

Instruction 510-0451

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Version 1

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Assembly Instructions: S&S Gear Drive Cam Display

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.

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.

Introduction

The S&S Gear Drive Cams Display is a proven selling tool that you can use to show your customers how S&S Gear Drive cams work, and to demonstrate the benefits of the S&S Gear Drive system by comparing them to stock chain drive camshafts in the 1999-'06 and 2007-'17 model year groups. S&S has been using this set up in our trade show and events displays for a number of years, and have had numerous requests from S&S Dealers to have a version of it for their shops.

What Comes In The Kit?

S&S provides the display frame with inner cam bearings installed, mounting hardware and sign, an S&S hydraulic cam chain tensioner kit, an S&S TC3 cam support plate kit, a set of S&S gear drive, easy start camshafts which are specially coated to prevent rust, and three "dummy" pinion shafts that will be used to turn the cams in the display.

Parts Required To Complete The Display

For the 1999-'06 style cams the dealer must provide a stock 1999-'06 style cam support plate, a set of stock 1999-'06 style chain drive camshafts, stock chains, sprockets, and spring loaded chain tensioner shoes. For 2007-'17 style cams the dealer must provide a stock 2007-'17 style cam support plate, a set of stock 2007-'17 camshafts, stock chains, and sprockets. We recommend that take-off stock parts be used. There is no need to buy new parts for this display.

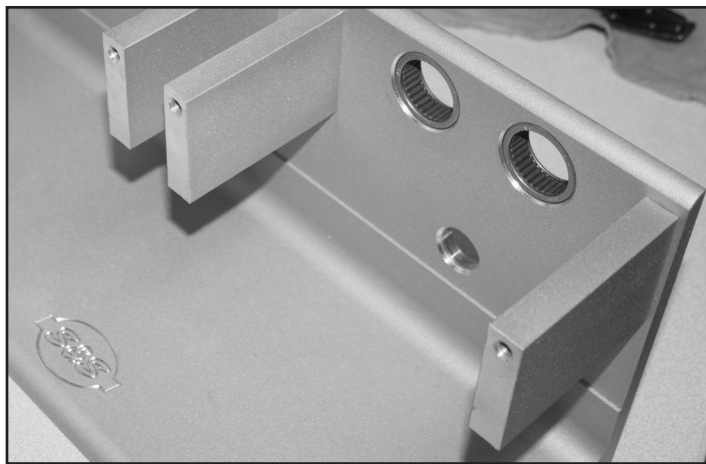
Assembly Instructions

1. Unpack the display parts and gather the required stock components.
2. Assemble T-Handles
 - a. Install one of the black 3/8"- 24 studs in each of the three plastic T-handles. The stud should protrude 1-3/16".
 - b. Place one of the aluminum spacers over the stud, apply green Loctite to the stud, install a 3/8"-24 flanged nut, and tighten the nut. **See Picture 1.**



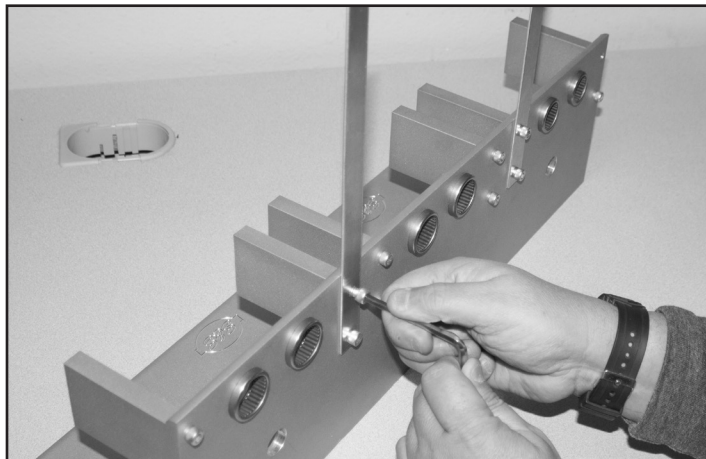
Picture 1

3. Install stand-off blocks to the display support with provided 1/4-20 x 7/8" socket head cap screws as shown in **Picture 2**. Apply green thread locker to the threads and tighten to 100 in-lb. Make sure the single mounting hole is positioned toward the top of the stand off.



Picture 2

4. On the second standoff from each end, install one of the sign brackets to the rear of the display before installing the mounting screws. Once the brackets are in place, peel off the backing from one side of the Velcro strips provided in the kit. Affix the Velcro strips to the sign brackets. The side of the bracket with the Velcro® should face the front of the display. See **Picture 3**.

