

TECH BY CHRIS MAIDA

# TP ROCKERS & BOXES

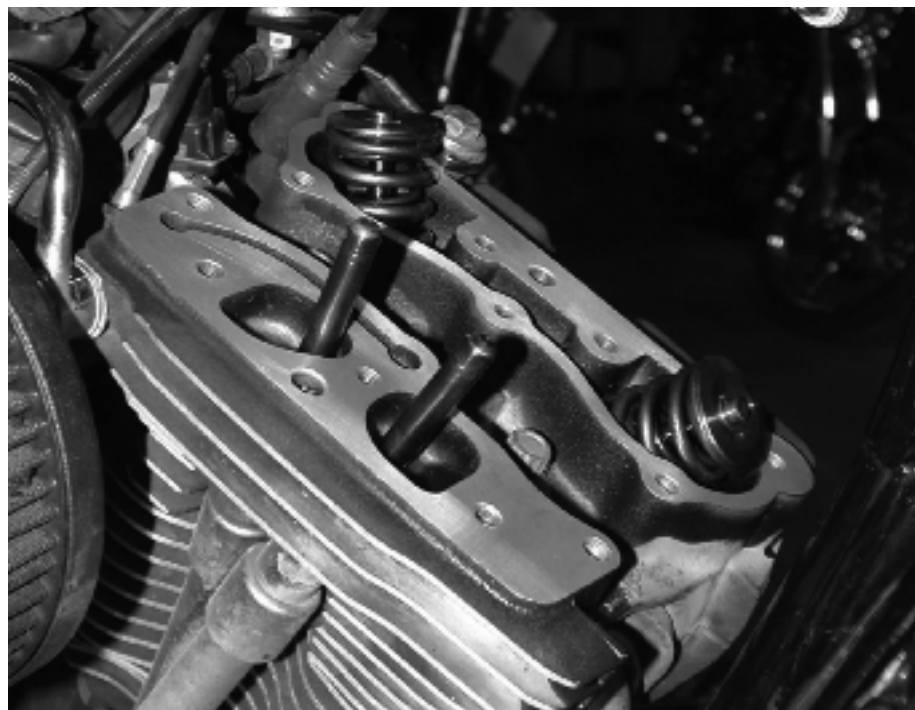
A great oil blow-by fix and valve guide saver

**B**E IT A TWIN CAM OR EVO, BOTH BIG TWIN and Sportster, the bane of a high performance Harley engine seems to be oil blow-by. Though you may not be familiar with the term, I'm sure you've heard of the result. This is when the engine spits oil out of the heads' top breathers and into the air cleaner, which then deposits this now-homeless oil all over the right side of the bike, and, usually, your leg. Not cool.

Though many fixes have been tried, with various levels of success, we've found that installing a set of TP Engineering's chrome billet rocker boxes usually fixes this frustrating problem. That's why when Logic Motor head honcho "Big" Rick Hoffman told me he had a high performance bagger that ran great, but puked oil all over the side of the bike whenever he blasted on the highway for a while, I told him I had the fix.

TP Engineering's Pro-Vent rocker boxes work because of a patented two-chamber design — check out photo 2 — that separates the engine's oil from the pressurized air that's on its way out of the engine. These chrome boxes are available either with the TP Engineering logo on the right side

(#TC 88 #45-2601-23/Evo #45-2501-23) or without the logo (TC 88#45-2600-23/Evo #45-2500-23) in a ball-milled design. They are machined from 6061-T6 billet aluminum and have extra-thick walls for greater strength and noise reduction. They also feature rocker arm stanchions that are machined into the rocker



**1** Our opening shot shows the stock rocker boxes and rocker arms removed from the engine. The top of the head is clean and ready for a new gasket and the pushrods are still in their tubes.



**2** Here's the patented TP oil breather system. Forcing the oily air that's trying to escape from the rocker boxes through this convoluted passageway makes the oil droplets separate from the air and fall into the TP box, which returns the oil to the engine.



**3** Mike starts the install by positioning the TP roller rocker arm — roller side over the valve spring hole — in the lower rocker box, which has the rocker arm support as part of the box, as shown.



**4** After lubing the TP-supplied rocker arm shaft, Mike installs them into the box and rocker arms, so the notch in the shaft will align with the holthole on the right side of the box.



**5** Mike puts a new TP-supplied special lower box gasket on the head as shown with the embossed side up. He then puts a little blue Loctite on the TP-supplied hardware's threads.



