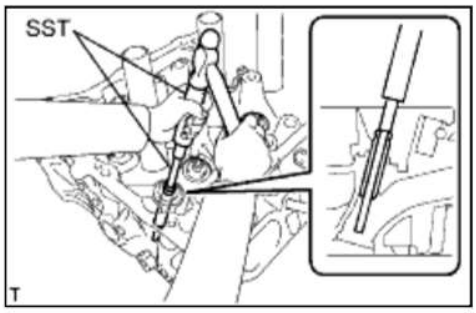
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XAF00YX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD: REPLACEMENT (2010 Corolla)		

REPLACEMENT

1. REPLACE INTAKE VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



(c) Using SST and a hammer, tap out the guide bush.

SST: 09201-10000

09201-01050

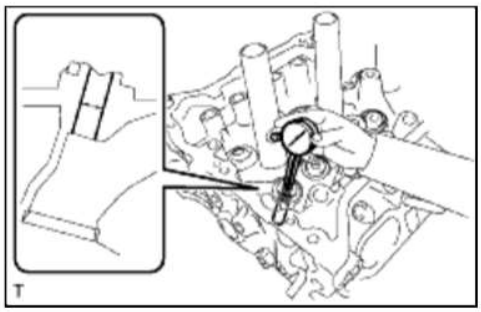
SST: 09950-70010

09951-07100

(d) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)

Select a New Guide Bush (STD or O/S 0.05):



BUSH SIZE	BUSH BORE DIAMETER
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

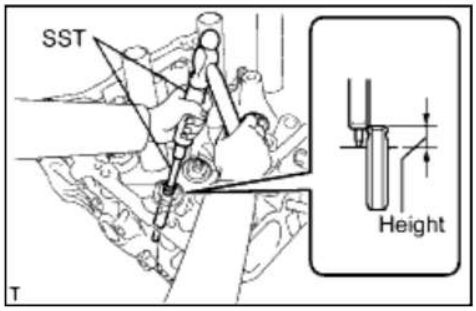
If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(e) Heat the cylinder head to 80 to 100°C (176 to 212°F).

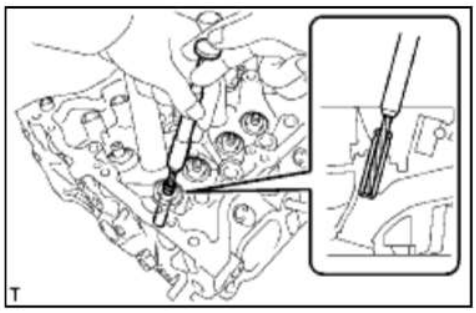
(f) Place the cylinder head on wooden blocks.

(g) Using SST and a hammer, tap a new guide bush into the specified protrusion height.

cardiagn.com



SST: 09201-10000
09201-01050
SST: 09950-70010
09951-07100
Protrusion height:
9.9 to 10.3 mm (0.3898 to 0.4055 in.)



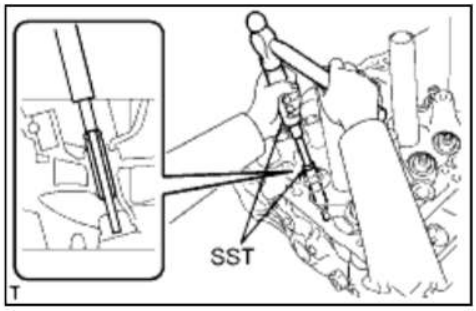
(h) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard clearance between the guide bush and valve stem.

Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)

2. REPLACE EXHAUST VALVE GUIDE BUSH

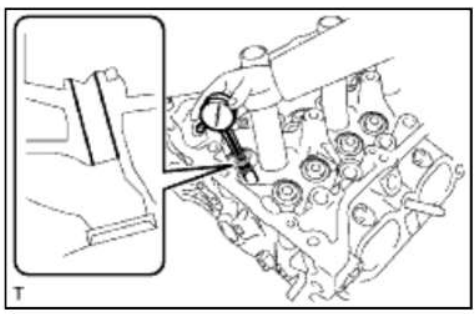
(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



(c) Using SST and a hammer, tap out the guide bush.

SST: 09201-10000
09201-01050
SST: 09950-70010
09951-07100



(d) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a New Guide Bush (STD or O/S 0.05):

BUSH SIZE	BUSH BORE DIAMETER
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)

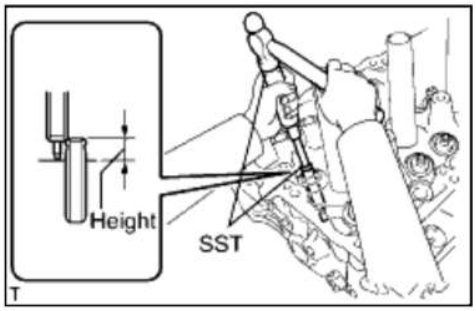
cardiagn.com

O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(e) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(f) Place the cylinder head on wooden blocks.



(g) Using SST and a hammer, tap a new guide bush into the specified protrusion height.

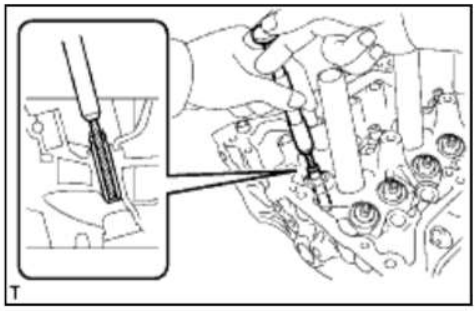
SST: 09201-10000

09201-01050

SST: 09950-70010

09951-07100

Protrusion height:
11.15 to 11.55 mm (0.4390 to 0.4547 in.)



(h) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard clearance between the guide bush and valve stem.

Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)

3. REPLACE RING PIN

NOTICE:

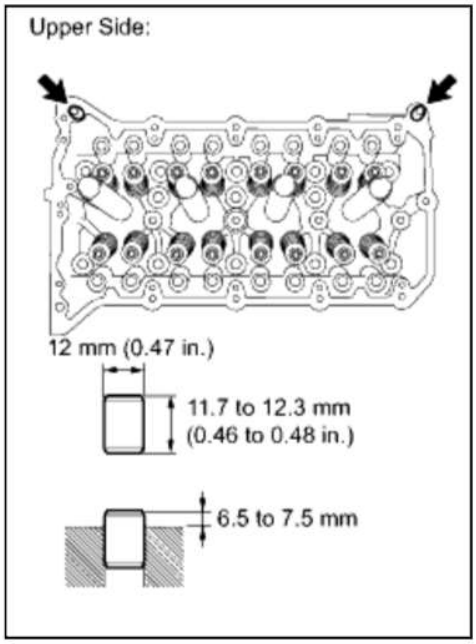
It is not necessary to remove the ring pins unless they are being replaced.

(a) Remove the ring pins.

(b) Using a plastic-faced hammer, tap in new ring pins to the specified protrusion height.

Protrusion height:
6.5 to 7.5 mm (0.26 to 0.30 in.)

cardiagn.com



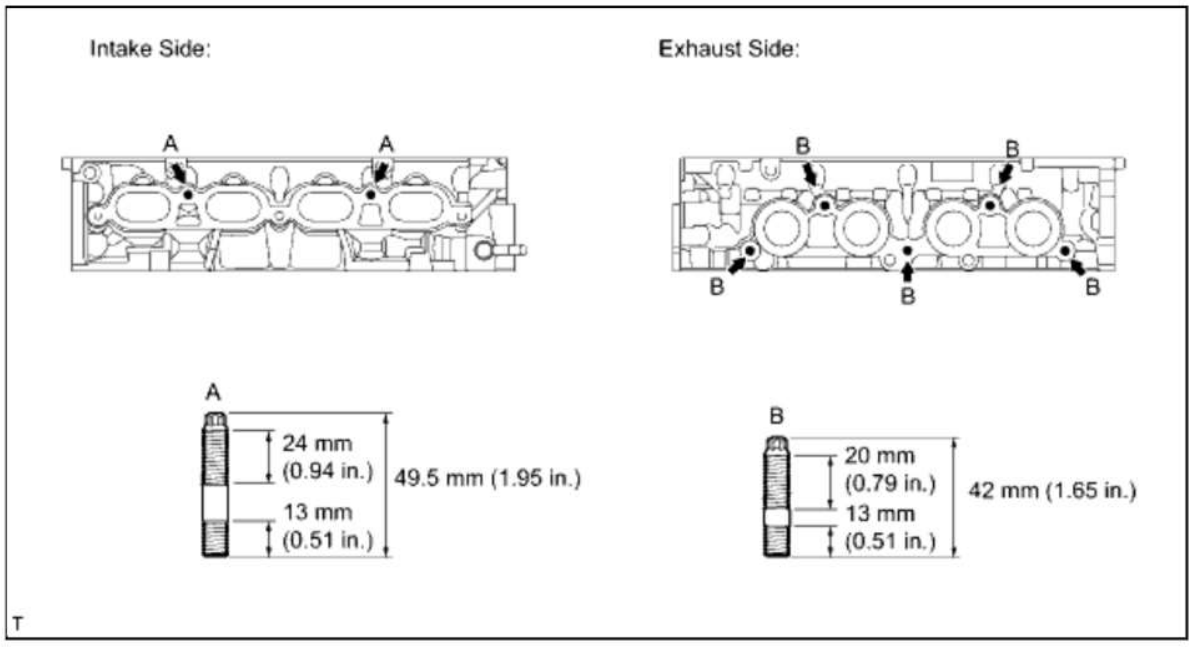
4. REPLACE STUD BOLT

NOTICE:

If any of the stud bolts is deformed or the threads are damaged, replace it.

(a) Remove the stud bolts.

(b) Using an E8 "TORX" socket, install the stud bolts.



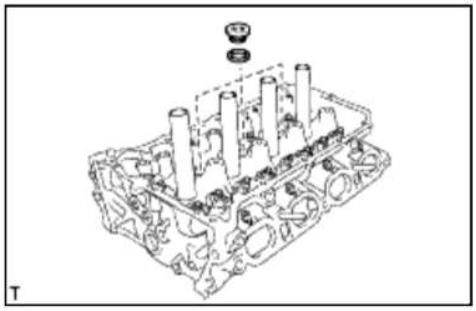
Torque: 9.5 N·m (97 kgf·cm, 84in·lbf)

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA402PX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD: REASSEMBLY (2010 Corolla)		

REASSEMBLY

1. INSTALL NO. 2 STRAIGHT SCREW PLUG



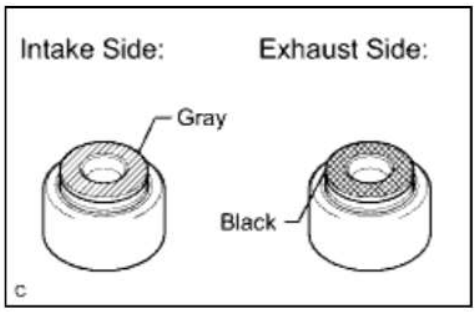
(a) Using a 10 mm straight hexagon wrench, install 3 new gaskets and the 3 straight screw plugs.

Torque: 44 N·m (449 kgf·cm, 33ft·lbf)

2. INSTALL VALVE SPRING SEAT

(a) Install the valve spring seats to the cylinder head.

3. INSTALL VALVE STEM OIL SEAL



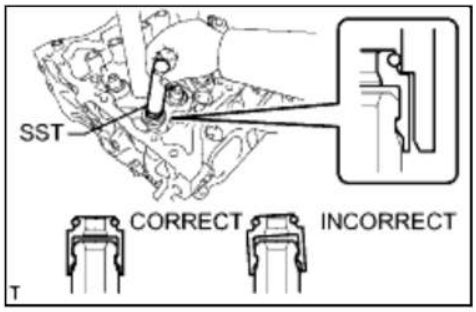
(a) Apply a light coat of engine oil to new oil seals.

NOTICE:

Pay close attention when installing the intake and exhaust oil seals. Installing the intake oil seal into the exhaust side or installing the exhaust oil seal to the intake side may cause installation problems later.

HINT:

The intake valve oil seal is gray and the exhaust valve oil seal is black.



(b) Using SST, push in the oil seals.

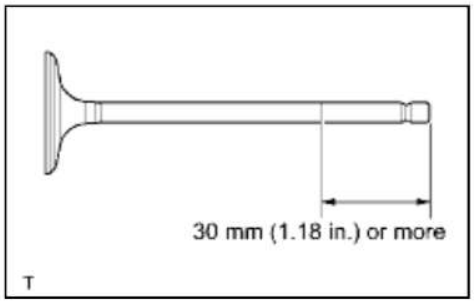
SST: 09201-41020

NOTICE:

Failure to use SST may cause the oil seal to be damaged or improperly seated.

4. INSTALL INTAKE VALVE

cardiagn.com

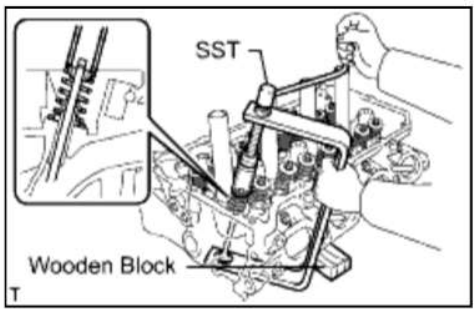


(a) Sufficiently apply engine oil to the tip area of the intake valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

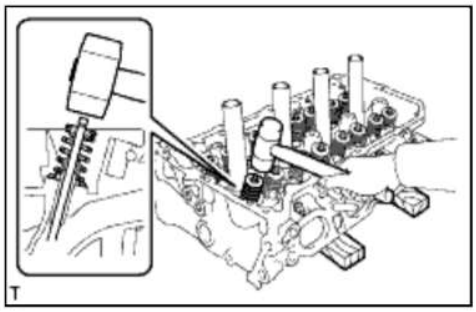
Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST: 09202-70020

09202-00010



(d) Using a plastic-faced hammer, lightly tap the valve stem tip to ensure a proper fit.

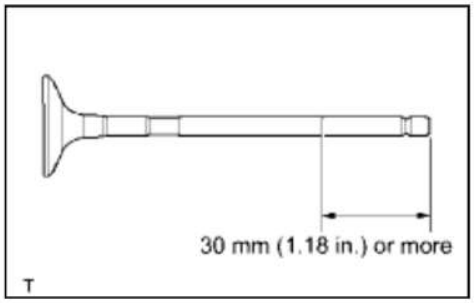
NOTICE:

- Be careful not to damage the valve stem tip.
- Be careful not to damage the retainer.

5. INSTALL EXHAUST VALVE

(a) Sufficiently apply engine oil to the tip area of the exhaust valve shown in the illustration.

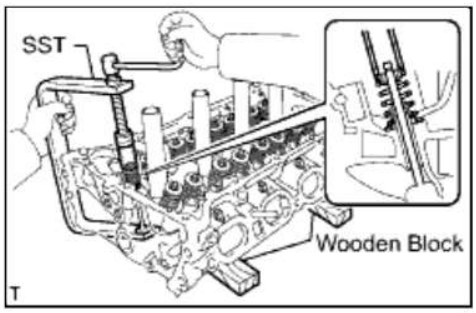
cardiagn.com



(b) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

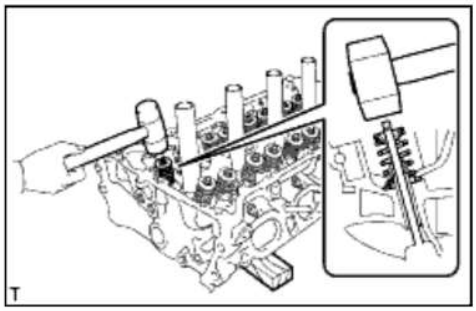
Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST: 09202-70020

09202-00010



(d) Using a plastic-faced hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

- Be careful not to damage the valve stem tip.
- Be careful not to damage the retainer.

6. INSTALL VALVE STEM CAP

(a) Apply a light coat of engine oil to the valve stem caps.

(b) Install the valve stem caps to the cylinder head.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001AN800YX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD GASKET: REMOVAL (2010 Corolla)		

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE INFO
2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
3. REMOVE FRONT WIPER ARM HEAD CAP INFO
4. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO
5. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO
6. REMOVE HOOD TO COWL TOP SEAL INFO
7. REMOVE CENTER NO. 1 COWL TOP VENTILATOR LOUVER INFO
8. REMOVE COWL TOP VENTILATOR LOUVER LH INFO
9. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY INFO
10. REMOVE OUTER COWL TOP PANEL INFO
11. REMOVE SUSPENSION TOWER DAMPER ASSEMBLY (w/ Front Strut Bar) INFO
12. REMOVE FRONT WHEEL RH
13. REMOVE ENGINE UNDER COVER LH
14. REMOVE ENGINE UNDER COVER RH
15. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY INFO
16. DRAIN ENGINE COOLANT INFO
17. DRAIN ENGINE OIL INFO
18. REMOVE CENTER EXHAUST PIPE ASSEMBLY INFO
19. REMOVE FRONT EXHAUST PIPE ASSEMBLY INFO
20. REMOVE V-RIBBED BELT INFO
21. REMOVE GENERATOR ASSEMBLY INFO
22. SEPARATE RADIATOR RESERVE TANK ASSEMBLY INFO
23. REMOVE AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE INFO
24. REMOVE THROTTLE BODY ASSEMBLY INFO

cardiagn.com

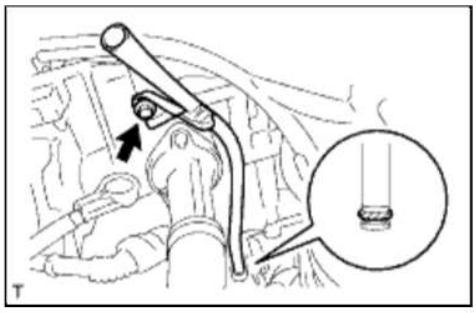
25. REMOVE IGNITION COIL ASSEMBLY INFO

26. REMOVE SPARK PLUG INFO

27. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

28. REMOVE ENGINE OIL LEVEL DIPSTICK

29. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE



(a) Remove the bolt and engine oil level dipstick guide.

(b) Remove the O-ring from the engine oil level dipstick guide.

30. DISCONNECT FUEL MAIN TUBE INFO

31. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

32. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY INFO

33. REMOVE INTAKE MANIFOLD INFO

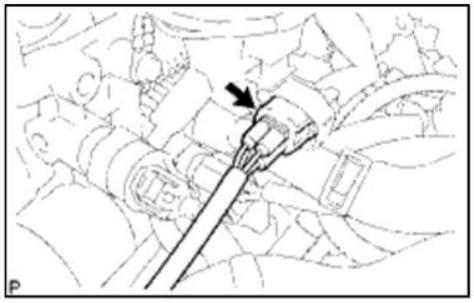
34. REMOVE NO. 1 INTAKE MANIFOLD INSULATOR INFO

35. REMOVE MANIFOLD STAY INFO

36. REMOVE NO. 2 MANIFOLD STAY INFO

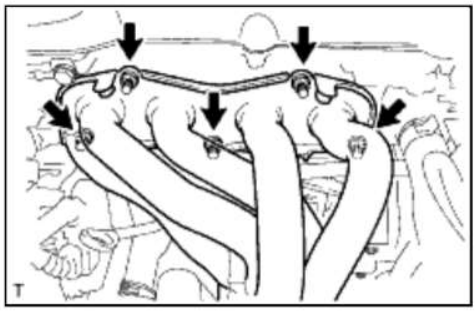
37. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

38. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY



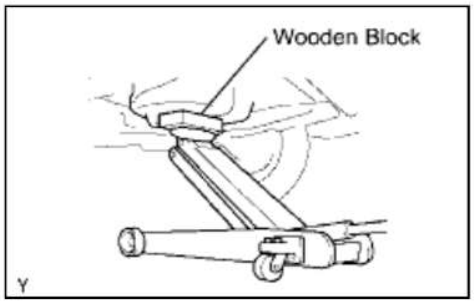
(a) Disconnect the air-fuel ratio sensor connector.

cardiagn.com

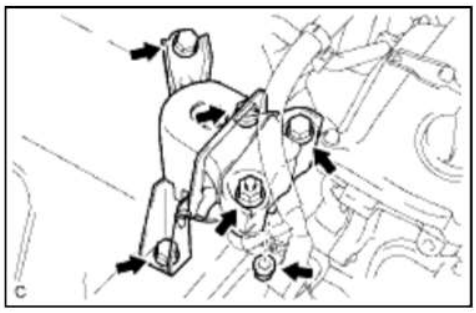


(b) Remove the 5 nuts, exhaust manifold converter sub-assembly and gasket.

39. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH



(a) Place a wooden block between a floor jack and the engine, then support the engine using the floor jack.



(b) Remove the 4 bolts and 2 nuts, then remove the engine mounting insulator sub-assembly RH.

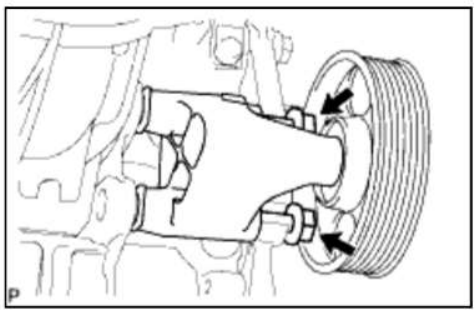
NOTICE:

Do not apply excessive force to the return tube when removing the engine mounting insulator sub-assembly RH.

HINT:

Keep clearance by lowering the engine using the floor jack when removing the front engine mounting insulator.

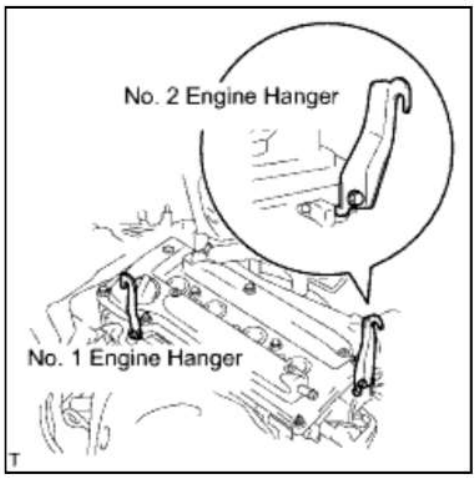
40. REMOVE IDLER PULLEY SUB-ASSEMBLY



(a) Loosen the 2 bolts and remove the idler pulley sub-assembly with the 2 bolts.

cardiagn.com

41. REMOVE OIL PAN SUB-ASSEMBLY



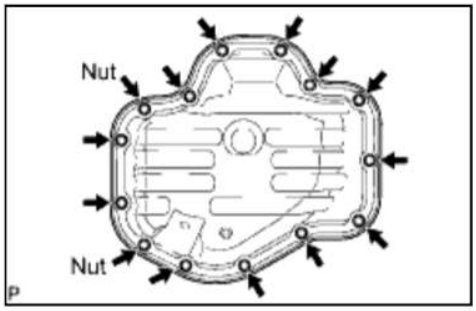
(a) Install the No. 1 and No. 2 engine hangers with new bolts.

Torque: 38 N·m (387 kgf·cm, 28ft·lbf)

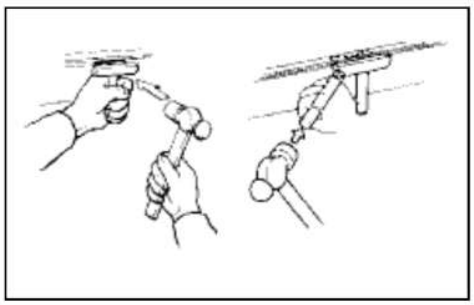
Part No.

ITEM	PART NO.
No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010 or 12282-AB010
Bolt	90080-10177

(b) Attach the sling device to the engine hangers and chain block.



(c) Remove the 12 bolts and 2 nuts.



(d) Insert the blade of oil pan seal cutter between the crankcase, chain cover and oil pan, then cut through the applied sealer and remove the oil pan.

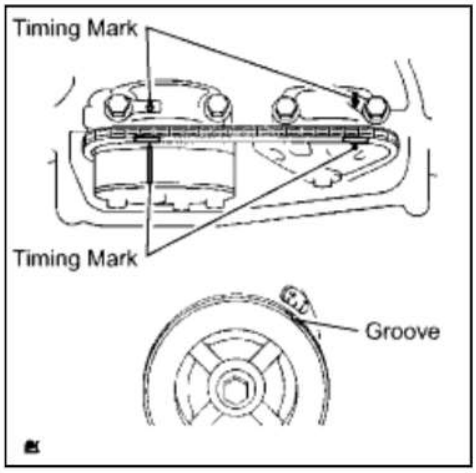
NOTICE:

Be careful not to damage the contact surface of the crankcase, chain cover or oil pan.

42. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley until the groove and the timing mark "0" on the timing chain cover are aligned.

cardiagn.com

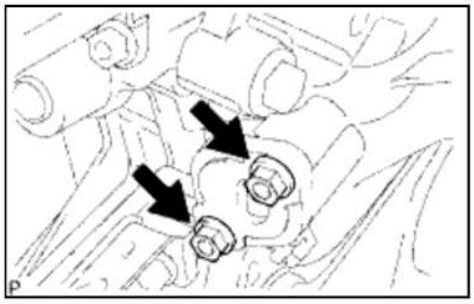


(b) Check that each timing mark on the camshaft timing gear and sprocket is aligned with the timing marks located on the No. 1 and No. 2 bearing caps as shown in the illustration.

If not, turn the crankshaft 1 revolution (360°) to align the timing marks as above.

43. REMOVE CRANKSHAFT PULLEY INFO

44. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY



(a) Remove the 2 nuts, No. 1 chain tensioner assembly and gasket.

NOTICE:

Do not turn the crankshaft without the No. 1 chain tensioner assembly.

45. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

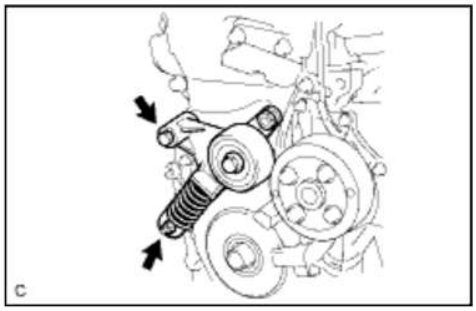
(a) Lift the engine upward.

NOTICE:

Do not lift the engine more than necessary.

(b) Remove the bolt, nut and V-ribbed belt tensioner assembly.

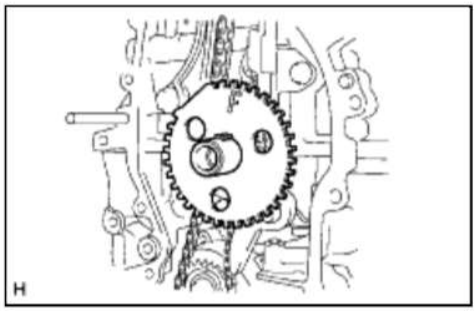
cardiagn.com



46. REMOVE CRANKSHAFT POSITION SENSOR INFO

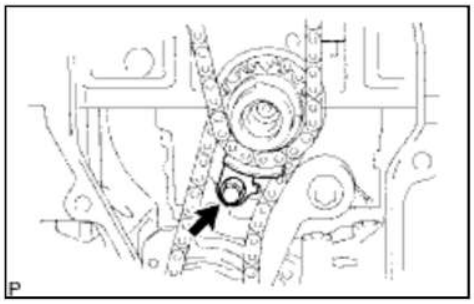
47. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY INFO

48. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE



(a) Remove the No. 1 crankshaft position sensor plate.

49. REMOVE TIMING CHAIN GUIDE

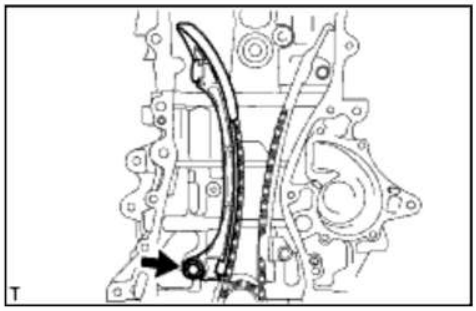


(a) Remove the bolt and timing chain guide.

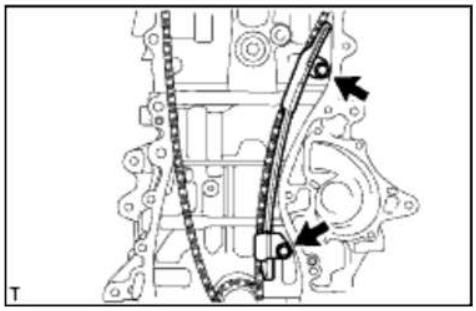
50. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and chain tensioner slipper.

cardiagn.com



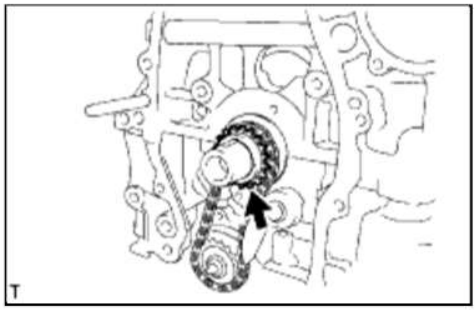
51. REMOVE NO. 1 CHAIN VIBRATION DAMPER



(a) Remove the 2 bolts and No. 1 chain vibration damper.

52. REMOVE CHAIN SUB-ASSEMBLY

53. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

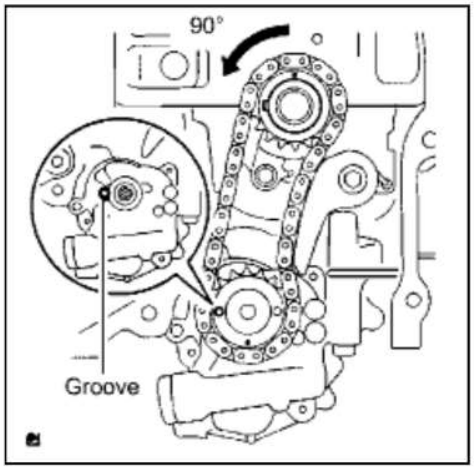


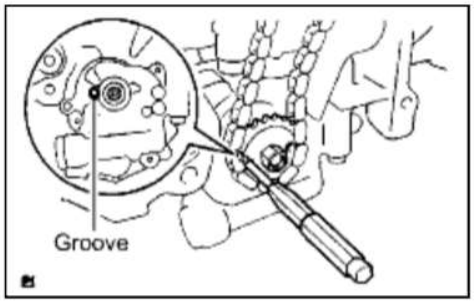
(a) Remove the crankshaft timing gear or sprocket from the crankshaft.

54. REMOVE NO. 2 CHAIN SUB-ASSEMBLY

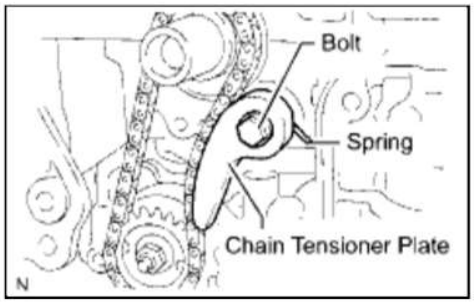
(a) Turn the crankshaft 90° counterclockwise to align the adjusting hole on the oil pump drive shaft sprocket with the groove on the oil pump.

cardiagn.com





(b) Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft sprocket to lock the gear in position, and then remove the nut.



(c) Remove the bolt, chain tensioner plate and spring.

(d) Remove the oil pump drive sprocket, oil pump drive shaft sprocket and No. 2 chain.

55. DISCONNECT NO. 1 RADIATOR HOSE INFO

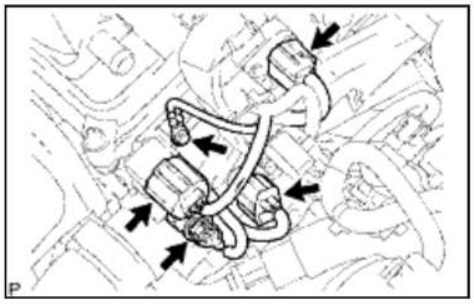
56. DISCONNECT OUTLET HEATER WATER HOSE INFO

57. DISCONNECT INLET HEATER WATER HOSE INFO

58. DISCONNECT ENGINE WIRE

(a) Disconnect the radio setting condenser connector.

cardiagn.com



(b) Disconnect the engine oil pressure switch connector.

(c) Disconnect the engine coolant temperature sensor connector.

(d) Disconnect the camshaft position sensor connector.

(e) Remove the bolt and ground cable.

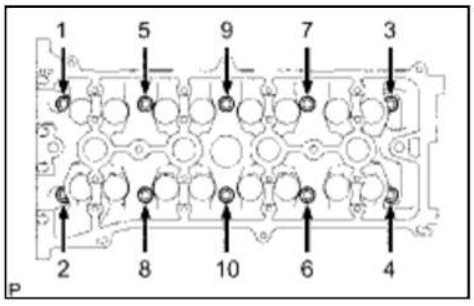
59. REMOVE NO. 2 CAMSHAFT INFO

60. REMOVE CAMSHAFT INFO

61. REMOVE NO. 1 CAMSHAFT BEARING INFO

62. REMOVE NO. 2 CAMSHAFT BEARING INFO

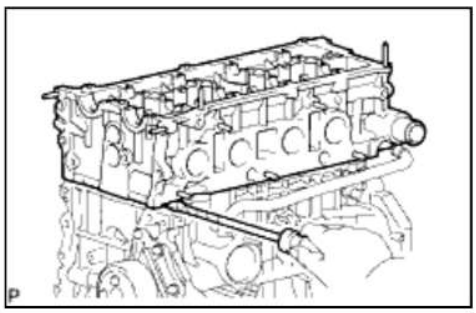
63. REMOVE CYLINDER HEAD SUB-ASSEMBLY



(a) In several steps, uniformly loosen and remove the 10 cylinder head bolts and 10 plate washers with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

NOTICE:

Head warpage or cracking could result from removing the bolts in the wrong order.

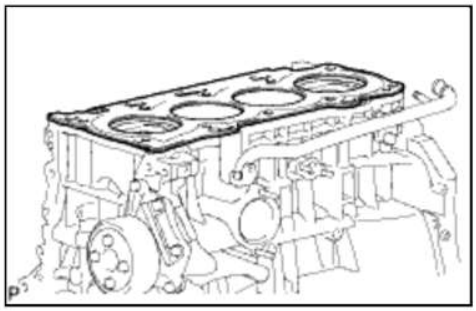


(b) Using a screwdriver with its tip wrapped with tape, pry between the cylinder head and cylinder block, and remove the cylinder head.

NOTICE:

Be careful not to damage the contact surfaces between the cylinder head and cylinder block.

cardiagn.com



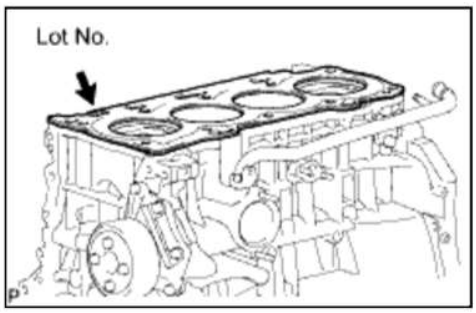
64. REMOVE CYLINDER HEAD GASKET

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001AN500XX
Title: 2AZ-FE ENGINE MECHANICAL: CYLINDER HEAD GASKET: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL CYLINDER HEAD GASKET



(a) Place a new cylinder head gasket on the cylinder block surface with the Lot No. stamp facing upward.

NOTICE:

- Remove any oil from the contact surface.
- Be careful of the installation direction.

2. INSTALL CYLINDER HEAD SUB-ASSEMBLY

(a) Place the cylinder head on the cylinder head gasket.

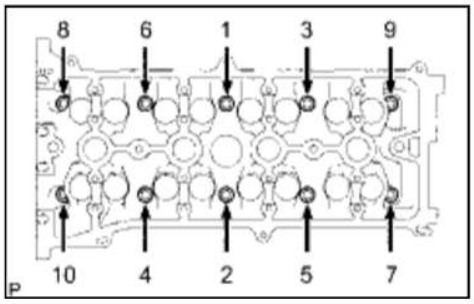
NOTICE:

Place the cylinder head gently in order to avoid damaging the cylinder head gasket.

(b) Install the cylinder head bolts.

NOTICE:

The cylinder head bolts are tightened in 2 successive steps.



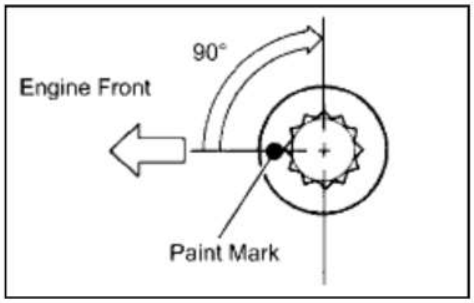
(1) Apply a light coat of engine oil to the threads and under the heads of the cylinder head set bolts.

(2) Using several steps, uniformly install and tighten the 10 cylinder head set bolts and plate washers with a 10 mm bi-hexagon wrench in the order shown in the illustration.

Torque: 70 N·m (714 kgf·cm, 52ft·lbf)

(c) Mark the front of the cylinder head bolts with paint.

cardiagn.com



(d) Further tighten the cylinder head bolts 90° as shown in the illustration.

(e) Check that the paint mark is now at a 90° angle to the front.

3. INSTALL NO. 1 CAMSHAFT BEARING INFO

4. INSTALL NO. 2 CAMSHAFT BEARING INFO

5. INSTALL CAMSHAFT INFO

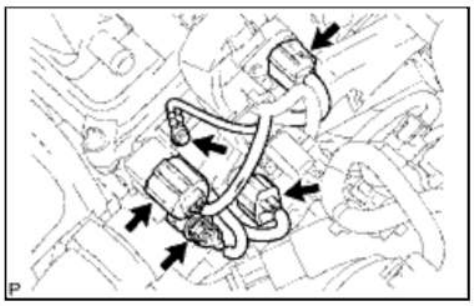
6. INSTALL NO. 2 CAMSHAFT INFO

7. CONNECT INLET HEATER WATER HOSE INFO

8. CONNECT OUTLET HEATER WATER HOSE INFO

9. CONNECT NO. 1 RADIATOR HOSE INFO

10. CONNECT ENGINE WIRE



(a) Connect the ground cable with the bolt.

Torque: 8.4 N·m (86 kgf·cm, 74in·lbf)

(b) Connect the camshaft position sensor connector.

(c) Connect the engine coolant temperature sensor connector.

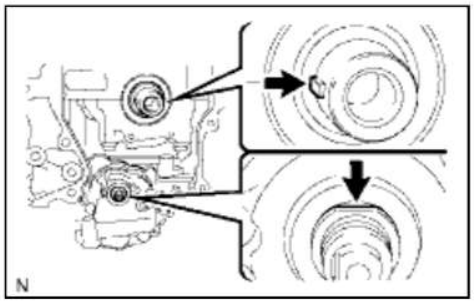
(d) Connect the engine oil pressure switch connector.

(e) Connect the radio setting condenser connector.

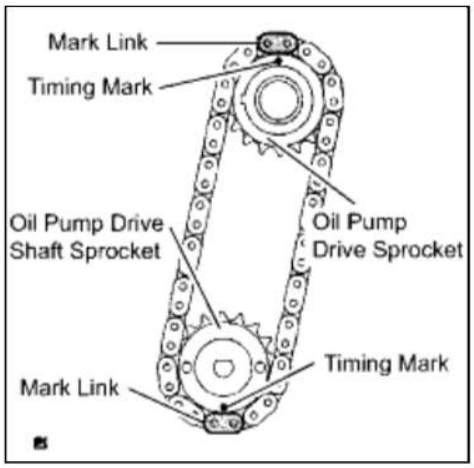
(f) Connect the heater water inlet hose.

11. INSTALL NO. 2 CHAIN SUB-ASSEMBLY

cardiagn.com



(a) Set the crankshaft key in the left horizontal position.

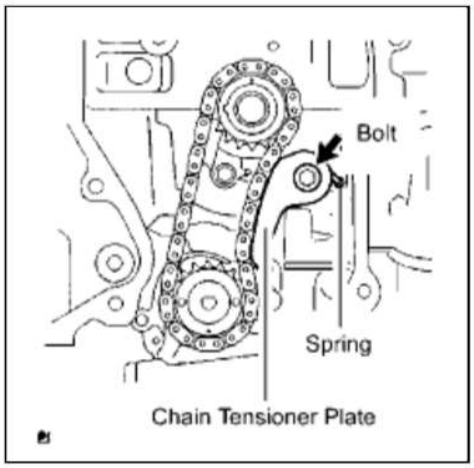


(b) Turn the cutout of the drive shaft so that it faces upward.

(c) Align the yellow mark links with the timing marks of each gear as shown in the illustration.

(d) Install the sprockets onto the crankshaft and oil pump shaft with the chain placed on the gears.

(e) Temporarily tighten the oil pump drive shaft sprocket with the nut.

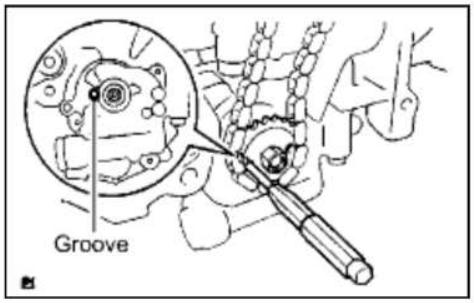


(f) Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.

Torque: 12 N·m (122 kgf·cm, 9ft·lbf)

(g) Align the adjusting hole on the oil pump drive shaft

cardiagn.com

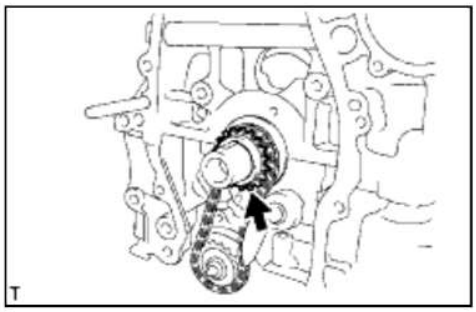


sprocket with the groove on the oil pump.

(h) Insert a 4 mm diameter bar into the adjusting hole on the oil pump drive shaft gear to lock the gear in position, and then tighten the nut.

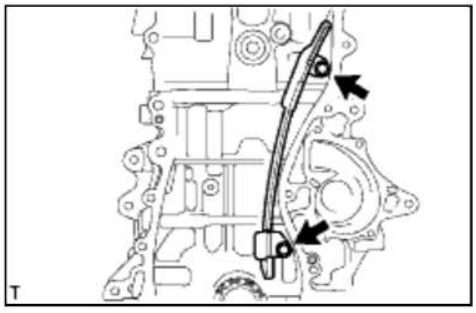
Torque: 30 N·m (301 kgf·cm, 22ft·lbf)

12. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET



(a) Install the crankshaft timing gear or sprocket to the crankshaft.

13. INSTALL NO. 1 CHAIN VIBRATION DAMPER



(a) Install the No. 1 chain vibration damper with the 2 bolts.

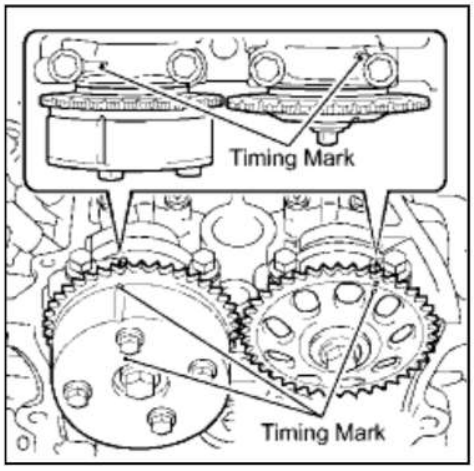
Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

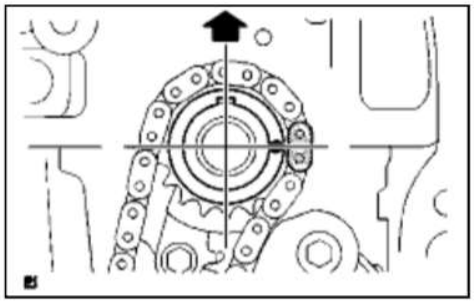
14. INSTALL CHAIN SUB-ASSEMBLY

(a) Set the No. 1 cylinder to TDC/compression.

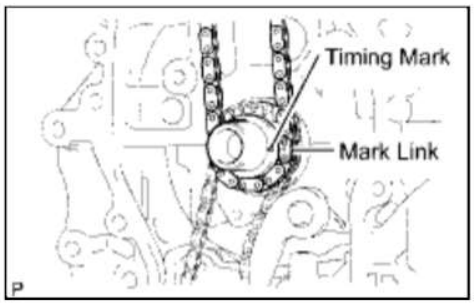
(1) Turn the camshafts with a wrench (using the hexagonal lobe) to align the timing marks on the camshaft timing gear with the timing marks located on the No. 1 and No. 2 bearing caps as shown in the illustration.

cardiagn.com

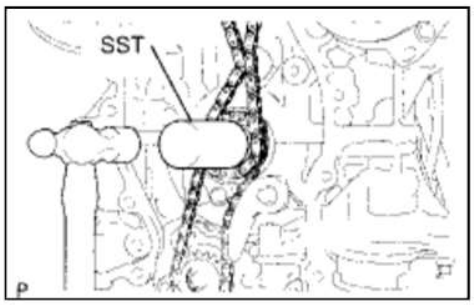




(2) Using the crankshaft pulley bolt, turn the crankshaft to position the key on the crankshaft upward.



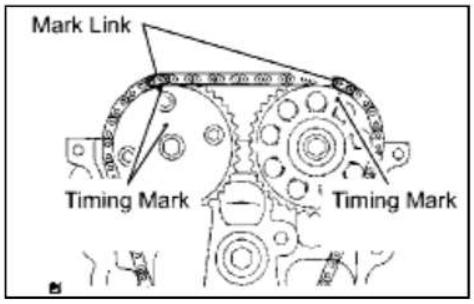
(b) Install the chain onto the crankshaft timing sprocket with the gold or orange mark link aligned with the timing mark on the crankshaft.



(c) Using SST and a hammer, tap in the crankshaft timing sprocket.

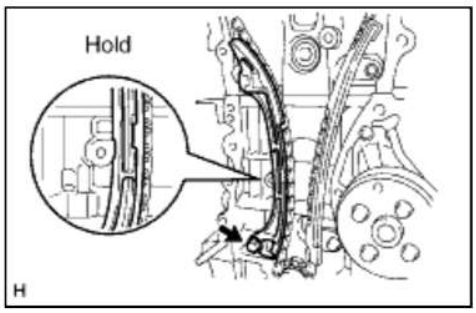
SST: 09309-37010

cardiagn.com



(d) Align the gold or yellow links with the timing marks located on the camshaft timing gear and sprocket, then install the chain.

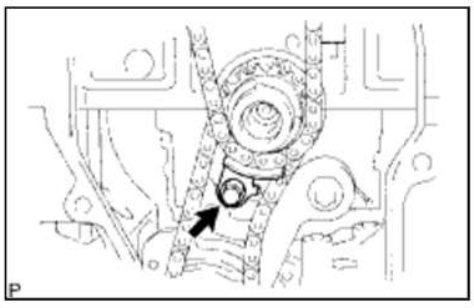
15. INSTALL CHAIN TENSIONER SLIPPER



(a) Install the chain tensioner slipper with the bolt.

Torque: 19 N·m (194 kgf·cm, 14ft·lbf)

16. INSTALL TIMING CHAIN GUIDE



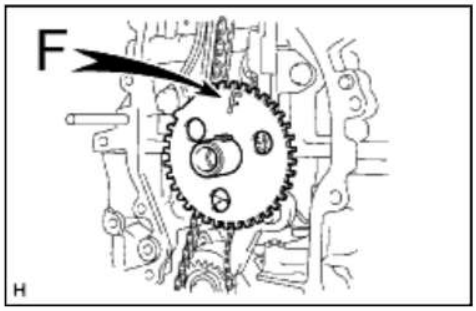
(a) Install the timing chain guide with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

17. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE

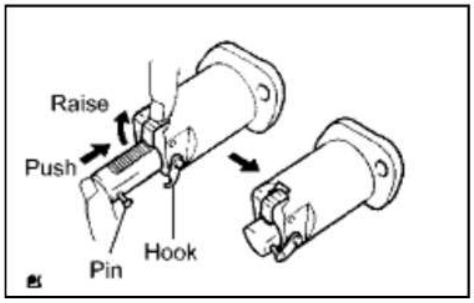
(a) Install the sensor plate with the "F" mark facing forward.

cardiagn.com

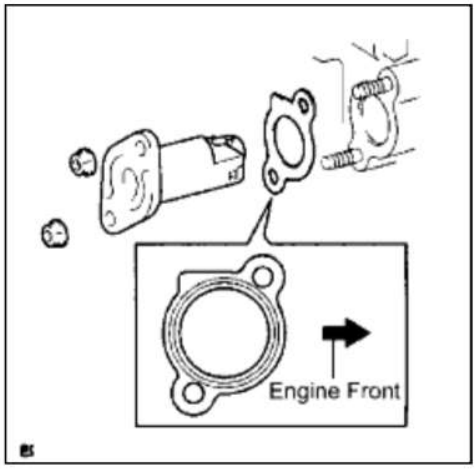


18. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

19. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY



(a) Release the ratchet pawl, then fully push in the plunger and set the hook to the pin so that the plunger is in the position shown in the illustration.



(b) Install a new gasket and the chain tensioner with the 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

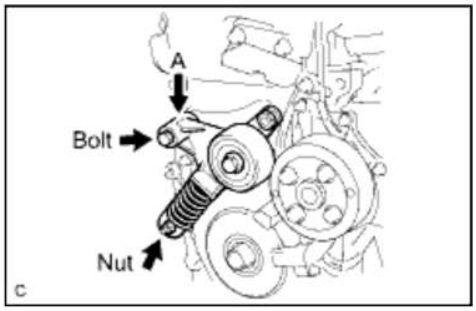
NOTICE:

When installing the chain tensioner, set the hook again if the hook releases the plunger.

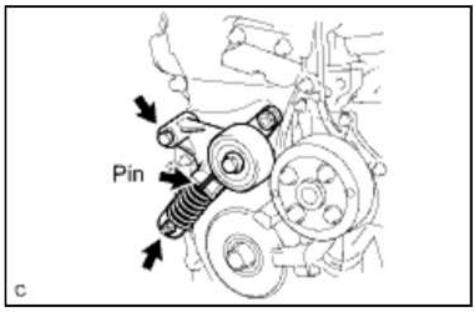
20. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Temporarily install the V-ribbed belt tensioner assembly with the nut.

cardiagn.com



(b) Slightly push down on the V-ribbed belt tensioner assembly at part (A) to align the holes of the engine and tensioner as shown in the illustration, and temporarily install the bolt .



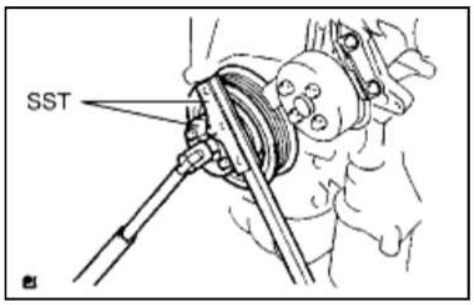
(c) Tighten the bolt and nut to install the V-ribbed belt tensioner.

Torque: 60 N·m (612 kgf·cm, 44ft·lbf)

NOTICE:

- When replacing the V-ribbed belt tensioner with a new one, do not pull out the pin.
- The pin will be removed in a later step.

21. INSTALL CRANKSHAFT PULLEY



(a) Using SST, secure the pulley in place and tighten the bolt.

SST: 09213-54015

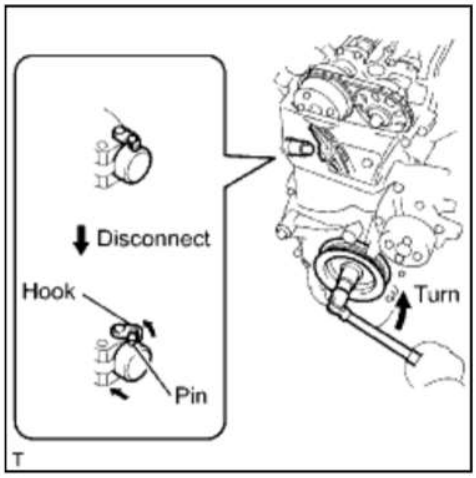
91651-60855

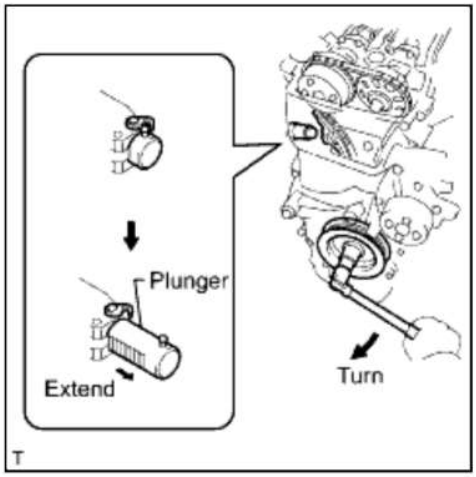
SST: 09330-00021

Torque: 180 N·m (1835 kgf·cm, 133ft·lbf)

(b) Turn the crankshaft counterclockwise, then disconnect the hook from the pin.

cardiagn.com





(c) Turn the crankshaft clockwise, then check that the plunger is extended.

22. INSTALL OIL PAN SUB-ASSEMBLY

(a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.

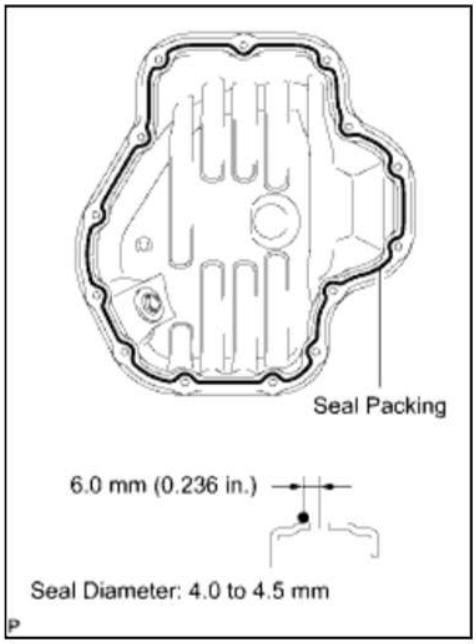
(b) Apply a continuous bead of seal packing (diameter 4.0 to 4.5 mm (0.158 to 0.177 in.)) as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

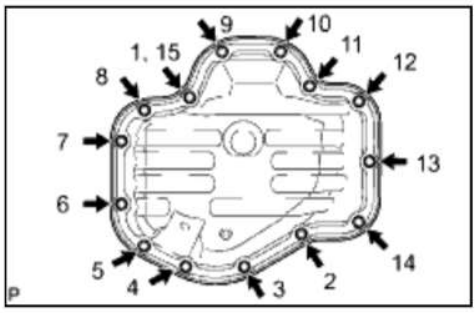
NOTICE:

- Remove any oil from the contact surfaces.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.

cardiagn.com

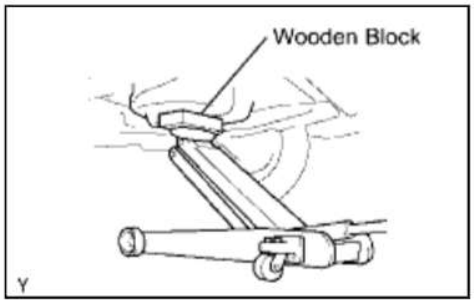


(c) Install the oil pan onto the cylinder block.



(d) Uniformly tighten the 12 bolts and 2 nuts in the sequence shown in the illustration.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)



(e) Place a wooden block between a floor jack and the engine, then support the engine using the floor jack.

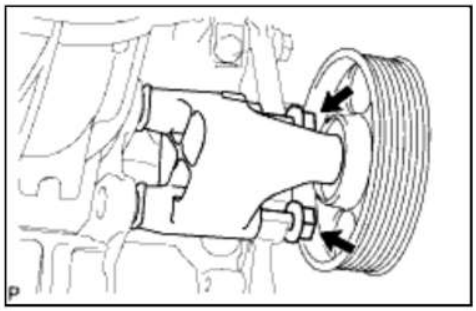
(f) Remove the chain block and sling device.

(g) Remove the 2 bolts and engine hangers.

23. INSTALL CRANKSHAFT POSITION SENSOR INFO

24. INSTALL IDLER PULLEY SUB-ASSEMBLY

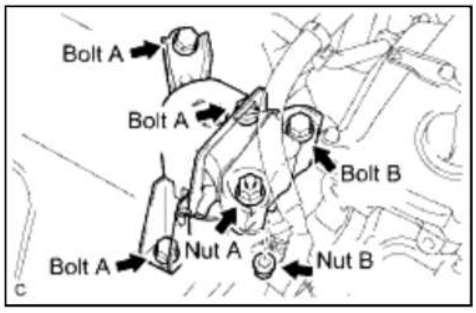
cardiagn.com



(a) Install the idler pulley sub-assembly with the 2 bolts.

Torque: 50 N·m (510 kgf·cm, 37ft·lbf)

25. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH



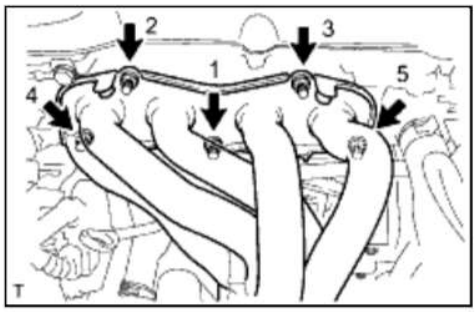
(a) Install the engine mounting insulator sub-assembly RH with the 4 bolts and 2 nuts.

Bolt A - Torque: 52 N·m (530 kgf·cm, 38ft·lbf)
Bolt B - Torque: 95 N·m (969 kgf·cm, 70ft·lbf)
Nut A - Torque: 95 N·m (969 kgf·cm, 70ft·lbf)
Nut B - Torque: 52 N·m (530 kgf·cm, 38ft·lbf)

26. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

(a) Install a new gasket onto the cylinder head sub-assembly.

(b) Temporarily tighten the exhaust manifold converter sub-assembly with the 5 nuts.

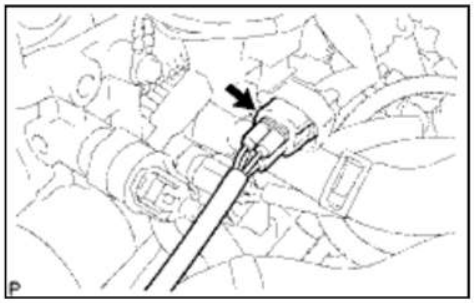


(c) Tighten the 5 nuts in the sequence shown in the illustration.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

(d) Connect the air fuel ratio sensor connector.

cardiagn.com



27. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

28. INSTALL NO. 2 MANIFOLD STAY INFO

29. INSTALL MANIFOLD STAY INFO

30. INSTALL NO. 1 INTAKE MANIFOLD INSULATOR INFO

31. INSTALL INTAKE MANIFOLD INFO

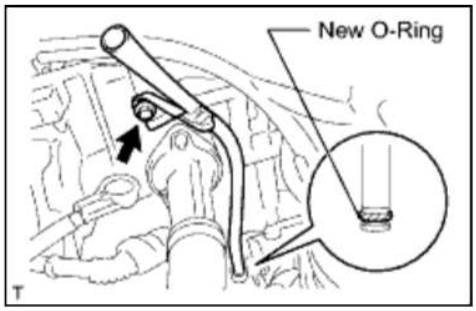
32. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY INFO

33. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

34. CONNECT FUEL MAIN TUBE INFO

35. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE

(a) Apply a light coat of engine oil to a new O-ring and install it onto the engine oil level dipstick guide.



(b) Install the engine oil level dipstick guide with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

36. INSTALL ENGINE OIL LEVEL DIPSTICK

37. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

38. INSTALL SPARK PLUG INFO

39. INSTALL IGNITION COIL ASSEMBLY INFO

40. INSTALL THROTTLE BODY ASSEMBLY INFO

cardiagn.com

41. INSTALL AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE INFO

42. INSTALL RADIATOR RESERVE TANK ASSEMBLY INFO

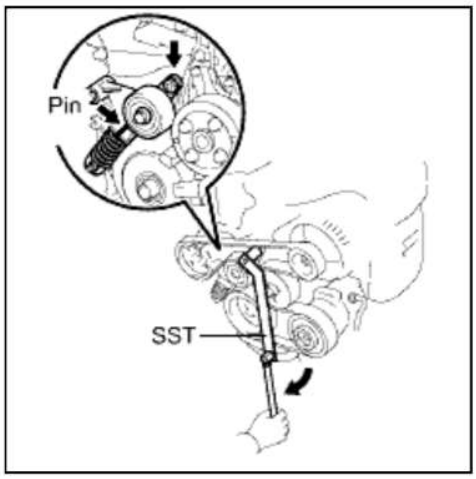
43. INSTALL GENERATOR ASSEMBLY INFO

44. INSTALL V-RIBBED BELT

(a) When reusing the V-ribbed belt tensioner:

(1) Install the V-ribbed belt INFO .

(b) When replacing the V-ribbed belt tensioner with a new one:



(1) Using SST, slowly turn the V-ribbed belt tensioner clockwise.

SST: 09216-42010

09216-04010

(2) Pull out the pin from the V-ribbed belt tensioner being compressed in a clockwise direction.

(3) Slowly return the V-ribbed belt tensioner.

NOTICE:

- Make sure that SST and other tools are set to the tensioner securely.
- When compressing the V-ribbed belt tensioner, slowly turn the tensioner.

(4) Install the V-ribbed belt INFO .

45. INSTALL FRONT EXHAUST PIPE ASSEMBLY INFO

46. INSTALL CENTER EXHAUST PIPE ASSEMBLY INFO

47. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque: 5.4 N·m (55 kgf·cm, 48in·lbf)

48. ADD ENGINE OIL INFO

49. ADD ENGINE COOLANT INFO

50. INSPECT FOR FUEL LEAK INFO

51. INSPECT FOR COOLANT LEAK INFO

cardiagn.com

52. INSPECT FOR OIL LEAK

53. INSPECT FOR EXHAUST GAS LEAK

54. INSPECT IGNITION TIMING INFO

55. INSPECT ENGINE IDLING SPEED INFO

56. INSPECT COMPRESSION INFO

57. INSPECT CO/HC INFO

58. INSTALL SUSPENSION TOWER DAMPER ASSEMBLY (w/ Front Strut Bar) INFO

59. INSTALL OUTER COWL TOP PANEL INFO

60. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY INFO

61. INSTALL COWL TOP VENTILATOR LOUVER LH INFO

62. INSTALL CENTER NO. 1 COWL TOP VENTILATOR LOUVER INFO

63. INSTALL HOOD TO COWL TOP SEAL INFO

64. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

65. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

66. INSTALL FRONT WIPER ARM HEAD CAP INFO

67. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY INFO

68. INSTALL ENGINE UNDER COVER LH

69. INSTALL ENGINE UNDER COVER RH

70. INSTALL FRONT WHEEL RH

Torque: 103 N·m (1050 kgf·cm, 76ft·lbf)



cardiagn.com

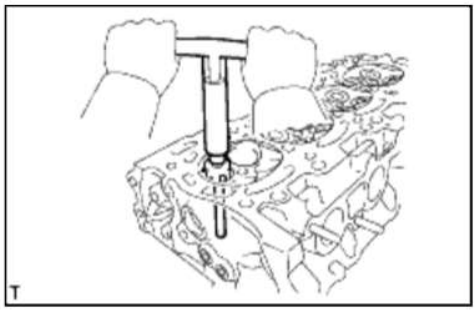
Last Modified: 3-10-2010	6.4 N	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA000XX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD: REPAIR (2010 Corolla)		

REPAIR

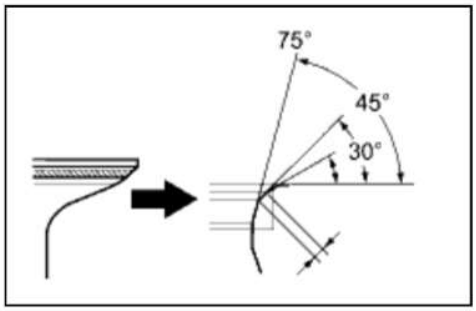
1. REPAIR VALVE SEATS

NOTICE:

- Repair the seat while checking the seating position.
- Keep the lip free of foreign matter.



(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.



(b) Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Valve Seat Width:

ITEM	SPECIFIED CONDITION
Intake Side	1.0 to 1.4 mm (0.039 to 0.055 in.)
Exhaust Side	1.0 to 1.4 mm (0.039 to 0.055 in.)

(c) Handrub the valve and valve seat with an abrasive compound.

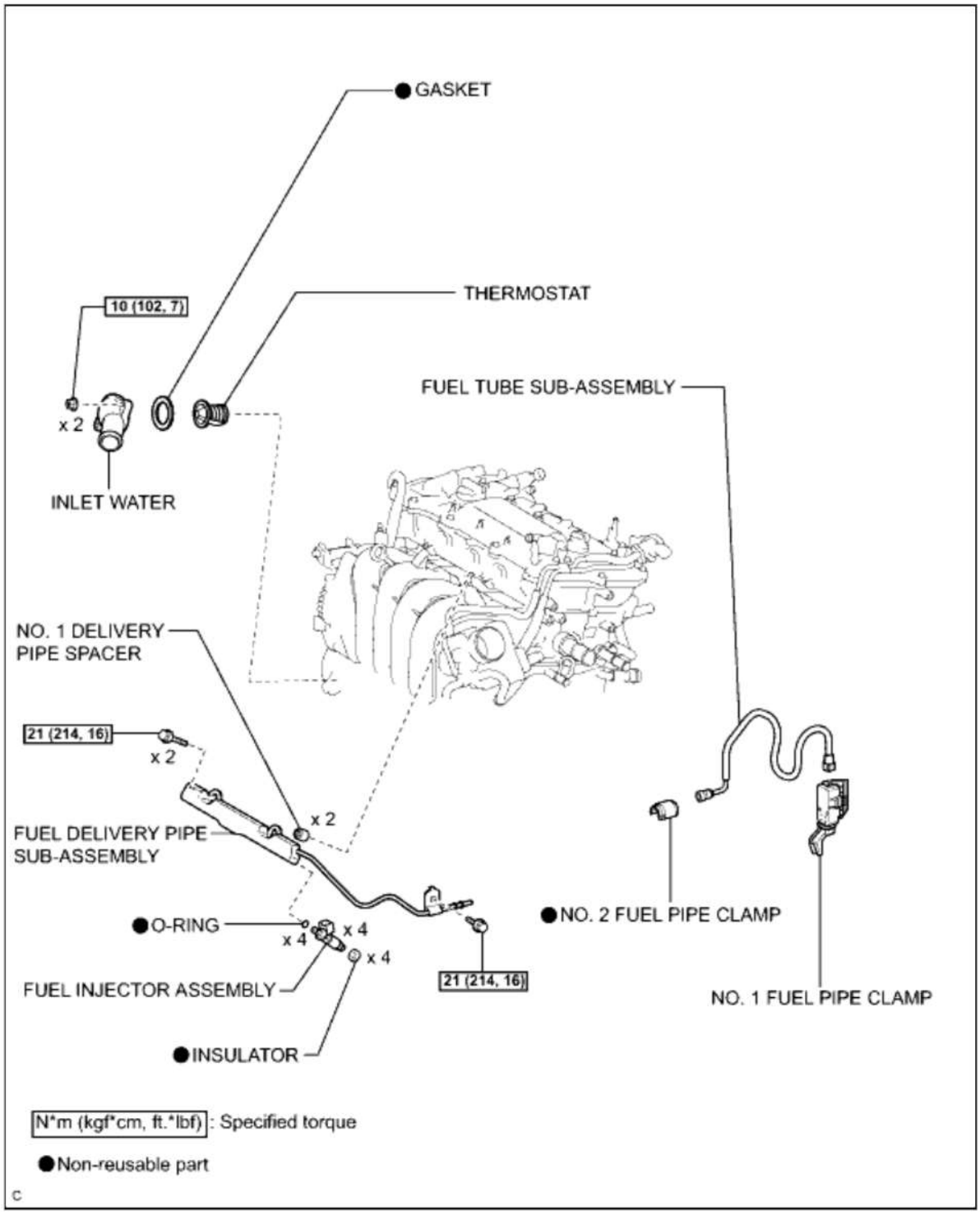
(d) Check the valve seating position.

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IA018X
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD GASKET: COMPONENTS (2010 Corolla)		

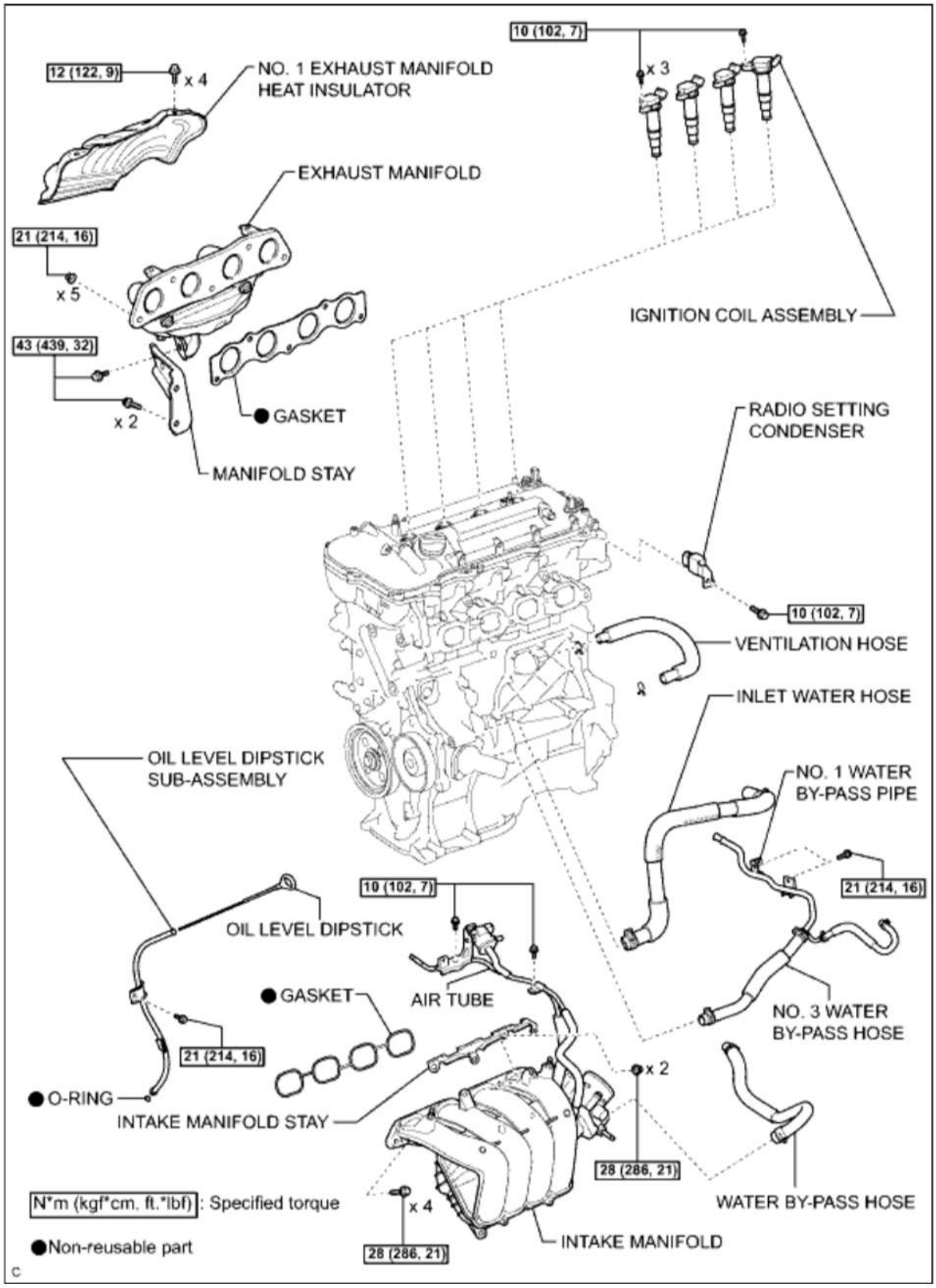
COMPONENTS

ILLUSTRATION



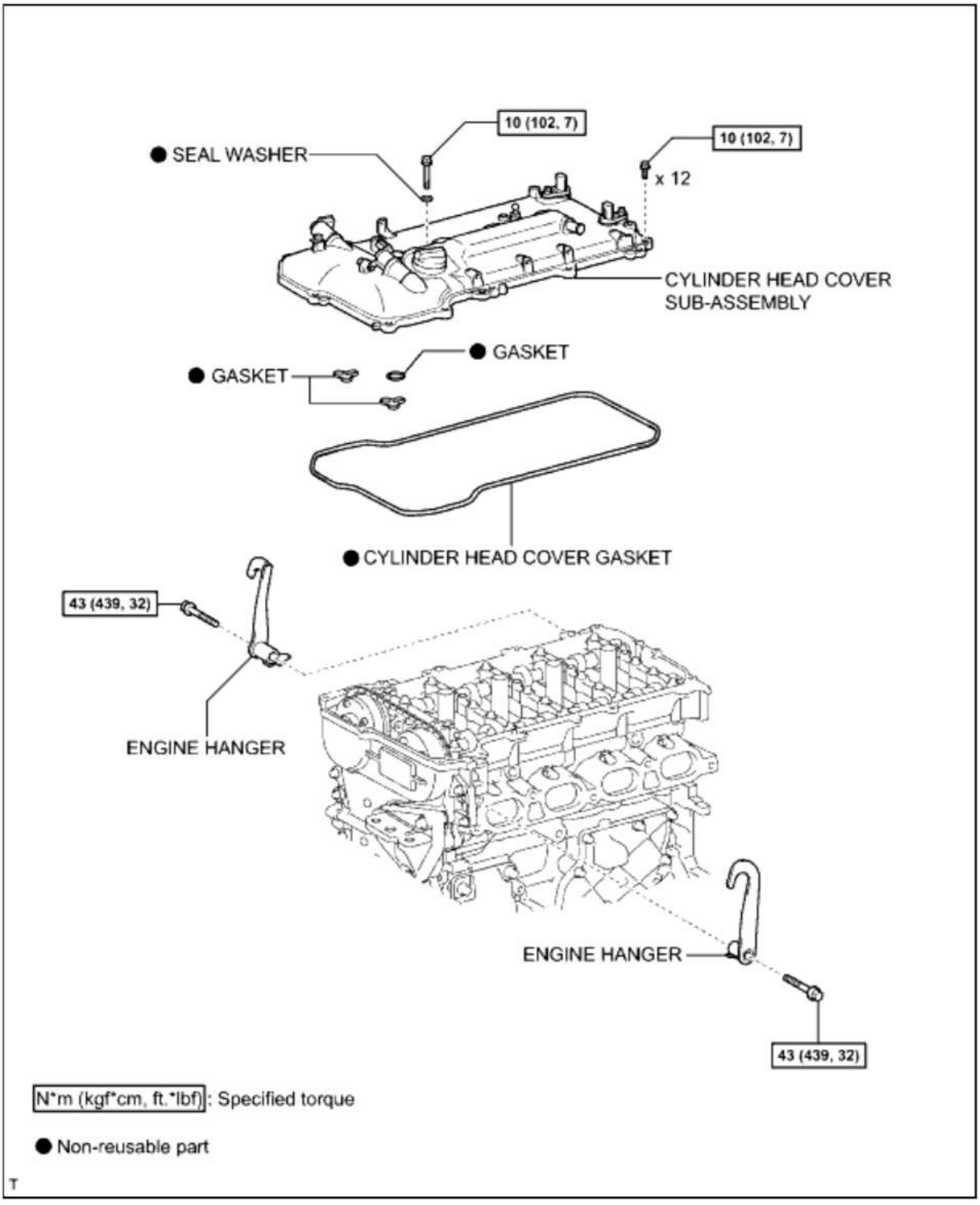
cardiagn.com

ILLUSTRATION



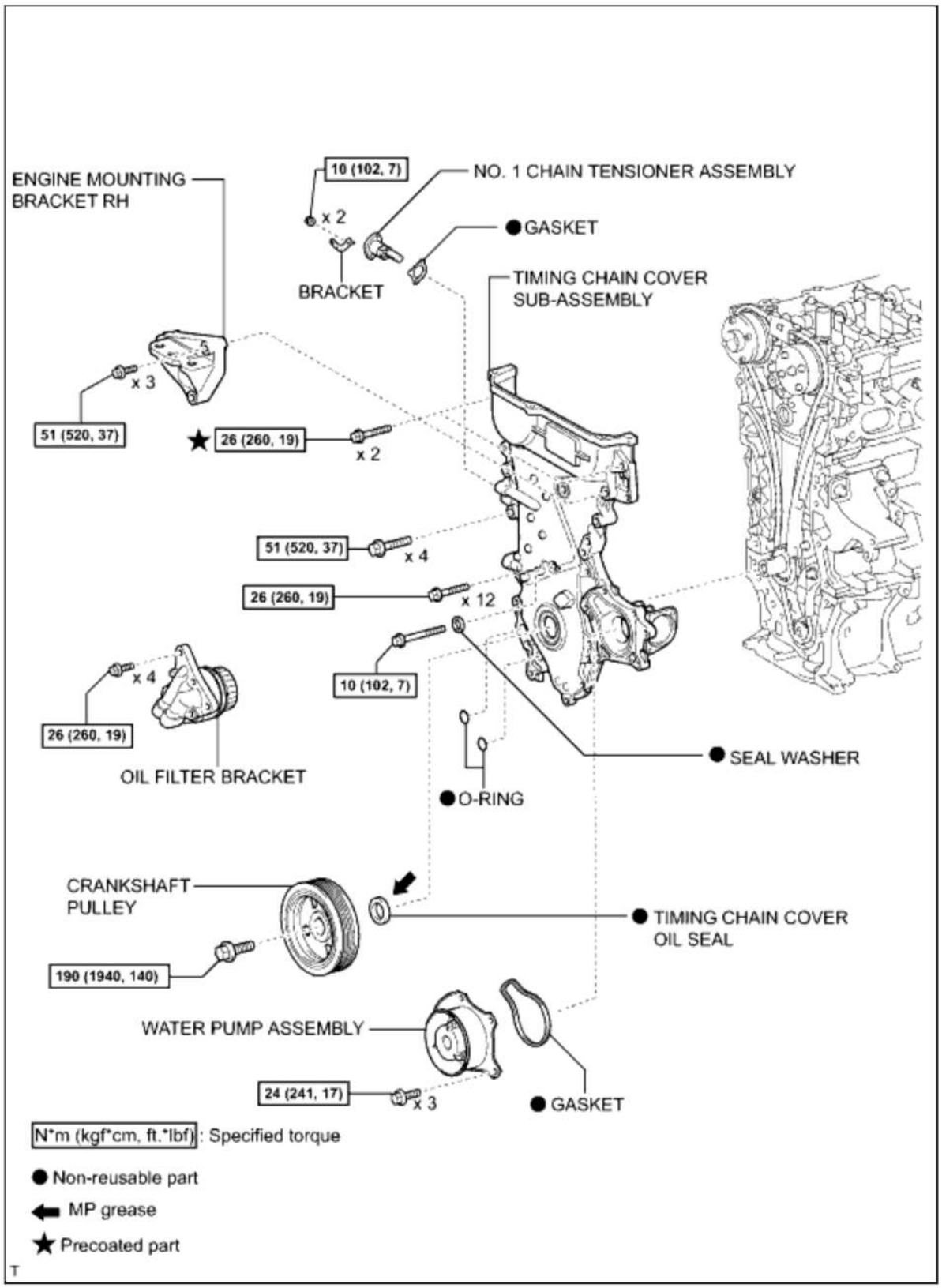
cardiagn.com

ILLUSTRATION



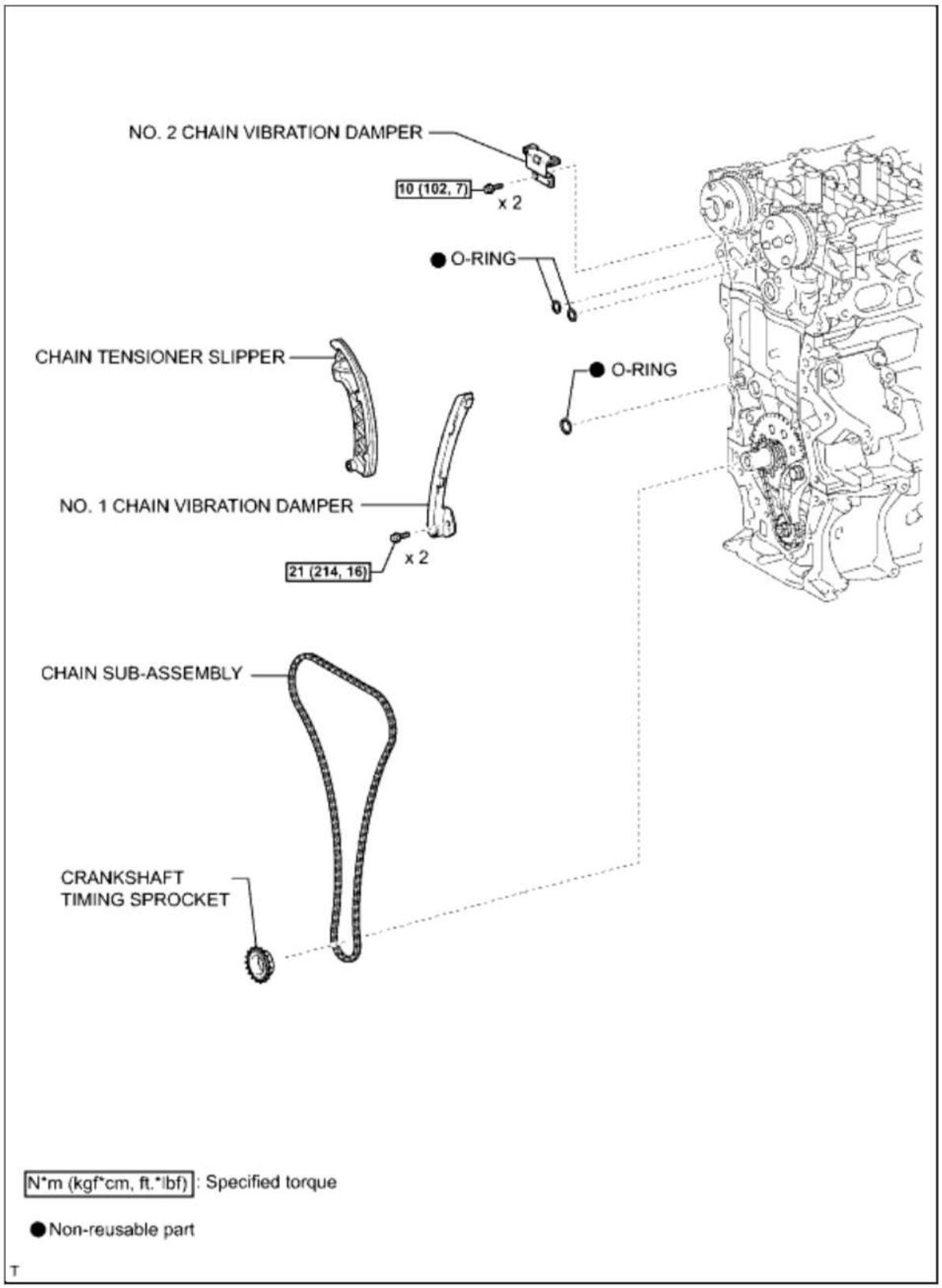
ILLUSTRATION

cardiagn.com



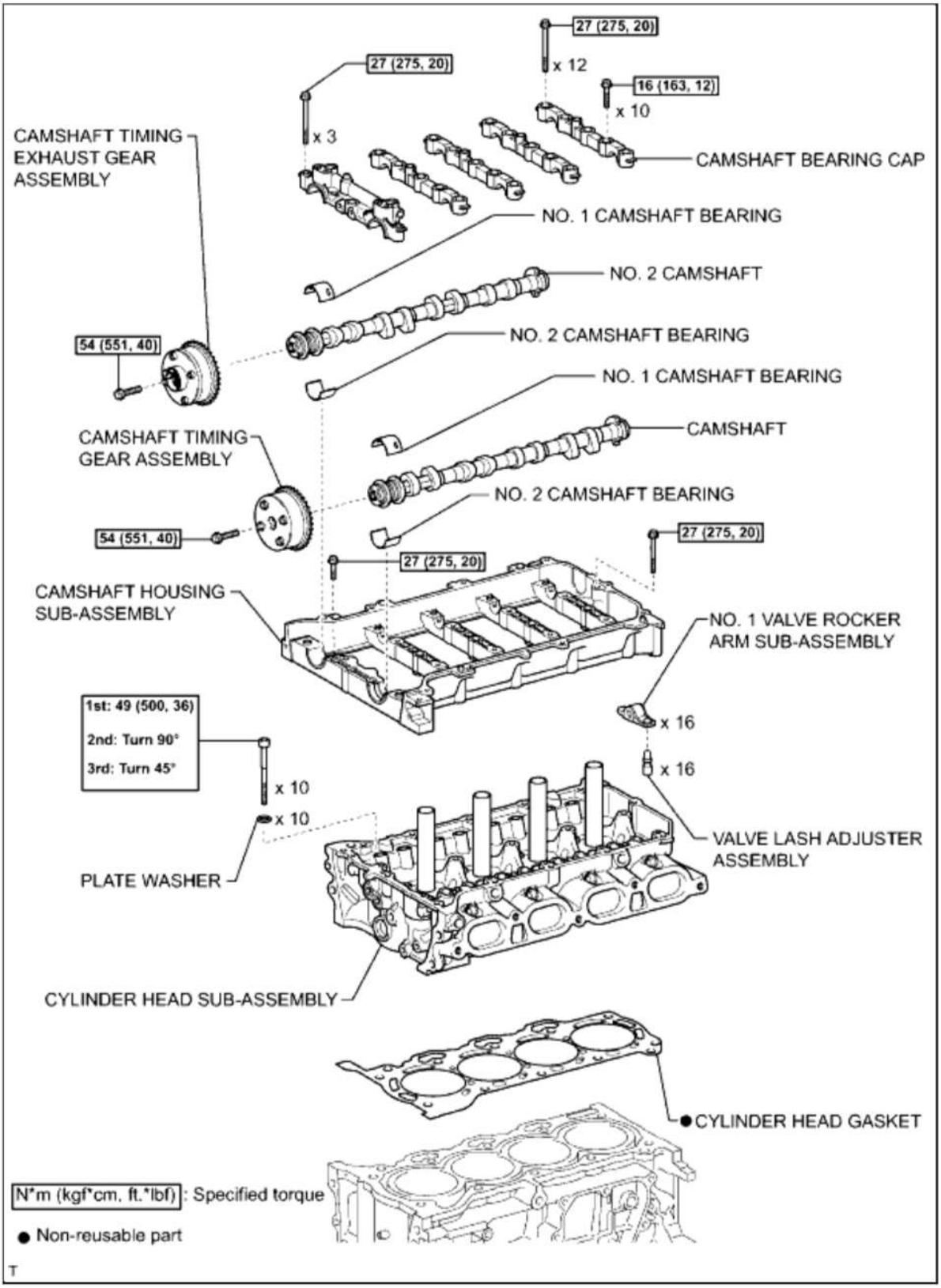
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com

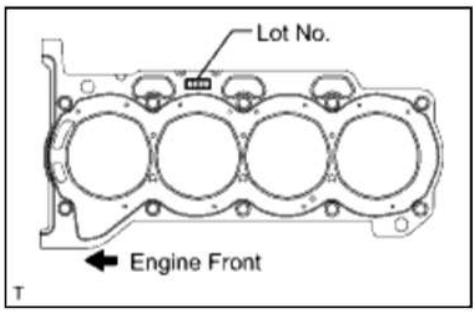


cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002 7I901IX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD GASKET: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL CYLINDER HEAD GASKET



(a) Place a new gasket on the cylinder block surface with the Lot No. stamp facing upward.

