SPECIAL TORQUES

	U.S. Value	Metric Value
Alternator Bracket Bolts (Lower)	18 lb ft	24 Nm (2.4 kgm)
Alternator Bracket Bolts (Upper)	18 lb ft	24 Nm (2.4 kgm)
Alternator Retaining Bolt	18 lb ft	24 Nm (2.4 kgm)
Belt Tensioner Bracket Bolts	18 lb ft	24 Nm (2.4 kgm)
Belt Tensioner Retaining Bolt	32 lb ft	43 Nm (4.3 kgm)
Camshaft Retaining Bolts	18 lb ft	24 Nm (2.4 kgm)
Connection Rod Bolts (Lubricate Threads With Engine Oil)	88 lb ft	120 Nm (12.0 kgm)
Exhaust Manifold Bolts	32 lb ft	43 Nm (4.3 kgm)
Fan Pulley Bracket Bolts	18 lb ft	24 Nm (2.4 kgm)
Fan Pulley Bolts	32 lb ft	43 Nm (4.3 kgm)
Flywheel Housing Bolts	45 lb ft	60 Nm (6.0 kgm)
Flywheel Retaining Bolts	101 lb ft	137 Nm (13.7 kgm)
Flywheel Housing Cover Bolts	18 lb ft	24 Nm (2.4 kgm)
Fuel Filter Inlet Bolt	24 lb ft	32 Nm (3.2 kgm)
Fuel Air Removal Bolt	6 lb ft 8 Nm	8 Nm (0.8 kgm)
Fuel Filter Inlet Nut	11 lb ft	15 Nm (1.5 kgm)
Fuel Line Fitting (High Pressure)	18 lb ft	24 Nm (2.4 kgm)
Fuel Line Fitting (Low Pressure)	11 lb ft	15 Nm (1.5 kgm)
Front Cover Bolts	18 lb ft	24 Nm (2.4 kgm)

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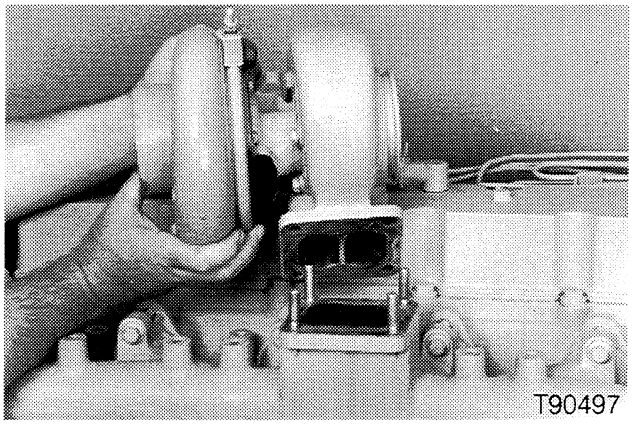
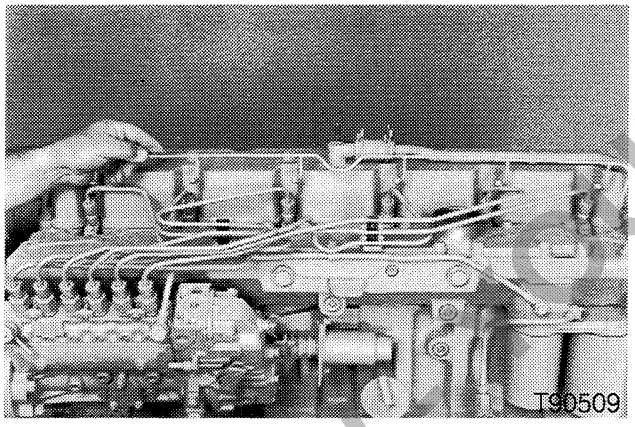
SERVICING THE CYLINDER HEAD AND VALVE TRAIN
Cylinder Head Removal

STEP 1



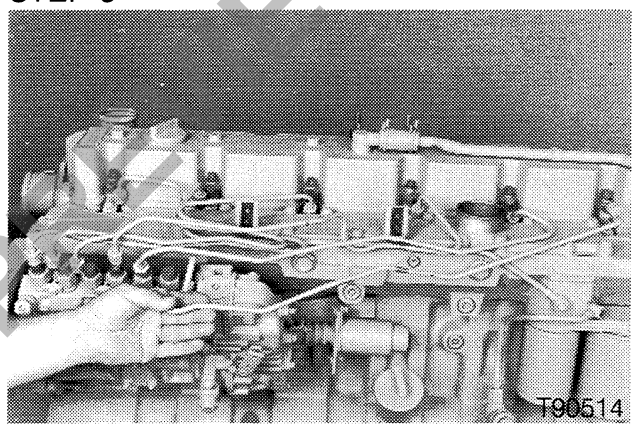
See Section 2465 to remove the turbocharger.

