

1.6L 4-CYL 16-VALVE - VIN [A]

Article Text

1988 Toyota MR2

For Rse 555 Main Street Clarksville Va 22901

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Thursday, February 14, 2002 03:35PM

ARTICLE BEGINNING

1988-89 ENGINES

Toyota 1.6L 16-Valve 4-Cylinder

MR2

* PLEASE READ THIS FIRST *

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

ENGINE IDENTIFICATION

NOTE: Engine identification number is stamped on left rear of engine block.

ENGINE IDENTIFICATION CODES TABLE

Application	Engine Code	VIN Code
1.6L 16-Valve 4-Cylinder		
Fuel Injected	4A-GE	A

1.6L 16-Valve 4-Cylinder

Fuel Injected 4A-GE A

AA

REMOVAL & INSTALLATION

ENGINE

Removal

1) Mark and remove hood. Remove battery. Remove engine under cover (splash) shields. Drain coolant, engine oil and transaxle fluid. Mark and disconnect vacuum hoses and electrical connectors.

2) Remove air cleaner assembly. Disconnect coolant hoses. Mark and disconnect throttle, cruise, and kickdown cables (if equipped). Mark and disconnect fuel inlet and return hoses.

3) Remove fuel tank protectors. Remove airflow meter assembly. Remove transaxle protector (if equipped). Remove accessory drive belts. Remove alternator.

4) Disconnect oil cooler hoses (if equipped). Disconnect power steering pump and A/C compressor and set aside (if equipped). Disconnect speedometer cable from transaxle. Remove clutch slave cylinder (if equipped). Mark and remove shift control cable(s).

5) Remove cruise control actuator assembly (if equipped). Raise vehicle and disconnect exhaust pipe from exhaust manifold.

Remove axle shafts. See FWD AXLE SHAFTS under DRIVE AXLES article.

6) Remove front engine mount. Remove rear transaxle mount. Support engine with a saddle type engine stand. Remove right engine mount and bracket. Remove left transaxle mount and bracket. Slowly raise vehicle and remove engine/transaxle assembly.

Installation

Position engine assembly under vehicle and lower vehicle. To complete installation, reverse removal procedure. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS table at end of this article. Fill fluids to proper level.

INTAKE MANIFOLD

NOTE: Removal and installation information is not available from manufacturer. For available information, see CYLINDER HEAD Removal & Installation in this article.

EXHAUST MANIFOLD

NOTE: Removal and installation information is not available from manufacturer. For available information, see CYLINDER HEAD Removal & Installation in this article.

CYLINDER HEAD

NOTE: To prevent warping or cracking, allow engine to cool before removing components.

Removal

1) Disconnect negative battery cable. Remove engine under cover (splash) shields. Drain coolant. Remove air cleaner assembly. Disconnect throttle, cruise and kickdown cables (if equipped).

2) Disconnect coolant hoses from cylinder head. Mark and disconnect electrical connectors and vacuum hoses for reassembly reference. Remove engine hood.

3) Remove cruise control actuator assembly (if equipped). Remove ignition coil. Remove EGR valve with piping. Remove cold start injector pipe. Remove fuel supply line and fuel pressure regulator.

4) Remove coolant outlet housing from cylinder head. Separate inlet pipe from exhaust manifold. Remove exhaust manifold. Match mark distributor for installation reference and remove distributor assembly.

5) Remove fuel delivery pipe with fuel injectors. Remove intake manifold bracket. Remove Vacuum Switching Valve (VSV) with air tank. Remove intake manifold and air control valve with gaskets. Slightly raise engine. Remove right-hand engine mount to gain access to timing belt cover.

6) Remove accessory belts. Remove valve covers. Remove spark plugs. Remove water pump pulley. Remove upper and center timing belt covers. Position No. 1 cylinder at TDC on compression stroke.

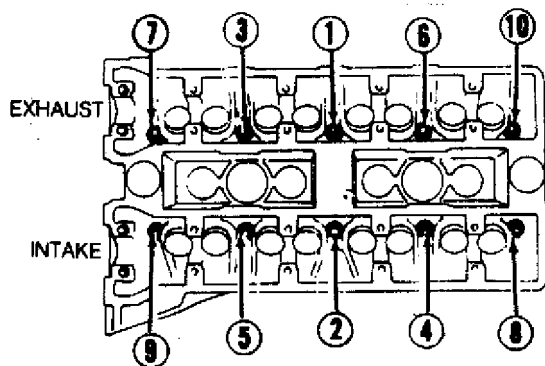
7) Match mark timing belt-to-camshaft sprocket(s). Loosen timing belt idler pulley (tensioner) bolt. Move idler pulley away from timing belt and tighten in place. Keeping timing belt tight on crankshaft sprocket, remove timing belt from camshaft sprocket(s).

8) Hold camshaft and remove camshaft sprocket(s). Remove cover located behind camshaft sprocket. Measure camshaft end play. If greater than specification, replace camshaft and/or cylinder head. See ENGINE SPECIFICATIONS table at end of this article.

9) Mark and remove camshaft bearing caps evenly and in reverse of installation sequence. See Fig. 3. Remove camshaft oil seals and camshafts. Remove cylinder head bolts in 3 steps gradually and in reverse of installation sequence. See Fig. 1. Remove cylinder head assembly.

Inspection

Thoroughly clean cylinder head. Check cylinder head surfaces for warpage. Check for cracks with dye penetrant. Check all clearances. See ENGINE SPECIFICATIONS table at end of this article. Repair or replace as necessary. Tap cylinder block head bolt hole threads and blow clean with compressed air.



