



Installation Instructions: S&S® 4 $\frac{1}{8}$ " and 4.425" Bore Crankcases for 2007-'16 Harley-Davidson® Dyna® Models

DISCLAIMER:

Many 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. 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.

NOT LEGAL FOR SALE OR USE IN CALIFORNIA ON ANY POLLUTION
CONTROLLED MOTOR VEHICLES

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 an 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.

Please read these instructions thoroughly before starting work. Proceed with the installation only after they are completely understood. These instructions should be supplemented by the appropriate OEM service manual for your motorcycle. Follow all safety information.

Introduction

S&S® crankcase assemblies for 2007-'16 Harley-Davidson® Dyna® models can be installed by any repair shop equipped to do complete Harley-Davidson® engine overhauls.

S&S 4.125" bore cases are a natural for use with the S&S® Hot Set Up kit® for Twin Cam 96™ & 103™, and 4.375" bore cases make it possible to build really large displacement custom engines.

NOTES:

- *S&S crankcases are sold in matched sets only. Individual case halves are not available.*
- **ADDITIONAL OIL LINE INSTALLATION KIT REQUIRED - S&S Part Numbers**
Black 310-0870
Silver 310-0871

Polishing, Painting, Plating, or Powder Coating S&S cases

S&S Cycle cautions against modifying these crankcases due to the possibility of damaging or weakening them. Modifying S&S crankcases in any fashion voids all manufacturer warranties. Should the customer elect to modify the crankcases regardless, it is imperative that they and the information tag attached to them be inspected beforehand to confirm that the correct model, style, bore size, etc. have been provided. The customer must confirm that crankcases and related parts are correct before assembling them or having them modified in any manner, and assumes all liability for modifications.

The customer must also verify that the serial numbers on the crankcase and attached information tag correspond with those on the certificate of origin and packing carton.

Under no circumstance will S&S be held responsible for expenses related to the modification of any S&S part in the event warranty service is required. Modified parts will not be accepted for credit or exchange. This will apply regardless of cause or fault: customer, retailer, manufacturer, or other.

For further information, contact S&S Technical Services at 608-627-8324, FAX 608-627-1488 or e-mail sstech@sscycycle.com

NOTE: *Modification includes but is not limited to appearance changes such as painting, Powder coating, plating, and polishing. Proper preparation for these procedures as well as the processes themselves may require the use of polishing compounds, chemicals or procedures that are potentially harmful to crankcases.*



Passages and internal cavities may become obstructed by residues from materials used to polish, paint, plate or powder coat surfaces. Additionally, surface finishing processes can damage critical machined surfaces. Any of the above may cause premature wear, damage or failure of other engine components as well as the crankcases themselves.

Powder coating - Subjecting heat-treated alloys such as those used in S&S® crankcases to excessive heat can drastically alter their strength and their critical properties. The degree of change depends upon the temperatures reached and the duration of exposure. When powder coating or otherwise processing alloy parts, S&S exposes them to a maximum temperature of 370°F for no longer than 20 minutes. Under no circumstances should parts be heated past 400°F!

Preparation and Installation

1. Inspection

- a. Inspect crankcases to confirm that they are correct style and machined for correct bore size. Refer to tag wired to crankcases.
- b. Verify that serial numbers on crankcases match numbers on packing carton and certificate of origin. Contact S&S immediately if numbers do not match.

NOTE: *Valid certificate of origin is required for any transfer or sale of aftermarket crankcases or complete engines built with aftermarket crankcases. Certificate of origin is required to title and license any motorcycle which is to be driven on public streets and highways.*

2. Crankcase Test Fit

If possible, bare crankcase should be positioned in motorcycle frame before assembly to check clearances.

- a. Position case in frame, check for clearance at frame, and alignment to transmission. It is a good idea to replace rubber engine and transmission mounts at this time. Old mounts deform over time and may induce unwanted stresses on the engine case.

NOTE: *Crankcases damaged by improper installation are not covered under warranty.*

3. Pre-Assembly Cleaning

- a. Clean crankcases in hot soapy water or solvent to remove any dirt or contamination which may have been introduced during shipping, handling, or set-up. Dry components and check passages with compressed air.



