

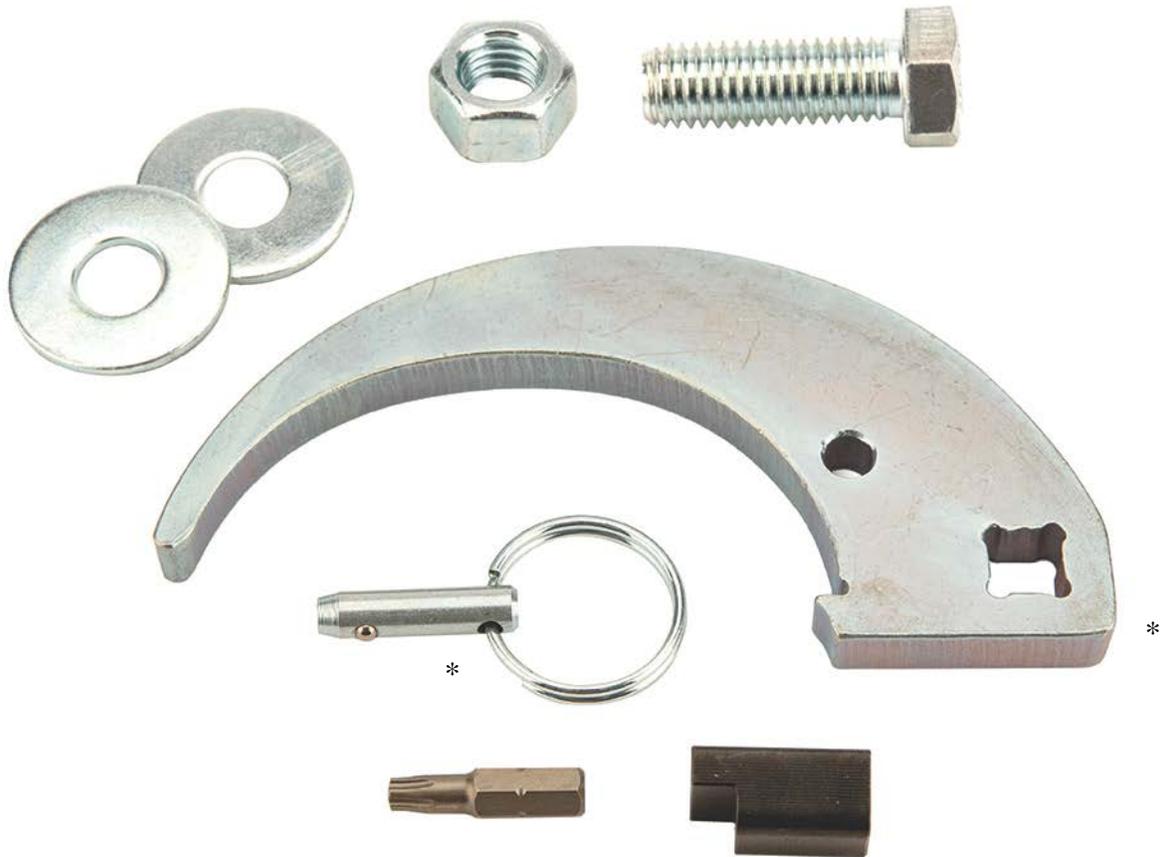


# INSTRUCTIONS

## COMP Cams® GM LT4 Cam Phaser Limiter (Kit Part #5450, Tool Only Part #5451) Patent #8,291,876 B2

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.

Description	Qty.	Description	Qty.
Cam Phaser Limiter Plug	1	Safety Bolt	1
Cam Phaser Spring Compression Tool*	1	Safety Nut	1
Cam Phaser Spring Lock Pin*	1	Washer	2
Torx Plus Bit	1	<i>* Part #5451 contains ONLY these items</i>	



*\* Part #5451 contains ONLY these items*

## **Read This Pre-installation Guide Before Installing Kit!!!!!!**

### **GM cam phaser: How it works, its limitations, and how COMP® uses them to make more power**

#### **What is a cam phaser?**

GM's cam phaser is a specially designed, computer controlled cam gear that has the ability to adjust camshaft position while the engine is running.

#### **How does it work?**

Engine oil is pressure fed through a series of passageways in the camshaft, out to the cam phaser. The engine computer controls a solenoid that adjusts the oil flow into, and out of, a series of chambers inside the cam gear. Located inside these chambers are vanes, attached to a free-floating central hub. The hub is directly attached to the camshaft, and as oil is allowed into and out of these chambers, the position of the cam can be retarded up to 60 crankshaft degrees.

#### **Why did GM put it in the engine?**

GM's primary reason for using a cam phaser was to increase the engine's efficiency by reducing its pumping losses. Basically, when the cam is retarded 20-40 degrees, during part throttle engine operation, it takes less power to turn the engine over. This helps to increase the engine's fuel efficiency, but an additional power benefit is also realized by being able to position the camshaft for maximum power, regardless of what RPM the engine is running at. This results in an engine that makes more torque and horsepower and extends the high RPM power-band.

