January 2011

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Please disregard anything different for either Address or Telephone numbers contained in these pages.

Thank You
MPG

PRO-STAND™
INSTRUCTIONS
MID-LIFT.COM

INTRODUCTION

*Congratulations on your purchase of the best value in high-end STAND mounted rocker arms available. The **MILLER PRO-STAND™** sets a NEW STANDARD in Professional roller rocker arm systems, for a near Sportsman price, having numerous design features **not** found with ANY other "shaft" system...at any price, regardless of name or fame!*

1. **PRO-STAND**™ rocker arms are designed to Jim Miller's MID-LIFT® Geometry from the principles of precision rocker arm engineering he developed in 1973 and Patented in 1982; which was later endorsed by both Chevrolet and Chrysler's racing engineers. *No other company can claim this.*

2. The rocker bodies are fully CNC machined (on 100% of all surfaces) by MPG's 4-Axis *Kitamura* high speed machining centers, from a solid block of Alcoa's proprietary 7150 alloy; the same material used to make the Boeing 777! This technique allows the molecular grain to run "lengthwise" with the rocker body, making fatigue resistance 6 times higher than the "cross-grain" *silhouette extrusions* used by the *other two* #1 "shaft" rocker manufacturers.

3. Twin-rib rocker beam with ball mill lightening, and drip down oiling are but only two design features first introduced by Jim Miller in 1980, that continue to this day, providing the greatest strength flowing up from the load points imposed over the 8620 precision ground roller pin and honed roller tip, while yielding the lightest in moment-of-inertia dynamics. Full compliment Universal Bearings, Torrington Thrust washers and MPG's 7/16-20 Form Rolled J-Thread Adjusters and 12-Point nuts finish out the ultimate combination of engineering, materials and workmanship available.

4. The full length STANDS are made from solid billet 7075-T6 bar stock, precision machined to specific head applications; using high strength precision formed, Rolled J-Threads to retain the shafts. ***Each** PRO-STAND™ system is Serial Numbered and traceable for all specification records.*

5. ***ARP/Jim Miller*** 7/16" 12-Point Crown Mounting Bolts secure the stands to the heads with shallow counterbores for maximum material; while rocker shafts are secured by Grade-8 cap screws.

6. **MPG** *ROCKER SHAFTS* are made from 8620 aircraft grade steel, fully machined on MPG's state-of-the-art 5-Axis CNC *Mori-Seiki* bar feed turning center, then precision centerless ground finished.

NOTE: **We DO NOT endorse the use of "*shims.*" Shims are *BAD engineering,* and we strongly recommend against them.** ***Miller PRO-STAND***™ systems are provided with a SURPLUS of material which *requires* the bottom of the stands to be cut for proper *Installed Geometry* by the engine builder. Removing anywhere from .100" to .300" may be needed, but most applications are closer to .200". The exact amount will depend on your engine's particular combination.

These stands are precision machined to provide ANY GOOD MACHINE SHOP with the ability to hold and machine them parallel to their top surface. We recommend seeking a shop that has a vertical end mill, with side-by-side Kurt (or equivalent) vises. MPG offers this service for $50.00 (plus shipping). MEI will cut stands to a specific height at NO CHARGE when ordered direct from us, and when height is known in advance.

THE GOAL: The fundamental thing to remember is: *when the valve is closed, the ROLLER'S AXIS (centerline) will be HALF of the NET Valve Lift ABOVE the ROCKER SHAFT AXIS.* The following pages are intended to provide one simple way to measure this with common tools, so you can determine the necessary material to be removed from your stands. ***MPG also offers precise MID-LIFT geometry tools for quick, direct measurements.***

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METHOD

Of the various techniques we can think of to set MID-LIFT rocker geometry, this method begins with the Valve Tip at MID-LIFT, then adds HALF your NET Valve Lift to give you the exact figure needed to determine how much to remove from your stands, while using the rocker shaft as an easy reference to measure from.

What is important to remember, is the MID-LIFT® point is ALL THAT MATTERS; exactly HALF of your NET valve lift is what everything is set to. Errors of only .010" or .020" on the pushrod side can greatly reduce what is referred to as "area-under-the-curve," requiring several more degrees of crank rotation to reach the same points of valve lift, thus losing effective duration and acceleration at the valve, where it counts.

