

Instruction 510-0685

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## Installation Instructions: S&S Performance Camshaft for Royal Enfield® Twin Cylinder Engines (PN 330-0709)

### 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.

The name Royal Enfield® is used in reference only. S&S Cycle is not associated with Royal Enfield and we in no way are implying that any of S&S Cycle's products are original equipment parts.

DISCLAIMER: NOT LEGAL FOR SALE OR USE IN CALIFORNIA ON ANY POLLUTION CONTROLLED MOTOR VEHICLE. Not legal for sale or use on any EPA pollution controlled motor vehicle.

### 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 twenty-four (24) 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 24 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.

## VALVE TIMING SPECIFICATIONS

Intake	Cylinder	Open	Close	Duration	Lobe Center
	Left	1 BTDC	35 ABDC	216	107
Right	0 @TDC	35 ABDC	215	107.5	
Exhaust	Cylinder	Open	Close	Duration	Lobe Center
	Left	32 BBDC	10 ATDC	222	101
Right	33 BBDC	12 ATDC	225	100.5	
	Cylinder	Overlap	Lobe Separation Angle	Peak cam lift	Peak valve lift
	Left	11	104	0.299"	0.354"
	Right	12	104		

\*All timing numbers measured at 0.050" of valve lift

### Kit Contents:

Camshaft *qty 1*

Valve Spring Shims *qty 8*

### Camshaft Removal:

1. Gain access to the rocker cover and remove.
2. Rotate crankshaft until the "L" mark on the camshaft is aligned with the cylinder head on the LH side.



Picture 1

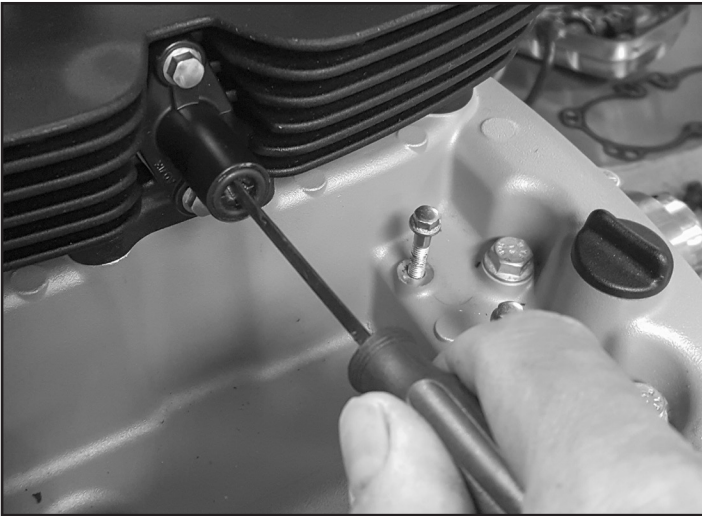


Picture 2

5. Remove the RH rocker carrier.
6. Loosen and remove the hex bolt from the cam chain auto tensioner.
7. Use a small straight screwdriver to fully loosen the timing chain.

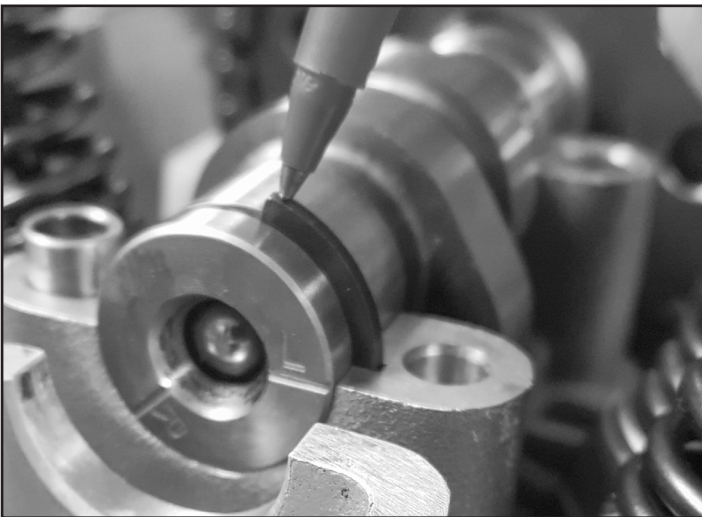
**NOTE:** Turn the adjuster screw clockwise to loosen the timing chain. The tensioner is spring loaded so once the screwdriver is removed, the tensioner will automatically engage to remove the slack.

3. Remove the LH rocker carrier.
4. Rotate the crankshaft until the "R" mark on the camshaft is aligned with the cylinder head on the LH side.