NOTE: Exhaust Bolts Are 4.25" (108.0 mm) Long
Intake Bolts Are 3.54" (90.0 mm) Long

Fig. 1: 4A-GE Cylinder Head Tightening Sequence
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Installation

1) Properly install new head gasket over dowels on block. Place cylinder head on block. Install short head bolts on intake side and long bolts on exhaust side.

2) Lightly oil cylinder head bolt threads and under the bolt head before installing. Tighten the cylinder head bolts in 3 steps and in sequence to specification. See Fig. 1. See specifications in the TORQUE SPECIFICATIONS table at end of this article.

3) Place camshafts in cylinder head and apply Seal Packing (SST 08826-00080). See Fig. 2. Ensure exhaust camshaft, with distributor drive gear, is on proper side of cylinder head. Install camshaft bearing caps to location as marked during removal. Ensure exhaust and intake caps are on proper camshaft.

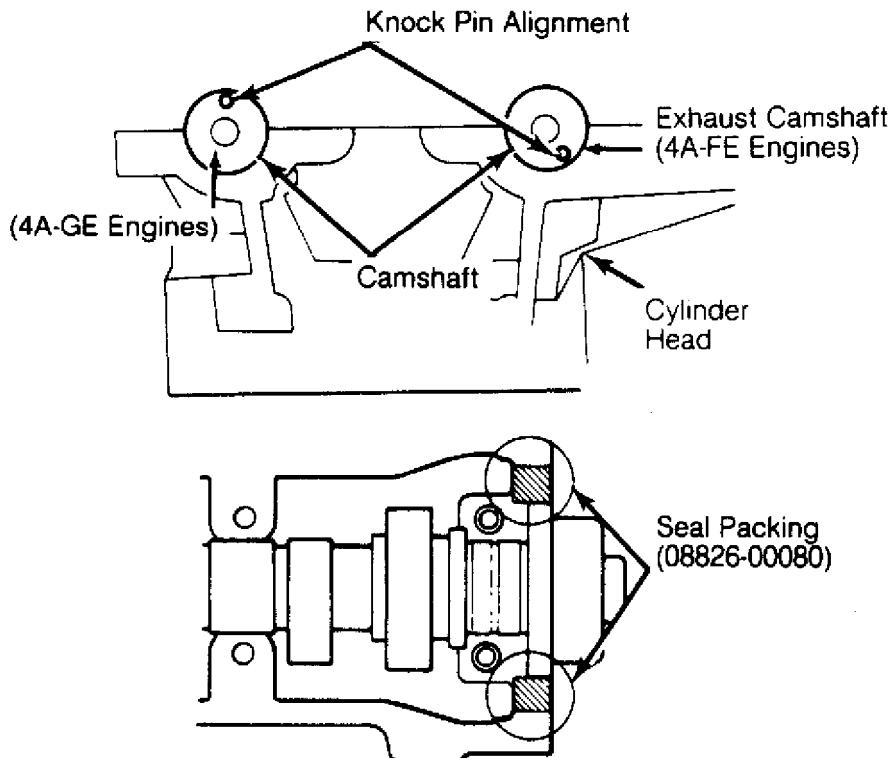


Fig. 2: Camshaft & Seal Packing Installation
Courtesy of Toyota Motor Sales, U.S.A., Inc.

4) Install camshaft bearing cap bolts. Tighten in 3 even steps and in sequence. See Fig. 3. Check camshaft thrust clearance and replace camshaft and/or cylinder head as necessary. Apply grease to new camshaft oil seal lip and install oil seal. Ensure oil seals are installed squarely.

5) To complete installation, reverse removal procedure. Ensure all timing marks are in proper alignment before installing timing belt. See TIMING BELT under CAMSHAFT in this article. Tighten bolts and nuts to specification.

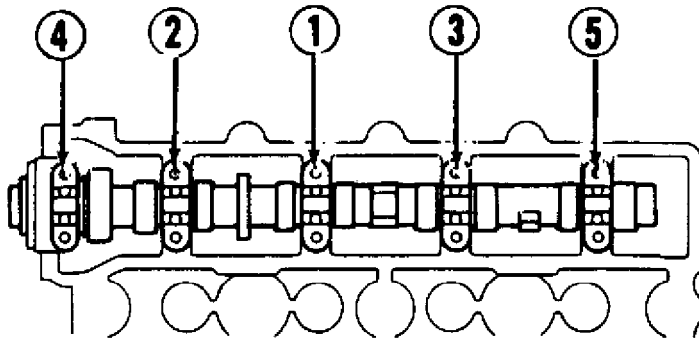
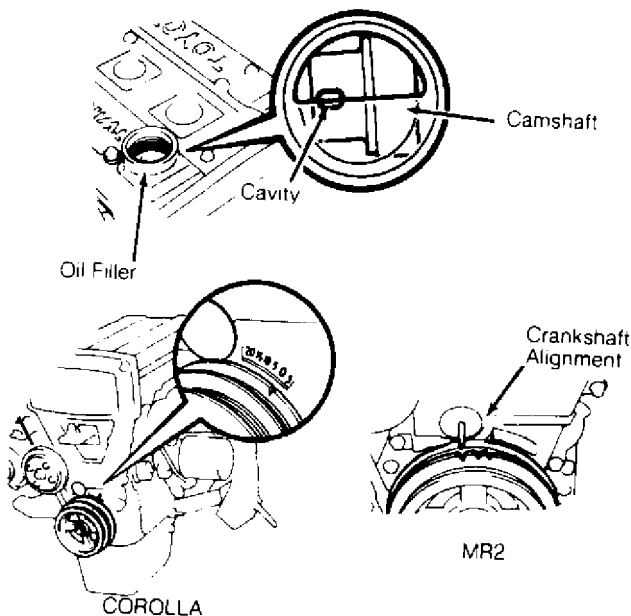


Fig. 3: Camshaft Bearing Cap Tightening Sequence
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

TIMING BELT

Removal

1) Remove right hand tire assembly and under engine cover. Remove A/C belt (if equipped). Remove drive belt and water pump pulley. Remove spark plugs. Set No. 1 cylinder to TDC on compression stroke. See Fig. 4.