STEP 2



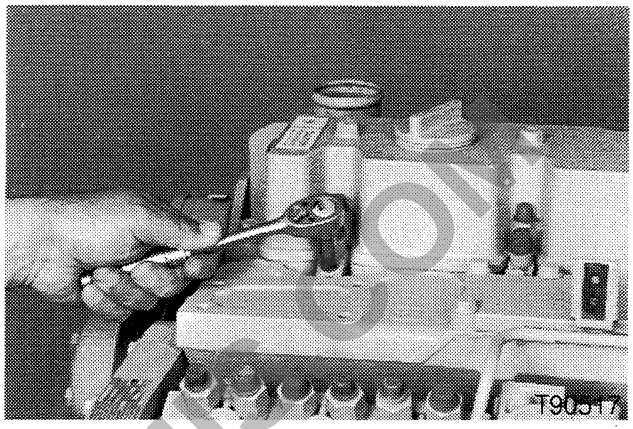
Remove the fittings, gaskets and the leak off line.

STEP 3



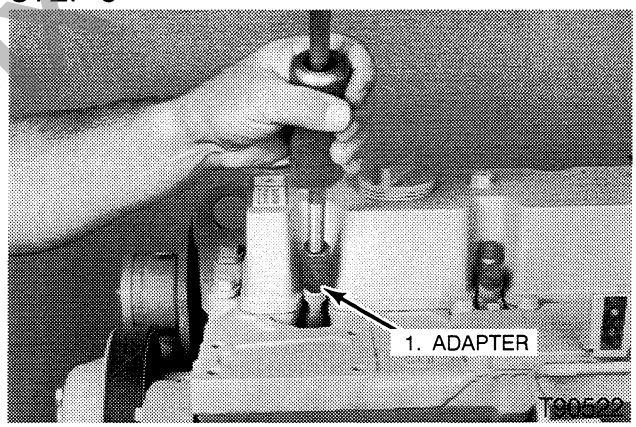
Disconnect the injection lines from the injectors and the injection pump. Remove the injection lines.

STEP 4



Remove the injector retaining bolts and the injector holders.

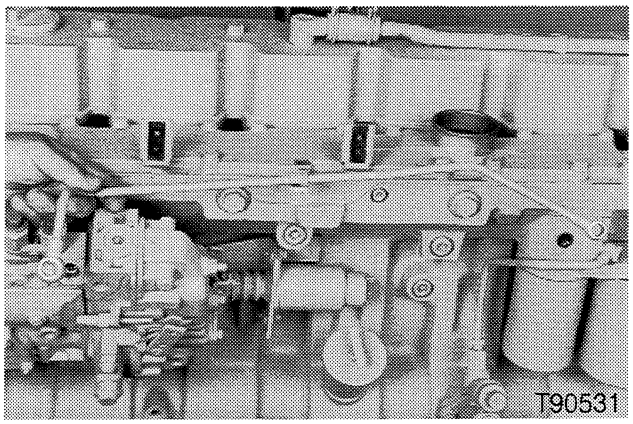
STEP 5



Install the injection puller adapter. Install a slide hammer in the adapter and remove the injector.

NOTE: *Make sure the injector seal is removed from the cylinder head.*

STEP 6



Remove the fittings and the fuel inlet line

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ENGINE SPECIFICATION DETAILS

	Metric Value
Cylinder Block	
Type	Wet Sleeved
Material	Cast Iron
Main Bearing Bore	104,987 to 105.013 mm
Maximum Service Limit	105.013 mm
Camshaft Bore	63.987 to 64.013 mm
Maximum Service Limit	64.013 mm
Lifter Bore	16,000 to 16.030 mm
Maximum Service Limit	16.055 mm
Cylinder Bore	132.900 to 132.950 mm
Maximum Service Limit	132.950 mm
Cylinder Counterbore	132.938 to 132.958 mm
Maximum Service Limit	132.958 mm
Cylinder Sleeve	
Type	Wet, Can Be Replaced
Material	Cast Iron
ID of Cylinder	114.000 to 114.040mm
Maximum Service Limit	114.117 mm
Maximum Out of Round (Installed in Block)	0.04 mm
Maximum Taper (Installed in Block)	0.04 mm
Sleeve Protrusion	0.013 to 0.109 mm
Piston	
Type	Cam Ground
Material	Aluminum Alloy
OD at 12 mm From the Bottom, 90 Degrees From Piston Pin	
Standard Size Piston	113.833 to 113.847
Minimum Service limit	113.776 mm
ID of Piston Pin Bore	45.006 to 45.012 mm
Maximum Service Limit	45.025 mm
Width of 1st Ring Groove (Top)	3.50 mm
Width of 2nd Ring Groove (Intermediate)	3.08 to 3.10 mm
Width of 3rd Ring Groove (Oil Ring)	4.040 to 4.060 mm
Protrusion Above Cylinder Block (Maximum)	0.018 to 0.380 mm
Piston Pin	
Type	Full Float
OD of Pin	44.997 to 45.003 mm
Minimum Service Limit	44.993 mm

