Instruction 510-0088
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S&S® Cycle, Inc.
14025 Cty Hwy G PO Box 215
Viola, Wisconsin 54664
Phone: 608-627-1497 • Fax: 608-627-1488
Technical Service Phone: 608-627-TECH (8324)
Technical Service Email: sstech@sscycle.com
Website: www.sscycle.com

Installation Instructions: S&S 80" Replacement Pistons For Harley-Davidson® Evolution® Big Twin Engines

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.

1- IMPORTANT INFORMATION

- *For maximum piston and ring life, fit pistons using close fit dimensions. Close fit requires absolute adherence to new engine break-in as described on page 3.*
- *For immediate drag strip use, fit pistons using loose fit dimensions. Break in rings and pistons with 50 easy miles if possible. Piston and ring life will be reduced with loose fit dimensions.*
- *These pistons can be used in either the front or rear cylinder, however they must be installed with the arrow on the dome pointing to the front of the engine due to the offset wristpin. If pistons are received from S&S® fit to cylinders, pistons must be installed in cylinders they were fit to.*

⚠ CAUTION ⚠

Failure to follow instructions and perform required clearancing, installation and/or break-in procedures may result in damage to pistons and/or other engine components not covered under warranty.

2- FITTING PISTONS

a. Measure all pistons at widest point across thrust face, perpendicular to wristpin hole. Several measurements should be taken to locate widest point. Typically, approximately ½" below level of wristpin hole.
b. Follow procedure recommended in Harley-Davidson® service manual for boring and honing stock bore big twin cylinders. Torque plates must be used to simulate compressive stress in an assembled engine. Cylinders will distort when installed if torque plates are not used.
c. It is recommended that cylinders be bored to .001"–.002" smaller than required final size.
d. Hone cylinders to size. Final hone with #220-#280 grit stones.
e. Thoroughly clean cylinders to remove all metal or abrasive particles.

Piston Fit Specifications		
Close Fit	.0010"-.0015"	Best engine life, quiet operation
Loose Fit	.0020"-.0025"	For Immediate hard service
Wristpin Fit	.0007" to .0014"	Pre-fit, for reference only

3- PISTON INSTALLATION

a. Thoroughly clean wristpin before installation, paying particular attention to bore. Pass clean, lint-free cloth back and forth through wristpin bore several times to insure removal of contaminants such as heat treating oxide scale.
b. Wristpin keepers included with these pistons are circlip type and must be installed with a snap ring pliers. Ensure that grooves in piston are free of burrs and foreign matter.
c. Install one wristpin clip in the piston and start the wristpin in the wristpin bore of the piston on the other side.
d. Hold the piston on the end of the connecting rod and slide the wristpin through the wristpin bushing in the rod until it seats against the wristpin clip in the piston.
e. Install the second wristpin clip, and make sure both wristpin clips are properly seated.
f. Repeat for other piston.
g. Check piston to piston clearance at closest point near bottom of stroke. Clearance should be at least .060".
h. Check piston to flywheel clearance a lowest point of piston travel. Clearance should be at least .060". Compare replacement pistons with ones being replaced and make corrections accordingly.

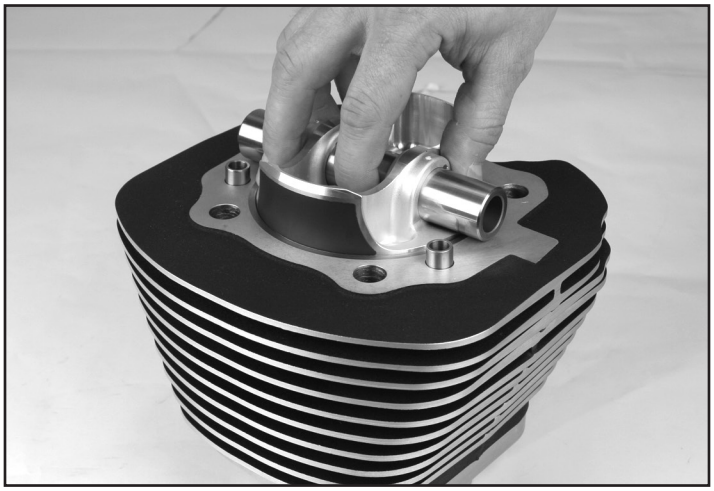
NOTE: *In all cases it is the engine builder's responsibility to confirm proper clearances when assembling an engine. This is especially critical with performance components such as higher compression pistons and high lift camshafts. In addition to clearances mentioned, .060" valve-to-piston clearance must be confirmed.*

