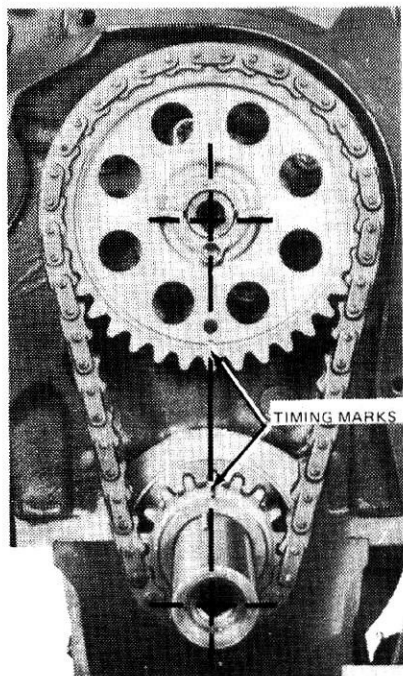


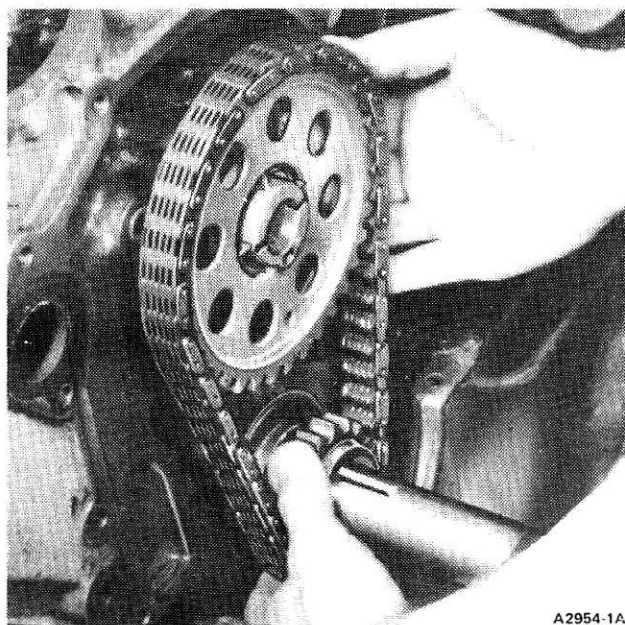


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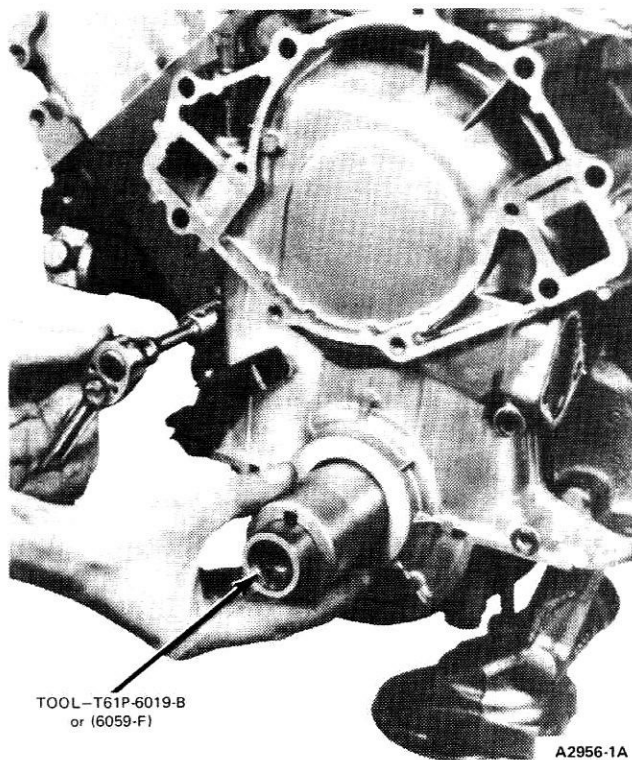
**FIG. 22 Aligning Timing Marks**

other as shown in Fig. 22. Install the chain and sprockets as an assembly to crankshaft and camshaft. Verify proper alignment of timing marks after installation.

