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Installation Instructions for S&S Adjustable Pushrods

DISCLAIMER:

S&S parts are designed for high performance, closed course, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely affect your factory warranty. In addition such installation and use may violate certain federal, state, and local laws, rules and ordinances as well as other laws when used on motor vehicles used on public highways, especially in states where pollution laws may apply. Always check federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties, and risks associated therewith.

The words Harley[®], Harley-Davidson[®], H-D[®], Sportster[®], Evolution[®], and all H-D[®] part numbers and model designations are used in reference only. S&S Cycle is not associated with Harley-Davidson, Inc.

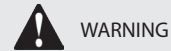
SAFE INSTALLATION AND OPERATION RULES:

Before installing your new S&S part it is your responsibility to read and follow the installation and maintenance procedures in these instructions and follow the basic rules below for your personal safety.

- Gasoline is extremely flammable and explosive under certain conditions and toxic when breathed. Do not smoke. Perform installation in a well ventilated area away from open flames or sparks.
- If motorcycle has been running, wait until engine and exhaust pipes have cooled down to avoid getting burned before performing any installation steps.
- Before performing any installation steps disconnect battery to eliminate potential sparks and inadvertent engagement of starter while working on electrical components.
- Read instructions thoroughly and carefully so all procedures are completely understood before performing any installation steps. Contact S&S with any questions you may have if any steps are unclear or any abnormalities occur during installation or operation of motorcycle with a S&S part on it.
- Consult an appropriate service manual for your motorcycle for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgment when performing installation and operating motorcycle. Good judgment begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgment. Start installation when you are fresh.
- Be sure all federal, state and local laws are obeyed with the installation.
- For optimum performance and safety and to minimize potential damage to carb or other components, use all mounting hardware that is provided and follow all installation instructions.
- Motorcycle exhaust fumes are toxic and poisonous and must not be breathed. Run motorcycle in a well ventilated area where fumes can dissipate.

IMPORTANT NOTICE:

Statements in this instruction sheet preceded by the following words are of special significance.



WARNING

Means there is the possibility of injury to yourself or others.



CAUTION

Means there is the possibility of damage to the part or motorcycle.

NOTE

Other information of particular importance has been placed in italic type.

S&S recommends you take special notice of these items.

WARRANTY:

All S&S parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of twelve (12) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at S&S's option if the parts are returned to us by the purchaser within the 12 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must call or write S&S immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action.

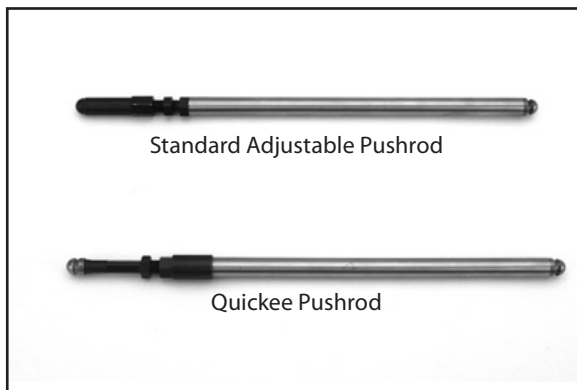
A part that is suspect of being defective must not be replaced by a Dealer without prior authorization from S&S. If it is deemed necessary for S&S to make an evaluation to determine whether the part was defective, a return authorization number must be obtained from S&S. The parts must be packaged properly so as to not cause further damage and be returned prepaid to S&S with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by S&S and the part was found to be defective, repair, replacement or refund will be granted.

ADDITIONAL WARRANTY PROVISIONS:

- (1) S&S shall have no obligation in the event an S&S part is modified by any other person or organization.
- (2) S&S shall have no obligation if an S&S part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the S&S part.
- (3) S&S shall not be liable for any consequential or incidental damages resulting from the failure of an S&S part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or for any other breach of contract or duty between S&S and a customer.
- (4) S&S parts are designed exclusively for use in Harley-Davidson[®] and other American v-twin motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.