⚠ CAUTION ⚠

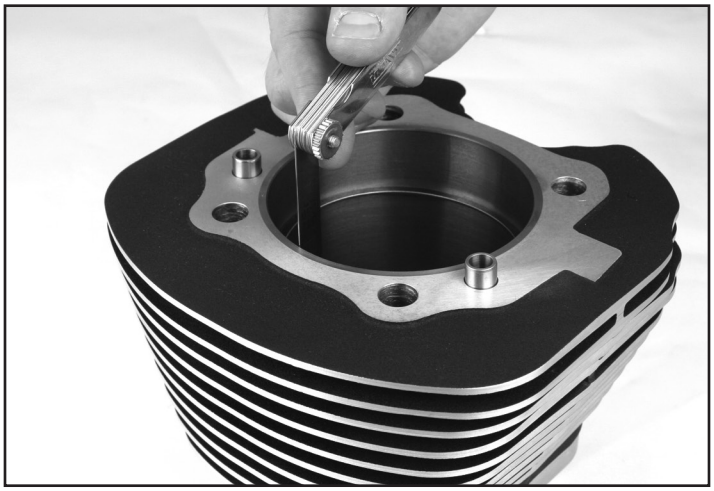
Failure to establish proper clearances can result in severe engine damage not covered under warranty.

4- PISTON RING INSTALLATION

a. Check ring end gaps by sliding rings into the top of the cylinder bore, Use a piston or caliper to ensure that the ring is placed squarely in the bore. **See Picture 1.**
b. Measure the ring end gap with a feeler gauge. Compression ring end gap should be .014" to .022", and oil rail end gap should be .015" to .035". **See Picture 2.**
c. If end gap is too tight, carefully file the ends of the piston rings to achieve correct end gap. Remove any burrs from the end of the ring. Do not file oil rail expanders.



Picture 1



Picture 2

d. Install oil rings - Oil rings are three piece type with two rails and one expander. Do not shorten expander for any reason! Installation is straightforward with one rail placed above expander, other rail below expander. Rails may be shortened to correct gap, but burrs must be carefully removed. Expander gap must be in center of thrust face (rear of piston), or 90° from wristpin. Bottom rail gap should be approximately 1.5" or 45° to right of expander gap. Top rail gap should be approximately 1.5" or 45° to left of expander gap.

NOTE: *Confirm that ends of expander do not overlap during installation. Properly installed expander will appear larger than piston but will compress when cylinder installed.*

e. Install second compression ring - Second compression ring has a darker, charcoal gray finish and slight bevel along inner surface. This ring has a dot. **See Figure 1.** Install in second or middle groove with dot up. Second compression ring gap should be 135° or approximately 1½" to right of oil expander gap.

f. Install top compression ring - Top compression ring has a gray finish that is relatively light in color, and may or may not have a slight bevel along the inner edge. It has no dot or other identifying mark. The light color can best be recognized by comparing compression rings to each other beneath a good light. Install light colored ring without dot in top groove, bevel up. If there is no bevel, ring can be installed either side up. **See figures 2 and 3.** Top compression ring gap should be 135° or approximately 1½" to left of oil expander gap.

⚠ CAUTION ⚠

Incorrect installation of rings may result in poor performance, excessive oil consumption or engine damage.

5- Cylinder Installation

a. Apply assembly lube or motor oil to the skirts of the piston and to the piston rings.
b. Place ring compressor around piston so that the rings are fully compressed in their respective grooves.
c. Slide cylinder over piston, making sure that rings do not come out of the grooves, and that ends of oil ring expander to not overlap.
d. Remove ring compressor and repeat for other cylinder.