NOTICE:

- Remove any oil from the contact surface.
- Make sure that the gasket is installed in the correct direction.

2. INSTALL CYLINDER HEAD SUB-ASSEMBLY

HINT:

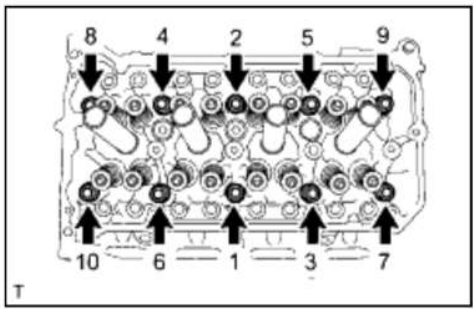
The cylinder head bolts are tightened in 2 progressive steps.

(a) Apply a light coat of engine oil to the bolt threads and the area beneath the bolt heads that come in contact with the washers.

(b) Install the bolts and plate washers to the cylinder head.

NOTICE:

Do not drop the washers into the cylinder head.

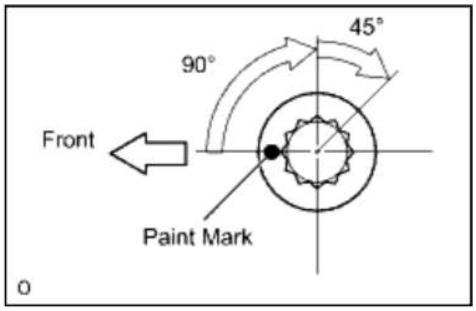


(c) Using several passes, uniformly install and tighten the 10 cylinder head set bolts and plate washers with a 10 mm bi-hexagon wrench in the order shown in the illustration.

Torque: 49 N·m (500 kgf·cm, 36ft·lbf)

(d) Mark the front side of the cylinder head bolts with paint.

cardiagn.com



(e) Retighten the cylinder head bolts an additional 90°, then once more 45° as shown in the illustration.

(f) Check that the paint mark is now at a 135° angle to the front.

3. INSTALL VALVE LASH ADJUSTER ASSEMBLY INFO

4. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

5. INSTALL NO. 1 CAMSHAFT BEARING INFO

6. INSTALL NO. 2 CAMSHAFT BEARING INFO

7. INSTALL NO. 2 CAMSHAFT INFO

8. INSTALL CAMSHAFT INFO

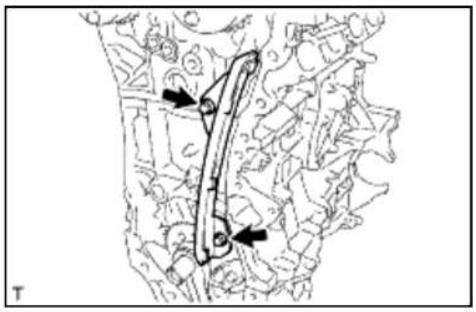
9. INSTALL CAMSHAFT BEARING CAP INFO

10. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY INFO

11. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY INFO

12. INSTALL CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY INFO

13. INSTALL NO. 1 CHAIN VIBRATION DAMPER



(a) Install the No. 1 chain vibration damper with the 2 bolts.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

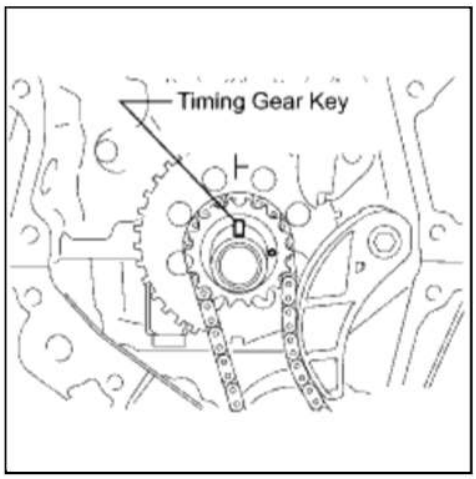
14. INSTALL NO. 2 CHAIN VIBRATION DAMPER INFO

15. INSTALL CHAIN SUB-ASSEMBLY

cardiagn.com

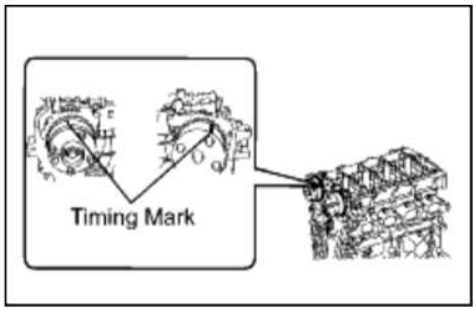
(a) Check the No. 1 cylinder TDC/compression.

(1) Temporarily tighten the crankshaft pulley bolt.



(2) Turn the crankshaft counterclockwise to position the timing gear key to the top.

(3) Remove the crankshaft pulley bolt.



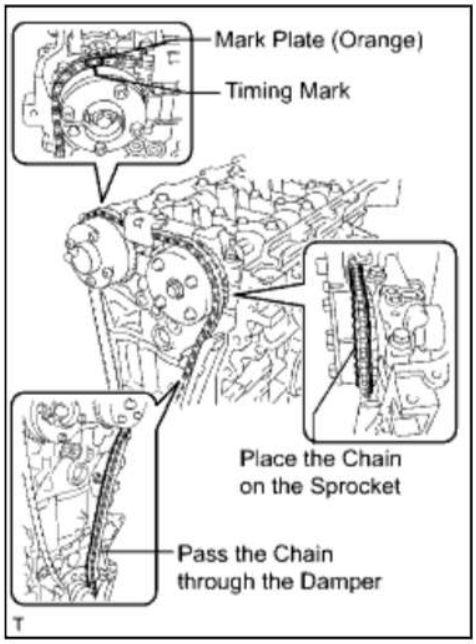
(4) Check the timing marks on each camshaft timing gear.

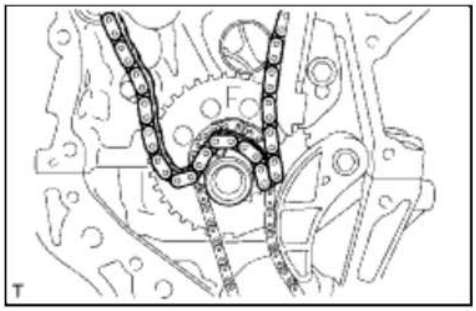
(b) Align the mark plate (orange) with the timing mark of the No. 2 camshaft as shown in the illustration and install the chain.

HINT:

- Be sure to position the mark plate at the front of the engine.
- The mark plate on the camshaft side is colored orange.
- Do not pass the chain around the sprocket of the camshaft timing gear assembly. Only place it on the sprocket.
- Pass the chain through the No. 1 vibration damper.

cardiagn.com





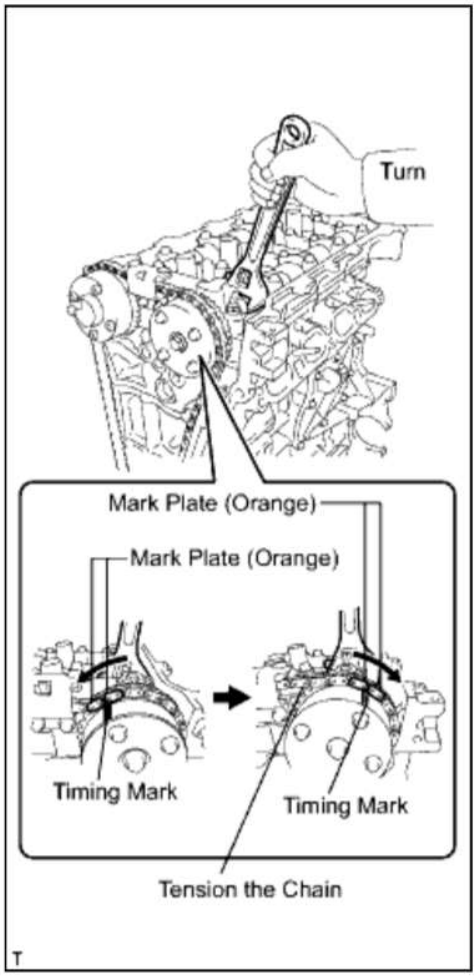
(c) Place the chain on the crankshaft without passing it around the shaft.

(d) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly counterclockwise to align the mark plate (orange) and timing mark.

HINT:

- Be sure to position the mark plate at the front of the engine.
- The mark plate on the camshaft side is colored orange.

cardiagn.com



(e) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly clockwise.

HINT:

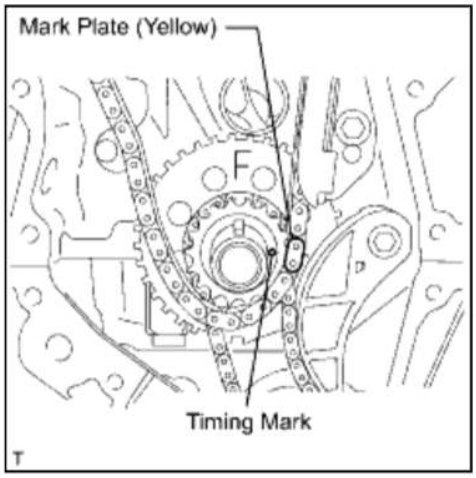
To tension the chain, slowly turn the camshaft timing gear assembly clockwise to prevent the chain from being misaligned.

(f) Align the mark plate (yellow) and timing mark and install the chain to the crankshaft timing gear.

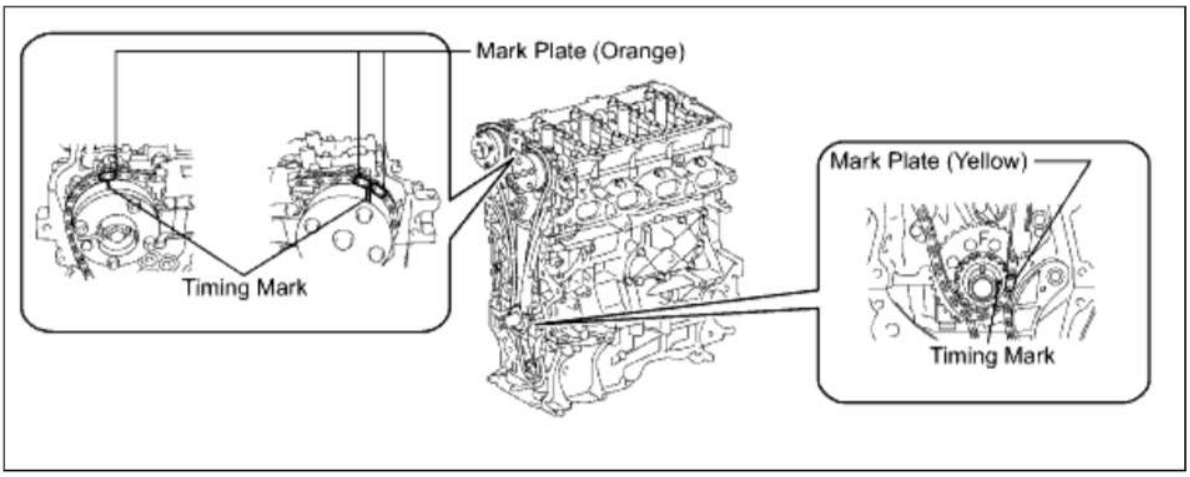
HINT:

The mark plate on the crankshaft side is colored yellow.

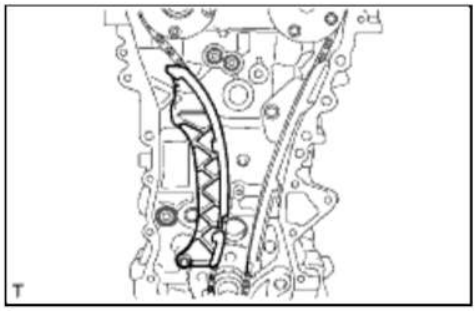
cardiagn.com



(g) Recheck each timing mark at TDC/compression.



16. INSTALL CHAIN TENSIONER SLIPPER



(a) Install the chain tensioner slipper.

17. INSTALL TIMING CHAIN COVER OIL SEAL INFO

18. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY INFO

19. INSTALL CRANKSHAFT PULLEY INFO

cardiagn.com

20. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY INFO

21. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

22. INSTALL RADIO SETTING CONDENSER INFO

23. INSTALL THERMOSTAT INFO

24. INSTALL INLET WATER INFO

25. INSTALL INLET WATER HOSE INFO

26. INSTALL WATER BY-PASS HOSE INFO

27. INSTALL NO. 1 WATER BY-PASS PIPE INFO

28. CONNECT NO. 3 WATER BY-PASS HOSE

29. INSTALL VENTILATION HOSE INFO

30. INSPECT EXHAUST MANIFOLD INFO

31. INSTALL EXHAUST MANIFOLD INFO

32. INSTALL MANIFOLD STAY INFO

33. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

34. INSTALL OIL LEVEL DIPSTICK SUB-ASSEMBLY INFO

35. INSTALL IGNITION COIL ASSEMBLY INFO

36. INSTALL FUEL INJECTOR ASSEMBLY INFO

37. INSTALL NO. 1 DELIVERY PIPE SPACER INFO

38. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

39. INSTALL FUEL TUBE SUB-ASSEMBLY INFO

40. INSTALL INTAKE MANIFOLD INFO

41. REMOVE ENGINE STAND INFO

42. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO .



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IB01IX
Title: 2ZR-FE ENGINE MECHANICAL: CYLINDER HEAD GASKET: REMOVAL (2010 Corolla)		

REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO .

2. INSTALL ENGINE STAND INFO

3. REMOVE INTAKE MANIFOLD INFO

4. DISCONNECT FUEL TUBE SUB-ASSEMBLY INFO

5. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

6. REMOVE FUEL INJECTOR ASSEMBLY INFO

7. REMOVE IGNITION COIL ASSEMBLY INFO

8. REMOVE OIL LEVEL DIPSTICK SUB-ASSEMBLY INFO

9. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

10. REMOVE MANIFOLD STAY INFO

11. REMOVE EXHAUST MANIFOLD INFO

12. REMOVE VENTILATION HOSE INFO

13. DISCONNECT NO. 3 WATER BY-PASS HOSE INFO

14. REMOVE NO. 1 WATER BY-PASS PIPE INFO

15. REMOVE WATER BY-PASS HOSE INFO

16. REMOVE INLET WATER HOSE INFO

17. REMOVE INLET WATER INFO

18. REMOVE THERMOSTAT INFO

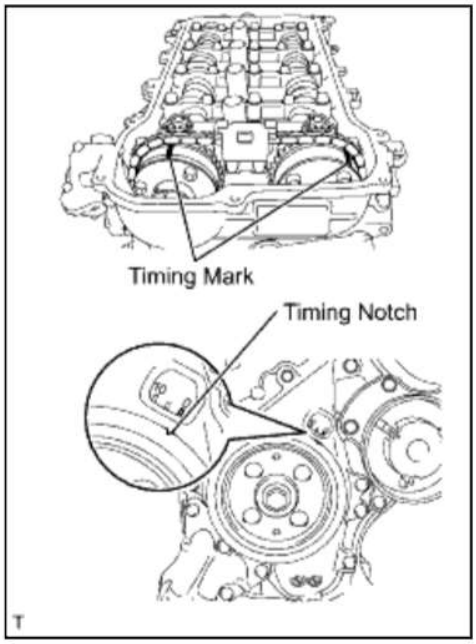
19. REMOVE RADIO SETTING CONDENSER INFO

20. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

21. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley until its groove and the timing mark "0" of the timing chain cover are aligned.

cardiagn.com



(b) Check that each timing mark of the camshaft timing gear and sprocket are aligned with each timing mark located as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) to align the timing marks as shown in the illustration.

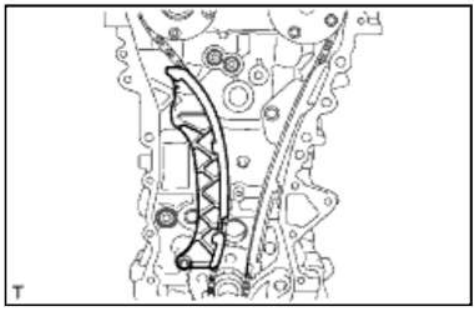
22. REMOVE CRANKSHAFT PULLEY INFO

23. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

24. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY INFO

25. REMOVE TIMING CHAIN COVER OIL SEAL INFO

26. REMOVE CHAIN TENSIONER SLIPPER



(a) Remove the chain tensioner slipper.

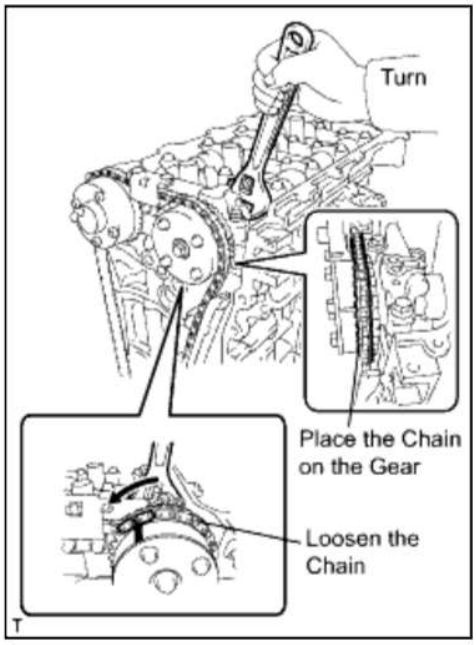
27. REMOVE NO. 1 CHAIN VIBRATION DAMPER

(a) Remove the 2 bolts and No. 1 chain vibration damper.

cardiagn.com



28. REMOVE CHAIN SUB-ASSEMBLY



(a) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly counterclockwise to loosen the chain between the camshaft timing gears.

(b) With the chain loosened, release the chain from the camshaft timing gear assembly and place it on the camshaft timing gear assembly.

HINT:

Be sure to release the chain from the sprocket completely.

(c) Turn the camshaft clockwise to return it to the original position and remove the chain.

29. REMOVE NO. 2 CHAIN VIBRATION DAMPER INFO

30. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY INFO

31. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY INFO

32. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY INFO

33. REMOVE CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY INFO

cardiagn.com

34. REMOVE CAMSHAFT BEARING CAP INFO

35. REMOVE CAMSHAFT INFO

36. REMOVE NO. 2 CAMSHAFT INFO

37. REMOVE NO. 1 CAMSHAFT BEARING INFO

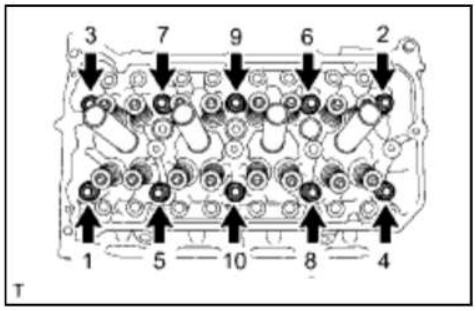
38. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

39. REMOVE VALVE LASH ADJUSTER ASSEMBLY INFO

40. REMOVE NO. 2 CAMSHAFT BEARING INFO

41. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY INFO

42. REMOVE CYLINDER HEAD SUB-ASSEMBLY



(a) Using several steps, uniformly loosen and remove the 10 cylinder head bolts and 10 plate washers with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

NOTICE:

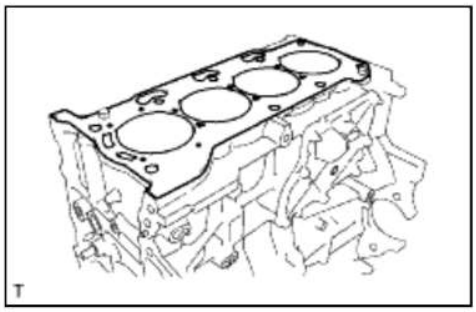
Head warpage or cracking could result from removing the bolts in the wrong order.

(b) Using a screwdriver with its tip wrapped with tape, pry between the cylinder head and cylinder block, and remove the cylinder head.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

43. REMOVE CYLINDER HEAD GASKET



(a) Remove the cylinder head gasket.

44. INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

45. INSPECT VALVE LASH ADJUSTER ASSEMBLY INFO

cardiagn.com

46. INSPECT CYLINDER HEAD SET BOLT INFO

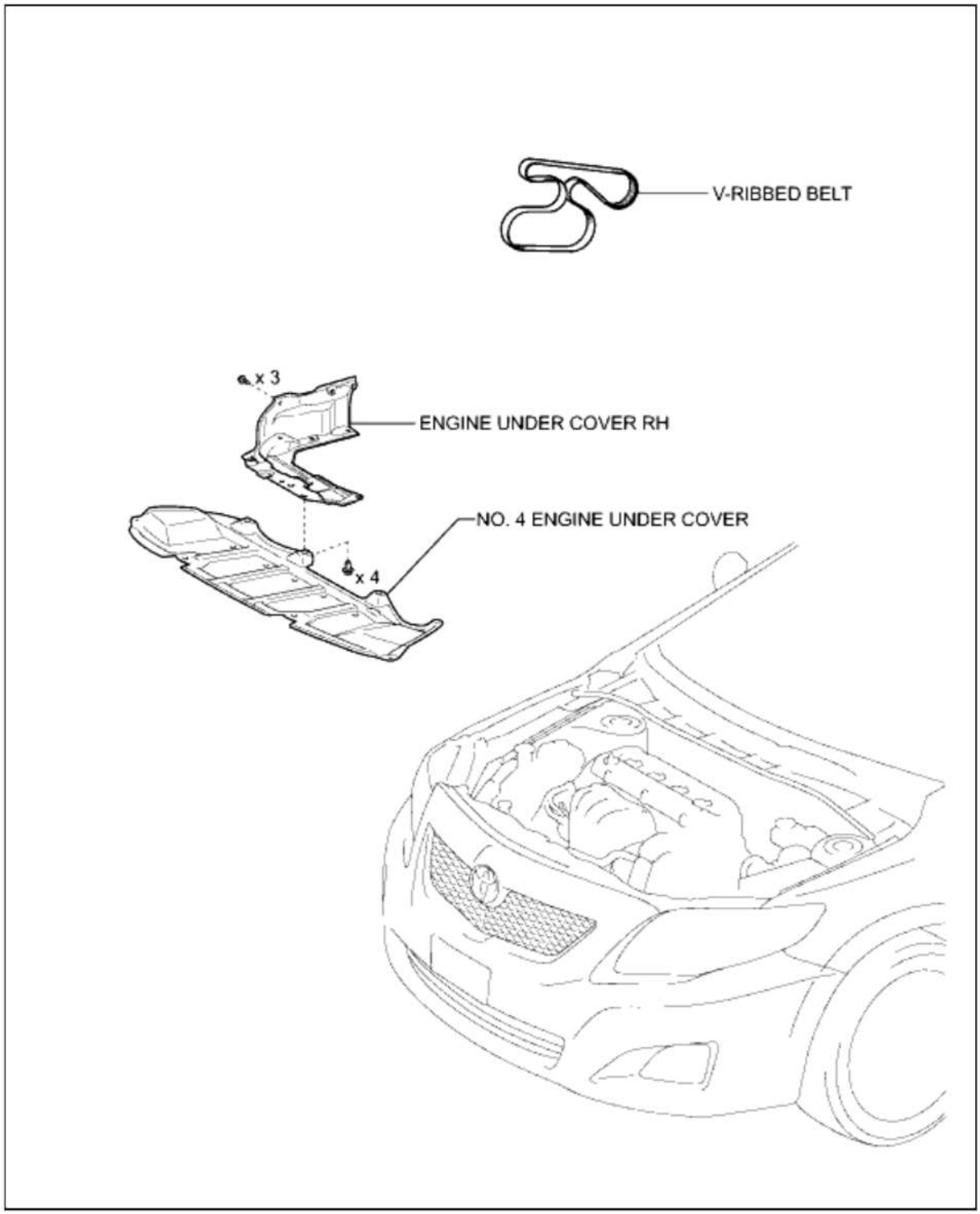


cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001R3E00IX
Title: 2AZ-FE ENGINE MECHANICAL: DRIVE BELT: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION



cardiagn.com

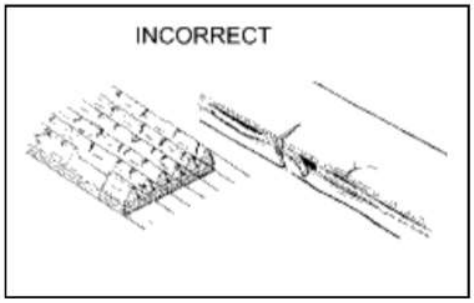


cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001ZYL00VX
Title: 2AZ-FE ENGINE MECHANICAL: DRIVE BELT: ON-VEHICLE INSPECTION (2010 Corolla)		

ON-VEHICLE INSPECTION

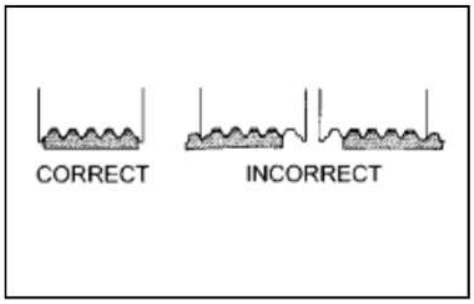
1. CHECK V-RIBBED BELT



(a) Check the belt for wear, cracks or other signs of damage.

If any of the following defects is found, replace the V-ribbed belt.

- The belt is cracked.
- The belt is worn out to the extent that cords are exposed.
- The belt has chunks missing from the ribs.



(b) Check that the belt fits properly in the ribbed grooves.

HINT:

Check by hand to confirm that the belt has not slipped out of the groove on the bottom to the pulley. If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt correctly.

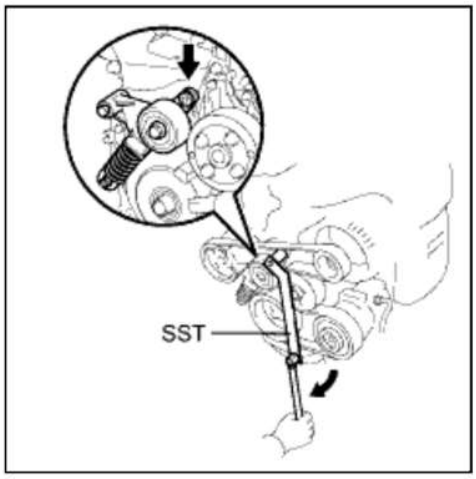
cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001R3F00IX
Title: 2AZ-FE ENGINE MECHANICAL: DRIVE BELT: REMOVAL (2010 Corolla)		

REMOVAL

1. REMOVE ENGINE UNDER COVER RH

2. REMOVE V-RIBBED BELT



(a) Using SST, slowly turn the V-ribbed belt tensioner clockwise.

SST: 09216-42010

09216-04010

(b) Remove the V-ribbed belt from each pulley and slowly return the tensioner.

NOTICE:

- Make sure that SST and other tools are set to the tensioner securely.
- When compressing the V-ribbed belt tensioner, slowly turn the tensioner.
- Be careful not to pinch your fingers between the parts.

cardiagn.com

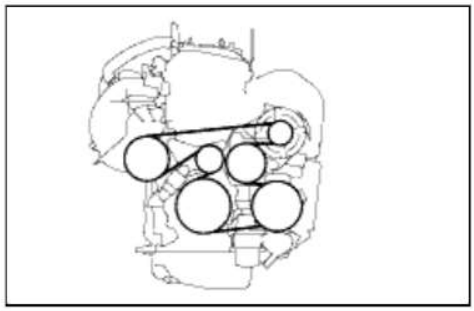
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001R3D00KX
Title: 2AZ-FE ENGINE MECHANICAL: DRIVE BELT: INSTALLATION (2010 Corolla)		

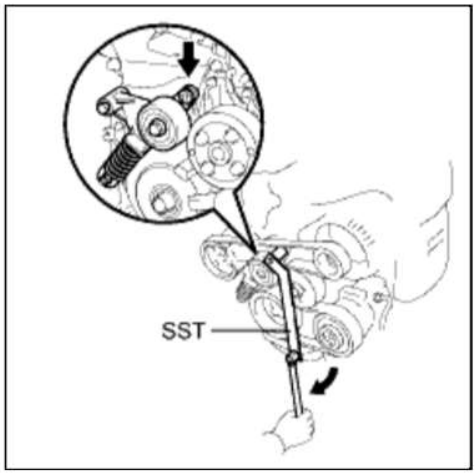
INSTALLATION

1. INSTALL V-RIBBED BELT

HINT:

The illustration shows the V-ribbed belt layout.





(a) Using SST, slowly turn the V-ribbed belt tensioner clockwise and install the V-ribbed belt.

SST: 09216-42010

09216-04010

NOTICE:

- Make sure that SST and other tools are set to the tensioner securely.
- When compressing the V-ribbed belt tensioner, slowly turn the tensioner.

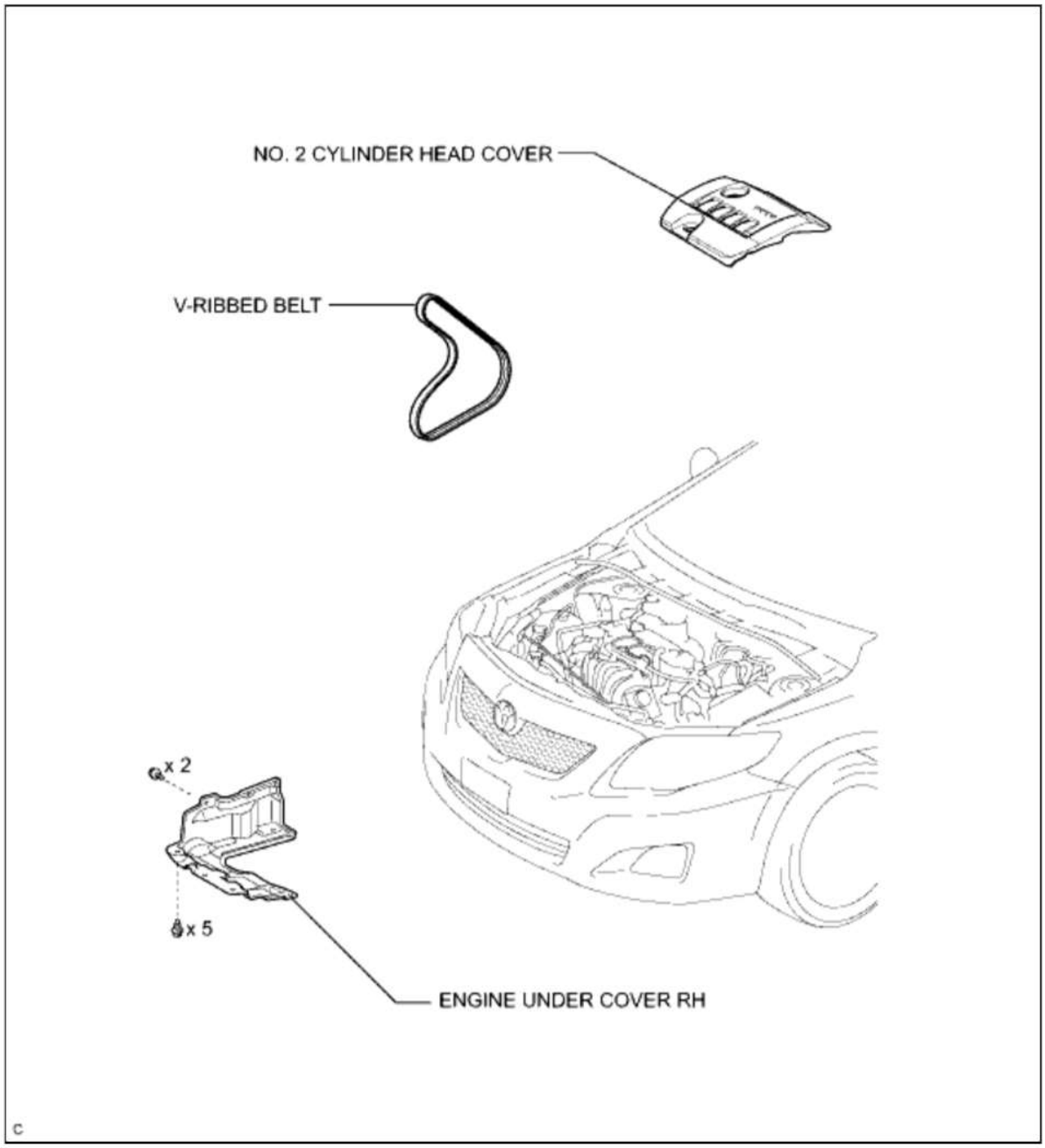
2. INSTALL ENGINE UNDER COVER RH

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IN00XX
Title: 2ZR-FE ENGINE MECHANICAL: DRIVE BELT: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION

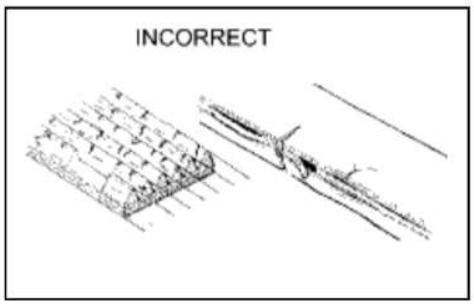


cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000034Q9007X
Title: 2ZR-FE ENGINE MECHANICAL: DRIVE BELT: ON-VEHICLE INSPECTION (2010 Corolla)		

ON-VEHICLE INSPECTION

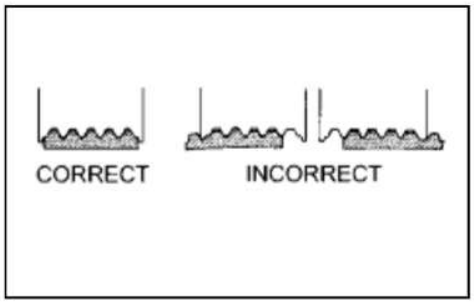
1. INSPECT V-RIBBED BELT



(a) Check the belt for wear, cracks or other signs of damage.

If any of the following defects is found, replace the V-ribbed belt.

- The belt is cracked.
- The belt is worn out to the extent that the cords are exposed.
- The belt has chunks missing from the ribs.



(b) Check that the belt fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley. If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt correctly.

(c) Check the V belt deflection and tension.

Deflection:

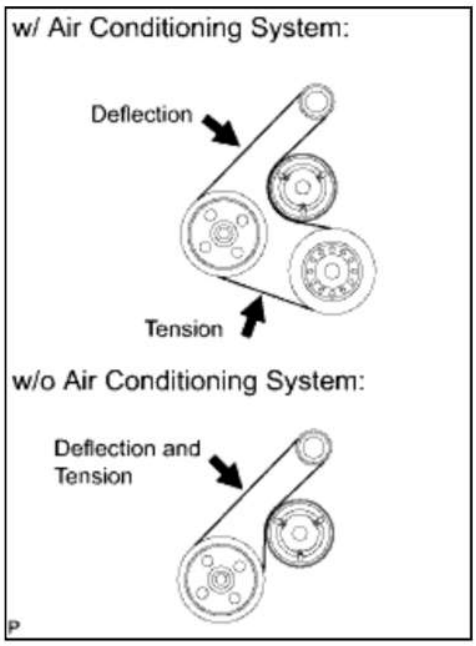
ITEM	SPECIFIED CONDITION
New belt	7.0 to 8.2 mm (0.276 to 0.323 in.)
Used belt	7.6 to 10.0 mm (0.299 to 0.394 in.)

Tension:

ITEM	SPECIFIED CONDITION
New belt	700 to 800 N (71 to 82 kg, 157 to 180 lb)
Used belt	550 to 750 N (56 to 77 kg, 124 to 169 lb)

If the belt deflection is not as specified, adjust it.

cardiagn.com



HINT:

- When inspecting the V belt deflection, apply 98 N (10 kgf) tensile force to it.
- After installing a new belt, run the engine for approximately 5 minutes and then readjust the tension to (new belt) specifications.
- Check the V-ribbed belt deflection and tension at the specified point.
- V-ribbed belt tension and deflection should be checked after 2 revolutions of the engine.
- V-ribbed belt tension and deflection should be checked at TDC crank angle and cold condition.
- When adjusting a belt, adjust its deflection and tension to the intermediate values of the specification.
- When reinstalling a belt which has been used for over 5 minutes, adjust its deflection and tension to the used belt specification.
- When using a belt tension gauge, confirm its accuracy by using a master gauge first.
- If using a sonic tension meter:

Input data for sonic tension meter

Weight:
15 g/rib*m
Width:
6 ribs
Span:
188 mm (7.40 in.) (w/ air Conditioning)
282 mm (11.1 in.) (w/o air Conditioning)

cardiagn.com

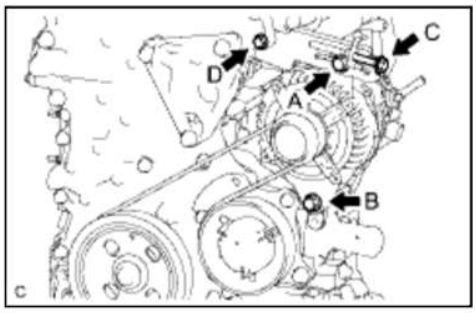
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IO00ZX
Title: 2ZR-FE ENGINE MECHANICAL: DRIVE BELT: REMOVAL (2010 Corolla)		

REMOVAL

1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. REMOVE ENGINE UNDER COVER RH

3. REMOVE V-RIBBED BELT



(a) Loosen bolts A and B.

(b) Loosen bolt C, then remove the V-ribbed belt.

NOTICE:

Do not loosen bolt D.

cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001R3C00NX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE: ON-VEHICLE INSPECTION (2010 Corolla)		

ON-VEHICLE INSPECTION

1. INSPECT ENGINE COOLANT

(a) Inspect the engine coolant INFO .

2. INSPECT ENGINE OIL

(a) Inspect the engine oil INFO .

3. INSPECT BATTERY

(a) Inspect the battery INFO .

4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Remove the air cleaner cap sub-assembly INFO .

(b) Remove the air filter element.

(c) Visually check that the air filter is not excessively damaged or oily.

If necessary, replace the air filter.

5. INSPECT SPARK PLUG INFO

6. INSPECT V-RIBBED BELT INFO

7. INSPECT IGNITION TIMING

NOTICE:

- Turn all the electrical systems and the A/C off.
- When checking the ignition timing, move the shift lever to neutral.

(a) Warm up and stop the engine.

(b) When using the Techstream:

(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Power Train / Engine and ECT / Data List / IGN Advance

(5) Start the engine.

(6) According to the display on the Techstream, read the Data List.

Standard ignition timing:
5 to 15° BTDC at idle

(7) Check that the ignition timing advances immediately when the engine speed is increased.

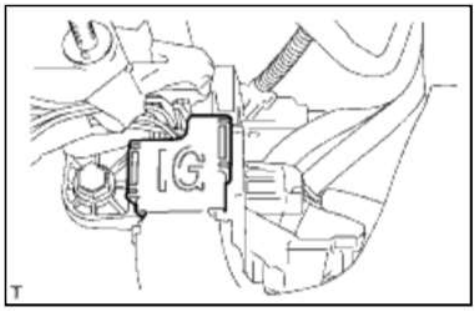
(8) Turn the ignition switch off.

(9) Disconnect the Techstream from the DLC3.

(c) When not using the Techstream:

cardiagn.com

(1) Remove the No. 1 engine cover sub-assembly INFO .



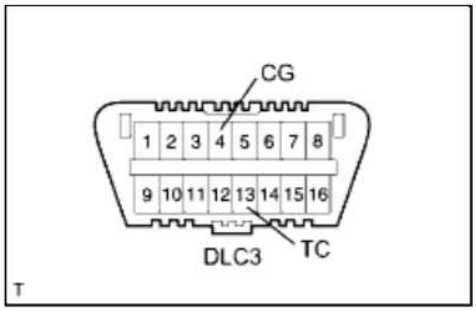
(2) Open the ignition cover located to the right of the No. 4 ignition coil.

(3) Pull the wire harness out from the IG cover.

(4) Connect the timing light to the wire harness.

NOTICE:

Use a timing light that detects the primary signal.



(5) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST: 09843-18040

(6) Allow the engine to idle and check the ignition timing.

Standard ignition timing:
8 to 12° BTDC at idle

HINT:

Run the engine at 1000 to 1300 rpm for 5 seconds, then check that the engine speed returns to idle speed.

(7) Disconnect SST from terminals 13 (TC) and 4 (CG) of the DLC3.

(8) Allow the engine to idle and check the ignition timing.

Standard ignition timing:
5 to 15° BTDC at idle

(9) Check that the ignition timing advances immediately when the engine speed is increased.

(10) Turn the ignition switch off.

(11) Remove the timing light.

(12) Close the IG cover.

(13) Install the No. 1 engine cover sub-assembly INFO .

cardiagn.com

8. INSPECT ENGINE IDLE SPEED

NOTICE:

- Turn all the electrical systems and the A/C off.
- When checking the idle speed, move the shift lever to P or neutral.

(a) Warm up and stop the engine.

(b) When using the Techstream:

(1) Connect the Techstream to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the Techstream on.

(4) Enter the following menus: Power Train / Engine and ECT / Data List / Engine Speed

(5) Start the engine.

(6) According to the display on the Techstream, read the Data List.

Standard idle speed:
600 to 700 rpm

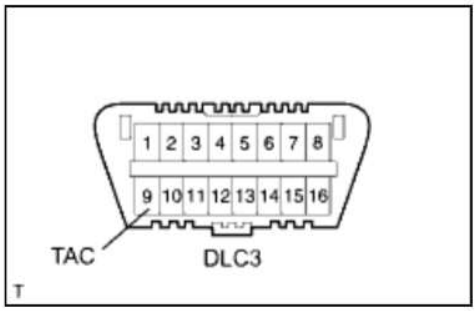
(7) Turn the ignition switch off.

(8) Disconnect the Techstream from the DLC3.

(c) When not using the Techstream:

(1) Turn off all the accessories and air conditioning.

(2) Move the shift lever to P or neutral.



(3) Connect SST to 9 (TAC) of the DLC3 terminal, and then connect a tachometer to SST.

SST: 09843-18030

(4) Start the engine.

(5) Check the idle speed with the cooling fan off.

Standard idle speed:
600 to 700 rpm

(6) Turn the ignition switch off.

(7) Remove the tachometer and disconnect SST from the DLC3.

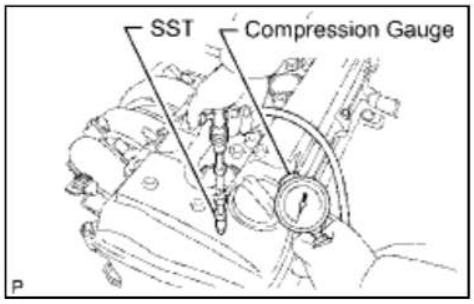
9. INSPECT COMPRESSION

(a) Warm up and stop the engine.

(b) Remove the 4 ignition coils and spark plugs INFO.

(c) Disconnect the 4 fuel injector connectors.

cardiagn.com



(d) Set SST and a compression gauge.

SST: 09992-00500

(e) Insert the compression gauge into the spark plug hole.

(f) Fully open the throttle.

(g) While cranking the engine, measure the compression pressure.

Standard compression pressure:
1300 kPa (13.3 kgf/cm^2, 189 psi)
Minimum compression pressure:
1000 kPa (10.0 kgf/cm^2, 145 psi)
Standard difference between each cylinder:
100 kPa (1.0 kgf/cm^2, 15 psi) or less

NOTICE:

- Always use a fully-charged battery to obtain an engine speed of 250 rpm or more.
- Check the other cylinders in the same way.
- This measurement must be done as quickly as possible.

If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect again.

HINT:

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If pressure stays low, a valve may be stuck or seated improperly, or there may be leakage in the gasket.

(h) Connect the 4 fuel injector connectors.

(i) Install the 4 spark plugs and ignition coils INFO .

10. INSPECT CO/HC

HINT:

This check determines whether or not the idle CO/HC complies with local regulations.

(a) Start and warm up the engine.

(b) Run the engine at 2500 rpm for approximately 180 seconds.

(c) Insert the CO/HC meter testing probe at least 40 cm (1.3 ft.) into the tailpipe while idling.

(d) Inspect the CO/HC concentration during idle at 2500 rpm.

If the CO/HC concentration does not comply with local regulations, troubleshoot in the order given below.

cardiagn.com

(1) Check the A/F sensor and heated oxygen sensor operation.

(2) See the table below for possible causes, then inspect the applicable parts and repair them if necessary.

:

CO	HC	PROBLEM	POSSIBLE CAUSE
Normal	High	Rough idle	1. Faulty ignition: - Incorrect timing - Plugs are contaminated, shorted, or gaps are defective 2. Incorrect valve clearance 3. Leaks in intake and exhaust valve 4. Leaks in cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leakage: - Ventilation hoses - Intake manifold - Throttle body - Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty EFI system: - Faulty pressure regulator - Faulty engine coolant temperature sensor - Faulty mass air flow meter - Faulty ECM - Faulty injectors - Faulty throttle body

cardiagn.com

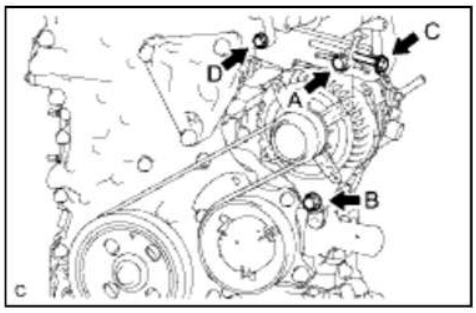
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IM00ZX
Title: 2ZR-FE ENGINE MECHANICAL: DRIVE BELT: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL V-RIBBED BELT

(a) Install the belt.

2. ADJUST V-RIBBED BELT



(a) Turn bolt C to adjust the tension of the V-ribbed belt.

(b) Tighten bolts A and B.

Bolt A - Torque: 19 N·m (190 kgf·cm, 14ft·lbf)

Bolt B - Torque: 43 N·m (438 kgf·cm, 32ft·lbf)

NOTICE:

Confirm that bolt D is not loosened.

3. INSPECT V-RIBBED BELT INFO

4. INSTALL ENGINE UNDER COVER RH

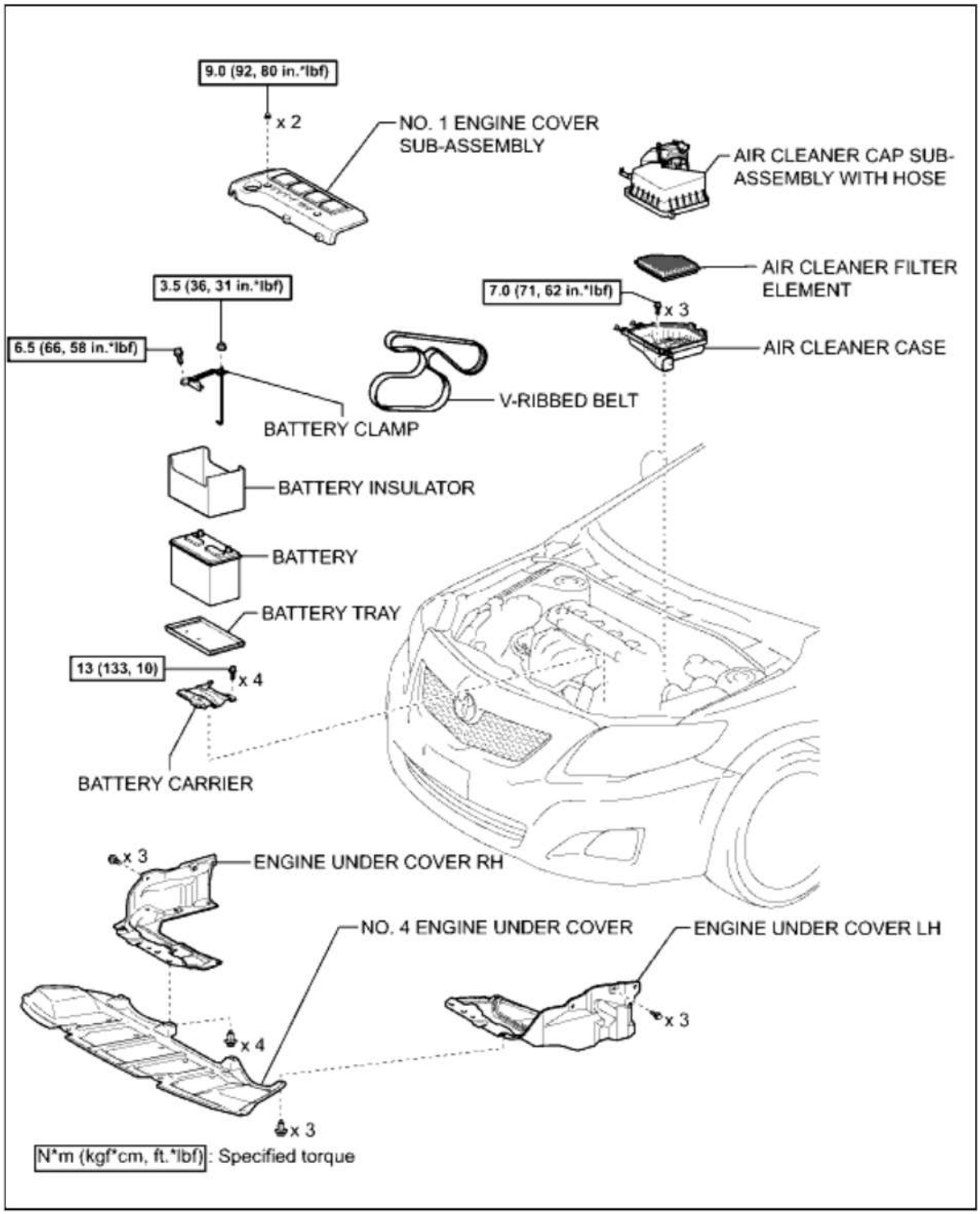
5. INSTALL NO. 2 CYLINDER HEAD COVER INFO

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001R3V00NX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE ASSEMBLY: COMPONENTS (2010 Corolla)		

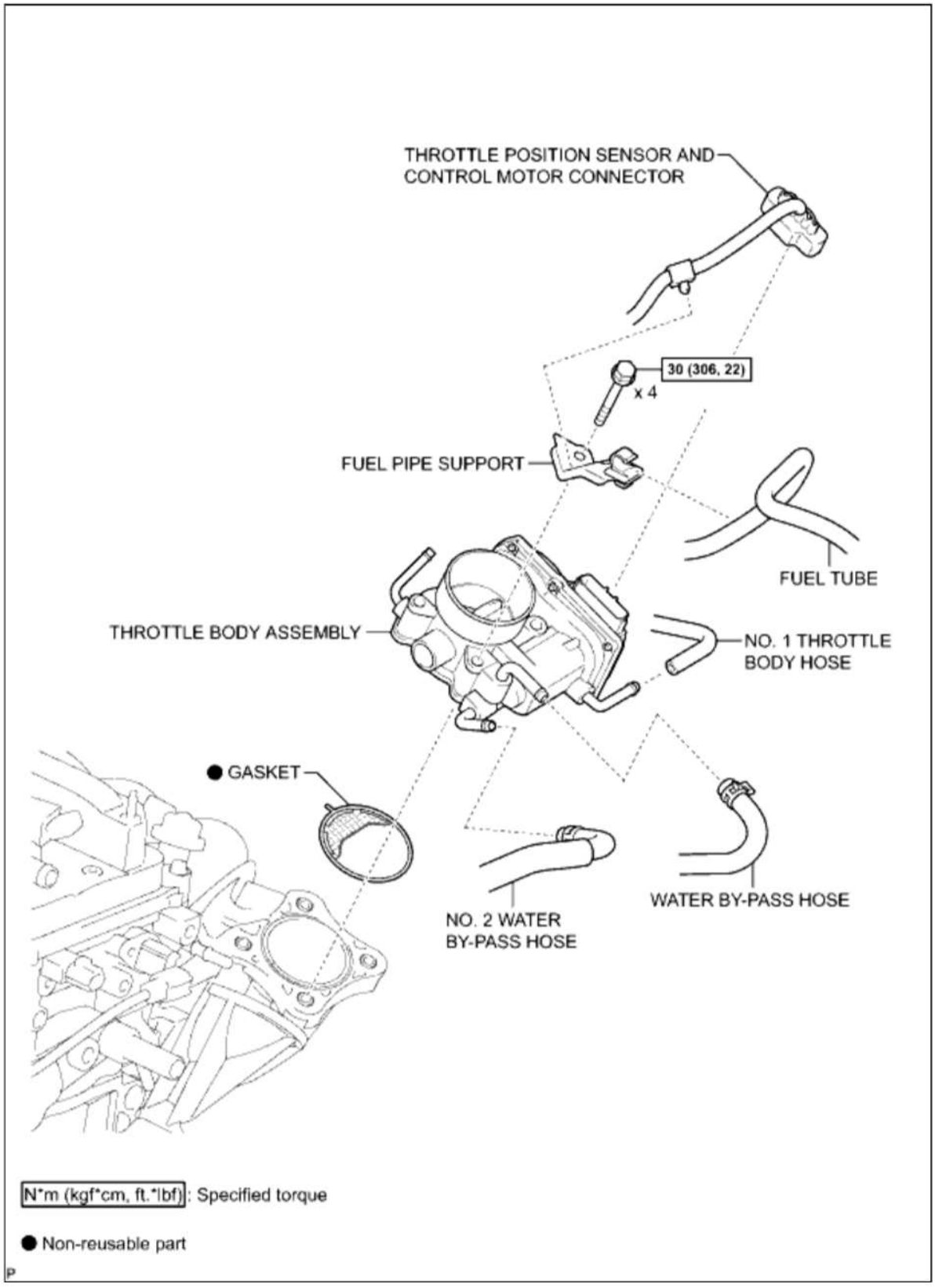
COMPONENTS

ILLUSTRATION



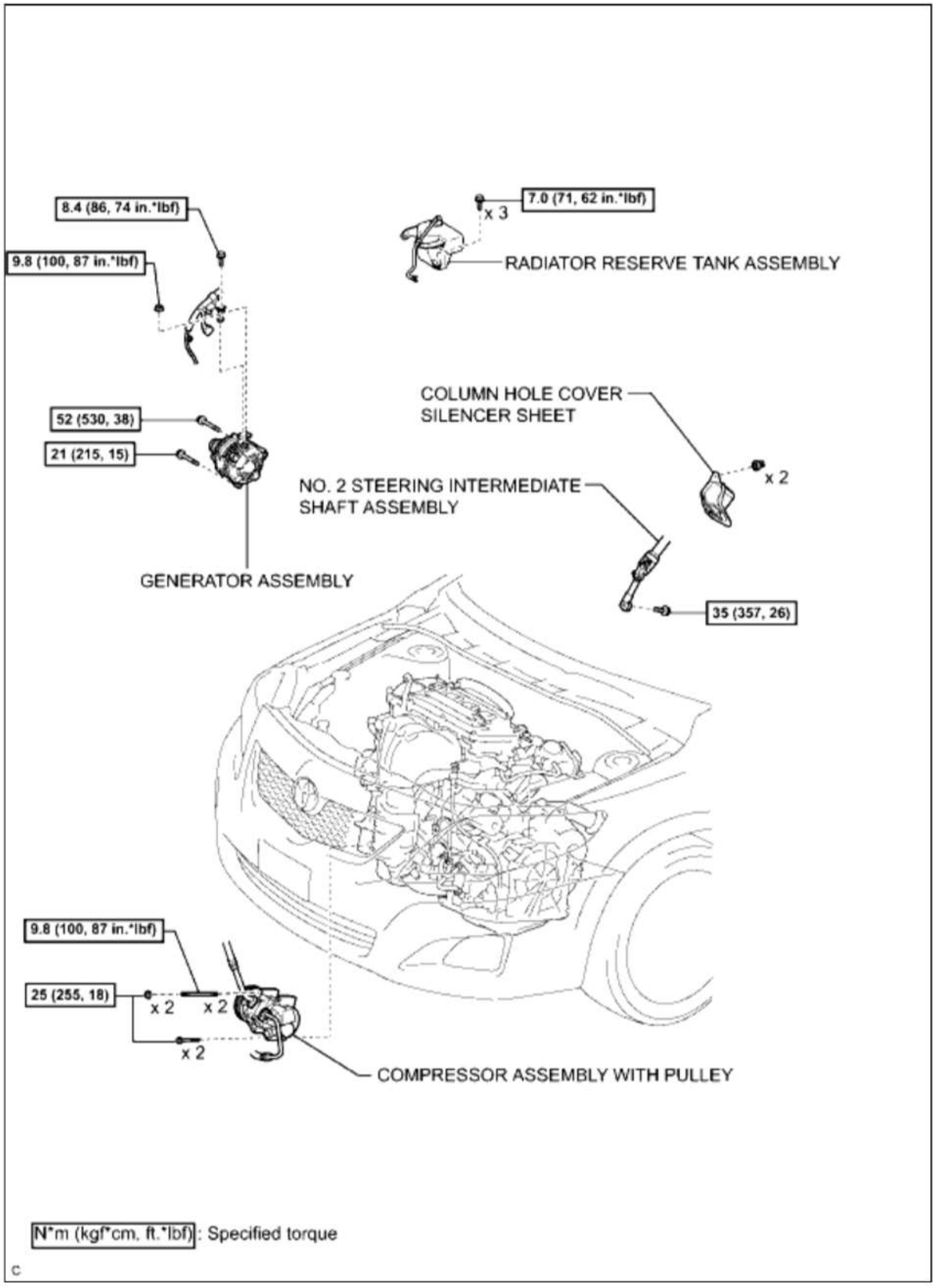
cardiagn.com

ILLUSTRATION



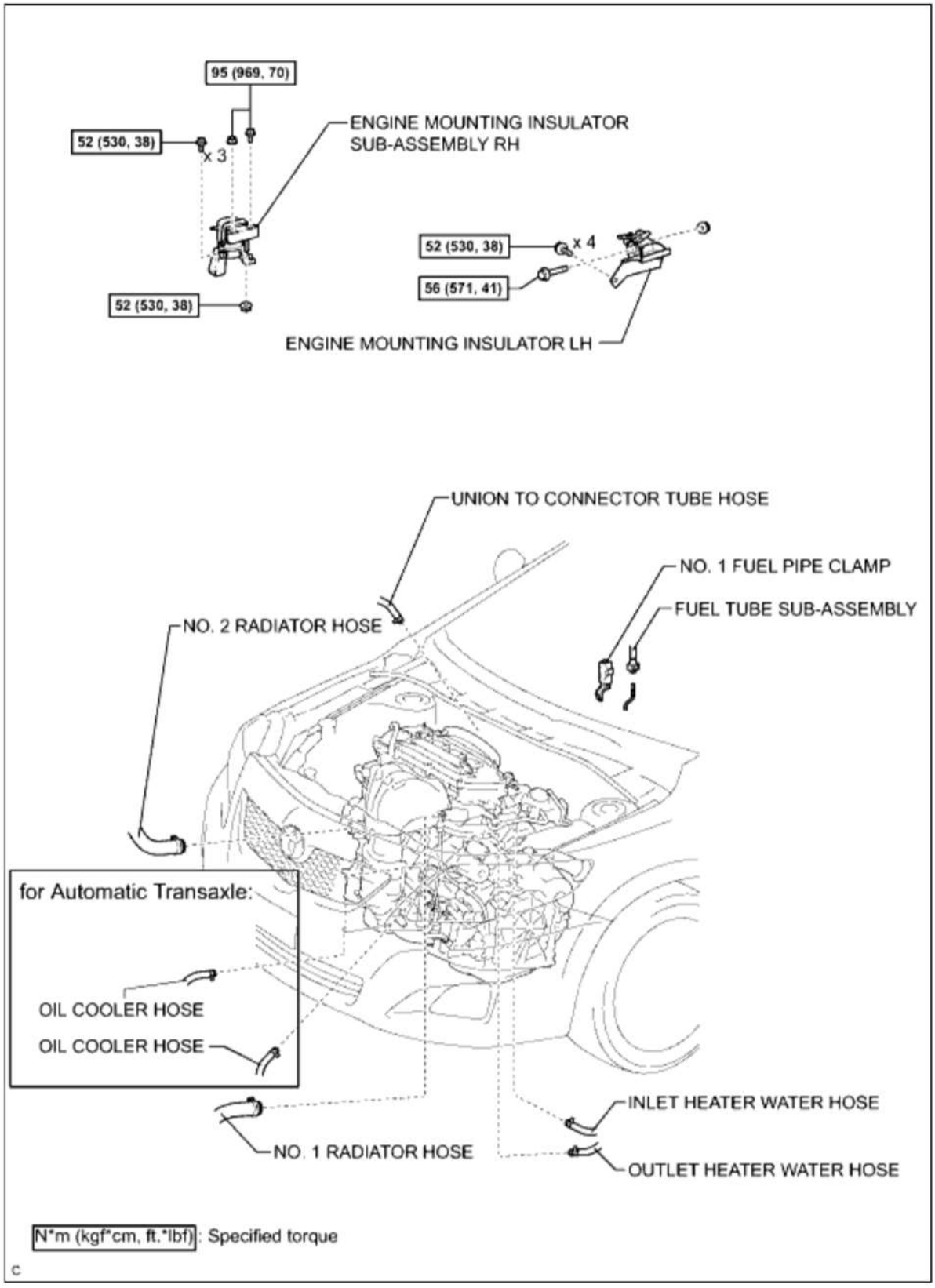
cardiagn.com

ILLUSTRATION



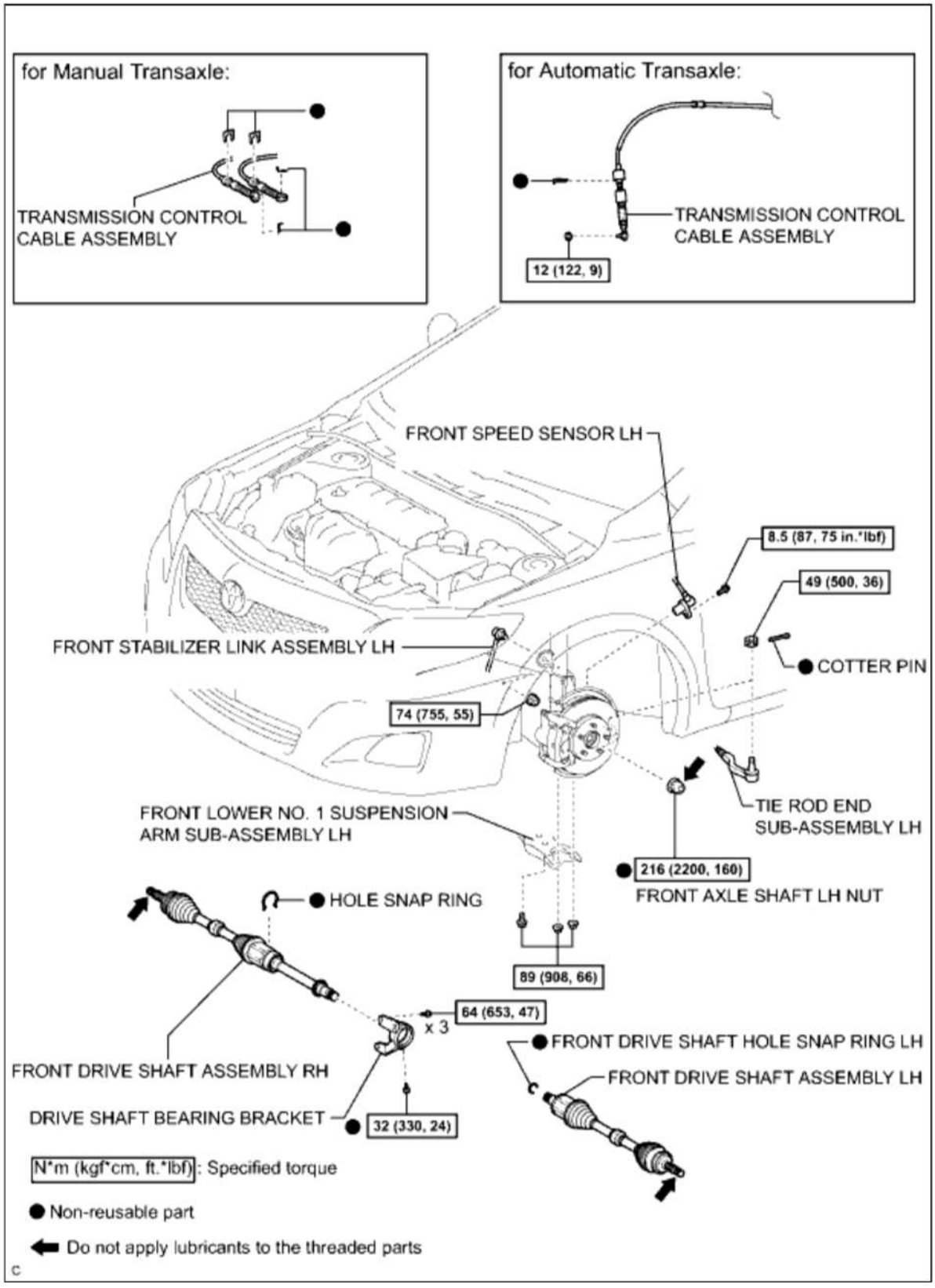
cardiagn.com

ILLUSTRATION



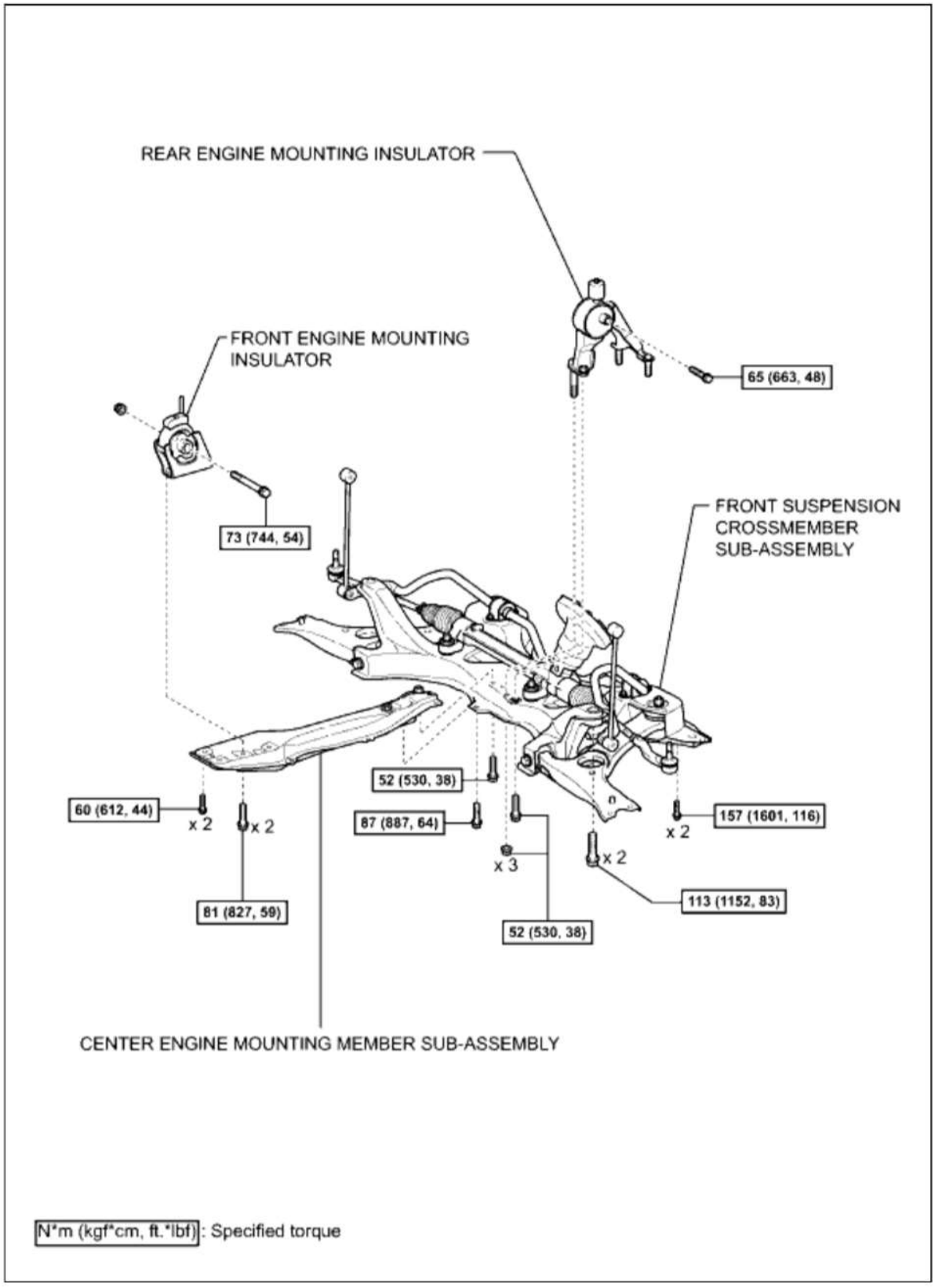
cardiagn.com

ILLUSTRATION



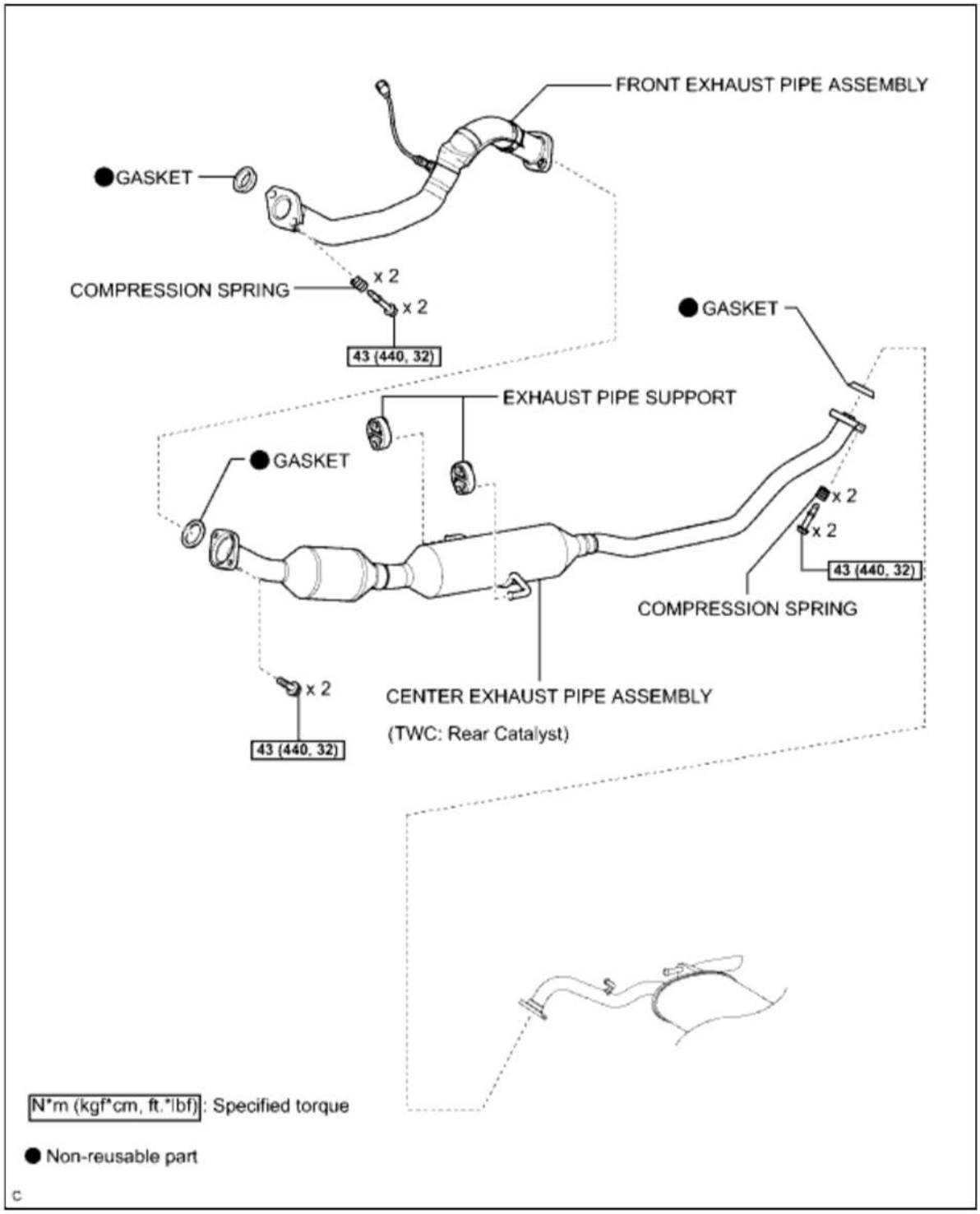
cardiagn.com

ILLUSTRATION



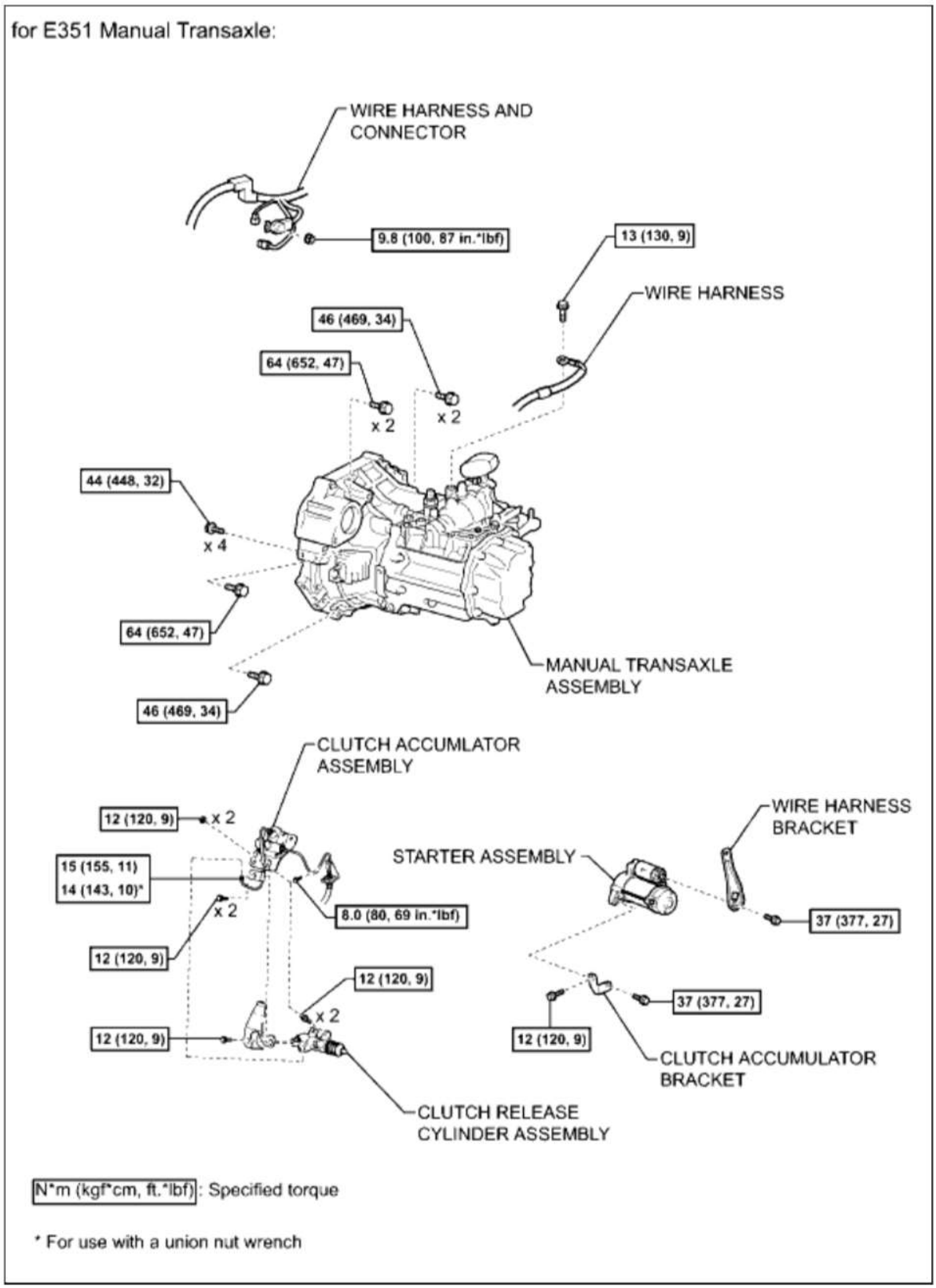
cardiagn.com

ILLUSTRATION



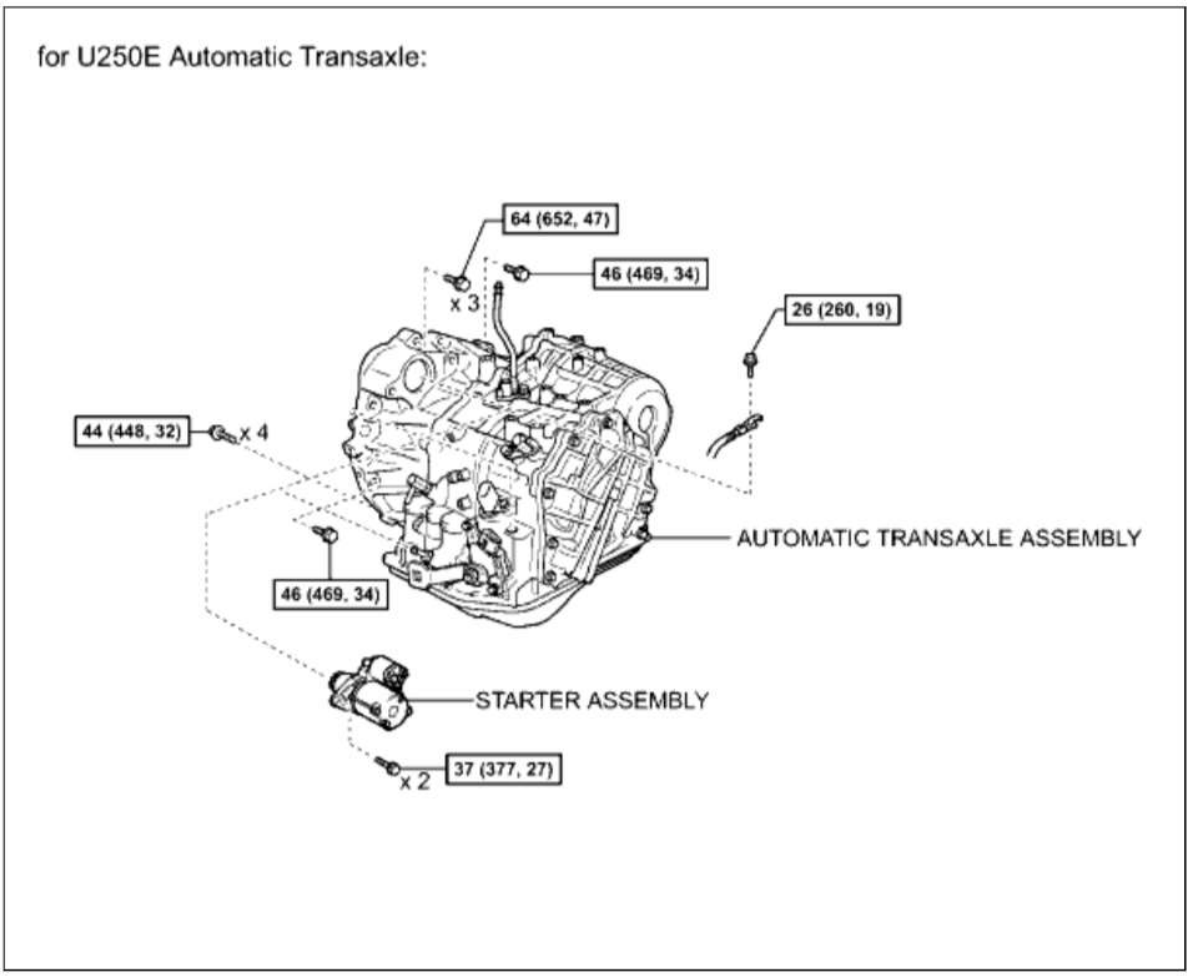
ILLUSTRATION

cardiagn.com



ILLUSTRATION

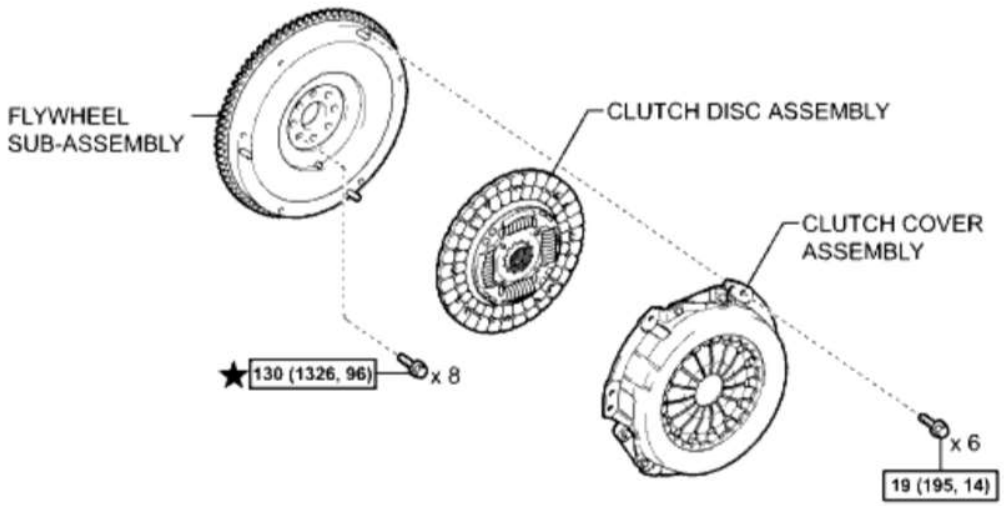
cardiagn.com



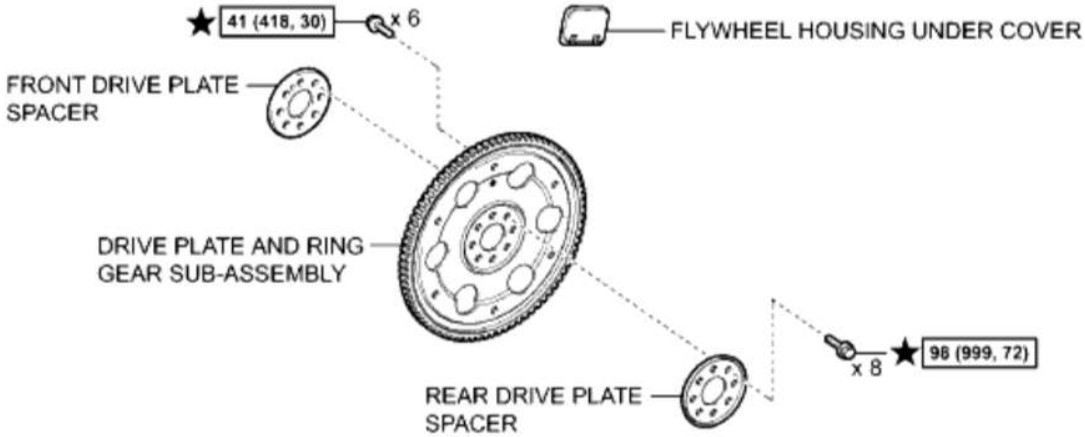
ILLUSTRATION

cardiagn.com

for Manual Transaxle:



for Automatic Transaxle:



N*m (kgf*cm, ft.*lbf): Specified torque

★ Precoated part

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001BC300RX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE ASSEMBLY: REMOVAL (2010 Corolla)		

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE INFO

2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

3. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

4. REMOVE FRONT WHEELS

5. REMOVE ENGINE UNDER COVER LH

6. REMOVE ENGINE UNDER COVER RH

7. DRAIN ENGINE COOLANT INFO

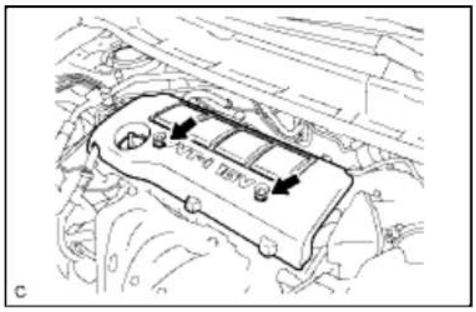
8. DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)

HINT: INFO **for U250E.**

9. DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle)

HINT: INFO **for E351.**

10. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY

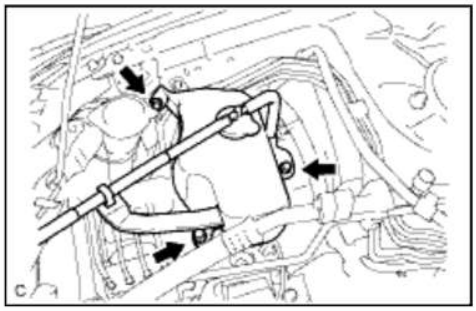


(a) Remove the 2 nuts and No. 1 engine cover sub-assembly.