NOTES:

- S&S Quickee Pushrods for all big twin engines contain two long and two short pushrods. All Sportster® model and 1999–up big twin pushrods are the same length.
- If S&S® adjustable pushrod kit contains four different length pushrods, the longest pushrod is for the front exhaust, next longest is the rear exhaust. Of the two shorter pushrods, the longer one is the front intake, the shortest pushrod is the rear intake. The pushrod kits for the 1999–up big twin engine have two different lengths—short for the intakes, long for the exhausts.
- All installation and adjustments must be made when engine is cold. Read instructions thoroughly and follow all recommended steps and procedures.
- The following instructions are for installing S&S adjustable pushrods with the stock-style hydraulic lifters. If the S&S HL2T (Hydraulic Lifter Limiter Travel) kit is to be used, refer to that section of this instruction sheet for installation of the kit, and pushrod adjustment.
- If unsure that the HL2T kit is installed in the lifters of an assembled engine, take note of the following: After the hydraulic piston assembly is compressed 4 complete turns of the pushrod, and after 20 minutes the pushrod is unable to be spun with fingers, the HL2T kit is installed in the lifters and the adjustment procedure for this kit must be followed. Detailed instructions for the HL2T kit are listed in Section C, Page 3.
- 1966–'84 big twin engines with hydraulic conversion require the use of S&S tappets and tappet guides.
- Pushrods with oil holes are for use with S&S rocker arms.
- Pushrods without oil holes are for stock rocker arms.
- When adjusting Quickee Pushrods, count flats on the 6 sided female adjuster, not the 4 sided male part.
- S&S adjustable pushrods have a thread pitch of 32 threads per inch. This means that one complete turn equals .031" of change in pushrod length and one flat is .005".
- S&S hydraulic lifters have .200" of hydraulic plunger travel.
- When adjusting pushrods, the plunger should be moved near the center of its travel. This would be 4 turns or 24 flats which is equal to .125".



Picture 1



CAUTION



It is recommended that S&S Quickee Pushrods have a minimum .500" thread engagement (adjuster to pushrod body) or failure to maintain proper thread engagement may result in engine damage.

PUSHROD KITS FOR HARLEY- DAVIDSON® 1984-'99 BIG TWIN, 1986–up SPORTSTER® AND BUELL® MODELS, S&S® P, SH, V & T SERIES ENGINES, AND 1966-'84 BT w/S&S HYDRAULIC CONVERSION AND QUICKEE PUSHRODS.

1. Remove pushrod cover clips and lift cover assemblies to view lifters.
2. Remove spark plugs and rotate engine until front piston is at the top of its stroke, with both front lifters at their lowest position (TDCC—top dead center compression).

NOTE: To ensure that the cylinder is at the correct position to remove pushrods, rotate the engine forward and watch the intake pushrod. The intake pushrods are the two closest to the center of the engine. Watch the intake pushrod rise and fall as the engine is rotated. When the intake pushrod is at its lowest position, the cylinder is on its compression stroke. Check to see if the piston is at TDC. If it isn't, rotate the engine a few more degrees to bring the piston to the top of the cylinder.

3. Remove front pushrods. If installing standard adjustable pushrods, disassemble the rocker cover and rocker arm assembly, as per the appropriate service manual. If installing Quickee pushrods, stock pushrods may be cut out with a bolt cutter to save time. See NOTE and CAUTION below.

NOTE: Since S&S Quickee pushrods do not require rocker arm disassembly for installation, stock pushrods may be cut out of the engine to save time. S&S recommends that they be cut with a bolt cutter.



CAUTION



If pushrods are cut with a saw, metal chips may enter engine and cause extensive damage not covered by warranty.



WARNING



Make sure tappet is at lowest point of travel and pushrod is not under valve spring pressure before cutting pushrods. Sudden release of valve spring pressure may cause cut pushrods to fly out of motor, potentially causing serious injury.

