Mopar Shaft Mounted Rocker Arm Geometry and Pushrod Length for Custom Pushrods (04/19)

The proper rocker arm geometry and pushrod length is critical to obtain the maximum performance out of your engine. The ratio of the rocker arm can be altered (**reduced**) if the geometry is incorrect. This will reduce the area –under-the-curve and available breathing time thereby **lowering** the power output. The ratio of the rocker arm is affected by the position of the adjusting screw ball (or cup). The small block is the most sensitive to this adjustment, due to the angle difference of the pushrod, lifter, and the rocker offset if any. More offset results in more ratio loss.

These instructions are designed to help you find the proper dimensions for your particular combination and may require custom made pushrods which we can supply.

Note: The most accurate way to check the geometry is by using a light checking spring as shown. High pressure springs will cause the checking pushrod to flex, giving you incorrect measurements.

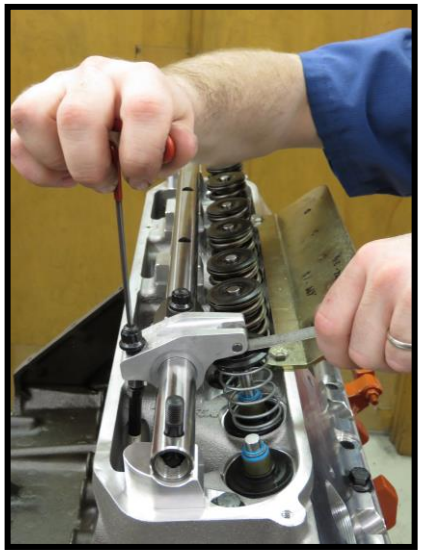
Step 1: **You are going to adjust the pushrod length and the adjusting screw protrusion to obtain the highest possible valve lift. Thread the adjusting screw in the rocker so that the ball is protruding the correct amount from the rocker body.**

LA - approximately .320"
Big Block - approximately .300"

The protrusions ARE NOT the final length. They are a starting point only.

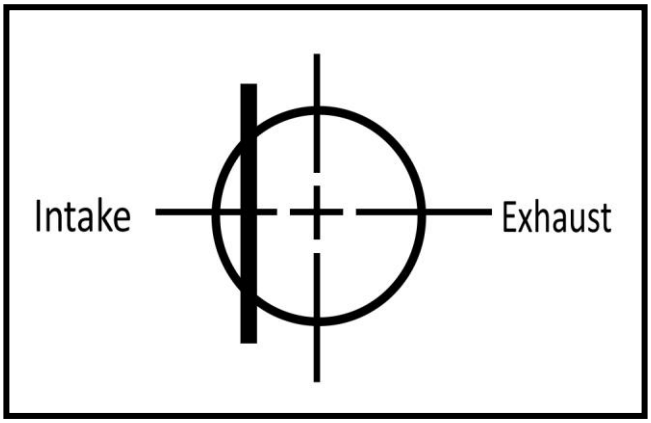
Note: This photo shows measuring for screw protrusion. On small block LA rockers, the maximum protrusion should be no more than .420" for a final length.

Step 2: **Install the rocker arms on the shafts and mount them in the saddles on the head. Check the rocker to retainer and spring clearance. Do this when the valve is closed (closest position) The red pointer is where you check.**



Step 3: **If you are using a mechanical cam, now is the time to set the lash.**

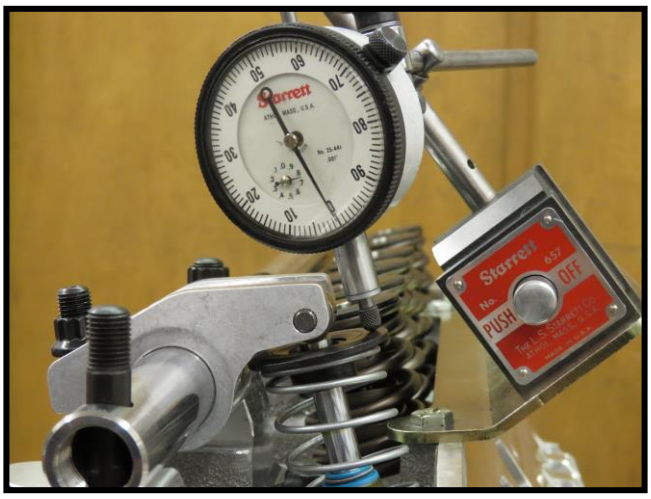
Step 4: **Check the wipe pattern at this time. The roller position with valve closed should start near the position shown, biased toward the intake side of the head.**



