

AXTELL 88" TO 97" KIT

Part I: Installing gear-driven Andrews' cams

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A LOOK AT ANY ONE OF THE MANY SOURCES for used bikes will show a lot of Twin Cam 88s at bargain prices. And though some of these machines have already been punched out to 95", the ones that haven't can be had for even less. After all, a displacement of 88" is considered small in today's Big Twin market. But once you buy one of these bargains, how do you get the power levels up to 2011 standards? Since Axtell has been making big power with reliable engines for decades, we decided it was time to do an engine using one of its Mountain Motor kits. The bike we found for this build is a 2003 Night Train with only 15,600 miles on it. You don't want to do a power increase on an engine that has a lot of miles on the lower end. If you do, you'll be ripping the entire engine apart in short order, since the increase in power will quickly wear out the already worn lower end.

The cam recommended by Axtell for this kit is an Andrews #288154G camshaft set with a #288K gear-drive kit. This is a fairly new (2008), high-lift (.555) cam specially designed for a 96" to 103" engine with a compression ratio up to 10:1. Axtell also wanted us not to run cam chain tensioners with this build, so it recommended using the gear drive setup developed by S&S Cycle. Besides eliminating the chain tensioner shoes that

wear out and require changing periodically, an engine with gear-driven cams usually has a 4 hp increase in rear wheel output over a chain-driven one. And we're going to need that gain since our Softail engine has the chain-driven counterbalancing system in its lower end. This balancing setup will definitely lower the power output we would normally realize with this Axtell kit and Andrews cam selection.

As for who would do the installation for us, our main dyno guy, Rob of Rob's Dyno, recommended we do this build with the folks at American Harley-Davidson. According to Rob, the techs and staff there are an excellent choice for riders in Massachusetts who want performance work done on their bike. Once there, I was paired up with Dirk Whiting, who impressed me with his attention to detail throughout the build. Of course, when I dropped the bike off at American, Rob met me there so he could do the baseline runs before Dirk pulled the engine down.

In the next issue, we'll tell you about the Axtell top end kit and show you what we got for a power increase.

Our opening shot shows the engine stripped down to the crankcases. Dirk has already checked the pinion shaft run out, and it's well within spec. The cam support plate has also been stripped down.



2 The first step is to take out the stock inner cam bearings and replace them with new Torrington bearings sent with the Andrews cam kit using a bearing removal and installation tool.



3 After placing a supplied key on the camshaft, Dirk uses a hydraulic press to install the gear onto the Andrews camshaft. He does both cams in the same way.



6 He then uses a special tool and the hydraulic press to press the cams into the plate at the same time. He then rechecks the timing marks to ensure they are still aligned.



9 After lubing the inboard ends of both cams, as well as the outboard cam bearings, Dirk slips the cam support plate assembly into the right case. He then checks the cam alignment dots again.



4 Dirk installs the two new Andrews outer cam ball bearings into the plate using a hydraulic press and the two-piece special tool that supports the cam plate and drives in the bearing.



7 The stock bearing retaining plate is then reinstalled using the stock hardware, some blue Permatex, and a T-20 Torx. These four screws get torqued to 30 in-lbs.



10 He secures the support plate to the case using the stock bolts, some blue Permatex, and a 3/16" Allen. These bolts get torqued to 90-120 in-lbs. as per the procedure in the H-D manual.



5 After marking the timing dots, so they are easier to see, Dirk positions both cams in the support plate (the rear one protrudes from the cam cover) and aligns the timing marks.



8 After inspecting the stock oil pump, changing the body O-ring, and lubing its internals, Dirk reinstalls the pump back into the case and on the pinion shaft with a new Cometic O-ring on the pickup tube.



11 After aligning the pump to the pinion shaft using two alignment pins, Dirk secures the pump using blue Permatex and the stock bolts. He uses a 3/16" Allen to torque them to 90-120 in-lbs.



12 After placing the Andrews key in its slot in the rear cam, the cam gear is pulled on using the Andrews bolt and washer, red Permatex, and a 9/16" socket. The bolt gets torqued to 35 ft-lbs.



13 After aligning the timing marks, Dirk installs the pinion drive gear using the Andrews bolt and washer, red Permatex, and a 1/2" socket. This bolt gets torqued to 25 ft-lbs.



14 After checking gear backlash as per the Andrews instructions, the cam cover is installed, and the clearance between the rear cam gear and this section of the cam cover is checked.

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15 With a new Andrews gasket on the case, Dirk installs the cam cover using the stock bolts, blue Permatex, and a 3/16" Allen. The bolts get torqued to 90-120 in-lbs. as per the H-D procedure.



18 With a new Andrews gasket on the case, Dirk installs the lifter covers using the stock bolts, blue Permatex, and a 3/16" Allen. The bolts get torqued to 90-120 in-lbs.



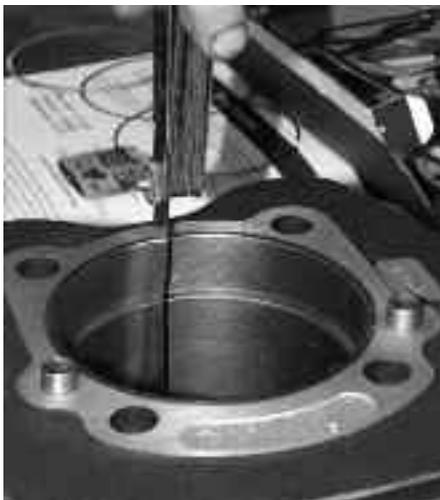
16 After lubing the rollers on the new H-D lifters, Dirk slips them into their bores in the right case as per their proper orientation.



19 After putting some assembly lube in the connecting rod's wrist pin bushing and marking the piston tops as to position and orientation, Dirk pops in one wrist pin clip on each piston.



17 The stock alignment pins go in next, one per lifter set.



20 After locating a compression ring in the bore using a piston, Dirk checks the end gap using a flat feeler gauge. Axtell wants about 0.016" and a minimum of 0.025" for the oil rails.



21 Dirk then installs the piston rings onto the pistons as per the piston manufacturer's instructions regarding dots and bevels for orientation and end gap locations. AIM

SOURCES

AMERICAN HARLEY-DAVIDSON
1437 Central St., Dept. AIM
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978/537-6919
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