AUTOMOTIVE Youth Educational Systems YES The Passport to a Rewarding Automotive Career

ASE CERTIFIED

Modern Automotive Technology Chapter 50

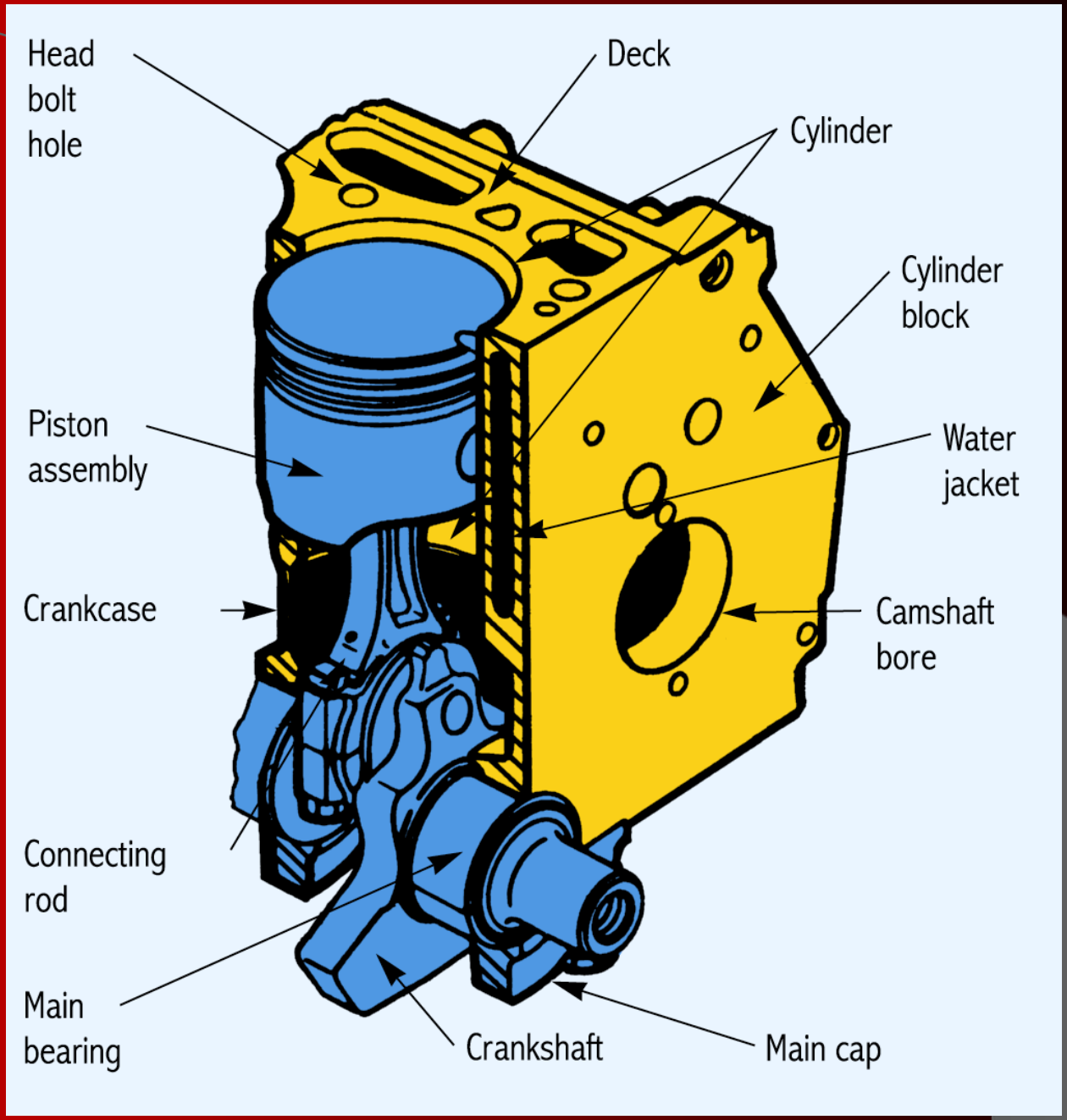
Engine Bottom End Service

North Montco Technical Career Center