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Fig. 4: 4A-GE Camshaft Cavity (TDC) Position
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

2) Disconnect coil wire. Disconnect brake booster and cruise control vacuum hose at intake manifold. Slightly raise engine with a jack. Remove right-hand engine mount.

3) Remove crankshaft pulley bolt. Using Puller (SST 09213-31021), remove crankshaft pulley.

4) Remove timing belt covers and gaskets. Remove timing belt guide. If reusing timing belt, direction mark belt rotation for installation. Note position of timing marks. Match mark timing belt with all sprockets for installation reference.

5) Loosen idler pulley (tensioner) bolt and push idler pulley to the left as far as it will go and temporarily tighten bolt. Remove timing belt.

Inspection

Check idler pulley tension spring free length and installed tension. Free length should be 1.713" (43.5 mm). Installed tension should be 22 lb.@1.976". If not within specifications, replace spring. Check timing belt and all sprockets. If any damage or oil is present replace as required.

Installation

1) Ensure No. 1 cylinder is at TDC on compression stroke. If timing belt was not previously removed, loosen idler pulley (tensioner) bolt and push idler pulley to the left as far as it will go and temporarily tighten bolt.

2) If reusing old timing belt, align marks made during removal. If installing new belt, align camshaft and crankshaft sprocket timing marks. See Fig. 5.

3) Install timing belt. Loosen idler pulley (tensioner) bolt and allow pulley to move against belt. Rotate crankshaft 2 revolutions from TDC to TDC. Tighten idler pulley (tensioner) bolt. Recheck timing mark alignment and adjust if necessary.

4) Measure belt deflection between both camshaft sprockets. See Fig. 5. Deflection should be 4.4 lbs. at .16" (2.0 kg at 4.1 mm). If deflection is incorrect, readjust with idler pulley (tensioner).

5) To complete installation, reverse removal procedure. Ensure timing cover bolts are installed to original position. Tighten all bolts to specification. See TORQUE SPECIFICATIONS table at end of this article.

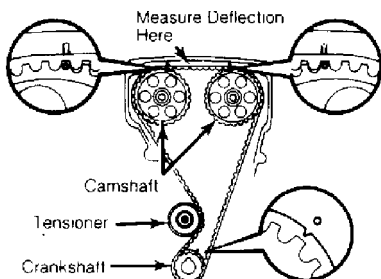


Fig. 5: 4A-GE Timing Mark Alignment
Courtesy of Toyota Motor Sales, U.S.A., Inc.

CAM & BEARINGS

NOTE: Check end play before removing camshafts.

Removal & Installation

Camshaft bearings are not replaceable. Camshafts are removed during cylinder head removal. See appropriate procedures under CYLINDER HEAD Removal & Installation in this article.

Inspection

Measure camshaft oil clearance. If oil clearance is not within specification, replace camshaft(s) and/or cylinder head. Check camshaft lobes for wear. If not within specification, replace as necessary. See ENGINE SPECIFICATIONS table at end of this article.

CAMSHAFT OIL SEAL

Removal & Installation

Remove valve covers and gaskets. Remove timing belt as previously described. Remove camshaft sprocket. Remove cover located behind camshaft gear(s). Remove oil seal(s) using care not to damage surfaces. Apply grease to lip of new oil seal(s) and install new seal(s). To complete installation, reverse removal procedure. Tighten all bolts and nuts to specification.

VALVE ARRANGEMENT

Right Side - Intake Valves.

Left Side - Exhaust Valves.

VALVE SPRINGS

Removal & Installation

Using Spring Compressor (SST 09202-70010), compress valve spring and remove valve keepers. Remove valve spring retainer, spring, seat and valve. Keep all components in order for reassembly reference. Clean parts and lubricate with engine oil. To install, reverse removal procedure.

Inspection

Measure squareness, free length and tension of valve spring at specified installed length. See ENGINE SPECIFICATIONS at end of this article.

VALVE GUIDES

Removal

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1) wrap tape around an bolt defective valve and insert into

valve guide. See Fig. 6. Break valve guide at snap ring. To prevent damage to lifter bore, place a shop rag in bore.

2) On all engines, gradually heat cylinder head to 176-212°F (80-100°C). Using Valve Guide Remover/Installer (SST 09201-70010), remove valve guide(s).

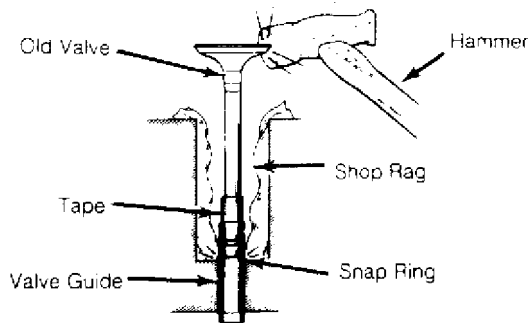


Fig. 6: Removing Valve Guide
Courtesy of Toyota Motor Sales, U.S.A. Inc.