11. SEPARATE RADIATOR RESERVE TANK ASSEMBLY

(a) Remove the 3 bolts and separate the radiator reserve tank assembly.

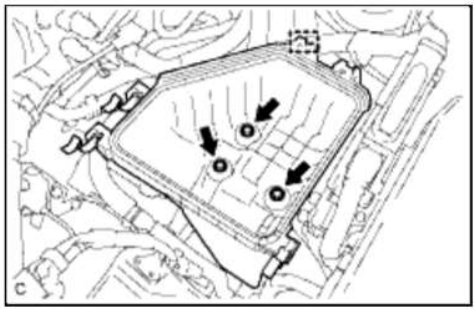
cardiagn.com



12. REMOVE AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE

13. REMOVE AIR CLEANER CASE

(a) Remove the air cleaner filter element.



(b) Disconnect the clamp of the engine wire.

(c) Remove the 3 bolts and air cleaner case.

14. REMOVE BATTERY



(a) Remove the bolt, nut and battery clamp.

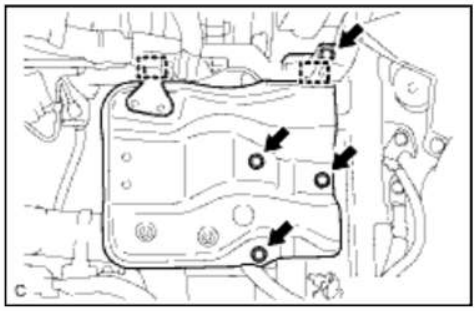
(b) Remove the battery and battery insulator.

15. REMOVE BATTERY CARRIER

(a) Remove the battery tray.

(b) Separate the 2 wire harness clamps from the battery

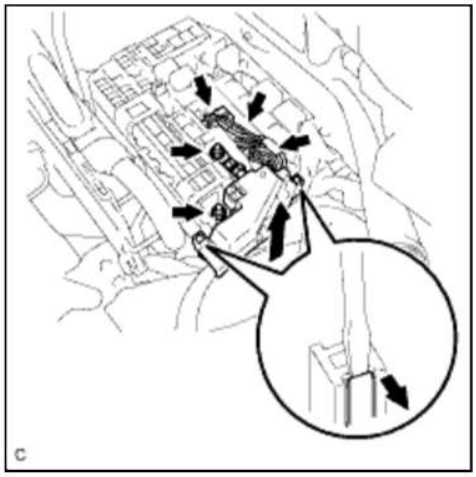
cardiagn.com



carrier.

(c) Remove the 4 bolts and battery carrier.

16. SEPARATE WIRE HARNESS

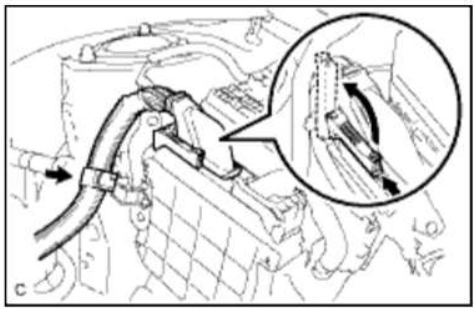


(a) Disconnect the 3 connectors from the engine room relay block.

(b) Remove the 2 nuts and disconnect the wire harnesses from the engine room relay block.

(c) Using a screwdriver, unlock the 2 claws.

(d) Pull the engine room relay block upward.

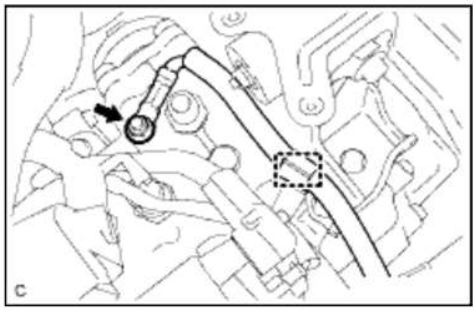


(e) Pull up the lever and disconnect the ECM connector.

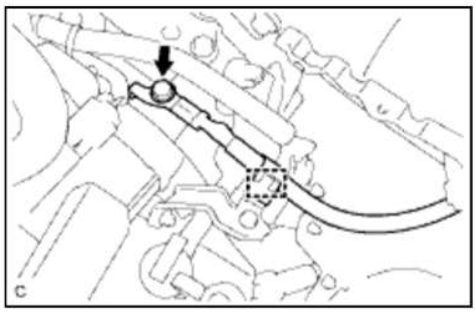
(f) Disconnect the clamp.

(g) Remove the bolt and disconnect the ground cable and

cardiagn.com



clamp (for Manual Transaxle).



(h) Remove the bolt and disconnect the ground cable and clamp (for Automatic Transaxle).

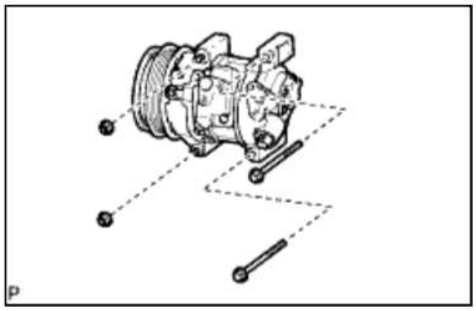
17. REMOVE THROTTLE BODY ASSEMBLY INFO

18. REMOVE V-RIBBED BELT INFO

19. REMOVE GENERATOR ASSEMBLY INFO

20. SEPARATE COMPRESSOR ASSEMBLY WITH PULLEY

(a) Disconnect the connector.



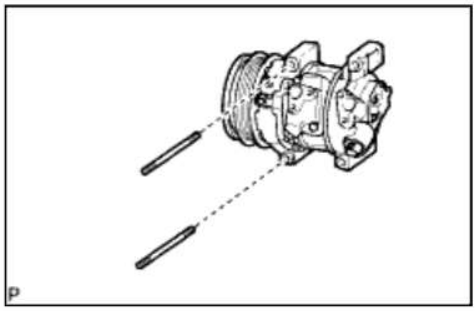
(b) Remove the 2 bolts and 2 nuts.

(c) Using a "TORX" socket wrench (E8), remove the 2 stud bolts and compressor with pulley assembly.

HINT:

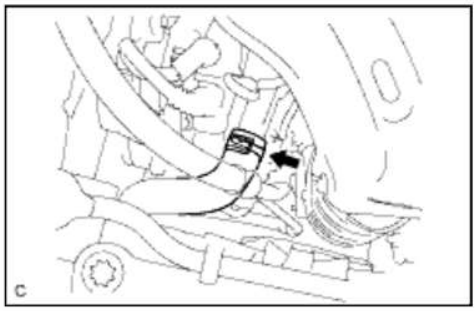
Secure the compressor and hoses off to the side instead of

cardiagn.com



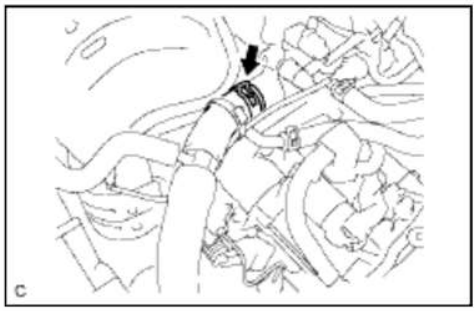
discharging the A/C system.

21. DISCONNECT NO. 2 RADIATOR HOSE



(a) Disconnect the No. 2 radiator hose from the inlet water.

22. DISCONNECT NO. 1 RADIATOR HOSE

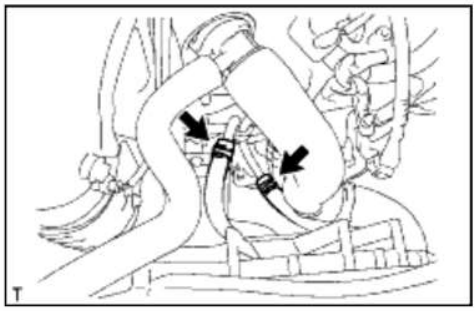


(a) Disconnect the No. 1 radiator hose from the cylinder head.

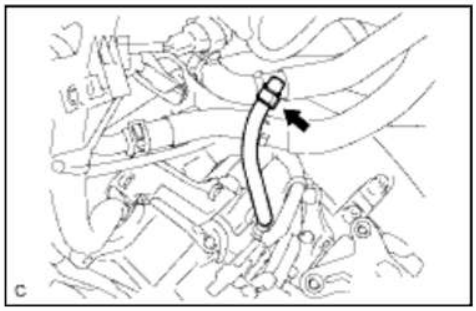
23. DISCONNECT OIL COOLER HOSE (for Automatic Transaxle)

(a) Disconnect the 2 oil cooler hoses.

cardiagn.com

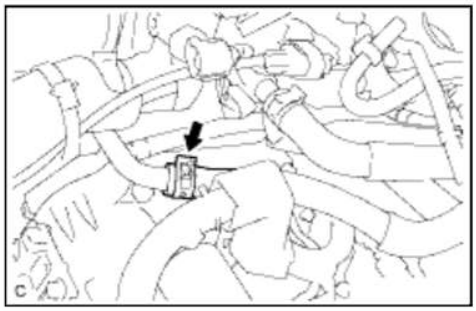


24. DISCONNECT BREATHER HOSE (for Automatic Transaxle)



(a) Disconnect the breather hose.

25. DISCONNECT OUTLET HEATER WATER HOSE

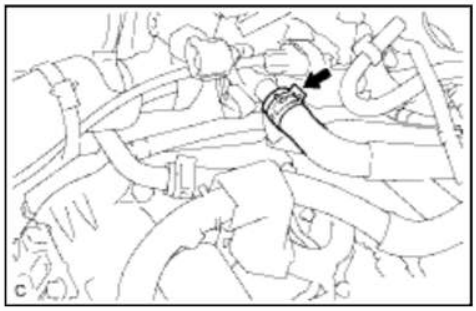


(a) Disconnect the outlet heater water hose.

26. DISCONNECT INLET HEATER WATER HOSE

(a) Disconnect the inlet heater water hose.

cardiagn.com

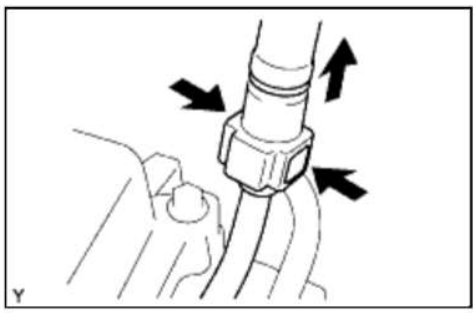


27. REMOVE FUEL TUBE SUB-ASSEMBLY



(a) Release the claw and remove the No. 1 fuel pipe clamp.

(b) Pinch the retainer as illustrated, then pull the fuel tube connector out of the pipe.

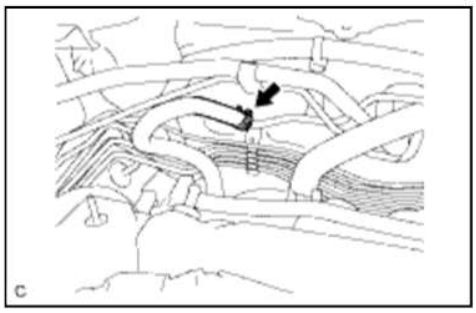


NOTICE:

- Remove any dirt or foreign matter from the fuel tube connector before performing this work.
- Do not allow any scratches or foreign matter on the parts when disconnecting, as the fuel tube connector has O-rings that seal the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, kink or twist the nylon tube.
- Protect the disconnected parts by covering them with vinyl bags after disconnecting the fuel tube.
- If the fuel tube connector and pipe are stuck, push and pull to release them.

cardiagn.com

28. DISCONNECT UNION TO CONNECTOR TUBE HOSE

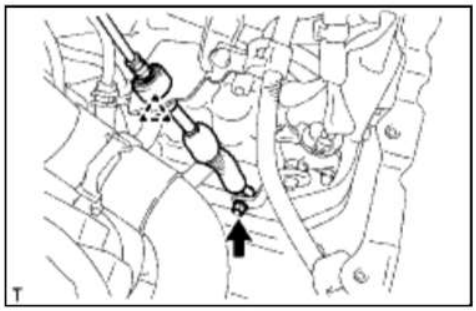


(a) Disconnect the union to connector tube hose.

29. SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)

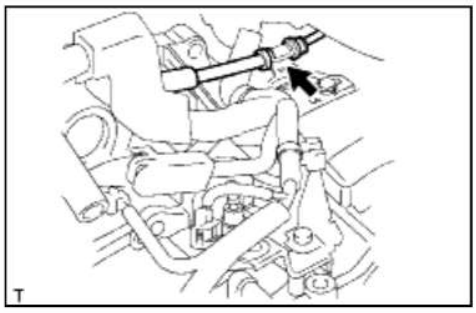
HINT: INFO **for E351.**

30. SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)



(a) Remove the nut and disconnect the control cable assembly from the control shaft lever.

(b) Remove the clip and disconnect the transmission control cable assembly from the control cable bracket.

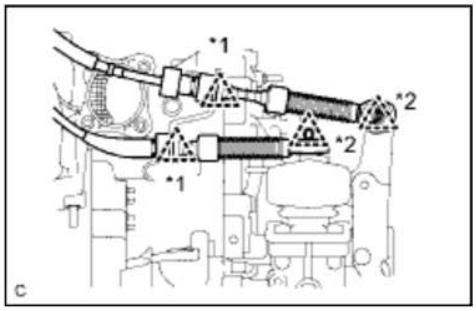


(c) Disconnect the control cable assembly from the control cable bracket.

31. SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)

(a) Remove the 2 clips and disconnect the 2 transmission control cables from the control cable bracket*1.

cardiagn.com



(b) Remove the 2 clips and disconnect the 2 transmission control cables from the transaxle*2.

32. SECURE STEERING WHEEL INFO

33. REMOVE COLUMN HOLE COVER SILENCER SHEET INFO

34. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

35. SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

36. REMOVE CENTER EXHAUST PIPE ASSEMBLY INFO

37. REMOVE FRONT EXHAUST PIPE ASSEMBLY INFO

38. REMOVE FRONT AXLE SHAFT LH NUT INFO

39. REMOVE FRONT AXLE SHAFT RH NUT

HINT:

Perform the same procedure for the LH side.

40. SEPARATE FRONT SPEED SENSOR LH INFO

41. SEPARATE FRONT SPEED SENSOR RH

HINT:

Perform the same procedure for the LH side.

42. SEPARATE TIE ROD END SUB-ASSEMBLY LH INFO

43. SEPARATE TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

44. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH INFO

45. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

cardiagn.com

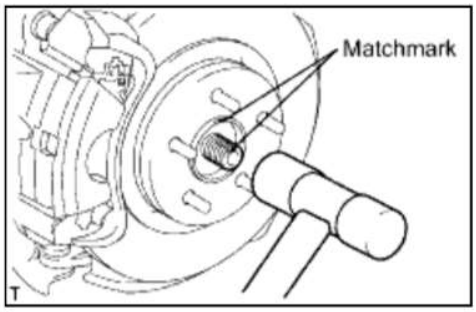
46. SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH INFO

47. SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

48. SEPARATE STEERING KNUCKLE WITH AXLE HUB LH



(a) Put matchmarks on the drive shaft and axle hub.

NOTICE:

Do not punch the marks.

(b) Using a plastic-faced hammer, disconnect the front axle assembly LH.

NOTICE:

- Be careful not to damage the boot or speed sensor rotor.
- Do not excessively push out the drive shaft from the axle assembly.

49. SEPARATE STEERING KNUCKLE WITH AXLE HUB RH

HINT:

Perform the same procedure for the LH side.

50. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH INFO

51. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING LH INFO

52. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH INFO

53. SEPARATE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle)

HINT: INFO **for U250E.**

54. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

55. REMOVE CENTER ENGINE MOUNTING MEMBER SUB-ASSEMBLY INFO

56. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

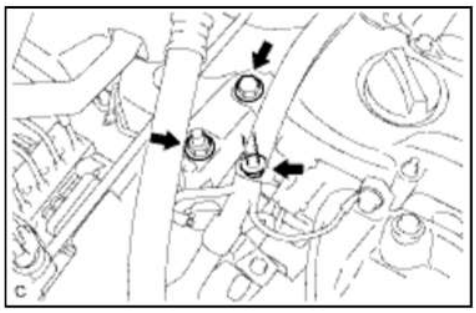
(a) Set the engine assembly with transaxle on the engine lifter.

cardiagn.com

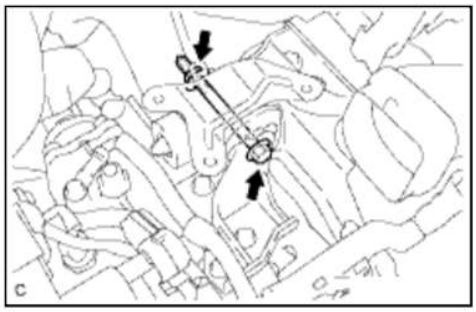


NOTICE:

Place the engine on wooden blocks or equivalent so that the engine is level.



(b) Remove the bolt and 2 nuts, and separate the engine mounting insulator RH.



(c) Remove the through bolt and nut, and separate the engine mounting insulator LH.

(d) Carefully remove the engine with transaxle from the vehicle.

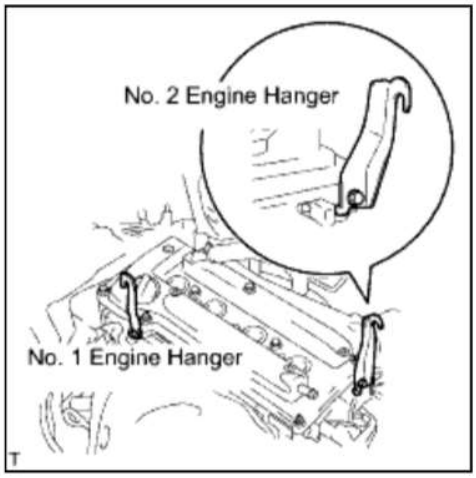
57. INSTALL ENGINE HANGERS

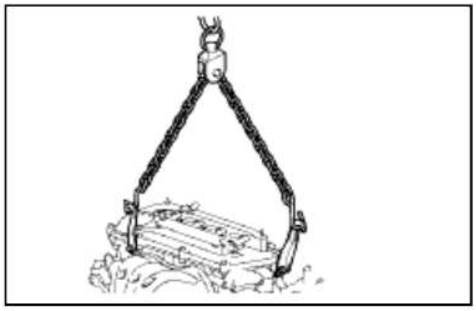
(a) Install the No. 1 and No. 2 engine hangers with new bolts as shown in the illustration.

Torque: 38 N·m (387 kgf·cm, 28ft·lbf)

ITEM	PART NO.
No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010 or 12282-AB010
Bolt	90080-10177

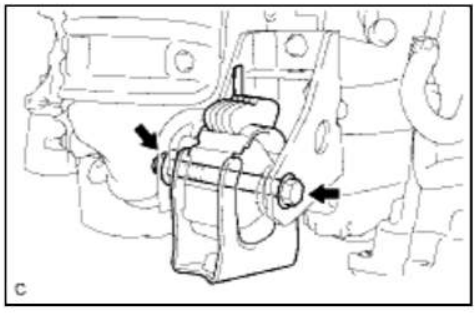
cardiagn.com





(b) Using an engine sling device and a chain block, suspend the engine assembly with transaxle.

58. REMOVE FRONT ENGINE MOUNTING INSULATOR

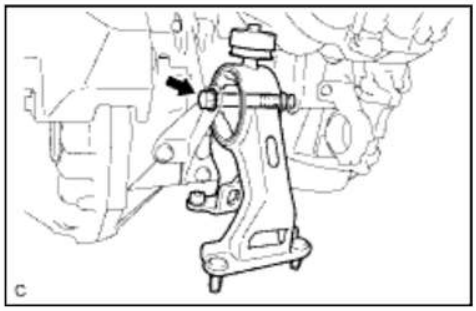


(a) Remove the through bolt and nut, and separate the front engine mounting insulator.

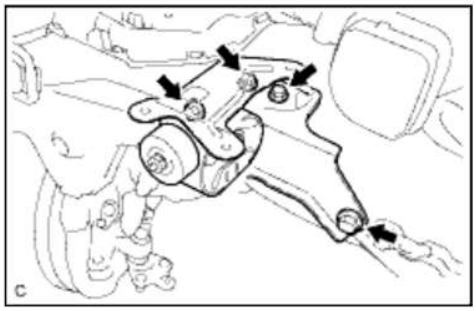
59. REMOVE REAR ENGINE MOUNTING INSULATOR

(a) Remove the through bolt and separate the rear engine mounting insulator.

cardiagn.com

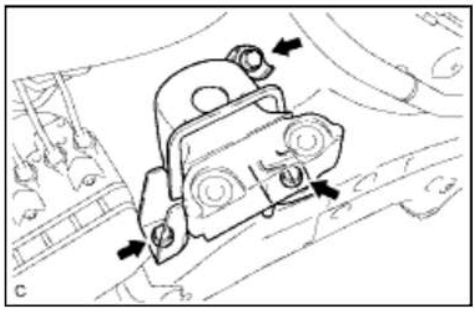


60. REMOVE ENGINE MOUNTING INSULATOR LH



(a) Remove the 4 bolts and engine mounting insulator LH.

61. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH

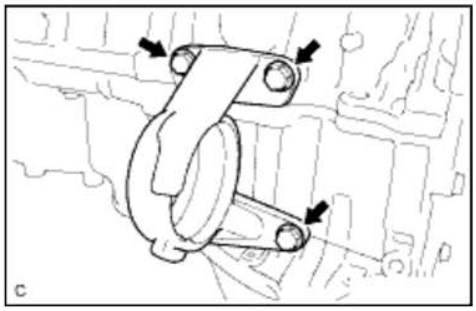


(a) Remove the 3 bolts and engine mounting insulator sub-assembly RH.

62. REMOVE DRIVE SHAFT BEARING BRACKET

(a) Remove the 3 bolts and bracket.

cardiagn.com



63. REMOVE STARTER ASSEMBLY (for Automatic Transaxle) INFO

64. REMOVE STARTER ASSEMBLY (for Manual Transaxle) INFO

65. REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

66. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U250E.**

67. REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

68. REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

69. REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) INFO

70. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) INFO

71. REMOVE ENGINE WIRE

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001BC100RX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE ASSEMBLY: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL ENGINE WIRE

2. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) INFO

3. INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) INFO

4. INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

5. INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

6. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U250E.**

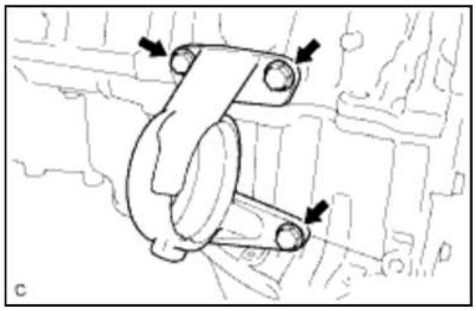
7. INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

8. INSTALL STARTER ASSEMBLY (for Manual Transaxle) INFO

9. INSTALL STARTER ASSEMBLY (for Automatic Transaxle) INFO

10. INSTALL DRIVE SHAFT BEARING BRACKET



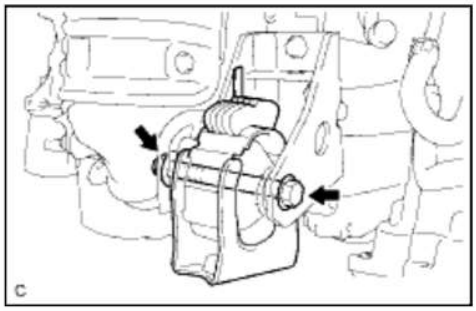
(a) Install the drive shaft bearing bracket with the 3 bolts.

Torque: 64 N·m (653 kgf·cm, 47ft·lbf)

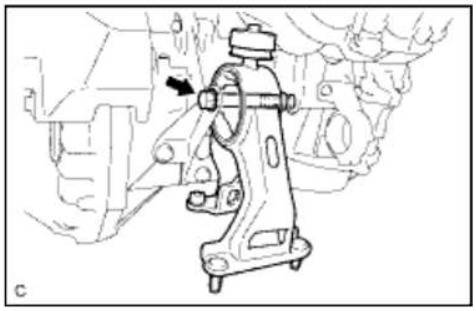
11. TEMPORARILY TIGHTEN FRONT ENGINE MOUNTING INSULATOR

(a) Temporarily install the front engine mounting insulator with the nut and through bolt.

cardiagn.com

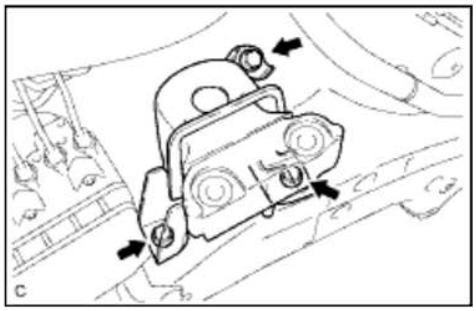


12. TEMPORARILY TIGHTEN REAR ENGINE MOUNTING INSULATOR



(a) Temporarily install the rear engine mounting insulator to the engine mounting bracket with the through bolt.

13. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH



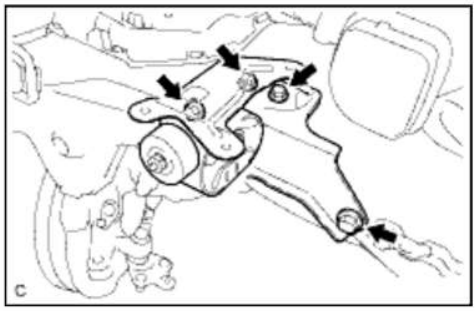
(a) Install the engine mounting insulator RH with the 3 bolts.

Torque: 52 N·m (530 kgf·cm, 38ft·lbf)

14. INSTALL ENGINE MOUNTING INSULATOR LH

(a) Temporarily install the engine mounting insulator LH with the 4 bolts.

cardiagn.com



(b) Tighten the 4 bolts.

Torque: 52 N·m (530 kgf·cm, 38ft·lbf)

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

15. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE



(a) Set the engine assembly with transaxle on the engine lifter.

NOTICE:

Place the engine on wooden blocks or equivalent so that the engine is level.

(b) Remove the 2 bolts and 2 engine hangers.

(c) Operate the engine lifter and lift the engine assembly with transaxle to the position where the engine mounting insulators RH and LH can be installed.

CAUTION:

Do not raise the engine more than necessary. If the engine is raised excessively, the vehicle may also be lifted up.

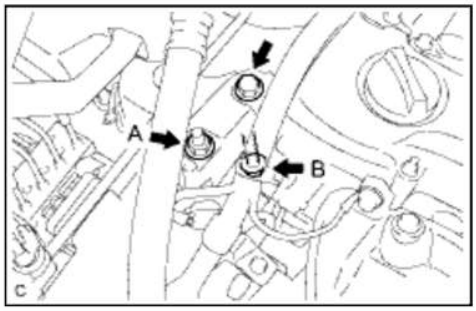
NOTICE:

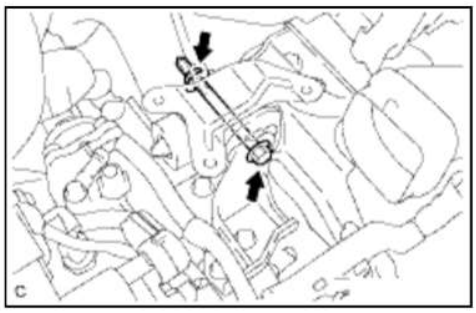
- Make sure that the engine is clear of all wiring and hoses.
- While raising the engine into the vehicle, do not allow it to contact the vehicle.

(d) Install the engine mounting insulator RH with the bolt and 2 nuts.

Nut A - Torque: 95 N·m (969 kgf·cm, 70ft·lbf)
Nut B - Torque: 52 N·m (530 kgf·cm, 38ft·lbf)
Bolt - Torque: 95 N·m (969 kgf·cm, 70ft·lbf)

cardiagn.com





(e) Install the engine mounting insulator LH with the through bolt and nut.

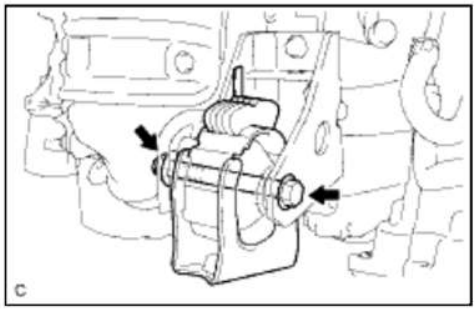
Torque: 56 N·m (571 kgf·cm, 41ft·lbf)

16. TEMPORARILY TIGHTEN CENTER ENGINE MOUNTING MEMBER SUB-ASSEMBLY INFO

17. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

18. FULLY TIGHTEN CENTER ENGINE MOUNTING MEMBER SUB-ASSEMBLY INFO

19. FULLY TIGHTEN FRONT ENGINE MOUNTING INSULATOR



(a) Fully tighten the front engine mounting insulator with the nut and through bolt.

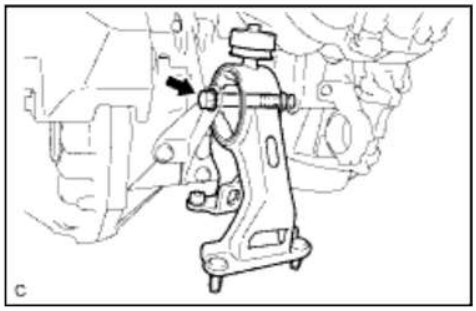
Torque: 73 N·m (744 kgf·cm, 54ft·lbf)

20. FULLY TIGHTEN REAR ENGINE MOUNTING INSULATOR

(a) Fully tighten the rear engine mounting insulator to the engine mounting bracket with the through bolt.

Torque: 65 N·m (663 kgf·cm, 48ft·lbf)

cardiagn.com



21. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle)

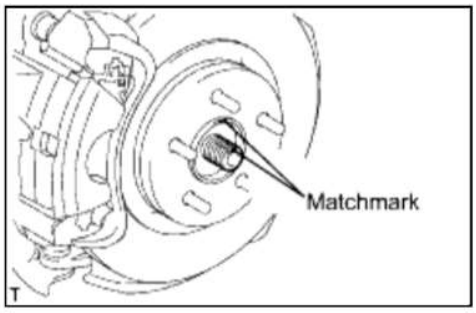
HINT: INFO **for U250E.**

22. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING LH INFO

23. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH INFO

24. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH INFO

25. INSTALL STEERING KNUCKLE WITH AXLE HUB LH



(a) Align the matchmarks and connect the front drive shaft assembly to the front axle assembly LH.

26. INSTALL STEERING KNUCKLE WITH AXLE HUB RH

HINT:

Perform the same procedure for the LH side.

27. INSTALL FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH INFO

28. INSTALL FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

29. INSTALL FRONT STABILIZER LINK ASSEMBLY LH INFO

30. INSTALL FRONT STABILIZER LINK ASSEMBLY RH

HINT:

cardiagn.com

Perform the same procedure for the LH side.

31. INSTALL TIE ROD END SUB-ASSEMBLY LH INFO

32. INSTALL TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

33. INSTALL FRONT SPEED SENSOR LH INFO

34. INSTALL FRONT SPEED SENSOR RH

HINT:

Perform the same procedure for the LH side.

35. INSTALL FRONT AXLE SHAFT LH NUT INFO

36. INSTALL FRONT AXLE SHAFT RH NUT

HINT:

Perform the same procedure for the LH side.

37. INSTALL FRONT EXHAUST PIPE ASSEMBLY INFO

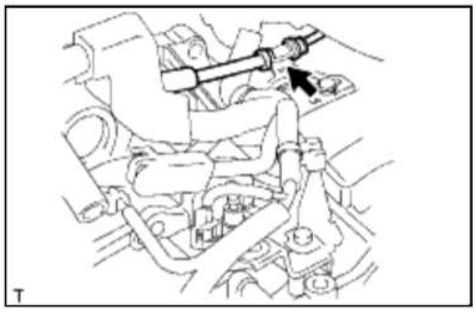
38. INSTALL CENTER EXHAUST PIPE ASSEMBLY INFO

39. INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

40. INSTALL NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

41. INSTALL COLUMN HOLE COVER SILENCER SHEET INFO

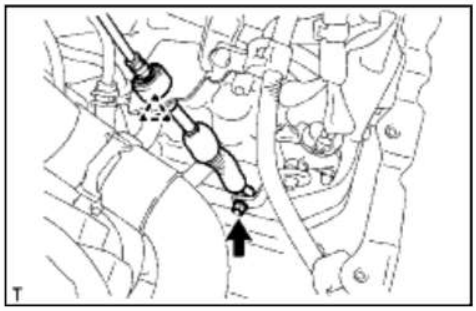
42. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)



(a) Connect the transmission control cable to the control cable bracket.

(b) Connect the transmission control cable to the bracket with a new clip.

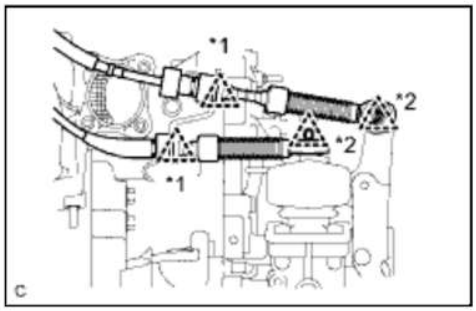
cardiagn.com



(c) Connect the transmission control cable assembly to the control shaft lever with the nut.

Torque: 12 N·m (122 kgf·cm, 9ft·lbf)

43. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)



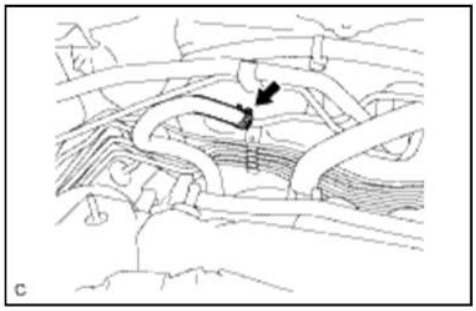
(a) Install the 2 transmission control cables to the control cable bracket with 2 new clips*1.

(b) Install the 2 transmission control cables to the transaxle with 2 new clips*2.

44. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

45. CONNECT UNION TO CONNECTOR TUBE HOSE



(a) Connect the union to connector tube hose.

46. INSTALL FUEL TUBE SUB-ASSEMBLY

(a) Connect the fuel tube connector and fuel pipe.

CAUTION:

Align the fuel tube connector with the pipe, then push the fuel tube connector in until the retainer

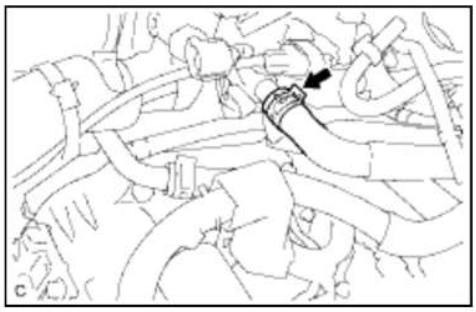
cardiagn.com

makes a "click" sound. If the connection is tight, apply a small amount of engine oil to the tip of the pipe. After connecting, pull the pipe and connector to make sure that they are securely connected.



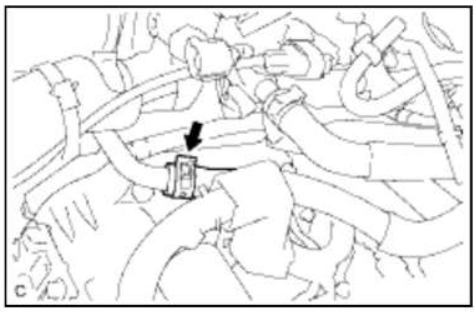
(b) Engage the claw and install the No. 1 fuel pipe clamp.

47. CONNECT INLET HEATER WATER HOSE



(a) Connect the inlet heater water hose with the clamp.

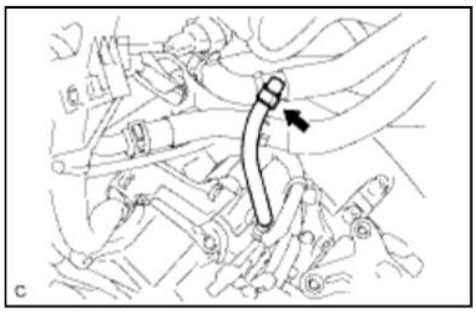
48. CONNECT OUTLET HEATER WATER HOSE



(a) Connect the outlet heater water hose with the clamp.

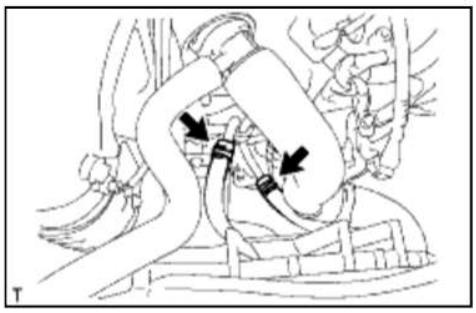
cardiagn.com

49. INSTALL BREATHER HOSE (for Automatic Transaxle)



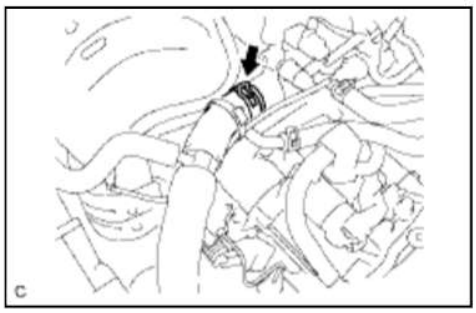
(a) Install the breather hose.

50. CONNECT OIL COOLER HOSE (for Automatic Transaxle)



(a) Connect the 2 oil cooler hoses with the clamps.

51. INSTALL NO. 1 RADIATOR HOSE

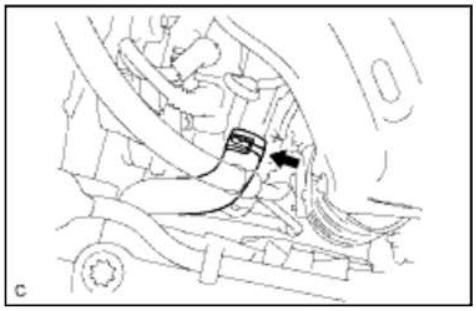


(a) Connect the No. 1 radiator hose with the clamp.

52. INSTALL NO. 2 RADIATOR HOSE

(a) Connect the No. 2 radiator hose with the clamp.

cardiagn.com



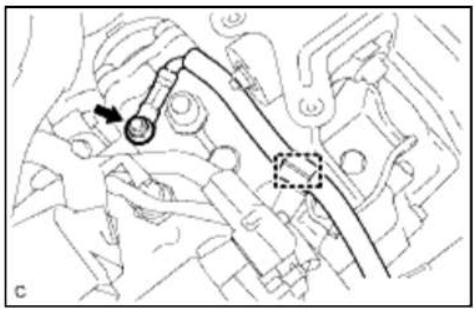
53. INSTALL COMPRESSOR ASSEMBLY WITH PULLEY INFO

54. INSTALL GENERATOR ASSEMBLY INFO

55. INSTALL V-RIBBED BELT INFO

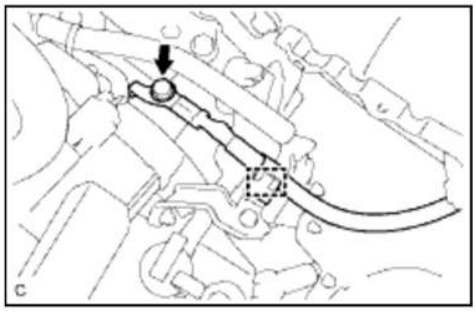
56. INSTALL THROTTLE BODY ASSEMBLY INFO

57. INSTALL WIRE HARNESS



(a) Install the ground cable to the transmission with the bolt and clamp (for Manual Transaxle).

Torque: 13 N·m (130 kgf·cm, 10ft·lbf)



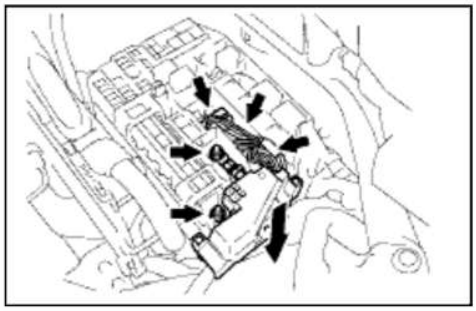
(b) Install the earth wire to the transmission with the bolt and clamp (for Automatic Transaxle).

Torque: 26 N·m (260 kgf·cm, 19ft·lbf)

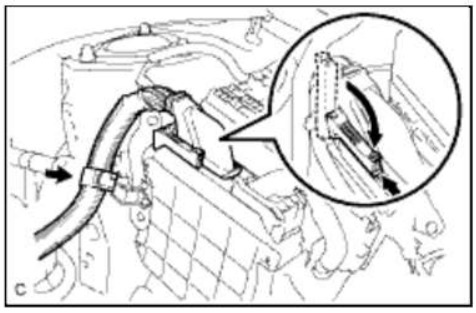
(c) Install the wire harness with the 2 nuts.

Torque: 8.4 N·m (85 kgf·cm, 74in·lbf)

cardiagn.com

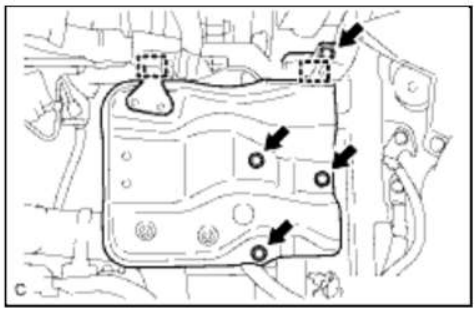


(d) Connect the 3 connectors



(e) Connect the connector to the ECM with the clamp and lock lever.

58. INSTALL BATTERY CARRIER



(a) Install the battery carrier with the 4 bolts.

Torque: 13 N·m (133 kgf·cm, 10ft·lbf)

(b) Connect the 2 wire harness clamps.

59. INSTALL BATTERY

(a) Install the battery tray, battery and battery insulator.

(b) Install the battery clamp with the bolt and nut.

Bolt - Torque: 6.5 N·m (66 kgf·cm, 58in·lbf)
Nut - Torque: 3.5 N·m (36 kgf·cm, 31in·lbf)

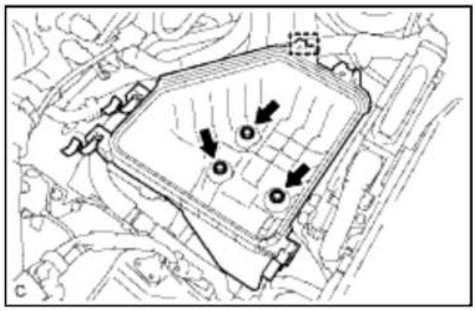
cardiagn.com



(c) Connect the battery cables.

Torque: 5.4 N·m (55 kgf·cm, 48in·lbf)

60. INSTALL AIR CLEANER CASE



(a) Install the air cleaner case with the 3 bolts.

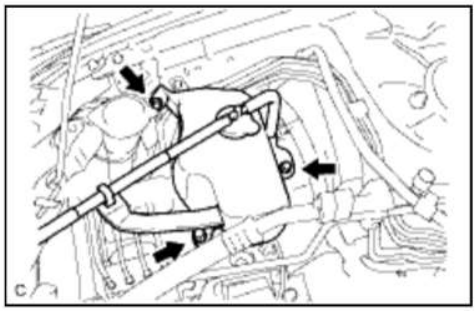
Torque: 7.0 N·m (71 kgf·cm, 62in·lbf)

(b) Install the engine wire clamp to the air cleaner case.

(c) Install the air cleaner filter element.

61. INSTALL AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE INFO

62. INSTALL RADIATOR RESERVE TANK ASSEMBLY



(a) Install the radiator reserve tank assembly with the 3 bolts.

Torque: 7.0 N·m (71 kgf·cm, 62in·lbf)

63. ADD MANUAL TRANSAXLE OIL (for Manual Transaxle)

HINT: INFO **for E351.**

64. INSPECT MANUAL TRANSAXLE OIL (for Manual Transaxle)

cardiagn.com

HINT: INFO for E351.

65. ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)

HINT: INFO for U250E.

66. INSPECT AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)

HINT: INFO for U250E.

67. INSPECT SHIFT LEVER POSITION (for Automatic Transaxle)

HINT: INFO for U250E.

68. ADJUST SHIFT LEVER POSITION (for Automatic Transaxle)

HINT: INFO for U250E.

69. ADD ENGINE COOLANT INFO

70. WARM UP ENGINE

71. FILL BRAKE FLUID RESERVOIR (for Manual Transaxle)

HINT: INFO for E351.

72. BLEED CLUTCH LINE (for Manual Transaxle)

HINT: INFO for E351.

73. INSPECT FLUID LEVEL (for Manual Transaxle)

HINT: INFO for E351.

74. INSPECT FOR FUEL LEAK INFO

75. INSPECT FOR COOLANT LEAK INFO

76. INSPECT FOR OIL LEAK

77. INSPECT FOR EXHAUST GAS LEAK

78. INSTALL ENGINE UNDER COVER LH

79. INSTALL ENGINE UNDER COVER RH

80. INSTALL FRONT WHEELS

Torque: 103 N·m (1050 kgf·cm, 76ft·lbf)

81. INSPECT IGNITION TIMING INFO

82. INSPECT ENGINE IDLING SPEED INFO

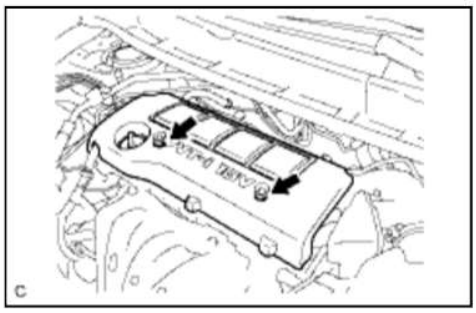
83. INSPECT CO/HC INFO

84. ADJUST FRONT WHEEL ALIGNMENT

HINT: INFO .

cardiagn.com

85. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY



(a) Install the No. 1 engine cover sub-assembly with the 2 nuts.

86. CHECK ABS SPEED SENSOR SIGNAL

HINT:

- INFO for ABS.
- INFO for VSC.

cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002ZLZ00PX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE: ON-VEHICLE INSPECTION (2010 Corolla)		

ON-VEHICLE INSPECTION

1. INSPECT ENGINE COOLANT

HINT: INFO .

2. INSPECT ENGINE OIL

HINT: INFO .

3. INSPECT BATTERY

HINT: INFO .

4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Remove the air cleaner cap.

(b) Remove the air filter element.

(c) Visually check that the air filter is not excessively damaged or oily. If necessary, replace the air filter.

5. INSPECT SPARK PLUG INFO

6. INSPECT V-RIBBED BELT INFO

7. INSPECT VALVE AND ADJUSTER NOISE

(a) Rev up the engine several times. Check that the engine does not emit unusual noises. If unusual noises occur, warm up the engine and idle it for over 30 minutes. Then perform the inspection above again. If any defects or problems are found during the inspection above, perform a lash adjuster inspection INFO .

8. INSPECT IGNITION TIMING

(a) When using the Techstream:

(1) Warm up and stop the engine.

(2) Connect the Techstream to the DLC3.

(3) Turn the ignition switch to ON.

(4) Enter Data List Mode on the Techstream.

HINT:

Refer to the Techstream operator's manual for further details.

(5) Inspect the ignition timing at idle.

Ignition timing:
8 to 12 degrees BTDC

NOTICE:

- Turn all the electrical systems and the A/C off.

cardiagn.com

- Inspect the ignition timing with the cooling fans off.
- When checking the ignition timing, shift the transmission to the neutral position.

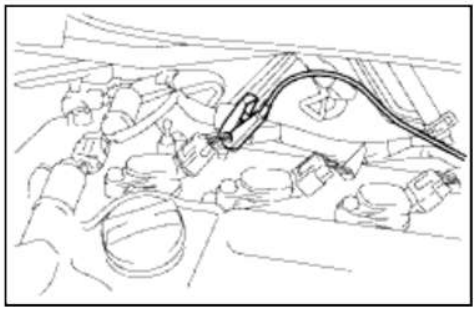
(6) Enter the following menus : TC (TE1) / OFF.

(7) Turn the ignition switch off.

(8) Disconnect the Techstream from the DLC3.

(b) When not using the Techstream:

(1) Remove the No. 2 cylinder head cover INFO .



(2) Connect the tester probe of a timing light to the wire of the ignition connector for No. 1 cylinder.

NOTICE:

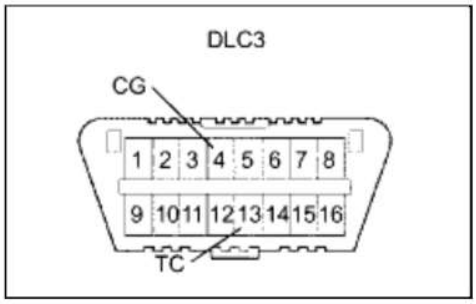
Use a timing light that detects the first signal.

(3) Warm up and stop the engine.

(4) Connect the clip of the timing light to the wire harness.

NOTICE:

Use a timing light that detects the primary signal.



(5) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST: 09843-18040

NOTICE:

Examine the terminal numbers before connecting them.
Connecting the wrong terminals can damage the engine.

(6) Inspect the ignition timing at idle.

Ignition timing:
8 to 12 degrees BTDC

NOTICE:

- Turn all the electrical systems and the A/C off.
- Inspect the ignition timing with the cooling fans off.
- When checking the ignition timing, shift the transmission to either neutral or park.

(7) Disconnect SST from terminals 13 (TC) and 4 (CG) of the DLC3.

(8) Turn the ignition switch off.

(9) Remove the timing light.

cardiagn.com

(10) Install the No. 2 cylinder head cover INFO .

9. INSPECT ENGINE IDLE SPEED

(a) Warm up and stop the engine.

(b) Connect the Techstream to the DLC3.

(c) Turn the ignition switch to ON.

(d) Enter Data List Mode on the Techstream.

HINT:

Refer to the Techstream operator's manual for further details.

(e) Inspect the engine idle speed.

Idle speed:
600 to 700 rpm

NOTICE:

- Turn all the electrical systems and the A/C off.
- Inspect the idle speed with the cooling fans off.
- When checking the idle speed, shift the transmission to either neutral or park.

(f) Turn the ignition switch off.

(g) Disconnect the Techstream from the DLC3.

10. INSPECT COMPRESSION

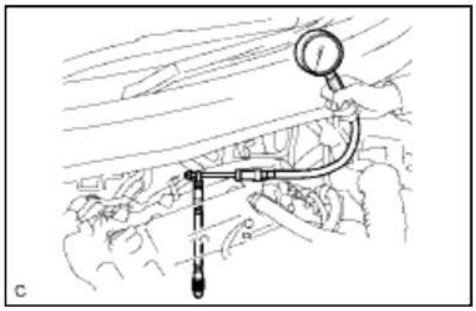
(a) Warm up and stop the engine.

(b) Remove the No. 2 cylinder head cover INFO .

(c) Remove the 4 ignition coils.

(d) Remove the 4 spark plugs INFO .

(e) Disconnect the 4 fuel injector connectors.



(f) Inspect the cylinder compression pressure.

(1) Insert a compression gauge into the spark plug hole.

(2) Fully open the throttle.

(3) While cranking the engine, measure the compression pressure.

Compression:
1373 kPa (14.0 kgf/cm^2, 199 psi)
Minimum pressure:
1079 kPa (11.0 kgf/cm^2, 157 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14.2 psi) or less

NOTICE:

- Use a fully-charged battery so the engine speed can be increased to 250 rpm or more.

cardiagn.com

- Inspect the other cylinders in the same way.
- Measure the compression in as short time as possible.

(4) If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole, then inspect it again.

HINT:

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If the pressure stays low, the valve may be stuck or seated improperly, or there may be leakage from the gasket.

(g) Connect the 4 fuel injector connectors.

(h) Install the 4 spark plugs INFO .

(i) Install the 4 ignition coils.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(j) Install the No. 2 cylinder head cover INFO .

11. INSPECT CO/HC

HINT:

This check determines whether or not the idle CO/HC complies with local regulations.

(a) Start the engine.

(b) Run the engine at 2500 rpm for approximately 180 seconds.

(c) Insert the CO/HC meter testing probe at least 40 cm (1.3 ft.) into the tailpipe while idling.

(d) Check the CO/HC concentration during idle and when the engine is running at 2500 rpm.

HINT:

When doing the 2 mode (with the engine idling/ running at 2500 rpm) test, the measuring procedures are determined by applicable local regulations.

If the CO/HC concentration does not comply with local regulations, troubleshoot in the order given below.

(1) Check the A/F sensor and heated oxygen sensor operation.

(2) See the table below for possible causes, then inspect the applicable parts and repair them if necessary.

CO	HC	PROBLEM	POSSIBLE CAUSE
Normal	High	Rough idle	1. Faulty ignition: o Incorrect timing o Fouled, shorted or improperly gapped plugs

cardiagn.com

CO	HC	PROBLEM	POSSIBLE CAUSE
			2. Incorrect valve clearance 3. Leakage from intake and exhaust valves 4. Leakage from cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: o PCV hoses o Intake manifold o Throttle body o Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air cleaner filter element 2. Plugged PCV valve 3. Faulty EFI system: o Faulty pressure regulator o Faulty engine coolant temperature sensor o Faulty mass air flow meter o Faulty ECM o Faulty injectors o Throttle body

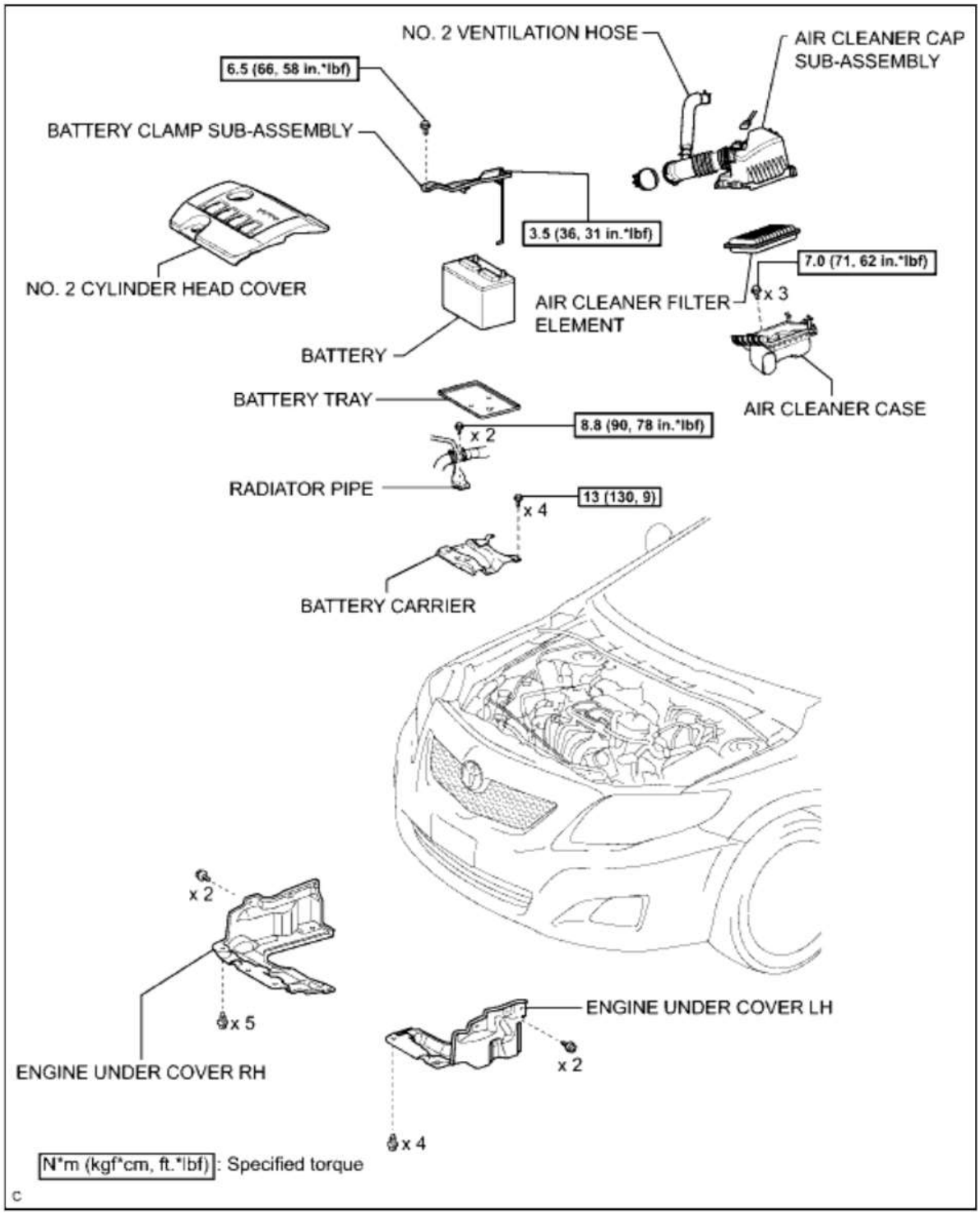


cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002WH500ZX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE ASSEMBLY: COMPONENTS (2010 Corolla)		