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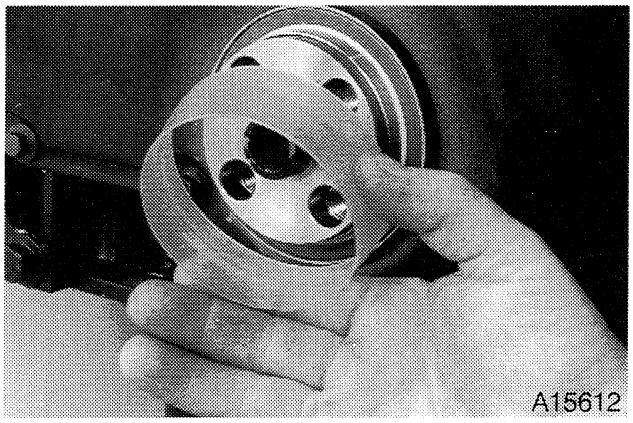
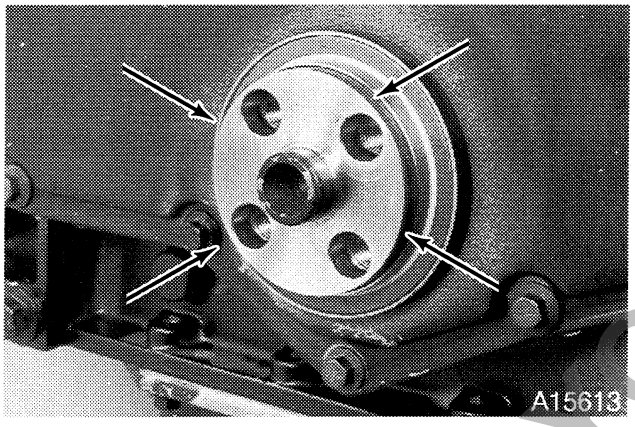
STEP 48



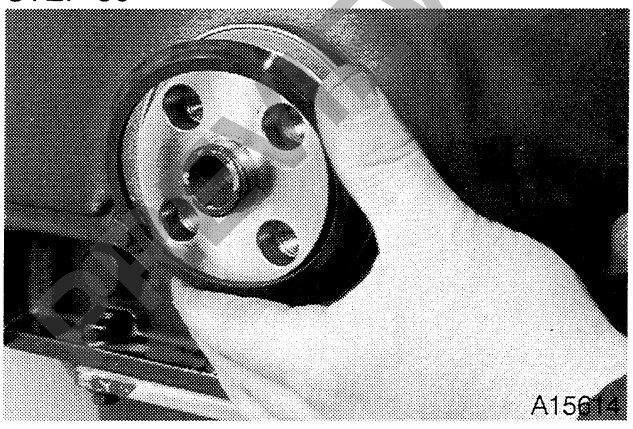
Remove the protective sleeve from the crankshaft.

STEP 49



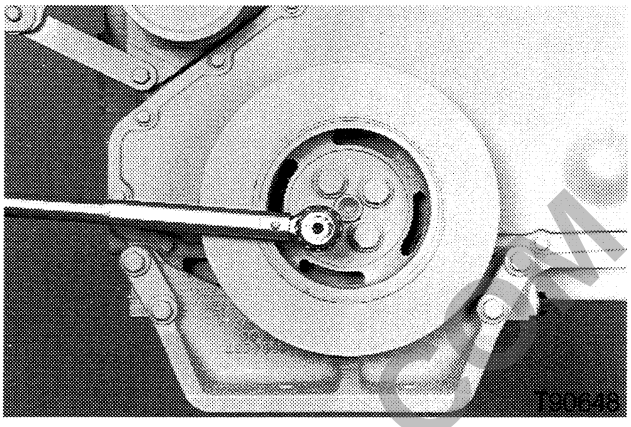
Measure the distance from the crankshaft end to the oil seal in four positions. The measurement must be the same in all positions.

