

1.8L 4-CYL VIN [A]

1994 Toyota Celica

1994 ENGINES
Toyota 1.8L 4-Cylinder
Celica

* PLEASE READ THIS FIRST *

NOTE: For repair procedures not covered in this article, see
ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION
article in GENERAL INFORMATION.

ENGINE IDENTIFICATION

Engine serial number is stamped on exhaust side of cylinder
block, near the flywheel or drive plate.

ENGINE IDENTIFICATION CODES TABLE

Engine	Code
Celica 1.8L 4-Cylinder	7A-FE

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

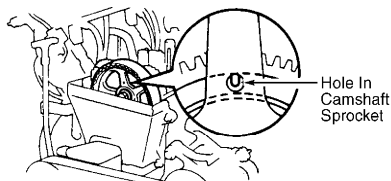
NOTE: Adjust valve clearance with engine cold.

CAUTION: When battery is disconnected, vehicle computer and memory
systems may lose memory data. Driveability problems may
exist until computer systems have completed a relearn cycle.

1) Disconnect negative battery cable. Disconnect necessary
control cables, spark plug wires, hoses and electrical connections for
access to valve cover. Remove nuts, seal washers, valve cover and
gasket.

2) Rotate crankshaft clockwise so cylinder No. 1 is at TDC of
compression stroke. Cylinder No. 1 is front cylinder at timing belt
end of engine. Ensure timing mark on crankshaft pulley aligns with "0"
mark on timing belt cover.

3) Ensure hole in camshaft sprocket is aligned with timing
mark on camshaft bearing cap. See Fig. 1. If hole in camshaft sprocket
is not aligned, rotate crankshaft clockwise one full revolution (360
degrees).



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Fig. 1: Checking Camshaft Sprocket Alignment
Courtesy of Toyota Motor Sales, U.S.A., Inc.

4) With cylinder No. 1 at TDC, check valve clearance on
specified valves. See VALVE CLEARANCE ADJUSTMENT SEQUENCE table. Using

feeler gauge, measure and record valve clearance between valve lifter and camshaft.

VALVE CLEARANCE ADJUSTMENT SEQUENCE TABLE

Cylinder No. At TDC	Adjust Intake Valves	Adjust Exhaust Valves
.....	1 & 2	1 & 3
4	3 & 4	2 & 4

5) To check remaining valves, rotate crankshaft clockwise one revolution (360 degrees) until cylinder No. 4 is at TDC on compression stroke. Measure and record valve clearance on specified valves. See VALVE CLEARANCE ADJUSTMENT SEQUENCE table. Ensure valve clearance is within specification. See VALVE CLEARANCE SPECIFICATIONS table.

VALVE CLEARANCE SPECIFICATIONS TABLE (1)

Application	In. (mm)
Exhaust Valve	.010-.014 (.25-.35)
Intake Valve	.006-.010 (.15-.25)

(1) - Adjust valve clearance with engine cold.

6) To adjust valve clearance on exhaust valves, rotate camshaft so lobe on valve to be adjusted is facing upward, away from valve lifter. Rotate valve lifter so notch on valve lifter is toward front of vehicle.

7) Use Valve Clearance Adjuster (SST 09248-55040) to remove adjusting shim. Using SST "A" of valve clearance adjuster, push downward on valve lifter. Place SST "B" between camshaft and valve lifter with side marked with No. 9 at designated position. See Fig. 2. Remove SST "A".

8) To adjust valve clearance on intake valves, manufacturer recommends removal of intake camshaft. Remove intake camshaft. See CAMSHAFTS under REMOVAL & INSTALLATION.

9) On all valve applications, use small screwdriver and magnet to remove adjusting shim. Measure and record thickness of removed adjusting shim. Using measured clearance and adjusting shim thickness, select proper replacement adjusting shim. See Figs. 4 and 7. Replacement adjusting shims have the thickness stamped on the shim in millimeters.

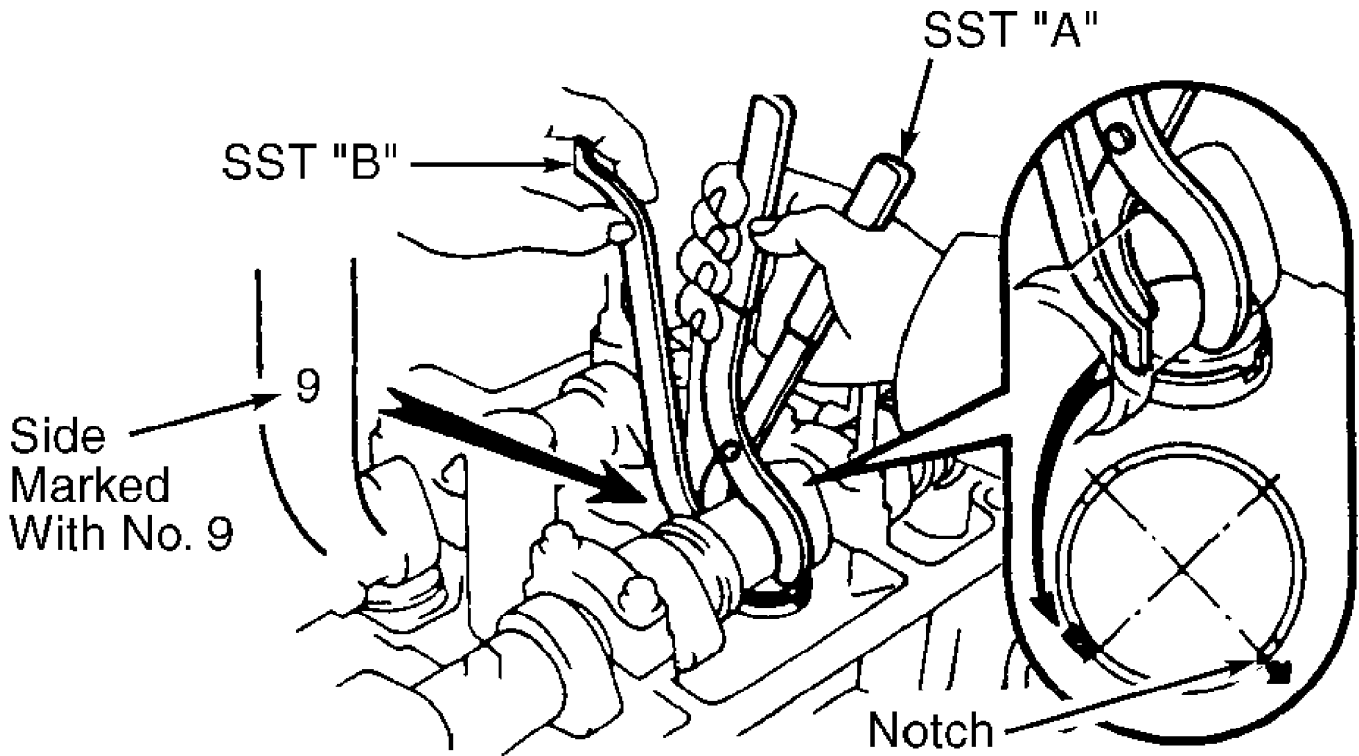
10) Install replacement adjusting shim. Install camshaft (if removed). Recheck valve clearance. Before installing valve cover and gasket, apply sealant at front and rear areas of cylinder head. See Fig. 3.

11) Using NEW gasket, install valve cover. Install seal washers. Install and tighten nuts to specification. See TORQUE SPECIFICATIONS. To install remaining components, reverse removal procedure.

NEW SHIM THICKNESS TABLE

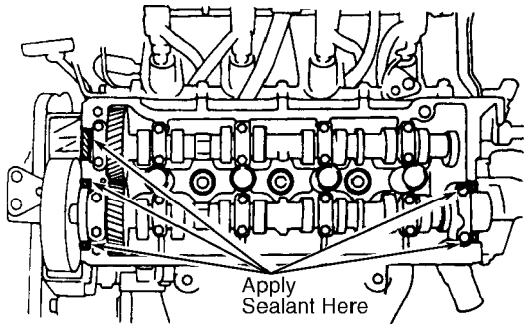
Shim No.	Thickness	Shim No.	Thickness mm (In.)
1	2.55 (0.1004)	9	2.95 (0.1161)
2	2.60 (0.1024)	10	3.00 (0.1181)

3	2.65 (0.1043)	11	3.05 (0.1201)
4	2.70 (0.1063)	12	3.10 (0.1220)
5	2.75 (0.1083)	13	3.15 (0.1240)
6	2.80 (0.1102)	14	3.20 (0.1260)
7	2.85 (0.1122)	15	3.25 (0.1280)
8	2.90 (0.1142)	16	3.30 (0.1299)



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Fig. 2: Adjusting Valve Clearance
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 3: Applying Valve Cover Sealant
Courtesy of Toyota Motor Sales, U.S.A., Inc.

INTAKE VALVES

Installed shim thickness mm (in.) Measured clearance mm (in.)	3030 (0.1193)	3040 (0.1197)	3050 (0.1201)	3060 (0.1205)	3080 (0.1213)	3100 (0.1220)	3120 (0.1228)	3140 (0.1236)	3150 (0.1240)	3160 (0.1244)	3180 (0.1252)	3200 (0.1260)	3220 (0.1268)	3240 (0.1276)	3250 (0.1280)	3260 (0.1283)	3280 (0.1291)	3300 (0.1299)
0.000 - 0.020 (0.0000 - 0.0008)	7	7	7	7	8	8	9	9	9	9	10	10	11	11	11	11	12	12
0.021 - 0.040 (0.0008 - 0.0016)	7	8	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	13
0.041 - 0.060 (0.0016 - 0.0024)	8	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	13	13
0.061 - 0.080 (0.0024 - 0.0031)	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13
0.081 - 0.100 (0.0032 - 0.0039)	8	9	9	9	9	10	10	11	11	11	11	12	12	13	13	13	13	14
0.101 - 0.120 (0.0040 - 0.0047)	9	9	9	9	10	10	11	11	11	11	12	12	13	13	13	13	14	14
0.121 - 0.140 (0.0048 - 0.0055)	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14	14	14	15
0.141 - 0.149 (0.0056 - 0.0059)	10	10	10	10	11	11	11	12	12	12	13	13	13	14	14	14	15	15
0.150 - 0.250 (0.0059 - 0.0098)																		
0.251 - 0.260 (0.0099 - 0.0102)	12	12	12	12	13	13	14	14	14	14	15	15	16	16	16	16	16	
0.261 - 0.280 (0.0103 - 0.0110)	12	12	12	13	13	13	14	14	14	15	15	15	16	16	16	16	16	
0.281 - 0.300 (0.0111 - 0.0118)	12	13	13	13	13	14	14	15	15	15	15	16	16	16	16	16		
0.301 - 0.320 (0.0119 - 0.0126)	13	13	13	13	14	14	15	15	15	15	16	16	16	16				
0.321 - 0.340 (0.0126 - 0.0134)	13	13	14	14	14	15	15	15	16	16	16	16	16					
0.341 - 0.360 (0.0134 - 0.0142)	14	14	14	14	15	15	15	16	16	16	16	16						
0.361 - 0.380 (0.0142 - 0.0150)	14	14	14	15	15	15	16	16	16	16	16							
0.381 - 0.400 (0.0150 - 0.0157)	14	15	15	15	15	16	16	16	16	16								
0.401 - 0.420 (0.0158 - 0.0165)	15	15	15	15	16	16	16	16										
0.421 - 0.440 (0.0166 - 0.0173)	15	15	16	16	16	16	16											
0.441 - 0.460 (0.0174 - 0.0181)	16	16	16	16	16	16												
0.461 - 0.480 (0.0181 - 0.0189)	16	16	16	16	16													
0.481 - 0.500 (0.0189 - 0.0197)	16	16	16	16														
0.501 - 0.520 (0.0197 - 0.0205)	16	16																

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Fig. 5: Intake Valve Adjusting Shim Selection Chart (2 Of 2)

Courtesy of Toyota Motor Sales, U.S.A., Inc.

NOTE: For reassembly reference, label all electrical connectors, vacuum hoses and fuel lines before removal. Also place mating marks on engine hood and other major assemblies before removal.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle.

CAUTION: To prevent air bag deployment, disconnect negative battery cable at least 90 seconds before working on vehicle.

FUEL PRESSURE RELEASE

With ignition off, disconnect negative battery cable. Place suitable container under fuel line connection. Cover fuel line connection with shop towel. Slowly loosen fuel line connection, allowing fuel pressure to be released. Once fuel pressure is released, fuel system components may be serviced.

ENGINE

NOTE: Remove engine and transaxle as an assembly.

Removal (Celica)

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Remove hood and battery. Drain cooling system and engine oil.

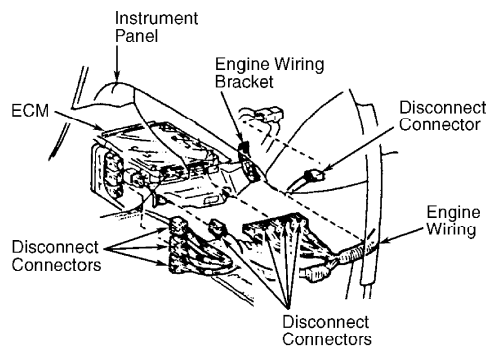
2) Remove air intake duct with air cleaner assembly and air cleaner case. Disconnect control cables at throttle body.

3) Remove relay box, located above radiator (if equipped). Disconnect necessary control cables, electrical connections, fuel lines, coolant hoses and vacuum hoses. Remove radiator with cooling fan.

4) Remove upper and lower covers from fuse/relay box located at driver's side front corner of engine compartment. Disconnect the 2 electrical connectors from bottom of fuse/relay box. Remove relay box near passenger's side front corner of engine compartment.

5) Remove passenger's side kick panel. Remove scuff plate from passenger's side door opening and remove carpet for access to engine wiring at Engine Control Module (ECM), located below instrument panel. See Fig. 8.

6) Remove glove compartment if necessary to access ECM. See Fig. 8. Remove engine wiring bracket from ECM. Disconnect necessary connectors so engine wiring can be pulled out through firewall. See Fig. 8.



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Fig. 8: Identifying ECM & Engine Wiring Connectors (Celica)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

7) Remove engine wiring-to-firewall retaining nuts, located below wiper motor. Pull engine wiring out through the firewall.

8) Remove A/C compressor and power steering pump with hoses attached and secure aside (if equipped). Raise and support vehicle. Remove lower engine covers. Remove front exhaust pipe, located between catalytic converter on exhaust manifold and the rear exhaust pipe. Remove exhaust pipe support bracket.

9) Disconnect control cables and electrical connectors at transaxle. On M/T models, disconnect clutch release cylinder from transaxle with hose attached and secure aside.

10) On A/T models, disconnect oil cooler hoses at transaxle. Disconnect transaxle shift cable brackets from crossmember.

11) On all models, remove front wheels. Remove cotter pin and retainer from end of axle shaft. Apply brakes. Loosen axle shaft nut. Release brakes. Remove axle shaft nut.

12) Drain transaxle oil. Remove nut and separate tie rod from steering knuckle. Disconnect stabilizer bar link from lower control arm.

13) Remove ball joint-to-lower control arm bolts/nuts. Using soft-faced hammer, tap axle shaft from hub assembly. Pull steering knuckle outward and separate axle shaft from hub assembly.

14) Remove axle shafts from transaxle by prying between transaxle case and axle shaft until axle shaft disengages from transaxle. Support engine with hoist. Remove front (exhaust manifold side) and rear (intake manifold side) engine mount through-bolts.

15) Remove rear (intake manifold side) engine mount-to-engine mount crossmember bolts/nuts. Remove rear (intake manifold side) engine mount from engine mount crossmember. Remove rear (intake manifold side) engine mount bracket from cylinder block.

16) Disconnect A/C pipe bracket from engine mount crossmember. Remove bolts and engine mount crossmember. Remove left (transaxle side) and right (timing belt side) engine mounts. Lift engine and transaxle from vehicle.

Installation

1) To install, reverse removal procedure. Install all bolts/nuts in engine mounts and engine mount crossmember before tightening to specification. Tighten bolts/nuts to specification. See TORQUE SPECIFICATIONS.

2) Before installing axle shafts, install NEW snap ring on end of axle shaft. Coat axle shaft seals in transaxle with grease. Coat axle shaft splines and sliding surfaces with gear oil (M/T) or Dexron-II (A/T).

3) Install axle shaft by lightly tapping axle shaft into transaxle. Ensure axle shaft will move inward and outward approximately .079-.120" (2.00-3.00 mm) and cannot be pulled from transaxle.

4) To install remaining components, reverse removal procedure. Use NEW gasket and NEW nuts when installing front exhaust pipe on catalytic converter. Tighten bolts/nuts to specification. See TORQUE SPECIFICATIONS. Adjust fluid levels and control cables.

NOTE: Remove engine and transaxle as an assembly.

CYLINDER HEAD & MANIFOLDS

Removal

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Drain cooling system. Raise and support vehicle. Remove lower engine covers.

2) Disconnect control cables at throttle body. Remove air intake duct with air cleaner cap assembly. Remove alternator and

distributor.

3) Disconnect front exhaust pipe from exhaust manifold or catalytic converter on exhaust manifold (if equipped). It may be necessary to remove front exhaust pipe located between exhaust manifold or catalytic converter on exhaust manifold (if equipped) and rear exhaust pipe.

4) Remove heat insulators from exhaust manifold. Remove catalytic converter braces, located at catalytic converter on exhaust manifold (if equipped).

5) Remove nuts, exhaust manifold with catalytic converter (if equipped) and exhaust manifold gasket. Remove catalytic converter and gasket from exhaust manifold (if necessary).

6) Disconnect necessary electrical connections, coolant hoses and vacuum hoses from throttle body, cylinder head and intake manifold. Remove coolant outlet for upper radiator hose from cylinder head.

7) Remove coolant inlet for lower radiator hose from rear of cylinder head. Remove EGR valve, EGR pipe, EGR Vacuum Switching Valve (VSV) and EGR vacuum modulator (if equipped).

8) Remove throttle body, gasket and air intake chamber support from air intake chamber. See Fig. 9. Remove air intake chamber and gasket from intake manifold. See Fig. 9.