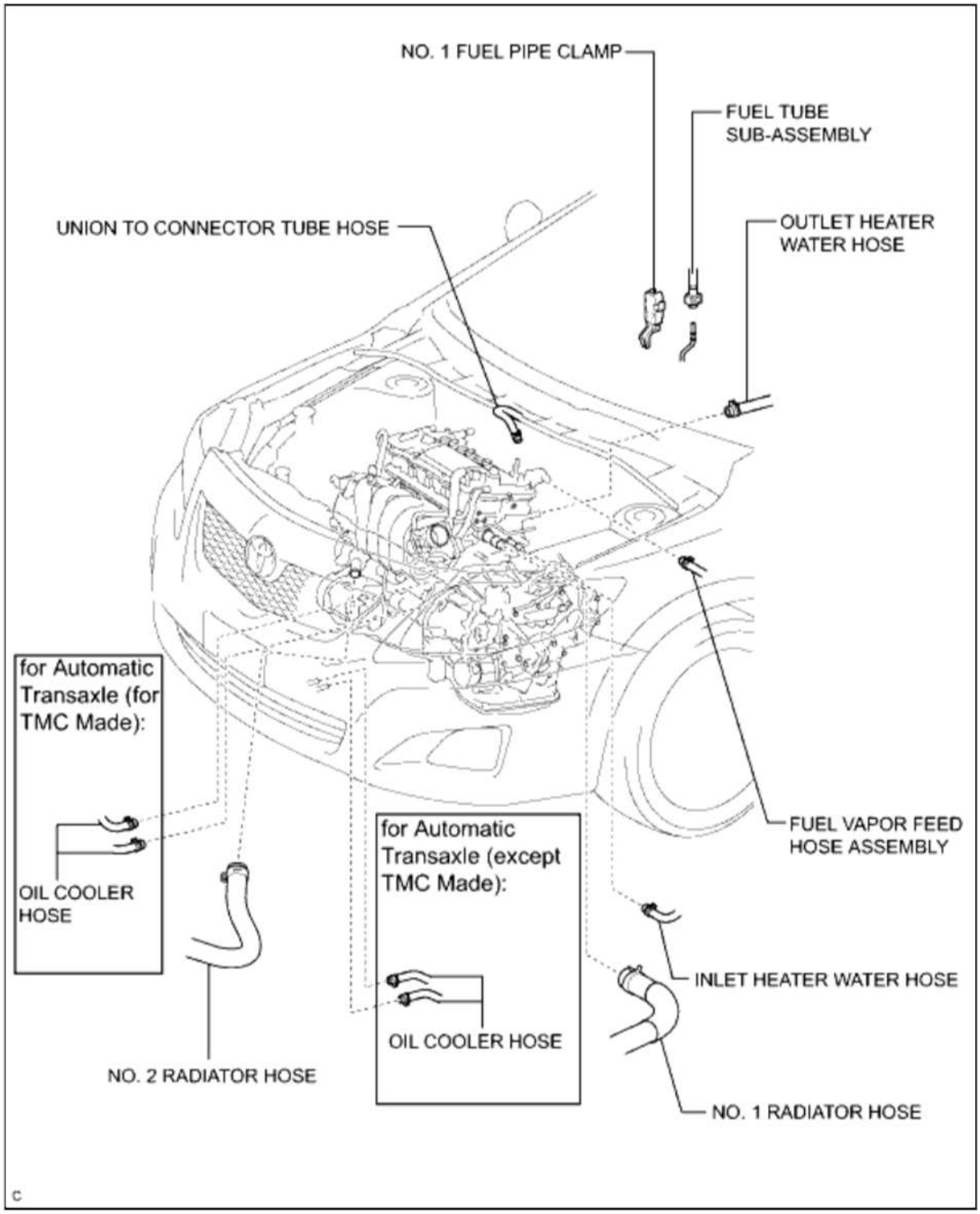
COMPONENTS

ILLUSTRATION



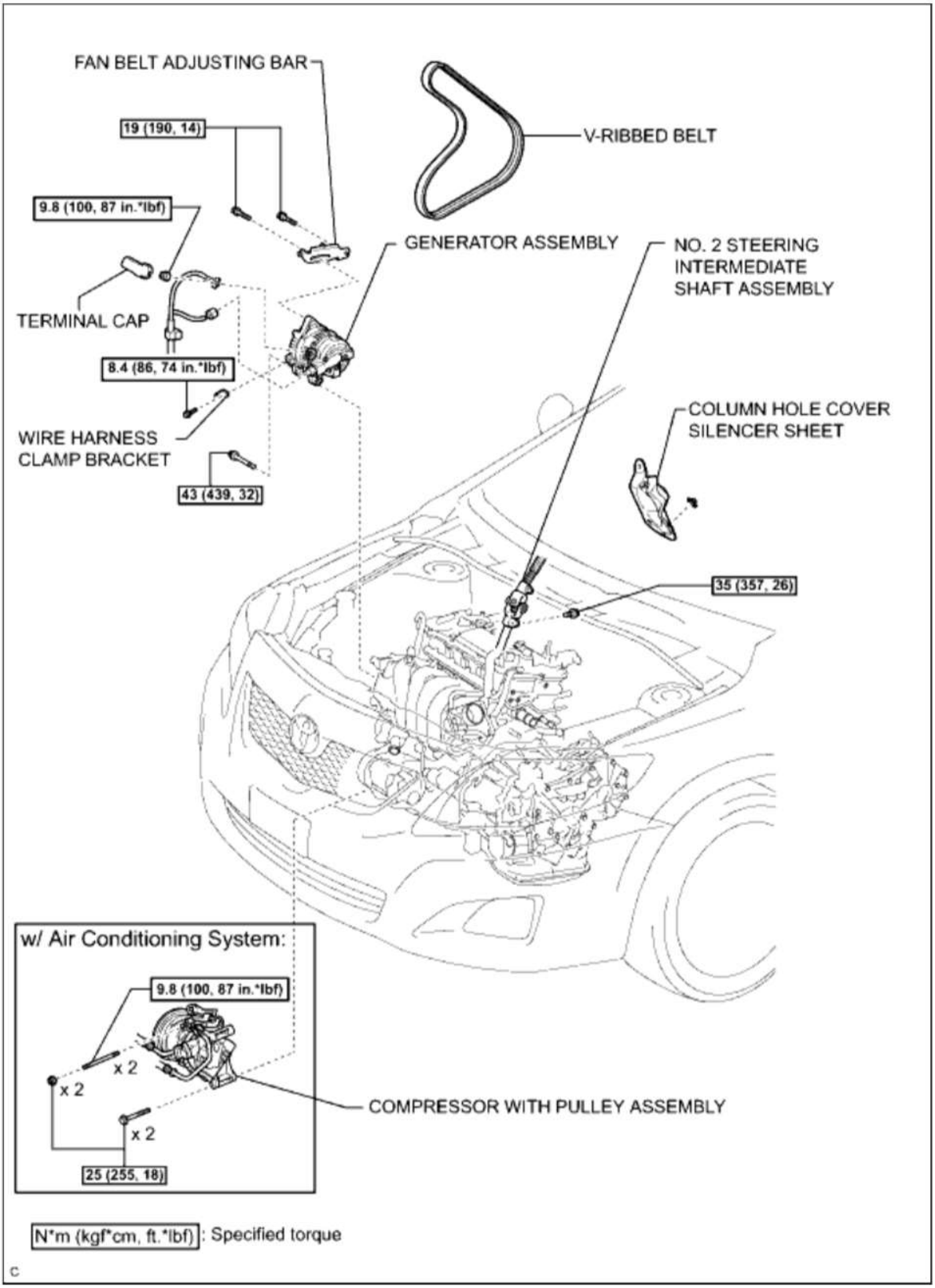
cardiagn.com

ILLUSTRATION



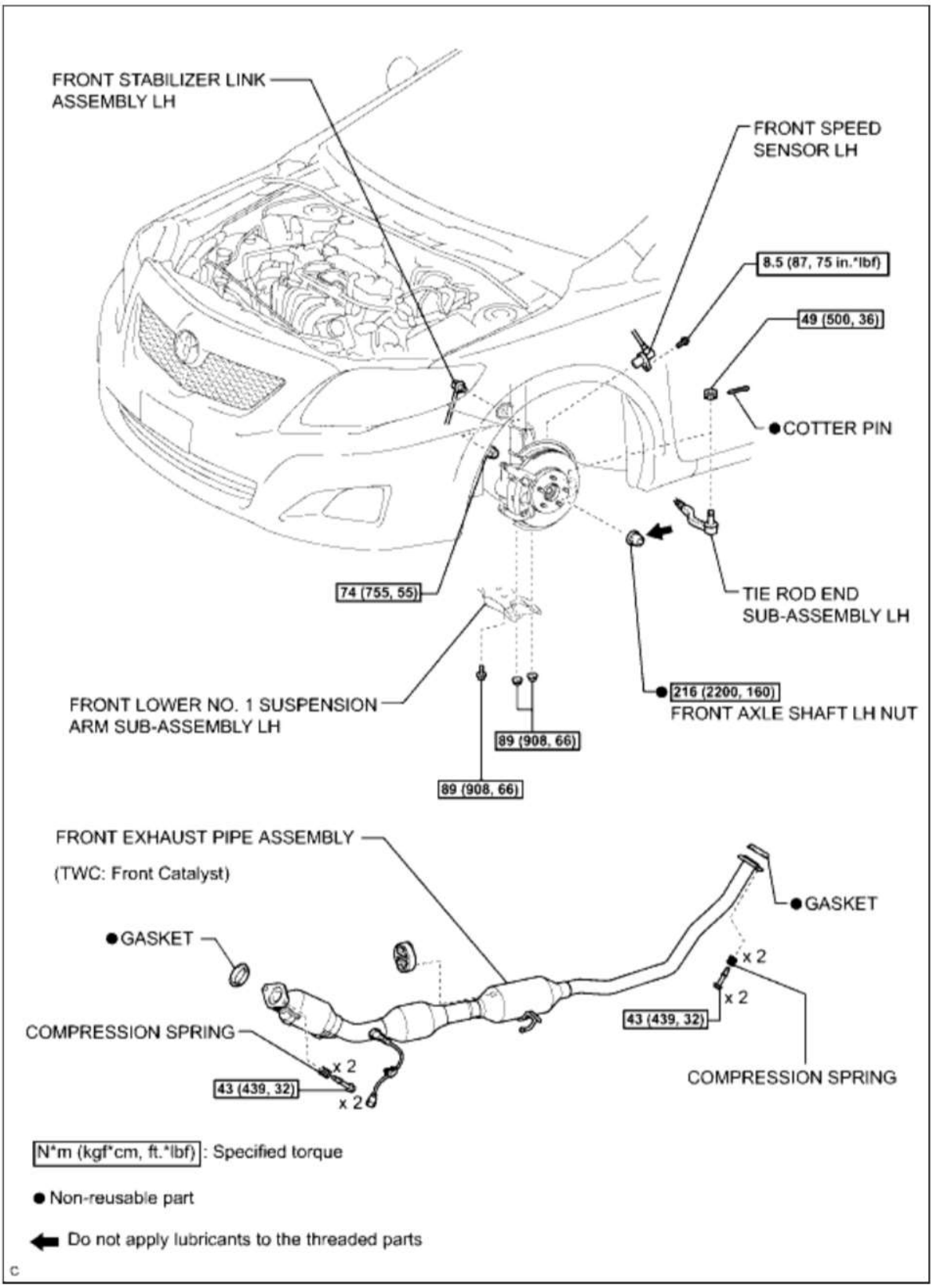
ILLUSTRATION

cardiagn.com



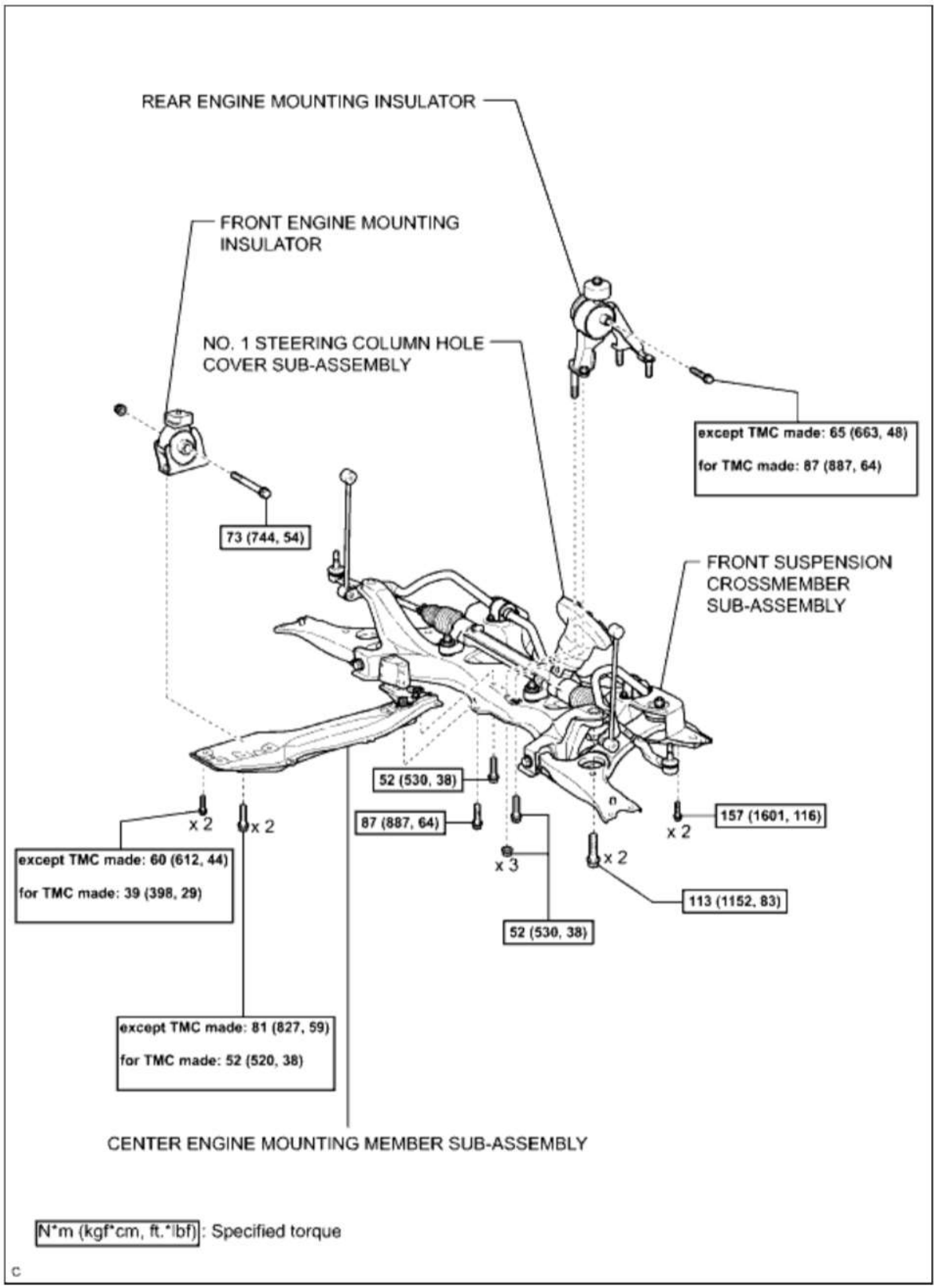
ILLUSTRATION

cardiagn.com



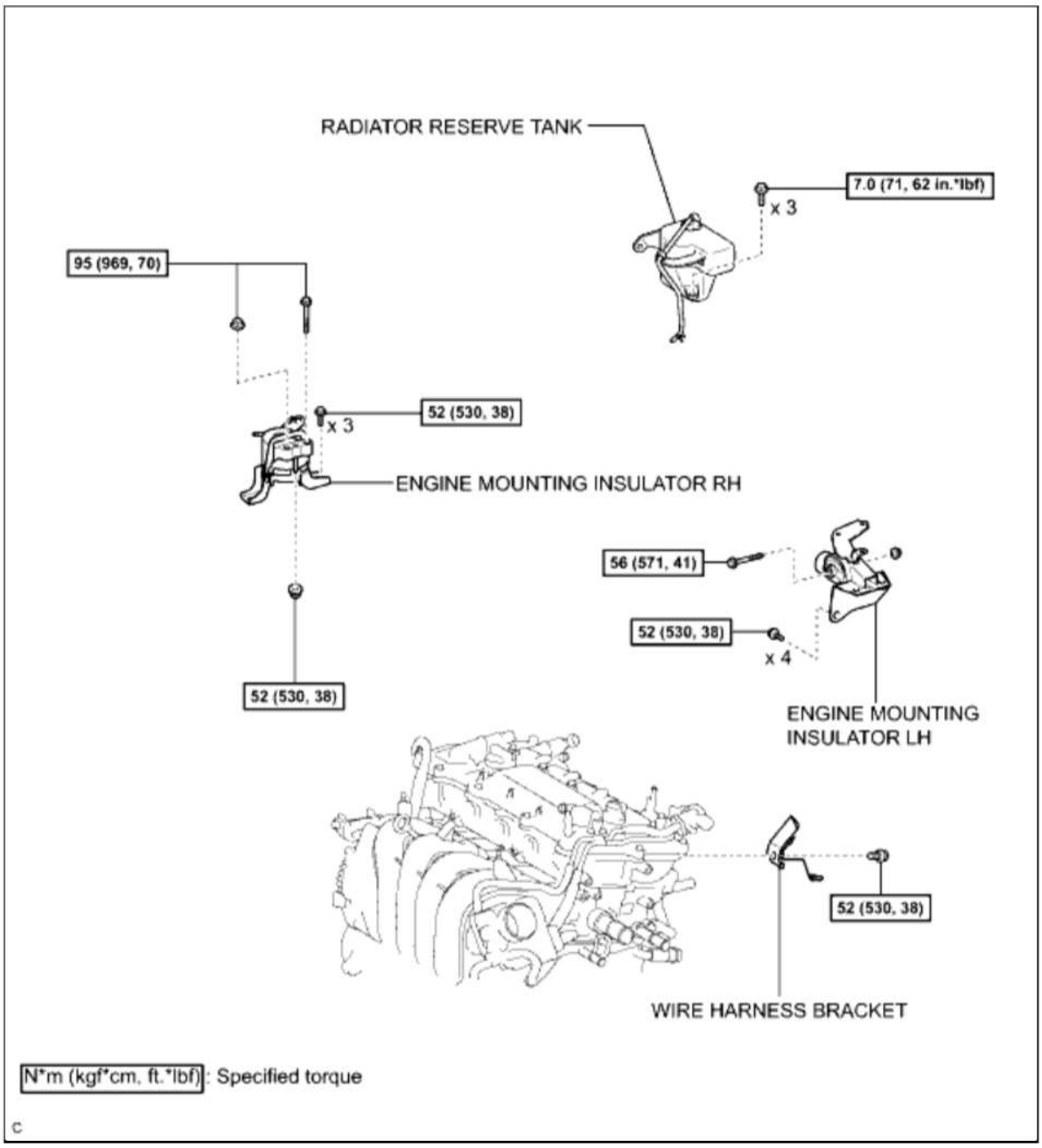
ILLUSTRATION

cardiagn.com



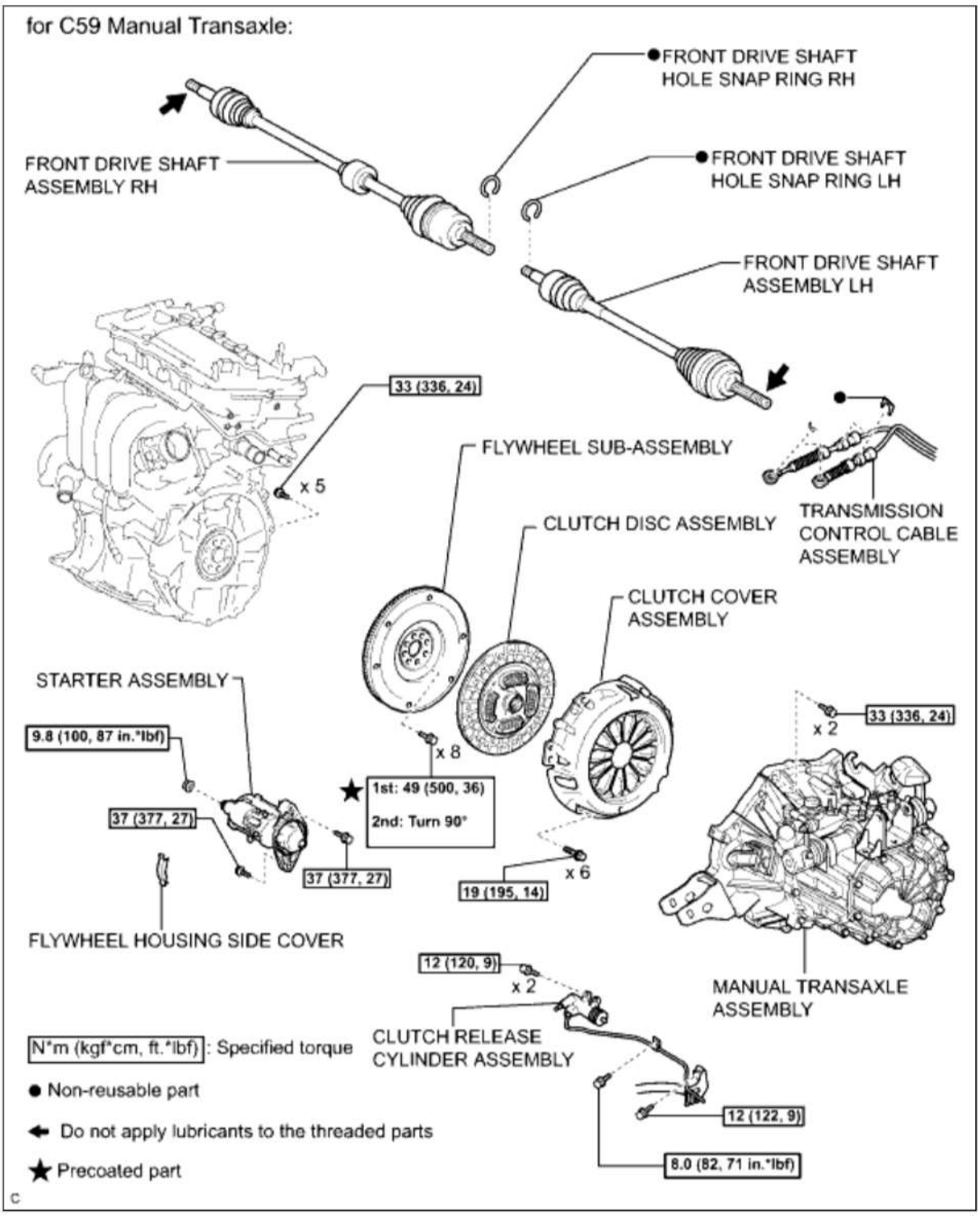
ILLUSTRATION

cardiagn.com



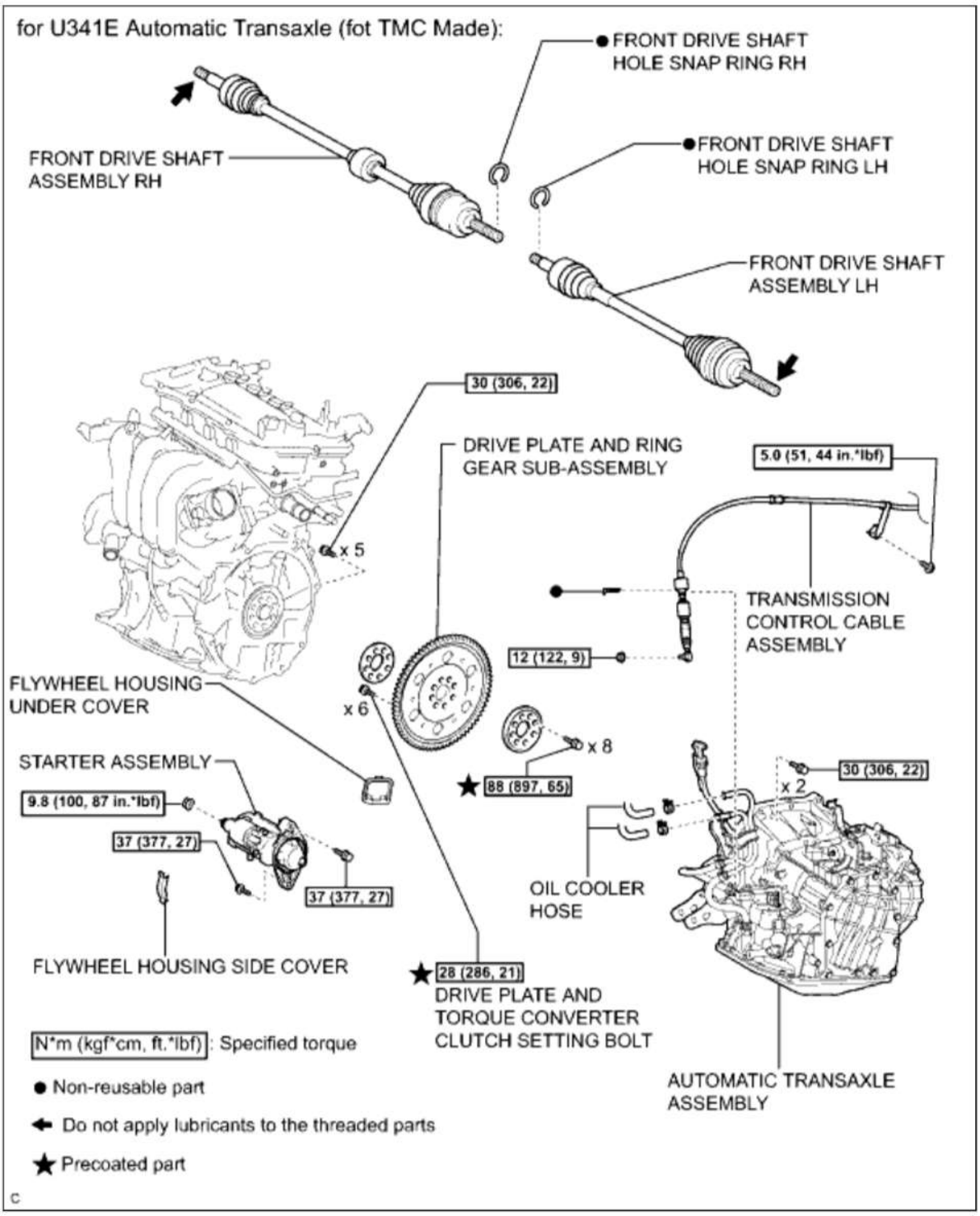
ILLUSTRATION

cardiagn.com



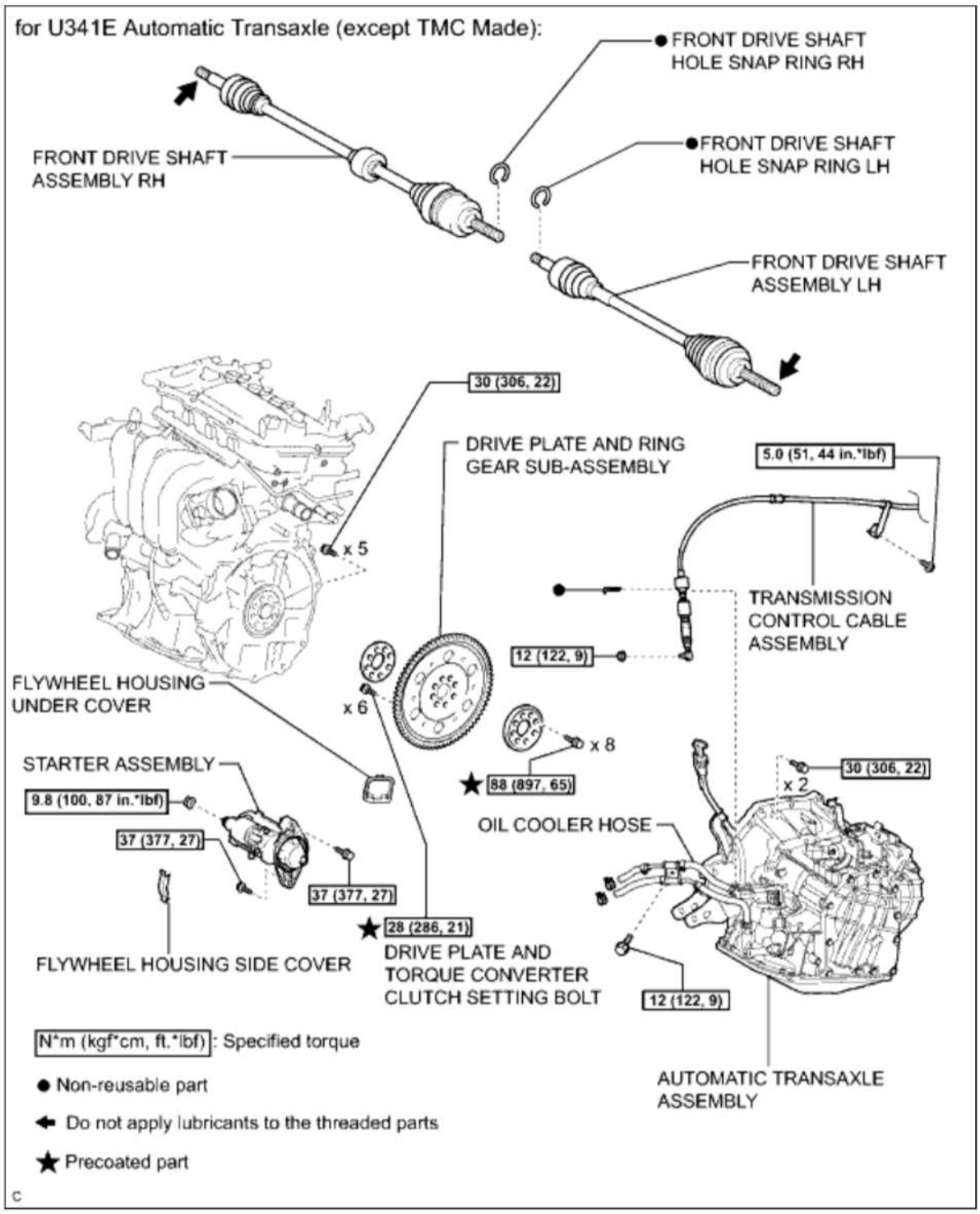
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002WH6019X
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE ASSEMBLY: REMOVAL (2010 Corolla)		

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE

HINT: INFO .

2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

3. REMOVE FRONT WHEEL

4. REMOVE ENGINE UNDER COVER LH

5. REMOVE ENGINE UNDER COVER RH

6. DRAIN ENGINE COOLANT INFO

7. DRAIN ENGINE OIL INFO

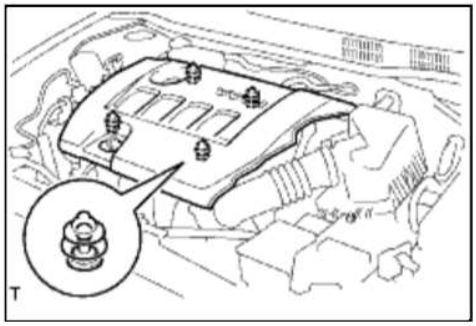
8. DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle)

HINT: INFO **for C59.**

9. DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)

HINT: INFO **for U341E.**

10. REMOVE NO. 2 CYLINDER HEAD COVER



(a) Hold the rear of the cover and raise it to disengage the 2 clips on the rear of the cover. Continue to raise the cover to disengage the 2 clips on the front of the cover to remove the cover.

NOTICE:

Attempting to disengage both front and rear clips at the same time may cause the cover to break.

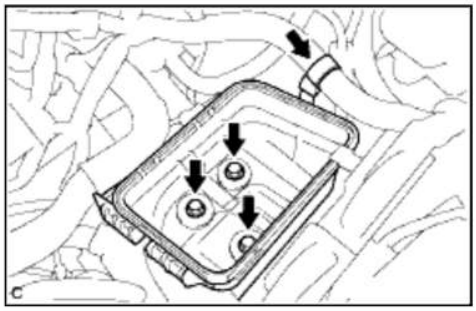
11. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

12. REMOVE AIR CLEANER CASE

(a) Separate the air cleaner filter element from the air cleaner.

(b) Disconnect the engine wire harness clamp from air cleaner case.

cardiagn.com



(c) Remove the 3 bolts and the air cleaner case.

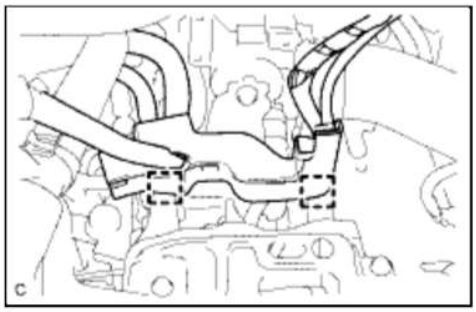
13. REMOVE BATTERY

(a) Disconnect the battery cables.

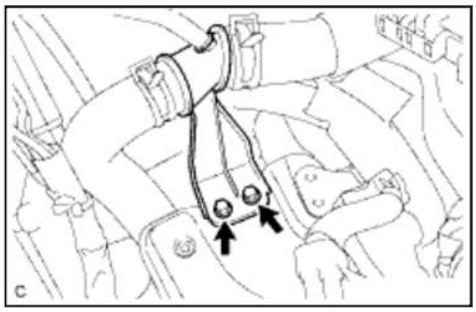
(b) Remove the bolt and loosen the nut.

(c) Remove the battery.

14. REMOVE BATTERY CARRIER



(a) Separate the 2 wire harness clamps from the battery carrier.



(b) Remove the 2 bolts.

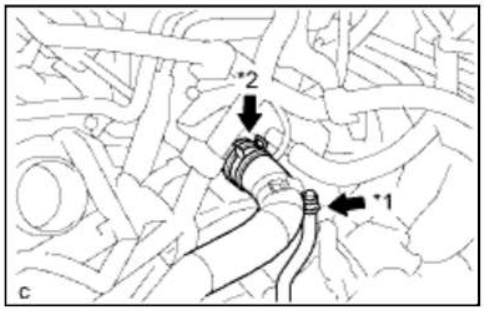
(c) Separate the radiator pipe from the battery carrier.

(d) Remove the 4 bolts and battery carrier.

15. DISCONNECT NO. 1 RADIATOR HOSE

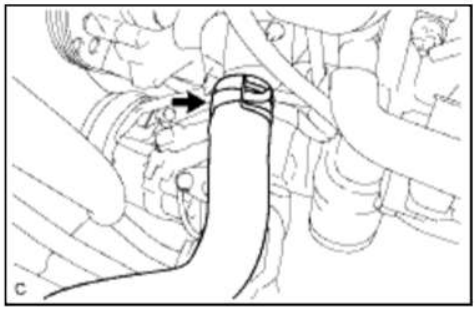
(a) Disengage the clamp*1.

cardiagn.com



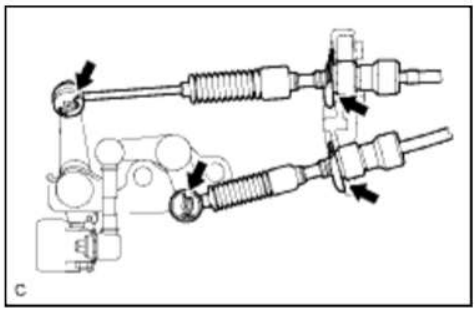
(b) Disconnect the No. 1 radiator hose from the cylinder head with the clamp*2.

16. DISCONNECT NO. 2 RADIATOR HOSE



(a) Disconnect the No. 2 radiator hose from the water inlet hose.

17. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)



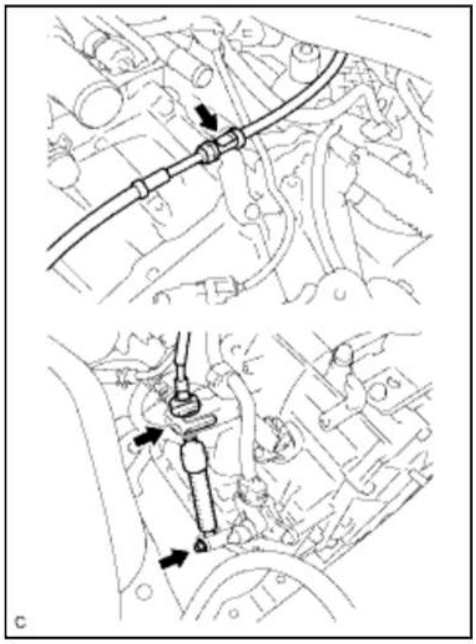
(a) Remove the 2 clips and disconnect the 2 cables from the transaxle.

(b) Remove the 2 clips and disconnect the 2 cables from the control cable bracket.

18. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)

(a) Disconnect the control cable from the control cable support.

cardiagn.com

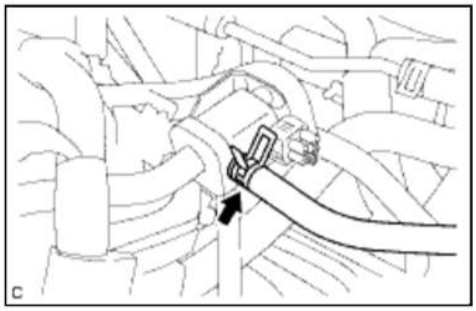


(b) Remove the nut and disconnect the control cable from the control shaft lever.

(c) Remove the clip and disconnect the control cable from the control cable bracket.

(d) Remove the bolt and disconnect the clamp of the control cable.

19. DISCONNECT FUEL VAPOR FEED HOSE ASSEMBLY

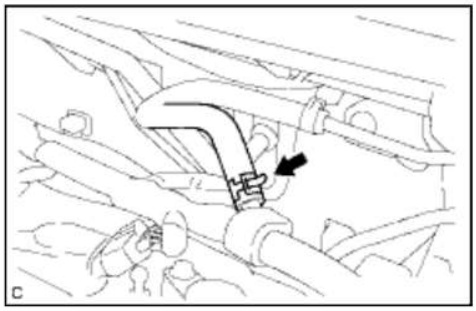


(a) Disconnect the fuel vapor feed hose.

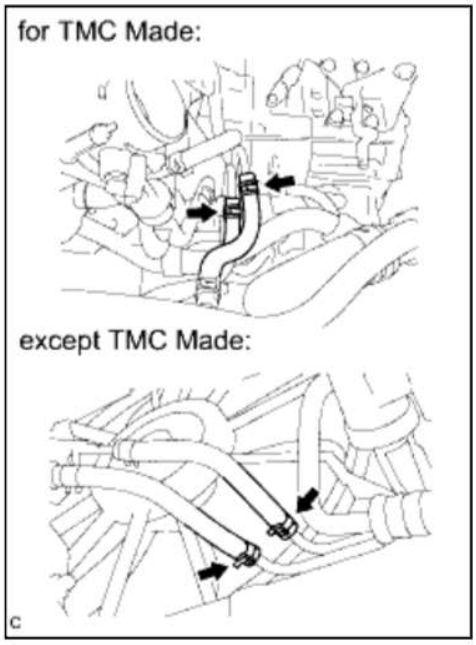
20. DISCONNECT UNION TO CONNECTOR TUBE HOSE

(a) Disconnect the union to connector tube hose.

cardiagn.com

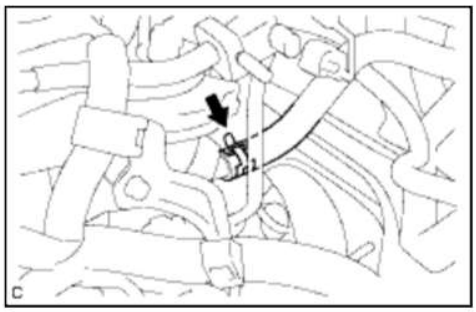


21. DISCONNECT OIL COOLER HOSE (for Automatic Transaxle)



(a) Disconnect the 2 oil cooler hoses from the oil cooler tube.

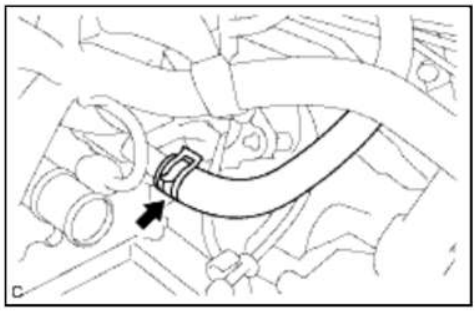
22. DISCONNECT OUTLET HEATER WATER HOSE



(a) Disconnect the outlet heater water hose from the engine.

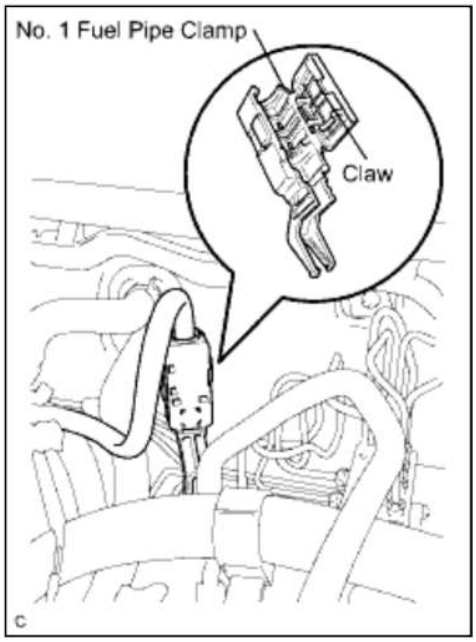
23. DISCONNECT INLET HEATER WATER HOSE

cardiagn.com



(a) Disconnect the inlet heater water hose from the engine.

24. DISCONNECT FUEL TUBE SUB-ASSEMBLY



(a) Release the claw and remove the No. 1 fuel pipe clamp.

(b) Pinch the retainer as illustrated, then pull the fuel tube connector out of the pipe.

NOTICE

- Remove any dirt and foreign matter from the fuel tube connector before performing this work.
- Do not allow any scratches or foreign matter on the parts when disconnecting, as the fuel tube connector has the O-rings that seal the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, kink or twist the nylon tube.
- Protect the disconnected parts by covering them with vinyl bags after disconnecting the fuel tube.
- If the fuel tube connector and pipe are stuck, push and pull to release them.

25. REMOVE V-RIBBED BELT

26. REMOVE GENERATOR ASSEMBLY

27. REMOVE FAN BELT ADJUSTING BAR



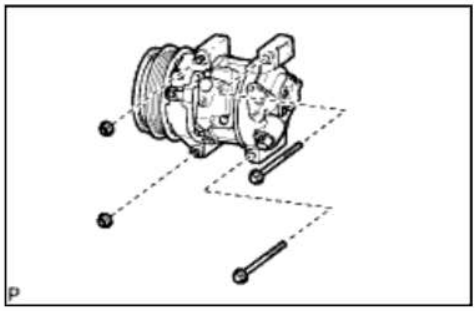
(a) Remove the bolt and fan belt adjusting bar.

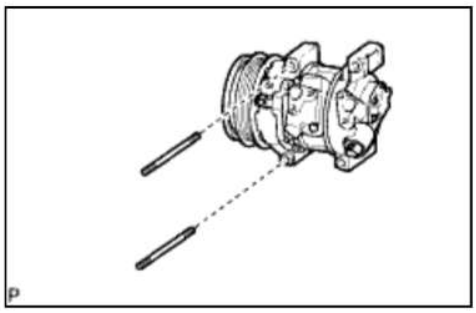
28. SEPARATE COMPRESSOR WITH PULLEY ASSEMBLY (w/ Air Conditioning System)

(a) Disconnect the connector.

(b) Remove the 2 bolts and 2 nuts.

cardiagn.com



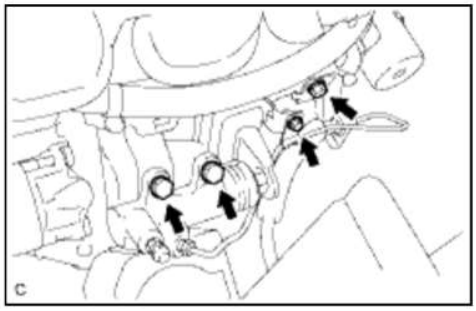


(c) Using a "TORX" socket wrench (E8), remove the 2 stud bolts and compressor with pulley assembly.

HINT:

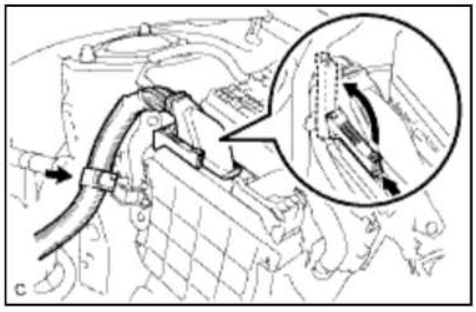
Secure the compressor and hoses off to the side instead of discharging the A/C system.

29. SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)



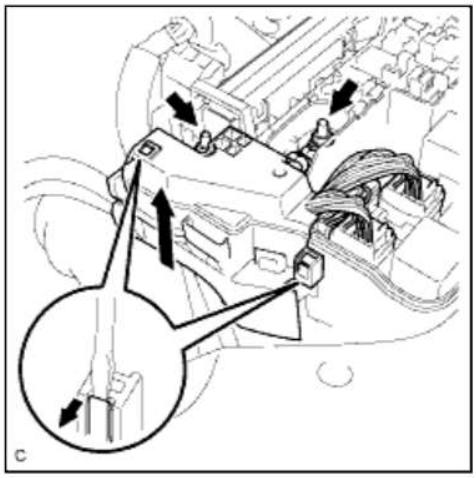
(a) Remove the 4 bolts and clutch tube bracket, and separate the clutch release cylinder assembly.

30. DISCONNECT WIRE HARNESS



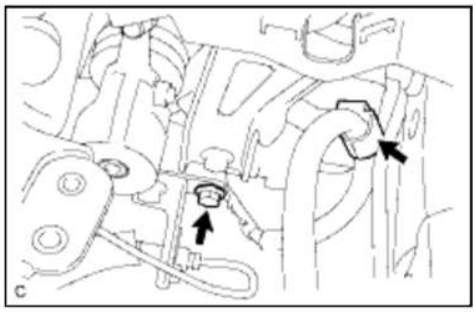
(a) Pull up the lever to disconnect the ECM connector and release the clamp.

cardiagn.com

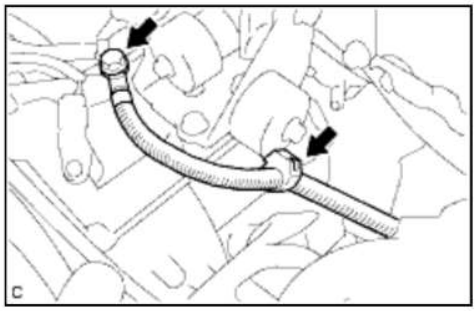


(b) Remove the 2 nuts.

(c) Remove the 3 connectors and 2 clamps from the engine room junction block and disconnect the wire harness.



(d) Remove the bolt and clamp (for Manual Transaxle).



(e) Remove the bolt and clamp (for Automatic Transaxle).

(f) Disconnect all the wire harnesses and connectors.

Make sure that no wire harness is connected between the body and engine.

31. SECURE STEERING WHEEL INFO

32. REMOVE COLUMN HOLE COVER SILENCER SHEET INFO

33. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

cardiagn.com

34. DISCONNECT NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

35. REMOVE FRONT EXHAUST PIPE ASSEMBLY INFO

36. REMOVE FRONT AXLE SHAFT LH NUT INFO

37. REMOVE FRONT AXLE SHAFT RH NUT

HINT:

Perform the same procedure for the LH side.

38. DISCONNECT FRONT SPEED SENSOR LH INFO

39. DISCONNECT FRONT SPEED SENSOR RH

HINT:

Perform the same procedure for the LH side.

40. SEPARATE TIE ROD END SUB-ASSEMBLY LH INFO

41. SEPARATE TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

42. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH INFO

43. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

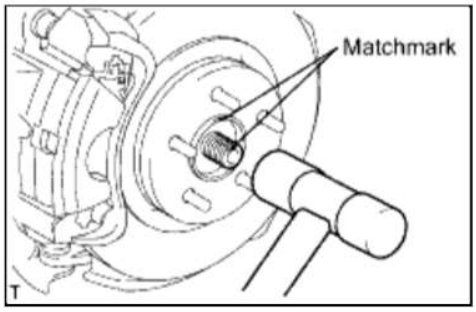
44. SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH INFO

45. SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

46. SEPARATE STEERING KNUCKLE WITH AXLE HUB LH



(a) Put matchmarks on the drive shaft and axle hub.

NOTICE:

Do not punch the marks.

cardiagn.com

(b) Using a plastic-faced hammer, disconnect the front axle assembly LH.

NOTICE:

- Be careful not to damage the boot and speed sensor rotor.
- Do not excessively push out the drive shaft from the axle assembly.

47. SEPARATE STEERING KNUCKLE WITH AXLE HUB RH

HINT:

Perform the same procedure for the LH side.

48. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH INFO

49. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH INFO

50. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING LH INFO

51. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING RH INFO

52. REMOVE FLYWHEEL HOUSING UNDER COVER (for Automatic Transaxle) INFO

53. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle) INFO

54. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

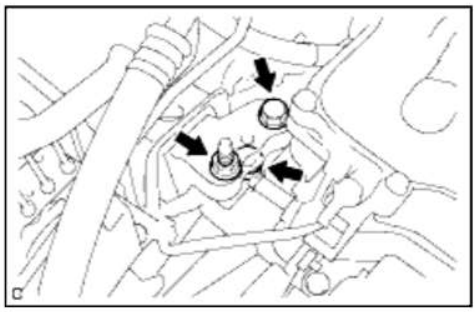
55. REMOVE CENTER ENGINE MOUNTING MEMBER SUB-ASSEMBLY INFO

56. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine lifter.

NOTICE:

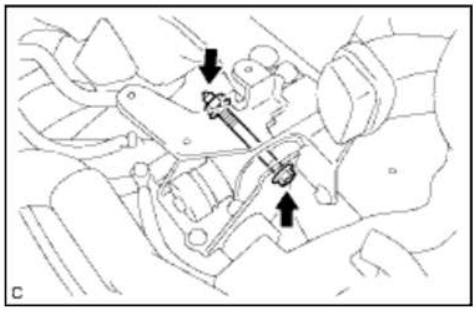
Place the engine on wooden blocks or equivalent so that the engine is level.



(b) Remove the bolt and 2 nuts, and separate the engine mounting insulator RH.

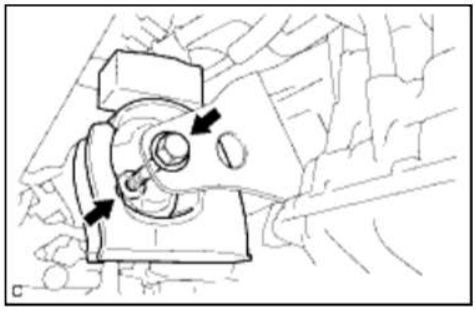
(c) Remove the through bolt and nut, and separate the engine mounting insulator LH.

cardiagn.com



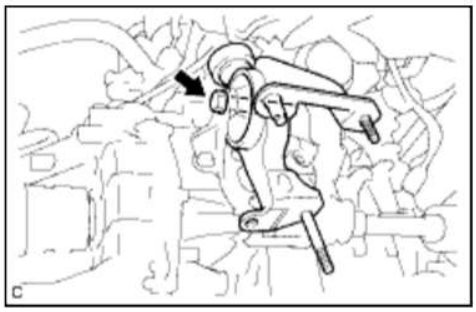
(d) Carefully remove the engine with transaxle from the vehicle.

57. REMOVE FRONT ENGINE MOUNTING INSULATOR



(a) Remove the bolt, nut and front engine mounting insulator.

58. REMOVE REAR ENGINE MOUNTING INSULATOR



(a) Remove the through bolt and rear engine mounting insulator.

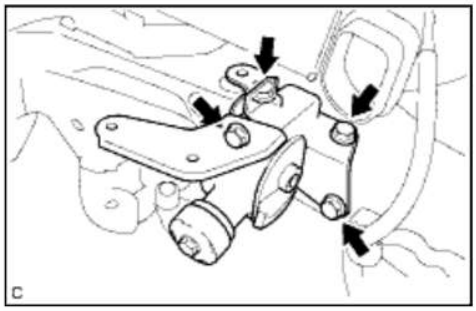
59. REMOVE ENGINE MOUNTING INSULATOR LH

(a) Remove the 4 bolts and engine mounting insulator LH.

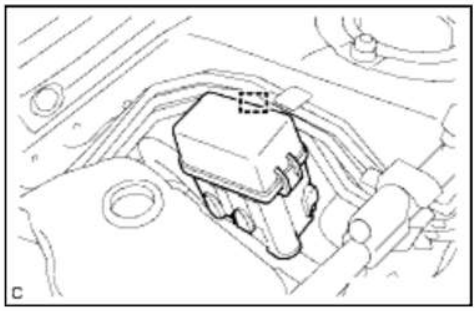
HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

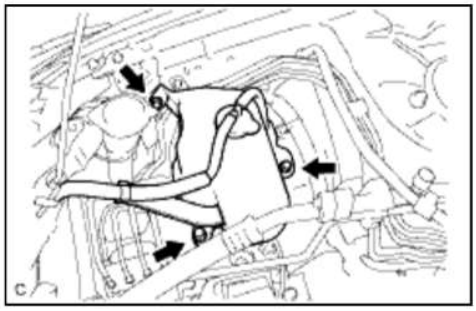
cardiagn.com



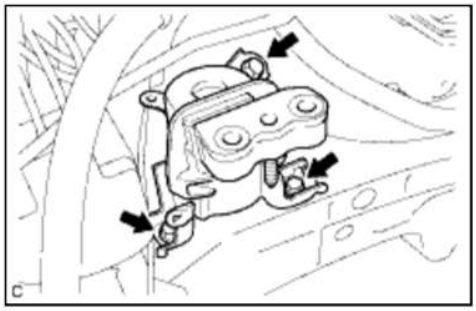
60. REMOVE ENGINE MOUNTING INSULATOR RH



(a) Disconnect the clamp, and release the relay block assembly.



(b) Remove the 3 bolts and radiator reserve tank.



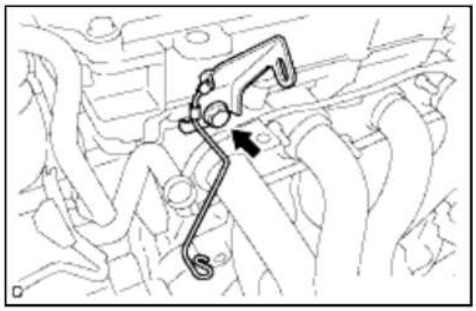
(c) Remove the 3 bolts and engine mounting insulator RH.

HINT:

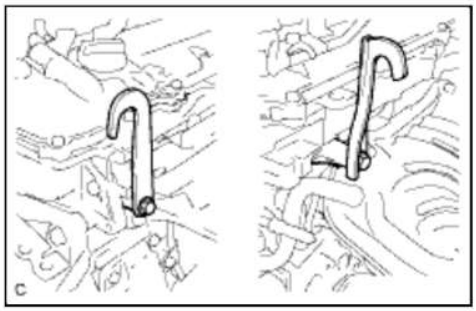
Perform this procedure only when replacement of the engine mounting insulator is necessary.

61. INSTALL ENGINE HANGER

cardiagn.com



(a) Remove the bolt and wire harness bracket.



(b) Install the 2 engine hangers with the 2 bolts.

Torque: 43 N·m (439 kgf·cm, 32ft·lbf)

PART NAME	PART NO.
No. 1 engine hanger	12281-37021
No. 2 engine hanger	12282-37011
Bolt	91552-81050

62. REMOVE FLYWHEEL HOUSING SIDE COVER

63. REMOVE STARTER ASSEMBLY INFO

64. REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for C59.**

65. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U341E.**

66. REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle) INFO

67. REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle) INFO

68. REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) INFO

69. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) INFO

70. REMOVE ENGINE WIRE

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002WH4019X
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE ASSEMBLY: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL ENGINE WIRE

2. INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) INFO

3. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) INFO

4. INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle) INFO

5. INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle) INFO

6. INSPECT AND ADJUST CLUTCH COVER ASSEMBLY (for Manual Transaxle) INFO

7. INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for C59.**

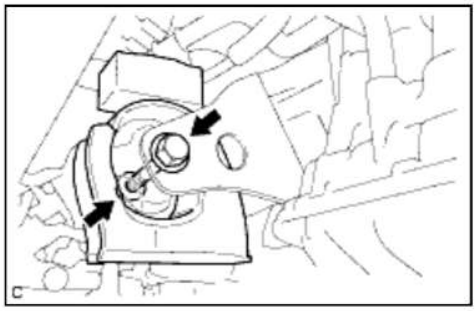
8. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U341E.**

9. INSTALL STARTER ASSEMBLY INFO

10. INSTALL FLYWHEEL HOUSING SIDE COVER

11. INSTALL FRONT ENGINE MOUNTING INSULATOR



(a) Install the front engine mounting insulator with the nut and bolt.

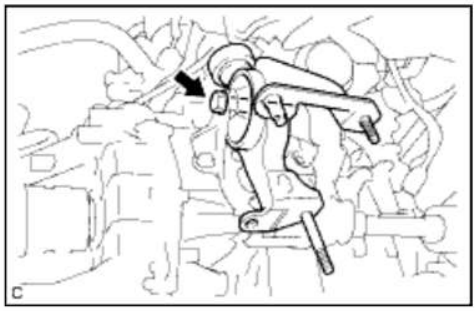
Torque: 73 N·m (744 kgf·cm, 54ft·lbf)

12. INSTALL REAR ENGINE MOUNTING INSULATOR

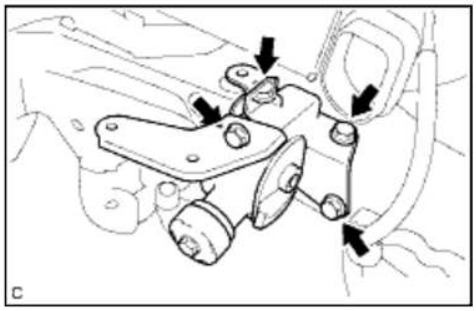
(a) Install the rear engine mounting insulator to the engine mounting bracket with the through bolt.

except TMC made - Torque: 65 N·m (663 kgf·cm, 48ft·lbf)
for TMC made - Torque: 87 N·m (887 kgf·cm, 64ft·lbf)

cardiagn.com



13. INSTALL ENGINE MOUNTING INSULATOR LH



(a) Temporarily install the engine mounting insulator LH with the 4 bolts.

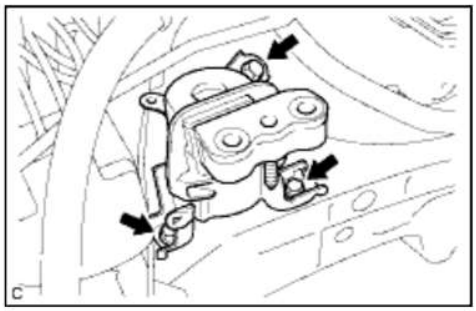
(b) Tighten the 4 bolts.

Torque: 52 N·m (530 kgf·cm, 38ft·lbf)

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

14. INSTALL ENGINE MOUNTING INSULATOR RH



(a) Install the engine mounting insulator RH with the 3 bolts.

HINT:

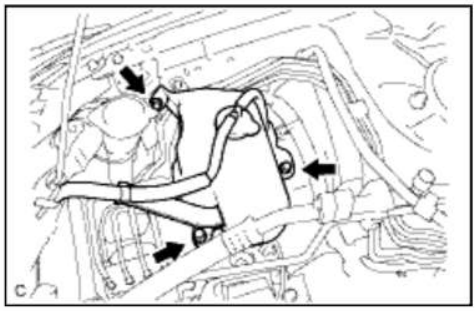
Perform this procedure only when replacement of the engine mounting insulator is necessary.

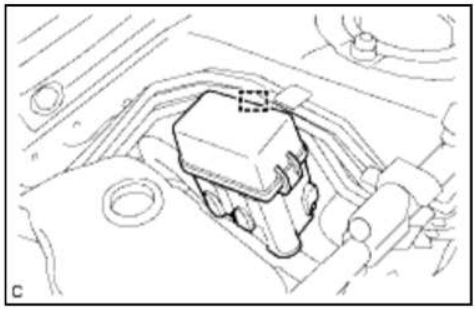
Torque: 52 N·m (530 kgf·cm, 38ft·lbf)

(b) Install the radiator reserve tank with the 3 bolts.

Torque: 7.0 N·m (71 kgf·cm, 62in·lbf)

cardiagn.com





(c) Install the relay block assembly.

15. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine assembly with transaxle and front suspension crossmember on the engine lifter.

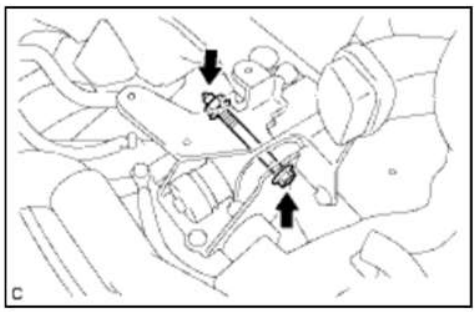
(b) Operate the engine lifter and lift the engine assembly with transaxle and front suspension crossmember to the position where the engine mounting insulators RH and LH can be installed.

CAUTION:

Do not raise the engine more than necessary. If the engine is raised excessively, the vehicle may also be lifted up.

NOTICE:

- Make sure that the engine is clear of all wiring and hoses.
- While raising the engine into the vehicle, do not allow it to contact the vehicle.

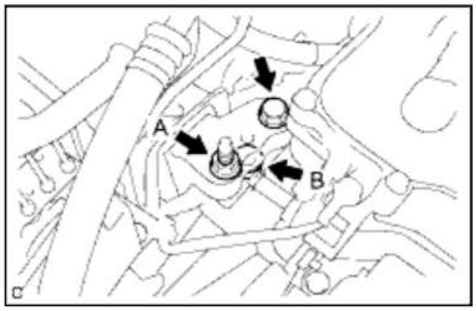


(c) Install the engine mounting insulator LH with the through bolt and nut.

Torque: 56 N·m (571 kgf·cm, 41ft·lbf)

(d) Install the engine mounting insulator RH with the bolt and 2 nuts.

cardiagn.com



Nut A - Torque: 95 N·m (969 kgf·cm, 70ft·lbf)
Nut B - Torque: 52 N·m (530 kgf·cm, 38ft·lbf)
Bolt - Torque: 95 N·m (969 kgf·cm, 70ft·lbf)

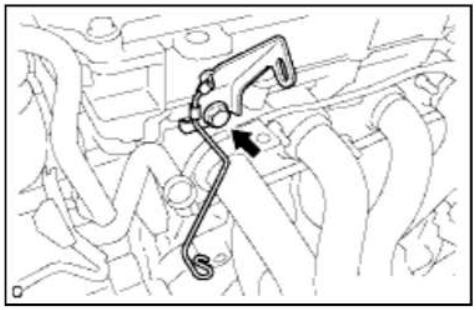
16. TEMPORARILY INSTALL CENTER ENGINE MOUNTING MEMBER SUB-ASSEMBLY INFO

17. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

18. FULLY TIGHTEN CENTER ENGINE MOUNTING MEMBER SUB-ASSEMBLY INFO

19. REMOVE ENGINE HANGER

(a) Remove the 2 bolts and 2 engine hangers.



(b) Install the wire harness bracket with the bolt.

Torque: 60 N·m (612 kgf·cm, 44ft·lbf)

20. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle) INFO

21. INSTALL FLYWHEEL HOUSING UNDER COVER (for Automatic Transaxle) INFO

22. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING LH INFO

23. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING RH INFO

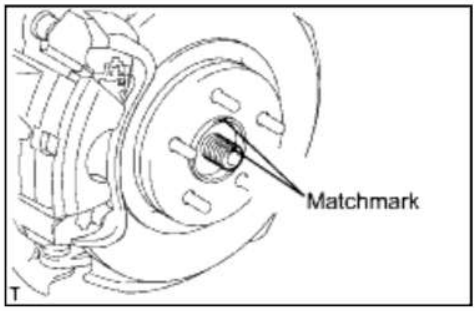
24. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH INFO

25. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH INFO

26. INSTALL STEERING KNUCKLE WITH AXLE HUB LH

(a) Align the matchmarks and connect the front drive shaft assembly to the front axle assembly LH.

cardiagn.com



27. INSTALL STEERING KNUCKLE WITH AXLE HUB RH

HINT:

Perform the same procedure for the LH side.

28. INSTALL FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH INFO

29. INSTALL FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

30. INSTALL FRONT STABILIZER LINK ASSEMBLY LH INFO

31. INSTALL FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

32. CONNECT TIE ROD END SUB-ASSEMBLY LH INFO

33. CONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure for the LH side.

34. INSTALL FRONT SPEED SENSOR LH INFO

35. INSTALL FRONT SPEED SENSOR RH

HINT:

Perform the same procedure for the LH side.

36. INSTALL FRONT AXLE SHAFT LH NUT INFO

37. INSTALL FRONT AXLE SHAFT RH NUT

HINT:

Perform the same procedure for the LH side.

38. INSTALL FRONT EXHAUST PIPE ASSEMBLY INFO

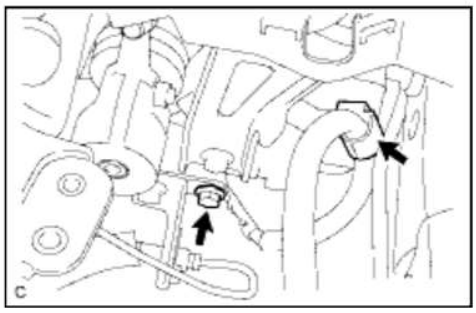
cardiagn.com

39. INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

40. INSTALL NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

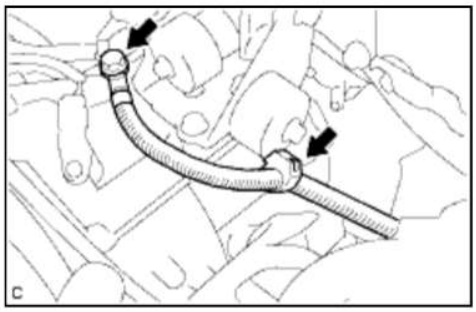
41. INSTALL COLUMN HOLE COVER SILENCER SHEET INFO

42. INSTALL WIRE HARNESS



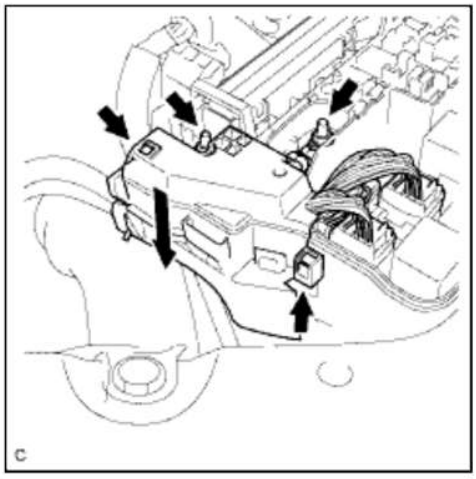
(a) Install the earth wire to the engine compartment with the bolt and clamp (for Manual Transaxle).

Torque: 13 N·m (130 kgf·cm, 10ft·lbf)



(b) Install the earth wire to the engine compartment with the bolt and clamp (for Automatic Transaxle).

Torque: 26 N·m (260 kgf·cm, 19ft·lbf)

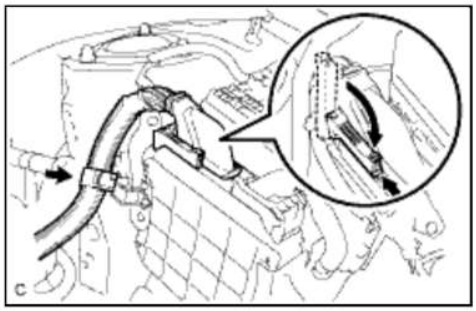


(c) Install the wire harness with the 2 nuts.

Torque: 8.4 N·m (85 kgf·cm, 74in·lbf)

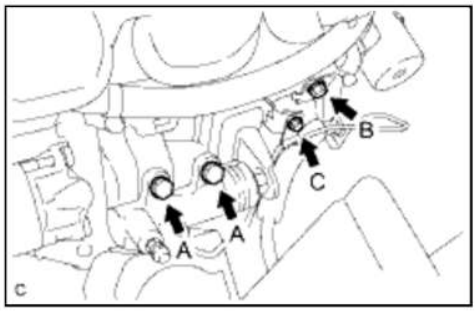
(d) Connect the 3 connectors and 2 wire harness clamps to the engine room junction block.

cardiagn.com



(e) Connect the connector to the ECU with the lock lever and connect the clamp.

43. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)



(a) Install the clutch release cylinder assembly with the 4 bolts and clutch tube bracket.

Bolt A - Torque: 12 N·m (120 kgf·cm, 9ft·lbf)
Bolt B - Torque: 12 N·m (122 kgf·cm, 9ft·lbf)
Bolt C - Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)

44. INSTALL COMPRESSOR WITH PULLEY ASSEMBLY (w/ Air Conditioning System) INFO

45. INSTALL FAN BELT ADJUSTING BAR

(a) Install the bolt and fan belt adjusting bar.

Torque: 19 N·m (194 kgf·cm, 14ft·lbf)

46. INSTALL GENERATOR ASSEMBLY INFO

47. INSTALL V-RIBBED BELT INFO

48. ADJUST V-RIBBED BELT INFO

49. INSPECT V-RIBBED BELT INFO

50. CONNECT FUEL TUBE SUB-ASSEMBLY

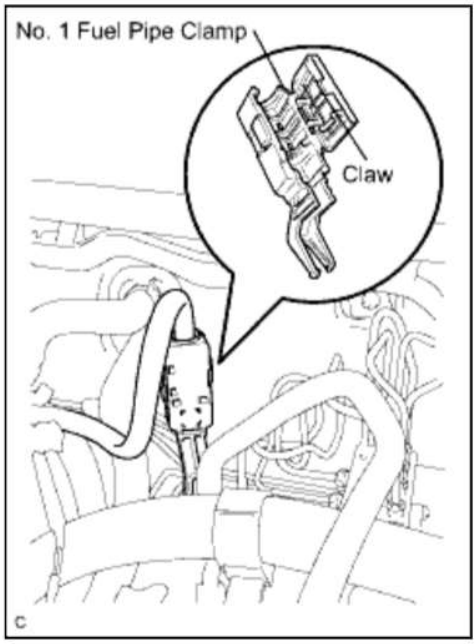
(a) Connect the fuel tube connector and fuel pipe.

CAUTION:

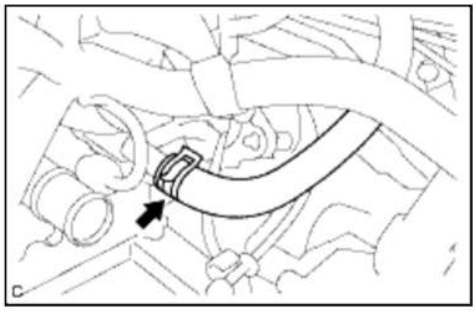
Align the fuel tube connector with the pipe, then push the fuel tube connector in until the retainer makes a "click" sound. If the connection is tight, apply a small amount of engine oil to the tip of the pipe. After connecting, pull on the pipe and connector to make sure that they are securely connected.

(b) Engage the claw and install the No. 1 fuel pipe clamp.

cardiagn.com

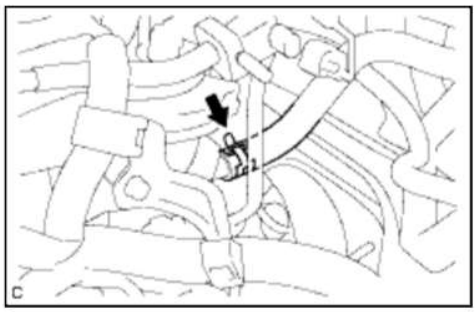


51. CONNECT INLET HEATER WATER HOSE



(a) Connect the inlet heater water hose with the clamp.

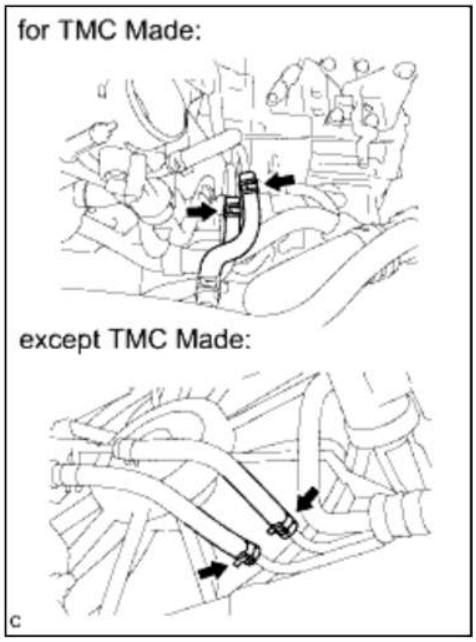
52. CONNECT OUTLET HEATER WATER HOSE



(a) Connect the outlet heater water hose with the clamp.

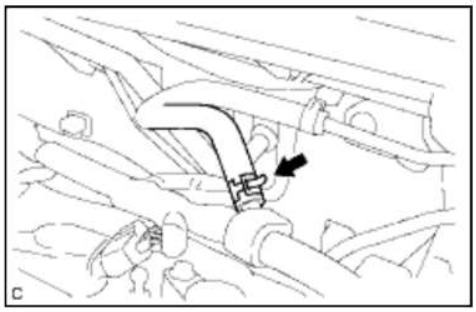
53. CONNECT OIL COOLER HOSE (for Automatic Transaxle)

cardiagn.com



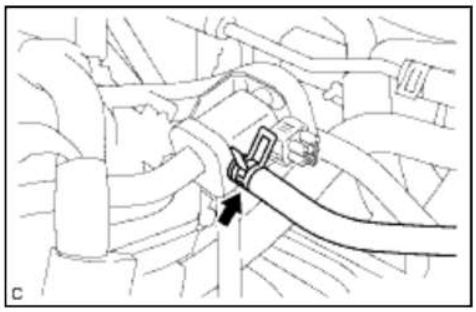
(a) Connect the 2 oil cooler hoses with the clamps.

54. CONNECT UNION TO CONNECTOR TUBE HOSE



(a) Connect the union to connector tube hose.

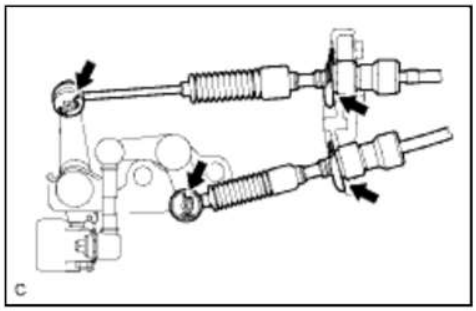
55. CONNECT FUEL VAPOR FEED HOSE ASSEMBLY



(a) Connect the fuel vapor feed hose assembly.

56. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)

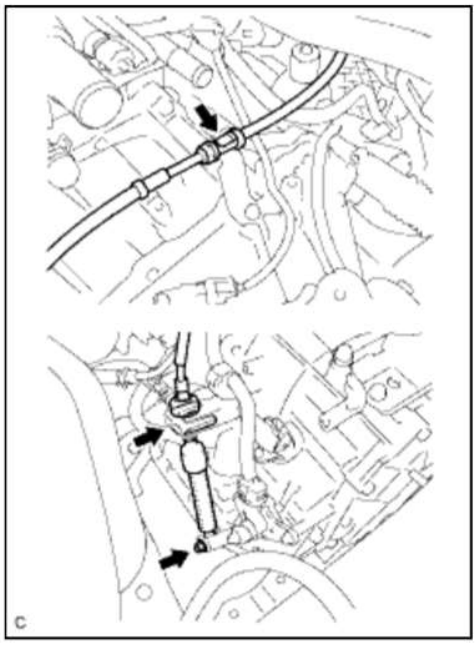
cardiagn.com



(a) Install the transmission control cable to the control cable bracket with 2 new clips.

(b) Install the transmission control cable to the transaxle with the 2 clips.

57. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)



(a) Secure the control cable onto the control cable bracket with a new clip.

(b) Connect the control cable onto the control shaft lever with the nut.

Torque: 12 N·m (122 kgf·cm, 9ft·lbf)

(c) Connect the control cable to the cable support.

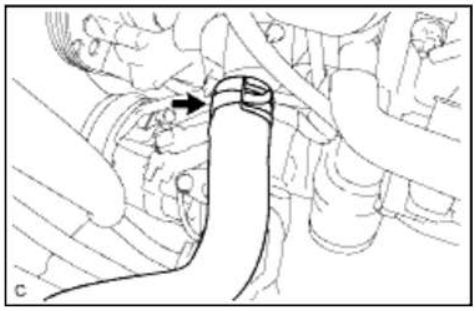
(d) Connect the clamp of the control cable with the bolt.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

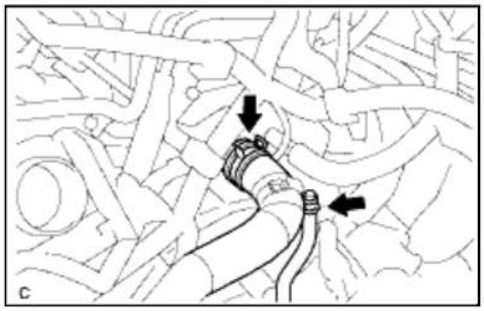
58. CONNECT NO. 2 RADIATOR HOSE

(a) Connect the No. 2 radiator hose with the clamp.

cardiagn.com



59. CONNECT NO. 1 RADIATOR HOSE



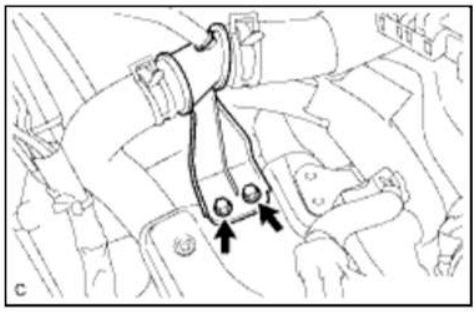
(a) Connect the No. 1 radiator hose with the clamp.

(b) Connect the clamp.

60. INSTALL BATTERY CARRIER

(a) Install the battery carrier with the 4 bolts.

Torque: 13 N·m (130 kgf·cm, 9ft·lbf)

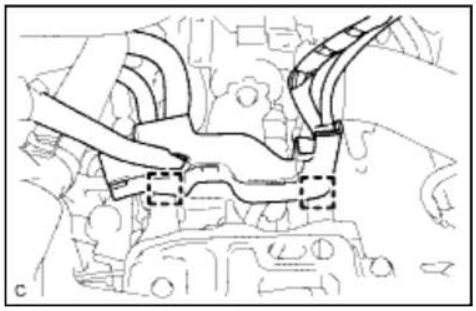


(b) Connect the radiator pipe with the 2 bolts.

Torque: 8.8 N·m (90 kgf·cm, 78in·lbf)

(c) Connect the 2 wire harness clamps.

cardiagn.com



61. INSTALL BATTERY

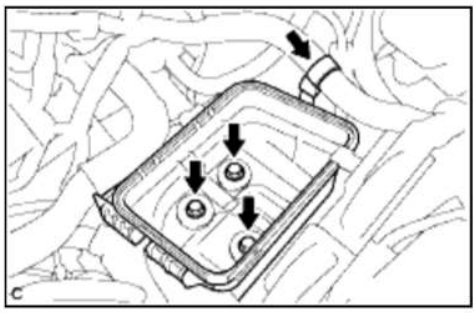
(a) Install the battery clamp with the bolt and nut.

for bolt - Torque: 6.5 N·m (66 kgf·cm, 58in·lbf)
for nut - Torque: 3.5 N·m (36 kgf·cm, 31in·lbf)

(b) Connect the battery cables.

Torque: 5.4 N·m (55 kgf·cm, 48in·lbf)

62. INSTALL AIR CLEANER CASE



(a) Install the air cleaner case with the 3 bolts.

Torque: 7.0 N·m (71 kgf·cm, 62in·lbf)

(b) Install the wire harness clamp to the air cleaner case.

(c) Install the air cleaner filter element.

63. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

64. ADD TRANSAXLE OIL (for Manual Transaxle)

HINT: INFO **for C59.**

65. INSPECT AND ADJUST TRANSAXLE OIL (for Manual Transaxle)

HINT: INFO **for C59.**

66. ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)

HINT: INFO **for U341E.**

67. INSPECT TRANSAXLE FLUID LEVEL (for Automatic Transaxle)

HINT: INFO **for U341E.**

cardiagn.com

68. INSPECT FOR AUTOMATIC TRANSAXLE FLUID LEAK (for Automatic Transaxle)

69. INSPECT SHIFT LEVER POSITION (for Automatic Transaxle)

HINT: INFO **for U341E.**

70. ADJUST SHIFT LEVER POSITION (for Automatic Transaxle)

HINT: INFO **for U341E.**

71. ADD ENGINE COOLANT INFO

72. ADD ENGINE OIL INFO

73. INSPECT ENGINE OIL LEVEL INFO

74. INSPECT FOR FUEL LEAK INFO

75. INSPECT FOR ENGINE COOLANT LEAK INFO

76. INSPECT FOR OIL LEAK

77. INSPECT FOR EXHAUST GAS LEAK

78. INSTALL ENGINE UNDER COVER LH

79. INSTALL ENGINE UNDER COVER RH

80. INSTALL FRONT WHEELS

Torque: 103 N·m (1050 kgf·cm, 76ft·lbf)

81. INSPECT IGNITION TIMING INFO

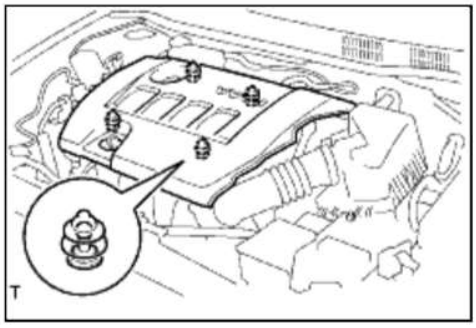
82. INSPECT ENGINE IDLE SPEED INFO

83. INSPECT CO/HC INFO

84. ADJUST FRONT WHEEL ALIGNMENT

HINT: INFO .

85. INSTALL NO. 2 CYLINDER HEAD COVER



(a) Engage the 4 clips to install the No. 2 cylinder head cover.

NOTICE:

- Be sure to engage the clips securely.
- Do not apply excessive force or do not hit the cover to engage the clips. This may cause the cover to break.

cardiagn.com

86. CHECK ABS SPEED SENSOR SIGNAL

HINT: INFO **for ABS.**

INFO **for VSC.**

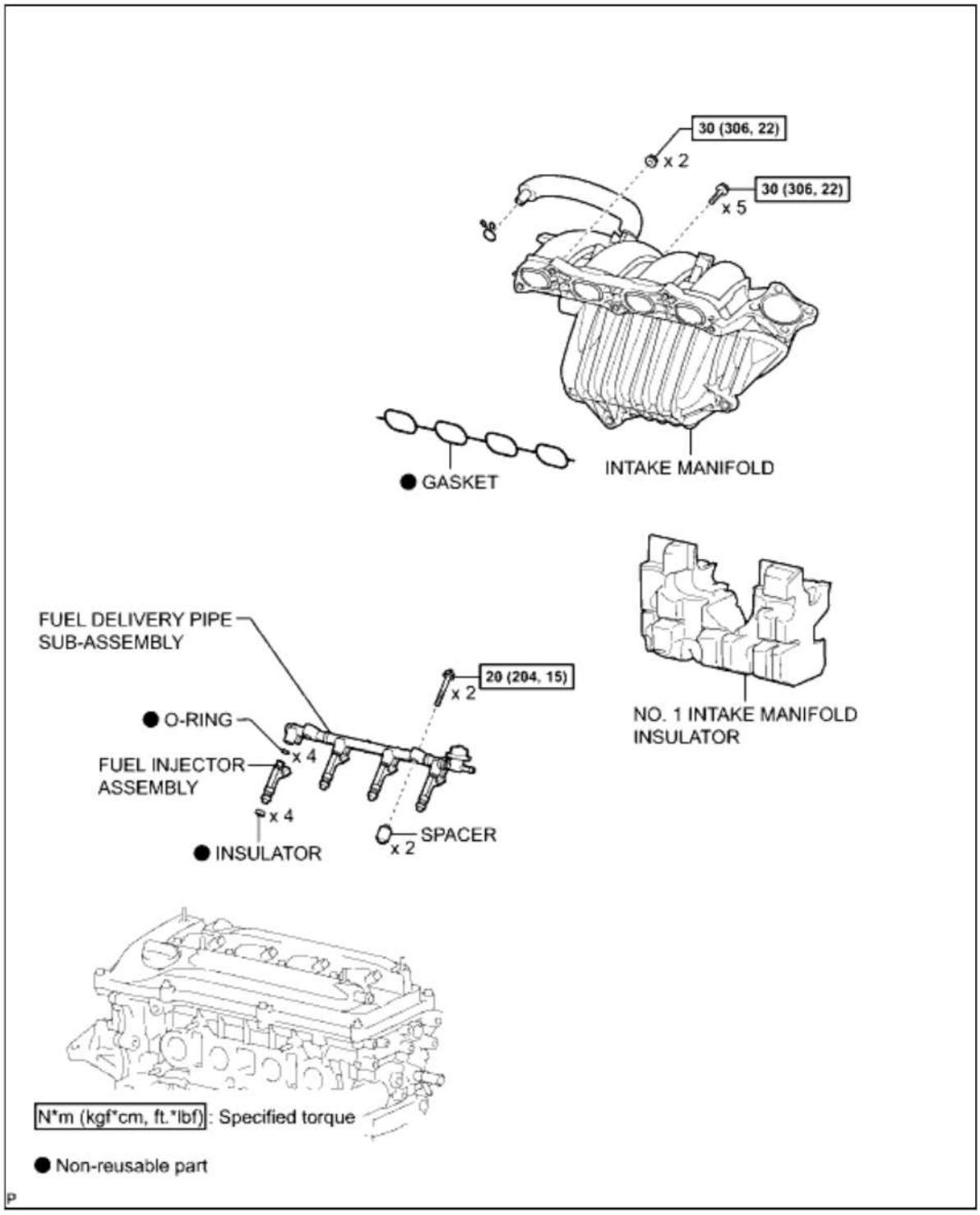


cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000000224600CX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE UNIT: COMPONENTS (2010 Corolla)		

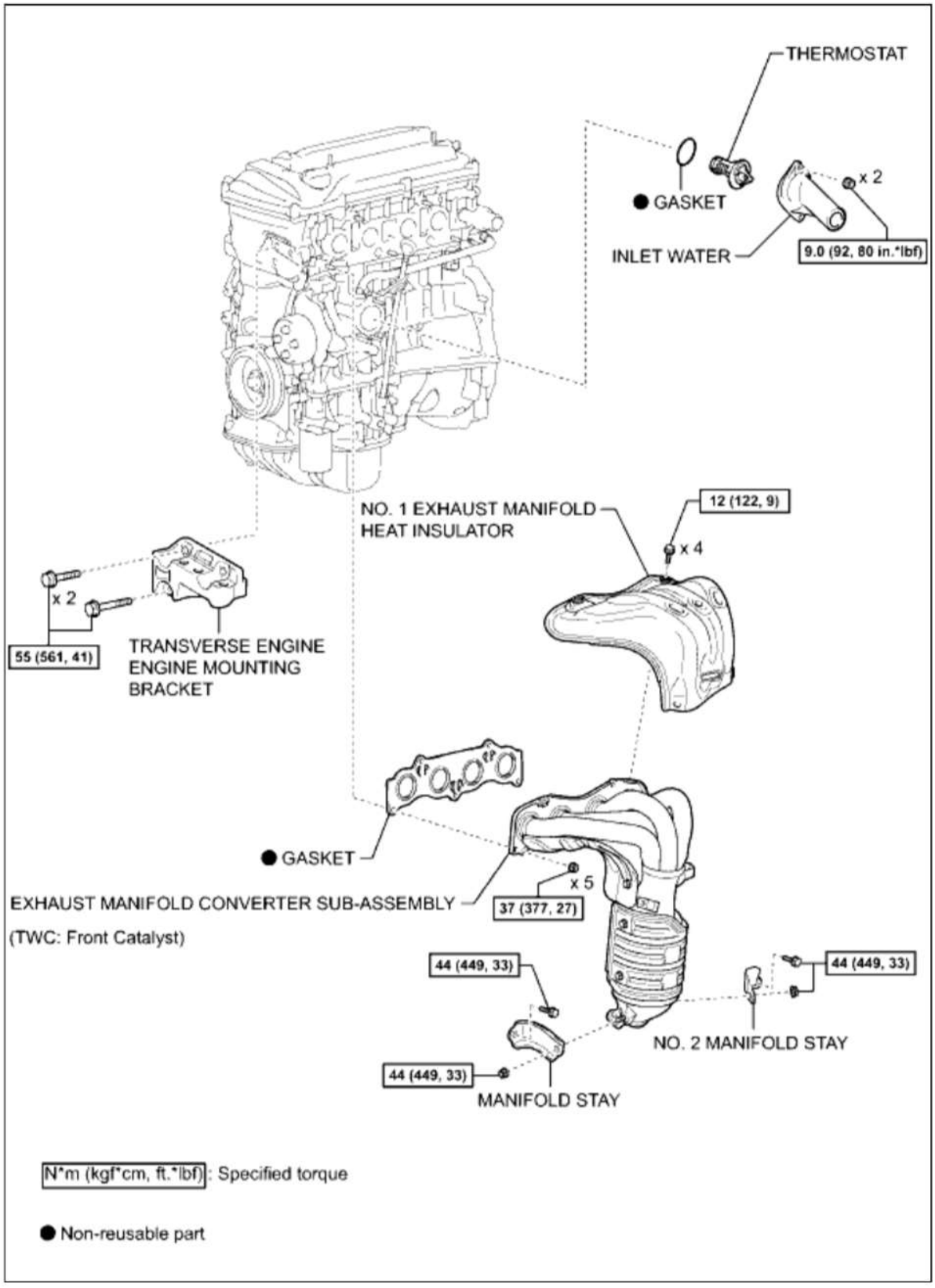
COMPONENTS

ILLUSTRATION



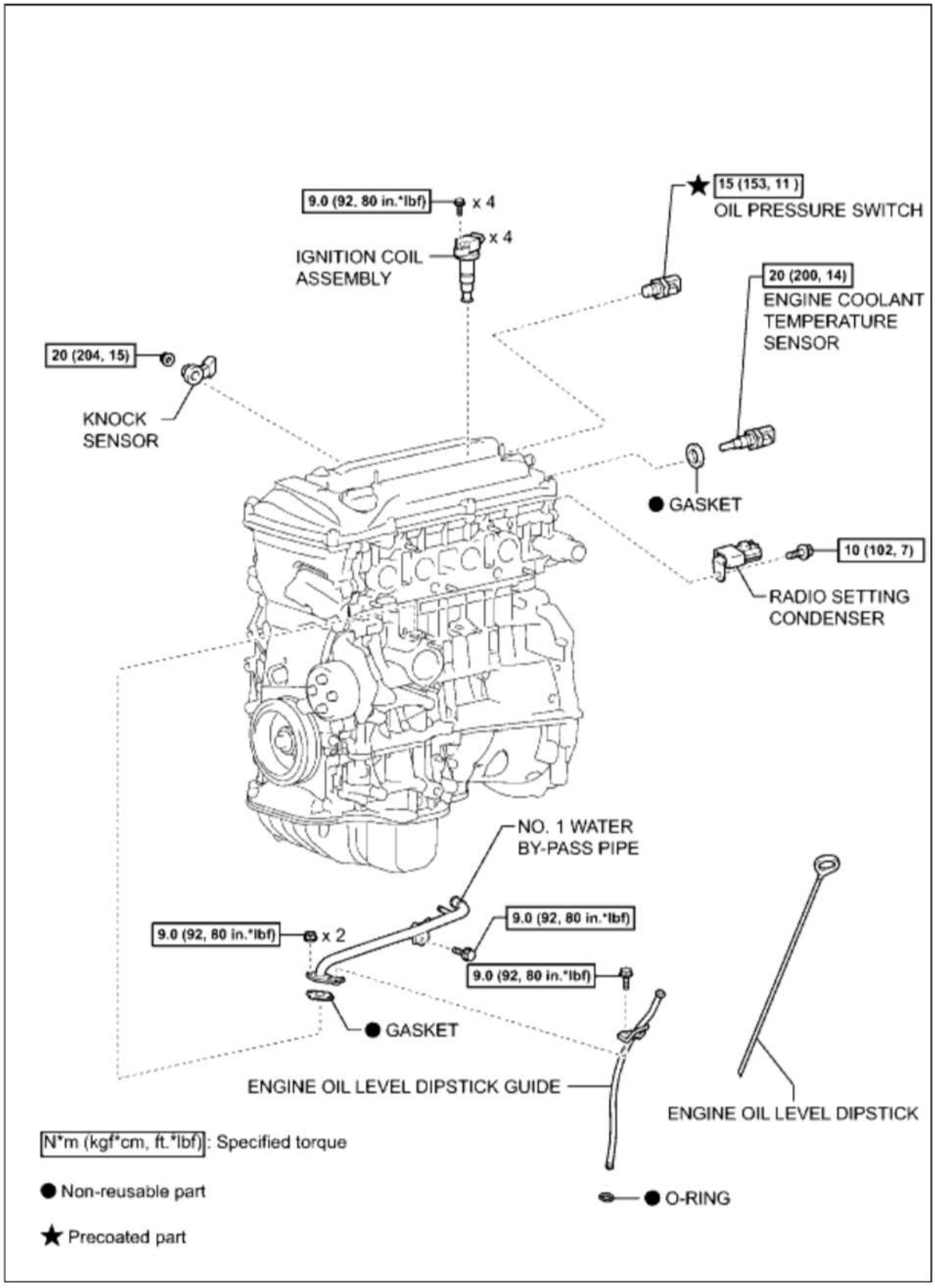
cardiagn.com

ILLUSTRATION



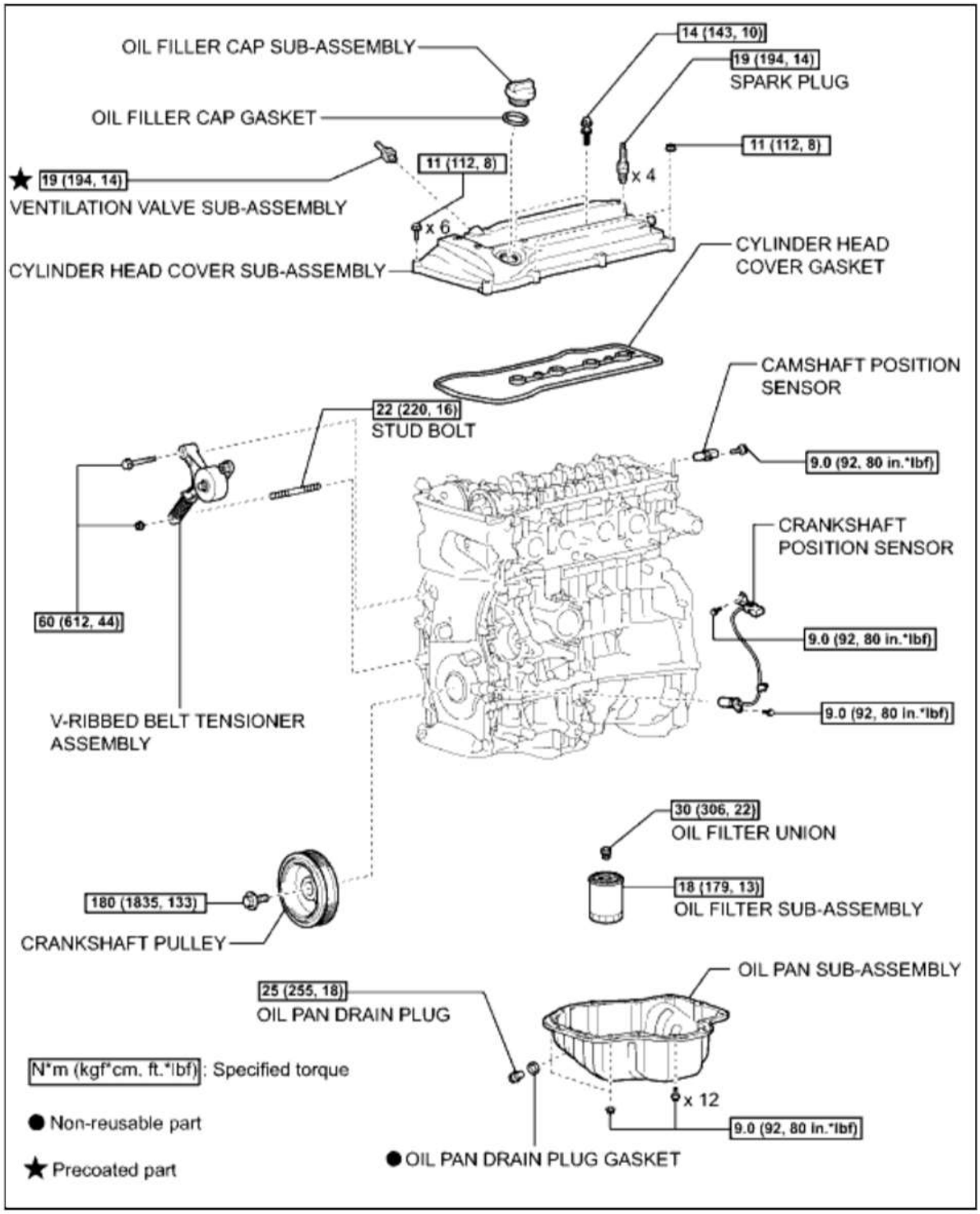
cardiagn.com

ILLUSTRATION



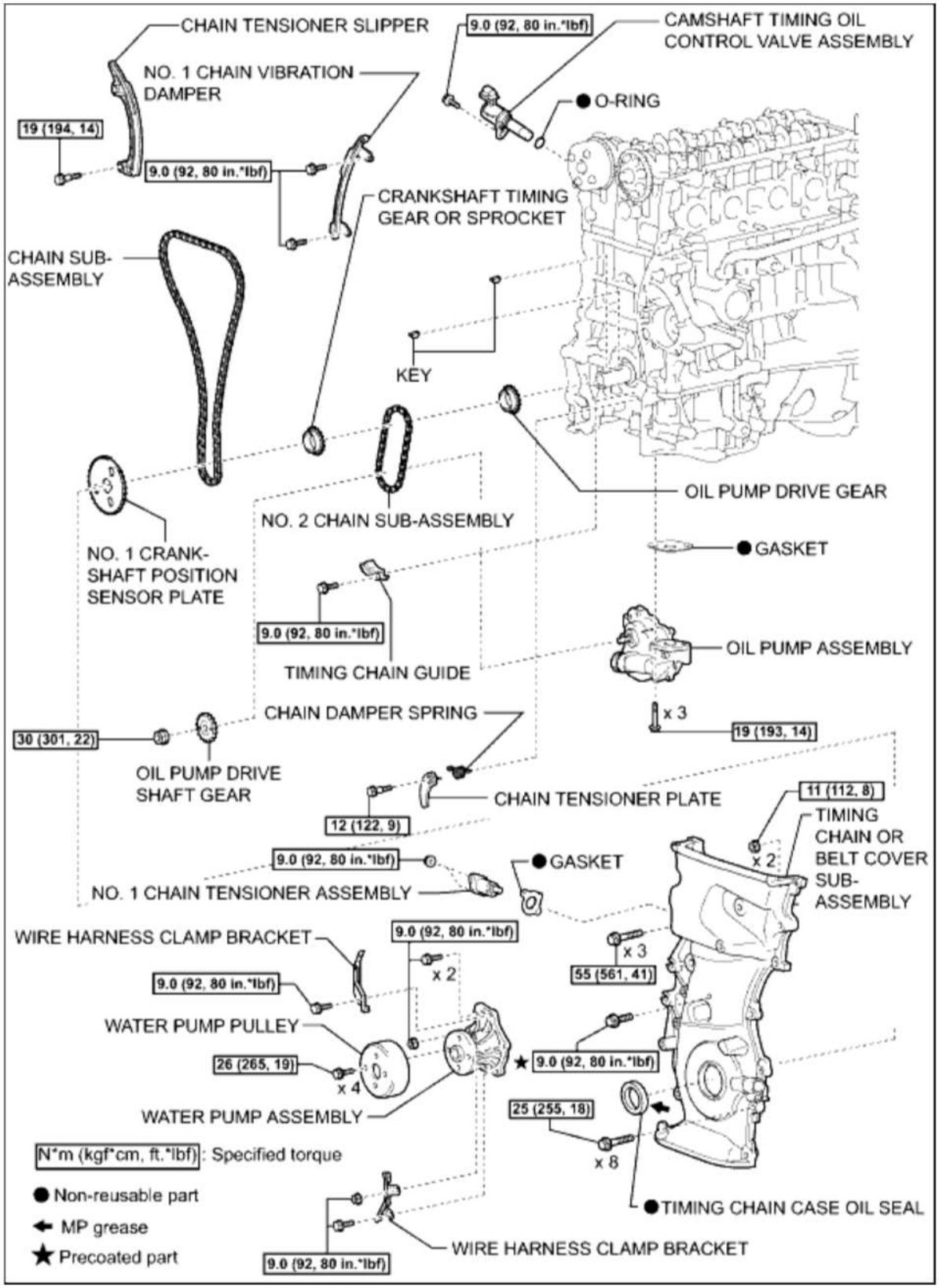
cardiagn.com

ILLUSTRATION



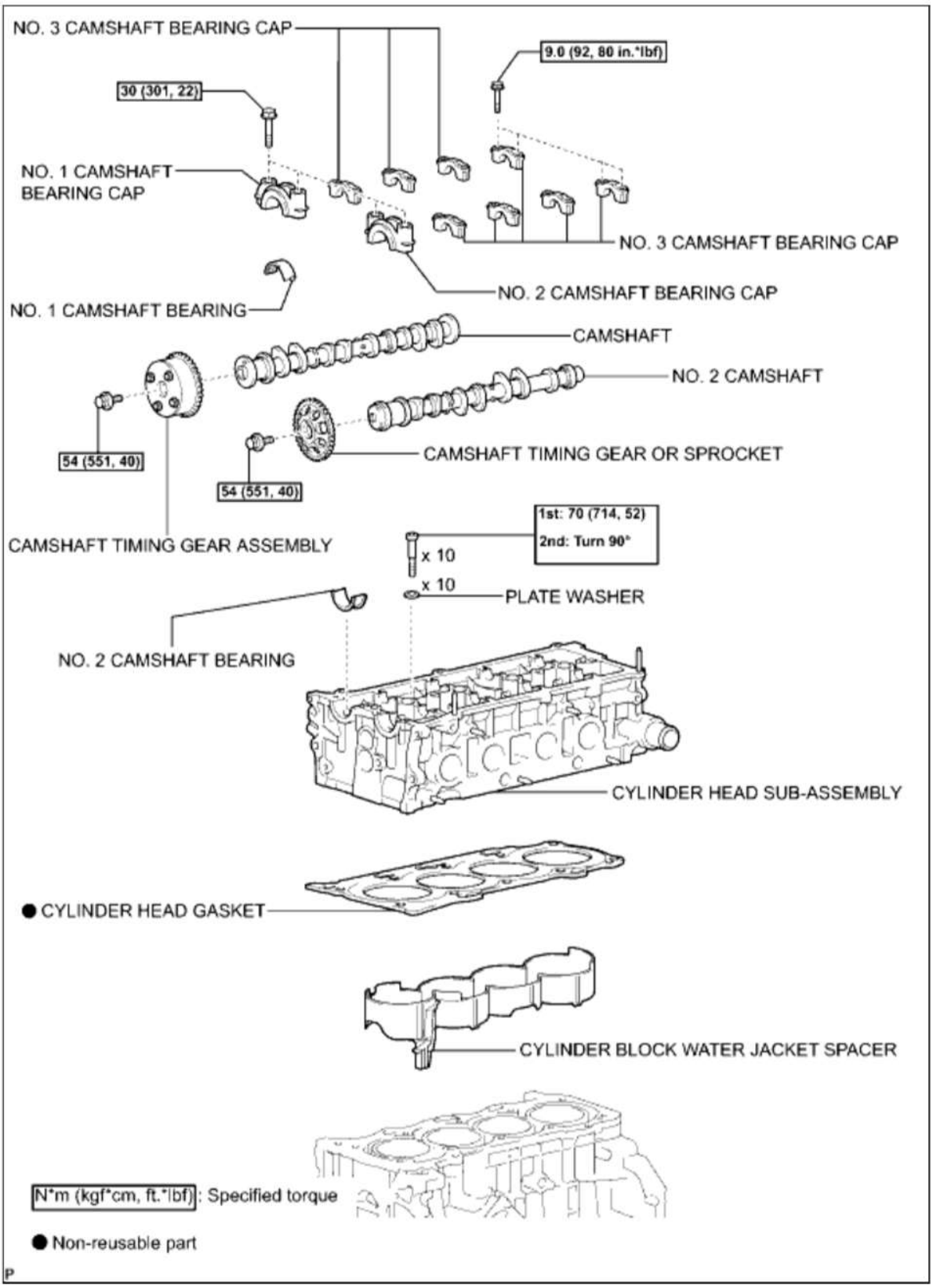
ILLUSTRATION

cardiagn.com



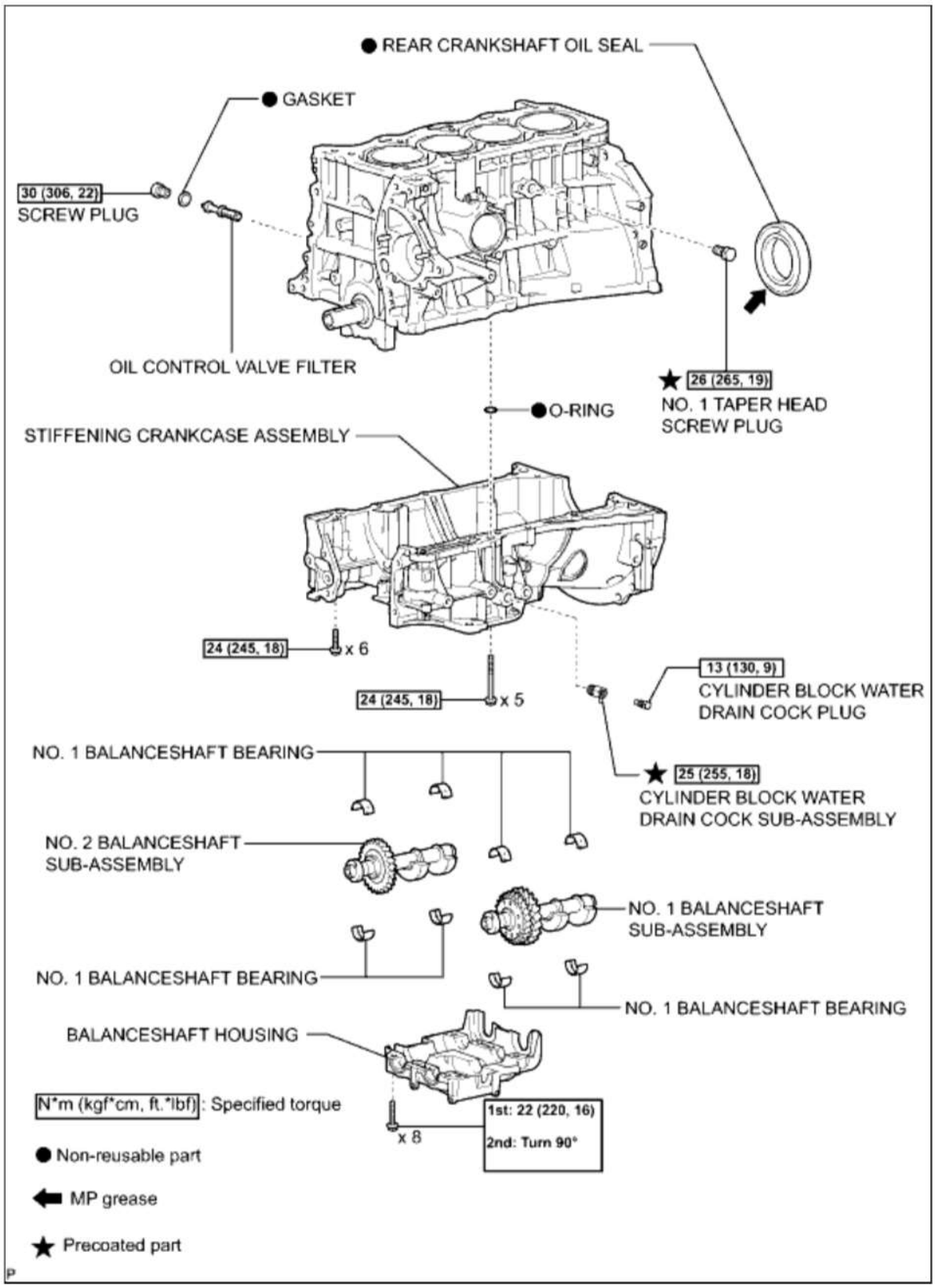
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com

