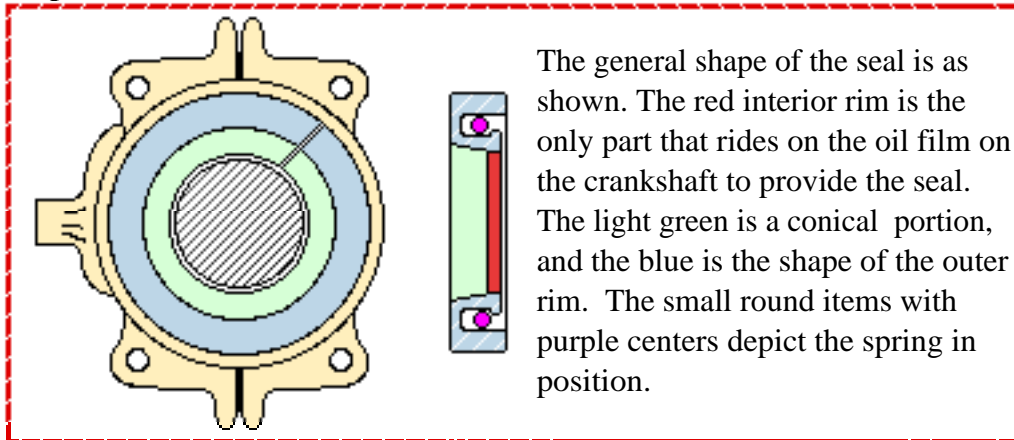


The Split Prop Seal for the C-xxF and O-200 Engines.

The Prop Seals:



The propeller seals, new on the left and the removed one on the right. The one on the right was removed because it leaked...not a lot...but enough to leave oil stains around it and below it on the engine and on the air chute for the oil tank shroud, but not such that any oil spots appeared on the windshield. Note the slight imperfection at the joint of the new unit? That seems to be common and is one of the reasons I suggest using RTV to close the gap. The “crud” on the used seal is Permatex? Form-A-Gasket used in an attempt to prevent leakage. There was this type on the outside and some red RTV on the inside.

Removal Steps:

First, discuss the operation with your A&X; the way the world is going, with training on jets, it may be that the A&X has never done the job and I have yet to see an article which shows and tells how to do the task. It is of paramount importance that the A&X be aware because none will allow you to do the task without seeing the steps taken, especially those which ensure that no parts or bits or pieces end up inside the engine!

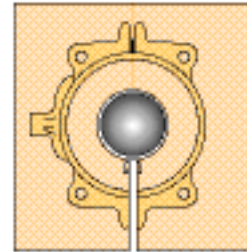
Remove the cowl and set it aside where it can't be blown over or run into. You will want to clean the inside, too, if some of the leak from the seal has settled there.

Remove the top spark plugs because you are going to move the prop several times during the operation and this makes life much easier and permits precise positioning of the prop.

Pierce the old seal in such a direction/angle that the end of the tool used to pierce it cannot possibly get jammed into the crankshaft or the case.

Using the holes as access and the larger screwdrivers as pry bars, pry the seal away from the case a little at a time, from several places around the front surface. After the first 1/8th of an inch or so of seal movement, new pry holes can be created perpendicular to the exposed rim and used. A little at a time, and moving around the outside, keep prying until the seal pops out.

Install the shield explained later to prevent anything from falling in the engine and then remove the spring of the seal using the long nose pliers and/or the pick set tools. Then remove the seal. The seal is tougher than it appears, so make sure you have a very good grip before opening the seal to get it off the crankshaft.



Cleaning After Seal Removal:

It is critically important that you have enough time and patience after the seal is removed to carefully grasp and remove the little pieces left behind. The little pieces might consist of some of the seal but will most likely be little bits of sealant. You must not let ANYTHING fall into the engine.

