

ANDREWS INDIAN 111 CAMSHAFTS

Part I: Removing the cams from the camshaft compartment

THOUGH INDIAN'S 111-CUBIC-INCH ENGINE DELIVERS A nice amount of power right from the factory, some owners want even more! To that end, the good folks at Andrews Products have come out with two new camshafts for the Indian 111: a TS 550 and a TS 570. A longtime major player in quality aftermarket components for both motorcycles and cars, Andrews is well-known for a full line of excellent camshafts and transmission gears and shafts for many Harley-Davidson engine designs, as well as for Victory models. For this installation, we decided to go with Andrews' 550 camshafts, but we'll give you more info on this cam in Part II of this build. That's when we'll be installing the cams and giving you the dyno results. In this issue, we'll show you the disassembly process and how to use the special tools needed, since this is where most people get into trouble. We'll also show you how to remove the compression releases from the stock cams and install them into the new Andrews cams.

Doing a cam upgrade on the Indian 111 is not similar to doing this procedure on an H-D engine.

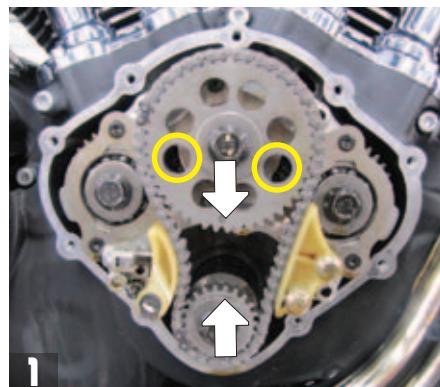
Unlike previous incarnations of modern Indian engines, the Polaris Indian engine's camshaft compartment internals are totally different than a Harley-Davidson's. On the 111, you must be careful when pulling the cam drive gears off their camshafts and when removing the old camshafts and installing the new ones. If a lifter drops down when the camshaft that controls it is removed, its pushrod will disconnect from its rocker arm at the top end of the engine. If this happens, the engine must be removed from the frame and the outer and inner valve covers removed, so you can

re-engage the pushrod with its rocker arm. Yup, that's as big a job as it sounds, 10 hours big. And, no, there's no way to get the pushrod re-engaged with its rocker arm via the camshaft compartment. I've been there when a camshaft dropped its lifter and checked it out myself. You have to remove the rocker cover, and you can only do that with the engine removed from the frame. For this reason, you must use a special tool to keep the lifters up in their bores when the camshaft is not under the lifter.

As far as I know, there are only two camshaft tools currently on the market for the Indian 111. The first is from Indian, naturally, and it's an excellent and well-made tool, as you would expect from a quality company like Polaris, but it's only available to Indian dealers. The second is offered by my buddy Rob at Rob's Dyno Service, and this is the tool we're using for this installation, since we're doing this cam swap at his shop. Rob's version (\$550, or rented for \$100) is CNC-machined from billet aluminum

TOOLS NEEDED

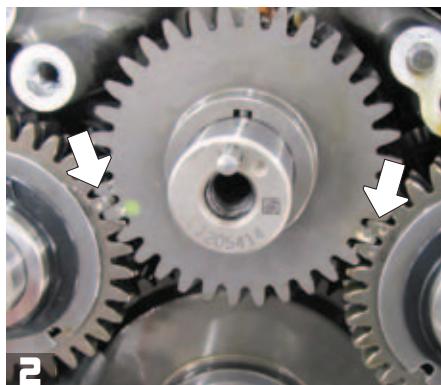
- Red Loctite
- Clean rags
- 6mm Allen
- 5/64" Allen
- 3/32" punch
- External circlip pliers
- Needlenose pliers
- Vise grips
- Flat-bladed screwdriver
- Hammer
- Plastic mallet
- Propane torch (small)
- Cutting wheel
- 10mm socket
- 15mm socket
- Impact gun
- Bench vise
- RDS Indian camshaft tool



Dan first rotates the engine so the timing marks on the two sprockets (arrows) are aligned. The two-dot timing marks on the front and rear camshafts (see Photo 2), which you can see through these two holes (circles) in the camshaft drive sprocket, must also be aligned with the single-dot timing marks on the center camshaft so there's no load on the camshafts from the valve springs.

and is also excellent and well-made. However, it differs from the Indian tool in that it also helps prevent the camshafts from coming out from under their lifters when you're pulling the drive gears off their camshafts. As I understand it, this is usually when the trouble starts.

