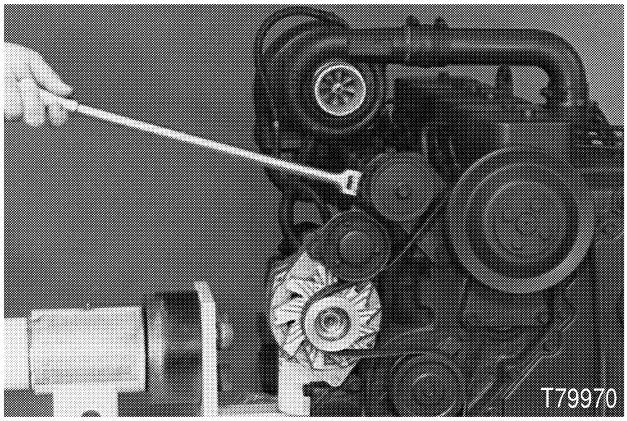
SERVICING THE CYLINDER HEAD AND VALVE TRAIN

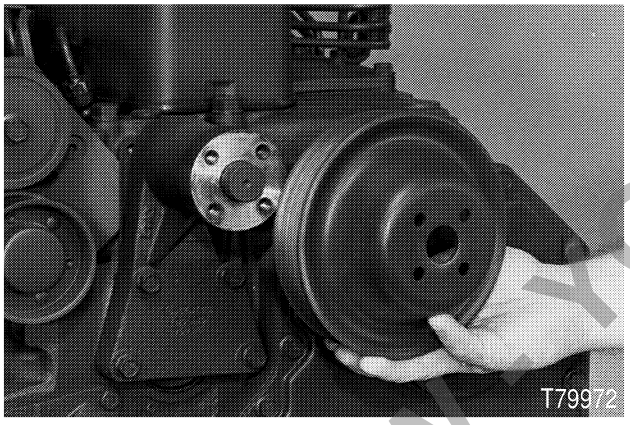
Cylinder Head Removal

STEP 1



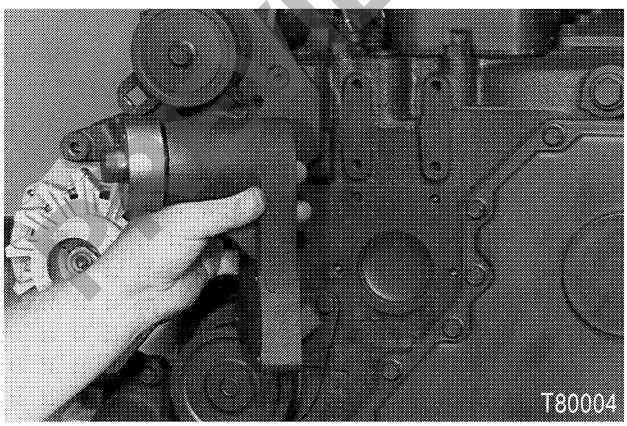
Lift the fan belt tensioner and remove the fan belt.

STEP 2



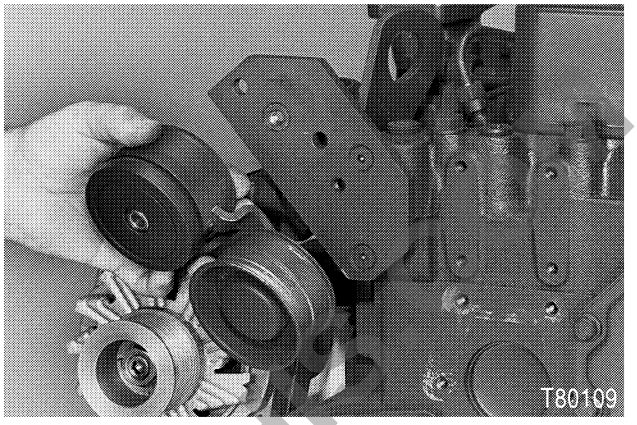
Remove the fan pulley bolts and fan pulley.

STEP 3



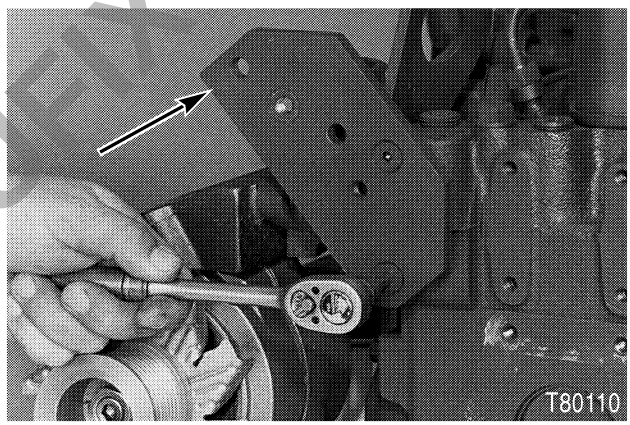
Remove the fan pulley bracket bolts and fan pulley bracket.

STEP 4



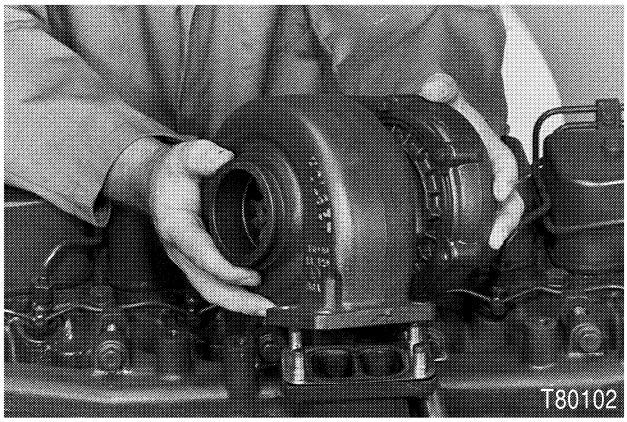
Remove the fan belt tensioner bolt and fan belt tensioner.

STEP 5



Remove the Allen head bolts and fan belt tensioner bracket.

STEP 6



See section 2465 to remove the turbocharger.