6- ENGINE BREAK-IN PROCEDURE

a. Initial start up. Run engine approximately one minute at 1250–1750 rpm. DO NOT crack throttle or subject to any loads during this period as head gaskets are susceptible to failure at this time. During this time check to see that oil pressure is normal, that oil is returning to the oil tank, and that no leaks exist.
b. Shut off engine and thoroughly check for any leaks or other problems. Let engine cool to the touch
c. After engine has cooled, start up again and allow the motor to build some heat. Engine should be run no longer than three to four minutes. When the cylinders become warm/hot to the touch (approximately 150°) shut the motor down and let it cool to room temp. Follow the same cautions as for the initial start-up, and continue to watch for problems.
d. Repeat this procedure 3 or 4 times. Each successive time it should take slightly longer to warm up and you can increase the temp slightly each time (+10°). You can be more liberal each time with the rpm, gently vary rpm continuously from idle up to 2500 rpm in the final cycle. Don't be too concerned with final carb settings at this time because idle speed and mixture cannot be correctly set until the motor reaches full operating temperature. The motor should not reach that temperature during these cycles. Do not allow engine temperature to become excessive. After the motor has cooled to room temperature for the final time you are ready to start the 500 mile engine break-in process.
e. The first 50 miles are most critical for new rings and piston break-in. Engine damage is most likely to occur during this period. Keep heat down by not exceeding 2500 rpm. Avoid lugging the motor, riding in hot weather or in traffic. Vary the engine speed. Do not lug the engine. We recommend changing the oil at 50 miles.
f. The next 500 miles should be spent running engine no faster than 3500 rpm or 60 mph. Avoid continuous steady speeds, and do not lug the engine. Vary engine rpm. We recommend changing the oil again at 500 miles.

⚠ CAUTION ⚠

Lugging or running engine prematurely at sustained high rpm may result in damage to pistons and other engine components. S&S® voids its guarantee if engine is not broken in properly.

g. For the balance of the first 1000 miles the motor can be run in a normal but conservative manner. You can be more liberal with the rpm range and motorcycle can be operated at normal highway speeds. Avoid overheating or putting any hard strain on the engine: no drag racing, dyno runs, excessive speed, trailer towing or sidecar operation.
h. After 1000 miles, change the engine oil. Motorcycle can now be operated normally.
i. Have Fun!

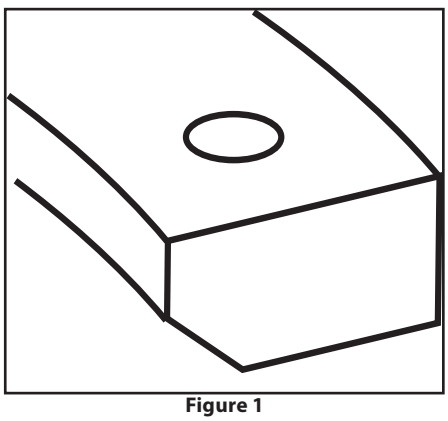


Figure 1

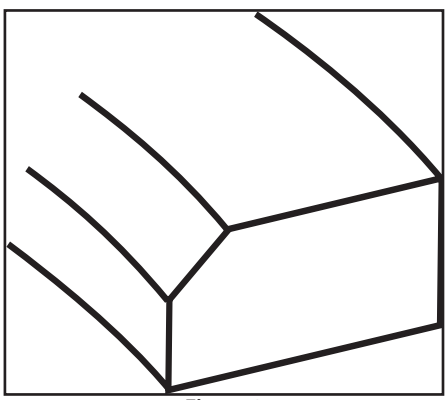


Figure 2

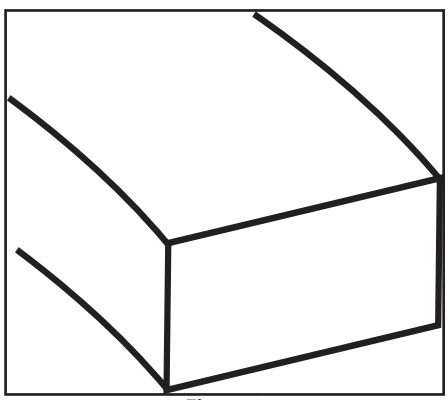


Figure 3