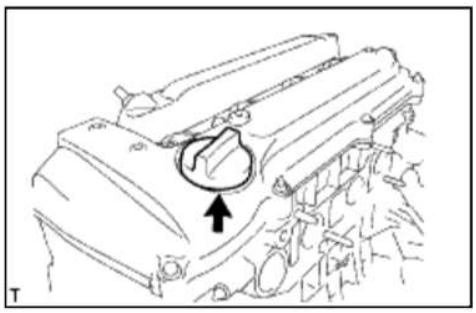


cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000000224700CX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE UNIT: DISASSEMBLY (2010 Corolla)		

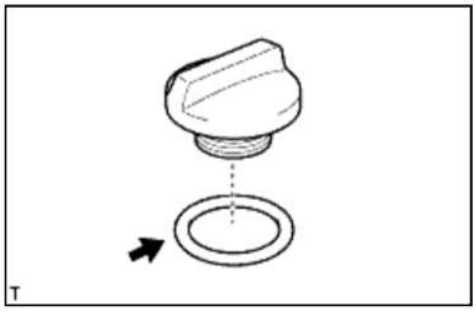
DISASSEMBLY

1. REMOVE OIL FILLER CAP SUB-ASSEMBLY



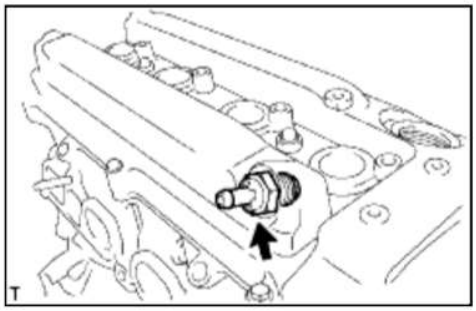
(a) Remove the oil filler cap from the cylinder head cover.

2. REMOVE OIL FILLER CAP GASKET



(a) Remove the oil filler cap gasket from the oil filler cap.

3. REMOVE VENTILATION VALVE SUB-ASSEMBLY



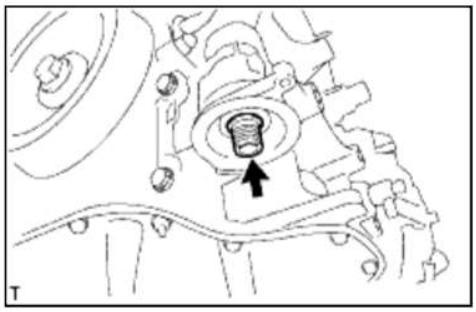
(a) Using a 22 mm deep socket wrench, remove the ventilation valve from the cylinder head cover.

4. REMOVE SPARK PLUG INFO

cardiagn.com

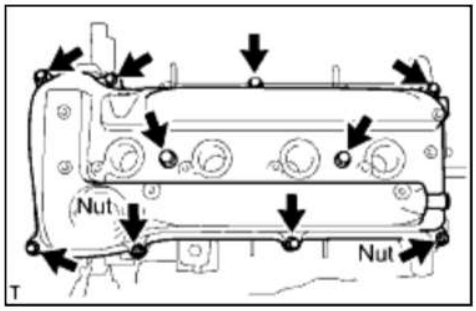
5. REMOVE OIL FILTER SUB-ASSEMBLY INFO

6. REMOVE OIL FILTER UNION



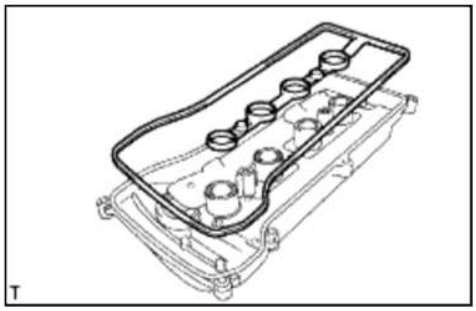
(a) Using a 12 mm socket hexagon wrench, remove the oil filter union.

7. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY



(a) Remove the 8 bolts and 2 nuts, and remove the cylinder head cover.

8. REMOVE CYLINDER HEAD COVER GASKET



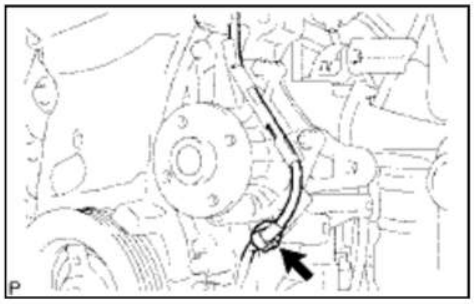
(a) Remove cylinder head cover gasket from the cylinder head cover.

9. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY INFO

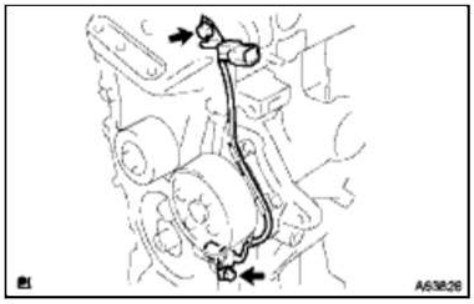
10. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the wire harness clamp.

cardiagn.com

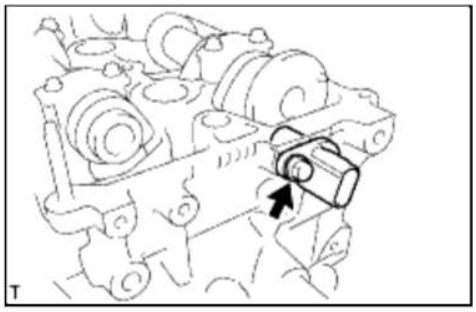


(b) Separate the wire harness from the wire harness clamp bracket.



(c) Remove the 2 bolts and sensor.

11. REMOVE CAMSHAFT POSITION SENSOR



(a) Remove the bolt and camshaft position sensor.

12. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

13. REMOVE CRANKSHAFT PULLEY INFO

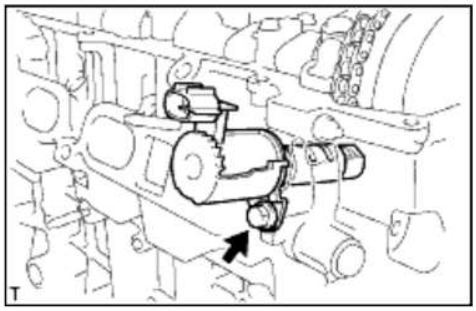
14. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Remove the bolt and camshaft timing oil control valve from the cylinder head.

NOTICE:

The camshaft timing oil control valve may be damaged when loosening the cylinder head bolts if the it is not removed.

cardiagn.com



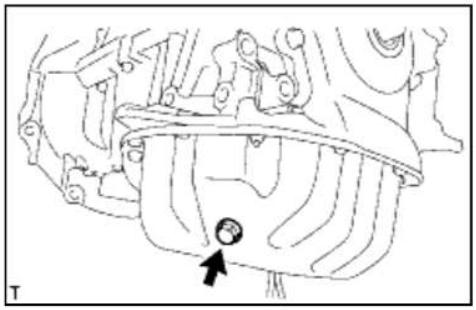
(b) Remove the O-ring from the camshaft timing oil control valve.

15. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

16. REMOVE WATER PUMP PULLEY INFO

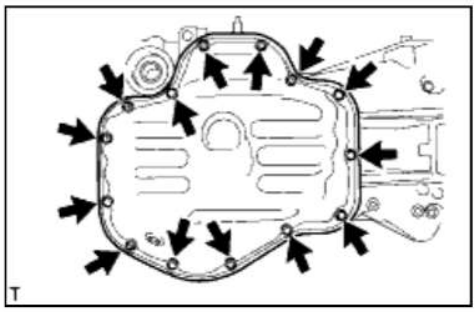
17. REMOVE WATER PUMP ASSEMBLY INFO

18. REMOVE OIL PAN DRAIN PLUG



(a) Remove the oil pan drain plug from the oil pan.

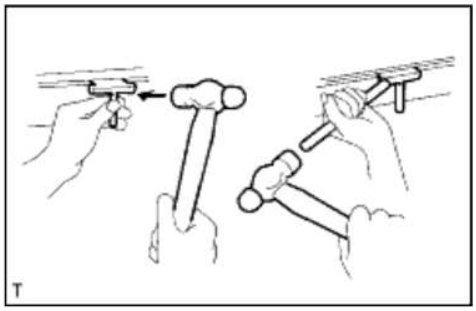
19. REMOVE OIL PAN SUB-ASSEMBLY



(a) Remove the 12 bolts and 2 nuts.

(b) Insert the blade of oil pan seal cutter between the crankcase, chain cover and oil pan, then cut through the applied sealer and remove the oil pan.

cardiagn.com



NOTICE:

Be careful not to damage the contact surfaces of the crankcase, chain cover and oil pan.

20. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY INFO

21. REMOVE FRONT CRANKSHAFT OIL SEAL INFO

22. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE INFO

23. REMOVE TIMING CHAIN GUIDE INFO

24. REMOVE CHAIN TENSIONER SLIPPER INFO

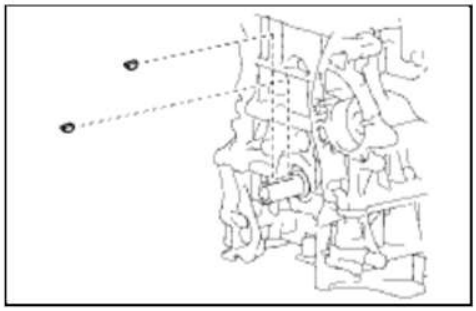
25. REMOVE NO. 1 CHAIN VIBRATION DAMPER INFO

26. REMOVE CHAIN SUB-ASSEMBLY

27. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET INFO

28. REMOVE NO. 2 CHAIN SUB-ASSEMBLY INFO

29. REMOVE KEYS



(a) Remove the 2 pulley set keys from the crankshaft.

30. REMOVE NO. 2 CAMSHAFT

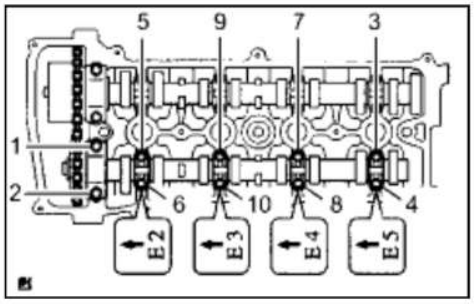
(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

Uniformly loosen the bolts while keeping the camshaft level.

HINT:

cardiagn.com

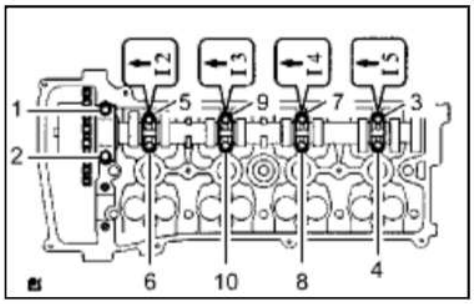


Arrange the removed parts in the correct order.

(b) Remove the 5 bearing caps.

(c) Remove the No. 2 camshaft.

31. REMOVE CAMSHAFT



(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

Uniformly loosen the bolts while keeping the camshaft level.

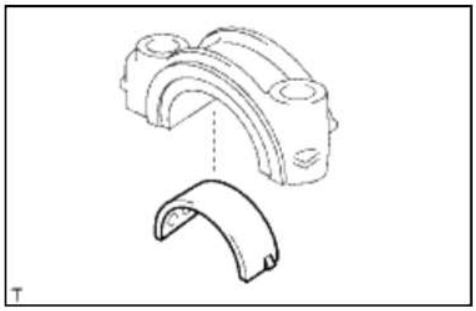
HINT:

Arrange the removed parts in the correct order.

(b) Remove the 5 bearing caps.

(c) Remove the camshaft.

32. REMOVE NO. 1 CAMSHAFT BEARING

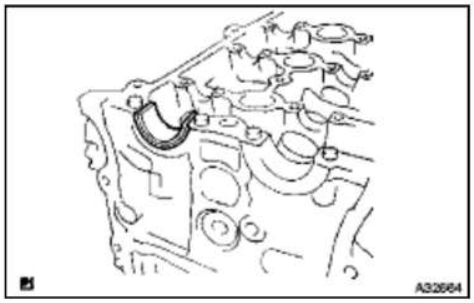


(a) Remove the camshaft bearing from the No. 1 camshaft bearing cap.

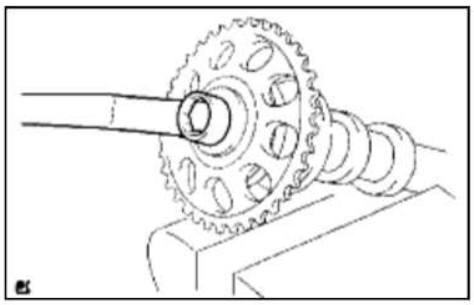
33. REMOVE NO. 2 CAMSHAFT BEARING

(a) Remove the No. 2 camshaft bearing from the cylinder head.

cardiagn.com



34. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET



(a) Clamp the camshaft in a vise.

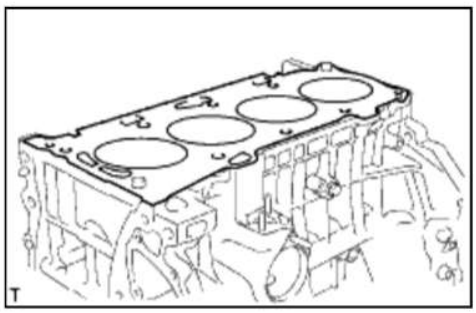
NOTICE:

- Do not overtighten the vise.
- Do not damage the camshaft.

(b) Remove the bolt and camshaft timing gear or sprocket.

35. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY INFO

36. REMOVE CYLINDER HEAD SUB-ASSEMBLY INFO



37. REMOVE CYLINDER HEAD GASKET

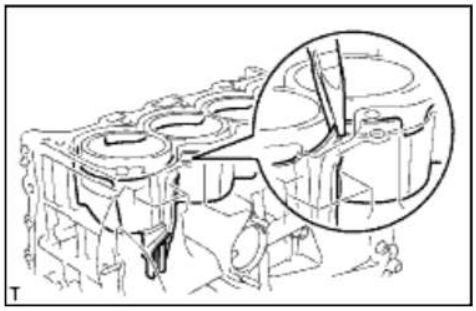
38. REMOVE CYLINDER BLOCK WATER JACKET SPACER

(a) Using needle nose pliers, remove the cylinder block water jacket spacer from the water jacket.

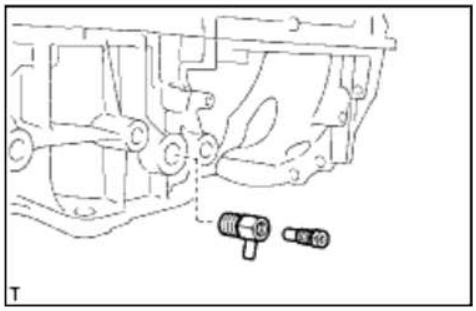
NOTICE:

Before turning the cylinder block upside down, make sure that the water jacket spacer is removed, as it will fall out.

cardiagn.com



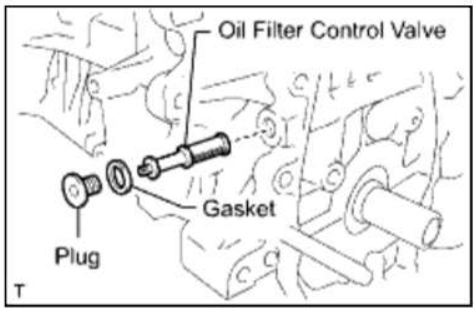
39. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY



(a) Remove the water drain cock from the stiffening crankcase.

(b) Remove the water drain cock plug from the water drain cock.

40. REMOVE OIL CONTROL VALVE FILTER

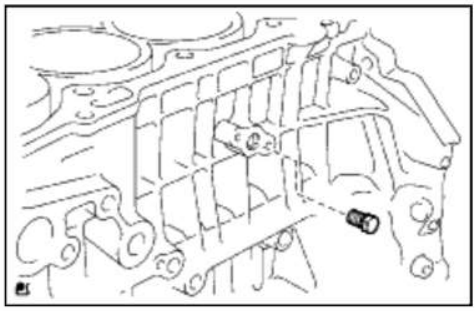


(a) Using a 8mm socket hexagon wrench, remove the plug, gasket and oil control valve filter.

41. REMOVE NO. 1 TAPER HEAD SCREW PLUG

(a) Remove the No. 1 taper head screw plug.

cardiagn.com

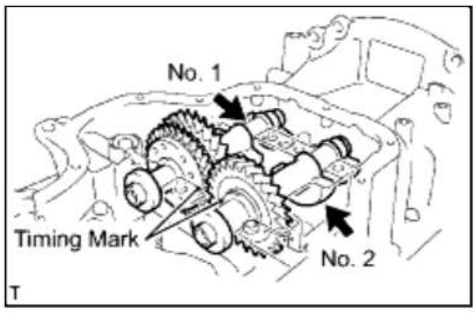


42. REMOVE OIL PUMP ASSEMBLY INFO

43. INSPECT BALANCESHAFT THRUST CLEARANCE INFO

44. INSPECT BALANCESHAFT OIL CLEARANCE INFO

45. REMOVE NO. 1 AND NO. 2 BALANCESHAFTS

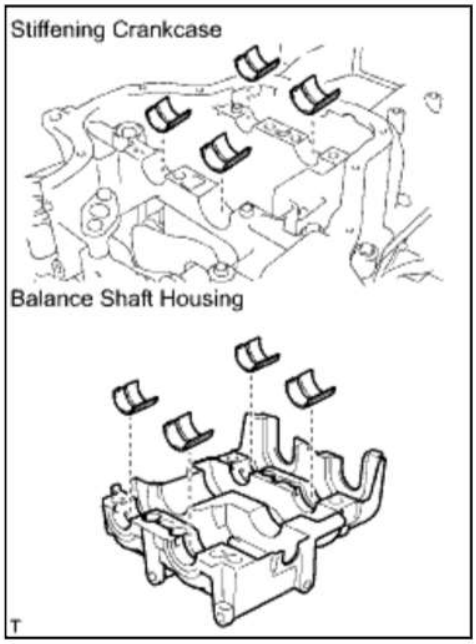


(a) Remove the No. 1 and No. 2 balanceshafts.

46. REMOVE NO. 1 BALANCESHAFT BEARING

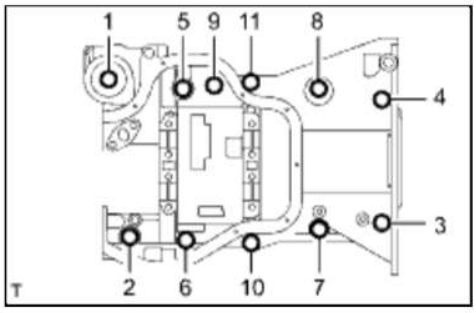
(a) Remove the 8 No. 1 balanceshaft bearings shown in the illustration.

cardiagn.com



47. REMOVE REAR CRANKSHAFT OIL SEAL INFO

48. REMOVE STIFFENING CRANKCASE ASSEMBLY



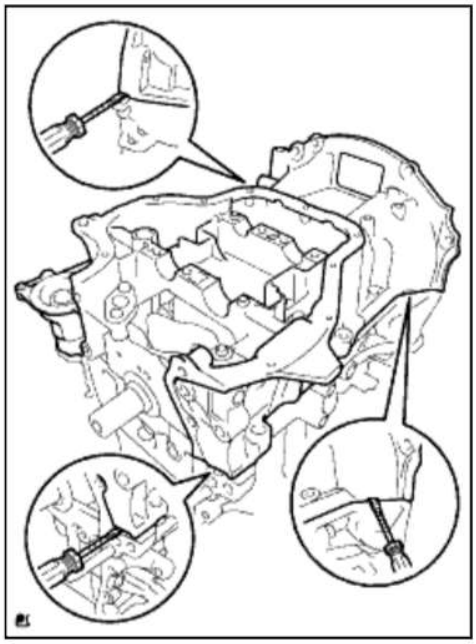
(a) Uniformly loosen and remove the 11 bolts in the sequence shown in the illustration.

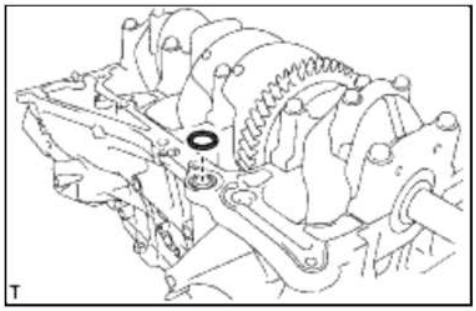
(b) Using a screwdriver with its tip wrapped with protective tape, remove the crankcase by prying between the crankcase and cylinder block.

NOTICE:

Be careful not to damage the contact surfaces between the crankcase and cylinder block.

cardiagn.com





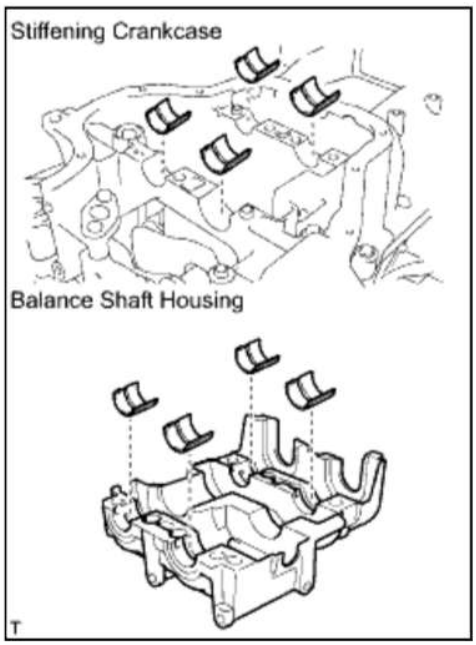
(c) Remove the O-ring from the cylinder block.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000000224800CX
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE UNIT: REASSEMBLY (2010 Corolla)		

REASSEMBLY

1. INSTALL NO. 1 BALANCESHAFT BEARING



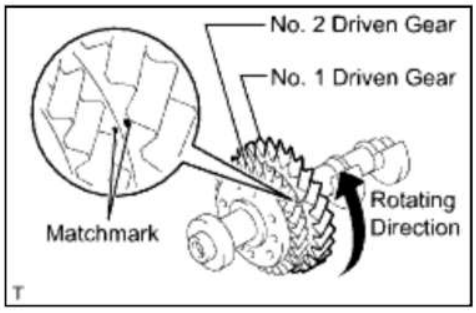
(a) Align the bearing claw with the claw groove, and push in the 8 bearings.

NOTICE:

Do not apply engine oil to the contact surfaces of the balanceshaft bearing and balanceshaft housing.

(b) Apply a light coat of the engine oil to the bearings.

2. INSTALL NO. 1 AND NO. 2 BALANCESHAFTS



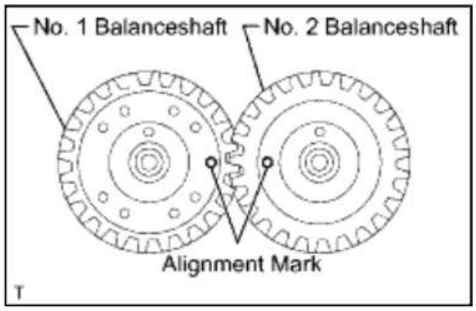
(a) Rotate the No. 1 driven gear of the No. 1 balanceshaft in the rotating direction until it hits the stopper.

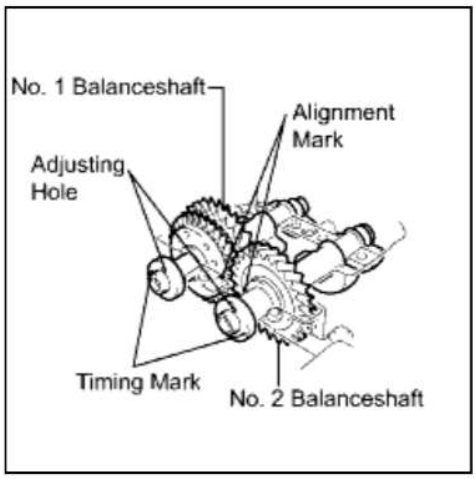
NOTICE:

Confirm that the matchmarks on the No. 1 and No. 2 driven gears are matched.

(b) Confirm that the alignment marks on the No. 1 and No. 2 balanceshafts are aligned.

cardiagn.com

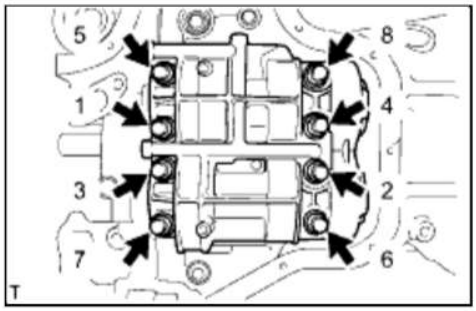




(c) Align the alignment marks on the No. 1 and No. 2 balanceshafts as shown in the illustration.

(d) Place the No. 1 and No. 2 balancshafts onto the crankcase.

(e) Apply a light coat of engine oil to the threads and under the heads of the bolts.

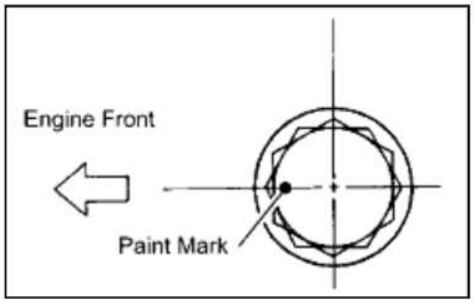


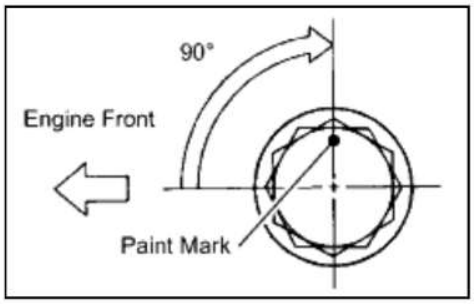
(f) Using several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 22 N·m (220 kgf·cm, 16ft·lbf)

(g) Mark the front of the bolts with paint.

cardiagn.com

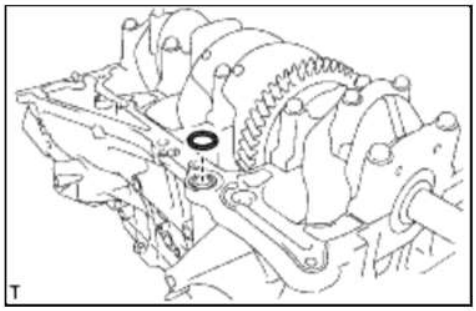




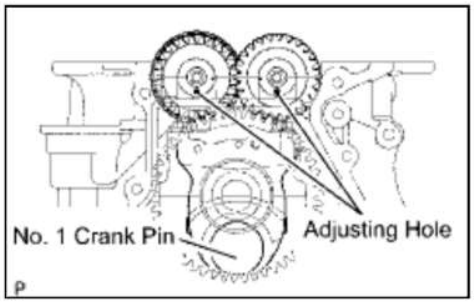
(h) Further tighten the bolts 90° as shown in the illustration.

(i) Check that the paint mark is now at a 90° angle to the front.

3. INSTALL STIFFENING CRANKCASE ASSEMBLY

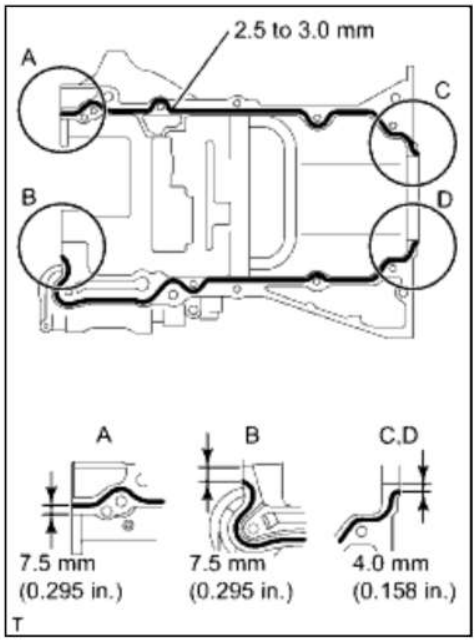


(a) Place a new O-ring on the cylinder block as shown in the illustration.



(b) With the No. 1 crank pin of the crankshaft placed at the TDC position, install the No. 1 and No. 2 balanceshafts and align the adjusting holes as shown in the illustration.

cardiagn.com



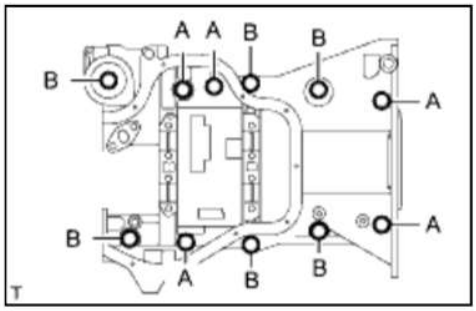
(c) Apply a continuous bead of seal packing (Diameter 2.5 to 3.0 mm (0.098 to 0.118 in.)) as shown in the illustration.

Seal Packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

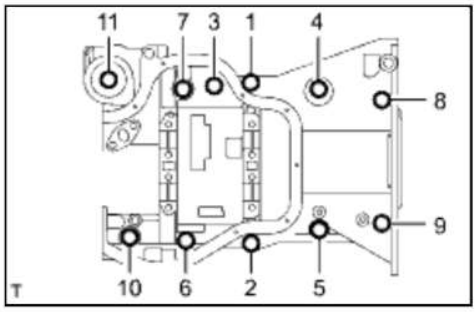
NOTICE:

- Remove any oil from the contact surfaces.
- Install the crankcase within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the crankcase.



(d) Temporarily install the crankcase with the 11 bolts.

ITEM	BOLT LENGTH
A	125 mm (4.92 in.)
B	45 mm (1.77 in.)

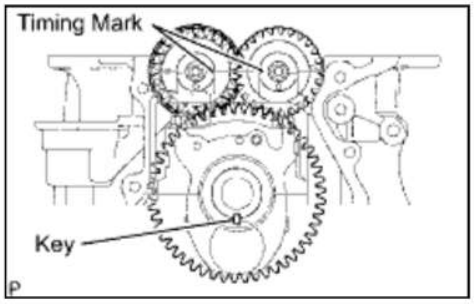


(e) Uniformly tighten the bolts.

Torque: 24 N·m (245 kgf·cm, 18ft·lbf)

(f) Confirm that the timing marks on the balanceshafts are aligned when the key groove is placed at the TDC position, as shown in the illustration.

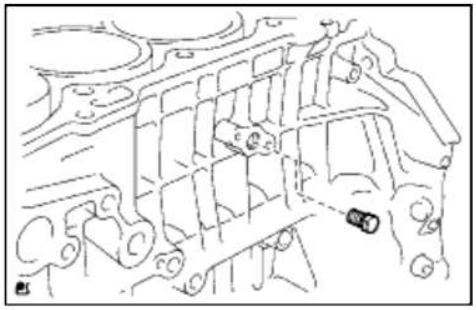
cardiagn.com



4. INSTALL OIL PUMP ASSEMBLY INFO

5. INSTALL REAR CRANKSHAFT OIL SEAL INFO

6. INSTALL NO. 1 TAPER HEAD SCREW PLUG



(a) Apply adhesive to 2 or 3 threads of the plug, and install it.

Torque: 26 N·m (265 kgf·cm, 19ft·lbf)

Adhesive:

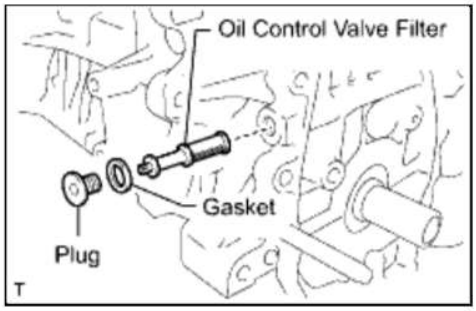
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

NOTICE:

- Install the plug within 3 minutes of applying adhesive.
- Do not add coolant for at least an hour after installing the plug.

7. INSTALL OIL CONTROL VALVE FILTER

(a) Check that there are no foreign objects on the mesh part of the oil control valve filter.



(b) Using a 8 mm socket hexagon wrench, install a new gasket and the oil control valve filter with the plug.

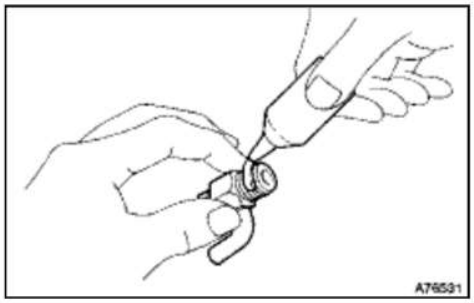
Torque: 30 N·m (306 kgf·cm, 22ft·lbf)

8. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

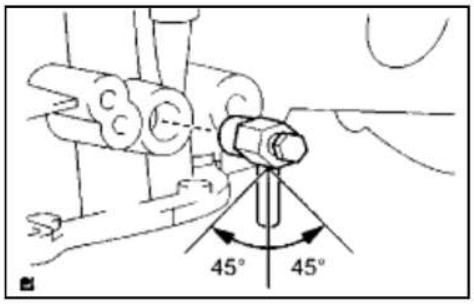
(a) Apply adhesive to 2 or 3 threads of the drain cock.

Adhesive:

cardiagn.com



Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent



(b) Install the water drain cock within the range shown in the illustration.

Torque: 25 N·m (255 kgf·cm, 18ft·lbf)

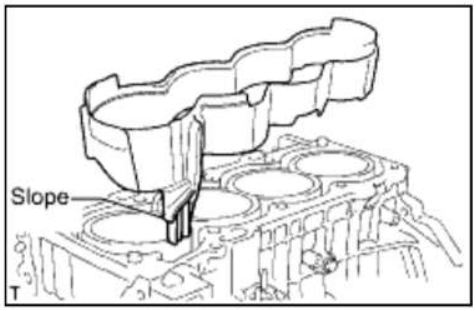
NOTICE:

Do not rotate the drain cocks more than 1 revolution (360°) after tightening the drain cock to the specified torque.

(c) Install the water drain cock plug to the water drain cock.

Torque: 13 N·m (130 kgf·cm, 9ft·lbf)

9. INSTALL CYLINDER BLOCK WATER JACKET SPACER



(a) Install the water jacket spacer as shown in the illustration.

HINT:

Be sure to face the slope to the front of the engine.

10. INSTALL CYLINDER HEAD GASKET INFO

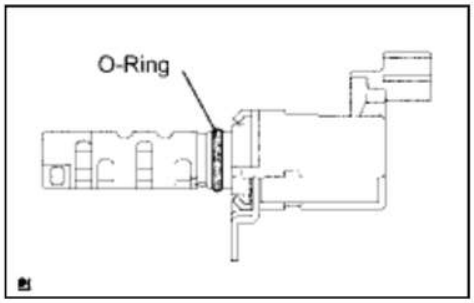
11. INSTALL CYLINDER HEAD SUB-ASSEMBLY INFO

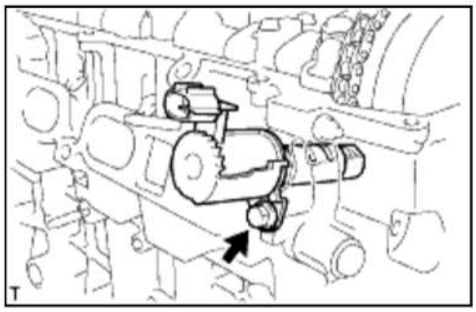
12. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Apply a light coat of engine oil onto a new O-ring.

(b) Install the O-ring to the camshaft timing oil control valve.

cardiagn.com



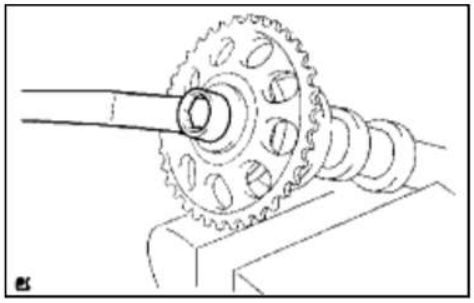


(c) Install the camshaft timing oil control valve with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

13. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

14. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET



(a) Clamp the camshaft in a vise, then install the camshaft timing sprocket with the bolt.

Torque: 54 N·m (551 kgf·cm, 40ft·lbf)

15. INSTALL NO. 1 CAMSHAFT BEARING

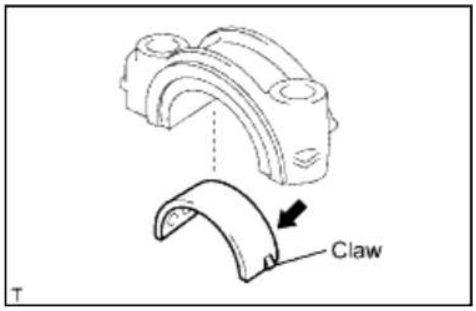
(a) Clean the installation surfaces and the inner and outer surfaces of the bearing.

NOTICE:

Keep the installation surfaces and the back surfaces of the bearing free of engine oil.

(b) Align the claws and install No. 1 camshaft bearing onto No. 1 camshaft bearing cap.

cardiagn.com

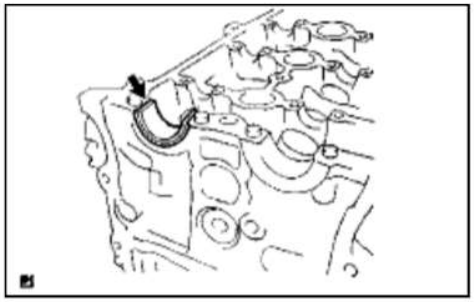


16. INSTALL NO. 2 CAMSHAFT BEARING

(a) Clean the installation surfaces and the inner and outer surfaces of the bearing.

NOTICE:

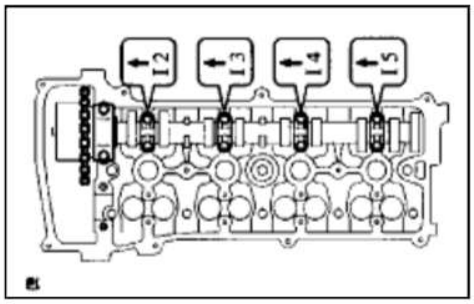
Keep the installation surfaces and the back surfaces of the bearing free of engine oil.



(b) Install the No. 2 camshaft bearing onto the cylinder head.

17. INSTALL CAMSHAFT

(a) Apply a light coat of engine oil to the journal portion.



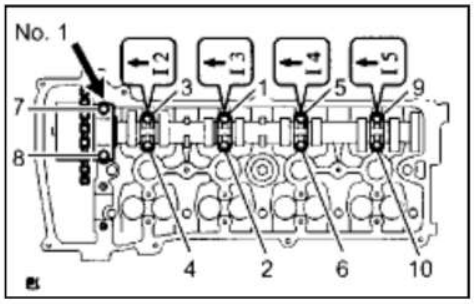
(b) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.

(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.

(d) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

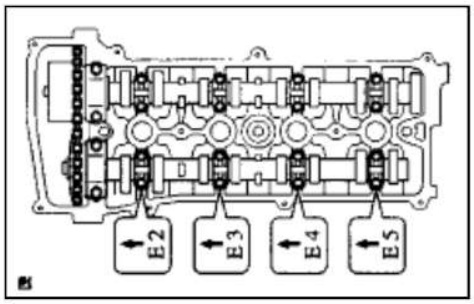
No. 1 Bearing cap - Torque: 30 N·m (301 kgf·cm, 22ft·lbf)
No. 3 Bearing cap - Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

cardiagn.com



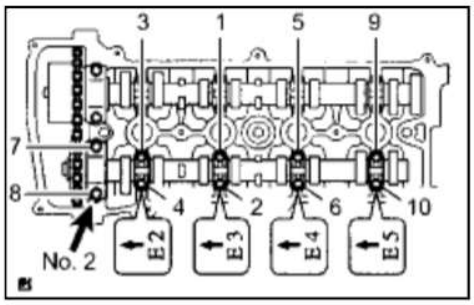
18. INSTALL NO. 2 CAMSHAFT

(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.



(b) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



(d) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

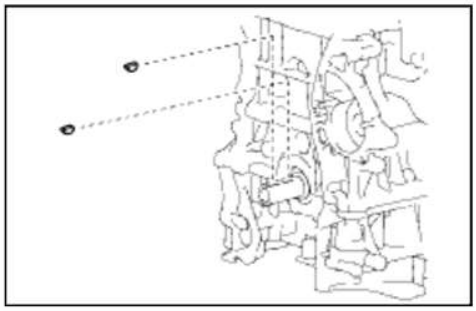
No. 2 Bearing cap - Torque: 30 N·m (301 kgf·cm, 22ft·lbf)

No. 3 Bearing cap - Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

19. INSTALL KEYS

(a) Install the 2 keys.

cardiagn.com



20. INSTALL NO. 2 CHAIN SUB-ASSEMBLY INFO

21. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET INFO

22. INSTALL NO. 1 CHAIN VIBRATION DAMPER INFO

23. INSTALL CHAIN SUB-ASSEMBLY INFO

24. INSTALL CHAIN TENSIONER SLIPPER INFO

25. INSTALL TIMING CHAIN GUIDE INFO

26. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE INFO

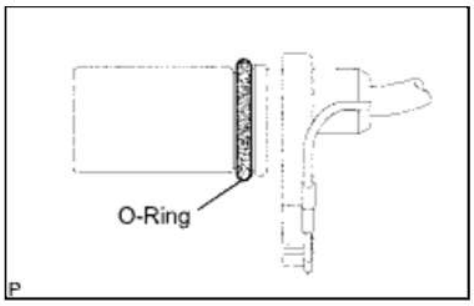
27. INSTALL FRONT CRANKSHAFT OIL SEAL INFO

28. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY INFO

29. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY INFO

30. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY INFO

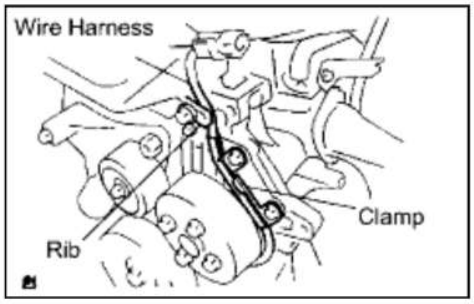
31. INSTALL CRANKSHAFT POSITION SENSOR

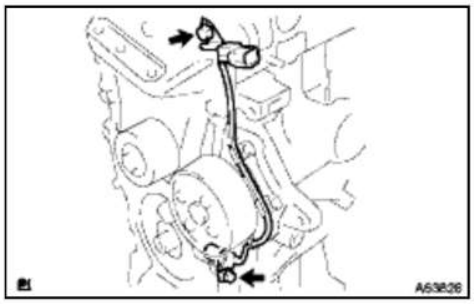


(a) Apply a light coat of engine oil to the O-ring of the sensor.

(b) Confirm that the wire harness of the sensor is placed as shown in the illustration.

cardiagn.com





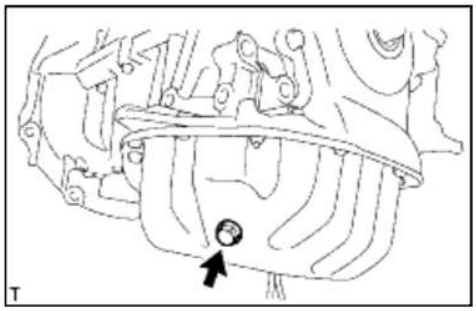
(c) Install the sensor with the 2 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

(d) Install the clamp of the crankshaft position sensor onto the water pump.

32. INSTALL OIL PAN SUB-ASSEMBLY INFO

33. INSTALL OIL PAN DRAIN PLUG



(a) Install the oil drain plug with a new gasket.

Torque: 25 N·m (255 kgf·cm, 18ft·lbf)

34. INSTALL WATER PUMP ASSEMBLY INFO

35. INSTALL WATER PUMP PULLEY INFO

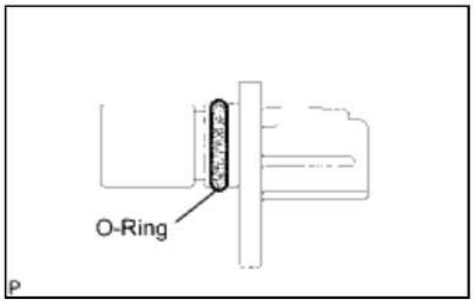
36. INSTALL CRANKSHAFT PULLEY INFO

37. INSPECT VALVE CLEARANCE INFO

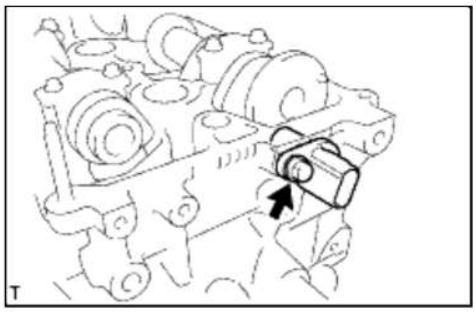
38. ADJUST VALVE CLEARANCE INFO

39. INSTALL CAMSHAFT POSITION SENSOR

cardiagn.com



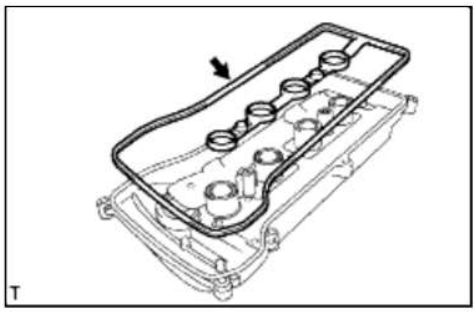
(a) Apply a light coat of engine oil onto the O-ring of the sensor.



(b) Install the camshaft position sensor with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

40. INSTALL CYLINDER HEAD COVER GASKET



(a) Install the cylinder head cover gasket onto the cylinder head cover.

41. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Remove any old packing material from the contact surface.

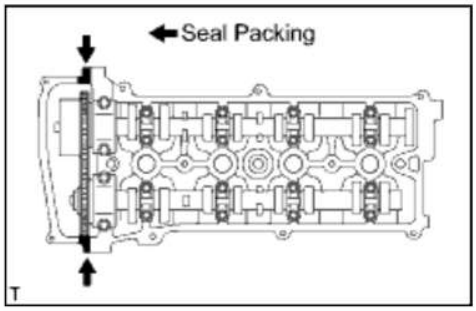
(b) Apply seal packing to the 2 locations shown in the illustration.

Seal Packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

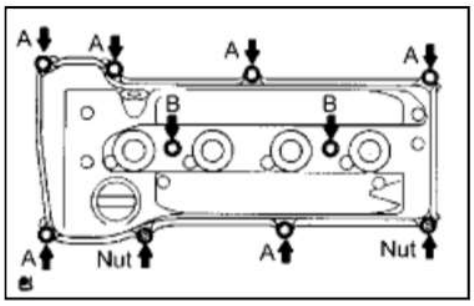
NOTICE:

- Remove any oil from the contact surfaces.

cardiagn.com



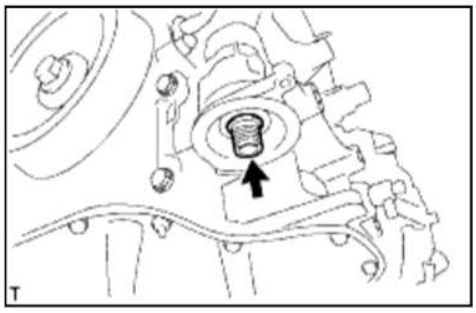
- Install the cylinder head cover within 3 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installing the cylinder head cover.



(c) Install the cylinder head cover with the 8 bolts and 2 nuts.

Bolt A - Torque: 11 N·m (112 kgf·cm, 8ft·lbf)
Bolt B - Torque: 14 N·m (143 kgf·cm, 10ft·lbf)
Nut - Torque: 11 N·m (112 kgf·cm, 8ft·lbf)

42. INSTALL OIL FILTER UNION



(a) Using a 12 mm socket hexagon wrench, install the oil filter union.

Torque: 30 N·m (306 kgf·cm, 22ft·lbf)

43. INSTALL OIL FILTER SUB-ASSEMBLY INFO

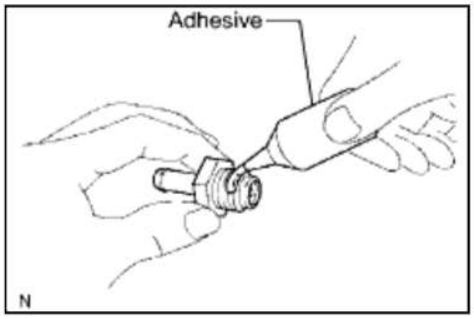
44. INSTALL SPARK PLUG INFO

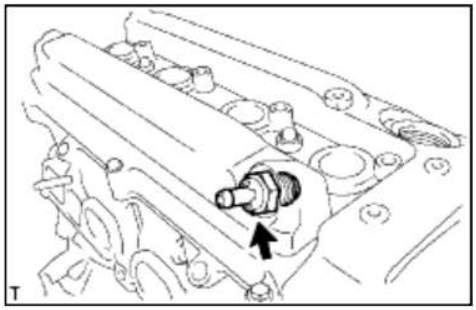
45. INSTALL VENTILATION VALVE SUB-ASSEMBLY

(a) Apply adhesive to the threads of the ventilation valve.

Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

cardiagn.com

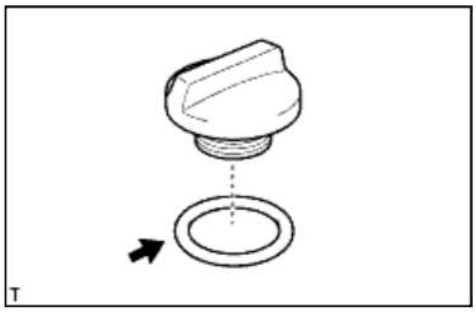




(b) Using a 22 mm deep socket wrench, install the ventilation valve onto the cylinder head cover.

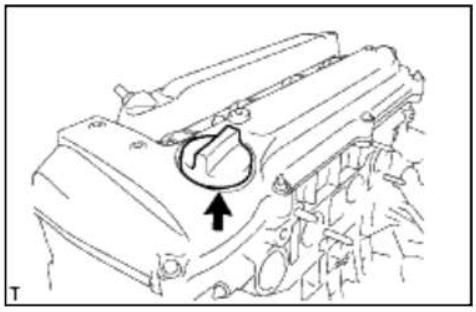
Torque: 19 N·m (194 kgf·cm, 14ft·lbf)

46. INSTALL OIL FILLER CAP GASKET



(a) Install the oil filler cap gasket onto the oil filler cap.

47. INSTALL OIL FILLER CAP SUB-ASSEMBLY



(a) Install the oil filler cap onto the cylinder head cover.

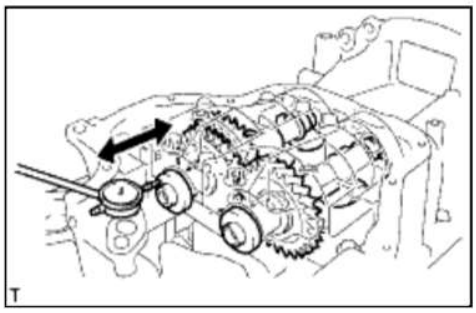
cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000026TQ018X
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE UNIT: INSPECTION (2010 Corolla)		

INSPECTION

1. INSPECT BALANCESHAFT THRUST CLEARANCE

(a) Install the balanceshafts INFO .



(b) Using a dial indicator, measure the thrust clearance while moving the balanceshaft back and forth.

Standard thrust clearance:
0.05 to 0.09 mm (0.0020 to 0.0035 in.)
Maximum thrust clearance:
0.09 mm (0.0035 in.)

If the thrust clearance is greater than the maximum, replace the balanceshaft housing and bearings. If necessary, replace the balanceshaft.

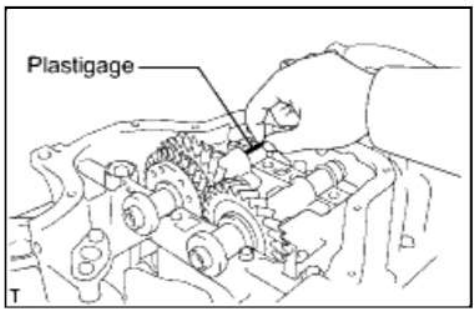
2. INSPECT BALANCESHAFT OIL CLEARANCE

(a) Clean each bearing and journal.

(b) Check each bearing and journal for pitting and scratches.

If a bearing or journal is damaged, replace the bearings. If necessary, replace the balanceshaft.

(c) Place the No. 1 and No. 2 balanceshafts onto the crankcase.



(d) Lay a strip of Plastigage across each journal.

(e) Install the balanceshaft housing INFO .

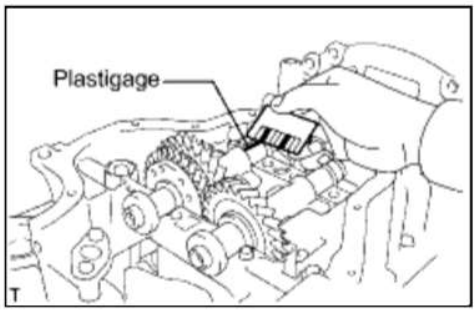
NOTICE:

Do not turn the balanceshafts.

(f) Remove the balanceshafts INFO .

(g) Measure the Plastigage at its widest point.

cardiagn.com



Standard oil clearance:
0.022 to 0.049 mm (0.0009 to 0.0019 in.)
Maximum oil clearance:
0.049 mm (0.0019 in.)

NOTICE:

Remove the Plastigage completely after the measurement.

If the oil clearance is greater than the maximum, replace the bearing. If necessary, replace the balanceshaft.

(h) If replacing a bearing, select a new one with the same number.

Standard Balanceshaft Housing Journal Bore Diameter:

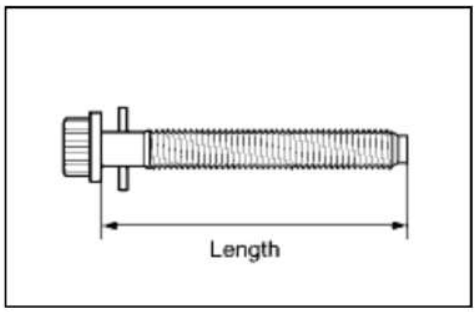
ITEM	SPECIFIED CONDITION
Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
Mark 2	26.007 to 26.012 mm (1.0239 to 1.0241 in.)
Mark 3	26.013 to 26.018 mm (1.0241 to 1.0243 in.)

Standard Bearing Center Wall Thickness:

ITEM	SPECIFIED CONDITION
Mark 1	1.486 to 1.489 mm (0.05850 to 0.05862 in.)
Mark 2	1.490 to 1.492 mm (0.05866 to 0.05874 in.)
Mark 3	1.493 to 1.495 mm (0.0588 to 0.0589 in.)

Standard balanceshaft journal diameter:
22.985 to 23.000 mm (0.9049 to 0.9055 in.)

(i) Inspect the balanceshaft housing bolts.



(1) Using a vernier caliper, measure the length of the bolts from the seat to the end.

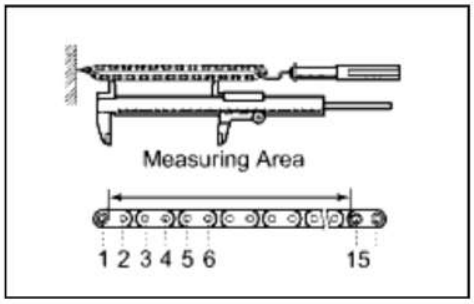
Standard bolt length:
58.3 to 59.7 mm (2.295 to 2.350 in.)
Maximum bolt length:
60.3 mm (2.374 in.)

If the bolt length is greater than the maximum, replace the balanceshaft housing bolt.

3. INSPECT CHAIN SUB-ASSEMBLY

(a) Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as

cardiagn.com



shown in the illustration.

(b) Using a vernier caliper, measure the length of 15 links.

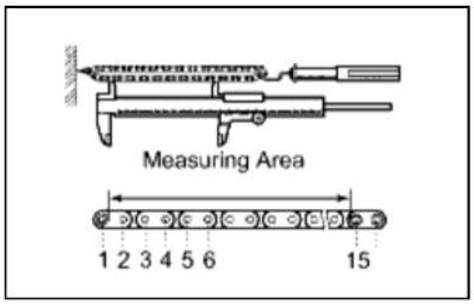
Maximum chain elongation:
114.5 mm (4.508 in.)

NOTICE:

Perform the measurement at 3 random places. Use the average of the measurements.

If the elongation is greater than the maximum, replace the chain.

4. INSPECT NO. 2 CHAIN SUB-ASSEMBLY



(a) Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.

(b) Using a vernier caliper, measure the length of 15 links.

Maximum chain elongation:
102.2 mm (4.024 in.)

NOTICE:

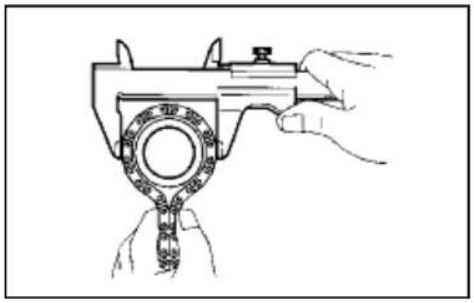
Perform the measurement at 3 random places. Use the average of the measurements.

If the elongation is greater than the maximum, replace the No. 2 chain.

5. INSPECT OIL PUMP DRIVE GEAR

(a) Wrap the chain around the sprocket.

cardiagn.com



(b) Using a vernier caliper, measure the sprocket diameter with the chain wrapped around.

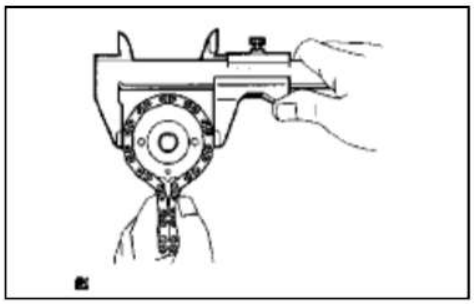
Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

6. INSPECT OIL PUMP DRIVE SHAFT GEAR



(a) Wrap the chain around the sprocket.

(b) Using a vernier caliper, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:

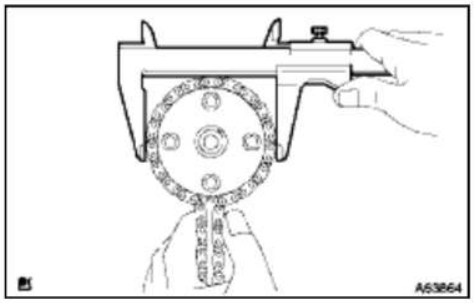
The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

7. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Wrap the chain around the sprocket.

cardiagn.com



(b) Using a vernier caliper, measure the sprocket diameter with the chain wrapped around.

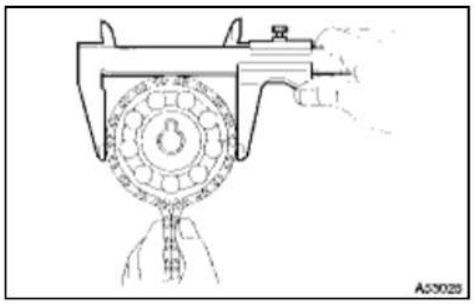
Minimum gear diameter (with chain):
97.3 mm (3.831 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

8. INSPECT CAMSHAFT TIMING GEAR OR SPROCKET



(a) Wrap the chain around the sprocket.

(b) Using a vernier caliper, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain):
97.3 mm (3.831 in.)

NOTICE:

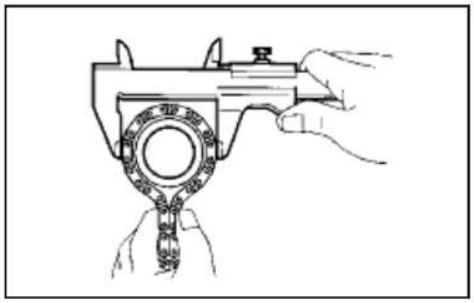
The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

9. INSPECT CRANKSHAFT TIMING GEAR OR SPROCKET

(a) Wrap the chain around the timing sprocket.

cardiagn.com



(b) Using a vernier caliper, measure the timing gear diameter with the chain wrapped around.

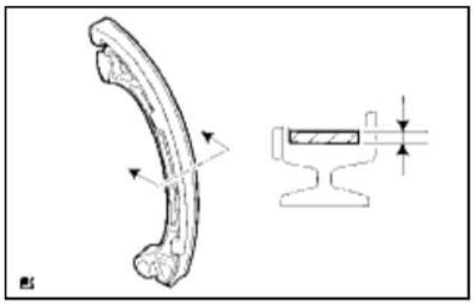
Minimum gear diameter (with chain):
51.6 mm (2.031 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the gear diameter is less than the minimum, replace the chain sub-assembly and crankshaft timing sprocket.

10. INSPECT CHAIN TENSIONER SLIPPER

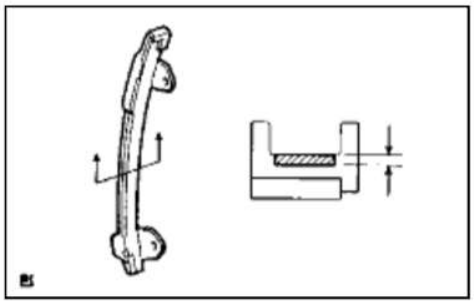


(a) Using a vernier caliper, measure the tensioner slipper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the chain tensioner slipper.

11. INSPECT NO. 1 CHAIN VIBRATION DAMPER



(a) Using a vernier caliper, measure the vibration damper wear.

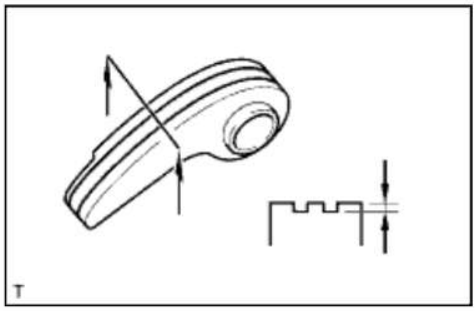
Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the No. 1 chain vibration damper.

12. INSPECT CHAIN TENSIONER PLATE

(a) Using a vernier caliper, measure the vibration damper

cardiagn.com

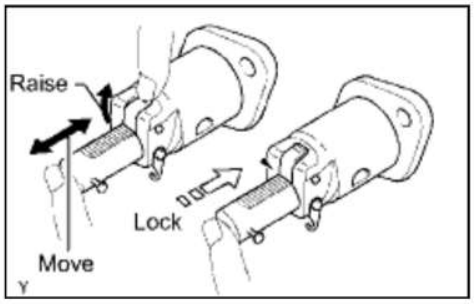


wear.

Maximum wear:
0.5 mm (0.020 in.)

If the wear is greater than the maximum, replace the chain tensioner plate.

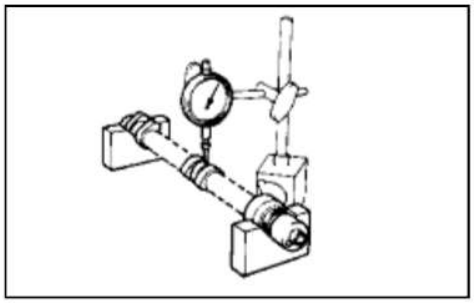
13. INSPECT NO. 1 CHAIN TENSIONER ASSEMBLY



(a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.

(b) Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

14. INSPECT CAMSHAFT



(a) Inspect the camshaft for runout.

(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:
0.03 mm (0.0012 in.)

If the circle runout is greater than the maximum, replace the camshaft.

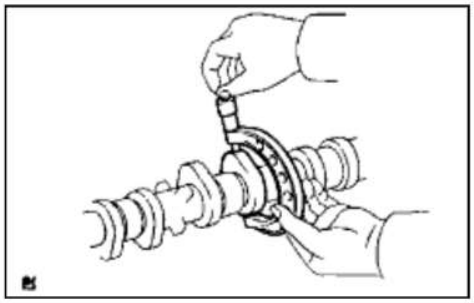
(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe heights.

Standard cam lobe height:
47.306 to 47.406 mm (1.8624 to 1.8664 in.)
Minimum cam lobe height:
47.196 mm (1.8581 in.)

If any of the cam lobe heights are less than the

cardiagn.com

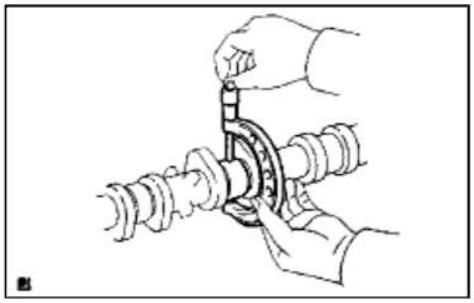


minimum, replace the camshaft.

(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

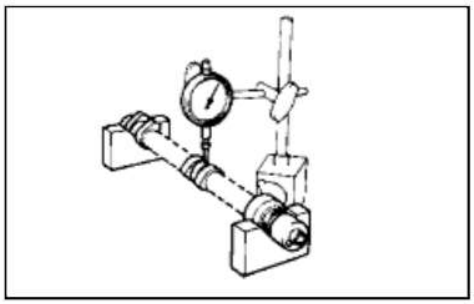
Standard Journal Diameter:



JOURNAL POSITION	SPECIFIED CONDITION
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Others	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

If the journal diameter is not as specified, check the oil clearance.

15. INSPECT NO. 2 CAMSHAFT



(a) Inspect the camshaft for runout.

(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:
0.03 mm (0.0012 in.)

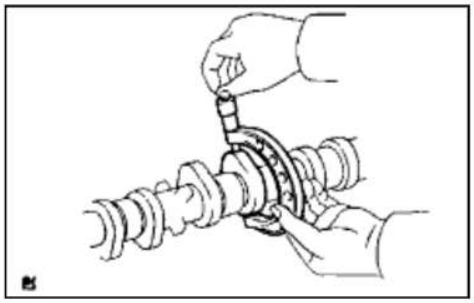
If the circle runout is greater than the maximum, replace the No. 2 camshaft.

(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe heights.

Standard cam lobe height:
46.063 to 46.163 mm (1.8135 to 1.8174 in.)
Minimum cam lobe height:
45.953 mm (1.8092 in.)

cardiagn.com

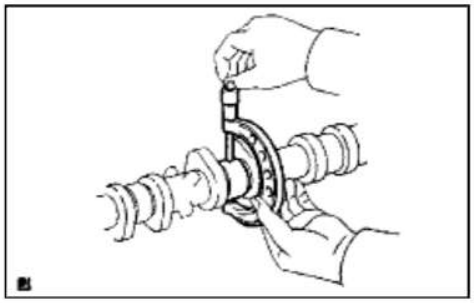


If any of the cam lobe heights are less than the minimum, replace the No. 2 camshaft.

(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

Standard Journal Diameter:



JOURNAL POSITION	SPECIFIED CONDITION
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Others	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

If the journal diameter is not as specified, check the oil clearance.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000003 2Z9007X
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE UNIT: REMOVAL (2010 Corolla)		

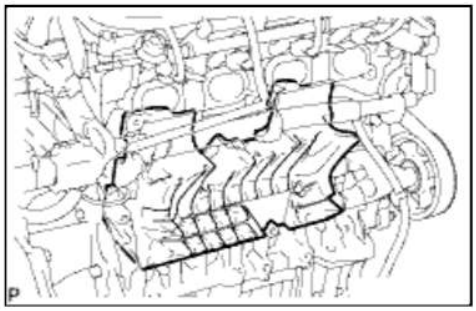
REMOVAL

1. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

2. REMOVE FUEL INJECTOR ASSEMBLY INFO

3. REMOVE INTAKE MANIFOLD INFO

4. REMOVE NO. 1 INTAKE MANIFOLD INSULATOR



(a) Remove the No. 1 intake manifold insulator.

5. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

6. REMOVE MANIFOLD STAY INFO

7. REMOVE NO. 2 MANIFOLD STAY INFO

8. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY INFO

9. REMOVE INLET WATER INFO

10. REMOVE THERMOSTAT INFO

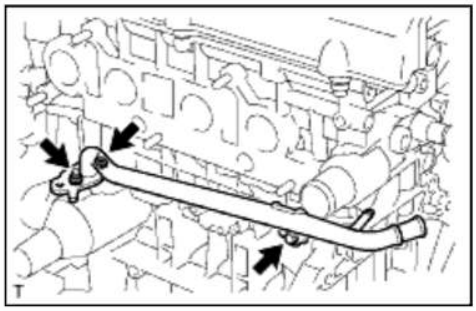
11. REMOVE ENGINE OIL LEVEL DIPSTICK

12. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE INFO

13. REMOVE NO. 1 WATER BY-PASS PIPE

(a) Remove the bolt and 2 nuts, then remove the No. 1 water by-pass pipe.

cardiagn.com



(b) Remove the gasket.

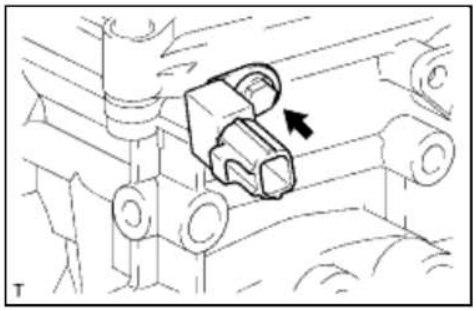
14. REMOVE IGNITION COIL ASSEMBLY INFO

15. REMOVE KNOCK SENSOR INFO

16. REMOVE OIL PRESSURE SWITCH INFO

17. REMOVE ENGINE COOLANT TEMPERATURE SENSOR INFO

18. REMOVE RADIO SETTING CONDENSER



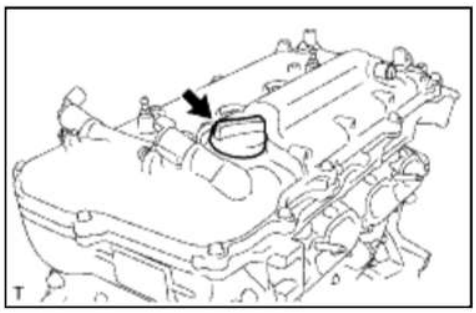
(a) Remove the bolt and radio setting condenser.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA302NX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: DISASSEMBLY (2010 Corolla)		

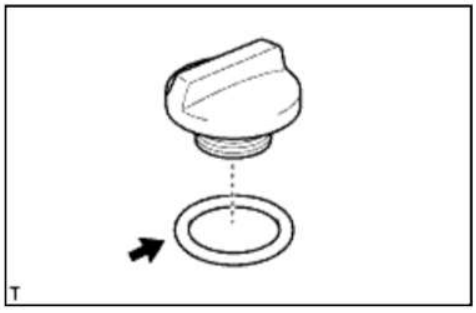
DISASSEMBLY

1. REMOVE OIL FILLER CAP SUB-ASSEMBLY



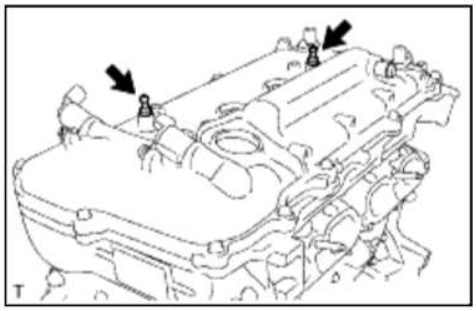
(a) Remove the oil filler cap.

