



INSTRUCTIONS

COMP Cams® GM Single Bolt LS Camshaft Installation (146, 646 Series)

Thank you for choosing COMP Cams® products; we are proud to be your manufacturer of choice. Please read this instruction sheet carefully before beginning installation, and also take a moment to review the included limited warranty information. Feel free to contact us at 1.800.999.0853 or at www.compcams.com/tech-help/ with any questions.



Comp Cams® GM LS Camshaft Parts List

- 1) Camshaft

Required Extra Parts

- 1) Comp Cams® matched valve springs required
- 2) Camshaft bolt (Part number dependent on your specific application)
- 3) Crankshaft bolt (Part number dependent on your specific application)

Specialty Tools Required

- 1) 24mm socket
- 2) Torque angle gauge

Optional Tools

- 1) Comp Cams® LS Valve Spring Compressor #5462 (Pictured, not included)
- 2) Comp Cams® LS Crankshaft Turning Socket #4914



Before you start

Order a camshaft bolt and crankshaft pulley bolt for your respective engine from your local dealership.

Camshaft Removal Preparation

- 1) Prepare a clean work area and assemble the tools needed for the camshaft installation. It is suggested to use an automotive manual to help determine which items must be removed from the engine in order to expose, remove, and reinstall the timing chain and camshaft. A good, complete automotive manual will save time and frustration during the installation.
- 2) Disconnect the negative post of your battery.
- 3) Remove any coil covers from the engine.
- 4) Disconnect any PCV connection and emission equipment, make sure to label, or take pictures, of their respective positioning to help during reinstallation.
- 5) Remove coil packs from the engine.
- 6) Remove the valve covers from both sides of the engine.
- 7) Remove rocker arms, stands, and pushrods from both sides of the engine.
- 8) Remove all eight spark plugs, this will ease rotation of the engine later.
- 9) Remove water pump, front drive accessories, and timing chain cover.

Comp Cams® LS Valve Spring Compressor (LS1/LS2/LS3/LS6/LS7/L99/L92)

The easy-to-use, custom design of the new COMP Cams® Valve Spring Compressor for LS Engines enables the effortless removal of either one or two valve springs at a time, without the hassle of first having to remove the rocker stand or any of the other installed rockers. The tool works on all GM Gen III/IV LS-type engines, both with cylinder heads installed or with the cylinder heads off.

The simple design facilitates easy usage in vehicles where other tools are incapable of reaching the tight spaces. This innovative Valve Spring Compressor is a must have for all LS engine builders and enthusiasts.



Camshaft Removal

- 10) Rotate the engine so the crankshaft gear is timing marker is pointing to the twelve o'clock position and the camshaft gear timing marker is pointing to six o'clock. This is also known as dot to dot. (COMP Cams® LS crank turning socket #4914 makes this step easy)
- 11) Remove the camshaft bolt and the camshaft timing gear.
- 12) Rotate the camshaft 360° a few times so the lifters are captured in their lifter trays. Make sure all the lifters are captured before you remove the camshaft.
- 13) Remove the camshaft retaining plate.
- 14) Remove the camshaft.

Camshaft Installation

- 15) Lube your new camshaft with COMP Cams® #103 Cam & Lifter Installation Lube.
- 16) Carefully install your new COMP Cams® camshaft.
- 17) Reinstall the camshaft retaining plate, ensuring the O-ring is facing the back. Torque the bolts to 18 lb*ft.
- 18) Without using the timing chain, align the camshaft pin to the camshaft timing gear. Rotate the camshaft and camshaft timing gear until the timing marker is pointing to six o'clock. Since we have not rotated the crankshaft you should now be lined up dot to dot once again.
- 19) Slide the timing chain on to the camshaft timing chain gear. Reinstall the gear and chain to the camshaft.
- 20) **Critical Check:** Make sure that your cam and crankshaft gears are aligned “dot-to-dot”.
- 21) Install new camshaft bolt, it must be tightened in two steps;
 - Step 1:** Torque to 66 lb*ft
 - Step 2:** Tighten an additional 40 degrees, using a torque angle gauge.
- 22) Install proper matching COMP Cams® valve springs, if it has not been done already.
- 23) Reinstall spark plugs.
- 24) Reinstall pushrods and rocker arms following the OEM procedure. Final torque is 22-24lb*ft on the rocker arms.
- 25) Reinstall valve covers, coil packs, etc.
- 26) Start reassembling the engine starting with the timing chain cover and crankshaft pulley. Seat your crankshaft pulley using your old bolt and torque to 250lb*ft and remove bolt once again.

27) Install new crankshaft pulley bolt, it must be tightened in two steps;

Step 1: Torque to 37 lb*ft

Step 2: Tighten an additional 140 degrees, using a torque angle gauge.

28) Reinstall the front accessory drive system including the water pump, belts, etc.

29) Reinstall PCV, emissions equipment, battery cables, or anything else removed during teardown for the cam swap.

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Limited Warranty

Competition Cams, Inc. warrants that all of its products are free from defects in material and workmanship, and against excessive wear for a period of (1) one year from the date of purchase. This **limited warranty** shall cover the original purchaser.

Competition Cams, Inc.'s obligation under this warranty is limited to the repair or replacement of its product. To make a warranty claim, the part must be returned within (1) one year of purchase to the address listed below, freight prepaid. Items covered under warranty will be returned to you freight collect.

It is the responsibility of the installer to ensure that all of the components are correct before installation. We assume no liability for any errors made in tolerances, component selection, or installation.

There is absolutely no warranty on the following:

- A) Any parts used in racing applications;**
- B) Any product that has been physically altered, improperly installed or maintained;**
- C) Any product used in improper applications, abused, or not used in conjunction with the proper parts.**

There are no implied warranties of merchantability or fitness for a particular purpose. There are no warranties, which extend beyond the description of the face hereof. Competition Cams, Inc. will not be responsible for incidental and consequential damages, property damage or personal injury damages to the extent permitted by law. Where required by law, implied warranties or merchantability and fitness are limited for a term of (1) one year from the date of original purchase.

This warranty gives you specific legal rights and you may also have other legal rights, which vary from state to state.