

**Instruction 510-0243**  
**12-30-13**

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## Installation Instructions: S&S Three Piece Flywheel Assemblies for S&S V-Series Engines for 1984-'99 Harley-Davidson® Big Twins

### 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.

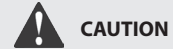
### IMPORTANT NOTICE:

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 your specific engine
- Timken® bearing installing tool
- 2" "C" or "V" micrometer with .0001" accuracy
- Digital or dial calipers
- Dial indicator
- Torque wrench

**General Information**

- Thoroughly read and understand these instructions. In addition to this instruction sheet you may wish to purchase S&S 4 1/8" bore V-Series Service Manual #510-0104.
- Please inspect your flywheels and confirm that they are the correct style and stroke for your engine. See the chart below.
- If you don't have the required tools for installing these flywheels either acquire them or refer installation to a professional mechanic.
- It is the engine builders responsibility to confirm proper clearances when assembling an engine

Stroke Codes	
Code	Stroke
9	3.600"
21	3 7/8"
17	4"
19	4 1/8"
9	4 3/16"
5	4 1/4"
1	4 3/8"
2	4 1/2"
6	4 5/8"
3	4 3/4"
7	4 13/16"
4	5"
Engine Style	
Code	Engine Style
SGX3	4 1/8" Bore V-Series
Flywheel Diameter	
Code	Diameter
X	8 1/4"

**SPECIAL NOTE** - Camside case of S&S 4 1/8" bore crankcase sets with serial numbers lower than NE00203X must be machined to provide adequate clearance for current production flywheel assemblies. See Page 4 for more information.

**NOTE:** If you do not have machining capabilities, crankcases may be sent to the S&S Service and Speed Center® and we can machine them for you. Contact your S&S dealer. Dealers, please contact your S&S Customer Service Representative at 608-627-1497 for a return authorization number.

**Flywheel Installation**

1. Remove flywheels assembly from packaging material. Handle with care to avoid dropping assembly. Avoid any sharp blows to the mainshafts which could potentially shift the flywheels out of true.
2. Using a clean lint free cloth, thoroughly clean flywheel assembly to remove rust preventative oil. Rust preventative oil is not suitable for use as engine oil and must be removed prior to installation. Be sure that assembly remains free of foreign material or contamination before and during installation.

**NOTE:** Do not immerse or wash assembly in solvent. Connecting rod bearings are coated with assembly grease, which may become contaminated by dirt and grit unless absolutely new, clean solvent is used.

3. Refer to the Harley Davidson service manual for the specific model of motorcycle you are working on for the correct engine removal procedure.
4. Remove engine from the frame of the motorcycle and completely disassemble.
5. Inspect crankcases carefully. If pinion bearing race is damaged or oversized, it must be replaced according to procedure outlined in the S&S 4 1/8" bore V-Series Service Manual #510-0104.
6. Clean all lower end parts for final assembly. Ensure that all passages, including piston oilers, are open and free from debris or contamination.
7. Wash the cases in warm soapy water, rinse and blow dry. Wipe them one last time with a clean, dry cloth.
8. Thoroughly clean crankcase mating surfaces with solvent and a scrubbing pad to remove any residual sealant from the sealing surfaces.

**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.

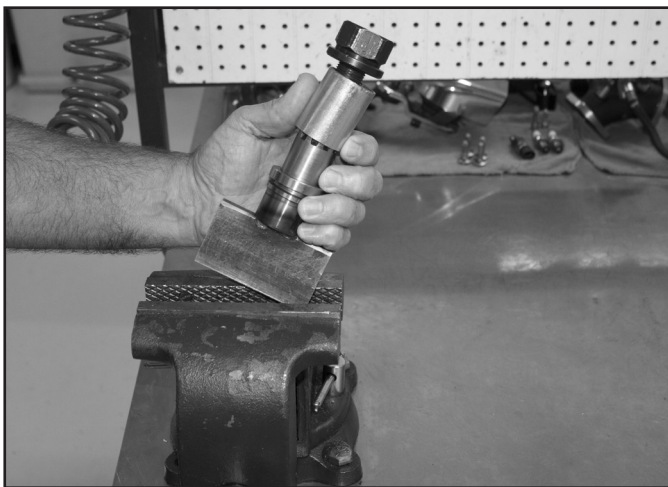
9. Measure the pinion shaft bearing surface outside diameter and pinion race inside diameter to an accuracy of .0001". Use the following table to select the correct pinion bearing. **See Picture 1.**
10. Check Timken® sprocket shaft bearing end play.