Compressed air and particles dislodged by compressed air are potentially harmful. Wear protective goggles when using compressed air and always direct air stream away from yourself and others nearby.

Hardware Identification and Installation

NOTES

- When installing hardware, be careful not to cross-thread fittings or damage threads. Damage caused by improper installation of hardware will not be covered under warranty.
- To prevent galling, apply anti-seize compound, pipe sealant, or PTFE tape to threads of all steel fittings prior to installation in crankcase.
- If PTFE tape is used, loose tape must not enter crankcase or oil passages. Do not apply tape to first 2-3 threads that screw into hole. If fittings are removed or replaced be sure no tape shreds remain in holes. Tape shred could block oil passages causing restriction of oil flow.



CAUTION

Restricted oil flow may result in extensive engine damage not covered under warranty.

Piston Jet Installation

1. Apply a thin film of clean engine oil to new o-ring.
2. Seat o-ring in groove of piston jet mounting flange.
3. With pinhole in the jet pointing upward, install using two T20 TORX screws. Apply blue threadlocker, then tighten to 20-30 in-lbs.



CAUTION

Piston jets must be installed using the correct o-ring. Leaving out a piston jet o-ring, installing too small of an o-ring, or pinching an o-ring at assembly will cause oil to by-pass the jet, resulting in low oil pressure.

NOTE: Always use a new o-rings when re-installing jets.

Oil Line Kit Installation

NOTE: S&S Engine Installation kits for 2006-'17 Harley-Davidson® Dyna® models are designed specifically to facilitate the installation of Dyna model specific S&S crankcases and engines. This is not a stock replacement oil pan, and will not work with stock Harley-Davidson engines.

1. Remove the stock engine from the chassis. Refer to the factory service manual for the recommended procedure.
2. Remove the stock oil pan from the transmission, save the stock mounting screws.
3. Remove the starter from the motorcycle.
4. Block the front of the transmission up to allow access to the frame cross-member for modification.
5. Remove the wiring harness "fir tree" fastener from the frame cross-member and use a wire tie to fasten the wiring harness to the frame.
6. Using the fastener hole in the flat portion of the frame cross-member as a pilot, cut out the majority of the flat area with a 1" hole saw. See **Picture 1**.



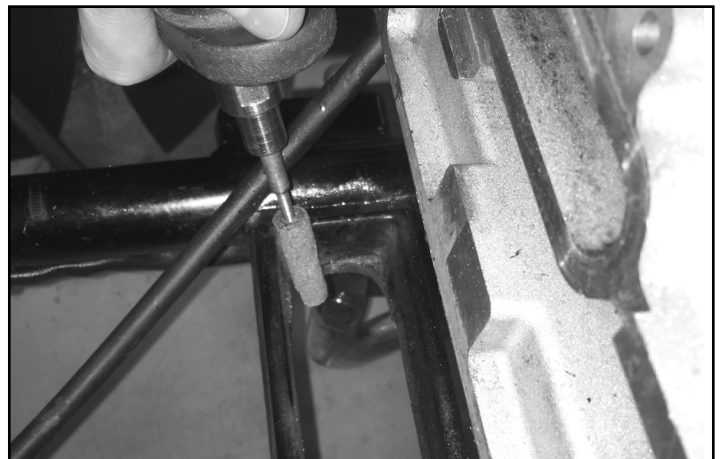
Picture 1

7. Use a die-grinder to remove most of the remaining flat area and blend it to the round frame tubes. See **Picture 2**.



Picture 2

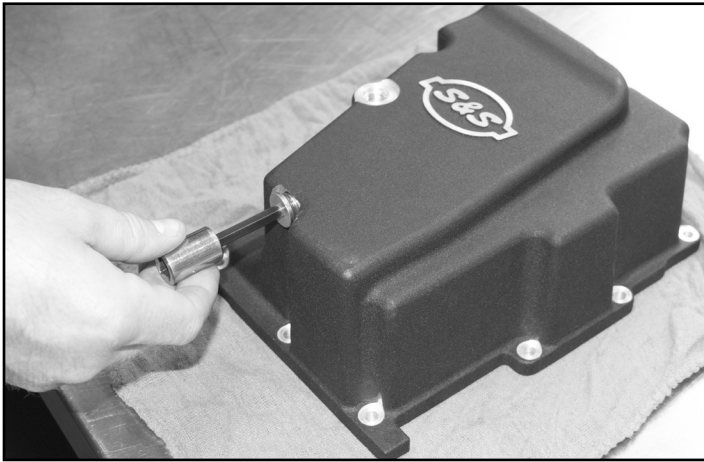
8. Use a sanding roll to smooth the edges of the remaining metal. See **Picture 3**.



