

**Instruction 51-1038
4-18-06**

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Because every industry has a leader

Installation Instructions: S&S® Degree Wheel Kit PN 53-0020

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.

General Information

Degree wheels have many uses. The more important ones are setting ignition timing, checking crankcase breather timing and checking cam timing.

The S&S® degree wheel assembly adapts to fit most any 45° v-twin engine by combining one or more of the special collars supplied in each kit. Once a proper combination is selected, the wheel is secured with a sprocket nut or with the clamping screw on the degree wheel.

Degree Wheel Divisions and Terminology

Degree wheel references encountered are listed below.

After Top Center (ATC) = Top Center (TC) (0°) clockwise to 90°

Before Bottom Center (BBC) = 90° ATC clockwise to Bottom Center (BC) (0°)

After Bottom Center (ABC) = BC (0°) clockwise to 90°

Before Top Center (BTC) = 90° ABC clockwise to TC (0°)

Ignition and Crankcase Breather Timing Piston Positioning

Most ignition timing and crankcase breather timing is done using front cylinder. To use S&S degree wheel:

1. Determine highest point of piston travel (Top Dead Center - TDC) for front cylinder and rotate flywheels so piston is in that position.
2. Clamp degree wheel on sprocket shaft so pointer lines up with with Top Center (0°) mark. (Most S&S flywheels have a Top Dead Center front cylinder (T/F) timing mark to indicate highest point of front piston travel. When mark is positioned in center of timing hole, front piston is at TDC.)

To locate TDC for rear cylinder by using front cylinder:

1. Position front cylinder at TDC.
2. Clamp degree wheel on sprocket shaft so pointer lines up with with 45° ATC mark.
3. Rotate flywheel assembly with degree wheel clamped in place so pointer lines up with Top Center (0°) mark. Rear cylinder is now positioned at TDC.

Ignition Timing Flywheel Marks

Ignition usually occurs before piston is at TDC. All ignition timing are positioned Before Top Center (BTC).

See the appropriate manual for timing specifications.

Crankcase breather timing for big twin engines

The crankcase breather timing on all big twins should be checked. Engines prior to 1980 require checking especially so, because the normal breather opening is a rough cast elliptical hole. This hole must be filed or ground to a rectangular shape: width and length should not exceed original dimensions. On all engines opening and closing sides and .690" dimension (See Figure A) should then be checked against specifications listed and filed if necessary.

This data is presented to maximize crankcase breathing efficiency which will help an engine perform better and cleaner.

Set degree wheel to TC 0° mark with front piston at TDC. Perform checks before engine is disassembled with pushrods and cam cover removed.

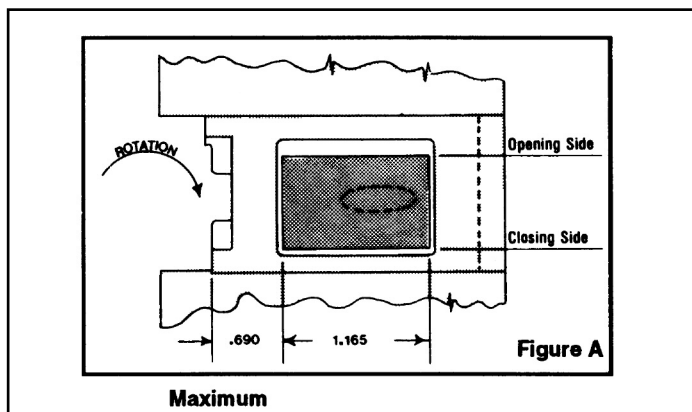


Figure A

Maximum

Breather opens 10 degrees BTC
Breather closes 75 degrees ABC

Minimum

Breather opens 10 degrees ATC
Breather closes 55 degrees ABC

We recommend using maximum specifications in competition engines. In most street engines if specs are within opening and closing tolerance ranges, *do not remove any additional material.*

1957 to -'77 Harley-Davidson® Sportster® model Breather Timing

Examination of some street engines has shown that breather timing varies from engine to engine. This is because positioning of the flywheel assembly in the crankcases changes the location of the pump drive worm gear on the pinion shaft and how it engages the oil pump gear.

