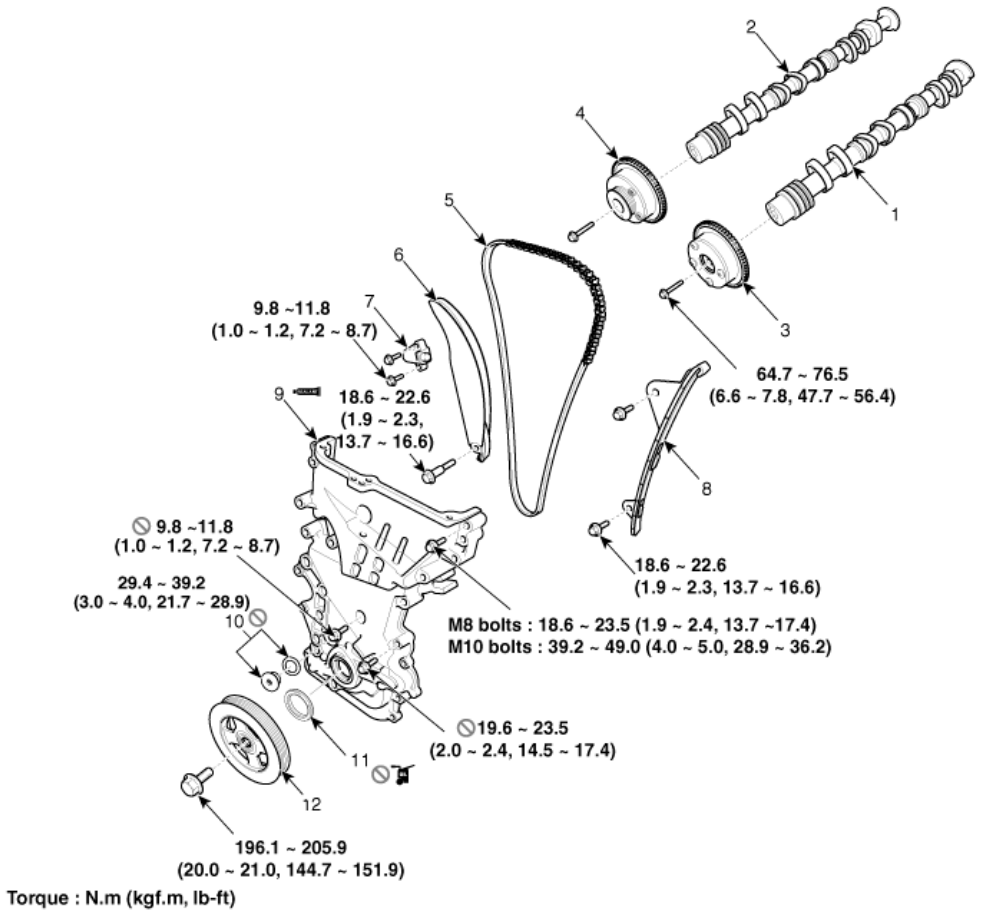
2012 ENGINE

Engine Timing System - Elantra

TIMING CHAIN

COMPONENTS AND COMPONENTS LOCATION

Components



1. Intake camshaft	5. Timing chain	9. Timing chain cover
2. Exhaust camshaft	6. Timing chain tensioner arm	10. Service plug bolt & gasket
3. Intake CVVT assembly	7. Timing chain tensioner	11. Front oil seal
4. Exhaust CVVT assembly	8. Timing chain guide	12. Crankshaft damper pulley

Fig. 1: Identifying Timing Chain Components With Torque Specification
Courtesy of HYUNDAI MOTOR AMERICA

REPAIR PROCEDURES

Removal

Engine removal is not required for this procedure.

CAUTION:
- **Use fender covers to avoid damaging painted surfaces.**
- **To avoid damage, unplug the wiring connectors carefully while holding the connector portion.**

NOTE: Mark all wiring and hoses to avoid misconnection.

1. Disconnect the battery negative terminal. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)
2. Remove the RH front wheel. (Refer to "**WHEEL** ")
3. Remove the RH under cover. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)
4. Remove the engine cover. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)
5. Disconnect the wiring connectors and harness clamps, and then remove the wiring and protectors from the cylinder head cover.
    1. The intake OCV (Oil control valve) connector (A)

