<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ST1776-A</td>
<td>303-578 (T971-6256-A) or equivalent</td>
</tr>
<tr>
<td>ST1770-A</td>
<td>Adapter for 303-577 303-576 (T971-6256-D) or equivalent</td>
</tr>
<tr>
<td>ST1778-A</td>
<td>Holding Tool, Camshaft 303-577 (T971-6256-C) or equivalent</td>
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<tr>
<td>ST1777-A</td>
<td>Holding Tool, Camshaft Sprocket 303-564 (T971-6256-B) or equivalent</td>
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<tr>
<td>ST1394-A</td>
<td>Remover, Spark Plug Wire 303-106 (T74P-6666A)</td>
</tr>
<tr>
<td>ST1781-A</td>
<td>Socket, Camshaft Sprocket Nut 303-565 (T971-6256-G) or equivalent</td>
</tr>
</tbody>
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(Continued)
<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>Tensioner, Timing Chain</td>
<td>303-571 (T97T-6K254-A) or equivalent</td>
<td>ST1774-A</td>
</tr>
<tr>
<td>Timing Tool, Crankshaft TDC</td>
<td>303-573 (T97T-6303-A) or equivalent</td>
<td>ST1775-A</td>
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<tr>
<td>Torque Wrench Extension</td>
<td>303-575 (T97T-6256-F) or equivalent</td>
<td>ST1780-A</td>
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</table>
Installation

Both sides
1. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
2. Position the cylinder head gaskets on the block.
3. **NOTE:** To avoid damage to the **timing chain** cassette, an assistant will be required to help position the cylinder head in the vehicle.

**NOTE:** New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

Position the RH cylinder head. Install 8 new M12 bolts and tighten in the sequence shown in 2 stages.
- Stage 1: Tighten to 12 Nm (9 lb-ft).
- Stage 2: Tighten to 25 Nm (18 lb-ft).

4. Install 2 new M8 bolts.
- Tighten to 32 Nm (24 lb-ft).
5. Tighten the 8 M12 bolts in the sequence shown in 2 stages.
^ Stage 1: Tighten 90 degrees.
^ Stage 2: Tighten an additional 90 degrees.

6. **NOTE:** The camshaft gear must turn freely on the camshaft. Do not tighten the bolt at this time.

**NOTE:** The right-hand camshaft sprocket bolt is a left-hand threaded bolt.
7. Install the RH side cassette bolt.
   ^ Tighten to 12 Nm (9 lb-ft).

7. Install the RH side cassette bolt.
   ^ Tighten to 12 Nm (9 lb-ft).
8. **NOTE**: To avoid damage to the timing chain cassette, an assistant will be required to help position the cylinder head in the vehicle.

**NOTE**: New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

Position the LH cylinder head. Install 8 new M12 bolts and tighten in the sequence shown in 2 stages.
- Stage 1: Tighten to 12 Nm (9 lb-ft).
- Stage 2: Tighten to 25 Nm (18 lb-ft).

9. Install 2 new M8 bolts.
   - Tighten to 32 Nm (24 lb-ft).
10. Tighten the 8 M12 bolts in the sequence shown in 2 stages.
   - Stage 1: Tighten 90 degrees.
   - Stage 2: Tighten an additional 90 degrees.

11. **NOTE:** The camshaft gear must turn freely on the camshaft. Do not tighten the bolt at this time.

   Remove the rubber band, position the camshaft sprocket and chain. Loosely install the bolt.
12. Install the LH side cassette bolt.
   ^ Tighten to 19 Nm (14 lb-ft).

13. NOTE: LH side shown, RH side similar.
14. **NOTE:** LH side shown, RH side similar.

Position new gaskets and the exhaust manifolds. Install the 12 new nuts.

^ Tighten to 23 Nm (17 lb-ft).
15. **NOTE:** Apply dielectric compound to the inside of the spark plug wire boots.

Connect the 6 spark plug wires to the spark plugs.

16. **NOTE:** LH side shown, RH side similar.

Install the 4 new catalytic converter-to-exhaust manifold nuts.
17. NOTE: Lubricate the new O-ring seals with clean engine oil.