**6** After positioning the hardware in the lower box, the box goes onto the head. Torque the four 5/16"-shank bolts (with washers) to 18-22 ft-lbs. and the eight 1/4"-20 bolts to 80-110 in-lbs.

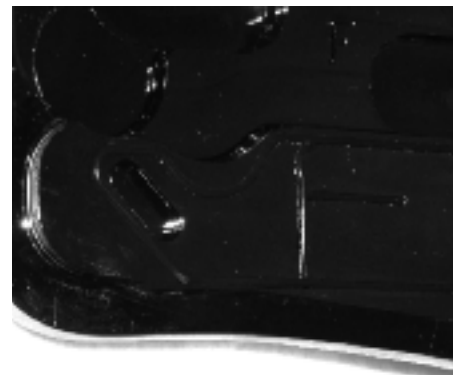
boxes, not bolted to the boxes like the stock units, for added internal strength. Each kit includes two rocker boxes and four rocker shafts, as well as all the hardware and gaskets you need for a complete installation.

While we were at it, and since Rick's engine has a high-lift cam,

but no roller rocker arms, we also installed a set of TP rollers. TP Pro-Series rocker arms (#45-0245-23) are forged and not cast for greater strength, but they are a little heavier than the stock units. These rockers feature solid shaft bushings for longer life and roller tips to eliminate valvetrain



**7** The TP-supplied O-ring, which must be installed dry, can now get placed in its groove in the lower box.



**8** The specially designed TP O-ring gasket, which seals the patented oil breather system, can now be carefully seated into its groove in the inside face of the top box as shown.

## THE REAR ROCKER BOX

IF YOU'RE INSTALLING TP PRO-VENT ROCKER BOXES WHEN THE engine is still in the frame, as we are, you'll probably need to either remove the pushrods or sneak the rear rocker box over the rear valve spring packs, as there is not enough room between the frame and head to just put the box in place. This is not a problem with the front head. And though this is not a difficult procedure, it does require some finesse and care, as well as an assistant.

With a new special TP gasket on the head, and the gasket surfaces cleaned, put the lower rocker box in from the right side of the bike and loop the box over the intake (forward) valve spring pack. Then position the box right next to the other valve spring pack. With the box positioned correctly, you'll need to compress the rear (exhaust) valve and spring pack about 1/4"-3/8". Do this by using a spacer that's about 3/4" in diameter and 1-5/8" in length as a press against the valve stem and the rear part of the spring pack's top collar.

With your assistant holding the box in place, use a prybar to press the spacer against the valve spring pack to depress it. Your assistant can then slip the rocker box past and over the upper edge of the rear (exhaust) valve spring pack's top collar. (Be sure to wear eye protection during this procedure, in case the spacer pops out. It's under a bit of pressure from the valve spring pack.) Once over the spring pack, the box can be properly positioned on the head and installed in the usual manner. You can then install the rocker arm and shaft in the same way you did the front box assembly. You can install the rockers and shafts when the box is on the bench or the engine. **n**

## TECH



**9** After putting some blue Loctite and the TP-supplied O-rings onto the four TP chrome bolts, Mike installs the chrome top cover onto the engine and torques the 5/32" Allens to 80-90 in-lbs.



**10** To get to both of the left-side bolts for the rear rocker box, you'll need to shorten the short end of a 5/32" Allen so it's only 3/4" long. Torque the bolts to spec.

drag for reduced valve guide wear. The problem with standard rocker arms is that the tip that pushes down on the valve's stem to open the valve has to drag across the end of the stem to do its job. This drags the valve toward the rocker arm, which places a side load on the valve guide, resulting in valve guide wear. A roller rocker allows the rocker arm to push on the valve stem without applying any side load for cleaner actuation of the valve. And, in case you're wondering, these roller rocker arms also fit any Evo Big Twin, Evo Sportster, or Twin Cam engine using the stock shafts and rocker boxes.

Here are a couple of tips before we move on. First, be sure to check for burrs on all surfaces and

in all holes, which is something you should do whenever you're installing new machined parts. Second, you will not be able to get a torque wrench on all of the top rocker box bolts. Use the torque wrench on the ones you can reach. Then see how hard you must pull on one of the torqued bolts with a standard Allen wrench (key) before it moves. You now have a decent idea of how much you need to pull on the other Allen bolts to get them to the proper torque.

That said, check out the accompanying photos to see how Logic's mechanic Mike Langer installs a set of TP rocker arms and boxes onto Rick's 118-hp 2002 Twin Cam bagger. And, yes, the bike's oil blow-by problem was fixed. Naturally. AIM

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