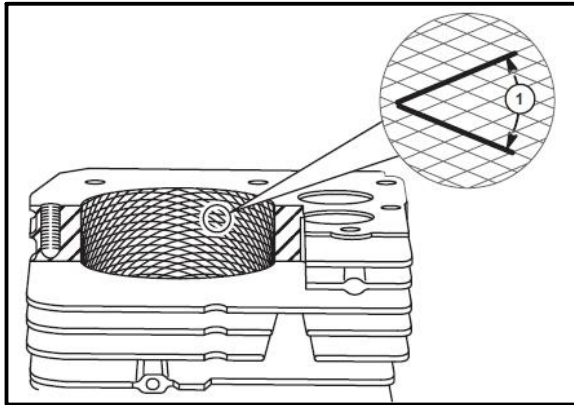
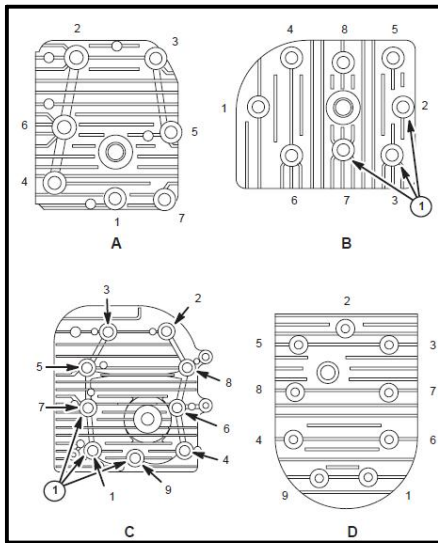


**Air-Cooled Engine Tech Worksheet**  
**Briggs & Stratton Engine Service & Tools**

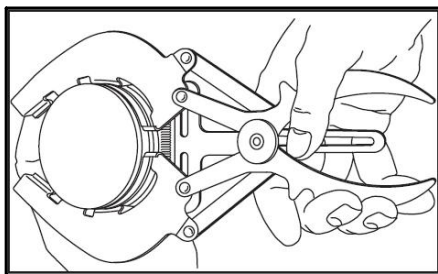
Name \_\_\_\_\_  
**58 Points**                      Date \_\_\_\_\_



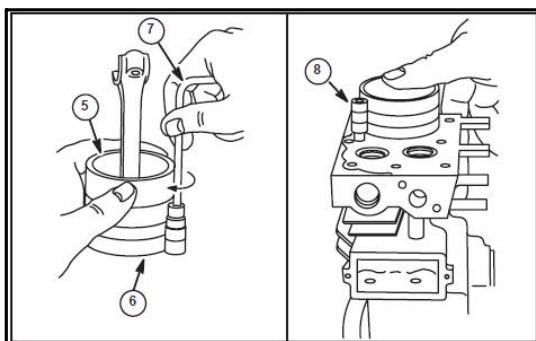
1. This cylinder wall surface finish is known as \_\_\_\_\_ . It retains oil which will *lubricate the piston & help seal the rings*. This is a “factory” finish, but if it’s worn off, *deglazing or honing will restore it*.



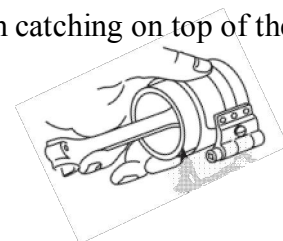
2. Cylinder head \_\_\_\_\_ sequences should be used to prevent cylinder head warp. Proper torque of critical fasteners will also prevent breakage from *over-tightening* as well as fatigue from *under-tightening*.