4. Clean and inspect the pushrod tubes. Replace all o-rings. Apply a light coat of engine oil to the o-rings.
5. Insert new pushrods through tube assemblies and install in appropriate positions.
6. Reinstall rocker assemblies according to appropriate service manual procedures if they were removed.
7. Holding pushrod so the top ball end is in the rocker arm cup, extend adjusting screw until the bottom ball end just contacts the tappet cup. Compress hydraulic unit in exhaust lifter an additional 4 complete turns (24 flats) and tighten locknut. Allow sufficient time for lifter to bleed down (20 to 30 minutes) before adjusting intake pushrod. Pushrods must spin freely with fingers.

NOTE: If pushrods can not be turned between fingers after 20 minutes, tappets contains S&S HL2T spacers. Detailed instructions for the HL2T kit are listed in Page 3.



CAUTION



Failure to follow recommended steps and procedures may result in damage to engine components.



WARNING



Installing or adjusting pushrods while engine is hot could result in burns from contact with hot engine parts.

CAUTION

Failure to allow hydraulic unit to bleed down before rotating engine or adjusting the other pushrod could result in valve-to-valve contact and serious valve train damage. Lifters are bled down when pushrod can be turned with fingertips.

8. Repeat above procedures for rear cylinder, this time bringing rear cylinder to TDCC (top dead center compression).
9. Replace spark plugs and pushrod tube clips. Start motorcycle and check for leaks.

1986-UP SPORTSTER® & BUELL® MODELS SPECIFIC INFORMATION

NOTES:

In order to access the pushrod adjuster screws in 1991 and later Harley-Davidson® Sportster® and Buell® models, it will be necessary to use pushrod cover assembly kit for 1986-90 Sportster® models, S&S part 93-4038, and the appropriate length pushrod cover keepers. 1991-'03 models will also require pushrod cover adapter kit, S&S part 33-5355. On 1991 and later models, it is necessary to disassemble the rocker arm/rocker box to remove the stock one piece pushrod cover.

HARLEY-DAVIDSON® TWIN CAM 88® AND TWIN CAM 96™ SPECIFIC INFORMATION

NOTES:

- S&S pushrod kits for the Twin Cam 88®, Twin Cam 96™, and Twin Cam 103™ engines are available as a kit containing pushrods only, however, it will be necessary to use S&S pushrod covers, or similar aftermarket product, in order to be able to access the adjuster units on the pushrods. S&S has a kit available, part number 106-6051, for stock height 1999-up big twin engines that contains the four adjustable pushrods, pushrod tube set, gaskets and o-rings for a complete assembly.
- If equipped with S&S Easy Start compression release cams, you must use extra care when adjusting pushrods. Because the decompression lobe is near TDC, it is possible to adjust the pushrod while the tappet is on the lobe if it is not exactly at TDC. This will cause incorrect exhaust pushrod adjustment. To verify correct position, you can rotate the engine in the forward direction and feel for the exhaust tappet to slightly lift (about .030") and set back down on the base circle. This is the proper point to adjust the pushrods.
- Remove lifter cover from crankcase to install regular adjustable pushrods.
- Reinstall rocker assembly if removed in above step, following procedures & torque specifications recommended in appropriate service manual.
- Insert pushrods through pushrod cover assemblies. Install intake and exhaust pushrod assemblies, along with the tappet cover and new gasket, into position in front cylinder. See Picture 2, above.



Picture 2

S&S® HYDRAULIC LIFTER LIMITED TRAVEL KIT (HL2T)

NOTES:

The S&S HL2T kit is designed to limit the travel of the hydraulic lifter making it impossible for the lifter to collapse. Stronger valve springs are often used to avoid valve float at high rpm. The HL2T kit prevents high valve spring pressure from collapsing lifters. With the HL2T kit installed, stock hydraulic lifters work like solid lifters at high rpm, while retaining normal hydraulic function for minimal noise and maintenance under normal conditions. Another advantage of the HL2T kit is that if a valve is held open when the engine is not running, valve spring pressure will not cause lifters to bleed down and collapse. Collapsed lifters can cause hard starting and excessive valve train noise when engine is restarted. Adjustable pushrods must be used with the HL2T kit.

