

The Main Thing

★ — Good News for Old Engines With Rope Seals



> Pulling a used rope seal out of the cap is easy, but getting the half out of the block can be a job. I loosened all the main caps and elevated the crank about $\frac{1}{4}$ inch. Since ours was dry and shriveled, it slid right out. You might have to poke or prod it with a piece of stiff wire, so be careful not to scratch the crank.

I KNOW A THING OR TWO ABOUT CHANGING REAR-MAIN SEALS IN OLDER ENGINES. I should—I did it eight times in one. I tried new rope seals. I tried neoprene lip seals. I tried shims. I tried sealants. All I learned was that nothing worked. I ultimately took out the engine and installed a small-block Chevy. It's a sad story.

Since then, fortunately, I've learned a bit more. Better yet, someone has actually developed not only a new rope seal that works in older engines but also better lip seals to replace rope in several applications.

In the case of my doomed engine, a '54 235ci Chevy six, there were two problems. The first has become fairly common knowledge: major-brand gasket makers have removed all asbestos from replacement rope seals and replaced it with something like Kevlar. I'm not sure if that's what it is, but the new, black, tightly woven seals were nearly impossible to trim to size with brand-new razor blades, and even if you got them fit and installed properly, they were prone to leaking—if not immediately, then soon. Second, in our case, although good modern lip seals were available to fit the '55 to '62 235s, the way the main caps were

shimmed for bearing tolerance in the earlier engines left a gap between the ends of the neoprene seals, causing them to leak. So at the time, there was no solution for the leaking rear main in our sick six.

In the last few years, however, an enterprising guy named Armin Brown saw a need for a better rope seal (specifically, for 312 Ford Y-block engines), started searching for ways to improve it, and stumbled upon a vintage engine gasket company—Best Gaskets, founded in 1947—that was available for acquisition complete with cutting dies for all gaskets for most early engines. Of course the company didn't come with a replacement for asbestos in rear-main seals. Brown discovered that himself. When I asked him how he could come up with something that worked, when the engineers at the major gasket companies couldn't, he just grinned and said, "Because I don't have pencils in my pocket." What he meant was that he used common sense to see what was available rather than trying to engineer a new product. What he found, he said, actually derives from packing used in valves related to irrigation and other agricultural applications. He calls his version GraphTite (which is a Best

trademark), and he says it's basically braided Teflon impregnated with graphite. Thus, it has its own lubricant built into it. And the best part is, it works. In fact, Brown uses it in new Best composition head gaskets for vintage engines, as well.

At the same time, Brown studied and cross-referenced hundreds of rear-main-seal widths, diameters, and thicknesses to come up with a fairly comprehensive line of neoprene lip seals to fit engines that originally only came with rope seals. So in many cases, you now have a choice.

Rope or Lip? Dos and Don'ts

You've undoubtedly seen articles in the past on how to properly install rope rear-main seals. More recently, you've probably seen one or two on installing Best's new seals in the Y-block Ford engine, which is an unusual case requiring side seals, shim pins, and other peculiarities. Here, I show how to replace an obviously failed original rope seal with a more modern neoprene lip seal in an early '50s Cadillac V-8. But first, here are several important considerations when selecting either type of seal for a vintage engine.

Is a lip seal better than a rope seal? Given an equal choice, I think so. It's what I chose. One thing you might not know is that all early rope seals are supposed to leak a little. If they don't get some oil on them and in them, they will burn up. So an engine with even a good early rope seal will "mark its spot" every time you park it. It's supposed to. Since the new Best seal has lubricant in it, it doesn't need to do this, and several engine builders I polled who have used them say they seal excellently. No drips.