STEP 50



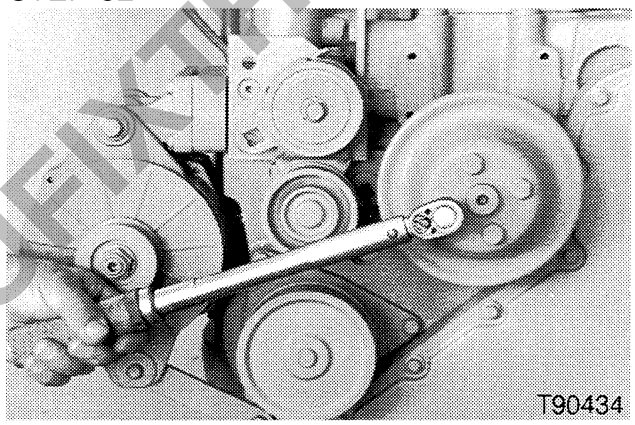
Install the crankshaft dust seal.

STEP 51



Install the crankshaft pulley. Tighten the bolts to a torque of 188 to 212 Nm.

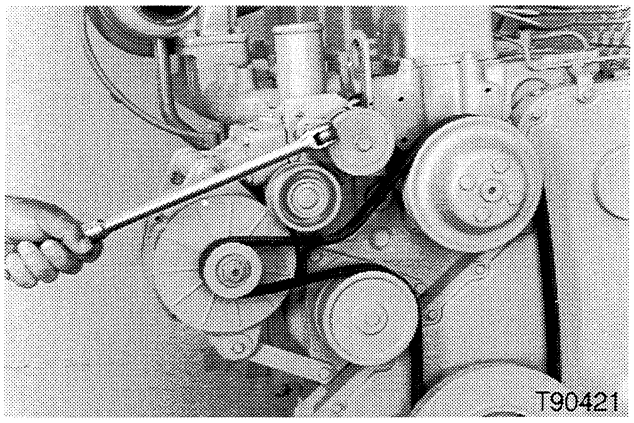
STEP 52



Install the fan pulley and tighten the fan pulley bolts to a torque of:

Grade 8.8 Size M8	21 to 31 Nm
Grade 10.9 Size M8	37 to 43 Nm
Grade 8.8 Size M10	51 to 62 Nm
Grade 10.9 Size M10	51 to 62 Nm

STEP 53



Lift the belt tensioner and install the fan belt.

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SPECIAL TORQUES (CONT'D)

	U.S. Value	Metric Value
Crankshaft Dampener Pulley	148 lb ft	200 Nm (20.0 kgm)
Cylinder Head Bolts (Lubricate the Threads with Engine Oil)	148 lb ft	200 Nm (20.0 kgm)
Injection Pump Drive Gear Nut	68 lb ft	93 Nm (9.3 kgm)
Injection Pump Retaining Nuts	32 lb ft	43 Nm 4.3 kgm)
Injector Leak Off Bolt	7 lb ft	9 Nm 0.9 kgm)
Injector Retaining Bolt	18 lb ft	24 Nm 2.4 kgm)
Intake Manifold Bolts	18 lb ft	24 Nm (2.4 kgm)
Intake Manifold Plug	92 lb ft	125 Nm (12.5 kgm)
Engine Lift Bracket Bolts	57 lb ft	77 Nm (7.7 kgm)
Main Bearing Bolts (Lubricate the Threads with Engine Oil)	129 lb ft	176 Nm (17.6 kgm)
Oil Pan Drain Plug	60 lb ft	80 Nm (8.0 kgm)
Oil Pan Heater Plug	60 lb ft	80 Nm (8.0 kgm)
Oil Pan Retaining Bolts	18 lb ft	24 Nm (2.4 kgm)
Oil Pump Retaining Bolts	18 lb ft	24 Nm (2.4 kgm)
Oil Inlet Tube Bolts	7 lb ft	9 Nm (0.9 kgm)
Oil Inlet Tube Brace	7 lb ft	9 Nm (0.9 kgm)
Oil Filter Housing Bolts	18 lb ft	24 Nm (2.4 kgm)
Rear Seal Retaining Bolts	7 lb ft	9 Nm (0.9 kgm)
Rocker Arm Bolts	32 lb ft	43 Nm (4.3 kgm)
Starter Retaining Bolts	57 lb ft	77 Nm (7.7 kgm)