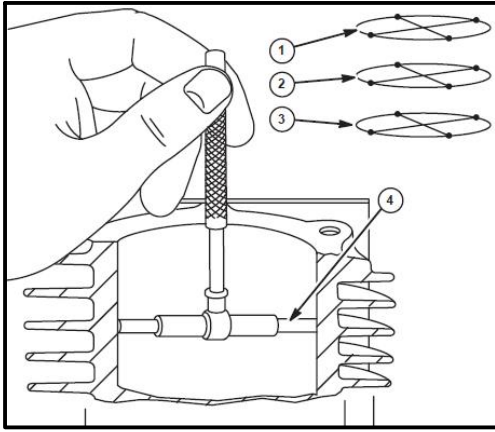


3. Using a piston ring \_\_\_\_\_ to remove & replace rings will prevent these brittle, cast-iron parts from breaking.



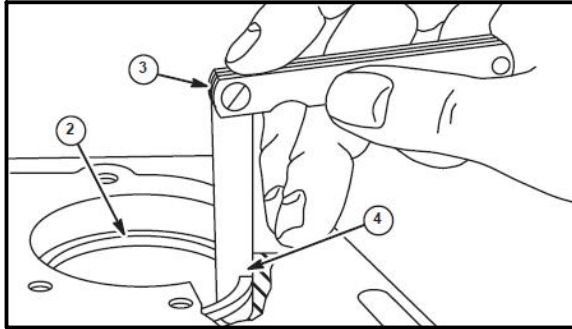
4. Using a piston ring \_\_\_\_\_ when installing the piston into the cylinder will prevent rings from catching on top of the block and breaking.





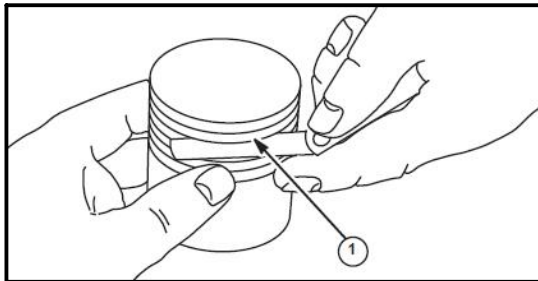
5. Measuring the cylinder in 3 places will help to determine the bore \_\_\_\_\_ (***I.D.***) and will identify \_\_\_\_\_ (***bigger at top***) as well as \_\_\_\_\_ -of- \_\_\_\_\_ (***oval***).

Measure at ***top, middle, & bottom*** of the bore.  
Measure ***parallel to & 90°*** to crankshaft C.L.

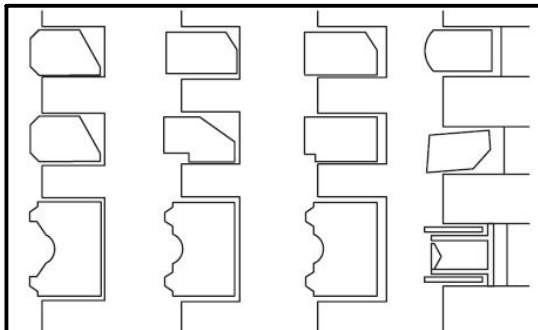


6. Measuring piston ring \_\_\_\_\_ will determine the need for new rings.

***Too much gap causes blowby & loss of compression.***  
***Too little gap causes seizing when engine gets hot.***

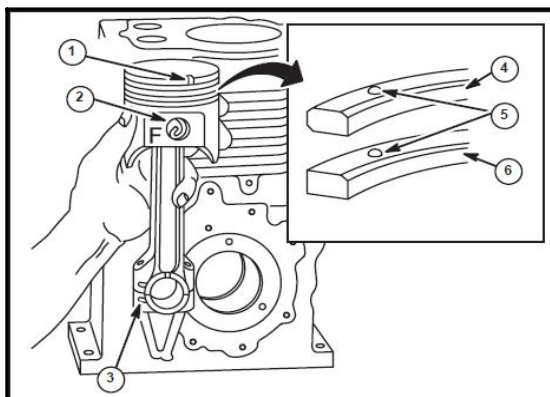


7. Measuring ring \_\_\_\_\_ clearance with a new piston ring in the groove determines if there is ***piston ring groove wear*** or ***if there is piston ring land wear***.