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6-590, 6T-590 and 6TA-590 Engines

Service Manual Don 7-67681

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Bosch Fuel Injection Pump with Aneroid	3416	7-38740

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Don 7-68021

March 1998

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SPECIAL TOOLS



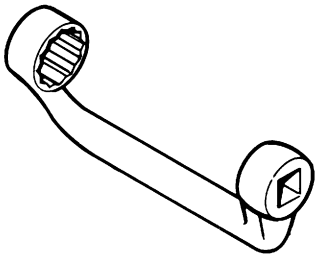
B902884J

CAS-1743 VALVE GUIDE REAMER



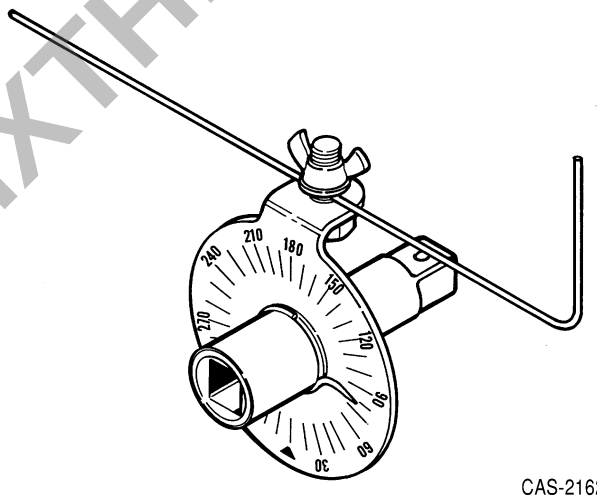
B902883J

CAS-1694 9 mm INJECTOR BORE CLEANER
CAS-2155 7 mm INJECTOR BORE CLEANER



B902886J

CAS-1066A WRENCH



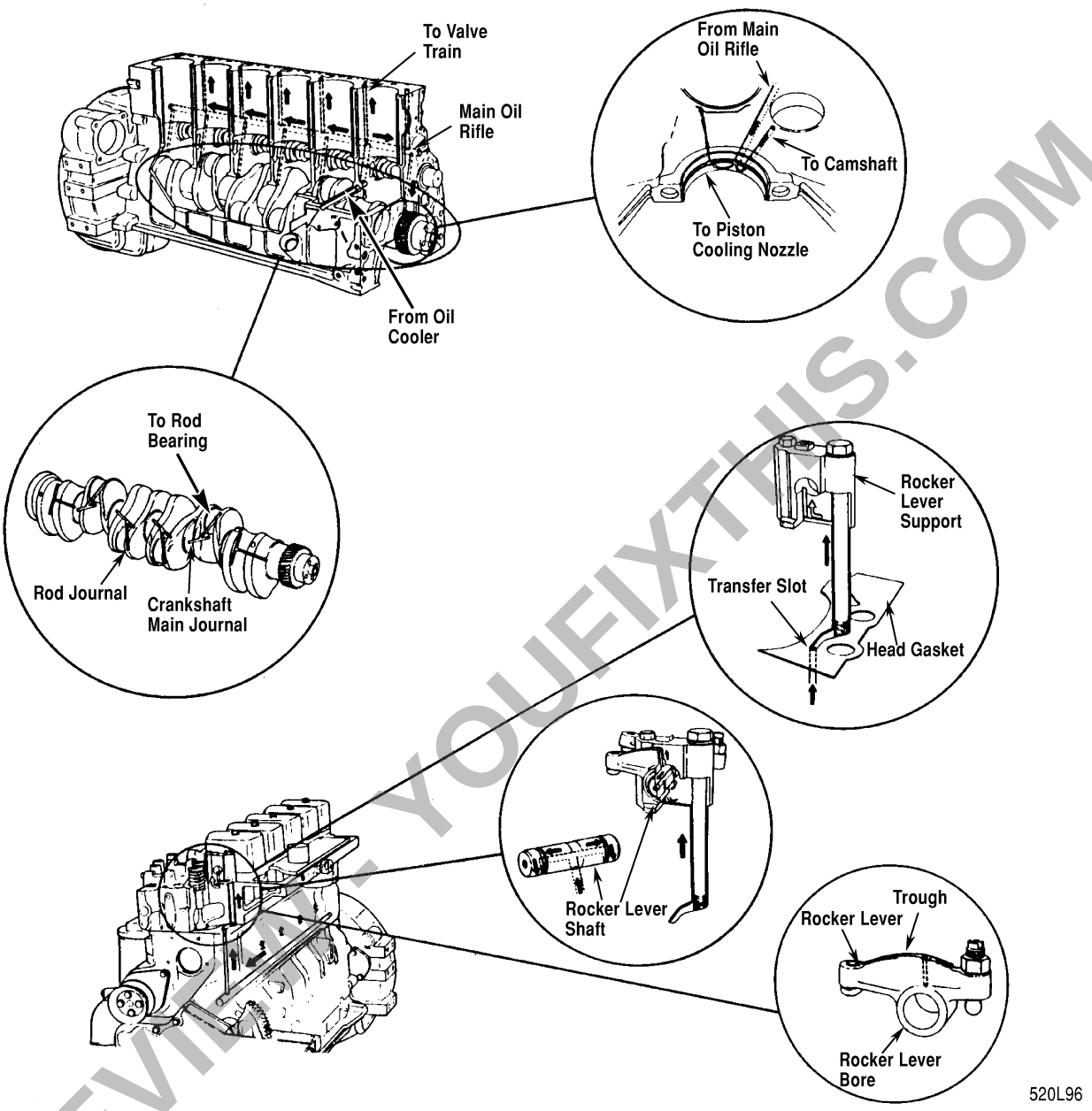
CAS-2162

CAS-2162 TORQUE ANGLE GAUGE

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Power Components



The main bearings and the valve train are lubricated by pressurized oil directly from the main oil rifle. The other power components, connecting rods, pistons and camshaft receive pressurized oil indirectly from the main oil rifle.