9) Disconnect fuel inlet line from delivery pipe. Disconnect electrical connectors from fuel injectors. Remove bolts, and delivery pipe with fuel injectors from intake manifold. DO NOT allow fuel injectors to fall from delivery pipe during removal.

10) Remove insulator and spacers from intake manifold. Remove bolt and clamps for wiring, located above valve cover. Remove air pipe, located below intake manifold (if necessary). Remove bolts/nuts, intake manifold and gasket.

NOTE: Manufacturer recommends removing camshaft sprocket with timing belt from camshaft. DO NOT allow timing belt to become disengaged from crankshaft sprocket.

11) Remove timing belt and camshaft sprocket from camshaft. See TIMING BELT under REMOVAL & INSTALLATION. Remove alternator bracket and engine hanger from cylinder head.

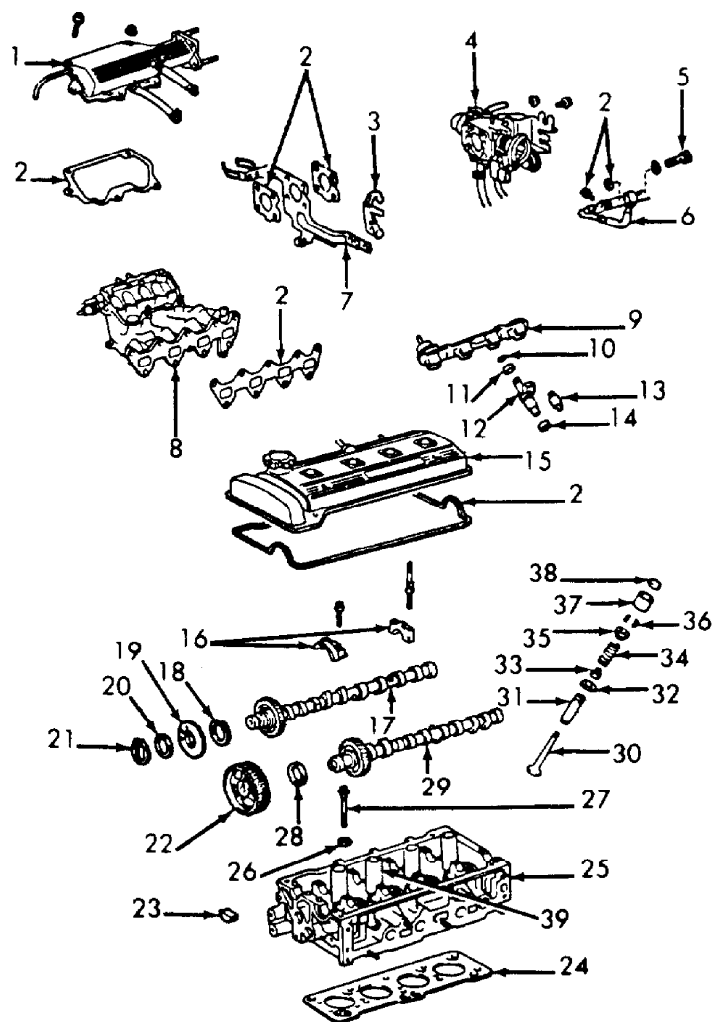
12) Remove oil dipstick, dipstick tube and "O" ring. Remove No. 2 coolant inlet and gasket from front of cylinder head. The No. 2 coolant inlet fits between cylinder head and rear of water pump.

13) Remove camshafts. See CAMSHAFTS under REMOVAL & INSTALLATION.

CAUTION: Cylinder head bolts must be loosened in proper sequence to prevent cylinder head warpage.

14) Loosen cylinder head bolts in proper sequence using several steps. See Fig. 10. Remove cylinder head bolts, washers, cylinder head and cylinder head gasket.

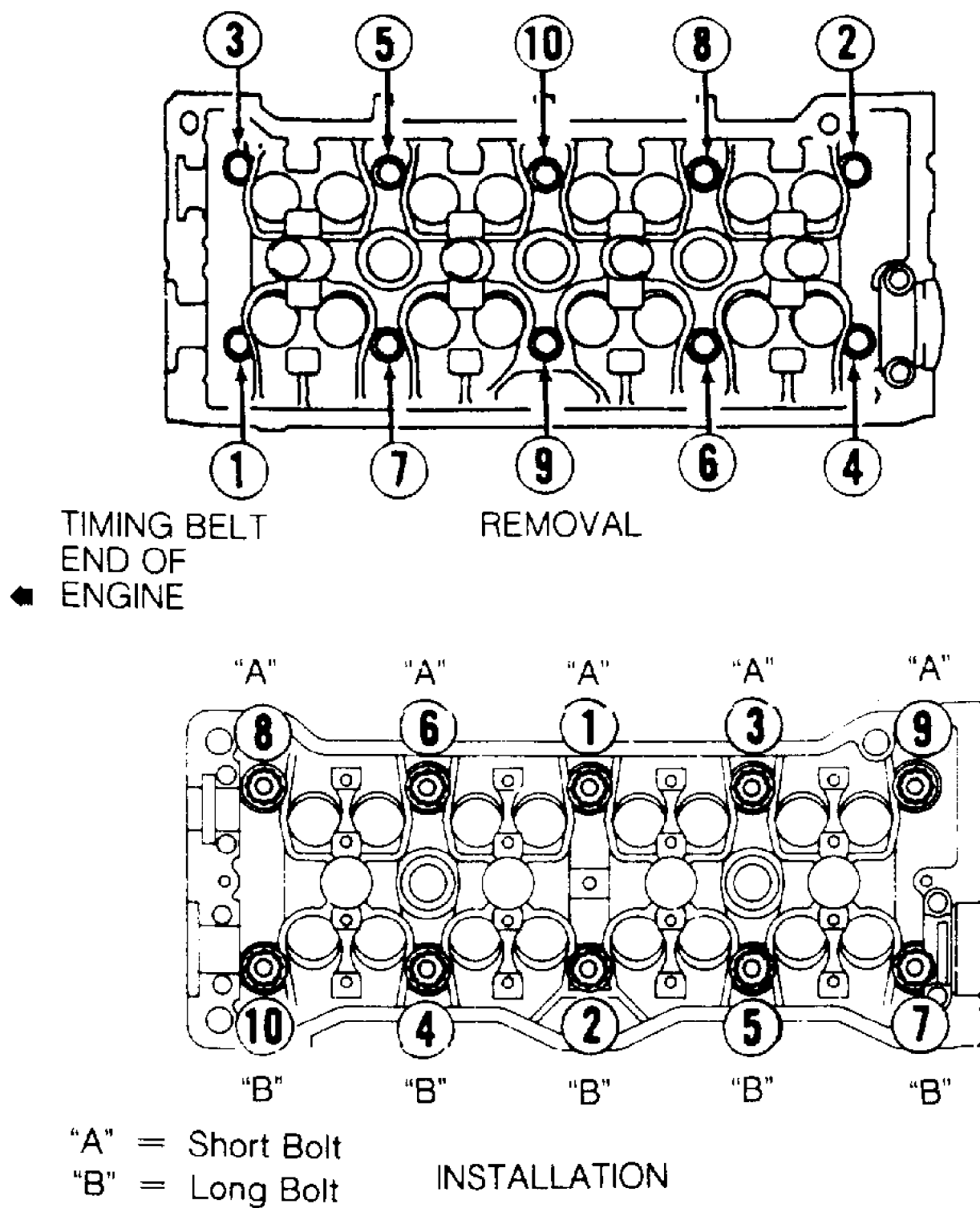
15) Note location of adjusting shims and valve lifters for reassembly reference. Remove adjusting shims and valve lifters from cylinder head (if necessary).



- | | |
|-------------------------------|--------------------------|
| 1. Air Intake Chamber | 21. Snap Ring |
| 2. Gasket | 22. Camshaft Sprocket |
| 3. Engine Hanger | 23. Semi-Circular Plug |
| 4. Throttle Body | 24. Cylinder Head Gasket |
| 5. Union Bolt | 25. Cylinder Head |
| 6. Fuel Inlet Line | 26. Washer |
| 7. Air Intake Chamber Support | 27. Cylinder Head Bolt |
| 8. Intake Manifold | 28. Oil Seal |
| 9. Delivery Pipe | 29. Exhaust Camshaft |
| 10. "O" Ring | 30. Valve |
| 11. Grommet | 31. Valve Guide |
| 12. Fuel Injector | 32. Spring Seat |
| 13. Spacer | 33. Valve Stem Oil Seal |
| 14. Insulator | 34. Valve Spring |
| 15. Valve Cover | 35. Spring Retainer |
| 16. Camshaft Bearing Cap | 36. Valve Keepers |
| 17. Intake Camshaft | 37. Valve Lifter |
| 18. Gear Spring | 38. Adjusting Shim |
| 19. Sub-Gear | 39. Spark Plug Tube |
| 20. Wave Washer | |

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Fig. 9: Exploded View Of Cylinder Head & Components
Courtesy of General Motors Corp.



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Fig. 10: Cylinder Head Bolt Removal & Installation Sequence & Identifying Bolt Locations
Courtesy of General Motors Corp.

1) Inspect cylinder head warpage at cylinder block, exhaust manifold and intake manifold surfaces. Replace cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS.

2) Inspect cylinder block deck surface for warpage. Replace cylinder block if deck surface warpage exceeds specification. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS.

3) Inspect exhaust manifold machined surfaces for warpage. Replace exhaust manifold if warpage exceeds .0118" (.300 mm).

4) Inspect intake manifold machined surfaces for warpage. Replace intake manifold if warpage exceeds .0079" (.200 mm). Inspect camshaft and components. See CAMSHAFTS under REMOVAL & INSTALLATION.

5) Measure valve lifter diameter and bore diameter. Ensure oil clearance is within specification. Replace components if not within specification. See VALVE LIFTERS table under ENGINE SPECIFICATIONS.

Installation

1) Install adjusting shims and valve lifters in original location on cylinder head (if removed). Ensure valve lifters rotate smoothly in cylinder head.

2) Install NEW cylinder head gasket on cylinder block. Ensure all holes in cylinder head gasket align with holes in cylinder block.

3) Install cylinder head. Coat threads and bolt-to-cylinder head contact surfaces on cylinder head bolts with engine oil. Install washers and cylinder head bolts. Ensure proper length cylinder head bolts are installed in correct location. See Fig. 10.

4) Tighten cylinder head bolts to specification in sequence using several steps. See Fig. 10. See TORQUE SPECIFICATIONS.

5) Install camshafts using proper procedure. See CAMSHAFTS under REMOVAL & INSTALLATION. To install remaining components, reverse removal procedure using NEW gaskets and NEW "O" rings. If camshafts or cylinder head components are serviced, adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

6) Before installing gasket and valve cover, apply sealant at front and rear valve cover areas on cylinder head. See Fig. 3. Using NEW gasket, install valve cover. Install and tighten valve cover nuts to specification. See TORQUE SPECIFICATIONS.

7) If installing fuel injector in delivery pipe, replace "O" ring and grommet on fuel injector. Coat NEW "O" ring with gasoline. Using twisting motion, install fuel injector into delivery pipe.

8) When installing delivery pipe, install NEW insulators on cylinder head. Install spacers and delivery pipe with fuel injectors on cylinder head. Position electrical connector on fuel injector facing toward top of engine.

9) Install and slightly tighten delivery pipe bolts. Ensure all fuel injectors rotate smoothly. If fuel injector fails to rotate smoothly, check for damaged "O" rings. Tighten delivery pipe bolts to specification. See TORQUE SPECIFICATIONS.

10) Install NEW throttle body gasket with protruding area on gasket facing toward bottom of throttle body. Tighten throttle body bolts/nuts to specification in a crisscross pattern.

11) Apply sealant on rear of coolant inlet and coolant outlet before installing. Use NEW gasket when installing catalytic converter on exhaust manifold.

12) Apply engine oil on dipstick "O" ring before installing dipstick. Install NEW "O" ring on distributor. Coat "O" ring with engine oil. Rotate crankshaft clockwise so cylinder No. 1 is at TDC on compression stroke. Cylinder No. 1 is front cylinder at timing belt end of engine.

13) Ensure slot area on intake camshaft is properly positioned. Align cutout on coupling on distributor with groove on distributor housing. See Fig. 11.

14) Install distributor so center of flange on distributor is aligned with bolt hole on cylinder head. Install distributor hold-down bolts.

15) To install remaining components, reverse removal procedure. Tighten all fasteners to specification. See TORQUE SPECIFICATIONS. Adjust control cables and ignition timing. Fill cooling system.

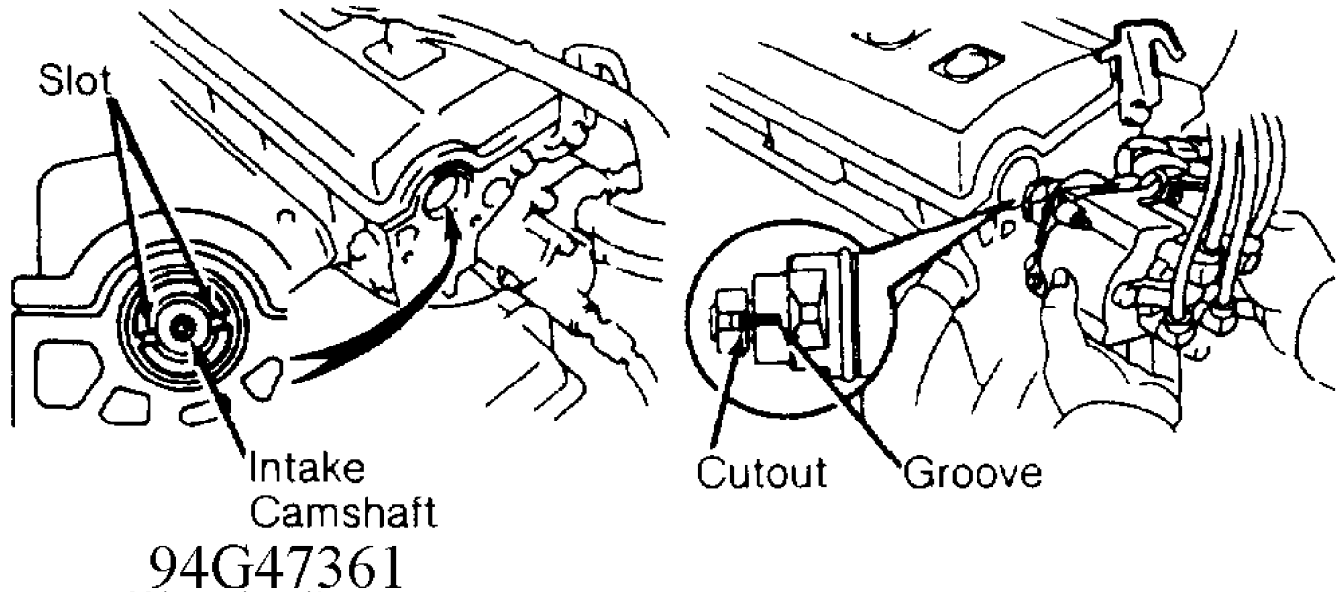


Fig. 11: Installing Distributor
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CRANKSHAFT FRONT SEAL

Removal & Installation (Oil Pump Installed)

1) Remove timing belt and crankshaft sprocket. See TIMING BELT under REMOVAL & INSTALLATION. Using a knife, cut off seal lip. Pry seal from oil pump housing. Use care not to damage sealing surfaces.

2) To install, apply grease to seal lip on NEW seal. Using hammer and Seal Installer (SST 09309-37010), install seal until seal surface is even with oil pump housing. To install remaining components, reverse removal procedure.

Removal & Installation (Oil Pump Removed)

Using hammer and drift, remove seal from oil pump housing. To install, use hammer and Seal Installer (SST 09309-37010). Install seal until seal surface is even with oil pump housing. Apply grease to lip of NEW oil seal. To complete installation, reverse removal procedure.

TIMING BELT

Removal

1) Disconnect negative battery cable. Remove windshield washer fluid reservoir (if necessary). Remove cruise control actuator from bracket on the body (if equipped).

2) Raise and support vehicle. Remove passenger's side front wheel and passenger's side right lower engine cover. Remove accessory drive belts. Remove A/C compressor with hoses attached and secure aside (if equipped). Remove A/C compressor mounting bracket from cylinder block.

3) Remove water pump pulley from water pump. Remove spark

plugs. Disconnect necessary control cables, hoses and electrical connections for access to valve cover. Remove nuts, seal washers, valve cover and gasket.

4) Rotate crankshaft clockwise so cylinder No. 1 is at TDC of compression stroke. Cylinder No. 1 is front cylinder at timing belt end of engine. Ensure timing mark on crankshaft pulley aligns with "0" mark on timing belt cover.

5) Ensure hole in camshaft sprocket is aligned with timing mark on camshaft bearing cap. See Fig. 1. If hole in camshaft sprocket is not aligned, rotate crankshaft clockwise one full revolution (360 degrees).

6) Support engine with floor jack. Remove right (timing belt side) engine mount for access to timing belt covers. Using Pulley Holder (SST 09213-54015), hold crankshaft pulley. Remove crankshaft pulley bolt. Using puller, remove crankshaft pulley.

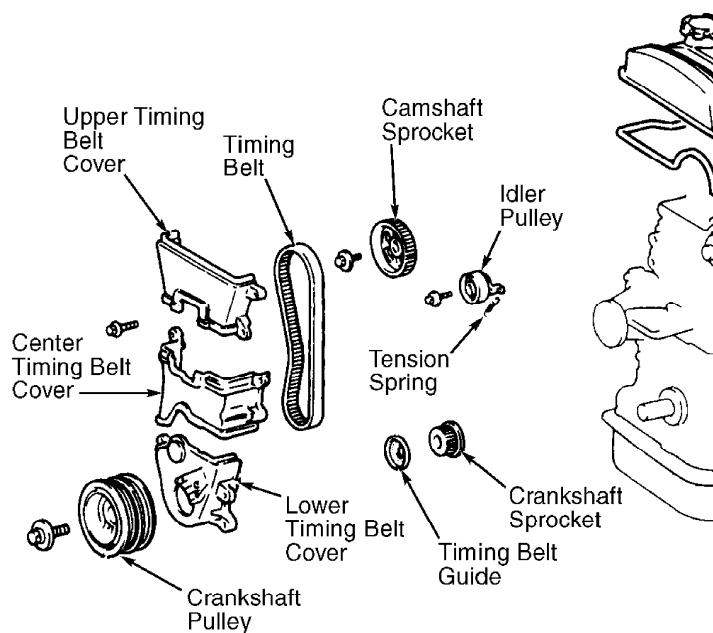
7) Remove all timing belt covers. See Fig. 12. Note direction of timing belt guide installation. See Fig. 12. Remove timing belt guide.

