

**INSTALLATION INSTRUCTIONS**  
**MID-LIFT® PA Series™**

**PA30, PA35, PA45 Series Stud Mounted Aluminum Roller Tip Rocker Arms**

**Rocker geometry is NOT “placing the roller in the middle of the valve”!** Where the roller is at on top of the valve has **NOTHING to do with “GEOMETRY”**. For more than 30 years every, single, “big-name” (and no-name) cam and rocker arm company you can mention, have unwittingly been selling over-arc-ing STUD and SHAFT system rocker arms to engine builders, hoping an embarrassing lie would never come out; **and changing the pushrod length won’t fix their mistake.**

Rocker arms are NOT just simple hunks of metal made to fit between the pushrod and the valve, yet that’s the way they’ve been designed by everyone for decades. Even the drawings shown by these companies reveal a “closed valve” mentality, as though the rocker would never move. **Rocker arms are radial devices that translate linear information.** When you strip away the various *shapes* of rocker arm bodies that different manufacturers have adopted over the years, there’s only **THREE POINTS** that matter. These are all **AXIS** points, and they define an **ANGLE** between each other. This angle is so critical, that as little as .020" error in the height of the pushrod pivot points will reduce cam velocity at the valve. As little as .050" difference in pushrod length can effect precise rocker geometry by more than 25% of its motion, forcing the pushrod to leave its linear (in-line) path, and follow an excessive arc around the rocker arm’s axis that robs your cam of performance at the valve! **“Over-arc-ing” rocker arms increase stud flex, induce premature valve spring and pushrod harmonics, destroy valve guides, stems, lifters, etc, etc, etc.** **THE ONLY WAY ON THE PLANET to get 100% of the cam’s information to the valve, with the LEAST AMOUNT of wasted linear motion, is to DIVIDE the rocker arm’s arc EQUALLY!** ..... **HENCE: MID-LIFT!**

Only one man developed this concept when no one else saw it. At the age of 19, with 2 years of BOSS 429 racing under his belt, **Jim Miller** developed MID-LIFT in 1973, and received the **MID-LIFT® Patent** in 1982. The **PVS** rocker arms are designed to this precision geometry Patent, that only **PVS** is licensed to use from **Miller Engineering Inc.** The **PA Series™** rocker arms represent an “affordable” high performance option never before offered in a stud mounted MID-LIFT® design roller tip rocker arm.

Don’t confuse the **PVS** rocker arms with those made by “machine shops” and cam companies that just copy other rocker manufacturer’s mistakes. *The PVS PA Series™ rockers may look “similar” to “some” rocker arms, but they are far from it. The PVS PA Series™ roller tip rocker arms have this discrete accuracy of proper pushrod location and angle, to guarantee precision geometry is applied to both sides of the rocker, simultaneously. (The pushrod angles with everyone else’s are all over the place.) The PVS “PA Series” aluminum rockers mark the beginning of “correct geometry” at affordable prices for stud mounted designs. They are computer engineered with leading edge innovation, and designed for engine builders by an engine builder.*

**NOTES:** ..... **ESPECIALLY “D thru F”**

- A. *These instructions assume and **require** that the engine builder/mechanic has experience and a working knowledge of internal combustion **OverHead Valve** engines, and specifically, valve train operation and modification. If you do not understand valve train operation, please consult with a professional engine builder who does, or go to **MID-LIFT.COM** for additional information, before doing it “wrong.” **We can’t warranty your mistakes.***
- B. If this is a newly assembled engine, be sure you “prime” the engine before operating, to guarantee there is no “dry time” during these first critical moments of operation.
- C. *It is typical for these rocker arms to require .150" to more than .200" longer than stock pushrods, in providing the correct 90 degree MID-LIFT® geometry. **Do all checks with full, running pressure valve springs.***
- D. Use of HYDRAULIC LIFTERS require a SOLID lifter of equal LENGTH to your hydraulic lifter be used for setup. **A Patent Pending adjustable Test-Tappet™ is available from MPG, if your cam supplier does not have what’s needed. Or you may use HALF your Net Valve Lift to set trunnion’s axis below roller pin axis, as depicted in INSTALLED GEOMETRY @ MID-LIFT.COM.**
- E. The following TECHNIQUE requires that your studs be accurately placed at OEM specifications. If you have modified the heads from “pressed” to “screw-in” studs, then you must check that rocker stud centerline with the valve centerline angle is **11-1/3 degrees** for the **SB Chevrolet**; and **10 degrees (even)** for the **SB Ford**. (The **BB Chevy** is *trickier*.)
- F. **Some studs require replacement because they are too short. Allow threads 1.5X the Diameter of your stud.**

To find out what pushrod length you need, you must have (1) an ADJUSTABLE PUSHROD and (2) preferably a long shank ADJUSTER (as supplied with stud girdles) or the 12-Point Miller adjuster (supplied with PVS aluminum roller rocker arms). You will also need a DIAL INDICATOR, or at least a set of DIAL CALIPERS for measuring exact LIFTER RISE on the CAM, and exact VALVE LIFT at the retainer. A simple, but revolutionary **Geometry Tool Kit** is available from **MPG** (see reverse side).