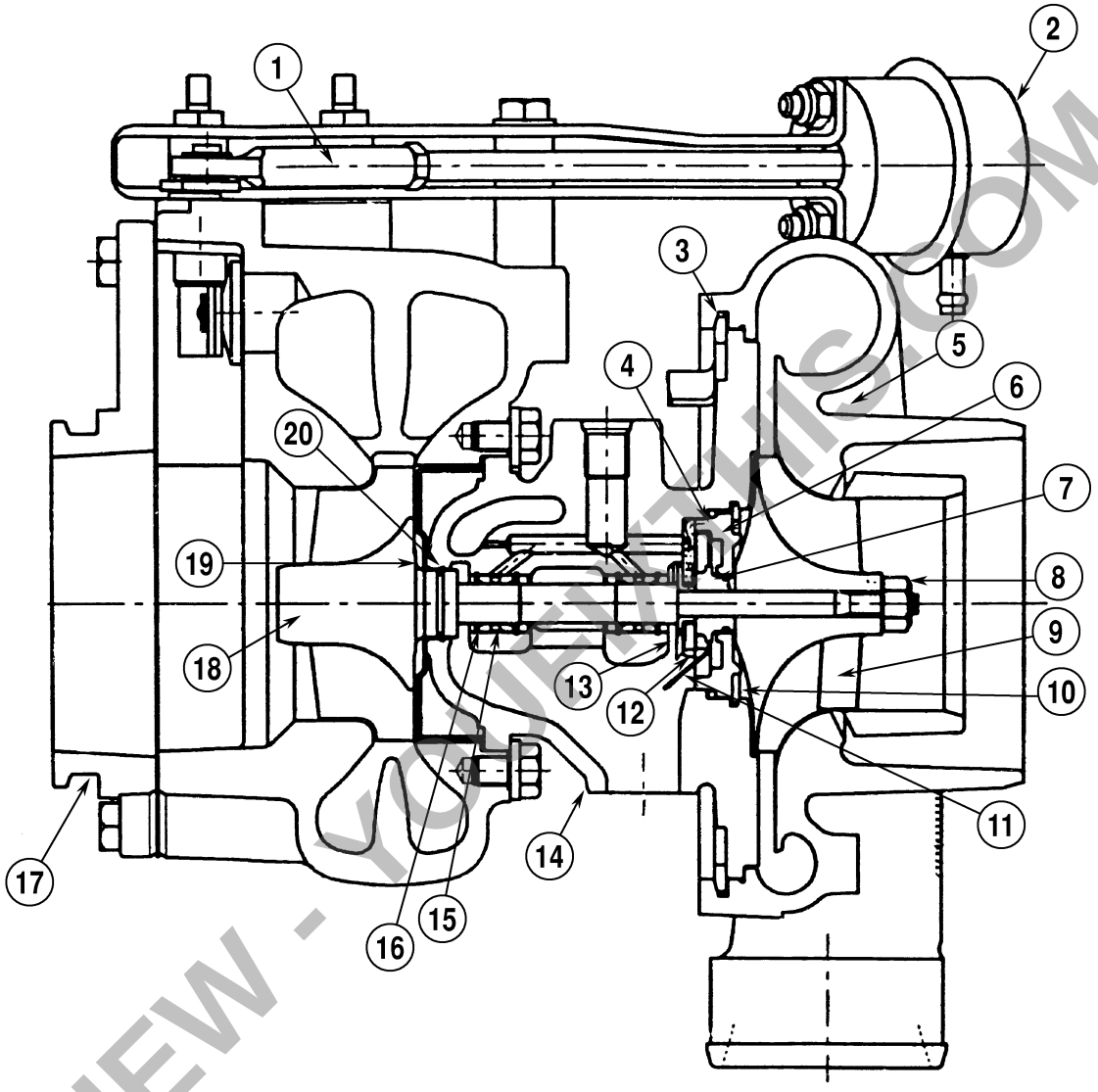
The drilling in the crankshaft supply oil to the connecting rod bearings. The oil is supplied to the camshaft journals through drillings in the main bearing saddle. Smaller drillings in the main bearing saddle supply oil to the piston cooling nozzles. The spray from the nozzles also provides lubrication for the piston pins.

The number one main bearing saddle does not contain a piston cooling nozzle. Cylinder number one revives the lubricating and cooling spray from the nozzle located in the number two bearing saddle. Cylinder number two receives the spray from the number three bearing saddle, etc.

Lubrication for the valve train is supplied through separate drillings in the cylinder block. The oil flows through the drillings and across the oil transfer slot in the cylinder head gasket. From the transfer slot, the oil flows around the outside diameter at the cylinder head capscrew, across a slot in the bottom of the rocker lever support, and up a vertical drilling in the support. From these drillings, oil flows through drillings in the rocker lever shaft to lubricate the rocker levers. Oil flows through a drilling in the rocker levers to fill a channel cast into the top of the levers. The oil from the channel lubricates the valve stems, push rods and tappets.

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HX35W Turbocharger Cross Section



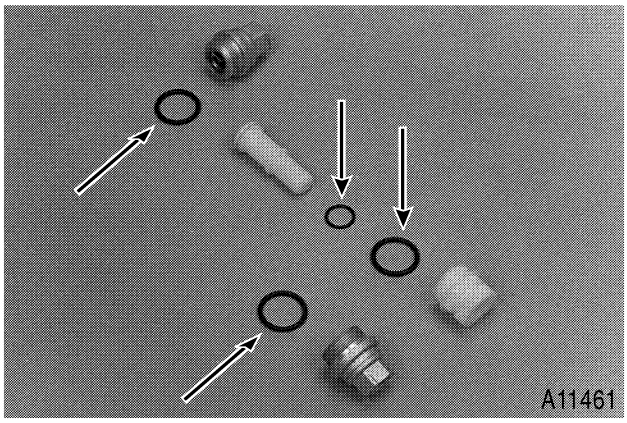
69L96

1. ADJUSTING LINK
2. ACTUATOR CANISTER
3. RETAINING RING
4. OIL SEAL PLATE
5. COMPRESSOR HOUSING
6. SPLIT SEAL
7. OIL SLINGER
8. LOCK NUT
9. COMPRESSOR IMPELLER
10. RETAINING RING
11. OIL BAFFLE
12. THRUST BEARING
13. THRUST COLLAR
14. BEARING HOUSING
15. BEARING
16. RETAINING RING
17. ADAPTER
18. WHEEL AND SHAFT
19. HEAT SHIELD
20. SPLIT RING SEAL

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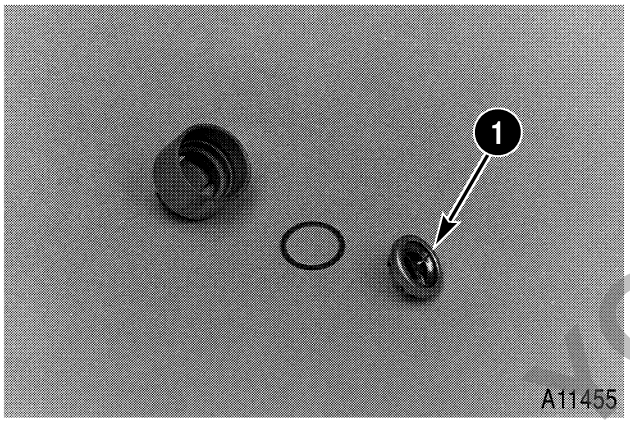
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STEP 12



Install new O-rings on the inlet and outlet fittings. Install new O-rings on the hand prime button and fitting.