**Picture 1**

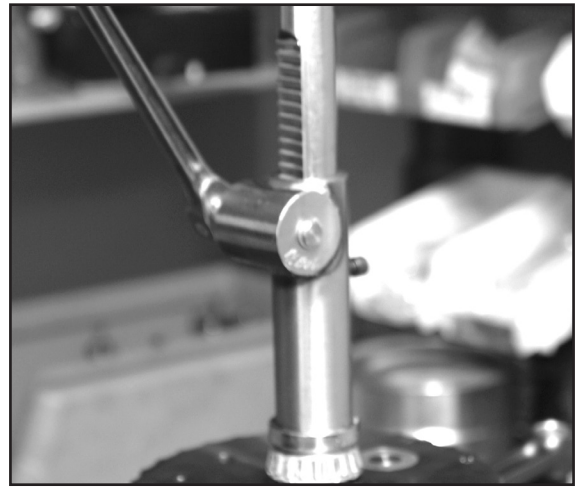
**NOTE:** S&S recommends that Timken® bearing end play be checked before final assembly of the flywheels in the crankcases. The simplest way to do this is to make a "slip-fit" test sprocket shaft. Turn the diameter of a used sprocket shaft down about .002" so that the Timken bearing will slide easily 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 2.**

BT BEARING	PINION SHAFT BEARING DIAMETER	
RACE DIAMETER	1.2498–1.2500	1.2500–1.2502
1.7511 to 1.7513	Red S&S® 31-4017 (H-D®# 24641-87A)	Blue S&S 31-4018 (H-D®# 24643-87A)
1.7509 to 1.7511	Blue S&S 31-4018 (H-D®# 24643-87A)	White S&S 31-4005 (H-D®# 24626-87A)
1.7507 to 1.7509	White S&S 31-4005 (H-D®# 24626-87A)	Green S&S 31-4016 (H-D®# 24628-87A)



**Picture 2**

11. Clamp the test shaft in a vise with the shaft pointing straight up.
12. Slide the inner bearing over the test sprocket shaft.
13. Put the left crankcase half over the inner bearing. Do not oil the bearings for this test.
14. Slide the Timken bearing spacer over the test shaft followed by the outer bearing.
15. Load the bearing with either a sprocket shaft nut and spacer or a bearing installer tool.
16. Attach a dial indicator to the crankcase and place the indicator on 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.
17. 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. A thinner spacer will produce less endplay. When the bearing end play is within specification, the flywheels may be installed in the crankcases.
18. Support the flywheel assembly in a stand with the sprocket shaft straight up. A coffee can or small bucket works well for this.
19. 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. **See Picture 3.**



**Picture 3**

20. Place the left crankcase half over the sprocket shaft.
21. Install the Timken bearing spacer and position the outer Timken bearing on the shaft.
22. Use a sprocket shaft bearing installation tool to press the bearing, shaft and case together.
23. Turn the left crankcase and flywheel assembly over so the pinion shaft is straight up. Support the crankcase half so it is stable.
24. Lubricate both the pinion shaft and new bearing with assembly lube and slide the bearing in place. Install a new snap ring with the rounded edge facing up using snap ring pliers. **See picture 4.**



**Picture 4**

25. S&S® uses and recommends Threebond® 1194 to seal crankcases. Apply a consistent thin coat to both cases, taking care not to get any material in a place where it could get into the engine.
26. Allow sealant to cure per the manufacturers instructions and install the right crankcase half.



27. Install the case bolts/alignment studs and tighten the alignment studs and  $\frac{5}{16}$ " fasteners to 18 ft-lbs. The center case bolt in S&S crankcases in a  $\frac{1}{4}$ " bolt and should be tightened to 120 in-lbs. Use the sequence in the diagram below.

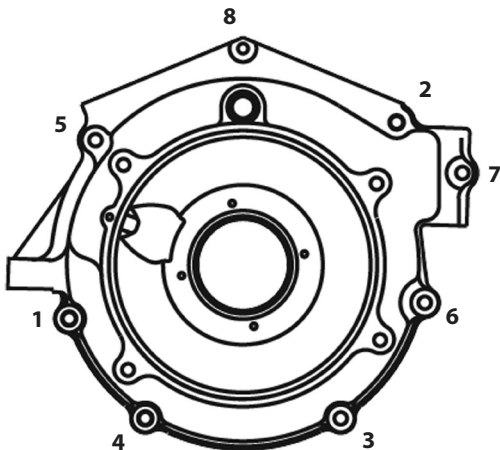


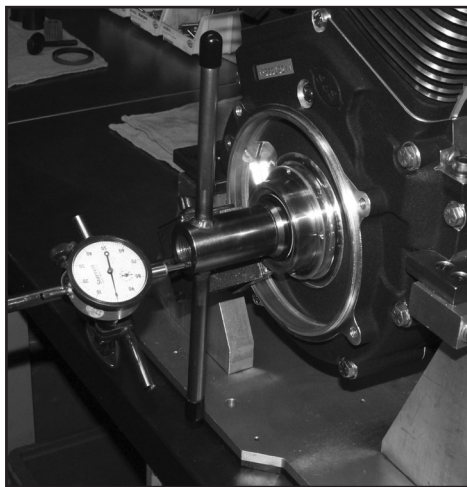
Figure 1

**NOTE:** Early production S&S crankcases are machined with an interlocking lip and use alignment studs and bolts to fasten crankcase halves together. Later style crankcases have flat mating surfaces and use bolts only to fasten crankcase halves.