However, there are several reasons certain engines must use rope seals. First, engines with unique rear-main-seal designs, such as Ford Y-blocks, FEs, and flatheads, require specially shaped, or multiple-part rope seals. Second, many early engines designed for rope seals have a knurled surface on the crankshaft where the seal rides, with the striations angled to direct oil back into the pan. In some cases, this knurling can be polished smooth, if it's not too deep. But otherwise, the knurled surface will not allow a lip to seal properly and will eventually wear off the lip. Third, several engines made for rope seals have a groove that is simply cast in the block and main cap, not machined. This rough, cast surface is good for grabbing a rope seal to keep it from spinning; the rope seal can conform to an irregular cavity. But a lip seal needs a machined groove that is uniform in depth and width and also concentric to the crankshaft. Brown says one engine type that came with rope seals is notorious for not sealing properly with a lip seal substitute: the Pontiac V-8. In any case, if the engine was designed and machined to use a rope seal, a lip seal substitute might or might not work. It can vary from block to

block depending on core shift or machine tolerances.

Since old-style rope seals needed to be lubricated, an old trick was to soak them in motor oil overnight before installing them. Don't do this with new Best seals. The other rope-installation trick is to roll the seal firmly and evenly into the groove in both the block and the cap. The old tool of choice for this was an RC Cola bottle (don't ask why, it just was). But I find that a large socket or something similarly shaped and weighty works well. Once you have the rope halves rolled completely down into the grooves, slice the ends nearly flush with the block and cap. You want about 0.015 inch of the rope protruding on each side so the ends will squish tightly together when the cap is torqued. The Best rope seal comes with a notched "gauge" of this thickness to measure it, a sharp razor knife to cut it cleanly, and even a wood stick to cut against so you don't slice your fingers.

The lip seal simply slips into the groove. The trick is to turn it so the lip protrudes toward the engine, not toward the flywheel. Also, each half of the lip seal must protrude at least 0.010 inch on each side of the flat block and cap surface so there is a total of 0.020 crush between the lip halves when the cap is torqued down. This holds the seal tightly in its groove, keeping it from spinning with the crank, which is important. In fact, Brown recommends a total of 0.040 crush (0.020 on each end).

It's uncommon for a rope seal to spin in its groove, but it's even more detrimental. I think that's what happened to the rope in our Cadillac because it had been sitting in the block, dry, for a couple of decades before I got the car. I've seen engines in the past (possibly Buicks) that had a small spike inserted in one half of the groove (block or cap) to keep the seal from spinning. One engine that doesn't have this but is prone to the rope seal rotating is the 312 Ford Y-block. For this application, Brown includes a 1/16-inch roll pin and instructions on how to drill the seal groove and install the pin as an anchor for the seal.

Finally, do not put any sort of sealant on the ends of either a rope or lip seal where they butt together. In either case, however, I recommend a quick swipe of oil on the seal surface where it contacts the crank so it doesn't start dry. If the engine won't be started right away, a thin coat of white grease or assembly lube might be better.

In this example, I was replacing a rope seal with a lip seal with the crank in place but with the engine on a stand. Even though I loosened all the main caps and lifted the crank, I was very lucky the rope seal was hard and dry and slid out of the block easily. Obviously, installing a lip seal in an engine that has a crank in it (especially if the engine is still in the car) is way easier than trying to install a rope seal without completely removing the crank. So if you have a choice between a lip or rope seal,

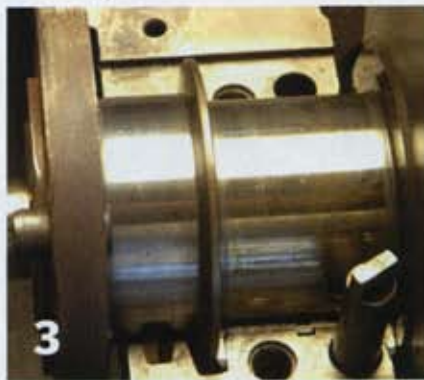
this could be the decider. Installing a new rope seal with the engine and/or crank in place can be done with a tool called a "Sneaky Pete," which is a cable with a grabber on one end and a T-handle on the other used to pull the rope seal through the groove in the block and around the (loosened) crank. This is a no-fun operation. I've done it once and hope never to do it again.