CAUTION: If reusing timing belt, mark timing belt for direction of belt rotation and place reference marks on timing belt at camshaft and crankshaft sprockets for reassembly reference.

8) Loosen idler pulley bolt. Pry idler pulley away from timing belt as far as possible and tighten bolt. Remove timing belt.

9) If removing camshaft sprocket, hold camshaft with wrench on hexagonal area near front of camshaft. Remove bolt and camshaft sprocket. If removing idler pulley, remove bolt, idler pulley and tension spring.

10) If removing crankshaft sprocket, place shop towels against oil pump housing. Using 2 screwdrivers, carefully pry crankshaft sprocket from crankshaft. Use care not to damage oil pump housing.



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Fig. 12: Exploded View Of Timing Belt & Components
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Inspection

- 1) Inspect timing belt for damaged teeth, cracking or oil

contamination. Ensure idler pulley rotates freely. Replace components if damaged or worn.

2) Ensure free length of tension spring is within specification. See TENSION SPRING SPECIFICATIONS table. Measure tension required to extend tension spring to specified spring installed length. Replace tension spring if not within specification. See TENSION SPRING SPECIFICATIONS table.

TENSION SPRING SPECIFICATIONS TABLE

Application	Specification
Free Length	
Celica	1.250" (31.76 mm)
Tension At Spring Installed Length	
Celica	10.7–11.6 lbs. (4.85–5.25 kg) @ 1.480" (37.60 mm)

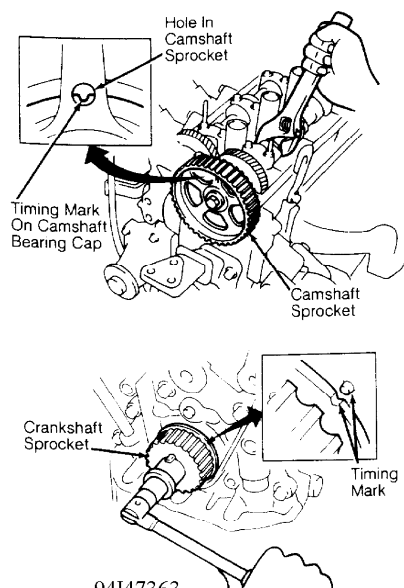
Installation

1) If installing crankshaft sprocket, align crankshaft sprocket with key in crankshaft. Install crankshaft sprocket with flange toward cylinder block.

2) Install idler pulley and tension spring (if removed). Pry idler pulley away from timing belt area as far as possible. Temporarily tighten idler pulley bolt. Ensure idler pulley is clean and rotates smoothly.

3) If installing camshaft sprocket, align pin groove in camshaft sprocket with pin in camshaft. Install camshaft sprocket. Install and tighten camshaft sprocket bolt to specification. See TORQUE SPECIFICATIONS.

4) Using crankshaft pulley bolt, rotate crankshaft so timing mark on crankshaft sprocket aligns with timing mark on oil pump housing. See Fig. 13. Rotate camshaft with wrench on hexagonal area near front of camshaft so hole in camshaft sprocket aligns with timing mark on camshaft bearing cap. See Fig. 13.



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Fig. 13: Aligning Timing Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CAUTION: If reusing timing belt, ensure reference mark on timing belt aligns with reference mark placed on camshaft and

crankshaft sprockets and timing belt is installed in original direction of rotation.

5) Ensure all sprockets and idler pulley are clean. Install timing belt on crankshaft sprocket and camshaft sprocket. Ensure tension exists on timing belt between crankshaft and camshaft sprockets.

6) Loosen idler pulley bolt, allowing idler pulley to apply tension on timing belt. Rotate crankshaft clockwise 2 full revolutions. DO NOT rotate crankshaft counterclockwise.

7) Ensure timing mark on crankshaft sprocket aligns with timing mark on oil pump housing and hole in camshaft sprocket aligns with timing mark on camshaft bearing cap. See Fig. 13. If timing marks are not aligned, remove timing belt and reinstall.

8) Tighten idler pulley bolt to specification. See TORQUE SPECIFICATIONS. Measure timing belt deflection halfway between camshaft and crankshaft sprockets. With 4.5 lbs. (2.0 kg) applied on timing belt, timing belt deflection should be .20-.24" (5-6 mm).

9) If timing belt deflection is not within specification, loosen idler pulley bolt and reposition idler pulley. Ensure all timing marks are aligned once timing belt is adjusted.

10) Remove crankshaft pulley bolt from crankshaft. Install timing belt guide with cupped side away from crankshaft sprocket and flat side toward timing belt. Install all timing belt covers. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

11) Align crankshaft pulley key groove with key in crankshaft. Install crankshaft pulley. Install and tighten crankshaft pulley bolt to specification while holding crankshaft pulley with pulley holder. See TORQUE SPECIFICATIONS.

12) To install remaining components, reverse removal procedure. Install all bolts in right (timing belt side) engine mount before tightening to specification. Tighten bolts/nuts to specification. See TORQUE SPECIFICATIONS.

13) Before installing valve cover and gasket, apply sealant at front and rear areas of cylinder head. See Fig. 3. Using NEW gasket, install valve cover. Install seal washers. Install and tighten nuts to specification. See TORQUE SPECIFICATIONS.

VALVE LIFTER

Removal

Remove camshaft. See CAMSHAFTS under REMOVAL & INSTALLATION. Note location of adjusting shims and valve lifters for reassembly reference. Remove adjusting shims and valve lifters from cylinder head.

Inspection

Inspect components for damage. Measure valve lifter diameter and bore diameter. Ensure oil clearance is within specification. Replace components if not within specification. See VALVE LIFTERS table under ENGINE SPECIFICATIONS.

Installation

To install, reverse removal procedure. Ensure components are installed in original location and valve lifters rotate smoothly in cylinder head. If camshaft, adjusting shims or valve lifters are replaced, check valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

CAMSHAFTS

Removal

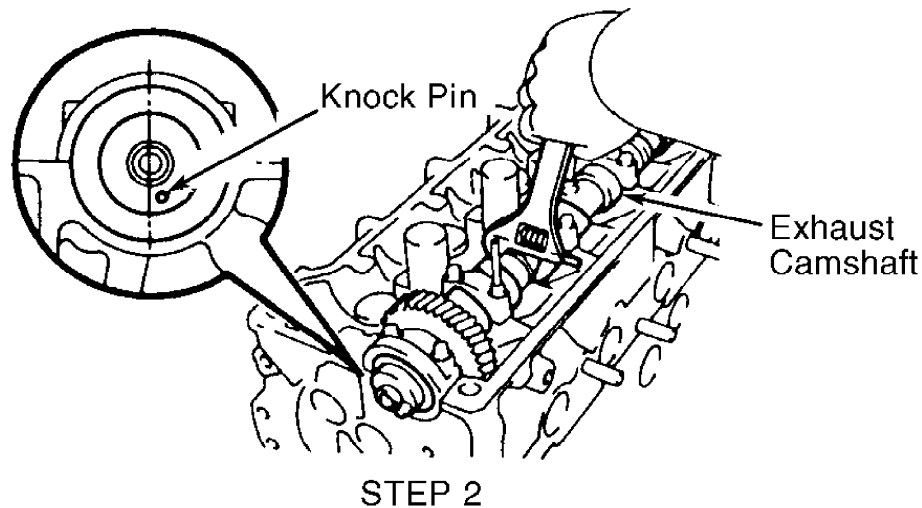
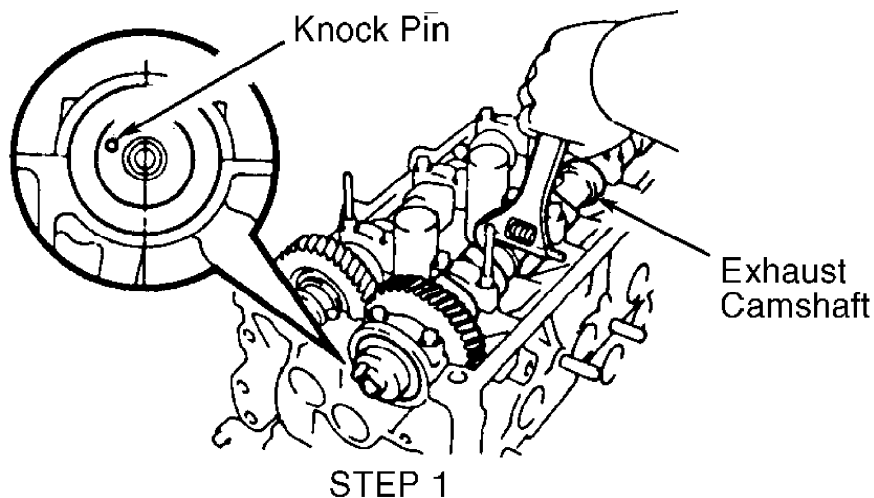
1) Remove valve cover, timing belt and camshaft sprocket. See

TIMING BELT under REMOVAL & INSTALLATION.

CAUTION: Camshafts must be properly positioned to lift camshaft straight from cylinder head to prevent damage to cylinder head and camshaft. DO NOT pry or force camshafts from cylinder head or component damage will result.

2) For servicing of intake camshaft, remove distributor. Rotate exhaust camshaft so knock pin on exhaust camshaft is properly positioned. Perform STEP 1. See Fig. 14. This positions intake camshaft so lobes on cylinders No. 1 and 3 on intake camshaft are pushing on the valve lifters.

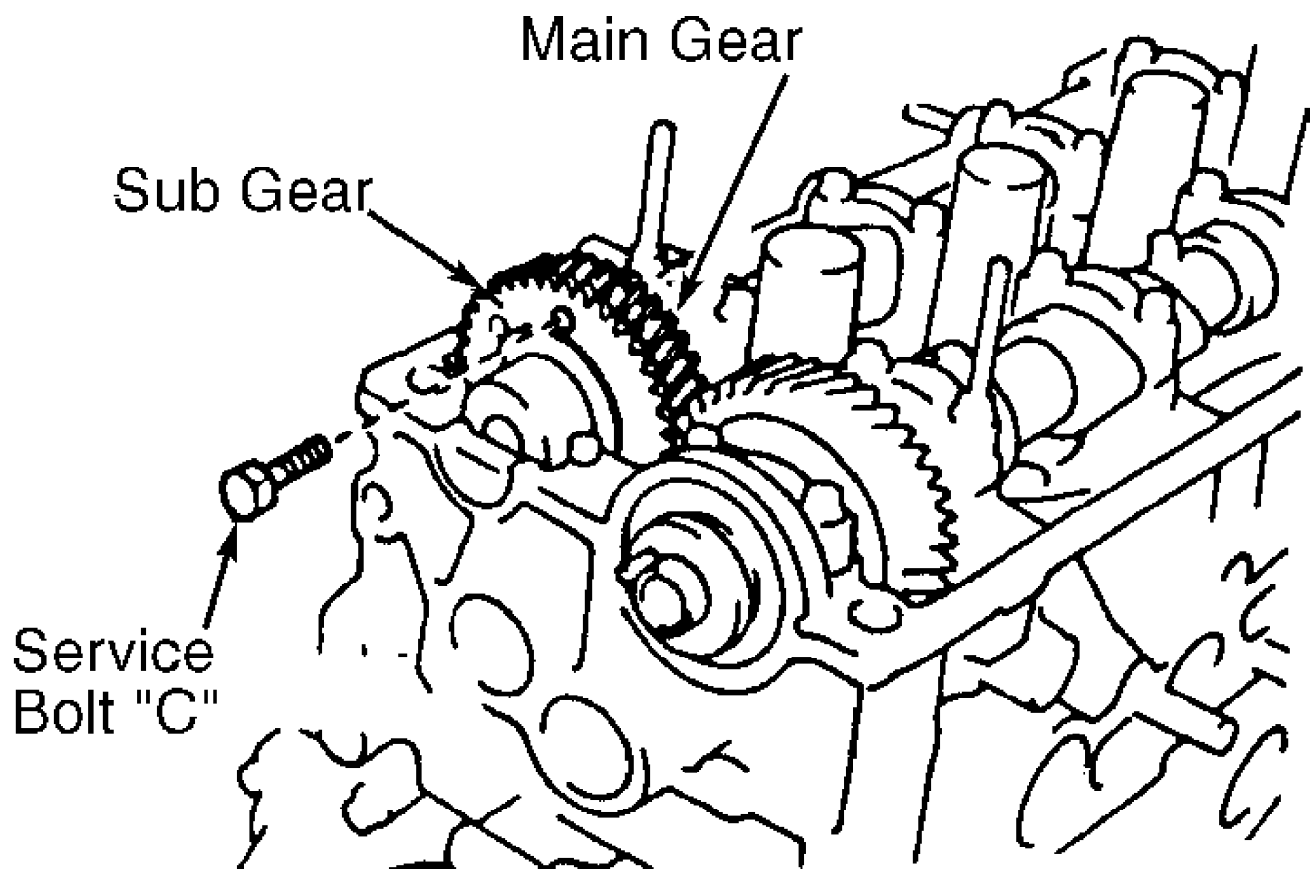
3) Remove bolts and front camshaft bearing cap from intake camshaft. Secure sub-gear to the main gear on intake camshaft with a 6 x 1.0 x 18 mm service bolt "C". See Fig. 15. Before removing camshaft bearing cap bolts, ensure torsional spring force of sub-gear is secured by service bolt "C".



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Fig. 14: Positioning Camshafts

Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 15: Securing Sub-Gear-To-Main Gear
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

NOTE: Camshaft bearing caps are marked either with an "I" for intake camshaft or an "E" for exhaust camshaft. Camshaft bearing caps are numbered starting with No. 1 (front) at timing belt end of engine. See Fig. 16. Arrow on camshaft bearing cap points toward timing belt end of engine.

4) Remove remaining intake camshaft bearing caps evenly in sequence. See Fig. 17. If intake camshaft is not lifted upward when removing bolts, reinstall No. 3 camshaft bearing cap bolts. Evenly loosen bolts while pulling upward on camshaft gear. Remove camshaft bearing caps and intake camshaft.

5) For servicing of exhaust camshaft, rotate exhaust camshaft so knock pin is properly positioned. Perform STEP 2. See Fig. 14. This positions exhaust camshaft so lobes on cylinders No. 1 and 3 on exhaust camshaft are pushing on the valve lifters.

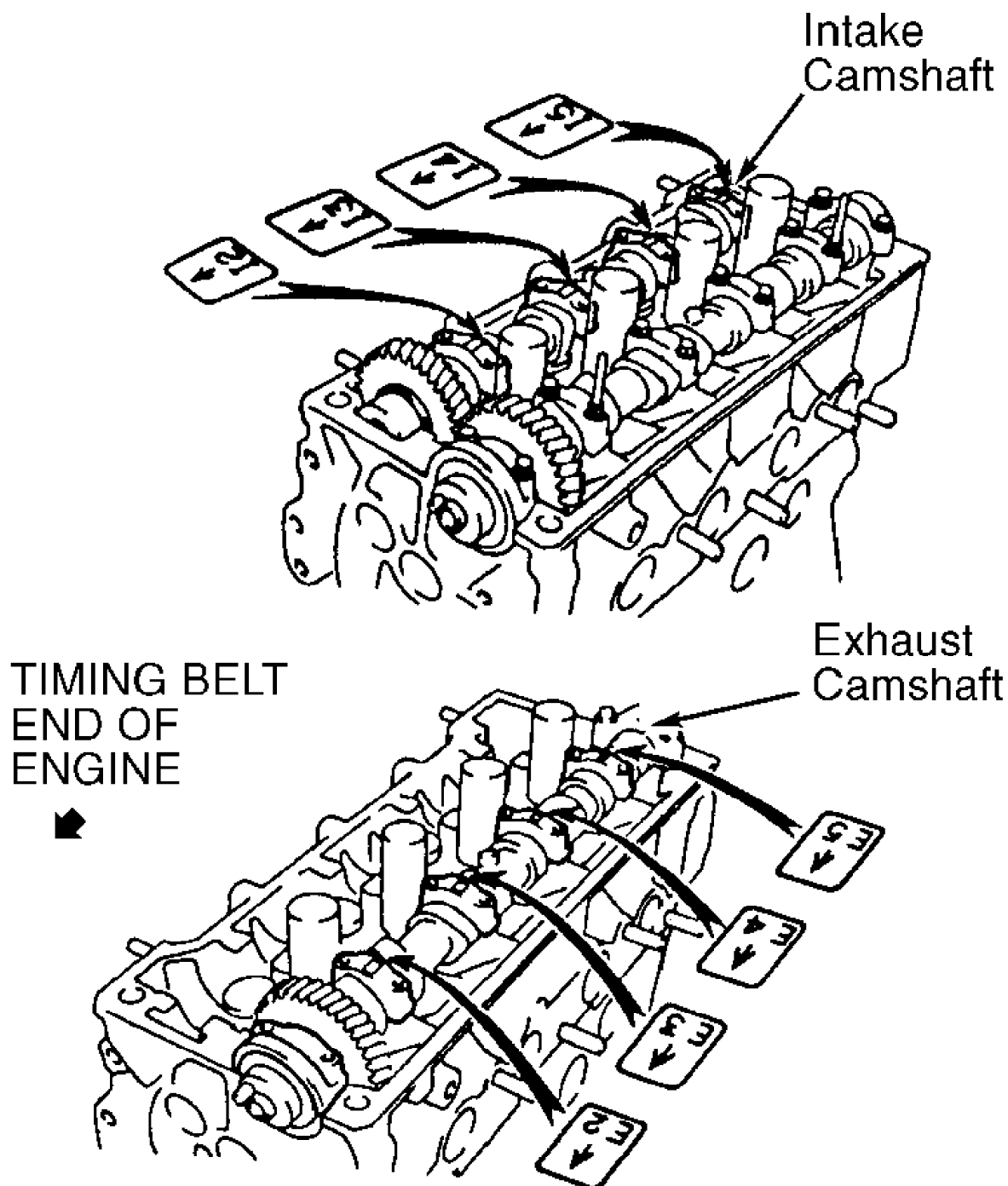
6) Remove bolts and front camshaft bearing cap from exhaust camshaft. Remove remaining exhaust camshaft bearing caps evenly in sequence. See Fig. 17. If exhaust camshaft is not lifted upward when removing bolts, reinstall No. 3 camshaft bearing cap bolts. Evenly loosen bolts while pulling upward on camshaft gear. Remove camshaft bearing caps and exhaust camshaft.

