



# INSTRUCTIONS

-J03817

REV. 07-13-2005

Kit Number 29791-05

## SCREAMIN' EAGLE® TWIN-CAM 203 CAMSHAFT KIT, STAGE II, STREET LEGAL

### General

This kit is designed for installation on 2005 Model Year 1550cc Anniversary Edition FLSTFI motorcycles.

#### NOTE

A Service Manual for your motorcycle is available from your Harley-Davidson Dealer.

### Additional Parts Required

Installation of the camshafts included in this kit requires the separate purchase of the following kits from your Harley-Davidson Dealer:

Description	Part Number
Spacer Kit	25938-00)
Cam Service Kit	17045-99B
Drive Gear Retention Kit	25533-99A

1999 Models will require the purchase of Splined Cam Drive Sprocket, 25716-99.

#### WARNING

The rider's safety depends upon the correct installation of this kit. Use the appropriate service manual procedures. If the procedure is not within your capabilities or you do not have the correct tools, have a Harley-Davidson dealer perform the installation. Improper installation of this kit could result in death or serious injury. (00333a)

### Kit Contents

Qty	Description	Part Number
1	S.E. 203 camshaft, front	not sold
1	S.E. 203 camshaft, rear	not sold

#### WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative battery cable before proceeding. (00048a)

#### WARNING

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect battery cables (negative cable first) before proceeding. (00307a)

#### WARNING

When servicing the fuel system, do not smoke or allow open flame or sparks in the vicinity. Gasoline is extremely flammable and highly explosive, which could result in death or serious injury. (00330a)

### Installation Procedure

Installation of this kit requires removal and re-installation of the cam support plate. Refer to Section 3, ENGINE, BOTTOM END, Cam Support Plate, Removal and Disassembly/Assembly (Camshaft, Camshaft Bearings) of the applicable Service Manual for instructions. Replace information pertaining to cam compartment components with the following information:

#### NOTE

Both crank and primary cam sprocket flange bolts are specially hardened while the flat washers are of a special diameter and have ground surfaces. Therefore, use only the parts provided in the Drive Gear Retention Kit (Part Number 25533-99A) when performing this upgrade. The crank and primary cam sprocket flange bolts are NOT interchangeable.

1. Remove crank and primary cam sprocket flange bolts and washers according to applicable Service Manual. Discard cam drive sprocket flange bolts and washers.
2. Remove existing cam drive sprocket according to instructions in applicable Service Manual.
3. Remove cam bearings according to ENGINE, BOTTOM END, Cam Support Plate, Disassembly/Assembly (Camshaft, Camshaft Bearings) instructions in applicable Service Manual. Discard cam bearings.

### Install New Cam Bearings

1. See Figure 1. Obtain new Rear Cam Roller Bearing Kit (Part Number 8983) from Cam Service Kit (Part Number 17045-99B) and install according to the following:
2. Install O-ring (1), thrust washer (2), and bearing inner race (3) onto rear camshaft as follows:

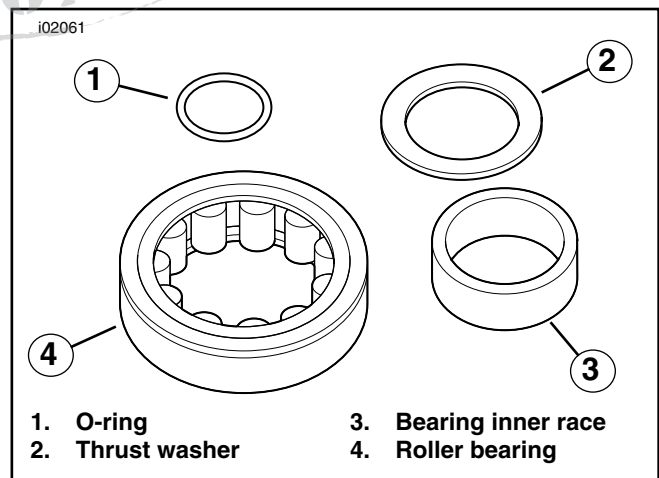


Figure 1. Rear Cam Roller Bearing Kit (Part Number 8983)

- a. To properly locate thrust washer (2), first install O-ring (1) in grinding relief groove. Groove is on the splined end between the machined area and the secondary cam sprocket. Exercise caution to avoid stretching or breaking the O-ring. Since the O-ring is not sold separately, damage will require purchase of new roller bearing kit.