2. REMOVE OIL FILLER CAP GASKET



(a) Remove the gasket from the oil filler cap.

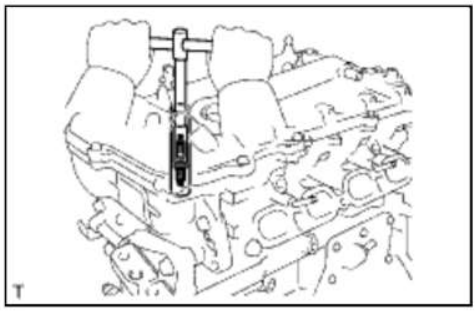
3. REMOVE ENGINE COVER JOINT



(a) Remove the 2 engine cover joints.

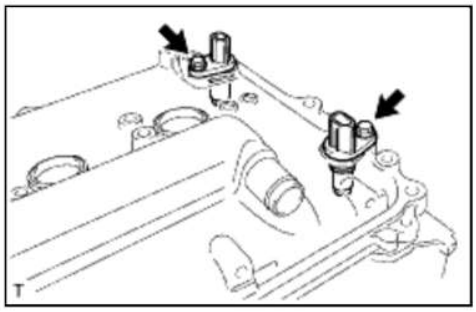
4. REMOVE SPARK PLUG

cardiagn.com



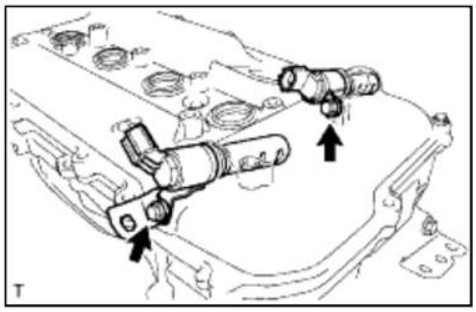
(a) Using a 14 mm spark plug wrench, remove the 4 spark plugs.

5. REMOVE CAMSHAFT POSITION SENSOR



(a) Remove the 2 bolts and 2 sensors.

6. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



(a) Remove the 2 bolts, O-rings, bracket and 2 oil control valves.

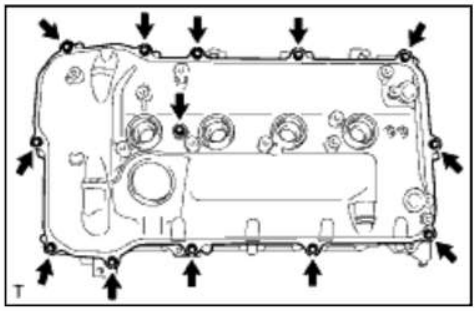
7. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

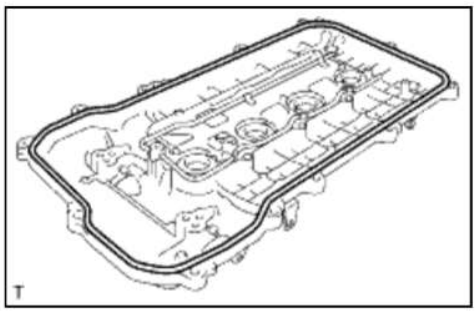
(a) Remove the 13 bolts, seal washer and cylinder head cover.

NOTICE:

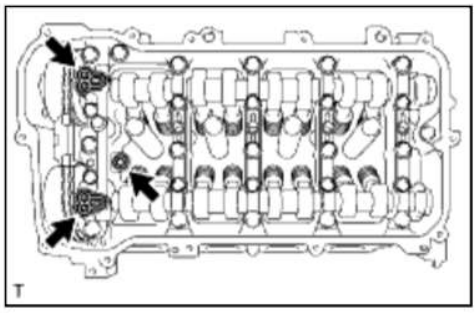
Be careful not to drop any of the gaskets into the engine when removing the cylinder head cover because the gaskets may stick to the cylinder head cover.

cardiagn.com





(b) Remove the cylinder head cover gasket.



(c) Remove the 3 gaskets from the camshaft bearing cap.

8. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

9. REMOVE CRANKSHAFT PULLEY INFO

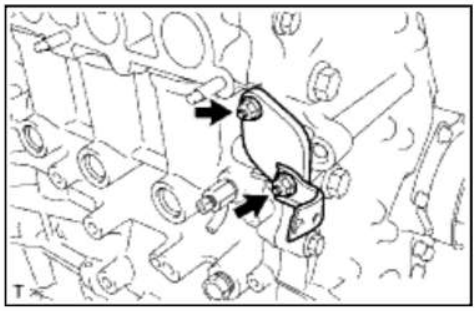
10. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

(a) Remove the 2 nuts, bracket, tensioner and gasket.

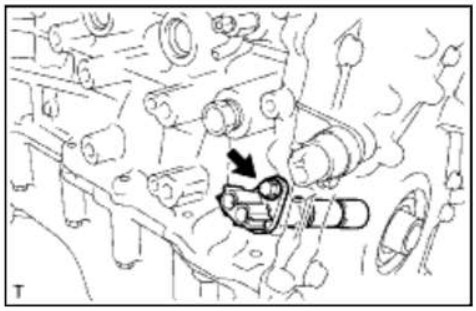
NOTICE:

Do not turn the crankshaft without the chain tensioner installed.

cardiagn.com

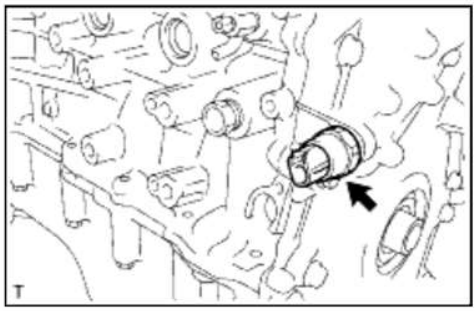


11. REMOVE CRANKSHAFT POSITION SENSOR



(a) Remove the bolt and sensor.

12. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY

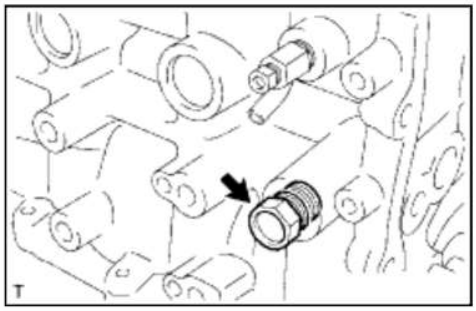


(a) Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.

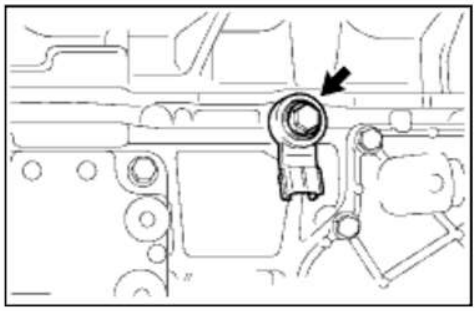
13. REMOVE NO. 1 TAPER SCREW PLUG

(a) Remove the taper screw plug.

cardiagn.com

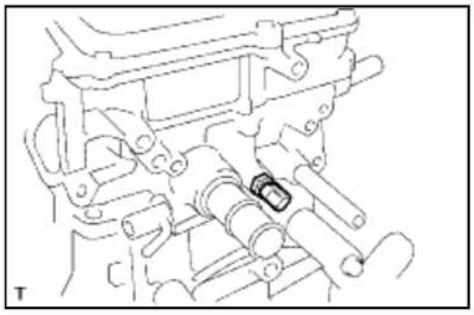


14. REMOVE KNOCK CONTROL SENSOR



(a) Remove the bolt and sensor.

15. REMOVE ENGINE COOLANT TEMPERATURE SENSOR



(a) Using a 19 mm deep socket wrench, remove the sensor.

(b) Remove the gasket from the engine coolant temperature sensor.

16. REMOVE OIL FILTER CAP ASSEMBLY INFO

17. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY INFO

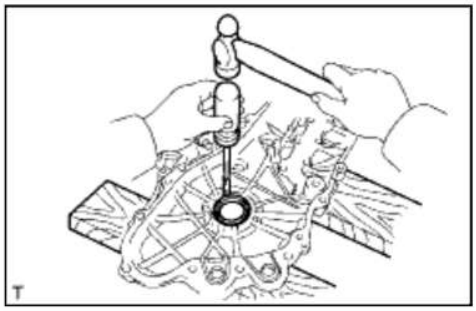
18. REMOVE TIMING CHAIN COVER OIL SEAL

(a) Using a screwdriver and hammer, remove the oil seal.

NOTICE:

Be careful not to damage the timing chain cover.

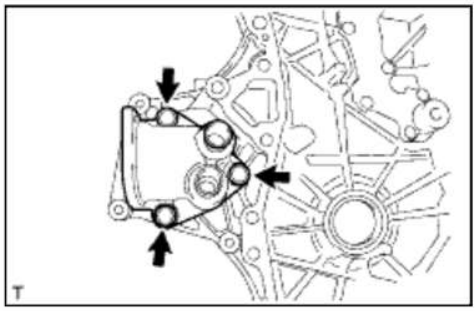
cardiagn.com



HINT:

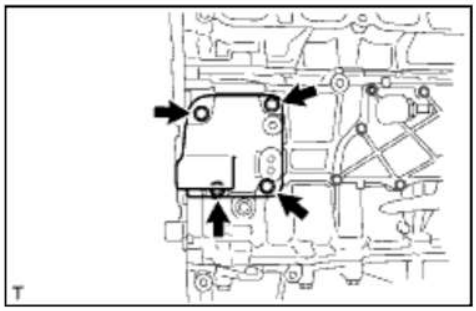
Tape the screwdriver tip before use.

19. REMOVE INLET WATER HOUSING



(a) Remove the 3 bolts, gasket and inlet water housing.

20. REMOVE NO. 1 GENERATOR BRACKET



(a) Remove the 4 bolts and No. 1 generator bracket.

21. REMOVE CHAIN TENSIONER SLIPPER INFO

22. REMOVE NO. 1 CHAIN VIBRATION DAMPER INFO

23. REMOVE CHAIN SUB-ASSEMBLY INFO

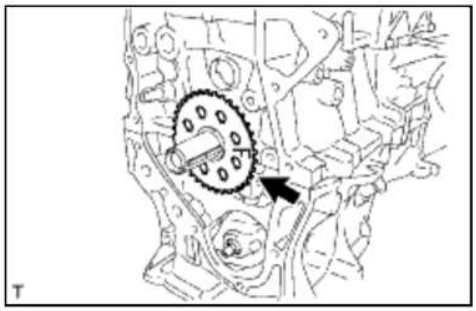
24. REMOVE NO. 2 CHAIN VIBRATION DAMPER INFO

25. REMOVE CRANKSHAFT TIMING SPROCKET INFO

26. REMOVE NO. 2 CHAIN SUB-ASSEMBLY INFO

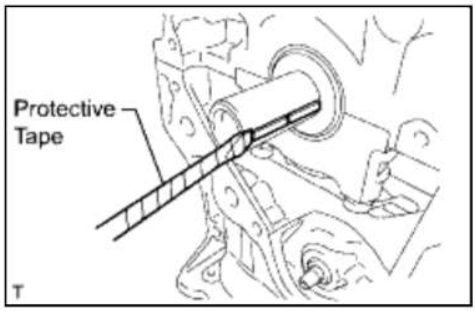
27. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE

cardiagn.com



(a) Remove the No. 1 crankshaft position sensor plate.

28. REMOVE CRANKSHAFT TIMING GEAR KEY



(a) Using a screwdriver, remove the 2 crankshaft timing gear keys.

HINT:

Tape the screwdriver tip before use.

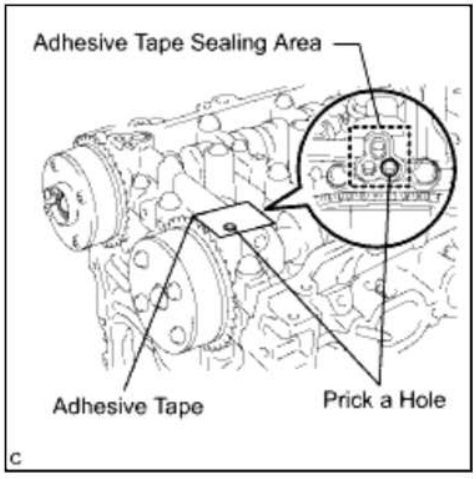
29. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

(a) Check the lock of the camshaft timing gear.

(b) Release the lock pin.

NOTICE:

Before removing the camshaft timing gear assembly, make sure that the lock pin has been released.



(1) After cleaning and degreasing the VVT oil hole on the intake side of the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

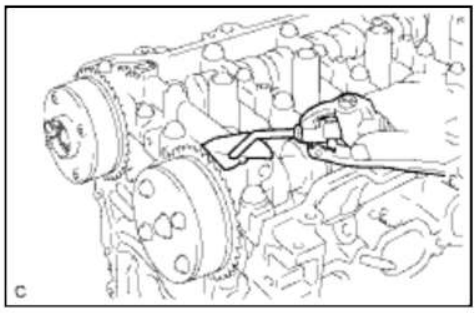
NOTICE:

Be sure to cover the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

(2) Prick a hole in the tape covering the oil hole as shown in the illustration. (Procedure A)

cardiagn.com

(3) Apply approximately 150 kPa (1.5 kgf/cm2, 22 psi) of air pressure to the hole pricked in procedure A to release the lock pin.



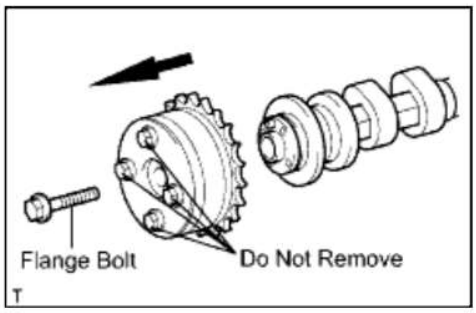
NOTICE:

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.
- Do not lock the camshaft timing gear assembly. If it is locked, release the lock pin again.

HINT:

- The camshaft timing gear assembly may be turned in the advance direction without applying any force.
- If enough air pressure cannot be applied because of air leakage from the port, releasing the lock pin may be difficult.

(4) Remove the adhesive tape from the No. 1 camshaft bearing cap.

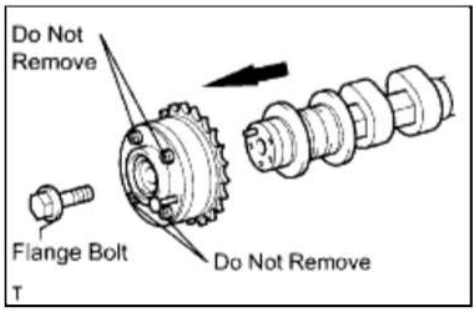


(c) Remove the flange bolt while holding the hexagonal portion of the camshaft, then remove the camshaft timing gear assembly.

NOTICE:

- Before removing the camshaft timing gear, make sure that the lock pin has been released.
- Be sure not to remove the other 4 bolts.
- Keep the camshaft timing gear assembly horizontal while removing it from the camshaft.

30. REMOVE CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY



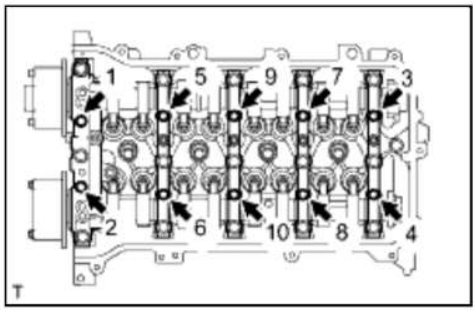
(a) Remove the flange bolt while holding the hexagonal portion of the camshaft, then remove the camshaft timing exhaust gear assembly.

NOTICE:

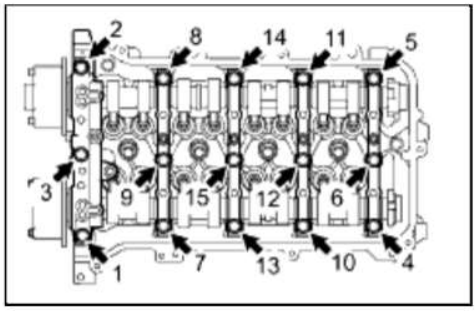
- Be sure not to remove the other 4 bolts.
- Keep the camshaft timing exhaust gear assembly horizontal while removing it from the camshaft.

31. REMOVE CAMSHAFT BEARING CAP

cardiagn.com



(a) Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.



(b) Uniformly loosen and remove the 15 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

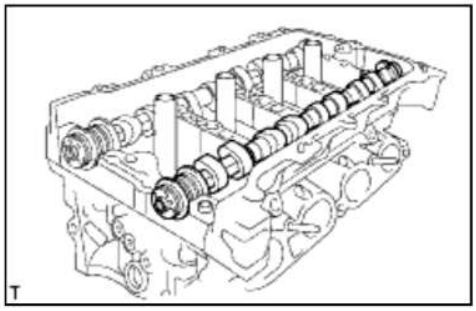
Uniformly loosen the bolts while keeping the camshaft level.

(c) Remove the 5 bearing caps.

HINT:

Arrange the removed parts in the correct order.

32. REMOVE CAMSHAFT

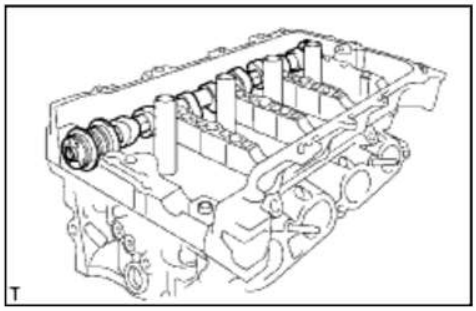


(a) Remove the camshaft.

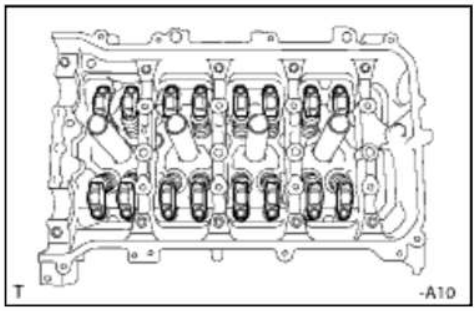
33. REMOVE NO. 2 CAMSHAFT

(a) Remove the No. 2 camshaft.

cardiagn.com



34. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

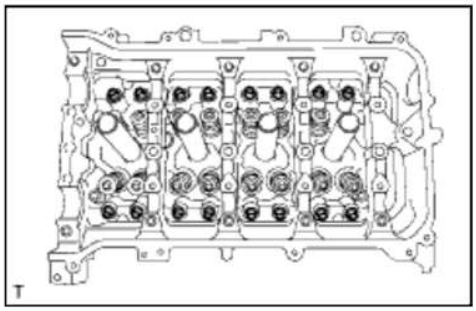


(a) Remove the 16 valve rocker arms.

HINT:

Arrange the removed parts in the correct order.

35. REMOVE VALVE LASH ADJUSTER ASSEMBLY



(a) Remove the 16 valve lash adjusters from the cylinder head.

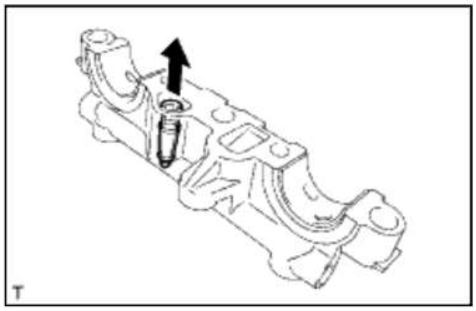
HINT:

Arrange the removed parts in the correct order.

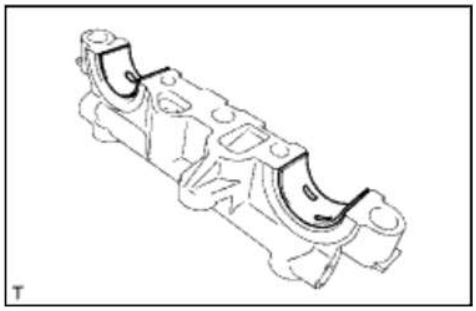
36. REMOVE OIL CONTROL VALVE FILTER

(a) Remove the oil control valve filter.

cardiagn.com

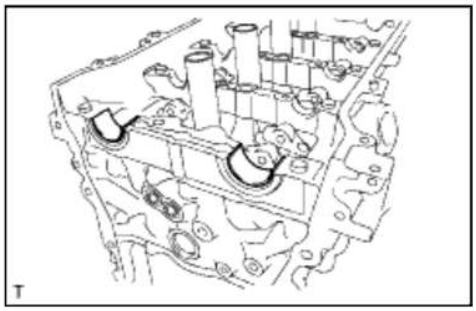


37. REMOVE NO. 1 CAMSHAFT BEARING



(a) Remove the 2 No. 1 camshaft bearings.

38. REMOVE NO. 2 CAMSHAFT BEARING

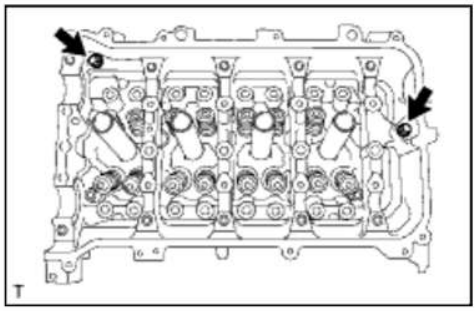


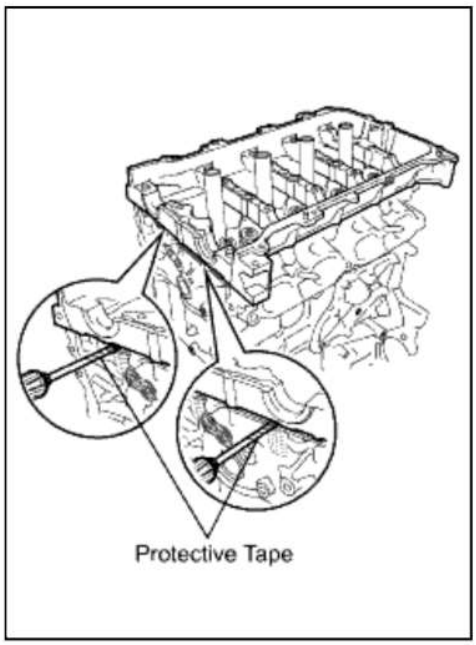
(a) Remove the 2 No. 2 camshaft bearings.

39. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY

(a) Remove the 2 bolts.

cardiagn.com





(b) Remove the camshaft housing by prying between the cylinder head and camshaft housing with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

Tape the screwdriver tip before use.

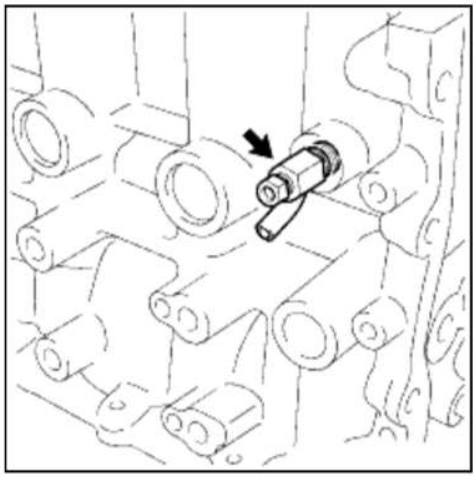
40. REMOVE CYLINDER HEAD SUB-ASSEMBLY INFO

41. REMOVE CYLINDER HEAD GASKET INFO

42. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

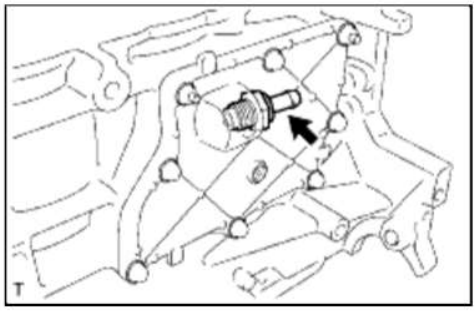
(a) Remove the water drain cock plug from the water drain cock sub-assembly.

cardiagn.com



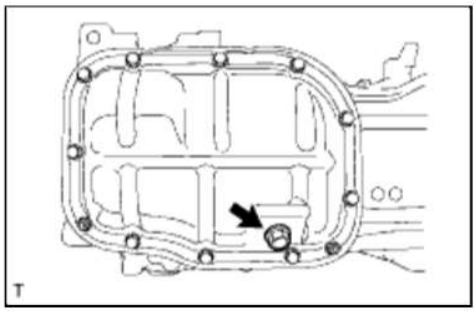
(b) Remove the cylinder block water drain cock sub-assembly from the cylinder block.

43. REMOVE VENTILATION VALVE SUB-ASSEMBLY



(a) Remove the ventilation valve.

44. REMOVE OIL PAN DRAIN PLUG



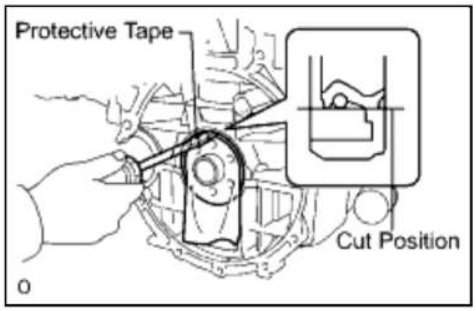
(a) Remove the oil pan drain plug and gasket.

45. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY INFO

46. REMOVE OIL PUMP ASSEMBLY INFO

47. REMOVE REAR ENGINE OIL SEAL

cardiagn.com



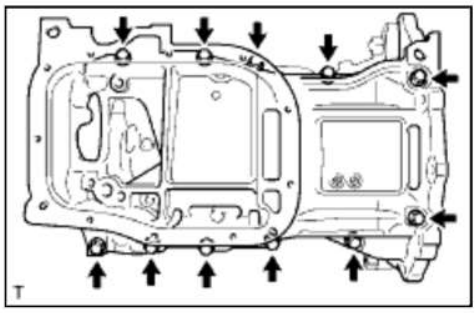
(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with its tip taped, pry out the oil seal.

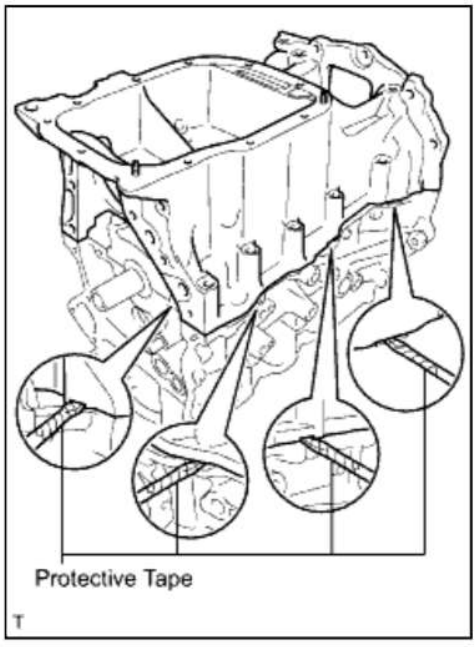
NOTICE:

After removing the oil seal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.

48. REMOVE STIFFENING CRANKCASE ASSEMBLY



(a) Uniformly loosen and remove the 11 bolts.



(b) Using a screwdriver, remove the crankcase by prying between the crankcase and cylinder block.

NOTICE:

Be careful not to damage the contact surfaces of the crankcase and cylinder block.

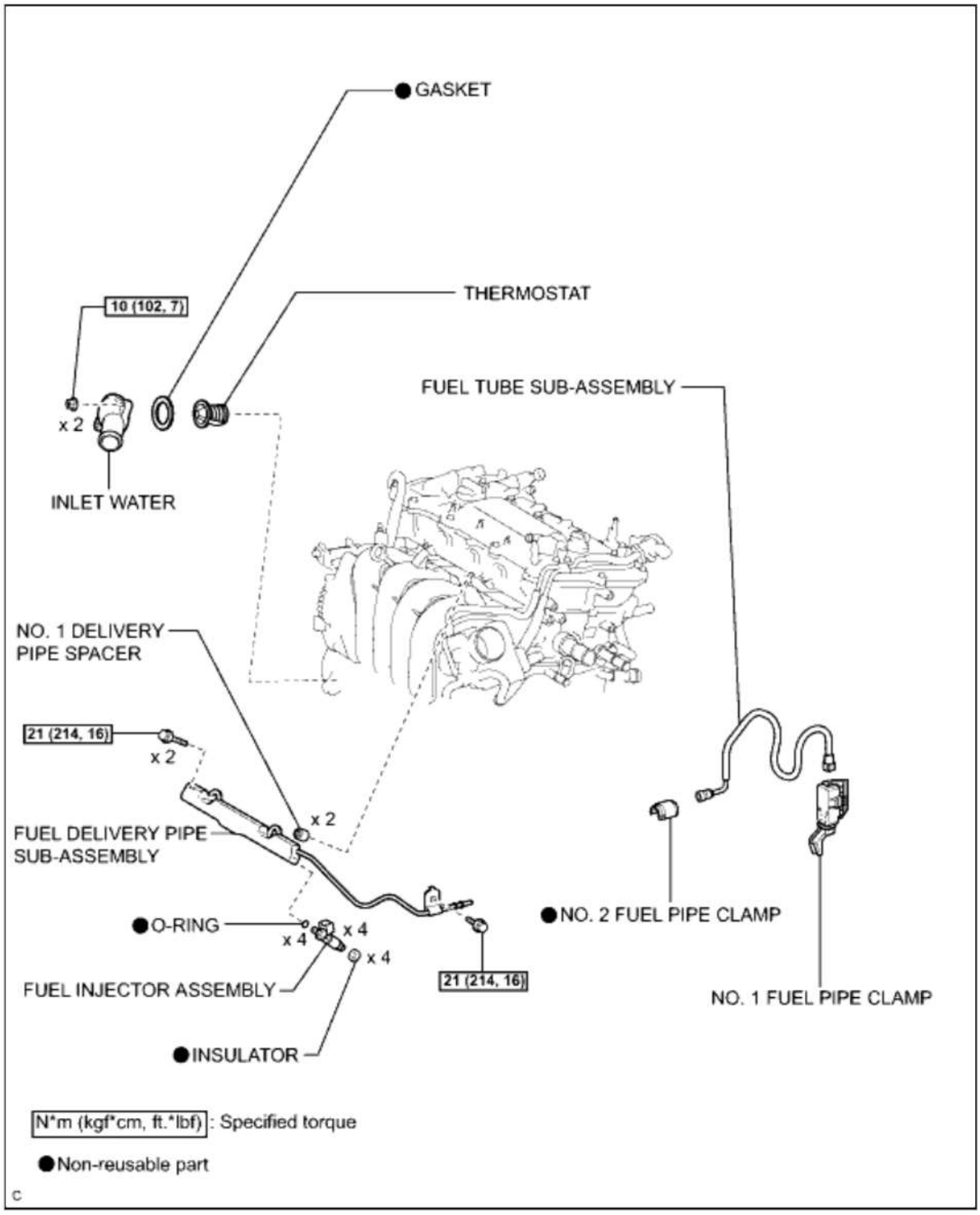
cardiagn.com

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA800WX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: COMPONENTS (2010 Corolla)		

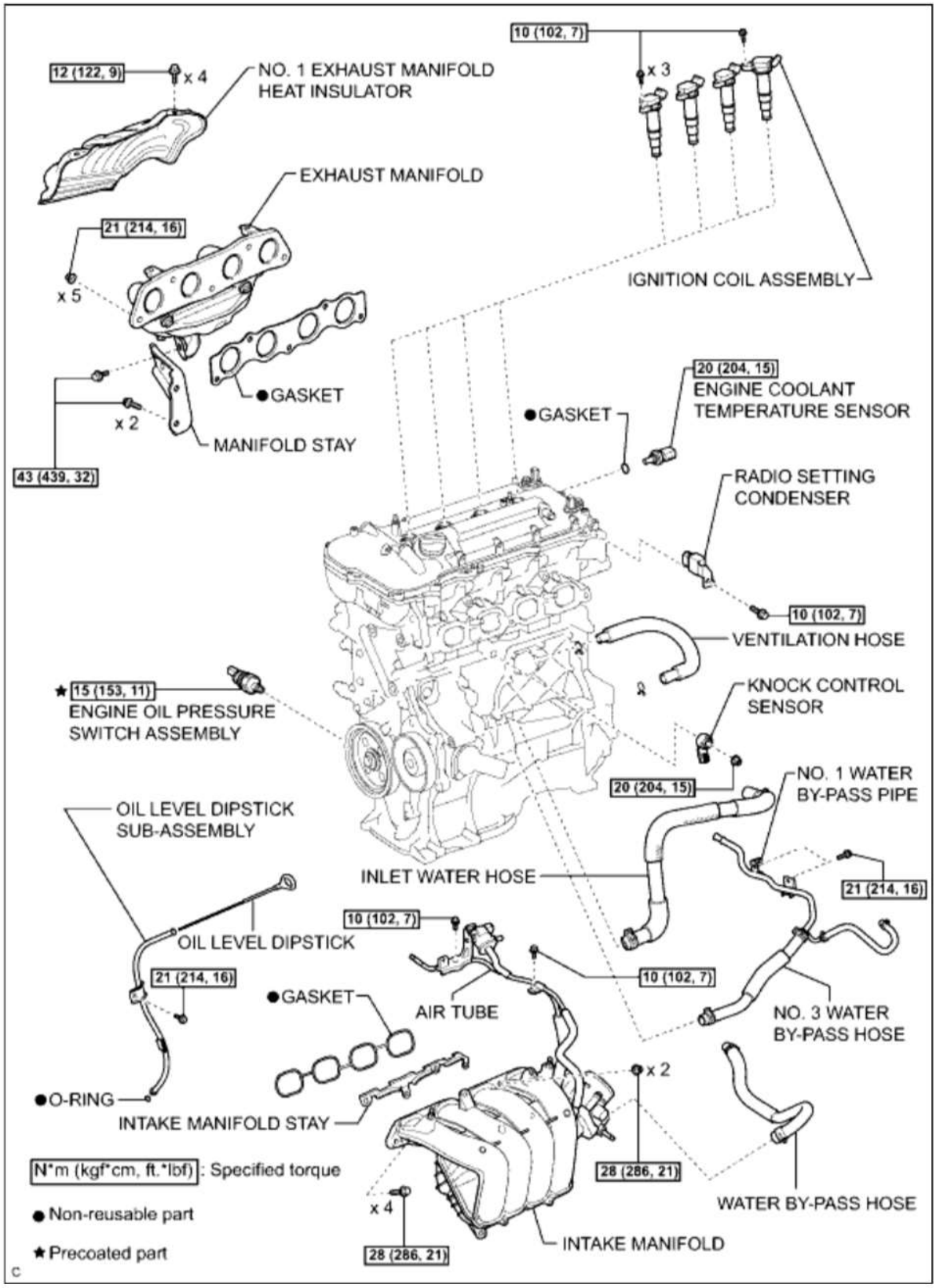
COMPONENTS

ILLUSTRATION



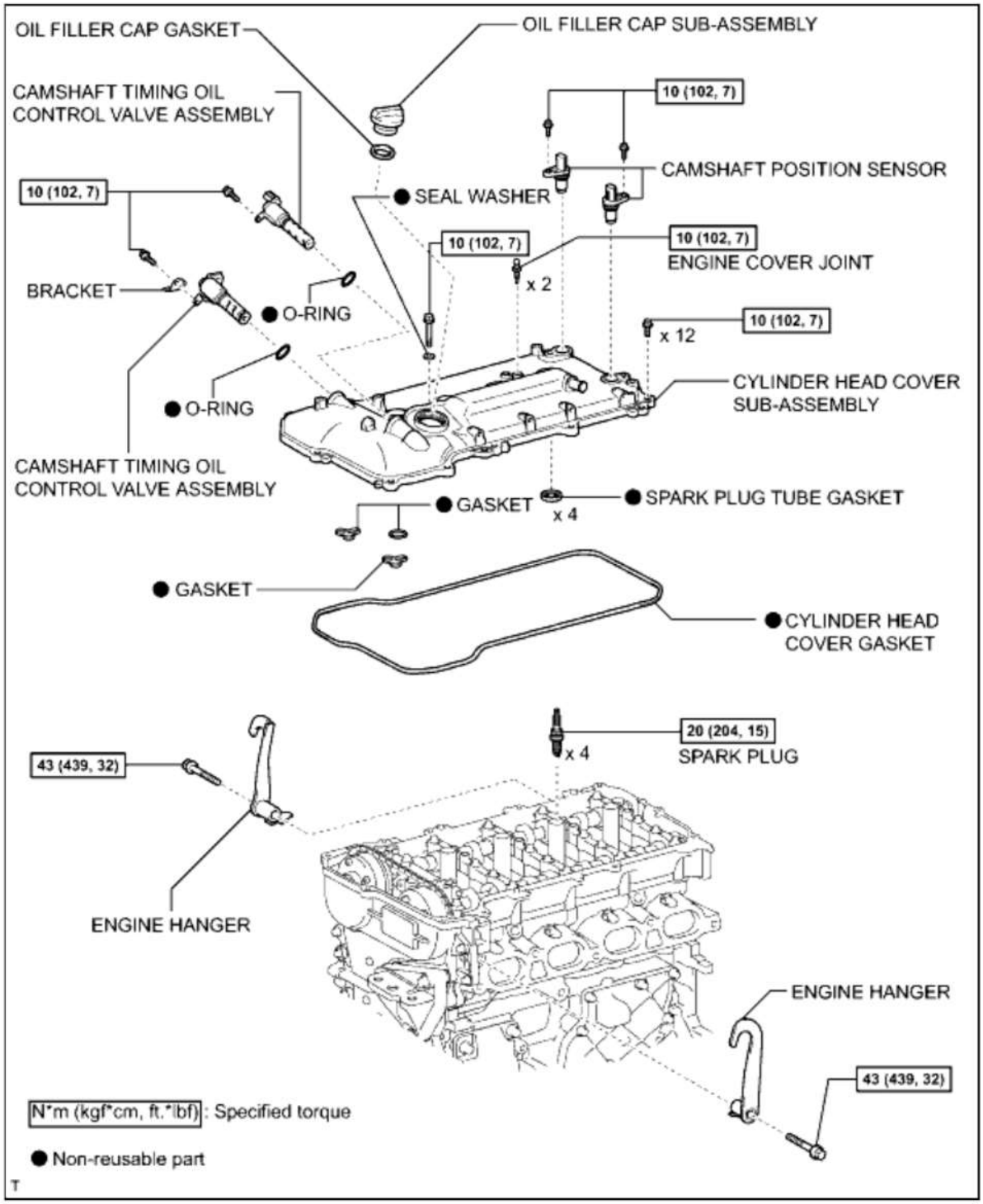
cardiagn.com

ILLUSTRATION



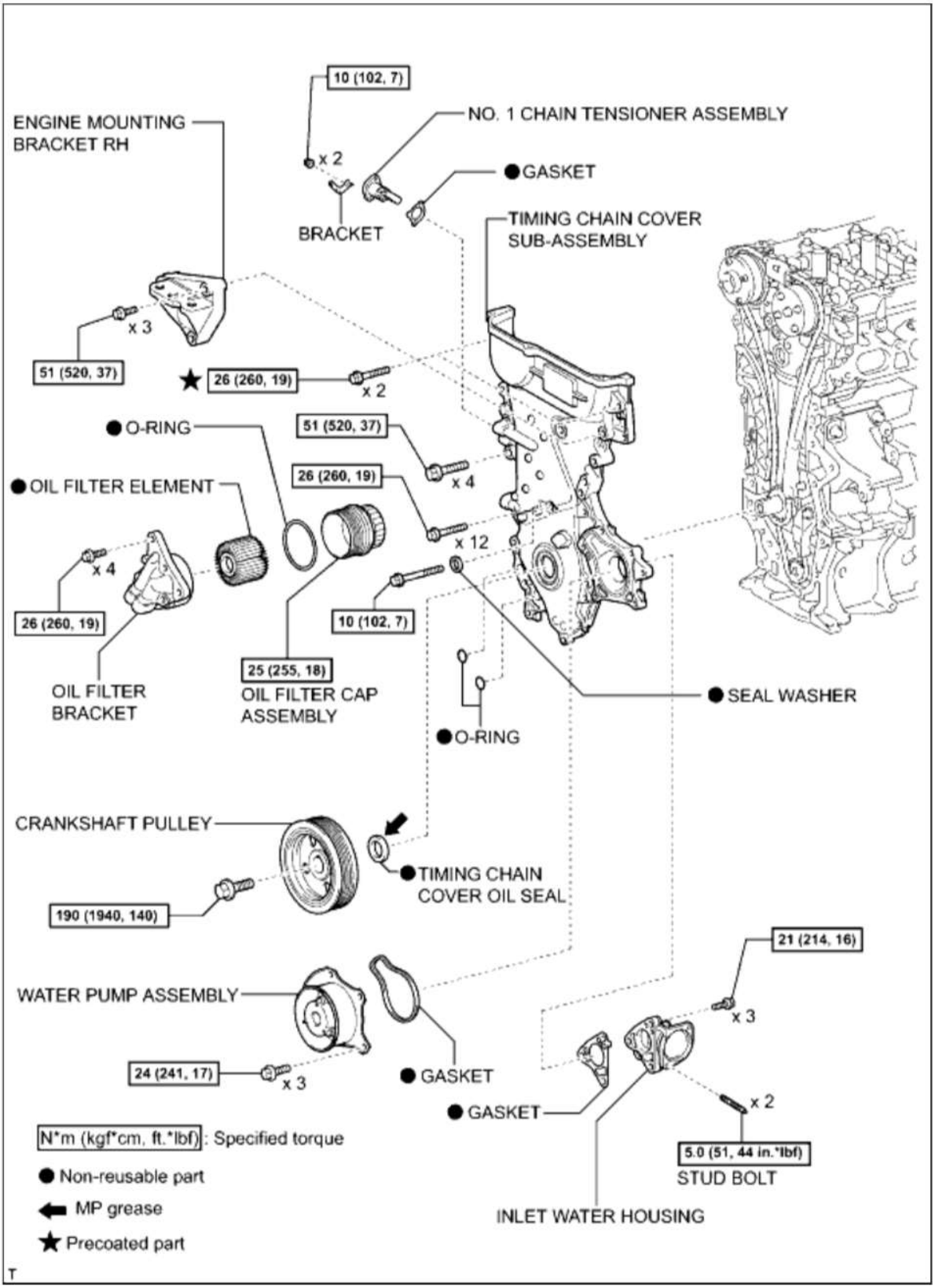
cardiagn.com

ILLUSTRATION



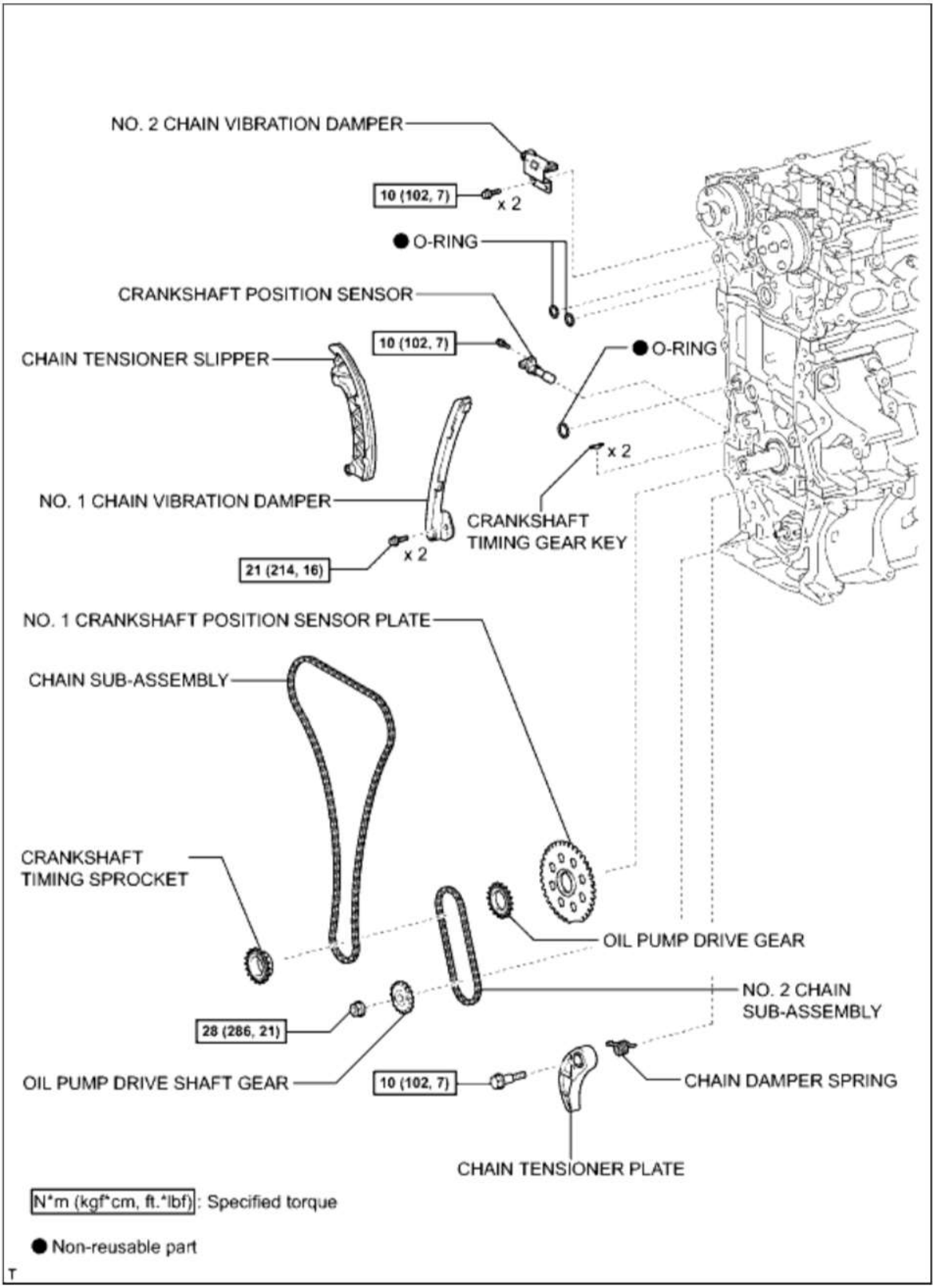
ILLUSTRATION

cardiagn.com



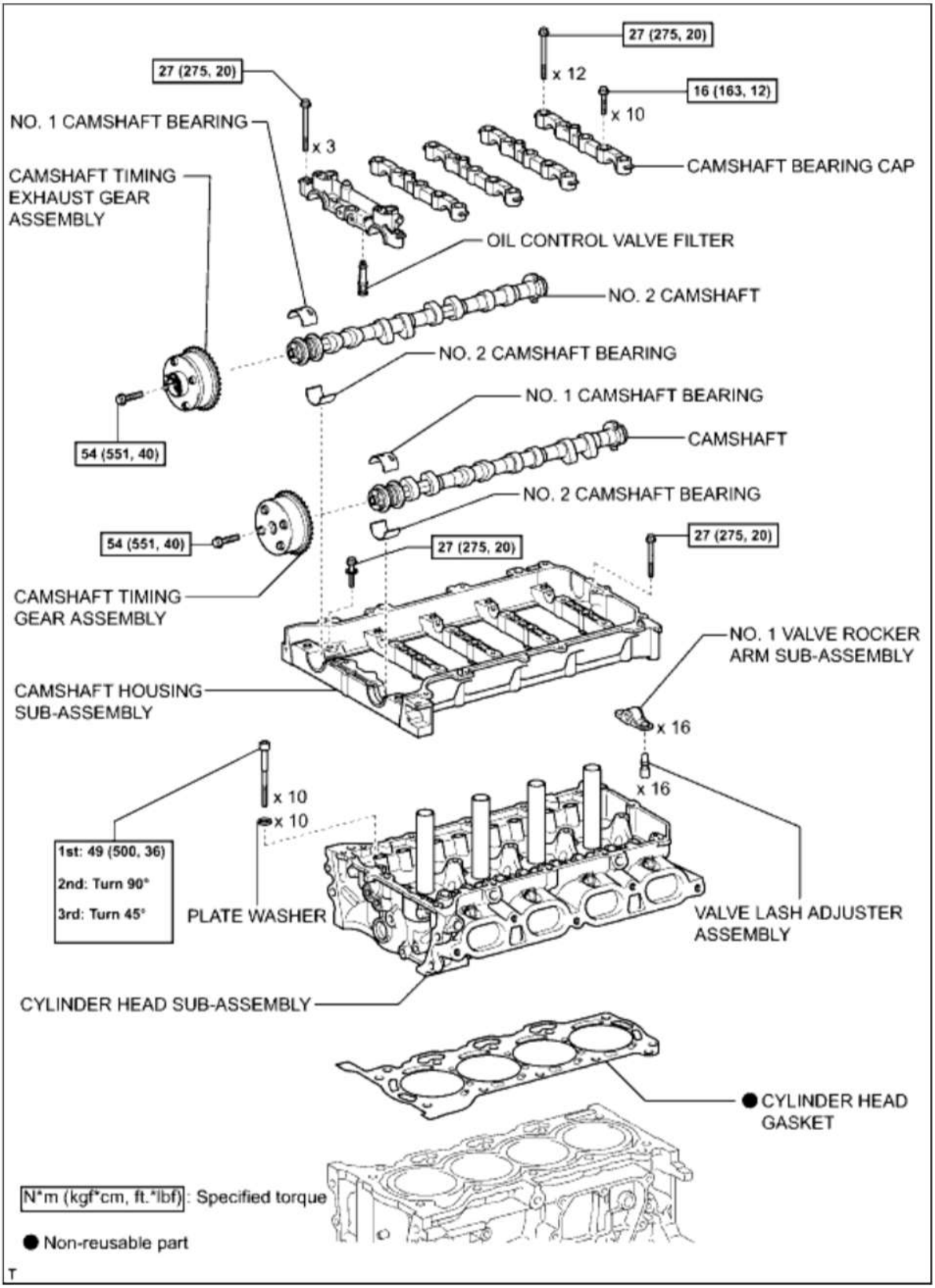
ILLUSTRATION

cardiagn.com



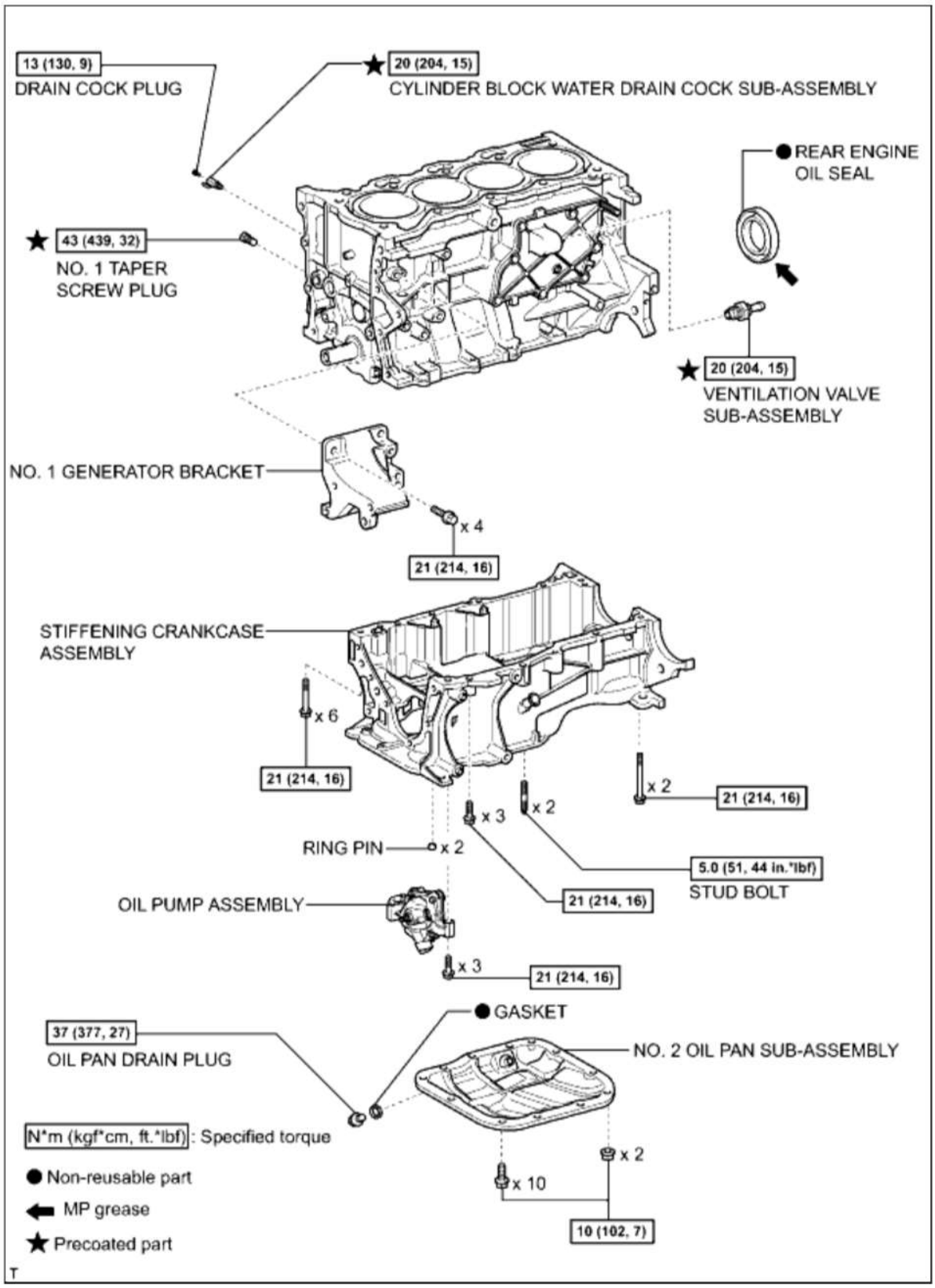
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com

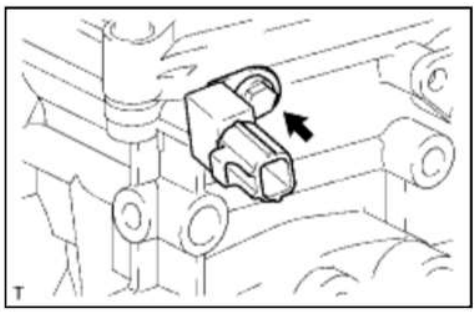


cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000003 2Z8007X
Title: 2AZ-FE ENGINE MECHANICAL: ENGINE UNIT: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL RADIO SETTING CONDENSER



(a) Install the condenser with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

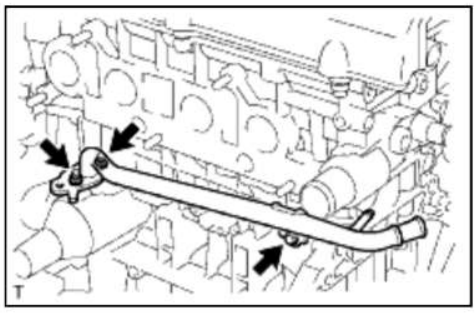
2. INSTALL ENGINE COOLANT TEMPERATURE SENSOR INFO

3. INSTALL OIL PRESSURE SWITCH INFO

4. INSTALL KNOCK SENSOR INFO

5. INSTALL IGNITION COIL ASSEMBLY INFO

6. INSTALL NO. 1 WATER BY-PASS PIPE



(a) Install a new gasket and the pipe with the bolt and 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)

7. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE INFO

8. INSTALL ENGINE OIL LEVEL DIPSTICK

9. INSTALL THERMOSTAT INFO

10. INSTALL INLET WATER INFO

11. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY INFO

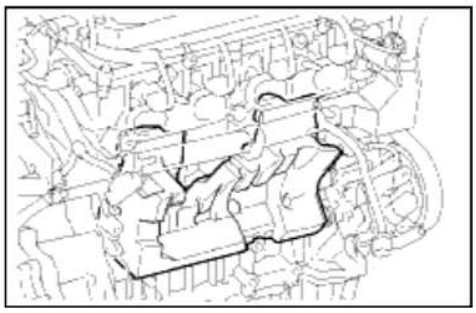
cardiagn.com

12. INSTALL NO. 2 MANIFOLD STAY INFO

13. INSTALL MANIFOLD STAY INFO

14. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

15. INSTALL NO. 1 INTAKE MANIFOLD INSULATOR



(a) Install the No. 1 intake manifold insulator onto the cylinder block.

16. INSTALL INTAKE MANIFOLD INFO

17. INSTALL FUEL INJECTOR ASSEMBLY INFO

18. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

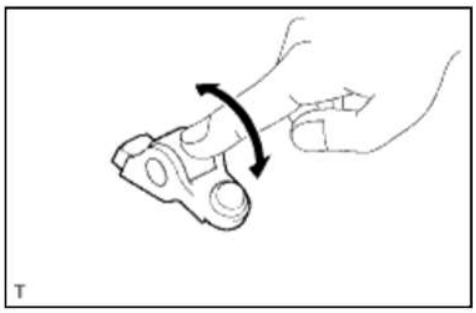
TOYOTA

cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XR2016X
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: INSPECTION (2010 Corolla)		

INSPECTION

1. INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY



(a) Turn the roller by hand to check that it turns smoothly.

HINT:

If the roller does not turn smoothly, replace the valve rocker arm sub-assembly.

2. INSPECT VALVE LASH ADJUSTER ASSEMBLY

NOTICE:

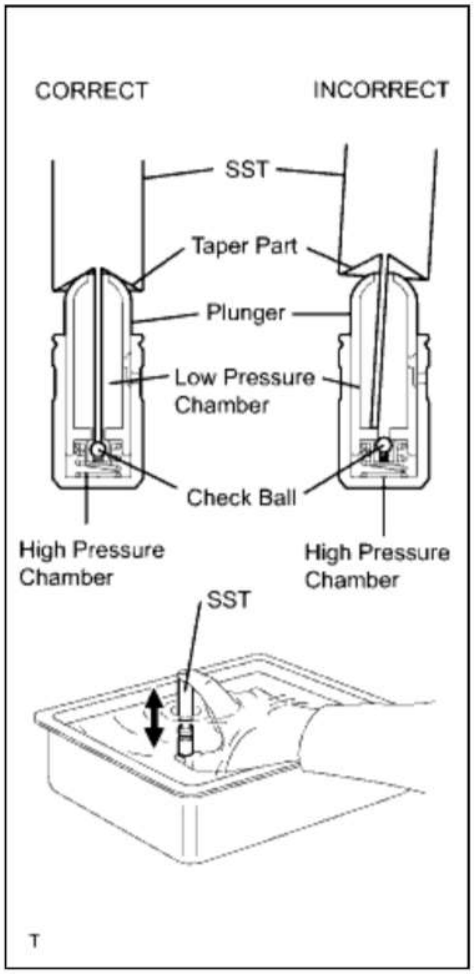
- Keep the lash adjuster free of dirt and foreign matter.
- Only use clean engine oil.

(a) Place the lash adjuster into a container filled with engine oil.

(b) Insert the tip of SST into the lash adjuster plunger and use the tip to press down on the check ball inside the plunger.

SST: 09276-75010

cardiagn.com



(c) Squeeze SST and the lash adjuster together to move the plunger up and down 5 to 6 times.

(d) Check the movement of the plunger and bleed it.

OK:

Plunger moves up and down.

NOTICE:

When bleeding the high-pressure chamber, make sure that the tip of SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, the high-pressure chamber will not be bled.

(e) After bleeding, remove SST. Then try to quickly and firmly press the plunger by hand.

OK:

Plunger is very difficult to move.

If the result is not as specified, replace the lash adjuster.

3. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

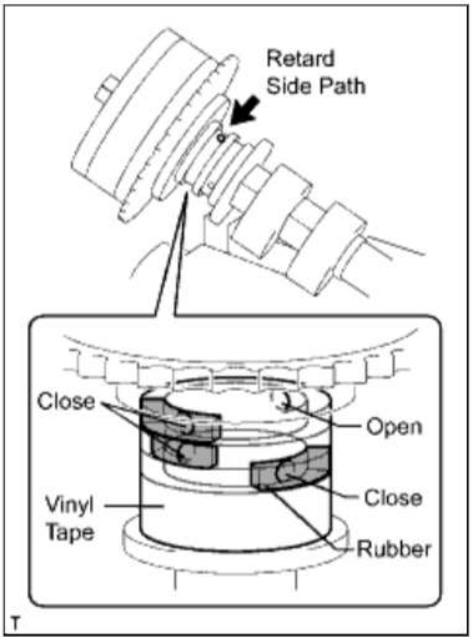
(a) Install the camshaft timing gear INFO .

(b) Check the lock of the camshaft timing gear.

(1) Confirm that the camshaft timing gear is locked.

(c) Release the lock pin.

cardiagn.com



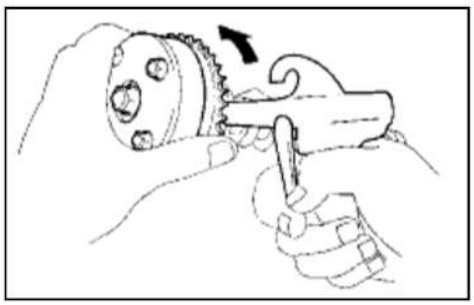
(1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

HINT:

There are 4 oil paths in the groove of the camshaft. Plug three of the paths with pieces of rubber.

(2) Prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.

(3) While applying approximately 150 kPa (1.5 kgf/cm2, 22 psi) of air pressure to the oil paths, forcibly turn the camshaft timing gear assembly in the advance direction (counterclockwise).



CAUTION:

Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

NOTICE:

Do not lock the camshaft timing gear assembly. If it is locked, release the lock pin again.

HINT:

- The camshaft timing gear assembly may be turned in the advance direction without applying any force.
- If enough air pressure cannot be applied because of air leakage from the port, releasing the lock pin may be difficult.

(d) Check for smooth rotation.

(1) Turn the camshaft timing gear within its movable range (26.5 to 28.5°) 2 or 3 times, but do not turn it to the most retarded position. Make sure that the gear turns smoothly.

NOTICE:

Do not lock the camshaft timing gear assembly. If it is locked, release the lock pin again.

cardiagn.com

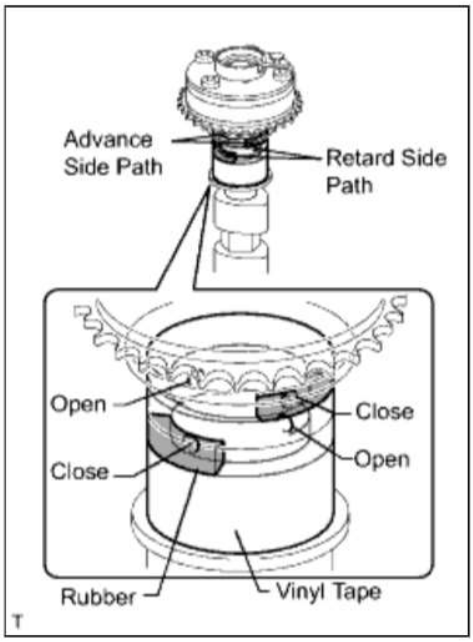
4. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

(a) Install the camshaft timing exhaust gear INFO .

(b) Check the camshaft timing exhaust gear lock.

(1) Make sure that the camshaft timing exhaust gear is locked.

(c) Release the lock pin.

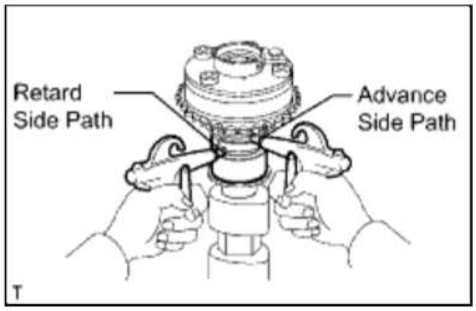


(1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

HINT:

The 4 oil paths are provided in the grooves. Plug 2 paths with rubber pieces.

(2) Prick a hole in the tape placed on the advance side path. Prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.



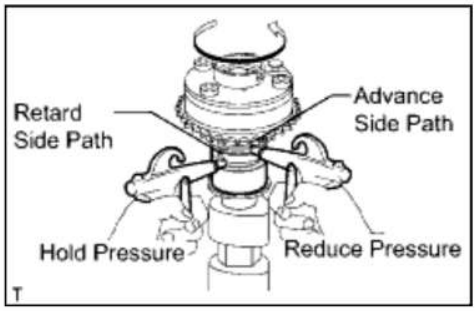
(3) Apply approximately 200 kPa (2.0 kgf/cm2, 28 psi) of air pressure to the 2 paths (the advance side path and the retard side path).

CAUTION:

Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

(4) Make sure that the camshaft timing exhaust gear turns in the retard direction when reducing the air pressure

cardiagn.com



applied to the advance side path.

HINT:

The lock pin is released and the camshaft timing exhaust gear turns in the retard direction.

(5) When the camshaft timing exhaust gear moves to the most retarded position, release the air pressure from the advance side path, then release the air pressure from the retard side path.

NOTICE:

Be sure to release the air pressure from the advance side path first. If the air pressure of the retard side path is released first, the camshaft timing exhaust gear may abruptly shift in the advance direction and break the lock pin or other parts.

(d) Check for smooth rotation.

(1) Turn the camshaft timing exhaust gear within its movable range (19 to 21°) 2 or 3 times, but do not turn it to the most advanced position. Make sure that the gear turns smoothly.

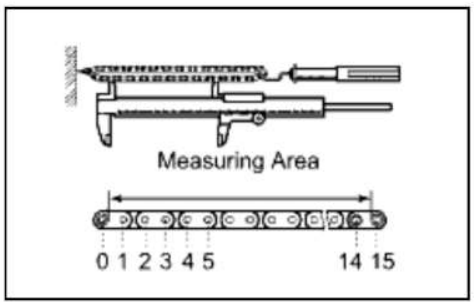
NOTICE:

When the air pressure is released from the advance side path, then from the retard side path, the gear automatically returns to the most advanced position due to the advance assist spring operation and locks. Gradually release the air pressure from the retard side path before performing the smooth rotation check.

(e) Check the lock at the most advanced position.

(1) Make sure that the camshaft timing exhaust gear is locked at the most advanced position.

5. INSPECT CHAIN SUB-ASSEMBLY



(a) Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.

(b) Using a vernier caliper, measure the length of 15 links.

Maximum chain elongation:
115.2 mm (4.535 in.)

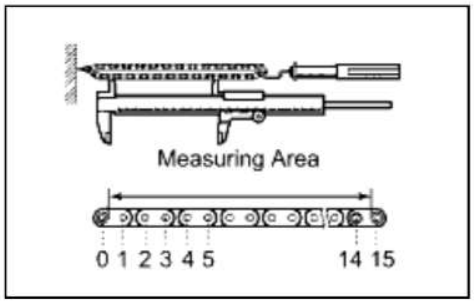
NOTICE:

Perform the measurement at 3 random places. Use the average of the measurements.

If the average elongation is greater than the maximum, replace the chain.

6. INSPECT NO. 2 CHAIN SUB-ASSEMBLY

cardiagn.com



(a) Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.

(b) Using a vernier caliper, measure the length of 15 links.

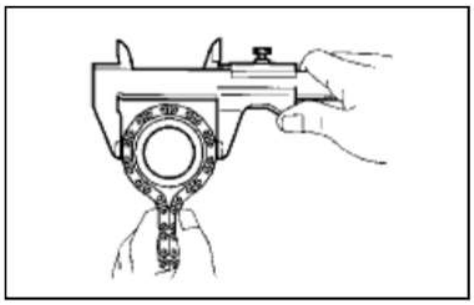
Maximum chain elongation:
102.1 mm (4.019 in.)

NOTICE:

Perform the measurement at 3 random places. Use the average of the measurements.

If the average elongation is greater than the maximum, replace the No. 2 chain.

7. INSPECT OIL PUMP DRIVE GEAR



(a) Place the chain around the gear.

(b) Using a vernier caliper, measure the diameter of the gear and chain.

Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:

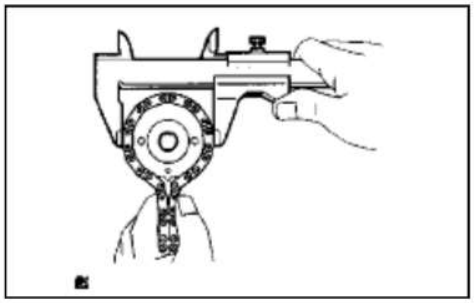
The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

8. INSPECT OIL PUMP DRIVE SHAFT GEAR

(a) Place the chain around the gear.

cardiagn.com



(b) Using a vernier caliper, measure the diameter of the gear and chain.

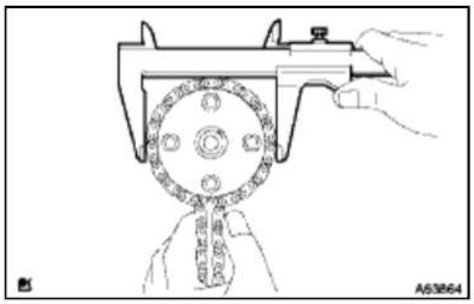
Minimum gear diameter (with chain):
48.8 mm (1.921 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

9. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY



(a) Place the chain around the gear.

(b) Using a vernier caliper, measure the diameter of the gear and chain.

Minimum gear diameter (with chain):
96.8 mm (3.811 in.)

NOTICE:

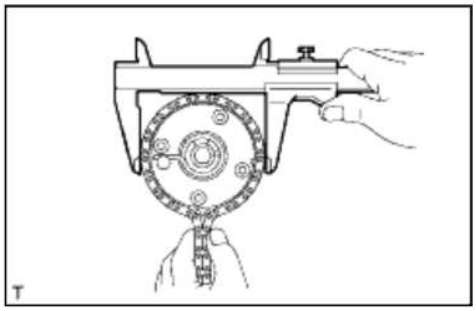
The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

10. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

(a) Place the chain around the sprocket.

cardiagn.com



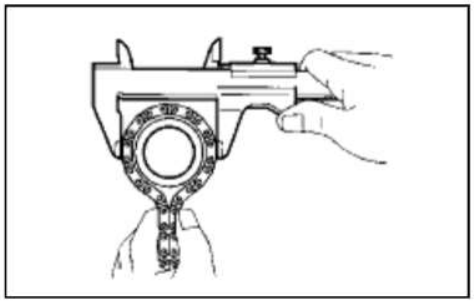
(b) Using a vernier caliper, measure the diameter of the sprocket and chain.

Minimum sprocket diameter (with chain):
96.8 mm (3.811 in.)

NOTICE:
The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

11. INSPECT CRANKSHAFT TIMING GEAR



(a) Place the chain around the gear.

(b) Using a vernier caliper, measure the diameter of the gear and chain.

Minimum gear diameter (with chain):
51.1 mm (2.012 in.)

NOTICE:
The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

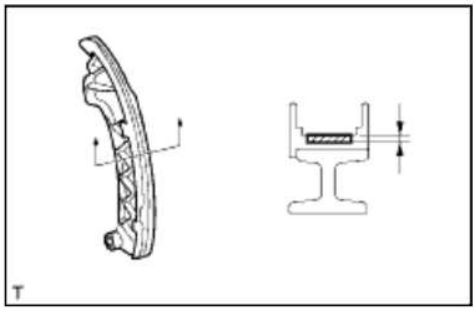
12. INSPECT CHAIN TENSIONER SLIPPER

(a) Using a vernier caliper, measure the tensioner slipper wear.

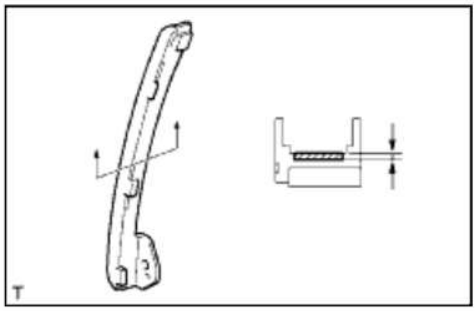
Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the chain tensioner slipper.

cardiagn.com



13. INSPECT NO. 1 CHAIN VIBRATION DAMPER

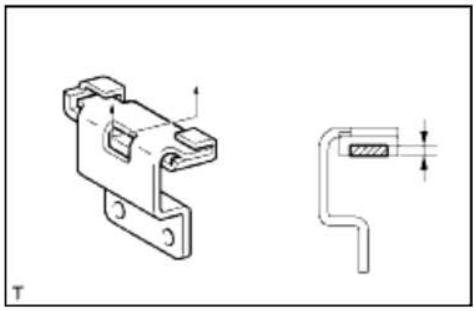


(a) Using a vernier caliper, measure the vibration damper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the No. 1 chain vibration damper.

14. INSPECT NO. 2 CHAIN VIBRATION DAMPER



(a) Using a vernier caliper, measure the vibration damper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the No. 2 chain vibration damper.

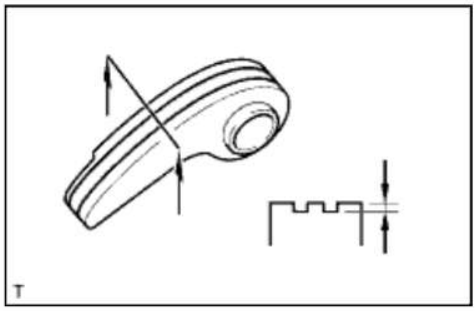
15. INSPECT CHAIN TENSIONER PLATE

(a) Using a vernier caliper, measure the chain tensioner plate wear.

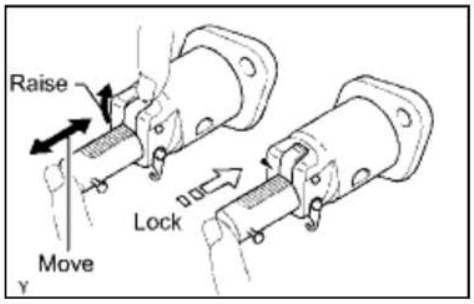
Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the chain tensioner plate.

cardiagn.com



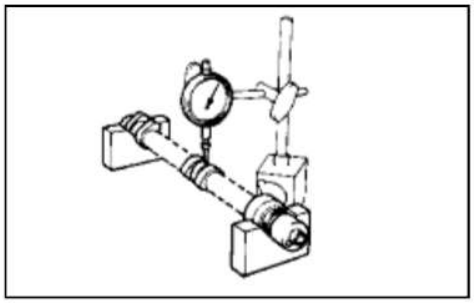
16. INSPECT NO. 1 CHAIN TENSIONER



(a) Check that the plunger moves smoothly when the ratchet pawl is raised by hand.

(b) Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed by hand.

17. INSPECT CAMSHAFT



(a) Inspect the camshaft for runout.

(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:
0.04 mm (0.0016 in.)

If the circle runout is greater than the maximum, replace the camshaft.

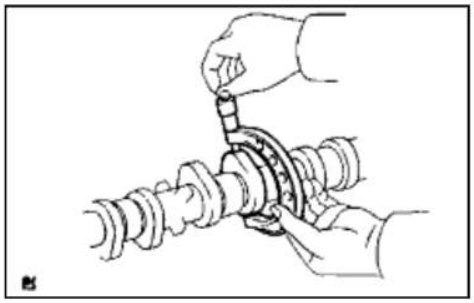
(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:
42.816 to 42.916 mm (1.6857 to 1.6896 in.)
Minimum cam lobe height:
42.666 mm (1.6798 in.)

If the cam lobe height is less than the minimum,

cardiagn.com

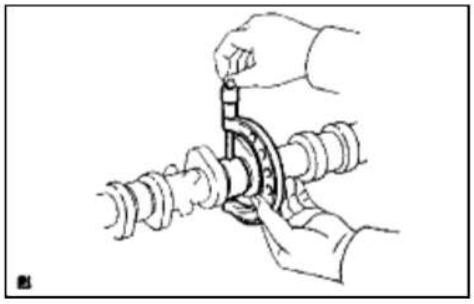


replace the camshaft.

(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

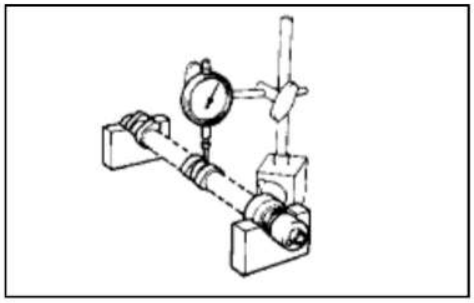
Standard Journal Diameter:



JOURNAL POSITION	SPECIFIED CONDITION
No. 1	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
Other	22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the journal diameter is not as specified, check the oil clearance INFO .

18. INSPECT NO. 2 CAMSHAFT



(a) Inspect the No. 2 camshaft for runout.

(1) Place the No. 2 camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:
0.04 mm (0.0016 in.)

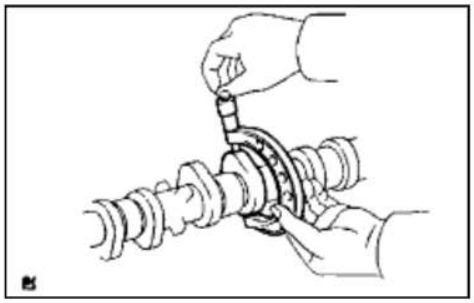
If the circle runout is greater than the maximum, replace the No. 2 camshaft.

(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:
44.336 to 44.436 mm (1.7455 to 1.7494 in.)
Minimum cam lobe height:
44.186 mm (1.7396 in.)

cardiagn.com

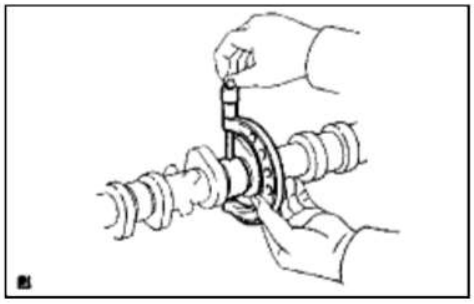


If the cam lobe height is less than the minimum, replace the No. 2 camshaft.

(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

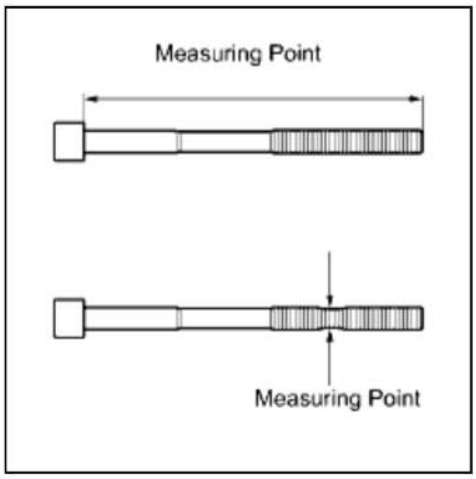
Standard Journal Diameter:



JOURNAL POSITION	SPECIFIED CONDITION
No. 1	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
Other	22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the journal diameter is not as specified, check the oil clearance INFO .

19. INSPECT CYLINDER HEAD SET BOLT



(a) Using a vernier caliper, measure the length of the cylinder head set bolt from the seat to the end.

Standard bolt length:
146.8 to 148.2 mm (5.7795 to 5.8346 in.)
Maximum bolt length:
149.2 mm (5.874 in.)

If the bolt length is greater than the maximum, replace the cylinder head set bolt.

(b) Using a vernier caliper, measure the minimum diameter of the elongated thread at the measuring point.

Standard outside diameter:
9.77 to 9.96 mm (0.3846 to 0.3921 in.)

cardiagn.com

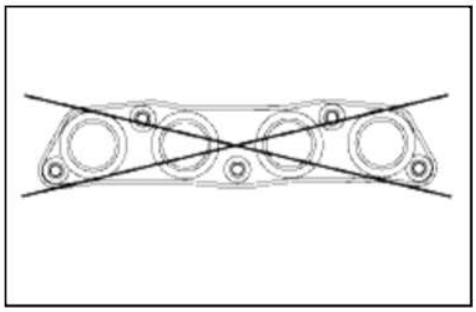
Minimum outside diameter:
9.4 mm (0.3701 in.)

HINT:

Using a straightedge, visually check thinner areas of the threaded part of the cylinder head set bolt.

If the diameter is less than the minimum, replace the cylinder head set bolt.

20. INSPECT EXHAUST MANIFOLD



(a) Using a precision straightedge and feeler gauge, measure the warpage on the contact surface of the cylinder head.

Maximum warpage:
0.7 mm (0.028 in.)

HINT:

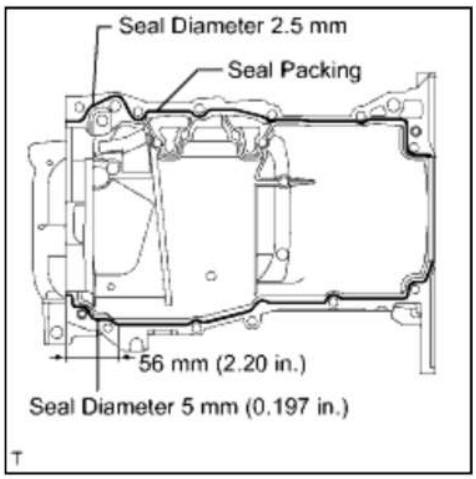
If the warpage is greater than the maximum, replace the manifold.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA402OX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: REASSEMBLY (2010 Corolla)		

REASSEMBLY

1. INSTALL STIFFENING CRANKCASE ASSEMBLY

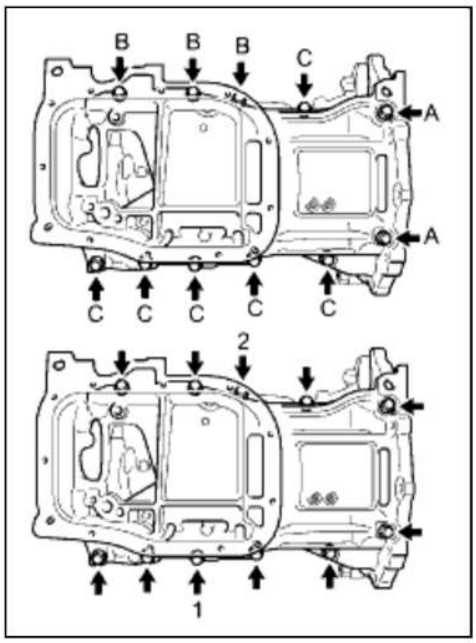


(a) Apply seal packing in a continuous bead (diameter: 2.5 mm (0.0984 in.)) to the places shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTICE:

- Remove any oil from the contact surface.
- Install the crankcase within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the stiffening crankcase.



