



## Installation Instructions: S&S® Three Piece Flywheel Assemblies for 1999-Up Harley-Davidson® big twin engines and S&S T-Series 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.

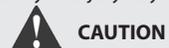
### IMPORTANT NOTICE:

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.

**SPECIAL TOOL REQUIREMENTS**

- Harley-Davidson® service manual or S&S® service manual for the specific model or engine you are working on
- Timken® bearing install tool - for engines with Timken sprocket shaft bearings
- Feeler gauge
- Dial indicator
- Torque wrench

**GENERAL INFORMATION**

- Thoroughly read and understand the section that pertains to the flywheels you are installing.
- If you don't have the required tools or knowledge for installing these flywheels you should have a qualified shop install them.
- It is the engine builder's responsibility to confirm proper clearances when assembling an engine.
- S&S produces flywheel assemblies with connecting rods of three different lengths. Make sure the connecting rods are correct for your application: **(See Picture 1, below)**
  - 1999-'06 — 7.667" length - marked with one dot
  - 2007-up — 7.659" length - not marked (no dot) Tapered wristpin end for stock pistons - straight wristpin end for performance pistons
  - 120R Engines — 7.575" length - marked with two dots
  - If using stock pistons for 2007 and later engines, connecting rods must have tapered wristpin bosses to fit the internal profile of the pistons. These rods are not rebuildable.

**DISASSEMBLY**

1. Refer to the Harley-Davidson service manual or S&S service manual for the specific model or engine you are working on for the correct disassembly procedure.
2. The engine will need to be removed from the frame of the motorcycle and completely disassembled.

**INSTALLATION**

**Preparation for Installation**

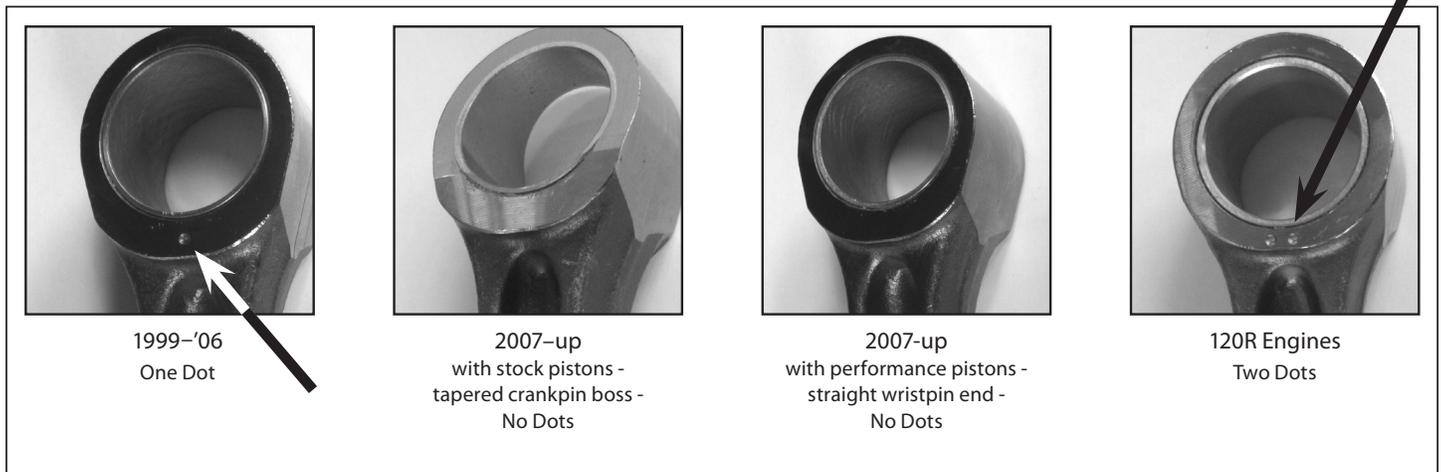
1. Remove flywheel assembly from packaging material. Handle with care to avoid dropping and potentially cutting your hands on sharp edges.
2. Using a lint free cloth and lacquer thinner, thoroughly clean flywheel assembly to remove rust preventative oil.
3. Do not immerse or wash the flywheel in a solvent tank. Connecting rod bearings are coated in grease which may become contaminated by dirt and debris if put in a solvent tank.