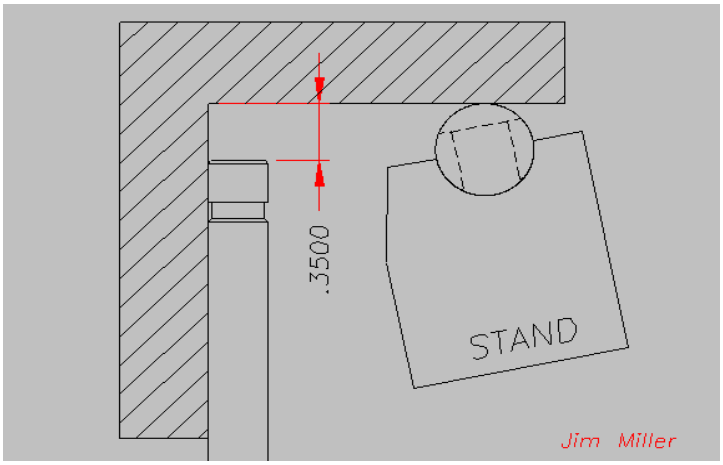
The stand must be cut for the NET Valve Lift. On mechanical cam applications (roller or flat tappet), you need to subtract the Valve lash from the GROSS valve lift. To do this, multiply cam lift by your rocker ratio to attain the "gross" valve lift; then subtract Valve Lash to get NET valve lift. *We strongly recommend "tight" lash settings. There is no need for valve lash settings of .020" or more. We recommend HOT valve lash settings for the Intake of .012" to .015" and .014" to .017" for the exhaust.* Naturally, the "feel" of the mechanic is important here. So be sure to be careful during these steps.

NOTE: If uncertain about cam position during valve lash measurements: Set INTAKE when the exhaust has just BEGUN to OPEN. Set EXHAUST when intake has just FINISHED CLOSING.

1. Mount your stand to the head with two bolts just to position it for checking.

2. Install a rocker shaft without rocker arms, using two of the cap screws to snug it down.

3. Use a small square to set along the side of the valve stem, and across its top until laying upon the top of the rocker shaft. *It is critical that your reference is exactly 90? to the valve centerline.*



FACTS

Placing the roller in the middle of the valve has NOTHING to do with setting correct geometry.

NET valve lift must be known on EVERY application to set rocker geometry.

Any brand rocker arm tool from any manufacturer which does NOT determine height from NET Valve Lift is useless.

4. Measure the gap beneath the square and the top of the intake valve stem tip, and make a note. Repeat this for the exhaust. In most cases this figure will be greater than.300". In our example, we show .350". We now need to convert O.D. references to find the centerline of the shaft and roller.

NOTE: For measuring top of shaft to valve tip on assembled heads: *use the valve spring retainer (which is 90? to the valve) as your reference plane to go straight across to the shaft, measuring the shaft height above the retainer, then measure the valve tip above the retainer to find the same value as if measuring directly between the top of the shaft and the top of the valve tip.* ***The FOLLOWING PAGES have been REVISED to ILLUSTRATE the MID-LIFT method.***

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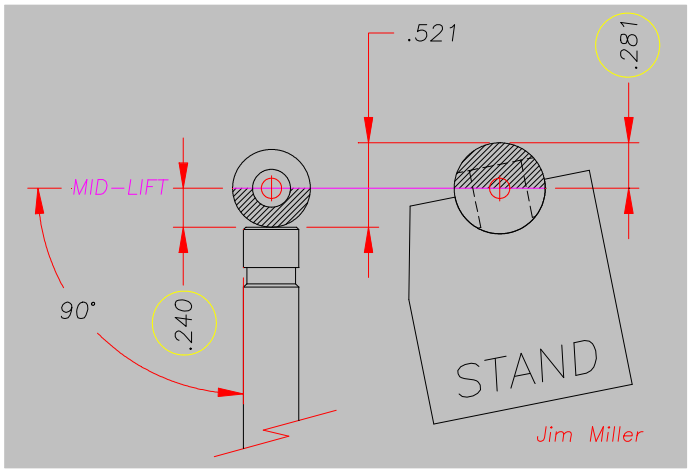
METHOD