(b) Install the stiffening crankcase with the 11 bolts.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

Bolt Length:

ITEM	LENGTH
Bolt A	138 mm (5.43 in.)
Bolt B	35 mm (1.38 in.)
Bolt C	70 mm (2.76 in.)

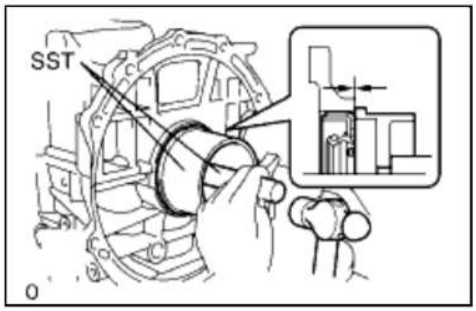
(c) Recheck the torque for bolts 1 and 2.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

(d) Wipe off any excess seal packing with a clean piece of cloth.

2. INSTALL REAR ENGINE OIL SEAL

cardiagn.com



(a) Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.

SST: 09223-15030

SST: 09950-70010

09951-07100

NOTICE:

- Keep the lip free of foreign matter.
- Do not tap on the oil seal at an angle.

(b) Apply MP grease to a new oil seal lip.

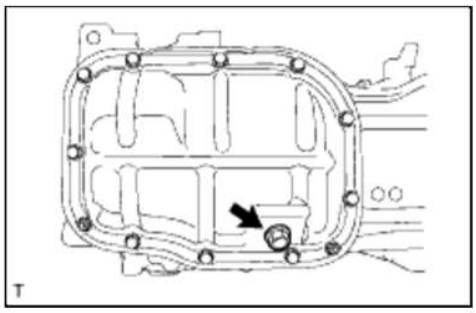
NOTICE:

Wipe off extra grease on the crankshaft.

3. INSTALL OIL PUMP ASSEMBLY

4. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY

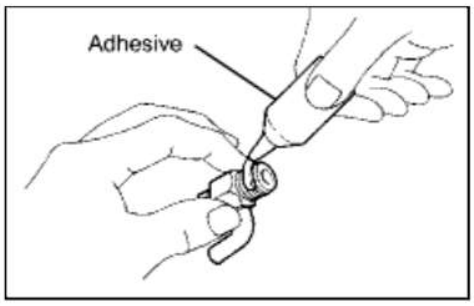
5. INSTALL OIL PAN DRAIN PLUG



(a) Install a new gasket and the oil pan drain plug.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

6. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY



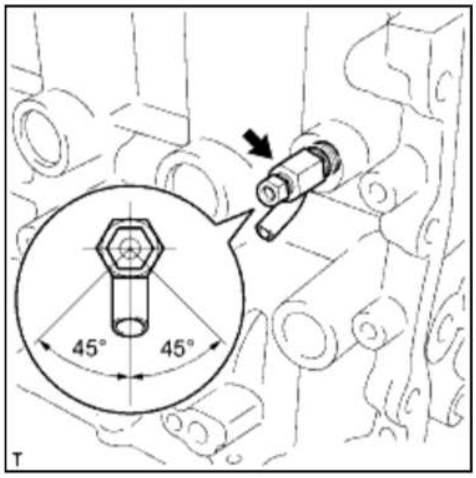
(a) Apply adhesive to the threads of the drain cock.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

(b) Install the water drain cock as shown in the illustration.

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

cardiagn.com



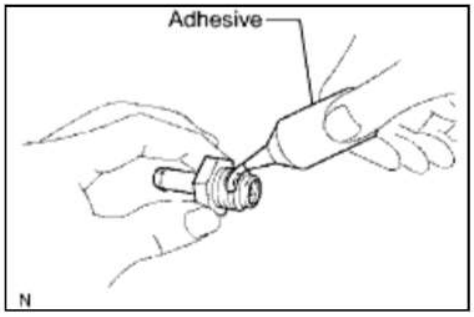
NOTICE:

- Do not rotate the drain cock more than 1 revolution (360°) after tightening it to the specified torque.
- Install the water drain cock within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the water drain cock.

(c) Install the water drain cock plug to the water drain cock.

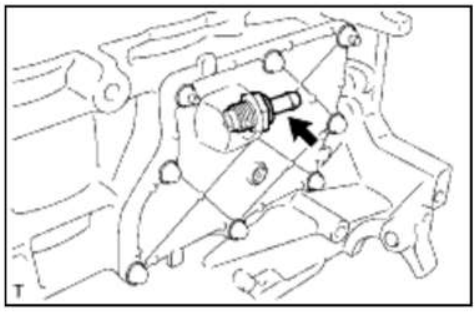
Torque: 13 N·m (130 kgf·cm, 9ft·lbf)

7. INSTALL VENTILATION VALVE SUB-ASSEMBLY



(a) Apply adhesive to the threads of the ventilation valve.

Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



(b) Install the ventilation valve.

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

NOTICE:

- Install the crankcase within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the ventilation valve.

8. INSTALL CYLINDER HEAD GASKET INFO

9. INSTALL CYLINDER HEAD SUB-ASSEMBLY INFO

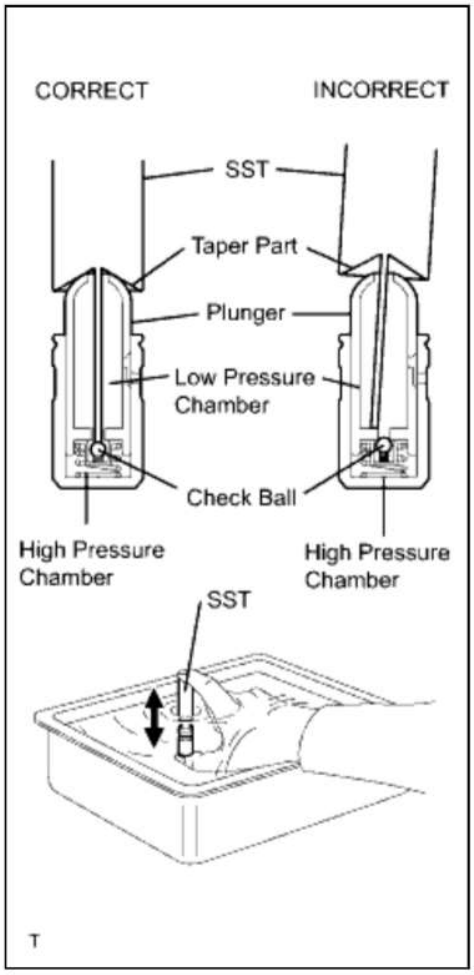
10. INSTALL VALVE LASH ADJUSTER ASSEMBLY

NOTICE:

cardiagn.com

- Keep the lash adjuster free of dirt and foreign matter.
- Only use clean engine oil.

(a) Place the lash adjuster into a container filled with engine oil.



(b) Insert the tip of SST into the lash adjuster plunger and use the tip to press down on the check ball inside the plunger.

SST: 09276-75010

(c) Squeeze SST and the lash adjuster together to move the plunger up and down 5 to 6 times.

(d) Check the movement of the plunger and bleed it.

OK:

Plunger moves up and down.

NOTICE:

When bleeding air from the high-pressure chamber, make sure that the tip of SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, the high-pressure chamber will not be bled.

(e) After bleeding, remove SST. Then, try to press the plunger quickly and firmly by hand.

OK:

Plunger is very difficult to move.

If the result is not as specified, replace the lash adjuster.

(f) Install the lash adjusters.

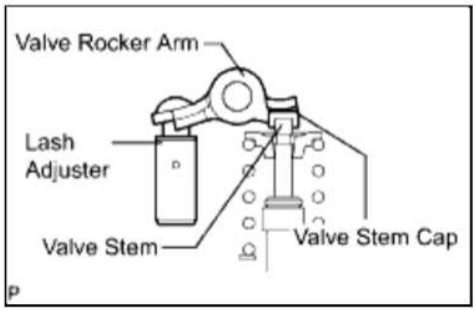
NOTICE:

Install the lash adjuster to the same place it was removed from.

cardiagn.com

11. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

(a) Apply engine oil to the lash adjuster tip and valve stem cap end.

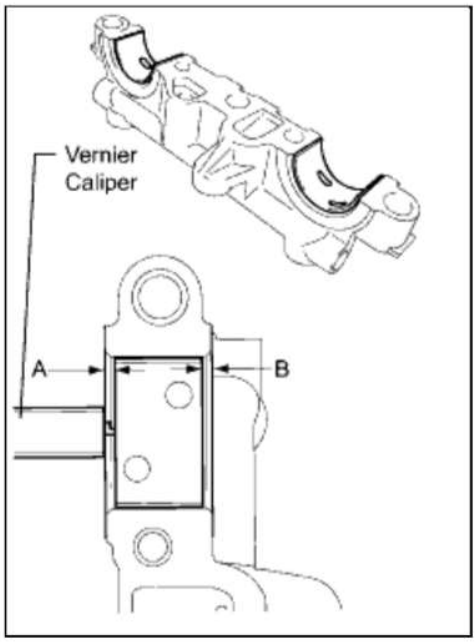


(b) Make sure that the valve rocker arms are installed as shown in the illustration.

12. INSTALL NO. 1 CAMSHAFT BEARING

(a) Clean the both surfaces of the bearings.

(b) Install the 2 No. 1 camshaft bearings.



(c) Using a vernier caliper, measure the distance between the bearing cap edge and the camshaft bearing edge.

Dimension (A - B):

0.7 mm (0.0276 in.) or less

NOTICE:

Position the bearings to the center of the bearing cap by measuring dimensions A and B.

13. INSTALL OIL CONTROL VALVE FILTER

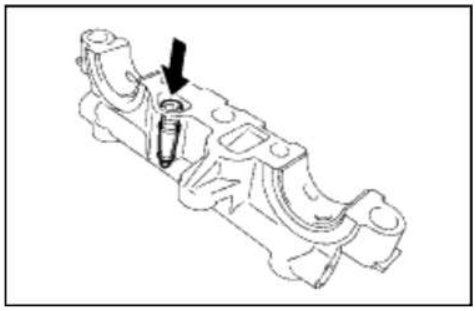
(a) Check that no foreign matter is on the mesh part of the filter.

(b) Install the oil control valve filter.

NOTICE:

Do not touch the mesh when installing the oil control valve filter.

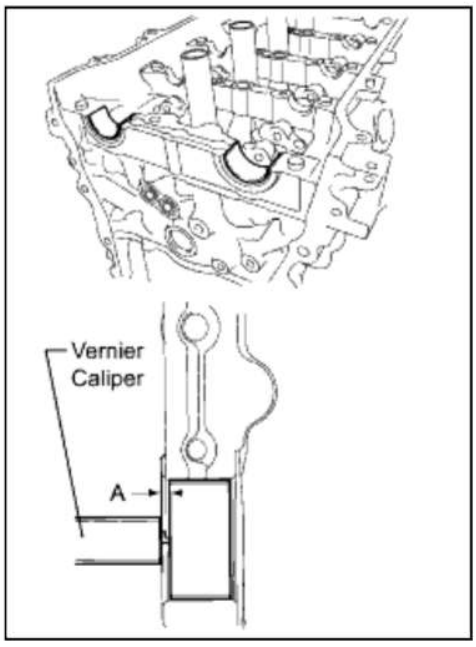
cardiagn.com



14. INSTALL NO. 2 CAMSHAFT BEARING

(a) Clean both surfaces of the bearings.

(b) Install the 2 No. 2 camshaft bearings.



(c) Using a vernier caliper, measure the distance between the bearing cap edge and the camshaft bearing edge.

Dimension (A):

1.05 to 1.75 mm (0.041 to 0.069 in.)

NOTICE:

Position the bearings to the center of the bearing cap by measuring dimension A.

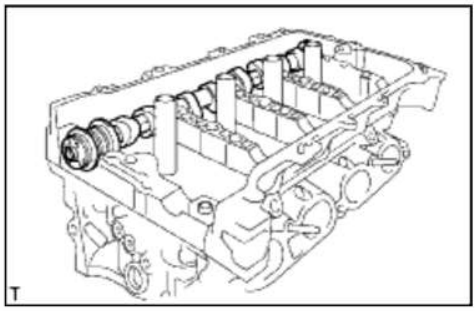
cardiagn.com

15. INSTALL NO. 2 CAMSHAFT

(a) Clean the camshaft journals.

(b) Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.

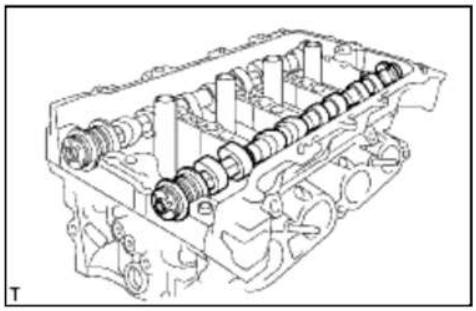
(c) Install the No. 2 camshaft to the camshaft housing.



16. INSTALL CAMSHAFT

(a) Clean the camshaft journals.

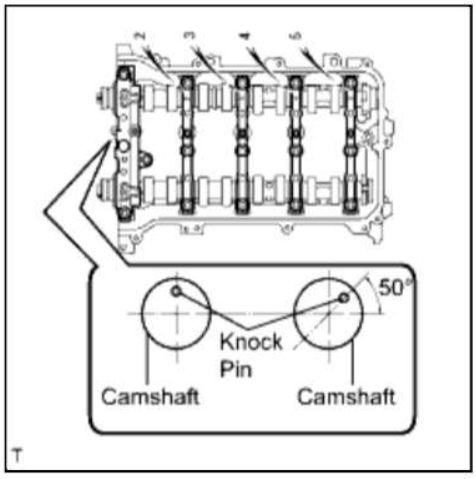
(b) Apply a light coat of engine oil to the camshaft journals, camshaft housing.



(c) Install the camshaft to the camshaft housing.

17. INSTALL CAMSHAFT BEARING CAP

(a) Apply engine oil to the bearing caps.



(b) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

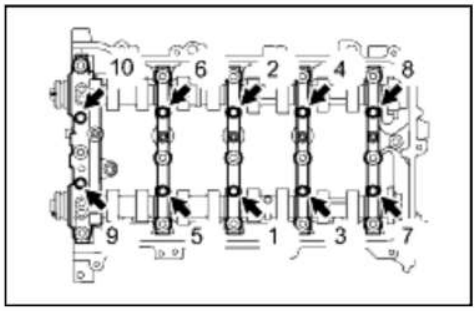
HINT:

Make sure that the knock pin of the camshaft is positioned as shown in the illustration.

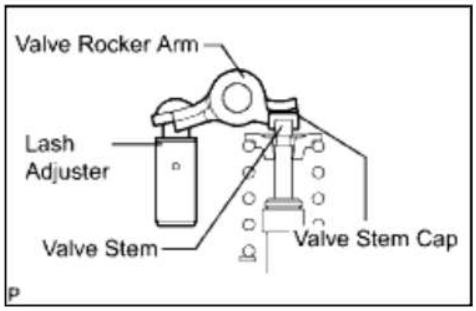
(c) Tighten the 10 bolts in the order shown in the illustration.

Torque: 16 N·m (163 kgf·cm, 12ft·lbf)

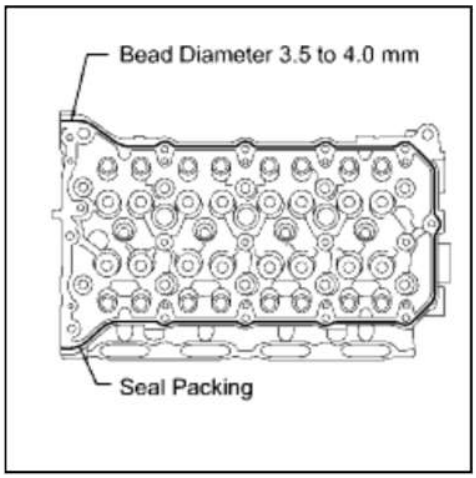
cardiagn.com



18. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY



(a) Make sure that the valve rocker arms are installed as shown in the illustration.



(b) Apply seal packing in a continuous bead as shown in the illustration.

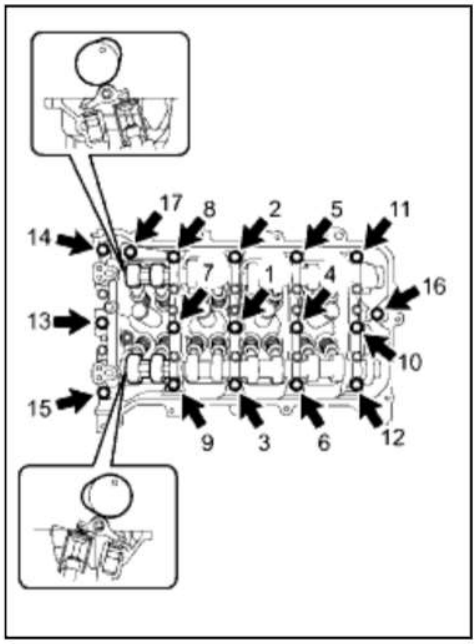
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Bead diameter:
3.5 to 4.0 mm (0.138 to 0.158 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the camshaft housing sub-assembly within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing.

(c) Set the camshaft and No. 2 camshaft as shown in the illustration.

cardiagn.com



(d) Install the camshaft housing and tighten the 17 bolts in the order shown in the illustration.

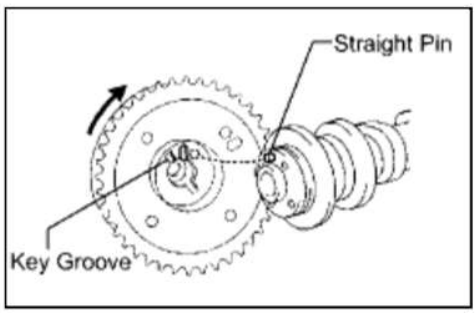
Torque: 27 N·m (275 kgf·cm, 20ft·lbf)

NOTICE:

- After installing the camshaft housing, make sure that the cam lobes are positioned as shown in the illustration.
- If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.
- If the camshaft housing is removed because any of the bolts are loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.
- After installing the camshaft housing, wipe off any seal packing that seeped out from between the housing and the cylinder head.

19. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

(a) Check that the knock pin is installed on the camshaft.



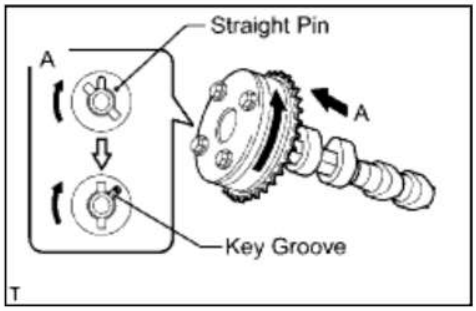
(b) Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.

NOTICE:

Do not forcefully push in the camshaft timing gear assembly. This may cause the camshaft knock pin tip to damage the installation surface of the camshaft timing gear assembly.

(c) Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further

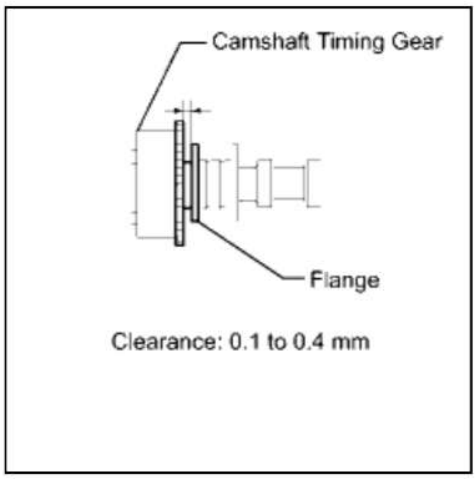
cardiagn.com



at the position where the pin fits into the groove.

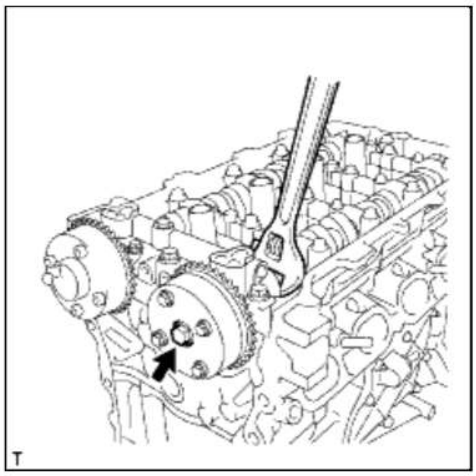
NOTICE:

Do not turn the camshaft timing gear in the retard direction (clockwise).



(d) Measure the clearance between the gear and the camshaft flange.

Clearance:
0.1 to 0.4 mm (0.004 to 0.016 in.)

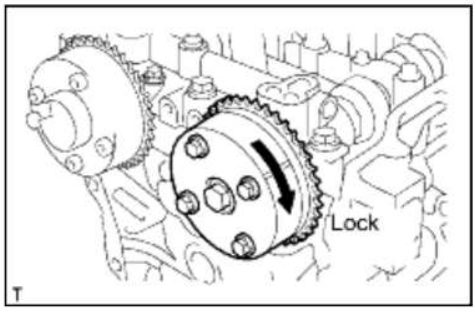


(e) Tighten the flange bolt with the camshaft timing gear secured in place.

Torque: 54 N·m (551 kgf·cm, 40ft·lbf)

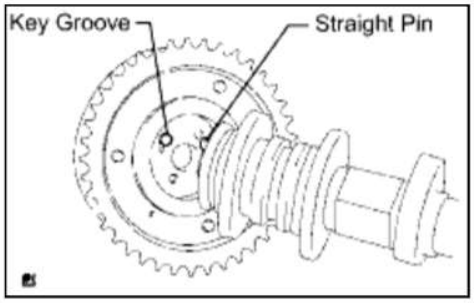
(f) Check that the camshaft timing gear can move in the retard direction (clockwise) and locks in the most retarded position.

cardiagn.com



20. INSTALL CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

(a) Check that the knock pin is installed on the camshaft.



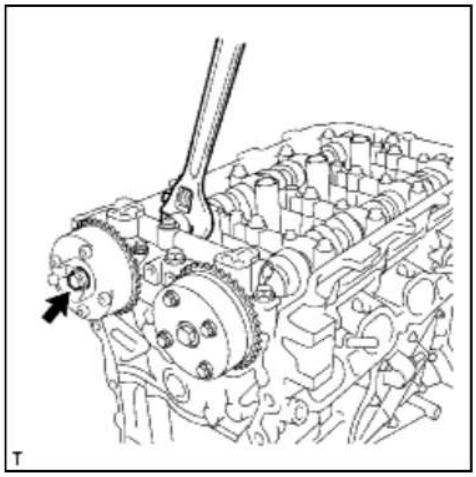
(b) Put the camshaft timing exhaust gear and camshaft together by aligning the key groove and straight pin.

(c) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.

NOTICE:

Be sure not to turn the camshaft timing exhaust gear in the retard direction (clockwise).

(d) Check that there is no clearance between the gear and the camshaft flange.



(e) Tighten the flange bolt with the camshaft timing exhaust gear fixed.

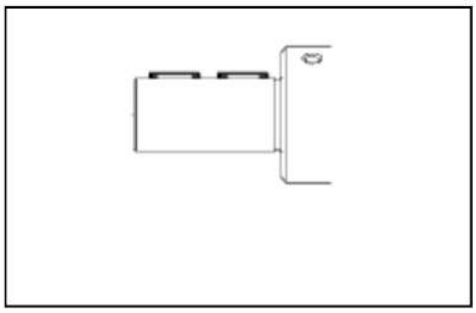
Torque: 54 N·m (551 kgf·cm, 40ft·lbf)

(f) Check the camshaft timing exhaust gear lock.

(1) Make sure that the camshaft timing exhaust gear is locked.

cardiagn.com

21. INSTALL CRANKSHAFT TIMING GEAR KEY

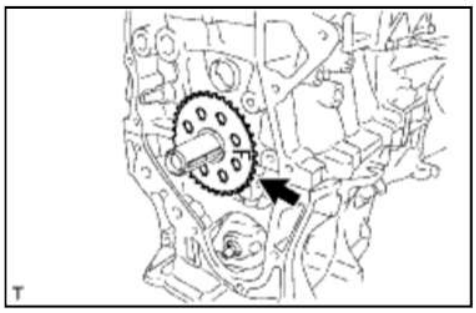


(a) Using a plastic-faced hammer, tap in the 2 crankshaft timing gear keys.

HINT:

Tap in the crankshaft timing gear keys until they contact the crankshaft as shown in the illustration.

22. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE



(a) Install the sensor plate with the "F" mark facing forward.

23. INSTALL NO. 2 CHAIN SUB-ASSEMBLY INFO

24. INSTALL CRANKSHAFT TIMING SPROCKET INFO

25. INSTALL NO. 1 CHAIN VIBRATION DAMPER INFO

26. INSTALL NO. 2 CHAIN VIBRATION DAMPER INFO

27. INSTALL CHAIN SUB-ASSEMBLY INFO

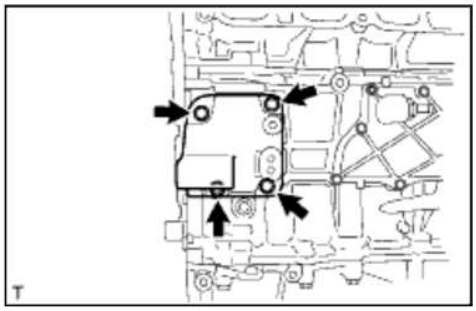
28. INSTALL CHAIN TENSIONER SLIPPER INFO

29. INSTALL NO. 1 GENERATOR BRACKET

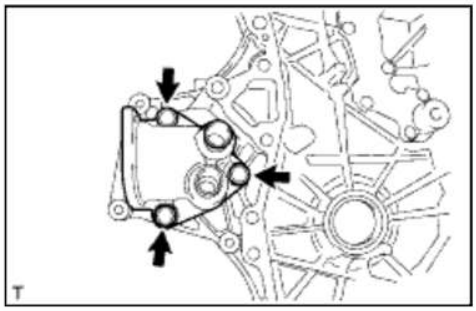
(a) Install the No. 1 generator bracket with the 4 bolts.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

cardiagn.com



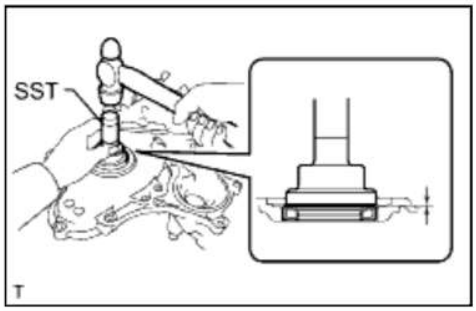
30. INSTALL INLET WATER HOUSING



(a) Install the inlet water housing with the 3 bolts.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

31. INSTALL TIMING CHAIN COVER OIL SEAL



(a) Using SST, tap in a new oil seal until its surface is flush with the timing gear case edge.

SST: 09223-22010

(b) Apply a light coat of MP grease to the lip of the oil seal.

NOTICE:

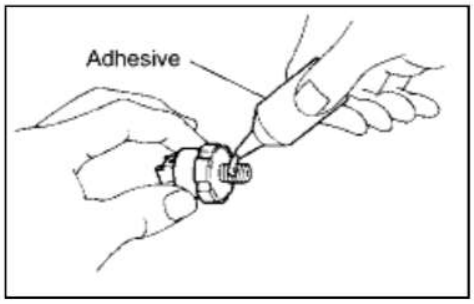
- Keep the lip free of foreign matter.
- Do not tap on the oil seal at an angle.
- Make sure that the oil seal edge does not stick out of the timing chain cover.

32. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY INFO

33. INSTALL CRANKSHAFT PULLEY INFO

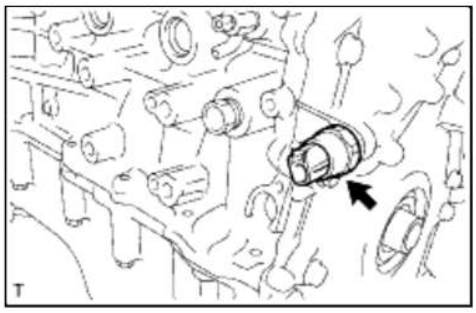
34. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

cardiagn.com



(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent



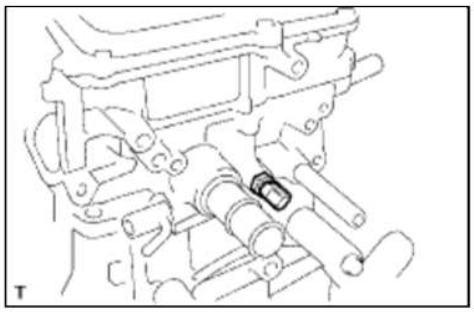
(b) Using a 24 mm deep socket wrench, install the oil pressure switch.

Torque: 15 N·m (153 kgf·cm, 11ft·lbf)

NOTICE:

- Install the oil pressure switch within 3 minutes after applying adhesive.
- Do not start the engine within 1 hour after installation.

35. INSTALL ENGINE COOLANT TEMPERATURE SENSOR



(a) Install a new gasket to the engine coolant temperature sensor.

(b) Using a 19 mm deep socket wrench, install the temperature sensor.

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

36. INSTALL KNOCK CONTROL SENSOR

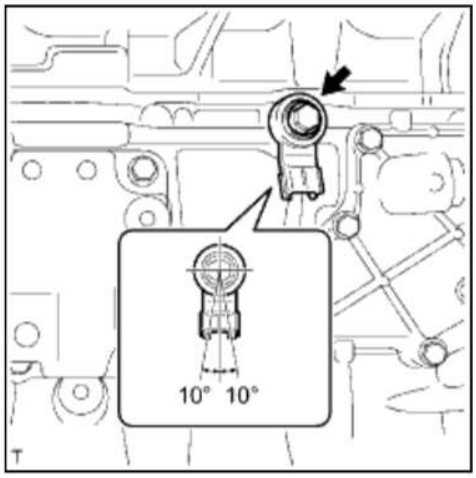
(a) Install the knock control sensor with the bolt.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

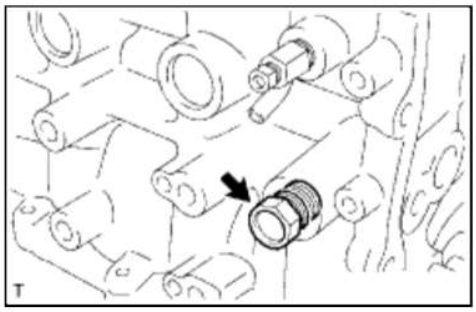
NOTICE:

Make sure that the knock control sensor is in the correct position.

cardiagn.com



37. INSTALL NO. 1 TAPER SCREW PLUG



(a) Apply adhesive to 2 or 3 threads of the plug, and install the plug.

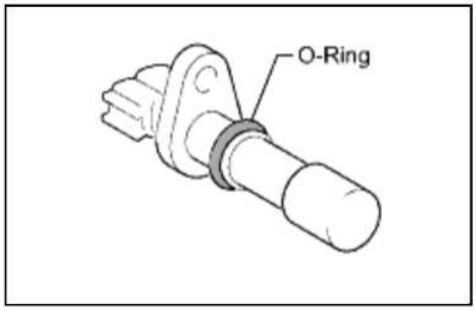
Torque: 43 N·m (439 kgf·cm, 32ft·lbf)

NOTICE:

- Install the plug within 3 minutes after applying adhesive.
- Do not start the engine within 1 hour after installation.

Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

38. INSTALL CRANKSHAFT POSITION SENSOR

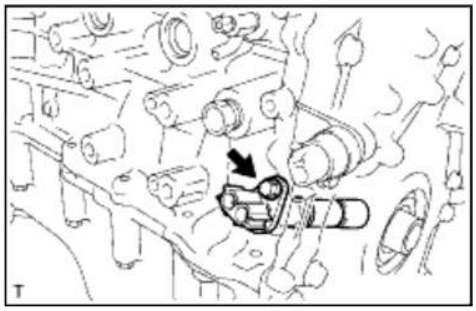


(a) Apply a light coat of engine oil to the O-ring of the sensor.

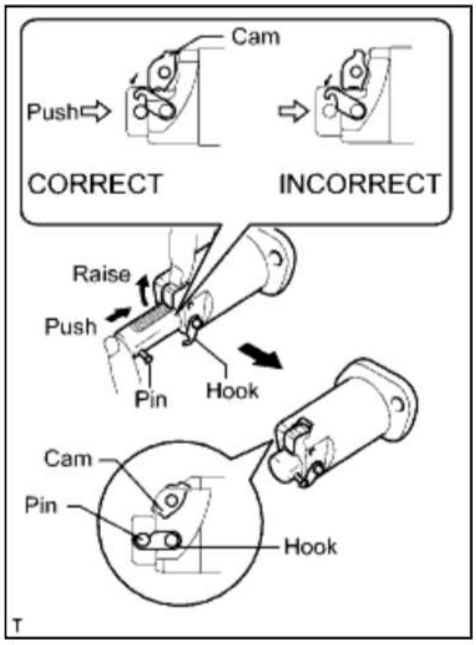
(b) Install the crankshaft position sensor with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

cardiagn.com



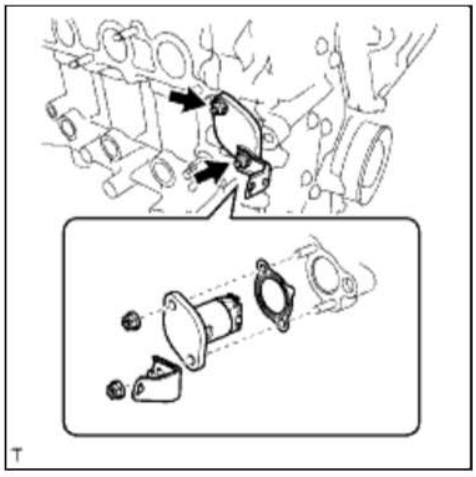
39. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY



(a) Release the ratchet pawl, then fully push in the plunger and engage the hook to the pin so that the plunger is in the position shown in the illustration.

NOTICE:

Make sure that the cam engages the first tooth of the plunger to allow the hook to pass over the pin.



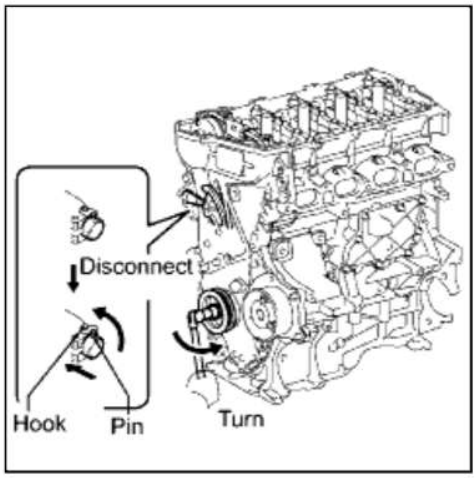
(b) Install a new gasket, bracket and No. 1 chain tensioner with the 2 nuts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

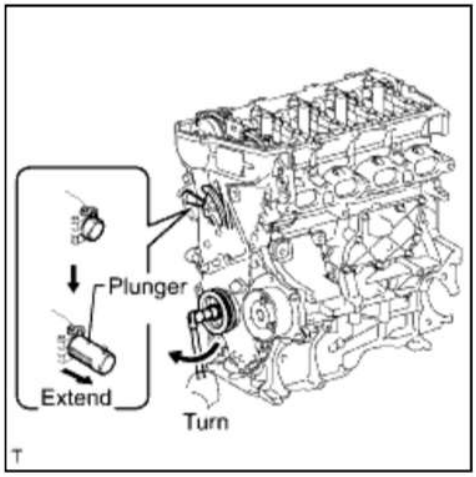
NOTICE:

If the hook releases the plunger while the chain tensioner is being installed, engage the hook again.

cardiagn.com



(c) Turn the crankshaft counterclockwise, then disconnect the hook from plunger knock pin.

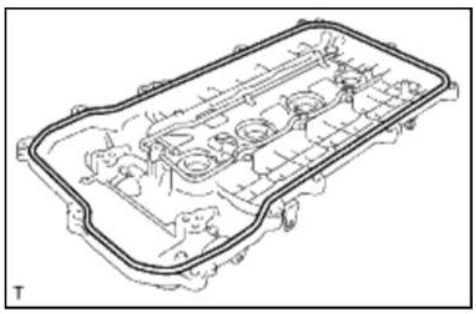


(d) Turn the crankshaft clockwise, then check that the plunger is extended.

cardiagn.com

40. INSTALL OIL FILTER CAP ASSEMBLY

41. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

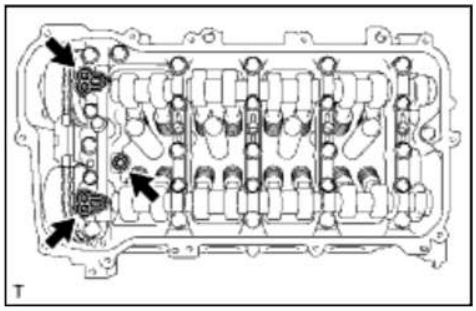


(a) Install a new gasket to the cylinder head cover.

NOTICE:

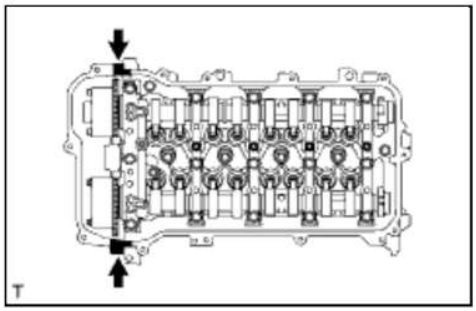
Remove any oil from the contact surfaces.

(b) Install 3 new gaskets to the No. 1 camshaft bearing cap.



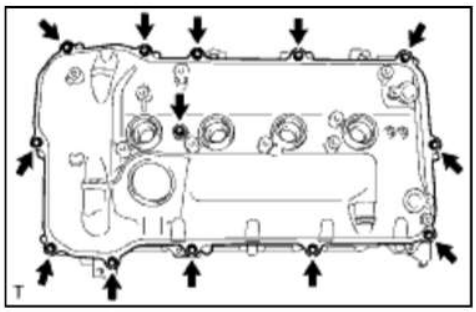
(c) Apply seal packing as shown the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent



NOTICE:

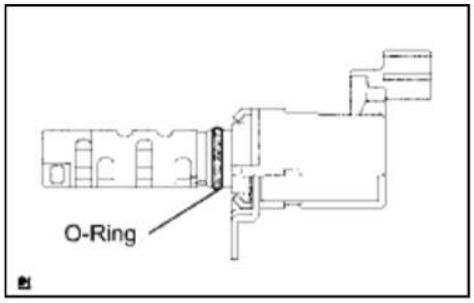
- Remove any oil from the contact surfaces.
- Install the cylinder head cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after the installation.



(d) Install the cylinder head cover with a new seal washer and the 13 bolts.

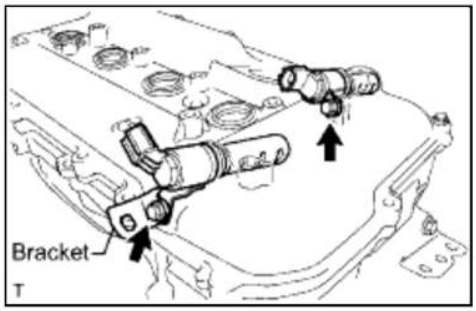
Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

42. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



(a) Apply a light coat of engine oil to 2 new O-rings, then install them onto the camshaft timing oil control valves.

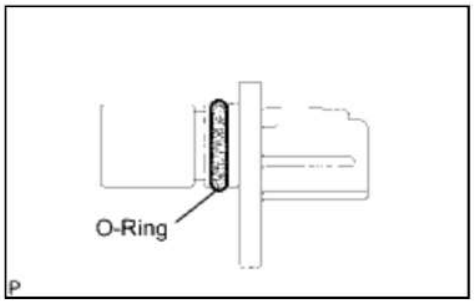
cardiagn.com



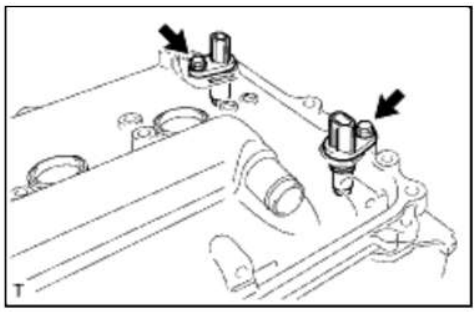
(b) Install the 2 camshaft timing oil control valves and bracket with the 2 bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

43. INSTALL CAMSHAFT POSITION SENSOR



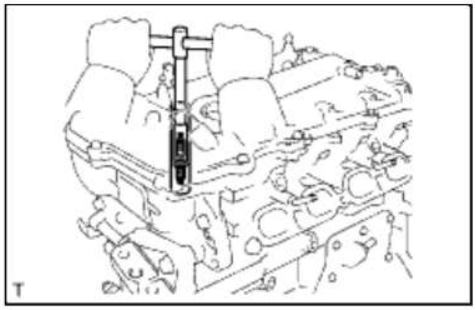
(a) Apply a light coat of engine oil to the O-rings of the sensors.



(b) Install the 2 sensors with the 2 bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

44. INSTALL SPARK PLUG

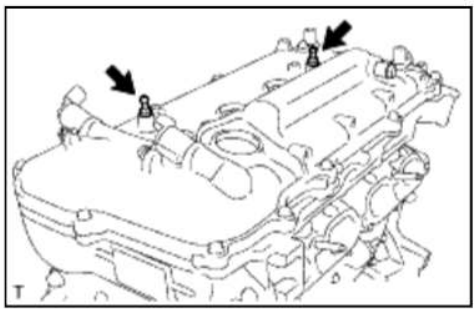


(a) Using a 14 mm spark plug wrench, install the 4 spark plugs.

Torque: 20 N·m (204 kgf·cm, 15ft·lbf)

cardiagn.com

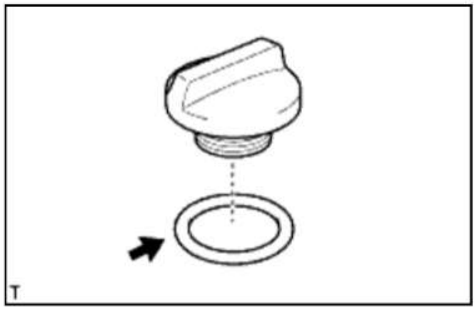
45. INSTALL ENGINE COVER JOINT



(a) Install the 2 engine cover joints.

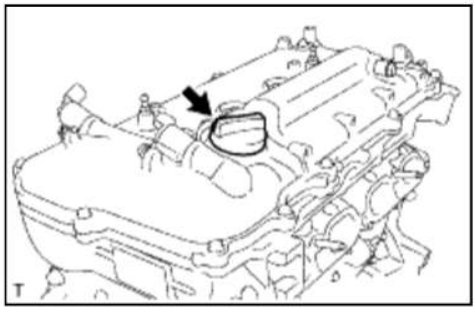
Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

46. INSTALL OIL FILLER CAP GASKET



(a) Install the gasket to the cap.

47. INSTALL OIL FILLER CAP SUB-ASSEMBLY



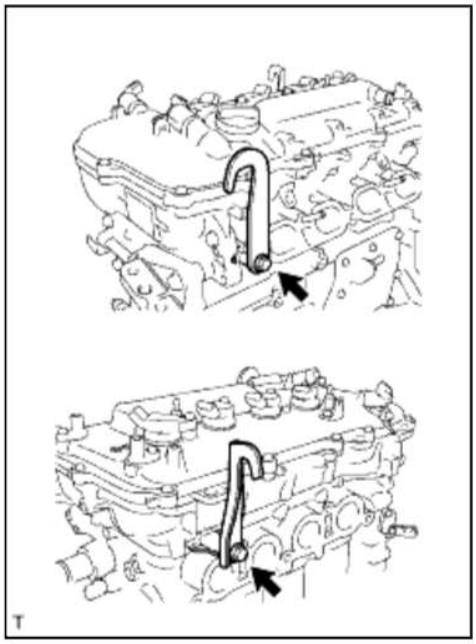
(a) Install the oil filler cap.

48. INSTALL ENGINE HANGER

(a) Install the 2 engine hangers with the 2 bolts.

Torque: 43 N·m (439 kgf·cm, 32ft·lbf)

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002WH601AX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: REMOVAL (2010 Corolla)		

REMOVAL

1. INSTALL ENGINE STAND

(a) Set the engine on an engine stand.

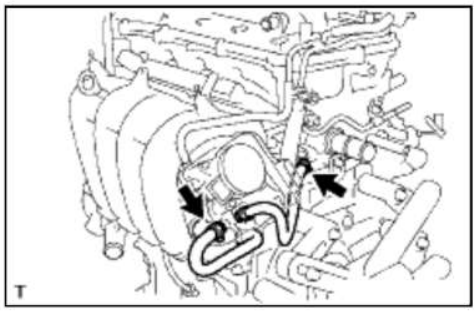
2. REMOVE ENGINE HANGER INFO

3. REMOVE INTAKE MANIFOLD

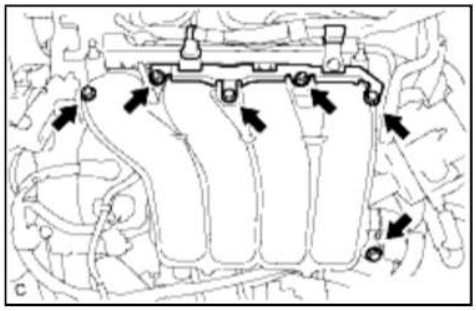
(a) Remove the wire harness clamp bracket.

(b) Remove the 2 bolts and disconnect the air tube.

(c) Disconnect the ventilation hose from the intake manifold.



(d) Disconnect the 2 water by-pass hoses.



(e) Remove the 4 bolts, 2 nuts and intake manifold and intake manifold stay.

(f) Remove the gasket from the intake manifold.

4. DISCONNECT FUEL TUBE SUB-ASSEMBLY INFO

5. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

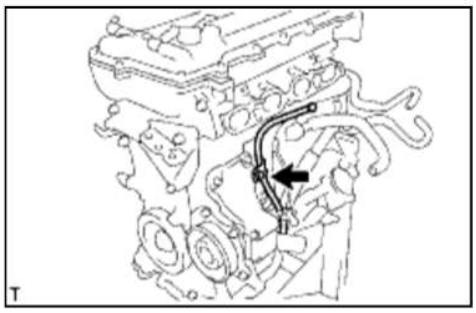
6. REMOVE FUEL INJECTOR ASSEMBLY INFO

7. REMOVE IGNITION COIL ASSEMBLY

(a) Remove the 4 bolts and 4 ignition coils.

cardiagn.com

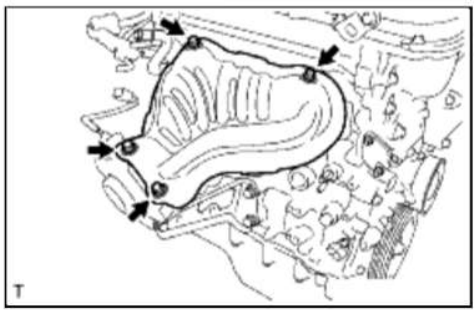
8. REMOVE OIL LEVEL DIPSTICK SUB-ASSEMBLY



(a) Remove the bolt and oil level dipstick.

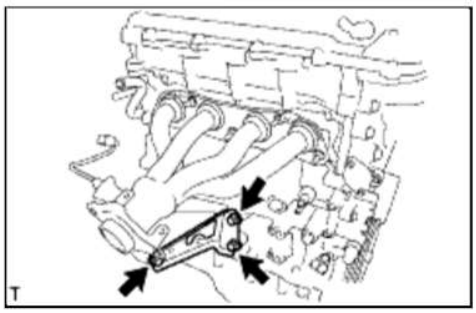
(b) Remove the O-ring from the oil level dipstick.

9. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR



(a) Remove the 4 bolts and exhaust manifold heat insulator.

10. REMOVE MANIFOLD STAY

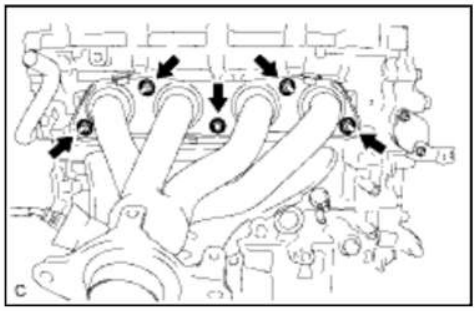


(a) Remove the 3 bolts and manifold stay.

11. REMOVE EXHAUST MANIFOLD

(a) Remove the 5 nuts and exhaust manifold.

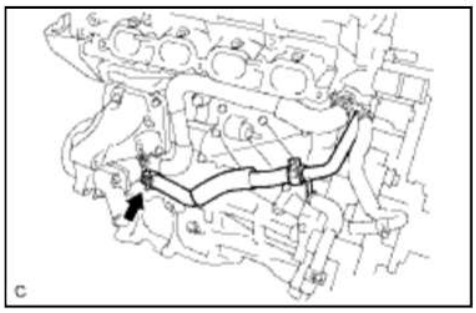
cardiagn.com



12. REMOVE VENTILATION HOSE

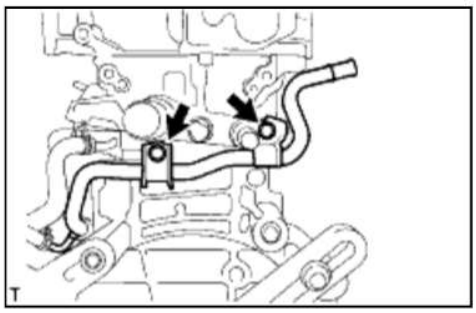
(a) Remove the ventilation hose.

13. DISCONNECT NO. 3 WATER BY-PASS HOSE



(a) Disconnect the No. 3 water by-pass hose from the water inlet housing.

14. REMOVE NO. 1 WATER BY-PASS PIPE



(a) Remove the 2 bolts and No. 1 water by-pass pipe.

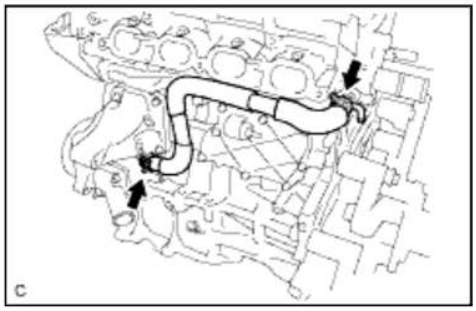
15. REMOVE WATER BY-PASS HOSE

(a) Remove the clamp and water by-pass hose.

16. REMOVE INLET WATER HOSE

(a) Remove the 2 clamps and inlet water hose.

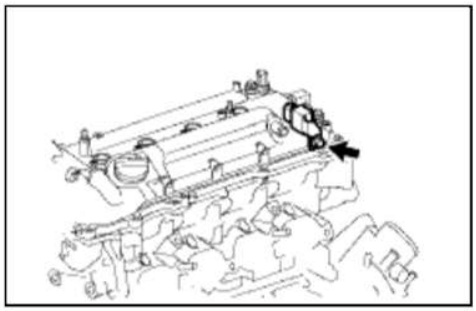
cardiagn.com



17. REMOVE INLET WATER INFO

18. REMOVE THERMOSTAT INFO

19. REMOVE RADIO SETTING CONDENSER



(a) Remove the bolt and radio setting condenser.

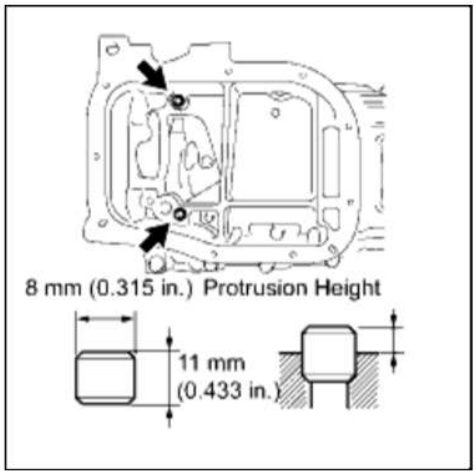
cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002XA101PX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: REPLACEMENT (2010 Corolla)		

REPLACEMENT

1. REPLACE RING PIN

(a) Remove the 2 ring pins.



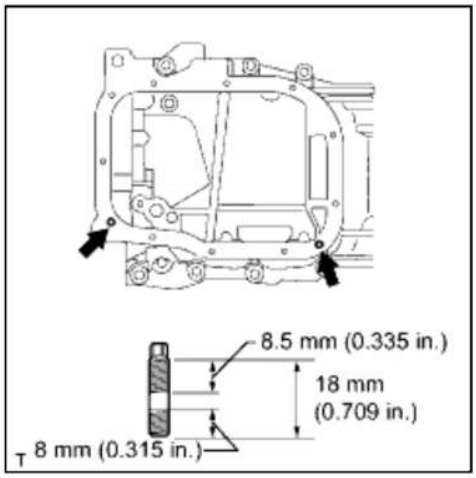
(b) Install 2 new ring pins to the crankcase.

Standard protrusion:
3 mm (0.118 in.)

2. REPLACE STUD BOLT

(a) For crankcase:

(1) Remove the 2 stud bolts.



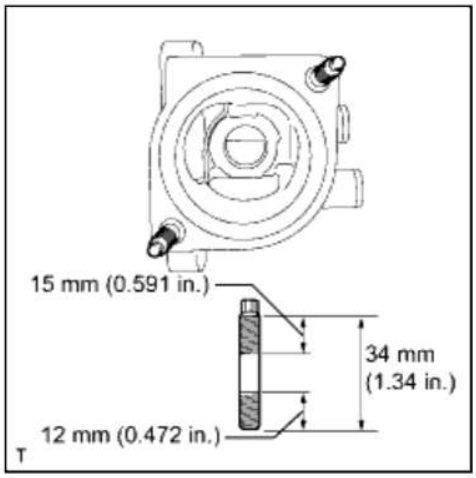
(2) Using a "TORX" socket E5, install the 2 stud bolts as shown in the illustration.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

(b) For water inlet housing:

(1) Remove the 2 stud bolts.

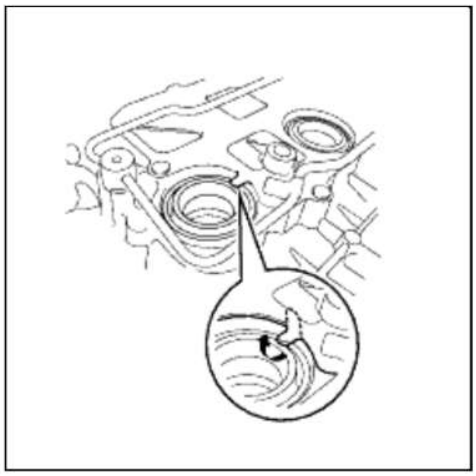
cardiagn.com



(2) Using a "TORX" socket E5, install the 2 stud bolts as shown in the illustration.

Torque: 5.0 N·m (51 kgf·cm, 44in·lbf)

3. REPLACE SPARK PLUG TUBE GASKET



(a) Pry up the claws of the ventilation baffle plate.

NOTICE:

Do not deform the claws of the baffle plate more than necessary.

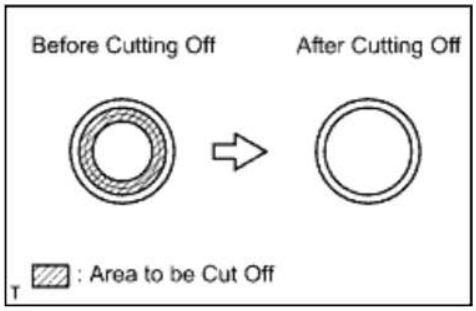
(b) Remove the 4 gaskets from the cylinder head covers.

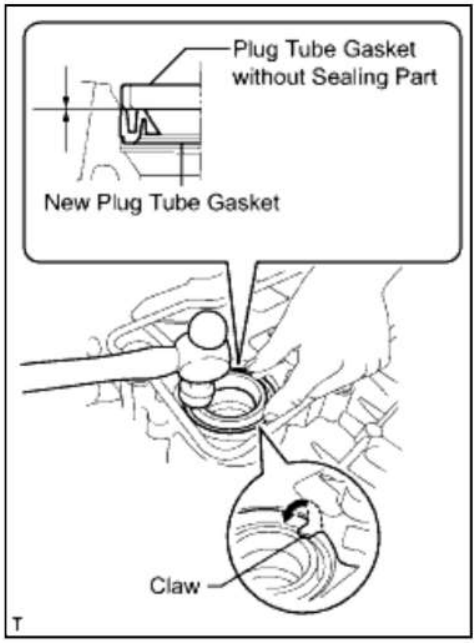
NOTICE:

- Prevent the plug tube gaskets from being deformed as much as possible. The removed gaskets will be used when reinstalling the gaskets.
- Do not damage the connection of the cylinder head cover.

(1) Using a cutter, cut off the sealing part of the removed plug tube gasket.

cardiagn.com





(2) Using the plug tube gasket which has had the sealing part cut off, uniformly press in a new plug tube gasket all the way.

NOTICE:

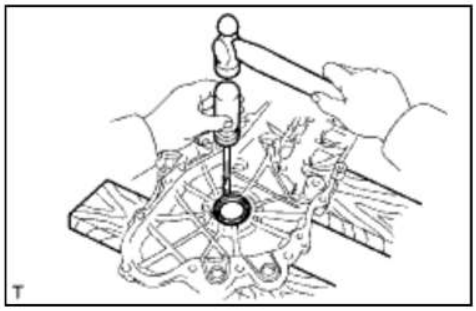
- Keep the lip free of foreign matter.
- Do not tap on the oil seal at an angle.

HINT:

If a plug tube gasket that will be used to install a new gasket is deformed, and cannot be positioned on a new gasket, correct the deformation using pliers.

(c) Return the claws of the ventilation baffle plate to their original positions.

4. REPLACE TIMING CHAIN COVER OIL SEAL



(a) Using a screwdriver and hammer, remove the oil seal.

NOTICE:

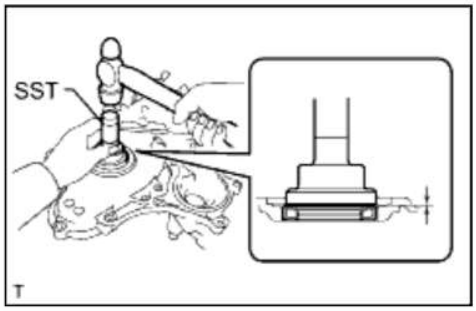
Be careful not to damage the timing chain cover oil seal.

HINT:

Tape the screwdriver tip before use.

(b) Using SST, tap in a new oil seal until its surface is flush with the timing gear case edge.

cardiagn.com



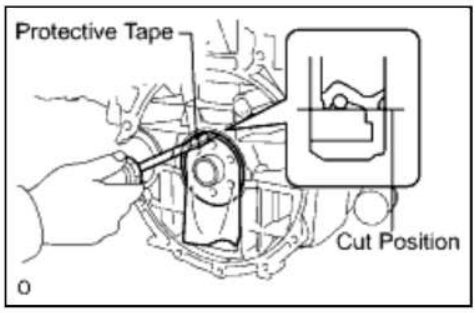
SST: 09223-22010

(c) Apply a light coat of MP grease to the lip of the oil seal.

NOTICE:

- Keep the lip free of foreign matter.
- Do not tap on the oil seal at an angle.
- Make sure that the oil seal edge does not stick out of the timing chain cover.

5. REPLACE REAR ENGINE OIL SEAL

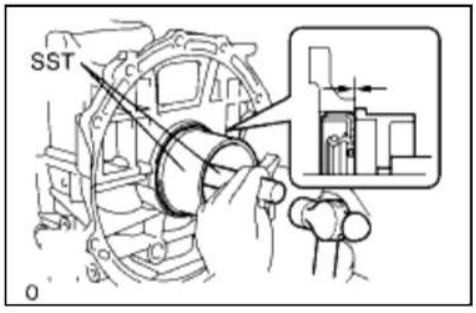


(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with its tip taped, pry out the oil seal.

NOTICE:

After removing the oil seal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.



(c) Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.

SST: 09223-15030

SST: 09950-70010

09951-07100

NOTICE:

- Keep the lip free of foreign matter.
- Do not tap on the oil seal at an angle.

(d) Apply MP grease to a new oil seal lip.

NOTICE:

Wipe off extra grease on the crankshaft.

cardiagn.com

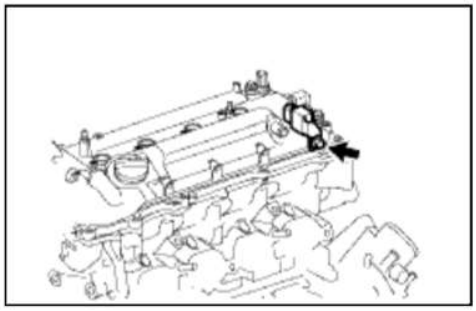


cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000002WH401AX
Title: 2ZR-FE ENGINE MECHANICAL: ENGINE UNIT: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL RADIO SETTING CONDENSER



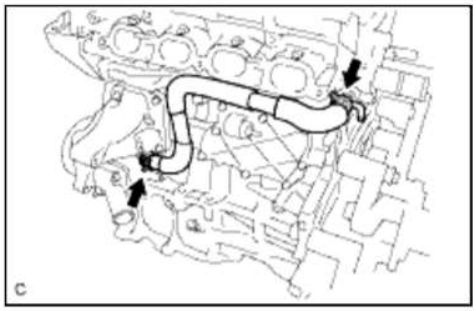
(a) Install the radio setting condenser with the bolt.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

2. INSTALL THERMOSTAT INFO

3. INSTALL INLET WATER INFO

4. INSTALL INLET WATER HOSE



(a) Install the inlet water hose with the 2 clamps.

5. INSTALL WATER BY-PASS HOSE

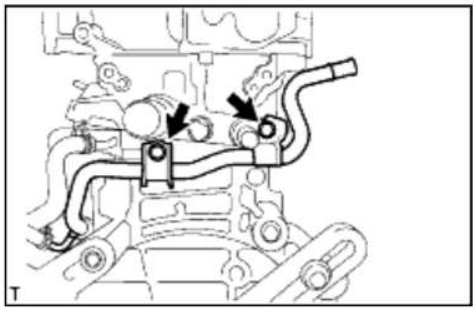
(a) Install the water by-pass hose with the clamp.

6. INSTALL NO. 1 WATER BY-PASS PIPE

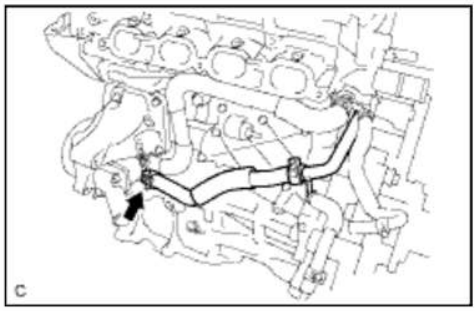
(a) Install the No. 1 water by-pass pipe with the 2 bolts.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

cardiagn.com



7. CONNECT NO. 3 WATER BY-PASS HOSE

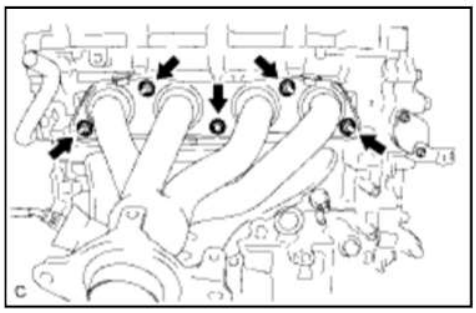


(a) Connect the No. 3 water by-pass hose to the inlet water housing.

8. INSTALL VENTILATION HOSE

(a) Install the ventilation hose.

9. INSTALL EXHAUST MANIFOLD



(a) Install a new gasket onto the exhaust manifold.

(b) Install the exhaust manifold with the 5 nuts.

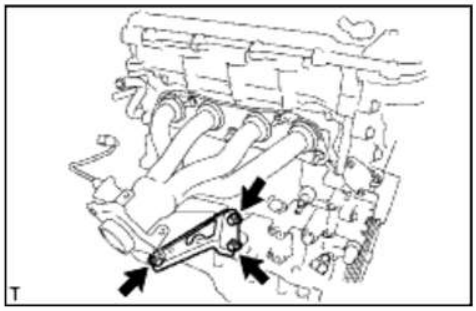
Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

10. INSTALL MANIFOLD STAY

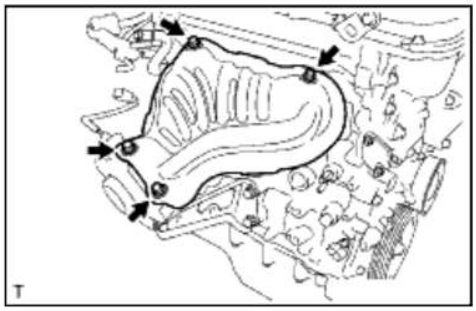
(a) Install the manifold stay with the 3 bolts.

Torque: 43 N·m (439 kgf·cm, 32ft·lbf)

cardiagn.com



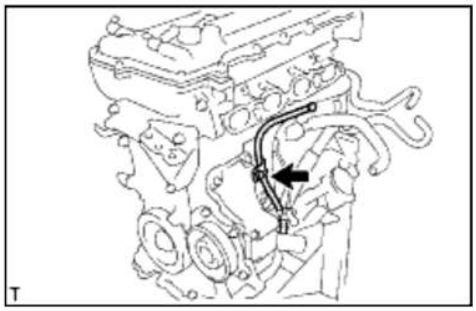
11. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR



(a) Install the exhaust manifold heat insulator with the 4 bolts.

Torque: 12 N·m (122 kgf·cm, 9ft·lbf)

12. INSTALL OIL LEVEL DIPSTICK SUB-ASSEMBLY



(a) Apply engine oil to a new O-ring.

(b) Install the oil level dipstick with the bolt through the new O-ring.

Torque: 21 N·m (214 kgf·cm, 16ft·lbf)

13. INSTALL IGNITION COIL ASSEMBLY

(a) Install the 4 ignition coils with the 4 bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

14. INSTALL FUEL INJECTOR ASSEMBLY INFO

15. INSTALL NO. 1 DELIVERY PIPE SPACER INFO

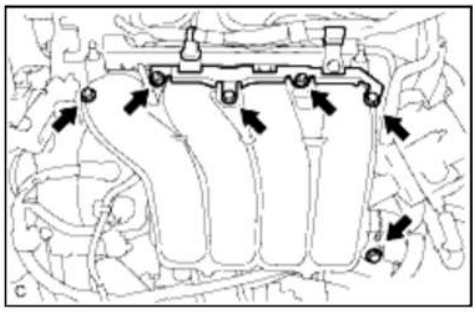
16. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

cardiagn.com

17. CONNECT FUEL TUBE SUB-ASSEMBLY INFO

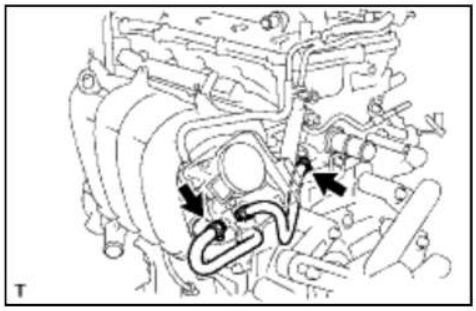
18. INSTALL INTAKE MANIFOLD

(a) Install a new gasket to the intake manifold.



(b) Install the intake manifold and intake manifold stay with the 4 bolts and 2 nuts.

Torque: 28 N·m (286 kgf·cm, 21ft·lbf)



(c) Connect the 2 water by-pass hoses.

(d) Connect the ventilation hose to the intake manifold.

(e) Install the air tube with the 2 bolts.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(f) Install the wire harness bracket.

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

19. INSTALL FAN BELT ADJUSTING BAR

(a) Install the bolt and fan belt adjusting bar.

Torque: 19 N·m (194 kgf·cm, 14ft·lbf)

20. INSTALL ENGINE HANGER INFO

21. REMOVE ENGINE STAND

(a) Attach the engine to the sling device with the chain block.

(b) Remove the engine from the engine stand.

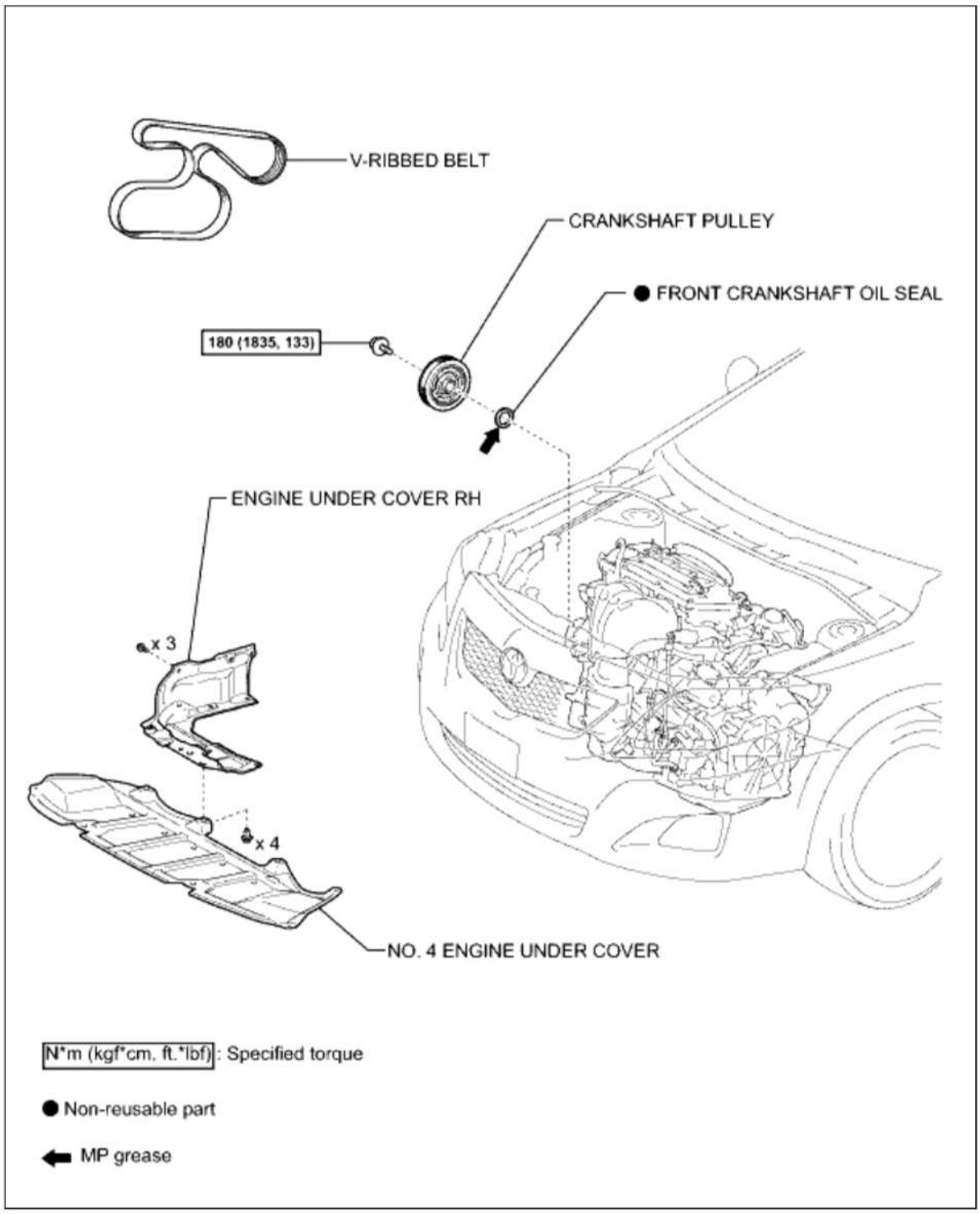
cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027ID00IX
Title: 2AZ-FE ENGINE MECHANICAL: FRONT CRANKSHAFT OIL SEAL: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IE00JX
Title: 2AZ-FE ENGINE MECHANICAL: FRONT CRANKSHAFT OIL SEAL: REMOVAL (2010 Corolla)		

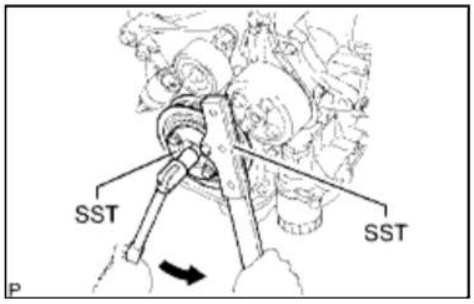
REMOVAL

1. REMOVE FRONT WHEEL RH

2. REMOVE ENGINE UNDER COVER RH

3. REMOVE V-RIBBED BELT INFO

4. REMOVE CRANKSHAFT PULLEY

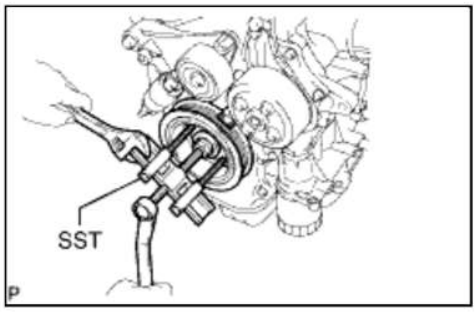


(a) Using SST, hold the crankshaft pulley in place and loosen the pulley bolt.

SST: 09213-54015

91651-60855

SST: 09330-00021



(b) Using SST, remove the crankshaft pulley.

SST: 09950-50013

09951-05010

09952-05010

09953-05020

09954-05021

SST: 09950-40011

09957-04010

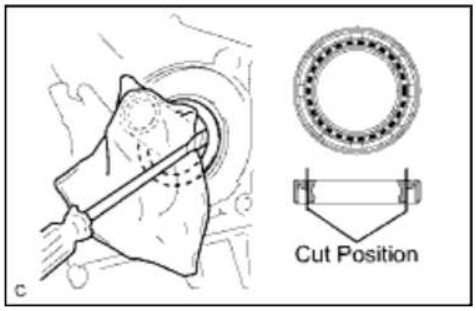
HINT:

If necessary, remove the pulley and pulley bolt using SST.

5. REMOVE FRONT CRANKSHAFT OIL SEAL

(a) Using a knife, cut off the lip of the oil seal.

cardiagn.com



(b) Using a screwdriver, pry out the oil seal.

NOTICE:

Do not damage the surfaces of the oil seal press fit hole and crankshaft.

HINT:

Tape the screwdriver tip before use.

TOYOTA

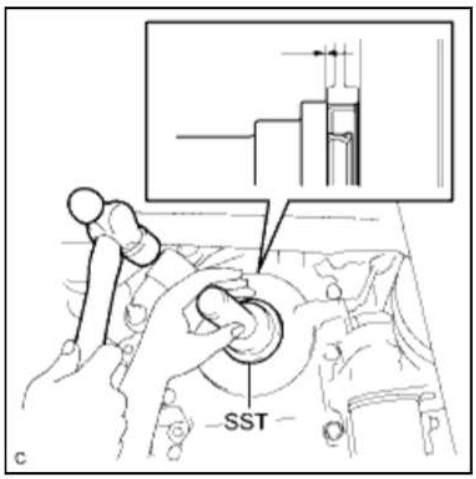
cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IC00IX
Title: 2AZ-FE ENGINE MECHANICAL: FRONT CRANKSHAFT OIL SEAL: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL FRONT CRANKSHAFT OIL SEAL

(a) Apply MP grease to the lip of a new front crankshaft oil seal.

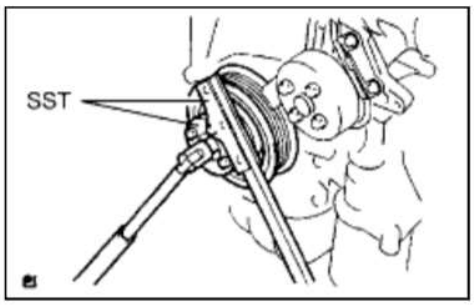


(b) Using SST and a hammer, tap in the front crankshaft oil seal until its surface is flush with the front oil seal retainer edge.

SST: 09223-22010

NOTICE:

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.



2. INSTALL CRANKSHAFT PULLEY

(a) Using SST, fix the crankshaft pulley in place and tighten the bolt.

SST: 09213-54015

91651-60855

SST: 09330-00021

Torque: 180 N·m (1835 kgf·cm, 133ft·lbf)

3. INSTALL V-RIBBED BELT INFO

4. INSPECT FOR OIL LEAK

5. INSTALL ENGINE UNDER COVER RH

6. INSTALL FRONT WHEEL RH

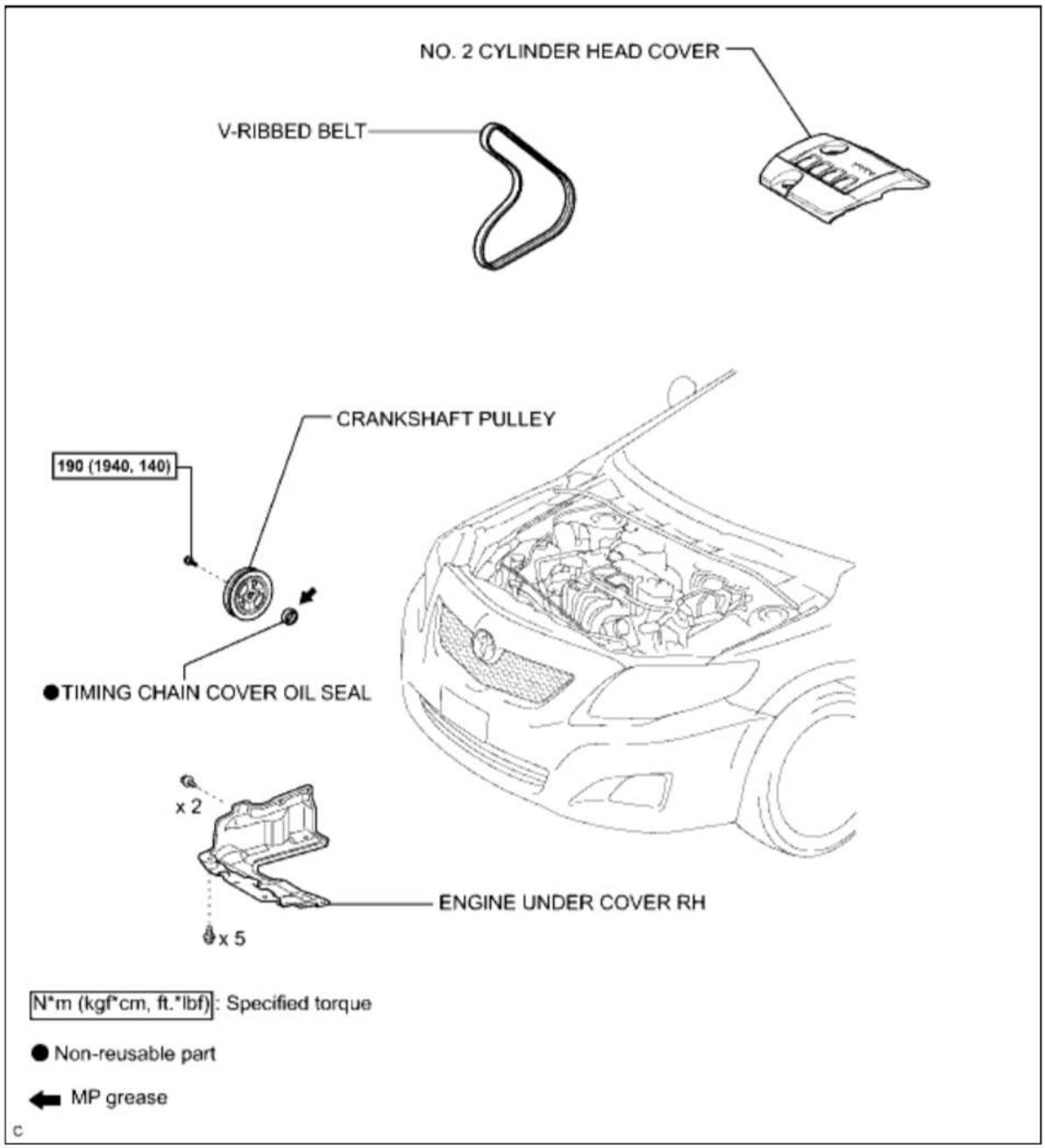
Torque: 103 N·m (1050 kgf·cm, 76ft·lbf)

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000008ZM01AX
Title: 2ZR-FE ENGINE MECHANICAL: FRONT CRANKSHAFT OIL SEAL: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000008ZN01AX
Title: 2ZR-FE ENGINE MECHANICAL: FRONT CRANKSHAFT OIL SEAL: REMOVAL (2010 Corolla)		

REMOVAL

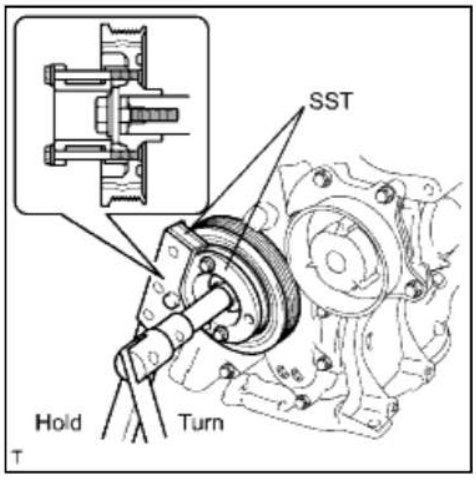
1. REMOVE FRONT WHEEL RH

2. REMOVE ENGINE UNDER COVER RH

3. REMOVE NO. 2 CYLINDER HEAD COVER INFO

4. REMOVE V-RIBBED BELT INFO

5. REMOVE CRANKSHAFT PULLEY



(a) Using SST, hold the pulley in place and loosen the pulley bolt.