The accompanying photos and captions show how Dan at Rob's Dyno Service removes the stock cams from an Indian 111 engine. In the next issue, we'll show you how Dan puts it all back together with a set of Andrews 550 cams. We'll also have some before and after dyno numbers so you can see what kind of power increases this upgrade produces.



2 Here's what the two-dot timing marks on the front and rear exhaust camshafts (arrows) look like without the sprockets and camshaft bearing carrier in the way.



3 Dan can now start the disassembly. He removes the chain tensioner bolt using a 6mm Allen. After noting its orientation, he pulls the tensioner from the camshaft bearing carrier and sets it aside for reinstallation later.



4 Dan removes the tenstioner shoe retainer circlip using external circlip pliers. Then, after noting how its spring is orientated, he pulls the tenstioner shoe from the camshaft bearing carrier and sets it aside for reinstallation later.



5 Dan removes the two bolts that hold the chain guide block using a 10mm socket. Then, after noting its orientation, he pulls the chain guide from the camshaft bearing carrier.

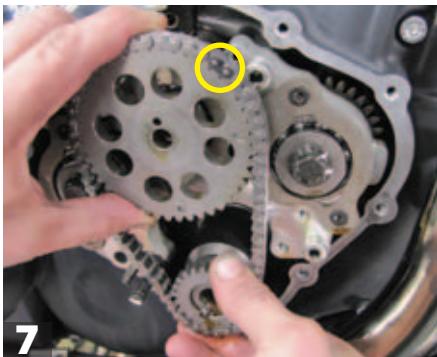
TO GET TO THE CAMSHAFT COVER and the cams under it, the front right floorboard's front and rear bolts should be removed, so the floorboard and rear brake assembly can be hung out of the way, but be careful not to damage the brake line. The exhaust header pipe heat shield must also be removed. Also make sure the transmission is in fifth gear, and the rear wheel is fully on the lift/ground to help keep the engine from turning over.

In the accompanying photos and captions, Photo 2 shows what you'll see after removing the sprockets and camshaft bearing carrier. We did this so you can easily see the two-dot timing marks on the front and rear exhaust camshafts, which must be visible through the two holes in the camshaft drive sprocket and aligned with the single-dot timing marks on the center camshaft. You have to position the camshafts this way before you remove any internal parts. When the engine's front and rear exhaust camshafts are set up in this way, there's no load on all three camshafts from the valve springs so you can remove the cams.

To install a Rob's Dyno Service (RDS) retaining pin, slip the pin in with its flat side facing the bottom of the lifter above it. When the pin contacts the lifter body, use a 15mm wrench to rotate the camshaft clockwise to make the cam's lobe push the lifter up into its bore in the right crankcase so you can push the retaining pin under the outer edge of the lifter's body. The idea is to keep the lifter up in its bore, so the top end of the pushrod it controls stays fully seated in its rocker arm. When the appropriate line (marked A or B) on the pin is at the face of the tool, the pin is fully installed. If the pin is in a B hole on the RDS tool, the pin must go in until it reaches its B line. The same goes for the holes marked with an A, which mate with an A line of the pin. When properly installed, these retaining pins prevent the lifters from dropping down and releasing the pushrods from their rocker arms when you remove the old camshafts from the engine. If any camshaft feels hard to pull out, the lifter may not be fully released from its camshaft and may fall if you remove the camshaft. Check before pulling the camshaft out. If a lifter does fall down, its pushrod will disconnect from its rocker arm. The engine must then be removed from the frame and the outer and inner valve covers removed, so you can re-engage the pushrod with its rocker arm. ■



6 Using a 15mm socket and an impact gun, Dan removes the pinion sprocket bolt and the center intake camshaft sprocket bolt, as well as their thick washers. He then sets them aside for reinstallation later on.