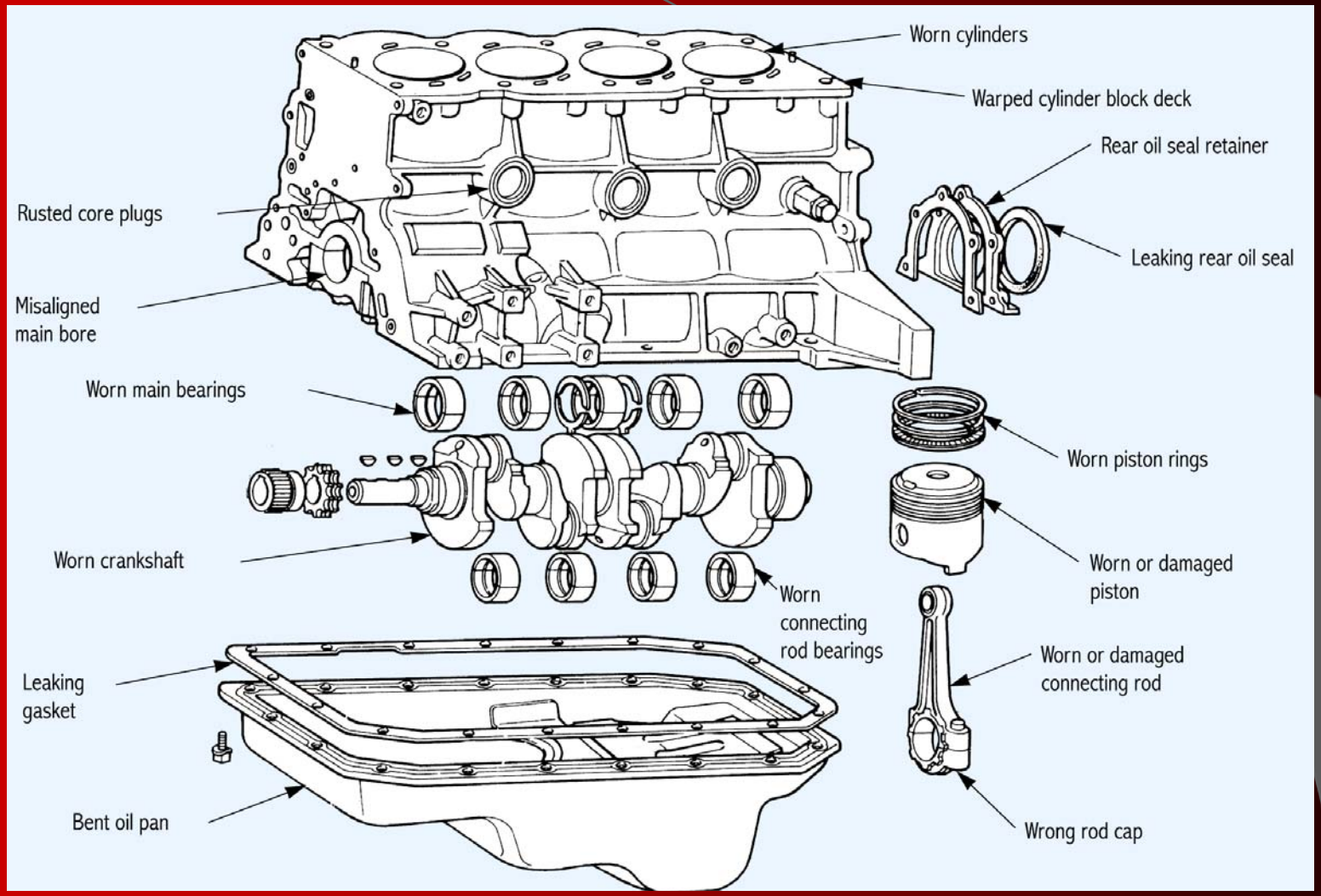
Learning Objectives

- Explain how to measure cylinder bore
- Hone cylinder walls
- Measure block, heads, etc
- Measure piston, bearing and ring wear
- Explain how to assembly a rod and piston
- Check ring-gap

