

# VOODOO BY LUNATI CAM INSTALL

*We pulled an extra 13 hp and 10 ft-lbs. out of a Fat Boy!*

**Thunder  
Alley**  
HIGH  
PERFORMANCE  
HARLEYS

Our opening shot shows our 2009 Fat Boy up on Dan's lift with the entire gearcase emptied, as well as the entire valvetrain and both rocker boxes removed from the engine since we're reusing the stock nonadjustable pushrods.

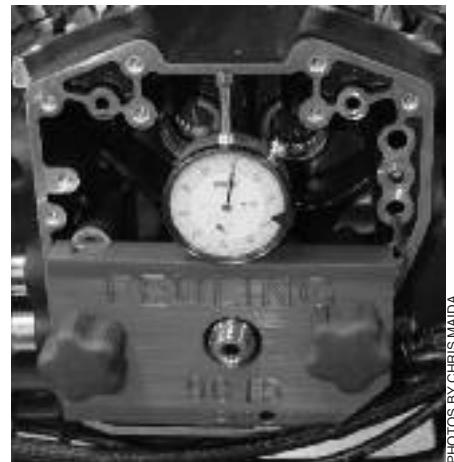
**A**UTOMOTIVE DRAG RACING FANS MIGHT already have their eyebrows raised, questioning the headline of this article. Go ahead, flip back to the cover to make sure you are, indeed, reading a Harley mag.

For those not familiar with Lunati's storied past in NHRA drag racing, here's a recap: Joe Lunati ran in the A/Modified Sports class in the mid-1960s; he was always intrigued by how slight changes in camshaft lobes could make a difference. In 1968, he opened his own cam grinding shop, quickly becoming a favorite of weekend drag racers and circle track racers. In fact, Lunati Cams became so successful that the company was bought out by Holley Carburetors in 1990. Now privately owned once more, Lunati has turned a portion of its business to cover the ever-expanding Harley market with its Voodoo cam series.

With such a great history of making power in American engines, we just had to put them to the test in a Harley. The 2009 Fat Boy we used for this project already had a performance air cleaner and exhaust system, so a set of street

## TOOLS NEEDED

- Assembly lube
- Brake cleaner
- Blue Loctite
- Red Loctite
- Snap ring pliers (external)
- Steel straightedge
- Flat feeler gauge
- Flat-bladed screwdriver
- T-27 Torx
- 3/16" Allen
- 3/8" socket
- 7/16" socket
- 1/2" socket
- 9/16" socket
- SE locking tool
- Dial indicator
- JIMS alignment dowels (2)
- Inner cam bearing tools
- Torque wrench (in-lbs.)
- Torque wrench (ft-lbs.) ■



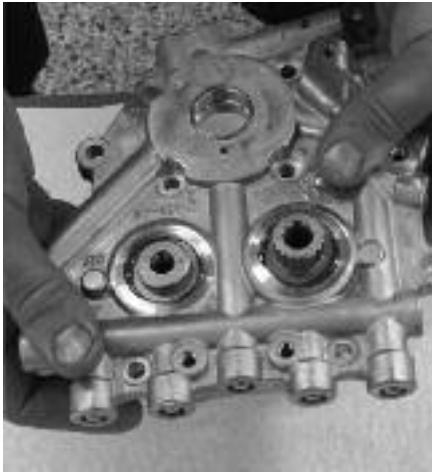
PHOTOS BY CHRIS MAIDA

**2** Dan's first step is to check the pinion shaft runout using a dial indicator. We got 0.002", which is within the acceptable range for the oil pump and chain drive setup.

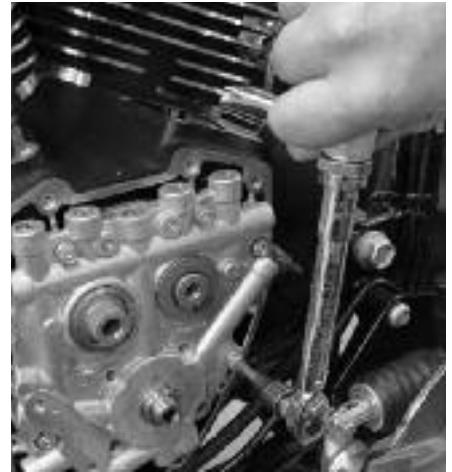
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**3** Dan then pulls both old inner cam bearings and replaces them with Torrington bearings using a couple of special tools. He then pulls and cleans the oil screen for the lifters, which is only on Softail models.



**6** With some assembly lube on the bearing surfaces on the end of the cams, Dan slips the stock H-D support plate onto both cams.



**9** Dan reinstalls the cam support plate in the right case and secures it using the 10 stock bolts, blue Loctite, and a 3/16" Allen. He torques the bolts to 90-120 in-lbs. as per the H-D procedure.



**4** Once he has slipped new Cometic O-rings onto the oil pump and right case, Dan assembles the stock oil pump in the gearcase compartment using lots of assembly lube on all the gerotor gears.



**7** After Dan slips the stock 0.100"-thick spacer over the end of the front cam, he secures it using a new H-D retaining ring and external snap ring pliers. He then rotates the retaining ring to ensure it's fully in its groove.



**10** Dan aligns the oil pump by spinning the engine and using two JIMS alignment dowels. Once he has finished the procedure outlined in Tips & Tricks, he torques all four stock bolts to 90-120 in-lbs.



**5** Dan then wraps the stock inner cam chain around the new Lunati cams noting their timing marks and the mark he made on one side of the chain before he removed it.



**8** Dan installs the stock inner chain tensioner using the stock bolts, blue Loctite, and a 3/16" Allen. After he torques the bolts to 90-120 in-lbs., he puts lube on the cam lobes, chain, and inner cam bearing surfaces.



**11** With the stock 0.120" spacer on the rear cam, Dan installs both stock sprockets. He then checks the sprocket alignment using a steel straightedge and a flat feeler gauge. The gap between them must be and is under 0.010". He then removes both sprockets.

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**12** With the pinion sprocket dot aligned with the line on the support plate, Dan wraps the stock outer chain around both sprockets (noting their alignment dots). He then slips both sprockets onto their respective shafts.



**14** Dan installs the stock outer hydraulic chain tensioner using the stock bolts, blue Loctite, and a T-27 Torx. He then torques the bolts to 90-120 in-lbs.



**16** After Dan pumps up each of the four new Lunati lifters with fresh engine oil, he drops them into their bores in the right case with one of their flat sides against where the alignment pin will rest.



**13** Dan installs the stock sprocket bolts and washers onto the engine using a SE locking tool, red Loctite, a 1/2" socket, and a 9/16" socket. He torques the bolts to 25 and 35 ft-lbs. respectively, as per the H-D procedure.



**15** With a new Cometic gasket in place, Dan installs the stock cam cover using the stock bolts, blue Loctite, and a 3/16" Allen. He torques the bolts to 90-120 in-lbs. as per the H-D procedure.



**17** The alignment pin is the next part in. Dan then cleans off any oil that dripped onto the lifter cover gasket surface and positions a new Cometic gasket onto each lifter cover base.

## TIPS & TRICKS

DON'T MIX UP THE 10 CAM COVER BOLTS AND THE 10 CAM SUPPORT plate bolts; the cam cover bolts are the longer ones.

Once you pull off the cam support plate on a Softail (only), all the oil in the oil tank is going to drain out, so have a large enough drip pan under the engine to catch it all and don't forget to refill the oil tank once the engine is closed back up. In fact, you might as well change the oil filter while you're at it.

If you plan to reuse the stock cam drive chains, be sure to mark the outer side of each chain before you remove it from the engine. You must reinstall the used chain so it will spin in the same direction as before.

To align the oil pump, spin the engine using the rear wheel while torquing two JIMS alignment dowels in stages to 45 in-lbs. using a 5/16" socket. After putting some blue Loctite on all the stock oil pump bolts, install and torque two of them to 45 in-lbs. Then remove the two dowels and install the last two stock bolts using a 3/16" Allen and torque the bolts to 45 in-lbs. Finally, torque all four bolts to 90-120 in-lbs.

Before installing the lifters, Dan fills each one with fresh engine oil by pumping oil through the oil hole in the side of the lifter until oil comes out of the hole in the top of the lifter. ■



**18** Dan reinstalls the stock lifter covers onto the right case using the stock bolts, blue Loctite, and a 3/16" Allen. He torques the bolts to 90-120 in-lbs. in a crisscross pattern.

ace prods



**19** After Dan installs new Cometec O-rings into both heads, all four lifter covers, and all four stock pushrod tubes, he installs the pushrod tubes onto the engine and pops in the top clips using a flat-bladed screwdriver.



**22** After Dan replaces the foam filter elements, umbrella valves, and gaskets in both stock oil breathers, he positions each breather onto its rocker arm assembly support complete with both its bolts.



**24** While the lifters are bleeding down, Dan torques the breather bolts to 120 in-lbs. using a 3/8" socket. Once he can spin the pushrods with his fingers, Dan does the same on the other head.



**20** With new Cometec gaskets and O-rings on each head, Dan installs the stock lower rocker boxes using the stock bolts, blue Loctite, and a 7/16" socket. He torques the bolts to 150 in-lbs. as per the H-D procedure.



**23** With this head's lifters at their lowest points, Dan installs the stock rocker assembly using the stock bolts, blue Loctite, and a 1/2" socket. He torques the bolts to 15-18 ft-lbs. in a crisscross pattern.

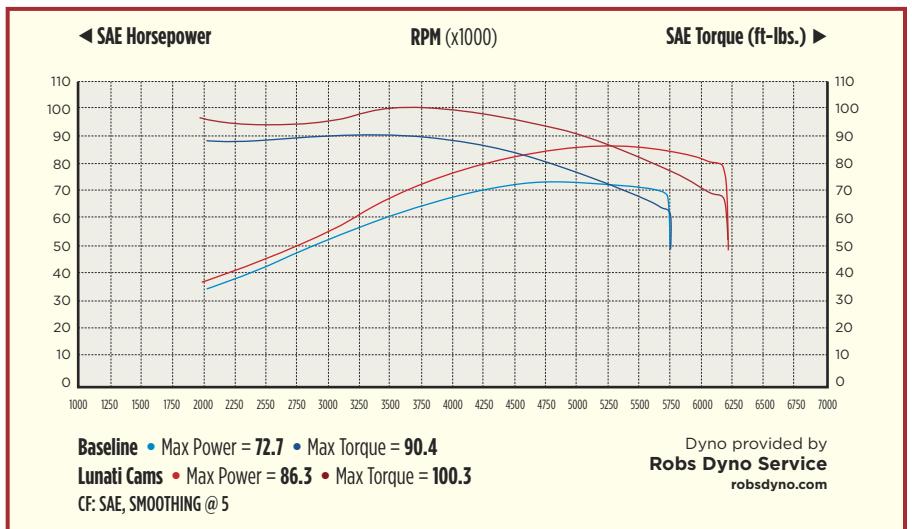


**25** With a new Cometec gasket on both bottom boxes, Dan reinstalls the stock covers using the stock bolts (long ones on the pushrod side), blue Loctite, and a 7/16" socket. He torques the bolts to 150 in-lbs. in a criss-cross pattern.



**21** After spraying brake cleaner through the oil hole in each stock pushrod and letting it air dry, Dan drops the long black exhaust pushrods and short silver intake ones into their respective pushrod tubes through the boxes.

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zippers

1 of 3

## TECH

*continued from page 116*

cams is the next best way to squeeze the Twin Cam for more juice.

We went with Lunati's Voodoo

hydraulic roller cam 285/289 set (#21760701/\$280.79). This is a great all-around, bolt-in street setup with .510" of lift, which requires no headwork. It's designed for optimal low-end and midrange power, making it perfect for cruisers like our Fat Boy. While we

were in the gearcase, we also upgraded the roller lifters to Lunati's performance flat tappet lifters (#72910-4/\$68.69). These are the same as what's found in a Chevy small block or LS engine, except the package comes with four instead of 16 lifters.

These Voodoo cams put the engine's optimal power between 1300 and 5300 rpm, and that's exactly what we discovered on the dyno. The Voodoo-equipped Fat Boy hits its maximum of 86.3 hp at 5253 rpm while the torque numbers max out at 100.3 ft-lbs. at 3754 rpm. That's a 13.6 hp jump and an additional 9.9 ft-lbs. of torque!

To complete the install properly, we also used a gearcase gasket set from Cometic Gaskets. Most engine gaskets aren't reusable, so it's handy to have the Cometic catalog nearby before starting any engine work.

To get the fuel and air mixtures right, we put the Fat Boy's existing TechnoResearch fuel tuner to work to make the engine run smoothly and get the most out of the engine package. The TechnoResearch DirectLink tuner allowed Rob of Rob's Dyno Service (RDS) to alter the fuel table, spark advance table, and other calibration table values as needed. You can also get real-time fuel table and spark table cell tracing with this setup. The DirectLink (Flash-Tuner) communicates directly with the stock EFI module, so Rob can just upload the new maps into the stock ECM. That means no wiring changes or additional modules to install.

Though Rob did the dyno work, RDS' mechanic, Dan Cantor, did the wrenching. RDS has been one of the Northeast's premier dyno tuners for years, and now it's also a top-notch place to get performance and custom work done. **AIM**

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iron braid

### SOURCES

#### COMETIC GASKET

440/354-0777  
Cometic.com

#### LUNATI

662/892-1500  
LunatiPower.com

#### ROB'S DYNO SERVICE

978/895-0441  
RobsDyno.com

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