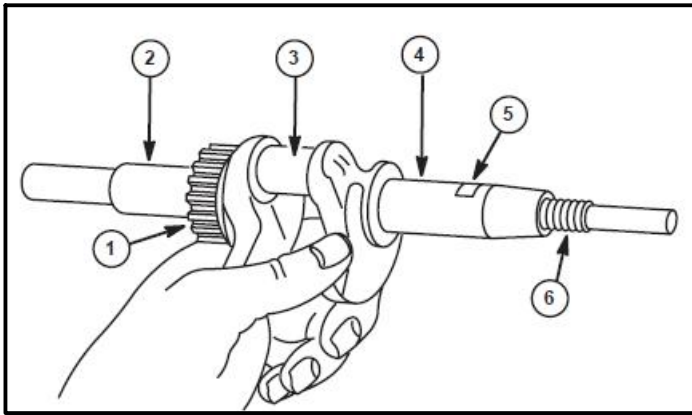


8. Piston ring ***cross-sectional shape*** determines their \_\_\_\_\_ on the piston and their \_\_\_\_\_ in the grooves.

***(Choose from Location & Direction)***

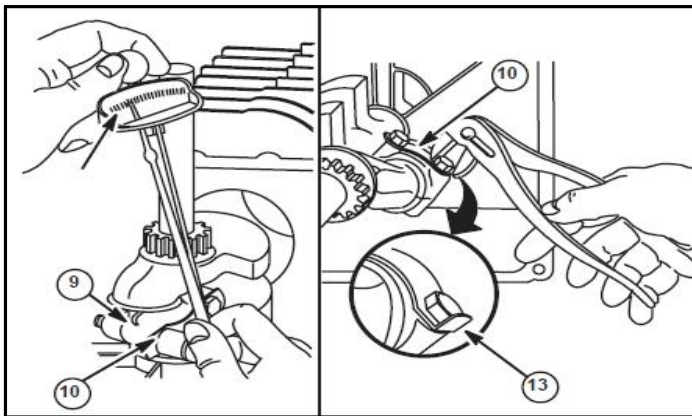


9. Dots on the rings point \_\_\_\_\_.  
Notches or arrows ***on the head of the piston*** typically face toward the \_\_\_\_\_.



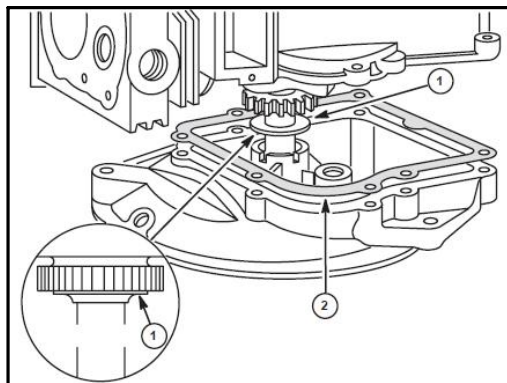
10. The numbered **Crankshaft parts** are:

- \_\_\_\_\_ threads for the flywheel nut
- \_\_\_\_\_ crankpin journal
- \_\_\_\_\_ timing gear
- \_\_\_\_\_ Power Take Off main bearing journal
- \_\_\_\_\_ breaker point plunger flat (*pre 1982*)
- \_\_\_\_\_ magneto main bearing journal



11. The \_\_\_\_\_ rod is arguably the *single most important thing to torque* on the engine.

Lock \_\_\_\_\_ (13) should be bent over with a pliers to prevent unwanted loosening due to vibration.

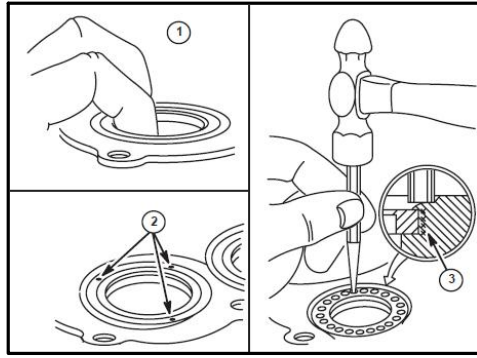


12. Crankshaft \_\_\_\_\_ is adjusted with sump cover gaskets of varying thicknesses. (.015".009".005")

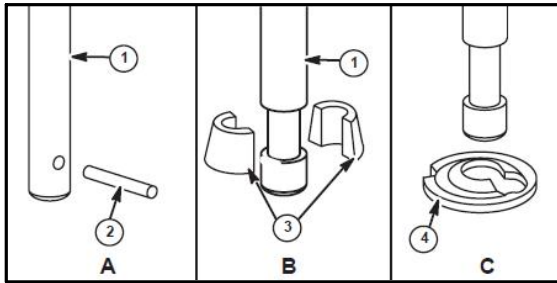
13. "Select-Fit" \_\_\_\_\_ can be used to take up excessive play.

