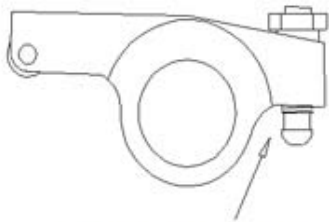


Pushrod Length & Rocker Arm Geometry Instructions (08/2010)

To get the maximum performance and life from your camshaft and valve train components the geometry and pushrod length must be correct. Pushrod length is very critical on Mopar engines because the rocker shaft position cannot be easily altered as with other brands of engines. There is not one correct length pushrod to fit all combinations of blocks, lifters, heads, cams and rockers and each of these components affect the pushrod length. The correct pushrod length and rocker arm geometry will provide the greatest area under the curve and reduce the wear and strain on the adjusting screw and cup.

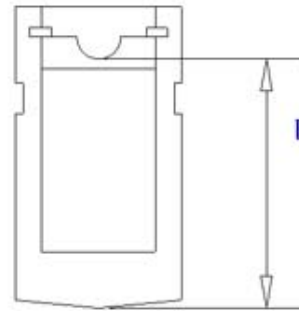
1. Install the rocker arms, springs and spacers correctly aligned on the shafts. Lightly tighten the hold-down bolts.
2. When using adjustable rocker arms, you should start with the rocker arm adjusting screw threads flush with the bottom (pushrod) side of the rocker arm. You should just barely see the first thread. (See Illustration #1). You want to end up with the pushrod/cup as close to the rocker as possible without touching to allow enough space for the lube oil to spray in.
3. Install your camshaft and one lifter. Use light oil, not cam lube or grease to lubricate the cam and lifter contact area during the checking procedure. If you are using solid flat tappet or roller tappet camshaft you can use one of the lifters as you test lifter. Be sure to include your valve lash with mechanical (or solid) lifter camshafts. If you are running a hydraulic camshaft you must use one of our adjustable solid test lifters that you must adjust to the same running length as the hydraulic lifter that you will use for final assembly. Lifter lengths will vary from one manufacturer to another; solid lifters are quit a bit shorter than hydraulic lifters, possibly as much as .400". (See Illustration #2)
4. Hughes Engines inc. provides an exclusive, unique adjustable length-checking solid lifter to be used in place of a hydraulic lifter when setting up a hydraulic camshaft. Separate instructions are provided for using it.
5. With the lifter on the heel (low side of the cam lobe), adjust the pushrod so that there is no slack in the valve train if you have a hydraulic cam. With a solid cam adjust in the proper lash clearance.
6. Install a dial indicator on the valve spring retainer and rotate the engine to determine the exact valve lift you are getting
7. Rotate the camshaft /crankshaft to 55% for Small Block or 50% for Big Block of the total valve lift position. All pushrod geometry checks must be done at this lift. NOTE: The lift at the valve is 1½ times greater than that at the camshaft when using a 1.5:1 ratio rocker. Do not confuse **valve lift** with **camshaft lobe lift**!
8. With the cam rotated to the position in Step 7 the center lines through the pushrod and the rocker arm adjusting screw should be one common line when viewed from the front of the engine. This is very important. (See Illustration #3). To get this alignment, you may have to lengthen or shorten either or both the adjusting screw and pushrod, and install shims between the rocker shaft and the saddle. Do whatever is necessary to get the straight line. You will may find that the rocker shaft must be raised slightly to gain rocker-to-retainer clearance (See Illustration #3, Area A) or the common line as shown in Illustration #3.
9. If you find you must raise the rocker shaft, (because yours looks like illustration #7) Hughes Engines inc. can provide you with special, aluminum, shims to correct the problem. These shims do not crush the rocker shaft like the more common flat steel shims do and seal the oil better than steel shims. Shims are available in thicknesses of .020", and .040" and can be stacked. NOTE: Some cases require stacking shims. Oil the shims individually and tighten them into place to contour them before final installation and torquing. When stacking 3 or more shims special trimming instructions are provided with the shims.
10. To determine how much the rocker shafts must be raised you may need to make some temporary shims from aluminum sheet, pop cans or paper. Use them in conjunction with the rocker screw and push rod length changes to get the common line straight as shown in illustration #3..
11. Once the pushrod length is determined the rocker tip to valve stem alignment should be checked. The rocker arm tip travel should be located as close as possible to the center of the valve stem tip when viewed from the top and side of cylinder head. (See Illustration #5). The rocker arms may contact the retainer/spring if they are not properly centered. side to side.
12. The rocker arm tip/roller should wipe across the center of the valve stem tip when the valve is lifted through its entire travel. This wipe pattern is most easily determined by "painting" the top of the valve stem with a felt tip marker and turning the engine over a few revolutions. This will leave a mark in the ink showing the wipe pattern (See Illustration #6). If you find the wipe pattern is not centered as shown or is very biased to the inner or outer edges of the valve stem, it may need to be corrected. If not corrected premature stem and valve guide wear could result. Hughes Engines Inc. can machine your rocker shaft saddles to correct this situation—it is common on Small Block LA iron heads.
13. On Small Blocks, and all aluminum heads, check for pushrod-to-tunnel interference as shown in Illustration #3, this may require a chamfer, halfway around the top of the tunnel and approximately .500" down. Usually this is the closest point, but check at the bottom of the tunnel too and correct as required. Some race heads may need considerable clearancing, check before final assembly. Area B. .002" is enough at tightest point during lift.
14. Now you have the correct pushrod length and valve train geometry. Return the Checking pushrod/lifter to us and we will cut and assemble a set of pushrods specifically for your engine.
15. As you can see, there are several points to check when correctly installing adjustable or roller tip rockers and measuring for proper pushrod length. Sometimes, all of the desired settings cannot be reached. The first and most important point to check and correct is interference problems. Second is the pushrod-to-adjusting screw alignment.
Third is the tip-to-valve alignment and "wipe" area.