7) If removing sub-gear from intake camshaft, mount camshaft in soft-jawed vise on hexagonal area of camshaft. Install service bolts "A" and "B" in holes on sub-gear. See Fig. 18.

8) Using screwdriver, rotate sub-gear clockwise and remove service bolt "C". Remove snap ring, wave washer, sub-gear and gear

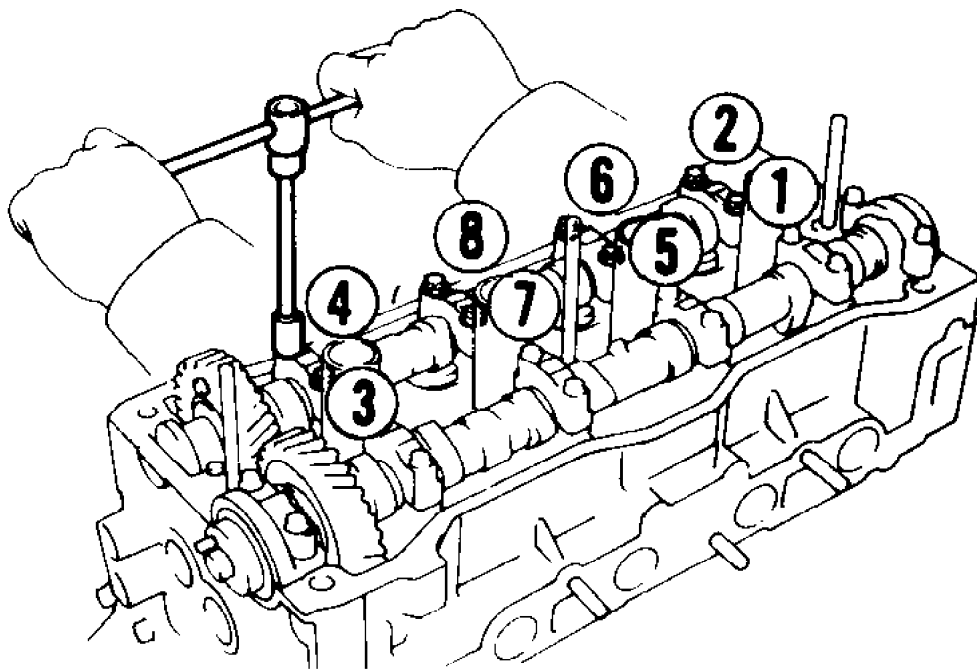
spring. See Fig. 9.

9) Note location of adjusting shims and valve lifters for reassembly reference. Remove adjusting shims and valve lifters from cylinder head (if necessary).

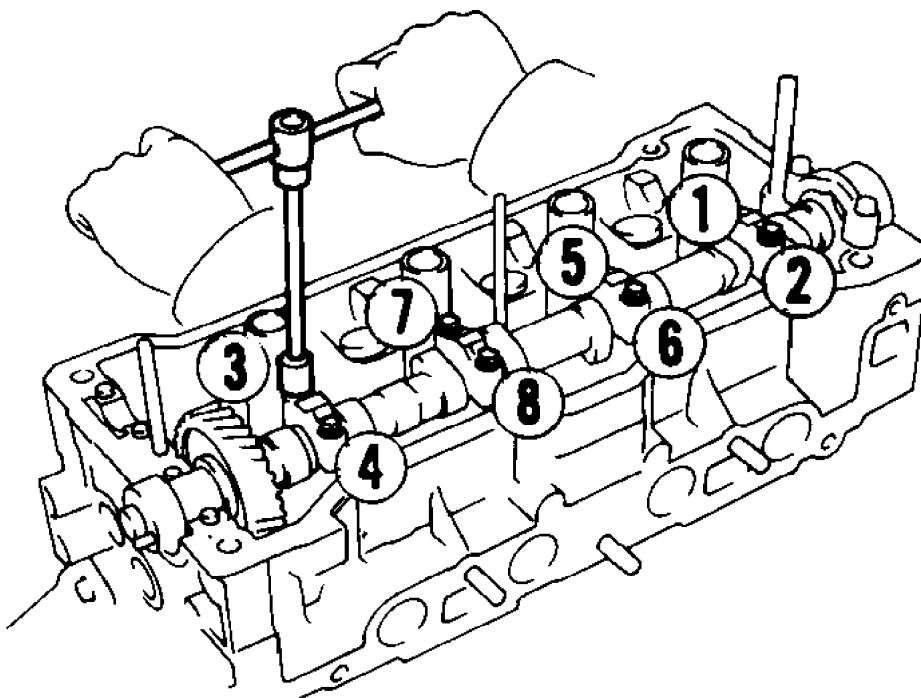


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Fig. 16: Identifying Camshaft Bearing Caps
Courtesy of Toyota Motor Sales, U.S.A., Inc.



INTAKE CAMSHAFT



EXHAUST CAMSHAFT

94D47368

Fig. 17: Camshaft Bearing Cap Bolt Removal Sequence
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

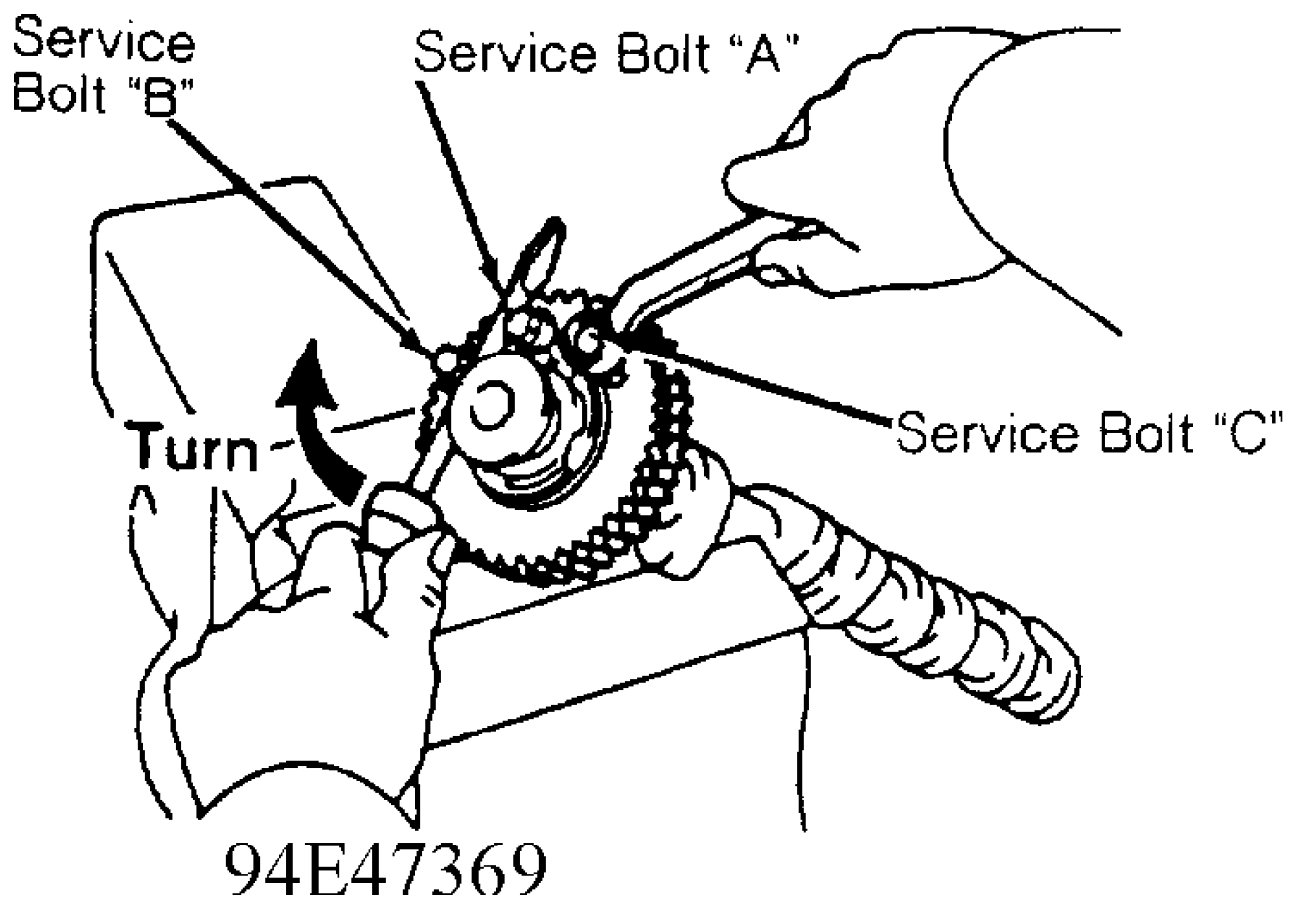


Fig. 18: Disassembling & Reassembling Sub-Gear On Main Gear
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Inspection

- 1) Inspect components for damage. Check camshaft journal diameter, lobe height and journal runout. Replace camshaft if not within specification. See CAMSHAFT table under ENGINE SPECIFICATIONS.
- 2) Install camshaft in cylinder head. Using Plastigage, check camshaft oil clearance with camshaft bearing cap bolts tightened to specification in sequence. See Fig. 20. See TORQUE SPECIFICATIONS.
- 3) Check camshaft end play with camshaft bearing cap bolts tightened to specification. Replace camshaft and/or cylinder head if camshaft oil clearance or end play is not within specification. See CAMSHAFT table under ENGINE SPECIFICATIONS.
- 4) Install both camshafts in cylinder head without sub-gear installed on intake camshaft. Install and tighten camshaft bearing cap bolts to specification in sequence. See Fig. 20. See TORQUE SPECIFICATIONS.
- 5) Using dial indicator, check gear backlash between gears on camshafts. Replace camshafts if gear backlash exceeds specification. See CAMSHAFT table under ENGINE SPECIFICATIONS.
- 6) Measure distance between ends of gear spring. Replace gear spring if distance is not .669-.693" (17.00-17.60 mm). Measure valve lifter diameter and bore diameter. Ensure oil clearance is within specification. Replace components if not within specification. See VALVE LIFTERS table under ENGINE SPECIFICATIONS.

Installation

- 1) If reassembling sub-gear on intake camshaft, install gear spring, sub-gear, wave washer and snap ring on intake camshaft. Ensure

ends of gear spring are engaged with pins on the gears.

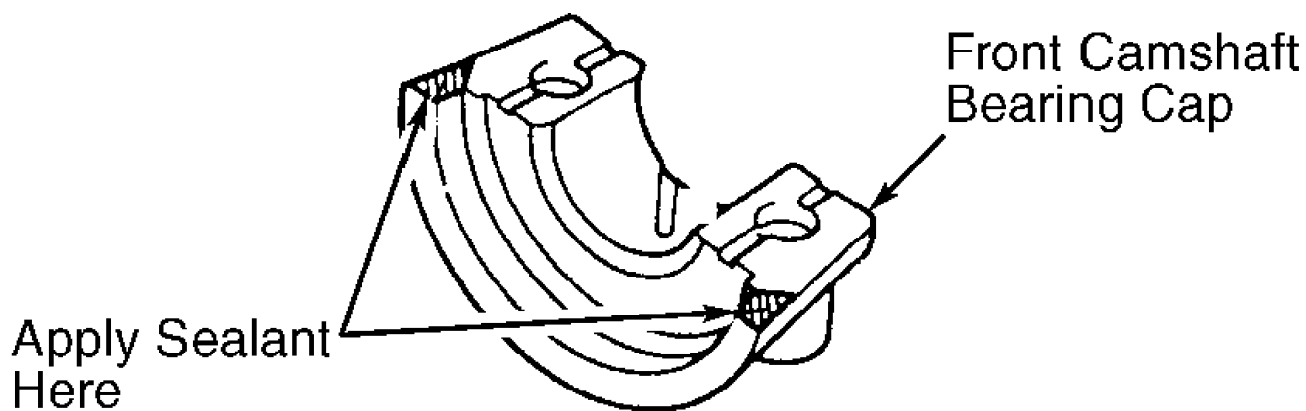
2) Install service bolts "A" and "B" on sub-gear.

See Fig. 18. Using screwdriver, rotate sub-gear clockwise and align holes in sub-gear with hole on main gear. Install service bolt "C". Remove service bolts "A" and "B".

3) Install adjusting shims and valve lifters in original location on cylinder head (if removed). Ensure valve lifters rotate smoothly in cylinder head.

4) Coat thrust surfaces of camshafts with multipurpose grease. To install exhaust camshaft, install exhaust camshaft in cylinder head with knock pin properly positioned. Perform STEP 2. See Fig. 14.

5) Apply sealant on front camshaft bearing cap for exhaust camshaft. See Fig. 19.



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Fig. 19: Applying Sealant On Front Camshaft Bearing Cap
Courtesy of Toyota Motor Sales, U.S.A., Inc.

6) Install front camshaft bearing cap for exhaust camshaft on cylinder head. Install remaining camshaft bearing caps for exhaust camshaft on cylinder head in numerical sequence with arrow pointing toward timing belt end of engine. See Fig. 16.

7) Coat threads and bolt head-to-camshaft bearing cap contact surfaces of camshaft bearing cap bolts with engine oil. Install and tighten camshaft bearing cap bolts to specification in sequence using several steps. See Fig. 20. See TORQUE SPECIFICATIONS.

8) Coat lip of NEW oil seal for exhaust camshaft with grease. Using Oil Seal Installer (SST 09223-46011), install oil seal into front camshaft bearing cap and cylinder head.

9) To install intake camshaft, rotate exhaust camshaft so knock pin is properly positioned. Perform STEP 1. See Fig. 14.

10) Install intake camshaft so installation marks on camshaft gears are aligned. DO NOT use timing marks on camshaft gears. Perform STEP 1. See Fig. 21. Ensure intake camshaft is fully seated in cylinder head.

11) Install all camshaft bearing caps except the front camshaft bearing cap for intake camshaft on cylinder head. Ensure camshaft bearing caps are in numerical sequence with arrow pointing toward timing belt end of engine. See Fig. 16.

12) Coat threads and bolt head-to-camshaft bearing cap contact surfaces of camshaft bearing cap bolts with engine oil. Install and tighten camshaft bearing cap bolts to specification in sequence using several steps. See Fig. 20. See TORQUE SPECIFICATIONS.

13) Remove service bolt "C" from intake camshaft gear. See Fig. 15. Install front camshaft bearing cap on intake camshaft. Ensure arrow on top of camshaft bearing cap points toward timing belt end of

engine.

NOTE: If front camshaft bearing cap does not fit correctly on intake camshaft, it may be necessary to lightly pry intake camshaft toward rear of cylinder head.

14) Install bolts in front camshaft bearing cap and alternately tighten to specification. See TORQUE SPECIFICATIONS.

15) Rotate exhaust camshaft so knock pin is at 12 o'clock position. Ensure installation marks are at 12 o'clock position and timing marks are aligned. Perform STEP 2. See Fig. 21.

16) Check valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS. Apply sealant in grooves on rear side of semi-circular plug located on intake camshaft side of cylinder head. See Fig. 9. Install semi-circular plug in cylinder head (if removed).

17) Install timing belt and camshaft sprocket using proper procedure. See TIMING BELT under REMOVAL & INSTALLATION. Before installing valve cover and gasket, apply sealant at front and rear areas of cylinder head. See Fig. 3.

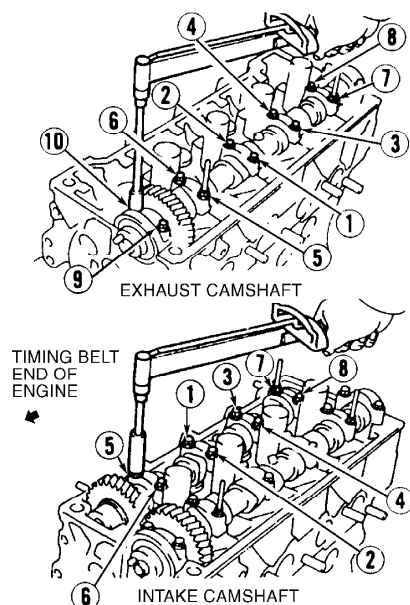
18) Using NEW gasket, install valve cover. Install seal washers. Install and tighten nuts to specification. See TORQUE SPECIFICATIONS.

19) If installing distributor, install NEW "O" ring on distributor. Coat "O" ring with engine oil. Rotate crankshaft clockwise so cylinder No. 1 is at TDC on compression stroke. Cylinder No. 1 is front cylinder at timing belt end of engine.

