

# FTF's XR1200 Gets New Cams

## Stage 2 is a good place to be

Previously, we introduced you to our XR1200 and went through the first round of changes: an ECM and exhaust swap. We are just getting started and have got a few more things in store to beef up this already potent machine. It's time to change the cams.

The XR1200's stock cams are an impressive .550" lift compared to stock XLs of the past, yielding only .475". So we're already *cammed* up quite a bit. When mentioning the attributes of the stock XR, we pointed out how it had surprisingly linear torque for such a wide rpm range. If there was one part alone that could be credited for the power curve of an engine, it's the cam. Steve "Poise" Pfaff has explained the in's and out's of these marvelous timing devices in his *IronWorks* rocket science columns, so we encourage you to go back and reread them for a full and clear understanding.

We don't want to destroy that power curve by over camming the engine. Instead we want to enhance this tractable curve. One of the most common mistakes people make when choosing a set of cams is going crazy (too big) with lift and timing, which may give you higher RPM horsepower but



at a cost: the bottom and midrange suffer dramatically making it flat-out boring for street riding unless you're near redline. Linear power and delivery is where it's at, and even if you don't get the highest horsepower numbers at the dyno shootout, you'll still have roll on power in the middle—where riders usually demand power the most. This is streetable power and manageable in most every riding condition.

We consulted with tuning guru Dan Fitzmaurice at Zipper's Performance and he recommended using Zipper's Redshift 567 cams. Although this cam profile offers a .017" increase in lift over stock, its timing characteristics are very similar to the stock XR. The added lift will give us a bigger gulp of air and fuel (more power), but

the similar timing and duration should maintain our power curve. This new cam profile has a larger base circle than stock, so it will be necessary for us to install adjustable pushrods. We chose to go with Zipper's Pro-Taper pushrods due to the tapered design, offering less flex at higher RPM's than the straight type. In order to gain access to the new pushrods we'll also need to install Zipper's telescoping pushrod cover set.

When working with four cams, gear fitment can be an issue. If the gears don't have enough lash between them, you'll get a whine; too much and the engine sounds like marbles in a blender. If you want to guarantee good fitment, you can send the original cams out to be reground—handily Zipper's provides this service. The expert team at Zipper's cut, grind, machine and press on new lobes, welding them in place to insure they'll maintain their proper position.

In order to complete our cam swap, and in addition to buying a factory manual, we've also needed to acquire some specialty tools. The XR's oiling system is of a completely different design and the fittings require the use of H-D tool numbers HD-46503 and HD-49096 for proper re-



Cams, clearancing tool, pushrods/covers, and oil line tools.

removal. Also the extra lift of our cams requires some case clearancing. For this activity we'll use Zipper's XL cam clearance tool.

After removing the main fuse and disconnecting the battery, we drain the oil, remove the O2 sensors, and remove the exhaust. To gain access to the rockers, it is necessary to remove the fuel tank and air box as well. With those items out of our way, it's time to get to business.

We remove the upper and lower rocker boxes and remove the pushrods to take any stress off of the cams. Next to come off the bike is the sprocket cover and what appears to be the cam cover but is actually an oil pump outer cover. Now we can see the new oil pump and cam cover setup that is unique to the XR. Using our new oil line tools, disconnect the oil lines from the cam cover. Remove the two screws holding the check valve into the top of the cam cover. Remove the inner oil pump cover and O-rings. Install the oil pump inner cover (without O-rings) loosely with a couple of screws so the gears don't hit the deck when the cam cover is removed. Remove the cam cover screws and cam cover exposing the camshafts.

Now the cams are removed beginning with the rear intake. The factory cams are cleaned up, carefully packaged, and sent off to Zipper's for bigger bumps. Next we'll remove the push rod tubes by unbolting the retainers at the base and sliding the tubes and retainers outward. One screw gets the anti-rotation device out of the way and out comes the lifters.