Illustration #1

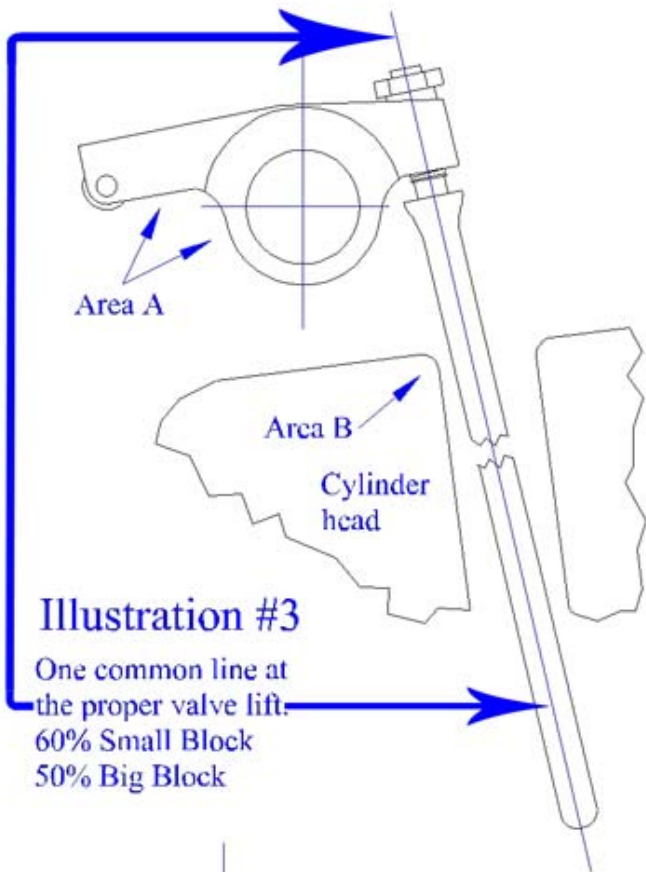


1-2 threads showing

Illustration #2



Lifter length:



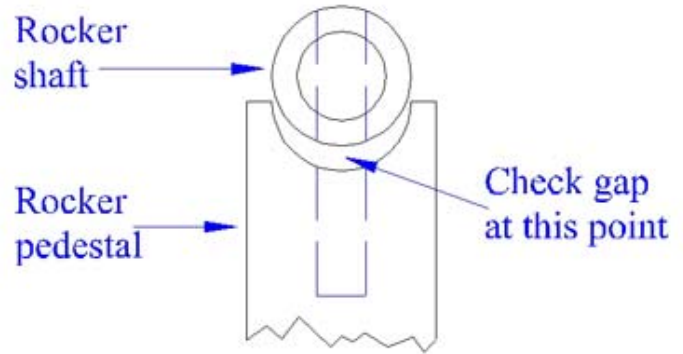
Area A

Area B

Cylinder head

Illustration #3

One common line at the proper valve lift.
60% Small Block
50% Big Block

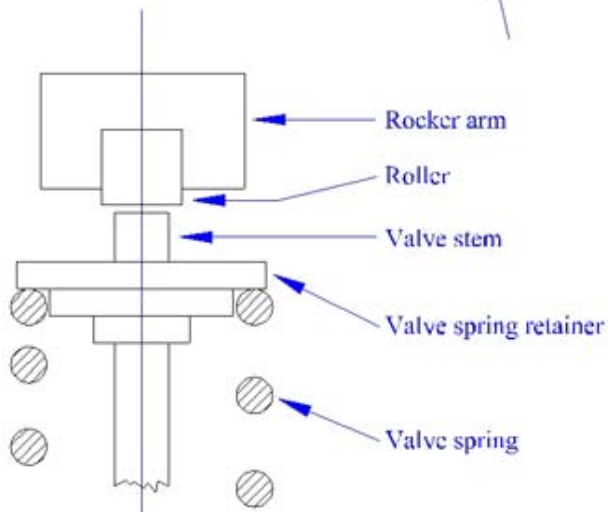


Rocker shaft

Rocker pedestal

Check gap at this point

Illustration #4



Rocker arm

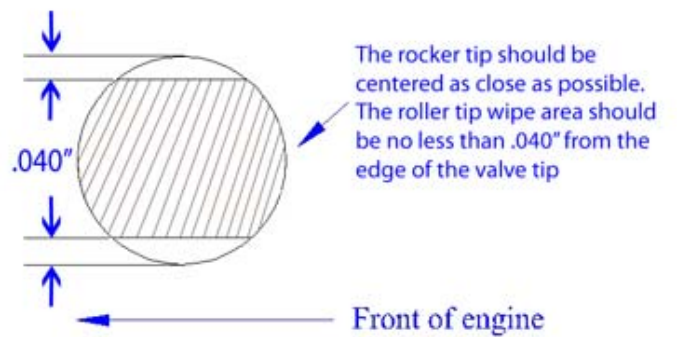
Roller

Valve stem

Valve spring retainer

Valve spring

Illustration #5



The rocker tip should be centered as close as possible. The roller tip wipe area should be no less than .040" from the edge of the valve tip

.040"

Front of engine

Illustration #6