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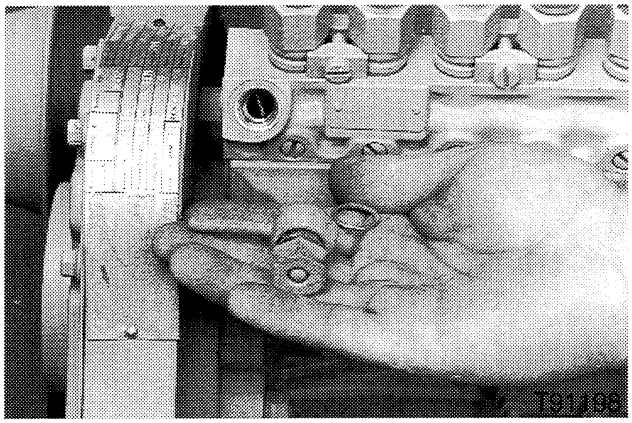
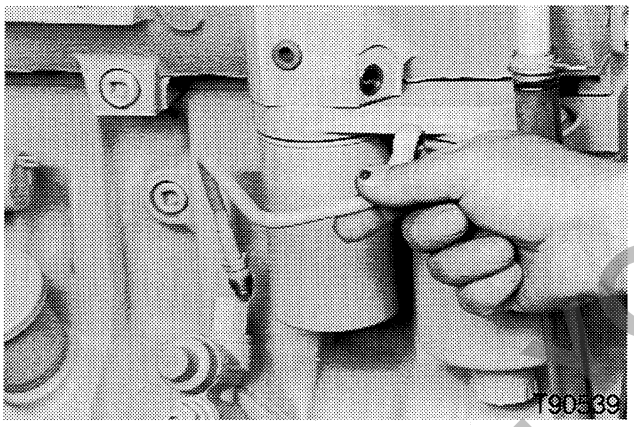
STEP 7



Remove the return line, fitting and gaskets.

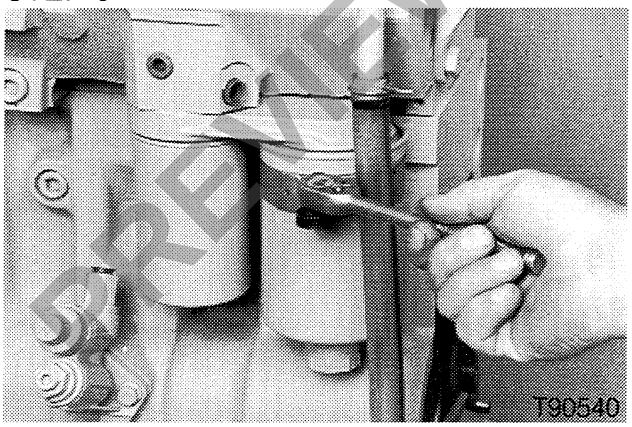
NOTE: *There are two gaskets on the return fitting, one on each side of the return line.*

STEP 8



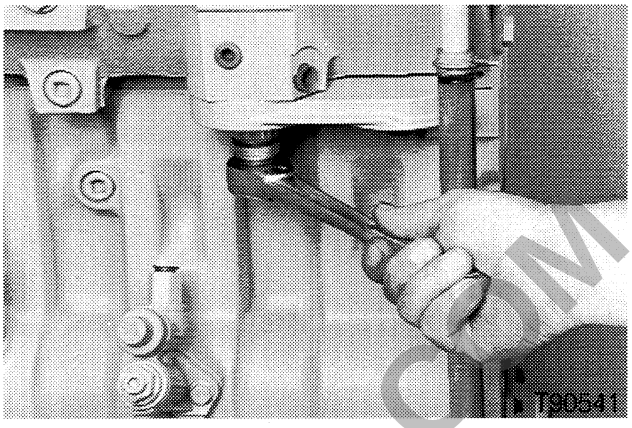
Disconnect and remove the fuel line.

STEP 9



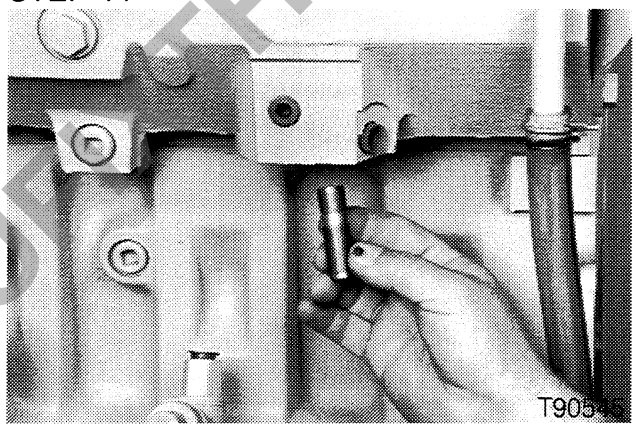
Use a strap wrench to remove the fuel filters.