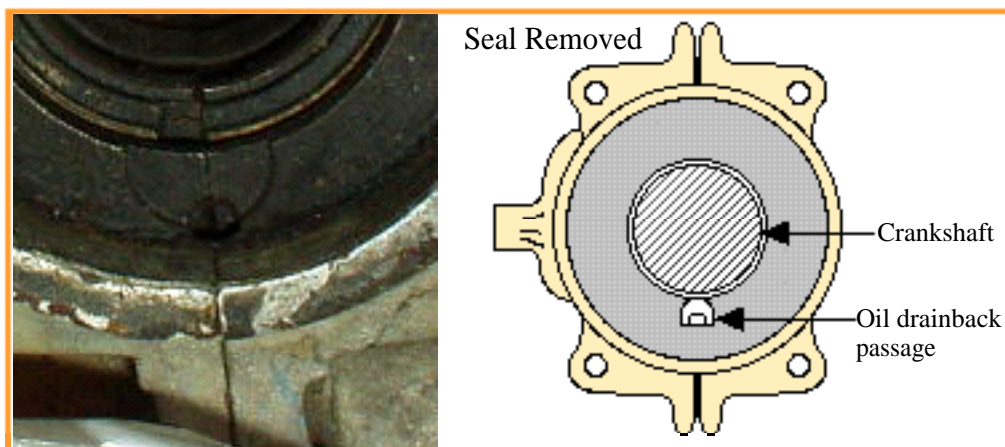
One of the best aids to seeing the little stuff is eyes which are not blinded by “trouble lights” or sunlight. Consequently, one of the best tidbits of advice is to do the task when the engine is shaded or at night, in the dark, unless you are lucky enough to have a hangar for a playroom and able to reduce the light to a low level. This step is often overlooked and almost always denied the pros because they get paid only in daylight hours. Bright lights and/or sunlight detract from your ability to see little things and to use the mirror and flashlight properly to find the tiny bits and get them out of the way. The Black and Decker “snake” light proved most useful because its light can be directed just where you want it without using an extra hand to hold it.

The recess must be absolutely clean of any RTV or other sealant (there should not be any but...). The long nose pliers and picks assist in this. With the flashlight and the little mirrors and the ability to see well out of bright lights, you can ensure that the entire cavity is clean and they will assist the A&X to inspect as well.

MEK on a piece of clean cotton or Viva paper towels is a great cleaner, but use gloves and make sure there is lots of fresh air. MEK is absorbed through the skin so use the gloves! Some people are extra sensitive to MEK, so stop using it if symptoms appear. MEK has the advantage that it leaves no oily residue, unlike many petroleum-based cleaning solutions, and no residue means that the sealant will stick and...seal.

Give special attention to the oil drainback hole to make sure it is clean.

If you must leave the opening for even a short period, stuff the clean cotton Tee-shirt into the crankshaft recess.



The Crankshaft Detail:

If your crankshaft was properly made or refurbished, it has microscopically deep “scratches” on the surface which mates with the seal. That scroll pattern of scratches is supposed to be in a direction so as to form a pump as the crank turns. With the correct orientation, it returns the oil between the seal and the crank to the inside of the engine. If your crank has been improperly made or refurbished, the pattern will be backwards and oil will be pumped out of the engine, new seal or not. That is why “no sandpaper” or any abrasive.

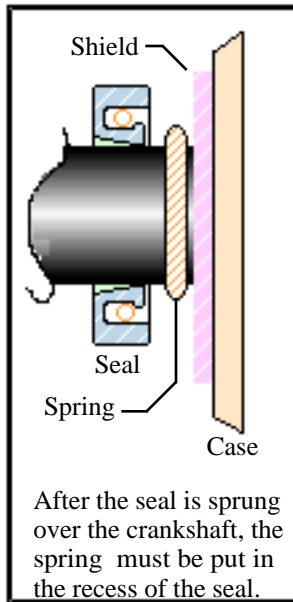
Continental has a service bulletin showing/telling how to restore that special pattern.

Installing the Seal:



This photo copy is larger than life so that you can see the details of the seal and spring. The seal combination consists of the Neoprene major part and the spring which applies radial tension so as to force the inner surface of the seal tight against the crankshaft. Here the back side is presented so as to show the features of the spring; if you get a good example, this is the relative size of the spring. If you get one from a “cheapie” outfit, the spring is smaller in diameter and the two end hooks are also smaller and extremely difficult to mesh when the time comes to join the ends.

Probably the best sequence is to install the spring (shield in place!) before placing the seal over the crankshaft. Shield in place, put the spring around the crankshaft and hook its ends together. Warm the seal if you can in hot water. Open the seal and place it over the crankshaft and move it as far forward as possible. Then, using the pick set, pick up the spring from the crankshaft and start it into the trough of the seal; while holding the first section in, use another pick to feed in the remainder of the spring.