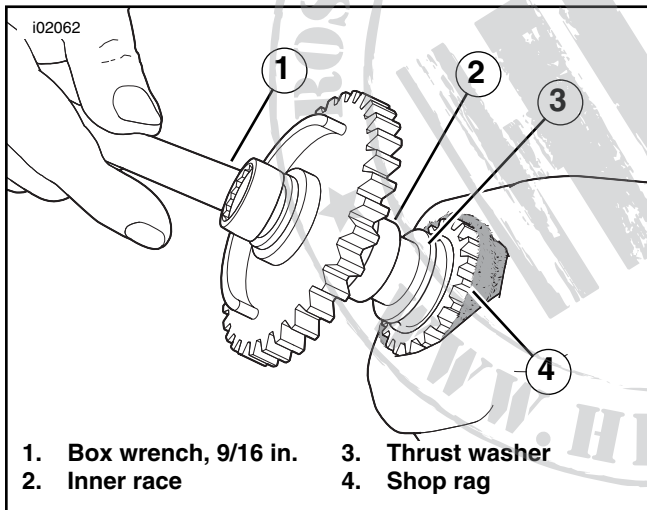
**CAUTION**

The thrust washer will be offset to one side if the O-ring is not installed in the grinding relief groove. Damage to the bearing cage can occur if the thrust washer is not properly centered.

- b. Slide thrust washer (2) down rear camshaft until centered over O-ring (1) in grinding relief position.
- c. Slide bearing inner race (3) down rear camshaft until contact is made with shoulder of machined area.
- d. Install primary cam sprocket spacer and sprocket on camshaft and secure using thicker flat washer and long flange bolt.

**NOTE**

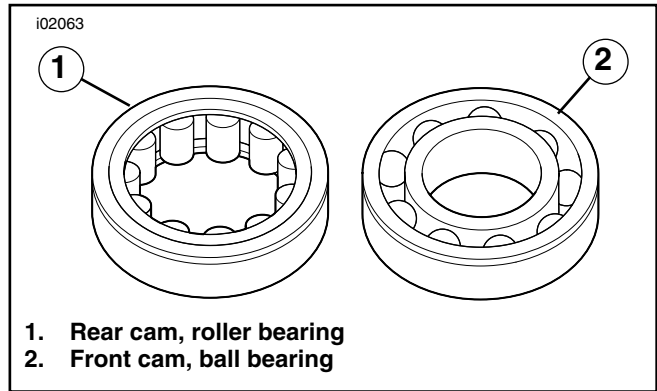
If not enough of the splined shaft is exposed to install the sprocket, leave out the spacer and proceed to Step 2(e). Once the bearing inner race (3) has been started onto the machined area, remove the flange bolt, washer and sprocket, then re-assemble using the spacer. Repeat Step 2(e) to fully install bearing inner race.



**Figure 2. Install Bearing Inner Race (with O-Ring and Thrust Washer)**

- e. See Figure 2. Wrap a shop rag (4) around camshaft to get a firm grip and also to protect hand from sharp edges of sprocket. Using a 9/16 in. box wrench (1), turn flange bolt in a clockwise direction. Bearing inner race (2) is fully installed when it makes firm contact with the thrust washer (3).
- f. Verify that thrust washer (3) is locked in place and cannot be rotated. If necessary, install shaft in vise using brass jaw inserts, and further tighten flange bolt until the desired result is achieved.
- g. Remove flange bolt, flat washer, sprocket and spacer.