**Picture 3**

8. Remove the cam chain tensioner assembly.
9. Rotate crankshaft until one of the hex bolts holding on the cam chain sprocket is near the top and remove the hex bolt.
10. Rotate crankshaft until the second hex bolt is near the top and remove.
11. Remove the "C" washer from the groove in the cylinder head on the LH side of the camshaft. In Picture 4 the "C" washer has been rotated out of the groove in the cylinder head for easy removal.

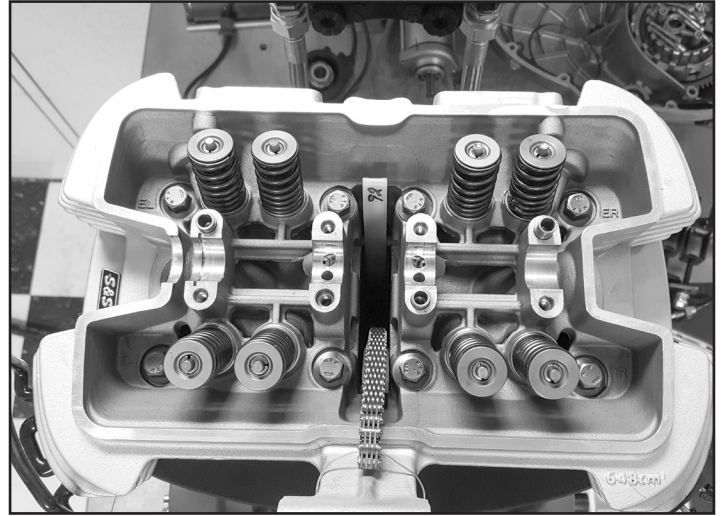


**Picture 4**

12. Slide the sprocket off the camshaft followed by removing the chain from the sprocket.
13. Remove the camshaft and sprocket from the cylinder head by sliding through the chain.
14. Support the cam chain to prevent it from falling into the engine.
15. Remove the sprocket from the camshaft and set aside.

### Cylinder Head and Valve Spring Removal:

1. Remove intake system and exhaust system if they haven't already been removed.
2. Loosen and remove the 8 bolts holding the cylinder head in a crisscross pattern.



**Picture 5**

3. Support the cam chain suitably and gently remove the cylinder head.
4. Use a suitable valve spring compressor to remove the top collars, split cotters, lower collars, valve springs and valves from the head. The valves should be labeled so that they can be re-installed in their original locations.

### Assembly — Valve Spring Shims

1. Lubricate the valve stem and install into the guide. A Moly assembly lube is recommended.
2. Place a spring shim over the valve guide onto the valve spring pad followed by the lower spring collar.



**Picture 6**

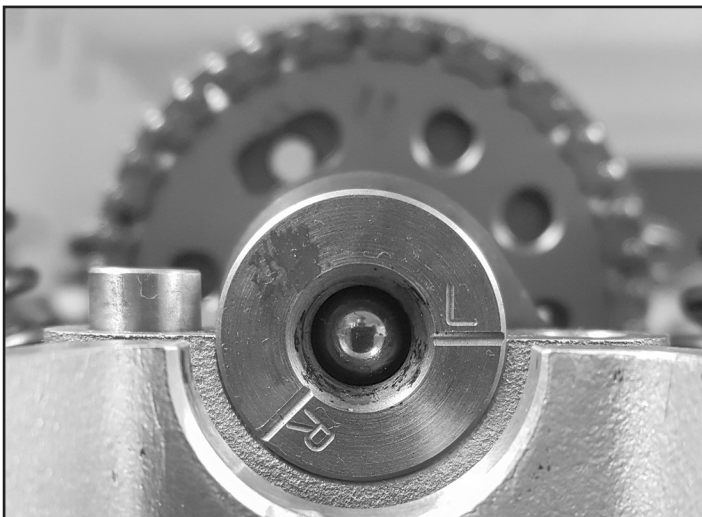
3. Place the spring over the valve stem and onto the spring pad.
4. Place the collar on top of the valve spring and use a suitable valve spring compressor to compress the spring.



5. Install the split cotters into the grooves of the valve stem. Gently release the valve spring compressor.
6. Repeat for the remaining 7 valves.