Step 5: **Mount the dial indicator stand on a securely mounted base (p/n ARE AR083, shown here).**

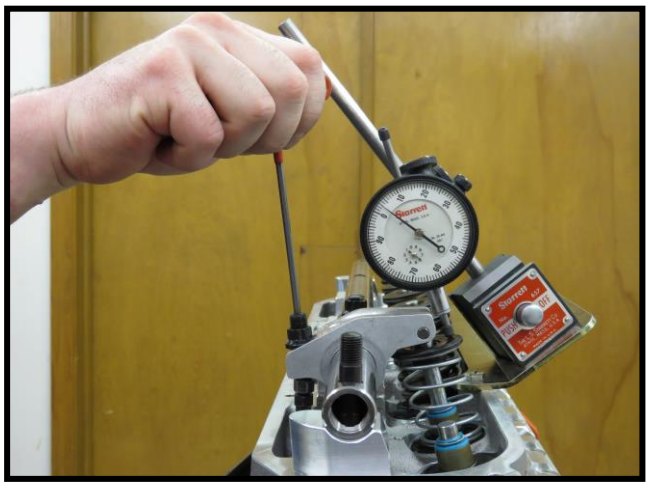
Note: make sure the indicator stem is not on the tapered edge of the retainer.

Zero (.000”) the dial indicator with a small amount of preload - .020”/.030”.



Step 6: **Rotate the crankshaft through one complete lift cycle and not the valve lift. Shown here as .610”**

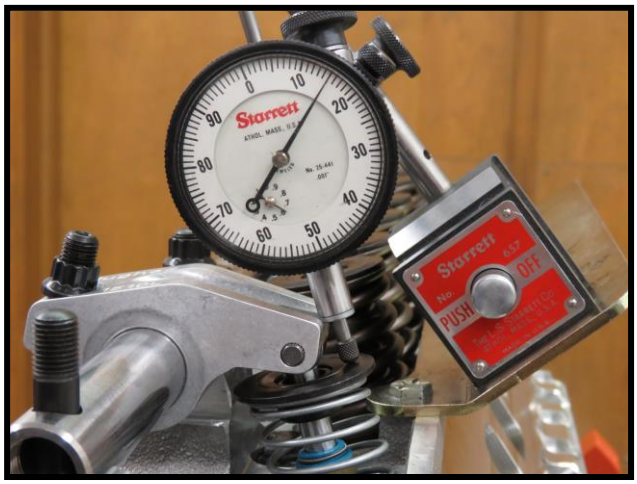
Step 7: **Next, loosen the pushrod and shorten it up ½ turn and change the adjusting screw position and take up the slack.**



Note: if you are using a mechanical cam, don't forget to keep the correct lash. The best way is to insert the feeler gauge between the valve stem tip and the rocker roller and tighten the adjusting screw until you feel the same drag on the gauge as you did in step 3.

Step 8: **Reset your dial indicator to zero and rotate the crankshaft through one full lift cycle. Note the lift change.**

In the example, the lift has increased to .615" indicating better geometry. This shows that you are progressing in the correct direction. If you lost lift, you must make the pushrod longer and the adjusting screw shorter.



Step 9: **If you lost lift when you shortened the pushrod you must go back and lengthen the pushrod 1 turn. ½ turn returns you to the starting length and ½ turn more makes it longer. When lengthening the pushrod, it will work best if you shorten the rocker adjusting screw first and then lengthen the pushrod to take up the slack.**

Continue to shorten or lengthen the pushrod and compensate the adjusting screw and lash until you have reached the maximum lift. The small block with its many angle variations and big blocks with big offset rockers are the most sensitive when adjusting, this is why we suggested using the checking spring before you started.

Also note that lots of rocker offset, high spring pressures, and long pushrods cause valve train flexing and lost ratio (lift). Use the largest diameter pushrod to reduce flexing, especially with mechanical roller cams.