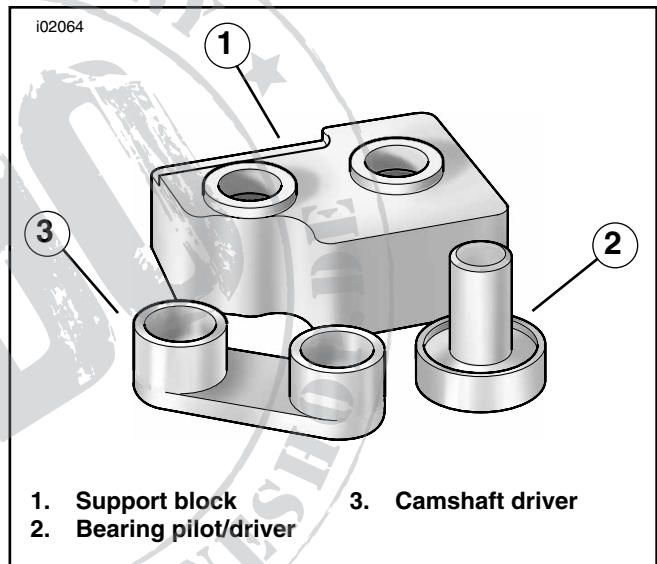
3. Install new cam bearings into cam support plate according to the following:



**Figure 3. Cam Bearings**

**NOTE**

See Figure 3. Be aware that the front and rear cam bearings are no longer interchangeable. The rear bearing (1) is now the roller type, while the front bearing (2) remains the ball type.



**Figure 4. Camshaft/Camshaft Bearing Remover/Installer (Part Number HD-43644)**

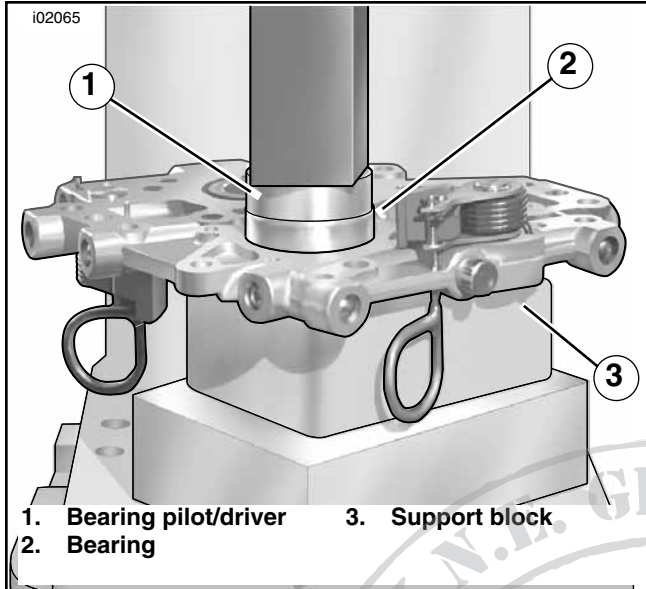
- a. See Figure 4. Obtain the CAMSHAFT/CAMSHAFT BEARING REMOVER/INSTALLER (HD-43644).

**NOTE**

Bearings may be a press to loose fit. If deemed necessary, clean bearing OD and apply Loctite® Low Strength Threadlocker 242 (blue) before installation, but exercise caution to avoid getting compound on rollers or bearing ID.

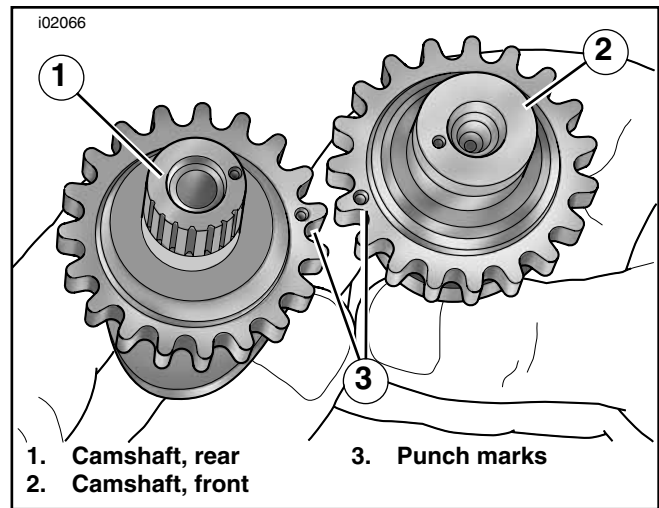
- b. With the secondary cam chain side facing upward, place cam support plate on support block (1), so that outer races of bearings are properly supported. Note that one corner of the support block (1) is contoured to accommodate the chain guide blocks cast into the front of the support plate.

