

Instruction No. 00-4354  
7-17-00

--  
Copyright © 2000  
by S&S Cycle, Inc.  
All rights reserved. Printed in the U.S.A.

**S&S<sup>®</sup> Cycle, Inc.**

14025 County Hwy. G P.O. Box 215  
Viola, Wisconsin 54664  
Phone 608-627-1497 Fax 608-627-1488  
Email: [sstech@sscycle.com](mailto:sstech@sscycle.com) [sscust@sscycle.com](mailto:sscust@sscycle.com)  
Website: [www.sscycle.com](http://www.sscycle.com)



## Die-Cast Rocker Cover Instructions For Twin Cams & Evolutions

### Safe Installation and Operation Rules:

Before installing any S&S engine part, it is your responsibility to read and follow all instructions. The rules below are for your personal safety, and must be kept in mind at all times.

- Gasoline is extremely flammable and explosive under certain conditions, and toxic when inhaled. Do not smoke around gasoline. Perform the installation in a well-ventilated area away from sparks or open flame.
- After installation, be sure all fuel lines are routed correctly with clamps in place and tightened securely. Even with protective cover, gas lines must not contact extremely hot surfaces where they could melt or leak and catch fire.
- Compressed air and particles dislodged by compressed air are potentially harmful. Wear protective goggles when using compressed air and always direct the air stream away from yourself and others nearby.
- Some solvents, degreasers and other chemicals are harmful, especially to skin and eyes. Many chemical compounds such as lacquer thinner are also flammable and present a fire hazard. Read the manufacturer's instruction label for precautions and proper use. Use in a well ventilated area and wear protective clothing to avoid personal injury.
- If the motorcycle has been running, wait until the engine and exhaust pipes have cooled before performing any mechanical work.
- Before beginning the installation, disconnect and remove the battery to eliminate potential sparks and possible inadvertent engagement of the electric starter while working on the motorcycle.
- Read instructions thoroughly and carefully so all procedures are completely understood before beginning installation. Contact S&S if you have questions, if any steps are unclear, or if any abnormalities occur during final assembly, installation, or operation.
- Consult an authorized H-D service manual for correct disassembly, reassembly, and installation procedures for any parts that need to be removed or disassembled to facilitate the installation.
- Use good judgment during assembly, installation, and when operating the motorcycle. Good judgment begins with a clear head. Don't let alcohol, drugs, or fatigue impair judgment. Perform installation when fresh and alert.
- For optimum performance and safety and to minimize potential damage to the cylinder heads or other components, use correct hardware and follow procedures outlined in S&S instructions and authorized H-D service manual.
- Motorcycle exhaust fumes are toxic and must not be inhaled. Run motorcycle only in a well ventilated area where fumes can dissipate.

### 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 six (6) 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 S&S by the purchaser within the 6 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must notify S&S of the problem immediately. Some problems can be rectified by a telephone call and need no further action. A part that is suspected of being defective must not be replaced 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, it must be packaged properly to avoid 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 was made by S&S and the part was found to be defective, repair, replacement, or refund will be granted.

### ADDITIONAL WARRANTY PROVISIONS:

- (1) No part shall be returned to S&S without first contacting the company and obtaining a Return Authorization (RA) number.
- (2) S&S shall have no obligation in the event an S&S part is modified by any other person or organization, or if another manufacturer's part is substituted for one provided by S&S.
- (3) 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 break-in or maintenance, improper use, abnormal operation, or any other misuse or mistreatment.
- (4) 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.
- (5) S&S parts are designed exclusively for use on Harley-Davidson motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.

### 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 motorcycle or a component.**

#### NOTE

*Other information of particular importance has been placed in italic type.*

**S&S urges you to take special notice of these advisories.**

## Introduction

With minor exceptions, S&S die-cast rocker cover kits for Twin Cams and Evos are identical. Mounting holes are larger in bases for Twin Cams and in slightly different locations. Because of the different vent systems and mounting-bolt patterns, different rocker housing bases, rocker supports and rocker housing base gaskets are required for the two engines.

Removal of existing rocker covers and installation of S&S Die-Cast covers is similar for Twin Cams and Evos. Steps 4, 7, and 9 involve procedures or components that apply only to one model or the other; where applicable, procedures and illustrations are clearly designated "Twin Cam" or "Evo." Otherwise, Twin Cam and Evo installations are identical. S&S recommends that the installer become thoroughly familiar with the "Top End Overhaul Procedure" section in an appropriate Twin Cam or Evo/V<sup>2</sup> H-D service manual and refer to this section as required.

