



## Installation Instructions for KPMI Part No.: 20-23450

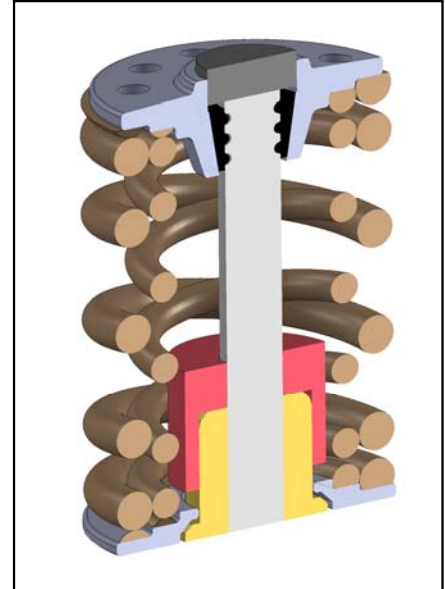
### Harley Davidson • Milwaukee-Eight Engines • 2017-'23

### Rocker-Shim Conversion Racing Spring Kit

The KPMI Rocker Shim Conversion Spring Kit for the Milwaukee-8 utilizes a dual spring system and a lightweight retainer that houses a standard Ø9.5mm hardened steel shim. The rocker arm rides directly on the shim surface and the 9.5mm diameter significantly increases the allowable rocker wipe area. This increase in wipe area provides the ability to utilize larger lift cams, that previously were unable to run on a 6mm valve stem.

The system is intended to be adjustable and allows for at least 0.060" of spring shims, tailoring the pressures and lift capacity to meet the engine builder's needs. Additionally, the rocker shim thickness can be varied to adjust effective stem protrusion.

This system is intended to be installed by an experienced engine builder, as there are modifications that must be performed and setup variables that must be determined for optimum performance and longevity.



#### A) 20-23450 Kit Includes:

<u>Qty</u>	<u>Application</u>	<u>Description</u>
8 - Pcs	Intake / Exhaust	HT Steel Retainers
8 - Prs	Intake / Exhaust	Chrome Silicon Dual Springs
8 - Pcs	Intake / Exhaust	HT Steel Basewashers
8 - Pcs	Intake / Exhaust	Viton Seals
8 - Pcs	Intake / Exhaust	9° Triple Bead Keepers
8 - Pcs	Intake / Exhaust	3.5mm Thick Rocker Shims

#### B) Rocker Shim System Notes

**Note 1: MODIFICATION NECESSARY.** Due to the larger diameter of the upper spring retainers, modifications to relieve the OEM lower rocker cover we be required to clear around the retainers. Additionally, relieving the lower rocker cover around the installed compression release valve, will provide additional freedom of movement when installing the cover.

**Note 2: MODIFICATION NECESSARY.** KPMI recommends roughly 0.100" of shim counterbore depth in the retainer. This distance is measured prior to the installation of the rocker shim, from the tip of the valve to the top surface of the retainer. To achieve this measurement, **the valve is intended to be "tipped" / shortened by 0.035"** (See Figure 1, page 2) Note: removing .035" should leave roughly .040" of tip length above the last groove on an OEM style groove. KPMI doesn't recommend less than .040" of tip length.

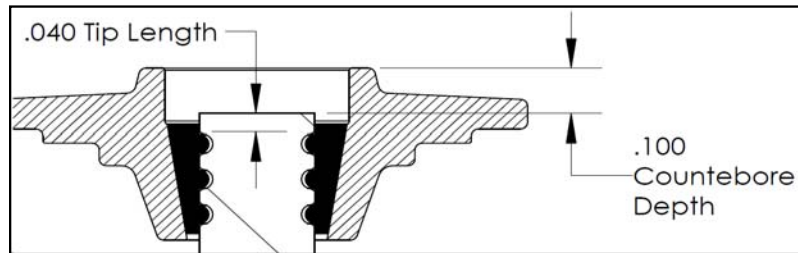


Figure 1) Installation assembly after valve tip modifications.

**Note 3: VALVE GUIDE COMPATIBILITY.** This system is designed to be run with KPMI’s newer style valve guides, which are shortened for 0.675” valve lift and can be identified with a large 1mm wide chamfer on the top of the shoulder (See Figure 2). The system is NOT compatible with older style KPMI guides. The system can also be run with the OEM guide but with reduced lift capacity due to higher guide heights. The OEM snap ring MUST be removed prior to installation.

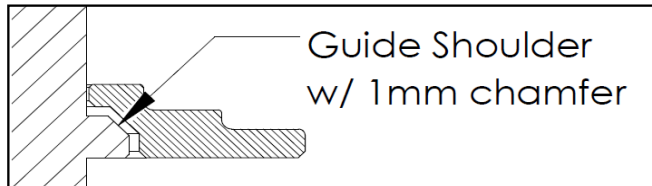


Figure 2) newer style KPMI guide compatibility

**Note 4:** The 3.5mm (.138”) thick included rocker shim, combined with the reduction of .035” from tipping the valve will increase the “effective” valve stem protrusion above the cylinder head by roughly .100”. This increase is necessary to correct rocker geometry with larger lift cams. This is a recommended starting place, but because rocker geometry is highly dependent on many variables, adjustment can and should be made. Any combination of different tipping length (mentioned above), different shim thickness or sinking the valves will effect this parameter.

**Note 5:** There is room for at least 0.060” of spring shims below the basewasher/lower collar. The installation height tables listed below in Section C, show the range of setup conditions for the system. It is up to the engine builder’s discretion to determine the setup condition best suited for the intended valvetrain and camshaft combination.

**Note 6:** When larger camshafts are used, and valvetrain acceleration values increase, KPMI strongly recommends running titanium valves for maximum performance.

### C) Installation Heights - Intake / Exhaust

Max Valve Lift	Installed Height	Seat Pressure	Open Pressure
0.675"	1.600"	86#	317#
0.660"	1.585"	91#	317#
0.645"	1.570"	96#	317#
0.630"	1.555"	101#	317#
0.615"	1.540"	107#	317#

NOTE: Each spring has a slightly tighter wind to the coils on one end. Install with tighter coils down, towards cylinderhead.

Packaged By: \_\_\_\_\_

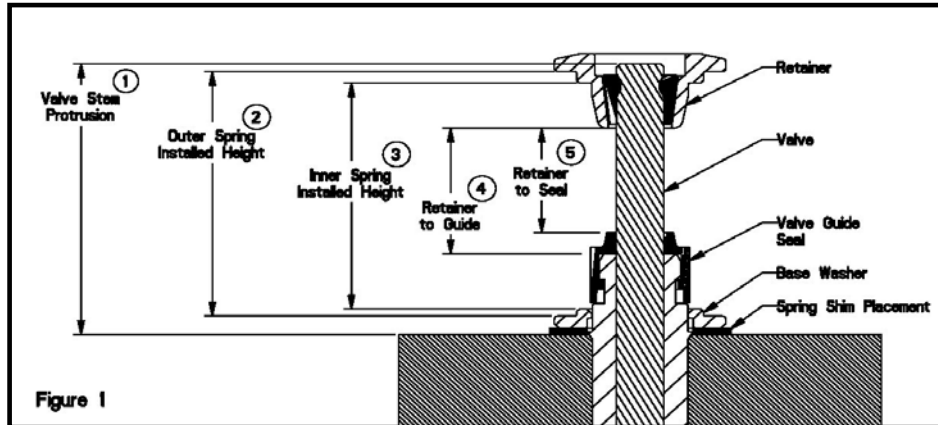
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# TECH TIPS

1. The difference between the installed height and the coil bind height is considered “Free-Travel”

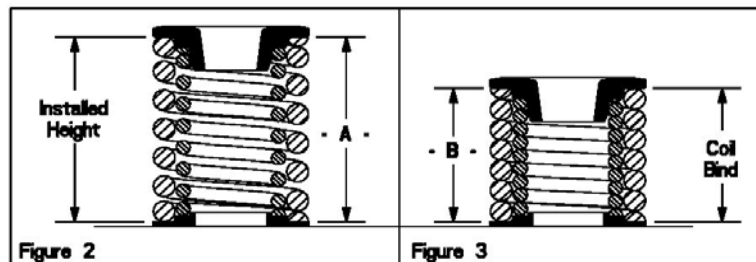
*The coil bind height is determined by compressing the spring(s) with the Retainer and Basewasher in place (a vice can be used for this operation). Once springs are compressed, measure the distance between the Retainer and Basewasher where the Outer Spring contacts them.*

2. Free-travel should always be gross valve lift +0.060” for safe operation.
3. Retainer-to-Seal / Guide clearance should also be gross valve lift +0.060” for safe operation.
4. Failure to check valve train clearances can result in serious damage to an engine



## Valve Train Terminology

1. Stem Protrusion is measured from the tip of the valve stem to the cylinder head. See Figure 1.
2. Outer spring installed height is measured where the outer spring contacts the Retainer and Basewasher when assembled (See Figure 1).
3. Inner spring installed height is measured where the inner spring contacts the Retainer and Basewasher when assembled (See Figure 1).
4. Retainer-to-Guide clearance is the distance between the Valve Guide (w/o the seal) and the bottom of the Retainer, with the Valve in the closed position (See Figure 1 and Notes 3 & 4).
5. Retainer-to-Seal clearance is the distance between the Valve Stem Seal and the bottom of the Retainer, with the Valve in the closed position (See Figure 1 and Notes 3 & 4).



## Installed Height

1. In Figure 2 the installed height is measured from where the Outer Spring contacts the Retainer and the Basewasher. This measurement is taken when the Valve, Basewasher, Retainer, and Keepers are assembled in the cylinder head.

## Coil Bind / Solid Height:

1. In Figure 3 the coil bind height is determined by compressing the Spring(s) with the Retainer and Basewasher in place (a vice can be used for this operation). Once springs are compressed, measure the distance between the retainer and basewasher where the Outer Spring contacts them.

## Notes:

1. The difference between the installed height and the coil bind height is considered “Free-Travel”
2. Free-travel should always be gross valve lift +0.060” for safe operation.
3. Retainer-to-Seal / Guide clearance should also be gross valve lift +0.060” for safe operation.
4. Failure to check valve train clearances can result in serious damage to an engine.