- c. Center new bearing over bearing bore with the lettered side up. Slide pilot shaft of bearing driver (2) through bearing into hole of support block (1).



**Figure 5. Press Bearings into Cam Support Plate**

- d. See Figure 5. Center bearing driver (1) under ram of arbor press. Press on driver until bearing (2) makes firm contact with counterbore in cam support plate. Repeat steps to install second bearing.
4. Apply a small amount of Loctite Medium Strength Threadlocker 243 (blue) to threads of four bearing retainer plate screws. Using a T20 TORX drive head, secure bearing retainer plate to cam support plate. Tighten screws to 20-30 **in-lbs** (2.3-3.4 Nm) in a cross-wise pattern.
5. Place cam support plate back on support block (3), if removed. The block properly supports inner races of bearings as camshafts are installed.



**Figure 6. Align Punch Marks on Teeth of Camshaft Sprockets**

6. See Figure 6. Align punch marks (3) on teeth of secondary cam sprockets (outboard faces). Using a colored marker, carefully mark the punch mark (3) locations on the inboard side of the sprocket teeth. These marks are needed to observe proper orientation of the camshafts when they are pressed into the bearings.
7. Place the secondary cam chain around the sprockets of both the front (2) and rear (1) camshafts. To maintain the original direction of rotation, be sure that the colored mark placed on the chain link during disassembly is facing opposite the cam support plate during installation.
8. Orient the camshafts so that they are positioned on opposite ends of the chain, and then verify that the colored marks placed on the inboard side of the sprocket teeth are still in alignment.
9. Maintaining the position of the camshafts on the chain with the colored marks in alignment, place the sprocket ends of the camshafts into the bearings.

**NOTE**

*Be sure not to mix camshafts during the press procedure. The rear camshaft, which can be identified by the splined shaft, must go into the roller bearing at the rear of the cam support plate.*

10. Place cup of camshaft driver over end of front camshaft only.

**CAUTION**

**Be sure that tensioner shoe is clear of the secondary cam chain during the press procedure. Contact can result in damage that requires replacement of the tensioner assembly.**

11. Center end of front camshaft under ram and slowly apply pressure to driver just to start front camshaft into bearing ID.

### CAUTION

If rear camshaft is not properly aligned, edge of installed inner race can catch on bearing rollers. Bearing damage can result if contact occurs during the press procedure.

12. Slowly apply pressure to driver on front camshaft, while wiggling rear camshaft as necessary to guide inner race between bearing rollers.
13. When inner race on rear cam is started into roller bearing, apply pressure to driver until front camshaft is fully seated. If necessary, keep finger pressure at top of rear camshaft to ensure that assembly remains square and inner race moves to installed position in roller bearing.
14. After installing new cams, check for proper cam-to-cam timing using straightedge along punch marks as described in Service Manual.
15. Install new retaining ring in groove at end of front camshaft.

### NOTES

Replace original oil pump to cam plate O-ring with new O-ring (Part Number 11286) from Service Kit (Part Number 17045-99B).

Replace original cam plate to crankcase O-ring with new O-ring (Part Number 11301) from Service Kit (Part Number 17045-99B).