Picture 3

9. Protect the bare metal with rust resistant paint.
10. Install the engine, starter, and primary. Refer to the appropriate factory manual or engine instructions for the recommended procedures. Remove oil line plugs from bottom of engine.

11. Install both drain plugs in the S&S oil pan. See **Pictures 4 & 5**.

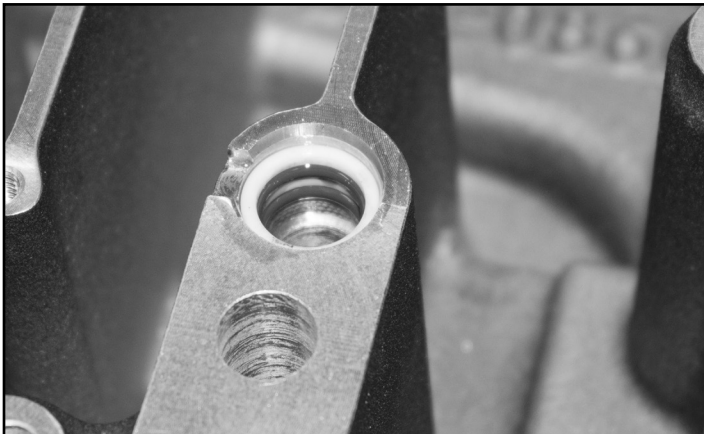


Picture 4



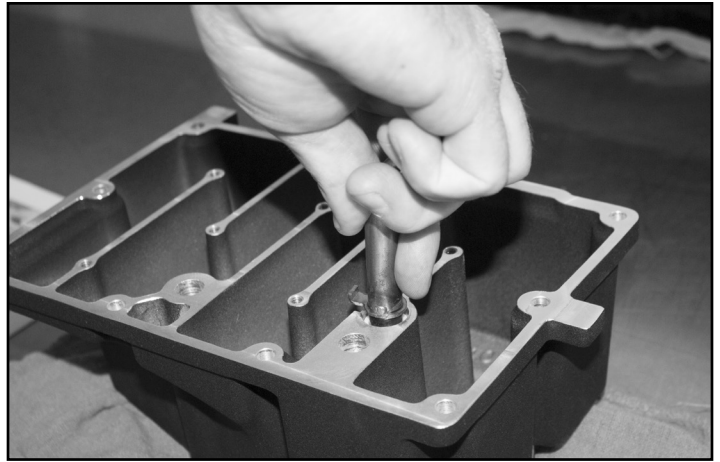
Picture 5

12. Lubricate o-rings and breather tube with assembly lube. Install an o-ring, a plastic washer, another o-ring, and another plastic washer in the breather tube bore of the oil pan, as shown in **Picture 6**.



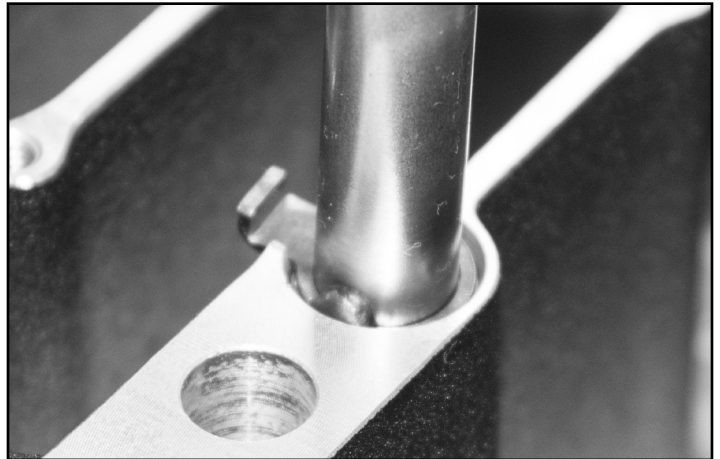
Picture 6

13. Insert the breather tube into the oil pan by rotating and pushing lightly, as shown in **Picture 7**.



Picture 7

*NOTE: Make sure the breather tube is inserted completely and the bent tab bracket portion of the tube is below the baffle surface of the oil pan as shown in **Picture 8**.*