Cut-Away of an Engine Block



Engine Bottom End



Engine Parts That May Need Servicing

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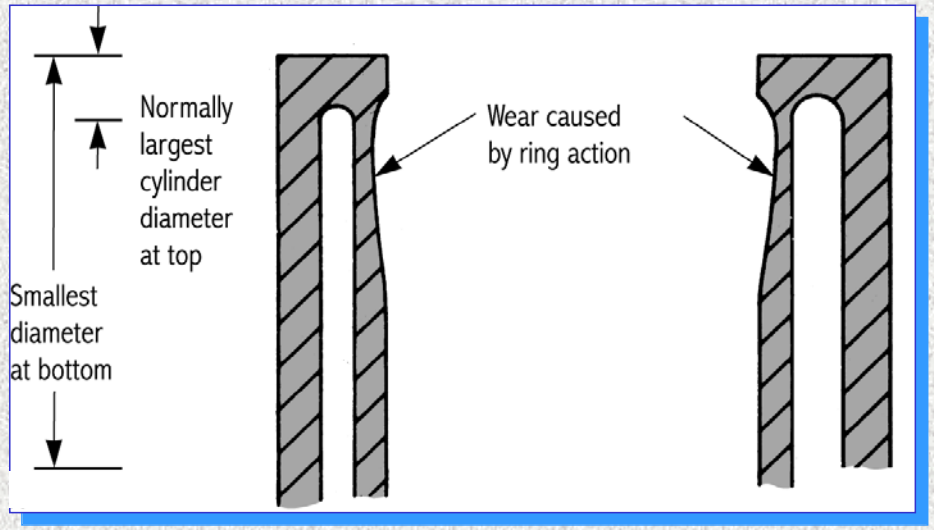
1. If the OVERBORE LIMIT is exceeded, the cylinder wall can become too thin