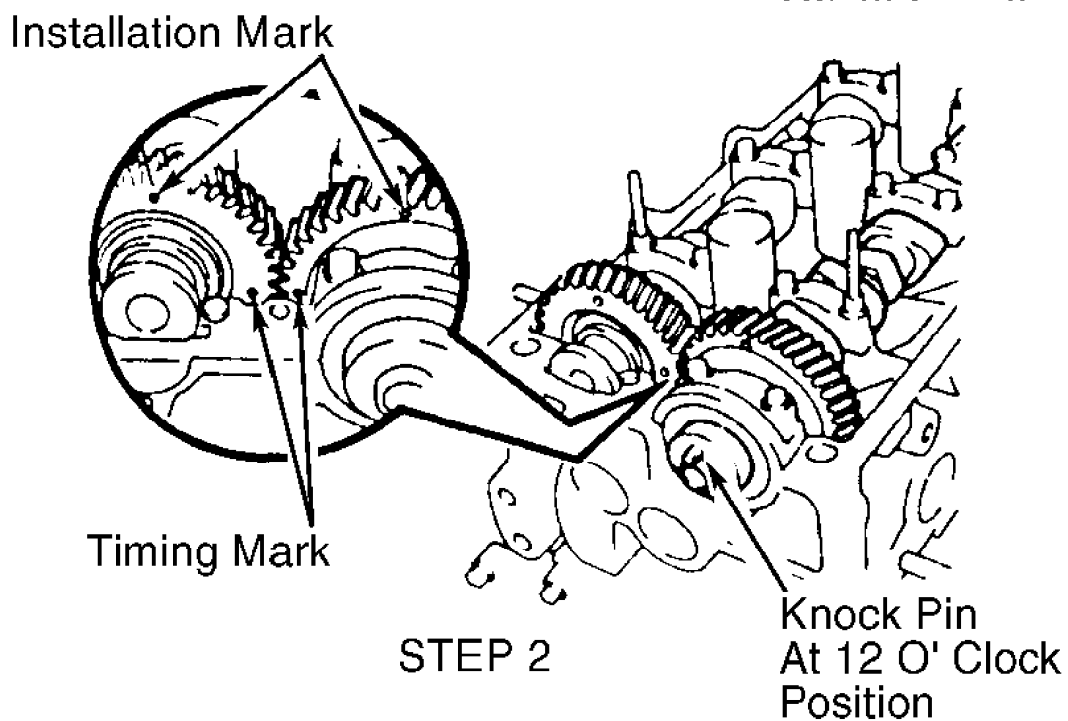
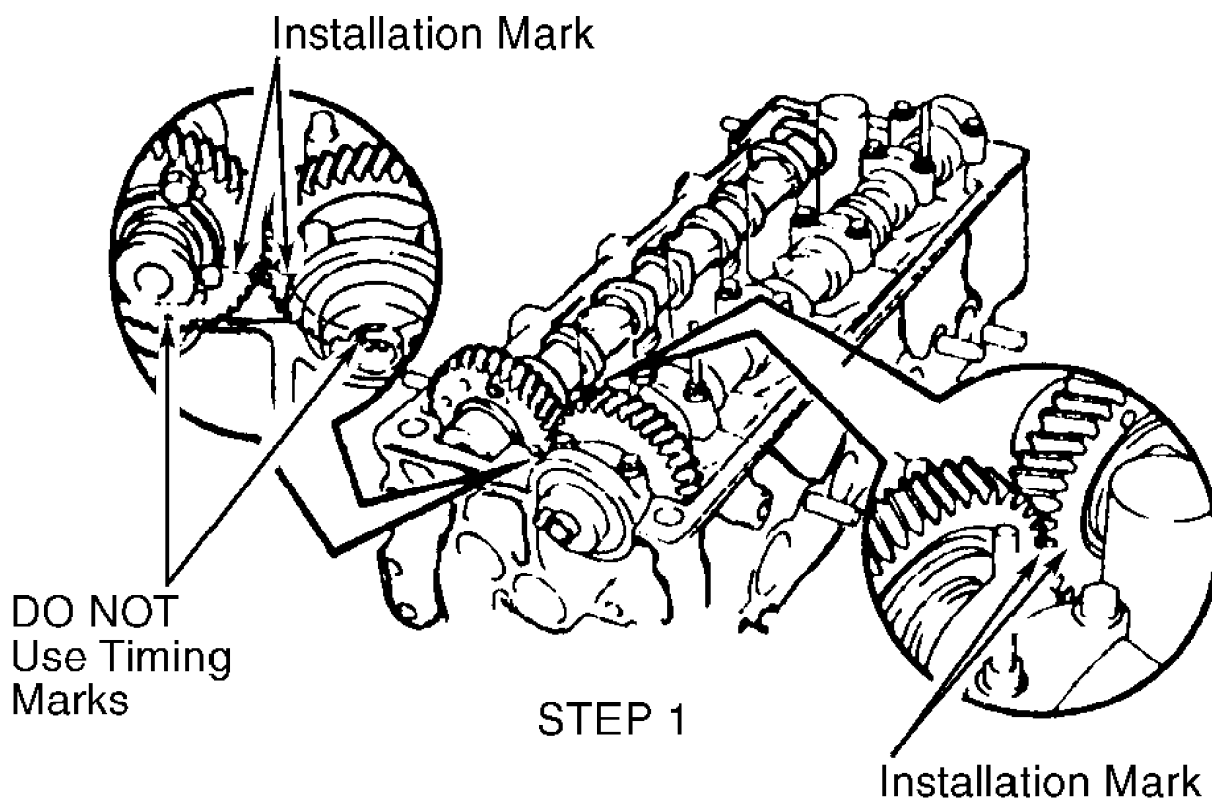
20) Ensure slot area on intake camshaft is properly positioned. Align cutout on coupling on distributor so it aligns with groove on distributor housing. See Fig. 11.

21) Install distributor so center of flange on distributor is aligned with bolt hole on cylinder head. Install distributor hold-down bolts.

22) To install remaining components, reverse removal procedure. Adjust ignition timing.



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Fig. 20: Camshaft Bearing Cap Bolt Installation Sequence
Courtesy of Toyota Motor Sales, U.S.A., Inc.



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Fig. 21: Aligning Camshaft Installation Marks & Checking Camshaft Alignment
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

Removal

Remove transaxle, clutch assembly (if equipped) and flywheel/drive plate. Using a knife, cut off oil seal lip. Pry oil seal from rear seal retainer housing. Use care not to damage sealing surfaces.

Installation

1) Ensure all sealing surfaces are clean. Apply grease to seal lip of NEW oil seal. Use Oil Seal Installer (SST 09223-41020) for oil seal installation.

2) Install oil seal in rear seal retainer housing until oil seal is even with surface of rear seal retainer housing. Apply Loctite to flywheel/drive plate bolts. Install flywheel/drive plate. Install and tighten bolts to specification in a crisscross pattern. See TORQUE SPECIFICATIONS. To install remaining components, reverse removal procedure.

WATER PUMP

Removal

1) Disconnect negative battery cable. Drain cooling system. Remove windshield washer fluid reservoir (if necessary). Remove cruise control actuator from bracket on the body (if equipped).

2) Raise and support vehicle. Remove passenger's side front wheel and passenger's side right lower engine cover. Remove accessory drive belts. Remove A/C compressor with hoses attached and secure aside (if equipped). Remove A/C compressor mounting bracket from cylinder block.

3) Remove water pump pulley from water pump. Disconnect necessary spark plug wires, control cables, hoses and electrical connections for access to valve cover. Remove nuts, seal washers, valve cover and gasket.

4) Support engine with floor jack. Remove front (exhaust manifold side) engine mount bolts. Remove electric cooling fan from radiator (if necessary). Remove right (timing belt side) engine mount for access to timing belt covers.

5) Remove upper and center timing belt covers. See Fig. 12. Remove oil dipstick, dipstick tube and "O" ring for access to water pump (if necessary).

6) Remove No. 2 coolant inlet and gasket from front of cylinder head. The No. 2 coolant inlet fits between cylinder head and rear of water pump. Remove bolts, water pump and "O" ring from cylinder block.

Installation

To install, reverse removal procedure using NEW gasket and "O" ring. Apply engine oil on dipstick tube "O" ring before installing dipstick tube. Tighten bolts/nuts to specification. See TORQUE SPECIFICATIONS. Fill cooling system.

OIL PAN

NOTE: Oil pan consists of No. 1 and 2 oil pans. See Fig. 22.

Removal

1) Disconnect negative battery cable. Raise and support vehicle. Drain engine oil. Remove lower engine covers. Remove oil dipstick, dipstick tube and "O" ring.

2) Remove front exhaust pipe, located between catalytic converter on exhaust manifold and rear exhaust pipe. Support engine with hoist.

3) Remove exhaust pipe support bracket. Remove front (exhaust

manifold side) engine mount-to-engine mount crossmember bolts. Remove rear (intake manifold side) engine mount through-bolt.

4) Remove rear (intake manifold side) engine mount-to-engine mount crossmember bolts/nuts. Disconnect A/C pipe bracket from engine mount crossmember. Remove bolts and engine mount crossmember.

5) Remove bolts/nuts, No. 2 oil pan and baffle plate. See Fig. 22. Remove nuts, pick-up tube and gasket. Remove No. 1 oil pan-to-transaxle bolts at rear of No. 1 oil pan.

6) Remove remaining No. 1 oil pan bolts. Remove No. 1 oil pan by prying between No. 1 oil pan and cylinder block. Use care not to damage sealing surfaces.

Installation

1) Ensure sealing surfaces are clean. Apply sealant on No. 1 oil pan at designated areas. See Fig. 23.

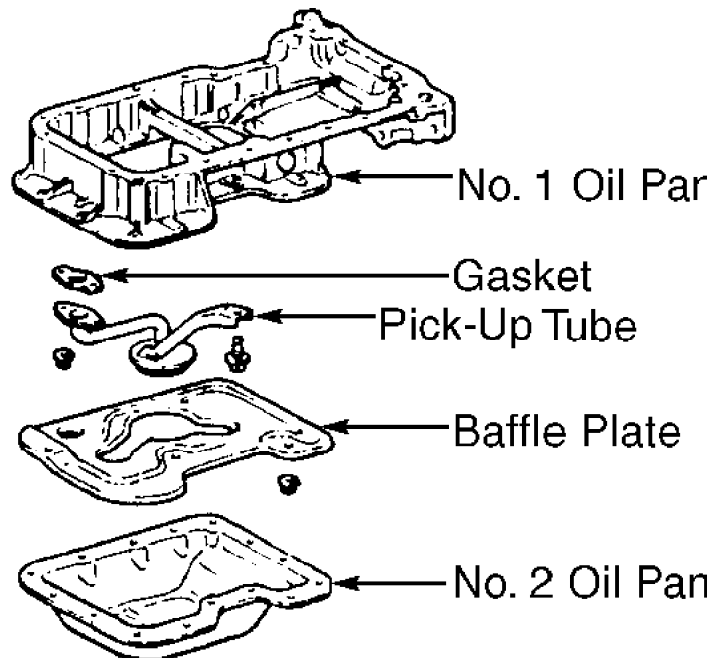
2) Install No. 1 oil pan. Install and tighten No. 1 oil pan-to-cylinder block, oil pump and rear seal retainer housing bolts to specification. See TORQUE SPECIFICATIONS. Install and tighten No. 1 oil pan-to-transaxle bolts to specification.

3) Using NEW gasket, install pick-up tube. Install and tighten nuts to specification. See TORQUE SPECIFICATIONS. Install baffle plate. Install and tighten bolts/nuts to specification.

4) Apply sealant on No. 2 oil pan at designated areas. See Fig. 23. Install No. 2 oil pan. Install and tighten No. 2 oil pan bolts/nuts to specification. See TORQUE SPECIFICATIONS.

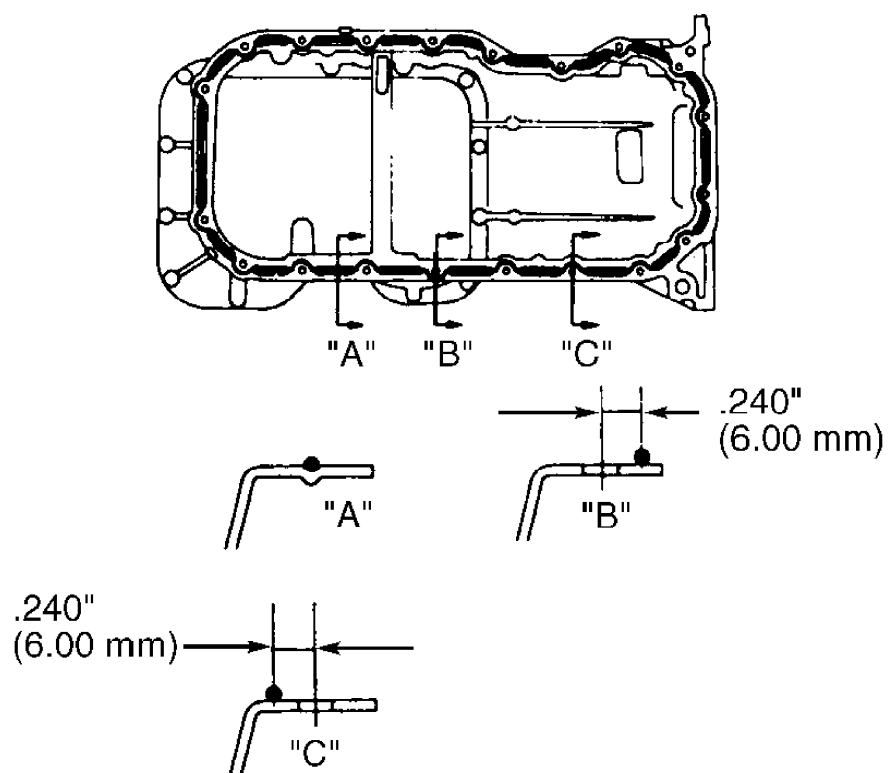
5) To install remaining components, reverse removal procedure using NEW "O" ring on dipstick tube. Tighten bolts/nuts to specification. See TORQUE SPECIFICATIONS.

6) Apply engine oil on dipstick tube "O" ring before installing dipstick tube. Use NEW nuts and NEW gaskets when installing front exhaust pipe. Fill crankcase with oil.

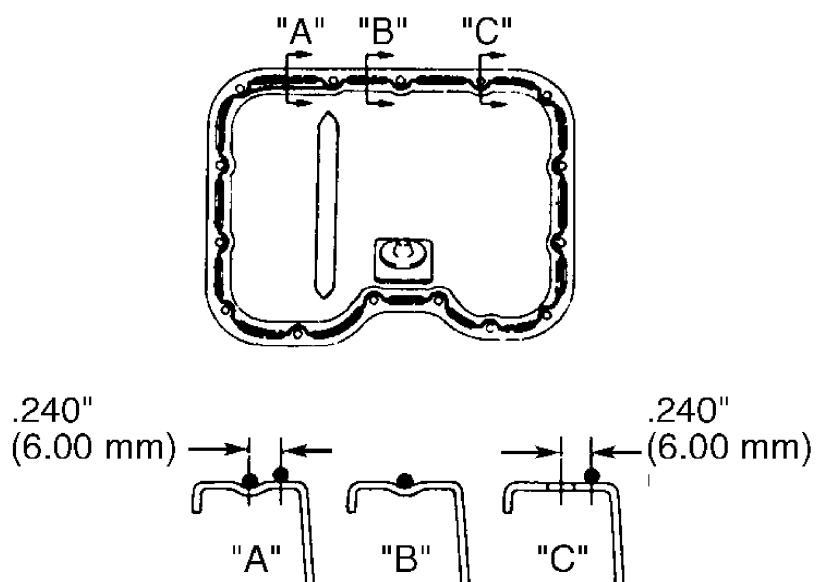


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Fig. 22: Identifying No. 1 & 2 Oil Pans
Courtesy of Toyota Motor Sales, U.S.A., Inc.



NO. 1 OIL PAN SEALANT APPLICATION



NO. 2 OIL PAN SEALANT APPLICATION

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Fig. 23: Identifying No. 1 & 2 Oil Pan Sealant Application Areas
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

CYLINDER HEAD

Cylinder Head

1) Inspect cylinder head warpage at cylinder block, exhaust manifold and intake manifold areas. Replace cylinder head if warpage exceeds specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS.

2) Install camshaft in cylinder head. Using Plastigage, check camshaft oil clearance with camshaft bearing cap bolts tightened to specification in sequence. See Fig. 20. See TORQUE SPECIFICATIONS.

3) Check camshaft end play with camshaft bearing cap bolts tightened to specification. Replace camshaft and/or cylinder head if camshaft oil clearance or end play is not within specification. See CAMSHAFT table under ENGINE SPECIFICATIONS.

4) Ensure valve lifter bore diameter in cylinder head is within specification. See VALVE LIFTERS table under ENGINE SPECIFICATIONS.

5) If installing spark plug tubes in cylinder head, apply Adhesive (1324) on spark plug tube bore in cylinder head. Using press, press spark plug tube into cylinder head until spark plug tube protrusion above cylinder head is 1.843-1.874" (46.80-47.60 mm) from surface of cylinder head. See Fig. 24.

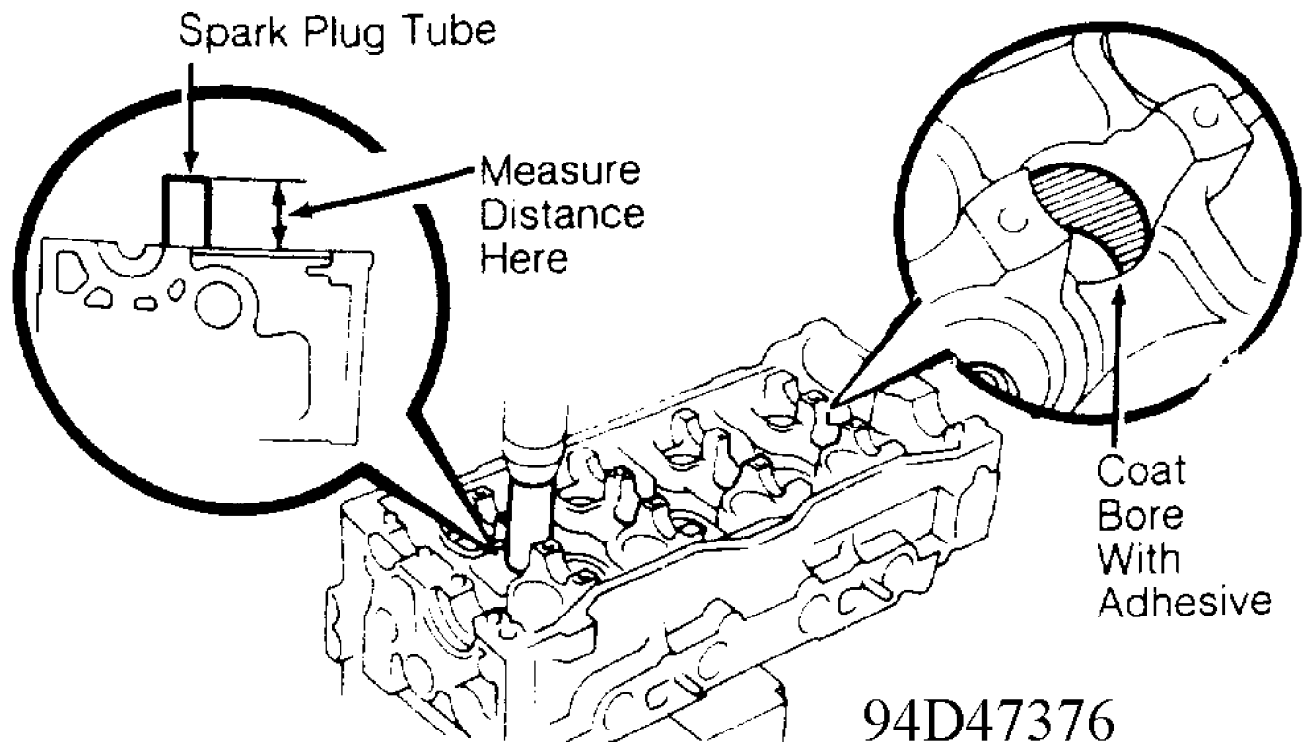


Fig. 24: Installing Spark Plug Tubes
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Valve Springs

Ensure valve spring free length, pressure and out-of-square are within specification. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS.