Inspection

With valves removed, measure I.D. of valve guide and O.D. of valve stem. Subtract valve stem O.D. from valve guide I.D. to obtain clearance. Replace valve and/or guide if not within specification. See ENGINE SPECIFICATIONS table at end of this Article.

Installation

1) Allow cylinder head to cool down. Measure valve guide bore of cylinder head. If bore exceeds .4341" (11.026 mm), machine bore to .4350-.4361" (11.049-11.077 mm) for oversize valve guide. If bore is less, use standard size guide.

2) Heat cylinder head to 176-212°F (80-100°C). Using remover/installer, install valve guide(s). Drive in guide until snap ring contact with cylinder head. Ream valve guide to obtain proper clearance for valve being installed.

VALVE CLEARANCE ADJUSTMENTS

NOTE: Mark valves, lifters and shims. They must be installed in original location as removed. Check and adjust valve clearance with engine cold.

1) Set No. 1 cylinder at TDC on compression stroke. Ensure No. 1 cylinder lifters are loose and No. 4 cylinder lifters are tight. If not, rotate crankshaft 1 revolution.

2) Measure clearance of cylinder No. 1 and 3 on exhaust side and cylinder No. 1 and 2 on intake side. Record clearances on valves not within specification. See VALVE CLEARANCE table. Rotate crankshaft 161 4-CYL

one complete revolution and repeat for remaining valves.

3) On valves not within specification, rotate crankshaft until camshaft lobe is at lowest point on valve to be adjusted. Position notch in lifter as shown. See Fig. 7. Using Lifter Compressor (SST 09248-55010-A & B), remove shim with small screwdriver and magnet.

4) Measure thickness of removed shim. Add removed shim thickness to recorded clearance in step 3). Subtract .008" (.20 mm) for intake and .010" (.25 mm) for exhaust. Select shim with thickness as close as possible to obtain clearance specification. Shims are available in increments of .002" (.050 mm) starting with .0984" (2.5 mm). Recheck clearance after adjustments are made.

VALVE CLEARANCE TABLE

AA

Application	In. (mm)
Cold	
Intake .....	.006-.010 (.15-.25)
Exhaust .....	.008-.012 (.20-.30)
Hot	
Intake .....	.008-.012 (.20-.30)
Exhaust .....	.010-.014 (.25-.36)

AA

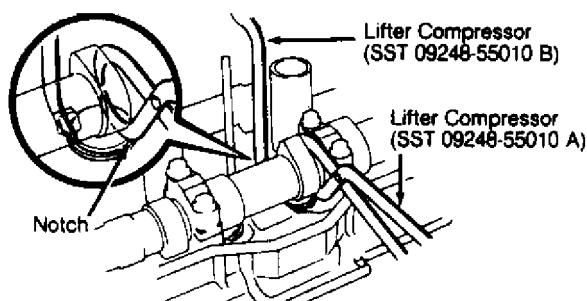


Fig. 7: Removing Valve Adjusting Shim
 Courtesy of Toyota Motor Sales, U.S.A. Inc.

VALVE SEATS

Removal & Installation

Valve seat replacement information is not available from manufacturer. Service valve guides as necessary, prior to valve seats.

Valves Inspection

Check valve length, diameter, margin and out-of-round. Replace valve if not within specification. See ENGINE SPECIFICATIONS table at end of this article.

VALVE LIFTERS INSPECTION

Measure O.D. of lifter and I.D. of lifter bore. Subtract lifter O.D. from bore I.D. to obtain oil clearance. Replace lifter and/or cylinder head if not within specification. See ENGINE SPECIFICATIONS table at end of this article.

CYLINDER BLOCK INSPECTION

Ensure all components are match marked during removal. Check cylinder block surface for warp. Check each cylinder bore for wear, cracks and damage. If not within specification, machine or replace as necessary. See ENGINE SPECIFICATIONS table at end of this article.

PISTON & ROD ASSEMBLY

Ensure rod and rod cap are with matching cylinder number. Ensure piston and rod are installed in cylinder from which they were removed. Check piston and rod and replace if not within specification. See ENGINE SPECIFICATIONS table at end of this article.

FITTING PISTONS & RINGS

NOTE: There are 3 different standard piston sizes and cylinder bore diameters being used. Pistons and cylinder bores are marked No. 1, No. 2 or No. 3. Mark is stamped on top of piston and cylinder block. See Figs. 8 and 9.

1) Remove carbon from top of piston. Clean piston and ring grooves. Measure piston clearance. Determine piston size being used. Measure piston diameter at right angles to piston pin center line. Measure 1.65" (42.0 mm) from piston skirt bottom edge.

2) Measure cylinder bore diameter in thrust direction. See Fig. 10. Subtract piston diameter measurement from cylinder bore diameter measurement. Piston clearance should be within specification.

3) If piston clearance is greater than maximum, replace all 4 pistons and/or rebore all 4 cylinders. See ENGINE SPECIFICATIONS at end of this article.

4) Check end gap of ring in cylinder to which it will be installed. If end gap is greater than specification, try new set of rings. If end gap is still greater than specification, rebore cylinder and use over size piston rings. See ENGINE SPECIFICATIONS table at end of this article.

5) Standard oil rings come in 2 sizes. Rings are marked with code mark "T" or "R", which is engraved on top of piston ring. See Fig. 11. End gap is different depending on which size is being installed. When installing oil rings, install with code mark facing

6) Properly position rings on piston prior to piston installation. See Fig. 11.