2. CYLINDER TAPRER is caused by less lubricating oil at the top of the cylinder

Cylinder Taper

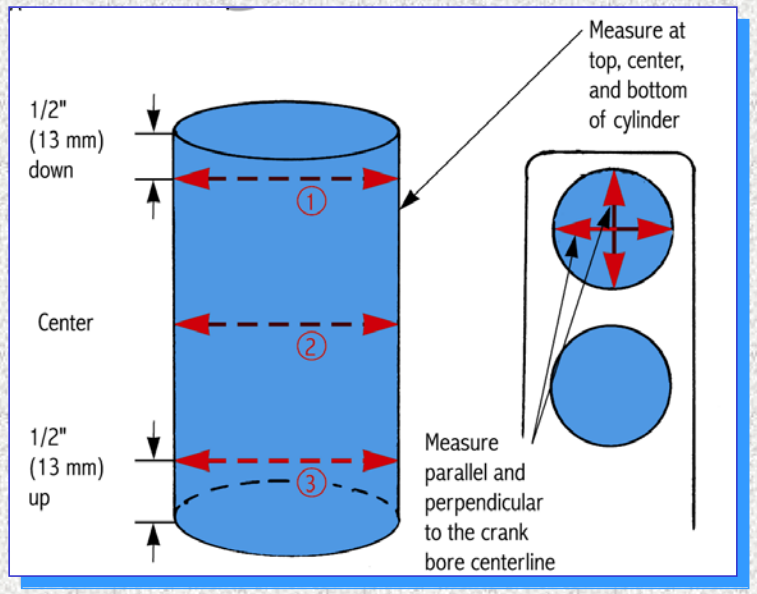
Cylinder Taper



More wear at the top of the cylinder

Cylinder Measurements

Cylinder Measurements



Measuring taper and out-of-round

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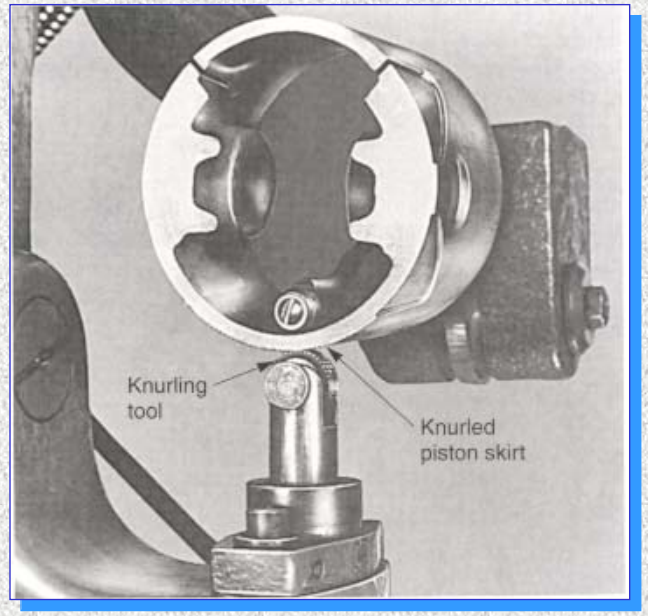
3. PISTON KNURLING can be used to increase the diameter of the skirt a few thousandths of an inch

4. UNDERSIZE BEARING are needed after the crankshaft has been turned

Piston Knurling

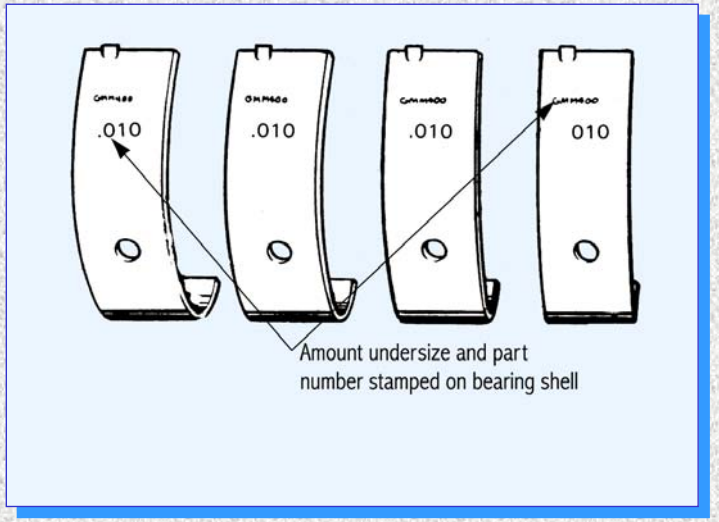
Knurling a Piston



Increases skirt diameter by squeezing metal outward around small dents

Engine Crankshaft Bearings

Undersize Bearings



These bearings are .010” undersize

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5. ENGINE BALANCING may be needed when the weight of the pistons, connecting rods, or crankshaft is altered by machining