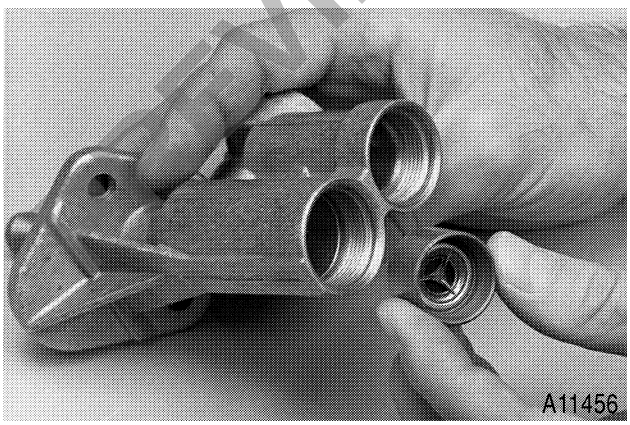
STEP 13



1. FLAT SIDE

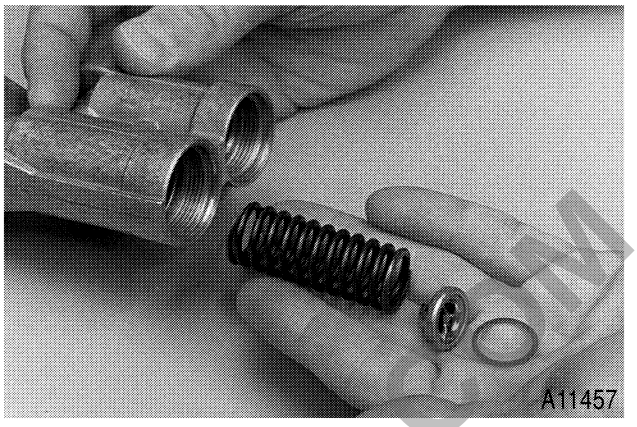
Install a new check valve gasket and a check valve in the piston. Be sure the check valve is installed with the flat side up.

STEP 14



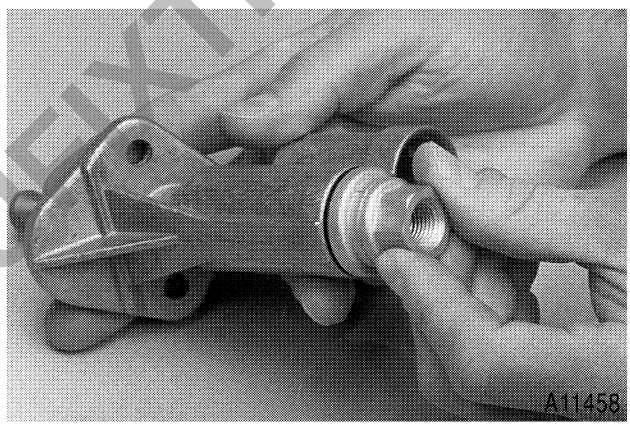
Install the piston assembly into the pump body.

STEP 15



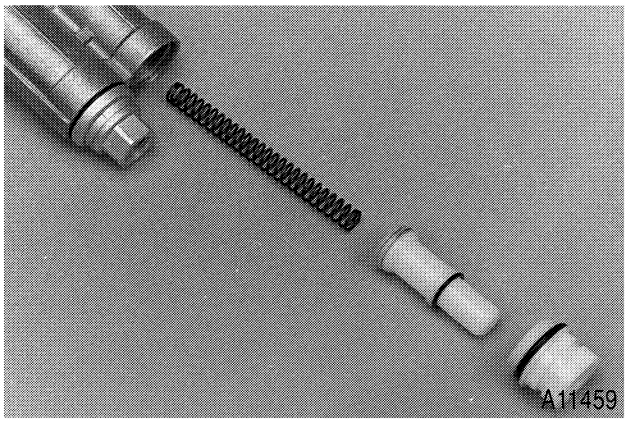
Install the spring, the other check valve and another new check valve gasket into the pump body. Be sure the check valve is installed with the flat side up.

STEP 16



Install the inlet fitting and finger tighten.

STEP 17



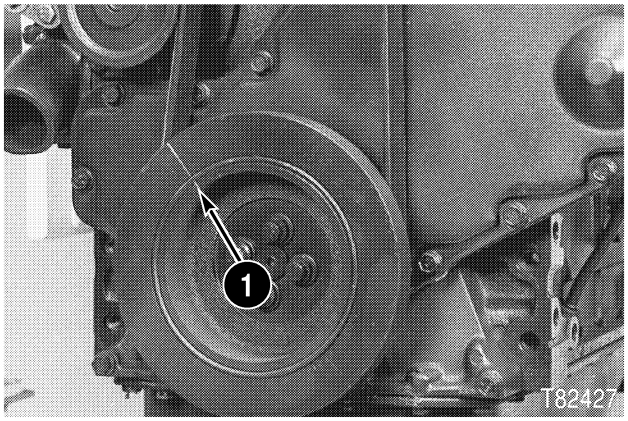
Install the remaining spring, hand prime button and fitting into the pump body. Finger tighten the hand prime fitting.

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SERVICING THE ENGINE BLOCK

Front Oil Seal Replacement

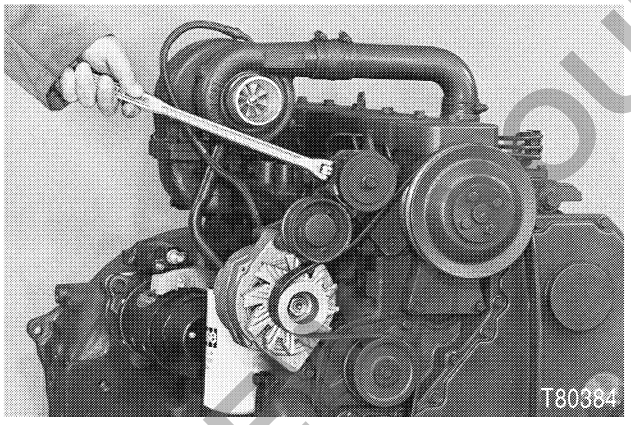
STEP 1



1. TIMING MARKS

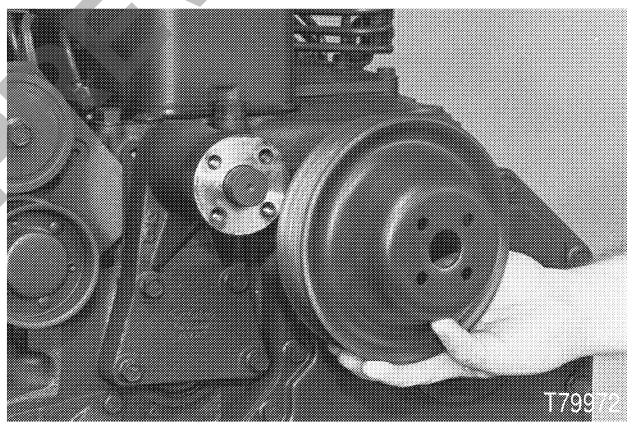
Make sure the inner and outer mark on the crankshaft pulley are aligned. If the mark is not aligned, the crankshaft pulley must be replaced.