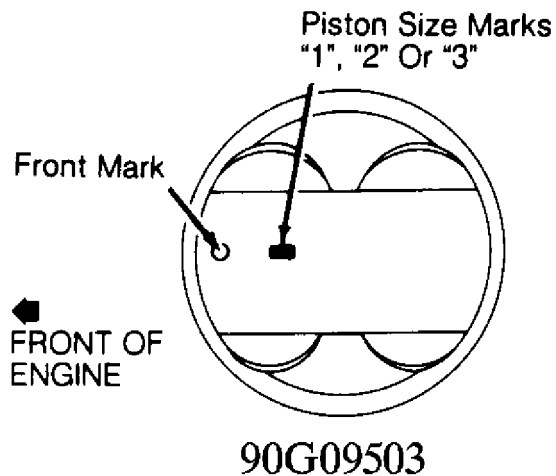


Fig. 8: Piston Identification Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.

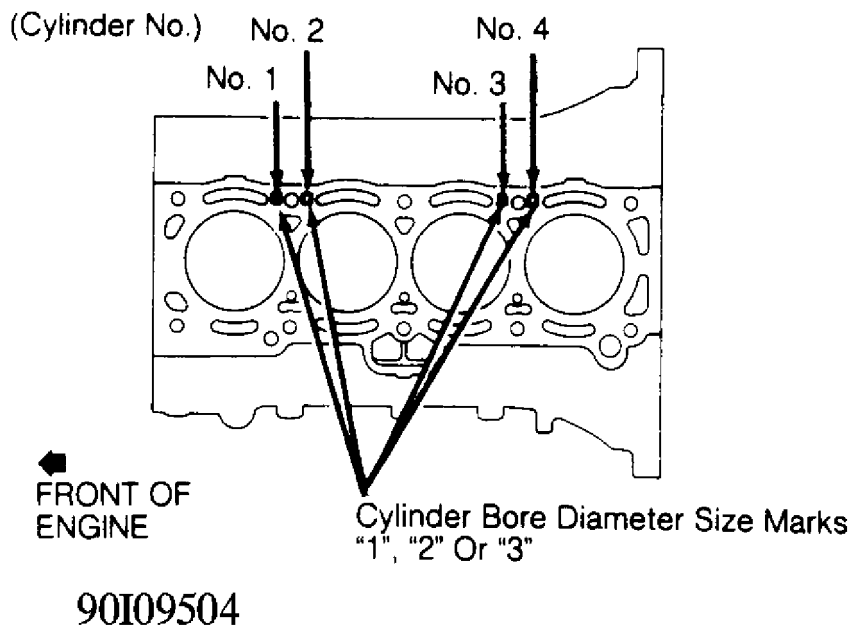
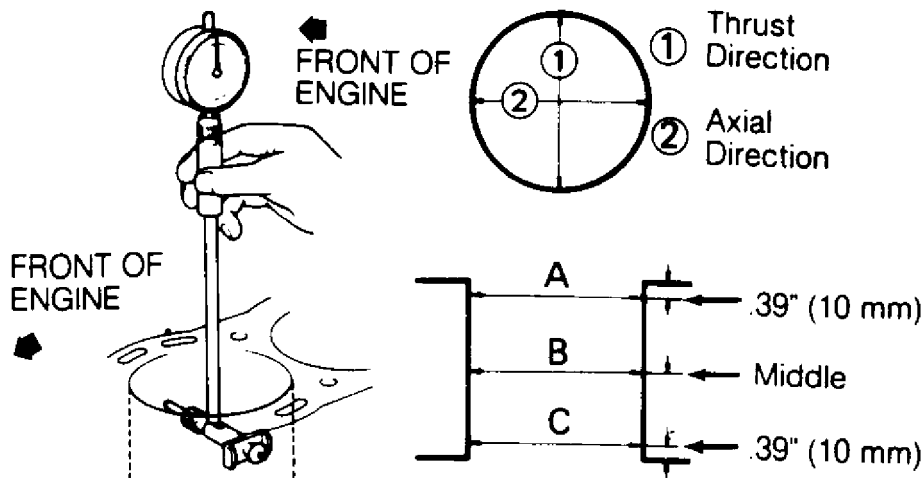
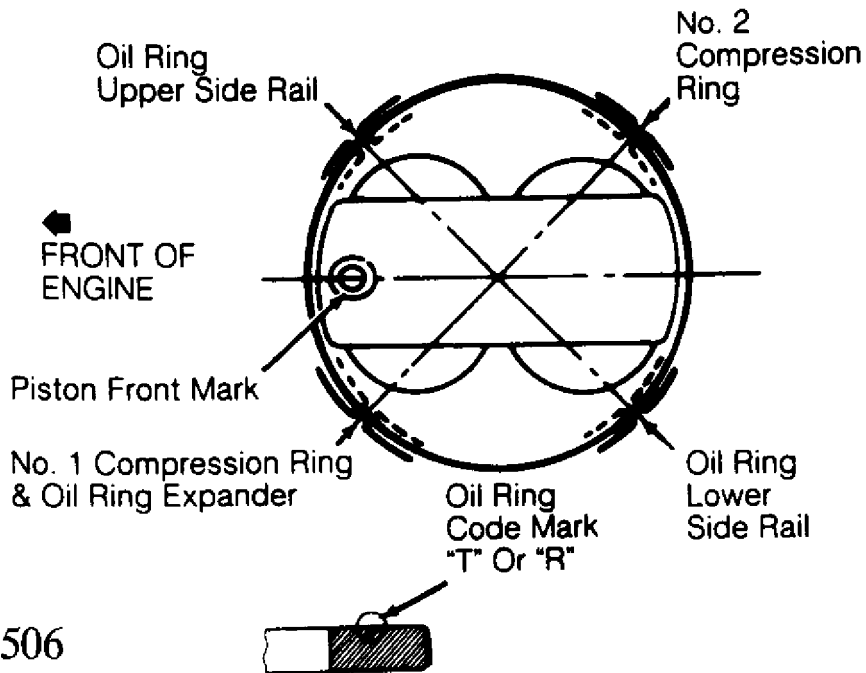


Fig. 9: Cylinder Bore Size Identification Marks
Courtesy of Toyota Motor Sales, U.S.A., Inc.