STROKE CODES	
CODE	STROKE
-	3.600"
21	3 <sup>3</sup> / <sub>8</sub> "
17	4"
19	4 <sup>1</sup> / <sub>8</sub> "
9	4 <sup>3</sup> / <sub>16</sub> "
5	4 <sup>1</sup> / <sub>4</sub> "
1	4 <sup>3</sup> / <sub>8</sub> "
2	4 <sup>1</sup> / <sub>2</sub> "
6	4 <sup>5</sup> / <sub>8</sub> "
3	4 <sup>3</sup> / <sub>4</sub> "
7	4 <sup>13</sup> / <sub>16</sub> "
4	5"
ENGINE STYLE	
CODE	ENGINE STYLE
SF3	1999-UP BT
FLYWHEEL DIAMETER	
CODE	DIAMETER
X	8 <sup>1</sup> / <sub>4</sub> "

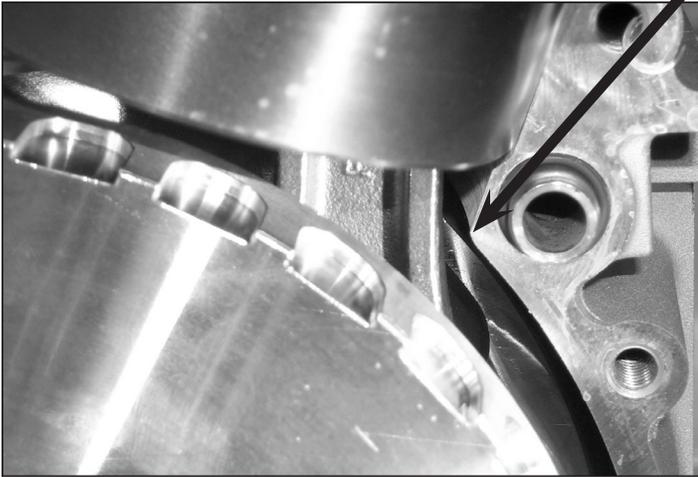
4. If flywheel is checked for runout, measurements should be checked at the bearing surfaces while fixtured on the mainshaft centers in a truing stand. The total indicated runout (TIR) for new S&S flywheels should be less than .0005".
5. Inspect flywheel assembly to make sure you have the correct style, diameter, stroke, and mainshafts are correct for your application. See identification chart above.

**Flywheel Installation**

1. Replace the pinion shaft bearing in the right side crankcase with a new bearing. Follow factory procedures.
2. Check flywheel and connecting rod to crankcase clearances. This is of particular importance with longer than stock strokes.
  - a. Install flywheel assembly in right crankcase only.
  - b. Assemble pistons without rings on their proper connecting rods. Installation of wristpin clips is not necessary.



**Picture 1**



**Picture 2**



**Picture 3**

**NOTE** - Rear piston has piston to piston clearance notch machined in piston skirt, place notch toward center of engine.

- c. Install both cylinders and temporarily secure each cylinder with one nut.
- d. Rotate flywheel to positions where connecting rods are closest to crankcase and cylinder spigots in front and rear. There must be a minimum of .060" clearance between connecting rods and crankcases or cylinder spigots. **See Picture 2, above.**
- e. Clearance crankcases or cylinder spigots if needed by grinding or machining material from areas of contact or insufficient clearance. Connecting rod to crankcase clearance is usually not a problem with S&S Stroker kits, but if engines are built with longer strokes or heavier connecting rods a potential for contact exists.
- f. If the right crankcase half requires clearancing, the left crankcase half will also require clearancing. Clearance as needed.

**NOTE** - If clearancing is required, tape off the bearings to prevent chips from getting into bearings.

- g. Disassemble cylinders and pistons. Remove flywheel assembly from right crankcase.
3. Clean all lower end parts for final assembly.
  4. Thoroughly clean crankcase mating surfaces with solvent and a shop-quality scrubbing pad to remove any residual gasket material from the sealing surfaces.
  5. Wash the cases in warm soapy water, rinse and blow dry. Wipe them one last time with a clean, dry cloth.