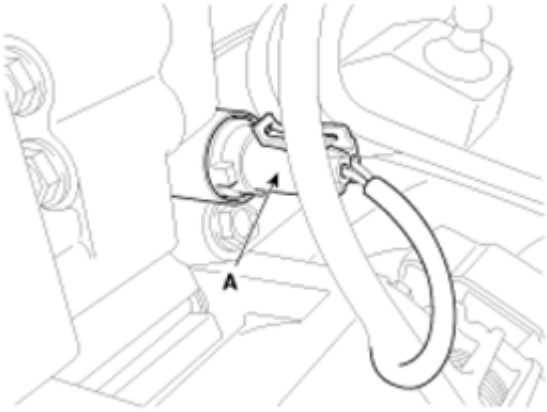


Fig. 2: Identifying Intake OCV Connector
Courtesy of HYUNDAI MOTOR AMERICA

    2. The exhaust OCV (Oil control valve) connector (A)

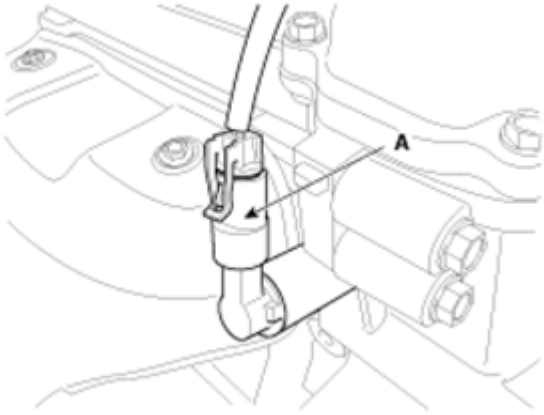


Fig. 3: Identifying Exhaust OCV Connector
Courtesy of HYUNDAI MOTOR AMERICA

3. The alternator connector (A)

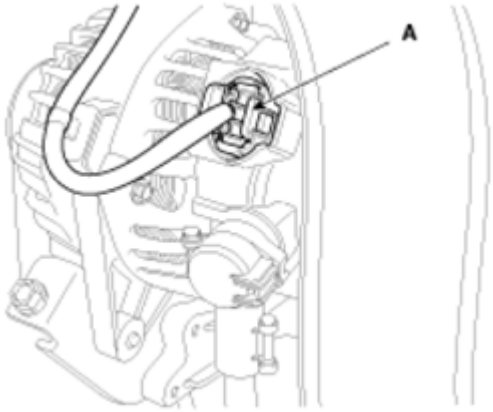


Fig. 4: Identifying Alternator Connector
Courtesy of HYUNDAI MOTOR AMERICA

4. The ignition coil connectors (A)

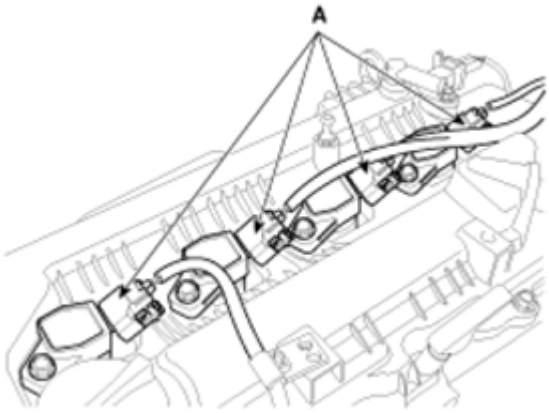


Fig. 5: Identifying Ignition Coil Connectors
Courtesy of HYUNDAI MOTOR AMERICA

5. The intake CMPS (Camshaft position sensor) connector (A)
6. The exhaust CMPS (Camshaft position sensor) connector (B)

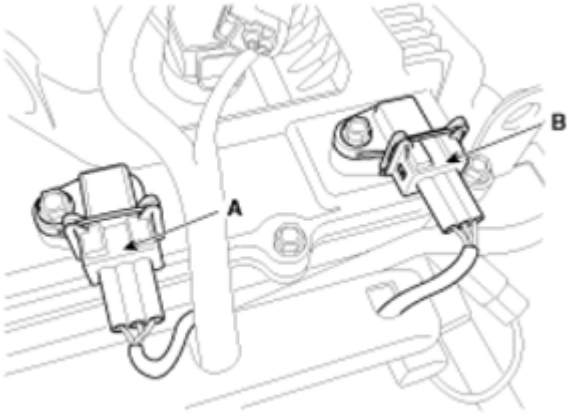


Fig. 6: Identifying CMPS Connectors
Courtesy of HYUNDAI MOTOR AMERICA

6. Disconnect the breather hose (A).

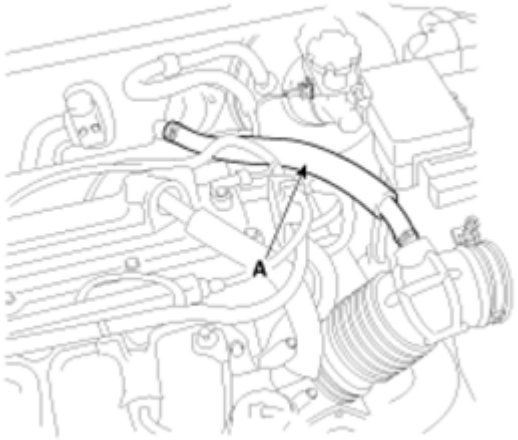


Fig. 7: Identifying Breather Hose
Courtesy of HYUNDAI MOTOR AMERICA

7. Disconnect the PCV (Positive crankcase ventilation) hose (A).

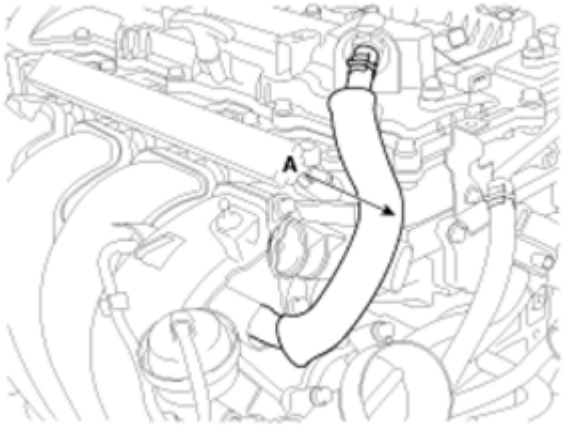


Fig. 8: Identifying PCV Hose
Courtesy of HYUNDAI MOTOR AMERICA

8. Remove the ignition coils (A).

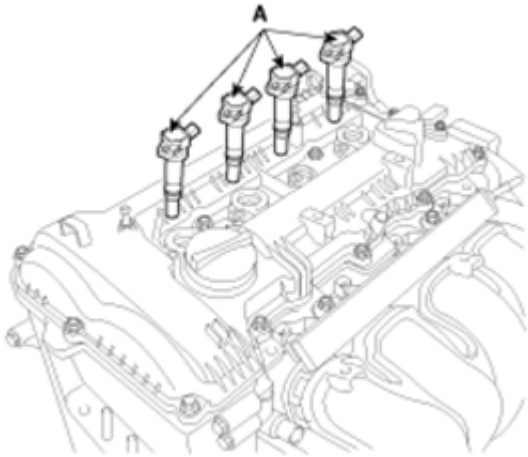


Fig. 9: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR AMERICA

9. Remove the engine oil level gauge (A).

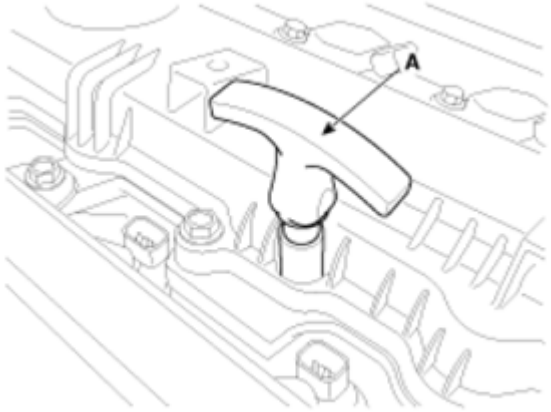


Fig. 10: Identifying Engine Oil Level Gauge
Courtesy of HYUNDAI MOTOR AMERICA

10. Remove the cylinder head cover (A).

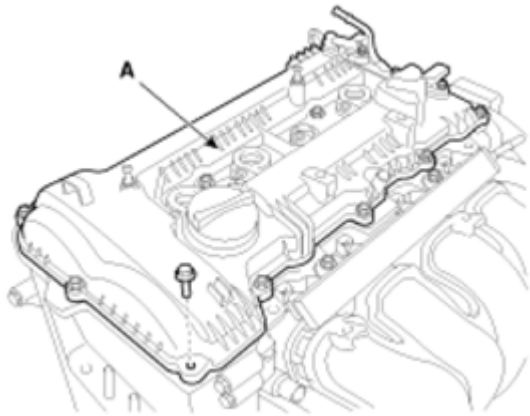


Fig. 11: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR AMERICA

NOTE: Unfasten the bolts in the sequence as shown.

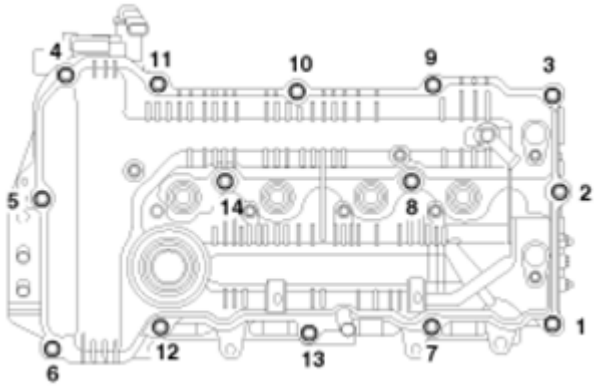


Fig. 12: Identifying Cylinder Head Cover Bolt Loosening Sequence
Courtesy of HYUNDAI MOTOR AMERICA

11. Drain engine oil and remove the oil pan. (Refer to **LUBRICATION SYSTEM**)
12. Remove the engine mounting support bracket.
    1. Set the jack to the edge of the lower crankcase.

NOTE: Put the wooden block between lower crankcase and jack.

CAUTION: Be careful not to damage the oil screen.

    2. Disconnect the engine ground line (A).
    3. Remove the engine mounting support bracket (B).

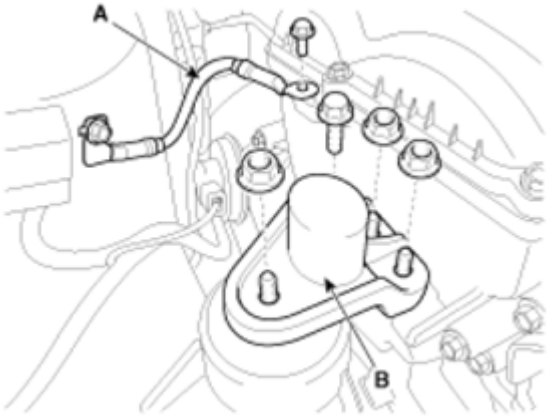


Fig. 13: Identifying Engine Ground Line
Courtesy of HYUNDAI MOTOR AMERICA

13. Remove the drive belt.
    1. Loosen the alternator mounting bolts (A).
    2. Loosen the tension by turning the tension adjusting bolt (B) counterclockwise.
    3. Remove the drive belt (C).

