

**Instruction 51-1043
4-6-06**

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Because every industry has a leader

Installation Instructions: for S&S® Stock Replacement 3⁷/₁₆" and 3¹/₂" Bore Shovelhead Cylinders

DISCLAIMER:

S&S parts are designed for high performance, off road, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely effect 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 inhaled. 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 judgement when performing installation and operating motorcycle. Good judgement begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgement. 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 inhaled. 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.

INTRODUCTION

S&S® stock bore shovelhead cylinders are designed for stock replacement and high performance applications in 74" and 80" shovelhead engines. Superior material and design provide increased strength and improved wear resistance.

NOTES:

- *Cylinders for 74" engines have a bore size of 3.437", and 80" cylinders have a bore size of 3.498". S&S cylinders are final honed slightly undersize to allow maximum flexibility in piston fitting.*
- *Due to increased section thickness S&S cylinders require the use of special S&S head bolts. Early production S&S cylinders also require the use of special S&S cylinder base nuts. Stock cylinder base nuts may be used with current production S&S cylinders.*
- *The S&S rear cylinder does not have the larger base flange found on stock cylinders. For this reason S&S supplies a special rear gasket to fit the smaller base flange. Stock gaskets may be trimmed to fit if desired.*
- *S&S cylinders are machined with two oil return holes. One hole is in the stock location and the other is lowered for stroker applications. These cylinders may be bolted on as is for stock replacement applications, but minor crankcase and cylinder oil return hole modifications are necessary for most stroker engines. See Step 2.*
- *S&S cylinders are clearanced for S&S Supreme connecting rods in engines of up to 4¾" stroke. However since it is nearly impossible to anticipate every possible engine combination, it is the engine builder's responsibility to check for proper running clearances. S&S considers checking and establishing all running clearances as standard engine building practice that must be performed during engine assembly. Engine failure due to improper clearances between moving parts is not covered under warranty.*

CAUTION

Contact between moving engine components may cause damage or destruction of the parts involved and produce abrasive particles which may cause damage or premature wear to other engine components.

CAUTION

To avoid parts damage and obtain accurate torque readings, clean head bolt threads thoroughly before installation. For knucklehead, panhead, or shovelhead, head bolt threads and area of bolt head that contacts washer (if applicable) or cylinder must then be lubricated with Permatex® Anti-Seize Lubricant or similar anti-seize compound. S&S has received reports of thread damage in these engines associated with use of engine oil to lubricate head bolts.

INSTALLATION

1. Inspect cylinders to insure that they are correct for the intended application.
2. For engines of 4½" or longer stroke, the oil return holes in the stock location must be plugged, and the crankcase must be modified to use the lowered oil return holes. This modification is necessary due to increased piston travel in longer stroke engines. Oil control ring position will be below stock cylinder oil return hole at the bottom of the stroke. If modification is not done, oil will be carried to the combustion chamber by piston rings causing engine to smoke.

NOTE: Engines with stroke shorter than 4½" stroke do not require this step.

- A. If using stock cylinder base gaskets, place base gasket on cylinder base gasket surface, and punch ¼" hole in gasket directly in center of oil return hole in base gasket surface of cylinder. S&S gaskets are pre-punched.
- B. Place gasket on driveside crankcase half in its respective position. Mark crankcase gasket surface through ¼" diameter hole in gasket.
- C. Drill ¼" diameter hole perpendicular into crankcase gasket surface ⅝" deep. **See Figure 1.**