During disassembly breather timing should be checked and set to:

Breather valve opens at 20° to 25° ATC

Breather valve closes at 85 to 90 ABC

To check existing breather timing set degree wheel to TC 0° mark with front piston at TDC. Perform checks with pushrods and cam cover removed.

To set breather timing to above specs during engine rebuild perform following steps:

1. Engines 1957 to 1971 - We strongly recommend purchase of 1972 and later pump breather gear, part #26331-72, and corresponding gear retainer lock ring, part #11002. These parts are used in place of early pump breather gear, part #26331-60, because slot in early gear is wider and makes modification of pump body too difficult to obtain desired results. To use later parts install scavenger gear, part #26315-62, with flat side of gear facing retainer lock ring.
2. Assemble engine to point of oil pump installation.
3. Place degree wheel on sprocket shaft and set to TC 0° mark with front piston at TDC.
4. Turn pump gear counterclockwise until slot in gear aligns with slot in pump body.
5. Place .002" shim in opening and reverse gear until shim is held tight between body and gear.
6. Scribe mark across pump gear sleeve and pump body at small timing notch on top edge of body. See **Figure B**. Because pump gear sleeve is very hard and difficult to scribe mark, it may be advantageous to coat top portion of sleeve just below teeth with Dykum® Blue.
7. Install and time pump using normal assembly procedure. Do not final tighten oil pump mounting bolts.
8. Rotate flywheels to 25° ATC mark. Be sure oil pump drive gear is firmly butted against shoulder on pinion shaft. If scribe mark on pump gear is to left of scribe mark on body, grind material off engine side of pump drive gear to allow it to move farther onto shaft until scribe marks align. If scribe mark is to right, shim between pump drive gear and flywheel assembly until marks line up. Big twin cam thrust washers, part #25550-36, can be used as shims, but are marginal because they do not fit well on pinion shaft. If you are not satisfied with fit, you may machine your own shims like we do.
9. Rotate flywheels to 85° ABC mark. Make second scribe mark on pump gear sleeve that lines up with first scribe mark on body.
10. Remove pump and carefully grind or file side of slot towards cam cover in body (closing side only) until slot closes when second scribe mark on sleeve and first mark on body line up.

11. Thoroughly clean and final assemble oil pump in crankcases.
12. Place oil pump drive gear on pinion shaft, and time pump in normal fashion. If material was removed from flywheel side of oil pump drive gear, it will be necessary to shim between pump drive gear and pinion gear. Pinion gear must be flush with or extend out slightly past splines on pinion shaft when installed tight against pump drive gear.
13. Check clearance between pinion gear and cam cover bushing. Clearance must be .005". Use Plasti-gauge or whatever method you choose to determine clearance. Shim on outer side of pinion gear to obtain .005" clearance. Harley-Davidson® shims, part #18268-48, are .015" thick each and may be used for this purpose.

**All reference to Harley-Davidson® 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 Harley-Davidson® part number shown.*

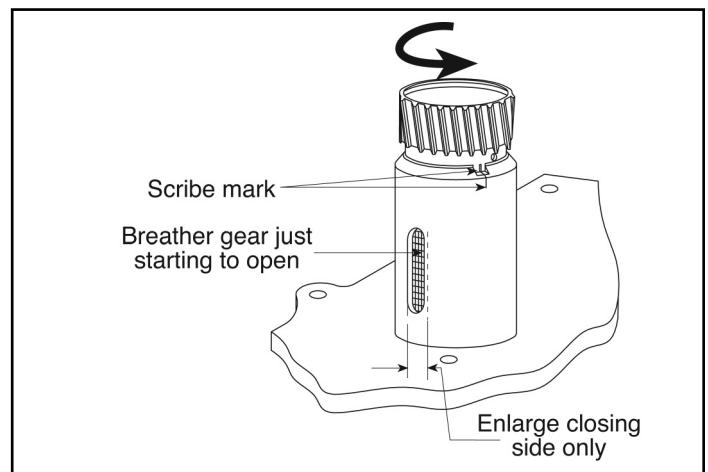


Figure B



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