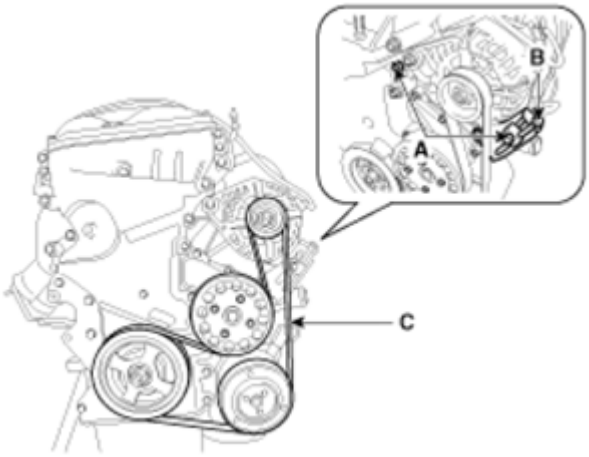


Fig. 14: Identifying Alternator Mounting Bolts
Courtesy of HYUNDAI MOTOR AMERICA

14. Remove the front engine hanger (A).

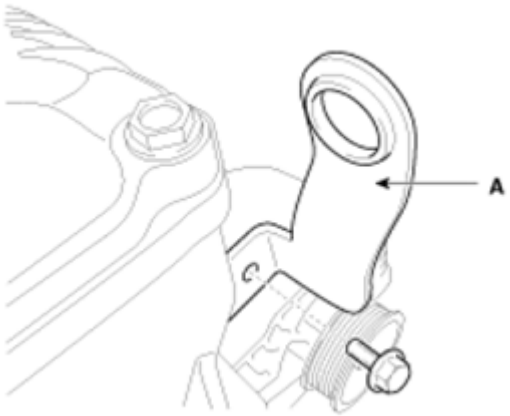


Fig. 15: Identifying Front Engine Hanger
Courtesy of HYUNDAI MOTOR AMERICA

15. Remove the alternator (A). (Refer to "**ALTERNATOR** ")

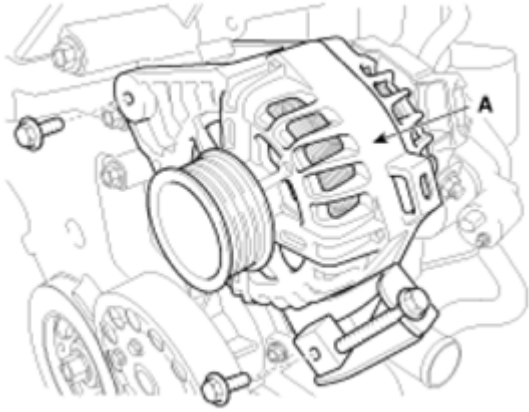


Fig. 16: Identifying Alternator
Courtesy of HYUNDAI MOTOR AMERICA

16. Remove the water pump pulley (A).

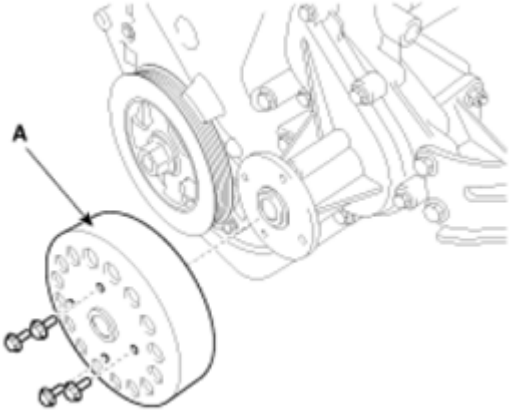


Fig. 17: Identifying Water Pump Pulley
Courtesy of HYUNDAI MOTOR AMERICA

17. Set No. 1 cylinder to TDC (Top dead center) on compression stroke.
    1. Turn the crankshaft pulley and align its groove with the timing mark of the timing chain cover.

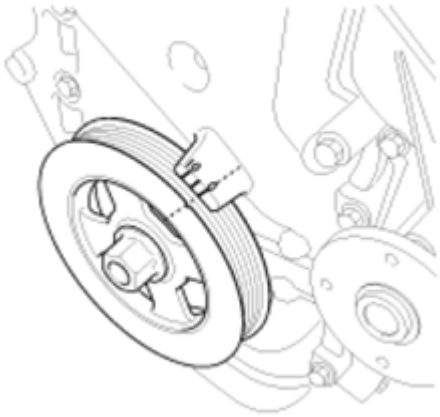


Fig. 18: Turning Crankshaft Pulley
Courtesy of HYUNDAI MOTOR AMERICA

2. Check that the TDC marks of the intake and exhaust CVVT sprockets are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft by one revolution (360°) more.

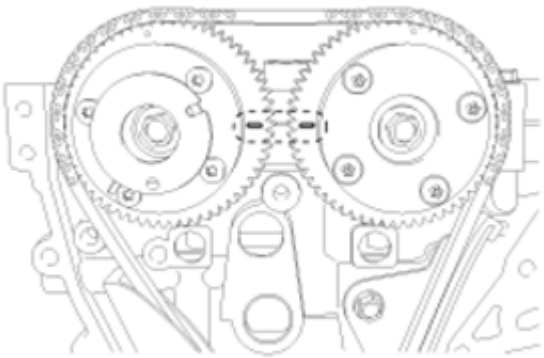


Fig. 19: Identifying TDC Marks
Courtesy of HYUNDAI MOTOR AMERICA

NOTE: Do not turn the crankshaft pulley counterclockwise.

18. Remove the crankshaft damper pulley (A).

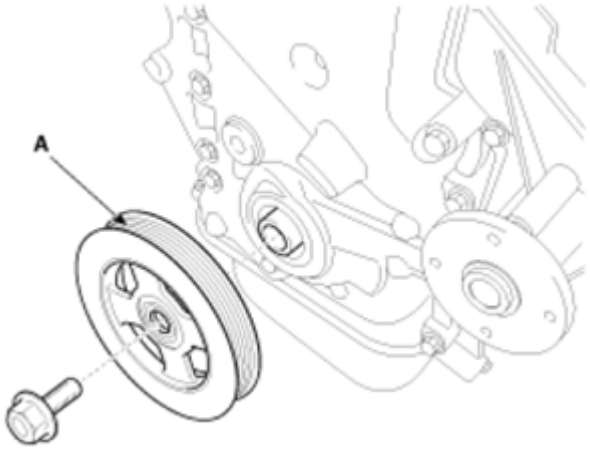


Fig. 20: Identifying Crankshaft Damper Pulley
Courtesy of HYUNDAI MOTOR AMERICA

CAUTION: Do not press the pulley or apply the excessive force to prevent the rubber part from being deformed.

NOTE: There are two methods to hold the ring gear when removing the crankshaft damper pulley.

- **Install the SST (09231-2B100) to hold the ring gear after removing the starter.**

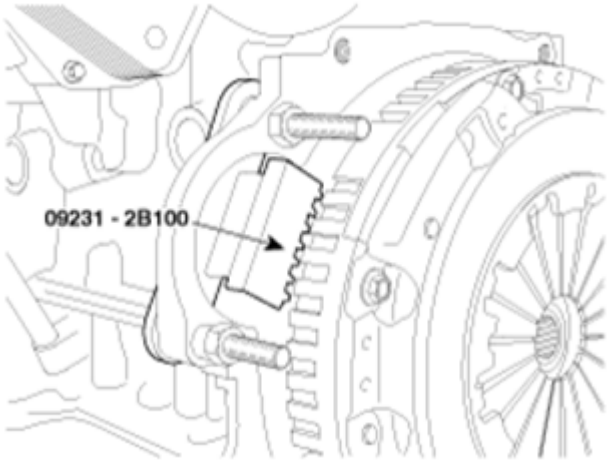


Fig. 21: Installing SST
Courtesy of HYUNDAI MOTOR AMERICA

- **Install the SST (09231-3D100) to hold the ring gear after removing the service cover.**

1. Remove the air guard (A).

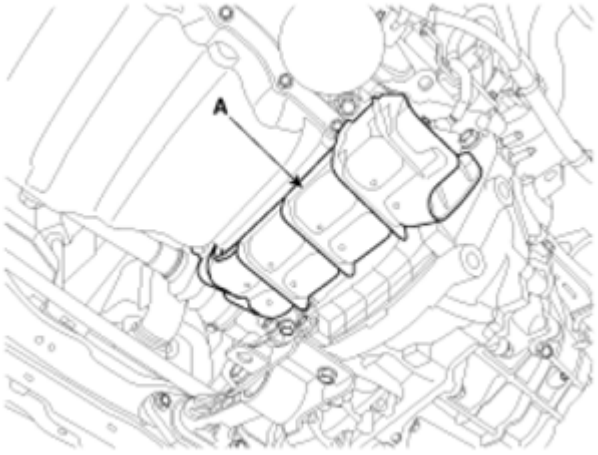


Fig. 22: Install SST (09231-3D100)
Courtesy of HYUNDAI MOTOR AMERICA

2. Remove the two transaxle mounting bolts (A) and the service cover (B) on the bottom of the lower crankcase.

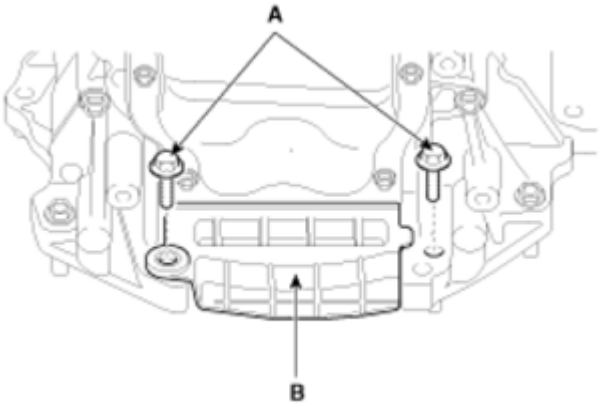


Fig. 23: Identifying Transaxle Mounting Bolts
Courtesy of HYUNDAI MOTOR AMERICA

3. Adjust the length of the holder (A) so that the grooves of the holder puts into the ring gears (B) at the closest position.
4. Adjust the angle and length of the links (C) so that the two transaxle mounting bolts can be fastened into the original mounted holes.