STEP 2



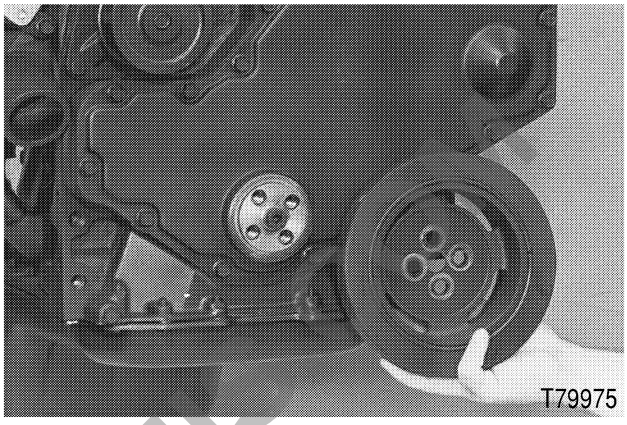
Lift the belt tensioner and remove the fan belt.

STEP 3



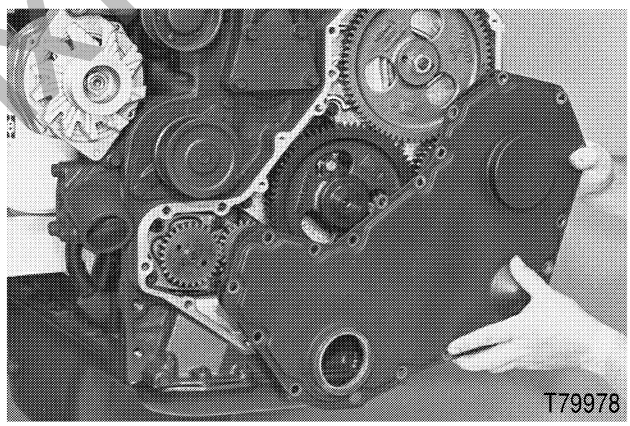
Remove the fan pulley bolts and the fan pulley.

STEP 4



Remove the crankshaft pulley bolts and the crankshaft pulley.

STEP 5



Remove the front cover bolts and the front cover.

STEP 6

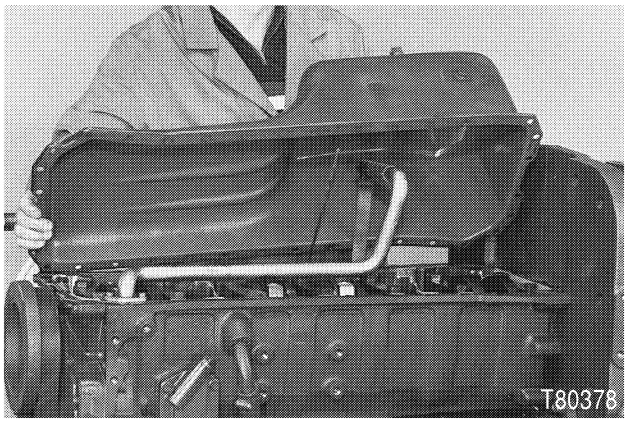


Clean the crankshaft seal surface with Loctite safety solvent.

IMPORTANT: *The seal surface on the crankshaft must be free of all oil and grease to prevent damage to the oil seal.*

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STEP 252

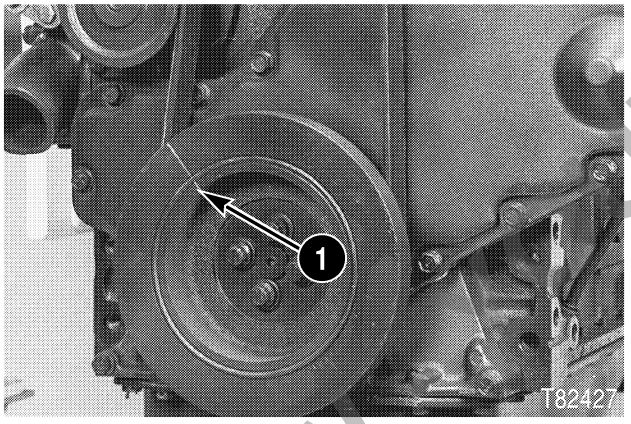


Install the engine oil pan. See Section 2445 for oil pan installation.

CAMSHAFT

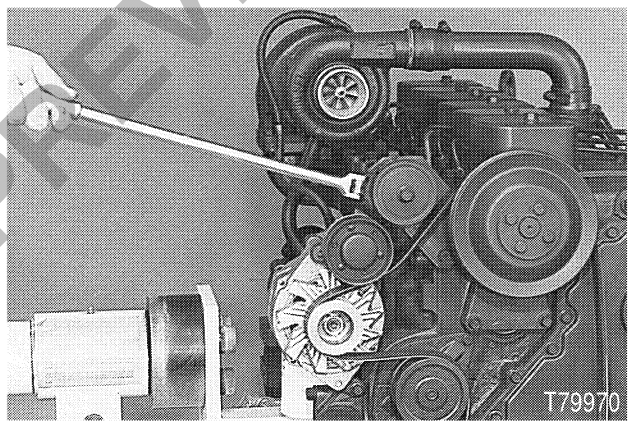
Removal

STEP 253



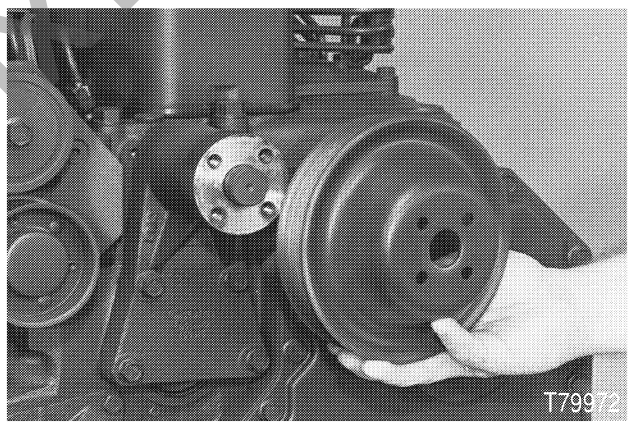
Make sure the inner and outer mark (1) on the crankshaft pulley are in align. If the upper and lower mark are not in align, replace the crankshaft pulley.