2. Install the fuel pump eccentric, camshaft sprocket cap screw and washer. Torque cap screw to specification. Lubricate timing chain with engine oil.
3. Coat the gasket surface of the oil pan with sealer. Cut and position the required sections of a new seal on the oil pan. Apply sealer at the corners.
4. Coat the gasket surfaces of the block and cover with sealer, and position a new gasket on the block.
5. Position the cylinder front cover and water pump on the cylinder block. Use care when installing the cover to avoid seal damage or possible mislocation.
6. Install the cylinder front cover to seal alignment tool into proper position. It may be necessary to force the cover downward to slightly compress the pan seal. This operation can be made easier by using a suitable tool at the attaching bolt hole locations.
7. Coat the threads of the attaching bolts with oil-resistant sealer and install the screws.
8. While pushing in on the alignment tool (Fig. 24), torque the oil pan to cover attaching bolts to specification. Torque the cover to cylinder block attaching screws. Remove alignment tool.
9. Apply Lubriplate or equivalent to front of crankshaft for damper installation.
10. Position crankshaft damper Woodruff key and install crankshaft damper (Fig. 25). Install damper attaching screw and washer.
11. Install the crankshaft pulley.
12. Coat new fuel pump gasket with oil-resistant sealer and place on fuel pump. Install fuel pump. Connect fuel lines to fuel pump.
13. Install compressor support bracket to compressor and water pump, if so equipped.



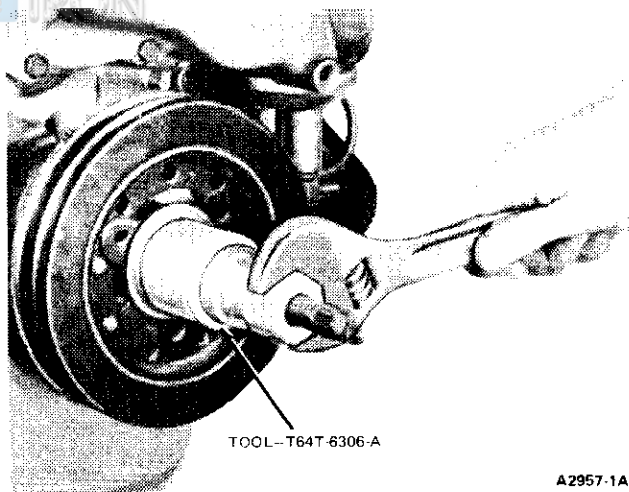
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**FIG. 23 Removing or Installing Timing Chain**

A2956-1A

**FIG. 24 Aligning Cylinder Front Cover**

14. Install water pump pulley and all drive belts.
15. Position radiator to lower support, position upper support to radiator, and install attaching bolts. Connect radiator upper and lower hoses at engine. On Police Interceptor models, connect engine oil cooler coolant lines at water pump and tighten hose clamps to specification. Connect oil cooler lines.
16. Place fan assembly inside radiator shroud and set in position in vehicle. Position the fan on the water pump and install and torque the attaching bolts. Install screws attaching shroud to radiator.



A2957-1A

FIG. 25 Installing Crankshaft Vibration Damper

17. Adjust belt tensions to specification. Tighten alternator and air pump attaching bolts and compressor idler pulley, if so equipped, to specification.
18. Fill and bleed the cooling system. Fill the crankcase to the correct level with the recommended oil.
19. Run engine at fast idle and check for coolant and oil leaks. Adjust ignition timing.

## FRONT OIL SEAL

### Removal

Replacement of the front oil seal is recommended whenever the cylinder front cover is removed.

1. Drive out the old seal with a pin punch. Clean the seal recess in the cylinder front cover.

### Installation

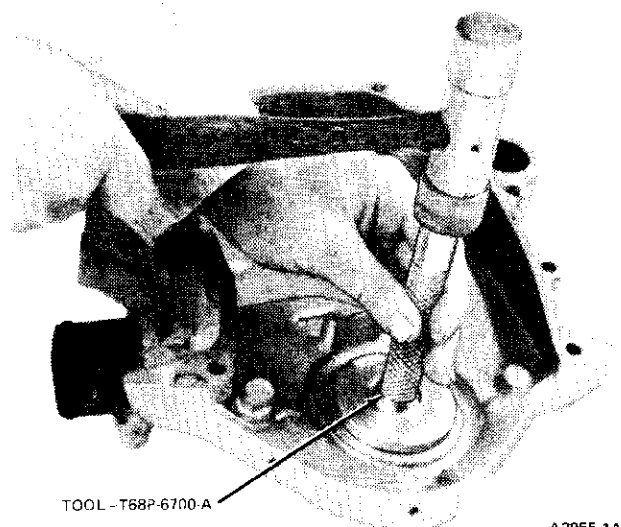
1. Coat a new seal with grease. Install the seal with Tool T68P-6700-A (Fig. 26). **After installation, be sure seal spring remains in proper position.**

## CAMSHAFT

The camshaft and related parts are shown in Fig. 27.

