

Instruction sheet No. 2077
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Installation Instructions for S&S Spring Kits #90-2077 and #90-2078 For All Big Twin and Sportster V2 Engines

S&S valve spring and collar kits #90-2077 and 90-2078 allow cam lifts up to .630". Kits are designed for S&S standard length 5/16" diameter valves and accept stock style valve guides and valve guide seals. Part number for intake valve is 90-2000. Part number for exhaust is 90-2001. Numbers are etched on valve stem near keeper groove. Prior to grinding, approximate overall length of #90-2000 is 4.5085", #90-2001 4.566". Kit components are not interchangeable with those from other S&S spring kits.

NOTES

● Previous S&S .630 lift kits require .085" longer valves and are not compatible with 90-2000/2001 valves. Part number for .085 longer intake valve is 90-2004. Part number for .085 longer exhaust valve is 90-2005. Numbers are etched on valve stem beside keeper groove.

● Longer valves used in previous S&S .630 lift kit are not compatible with spring kits #90-2077/2078 unless spring assembly is elevated .085" with shims/spacer to compensate.

● Top and bottom collars for #90-2077/2078 are also different from collars in previous S&S spring kits and may not be interchanged.

CAUTION - Mixing of valves, springs or collars between early and late S&S high-lift kit can cause extensive engine damage not covered under warranty.

Installation of 90-2077/2078 spring kits does not usually require modification for S&S or most OEM heads. Exceptions are Buell Thunderstorm heads and certain OEM Sportster and Big Twin heads with different machining in valve spring pockets. In such cases, removing a small amount of material (approximately .030") from O.D. of S&S bottom collar should allow collar to rest flat in spring pocket for correct installation.

90-2077/2078 spring pressures are as follows: Closed valve - 171 lbf; .560" lift - 389 lbf; .630 lift - 416 lbf.

Spring Installation Procedure

1. Remove heads from engine and disassemble. If cylinder heads/valves are to be reconditioned, proceed at this time according to standard procedure. Refer to Harley-Davidson service manual as necessary.

2. Place lower spring collar in valve spring pocket in head. Place outer spring on collar. Collar must sit flat on cylinder head and spring coils must not contact sides of spring pocket in head. If necessary, machine lower collar and/or spring pocket to obtain minimum clearance of .030". Do not modify spring in any way.
3. Using following procedure, determine installed spring height and clearance between top collar and valve guide.
 - A. Lubricate valve stem and install valve in guide.
 - B. Install bottom collar, valve seal, top collar, and valve keepers. Pull top collar tightly against keepers to seat keepers in collar.
 - C. While holding valve firmly against seat in closed position, measure installed spring height (distance between lower valve spring seating surface and outside step of top collar). **See Figure A, Dimension A.** Record measurement.
 - D. Measure distance between top collar keepers and top of valve guide or seal (if applicable). **See Figure A, Dimension B.** Distance must be at least .060" greater than valve lift of cam to be used. If dimension B is not .060" greater than valve lift, valve guide must be shortened to obtain required clearance.
 - E. Repeat Steps A-D for remaining valves and record all measurements. Be sure to keep track of all parts during assembly to assure they are installed in same location and with same valves clearances were measured with.
4. Adjust installed spring height for all valves to 1.800" ± .020". If spring height is too high, place shims under lower collar to achieve correct spring height. Shims are available from S&S and local sources such as automotive parts houses. If spring height is too low, grind valve or valve seat to achieve correct spring height.

NOTES

● Installed spring height is same height as outer valve spring when valve and spring are installed and in closed position. Correct installed spring height for S&S #90-2077/2078 is 1.800" ± .020".

● For race and similar applications, experienced engine builders may elect to shim valve spring assembly to installed height under 1.800" if cam with less than .630" valve lift is used. In such cases, installed height should be 1.170" + valve lift ± .020". For example, with .500 lift cam,

installed height could be shimmed to $1.170'' + .500''$, or $1.670'' \pm .020''$. In such cases, spring pressure and valvetrain wear will increase significantly. Engine builder assumes all responsibility for installing springs at height other than $1.800'' \pm .020''$.

● Titanium top collars supplied with kit #90-2078 do not require steel wear plate used with previous S&S titanium collars.

CAUTIONS

● Installing springs at height less than recommended dimension will cause rapid spring fatigue resulting in possible engine damage. Engine should be frequently disassembled for spring tension measurement.

● Installing springs at height above recommended dimension will decrease spring tension resulting in possible valve float and engine damage.

● Failure to establish required clearances may cause valve seal failure and other, more extensive engine damage not covered under warranty.

WARNING - Valve spring assembly is under considerable tension when compressed and is potentially dangerous. Wear eye protection and take due caution when checking for coil bind and during installation. After assembly, carefully strike tip of valve stem with plastic hammer to insure that keepers are seated. Direct spring assembly away from face and body during this procedure.