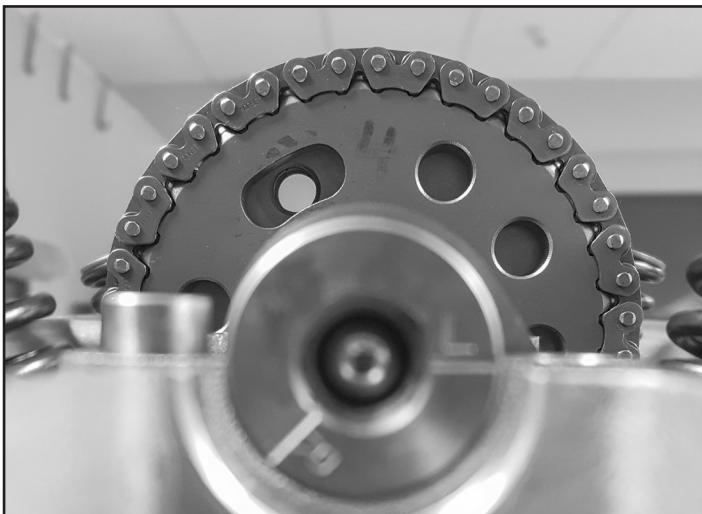
### Camshaft Installation

1. Install the cylinder head and front cam chain tensioner according to the Factory Service Manual.
2. Hold the timing chain to prevent binding and rotate the crankshaft clockwise to bring the LH piston to TDC.
3. Install the cam chain sprocket onto the camshaft. Do not install bolts at this time.
4. Install the camshaft and sprocket assembly through the cam chain and place the camshaft into the cylinder head. The sprocket will need to be slid off the cam in order to get the chain full installed on the sprocket. Once the chain is on, the sprocket can be slid back onto the cam.
5. Ensure that the "L" mark is aligned to the cylinder head on the LH side.



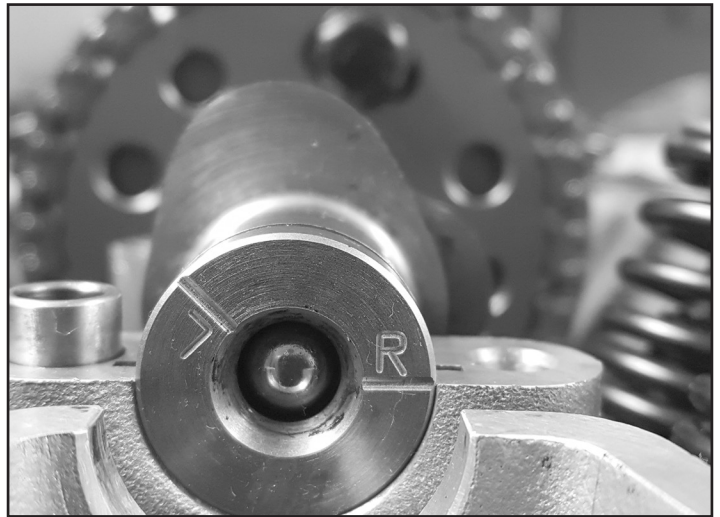
**Picture 7**

6. Ensure the flat edge of the cam position tool (Part No: ST3026/a) is correctly located in the slot of the camshaft on RH side and the tool is resting correctly on the cylinder head.
7. Locate the timing chain sprocket on the camshaft with its mounting slots centralized to the threads of the camshaft.



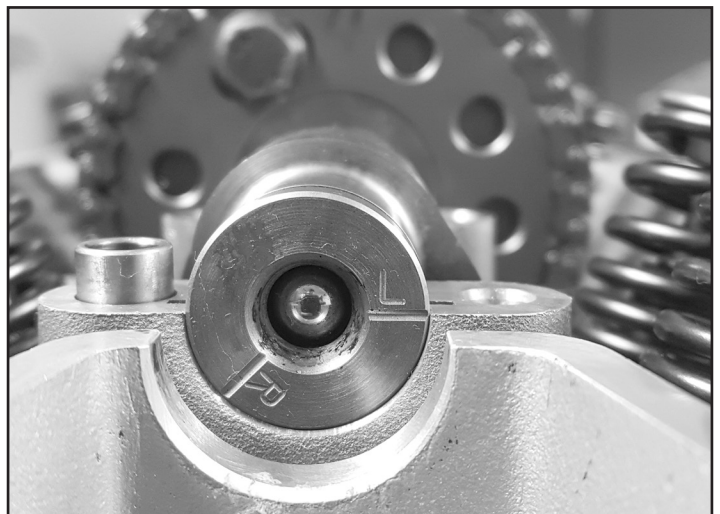
**Picture 8**

8. Install a M8 hex bolt but do not fully tighten yet.
9. Remove the special tool from the camshaft.
10. Rotate the crankshaft until the other slotted hole on the cam chain is in the upper position. Ensure the "R" mark on the camshaft is aligned to the cylinder head.