   Install the 6 fuel injectors.
   ^ Install new O-ring seals on the injectors.
   ^ Install the injectors.

18. Position the fuel rail and injectors and install the 4 bolts.
   ^ Tighten to 23 Nm (17 lb-ft).
19. **NOTE**: The LH and RH camshafts must be retimed when either camshaft is disturbed.

   Turn the **crankshaft** clockwise to position the No. 1 cylinder at top dead center (TDC).

20. **CAUTION**: Do not rotate the **engine** counterclockwise. Rotating the engine counterclockwise will result in incorrect timing of the engine.

   **NOTE**: The special tool must be installed on the damper and should contact the engine block, this positions the engine at TDC.

   Install the special tool.
21. **NOTE:** Leave the top 2 special tool clamp bolts loose.

Install the special tools on the rear of the RH cylinder head.

22. **NOTE:** The camshaft timing slots are off-center.

Position the camshaft timing slots below the centerline of the camshaft to correctly fit the special tools, and install
23. Tighten the top clamp bolts to 10 Nm (89 lb-in).

24. Install the special tool.
25. **NOTE:** The RH camshaft sprocket bolt is a LH-threaded bolt.

Using the special tool with the Camshaft Sprocket Nut Socket 303-565, tighten the camshaft bolt to 85 Nm (63 lb-ft).
27. **NOTE:** Leave the top 2 special tool clamp bolts loose.

Install the special tools on the front of the LH cylinder head.
28. **NOTE:** The camshaft timing slots are off-center.

Position the camshaft timing slots below the centerline of the camshaft to correctly fit the special tools, and install the special tools on the rear of the LH cylinder head.

29. Install the special tool.
30. Tighten the bolts.
   1. Tighten the special tool top 2 clamp bolts to 10 Nm (89 lb-in).
   2. Tighten the camshaft bolt to 85 Nm (63 lb-ft).
LH side

32. Position the ground strap and install the bolt.
  ^ Tighten to 40 Nm (30 lb-ft).
  ^ Attach the wiring harness retainer to the backside of the cylinder head.
33. Position the starter motor wiring retainer bracket and install the bolt.
   ^ Tighten to 40 Nm (30 lb-ft).

34. Position the FEAD bracket and A/C compressor. Install the 3 bolts and the nut.
   ^ Tighten to 48 Nm (35 lb-ft).
35. Position the power steering pump and install the 3 bolts.
^ Tighten to 25 Nm (18 lb-ft).

36. Position the power steering pump pulley and install the 3 bolts.
^ Tighten to 25 Nm (18 lb-ft).
37. Attach PSP tube bracket to the crossmember and install the bolt.
\(^{^*}\) Tighten to 11 Nm (8 lb-ft).

38. Attach the power steering supply hose bracket to the FEAD bracket and install the bolt.
39. Position the ground strap and install the stud bolt.

^ Tighten to 10 Nm (89 lb-in).
RH side

41. **NOTE:** Inspect the O-ring seal. Install a new O-ring seal if necessary.

Position the [thermostat housing](http://repair.alldata.com/alldata/article/display.action?componentId=65...) and install the 3 bolts.

^Tighten to 11 Nm (8 lb-ft).
42. Position the coolant bypass hose clamp and connect the ECT sensor electrical connector.

43. Install the upper radiator hose.
44. Connect the heater hose to the thermostat housing.

45. Position the generator mounting bracket assembly and install the 2 bolts and the nut. ^ Tighten to 47 Nm (35 lb-ft).
46. Install the accessory drive belt tensioner and bolt.
   ^ Tighten to 47 Nm (35 lb-ft).

47. Connect the generator electrical connector. Position the B+ terminal and install the nut.
   ^ Tighten to 8 Nm (71 lb-in).
48. Install the 2 coolant tube bracket bolts.

   - Tighten the M12 bolt to 34 Nm (25 lb-ft).
   - Tighten the M8 bolt to 23 Nm (17 lb-ft).
50. Install the hydraulic lash adjusters.
51. Install the intake manifold.
52. Fill and bleed the engine cooling system.