*An engine with a 1" crankshaft and a .015" sump cover gasket in place that still has .010" too much end play would need a #220708 thrust washer installed between the crank gear & sump cover to correct the end play.*

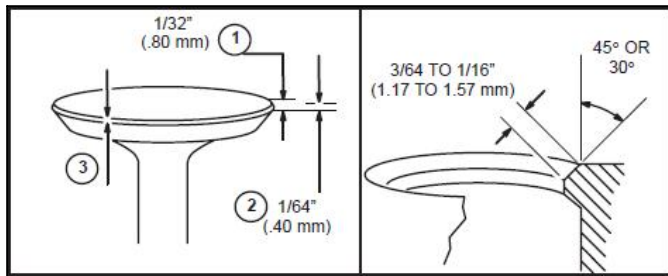
- 220624 .0625 thrust washer for .875" (22.23 mm) dia. crankshaft.
- 220708 .0625 thrust washer for 1.000" (25.4 mm) dia. crankshaft.
- 222949 .062 thrust washer for 1.181" (30.0 mm) dia. crankshaft.
- 222951 .062 thrust washer for 1.378" (35.0 mm) dia. crankshaft.



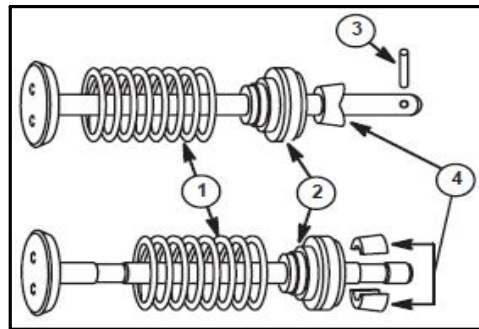
14. If a valve \_\_\_\_\_ comes loose from over-heating or if it just being replaced, it is \_\_\_\_\_ or *staked into place* using a hammer & a pin punch.



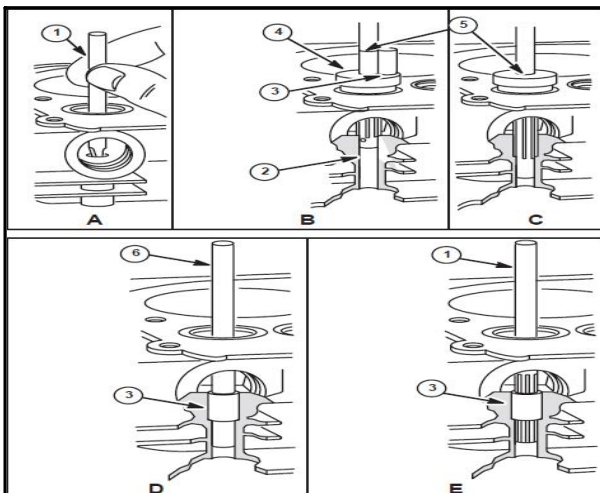
15. Valve springs are held into place on the valve stems by either A) \_\_\_\_\_, B) \_\_\_\_\_, or by “keyhole” C) \_\_\_\_\_ or “keepers”.