With the **MILLER PRO-STAND**™ Rocker System, *the TIP of the valve will always be exactly **.521"** BELOW the TOP of the Rocker Shaft when the valve is at precise MID-LIFT.* The illustration below has the rocker body stripped away, and only shows the rocker SHAFT and the rocker's ROLLER, properly placed at precise MID-LIFT. Since we are measuring from the top of the rocker shaft, to the valve tip, which is on the bottom half of the rocker's roller, we've SHADED these two respective halves and represented their individual dimensions in yellow circles below. The SUM of these can be seen by the **.521"** figure between them.



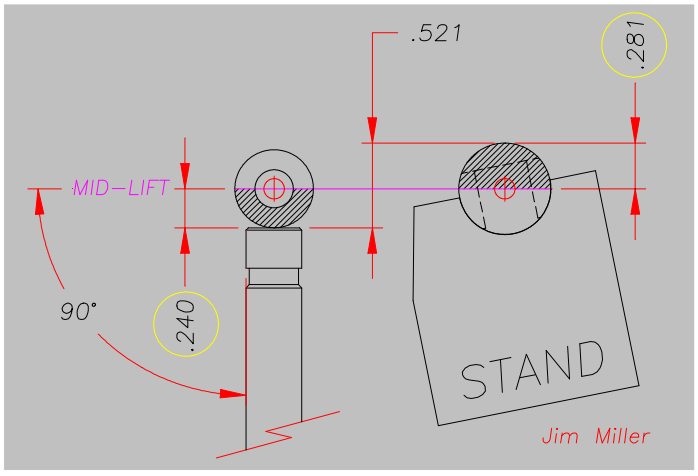
HOW IMPORTANT?

The most important aspect of MILLER rocker geometry is NOT on the valve side, but the *pushrod* side. Your total margin to accurately intersect MID-LIFT is only 1/2 of CAM lift. (i.e., .200")

Missing this by only .010" can mean 5% error on a .400" lobe cam, and reduce cam information reaching the valve by several degrees.

NOTE: *Use the ZOOM tool on your Adobe browser to view exact details.*

5. Multiply CAM Lift x RATIO, then subtract LASH to get NET Valve Lift. This is divided in half. Our example is .325", which is *subtracted* from our fixed standard of.521" to give us **.196"**. This is the height our example rocker shaft needs to be above the valve tip when the valve is **CLOSED**.



FOUR STEPS

1. Measure TOP of Shaft to Valve Tip.
2. Subtract 1/2 NET VL from .521".
3. Subtract sum of #2 from #1.
4. Add 2% to #3 for material to cut.

Here, the Valve and Roller are shown in the **CLOSED** position, with the **green line** showing where the tip is at MID-LIFT. The .325" shows as half of our NET VL.

The **.196"** dimension is the sum derived by subtracting .325" from the **.521"**, which gives the correct height at CLOSED Valve, to establish what stand needs to be cut to.

6. Next we subtract .196" from the .350" we measured in our first illustration, to get .154". We multiply .154 x 1.02 (2%) to allow for the stand's angle, which gives our sample a final stand cut of **.157".**

NOTE: For engines with different intake and exhaust valve lifts: Ideally, *the valve tip lengths should vary in their height with each other to compensate*. The only way to *precisely* set the MID-LIFT point for both is to have the valve with the greater lift be longer, by half the difference. (i.e., If the intake has .050" more valve lift than the exhaust, then its tip should be .025" higher than the exhaust.)