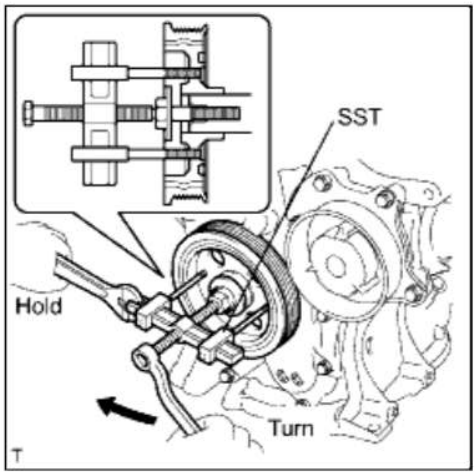
SST: 09213-58014

91551-80840

SST: 09330-00021

NOTICE:

Check the SST installation positions when installing them to prevent the SST fixing bolts from coming into contact with the timing chain cover sub-assembly.



(b) Using SST, remove the crankshaft pulley and pulley bolt.

SST: 09950-50013

09951-05010

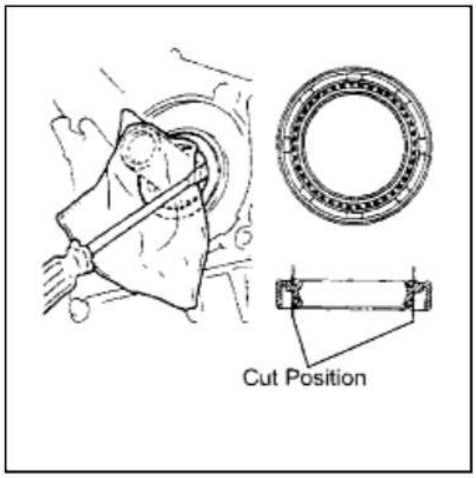
09952-05010

09953-05020

09954-05021

6. REMOVE TIMING CHAIN COVER OIL SEAL

cardiagn.com



(a) Using a knife, cut off the lip of the oil seal.

(b) Using a screwdriver with its tip wrapped with tape, pry out the oil seal.

NOTICE:

After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

cardiagn.com

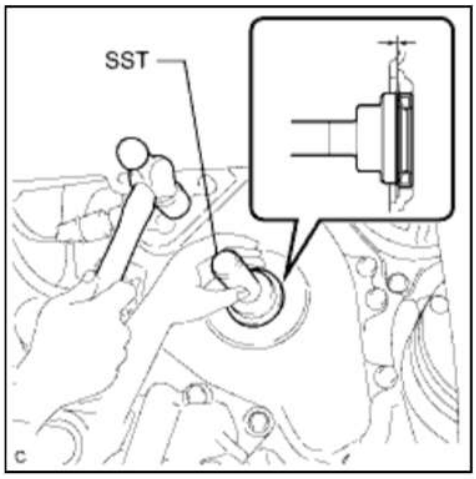
Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000008ZL01AX
Title: 2ZR-FE ENGINE MECHANICAL: FRONT CRANKSHAFT OIL SEAL: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL TIMING CHAIN COVER OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.

NOTICE:
Keep the lip free of foreign matter.



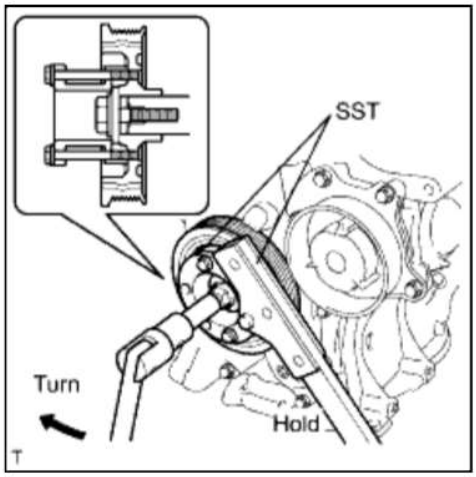
(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST: 09223-22010

NOTICE:
Wipe off extra grease from the crankshaft.

2. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley.



(b) Using SST, hold the pulley in place and tighten the bolt.

SST: 09213-58014

91551-80840

SST: 09330-00021

Torque: 190 N·m (1940 kgf·cm, 140ft·lbf)

NOTICE:
Check the SST installation positions when installing them to prevent the SST fixing bolts from coming into contact with the timing chain cover sub-assembly.

3. INSTALL V-RIBBED BELT INFO

cardiagn.com

4. ADJUST V-RIBBED BELT INFO

5. INSPECT V-RIBBED BELT INFO

6. ADD ENGINE OIL INFO

7. INSPECT FOR ENGINE OIL LEAK

8. INSTALL NO. 2 CYLINDER HEAD COVER INFO

9. INSTALL ENGINE UNDER COVER RH

10. INSTALL FRONT WHEEL RH



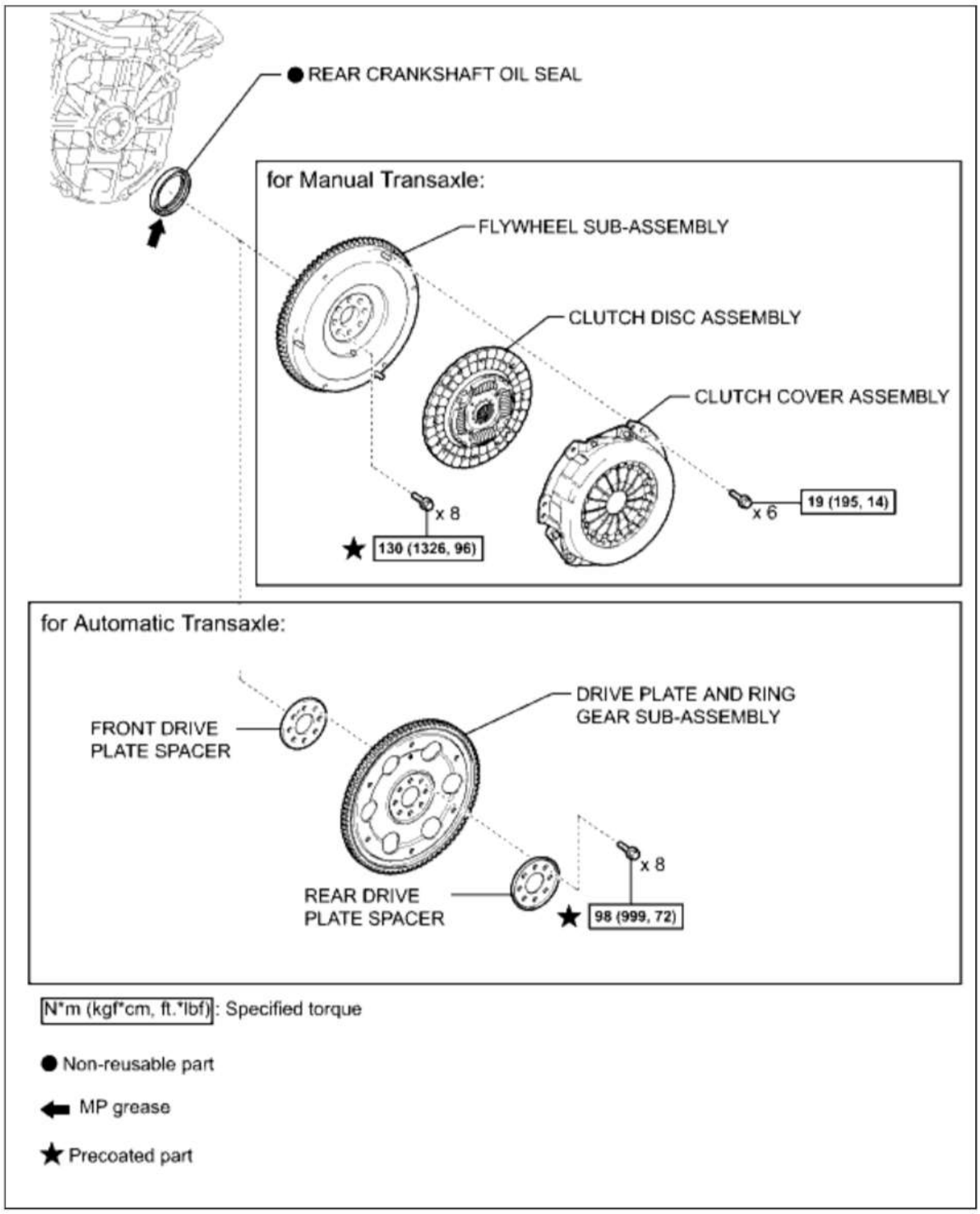
cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IG014X
Title: 2AZ-FE ENGINE MECHANICAL: REAR CRANKSHAFT OIL SEAL: COMPONENTS (2010 Corolla)		

COMPONENTS

ILLUSTRATION

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IH017X
Title: 2AZ-FE ENGINE MECHANICAL: REAR CRANKSHAFT OIL SEAL: REMOVAL (2010 Corolla)		

REMOVAL

1. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U250E.**

2. REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

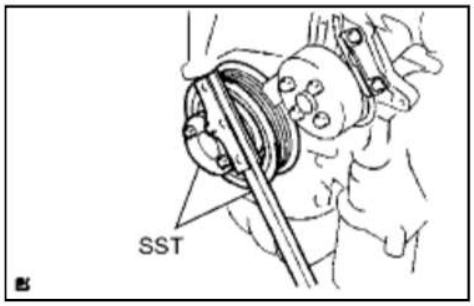
3. REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

4. REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

5. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)

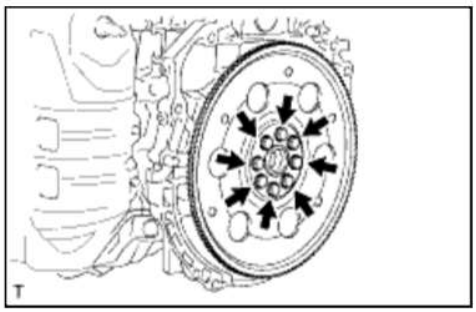


(a) Using SST, hold the crankshaft.

SST: 09213-54015

91651-60855

SST: 09330-00021



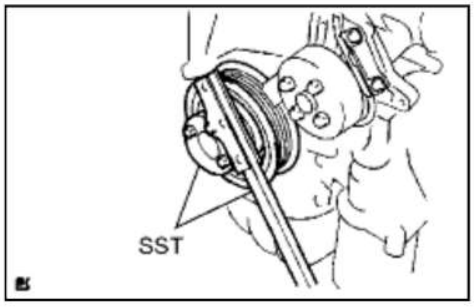
(b) Remove the 8 bolts, rear drive plate spacer, drive plate and front drive plate spacer.

6. REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)

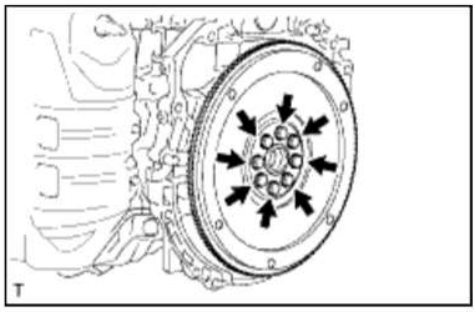
(a) Using SST, hold the crankshaft.

SST: 09213-54015

cardiagn.com

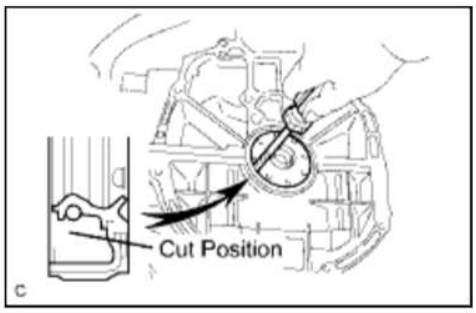


91651-60855
SST: 09330-00021



(b) Remove the 8 bolts and flywheel.

7. REMOVE REAR CRANKSHAFT OIL SEAL



(a) Using a knife, cut off the lip of the oil seal.

(b) Using a screwdriver, pry out the oil seal.

NOTICE:

After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

HINT:

Tape the screwdriver tip before use.

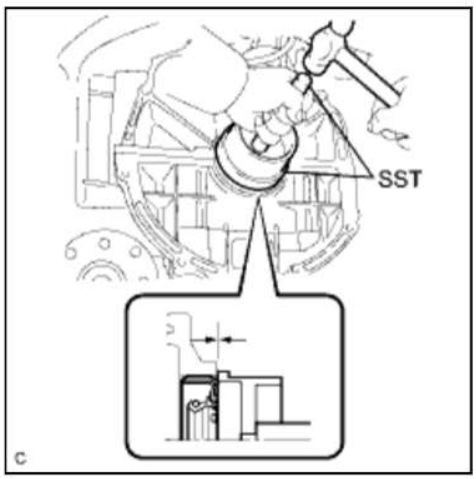
cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IF017X
Title: 2AZ-FE ENGINE MECHANICAL: REAR CRANKSHAFT OIL SEAL: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL REAR CRANKSHAFT OIL SEAL

(a) Apply MP grease to the lip of a new rear crankshaft oil seal.



(b) Using SST and a hammer, tap in the rear crankshaft oil seal until its surface is flush with the rear oil seal retainer edge.

SST: 09223-15030

SST: 09950-70010

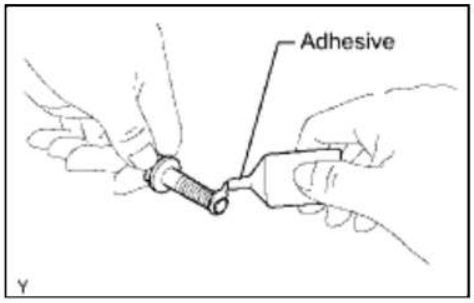
09951-07100

NOTICE:

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.

2. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)

(a) Clean the 8 bolts and 8 bolt holes.



(b) Apply adhesive to 2 or 3 threads of the 8 bolts.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

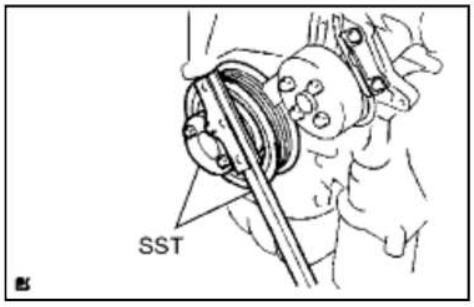
(c) Using SST, hold the crankshaft.

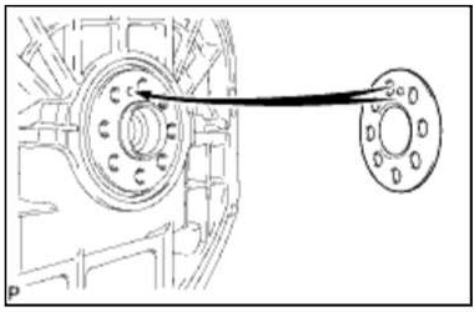
SST: 09213-54015

91651-60855

SST: 09330-00021

cardiagn.com

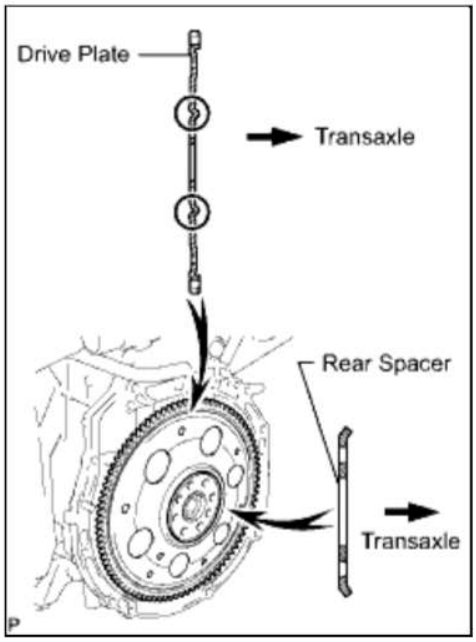




(d) Install the front drive plate spacer.

HINT:

Align the pin of the front spacer with the pin hole of the crankshaft.

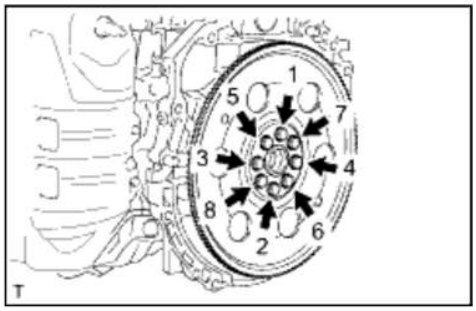


(e) Install the drive plate and rear drive plate spacer onto the crankshaft.

(f) In several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 98 N·m (999 kgf·cm, 72ft·lbf)

cardiagn.com

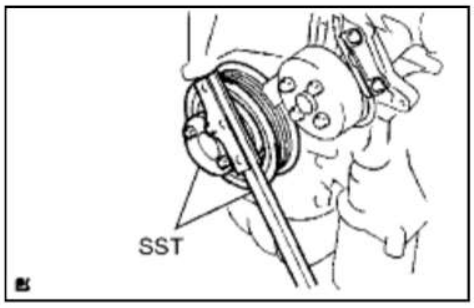


3. INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)

(a) Clean the 8 bolts and 8 bolt holes.

(b) Apply adhesive to the end 2 or 3 threads of the 8 bolts.

Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

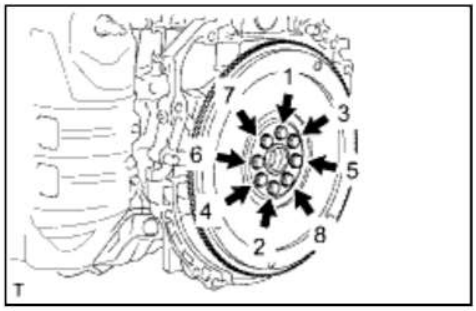


(c) Using SST, hold the crankshaft.

SST: 09213-54015

91651-60855

SST: 09330-00021



(d) In several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 130 N·m (1326 kgf·cm, 96ft·lbf)

4. INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

5. INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**

6. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U250E.**

cardiagn.com

7. INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for E351.**



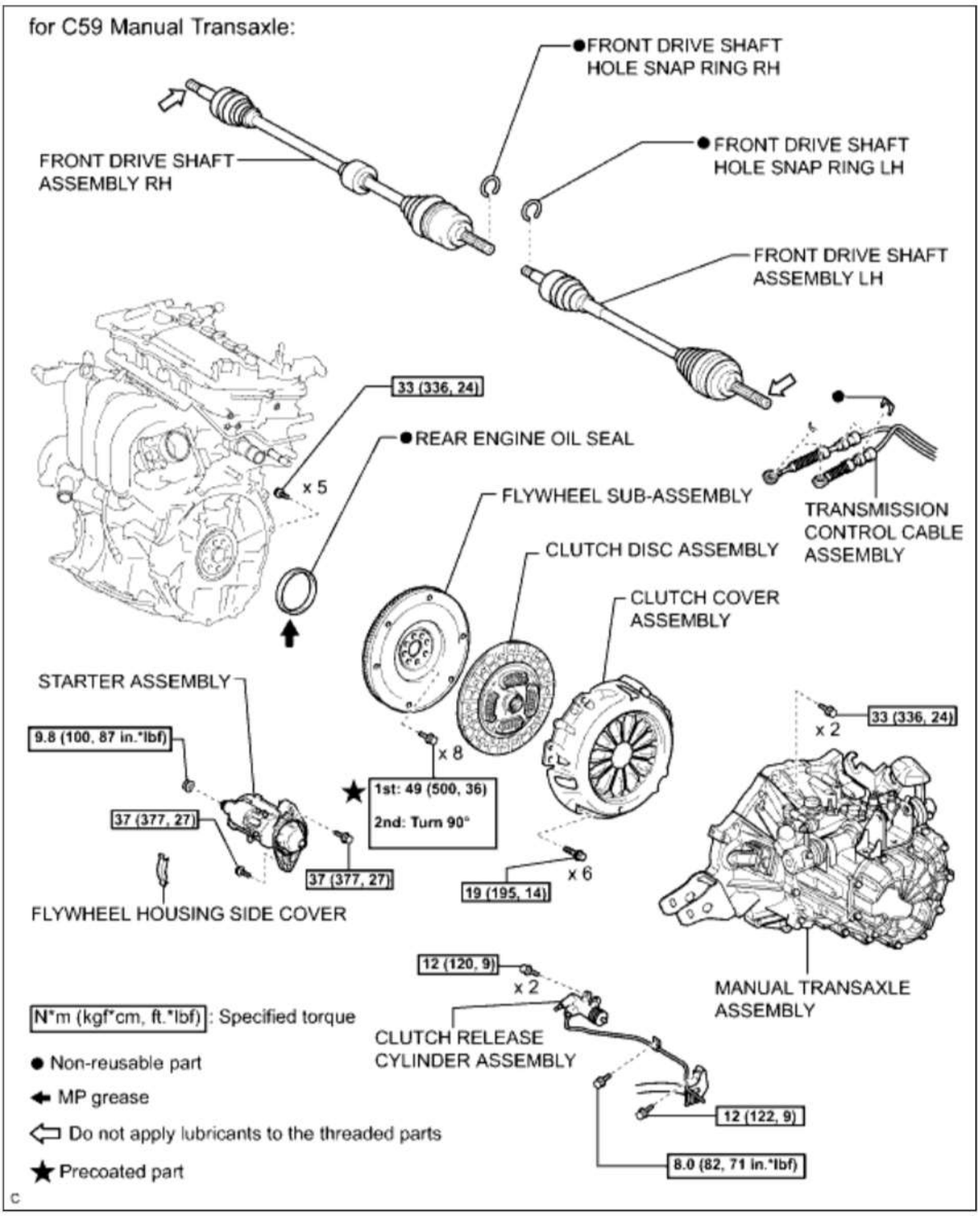
cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IG013X
Title: 2ZR-FE ENGINE MECHANICAL: REAR CRANKSHAFT OIL SEAL: COMPONENTS (2010 Corolla)		

COMPONENTS

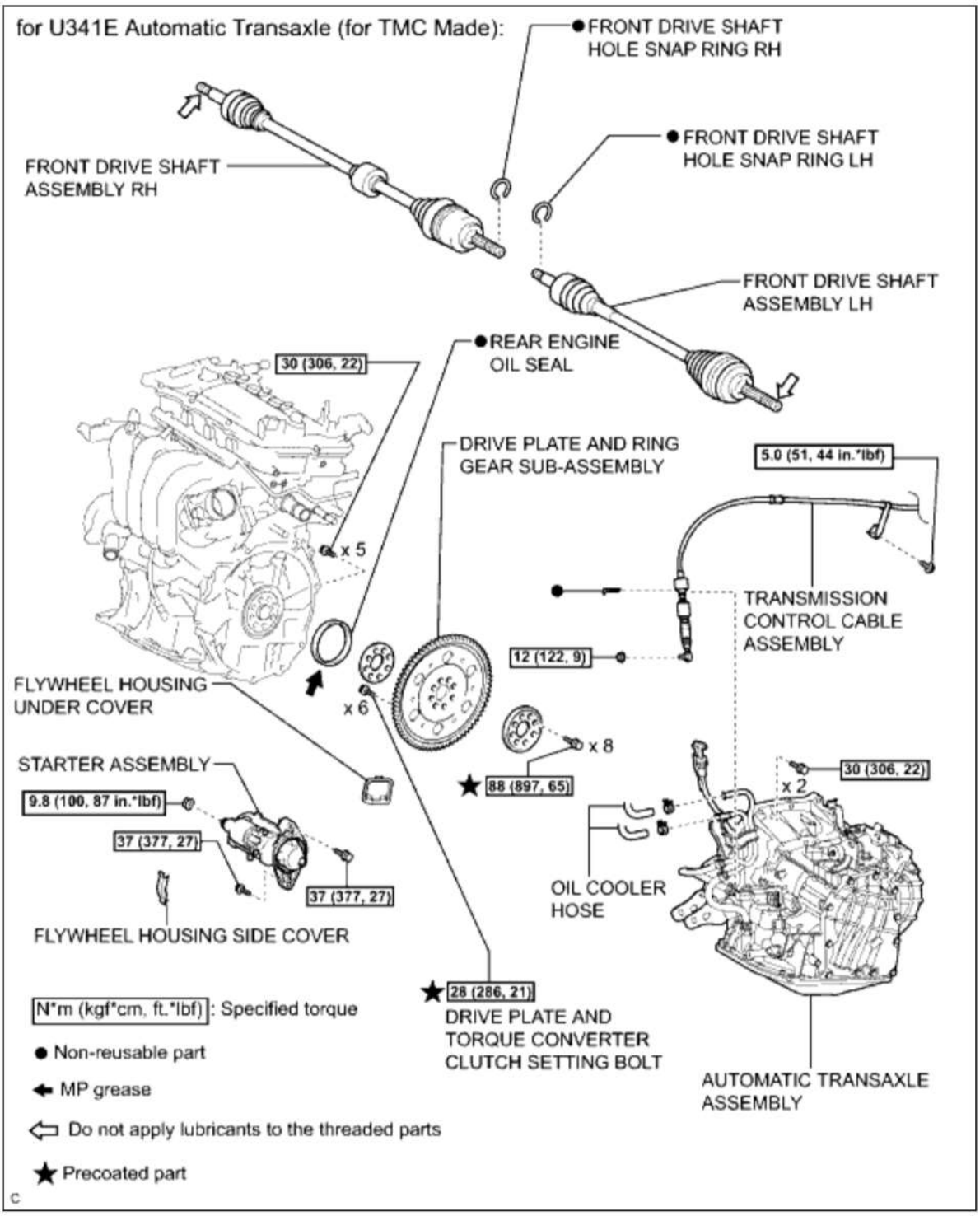
ILLUSTRATION

cardiagn.com



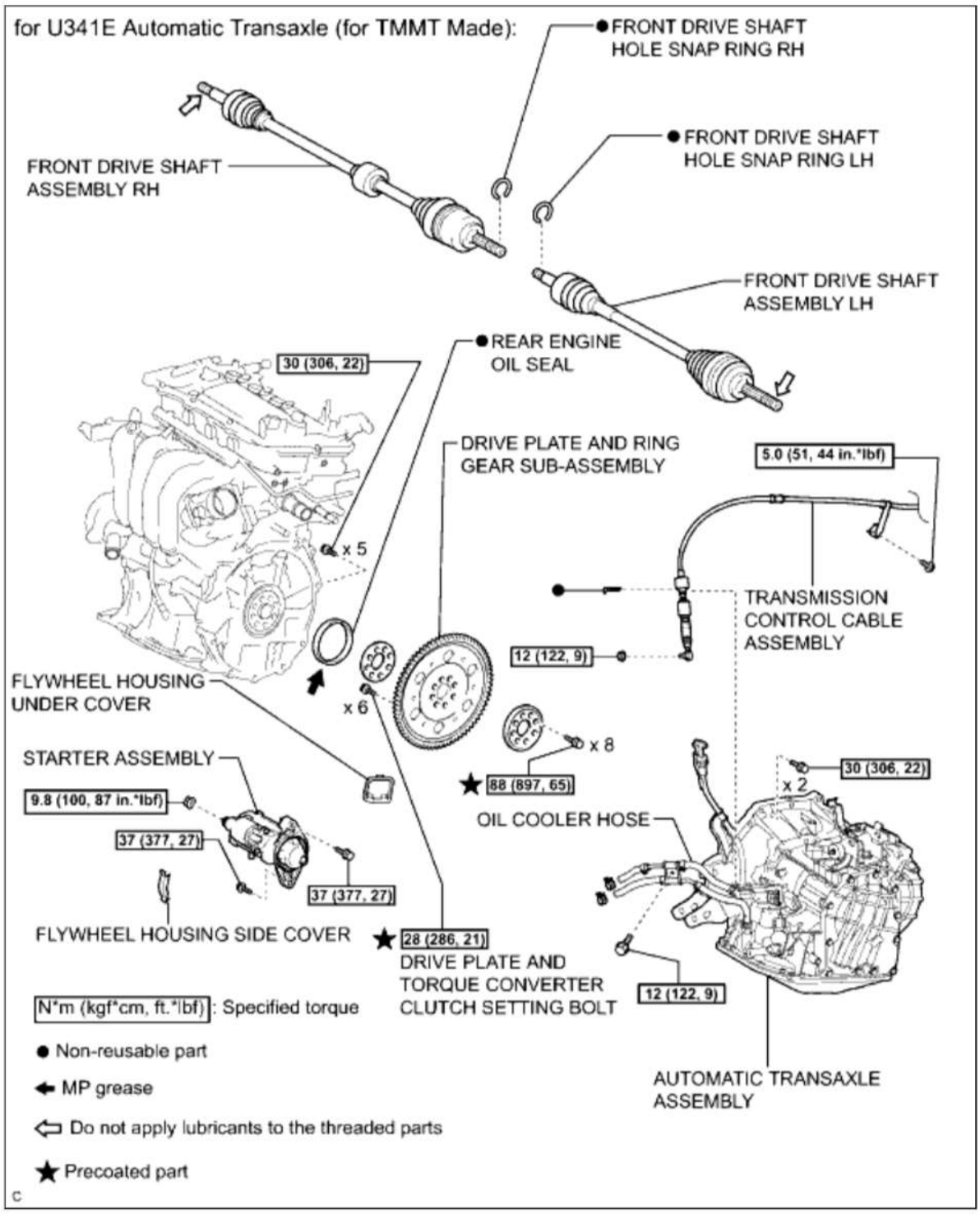
ILLUSTRATION

cardiagn.com



ILLUSTRATION

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IF016X
Title: 2ZR-FE ENGINE MECHANICAL: REAR CRANKSHAFT OIL SEAL: INSTALLATION (2010 Corolla)		

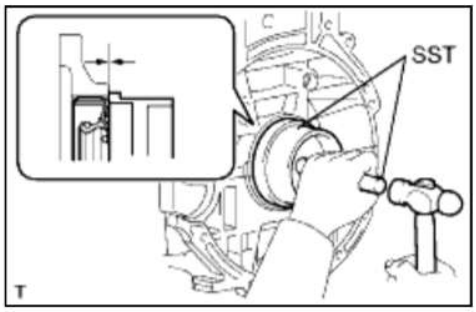
INSTALLATION

1. INSTALL REAR ENGINE OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.

NOTICE:

Keep the lip free from foreign matter.



(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST: 09223-15030

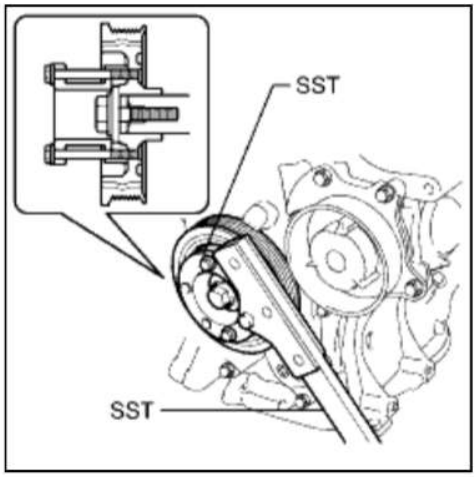
SST: 09950-70010

09951-07100

NOTICE:

- Wipe any extra grease off the crankshaft.
- Do not tap the oil seal at an angle.

2. INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)



(a) Using SST, hold the crankshaft.

SST: 09213-58014

91551-80840

SST: 09330-00021

NOTICE:

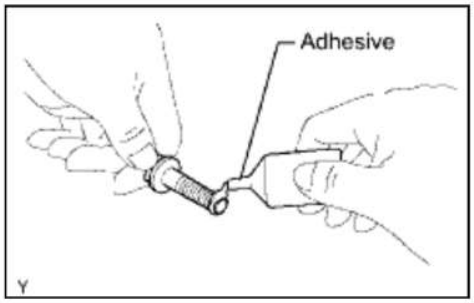
Check the SST installation positions when installing them to prevent the SST fixing bolts from coming into contact with the timing chain cover sub-assembly.

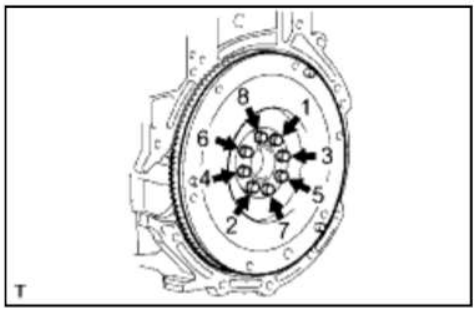
(b) Apply adhesive to 2 or 3 threads of the bolt ends.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

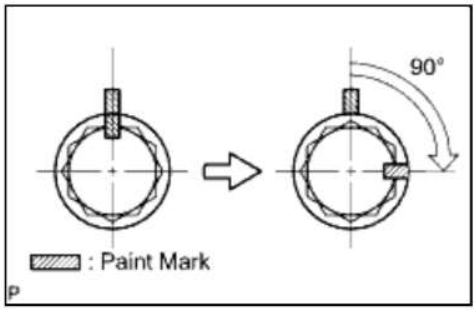
cardiagn.com





(c) Using several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 49 N·m (500 kgf·cm, 36ft·lbf)



(d) Mark the top of the bolts with paint.

(e) Retighten the 8 bolts an additional 90° in the same sequence.

(f) Check that the paint marks are now at a 90° angle to the top.

(g) Check that the crankshaft turns smoothly.

3. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)

(a) Using SST, hold the crankshaft.

SST: 09213-58014

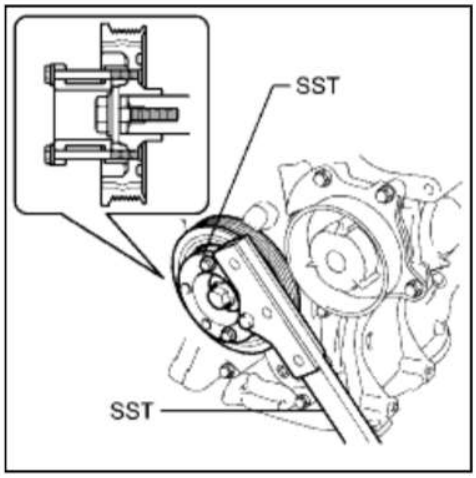
91551-80840

SST: 09330-00021

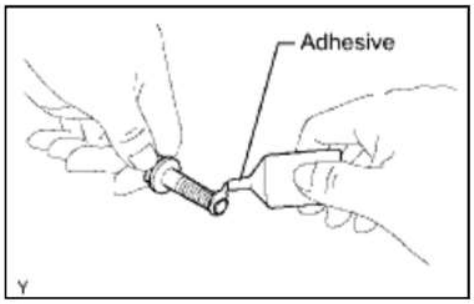
NOTICE:

Check the SST installation positions when installing them to prevent the SST fixing bolts from coming into contact with the timing chain cover sub-assembly.

cardiagn.com

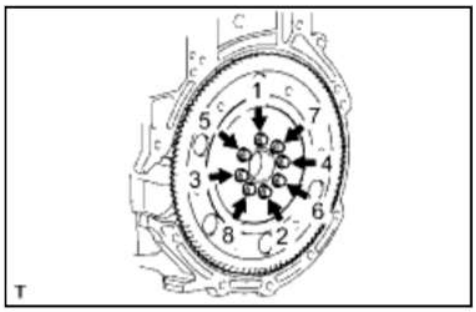


(b) Clean the bolts and the bolt holes.



(c) Apply a few drops of adhesive to 2 or 3 threads of the 8 bolts tip.

Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



(d) Install the front spacer, drive plate and rear spacer with the 8 bolts. uniformly tighten the 8 bolts in the sequence shown in the illustration.

Torque: 88 N·m (897 kgf·cm, 65ft·lbf)

4. INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle) INFO

5. INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle) INFO

6. INSPECT AND ADJUST CLUTCH COVER ASSEMBLY (for Manual Transaxle) INFO

7. INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for C59.**

8. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

cardiagn.com

HINT: INFO **for U341E.**

9. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO .



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM0000027IH016X
Title: 2ZR-FE ENGINE MECHANICAL: REAR CRANKSHAFT OIL SEAL: REMOVAL (2010 Corolla)		

REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO .

2. REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT: INFO **for C59.**

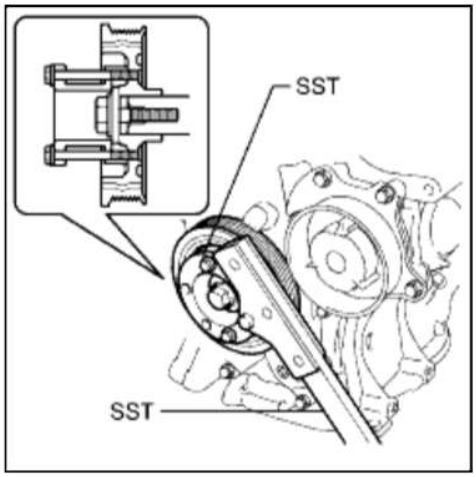
3. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT: INFO **for U341E.**

4. REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle) INFO

5. REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle) INFO

6. REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)



(a) Using SST, hold the crankshaft.

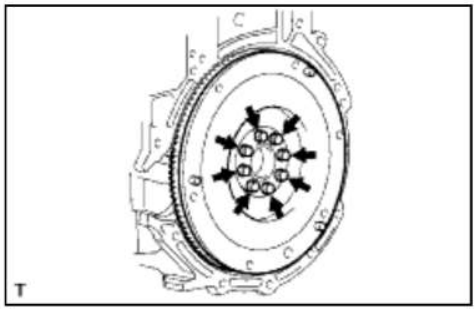
SST: 09213-58014

91551-80840

SST: 09330-00021

NOTICE:

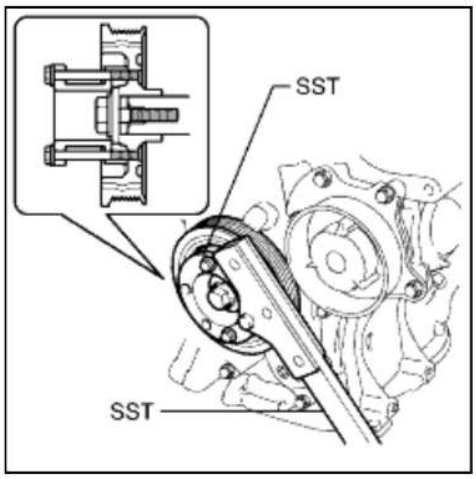
Check the SST installation positions when installing them to prevent the SST fixing bolts from coming into contact with the timing chain cover sub-assembly.



(b) Remove the 8 bolts and flywheel.

cardiagn.com

7. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)



(a) Using SST, hold the crankshaft.

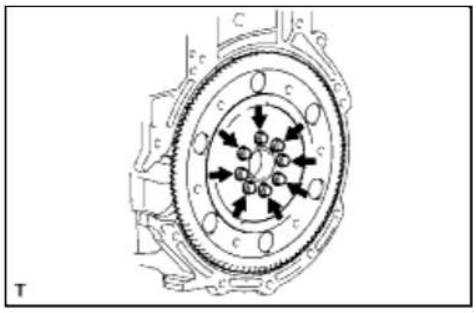
SST: 09213-58014

91551-80840

SST: 09330-00021

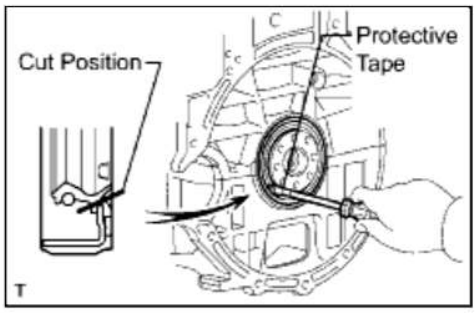
NOTICE:

Check the SST installation positions when installing them to prevent the SST fixing bolts from coming into contact with the timing chain cover sub-assembly.



(b) Remove the 8 bolts, rear spacer, drive plate and front spacer.

8. REMOVE REAR ENGINE OIL SEAL



(a) Using a knife, cut off the lip of the oil seal.

(b) Using a screwdriver with its tip wrapped with tape, pry out the oil seal.

NOTICE:

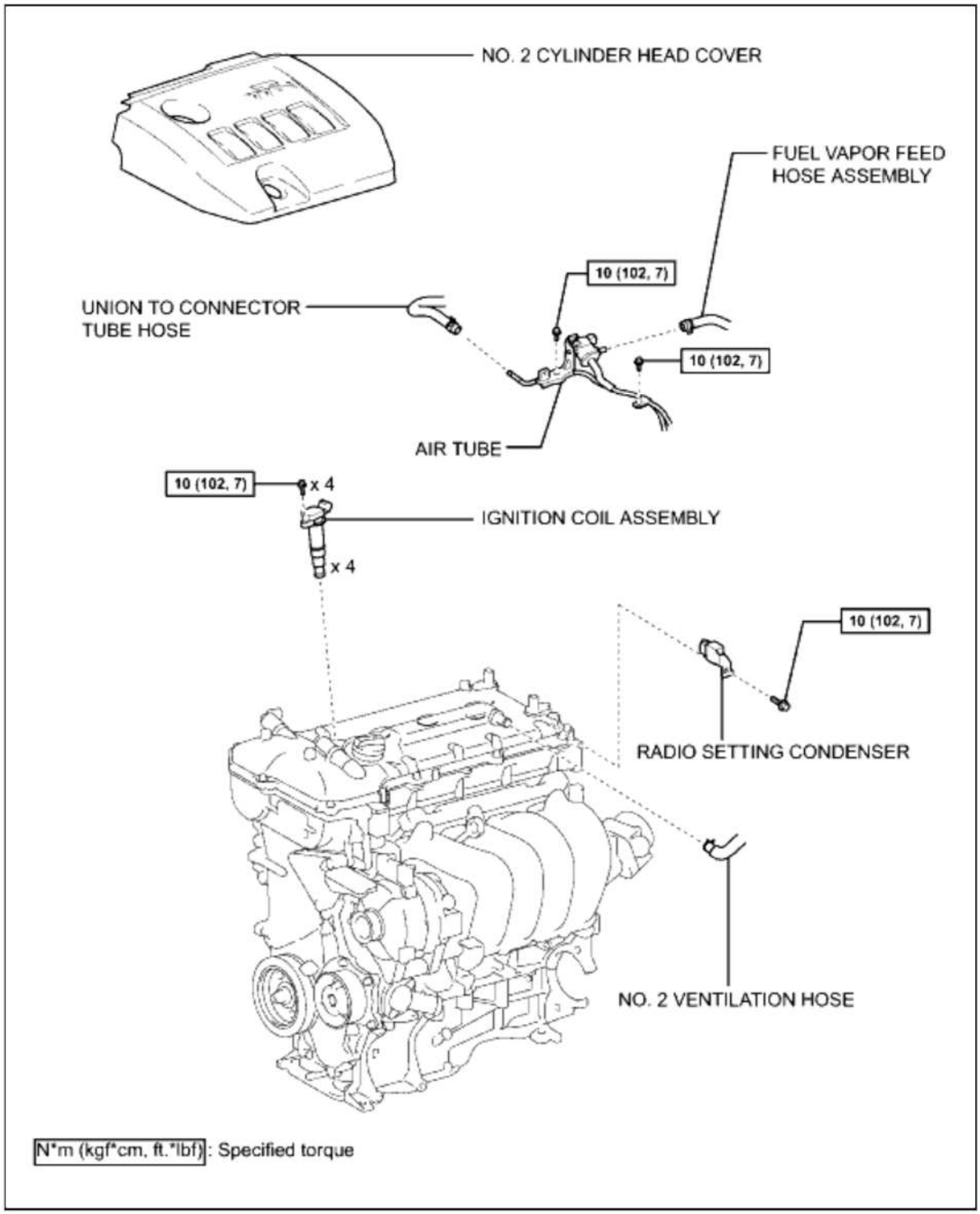
After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

cardiagn.com

Last Modified: 3-10-2010	6.4 K	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000381H009X
Title: 2ZR-FE ENGINE MECHANICAL: TIMING GEAR: COMPONENTS (2010 Corolla)		

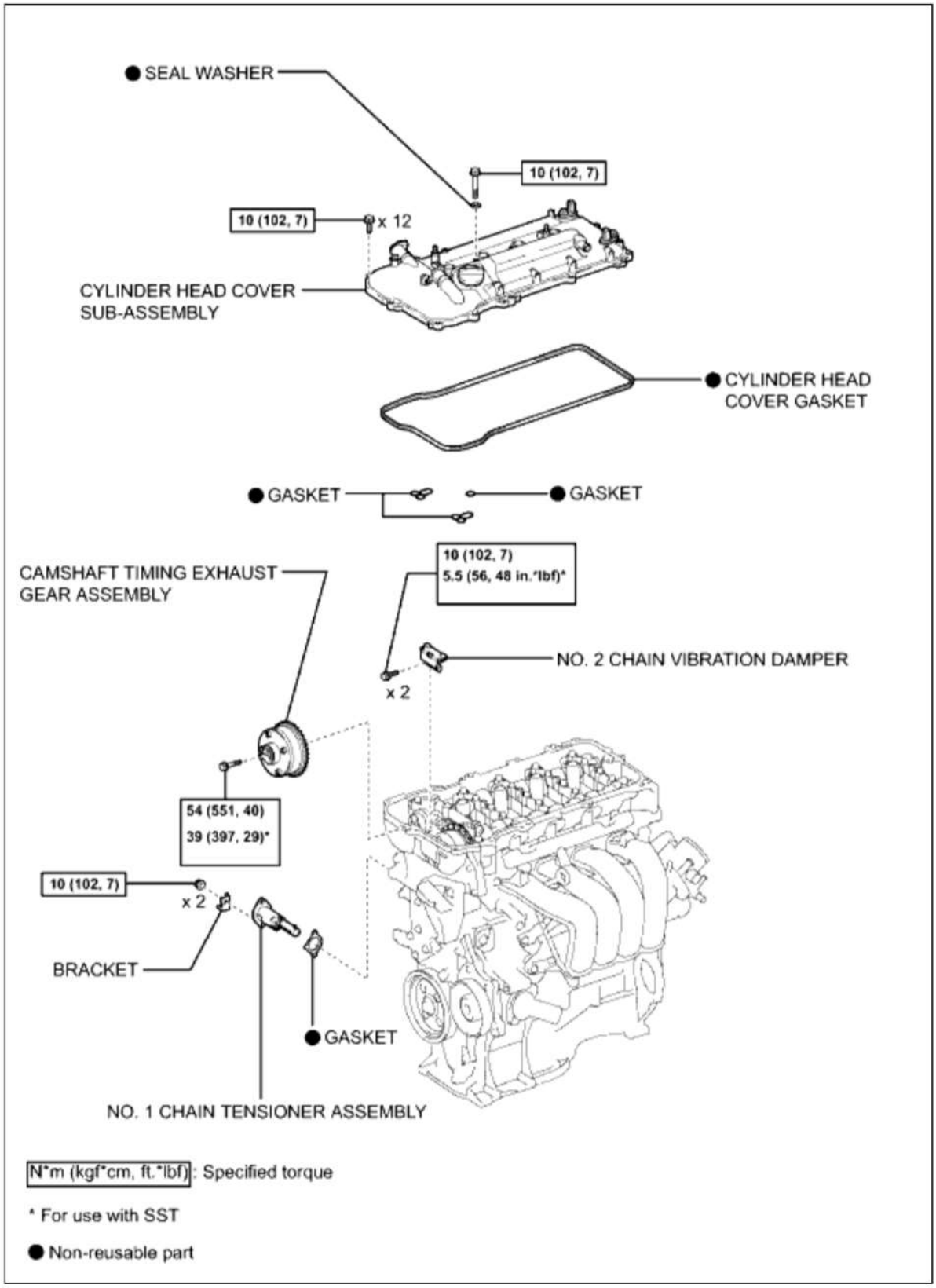
COMPONENTS

ILLUSTRATION



cardiagn.com

ILLUSTRATION



cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000381F00AX
Title: 2ZR-FE ENGINE MECHANICAL: TIMING GEAR: REMOVAL (2010 Corolla)		

REMOVAL

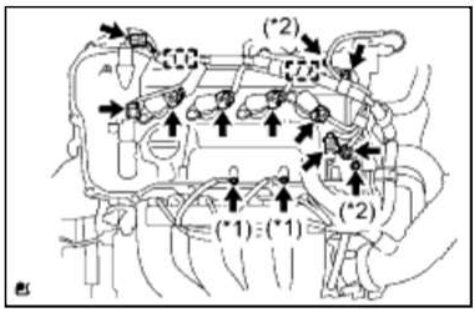
1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. DISCONNECT FUEL VAPOR FEED HOSE ASSEMBLY INFO

3. DISCONNECT UNION TO CONNECTOR TUBE HOSE INFO

4. DISCONNECT NO. 2 VENTILATION HOSE

5. SEPARATE WIRE HARNESS



(a) Remove the 2 bolts (*1) and disconnect the 9 connectors and 2 clamps. Then disconnect the wire harness.

(b) Remove the 2 bolts (*2) and disconnect the air tube.

6. REMOVE RADIO SETTING CONDENSER INFO

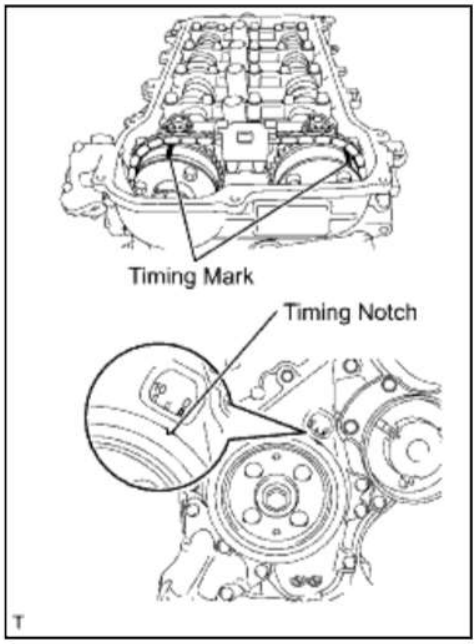
7. REMOVE IGNITION COIL ASSEMBLY INFO

8. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

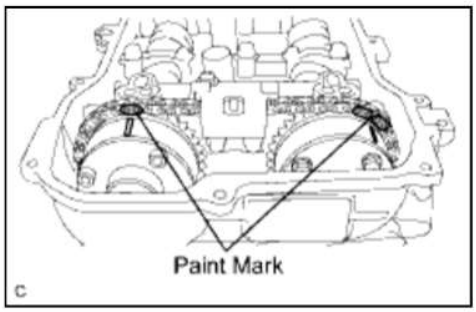
9. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley until its groove and the timing mark "0" of the timing chain cover are aligned.

cardiagn.com

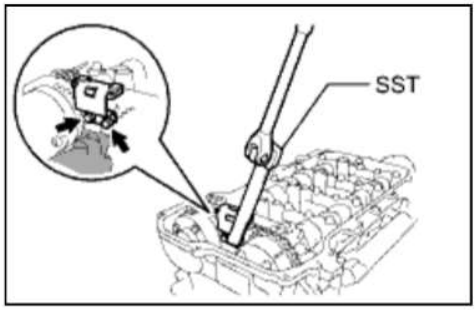


(b) Check that each timing mark of the camshaft timing gear and sprocket are aligned with each timing mark located as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) to align the timing marks as shown in the illustration.



(c) Place paint marks on the chain in alignment with the timing marks on the camshaft timing gear and camshaft timing exhaust gear.

10. REMOVE NO. 2 CHAIN VIBRATION DAMPER



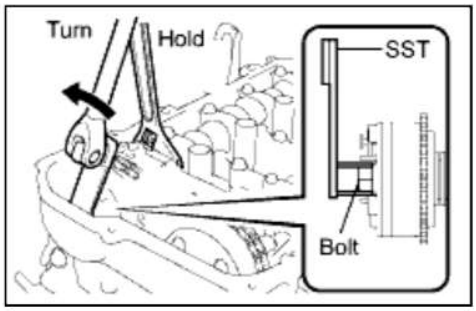
(a) Using SST, remove the 2 bolts and No. 2 chain vibration damper from the cam cap.

SST: 09961-00950

11. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

cardiagn.com

12. REMOVE CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY



(a) While holding the hexagonal portion of the No. 2 camshaft with a wrench, loosen the camshaft timing exhaust gear bolt with SST.

SST: 09249-37010

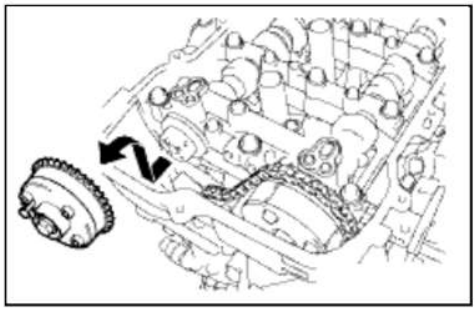
NOTICE:

Do not remove the other 4 bolts ("TORX" bolt). If any of them is removed, replace the camshaft timing exhaust gear assembly.

HINT:

The bolt cannot be removed separately from the camshaft timing exhaust gear assembly due to lack of space.

(b) Hold the hexagonal portion of the intake camshaft with a wrench and turn it slightly counterclockwise to release the chain.



(c) While removing the chain, pull out the camshaft timing exhaust gear assembly horizontally and then upward with the bolts installed.

NOTICE:

Do not turn the intake camshaft more than necessary.

HINT:

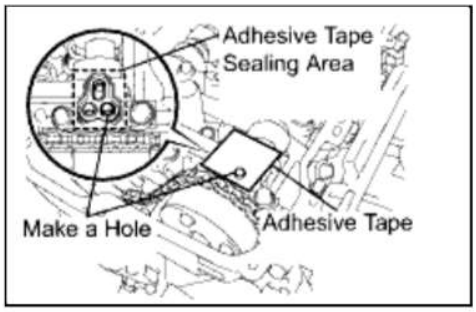
Be sure to loosen the chain because the camshaft timing exhaust gear assembly cannot be removed with the chain tensioned.

13. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Inspect the camshaft timing gear lock.

(1) Check that the camshaft timing gear is locked.

(b) Inspect camshaft timing gear operation.



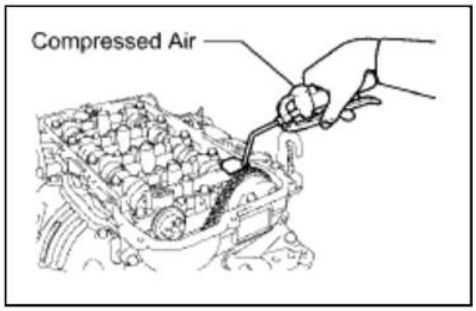
(1) After cleaning and degreasing the intake side VVT oil hole on the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

NOTICE:

Be sure to seal the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

(2) Make a hole in the adhesive tape covering the oil hole as shown in the illustration. (Procedure A)

cardiagn.com



(3) Apply approximately 100 kPa (1.0 kgf/cm2, 14.5 psi.) of air pressure to the hole made in procedure A to release the lock pin.

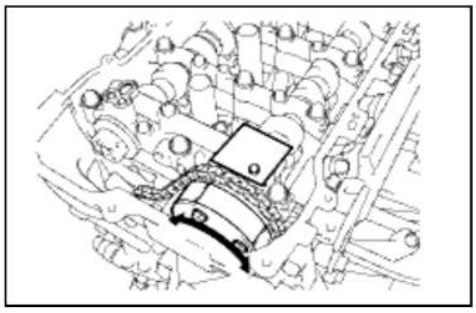
NOTICE:

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.

(4) Forcibly turn the camshaft timing gear in the advance direction (counterclockwise).

HINT:

Depending on the air pressure applied, the camshaft timing gear may turn in the advance direction without assistance by hand.



(5) Turn the camshaft timing gear within its movable range (27.5°) 2 or 3 times without turning it to the most retarded position. Check that the camshaft timing gear turns smoothly.

(6) Lock the camshaft timing gear.

NOTICE:

Be sure to turn the camshaft timing gear to the locked position and then confirm that it is securely locked again to prevent the valve timing from being affected.

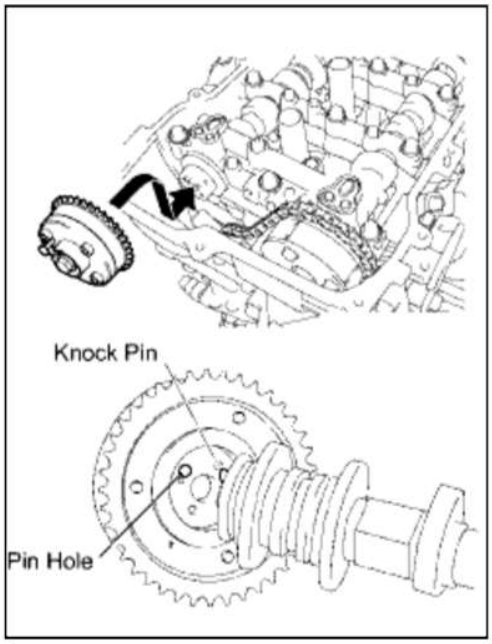
(7) Remove the adhesive tape from the No. 1 camshaft bearing cap.

14. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

(a) Temporarily install the camshaft timing exhaust gear assembly.

(1) Install the bolt to the camshaft timing exhaust gear assembly.

cardiagn.com



(2) Align the knock pin on the No. 2 camshaft with the pin hole in the camshaft timing exhaust gear assembly and temporarily install the camshaft timing exhaust gear assembly to the No. 2 camshaft with the bolt.

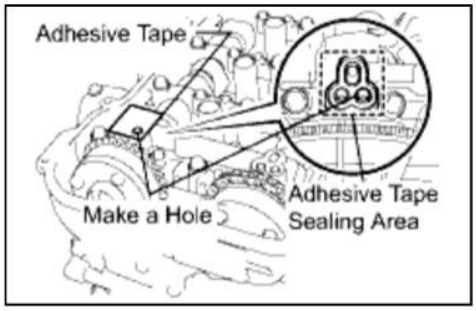
NOTICE:

- Do not install the chain onto the gear at this step.
- Do not allow the chain to interfere with the gear when installing the gear assembly.

(b) Inspect the camshaft timing exhaust gear lock.

(1) Check that the camshaft timing exhaust gear is locked.

(c) Inspect camshaft timing exhaust gear operation.



(1) After cleaning and degreasing the exhaust side VVT oil hole on the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

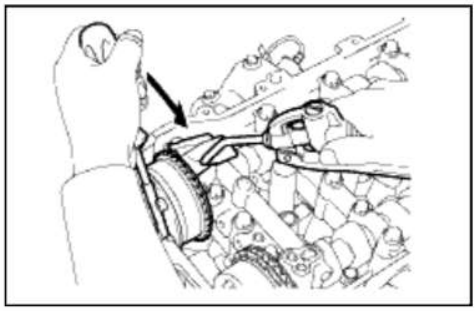
NOTICE:

Be sure to seal the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

(2) Make a hole in the adhesive tape covering the oil hole as shown in the illustration. (Procedure B)

(3) Apply approximately 100 kPa (1.0 kgf/cm2, 14.5 psi.) of air pressure to the hole made in procedure B to release the lock pin.

cardiagn.com



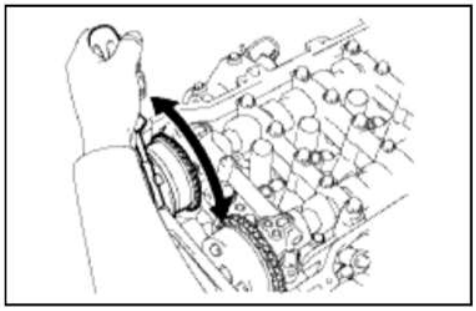
NOTICE:

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.

(4) Using a screwdriver with its tip taped, forcibly turn the camshaft timing exhaust gear in the retard direction (clockwise).

NOTICE:

- Be sure to keep the camshaft timing exhaust gear in the retard direction. If the gear is released, it will return to the advanced position automatically due to the force from the spring.
- Do not damage the camshaft timing exhaust gear.

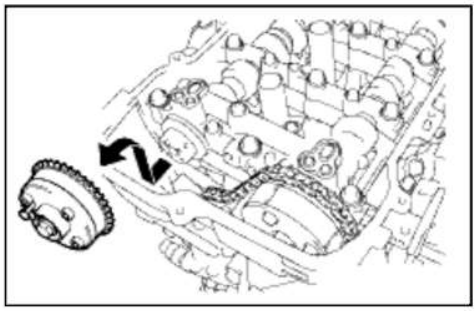


(5) Using a screwdriver with its tip taped, turn the camshaft timing exhaust gear within its movable range (20°) 2 or 3 times without turning it to the most advanced position. Check that the camshaft timing gear turns smoothly.

(6) Lock the camshaft timing exhaust gear.

(7) Remove the adhesive tape from the No. 1 camshaft bearing cap.

(d) Remove the camshaft timing exhaust gear assembly.



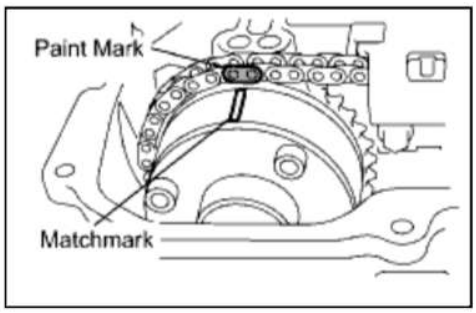
(1) Remove the temporarily installed camshaft timing exhaust gear assembly.

cardiagn.com

Last Modified: 3-10-2010	6.4 A	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM00000381G009X
Title: 2ZR-FE ENGINE MECHANICAL: TIMING GEAR: INSTALLATION (2010 Corolla)		

INSTALLATION

1. INSTALL CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY



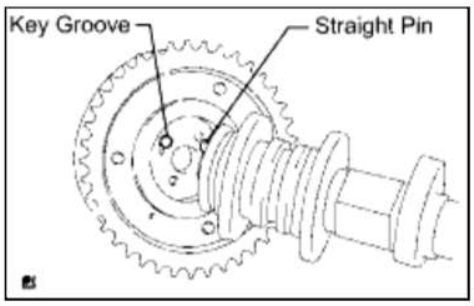
(a) Raise the chain.

(b) Hold the hexagonal portion of the intake camshaft with a wrench and turn it slightly counterclockwise to release the chain.

(c) Align the paint mark with the matchmark to install the chain.

NOTICE:

Do not turn the intake camshaft more than necessary.



(d) Align the straight pin on the No. 2 camshaft with the pin hole in the camshaft timing exhaust gear assembly and install the camshaft timing exhaust gear assembly to the No. 2 camshaft.

NOTICE:

- If the straight pin cannot be aligned with the pin hole, hold the hexagonal portion of the No. 2 camshaft with a wrench and turn it slightly to install the gear.
- Do not turn the No. 2 camshaft more than necessary.
- Do not forcibly push on the tip of the straight pin with the camshaft timing exhaust gear assembly.

(e) Using SST and a wrench, hold the hexagonal portion of the No. 2 camshaft and install the camshaft timing exhaust gear assembly to the No. 2 camshaft.

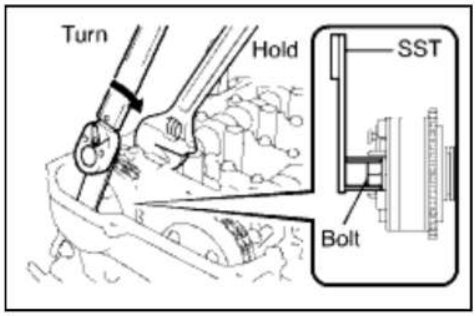
SST: 09249-37010

without SST - Torque: 54 N·m (551 kgf·cm, 40ft·lbf)

with SST - Torque: 39 N·m (397 kgf·cm, 29ft·lbf)

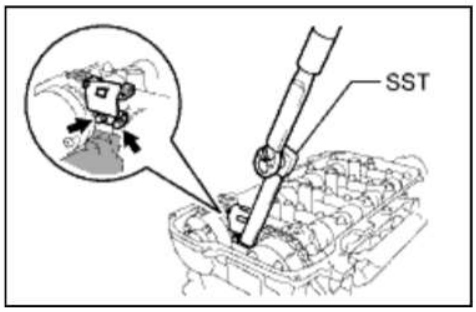
NOTICE:

cardiagn.com



- This torque value can be obtained by using a torque wrench with a fulcrum length of 260 mm (10.24 in.) and SST of 100 mm (3.94 in.) INFO .
- This torque value is effective when SST is parallel to the torque wrench.

2. INSTALL NO. 2 CHAIN VIBRATION DAMPER



(a) Using SST, install the No. 2 chain vibration damper with the 2 bolts.

SST: 09961-00950
without SST - Torque: 10 N·m (102 kgf·cm, 7ft·lbf)
with SST - Torque: 5.5 N·m (56 kgf·cm, 48in·lbf)

NOTICE:

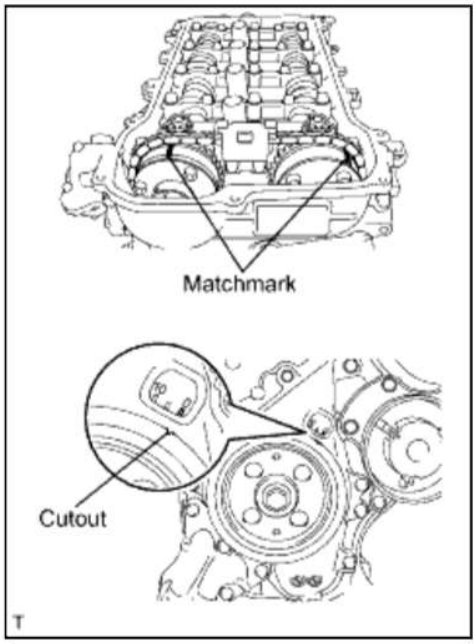
- This torque value can be obtained by using a torque wrench with a fulcrum length of 180 mm (7.09 in.) and SST of 150 mm (5.91 in.) INFO .
- This torque value is effective when SST is parallel to the torque wrench.

3. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY INFO

4. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft clockwise 360° to set the No. 1 cylinder to TDC/compression and align the matchmark (cutout) with the "0" mark on the timing chain (belt) cover.

cardiagn.com



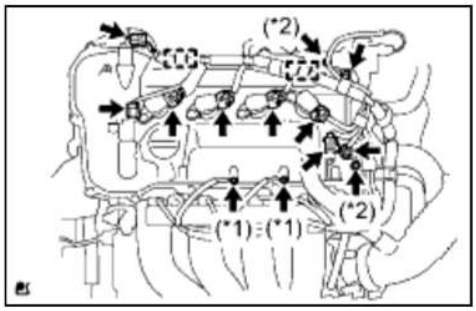
(b) Check that the matchmark on each camshaft timing gear is positioned as shown in the illustration.

5. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

6. INSTALL IGNITION COIL ASSEMBLY INFO

7. INSTALL RADIO SETTING CONDENSER INFO

8. INSTALL WIRE HARNESS



(a) Install the air tube with the 2 bolts (*2).

Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

(b) Connect the 9 connectors and install the wire harness with the 2 bolts (*1) and 2 clamps.

Torque: 8.4 N·m (86 kgf·cm, 74in·lbf)

9. INSTALL NO. 2 VENTILATION HOSE

10. CONNECT FUEL VAPOR FEED HOSE ASSEMBLY INFO

11. CONNECT UNION TO CONNECTOR TUBE HOSE INFO

12. INSTALL NO. 2 CYLINDER HEAD COVER INFO

cardiagn.com



cardiagn.com

Last Modified: 3-10-2010	6.4 N	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000001A8Z01OX
Title: 2AZ-FE ENGINE MECHANICAL: VALVE CLEARANCE: ADJUSTMENT (2010 Corolla)		

ADJUSTMENT

1. REMOVE ENGINE UNDER COVER RH

2. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY INFO

3. REMOVE IGNITION COIL ASSEMBLY INFO

4. REMOVE SPARK PLUG INFO

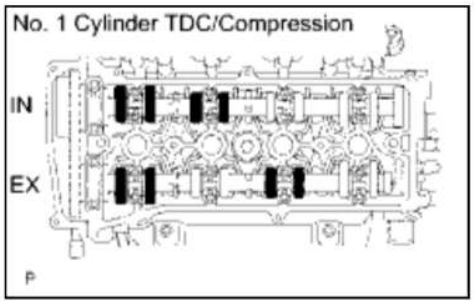
5. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

6. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

7. CHECK VALVE CLEARANCE

(a) Check only the valves indicated in the illustration.

(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.



Standard Valve Clearance (Cold):

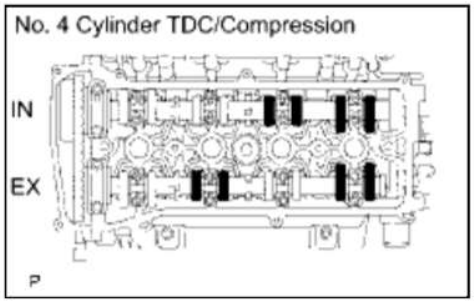
ITEM	SPECIFIED CONDITION
Intake	0.19 to 0.29 mm (0.00748 to 0.0114 in.)
Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)

(2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve clearance lifters.

(b) Turn the crankshaft 1 revolution (360°) and set the No. 4 cylinder to TDC/compression.

(c) Check only the valves indicated in the illustration.

(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.



Standard Valve Clearance (Cold):

ITEM	SPECIFIED CONDITION
Intake	0.19 to 0.29 mm (0.00748 to 0.0114 in.)
Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)

cardiagn.com

(2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifters.

8. ADJUST VALVE CLEARANCE

(a) Set No. 1 cylinder to TDC/compression INFO .

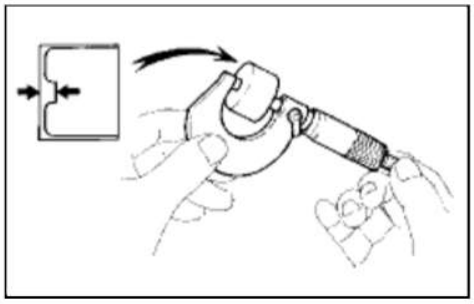
(b) Remove the No. 1 chain tensioner INFO .

(c) Loosen the camshaft timing sprocket INFO .

(d) Remove the No. 2 camshaft INFO .

(e) Remove the camshaft INFO .

(f) Remove the valve lifters.



(g) Using a micrometer, measure the thickness of the removed valve lifters.

(h) Calculate the thickness of a new lifter so that the valve clearance comes within the specified values.

New Lifter Thickness:

ITEM	SPECIFICATION
Intake	A = B + (C - 0.24 mm (0.00945 in.))
Exhaust	A = B + (C - 0.43 mm (0.0169 in.))

A	New lifter thickness
B	Used lifter thickness
C	Measured valve clearance

CALCULATION EXAMPLE (Intake):

1. Measured intake valve clearance = 0.40 mm (0.0157 in.)

(Measured - Specification = Excess clearance)

a. 0.40 mm (0.0157 in.) - 0.24 mm (0.00945 in.) = 0.16 mm (0.00630 in.)

2. Measured used lifter thickness = 5.250 mm (0.2067 in.)

cardiagn.com

3. New lifter thickness = 5.410 mm (0.2130 in.)

(Excess clearance + Used lifter thickness = Ideal new lifter)

a. 0.16 mm (0.00630 in.) + 5.250 mm (0.2067 in.) = 5.410 mm (0.2130 in.)

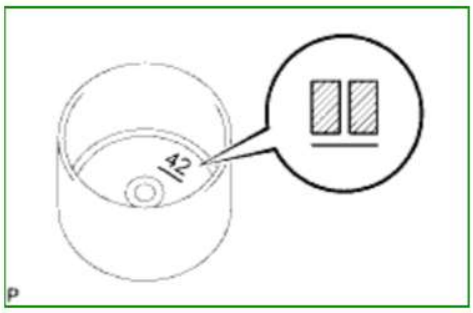
4. Closest new lifter = 5.420 mm (0.2134 in.)

- Select No. 42 lifter

(i) Select a new lifter with a thickness as close as possible to the calculated values.

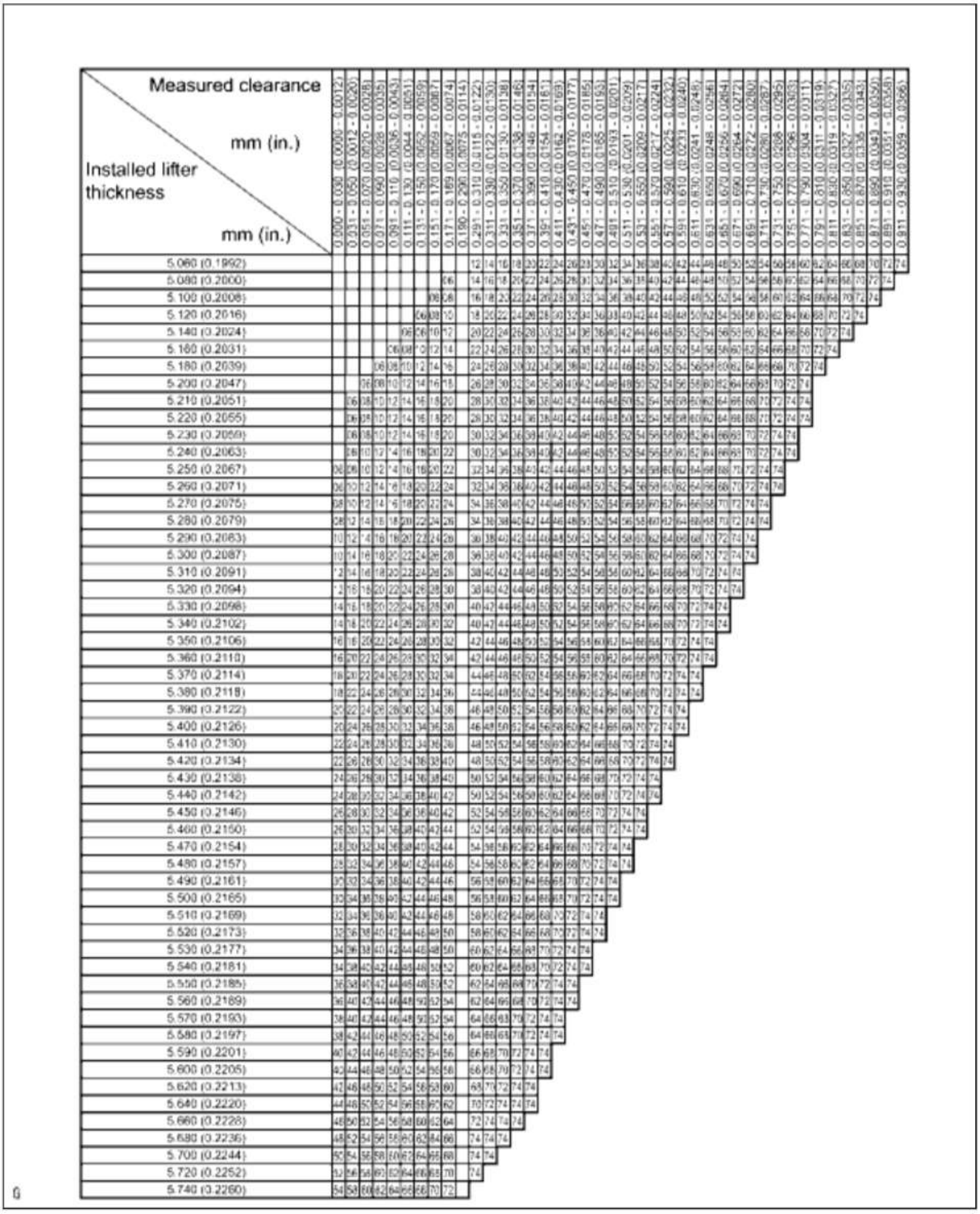
HINT:

- Lifters are available in 35 sizes in increments of 0.020 mm (0.000787 in.), from 5.060 to 5.740 mm (0.1992 to 0.2260 in.).
- The identification number inside the valve lifters shows the value to 2 decimal places. (The illustration shows 5.420 mm (0.2134 in.)



(j) Valve lifter selection chart (intake).

cardiagn.com



New Lifter Thickness

LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)

cardiagn.com

LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)	-	-

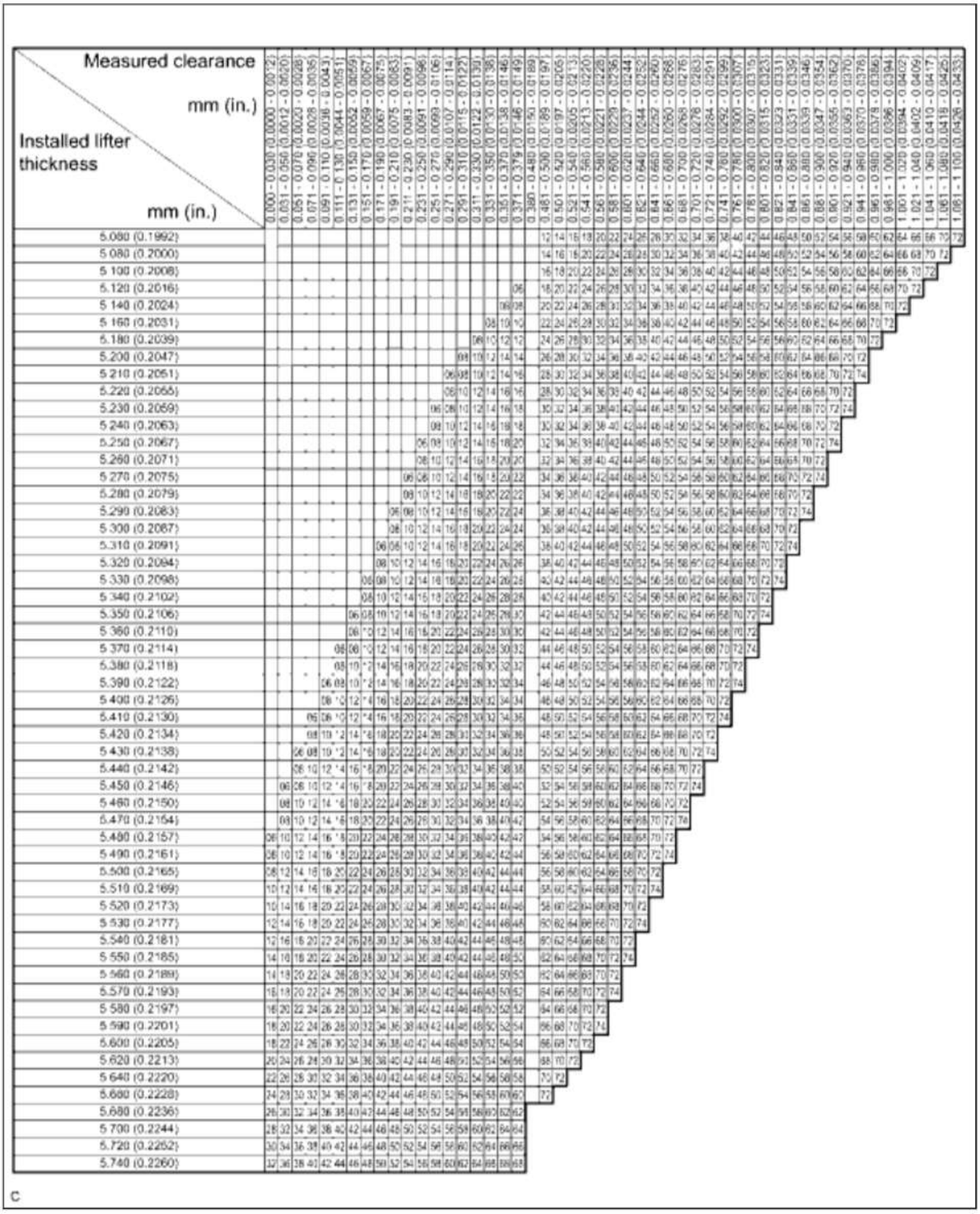
Standard intake valve clearance (cold):
0.19 to 0.29 mm (0.00748 to 0.0114 in.)

EXAMPLE:

The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0157 in.). Replace the 5.250 mm (0.2067 in.) lifter with a new No. 42 lifter.

(k) Valve lifter selection chart (exhaust).

cardiagn.com



New Lifter Thickness

LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)

cardiagn.com

LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)	LIFTER NO.	THICKNESS MM (IN.)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)	-	-

Standard exhaust valve clearance (cold):
0.38 to 0.48 mm (0.0150 to 0.0189 in.)

EXAMPLE:

The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.510 mm (0.0201 in.). Replace the 5.340 mm (0.2102 in.) lifter with a new No. 42 lifter.

(l) Install the selected valve lifter.

(m) Install the camshaft INFO .

(n) Install the No. 2 camshaft INFO .

(o) Install the No. 1 chain tensioner INFO .

9. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

10. INSTALL SPARK PLUG INFO

11. INSTALL IGNITION COIL ASSEMBLY INFO

12. INSPECT FOR OIL LEAK

13. INSPECT IGNITION TIMING INFO

14. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY INFO

15. INSTALL ENGINE UNDER COVER RH

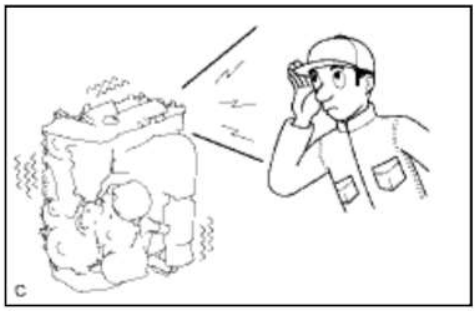


cardiagn.com

Last Modified: 3-10-2010	6.4 G	**From:** 200901
Model Year: 2010	**Model:** Corolla	**Doc ID:** RM000004094000X
Title: 2AZ-FE ENGINE MECHANICAL: VALVE CLEARANCE: ON-VEHICLE INSPECTION (2010 Corolla)		

ON-VEHICLE INSPECTION

1. INSPECT VALVE CLEARANCE



(a) Check for noise and vibration

(1) Check for valve noise or a rough idle.

(2) Judge whether the valve clearance needs to be adjusted.

HINT:

If the valve noise is too loud or the idle is rough, inspect the valve clearance INFO **.**

cardiagn.com