

OVERHAUL

CYLINDER HEAD

Cylinder Head

Check cylinder head for cracks or damage. If maximum warpage exceeds .004" (.10 mm), replace cylinder head.

Valve Springs

Inspect valve spring free length, out-of-square and pressure. Replace valve spring if not as specified. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS.

Valve Stem Oil Seals

Use Seal Installer to install oil seals.

Valve Guides

NOTE: DO NOT ream valve guides from standard to maximum oversize in one step. Ream guides in gradual steps, so guides are reamed in true relation to valve seat. Valve seats must be ground when valve guide is reamed or replaced.

1. Valve guides may be reamed for oversize valves if stem-to-guide oil clearance exceeds specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Valves are available in .015" (.38 mm) and .030" (.76 mm) oversize.
2. Valve guides may also be replaced with a NEW guide if oversize valves are not available or guide is damaged. Ream valve guides until proper stem-to-guide clearance exists.

Valve Seat

Ensure valve seat angle, seat width and seat runout are within specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Valve seats must be ground when valve guide is reamed or replaced. Replacement information is not available.

Valves

CAUTION: DO NOT remove more than .010" (.25 mm) from valve stem when resurfacing tip.

Ensure head diameter, stem diameter, valve face runout and valve margin are within specification. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS.

Valve Seat Correction Angles

If seat width is too wide after grinding seat, use a 75-degree stone to remove stock from bottom of valve seat (raise seat) or a 30-degree stone to remove stock from top of seat (lower seat).

CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

CAUTION: Connecting rod bearing caps are mechanically fractured during manufacturing and cannot be serviced or interchanged. Mark connecting rod and cap for reassembly reference. DO NOT attempt to repair connecting rods. Replace connecting rod if out of specification. Install NEW connecting rod bolts. DO NOT reuse bolts.

Note direction of connecting rod installation on piston. Install piston and connecting rod in engine, with arrow on top of piston toward front of engine.

Fitting Pistons

1. Standard service pistons are coded 1, 2 and 3 on dome of piston. Measure piston skirt diameter at 90-degree angle to piston pin, 1.62" (42.0 mm) below piston top. Replace piston if piston diameter is not within specification. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
2. Measure cylinder bore at .50" (12.7 mm) below top of piston travel and .50" (12.7 mm) above bottom of piston travel. Ensure piston clearance is within specification. See **PISTONS, PINS & RINGS** table.
3. If piston clearance is not within specification, choose a selective fit piston to bring piston clearance within specification. See **PISTONS, PINS & RINGS** table, for selective fit piston sizes.
4. If piston clearance cannot be corrected using a selective fit piston, bore all cylinders to nearest oversize.

Piston Rings

Ensure ring end gap and side clearance are within specification. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Position oil control ring expander with gap positioned straight forward and rails with gaps 180 degrees apart, aligned with piston pin. Install compression rings with gaps staggered, so ring gaps do not align.

Rod Bearings

CAUTION: Mark connecting rod and cap for reassembly reference. Components are not marked at factory. Install NEW bolts in connecting rods. Do not reuse bolts.

1. Ensure piston and connecting rod are installed in engine with arrow on top of piston toward front of engine.
2. Check bearing clearances using Plastigage. Ensure bearing oil clearance and side play are within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** and **CONNECTING RODS** tables under ENGINE SPECIFICATIONS. If oil clearance exceeds specification, grind crankshaft to fit undersize bearings. Tighten connecting rod bearing cap bolts to specification. See **TORQUE SPECIFICATIONS**.