#### **Why should I modify the cam phaser with COMP's limiter kit?**

If there is a downside to the cam phaser as designed by GM, it's that it has such a wide range of movement. Since the cam can theoretically be retarded up to 52 degrees, there is very little piston to valve clearance in the engine. This minimal piston to valve clearance limits us to fairly small cam profiles with very little overlap; not the best for making maximum power or achieving an aggressive idle sound.

#### **What does COMP's cam phaser limiter kit do?**

COMP's Cam Phaser Limiter is a precision machined block that is inserted into one of the control chambers in the cam phaser. This limiter block takes up excess volume that would normally be used by the factory cam gear for movement. By installing COMP's cam phaser limiter, the cam design window opens up, allowing you to install a big, powerful camshaft with safe piston to valve clearances. At the same time, by keeping up to 16 degrees of movement available, all of the wide-open throttle benefits of the cam phasing can still be retained.

#### **Why can't I just reprogram the ECU to limit cam phaser movement?**

Since GM's factory engine computer is fully programmable, the question arises as to why you can't simply program in the limits and not bother with mechanically limiting the cam phaser. Theoretically you could do that, but a problem arises if something happens that would cause the engine's RPM to shift faster than the cam phaser controls can react to. For example, if you ever missed a shift, broke a driveline part, did a clutch dump on a sticky set of slicks, or anything that could for a split second cause the cam phaser to get out of its programmed limits, the valves could crash into the pistons. By mechanically limiting the maximum movement of the cam phaser, total engine safety is assured when running a big performance cam in these engines.

#### **Do I have to reprogram my engine's computer after installing COMP's Cam Phaser Limiter Kit?**

While custom tuning is not a requirement for proper engine operation, major gains in performance can often times be had when the kit is used with a stock cam. When using an aftermarket camshaft, custom tuning is required.

#### **What camshaft profiles has COMP® developed to work with the Cam Phaser Limiter Kit?**

The Cam Phaser Limiter Kit unlocks the door to safely use much more powerful camshaft grinds. COMP Cams® spent a tremendous amount of engine dyno time testing and developing special designs for maximum power, torque and reliability. Along with these premier camshafts, a complete line of valve springs, pushrods, rocker arms and retainers are available that round out the matched performance package.

## INSTALLATION INSTRUCTIONS

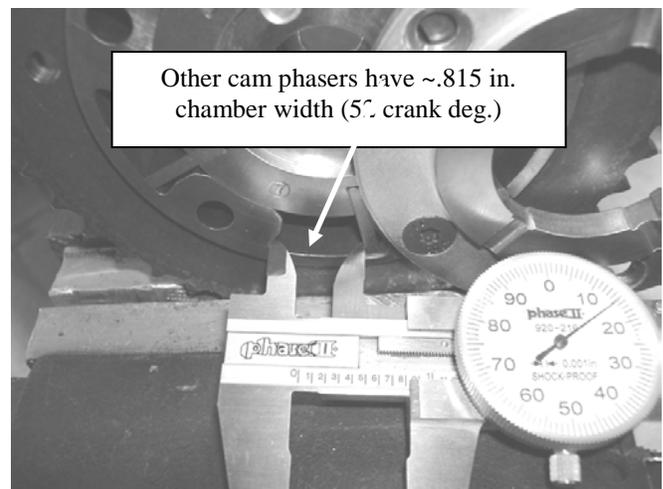
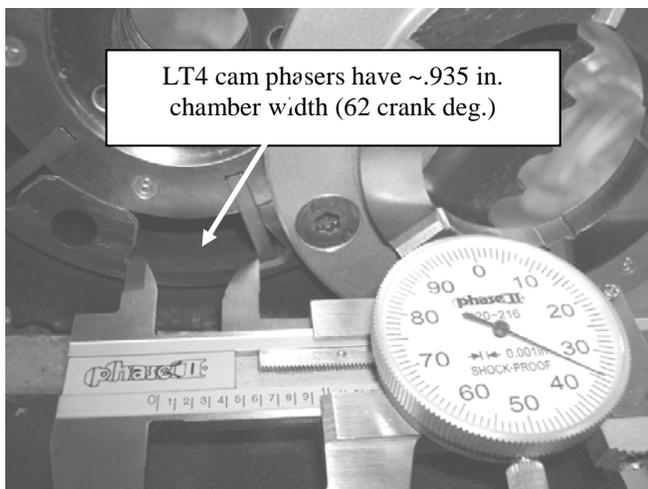
**Note:** These instructions give a very basic overview of what is required to install the COMP Cams® GM Cam Phaser Limiter Kit. They in NO WAY replace the VERY specific factory instructions for removing and replacing the camshaft. Failure to follow the specific factory recommended instructions for removal and replacement of the camshaft during the installation of the cam phaser limiter can lead to an incorrectly timed camshaft and resulting engine damage.