S&S wrench set # 53-0040 will prove helpful when installing S&S rocker covers. As an alternative, conventional Allen wrenches can be shortened by grinding. Otherwise, the motorcycle frame may interfere with the tightening of some fasteners. S&S strongly recommends the use of a torque wrench and Loctite 242 (included) on all fasteners.

S&S rocker covers accept valve springs up to 1.660" O.D. with no modification. In most instances, they will accept valve lifts to .710" without modification. It remains the installer's responsibility to confirm all clearances. For your own protection and to prevent damage to your motorcycle during the installation, thoroughly familiarize yourself with these instructions before proceeding.

### NOTES

- *Threads should be cleaned with Loctite primer or an equivalent before applying Loctite; S&S has used lacquer thinner with excellent results.*
- *The installer must check clearances between the valve spring/top collar and rocker cover housing as well as between the rocker arm and top cover. These procedures are described in Steps 10 and 16.*
- *The cylinder head must be correctly prepared for higher than stock lifts according to the cam manufacturer's instructions.*

## CAUTIONS

- **Failure to establish correct clearances can result in extensive engine damage not covered under warranty.**
- **It is the installer's responsibility to use Loctite according to directions printed on the container, and to tighten fasteners to correct torque values. Failure to install fasteners correctly may result in the fastener vibrating loose and causing extensive engine damage not covered under warranty.**

**WARNING – Gasoline, lacquer thinner, and many solvents are extremely flammable. Fumes may be explosive and toxic if inhaled. Read and follow the manufacturers' instructions if applicable, and use these materials only in a well ventilated area away from sparks and open flame.**

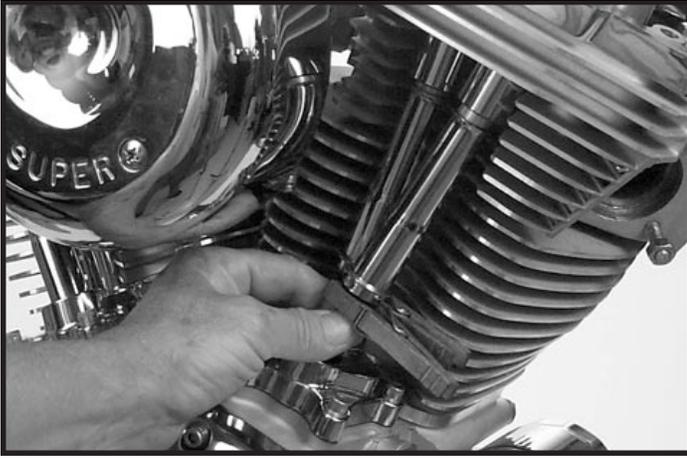
## Installation

1. Wash motorcycle, taking special care to remove dirt from engine and surrounding area. Remove gas tanks and clean engine and surrounding area with compressed air. Disconnect battery, ground cable first, and remove from motorcycle.

**CAUTION - Dirt and other contaminants can cause extensive damage if allowed to fall into engine.**

## WARNINGS

- **Sparks from motorcycle electrical system can ignite gasoline fumes, resulting in an explosion. Removing battery eliminates the possibilities of explosion and injury arising from inadvertent activation of the electric starter.**
  - **High-pressure air is potentially hazardous. Wear eye protection during use and direct air stream away from face and others nearby.**
2. Remove OEM top rocker cover. Remove pushrod cover retainers from front cylinder pushrods and collapse pushrod covers.
  3. Remove spark plugs, place motorcycle in fifth gear, and turn wheel to rotate engine and place intake and exhaust pushrods/lifters for front



Picture 1 (Twin Cam & Evo)

cylinder at lowest point on cam; front piston will be at TDC on Compression stroke with pushrods/lifters at lowest point. Confirm that both pushrods can be rotated with light finger pressure. **See Picture 1.**

**CAUTION – Failure to confirm correct pushrod position can result in damage to rocker arm support plates and other parts.**