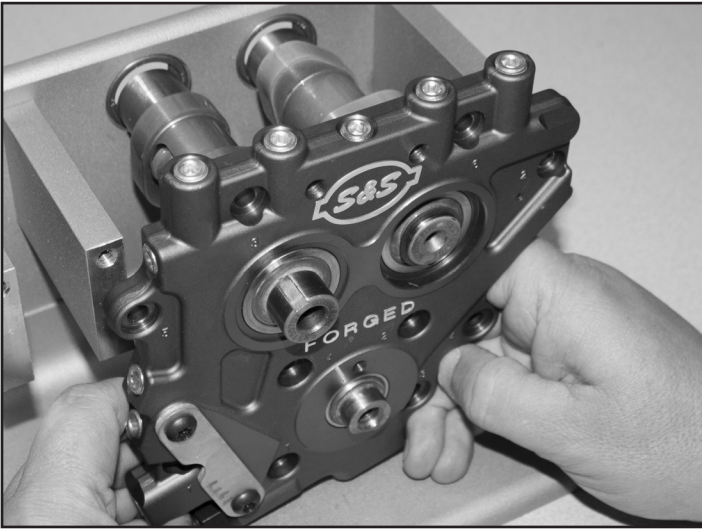


Picture 3

5. Using one of the "dummy" pinion shafts, install the S&S Gear Drive camshafts in the S&S cam support plate according to the installation instructions provided with the cam kit.

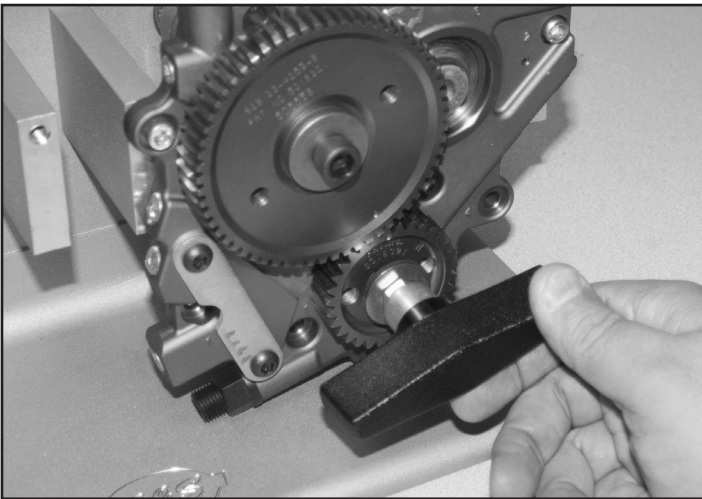
NOTES

- Since the cams will not be installed in a crankcase, the "dummy" pinion shaft will be used when installing cams and drive chains or gears on cam support plate.
- No oil pump will be used in this installation
- S&S Cams included in this kit have been coated with a clear powder coat to prevent corrosion. These cams should never be installed in an engine..
- 6. Install the S&S gear drive cam and cam support plate assembly on the display in the far right hand position. See **Picture 4**. Apply green thread locker to the mounting screws and tighten to 95 in-lb.



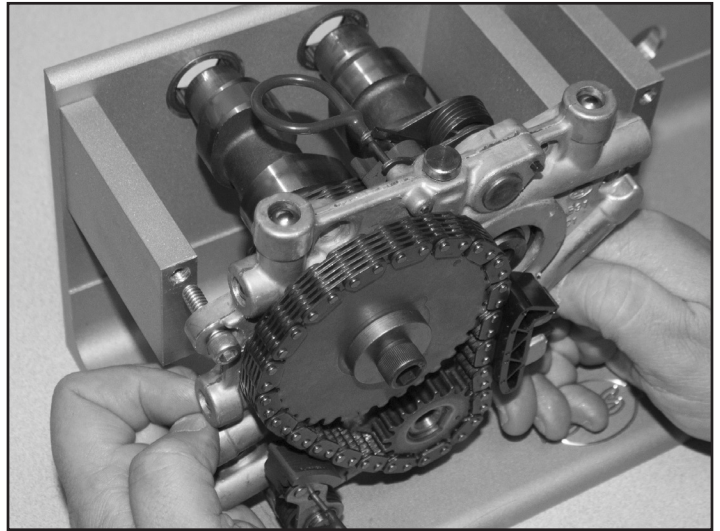
Picture 4

7. Install rear cam outer drive gear according to gear drive cam instructions included.
8. Install pinion gear on pinion shaft per gear drive cams instruction sheet included.
9. Apply green thread locker to the threads of one of the T-handles, slip one of the thick flat washers over the end of the stud, and thread it into the end of the pinion shaft. Tighten the handle. The gears and cams should spin freely when the handle is turned. See **Picture 5**.