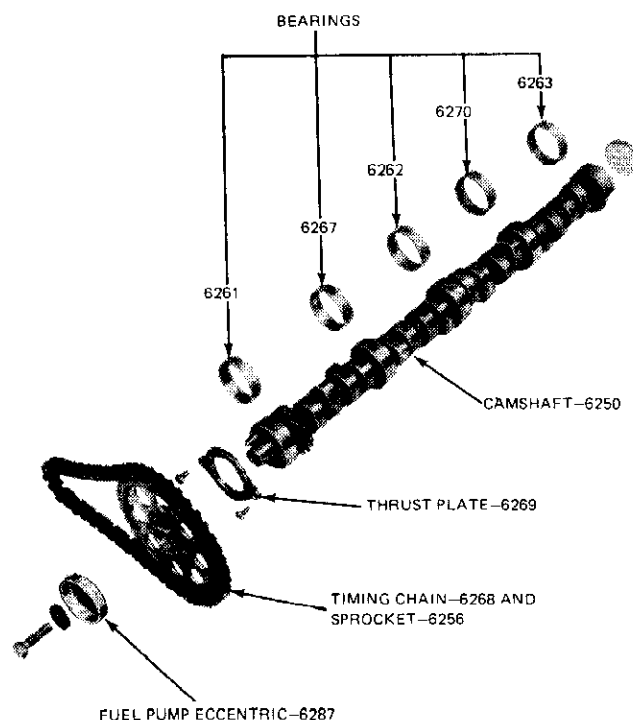
### Removal

1. Remove timing chain and sprockets, following procedure under Cylinder Front Cover and Timing Chain. Check timing chain deflection before removal (Part 21-01).
2. Remove the intake manifold and carburetor as an assembly, following the instructions under Intake Manifold.
3. Remove valve rocker arm covers. Back off all rocker arm bolts, turn rocker arms sideways, and remove the push rods in sequence (Fig. 18).
4. Remove the tappets with a magnet and place them in a rack in sequence. If the tappets are stuck in bores, use Tool (T70P-14151) to remove them. Rotate the tappets back and forth to loosen them from gum or varnish deposits.
5. Remove the bolts attaching the air conditioning condenser to the chassis, if so equipped, and



A2955-1A

FIG. 26 Installing Front Oil Seal



A2959-1C

FIG. 27 Camshaft and Related Parts

carefully move the condenser to rest on the left fender apron. Secure it in this position.

6. Remove the grille.
7. Remove the camshaft thrust plate attaching bolts, and carefully remove the camshaft from the front of engine. **Do not damage the camshaft bearings.**

Refer to Part 21-01 for cleaning and inspection procedures.

Refer to Part 21-01 for repair procedure.