**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.

6. If flywheel assembly is to be installed in 2003-later stock Harley-Davidson® crankcases with straight roller sprocket shaft bearing, follow installation procedure and specifications in Harley-Davidson service manual.

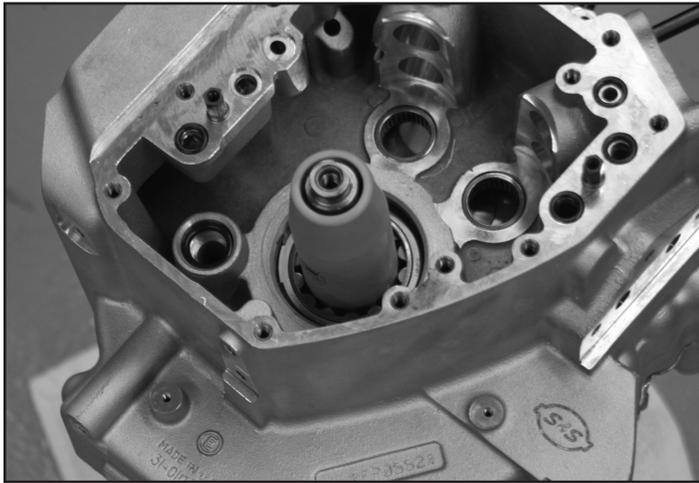
**NOTES**

- 1999-'02 Harley-Davidson® big twin engines have Timken® sprocket shaft bearings. Stock 2003 and later engines use the same roller type bearing for the sprocket shaft that is used on the pinion shaft.
- S&S offers two styles of flywheel assemblies to accommodate both styles of crankcases. One style is designed for use with Timken® sprocket shaft bearings. They will fit directly in stock 1999-'02 Harley-Davidson® crankcases, all S&S crankcases for 1999-later big twin engines, and 2003 and later Harley-Davidson cases which have been updated to accept Timken® sprocket shaft bearings. These flywheels may be used in 2003 and later engines if Harley-Davidson® bearing kit #24004-03B is installed.
- If installing #24004-03B bearing kit, verify that it contains 24604-00D or 24607-07 sprocket shaft bearing. Do not use a 24604-00, 24604-00A, 24604-00B or 24604-00C bearing.
- S&S also produces flywheel assemblies that are a direct replacement for 2003 and later big twin engines and includes a bearing race for the stock roller bearings installed on the sprocket shaft.

7. If flywheel is to be installed in stock 1999-'02 crankcases, S&S crankcases, or 2003-later stock crankcase which have been converted to Timken® sprocket shaft bearings, follow steps 8 through 30.

**NOTE** - S&S recommends that Timken® bearing end play be checked before final assembly of the flywheels in the crankcases. The simplest way to do this is to make a "slip-fit" test sprocket shaft. Turn the diameter of a used sprocket shaft down about .002" so that the Timken bearing will slide easily over it for this test. Weld a vise tab on the flywheel end of the shaft so it can be held securely in a large vise. **SEE PICTURE 3, ABOVE**

8. Clamp the test shaft in a vise with the shaft pointing straight up.
9. Slide the inner bearing over the test sprocket shaft.
10. Put the left crankcase half over the inner bearing. Do not oil the bearings for this test.
11. Slide the Timken bearing spacer over the test shaft followed by the outer bearing.
12. Load the bearing with either a sprocket shaft nut and spacer or a bearing installer tool.
13. Attach a dial indicator to the work bench or the sprocket shaft, and place the probe on the crankcase near the sprocket shaft. Check the amount of endplay in the bearing by moving the crankcase up and down, noting the readings on the dial indicator.