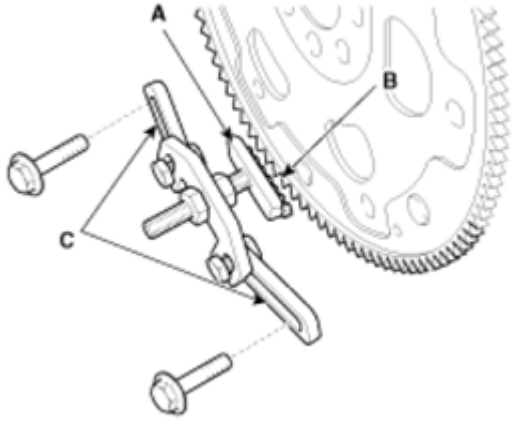


Fig. 24: Adjusting Length Of Holder
Courtesy of HYUNDAI MOTOR AMERICA

5. Install the SST using the two transaxle mounting bolts. Tighten the bolts and nuts of the holder and links securely.

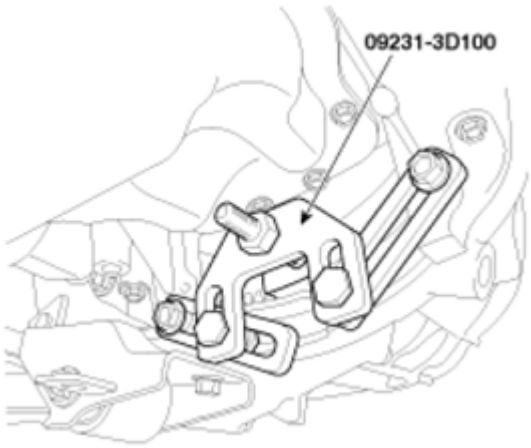


Fig. 25: Installing SST
Courtesy of HYUNDAI MOTOR AMERICA

19. Remove the timing chain cover (A) by gently prying the gaps between the cylinder head and cylinder block.

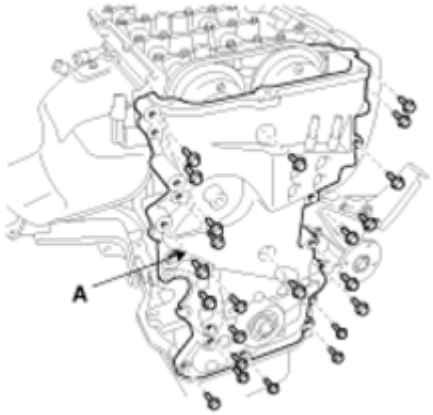


Fig. 26: Identifying Timing Chain Cover
Courtesy of HYUNDAI MOTOR AMERICA

CAUTION: Be careful not to damage the contact surfaces of cylinder block, cylinder head and timing chain cover.

20. Remove the timing chain tensioner (A).

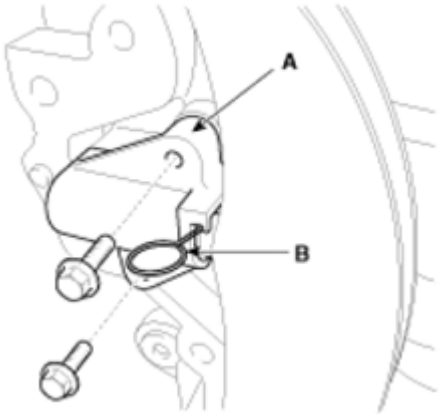


Fig. 27: Identifying Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR AMERICA

CAUTION: Compress the piston and then insert a stopper pin (B) into the slot to hold the compressed piston.

21. Remove the timing chain tensioner arm (A).

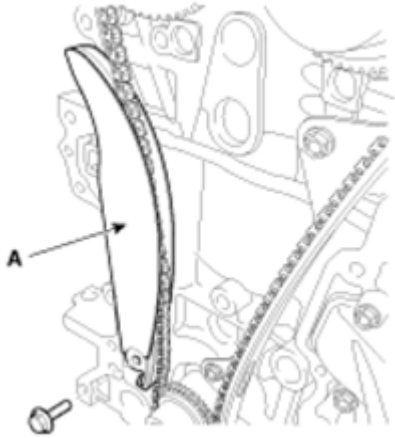


Fig. 28: Identifying Timing Chain Tensioner Arm
Courtesy of HYUNDAI MOTOR AMERICA

22. Remove the timing chain (A).

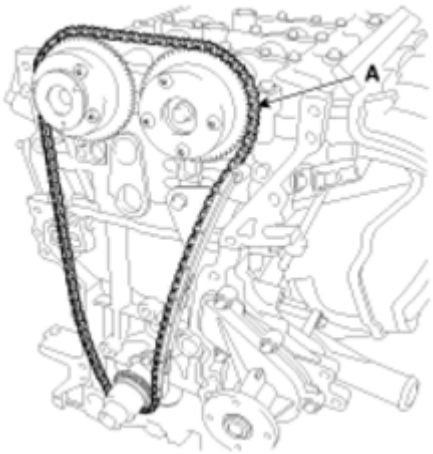


Fig. 29: Identifying Timing Chain
Courtesy of HYUNDAI MOTOR AMERICA

23. Remove the timing chain guide (A).

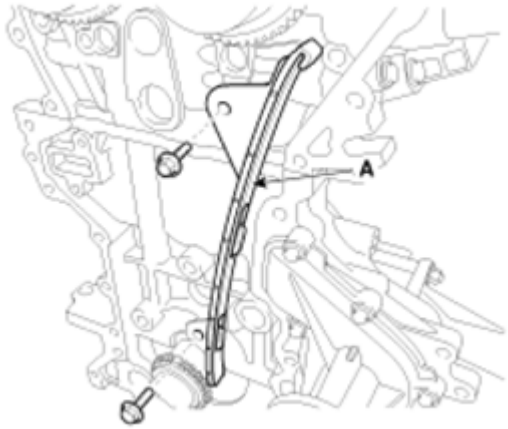


Fig. 30: Identifying Timing Chain Guide
Courtesy of HYUNDAI MOTOR AMERICA

Inspection

Sprockets, Chain Tensioner, Chain Guide, Chain Tensioner Arm

1. Check the CVVT sprocket and crankshaft sprocket for abnormal wear, cracks, or damage. Replace if necessary.
2. Inspect the tensioner arm and chain guide for abnormal wear, cracks, or damage. Replace if necessary.
3. Check that the tensioner piston moves smoothly.

Drive belt, Idler, Pulley

1. Check the idler for excessive oil leakage, abnormal rotation or vibration. Replace if necessary.
2. Check belt for maintenance and abnormal wear of V-ribbed part. Replace if necessary.
3. Check the pulleys for vibration in rotation, oil or dust deposit of V-ribbed part. Replace if necessary.

CAUTION:
- **Do not bend, twist or turn the timing belt inside out.**
- **Do not allow the timing belt to come into contact with oil, water and steam.**

Installation

1. The TDC marks of the intake and exhaust CVVT sprockets are slightly turned from the TDC position as shown when the timing chain is removed.

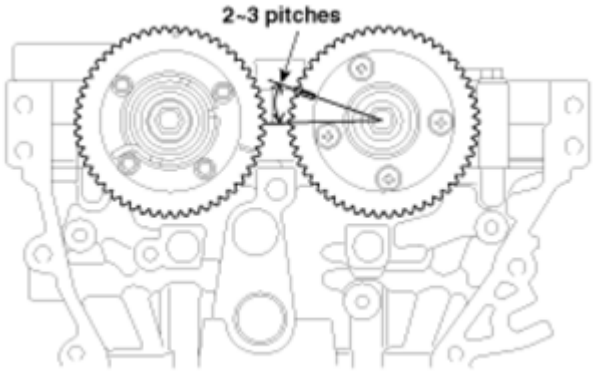


Fig. 31: Identifying TDC Marks
Courtesy of HYUNDAI MOTOR AMERICA

2. Turn the crankshaft clockwise (about 2~3 pitches) from the TDC position (the dowel pin (A) of crankshaft is about 3° with the engine vertical line) as rotation of the intake CVVT sprocket from the TDC position.

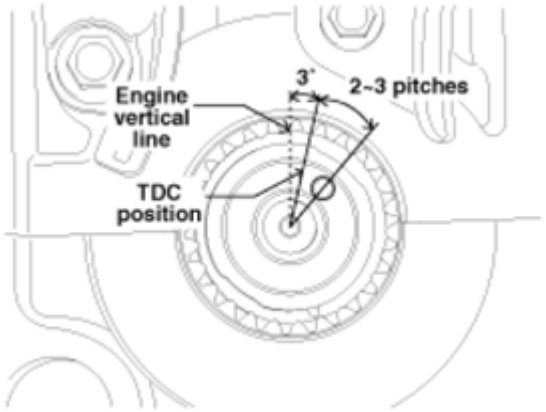


Fig. 32: Turning Crankshaft Clockwise
Courtesy of HYUNDAI MOTOR AMERICA

3. Install the timing chain guide (A).

Tightening torque:

18.6 ~ 22.6 N.m (1.9 ~ 2.3 kgf.m, 13.7 ~ 16.6 lb-ft)

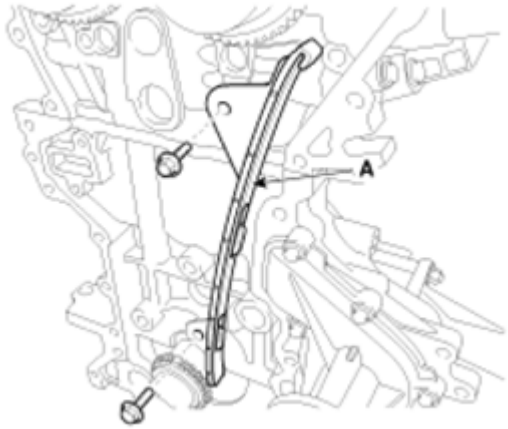


Fig. 33: Identifying Timing Chain Guide
Courtesy of HYUNDAI MOTOR AMERICA

4. Install the timing chain tensioner arm (A).

   Tightening torque:

   18.6 ~ 22.6 N.m (1.9 ~ 2.3 kgf.m, 13.7 ~ 16.6 lb-ft)

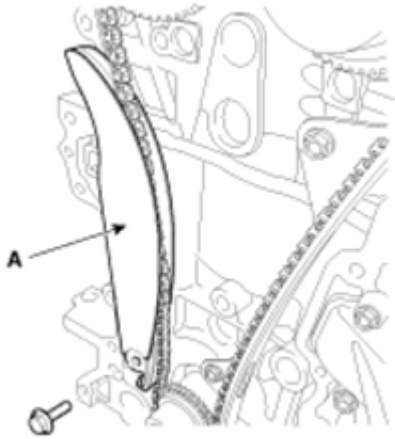


Fig. 34: Identifying Timing Chain Tensioner Arm
Courtesy of HYUNDAI MOTOR AMERICA

5. Install the timing chain.

   Crankshaft sprocket (A) --> Timing chain guide (B) --> Intake CVVT sprocket (C) --> Exhaust CVVT sprocket (D)

   1. Install the timing chain with no slack between the crankshaft sprocket and the intake CVVT sprocket.

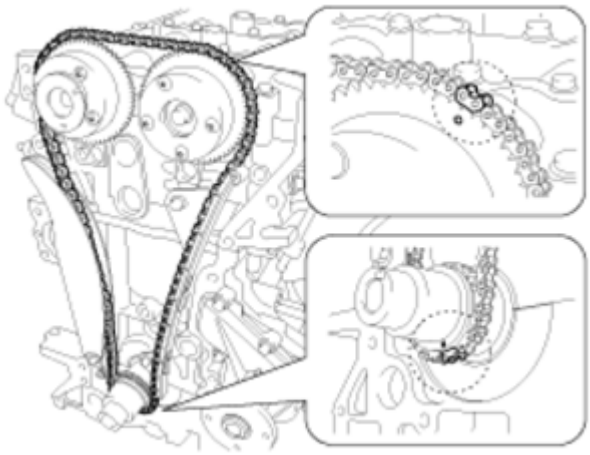


Fig. 35: Identifying Crankshaft Sprocket
Courtesy of HYUNDAI MOTOR AMERICA

NOTE: The timing marks of each sprocket should be matched with timing marks (color link) of timing chain when installing the timing chain.

2. Install the timing chain on the exhaust CVVT sprocket with no slack while turning the CVVT assembly clockwise.

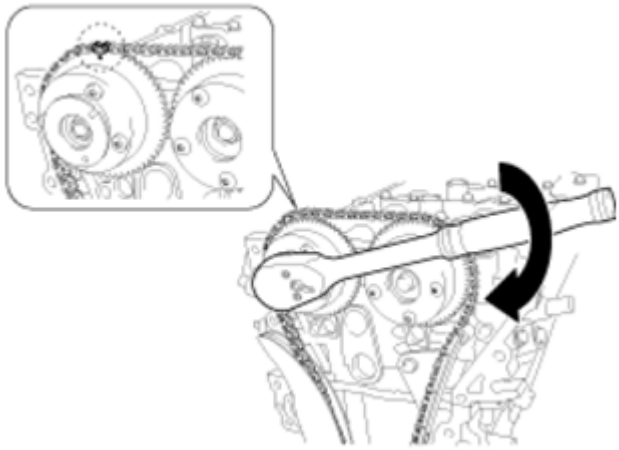


Fig. 36: Identifying Timing Marks
Courtesy of HYUNDAI MOTOR AMERICA

NOTE:

- **The timing mark of the exhaust CVVT sprocket should be matched with timing mark (color link) of timing chain when installing the timing chain.**
- **Press down the timing chain links on the exhaust CVVT sprocket to prevent the sprocket from spinning.**

6. Install the timing chain auto tensioner (A) and remove the stopper pin (B).

Tightening torque:

9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)

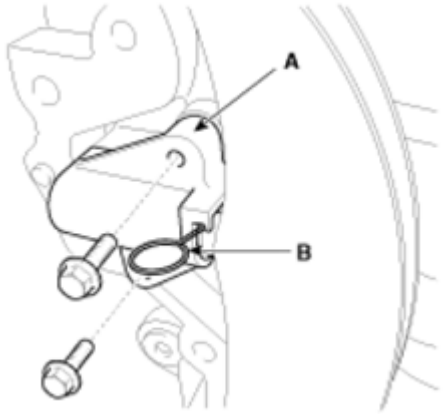


Fig. 37: Identifying Timing Chain Auto Tensioner
Courtesy of HYUNDAI MOTOR AMERICA

7. After rotating crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm that the TDC marks on the intake and exhaust CVVT sprockets are aligned with the top surface of cylinder head.

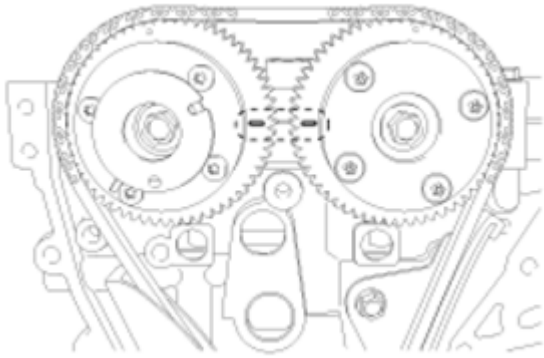


Fig. 38: Rotating Crankshaft
Courtesy of HYUNDAI MOTOR AMERICA

8. Install the timing chain cover.
    1. Using a gasket scraper, remove all the old packing material from the gasket surfaces.
    2. The sealant locations on the chain cover and the counter parts (cam carrier, cylinder head, cylinder block, and lower crankcase) must be free of harmful foreign materials, oil, dust and moisture. Spraying cleaner on the surface and wiping with a clean duster.
    3. Before assembling the timing chain cover, liquid sealant should be applied on the gap between cam carrier, cylinder head and cylinder block.

        Bead width: 3.0 ~ 5.0 mm (0.11 ~ 0.20 in.)

Sealant: Threebond 1217H or equivalent

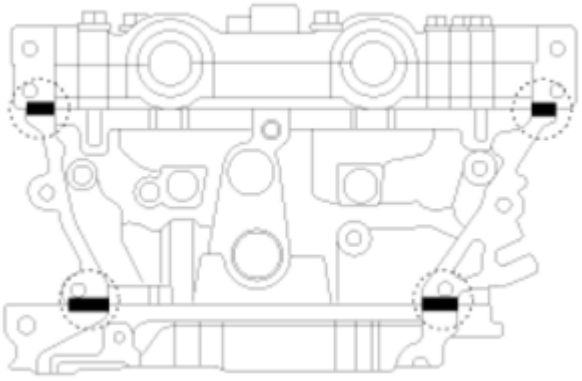


Fig. 39: Identifying Sealant Locations
Courtesy of HYUNDAI MOTOR AMERICA

4. After applying liquid sealant on the timing chain cover, assemble the cover within 5 minutes after sealant was applied. Continuous bead of sealant should be applied to prevent any path from oil leakage.

   Bead width

   Whole section: 2.5 ~ 3.5 mm (0.10 ~ 0.14 in.)

   Section A: 4.5 ~ 5.5 mm (0.18 ~ 0.22 in.)

   Section B: 8.0 ~ 9.0 mm (0.32 ~ 0.35 in.)

   Sealant: Threebond 1217H or equivalent

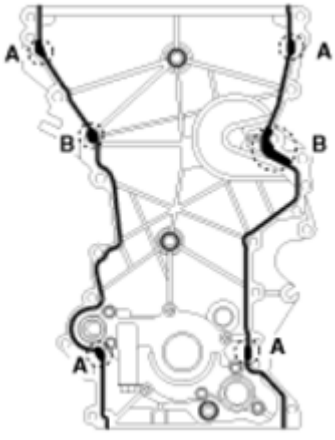


Fig. 40: Identifying Liquid Sealant Apply Area
Courtesy of HYUNDAI MOTOR AMERICA

5. Install the timing chain cover. The dowel pins on the cylinder block and holes on the timing chain

cover should be used as a reference in order to assemble the timing chain cover in exact position.