90B09505

Fig. 10: Measuring Cylinder Bore Diameter
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



90D09506

Fig. 11: Positioning Piston Ring Gaps
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

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 PISTON PIN

Piston and pin are a matched set and must be kept together. The 4A-GE engine uses snap rings on each end. Remove Gradually heat piston assembly to 158-176°F (70-80°C) to remove and install pin. and 4A-GE engines, use a press and pin kit to remove and install pin. Ensure piston is reassembled properly on rod. See Fig. 12.

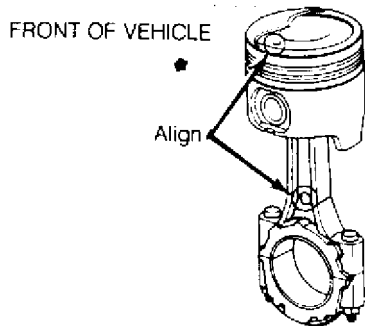


Fig. 12: Piston & Connecting Rod Alignment
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

FRONT CRANK SEAL

Removal & Installation

Remove oil pump. Remove oil seal from pump. Do not damage seal contact surface of pump. Apply grease to new oil seal. Using Seal Installer (SST 09517-30010), install seal. Ensure oil seal is flush with oil pump body outer surface.

MAIN BEARINGS

NOTE: No in-vehicle service is available from manufacturer.

1) Remove main bearing caps evenly in 3 steps and in sequence. To tighten, reverse removal sequence. See Fig. 13. Check bearing clearance. If bearing clearance is not within specification, machine or replace as necessary. See ENGINE SPECIFICATIONS table at end of this article.

2) Main bearings must be replaced with one having same number. Install thrust washers on center bearing cap with oil grooves facing outward. Install bearing caps in numerical order with arrows facing forward.

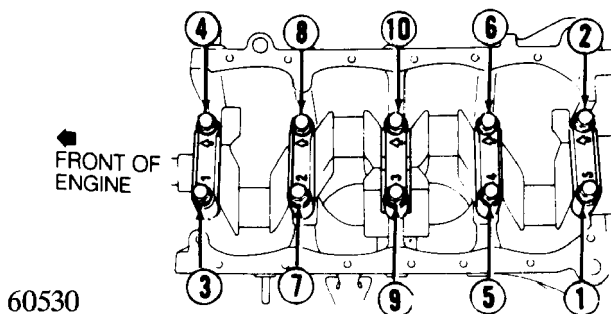


Fig. 13: Main Bearing Cap Removal Sequence
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

CONNECTING ROD BEARINGS

Removal & Installation

Check crankshaft journal condition. Check rod bearing clearance. If clearance is not within specification, machine or replace as necessary. See ENGINE SPECIFICATIONS table at end of this article.

THRUST BEARING ALIGNMENT

Using dial indicator, measure thrust clearance. If clearance exceeds specification, replace thrust bearings as a set. If less than specification, remove and reinstall thrust bearing. Recheck thrust clearance. See ENGINE SPECIFICATIONS table at end of this article.

REAR MAIN SEAL

Removal & Installation

1) Remove transaxle. See TRANSMISSION SERVICING article. Remove flywheel/flexplate. Remove rear engine plate. Remove oil seal retainer and drive seal out.

2) Using Seal Installer (SST 09223-41020), install new oil seal. Lightly coat seal lip with grease. Replace oil seal retainer gasket and install retainer. Tighten bolts and nuts to specification. To complete installation, reverse removal procedure.

ENGINE OILING SYSTEM

Oil from the oil pan is pumped by oil pump. After it passes through oil filter, it is fed through various oil holes in crankshaft and cylinder block. After passing through cylinder block and performing its lubricating function, oil is returned by gravity to oil pan.

CRANKCASE CAPACITY

MR2 crankcase capacity with filter change is 3.5 qts. (3.3L).

OIL PRESSURE

Normal oil pressure at idle is greater than 4.3 psi (.3 kg/cm²) and at 3000 RPM oil pressure should be 36-71 psi (2.5-5.0 kg/cm²).

OIL PRESSURE REGULATOR VALVE

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Oil pressure regulator valve is located in the oil pump body.

It is a nonadjustable type valve.

OIL PUMP

Removal & Installation

Remove oil pan and oil pump pick-up tube. Remove crankshaft sprocket. Remove dipstick tube from oil pump body. Remove oil pump retaining bolts. Using a plastic hammer tap oil pump assembly off block. To install, reverse removal procedure.

Inspection

If oil pump is not within specification, replace gear set and/or body. See appropriate OIL PUMP SPECIFICATIONS table.