## Installation

1. Oil the camshaft journals and apply Lubriplate or equivalent to the cam lobes. Carefully slide camshaft into position.
2. Install camshaft thrust plate. Check camshaft end play, following procedure in Part 21-01. If end play is excessive, replace the camshaft thrust plate.
3. Install timing chain, sprockets, and cylinder front cover as detailed under Cylinder Front Cover and Timing Chain. Install the vibration damper.
4. Position the radiator in the vehicle and install the radiator upper support to secure radiator. Connect the radiator fan shroud, fresh air duct assembly hose and transmission oil cooler lines.
5. Install the grille center support and air conditioning condenser, if so equipped.
6. Lubricate the tappets and tappet bores with heavy oil SE before installing them. Lubricate the push rod ends with Lubriplate or equivalent. Install the tappets and push rods in their original position.
7. Install intake manifold and carburetor, following the procedure under Intake Manifold.
8. Rotate the crankshaft damper until No. 1 piston is at TDC at the end of compression stroke. Position the distributor in the block with the rotor at No. 1 firing position and the stator tooth centered on the magnetic pickup (see Part 23-01). Install the hold down clamp. Connect the distributor wiring harness.
9. Apply Lubriplate or equivalent to valve stem tips. Position rocker arms over push rods and tighten bolts following the procedure under Valve Rocker Arm Installation. Check tappet clearance, as shown in Part 21-01.
10. Clean the valve rocker arm covers and cylinder head gasket surfaces. Apply oil-resistant sealer to one side of the new cover gaskets. Lay the cemented side of gaskets in place in the covers.
11. Position the covers on the cylinder heads and make sure that gaskets seat evenly. Install cover attaching bolts and torque to specification. Two minutes later, torque bolts to same specification.
12. Connect the radiator upper hose. Connect heater hose at intake manifold and at water pump.
13. Connect the fuel line to carburetor.
14. Install the coil and bracket assembly to intake manifold.
15. Install the accelerator linkage. Install the speed control linkage, if so equipped.
16. Engage engine wiring harness in clips on left cylinder head and connect all wire terminals. Connect engine vacuum lines to their original outlets on the fitting at rear of the intake manifold. Connect positive crankcase ventilation (PCV) valve and hose to right valve rocker arm cover.
17. Install the distributor cap and connect the coil and spark plug wires. See Part 23-01 for special installation instructions.
18. Place the water pump pulley and drive belts in position. Place the fan assembly in the radiator shroud and set in position. Position the fan assembly to water pump hub and install and torque

the attaching screws to specification. Install screws attaching shroud to the radiator.

19. Adjust the tension of drive belts to specifications and tighten attaching screws.
20. Fill and bleed the cooling system and power steering reservoir. Run engine at fast idle and check for leaks.
21. Adjust the ignition timing and connect distributor and all other vacuum lines.
22. Check and adjust the carburetor idle speed and mixture as required after engine temperature has stabilized. Adjust transmission linkage, if necessary. Install the air cleaner and intake duct.

## FLYWHEEL

### Removal

1. Remove the transmission from vehicle. Remove the mounting bolts and remove flywheel from the crankshaft.

Refer to Part 21-01, for inspection.

### Installation

1. Install flywheel on crankshaft. Install the mounting bolts and torque to specifications.
2. Check flywheel runout and ring gear runout following procedure in Part 21-01.
3. Install transmission assembly in vehicle.

## CAMSHAFT REAR BEARING BORE PLUG

### Removal

1. Remove the transmission from the vehicle as detailed in Group 17.
2. Remove flywheel and engine rear cover plate, following procedure under Flywheel Removal.
3. Replace the plug as detailed under Core Plugs in Part 21-01.

### Installation

1. Install the engine rear cover plate and flywheel, following procedure under Flywheel Installation.
2. Install the transmission as detailed in Group 17.

## OIL PAN

### Lincoln Continental and Continental Mark V

### Removal

1. Disconnect the battery ground cable. Disconnect the two transmission oil cooler lines from the radiator and move aside.
2. Remove the fresh air intake duct, radiator shroud attaching bolts and position the shroud over the fan.
3. Raise the vehicle on a hoist.
4. Drain the crankcase. Remove "X" brace below oil pan (Continental Mark V).
5. Remove end attachments of front stabilizer bar and rotate ends of bar down to raise center of bar.
6. Support the engine with a jack, then remove long engine support through-bolts.
7. Raise the engine high enough to position a wood block 3 inches high between each engine support

bracket and frame. Lower the engine to allow the blocks to support the engine.

8. Remove the oil pan attaching bolts and lower the pan to the No. 2 crossmember. Position rear crankshaft throw horizontally to ease pan removal.
9. Remove the pan.

Refer to Part 21-01 for cleaning and inspection procedures. Check the gasket surface for damage caused by over-torqued bolts. Straighten the surface as required to restore original flatness.

#### Installation

1. Clean the gasket surfaces of the block and oil pan. Coat the block gasket surface with Ford contact cement or equivalent. Position the oil pan gaskets on the cylinder block.
2. Position the oil pan front seal on the cylinder front cover. **Be sure that the tabs on the seal are over the oil pan gasket.**
3. Position the oil pan rear seal on the rear main bearing cap. **Be sure that the tabs on the seals are over the oil pan gasket.**
4. Hold the oil pan in place against the block and install a bolt, fingertight, on each side of the pan. Install the remaining bolts. Torque the bolts from the center outward in each direction to specification.
5. Raise the engine and remove the two wood support blocks.
6. Install the engine support.
7. Lower the engine into place and install and torque the engine support through-bolts to specification.
8. Rotate front stabilizer bar into position and attach ends to lower control arms.
9. Lower the vehicle to the floor.
10. Position the radiator shroud and install the attaching bolts. Install the carburetor fresh air inlet duct.
11. Connect the transmission oil cooler lines to the radiator.
12. Fill the crankcase to the proper level with the recommended oil.
13. Connect the battery ground cable. Start the engine and check for leaks and correct as required.

#### Ford and Mercury

##### Removal

1. Disconnect the battery ground cable. Disconnect the fresh air inlet tube, remove the radiator shroud from the radiator, and position it over the fan.
2. Raise the vehicle on a hoist and drain the crankcase.
3. Remove the sway bar attaching bolts. Remove the two bolts and bushings that attach the sway bar to the lower arms. Move the sway bar forward on the struts.
4. Remove the through bolt from each engine support. Place floor jack under the front edge of the oil pan, with block of wood between jack and oil pan. Raise the engine just enough to insert 2x4 inch blocks of wood between the insulators and brackets. Remove the floor jack.

5. Remove the oil pan attaching bolts and lower the pan. Rotate the crankshaft to provide clearance between the pan and crank throw or counterweight.
6. Remove the oil pan.
7. Refer to Part 21-01 for cleaning and inspection procedures. Check the gasket surface for damage caused by over-torqued bolts. Straighten the surface as required to restore original flatness.

#### Installation

1. Clean the gasket surfaces of the block and oil pan. Coat the block gasket surface and the oil pan gasket surface with Ford contact cement or equivalent. Position the oil pan gaskets on the cylinder block.
2. Position the oil pan front seal on the cylinder front cover. **Be sure that the tabs on the seal are over the pan gasket.**
3. Position the oil pan rear seal on the rear main bearing cap. **Be sure that the tabs on the seal are over the oil pan gasket.**
4. Hold the oil pan in place against the block and install a bolt, fingertight, on each side of the oil pan. Install the remaining bolts. Torque the bolts from the center outward in each direction to specification.
5. Move the stabilizer bar into position and install the attaching bolts. Rotate the stabilizer bar into position and attach the ends to the lower control arms.
6. Clean the oil filter seal surface and install a new oil filter.
7. Raise the engine slightly with a floor jack and wood block against the forward edge of the oil pan. Remove the wood spacers from under the front support insulators. Lower the engine as required to install the insulator through bolts. Remove the jack, then torque the nuts to specification.
8. Lower the vehicle on a hoist and attach shroud and fresh air tube. Connect the battery ground cable.
9. Fill the crankcase to the proper level with the recommended oil. Start the engine and check for leaks.

## OIL PUMP

#### Removal

1. Remove the oil pan, following the procedure under Oil Pan Removal.
2. Remove the oil pump mounting bolts, and remove the pump from the cylinder block.

#### Installation

1. Prime the oil pump by filling the inlet port with engine oil. Rotate the pump shaft to distribute oil within the pump body.
2. Install the distributor intermediate shaft in the oil pump rotor.
3. Insert the intermediate shaft into the distributor shaft hex bore. Make certain that the intermediate shaft is properly seated. Do not force the pump into position if it will not seat readily. The intermediate shaft hex may be misaligned with distributor shaft.

To align, rotate the intermediate shaft until it can be seated. Secure the oil pump to cylinder block and torque the screws to specifications.

4. Install the oil pan and related parts, following procedure under Oil Pan Installation.

## CRANKSHAFT REAR OIL SEAL

A split-lip type crankshaft rear oil seal is used for replacement on all engines. If replacement is necessary, this type of seal must be used. The complete seal can be replaced without removing the crankshaft. Refer to Part 21-01 for removal and installation procedures.

## MAIN BEARING

Main and connecting rod bearing inserts are selective fits.