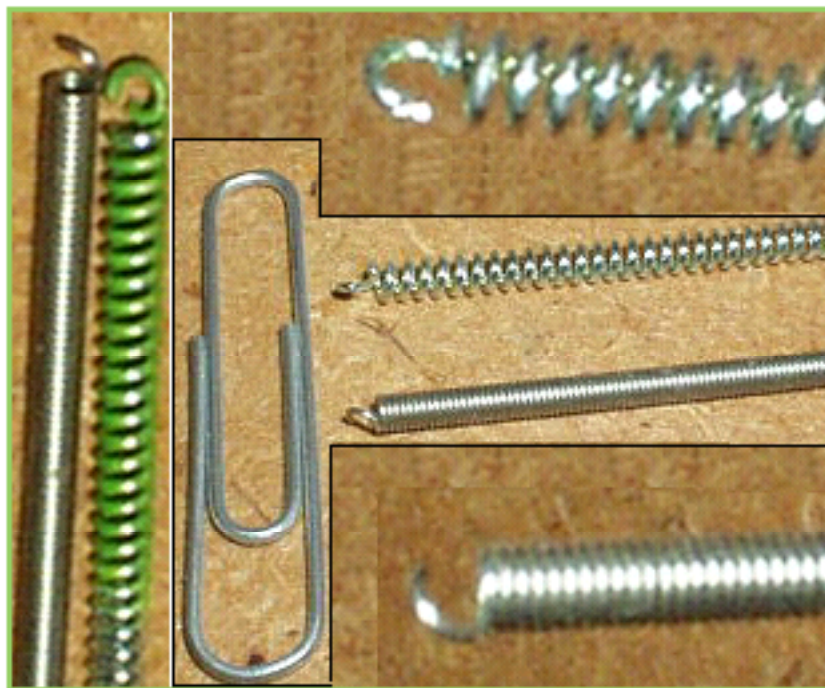
The other way is to put the seal around the crankshaft, move it as far forward as possible and then attempt to put the spring in the recess of the seal and then hook the ends. Because seeing and manipulation is so much tougher, this sequence is not recommended.

Either way, it is common for the spring to jump away from the grasp of the pliers or the hooks and is one of the biggest reasons to make sure you have the shield in front of the opening of the engine so that the spring does not jump into the engine. Keep a clean floor to make the search easier if it does depart from your control.

Make sure no part of a finger gets between the ends of the seal or the seal and crankshaft as you install it. It took about a year for the blood patch under my finger to disappear.

Whichever method is used, ensure that the spring is not twisted after its ends are connected.

Most installers prefer to use the small pick set tools to install and position the spring but others find that holding one end with the small-ended long nose pliers works best for them.



Using a standard size paperclip as a reference, these are two springs from seals purchased from different places.

The smaller spring is much harder to handle and to connect ends!

The larger end hoops help, especially if the hoops are open as one on the green end appears.

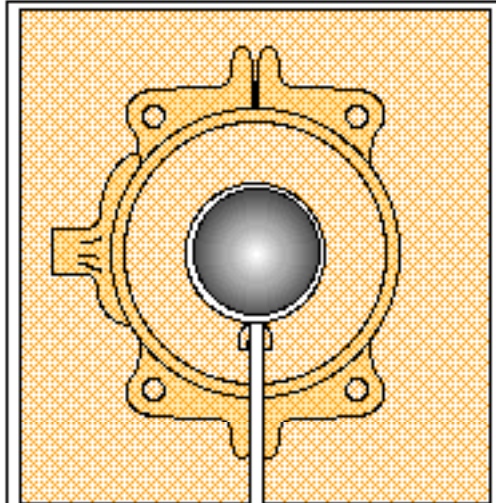
The magnified images are to make comparison easier for you. Apply as little force end to end as possible so as to not upset the tension when installed.

There is no need to attempt to close the end hoops after they are joined.

From this figure, one can see the contrast between the spring on the “good” seal and the spring on the “lesser” seal. The big one is much easier to join.

The Shield:

To prevent losing a tool or the spring of the seal into the engine, make a shield of thin aluminum or stiff sheet plastic or stiff cardboard which goes over the crank. This suggests the purpose, with the shield preventing anything from entering the engine while the seal and the spring for the seal are being installed and combined.

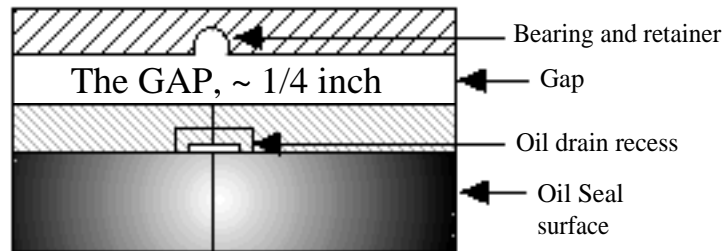


This is meant to represent the thin cardboard or plastic shield which prevents "things" from falling inside the engine while the seal spring is rejoined and put in place.