7 Dan removes the pinion sprocket and its woodruff key, and the center intake camshaft sprocket, as well as the drive chain, from the engine. Note that the two dark links are on the side of the chain facing out (circle).



8 Dan uses a 15mm socket and an impact gun to remove the front and rear exhaust camshaft bolts and their thick washers from the engine.



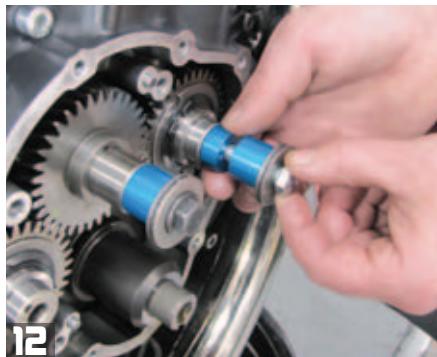
9 He then uses a 6mm Allen to remove the three remaining cam bearing carrier bolts. Dan now threads just the two exhaust camshaft bolts partway back into their camshafts.



10 To remove the bearing carrier, Dan gently pries on the carrier's three ears using a flat-bladed screwdriver. If any of the cams start to move out with the carrier, he gently taps them back onto the engine using a plastic mallet. Don't let the cams come out of their bearings in the right crankcase!



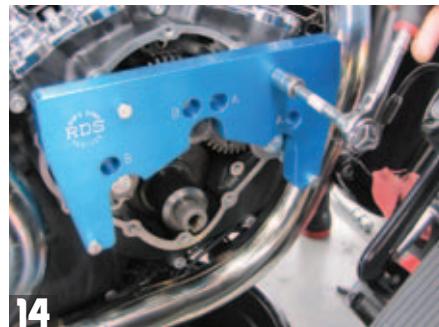
11 To install the RDS Indian camshaft removal tool, Dan slips the RDS spacer with the hole over the locating pin on the center camshaft and secures it finger-tight using the stock thick spacer and bolt.



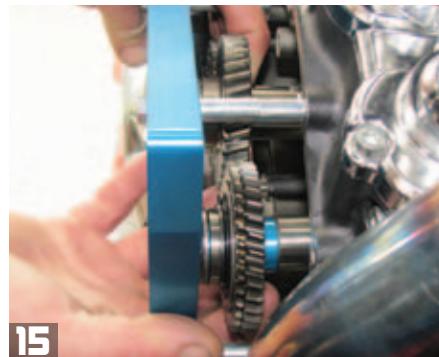
12 The other two camshafts get one long RDS and one short RDS spacer, which are held to their camshafts by a stock thick washer and a RDS-supplied longer bolt. Dan secures the bolts only finger-tight.



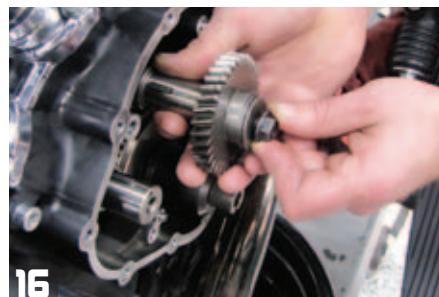
13 To prepare the RDS tool's body, Dan slips two of the RDS-supplied bolts into the tool. He then slips two of the long RDS spacers over the bolts.



14 After loosely securing the tool body to the case using these two bolts, Dan installs the other two RDS-supplied bolt and spacer setups in the same way. He then tightens all four bolts to firmly attach the RDS tool to the case.



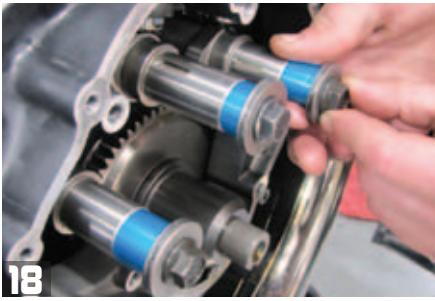
15 After covering the interior of the camshaft compartment with a clean rag, Dan can now safely pull the three camshafts' gears off their shafts by pulling on the center gear, which should pull the front and rear exhaust camshaft gears out with it. Do not let a camshaft come out from under its lifter!