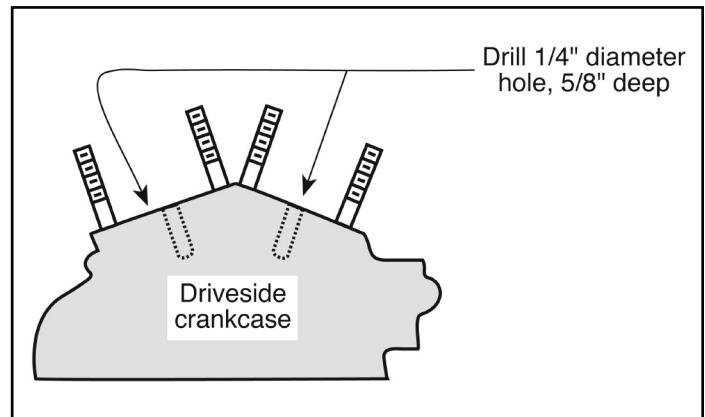


Figure 1

- D. Perform Steps A through C on other cylinder.
- E. Bolt front and rear cylinders on drive side crankcase half.
- F. Using lower oil return hole in cylinder spigots as a guide, drill $\frac{1}{4}$ " diameter connecting holes in crankcase to intercept holes drilled $\frac{5}{16}$ " deep in Step C. See Picture 1 & Figure 1.



Picture 1

NOTES:

- If base plates are to be used, be sure they are in place.
- Lower oil return hole in current production S&S® cylinders is $\frac{1}{2}$ " on center below base gasket surface of cylinder. This dimension allows the use of up to 5" stroke using a $\frac{1}{8}$ " thick base plate. Some early production cylinders have lower oil hole located about $\frac{5}{16}$ " on center below gasket surface. These early production cylinders can be used with strokes up to 4 $\frac{3}{4}$ " where base plates are not used.

- G. Clean dirt, filings, etc. out of passageways.
- H. Press a piece of $\frac{3}{4}$ " long x $\frac{3}{8}$ " O.D. steel tubing (93-1032) provided in kit into oil return hole in base gasket surface until tubing is flush with surface. Ream hole slightly with drill to remove any burrs that may exist.

NOTE: A very tight press fit with 100% seal is not critical as tube will sufficiently divert oil flow to new hole. Loctite® may be applied to tube if fit seems too loose.

3. Hone cylinders to fit pistons. If using S&S pistons refer to S&S Piston Installation Instruction Sheet #2500 for piston to cylinder clearance specifications. If using other pistons, refer to manufacturer's instructions for clearance specifications.

NOTE: S&S recommends the use of 220 - 280 grit stones for final honing of cylinder. A finer finish does not retain oil on the cylinder wall as well. This may result in inadequate piston skirt lubrication and piston scuffing.

4. Thoroughly clean all parts before final assembly.

NOTE: Cleaning parts prior to and during assembly and keeping parts clean after final assembly are imperative to minimize contaminants that may circulate in oil and shorten engine life. Many parts can be cleaned with soap and water first. Then, reclean all internal parts and gasket mating surfaces using high quality solvent that does not leave any harmful residues. Be sure to read and follow manufacturer's instruction label before use. Use drills and compressed air to clean all oil passageways of dirt, filings, etc. whenever possible. During actual final assembly, recoat all internal parts with high quality engine oil or assembly lube such as S&S 51-9000.

CAUTION

Manufacturing chips, dirt and other contaminants circulating in engine oil may possibly damage engine components resulting in shorter engine life and possible engine failure.

WARNING

- Some solvents, degreasers and other chemicals are harmful to skin, eyes and other body parts. Many items are flammable and present a fire hazard. Read manufacturer's instruction label for proper use. Use in well ventilated area and wear protective clothing when using them to avoid personal injury.
- Compressed air and particles dislodged by compressed air are harmful to eyes and body. Wear protective goggles when using compressed air and always direct air stream away from body parts such as hands and eyes. Never direct compressed air toward other people.

5. Assemble engine according to stock Harley-Davidson® factory procedures. If installing a high performance kit such as an S&S stroker kit follow special procedures outlined in kit instructions.

NOTE: If using S&S base nuts, use a heavy duty $\frac{1}{2}$ " open end wrench like the Mac Tools CL-166KS. Other thinner wrenches will spread and round corners of nut before providing enough torque to adequately tighten base nut.

CAUTION

Insufficiently tightened cylinder base nuts may cause base gasket leaks. If base nuts become loose enough that cylinder is not held tightly to the crankcase, repeated impact between crankcase and cylinder base may cause base flange of cylinder to crack.



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