Picture 8

14. Slip the baffle plate over the breather tube as shown in **Picture 9**.



Picture 9

15. Apply red thread locker to the baffle plate screws and fasten the baffle plate to the baffle surface of the oil pan. Tighten the screws to 50 in-lb. See **Picture 10**. Next page.



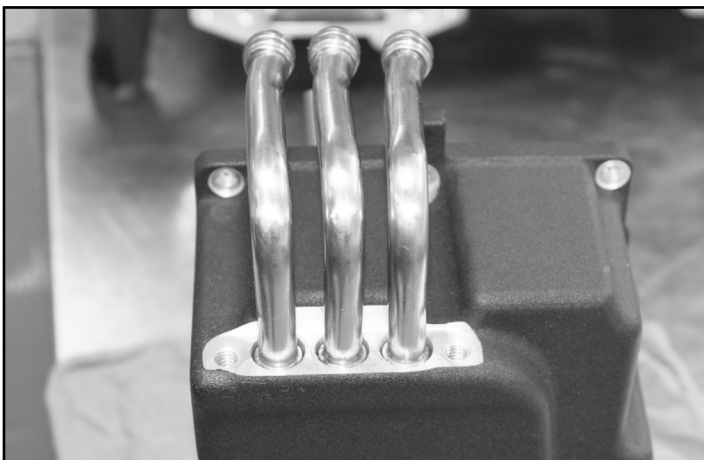
Picture 10

16. Remove all six o-rings and plastic washers from the engine crankcase. The washers will be reused, but discard the o-rings. They will be replaced in the next step, with all new o-rings supplied in the kit.
17. Install two o-rings and plastic washers on both ends of each of the three "L" shaped oil lines as shown in **Picture 11**. Lubricate the o-rings with assembly lube. All three "L" shaped oil lines are identical.



Picture 11

18. Install the three oil lines in the oil line bores in the front of the oil pan with the shorter leg toward the oil pan. The longer legs will point up past the gasket surface of the oil pan. See **Picture 12**.



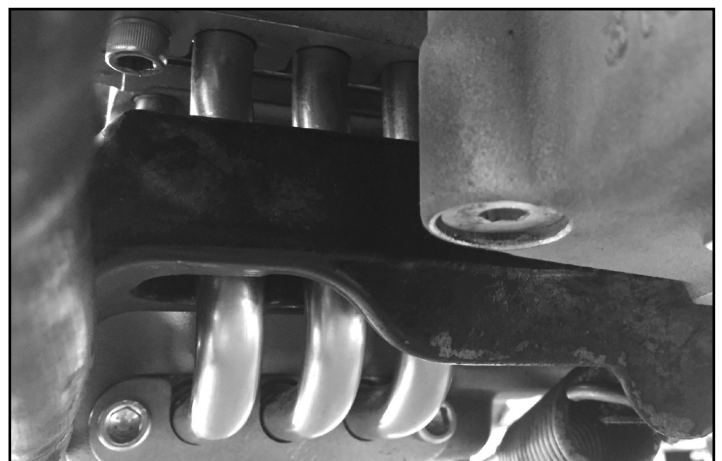
Picture 12

19. Install the oil line retention plate. Apply blue thread locker to the $\frac{5}{16}$ "-18 X $\frac{3}{4}$ " screws and fasten the retention plate to the oil pan. Tighten screws to 15-18 ft-lb.
20. Apply high temp gasket sealer or silicone sparingly to the gasket surface of the oil pan. Install the oil pan gasket to the oil pan, and allow it to set for a few minutes. The object of this is to keep the gasket in place while installing the oil pan.
21. Apply blue thread locker to the stock oil pan mounting bolts and to the oil line retention plate mounting bolts and set aside.
22. Place the oil pan assembly under the motorcycle. Raise the rear end of the pan, and move it toward the engine until the rear of the pan can be inserted between the frame rails where they are farther apart. See **Picture 13**.