4. Remove existing components
  - A. Twin Cam:
    1. Remove breather and baffle assembly. **See Picture 2.**
    2. Gradually loosen rocker arm support bolts in sequence shown. **See Figure 1.** Loosen rocker support bolts in  $\frac{1}{4}$ -turn increments for first  $\frac{3}{4}$  turn, then remove.
    3. Remove rocker arms/support assembly from cylinder head. Loosen bolts in  $\frac{1}{4}$ -turn increments for first  $\frac{3}{4}$  turn, then remove bolts and remove rocker housing from cylinder head.
  - B. Evo:
    1. Gradually loosen and remove five rocker housing screws. Loosen screws in  $\frac{1}{4}$ -turn increments for first  $\frac{3}{4}$  turn, then remove.
    2. Remove rocker housing with rocker arms and shafts from cylinder head.
5. Taking care to keep parts in same order as removed, remove rocker shafts and rocker arms from support (Twin Cam) or lower rocker housing (Evo). Mark components according to



Picture 2 (Twin Cam Only)

location: “front intake,” etc., so they can be returned to their original locations.

6. Remove oil and any remaining gasket material from cylinder head gasket surface. Clean gasket surface with lacquer thinner.

**WARNING – Lacquer thinner is extremely flammable, potentially explosive, and the fumes toxic when inhaled. Read manufacturer’s cautions on container and use only in a well-ventilated area away from sparks and open flame.**

7. Place lower rocker housing gasket(s) supplied in kit on cylinder head.
  - A. Twin Cam: One gasket required. Gasket must be positioned to cover breather channel in cylinder head. If necessary, use a small amount of gasket adhesive or

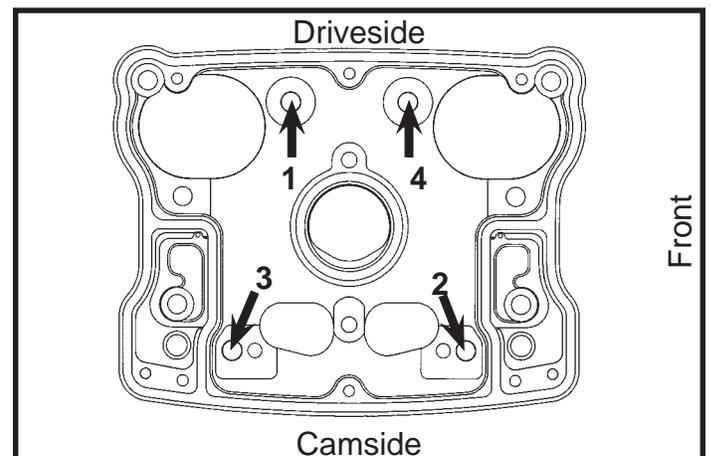
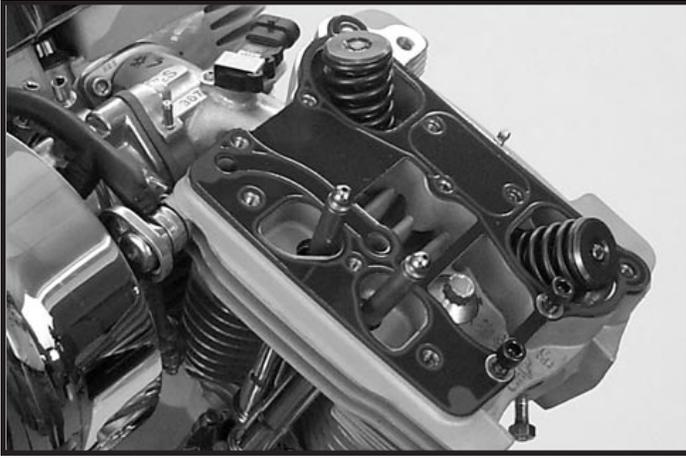


Figure 1 (Twin Cam & Evo)



**Picture 3A (Correct)**

sealant to hold gasket in place. Otherwise, gasket should be installed dry.

**NOTE – It is possible to install gasket incorrectly. Before proceeding, confirm that gasket is placed correctly and covers breather channel. See Pictures 3A (TC Only) & 3B (TC Only).**

B. Evo: Two gaskets required. Factory-applied silicone beads should face up. If necessary, use a small amount of gasket adhesive or sealant to hold gaskets in place. Otherwise, gaskets should be installed dry.

8. Prepare lower rocker housing screws according to instructions on Loctite container and apply thin film of Loctite to threads.