In fact, during the eight times I installed new main seals in that sick six, I pulled the engine and the crank rather than trying to install the rope seal under the car. Now that Brown has new rope seals that work, not to mention modern lip seals to replace many of them, I won't have to do any of that again.

Besides rear-main seals, complete Best Gasket sets are available for numerous vintage engines through Egge Machine.

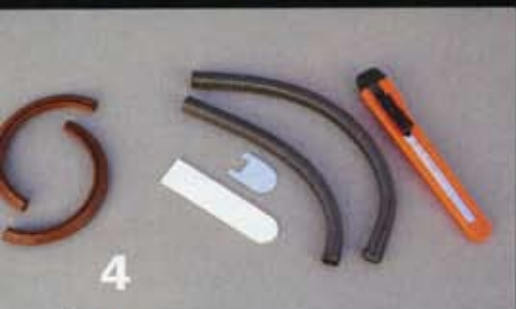


> If you were rebuilding the engine, you'd have the crank journals polished, including the seal surface. Since this one was neither scored nor scratched, I tore a piece of medium emery cloth to the right width and used it to lightly polish the journal. Use an air gun to blow any grit or debris out of the channel afterward.



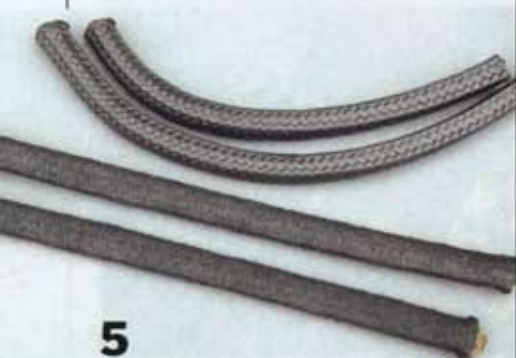
> These engines came only with rope seals, but fortunately the crank flange was not knurled and the groove is even and symmetrical. Better, the raised, thin flange between the seal and the bearing, while not exactly an oil slinger, is still a very good oil shield, diverting oil back into the pan through a hole in the bottom of the cap. Given the chunk of seal that was missing, this was working pretty well. GM didn't want their Caddys dripping oil.

THE MAIN THING



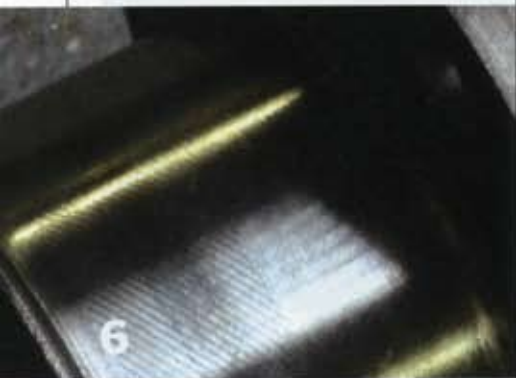
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> The really good news is that Best Gasket now offers vastly improved rope seals and replacement neoprene lip seals for a growing range of early engines. As you can see, the rope seal comes with a fresh, sharp razor knife to cut it, plus a small measuring template and a finger-protecting piece of wood to trim it properly. Since I had a choice of lip or rope with the Cad, I opted for the easier-to-install (and possibly better sealing) lip seal.



5

> Just so you know, the "bad" new asbestos-free rear-main seals look like the examples at the bottom. They are black and tightly woven. Older seals with asbestos are more loosely woven and lighter in color. The Best Gaskets with GraphTite at top look like dreadlocks and are silvery-gray in color.



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> I had a surprisingly hard time finding a crank that was knurled for a rope seal. This one is for a DeSoto Hemi, and hopefully in the close-up you can see how the knurling is angled to sweep oil back to the pan. In this case, it's probably shallow enough that it could be polished smooth (during crank prep) to use a lip seal, if you prefer.



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> The Ford flathead V-8 has this deep, spiral groove to direct oil back to the pan, so a lip seal obviously wouldn't work (nor are any available).



