How To Find The Noise and Eliminate It

Why Do Gear Driven Cams Cause Noise?

Over the last few years there has been lots more interest in quiet engines. Since cam gear noise can sound like bad lifters, the explanation and discussion in the following section is appropriate.

Whenever the roller follower on a cam lobe passes the maximum lift point, the forces on cam drive gear teeth change direction. If more than .002 inches (.05mm) backlash is present between the cam and pinion gear, this directional change of force will result in an audible “click” as the backlash moves from the back side of each gear tooth to the front side.

While some positive backlash is necessary to prevent localized gear tooth overloading, excess backlash (and “clicking”) may sound annoying but won’t hurt anything.

Tight-fitting gears will cause very noticeable whining, which is definitely a much more serious problem. Gear tooth and bearing damage can result from running zero backlash. In this case, cam or pinion gears with smaller pitch diameters would be required.

Different size gears permit custom fitting for a specific engine. By choosing two gears which are compatible sizes for a given engine, gear backlash can be minimized so that gears will not whine or click but just operate quietly.

If you need them, Andrews Products makes cam gears one size larger than standard and one size smaller. H/D makes pinion gears in several different sizes.

What Can Be Done To Reduce The Noise

The factory service manual for Shovel and EV Big Twin engines lists different size pinion and cam gears. We are recommending that service manuals be used for reference. If your camshaft has been changed and your engine makes noise like lifters out of adjustment, the noise is most likely a result of excessive pinion to cam gear backlash. There are several possible techniques for reducing gear noise.

1. Remove the stock cam gear and press it onto the new camshaft. Stock gears will work OK with Andrews Products camshafts. To press a new gear onto a camshaft, the center of the 1/4" keyway (in the camshaft) must be exactly 180 degrees (21 teeth) from the pinion timing mark on the drive gear.
   OR
2. Measure the stock cam gear and pinion gear (over pins) as shown in the diagram. Write down the measurements.
3. Now measure the new cam gear (over pins) and write down that number also.
4. Subtract the new gear size from the stock size.
5. If the new cam gear is smaller than the stock gear (for clicking), add the difference (from step 4) to the size of the pinion gear to obtain a new (larger) pinion gear size.
6. If the new cam gear is larger than the stock gear (for whining), subtract the difference (from step 4) from the size of the pinion gear to obtain a new (smaller) pinion gear size.

If you are working with an engine that does not have quiet running cam gears to use as a starting point, another method may be used to size drive gears when installing new cams.

In this case it will be necessary to use either a larger cam gear, a larger pinion gear, (or both) to correct noisy gears. If the problem is excess whining, a smaller pinion or cam gear will be needed.

Measure pinion and cam (over pins) as in diagram below. Look in H/D service manual for part numbers listed by pin sizes. A decision must now be made regarding what size pinion or cam gear to choose. Our recommendation would be to pick two sizes larger to correct clicking (noisy gears) or two sizes smaller (to correct whining) as a starting point.

If both gears are sized properly for the engine, a very slight whine is normal. Only a small percentage of engines were made with larger size cam drive gears. The two largest sizes of cam drive gears will be color-coded green or black. If a particular engine has a stock cam with one of these color codes, matching cam drive gears and pinions for correct backlash can result in a quieter running engine whenever a new camshaft is installed.

Engines having cam gears color-coded red or blue should not require any cam or pinion gear changes.

7. Then match this size to a new pinion gear part number in the H/D manual and install it.
8. Remember to use the same size pins as the manual lists for measuring your gears! (.108" dia. or .105" dia.)