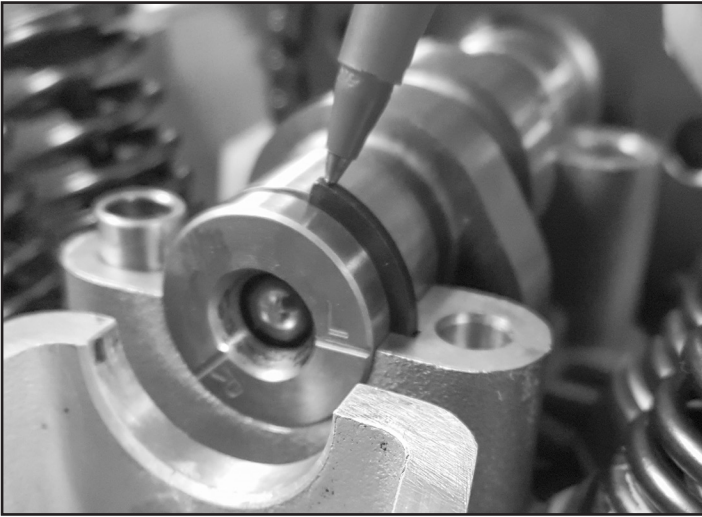
**Picture 9**

11. Ensure the angular edge of the special install tool is correctly located in the slot of the camshaft on RH side and the tool is resting correctly on the cylinder head.
12. Install the other M8 hex bolt and tighten to 35 N-m/3.5 kgf-m.
13. Remove the special install tool and rotate the crankshaft until the first bolt is in upper position. Ensure the reference mark "L" in the camshaft is aligned to the cylinder head on the LH side.

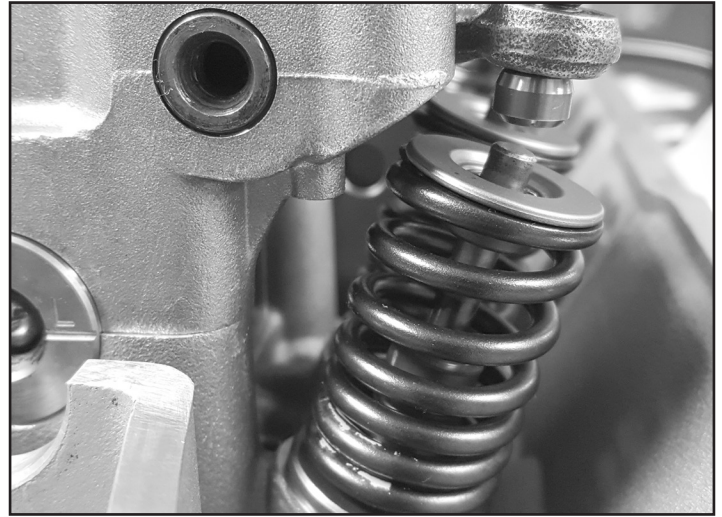


**Picture 10**

14. Tighten the hex bolt to 35 N-m/3.5 kgf-m.
15. Locate and fit the "C" washer on the camshaft. Rotate the "C" washer until it full seats into the cylinder head.



**Picture 11**



**Picture 13**

16. Locate the timing chain tensioner. Release the spring tension by holding the tensioner in one hand and using a small straight screwdriver to turn the adjuster screw clockwise.
17. Install the tensioner and tighten the 2-M6 screws to 12N-m/1.2 kgf-m.
18. Remove the screwdriver. The tensioner will automatically release and set the cam chain tension.
19. Install O-ring and M6 screw and torque to 4N-m/0.4 kgf-m.

4. Assemble rocker carrier LH on cylinder head LH such that tappet adjusters are above the intake and exhaust valves.
5. Assemble the 4-M6 hex flange bolts on rocker carrier and tighten in a crisscross pattern to 12 N-m/1.2kg-m.
6. Remove the locking tool from the crankcase.
7. Rotate the crankshaft until the "R" mark on the camshaft is aligned with the cylinder head.

**Camshaft Install — LH and RH Rocker Arm Carriers**

1. Locate the LH rocker arm carrier and ensure the "L" mark on the camshaft is aligned to the cylinder head.



**Picture 12**



**Picture 14**

8. Repeat the assembly procedure above for the RH rocker arm carrier.

2. Insert the Special Tool No: ST-27533-2 in the right side of the crankcase to prevent crankshaft rotation.
3. Ensure the tappet adjuster locknuts and adjusters are fully loosend on the intake and exhaust rocker arms.

**Camshaft Install — Tappet Clearance Adjustment**

1. Refer to the service manual for the detailed procedure.
2. Tappet clearance for a cold engine.

Intake	0.08mm
Exhaust	0.18mm