STEP 254



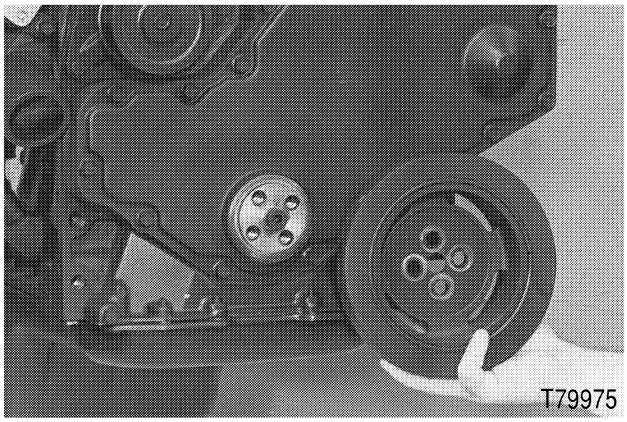
Lift the belt tensioner and remove the fan belt.

STEP 255



Remove the fan pulley bolts and the fan pulley.

STEP 256



Remove the crankshaft pulley bolts and the crankshaft pulley.

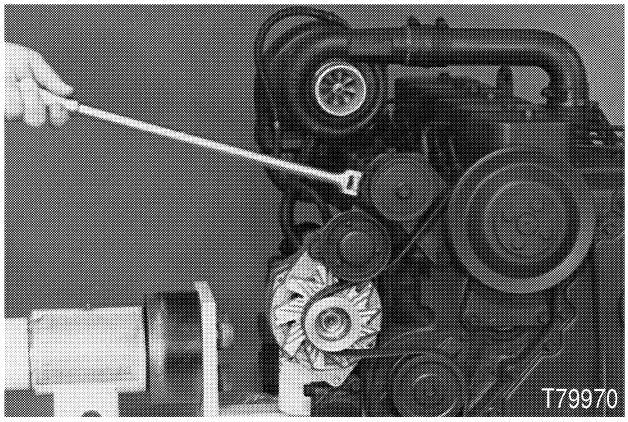
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COOLANT INLET SERVICING

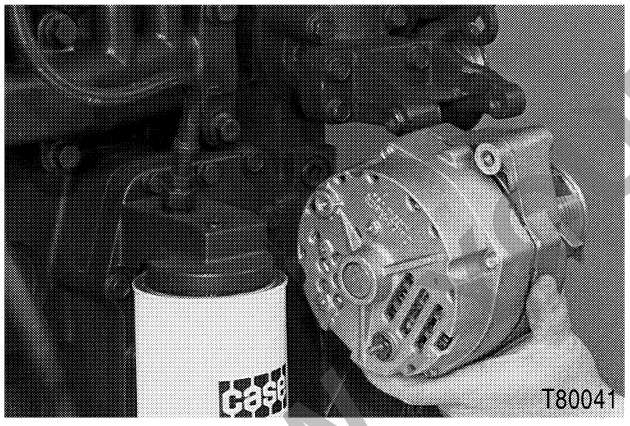
Coolant Inlet Removal

STEP 18



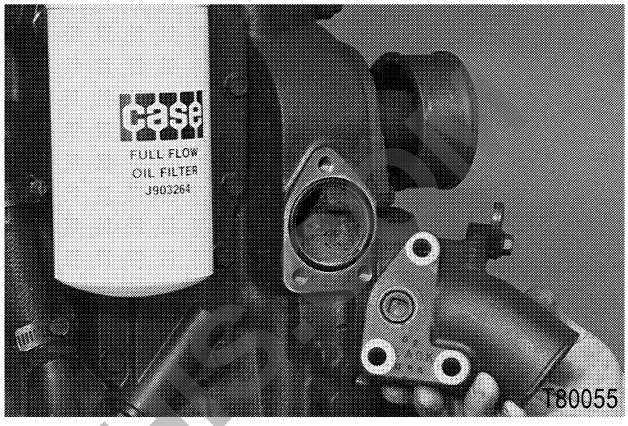
Lift the belt tensioner pulley and remove the fan belt.

STEP 19



Remove the alternator bolts and the alternator.

STEP 20

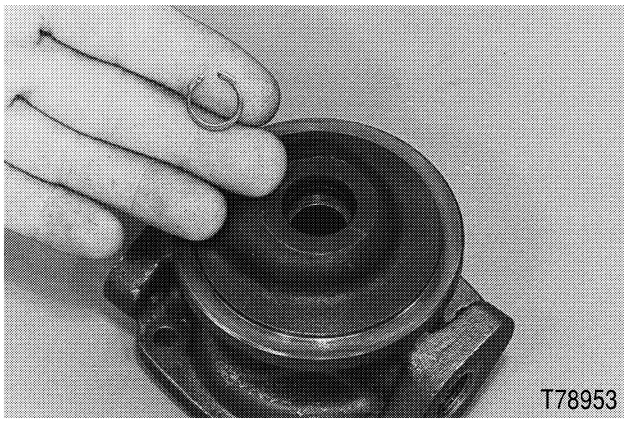


Remove the coolant inlet bolts and the coolant bolt

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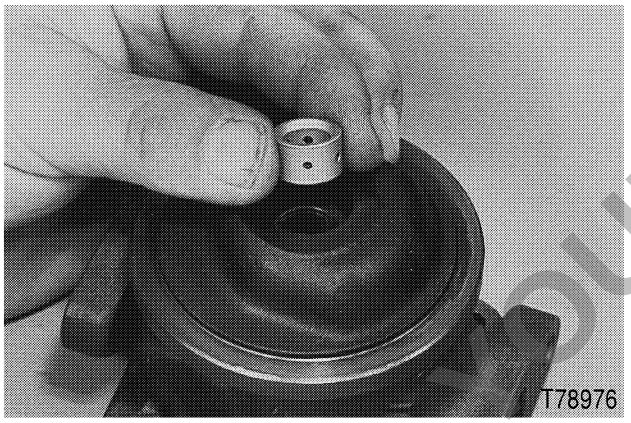
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STEP 56



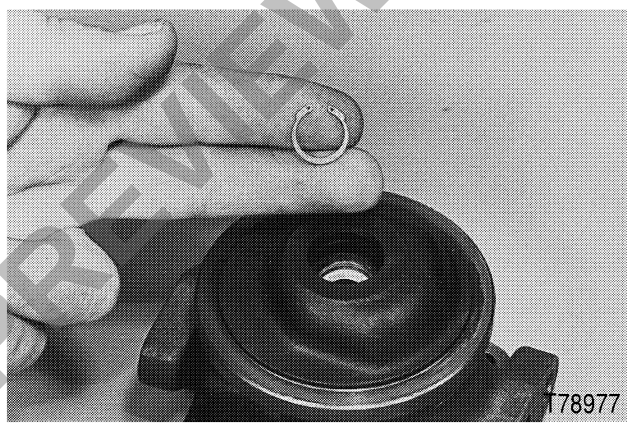
Install a new inner bearing retaining ring. The round edge of the retaining ring must be toward the top.