28. When the crankcase has been assembled, confirm that the flywheel endplay specification is still within .001"-.005".

29. Load the bearing by either tightening a sprocket shaft nut and spacer on the sprocket shaft threads or by using a bearing installer tool.

30. Mount a dial indicator on the left side of the lower end assembly. Put the indicator on the sprocket shaft nut or installation tool so it measures in and out horizontal shaft movement. See Picture 5.



Picture 5

31. 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".

32. If endplay is not within this range, the main bearing spacer must be changed. Remember a thinner spacer will produce less endplay.

33. Install the sprocket shaft spacer and seal in the left side of the case. Note: S&S® installs the spring side of the seal facing out in a wet primary. For dry primary applications, install the seal with the spring facing in.

**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

34. Once you are sure the crankcase sealant has dried, pour four ounces of engine oil on the lower portion of the connecting rods. Carefully rotate the flywheel assembly around to spread the oil out over the rod bearings. As you do this, the wheels should rotate freely with no binding or drag.

35. With the flywheel assembly installed in the crankcases, the rest of the engine may be assembled. Follow steps outlined in S&S service manual. In addition, follow any special steps required for any aftermarket or high performance components used in the engine.

**SPECIAL NOTE** – Camside case of S&S 4  $\frac{1}{8}$ " bore crankcase sets with serial numbers lower than NE00203X must be machined in the hatched area as illustrated in Figure 2 to a depth of 1.928"  $\pm$  .002" from the crankcase mating surface to provide adequate clearance for current production flywheel assemblies. Please pay special attention to the following:

1. Secure the camside case on a rotary table on a mill so that the pinion bearing race is concentric with the center of the table
2. Using a long end mill, move to the front wall of the flywheel cavity and set the depth to 1.929" from the crankcase mating surface. Add the height of the crankcase interlocking lip if present, and measure from the top of the lip. As shown in Picture 6.

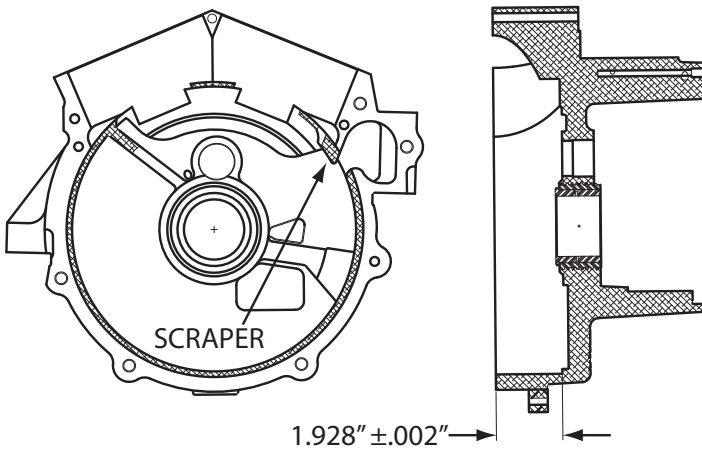


Picture 6

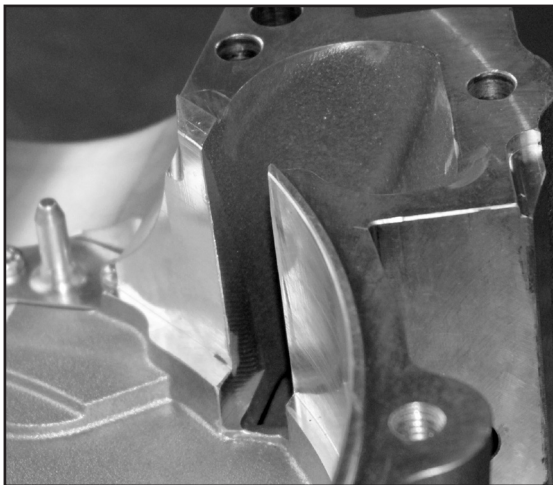
3. Do not increase the diameter of the flywheel cavity. Increase the depth only.

4. Rotate the table and machine the lip at the bottom of the case, but stop before the end mill touches the oil scraper. Do not machine the oil scraper.

5. Flywheel cavity is not perfectly cylindrical. Distance from crankshaft center increases toward the rear of the case, near the breather passage and oil scraper. As the crankcase is machined on the rotary table, a lip will remain toward the rear of the crankcase. This lip will clear the flywheel and will have no effect.
6. Flywheel oil scraper is closer to the flywheel than the walls of the flywheel cavity. Do not change the distance of the scraper to the crankshaft center. Increase the depth only. **See Figure 2 and Picture 7.**



**Figure 2**



**Picture 7**

**NOTE:** If you do not have machining capabilities, crankcases may be sent to the S&S Service and Speed Center® and we can machine them for you. Contact your S&S dealer. Dealers, please contact your S&S Customer Service Representative at 608-627-1497 for a return authorization number.