STEP 10



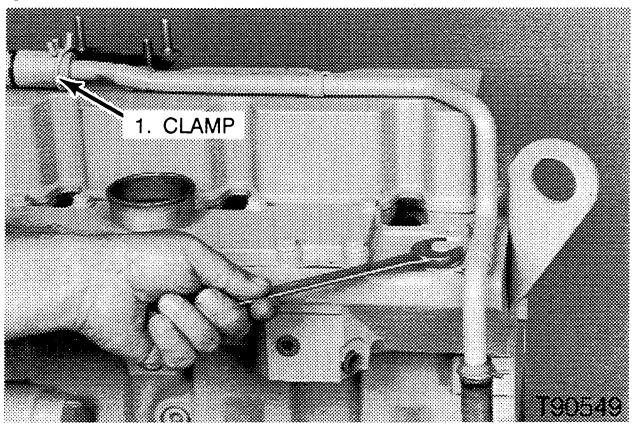
Remove the nut that holds the fuel filter housing and remove the filter housing.

STEP 11



Remove the fuel filter inlet fitting.

STEP 12



Remove the hose clamp, clamp bolt and the breather tube from the engine.

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Piston Rings

No. 1 Compression 6T830	Key Stone Type (Barrel Face)
End Gap in 114.020 ID	0.40 to 0.70 mm
No. 1 Compression 6-830 Engine	Key Stone Type Barrel Face
End Gap in 114.020 ID	0.40 to 0.70 mm
Maximum Service Limit	0.70 mm
No. 2 Compression	Rectangular Type (Taper Face)
End Gap in 114.020ID	0.40 to 0.70 mm
Maximum Service Limit	0.70 mm
Side Clearance	0.70 to 0.125 mm
No. 3 Oil Control Rings	Two Piece
End Gap in 114.020 ID	0.30 0.60 mm
Maximum Service Limit	0.60 mm
Side Clearance	0.020 to 0.065 mm

Cylinder Head

Warpage (Maximum)	0.20 mm
Valve Guide Bore	15.931 to 15.971 mm
Maximum Service Limit	15.971 mm
Insert Bore (Intake)	53.897 to 53.927 mm
Maximum Service Limit	53.927 mm
Insert Bore Depth (Intake)	12.00 to 12.20 mm
Maximum Service Limit	12.20 mm
Insert Bore (Exhaust)	46.997 to 47.027 mm
Maximum Service Limit	47.027 mm
Insert Bore Depth (Exhaust)	9.63 to 9.83 mm
Maximum Service Limit	9.83 mm

Lifters

Material	Hardened Iron
ID of Lifter	15.929 to 15.980 mm
Minimum Service Limit	15.925 mm
Bore Diameter in Block	16.000 to 16.030 mm
Maximum Service Limit	16.055 mm

Connecting Rod

Bushing	Steel Backed Leaded BRonze
Bushing ID Installed (Ream to Size)	45.023 to 45.035 mm
Maximum Service Limit	45.035 mm
Bearing Liners	Replaceable
Journal ID Without Bearing Liners	80.987 to 81.013 mm
Maximum Service Limit	81.013 mm
Bearing Oil Clearance	0.033 to 0.117 mm
Maximum Service Limit	0.117 mm
Side Clearance	0.100 to 0.300 mm
Maximum Service Limit	0.330 mm
Connecting Rod Bend (Maximum)	
Without Bushing	0.200 mm
With Bushing	0.150 mm
Connecting Rod Twist (Maximum)	
Without Bushing	0.500 mm
With Bushing	0.300 mm

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TROUBLESHOOTING CHART

Battery(ies)

PROBLEM	POSSIBLE CAUSE	CORRECTION
Discharged battery(ies).	Low electrolyte level in battery(ies).	See Electrolyte Level in Section 4005.
	Dirty battery top.	See Maintenance in Section 4005.
	Loose or dirty connections for battery cables.	Clean clamps on battery cables and clean battery posts.
	Damaged battery cell or cells.	Do Capacity (Load) Test in Section 4005.
	Low or no output from alternator.	Do Troubleshooting the Charging Circuit in this section.
Battery needs water frequently.	Battery malfunction.	Do Battery Tests in Section 4005.
	Bad wire connections between alternator and battery.	Clean and tighten connections.
	Bad voltage regulator.	Do the Alternator and Voltage Regulator Test in this section.