Picture 13

23. Move the oil pan toward the back of the bike, raising the front of the pan. Take care that the breather tube does not hang up on the gasket surface on the front of the transmission.
24. While raising the oil pan, insert the oil lines into the oil line bores in the S&S crankcase. The oil lines will go through the cross-member of the frame, that was modified in Step 5. See **Picture 14**.



Picture 14

25. Start several of the oil pan screws into the transmission, but do not tighten yet.
26. Ensure the raised bead on the oil line is flush with, or below the retention plate surface of the crankcase.

27. Install the oil line retention plate on the crankcase. Install the mounting screws and tighten to 15-18 ft-lb.
28. Install the rest of the oil pan screws and torque to 120 in-lb.
29. Reinstall exhaust pipes and any other components removed during the installation.
30. Fill oil pan with recommended engine oil. Start engine and check for leaks.

Crankcase Cylinder Studs

S&S® crankcases for 2007-later Harley-Davidson® models are shipped with cylinder studs installed.



Do not carry the crankcase by the studs. It stresses the crankcase and studs in ways they are not designed to handle. Also, it is easy to drop and damage the case when it is carried by the studs.

Flywheel Assembly

1999-2002 style Timken® tapered roller bearings are included with the crankcase. Flywheel assembly must have a sprocket shaft without the stock flat roller bearing race and thrust washer. If a stock 2007-later flywheel is to be installed, the bearing race and thrust washer must be removed from the sprocket shaft.

S&S® crankcases for 2007- later Harley-Davidson® big twin models are designed to use any S&S flywheel assembly, or 1999-2002 Harley-Davidson flywheel assembly without sprocket shaft bearing race.

NOTE: S&S crankcases are designed for Timken® sprocket shaft bearings. 2003-up flat roller sprocket shaft bearing is not compatible with S&S cases. Stock flywheels with flat roller bearing races on sprocket shaft may be used if bearing race and thrust washer are removed.



Installing and setting the clearances for 1999-2002 style taper roller bearings is a critical operation. Install and set clearances per 1999-2002 Harley-Davidson service manual.

NOTE: Unlike stock engines, the pinion bearing is secured in place with a snap ring in S&S crankcases.

Camshaft And Cam Plate Installation

Install S&S camshafts using the instructions packaged with them. Install Harley-Davidson camshafts procedures in stock 2007-up service manual.