Tightening torque

Bolts (A, B):

18.6 ~ 23.5 N.m (1.9 ~ 2.4 kgf.m, 13.7 ~ 17.4 lb-ft)

Bolt (C):

19.6 ~ 23.5 N.m (2.0 ~ 2.4 kgf.m, 14.5 ~ 17.4 lb-ft)

Bolts (D, E):

39.2 ~ 49.0 N.m (4.0 ~ 5.0 kgf.m, 28.9 ~ 36.2 lb-ft)

Bolt (F):

9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)

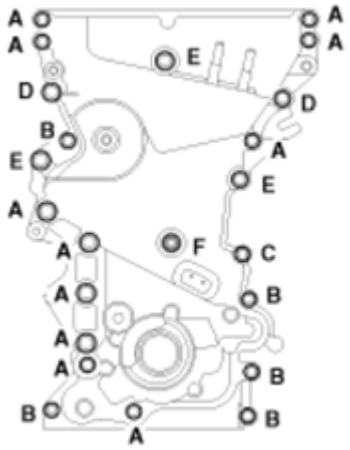


Fig. 41: Identifying Timing Chain Cover Bolt Tightening Sequence
Courtesy of HYUNDAI MOTOR AMERICA

CAUTION: Do not reuse the seal bolts (C, F).

CAUTION: The engine running or pressure test should not be performed within 30 minutes after the timing chain cover was assembled.

9. Replace the front oil seal if necessary.
    1. Apply engine oil on the edge of new oil seal.

CAUTION: Remove any debris from the lip portion of the oil seal.

2. Install the front oil seal (A) using SST (09231-2E000, 09231-H1100).

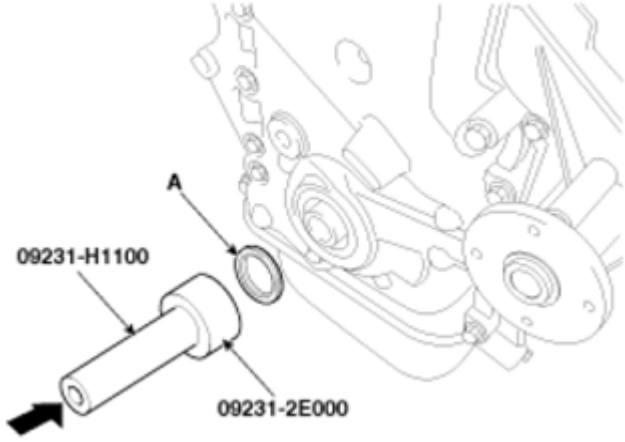


Fig. 42: Identifying Front Oil Seal
Courtesy of HYUNDAI MOTOR AMERICA

10. Install the crankshaft damper pulley (A).

Tightening torque:

196.1 ~ 205.9 N.m (20.0 ~ 21.0 kgf.m, 144.7 ~ 151.9 lb-ft)

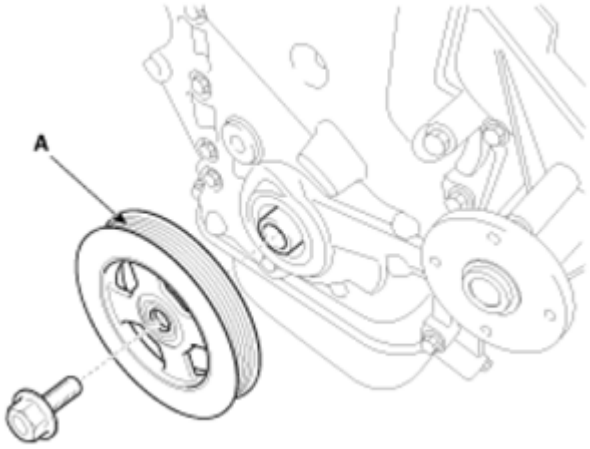


Fig. 43: Identifying Crankshaft Damper Pulley
Courtesy of HYUNDAI MOTOR AMERICA

CAUTION: Do not press the pulley or apply the excessive force to prevent the rubber part from being deformed.

NOTE: **There are two methods to hold the ring gear when installing the crankshaft damper pulley.**

- **Install the SST (09231-2B100) to hold the ring gear after removing the starter.**

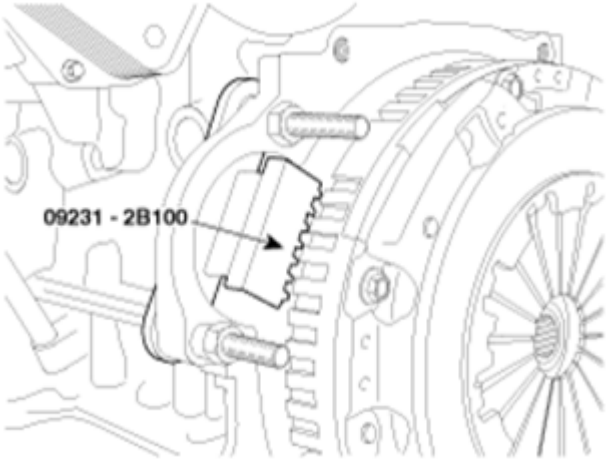


Fig. 44: Identifying SST (09231-2B100)
Courtesy of HYUNDAI MOTOR AMERICA

- **Install the SST (09231-3D100) to hold the ring gear after removing the service cover.**

1. **Remove the air guard (A).**

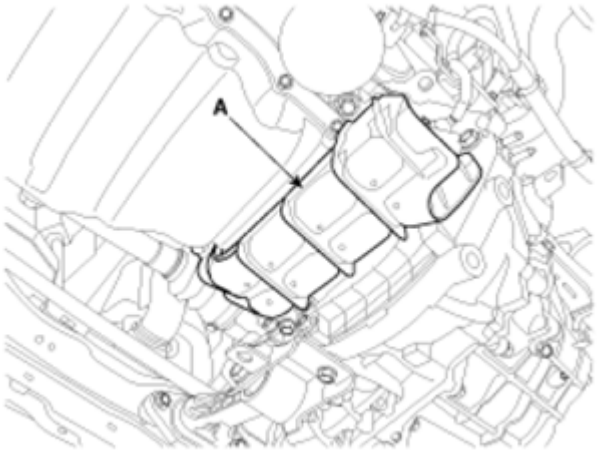


Fig. 45: Identifying Air Guard
Courtesy of HYUNDAI MOTOR AMERICA

2. **Remove the two transaxle mounting bolts (A) and the service cover (B) on the bottom of the lower crankcase.**

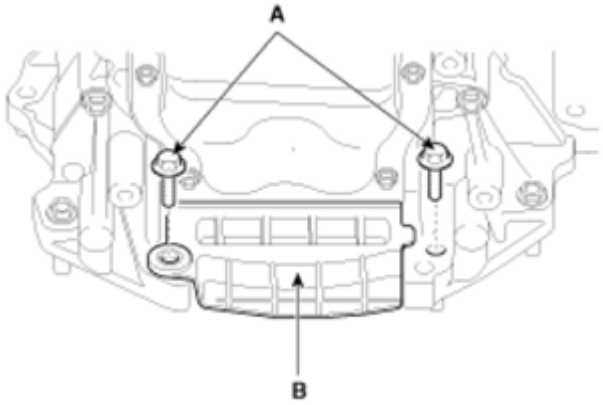


Fig. 46: Identifying Transaxle Mounting Bolts
Courtesy of HYUNDAI MOTOR AMERICA

3. **Adjust the length of the holder (A) so that the grooves of the holder puts into the ring gears (B) at the closest position.**

- **Adjust the angle and length of the links (C) so that the two transaxle mounting bolts can be fastened into the original mounted holes.**

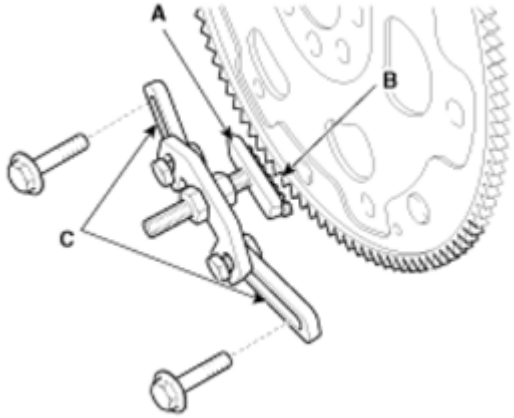


Fig. 47: Adjusting Length Of Holder
Courtesy of HYUNDAI MOTOR AMERICA

- **Install the SST using the two transaxle mounting bolts. Tighten the bolts and nuts of the holder and links securely.**

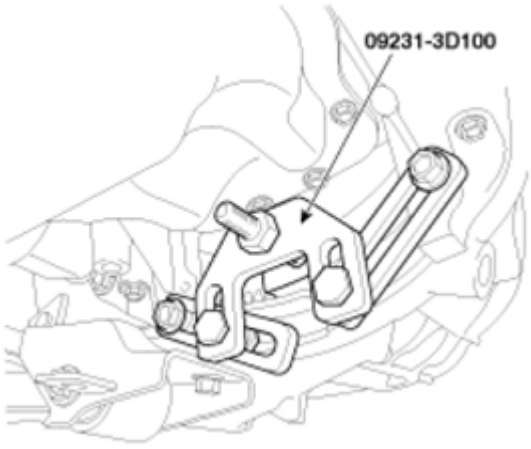


Fig. 48: Installing SST
Courtesy of HYUNDAI MOTOR AMERICA

11. Install the water pump pulley (A).

    Tightening torque:

    9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)