Picture 5

11. Install the 1999-'06 cam support plate and cams assembly in the far left position on the display. See **Picture 6**. Apply green thread locker to the mounting screws and tighten to 95 in-lb. Cams and sprockets should rotate freely at this point.



Picture 6

12. Apply green thread locker to the threads of one of the T-handles, place one of the thick flat washers and one of the smaller .325" x .548" x .062" washers over the end of the stud. See **Picture 7**. Thread the stud into the end of the pinion shaft. Lock the sprockets by inserting a stock sprocket locking tool or a small piece of wood between the chain and sprocket and tighten the handle.



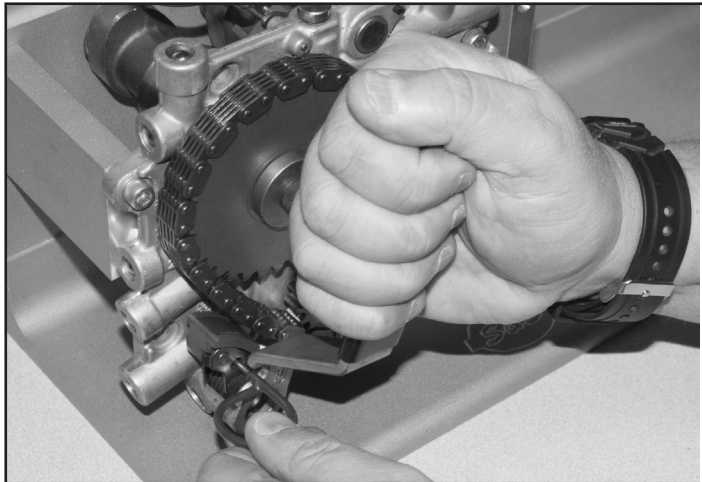
Picture 7

NOTE – If gears and cams bind or turn hard, it may be necessary to loosen the support plate mounting screws and adjust the position of the plate to eliminate binding.

10. Using a "dummy" pinion shaft, install the stock chain drive cams, tensioner shoes, and drive chains and sprockets into the stock 1999-'06 style cam support plate according to the instructions in the stock service manual. Normally the sprockets are installed with the cam support plate installed in an engine, so it may be necessary to hold the plate in a vise with soft jaws when releasing tension on stock spring loaded tensioner shoes

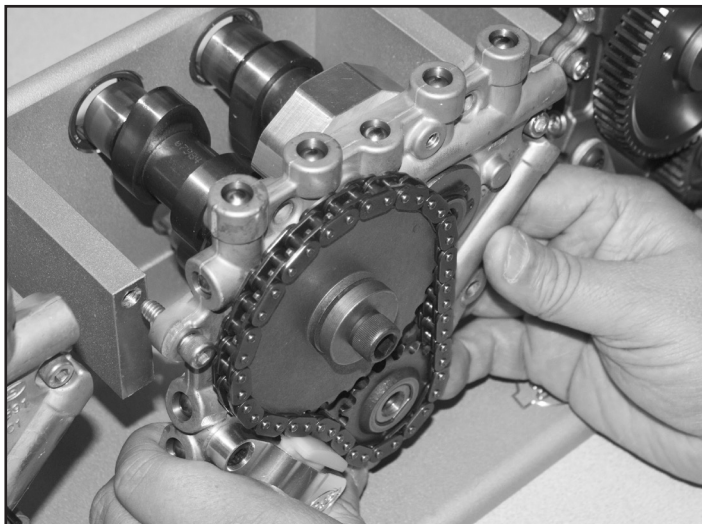
Note – The stock spring tensioner unloading tool and pins must be used or the spring tension will force the cams out of alignment making installation into the display frame difficult.

13. Using the stock spring unloader tool, remove the tensioner locking pins to apply pressure to the drive chains. See **Picture 8**. This will make the cams considerably harder to turn.



Picture 8

14. Using a “dummy” pinion shaft, install the stock chain drive cams, cam drive chains, and sprockets into the stock 2007-'17 cam support plate according to the instructions in the stock service manual.
15. Install the provided S&S hydraulic cam chain tensioners on the stock cam support plate according to the instructions included with the kit.
16. Install the 2007-'17 cam support plate and cams assembly in the center position on the display. Apply green thread locker to the mounting screws and tighten to 95 in-lb. See **Picture 9**.



Picture 9

17. Apply green thread locker to the threads of the third T-handle and place one of the thick flat washers and one of the smaller .325" x .548" x .062" washers over the end of the stud as shown in **Picture 7**, and thread it into the end of the pinion shaft. Lock the sprockets by inserting a stock sprocket locking tool or a small piece of wood between the chain and sprocket and tighten the handle.

NOTE - The cams will spin with some resistance when the handle is turned.

18. Install the sign to the back of the display frame.
- a. Strip the protective tape from the adhesive backing of the Velcro® on the sign mounting brackets.