Valve Stem Oil Seals

Intake valve stem oil seal is Brown and exhaust valve stem oil seal is Black. Ensure proper valve stem oil seal is installed.

Lubricate valve stem oil seal with engine oil. Install valve stem oil seal using Oil Seal Installer (SST 09201-41020).

Valve Guides

1) Ensure valve guide inside diameter is within specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS. Replace valve guide if inside diameter exceeds specification.

2) To replace valve guide, heat cylinder head to 176-212°F (80-100°C). Using hammer and Valve Guide Remover/Installer (SST 09201-01060), drive valve guide from camshaft side of cylinder head.

3) Measure cylinder head valve guide bore inside diameter. If bore inside diameter is .4331-.4341" (11.000-11.027 mm), use standard valve guide. If bore inside diameter is .4350-.4361" (11.050-11.077 mm), use oversize valve guide.

4) If bore inside diameter exceeds .4341" (11.027 mm), machine valve guide bore to .4350-.4361" (11.050-11.077 mm) for oversize valve guide. If bore inside diameter exceeds .4361" (11.077 mm), replace cylinder head.

5) To install valve guide, heat cylinder head to 176-212°F (80-100°C). Using hammer and valve guide remover/installer, drive valve guide in from camshaft side of cylinder head until valve guide installed height is within specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS. Valve guide installed height is measured from top of valve guide to the cylinder head surface next to valve guide.

6) Using .236" (6.00 mm) reamer, ream valve guide to obtain correct valve stem-to-guide oil clearance. See CYLINDER HEAD table under ENGINE SPECIFICATIONS.

Valve Seat

Ensure valve seat angle and seat width are within specification. See CYLINDER HEAD table under ENGINE SPECIFICATIONS. Valve seat replacement information is not available from manufacturer.

Valves

Ensure minimum refinish length, stem diameter and valve margin are within specification. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS.

Valve Seat Correction Angles

Use 30-degree and 45-degree stones to lower valve seat contact area. Use 45-degree and 60-degree stones to raise valve seat contact area.

VALVE TRAIN

Valve Lifters

Ensure valve lifter diameter, bore diameter and oil clearance are within specification. See VALVE LIFTERS table under ENGINE SPECIFICATIONS.

CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

1) Ensure connecting rod and connecting rod cap are marked with matching cylinder number for reassembly reference. Piston, connecting rod and connecting rod cap must be installed with front mark toward timing belt end of engine. See Fig. 25.

2) Before disassembling piston and connecting rod, try to move piston back and forth on piston pin. Replace piston and piston pin if any movement is felt.

3) Note that piston must be installed with front mark (cavity) on top of piston aligned with front mark (protrusion) on

connecting rod. See Fig. 25.

4) Press piston pin from piston and connecting rod. Separate piston from connecting rod. Ensure connecting rod bend and twist are within specification. See CONNECTING RODS table under ENGINE SPECIFICATIONS.

5) To determine piston diameter, measure piston skirt diameter at .965" (24.50 mm) from top of piston at 90-degree angle to piston pin. Different piston sizes are used. Piston size can be identified by size mark ("1", "2" or "3") stamped on top of piston. See Fig. 26. Ensure piston diameter is within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS.

6) Use caliper to measure connecting rod bolt outside diameter .787" (20.00 mm) down from the bottom of the bolt head. Replace connecting rod bolt if outside diameter is less than .276" (7.00 mm).

7) To reassemble, position piston on connecting rod so front mark (cavity) on top of piston aligns with front mark (protrusion) on connecting rod. See Fig. 25. Coat piston pin with engine oil. Press piston pin into piston and connecting rod

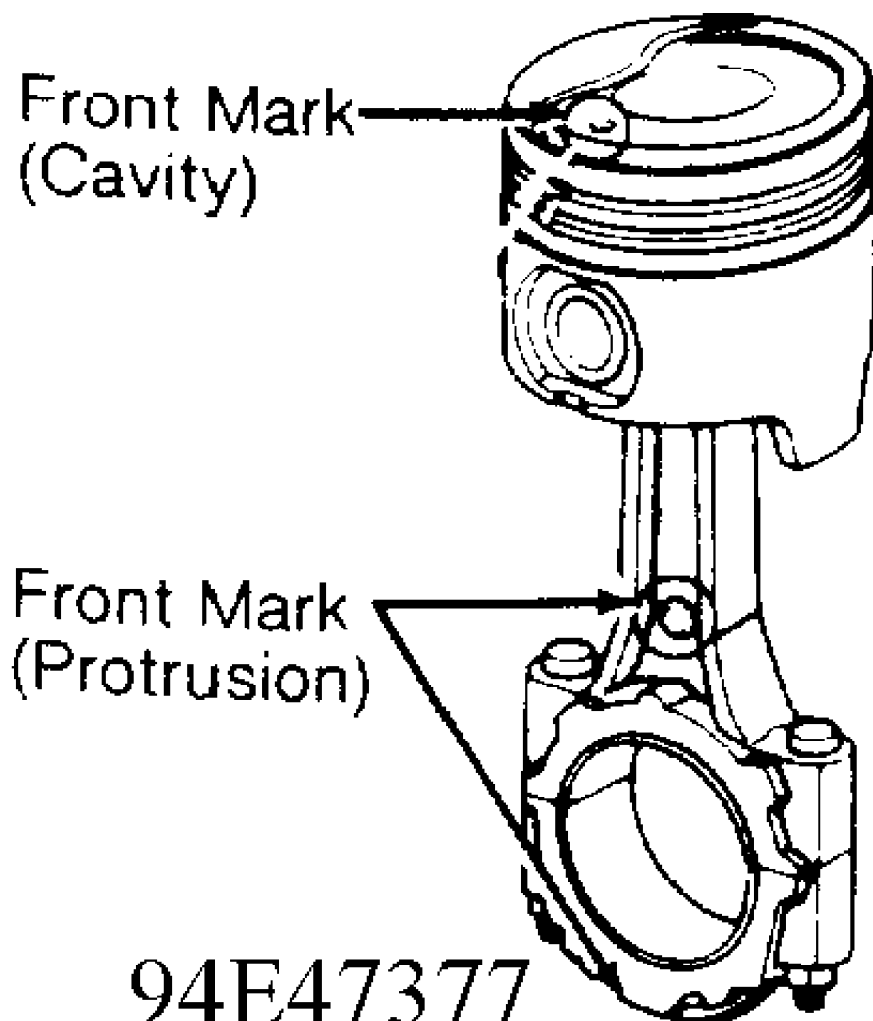


Fig. 25: Identifying Typical Front Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Fitting Pistons

1) To determine piston-to-cylinder clearance, measure piston

skirt diameter at .965" (24.50 mm) from top of piston at 90-degree angle to piston pin.

2) Different piston sizes are used. Piston size can be identified by size mark ("1", "2" or "3") stamped on top of piston. See Fig. 26. Ensure piston diameter is within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS.

3) Measure cylinder bore diameter at .39" (10.0 mm) from top and bottom of cylinder bore and at middle of cylinder bore. Different cylinder bore sizes are used. Cylinder bore diameter can be identified by cylinder bore size mark ("1", "2" or "3") stamped on cylinder block deck surface. See Fig. 27.

4) Ensure cylinder bore diameter is within specification. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS. Determine piston clearance.

5) Replace piston or bore cylinder block for oversize pistons if clearance is not within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS. Pistons are available in .20" (.50 mm) oversize. If replacing piston, ensure replacement piston contains same size mark as cylinder bore size mark on cylinder block.

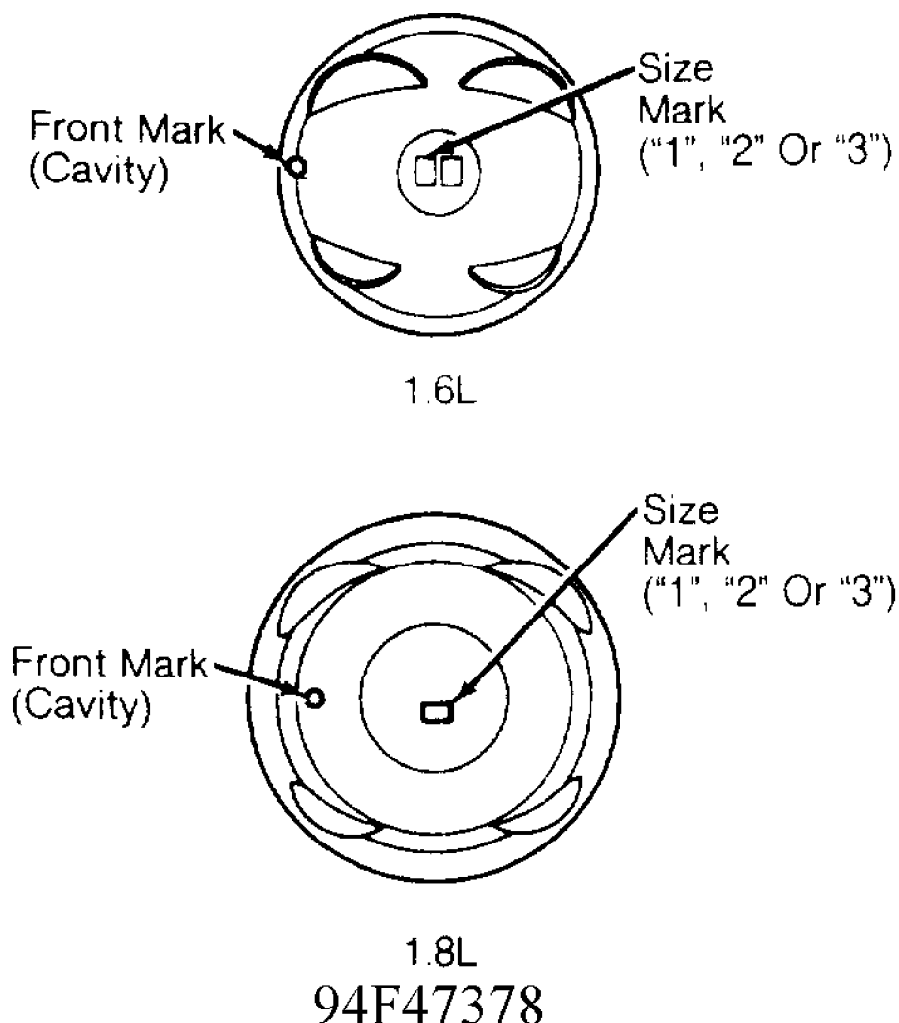
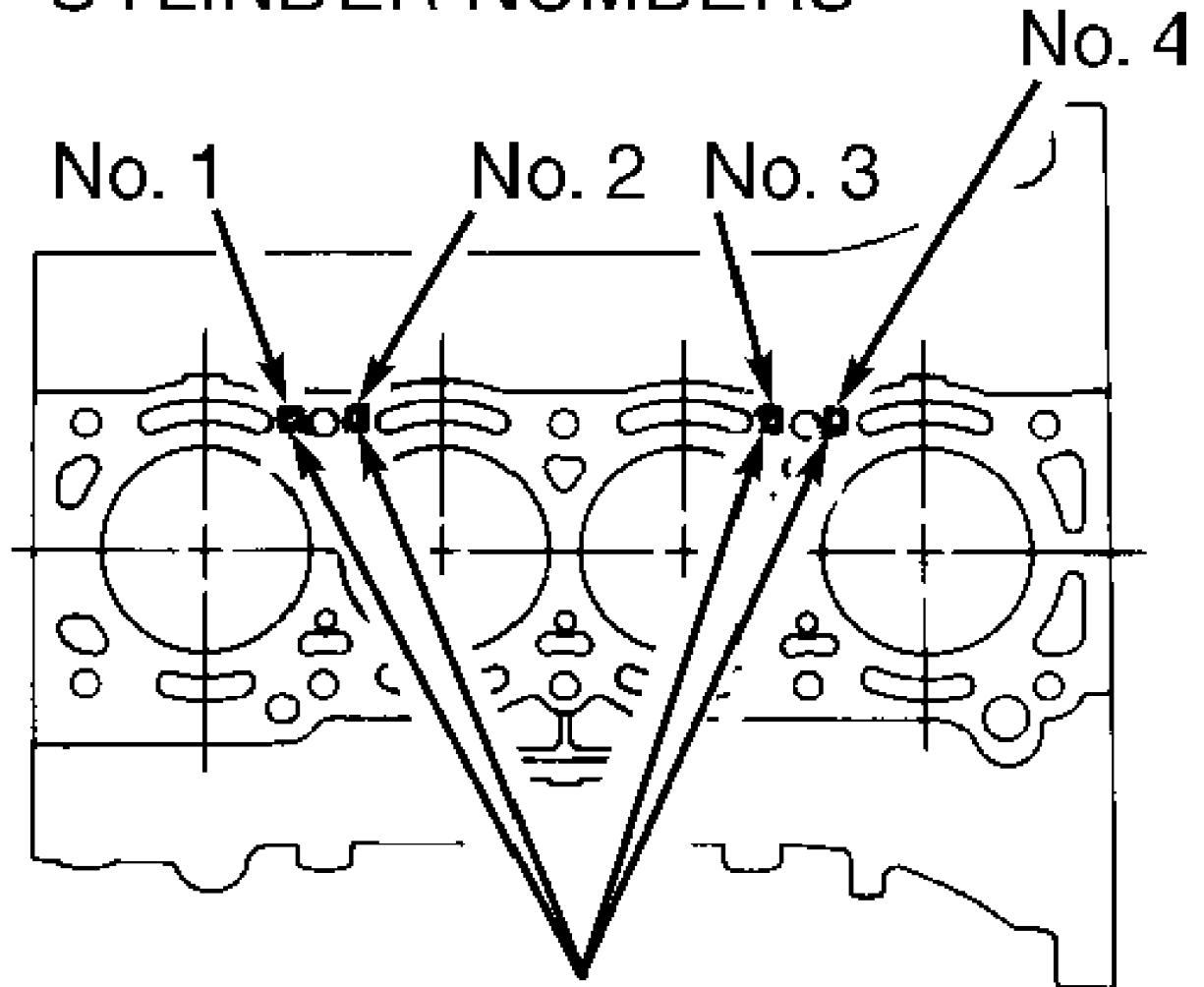


Fig. 26: Identifying Piston Size Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CYLINDER NUMBERS



Cylinder Bore Size Mark
("1", "2" Or "3")

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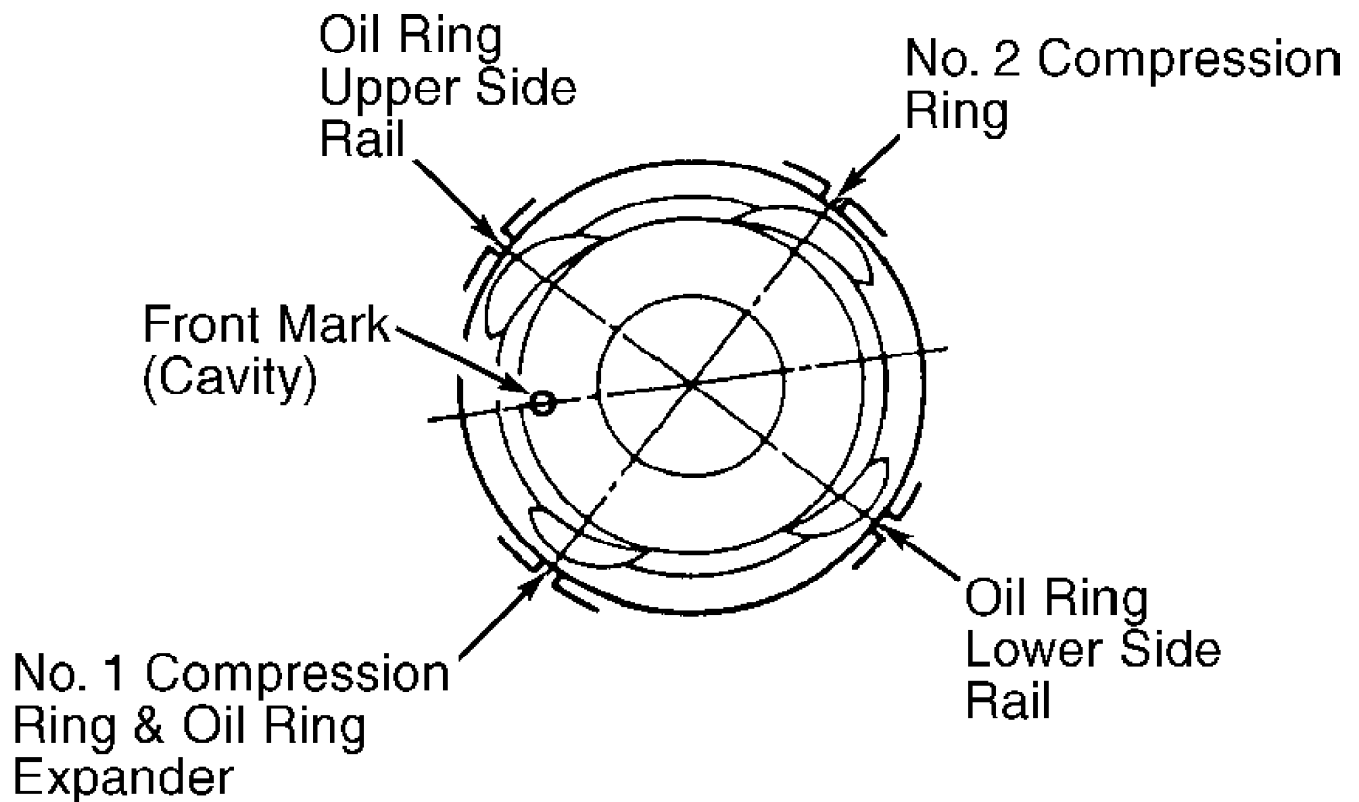
Fig. 27: Identifying Cylinder Bore Size Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Piston Rings

1) Ensure piston ring end gap and side clearance are within specification. See PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS.