A. Twin Cam: Lower rocker housing screws are  $\frac{5}{16}$ -18 x  $\frac{3}{4}$  (6 ea.)

**NOTE – Screws for remaining holes in bottom of Evo and TC rocker housing base will be installed in Step 14-A.**

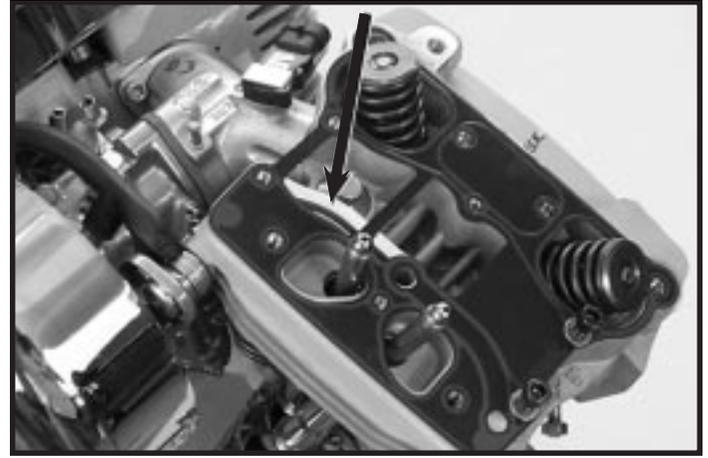
B. Evo: Lower rocker housing screws are  $\frac{1}{4}$ -20 x  $\frac{3}{4}$  (4 ea.)

**NOTE – Screw for center right bolt hole in Evo engines will be installed in Step 14-B.**

9. Install lower rocker housing on cylinder head.

A. Twin Cam:

1. Place rocker housing screws in front and rear left (drive side) holes of rocker housing and place housing on cylinder



**Picture 3B (Incorrect)**

head. Tighten screws two turns to hold rocker housing and gasket in place.

2. Install four remaining rocker housing screws. Gradually tighten six screws to 15-18 ft-lbs. using sequence illustrated in **Figure 2**.

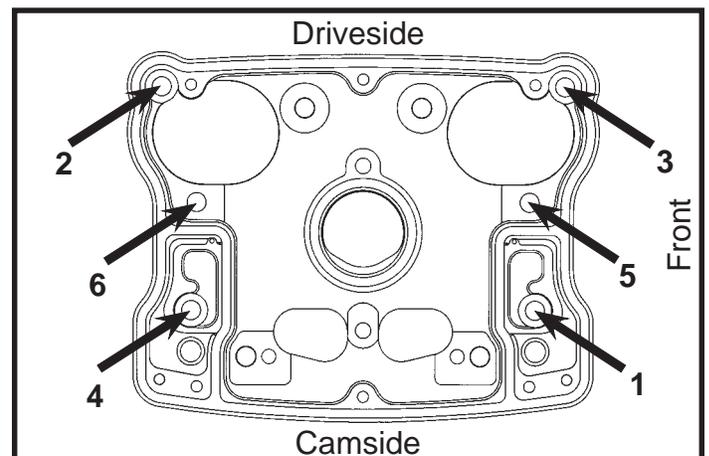
3. Measure clearance between rocker housing and valve spring. **See Picture 4**. Minimum is .025". If necessary, loosen screws and reposition housing to increase clearance, then retighten screws.

4. Place o-ring in center of rocker housing.

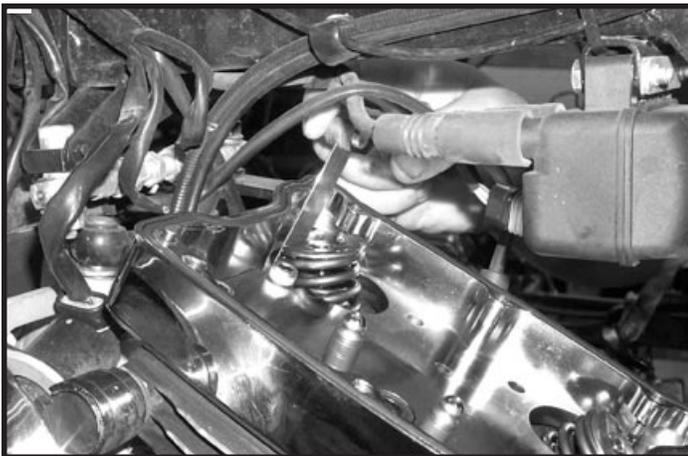
B. Evo:

1. Place two rocker housing screws in left (drive side) holes of rocker housing and place housing on cylinder head.

2. Start two  $\frac{5}{16}$ -18 x  $2\frac{1}{2}$  hex head bolts in right (cam side) rocker support holes to temporarily hold cam-side rocker housing gasket in position. Install two



**Figure 2 (Twin Cam Only)**



**Picture 4 (Twin Cam & Evo)**



**Picture 5 (Twin Cam & Evo)**

remaining rocker housing screws. Gradually tighten four  $\frac{1}{4}$ -20 x  $\frac{3}{4}$  screws to 10-13 ft-lbs. Remove hex head bolts.

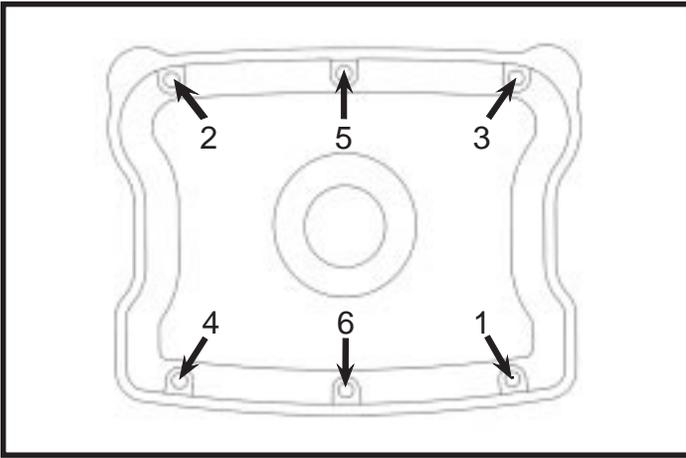
3. Measure clearance between rocker housing and valve spring. **See Picture 4.** Minimum is .025". If necessary, loosen screws and reposition housing to increase clearance, then retighten screws.
  4. Place o-ring in center of rocker housing.
10. Inspect rocker shafts for burrs and excessive wear; deburr or replace as necessary. Lubricate rocker shafts with assembly lube, place rocker arms in support, and slide shafts through supports and rocker arms. Reliefs in shafts must face away from center of engine and align with right (cam side) bolt holes. **See Picture 5.**
  11. Check rocker arm endplay by sliding rocker arm as far to one side as possible and measuring gap between rocker arm and support on opposite end. Acceptable endplay is .001" to .012". If endplay is insufficient, carefully remove material from end of rocker arm to achieve correct endplay. Leave a smooth, nonabrasive surface.
  12. Prepare rocker support bolts according to instructions on Loctite container and apply thin film of Loctite to threads. Insert two  $\frac{5}{16}$ -18 x 2  $\frac{1}{4}$ " socket head bolts and washers in holes in left (drive) side of support and two  $\frac{5}{16}$ -18 x 2  $\frac{1}{2}$ " hex head bolts in holes in right (cam) side of support.

13. Place rocker arm support assembly with rockers in rocker housing. Align pushrod ends with sockets in rockers and gradually tighten four support bolts to 15-18 ft-lbs. according to sequence shown. **See Figure 1.**
14. Install remaining rocker support bolt(s).
  - A. Twin Cam: Prepare one  $\frac{1}{4}$ -20 x 1 socket head bolt and one  $\frac{1}{4}$ -20 x 2 socket head bolt for Loctite and apply thin film of Loctite to threads. Install washers on both bolts. Insert  $\frac{1}{4}$ -20 x 1 bolt with washer in center left side of support and  $\frac{1}{4}$ -20 x 2 bolt with washer in center right side of support. Tighten both to 10-13 ft-lbs.
  - B. Evo: Prepare one  $\frac{1}{4}$ -20 x 2 socket head bolt for Loctite and apply thin film of Loctite to threads. Install washer on bolt and inert bolt with washer in center right hole of support. Tighten to 10-13 ft-lbs.