STEP 57



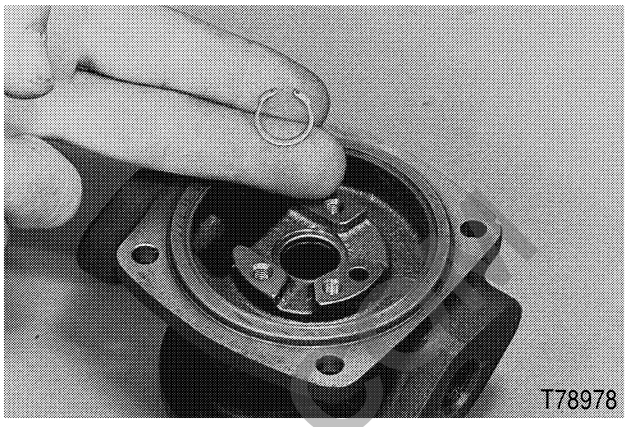
Install a new center housing bearing.

STEP 58



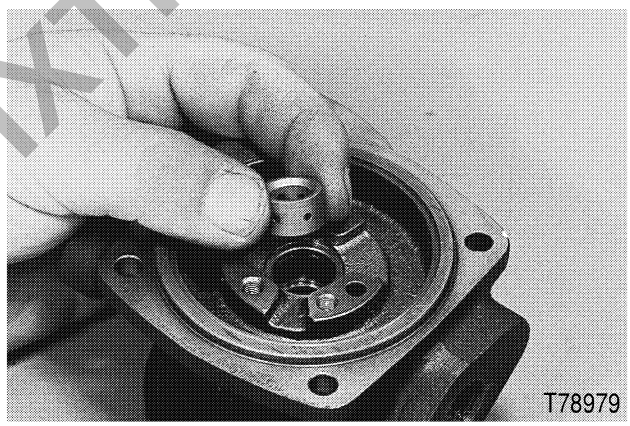
Install a new outer bearing retaining ring

STEP 59



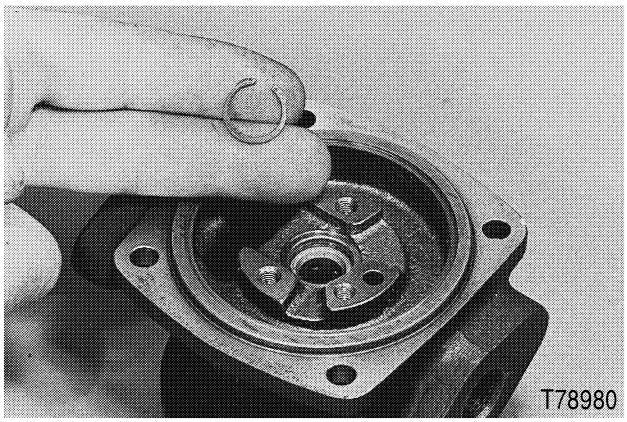
Turn the center housing over and install a new inner bearing retaining ring. The round edge of the retaining ring must be toward the top.

STEP 60



Install a new bearing in the center housing.

STEP 61

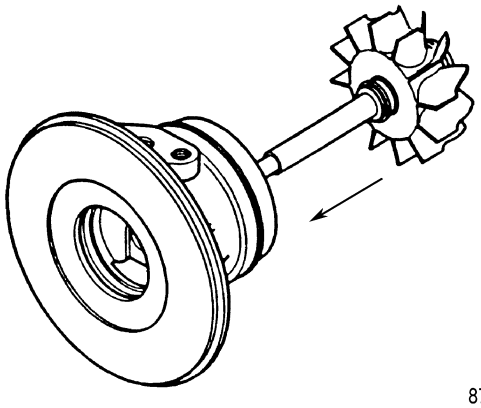


Install a new outer bearing retaining ring with the round edge down.

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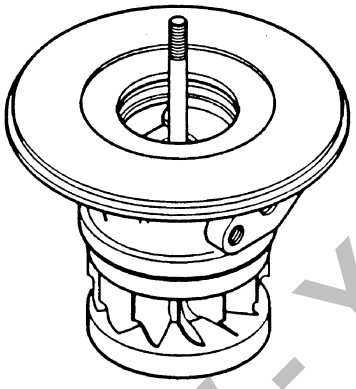
STEP 54



87L96B

Lubricate the shaft using clean engine oil. Align the piston ring seal so the gap is positioned 180˚ from the oil drain hole in the housing. Gently press down on the turbine wheel with a slight rotation motion to properly locate the seal.

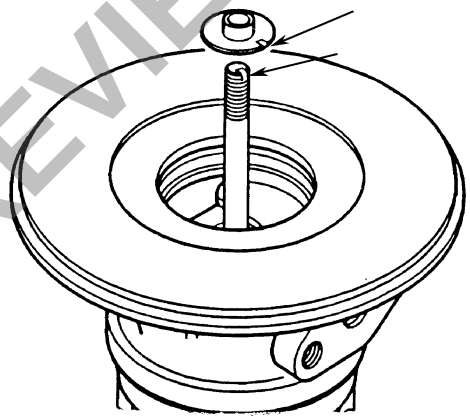
STEP 55



87L96C

Put the assembly turbine wheel in a suitable fixture.

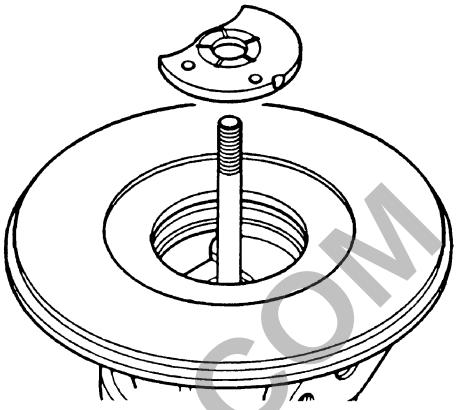
STEP 56



88L96A

Align the balance mark on the thrust collar with the mark on the shaft. Install the thrust collar on the shaft.