2) Position piston rings with ring end gaps in proper areas with identification mark on piston ring toward top of piston. See Fig. 28.

3) No. 2 compression ring may contain a 2R or "T" identification mark. Ensure compression rings are installed in correct location.



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Fig. 28: Positioning Piston Rings
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Rod Bearings

1) Mark direction of connecting rod cap and cylinder number before disassembly. Connecting rod must be installed with front mark (protrusion) at center of connecting rod toward timing belt end of engine. Front mark (protrusion) on connecting rod cap must face toward timing belt end of engine. See Fig. 25.

2) Connecting rod cap and rod bearing are stamped with size mark ("1", "2" or "3"). See Fig. 29. Ensure size marks on connecting rod cap and rod bearing are same.

NOTE: If replacing rod bearing, ensure size mark on replacement rod bearing is same as size mark on original rod bearing.

3) Rod bearing thickness is determined by the size mark. See ROD BEARING SPECIFICATIONS table.

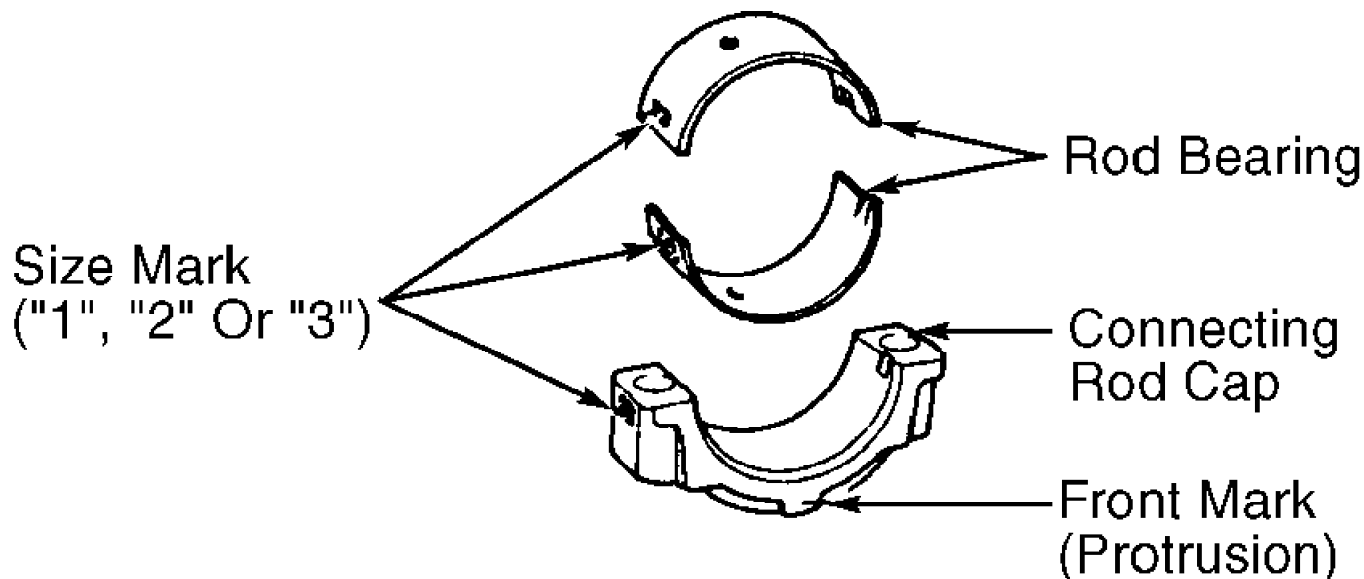
4) Use caliper to measure connecting rod bolt outside diameter .787" (20.00 mm) down from the bottom of the bolt head. Replace connecting rod bolt if outside diameter is less than .276" (7.00 mm).

6) Install connecting rod cap with front mark (protrusion) toward timing belt end of engine. See Fig. 25. Coat threads of connecting rod bolt and bolt head or nut-to-connecting rod cap surface with engine oil before tightening to specification. See TORQUE SPECIFICATIONS.

7) Ensure bearing oil clearance and connecting rod side play are within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS and CONNECTING RODS tables under ENGINE SPECIFICATIONS.

ROD BEARING SPECIFICATIONS TABLE

Bearing Size Mark	Bearing Thickness	
	In. (mm)	
"1"	.0585-.0587	(1.486-1.490)
"2"	.0587-.0588	(1.490-1.494)
"3"	.0588-.0590	(1.494-1.498)



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Fig. 29: Identifying Connecting Rod Cap & Rod Bearing Size Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Crankshaft & Main Bearings

1) Main bearing caps are numbered on top of cap for location reference. No. 1 main bearing cap is at timing belt end of engine and No. 5 is at flywheel/drive plate end. Arrow on top of main bearing cap must point toward timing belt end of engine.

2) Remove main bearing cap bolts in sequence. See Fig. 30. Remove main bearing caps, crankshaft, thrust bearings and main bearings.

3) Cylinder block main bearing bore inside diameter is identified by main bearing bore size mark ("1", "2" or "3") stamped on cylinder block. See Fig. 31. Front size mark indicates No. 1 main bearing bore and rear size mark indicates No. 5 main bearing bore.

4) Crankshaft main bearing journal diameter is identified by main bearing journal size mark ("0", "1" or "2") located on crankshaft counterweight. See Fig. 31.

5) Ensure journal diameter, taper and out-of-round are within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS.

6) Main bearing size mark ("1", "2", "3", "4" or "5") is located on side of main bearing. See Fig. 31. If replacing main bearing, ensure size mark on replacement main bearing is same as size mark on original main bearing.

7) If main bearing size mark cannot be obtained, add size marks on cylinder block and crankshaft together to determine size mark of main bearing to be used. For example, if size mark on cylinder block is "2" and size mark on crankshaft is "1", use main bearing with size mark "3".

8) Main bearing thickness is determined by size mark. See

MAIN BEARING SPECIFICATIONS table. Install main bearings, thrust bearings, crankshaft and main bearing caps.

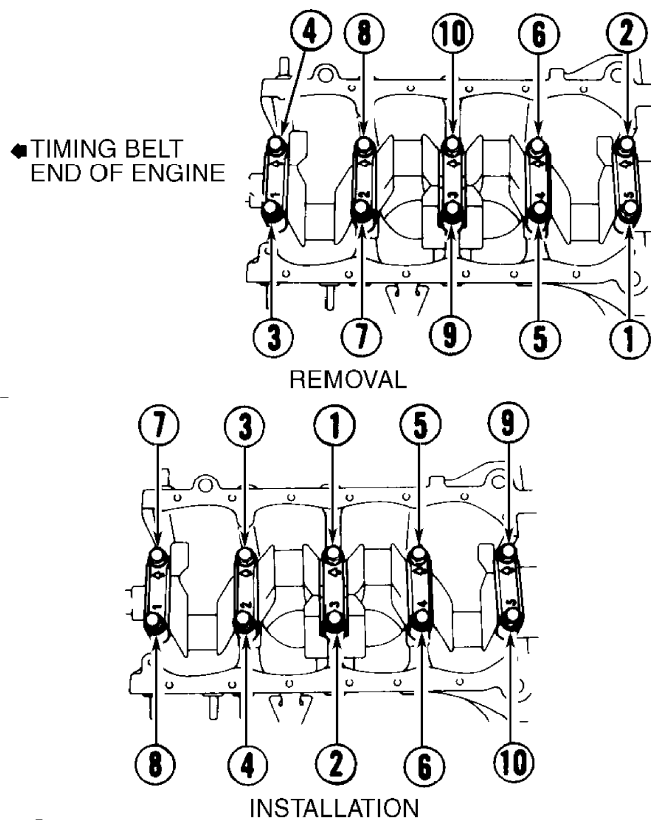
9) Ensure main bearings caps are properly installed in numerical sequence with No. 1 at timing belt end and No. 5 at flywheel/drive plate end of engine. Ensure arrow on top of main bearing cap points toward timing belt end of engine.

10) Coat threads and bolt-to-main bearing cap contact surfaces on main bearing cap bolts with engine oil. Install and tighten main bearing cap bolts to specification in sequence. See Fig. 30. See TORQUE SPECIFICATIONS.

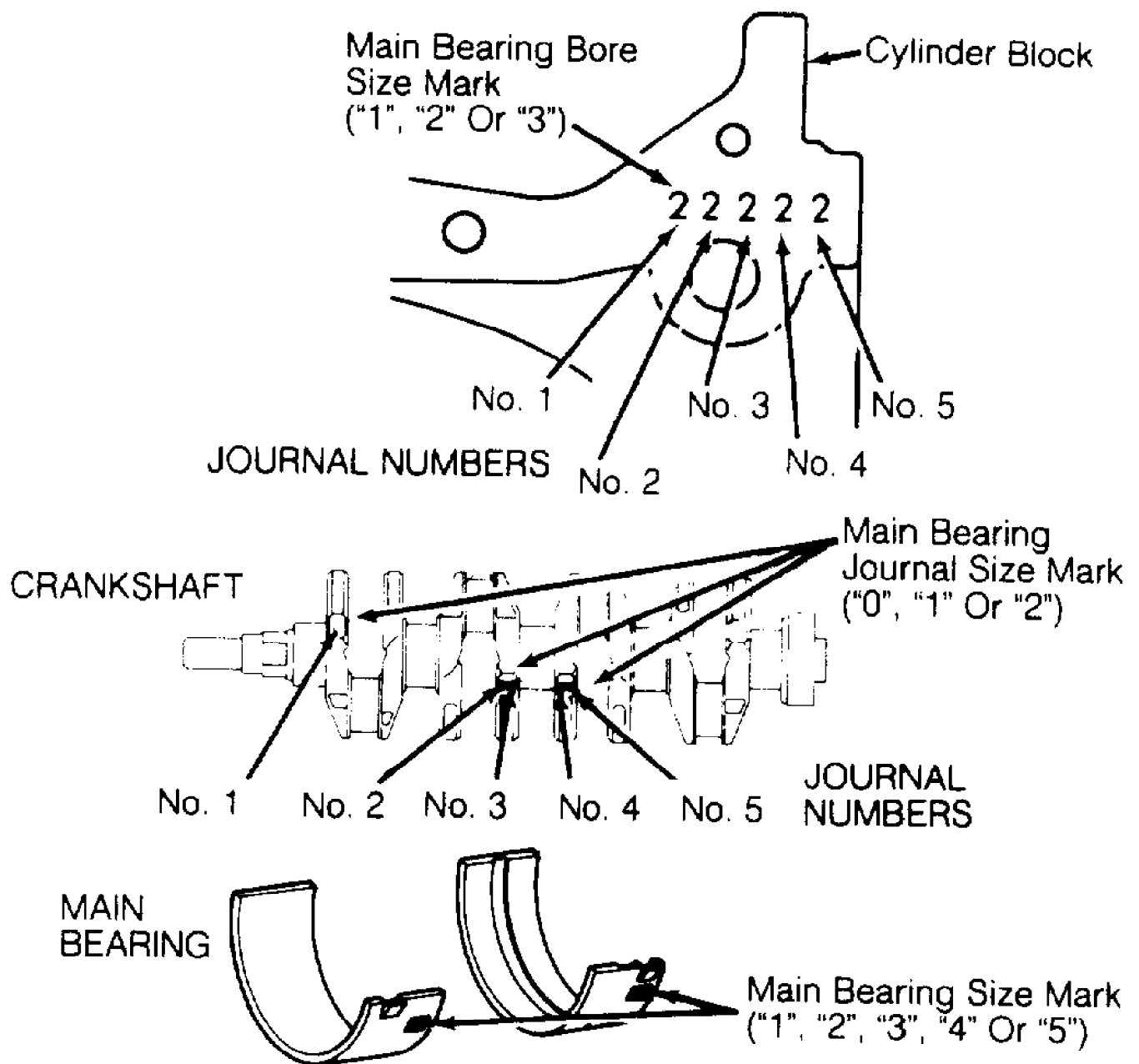
11) Ensure crankshaft main bearing oil clearance and end play are within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS. Replace thrust bearing if crankshaft end play is not within specification.

MAIN BEARING SPECIFICATIONS TABLE

Bearing		Bearing Thickness	
Size	Mark	In.	(mm)
"1"		.0788-.0789	(2.002-2.005)
"2"		.0789-.0791	(2.005-2.008)
"3"		.0791-.0792	(2.008-2.011)
"4"		.0792-.0793	(2.011-2.014)
"5"		.0793-.0794	(2.014-2.017)



94B47382
Fig. 30: Main Bearing Cap Bolt Removal & Installation Sequence
Courtesy of Toyota Motor Sales, U.S.A., Inc.



94C47383

Fig. 31: Identifying Cylinder Block, Crankshaft & Main Bearing Size Marks

Courtesy of Toyota Motor Sales, U.S.A., Inc.

Thrust Bearing

Install thrust bearing on No. 3 main bearing with grooves facing toward crankshaft away from cylinder block and main bearing cap. Replace thrust bearing if crankshaft end play is not within specification. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS.

Cylinder Block

1) Inspect cylinder block deck surface warpage. Replace

cylinder block if deck surface warpage exceeds specification. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS.

2) Different cylinder bore sizes are used and are identified by cylinder bore size mark ("1", "2" or "3") on cylinder block deck surface. See Fig. 27. Measure cylinder bore diameter at .39" (10.0 mm) from top and bottom of cylinder bore and at middle of cylinder bore.

3) Ensure cylinder bore diameter is within specification. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS. Bore cylinder block for oversize pistons if cylinder bore diameter is not within specification. Pistons are available in .20" (.50 mm) oversize.

4) Install main bearing caps in numerical sequence with No. 1 at timing belt end and No. 5 at flywheel/drive plate end of engine. Ensure arrow on top of main bearing cap points toward timing belt end of engine.

5) Install and tighten main bearing cap bolts to specification in sequence. See Fig. 30. See TORQUE SPECIFICATIONS. Ensure main bearing bore inside diameter is within specification. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS.

NOTE: Main bearing bore inside diameter is identified by main bearing bore size mark ("1", "2" or "3") stamped on cylinder block. See Fig. 31.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

Oil pump provides pressurized engine lubrication. See Fig. 32.

Crankcase Capacity
See CRANKCASE CAPACITIES table.

CRANKCASE CAPACITIES TABLE (1)

Application	Qts. (L)
Celica	3.9 (3.7)

(1) - Approximate capacity listed is with oil filter.

Oil Pressure
With engine at normal operating temperature, oil pressure should be at least 4.3 psi (0.3 kg/cm²) at idle and 36-71 psi (2.5-5.0 kg/cm²) at 3000 RPM.

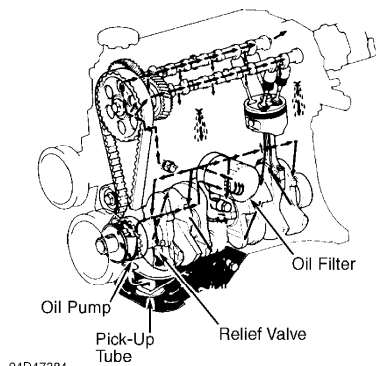


Fig. 32: Cross-Sectional View Of Engine Oil Circuit
Courtesy of Toyota Motor Sales, U.S.A., Inc.

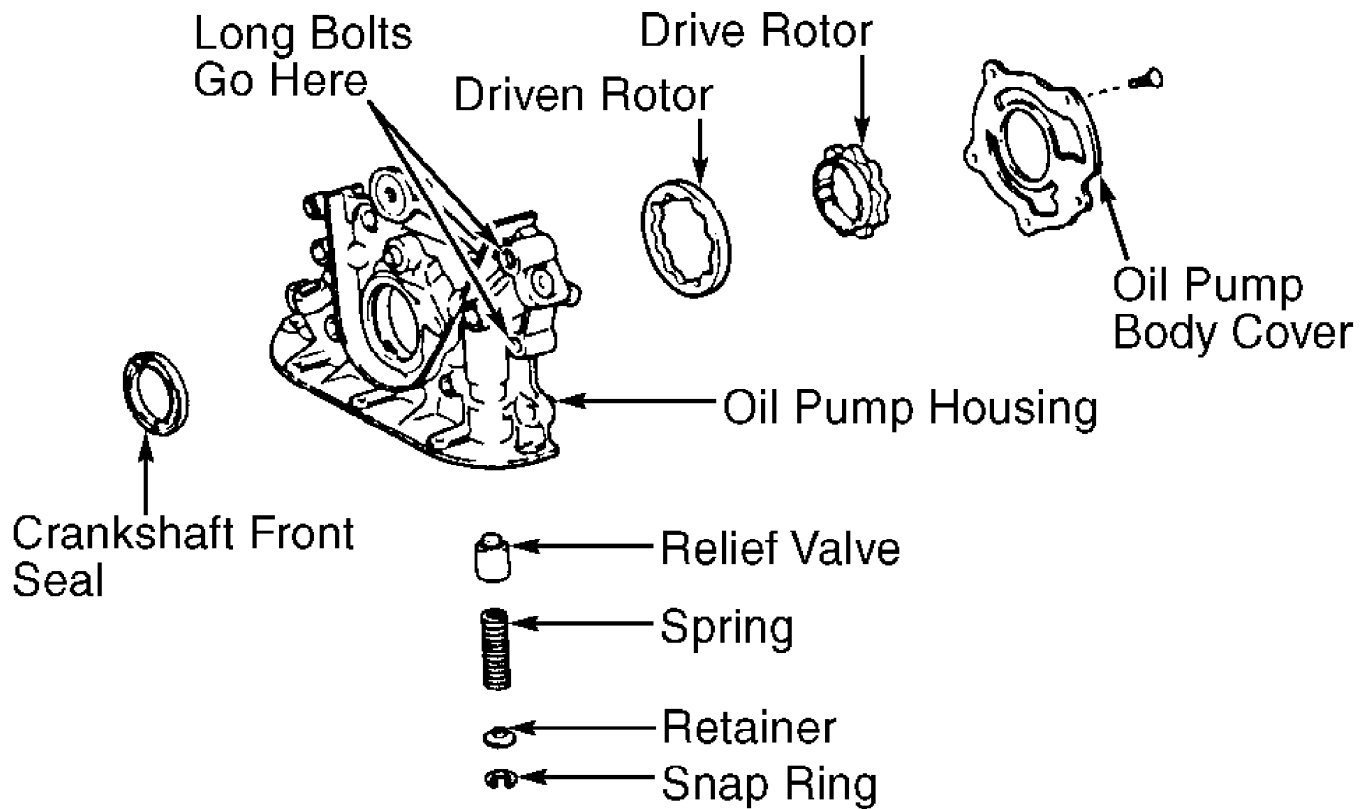
OIL PUMP

Removal & Disassembly

1) Remove timing belt and crankshaft sprocket. See TIMING BELT under REMOVAL & INSTALLATION. Remove oil pan. See OIL PAN under REMOVAL & INSTALLATION.