16. Valve \_\_\_\_\_ should be between 1/64” & 1/32”. (.016” to .032”)  
 Valve \_\_\_\_\_ should be held to a width of 3/64” to 1/16”. (.046” to .062”)

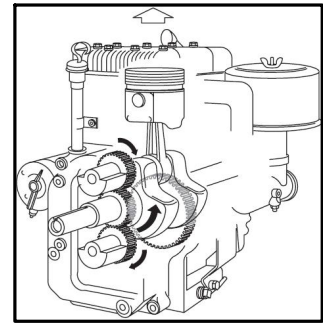
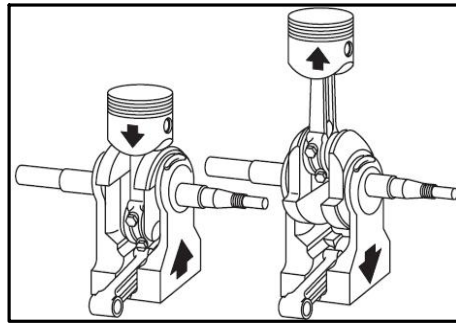
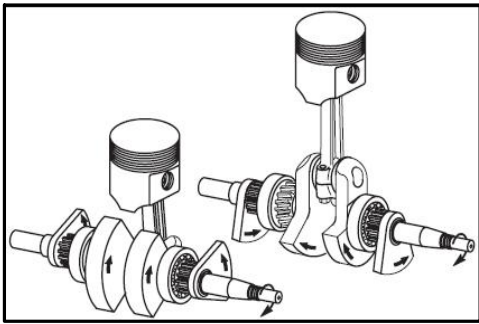


17. Industrial-Commercial (IC) engines are often fit with valve \_\_\_\_\_ (2) which slightly rotate the valves just a few degrees every time they open to wipe the faces & seats clean of carbon.



18. Valve \_\_\_\_\_ must be in good condition and not too much oversize in order for the *face & seat* to seal tightly. Guides can be *reamed out & re-bushed* back to original size if they are worn.





19. The *counterbalance systems* shown above substantially reduce engine \_\_\_\_\_.

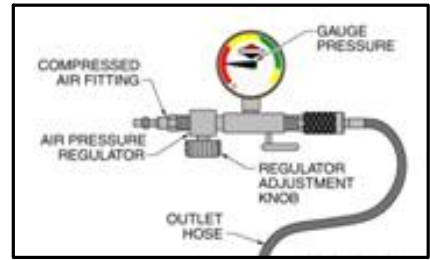
20. Check off the name the tools pictured. **Be able to explain when & why they are used.**



- Vacuum Gauge
- Compression Gauge
- Cylinder Leakage Tester



- Spark Tester
- Compression Tester
- Tachometer



- Vacuum Gauge
- Compression Gauge
- Cylinder Leakage Tester



- Piston Ring Compressor
- Piston Ring Expander
- Piston Ring Ridge Reamer



- Piston Ring Compressor
- Piston Ring Expander
- Piston Ring Ridge Reamer



- Piston Ring Compressor
- Piston Ring Expander
- Piston Ring Ridge Reamer



- Valve Seat Cutter Kit
- Valve Lapping Stick
- Valve Spring Compressor



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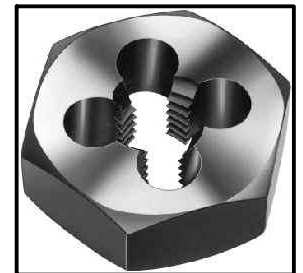


- Recoil Clutch Tool
- Strap Wrench
- Flywheel Holder

- Recoil Clutch Tool
- Strap Wrench
- Line Wrench

- Flywheel Holder
- Flywheel Puller
- Flywheel Torque Tool

- Knock-off Tool
- Gear Puller
- Torque Wrench



- Sirometer
- Vibration Tachometer
- Tiny Tach®

- Vibration Tachometer
- Tiny Tach®
- Photo Tachometer

- Die
- Tap
- Drill Bit

- Tap
- Die
- Hex Key



- Wire Feeler Gauge
- Flat Feeler Gauge
- Spark Plug Gauge

- Torx® Bit
- Hex Key
- Allen Wrench

- Beam-Type Torque Wrench
- Ratcheting Torque Wrench
- Dial-Type Torque Wrench

- Telescoping Gauges
- Small Hole Gauges
- Big Hole Gauges



- Inside Micrometer
- Depth Micrometer
- Outside Micrometer

- Small Hole Gauges
- Torx® Bits
- Hex Keys

- Analog Meter
- Digital Multimeter
- Tachometer

- Electronic Caliper
- Dial Indicator
- Dial Caliper