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SPECIAL TORQUES (CONT'D)

	U.S. Value	Metric Value
Thermostat Housing Bolts	18 lb ft	24 Nm (2.4 kgm)
Timing Pin Retaining Bolts	4 lb ft	5 Nm (0.5 kgm)
Fuel Shutoff Solenoid Bolts	7 lb ft	9 Nm (0.9 kgm)
Turbocharger Mounting Bolts	24 lb	32 Nm (3.2 kgm)
Turbocharger Drain Tube Bolts	18 lb ft	24 Nm (2.4 kgm)
Turbocharger Oil Supply (Both Ends)	18 lb ft	24 Nm (2.4 kgm)
Turbine Housing Bolts	96 lb inch	11 Nm (1.1 kgm)
Center Housing to Back Plate Bolts	48 lb inch	6 Nm (0.6 kgm)
Compressor Housing Bolts	48 lb inch	6 Nm (0.6 kgm)
Compressor Lock Nut	120 lb inch	14 Nm (1.4 kgm)
Thrust Bearing Screws (Torx Head)	36 lb inch	5 Nm (0.5 kgm)
Water Pump Mounting Bolts	18 lb ft	24 Nm (2.4 kgm)
Coolant Outlet Bolts	18 lb ft	24 Nm (2.4 kgm)
Valve Cover Bolts	18 lb ft	24 Nm (2.4 kgm)
Primer Pump Bolts	18 lb ft	24 Nm (2.4 kgm)
Timing Pin Cover(Injection Pump)	11 lb ft	15 Nm (1.5 kgm)
Oil Pressure Plug	60 lb ft	80 Nm (8.0 kgm)

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NOTE: The CASE CORPORATION reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

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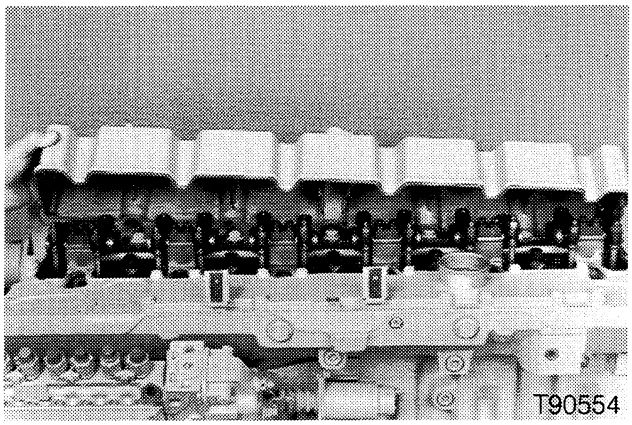
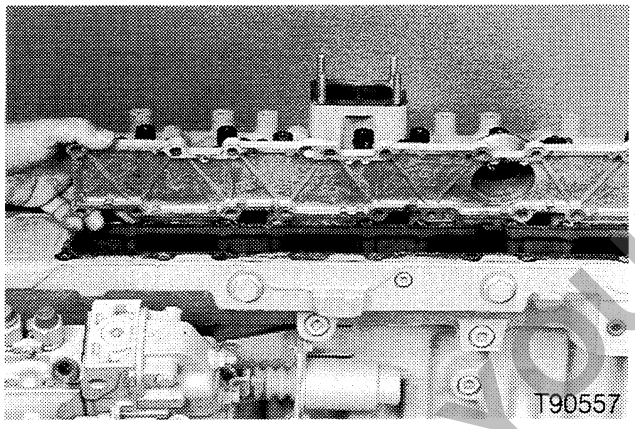
STEP 13



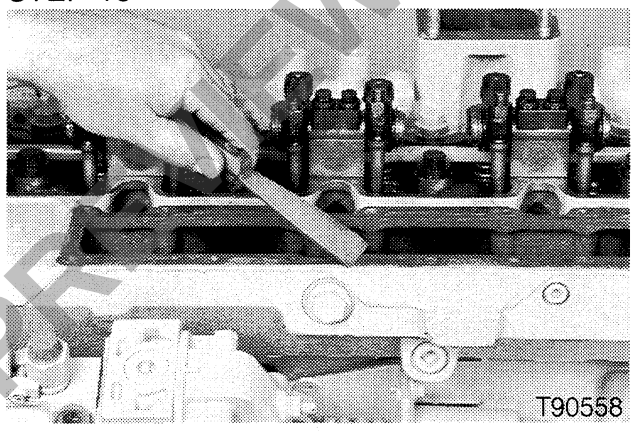
Remove the valve cover bolts and the valve cover.

STEP 14



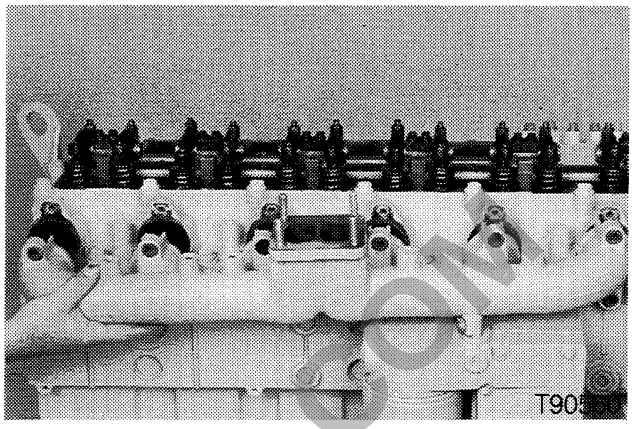
Remove the intake manifold cover bolts and the intake manifold cover.