*NOTE – Hydraulic lifters may take 5-10 minutes to bleed down after rocker assembly is installed. Do not rotate engine until pushrods can be turned with light finger pressure.*

**CAUTION – Rotating engine before lifters have bled down can cause extensive engine damage.**

15. Confirm clearance between rocker arm and top rocker cover by applying layer of clay at least .060" thick to areas of cover that rocker arms will come closest to at maximum lift. Temporarily



**Figure 3 (Twin Cam & Evo)**

install covers with four screws and rotate engine through two complete revolutions. Carefully remove covers and examine clay. Layer of clay above rocker arm must remain at least .060" thick. If dented, indentation must leave at least .060" of clay between rocker arm and cover. Remove clay and thoroughly clean rocker and cover with clean, lint-free cloth.

16. Place rocker cover seal and o-ring in position on rocker housing.

17. Install one flat and one rubber-covered metal washer on each of six  $\frac{1}{4}$ -20 x  $\frac{3}{4}$  rocker cover screws.

*NOTE – Install flat washer on screw first. Rubber-covered washer goes between flat washer and rocker cover.*

18. Install rocker cover and gradually tighten screws to 10-13 ft-lbs. in sequence shown. **See Figure 3.**

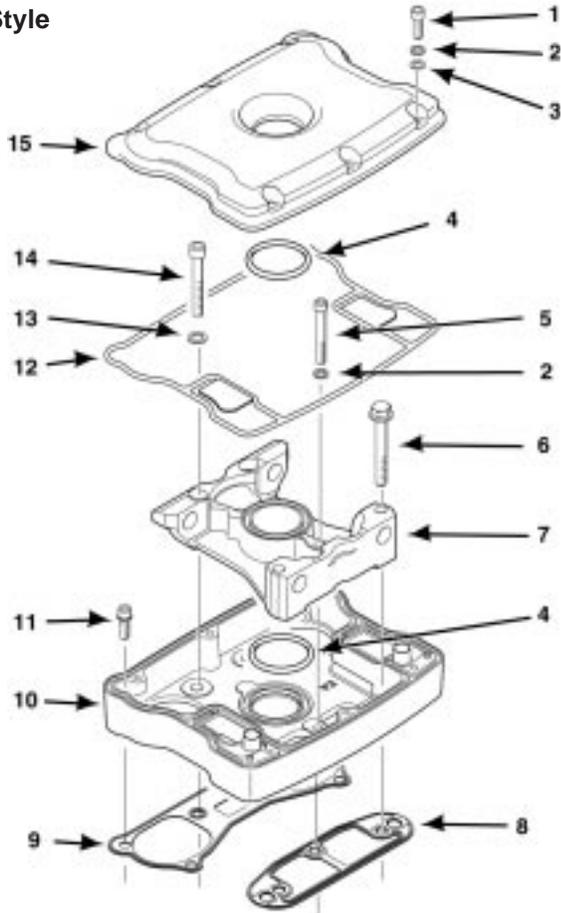
19. After confirming that pushrods turn with light finger pressure, extend pushrod tubes and replace retainer clips.

20. Remove retainers and collapse covers of rear cylinder pushrods. Rotate engine to place pushrods at lowest point on cam with rear piston at TDC on compression stroke. Repeat rocker cover removal and installation procedure for rear cylinder.