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> On engines made for rope seals, the channel might be as-cast or machined to loose tolerances that wouldn't hold a lip seal in place properly. This close-up of the Cadillac main cap shows the groove is slightly rough-ground (to hold the rope in place and keep it from spinning), but it is even and concentric, allowing a lip seal to be substituted.



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> While there is an art to installing a rope seal properly, the only thing you can screw up with a lip seal is installing it backward. The lip—the larger, fatter lip—needs to face to the front of the engine, as shown. Another good recommendation is to spread a thin coat of motor oil or assembly lube on the lip before installing it.



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> Next, you can simply slide the lip into the groove in the block, as shown. You can't do this with a new rope seal when the crank is in place like this. It can be done with a "Sneaky Pete" tool, but it's not a pretty process.



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> Again, when the lip seal is in place, the lip should be positioned as shown, facing the front of the engine (to the left, or toward you, in this photo).



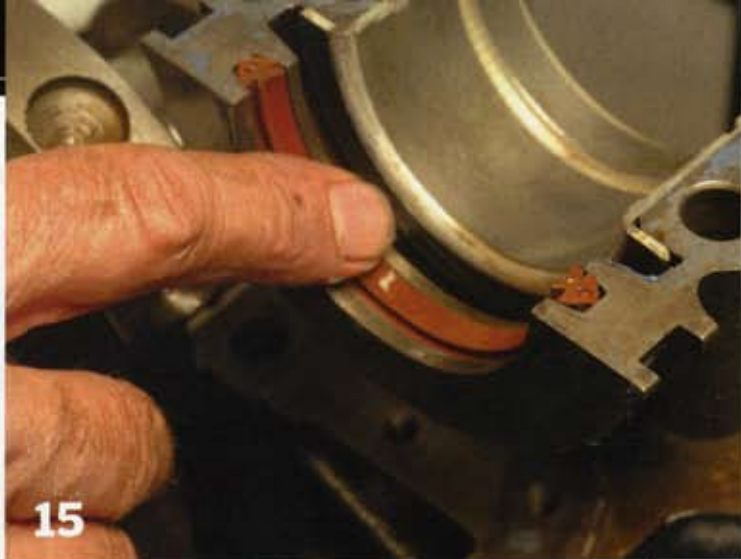
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> Now here's a part of installing a lip seal many neophytes don't know, and it's particularly important if you're putting one in an engine that didn't come with one originally. When the seal is in place and centered in the groove (around the crank), push it firmly down and then measure the amount that protrudes above the flat block surface with a feeler gauge, as shown. You need to have at least 0.010 inch of it sticking out on each side.



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> Here I am checking the amount the ends of the seal protrude from the cap with the seal pressed in place. You need 0.010-0.020 inch sticking out at each end so the seal will crush 0.020-0.040 to hold it tightly in the groove to keep it from spinning with the crank. This is very important.



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> If the engine will sit before it's started, spread a thin coat of oil or grease on either a new lip or rope seal so it isn't dry at initial startup.



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> If the seal doesn't protrude the proper amount from the block or cap, you can get from Best these special shims made from composition gasket material to adjust it. Do not try brass shim stock or filling the groove with silicone to shim the lip seal. I can tell you from experience it doesn't work.



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> Some people spread a very thin coat of sealer on the flat cap surfaces, but I don't think it's necessary. Do not apply any sort of sealer to the ends (where they butt) of either a rope or lip seal, however. Then install the cap and torque to spec.



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> Best Gasket now offers complete engine gasket sets for most of the popular early V-8s, including either copper or GraphTite head gaskets. Besides the replacement rear-main seals, all I needed was a new pan gasket to button up this side of the venerable Caddy and intake/exhaust gaskets for the top end once it was back in the chassis. ★



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SOURCES

Best Gasket; Whittier, CA; 888/333-2378; www.bestgasket.com

Egge Machine; Santa Fe Springs, CA; 866/534-3443; www.egge.com