2) Remove pump pick-up tube and gasket. Remove oil pump bolts. Using soft-faced hammer, tap oil pump housing from cylinder block.

3) To disassemble, remove oil pump body cover screws, oil pump body cover and "O" ring. Disassemble oil pump components. See Fig. 33. Remove crankshaft front seal (if necessary).



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Fig. 33: Identifying Oil Pump Components & Bolt Installation Areas
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Inspection

1) Inspect components for damage. Coat relief valve with engine oil and ensure relief valve slides freely in bore of oil pump housing. Install rotors in oil pump housing.

2) Using feeler gauge, measure driven rotor-to-oil pump housing clearance. Replace rotor assembly or oil pump housing if clearance exceeds specification. See OIL PUMP SPECIFICATIONS table.

3) Using feeler gauge, measure rotor tip clearance between tip of both rotors. Replace rotor assembly if clearance exceeds specification. See OIL PUMP SPECIFICATIONS table.

4) Place straightedge across oil pump housing, above both rotors. Using feeler gauge, measure rotor end clearance between both rotors and straightedge. Replace oil pump assembly if rotor end clearance exceeds specification. See OIL PUMP SPECIFICATIONS table.

OIL PUMP SPECIFICATIONS TABLE

Application	In. (mm)
Driven Rotor-To-Oil Pump Housing Clearance	
Standard	.0031-.0071 (.080-.180)
Wear Limit	.0079 (.200)
Rotor End Clearance	
Standard	.0010-.0033 (.025-.085)
Wear Limit	.0039 (.100)
Rotor Tip Clearance	
Standard	.0010-.0033 (.025-.085)
Wear Limit	.0014 (.350)

Reassembly & Installation

1) To reassemble, reverse disassembly procedure. Ensure reference marks (triangle area) on rotors face toward oil pump body cover, away from oil pump housing.

2) Using Seal Installer (SST 09309-37010), install NEW crankshaft front seal (if removed) until seal surface is even with oil pump housing. Coat seal lip with grease.

3) Install oil pump body cover using NEW "O" ring. Install and tighten oil pump body cover screws to specification. See TORQUE SPECIFICATIONS.

4) Using NEW gasket, install oil pump on cylinder block. Ensure splines on drive rotor engage with flat areas on crankshaft.

5) Install oil pump bolts. Ensure the 2 longest bolts are located in proper areas. See Fig. 33. Tighten bolts to specification. See TORQUE SPECIFICATIONS. To install remaining components, reverse removal procedure.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
A/C Compressor Bolt	18 (24)
A/C Compressor Mounting Bracket Bolt	35 (47)
Air Intake Chamber Bolt/Nut	14 (19)
Air Intake Chamber Support Bolt	21 (29)
Axle Shaft Nut	159 (216)
Ball Joint-To-Lower Control Arm Bolt/Nut	94 (127)
Camshaft Sprocket Bolt	43 (58)
Catalytic Converter Brace Bolt	29 (39)
Catalytic Converter-To-Exhaust Manifold Nut	21 (29)
Connecting Rod Bolt	
Step 1	18 (24)
Step 2	Additional 90 Degrees
Coolant Inlet Bolt/Nut	15 (20)
Coolant Outlet Nut	11 (15)
Crankshaft Pulley Bolt	87 (118)
Cylinder Head Bolt (1)	
Step 1	22 (30)
Step 2	Additional 90 Degrees
Step 3	Additional 90 Degrees
Delivery Pipe Bolt	11 (15)
Distributor Hold-Down Bolt	15 (20)
Engine Mounts & Brackets (Celica)	
Front (Exhaust Manifold Side) Engine	

Mount Through-Bolt	65 (88)
Left (Transaxle Side) Engine Mount	
Through-Bolt	54 (73)
Left (Transaxle Side) Engine	
Mount-To-Bracket Bolt/Nut	47 (64)
Rear (Intake Manifold Side) Engine Mount	
Bracket-To-Cylinder Block Bolt	58 (79)
Rear (Intake Manifold Side) Engine	
Mount Through-Bolt	65 (88)
Rear (Intake Manifold Side) Engine Mount-To-Engine	
Mount Crossmember Bolt/Nut	59 (80)
Right (Timing Belt Side) Engine Mount	
Bracket-To-Cylinder Block Bolt	38 (52)
Right (Timing Belt Side) Engine Mount-To-Bracket Nut	
12-mm Bolt Head	21 (29)
14-mm Bolt Head	38 (52)
Engine Mounts & Brackets	
Front (Exhaust Manifold Side) Engine Mount-To-Engine	
Mount Crossmember Bolt	47 (64)
Front (Exhaust Manifold Side) Engine	
Mount Through-Bolt	47 (64)
Left (Transaxle Side) Engine Mount	
Bracket-To-Transaxle Bolt	38 (52)
Left (Transaxle Side) Engine Mount	
Support Bracket-To-Mount Bolt	15 (20)
Left (Transaxle Side) Engine Mount	
Through-Bolt	64 (87)
Left (Transaxle Side)	
Engine Mount-To-Bracket Bolt	41 (56)
Rear (Intake Manifold Side)	
Engine Mount Through-Bolt	64 (87)
Rear (Intake Manifold Side) Engine Mount-To-Engine	
Mount Crossmember Bolt	47 (64)
Right (Timing Belt Side) Engine Mount-To-Body Bolt	
Lower Bolt	47 (64)
Upper Bolt	19 (26)
Right (Timing Belt Side) Engine Mount-To-Mount	
Bracket Bolt/Nut	
Bolt	47 (64)
Nut	38 (52)
Engine Mount Crossmember-To-Body Bolt/Nut	
Celica	26 (35)
Exhaust Manifold Nut	25 (34)
Exhaust Pipe Support Bracket Bolt/Nut	14 (19)
Flywheel/Drive Plate Bolt	
A/T	47 (64)
M/T	58 (79)
Front Exhaust Pipe-To-Catalytic Converter Or	
Exhaust Manifold Nut	32 (43)
Front Exhaust Pipe-To-Rear Exhaust Pipe Bolt/Nut ..	46 (62)
Fuel Inlet Line-To-Delivery Pipe Union Bolt	22 (30)
Fuel Line-To-Fuel Filter Union Bolt	22 (30)
Idler Pulley Bolt	27 (37)
Intake Manifold Bolt/Nut	14 (19)
Intake Manifold Support Bolt	
12-mm Bolt Head	14 (19)
14-mm Bolt Head	29 (39)
Main Bearing Cap Bolt (2)	44 (60)
No. 1 Oil Pan Bolt	(3)
No. 1 Oil Pan-To-Transaxle Bolt	17 (23)
No. 2 Coolant Inlet Bolt	11 (15)
Oil Pump Bolt	16 (22)
Power Steering Pump Bolt	

12-mm Head	14 (19)
14-mm Head	29 (39)
Spark Plug	13 (18)
Stabilizer Bar Link-To-Lower Control Arm Nut	33 (45)
Throttle Body Bolt/Nut	16 (22)
Tie Rod-To-Steering Knuckle Nut	36 (49)
Wheel Lug Nut	76 (103)

INCH Lbs. (N.m)

Baffle Plate Bolt/Nut	69 (7.8)
Camshaft Bearing Cap Bolt (5)	115 (13.0)
Clutch Release Cylinder Bolt	106 (12.0)
EGR Valve & Pipe Bolt/Nut	115 (13.0)
No. 2 Oil Pan Bolt/Nut	43 (4.9)
Oil Pump Body Cover Screw	89 (10.0)
Pick-Up Tube Bolt/Nut	82 (9.3)
Rear Plate-To-Cylinder Block Bolt	50 (5.6)
Rear Seal Retainer Bolt	82 (9.3)
Timing Belt Cover Bolt	65 (7.4)
Valve Cover Nut	52 (5.9)
Water Pump Bolt	124 (14.0)
Water Pump Pulley Bolt	82 (9.3)

- (1) - Tighten bolts to specification in sequence.
See Fig. 10.
- (2) - Tighten bolts to specification in sequence.
See Fig. 30.
- (3) - Tighten No. 1 oil pan-to-cylinder block bolts to
12 ft. lbs. (16 N.m). Tighten No. 1 oil pan-to-oil
pump and rear seal retainer housing bolts to 69
INCH lbs. (7.8 N.m).
- (4) - Tighten bolts to specification in sequence.
See Fig. 23.
- (5) - Tighten bolt to specification in sequence.
See Fig. 20.

ENGINE SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS TABLE

Application	Specification
Displacement	109 Cu. In. (1.8L)
Bore	3.19" (81.0 mm)
Stroke	3.37" (85.5 mm)
Compression Ratio	9.5:1
Fuel System	MFI
Horsepower @ RPM	110 @ 5600

CRANKSHAFT, MAIN & CONNECTING

ROD BEARINGS SPECIFICATIONS

CRANKSHAFT, MAIN & CONNECTING
ROD BEARINGS SPECIFICATIONS TABLE

Application	In. (mm)
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Crankshaft			
End Play			
Standard		.0006-.0087	(.015-.220)
Wear Limit		.0118	(.300)
Runout		.0012	(.030)
Main Bearings			
Journal Diameter (1)			
Size Mark "0"	.....	1.8895-1.8898	(47.994-48.000)
Size Mark "1"	.....	1.8893-1.8895	(47.988-47.994)
Size Mark "2"	.....	1.8891-1.8893	(47.982-47.988)
Journal Out-Of-Round	.....	.0002	(.005)
Journal Taper	.....	.0002	(.005)
Oil Clearance			
Standard Crankshaft Journal			
Standard	.....	.0006-.0013	(.015-.033)
Wear Limit	.....	.0031	(.080)
.010" (.25 mm) Undersize Crankshaft Journal			
Standard	.....	.0006-.0022	(.015-.056)
Wear Limit	.....	.0031	(.080)
Connecting Rod Bearings			
Journal Diameter			
1.8L	.....	1.8893-1.8898	(47.988-48.000)
Journal Out-Of-Round	.....	.0002	(.005)
Journal Taper	.....	.0002	(.005)
Oil Clearance			
Standard Crankshaft Journal			
Standard	.....	.0008-.0017	(.020-.044)
Wear Limit	.....	.0031	(.080)
.010" (.25 mm) Undersize Crankshaft Journal			
Standard	.....	.0007-.0022	(.019-.058)
Wear Limit	.....	.0031	(.080)

(1) - Main bearing journal diameter is determined by size mark on crankshaft. See Fig. 31.

CONNECTING RODS SPECIFICATIONS

CONNECTING RODS TABLE

Application		In. (mm)
Maximum Bend	0020 Per 3.94	(.050 Per 100.1)
Maximum Twist	0020 Per 3.94	(.050 Per 100.1)
Side Play		
Standard	.....	.0059-.0098 (.150-.250)
Wear Limit	.....	.0118 (.300)

PISTONS, PINS & RINGS SPECIFICATIONS

PISTONS, PINS & RINGS TABLE

Application		In. (mm)
Pistons		
Oil Clearance		
Standard	.....	.0033-.0041 (.085-.105)
Maximum	.....	.0079 (.200)
Diameter (1)		
Size Mark "1"	.....	3.1852-3.1856 (80.905-80.915)
Size Mark "2"	.....	3.1856-3.1860 (80.915-80.925)
Size Mark "3"	.....	3.1860-3.1864 (80.925-80.935)

Pins		
Diameter	.....	Information Is Not Available
Rod Fit	.....	Information Is Not Available
Rings		
No. 1		
End Gap		
Standard	.....	.0098-.0138 (.250-.350)
Wear Limit	.....	.0413 (1.050)
Side Clearance	.....	.0003-.0031 (.008-.080)
No. 2		
End Gap		
Standard	.....	.0138-.0197 (.350-.500)
Wear Limit	.....	.0472 (1.200)
Side Clearance	.....	.0012-.0028 (.030-.070)
No. 3 (Oil)		
End Gap		
Standard	.....	.0039-.0157 (.100-.400)
Wear Limit	.....	.0433 (1.100)

(1) - Piston diameter is determined by size mark on piston.
 See Fig. 26.

CYLINDER BLOCK SPECIFICATIONS

CYLINDER BLOCK TABLE

Application	In. (mm)
Cylinder Bore	
Standard Diameter (1)	
Size Mark "1"	 3.1890-3.1894 (81.000-81.010)
Size Mark "2"	 3.1894-3.1898 (81.010-81.020)
Size Mark "3"	 3.1898-3.1902 (81.020-81.030)
Main Bearing Bore Inside Diameter (2)	
Size Mark "1"	 2.0482-2.0485 (52.025-52.031)
Size Mark "2"	 2.0485-2.0487 (52.031-52.037)
Size Mark "3"	 2.0487-2.0489 (52.037-52.043)
Maximum Deck Surface Warp	0020 (.050)

- (1) - Cylinder bore diameter is determined by size mark cylinder block. See Fig. 27. Maximum cylinder bore diameter is 3.1982" (81.230 mm).
- (2) - Main bearing bore inside diameter is determined by main bearing bore size mark on cylinder block.
 See Fig. 31.

VALVES & VALVE SPRINGS SPECIFICATIONS

VALVES & VALVE SPRINGS SPECIFICATIONS TABLE

Application	Specification
Intake Valves	
Face Angle	 44.5 °
Minimum Margin	020" (.50 mm)
Minimum Refinish Length	 3.4232" (86.950 mm)
Stem Diameter	2350-.2356" (5.970-5.985 mm)
Exhaust Valves	
Face Angle	 44.5 °
Minimum Margin	020" (.50 mm)
Minimum Refinish Length	 3.4390" (87.350 mm)

Stem Diameter	.....	.2348-.2354"	(5.965-5.980 mm)
Valve Springs			
Free Length	.....	1.5185"	(38.570 mm)
Out-Of-Square	.....	.079"	(2.00 mm)
			Lbs. @ In. (kg @ mm)
Pressure			
Valve Closed	.....	37.3 @ 1.248	(16.9 @ 31.70)

CYLINDER HEAD SPECIFICATIONS

CYLINDER HEAD TABLE

Application	Specification
Maximum Warpage	
Cylinder Block Surface	002" (.05 mm)
Manifold Surface	0039" (.100 mm)
Valve Seats	
Intake & Exhaust Valves	
Seat Angle	 45 °
Seat Width	039-.055" (1.00-1.40 mm)
Valve Guides	
Intake Valve	
Valve Guide Cylinder Head Bore I.D.	
Standard Valve Guide	4331-.4341" (11.000-11.027 mm)
Oversize Valve Guide	4350-.4361" (11.050-11.077 mm)
Valve Guide I.D.	2366-.2374" (6.010-6.030 mm)
Valve Guide Installed Height	.. .500-.516" (12.70-13.10 mm)
Valve Stem-To-Guide Oil Clearance	
Standard	0010-.0024" (.025-.060 mm)
Wear Limit	0031" (.080 mm)
Exhaust Valve	
Valve Guide Cylinder Head Bore I.D.	
Standard Valve Guide	4331-.4341" (11.000-11.027 mm)
Oversize Valve Guide	4350-.4361" (11.050-11.077 mm)
Valve Guide I.D.	2366-.2374" (6.010-6.030 mm)
Valve Guide Installed Height	.. .500-.516" (12.70-13.10 mm)
Valve Stem-To-Guide Oil Clearance	
Standard	0012-.0026" (.030-.065 mm)
Wear Limit	0039" (.100 mm)

CAMSHAFT SPECIFICATIONS

CAMSHAFT TABLE

Application	In. (mm)
End Play	
Intake Camshaft	
Standard	0012-.0033 (.030-.085)
Wear Limit	0043 (.110)
Exhaust Camshaft	
Standard	0014-.0035 (.035-.090)
Wear Limit	0043 (.110)
Journal Diameter	
Intake Camshaft	9035-.9041 (22.949-22.965)
Exhaust Camshaft	
No. 1 Journal	9822-.9829 (24.949-24.965)
All Other Journals	9035-.9041 (22.949-22.965)
Journal Runout	0016 (.040)

Lobe Height		
Celica		
Intake Lobe		
Standard	1.6776-1.6815	(42.610-42.710)
Wear Limit	1.6614	(42.200)
Exhaust Lobe		
Standard	1.6520-1.6560	(41.960-42.060)
Wear Limit	1.6358	(41.550)
Oil Clearance		
Standard	.0014-.0028	(.035-.072)
Wear Limit	.0039	(.100)
Gear Backlash		
Standard	.0008-.0079	(.020-.200)
Wear Limit	.0118	(.300)

VALVE LIFTERS SPECIFICATIONS

VALVE LIFTERS TABLE

Application	In. (mm)	
Bore Diameter	1.2205-1.2215	(31.000-31.025)
Lifter Diameter	1.2191-1.2195	(30.966-30.976)
Oil Clearance		
Standard	.0009-.0023	(.024-.059)
Maximum	.0028	(.070)