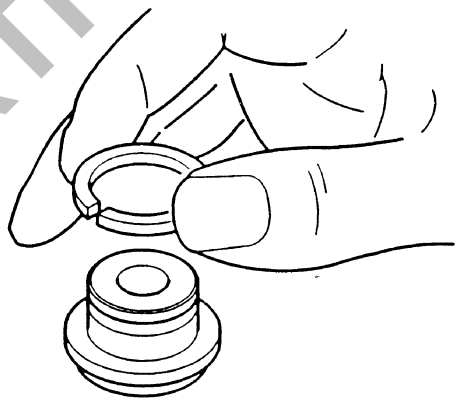
STEP 57



88L96B

Lubricate the thrust bearing with clean engine oil. Install the thrust bearing onto the shaft.

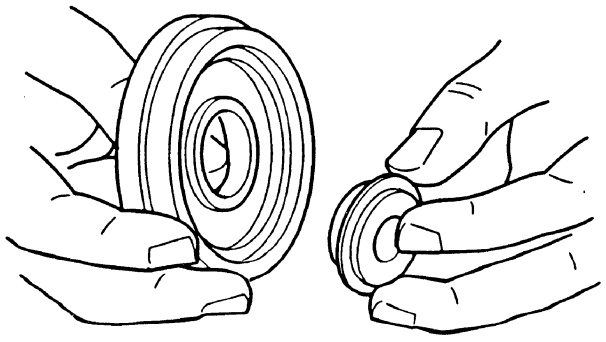
STEP 58



83L96C

Install a new piston ring seal onto the oil slinger.

STEP 59



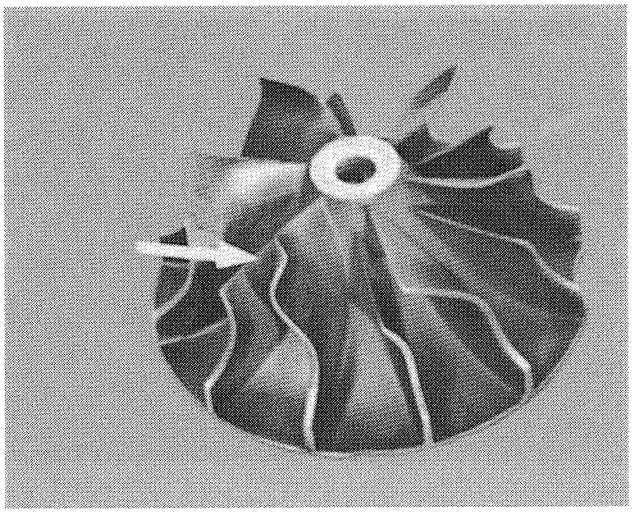
89L96A

Lubricate the oil slinger with clean engine oil. Install the oil slinger into the oil seal plate.

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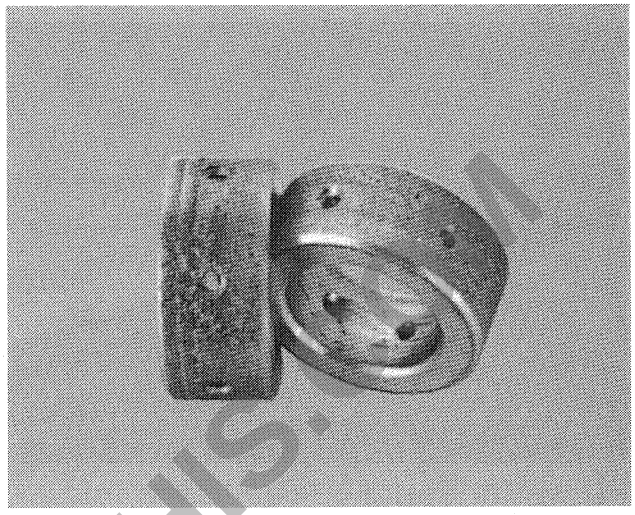
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Blade Edges Lifted



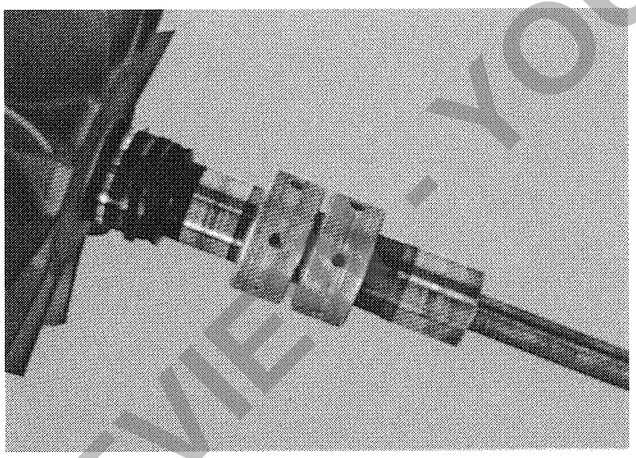
Blade edges of the compressor wheel lifted by improper removal of the compressor housing. Housing should not be pried off but lifted straight off.

Bearing Damage



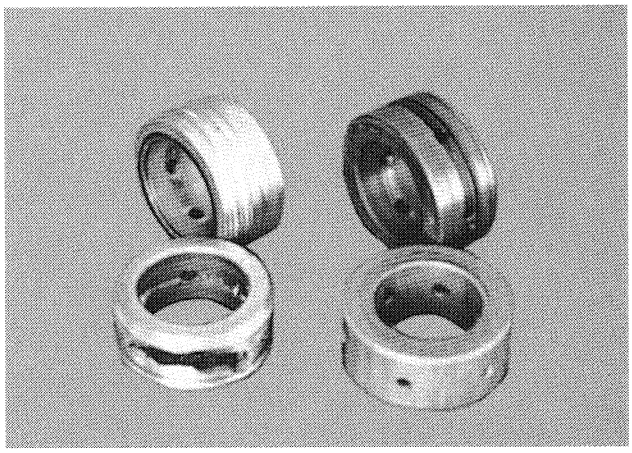
Engine bearing material imbedded in the bearing surfaces. Checkout the engine for possible bearing failure.

Turbine Shaft & Bearings



Turbine shaft and bearings showing effect of oil starvation.

Bearing Failure



Bearing failures occur in two separate areas. Scoring on the inside as well as the outside is attributed to dirty oil. Abrasive wear can also cause erosion around the oil holes in the bearings. A good bearing is shown in the lower right for comparison.

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