21. Replace any parts removed for rocker cover installation, start motorcycle and inspect for gas and oil leaks.

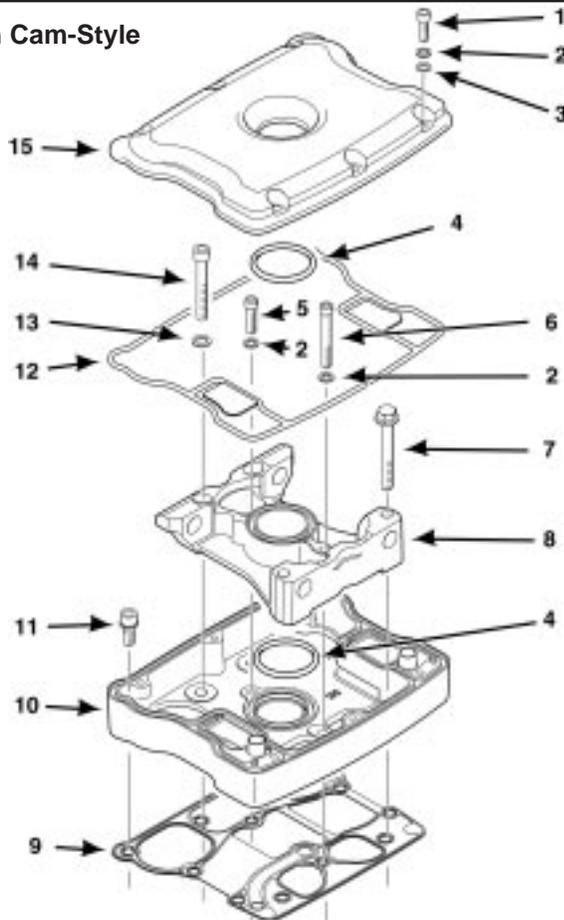
**Safe riding!**



V<sup>2</sup>-StyleDie Cast Rocker Cover V<sup>2</sup>-Style and Related Parts

1.	Screw, Socket Head 1/4-20 x 3/4 .....	50-0067
2.	Washer, Flat 1/4 (14) .....	50-7017
3.	Washer, Fiber 1/4 (12) .....	50-7015
4.	Seal, O-ring (4) .....	50-8044
5.	Screw, Socket Head 1/4-20 x 2 (4) .....	50-0013
6.	Screw, Hex Flange Head 5/16-18 x 2-1/4 (4) ...	50-0132
7.	Support, Rocker Arm .....	90-4094
8.	Gasket, Rocker Housing (Camside) (2) .....	90-4058
9.	Gasket, Rocker Housing (Driveside) (2) .....	90-4059
10.	Housing, Rocker (Chrome) (2) .....	90-4088
	Housing, Rocker - Polished) (2) <i>Not shown</i> .....	90-4086
	Housing, Rocker - Plain) (2) <i>Not shown</i> .....	90-4092
11.	Screw, Socket Head 1/4-20 x 3/4 (8) .....	50-0066
12.	Seal, Rocker Cover (2) .....	90-4079
13.	Washer, Flat 5/16 (4) .....	50-7056
14.	Screw, Socket Head 5/16-18 x 2-1/4 .....	50-0115
15.	Cover, Rocker - Chrome (2) .....	90-4089
	Cover, Rocker - Polished (2) .....	90-4087
	Cover, Rocker - Plain (2) .....	90-4093
*	Kit, Rocker Cover - Chrome <i>Not shown</i> .....	90-4095
*	Kit, Rocker Cover - Polished <i>Not shown</i> .....	90-4090
*	Kit, Rocker Cover - Plain <i>Not shown</i> .....	90-4083
*	Gasket Set <i>Not shown</i> .....	90-4091

## Twin Cam-Style



## Die Cast Rocker Cover Twin Cam-Style &amp; Related Parts

1.	Screw, Socket Head 1/4-20 x 3/4 .....	50-0067
2.	Washer, Flat 1/4 (16) .....	50-7017
3.	Washer, Fiber 1/4 (12) .....	50-7015
4.	Seal, O-ring (4) .....	50-8044
5.	Screw, Socket Head 1/4-20 x 1 (2) .....	50-0084
6.	Screw, Socket Head 1/4-20 x 2 (2) .....	50-0013
7.	Screw, Hex Flange Head 5/16-18 x 2-1/4 (4) ...	50-0132
8.	Support, Rocker Arm .....	90-4109
9.	Gasket, Rocker Housing .....	90-4071
10.	Housing, Rocker (Chrome) (2) .....	90-4107
	Housing, Rocker - Polished) (2) .....	90-4106
	Housing, Rocker - Plain) (2) .....	90-4108
11.	Screw, Socket Head 1/4-20 x 3/4 (8) .....	50-0099
12.	Seal, Rocker Cover (2) .....	90-4079
13.	Washer, Flat 5/16 (4) .....	50-7056
14.	Screw, Socket Head 5/16-18 x 2-1/4 .....	50-0115
15.	Cover, Rocker - Chrome (2) .....	90-4089
	Cover, Rocker - Polished (2) .....	90-4087
	Cover, Rocker - Plain (2) .....	90-4093
*	Kit, Rocker Cover - Chrome <i>Not shown</i> .....	90-4110
*	Kit, Rocker Cover - Polished <i>Not shown</i> .....	90-4106
*	Kit, Rocker Cover - Plain <i>Not shown</i> .....	90-4108
*	Gasket Set <i>Not shown</i> .....	90-4111