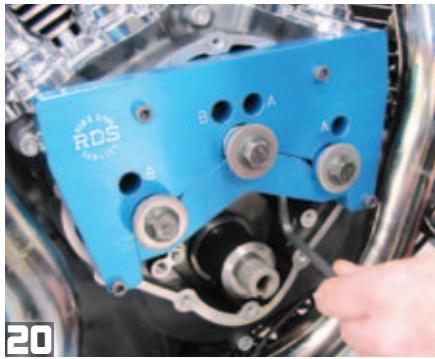
16 He then removes the bottom RSD tool from the engine. Using a 15mm wrench, he removes the bolts and their thick washers from the camshafts.



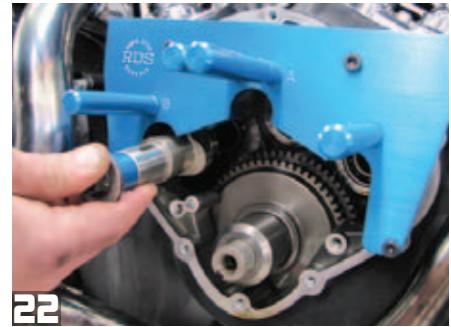
17 Dan removes the woodruff key from each camshaft so they don't fall into the engine.



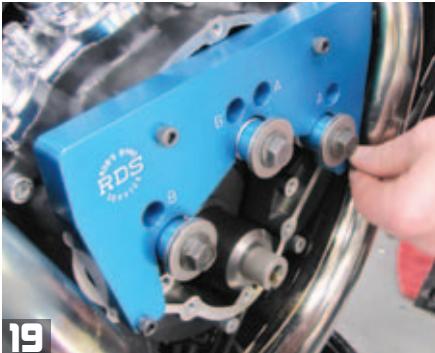
18 Dan screws the RDS-supplied spacers, stock thick washers, and stock bolts into the end of each camshaft. The center intake camshaft gets the short spacer with the hole aligned with the locating pin. He makes the bolts only finger-tight.



20 Dan now installs the lower half of the RSD tool body using the RDS-supplied bolts and a 6mm Allen. He tightens both bolts until snug.



22 After removing just the bottom half of the tool and slightly loosening the bolts in each shaft, Dan pulls the camshafts from the engine. He sometimes has to rotate the cam so its lobe clears the tool.



19 Dan reinstalls the RDS tool body using the four short RDS-supplied Allen bolts, which he installs only finger-tight.



21 Dan inserts each of the RDS retaining pins into the RDS tool and under the lifter in front of it without letting the lifter or camshaft come out of its place in the engine.



23 Once he has all three camshafts removed, Dan uses a 5/64" Allen to remove the setscrew in the side of each stock cam. This setscrew holds the pin that the compression release pivots on. He then puts the camshaft in a vise.

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24 Dan uses a cutting wheel to grind into the stock cam 180 degrees opposite the setscrew hole until he just breaks through into the setscrew hole. Then, with his hand under the setscrew hole, he uses a 3/32" punch to gently drive out the pin inside and leaves the punch in the hole.



25 Dan now removes the punch and uses needle-nose pliers to remove the compression release from the stock cam. After noting how the compression release's spring is positioned in its well in the cam, he removes the spring.



26 Here's a stock camshaft and its parts: the compression release, the compression release spring, the compression release pivot pin, and the compression release pin setscrew. Disassemble both exhaust cams.



27 Dan reassembles the stock compression release setups in the new cams the same way they were in the stock cams. After gently driving the pivot pin into its seat in the cam, he reinstalls the setscrew with some red Loctite on it.



28 On the stock center cam, after using a small propane torch to heat the area near the sprocket locating pin (don't overheat it!), Dan uses vise grips to pull the pin from the camshaft. He then uses a hammer to tap the sprocket locating pin into the new center cam. **AIM**

SOURCES

Andrews Products
847/759-0190
AndrewsProducts.com

Rob's Dyno Service
978/895-0441
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