# MPG

## PRECISION VALVE-TRAINS

### INSTALLATION

Go MID-LIFT.COM

**NO GEOMETRY TOOL can set proper rocker arm geometry, if it is NOT designed for SPECIFIC VALVE LIFTS.**

The TOP of the "PA Series™" (Precision Aluminum) roller tip rocker arms, like all PVS rocker arms, is designed to be its own installation tool. This Patent Pending feature sets the *Measuring Face™* surface at exactly 90 degrees with the STUD centerline when the VALVE is at the MID-LIFT position. The CAM/LIFTER will also be at their MID-LIFT position at this same time.

**NOTE: Original specification stud angles are required for accurate use of these instructions.**

#### SYNCHRONIZING the CAM & ROCKER to MID-LIFT®

1. With a dial indicator or dial caliper stem, rotate your engine over 2 full revolutions to measure the CAM's NET LOBE LIFT and MAKE A WRITTEN NOTE OF THIS DIMENSION. (For simplicity, we will use an even .400" in our example.)
2. Rotate the engine until the cam lobe has lifted exactly to the LOBE's MID-LIFT POINT (i.e., ½ of .400" Total LOBE LIFT = .200").
3. Install your dial indicator upon the valve spring retainer and in-line with valve stem. Be sure to mount the gauge close enough to allow the indicator's stem to extend as needed to follow the valve lift, but clear of the rocker arm during this opening cycle.
4. Using an adjustable pushrod set to approximately .100" longer than stock, install the rocker arm. The only way to set the rocker in a MID-LIFT position now, is to open it while the cam is at MID-LIFT. ALL PVS rocker arms are designed for a NET RATIO at ZERO LASH. You must multiply your CAM lift by the ratio of the rocker arms you have, to acquire your *estimated NET VALVE LIFT*. (i.e., If the LOBE LIFT is .400" and you have a 1.5:1 ratio [Part #PA3550], your VALVE LIFT will be .600" @ ZERO LASH.)

**NOTE:** If you have a **mechanical tappet** cam, don't worry about compensating your net lift for the ZERO LASH we are using; it will compensate itself when you set the valve lash later. For right now, ZERO LASH must be used for cam and rocker positioning.

5. As you install the rocker arms, your cam lobe is already at MID-CAM-LIFT, so you will need to turn the adjusting nut down to begin opening the valve. STOP at the MID-LIFT figure that your ROCKER RATIO and CAM LIFT dictate. In our example, this would be half of .600", or .300". **NOTE: The Miller G-Tool™ can set precise Pushrod length in the CLOSED valve position!**
6. Once you have stopped the valve at your prescribed MID-LIFT position, check to see if the TOP SURFACE *Measuring Face™* is at a 90 degree angle with the BACK side of the adjusting nut. As easy as this sounds (and it is), anything with a square edge can be laid across the top of rocker's surface and up against the rear side of the stud, to "eyeball" very accurately (within .010" or less) if this 90 degree relationship is true. **NOTE: You will probably have to lengthen the pushrod.**

#### ESTABLISHING PUSHROD LENGTH

7. **Change your adjustable pushrod length** as required to square the top of the rocker arm 90 degrees with the BACK of the stud. As you change the pushrod's length, the VALVE LIFT will also change. But since you want to keep the position of the valve frozen at MID-LIFT, you must correct this by rotating the **adjusting nut** in the **counter-direction** of the valve's movement to offset this. This technique is quick and simple once you've done it. It's simply a back-and-forth game between adjusting the pushrod length and the adjusting nut, to keep the valve locked at MID-LIFT, until the top of the rocker is SQUARE with the back of the STUD. **When you have accomplished this, ROTATE the engine all the way through, set your valve lash (if required), and confirm the NET valve lift has been accurately duplicated for your cam.** Repeat as necessary to set exact pushrod length.
8. Once you've accomplished the above, back off the adjusting nut to remove the rocker arm and MEASURE the PUSHROD's final length; ORDER your EXACT LENGTH PUSHRODS... *then throw away those little toy "closed valve" pushrod checkers.*

#### OPTIONAL MEI PRODUCTS

MILLER ENGINEERING INC offers a 3-piece Geometry Tool Kit.

The Patent Pending **Miller G-Tool™** makes precision geometry rocker arm setup "painless" and quick. **Hydraulic Tappet setup is easy with the Miller Test-Tappet™.**

For your **G-Tool™, Test-Tappet™**, or custom length **Pushrods**, contact MPG: **954-978-7001**

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