NOTES:

- S&S Limited Travel Kit 33-5338 fits all S&S tappets and all Harley-Davidson® replacement tappets for 1999-'14 big twins (18538-99C & 18572-13) and 1991-'14 Sportster® models (18526-89A & 18538-99C).
- S&S Limited Travel kit does not fit Harley-Davidson® replacement tappets (18523-86B) for 1984-'99 big twins and 1986-'90 Sportster® models.
- If using aftermarket tappets, consult the manufacturer to determine compatibility. See Limited Travel washer dimensions below.

KIT	OD	ID
33-5338	.605 OD	.440 ID

INSTALLATION

1. If tappets are installed in the engine, it is recommended that they be removed. Be sure that each tappet is kept with its original tappet block and bore.

NOTE: This procedure is the preferred method of installation. However, kit can be installed without removing lifters from engine.

2. Remove hydraulic piston retaining wire clip from one assembly at a time.

CAUTION

Be careful not to bend wire clip during disassembly.

3. Completely disassemble tappet removing all parts.

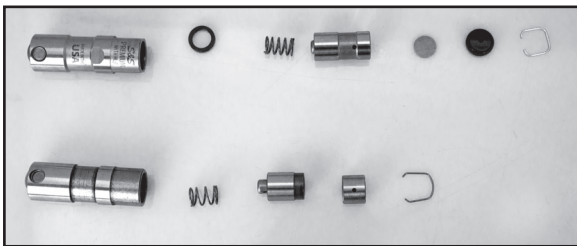
All reference to Harley-Davidson® part numbers is for identification purposes only. We in no way are implying that any of S&S® Cycle's products are original equipment parts or that they are equivalent to the corresponding Harley-Davidson® part number shown.

4. Thoroughly clean all parts including tappet body. Remove any oil which might prevent hydraulic unit from fully collapsing during adjustment.
5. Insert one spacer from S&S HL2T kit in tappet body.
6. Reassemble tappet in reverse order making sure original parts are returned to their original positions. See **Picture 3** below.
7. Replace wire retaining clip in tappet body.
8. Put tappet back in original tappet block.
9. Repeat Steps 2 through 8 for three remaining tappets.
10. Reassemble engine with modified tappets.
11. Adjust pushrods.

NOTE: In all cases engine must be cold and lifter must be at lowest point of travel for pushrod adjustment.

- a. Remove sparkplugs.
- b. Remove spark plugs and rotate engine until front piston is at the top of its stroke, with both front lifters at their lowest position (TDCC – top dead center, compression).

NOTE: To ensure that the cylinder is at the correct position to adjust pushrods, rotate the engine forward and watch the intake pushrod. The intake pushrods are the two closest to the center of the engine. Watch the intake pushrod rise and fall as the engine is rotated. When the intake pushrod is at its lowest position, the cylinder is on its compression stroke. Check to see if the piston is at TDC. If it isn't, rotate the engine a few more degrees to bring the piston to the top of the cylinder.



Picture 3

- c. Extend front pushrod until it contacts the hydraulic piston assembly in the lifter body, then extend pushrod an additional four complete turns, until piston assembly is in contact with HL2T spacer and the valve is lifted off of its seat. If tappets contain oil, as when pushrods are readjusted after engine has been run, or if all oil was not removed during installation, allow at least 20–30 minutes for piston assembly to bleed down. If pushrod can be turned between the fingers, tappet piston is not in contact with HL2T spacer. Lengthen pushrod one additional turn and test again after 20 minutes.
- d. Loosen pushrod adjustment until pushrod can be rotated with the fingers with slight drag. Continue loosening (shortening) pushrod one full turn (6 flats).

NOTE: Shortening adjuster an additional six flats or full turn from zero lash often results in quieter pushrod operation. This provides additional travel for the hydraulic piston assembly, which can improve the ability of the hydraulic unit to maintain zero lash under normal operating conditions.

- e. Tighten lock nut.
- f. Repeat above procedures for rear cylinder, this time bringing rear cylinder to TDCC (top dead center compression).
- g. Replace spark plugs and install pushrod clips.

NOTE: Perform this operation on one cylinder at a time. Do not turn engine until pushrod adjustment is complete, and pushrod can be spun with fingers.