STEP 15



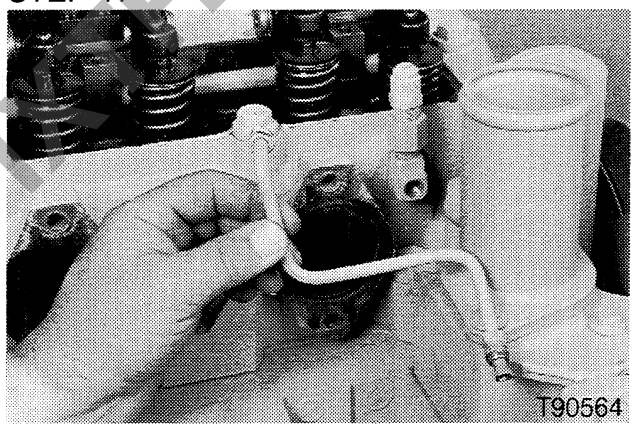
Clean the intake manifold mounting surfaces of all foreign material.

STEP 16



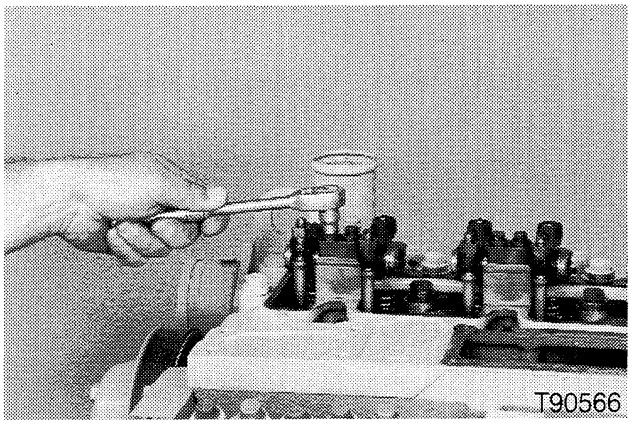
Remove the exhaust manifold bolts and the exhaust manifold.

STEP 17



Disconnect and remove the coolant bypass tube.

STEP 18



Remove the rocker arm bolts and the rocker arm assembly.

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Crankshaft

Type	Hardened Steel, Balanced
Main Bearing Liners	Replaceable
Crankshaft End Clearance	0.157 to 0.334 mm
Maximum Service Limit	0.381 mm
Center Main Bearing Thrust Surface Thickness	3.447 to 3.530 mm
Connecting Rod Journal	
OD Standard	75.987 to 76.013 mm
Maximum Service Limit	75.962 mm
0.25 mm OD Undersize, Grind to	75.737 to 75.763 mm
Maximum Service Limit	75.712 mm
0.50 mm OD Undersize, Grind to	75.487 to 75.513 mm
Maximum Service Limit	75.462 mm
0.75 mm OD Undersize, Guide to	75.237 to 75.263 mm
Maximum Service Limit	75.212 mm
1.00 mm OD Undersize, Grind to	74.987 to 75.013 mm
Maximum Service Limit	74.962 mm
Connecting Rod Journal Maximum Taper	0.013 mm
Journals Out of Round Maximum	0.050 mm
Undersize Main Bearing Liners For Service	0.25,0.50, 0.75 and 1.00 mm
Main Bearing Oil Clearance	0.66 to 0.134 mm
Maximum Service Limit	0.134 mm
Main Bearing Journal	
OD, Standard	97.987 to 98.013 mm
Maximum Service Limit	97.962 mm
0.25 mm OD Undersize, Grind to	97.737 to 97.763 mm
Maximum Service Limit	97.712 mm
0.50 mm OD Undersize, Grind to	97.487 to 97.513 mm
Maximum Service Limit	97.462 mm
0.75 mm OD Undersize, Grind to	97.237 to 97.263 mm
Maximum Service Limit	97.212 mm
1.00 mm OD Undersize, Grind to	96.987 to 97.013 mm
Maximum Service Limit	96.972 mm
Main Bearing Journal Bore ID No Liners	104.987 to 105.013 mm
Main Journal Width:	
1st, 2nd, 3rd, 5th and 6th	42.924 to 43.076 mm
4th	42.975 to 43.025 mm
Connecting Rod Journals Width	45.950 to 46.050 mm

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