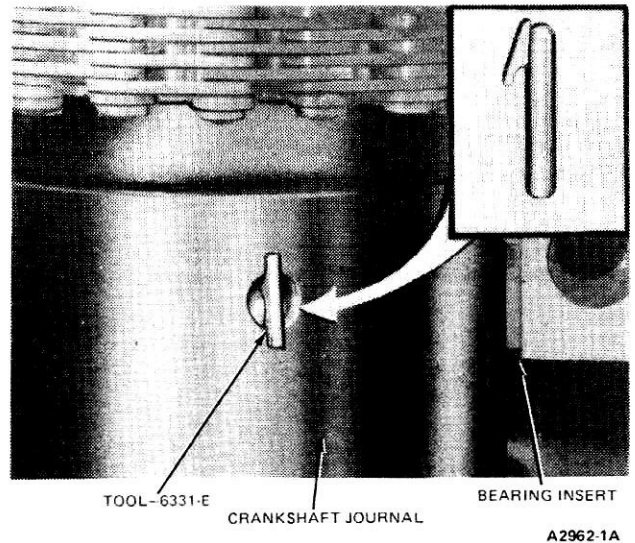
Selective fit bearings are available for service in standard size, 0.001 and 0.002 inch undersize. Undersize bearings, (0.010, 0.020, 0.030 and 0.040 inch) which are not selective fit, are available for use on crankshaft journals that have been refinished.

### Removal

1. Drain the crankcase. Remove the oil level dipstick. Remove the oil pan and related parts, following the procedure under Oil Pan Removal.
2. Remove the oil pump.
3. Replace one bearing at a time, leaving other bearings securely fastened. Remove the main bearing cap to which new bearings are to be installed.
4. Insert the upper bearing removal tool (Tool 6331) in oil hole in crankshaft (Fig. 28).
5. Rotate the crankshaft in the direction of engine rotation to force bearing out of block.
6. Clean the crankshaft journals. Inspect journals and thrust faces (thrust bearing) for nicks, burrs or bearing pickup that would cause premature bearing wear.

### Installation

1. To install upper main bearing, place plain end of bearing over shaft on locking tang side of block and partially install bearing so Tool 6331 can be inserted in oil hole in crankshaft (Fig. 29). With Tool 6331 in oil hole, rotate the crankshaft in the opposite direction of engine rotation until the bearing seats itself. Remove the tool.
2. Fit the main bearings as detailed in Part 21-01 under Fitting Bearings with Plastigage.
3. After the bearing has been fitted, apply light coat of engine oil to journal and bearings. Install the bearing cap. Torque the cap bolts to specification.
4. Repeat the procedure for remaining bearings that require replacement.
5. If the rear main bearing is to be replaced, remove the rear main bearing cap. Remove and discard the rear oil seal.
6. Clean rear journal oil seal groove and mating surfaces of block and rear main bearing cap.
7. Install the new seal.



**FIG. 28 Removing or Installing Upper Main Bearing Insert**

8. Refer to Part 21-01 for procedure used in sealing the rear main bearing cap. After sealing, install the rear main bearing cap and torque cap bolts to specification.
9. If thrust bearing cap (No. 3 main bearing) has been removed, install as follows:  
Install the thrust bearing cap with bolts finger-tight. Pry the crankshaft forward against the thrust surface of upper half of bearing (Fig. 29). Hold the crankshaft forward and pry thrust bearing cap to rear. This aligns thrust surfaces of both halves of bearing. Retain forward pressure on crankshaft. Torque cap bolts to specification.
10. Clean the oil pump inlet tube screen. Prime the oil pump by filling the inlet opening with oil and rotate the pump shaft until oil emerges from the outlet opening. Install the oil pump following procedure under Oil Pump Installation.
11. Install the oil pan, following procedure under Oil Pan Installation.
12. Fill the crankcase to the proper level with the recommended oil. Start the engine and check for oil pressure. Operate the engine at fast idle and check for oil leaks.

## CONNECTING ROD BEARING

### Removal

1. Follow steps 1 and 2 under Main Bearing Removal.
2. Turn the crankshaft until connecting rod to which new bearings are to be fitted is down. Remove the connecting rod cap. Remove the bearing inserts from rod and cap.
3. Be sure the bearing inserts and bearing bore in connecting rod and cap are clean. Foreign material under inserts will distort bearing and cause a failure.
4. Clean the crankshaft journal. When replacing standard bearings with new bearings, it is good practice to fit the bearing to minimum specified clearance.