16. Install cam plate according to ENGINE, BOTTOM END, Cam Support Plate, Disassembly/Assembly instructions in applicable Service Manual.
17. Apply a thin film of clean H-D 20W50 engine oil to the splines of the rear cam.
18. Install splined sprocket onto rear camshaft according to ENGINE, BOTTOM END, Cam Support Plate, Disassembly/Assembly (Camshaft, Camshaft Bearings) instructions in applicable Service Manual. Use new spacers provided in kit (Part Number 25938-00) in place of those listed in Service Manual.

### NOTES

Verify alignment at crank and primary cam sprocket punch marks as described in Service Manual.

Verify alignment at crank and primary cam sprocket faces. Use spacers provided in kit (Part Number 25938-00) to maintain alignment at  $\pm 0.10$  in.

19. Use new cam drive sprocket flange bolt (Part Number 996), new washer (Part Number 6294), new crank flange bolt (Part Number 898A), and new flat washer (Part Number 6278A) provided in kit (Part Number 25533-99A).
20. Install new flange bolts and washers as follows:
  - a. Ensure threads are clean and free from oil; then apply Loctite Primer 7649 (Part Number 98968-99).
  - b. Apply Loctite High Strength Threadlocker 262 (red) (Part Number 94759-99) to threads of flange bolts.

### WARNING

Failure to use Loctite 262 (red) may result in a joint that will not maintain proper clamp load and may loosen under certain circumstances, causing engine failure, which could result in death or serious injury.

- c. Apply a thin film of clean H-D 20W50 engine oil to both sides of flat washers.
- d. Start flange bolt with flat washer to secure crank sprocket to end of crankshaft.
- e. Start flange bolt with flat washer to secure primary cam sprocket to end of camshaft.

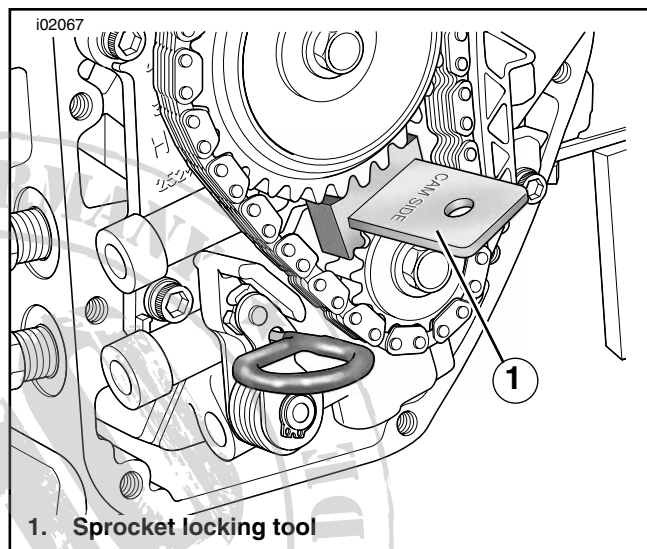


Figure 7. Crankshaft/Camshaft Sprocket Locking Tool (Part Number HD-42314)

- f. See Figure 7. Position CRANKSHAFT/CAMSHAFT SPROCKET LOCKING TOOL (HD-42314) between the crank and primary cam sprockets to prevent rotation. The handle of the tool is stamped "Crank" and "Cam" to ensure proper orientation.
- g. Tighten crank and primary cam sprocket flange bolts to 15 ft-lbs (20.3 Nm).
- h. Loosen each flange bolt one full turn.
- i. Tighten the crank flange bolt to 24 ft-lbs (32.5 Nm) final torque value.
- j. Tighten the primary cam sprocket flange bolt to 34 ft-lbs (46.0 Nm) final torque value.
- k. Remove the sprocket locking tool (1) and follow instructions in Service Manual for unloading the primary cam chain tensioner.
21. Install the cam cover according to ENGINE, BOTTOM END, Cam Support Plate, Disassembly/Assembly instructions in the applicable Service Manual.

### NOTE

Replace original cam cover gasket with new cam cover gasket (Part Number 25244-99A) from Cam Service Kit (Part Number 17045-99B).

22. Apply E.O. Label to frame tube.