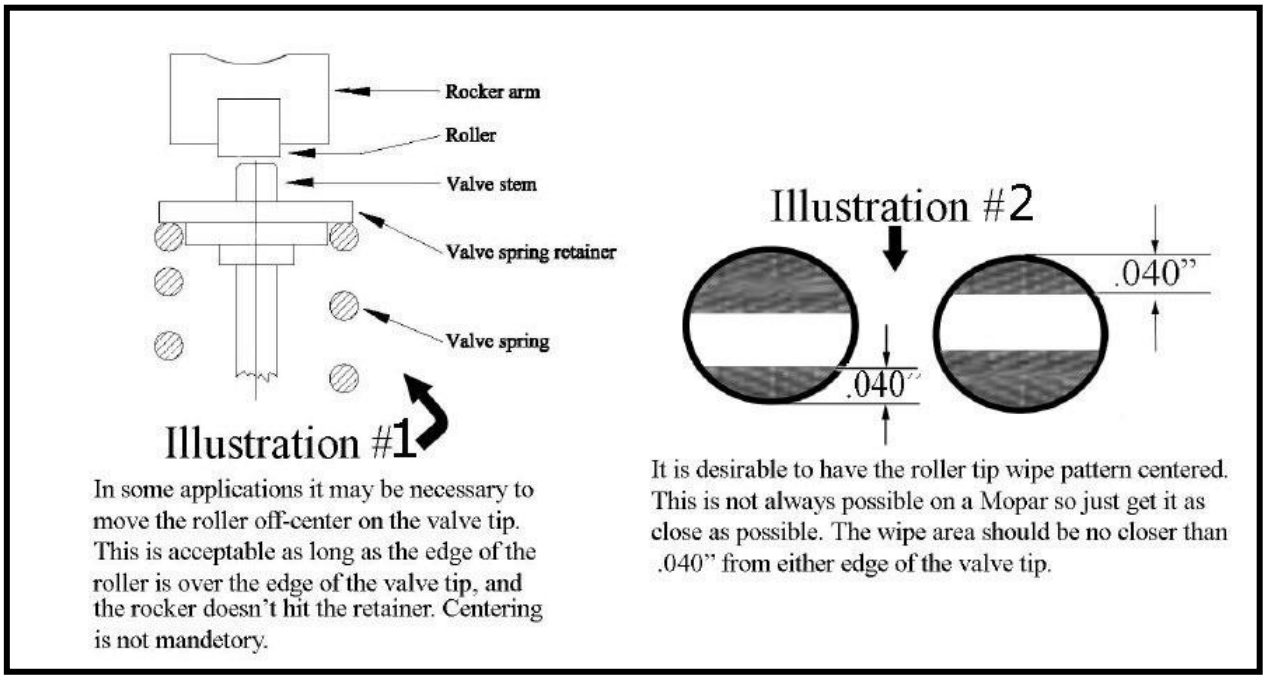
Step 10: **Once you have achieved the maximum lift, you have the correct geometry and pushrod length.**

Step 11: **In some cases, you may find that you must raise the rocker shaft. Use the included HUG 1710 aluminum shims to correct that problem. These shims do not crush the rocker shaft like the more common flat steel shims do. They also seal the oil better than steel shims. Shims are 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 torqueing. When stacking 3 or more shims, special trimming instructions are enclosed with the shims.

Step 12: **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 the cylinder head. (See Illustration #2, below). The rocker arms on small blocks may contact the retainer/spring if they are not properly centered side to side. In some cases, the rocker/roller can be offset to the extreme position for pushrod clearance. (Illustration #1, below)**

Step 13: **The rocker arm tip/roller wipe should be checked 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 #2, below). If you find the wipe pattern is not centered as shown but the pattern is no closer to the edge than .040" it is acceptable. Hughes Engines Inc. can machine your rocker shaft saddles to correct this situation – this is common on small block LA iron heads or with Crane or foreign rockers.**



Step 14: **On all heads, check for pushrod-to-tunnel interference, and correct as required. Some race heads may need considerable clearancing. Check before going through the pushrod length procedure. .002" is enough at tightest point during lift.**

Note: Pushrods can touch on their sides without problems as long as they don't rub hard enough to tear a piece of masking tape off of the pushrod. Run them!

Step 15: **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.**

Step 16: **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 obtaining maximum valve lift. Third is the tip-to-valve alignment and "wipe" area.**

Helpful tips

1. **Always make sure your dial indicator is perfectly aligned with the valve stem or you won't show accurate lift numbers. A little angle change will make quite a difference.**
2. **Make sure your pushrod locking nut and rocker nut are snug during your tests. The normal rotation of the lifter can cause the screws to lengthen or shorten.**
3. **Always make sure your dial indicator is zeroed before each lift check.**
4. **As you approach the best pushrod length/rocker geometry position you must make your changes shorter in length or you will overshoot your goal.**
5. **This procedure is the most important when working on a small block due to the angle between the lifter and the pushrod. The pushrod length and rocker screw position will change depending on the lifter type/length. The functioning length of the hydraulic roller lifter is approximately 9/16" longer than the solid flat tappet style lifter.**