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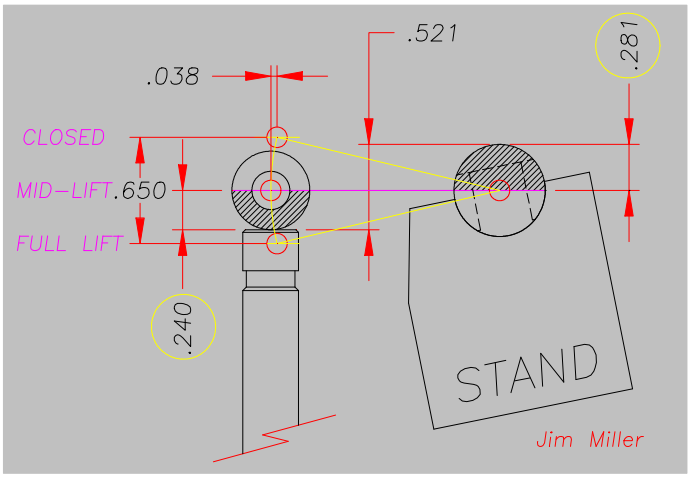
PUSHROD LENGTH

Once the STAND is cut for the proper height, assemble it to the head with engine ready for final assembly. The adjusting screw should be turned 2.5 turns out from bottomed up inside the rocker body.

An adjustable pushrod is used to gently bottom out within the adjusting screw. Remove the test pushrod and avoid changing its setting, then measure it's overall length and order the exact length you need.

NOTE: ***MPG*** *provides* ***same day or 24 hour shipping*** *on exact length, 3-piece Push-Rods of various wall thicknesses for all forms of competition;* ***DON'T*** *compromise with .025" & .050" choices.*



Small RED circles depict the exact center of the shaft and the roller, including where the roller axis would be in the **CLOSED** and **FULL OPEN** for our .650" total NET Valve Lift, also shown between them.

NOTE: *The TOTAL in and out SWEEP of the Roller is only* ***.038"****, for .650" NET VL. This is the precision of MID-LIFT.*

The **YELLOW LINES** represents 26? 39' of total motion, which under MID-LIFT, is divided equally to BALANCE the loads and assure the very least amount of side loads are applied to the valve stem and guide, which is **not** the case with *any other form of rocker geometry. Period.*

With **Hydraulic Tappet Cams**, you must be sure that the tappet is fully extended, or fully collapsed. New tappets will be easier to confirm that they are fully collapsed, but we recommend using a used or recently primed tappet that is fully extended. Most valve actions within the tappet allow for approximately .050" movement, and under performance operating conditions will usually compress down about .020" from their extended height. Add this amount to your measured length, to allow for this when having your pushrods made. If you choose the "collapsed" measurement point with a new lifter, then subtract .030" from your measured pushrod length, to allow for the extra length you've measured this way.

NOTE: **MPG** uses Full Compliment Needle Bearings because of their strength over "caged" rollers. However, the needles are grease retained. Keep rocker bodies mounted on their shafts during tear-down; otherwise add grease to keep the needle rollers in place, if removed.

TORQUE SPECS

ARP/Jim Miller Rocker Stand Mounting Bolts (7/16-14): . . . . . **45-50 Ft/lbs.**
MPG Grade-8 Rocker Shaft Cap Screws (5/16-18): . . . . . **12-15 Ft/lbs.**
CAUTION: Tighten rocker shafts down ONLY when BOTH CAM LOBES are fully CLOSED (@ TDC). (Always use liberal amounts of 50W oil on all threads when assembling.)

COMPLETE and MAIL your PRO-STAND™ REGISTRATION

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PRO-STAND™

OWNER REGISTRATION

MID-LIFT.COM

COMPANY NAME: _____

CONTACT NAME: _____

SHIPPING ADDRESS: _____

_____

_____

TELEPHONE: _____eMail:_____

PRO-STAND Serial Number: _____Model/Pt. No:_____

DATE of PURCHASE: _____From:_____

PREVIOUS ROCKER BRAND: _____Ratios:_____

CYLINDER HEAD Manufacturer: _____Model/Pt. No:_____

CYLINDER HEAD Special Notes: _____

VALVE SPRINGS; Brand, Size, Press: _____Dia._____Seat_____Open_____

ENGINE CUBIC INCHES: _____Bore:_____Stroke:_____

INDUCTION SYSTEM DESCRIPTION: _____

COMPRESSION RATIO: _____ FUEL Used:_____

CAMSHAFT MANUFACTURER: CAM LIFT:_____

CAM LOBE: Duration @.050 _____Separation:_____

VEHICLE, USE and/or CLASS: _____

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