Picture 4

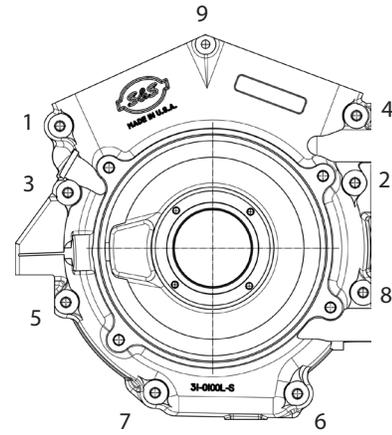
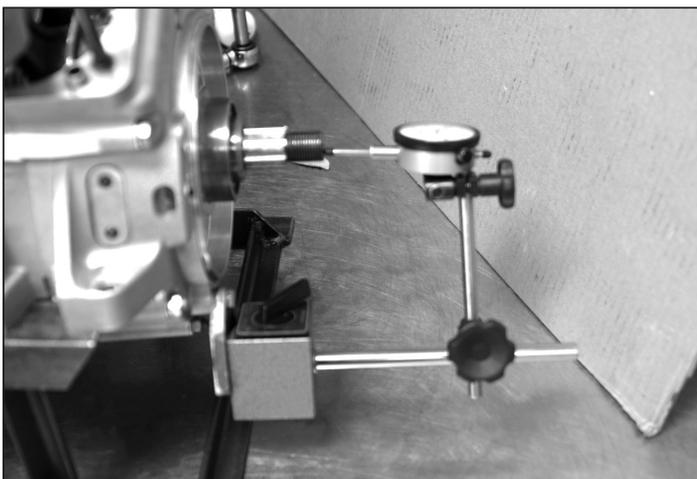


Fig. 1

14. Endplay should be between .001" and .005". If endplay is less than .001" a thicker spacer must be used. If endplay is greater than .005" a thinner spacer must be used. When the bearing end play is within specification, the flywheels can be installed in the crankcases.
15. Support the flywheel assembly in a stand with the sprocket shaft straight up. A coffee can or small bucket works well for this.
16. Use a sprocket shaft bearing installation tool (such as S&S PN 53-0060) to press the inner bearing onto the sprocket shaft against the flywheel.
17. Place the left crankcase half over the sprocket shaft.
18. Install the Timken bearing spacer and position the outer Timken bearing on the shaft.
19. Use the sprocket shaft bearing installation tool to press the bearing, shaft and case together.
20. Turn the left crankcase and flywheel assembly over so the pinion shaft is straight up. Support the crankcase half so it is stable.
21. S&S® uses and recommends Threebond® 1184 to seal the joint between left and right crankcases. Apply a consistent thin coat to both cases, taking care not to get any material in a place where it could get inside the engine. Take special care not to block oil return passages.
22. Allow sealant to cure per the manufacturer's instructions and install the right crankcase half.
23. In order to assemble the right side case half S&S recommends the use of a pinion shaft guide (Jims® #1288 or similar). The guide fits over the pinion shaft **as shown in Picture 4, above**. The shaft guide positions the rollers in the right crankcase bearing so the shaft can slip through as the right case is lowered into place.
24. Install the case bolts and tighten the 5/16" fasteners to 18 ft-lbs. The center case bolt in S&S crankcases in a 1/4" bolt and should be tightened to 120 in-lbs. Use the sequence in Fig. 1, above.
25. When the crankcase has been assembled, confirm that the flywheel endplay specification is within .001"-.005".
26. Load the bearing with either a sprocket shaft nut and spacer or a bearing installer tool.
27. Mount a dial indicator on the right side of the lower end assembly. Put the indicator on the pinion shaft so it measures in and out horizontal shaft movement. **See Picture 5, below left.**
28. Rotate the shaft and push in on it, noting the indicator reading. Rotate the shaft and pull on it, noting the dial indicator reading. The difference between the two readings is the endplay—it should be between .001" and .005".
29. If endplay is not within this range, the main bearing spacer must be changed. Remember a thinner spacer will produce less endplay.
30. With the flywheel assembly installed in the crankcases, the rest of the engine may be assembled. Follow steps outlined in stock or S&S service manual. In addition, follow any special steps required for any aftermarket or high performance components used in the engine.



Picture 5

CLEARANCE SPECIFICATIONS S&S® THREE PIECE FLYWHEEL ASSEMBLY		
COMPONENT	FACTORY SPECIFICATION	SERVICE WEAR LIMIT
CONNECTING ROD SIDEPLAY	.005"-.035"	.040"
WRISTPIN CLEARANCE	.0007"-.0013"	.002"
PINION SHAFT RUNOUT*	.003" MAX	-

\*w/o compensator or charging system installed