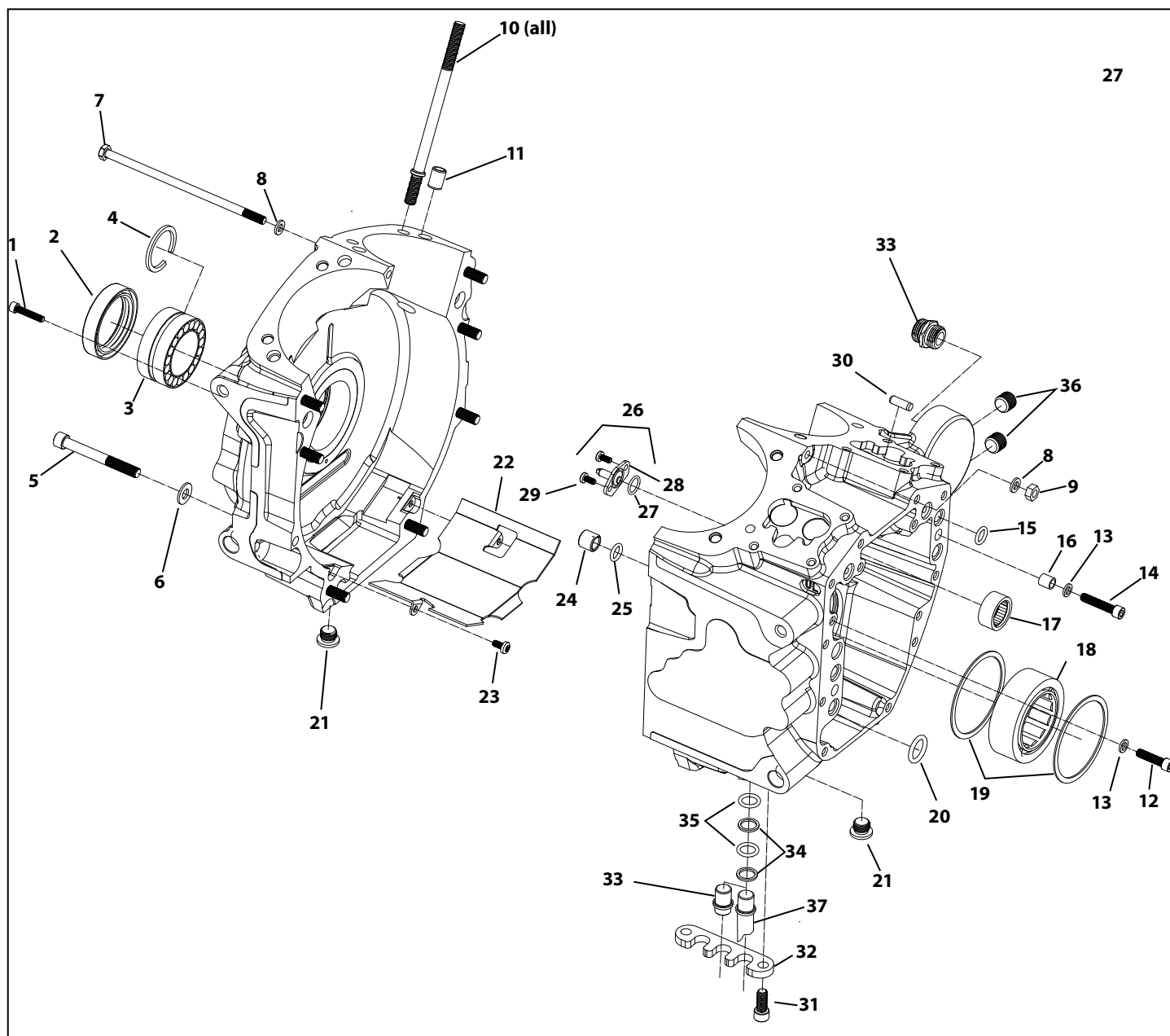
Oil Pump, Lifters, Lifter Covers, and Cam Cover Installation

Install these and any other crankcase components not listed per 2007-up Harley-Davidson® service manual.

