

TWIN CAM 88 UPGRADE

Part I: Andrews cams and H-D support plate and oil pump

Here's our 1999 Road King up on Dan's lift with the rocker boxes, pushrods, lifters, and exhaust system removed. The gearcase section is emptied and ready to receive its new H-D oil pump and gearcase upgrade kit, and Andrews cams.

GOT AN EARLY TWIN CAM 88? LOOKING TO GET A BIT more power out of it, but don't want to pull the top end just yet? That's exactly what a buddy of mine wanted to do. However, he also had other issues to deal with. It seems the gearcase section of his bike had never been updated, except for the rear cam bolt upgrade. Yup, his 1999 Road King was still running the old (failure-prone) rear cam ball bearing setup and the original version of the oil pump. The rocker boxes were also starting to weep a little oil from their seams. Plus, since the engine had about 10,000 miles on it, so the stock spring-loaded cam chain tensioners were probably due for replacement. When he asked me what he should do, the only logical answer was to update the gearcase section with all 2007 and later components. That meant getting the newest oil pump, cam support plate, roller cam drive chains, and hydraulic cam chain tensioners from H-D. We'll have a list of all the H-D parts we needed to do this installation, including doing the rocker boxes, in part II.

Of course, while we're in the gearcase section, we wanted to

bolt in a set of Andrews performance camshafts. Based on the type of riding my friend does, we went with a set of Andrews 26N .490-lift cams (#216826/\$281.56). These are bolt-in

TOOLS NEEDED

- Assembly lube
- Blue Loctite
- Red Loctite
- Torx T-25
- Torx T-27
- 3/16" Allen
- Snap ring pliers (external)
- Steel straightedge
- Flat feeler gauge
- 5/16" socket
- 1/2" socket
- 9/16" socket
- Torque wrench (in-lbs.)
- Torque wrench (ft-lbs.)
- Dial indicator
- JIMS alignment dowels (2)
- JIMS locking tool
- JIMS inner cam bearing puller
- JIMS inner cam bearing installer



2 Dan first checks the pinion shaft runout using a dial indicator. Ours is 0.0025". Dan also checked the pinion shaft bushing in the support plate and oil pump for excessive wear — none found.



3 Dan then changes the inner cam bearings using a JIMS puller and installer. Dan prefers to use Screamin' Eagle (SE) bearings.

PHOTOS BY JOE KNEZEVIC

TIPS & TRICKS

MARK THE STOCK PUSHRODS SO YOU CAN REINSTALL THEM INTO THEIR ORIGINAL LOCATIONS SINCE not all stock pushrods are the same length.

Be sure you don't mix up the cam support plate bolts with the cam cover bolts, which are longer. If you do, you'll crack the right case since the longer cam cover bolts will bottom out in the right case.

Before assembling anything, Dan makes sure all old gasket material is removed from the stock parts and cases. He also uses a Q-tip soaked in brake cleaner to break down and remove any oil trapped in the boltholes. Oil left in a bolthole can cause hydraulic lock and give you a false torque reading.

When plugging the unneeded oil hole in the new H-D support plate, Dan uses a 1/4"-20 x 3/8" bolt with a sealing washer, which is a steel washer with a rubber O-ring that is actually a derby cover sealing washer.

When checking the pinion and rear cam sprocket alignment, push the rear cam sprocket all the way against the support plate. Then lay a steel straightedge across the face of both sprockets, but make sure the straight-edge is flat against the pinion sprocket. Then use a flat feeler gauge to see what the gap is between the steel straightedge and the outer face of the rear cam sprocket. It must be under 0.010". ■



4 After Dan threads this hole in the new H-D support plate using a 1/4"-20 bottoming tap, he screws in a 1/4"-20 x 3/8" bolt with a sealing washer, using a Torx T-25 and a little red Loctite.



5 Once he has slipped a new H-D O-ring onto the new SE oil pump housing's snout and oils the seal, Dan presses in the pump housing.

mystry design

cams for Twin Cam 88"-96" engines running the stock compression ratio. Andrews designed this cam profile specifically for two-up touring, and as the dyno chart will show, it increases torque and horsepower output in the lower and middle rpm ranges. However, since we

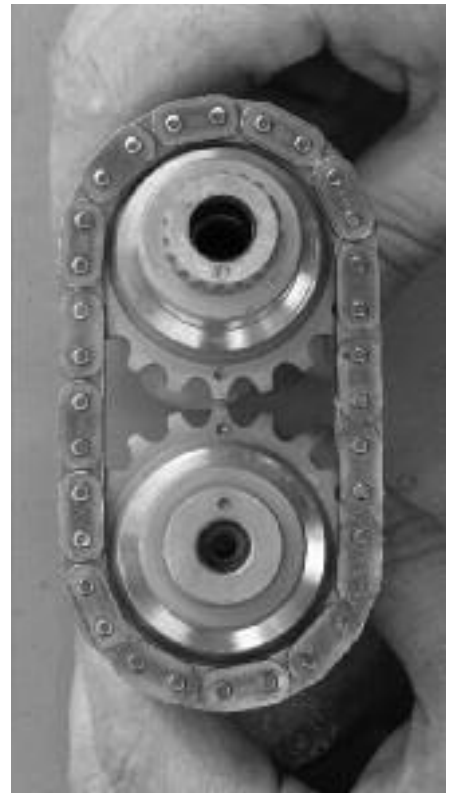
were working on a 1999 motor equipped with a cam sensor, we had to use the ridged 34-tooth Andrews rear cam sprocket (#216015/\$73.54). If you try to use the later version sprocket, the cam position sensor will not work since there's no Hall Effect ridge on its face.



6 After putting some assembly lube onto all the gerotor gears, Dan installs the wider scavenger gerotors. Be sure to align the gerotor teeth or you won't get both of them in.



7 Next in are the flat washer, wave washer, and another flat washer, followed by both feed gerotors.

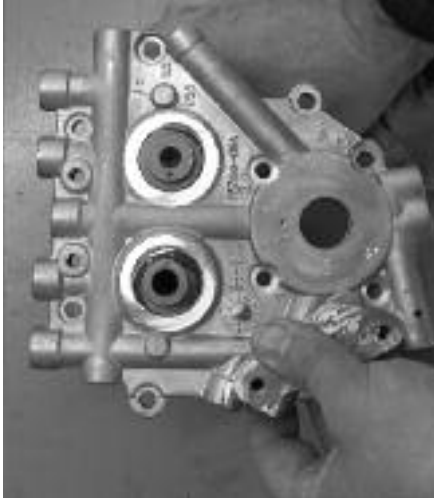


8 Dan then positions both Andrews cams in the new H-D inner cam chain with their alignment dots next to each other.

dyno jet

As for who would do the installation, I brought the bike to my buddies at Rob's Dyno. Though we've used Rob for many dyno tests over the years, he's now expanded his operation and also does installations in addition to being a full-service dyno tuning center for all make and

model motorcycles. Dan, who has been a mechanic at Harley-Davidson dealerships for over 18 years, is the man behind the wrenches on this build. We'll button up the lower end in this issue and wrap up the top end next month. That's when we'll also have the dyno chart for you.



9 With some assembly lube on the bearing surfaces and on the end of the cams, Dan slips the new H-D support plate over the cams. He then checks that the dots are still aligned using a steel straightedge.



10 After Dan slips a new H-D 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. Dan moves the retaining ring to ensure it's fully in its groove.



11 Dan then checks the gap between the cam and inner face of the cam support plate using a flat feeler gauge. He needs and gets 0.008"-0.012".

dyno jet

avon grips



12 Dan installs the new H-D inner hydraulic chain tensioner using the new H-D bolts, which already have threadlocker on them, and a 3/16" Allen. He torques the bolts to 90-120 in-lbs.



15 Dan aligns the pump by spinning the engine while torquing two JIMS alignment dowels in stages to 45 in-lbs. using a 5/16" socket. He then inserts two of the new H-D bolts, which have threadlocker on them, and torques all four to 90-120 in-lbs.



13 After putting a new O-ring on the 1999 right case, pulling out the tensioner clip, and putting assembly lube on the cam lobes, chain, and inner cam bearing surfaces, Dan slips in the support plate assembly.



16 He then removes the two dowels and installs the last two new H-D bolts using a 3/16" Allen and torques all the bolts to 90-120 in-lbs. Dan then puts a 0.120"-thick spacer on the rear cam.



14 Dan secures the support plate to the right case using the stock bolts, a little blue Loctite, and a 3/16" Allen. He torques the bolts to 90-120 in-lbs. as per the procedure in the H-D manual.



17 After he installs both Andrews sprockets using H-D hardware, a 9/16" socket, and 1/2" socket, Dan uses a flat feeler gauge to check for a 0.008"-0.012" gap between the back of the rear cam sprocket and spacer.

s&s

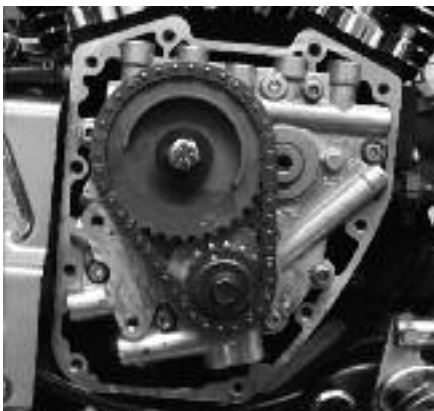
bad dad



18 Dan checks the sprocket alignment by laying a steel straightedge across the face of both sprockets. He uses a flat feeler gauge to make sure the gap between the straightedge and rear sprocket is less than 0.010".



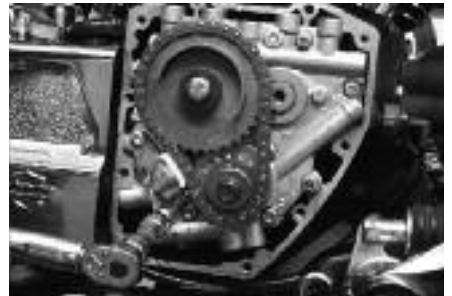
19 After he removes the rear cam sprocket, Dan ensures the pinion sprocket alignment dot is aligned with the line on the outer face of the support plate. If it isn't, he turns the engine to make it so.



20 After Dan puts red Loctite on the new H-D hardware and positions both sprockets in the new H-D outer cam chain with their dots aligned, he slips both sprockets onto their respective shafts and threads in the H-D hardware.



21 Dan tightens the new H-D sprocket bolts and washers using a JIMS locking tool, a 1/2" socket, and 9/16" socket. He torques the bolts to 25 and 35 ft-lbs. respectively.



22 Dan installs the new H-D outer hydraulic chain tensioner using new H-D bolts, which already have threadlocker on them, and a 3/16" Allen. He removes the tensioner clip and torques the bolts to 90-120 in-lbs.



23 With a new Andrews gasket in place, Dan installs the cam cover using the stock bolts, blue Loctite, and a Torx T-27. He torques the bolts to 90-120 in-lbs. as per the procedure in the H-D manual. MB

SOURCES

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