5. Observing previous warning, check for coil bind as follows:
 - A. Place outer spring in vise or spring checking device and carefully compress to $1.800''$ - valve lift - $.060''$. Using $.630$ lift cam, for example, compress spring to $1.800'' - .630'' - .060''$, or $1.110''$.
 - B. Measure clearance between adjacent coils. Minimum is $.060''$. If clearance between spring coils is insufficient, a different spring pack or cam with less lift must be used.

C. Repeat procedure for middle and inner spring for each spring assembly.

6. Install valves and valve springs in heads. Install all S&S outer springs with O.D. chamfer toward top collar. Be sure valve guide seals are in place. Install middle and inner springs followed by top collar and keepers.

NOTE - Installed height should be the same for each spring assembly.

7. Confirm that rocker arm does not contact top collar. This is most likely to occur when valve is fully closed. Clearance should be at least $.040''$.
8. Confirm rocker arm to rocker cover clearance.
 - A. Install pushrods and rocker assemblies. Adjust pushrods per manufacturer's instructions.
 - B. Place thin deposit of clay or putty on inside of top rocker cover directly above pushrod and valve spring areas.
 - C. Install top cover and rotate flywheels two complete revolutions (720°).

NOTE - Do not force engine if resistance is encountered. Instead remove top cover and determine cause.

- D. Remove top cover and examine clay for indentation caused by rocker arm. Thickness of clay beneath indentation should be at least $.060''$. Carefully remove metal from cover or rocker arm to obtain correct clearance.

NOTE - Remove minimum amount of metal needed for correct clearance. Care must be taken not to break through rocker covers or alter rocker arm heat treatment by overheating while grinding. Oil is supplied to V^2 top end through pushrods and rocker arms, so it is also important not to disturb oil passages.

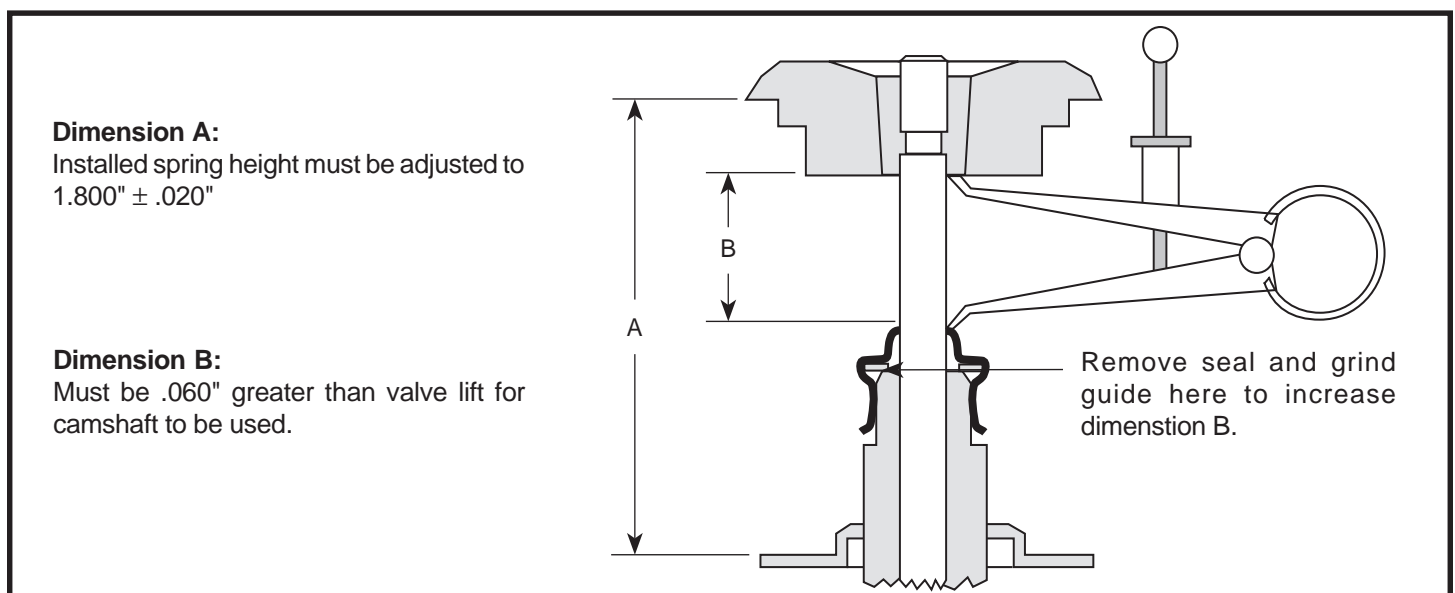


Figure A