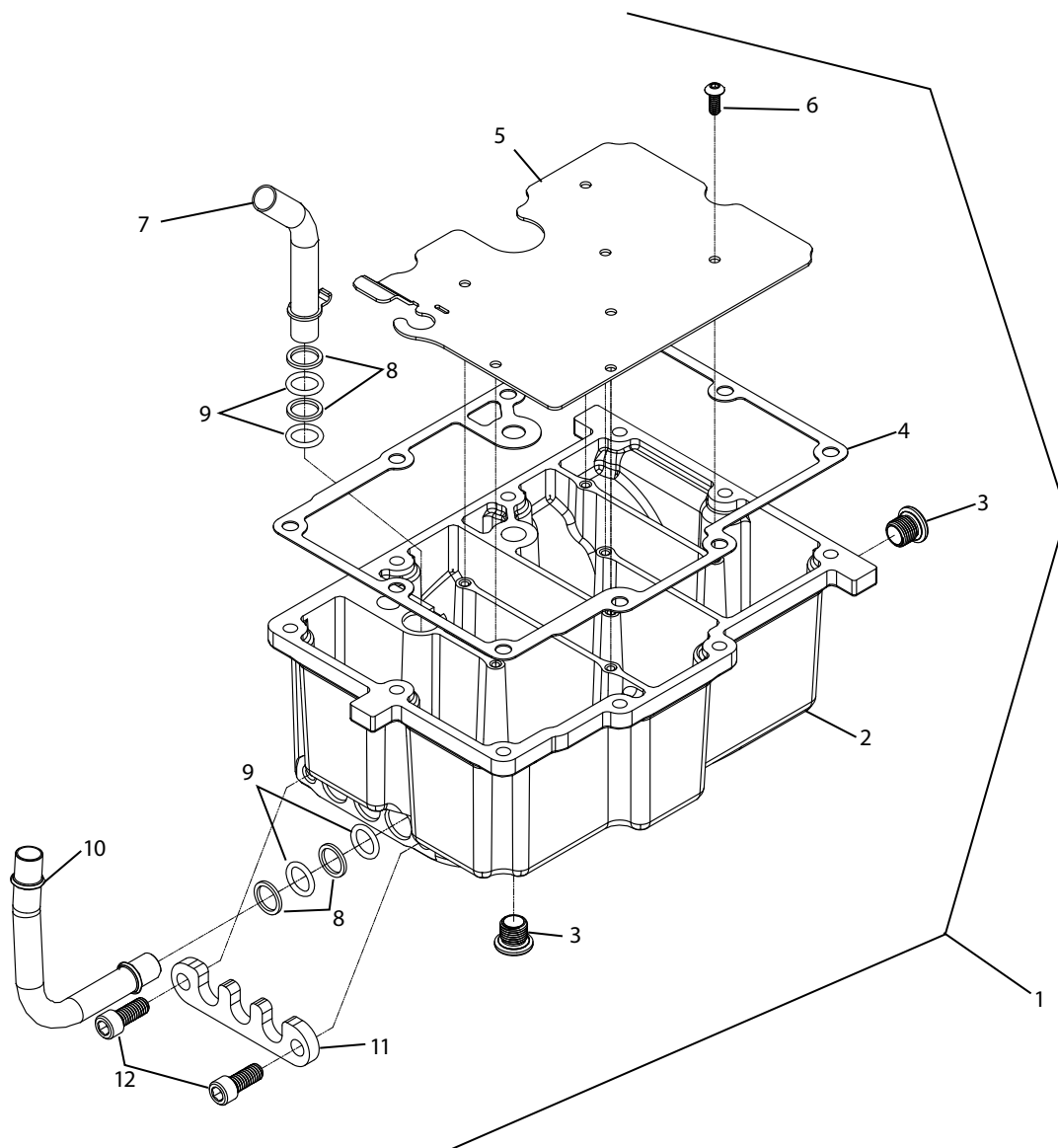
Replacement Parts for S&S® Crankcases for Harley-Davidson® 2006-'16 Dyna® Models

1. Bolt, stator 10-24 x 1" SHC - 4 required (H-D®# 2720))
 - Each 50-0044
 - 10 pack 50-0194
2. Seal, sprocket shaft (H-D®# 12068) 31-4035
3. Bearing, Timken® sprocket shaft (H-D®# 9028) 31-4013
4. Timken® Main Bearing Spacers
 - Fits 1¼" stock diameter shaft.
 - .0995" - .1005" (H-D®# 9124) 31-4071
 - .1015" - .1025" (H-D®# 9125) 31-4072
 - .1035" - .1045" (H-D®# 9126) 31-4073
 - .1055" - .1065" (H-D®# 9127) 31-4074
 - .1075" - .1085" (H-D®# 9128) 31-4075
 - .1195" - .1205" (H-D®# 9134) 31-4076
5. Bolt, case ⅝" -18 x 3½" HHC - 8 required
 - Chrome (each) 50-0254-S
 - 6 pack 106-3452
 - Zinc (H-D®# 3427) (each) 50-0117
6. Washer, flat ⅝" x 1⅞" x ⅛" - 8 required 50-7034
7. Bolt center case ¼" -28 x 6" HHC Grade 8
 - Each 50-0020
 - 5 pack 50-0221
8. Washer, flat, ¼" x .474" x .050"
 - Each 50-7020
 - 10 pack 50-7076
9. Nut 1¼"-28 Grade 8 - 1 required (H-D®# 7683) 50-5011
10. Cylinder stud - 8 required (H-D®# 16834-99A)
 - Each 31-2325-S
 - 8 pack 31-2340
11. Pin, Dowel, .4377" x .500", Steel, 4 Pack 500-0219
12. Bolt, cam plate ¼" -20 x 1" SHC - 4 required (H-D®# 852)
 - Each 50-0084
 - 10 pack 50-0244
13. Washer, Flat, .260"x.425"x.060" Chrome Steel 50-7017
14. Bolt, cam plate ¼" -20 x 1¼" SHC - 2 required (H-D®# 4740A, 3482A)
 - (each) 50-0008
 - 10 pack 50-0153
15. O-ring, cam plate - 9 required (H-D®# 11301) (each) 50-8066-S
- 10 pack 50-8066
16. Dowel, cam plate - 2 required (H-D®# 16589-99A) 50-8148-S
17. Bearing, Inner, Needle, Cam, 1.0" x 1.25" x .50" 31-4199-S
18. Bearing, pinion shaft - Fits all S&S and OEM 2000-'02
(Balanced models only) & all OEM 2003-up
(H-D®# 24604-00D) 31-4085
19. Retaining Ring, Internal, 2⅝", Black, Carbon Steel 2 required 56-3018-S
20. O-ring, oil pump 1⅞" I.D. x 1⅞" O.D. x ⅛" CS
(H-D®# 11157, 11293) 50-8039
- 10 pack 93-4110
21. Plug, magnetic drain 50-8335
22. Baffle plate 31-0119-S
23. Screw 10-24 x ⅜" pan head - 2 required
 - Each 50-0050
 - 10 pack 50-0139
24. Dowel, case alignment - 2 required
(H-D®# 16573-83, 16574-99A, 16573-83A) Each 50-8023