Fast forward a couple of weeks and our cams have arrived! First we read the instructions provided by Zipper's. Now we slip the cams into the case one at a time to see where we need to pick up clearance. After carefully blocking off anything that would be contaminated by metal shavings, the cam



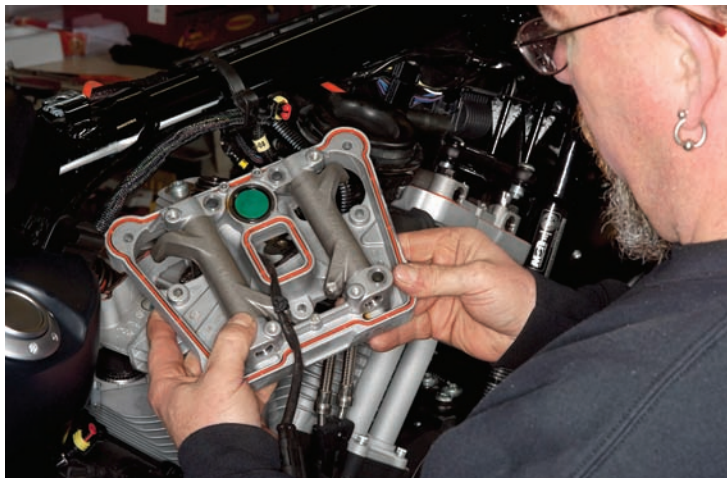
Clearancing case for cams.

clearance tool is fitted to the case and we relieve the pinion outer race and lifter bore areas. The cam area receives a thorough cleaning being sure no shrapnel is left behind.

The cams and oil pump are installed per the manual using all new gaskets and O-rings. (Timing is everything.) Install the lifters, anti-rotation device and retainers.

Now the new pushrod tubes are slipped into place. Install the bottom rocker boxes with rocker arms removed and bolts finger tight. Lubricate the pushrod tips with engine assembly lube and install in the collapsed position. Install the rocker arms and torque the rocker boxes down.

The next step is to adjust the pushrods. There's nothing in the manual about this so here's the FTF Cycles way. Remove the spark plugs, jack up the back of the bike and in 5th gear, roll the engine forward until you see the rear pushrods rocking



Fresh H-D gaskets.

(valve overlap). Now you're at TDC exhaust stroke in the rear and slightly before TDC compression stroke in the front. Roll it around a little more until the front is about  $\frac{1}{2}$ " from TDC. Adjust the pushrods for the front cylinder. We like to compress the lifter to .100" from zero lash. For these pushrods that's about 3.5 turns or 21 wrench flats. For the next ten minutes, grab your favorite beverage and *stay away from the bike* so the lifters have time to bleed down. Upon re-

turn, rotate the motor backwards until the front pushrods are rocking, bring the rear cylinder up to  $\frac{1}{2}$ " after TDC and adjust the rear pushrods. Do not turn the engine for ten minutes. Install the pushrod tube clips. Install the spark plugs and wires. Now install the rocker box covers.

Why don't we adjust at exactly TDC compression stroke? Because depending on your method and rocker arm ratio, when you adjust the pushrod the valve is going to open anywhere from .165" to .350", and the piston is going to be at the top. If you're building a motor with tight specs like shaved heads or domed pistons, the valve could kiss the piston, and as romantic as it sounds, it's not a good scenario.

It's time to install our air box, fuel tank, and exhaust. We'll fill the oil with Amsoil Synthetic 20-50 keeping in mind we'll have to recheck the oil level after running a few minutes. Now the battery gets hooked up and the ECM fuse is installed. After re-initializing the ThunderMax, it's a runner!

If you're like me, I'm sure you're chomping at the bit, wanting to know how our torque curve came out. We still have one more phase of engine work to get through to help our XR breathe a little easier and then will go to the dyno and collect some data, which will be covered in our next segment. So until then, take the road less traveled; I hear there aren't as many cops there! **IW**

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