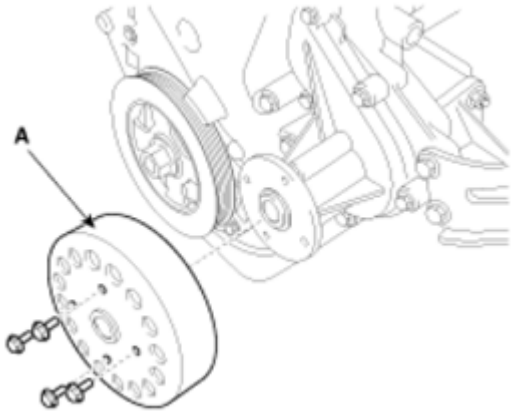


Fig. 49: Identifying Water Pump Pulley
Courtesy of HYUNDAI MOTOR AMERICA

12. Install the front engine hanger (A).

    Tightening torque:

    34.3 ~ 39.2 N.m (3.5 ~ 4.0 kgf.m, 25.3 ~ 28.9 lb-ft)

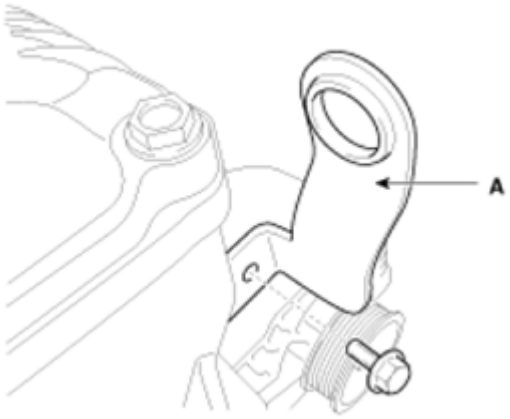


Fig. 50: Identifying Front Engine Hanger
Courtesy of HYUNDAI MOTOR AMERICA

13. Install the drive belt.
    1. Preassemble the alternator (A) temporarily.

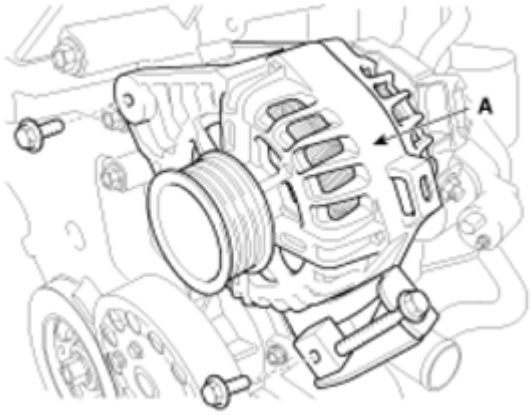


Fig. 51: Identifying Alternator
Courtesy of HYUNDAI MOTOR AMERICA

    2. Install the drive belt (B).
    3. Adjust the tension by turning the tension adjusting bolt (A) clockwise. (Refer to "**ALTERNATOR**")

Belt tension

New belt:

637.4 ~ 735.5 N (65 ~ 75 kgf, 143.3 ~ 165.3 lbf)

Used belt:

441.3 ~ 539.4 N (45 ~ 55 kgf, 99.2 ~ 121.3 lbf)

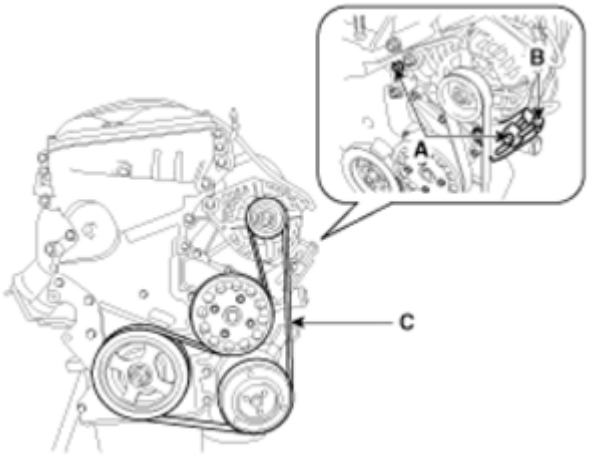


Fig. 52: Turning Tension Adjusting Bolt
Courtesy of HYUNDAI MOTOR AMERICA

4. Tighten the alternator mounting bolts with the specified torque.

   Tightening torque

   M10 bolt:

   29.4 ~ 41.2 N.m (3.0 ~ 4.2 kgf.m, 21.7 ~ 30.4 lb-ft)

   M8 bolt:

   21.6 ~ 32.4 N.m (2.2 ~ 3.3 kgf.m, 15.9 ~ 23.9 lb-ft)

14. Install the engine mounting support bracket.
    1. Install the engine mounting support bracket (B).

       Tightening torque

       Nut (C):

       63.7 ~ 83.4 N.m (6.5 ~ 8.5 kgf.m, 47.0 ~ 61.5 lb-ft)

       Bolt (D) and Nuts (E):

       49.0 ~ 63.7 N.m (5.0 ~ 6.5 kgf.m, 36.2 ~ 47.0 lb-ft)

    2. Connect the engine ground line (A).

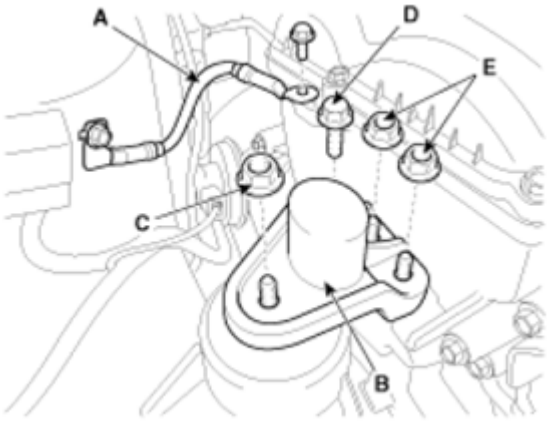


Fig. 53: Connecting Engine Ground Line
Courtesy of HYUNDAI MOTOR AMERICA

3. Remove the jack from the lower crankcase.

15. Install the oil pan. (Refer to **LUBRICATION SYSTEM**)
16. Install cylinder head cover.
    1. The hardening sealant located on the cylinder head cover and the gap between the timing chain cover and the cam carrier should be removed before assembling cylinder head cover.
    2. Apply engine oil on the lip portion of the oil seal on the cover and outer surface of the spark plug pipes.
    3. After applying sealant on the gap between the timing chain cover and the cam carrier, it should be assembled within 5 minutes.

       Bead width: 2.0 ~ 3.0 mm (0.08 ~ 0.12 in.)

       Sealant: Threebond 1217H or equivalent

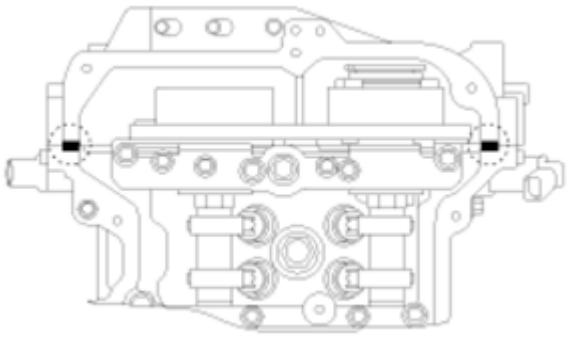


Fig. 54: Identifying Sealant Apply Area
Courtesy of HYUNDAI MOTOR AMERICA

4. Install the cylinder head cover (A) by tightening the bolts, in several passes, in the sequence as shown.

Tightening torque

1st step: 3.9 ~ 5.9 N.m (0.4 ~ 0.6 kgf.m, 2.9 ~ 4.3 lb-ft)

2nd step: 7.8 ~ 9.8 N.m (0.8 ~ 1.0 kgf.m, 5.8 ~ 7.2 lb-ft)

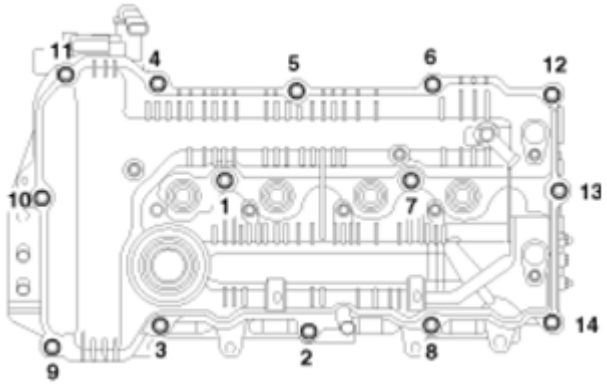


Fig. 55: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR AMERICA

CAUTION:

- **Do not reuse cylinder head cover gasket.**
- **Before installing the cylinder head cover, make sure the cylinder head cover gasket is not separated from the cylinder head cover gasket groove.**
- **The engine running or pressure test should not be performed within 30 minutes after the cylinder head cover was assembled.**