## WARNING!!!!

Extreme care must be taken when handling the cam phaser. In particular, the thin metal sensor trigger wheel that is attached to the front of the cam phaser is only held on by a light friction fit once the cam bolt is removed. Do NOT handle the cam phaser by this trigger wheel, as it pulls off its installation pins very easily if care is not taken. A safety bolt is provided in the kit that will hold this trigger wheel in place while handling. Remember to install this safety bolt while handling the cam phaser. If the trigger wheel comes off the cam phaser, the coil spring on the front of the gear will unwind and the cam phaser will be ruined, requiring you to purchase another.

## VERIFY CAM PHASER!!!!

GM designed 62 crank degrees of total cam phaser movement for the LT4 engine platform. For some GM engines the phaser motion was mechanically reduced to 52 degrees. Due to the fact that the factory often times makes running changes in their production line, regardless of what year engine you may have, it is always a good idea to verify which cam phaser you have installed in the engine. See the pictures below and compare the measurements from your cam phaser to them:

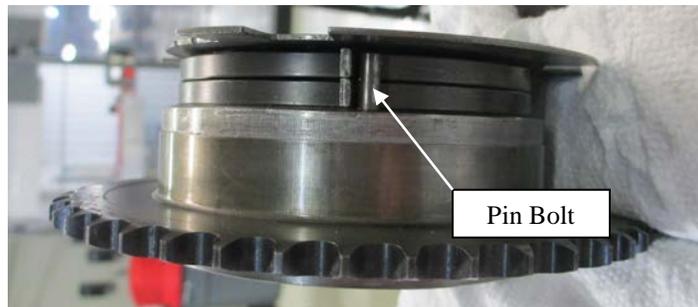


**Step 1:** The first step once the cam phaser has been removed from the engine is to temporarily install the safety bolt, washers, and nut. This safety bolt assembly is provided to ensure the trigger wheel cannot come off during normal handling. Remove the safety bolt just prior to installing the cam phaser back onto the camshaft.

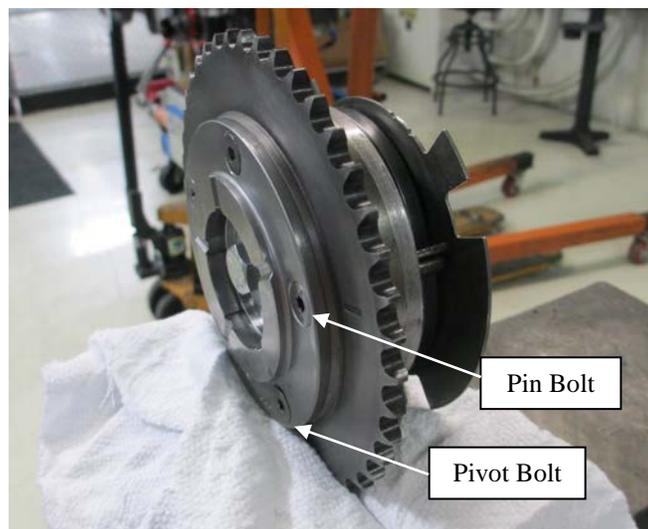
**Step 2:** Special tools are required to properly disassemble the cam phaser. We designed and provided these tools as part of the kit. The Cam Phaser Spring Compression Tool is designed to snap onto a standard 3/8" ratchet.



**Step 3:** Looking at the side of the cam phaser, locate the pin-bolt that the cam phaser spring is latched onto.



**Step 4:** Using a soft cloth to protect the cam gear, lock just the gear portion of the cam phaser in a vise. Do not over tighten the vise, use just enough force to secure the gear. Position the cam phaser in the vise with the pin-bolt at the 2-3 o'clock position, looking at it from the cam side. Take note that the first bolt located clockwise from this pin-bolt will not be removed. We will be using that bolt to pivot the cam phaser cover out of the way.



**Step 5:** Take the spring compression tool and hook it on the spring's L-bend where it contacts the pin-bolt; making sure the compression tool is centered on the phaser spring. Compress the spring by rotating the tool until the locking pin hole visible, then insert the spring lock pin.



**Step 6:** Using the included TORX Plus bit, locate the pivot bolt and loosen it 1/2 turn. It is the first bolt located clockwise from the pin-bolt. Remember, DO NOT remove this bolt, just loosen it 1/2 turn. Remove the other four bolts and temporarily remove the safety bolt. Rotate the cover away to expose the phaser control chambers.



**Step 7:** Insert the cam phaser limiter block into one of the cam phaser control chambers; the slotted end goes in first.



**Step 8:** Rotate the cover plate back over the control chambers and reinstall the safety bolt. Reinstall the cam phaser bolts, making sure to install the pin-bolt back into the correct position. Remember to torque the bolts to 85 in. lbs.



**Step 9:** Remove the cam phaser spring compression tool and the safety bolt assembly. The modified cam phaser is now ready for installation.

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 [cpgnation.com](http://cpgnation.com)



## 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.

## CALIFORNIA PROPOSITION 65 WARNING

This product may contain one or more substances or chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm.