

# AXTELL 88" TO 97" KIT

Part II: Want a 22 hp and 18 ft-lbs. power increase?

**Thunder  
Alley**  
HIGH  
PERFORMANCE  
HARLEYS

**W**HEN IT WAS TIME TO BOOST THE POWER output of a 2003 Softail Night Train TC 88, we decided to call the motorheads at Axtell. Axtell has been making reliable, big-displacement engines for decades. What the Axtell crew recommended was one of their Mountain Motor 97" Stage 2 kits (#900-203/\$2,974.72). Since our test bike only had 15,600 miles on it, we knew the lower end would be fine with this amount of power increase. You don't want to do a large power boost on an engine that has a lot of miles on it. The increase in power will quickly wear out the already worn lower end components.

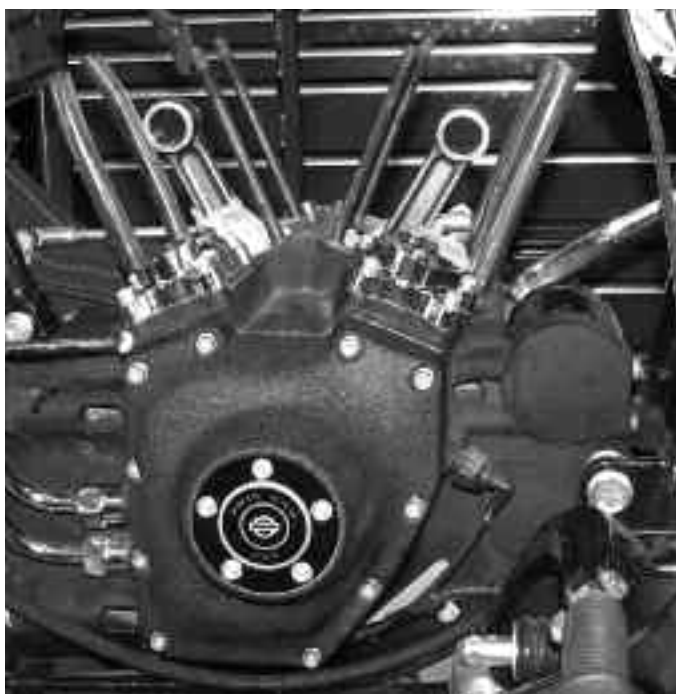
Last month, we told you about the Andrews cam and other gearcase parts recommended by Axtell for this kit, so this time around, we'll give you some stats on the top end components. Though Axtell doesn't port out the stock heads with this stage kit, it does improve air flow with valve upgrades and valve seat modifications. The stock valves are replaced with Kibblewhite black diamond high tulip valves on both the intake and exhaust. The shape of these valve heads increases airflow and velocity around the head as the air/fuel mixture enters and exits the cylinder, resulting in a high percentage of cylinder fill and, therefore, more power. The intake valve size is also increased

from the stock 1.840" to 1.900". The exhaust, however, stays at the stock size of 1.580" since the high tulip shape provides enough airflow. The stock valve spring packs are also upgraded to Cams Comp valve springs and collars with Viton valve seals.

As for the stock cylinders, they are bored and honed out to 3.932" on Axtell's Sunnen SV-10 diamond honing machine and then fitted with Axtell's new Reverse 20 pistons. Since we're retaining the stock lower end with its 4" stroke, this gives us a displacement increase to 97". After the compression chambers in the stock heads are cut at a 20-degree angle to match the new Axtell pistons, we end up with a very streetable 10:1 compression ratio. To round out the performance parts list, we also swapped out the stock nonadjustable pushrods for a set of Screamin' Eagle Quick-Install adjustable pushrods and a new set of H-D lifters. Excellent Cometic gaskets are used to keep all fluids and gases where they belong!

To get the correct mixture of air and fuel into that now larger engine, Axtell requested a Mikuni HSR 45 Easy-Kit carb (#45-5/\$419), Screamin' Eagle Pro

**1** Our opening shot shows where Dirk left off last issue. The lower end is buttoned up. The cylinder studs have been measured to ensure they are within spec and are covered with rubber hose to protect the pistons. The spigots are filled with towels to keep out debris.



**2** Dirk positions each piston onto its connecting rod and sends the wrist pin through. Once he has popped in the last wrist pin clip he can remove the towels and rubber hoses.



**3** After coating the rings with oil and putting a new Cometic O-ring on the cylinder, Dirk uses a piston ring compressor to install the rear cylinder. He then does the same for the front one.



**4** With a new Cometic MLS gasket on the cylinder and a drop of oil under the bolt head and on the threads, Dirk installs the heads using a 12-point 1/2" socket, torquing the bolts as per the H-D sequence.



**5** With all new Cometic O-rings in the lower boxes and a new Cometic gasket on the heads, Dirk installs both lower boxes using the stock hardware, blue Permatex, and a 7/16" socket. The bolts are torqued as per the H-D procedure to 120-160 in-lbs.



**6** After assembling the SE kit's tubes, Dirk slips the new SE adjustable pushrods into their chrome tubes. The two short ones are for the intake valves and the two long ones for the exhausts.



**7** With the pushrods collapsed as far as they can go, and new O-rings in the lifter covers and heads, Kenny positions the pushrod assemblies over their lifters.



**8** Dirk is updating this motor using the new metal breather housing instead of the original plastic ones. The first part on is a new rubber umbrella valve.



**9** The housing is then turned over and a new oil separator mesh is put into its well, followed by a new gasket.

## FIN REPAIRS

THE FINS ON ONE OF OUR HEADS were snapped off during shipping to Axtell. But instead of having to buy another set of heads for our build, Axtell was able to repair the broken fins. When we did the installation at American Harley-Davidson, I had forgotten the fins had been broken and never noticed any defects on the heads. Axtell did an excellent job. ■





**10** A new gasket and the top cover are then installed and the entire assembly is positioned, with its stock hardware, in the rocker arm assembly, which was inspected and reassembled.



**11** Dirk can now install the complete rocker/breather assembly using blue Permatex, the stock hardware, and 1/2" and 3/8" dog bones. The 1/2" bolts get 18-22 ft-lbs., and the 3/8" bolts get 90-120 in-lbs.



**12** With both lifters at their lowest point, Dirk adjusts the front cylinder pushrods as per the SE specs using a pair of 1/2" wrenches and a 5/16" wrench. He then extends the upper pushrod tube.

american custom



**13** After waiting until the lifters bled down (when he can spin the pushrods with his fingers), he does the same on the rear cylinder. Once he's popped in the top clips, Dirk spins the engine over several times to check for binding.



**16** With a new seal on the intake manifold and a little silicone lube, the new HSR 45 Mikuni carb gets installed and hooked up. The choke knob gets attached to the top motor mount.



**18** The SE backing plate gets attached using the supplied hardware, a deep 7/16" socket on the breather bolts (120-144 in-lbs.), and a 1/2" socket on the air cleaner studs (55-60 in-lbs.).



**14** Dirk puts a new Comet gasket on the lower box and installs the top covers using blue Permatex and the stock hardware. He uses a 7/16" socket to torque the bolts to 15-18 ft-lbs., as per the H-D procedure.



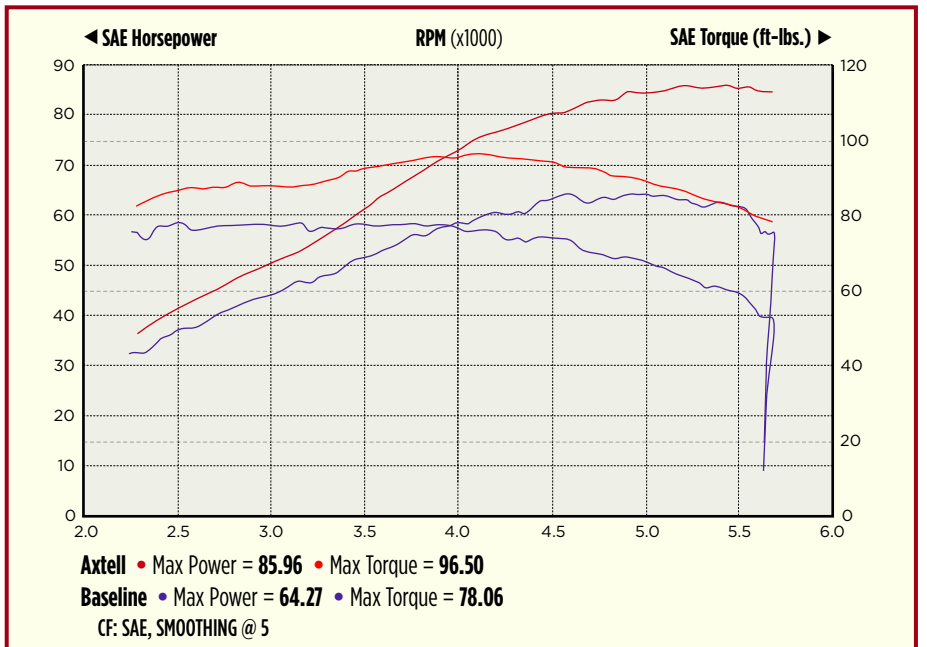
**17** The SE air cleaner kit comes with this carb-to-backing plate adapter, which has an O-ring seal. The adapter just presses on the throat of the carb.



**19** After hooking up the throttle cables and placing the SE filter element on the backing plate, the stock outer cover gets reinstalled using a 5/16" Allen. Dirk torques the bolt to 36-60 in-lbs.



**15** The SE 44mm intake manifold can now go on using new seals and hardware, some anti-seize, and the stock flanges and MAP sensor. Dirk uses a long 1/4" ball Allen to torque the bolts to 8-12 ft-lbs.





**20** With new Cometic gaskets in the exhaust ports, Dirk coats the inside of the pipes with the Cycle Shack-supplied coating. He then loosely installs both pipes to the engine using the stock flanges and a 1/2" deep socket.



**21** With the Cycle Shack muffler bracket on the frame, Dirk attaches the rear end of the pipe using 1/2" and 9/16" sockets. He then torques the flange bolts to 60-80 ft.-lbs. and tightens down the rest of the exhaust.



**22** After wiping down both pipes, the Cycle Shack heat shields get installed using a flat-bladed screwdriver.

air cleaner, and Screamin' Eagle Performance 44mm intake manifold. This intake system is a great choice for this size engine, as well as a larger one, should you choose to increase the displacement again when redoing the lower end. A Twin Tec ignition is Axtell's black box of choice, even on its Bonneville record setter. This ignition allows you to make tuning adjustments externally or with a custom map. A set of Cycle Shack pipes will take care of getting the exhaust gases out. It's amazing how few people realize how important the proper exhaust system is to an engine build. Select the wrong set of pipes and your engine output will be drastically affected.

As for who would do the installation for us, our main dyno guy, Rob of Rob's Dyno, recommended the folks at American Harley-Davidson. For this build, I was paired up with Dirk Whiting. Dirk's attention to detail throughout the build showed me Rob didn't steer me wrong. Of course, Rob performed the before and after dyno runs. He also tuned the finished machine after the initial 1,000 miles were put on the bike.



**23** A Daytona Twin Tec fully adjustable ignition system is also a required component for this performance upgrade.



**24** Here's how the finished installation looks. Dirk can now install the tanks, seat, and other components so the bike can be tuned for the 1,000-mile break-in. AIM

## SOURCES

### AMERICAN HARLEY-DAVIDSON

1437 Central St., Dept. AIM  
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