6. CYLINDER SLEEVING is needed when the damage to the cylinder wall is too severe to clean up with boring.

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Engine Bottom End Service

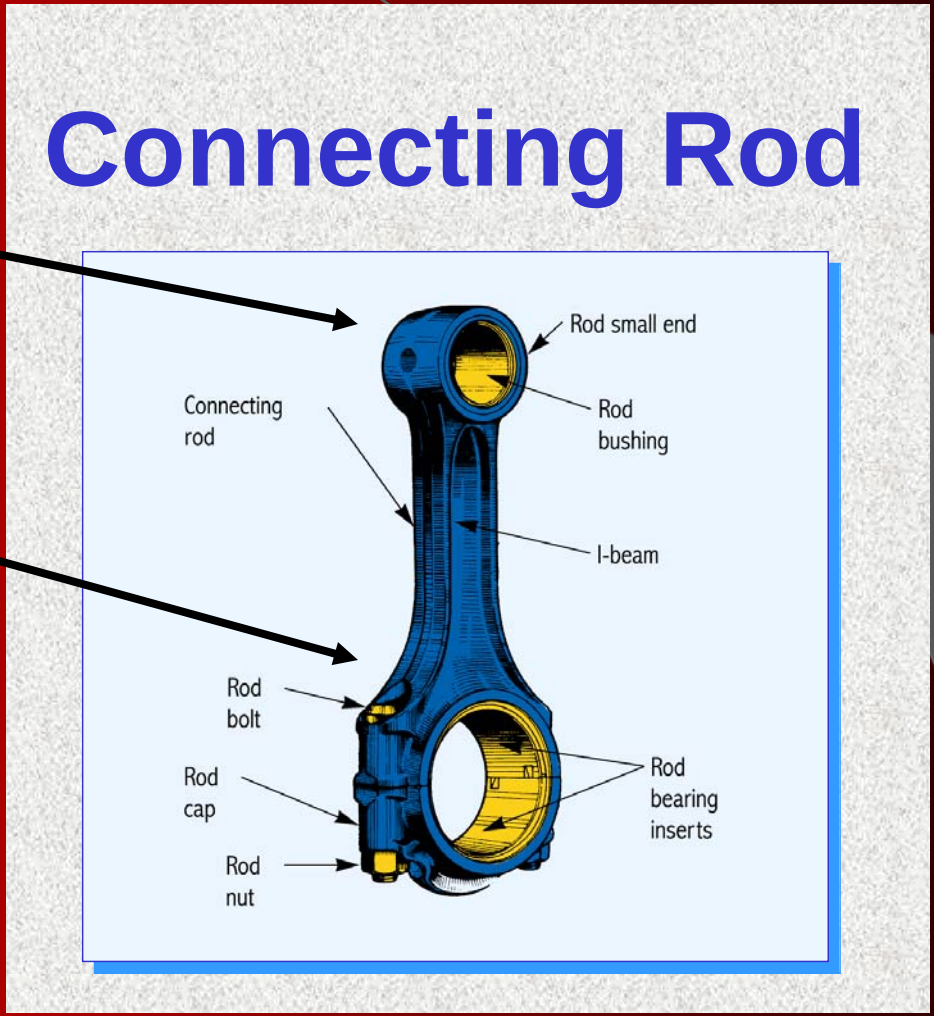
Piston and Rod Balancing

- Pistons, rings, piston pins, connecting rods and bearings are weighed on an accurate scale
- Material is machined or ground off the pistons and rods until all pistons weigh the same and all rods weigh the same
- All rod big ends and rod small ends should weigh the same

Piston Connecting Rods

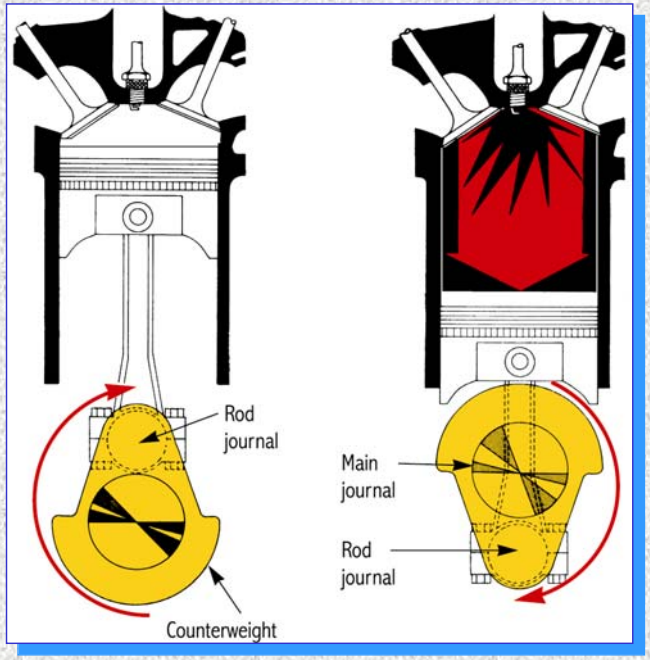
“Small-End”

“Large-End”



Crankshaft

Crankshaft Parts



Counterweight offsets the weight of the piston and rod to prevent vibration

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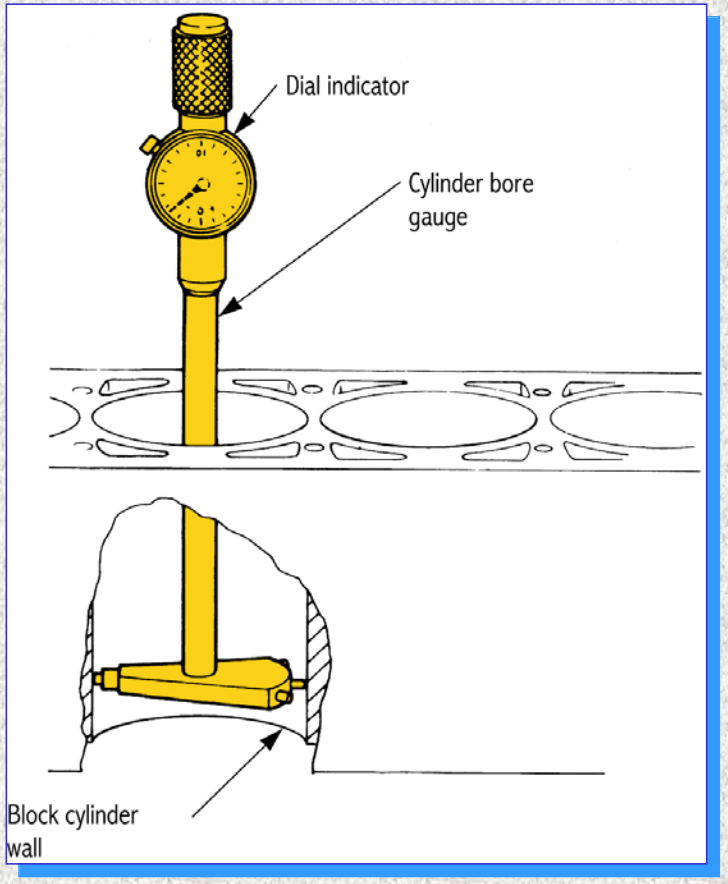
7. Machining cylinders larger in diameter to make the cylinder walls perfectly smooth and straight is known as CYLINDER BORING

8. The piston groove is machined wider to accept SPACERS

Measuring Cylinder Wear

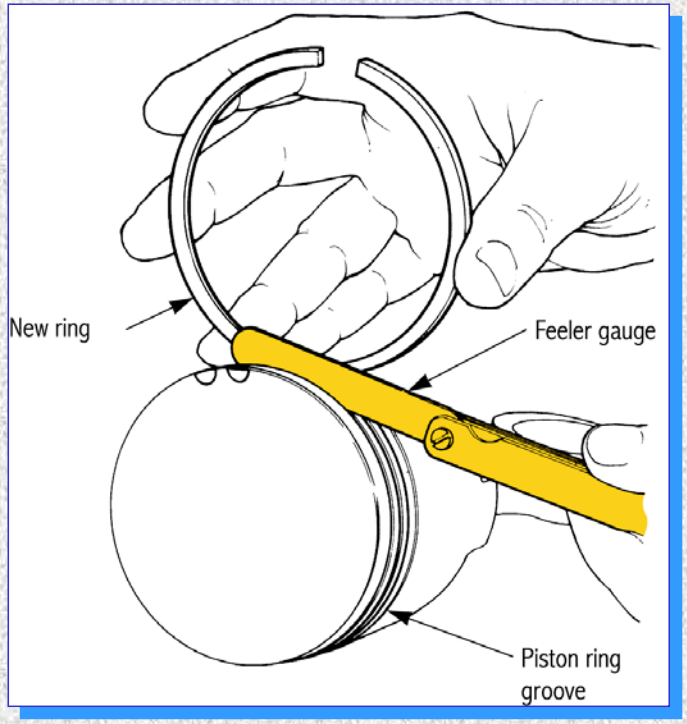
Cylinder Bore Gauge

- Slide gauge up and down the cylinder
- Indicator movement indicates differences in diameter



Piston Ring Side Clearance

Measuring Piston Ring Side Clearance



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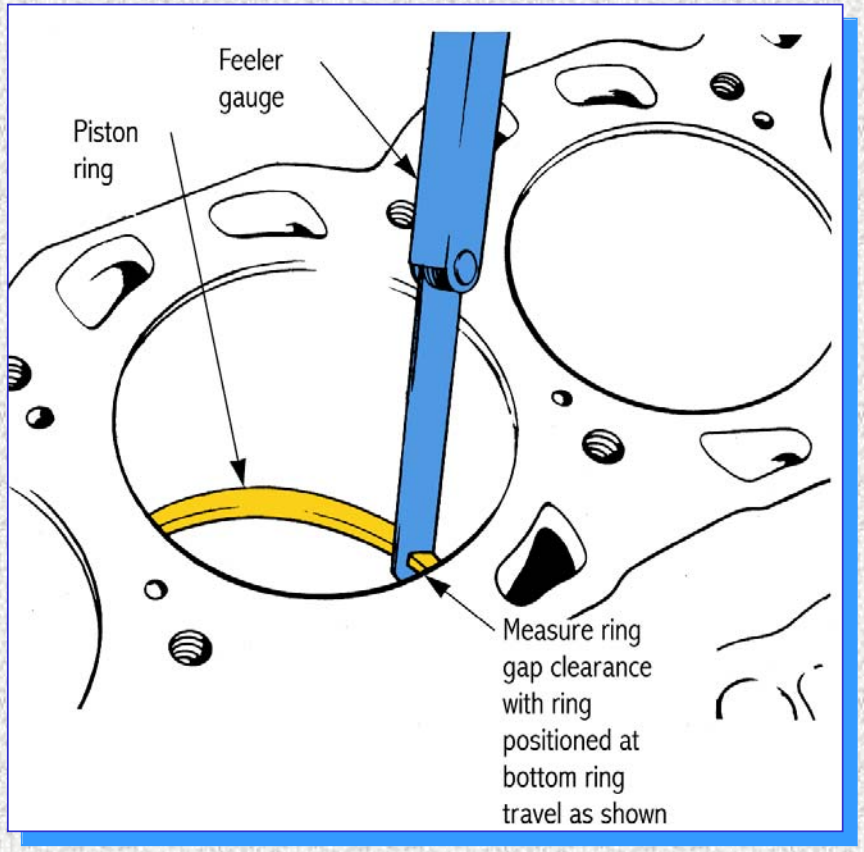
9. A FEELER GAUGE is a clearance measuring device

10. A CYLINDER HONE produces a precisely textured, crosshatched pattern on the cylinder wall to help piston rings seat easier and quicker

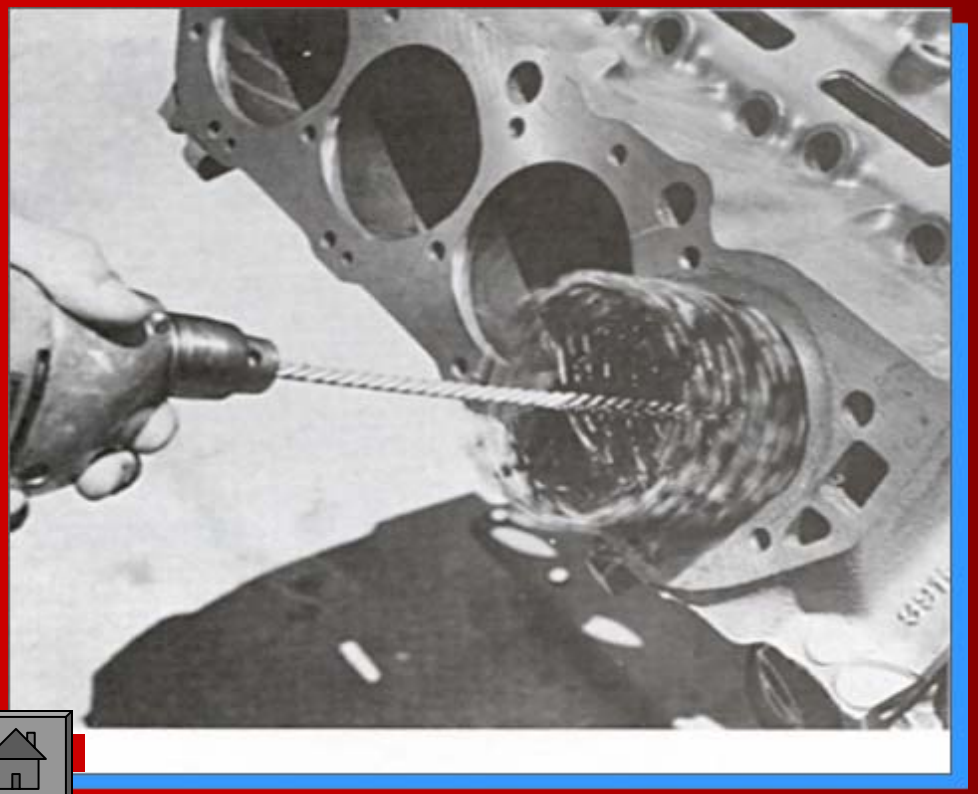
Piston Ring Gap

Measuring Piston Ring Gap



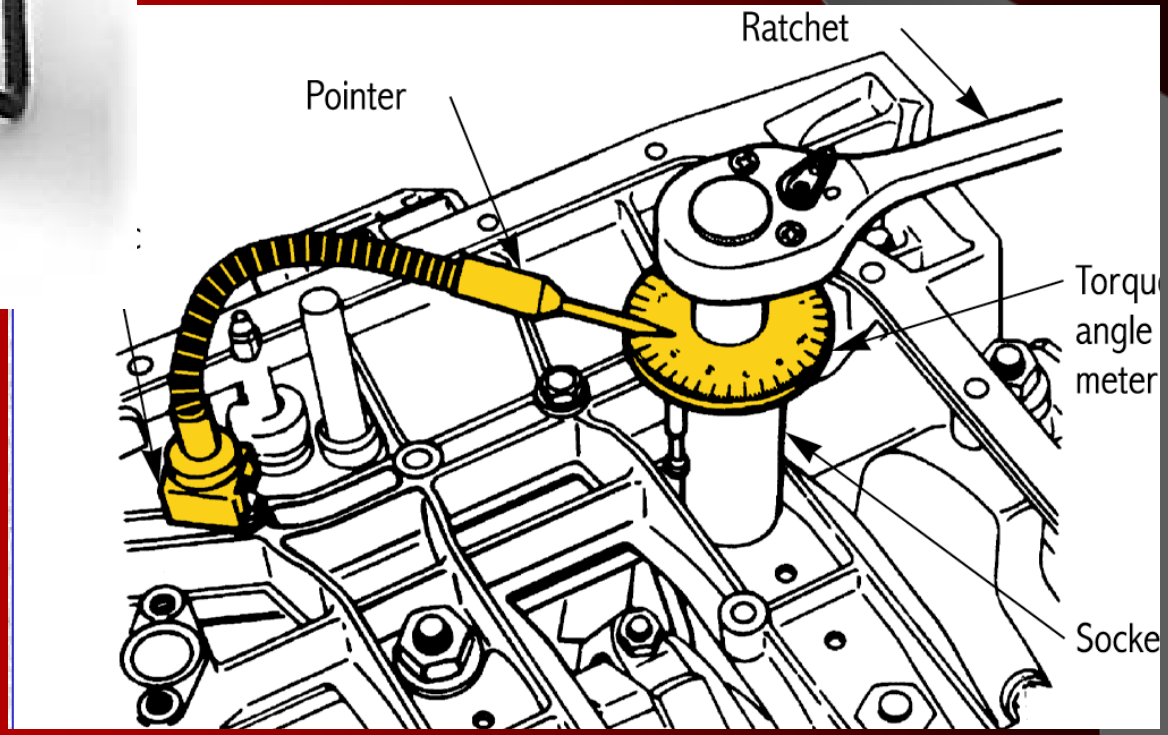
Cylinder Honing

Honing restores cylinder surface. Mover hone up and down fast enough to produce a 50^{o} – 60^{o} cross-hatch pattern.



Torque-to-Yield

Use a “Torque-Angle” Meter when installing “Torque-to-Yield” bolts.



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