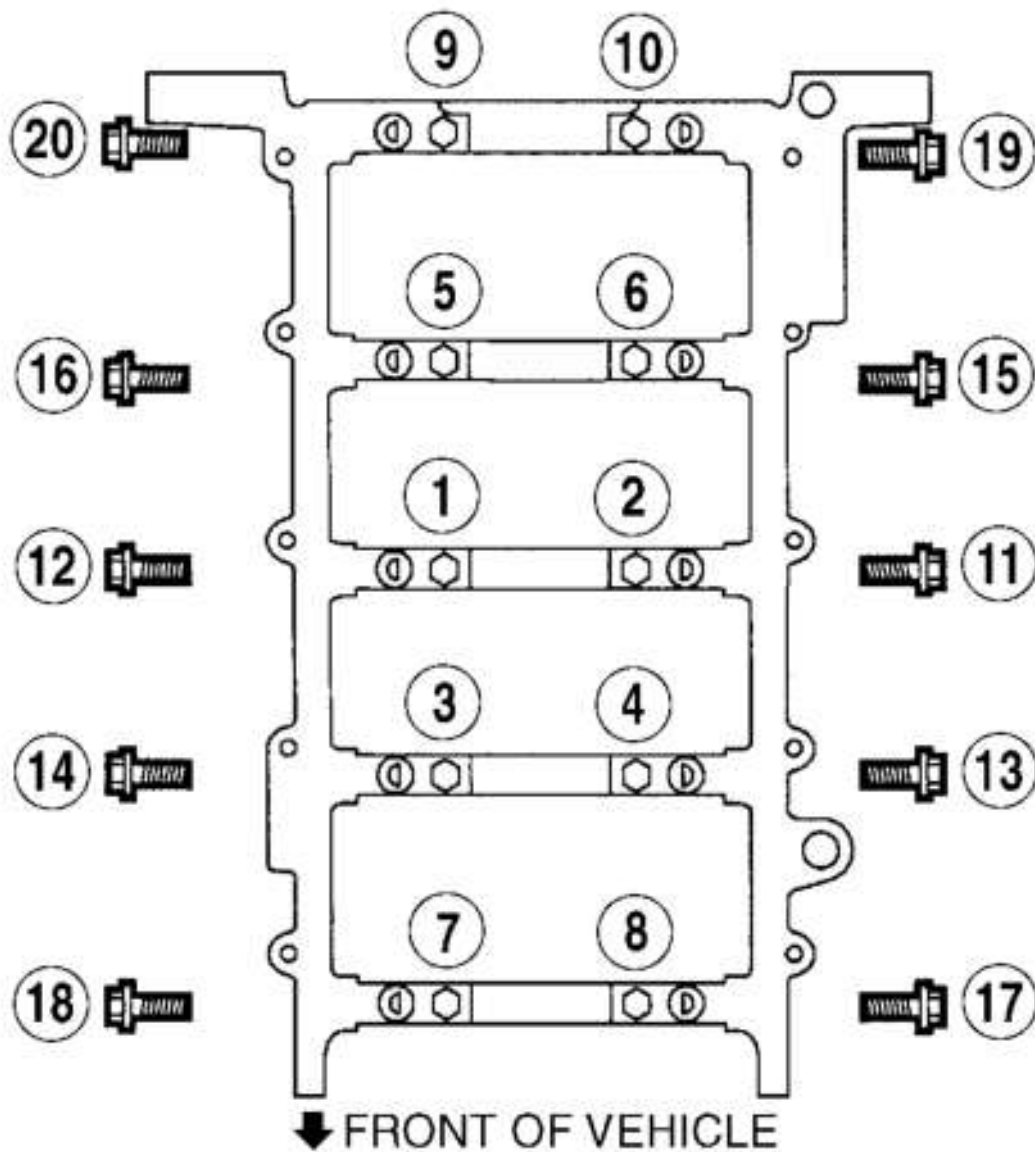
NOTE: When checking bearing clearances using Plastigage, side bolts and side adjusting screws do not need to be installed.

Crankshaft & Main Bearings

1. Measure main bearing clearances using Plastigage. Main bearing caps are marked for location, with No. 1 at front, and No. 5 at rear of engine. Arrow on main bearing cap must point toward front of engine. Lubricate bearing shells with assembly lube or heavy oil before installation.
2. Install main bearing inserts in cylinder block. Lay crankshaft into cylinder block. Push crankshaft rearward. Roll thrust washer into cylinder block, ensure coating on bearing is facing crankshaft thrust surface.

CAUTION: Ensure side adjusting screws on main bearing caps are screwed inward completely before installing main cap. Using a brass hammer, tap main bearing caps into position on cylinder block before tightening bolts to specification. This must be done to ensure proper torque reading. DO NOT reuse main bearing cap bolts. Side bolts and side adjusting screws may be reused.

3. Install main bearing caps using NEW bolts, do not fully tighten. Using a pry bar, push crankshaft forward to seat thrust washer. While holding crankshaft forward, evenly pry No. 5 main bearing cap rearward. DO NOT cock bearing cap. Tighten main bearing cap bolts to specification in 2 steps using proper sequence. See **Fig. 85**. See **TORQUE SPECIFICATIONS**.
4. Tighten side adjusting screws against cylinder block to specification in 2 steps using proper sequence. See **Fig. 85**. Side adjusting screws have left-hand threads. Tighten side bolts.



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Fig. 85: Main Bearing Cap Bolt Tightening Sequence
 Courtesy of FORD MOTOR CO.

Cylinder Block

1. Using a feeler gauge and straightedge, inspect cylinder block deck for warpage. If not within specification, resurface or replace cylinder block. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS.

CAUTION: DO NOT machine more than .010" (.025 mm) from original cylinder block head surface.

2. Check cylinder bore diameter, out-of-round and taper. Cylinder bore is measured at .50" (12.7 mm) below top of cylinder block head surface and .50" (12.7 mm) above piston when at bottom of cylinder bore.

CAUTION: Before boring cylinder block, install main bearing caps and tighten bolts to specification. See TORQUE SPECIFICATIONS. This prevents main bearing bores from being distorted when cylinder block is bored.

3. Bore cylinder block if measurements are not within specification. See CYLINDER BLOCK table.