All reference to H-D® 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 H-D® part number shown.



10 pack	50-8109	35. O-ring, (-112), .487" ID x .693" OD, Viton®	500-0518
25. O-ring, case alignment, - 2 required (H-D®# 26432-76A) $\frac{9}{16}$ " I.D. x $\frac{1}{4}$ " O.D. x $\frac{1}{16}$ " CS	50-8034-S	36. Plug, Pipe, $\frac{3}{4}$ " Taper, $\frac{1}{4}$ -18 UNF 2A x 1", steel	50-8330
26. Piston Oiler Jet Kit (H-D®# 22307-99) Each	31-2025B	37. Oil Line, 90° (See Oil Line Kit Line Drawing)	
2 pack	31-2026		
27. O-ring, (-014), .500" ID x .625" OD (H-D®# 11140) Each	50-8032		
10 pack	50-8130		
28. Jet, Assembly, Piston Cooling (H-D®# 22307-99) Each	31-2025B		
29. Screw, Torx Panhead, 8-32 x $\frac{3}{8}$ ", Zinc, Steel (H-D®# 68042-99) Each	50-0054-S		
30. Pin Dowel, (H-D®# 18535-99) 2 pack.....	50-8195		
31. Screw, SHC, $\frac{5}{16}$ -18 x $\frac{3}{4}$ ", Zinc.....	50-0302-S		
32. Clamp, Hold-Down, Oil Line, Polished, 2006-up Dyna®	310-0867		
33. Plug, Oil Line, S&S® Cases, 2006-up Dyna® (For Shipping Only)	310-0865		
34. Washer, .650" x .505" x .062" Thick, Plastic, PTFE.....	500-0519		



S&S® Oil Line Kit For 2006-'16 Harley-Davidson® Dyna® Models

1. Installation Kit, Engine, 2006-up Dyna®	
Wblack.....	310-0870
Silver.....	310-0871
2. Pan, Oil, Machined, 2006-up Dyna®	
Wblack.....	310-0863
Silver.....	310-0864
3. Plug, Drain, w/ O-ring, Magnetic, 1/2-20, Zinc.....	50-8335
4. Gasket, Oil Pan, 2006-up Dyna®	310-0875
5. Plate, Baffle, .060" Thick, Steel, 2006-up Dyna®.....	310-0874
6. Screw, BHC, 10-24 x 1/2", Black Oxide.....	500-0520
7. Tube, Breather, Bent w/ Tab, Steel, 2006-up Dyna®	310-0873
8. Washer, .650" x .505" x .062" Thick, Plastic, PTFE.....	500-0519
9. O-ring, (-112), .487" ID x .693" OD, Viton®	500-0518
10. Oil Line, Bent, .500" OD x .035" Wall, 2006-up Dyna®.....	310-0872
11. Clamp, Hold-Down, Oil Line, Polished, 2006-up Dyna®	310-0867
12. Screw, SHCS, 5/16-18 x 3/4", Zinc, ASTM A574	50-0302-s