17. Install the oil level gauge (A).

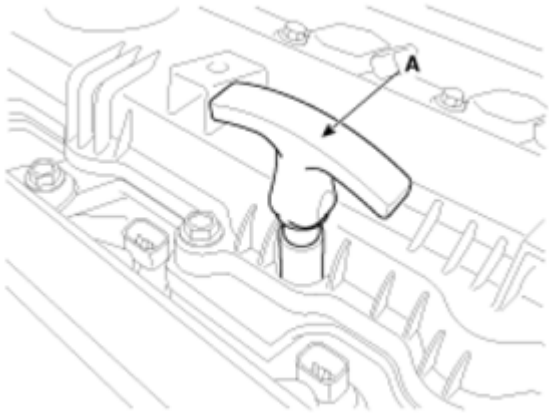


Fig. 56: Identifying Oil Level Gauge
Courtesy of HYUNDAI MOTOR AMERICA

18. Install the ignition coils (A).

    Tightening torque:

    9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)

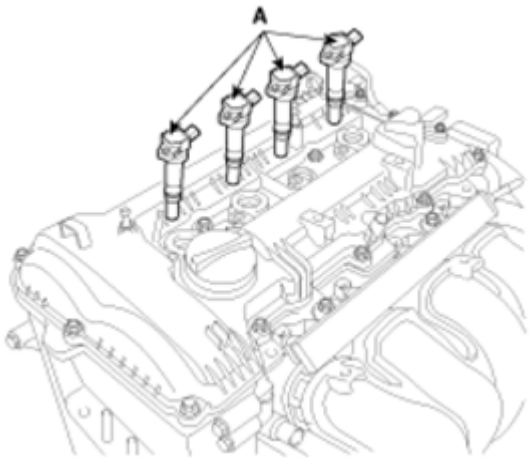


Fig. 57: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR AMERICA

19. Connect the PCV (Positive crankcase ventilation) hose (A).

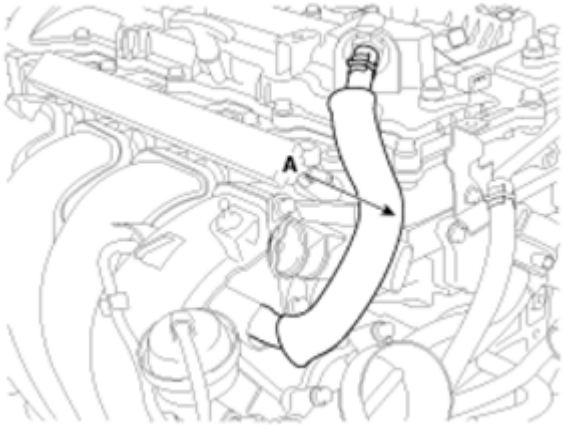


Fig. 58: Identifying PCV Hose
Courtesy of HYUNDAI MOTOR AMERICA

20. Connect the breather hose (A).

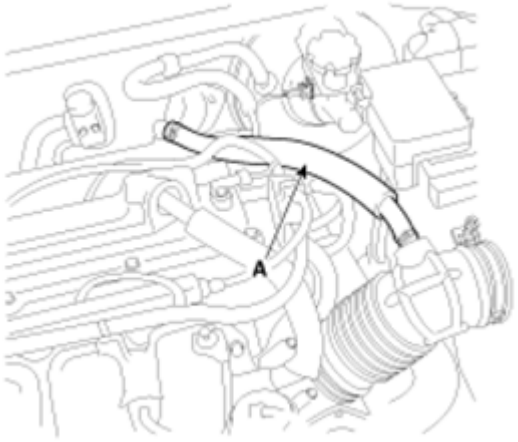


Fig. 59: Identifying Breather Hose
Courtesy of HYUNDAI MOTOR AMERICA

21. Install the wiring and protectors on the cylinder head cover and then connect the wiring connectors and harness clamps.
    1. The intake OCV (Oil control valve) connector (A)

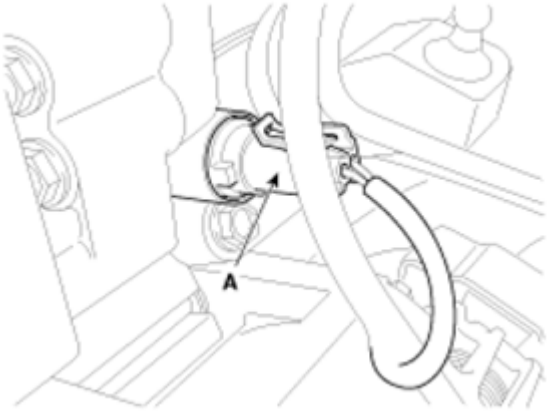


Fig. 60: Identifying Intake OCV Connector
Courtesy of HYUNDAI MOTOR AMERICA

    2. The exhaust OCV (Oil control valve) connector (A)

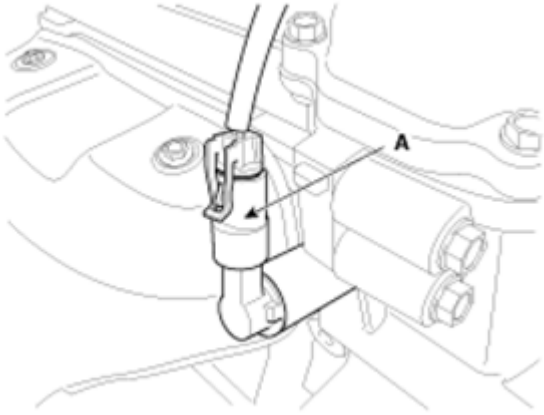


Fig. 61: Identifying Exhaust OCV Connector
Courtesy of HYUNDAI MOTOR AMERICA

3. The alternator connector (A)

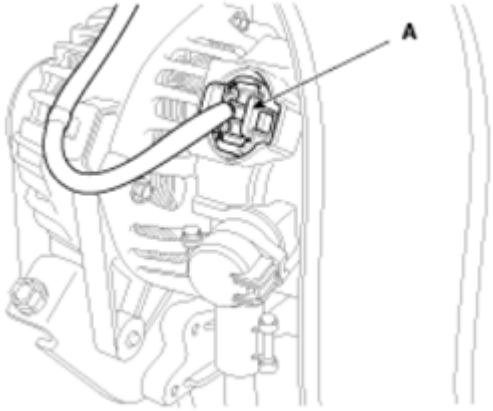


Fig. 62: Identifying Alternator Connector
Courtesy of HYUNDAI MOTOR AMERICA

4. The ignition coil connectors (A)

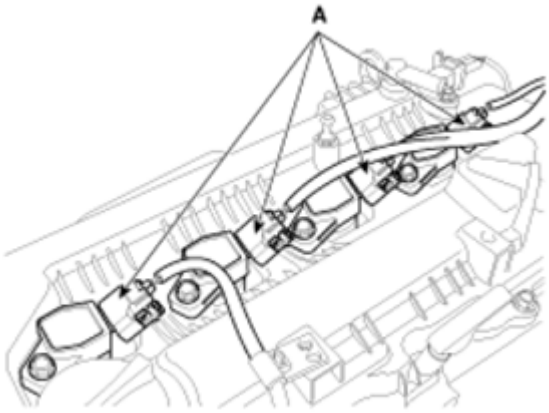


Fig. 63: Identifying Ignition Coil Connectors
Courtesy of HYUNDAI MOTOR AMERICA

5. The intake CMPS (Camshaft position sensor) connector (A)
6. The exhaust CMPS (Camshaft position sensor) connector (B)

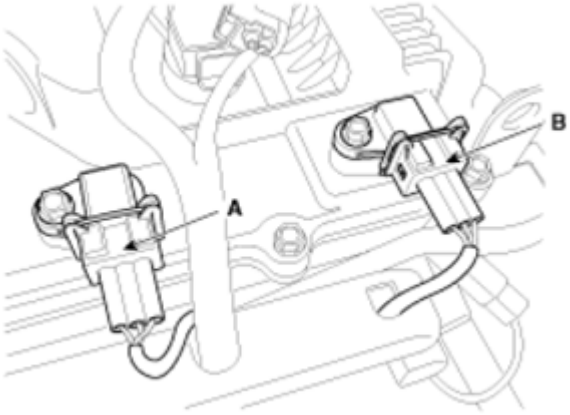


Fig. 64: Identifying CMPS Connectors
Courtesy of HYUNDAI MOTOR AMERICA

22. Install the engine cover. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)
23. Install the RH under cover. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)
24. Install the RH front wheel. (Refer to "**WHEEL** ")
25. Connect the battery negative terminal. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)
26. Add all the necessary fluids and check for leaks. Connect GDS. Check for codes, note, and clear. Recheck.

NOTE:

- **Refill engine with engine oil.**
- **Clean battery posts and cable terminals and assemble.**
- **Inspect for fuel leakage.**
- **After assembling the fuel line, turn on the ignition switch (do not operate the starter) so that the fuel pump runs for approximately two seconds and fuel line pressurizes.**
- **Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.**