4A-GE OIL PUMP SPECIFICATIONS TABLE

Application	In. (mm)
Drive Gear Tip-to-Crescent Clearance	
Standard	.0042-.0098 (.107-.248)
Maximum	.0138 (.35)
Driven Gear Tip-to-Crescent Clearance	
Standard	.0023-.0122 (.058-.310)
Maximum	.0138 (.35)
Gear Side Clearance	
Standard	.0250-.0750 (.001-.003)
Maximum	.0039 (.100)
Driven Gear-to-Body Clearance	
Standard	.0039-.0075 (.100-.191)
Maximum	.0079 (.20)

COOLING SYSTEM

COOLING SPECIFICATIONS

BELT ADJUSTMENT SPECS TABLE Tension in Lbs. (Kg.) Using Burroughs Tension Gauge

Application	New Belt	Used Belt
Alternator	175 (79)	115 (52)
A/C	160 (73)	105 (48)

COOLING SYSTEM SPECIFICATIONS TABLE

Application	In. (mm)
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Application

Specification

Cooling System (Includes Heater)

Man. Trans. Without A/C	12.9 qts (12.2L)
Auto. Trans. With A/C	13.6 qts. (12.9L)
Pressure Cap	15.0 psi (1.1 Kg/cm ²)
Thermostat	180øF (82øC)

AA

WATER PUMP

NOTE: Do not allow coolant to contact timing belt.

Removal

1) Drain cooling system. Remove belts and A/C idler pulley (if equipped). Remove water pump pulley. Disconnect coolant inlet and by-pass hoses from inlet pipe.

2) Remove coolant inlet pipe and "O" ring from rear of water pump. Remove oil dipstick tube and plug hole in oil pump body. Remove upper and center timing belt cover. Remove water pump retaining bolts and remove water pump.

Installation

Install new "O" ring on clean block surface and mount pump. Tighten bolts to specification. See TORQUE SPECIFICATIONS table. Install dipstick tube with new "O" ring in place. To complete installation, reverse removal procedure. Adjust drive belt tension, fill cooling system and check for leaks.

NOTE: For further information on cooling systems, see ENGINE COOLING article in this manual.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

AA

Application	Ft. Lbs. (N.m)
Camshaft Sprocket Bolt	34 (46)
Connecting Rod Nut	36 (49)
4A-GE With 12 Sided Nut	
Step 1	29 (39)
Step 2	90 Degrees Additional
Crankshaft Pulley Bolt	87 (118)
Cylinder Head Bolt (1)	
Step 1	22 (29)
Step 2	90 Degrees Additional

Step 3	90 Degrees Additional	
Delivery Pipe-to-Cylinder Head		13 (18)
Exhaust Manifold Bolt		18 (24)
Flywheel Bolt (2)		54 (74)
Flex Plate (2)		47 (64)
Front Engine Mount Through Bolt		58 (79)
Intake Manifold Bolt		20 (27)
Main Bearing Cap Bolt (3)		43 (58)
Oil Pump Body Mount Bolt	13-18	(18-24)
Rear Engine Mount		
10 mm Bolt Head		38 (52)
12 mm Bolt Head		58 (79)
Right-Hand Engine Mount Bolt		58 (79)
Spark Plug		13 (18)
Timing Belt Tensioner Bolt		27 (37)
Torque Converter Bolt		20 (27)
Transaxle-to-Engine		
10 mm Bolts		34 (46)
12 mm Bolts		47 (64)
Water Pump Bolt		11 (15)

INCH Lbs. (N.m)

Camshaft Cap Bolt (4)	108	(12)
Oil Pan Bolt & Nut	43	(5)
Oil Pump Cover Bolt	72-108	(8-12)
Oil Pump Pick-Up Tube	82	(9)

- (1) - Tighten in sequence. See Fig. 1.
- (2) - Tighten evenly in a diagonal pattern.
- (3) - Tighten evenly in sequence. See Fig. 13.
- (4) - Tighten evenly in sequence. See Fig. 3.

AA

ENGINE SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS TABLE

AA

Application	In. (mm)
Displacement	
Cubic Inches	96.8
Liters	1.6
Fuel System	PFI
HP @ RPM	115@6600 1.6L 4-CYL 16-VALVE

Torque Ft. @ RPM 100@4800
 Compression Ratio 9.4:1
 Bore 3.19 (81.0)
 Stroke 3.03 (77.0)
 AAA

PISTON/PIN/RING SPECIFICATIONS

PISTONS, PINS & RINGS SPECIFICATIONS TABLE

AA

Application In. (mm)

1.6L

Piston Clearance0039-.0047 (.100-.120)
 Piston Diameter (1) (2) 3.1846-3.1850 (80.89-80.90)
 (3) 3.1850-3.1854 (80.90-80.91)
 (4) 3.1854-3.1858 (80.91-80.92)

Pins

Diameter7876-.7880 (20.004-20.016)
 Piston Fit (5)
 Rod Fit

Rings

Ring No. 1

End Gap (6) .0098-.0185 (.25-.47)
 Side Clearance0016-.0031 (.04-.08)

Ring No. 2

End Gap (7) .0079-.0165 (.20-.42)
 Side Clearance0012-.0028 (.03-.07)

Oil Ring

End Gap (8 & 9) .006-.021 (.15-.52)
 Side Clearance

- (1) - Three different piston sizes are used. Pistons are marked 1, 2, or 3. See Fig. 8.
- (2) - Piston size marked 1.
- (3) - Piston size marked 2.
- (4) - Piston size marked 3.
- (5) - Piston pin installed temperature is 176°F (80°C).
- (6) - Standard listed. Limit is .0421" (1.070 mm).
- (7) - Standard listed. Limit is .0402" (1.020 mm).
- (8) - End gap with code mark "T" listed. Code mark "R" is .0118-.0402" (.300-1.020 mm). See Fig. 11.
- (9) - Standard listed. Limit on code mark "T" is .0441" (1.120 mm). Limit on code mark "R" is .0638" (1.620 mm). See Fig. 11.