- b. Carefully position the sign on top of the display, and press it against the adhesive backing of the Velcro on the sign mounting brackets. See **Picture 10**



Picture 10

Selling Tips For The S&S Gear Drive Cam Display

1. The most compelling feature the S&S Gear Drive Cams Display is the hands on experience. When the customer turns the handles on the various cam set ups, it immediately becomes obvious that the chain drives require much more force to turn than the S&S Gear Drive cams.
2. The difference is real. These are not special “tricked up” parts designed to make the stock cams look bad. The stock parts are production components taken out of actual motorcycles. The S&S parts are not any different than what we sell to install in your customer’s engine, except that the cams are coated to prevent rust.
3. It actually takes 2-3 horsepower to drive the early (1999-2006) chain drive cams at 5000 rpm. So even if the S&S OES (Original Equipment Spec) gear drive cams are installed, there will be more power available just because of the reduced drag. Later style stock chain drive cams take somewhat less power to turn.
4. Wear on the stock tensioner shoes should be pointed out, and it should be mentioned that the debris generated remains inside the engine.
5. Early (1999-2006) chain drives are most prone to failure and must be regularly checked for damage. Even the tensioner shoes on 2007-'17 style hydraulic chain tensioners and must be checked for wear and replaced periodically. Gear drives do not have wear parts, and don’t need periodic monitoring.
6. Stock chain drives do not control cam timing well at high rpm, particularly with heavier performance valve springs. This is due to the inability of the chain tensioners to maintain constant tension. Cam timing can vary as much as 4-5°. Gear drive cams do not have tensioners. Since the gears are constantly meshed, and cannot fluctuate, gear drive cams maintain correct valve timing even with high lift cams at high rpm.
7. The S&S cam support plate included in the kit is available for two engine year groups. 1999-2006 and 2007-'17. The early style S&S cam support plate is machined to accept a late style oil pump and is not compatible with the stock, spring loaded cam chain tensioners. Both cam support plates may be used with the late style hydraulic cam chain tensioners or preferably with S&S Gear Drive Cams.
8. The S&S hydraulic tensioner unit is included in this kit to show potential customers with 2007-17 models, that if they choose to

stay with chain drive, there is an upgrade available that will improve valve train stability. There is a good chance that customers with late style engines will not be able to install gear drive cams due to excessive pinion shaft runout on the stock flywheels, so chain drive is their only economical option.

Replacement Parts

1. Stand, Gear Drive Display, w/Bearings.....510-0441
2. Bracket, Cam Support Plate, Powder Coated, 6 Req.....510-0434
3. Pinion Shaft, Gear Drive Display, Clear Coat,3 Req.....510-0438
4. Camshaft, Front, Gear Drive Display, Clear Coat510-0446
5. Camshaft, Rear, Gear Drive Display, Clear Coat510-0449
6. Kit, Cam Support Plate.....310-0625
7. Retaining Ring, External, .722" x .042"50-8286-S
8. Cover, Kit, Hydraulic Tensioner, Oil Block Off, 2007-up bt.....106-5723
9. Gear, Pinion, Packaged,31 Tooth,1999-up bt33-4160
10. Gear, Outer, Cam Drive, 2006-up Dyna™,
2007-17 bt exc 17 touring models 33-4269
11. Screw, SHCS,1/4-20 x 7/8", Zinc, 18 Req.....50-0025
12. Screw, SHCS,3/8-24 x 1-3/4", Black.....50-0132
13. Washer, Flat,.405" x 1.150" x .230", Alloy Steel.....50-7056
14. Key, Parallel,.188" x .150" x .420", Steel.....106-1348
15. Washer, flat 5/16" x 1-1/8" x 1/8", 3 Req.....50-7042
16. Nut, HSFH, 5/16-18 UNC-2B x .283", Zinc, Steel, 3 Req.....50-5053-S
17. Spacer, Handle, Gear Drive Display,.325" x .480" x .550",
Aluminum, 3 Req.....51-8705
18. Screw, SHS,5/16-18 x 2", Alloy Steel, 3 Req.....50-0414-S
19. Knob, Two-Arm Clamping, Gear Drive Display,
5/16-18 x 3-1/2", Black, Plastic, 3 Req.....51-8007-S
20. Bracket, Sign Support, 2 Req.....510-0457
21. Sign, Assembly, Gear Drive Display.....510-0452
22. Washer, Flat,.325" x .548" x .062", Zinc, Low Carbon Steel, 2 Req.....50-7025
23. Tensioner,Kit,Cam Chain,Hydraulic,2006-up Dyna®,2007-up bt.....330-0518
24. Washer, Retaining, 1.500 x .790 x .110"50-8279