AA

CRANKSHAFT MAIN & CONNECTING

ROD BEARINGS SPECIFICATIONS TABLE

AA

Application In. (mm)

1.6L

Crankshaft

Crankshaft End Play	.....	(1)	.0008-.0087	(.02-.22)
Runout	.....		.0024	(.060)
Journal Taper	.....		.0008	(.02)
Journal Out-Of-Round	.....		.0008	(.02)

Main Bearings

Journal Diameter	.....	1.8891-1.8898	(47.982-48.000)
Oil Clearance	.....	.0006-.0013	(.015-.033)

Connecting Rod Bearings

Journal Diameter	.....	1.6529-1.6535	(41.984-42.00)
Oil Clearance (2)	.....	.0008-.0020	(.020-.051)

(1) - Standard listed. Limit is .0118" (.3 mm).

(2) - Standard listed. Limit is .0031" (.08 mm).

AA

CONNECTING ROD SPECIFICATIONS

CONNECTING ROD SPECIFICATIONS TABLE

AA

Application In. (mm)

1.6L

Side Play (1)	.....	.0059-.0098	(.15-.25)
Maximum Bend & Twist (2)	.....	.0012	(.03)
Pin Bore Diameter	.....	.7878-.7883	(20.010-20.022)
Large Bore Diameter	.....	
Center-to-Center Length	.....	

(1) - Standard listed. Limit is .0118" (.3 mm).

(2) - Maximum bend listed. Maximum twist is .002" (.05 mm).

AA

CYLINDER HEAD SPECIFICATIONS

CYLINDER HEAD SPECIFICATIONS TABLE

AA

Application In. (mm)

1.6L

Maximum Cylinder Head Valve	1.0E-4	16-VALVE--VIN [A]	Article Text (p. 19)	1988 Toyota MR2 For Rs
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Seat Angle	45ø
Maximum Runout
Seat Width039-.055 (.99-1.40)
Seat Bore Diameter4350-.4361 (11.05-11.08)
Valve Stem Oil Clearance	
Intake (2) .....	.0010-.0024 (.025-.061)
Exhaust (3) .....	.0012-.0026 (.031-.066)
Valve Guide Inside Diameter ....	.2366-.2374 (6.01-6.03)
Valve Guide Bore I.D. ....	.4331-.4341 (11.000-11.027)

- (1) - Intake & block side. Exhaust side is .0039" (.10 mm).
- (2) - Standard listed. Limit is .0031" (.079 mm).
- (3) - Standard listed. Limit is .0039" (.10 mm).

AA

CYLINDER BLOCK SPECIFICATIONS

CYLINDER BLOCK SPECIFICATIONS TABLE

AA

Application	In. (mm)
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1.6L

Maximum Block Warp002 (.051)
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Cylinder Bore

Standard Diameter (1) .. (2)	3.1890-3.1894 (81.00-81.01)
	(3) 3.1894-3.1898 (81.01-81.02)
	(4) 3.1898-3.1902 (81.02-81.03)

Maximum Taper
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Maximum Out-of-Round
----------------------------	-------

- (1) - Three different bore sizes are used. Cylinders are marked 1, 2, or 3. See Fig. 9.
- (2) - Cylinder marked 1.
- (3) - Cylinder marked 2.
- (4) - Cylinder marked 3.

AA

VALVE/VALVE SPRING SPECIFICATIONS

VALVES & VALVE SPRINGS SPECIFICATIONS TABLE

AA

Application	In. (mm)
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1.6L

Intake

Head Diameter
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Stem Diameter2350-.2356 (5.970-5.985)
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Face Angle	44.4ø1.6L 4-CYL 16-VALVI
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Minimum Margin (1) .031-.047 (.8-1.2)
 Maximum Refinish
 Springs
 Free Length 1.618 (41.1)
 Out-Of-Square071 (1.8)
 Installed Height
 Pressure Lbs. @ In. (Kg @ mm)
 Valve Closed 32.2-37.5@1.366 (13.6-17.0@34.7)
 Valve Open

Exhaust
 Head Diameter
 Stem Diameter2348-.2354 (5.965-5.980)
 Face Angle 44.5ø
 Minimum Margin (1) .031-.047 (.8-1.2)
 Maximum Refinish

Springs
 Free Length 1.618 (41.1)
 Out-Of-Square071 (1.8)
 Installed Height
 Pressure Lbs. @ In. (Kg @ mm)
 Valve Closed 32.2-37.5@1.366 (13.6-17.0@34.7)
 Valve Open

(1) - Standard listed. Limit is .020" (.50 mm).
 AA

VALVE/VALVE SPRING SPECIFICATIONS

VALVE LIFTERS SPECIFICATIONS TABLE
 AA

Application	In. (mm)
1.6L	
Diameter	1.1014-1.1018 (27.075-27.985)
Bore Diameter	1.102-1.104 (27.99-28.03)
Oil Clearance	(1) .0006-.0018 (.015-.046)

(1) - Standard listed. Limit is .0039" (.1 mm.).
 AA

CAMSHAFT SPECIFICATIONS

CAMSHAFT SPECIFICATIONS TABLE
 AA

Application	In. (mm)
Journal Diameter	1.0610-1.0616 (26.949-26.965)
Oil Clearance	(1) .0014-.0028 (.035-.072)

1.6L 4-CYL 16-VALVE

Bearing Bore
Runout0016 (.04 mm)
End Play (2) .0031-.0075 (.08-.19)
Lobe Lift
Lobe Height 1.3823-1.3980 (35.41-35.51)

(1) - Standard listed. Limit is .0039" (.10 mm).

(2) - Standard listed. Limit is .0118" (.3 mm).

AA

END OF ARTICLE