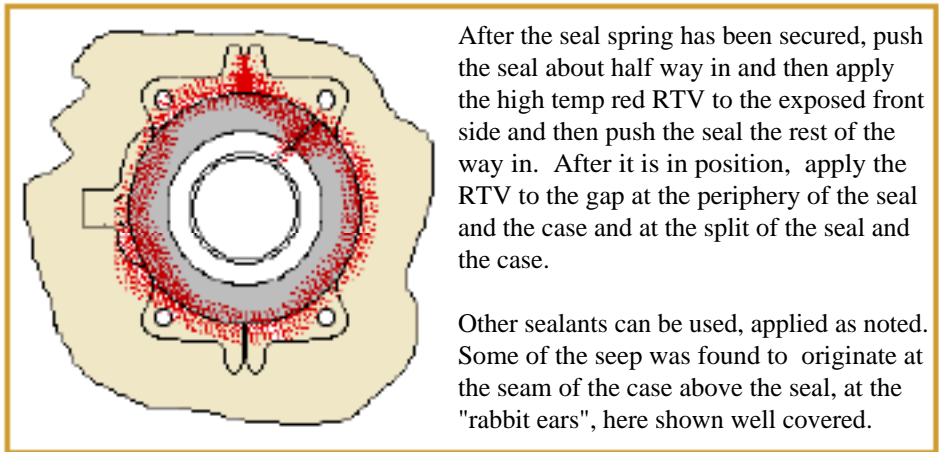
This is the ferocious front end of the engine, with the picture taken at an angle so as to accentuate the gap between the case and the front bearing mount. Particles and pieces can enter the engine via that gap if you are not very careful.

In plan view halfway through the engine, it would look something like this.

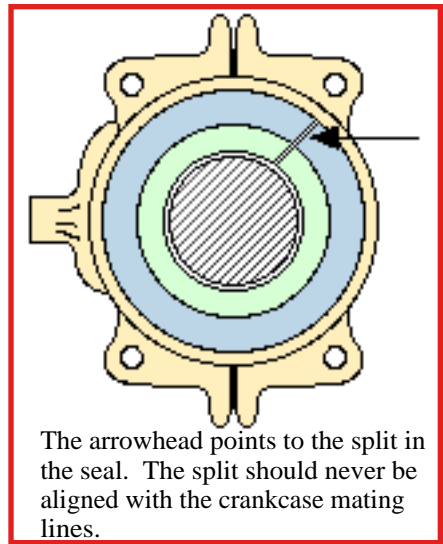


Sealant:

There are two schools of thought on whether to use sealant or not. The people who installed the seal on the O-200 used sealant, sloppily and to great excess but the seal still leaked. They applied sealant all over the outside of the seal and then pushed it into place, thereby scraping off most of the sealant and forcing some to be on the inside of the engine where it partially blocked the oil return hole. The replacement was installed without sealant based on the recommendation of experts? but it leaked until the oil was removed with an MEK-soaked rag and then immediately had the high temperature red RTV applied on the front, outside surface as shown. No leak, no seep. The recommendation is as stated in the next figure. If the smeared appearance bothers, make a better job of getting the sealant in the cracks. As stated on the RTV containers, a water wet finger is the best spreader so far. I used Red RTV, the high temp variety, because I wanted to be able to see it. Use black if you prefer.



Nobody tells you this, but the mating ends of the seal do not make a perfect, leak-free junction with each other, and the gaps in the case above and below the seal also are not "perfect", so these openings can weep oil. Whether you elect to use sealant or not, do use sealant in these places.



Make sure you leave the sealant undisturbed for the recommended setup time. I know you want to run the engine the same day. Don't! Let the sealant dry.

Gloves:

From Jim Williams:

I started off with latex. They would dissolve immediately in paint thinner (mineral spirits - which we use to wipe the oil off our planes after flights, or cleaning parts/wheel bearings, etc.) but would stand up just fine to the much "hotter" lacquer thinners, acetone, MEK, etc. Nitrile was essentially the same. I went to the vinyl gloves and the mineral spirits didn't touch them, neither did the lacquer thinner, but then the MEK dissolves them on contact! Back to the latex and the MEK won't touch them. SO - You need latex for MEK, and vinyl for everything else, OR latex for everything except mineral spirits, for which you need vinyl.

Parts:

Seal part number: 530019

Sources: Aircraft Spruce and Fresno Airparts, et al

Tools and assists:

Flashlight

The "snake light" by Black and Decker is a great aid.

Dental mirror (s)

The four piece small pick set from Snap-on or Sears

Relatively narrow blade (1/8th or so) screwdriver which will be used to pierce and pry the old seal out.

Wider blade screwdriver (1/4 or 3/8ths) to add more force for removal

Ice pick to start the holes for removal

Large clean cotton (old T-shirt) for stuffing in the void while the seals are out

At least two sizes of long nose pliers

Two sets of standard pliers to remove the old seal if your fingers are not up to the task but not to be used on the new.

Patience, lots

A small step stool to give you a better position over the operation.

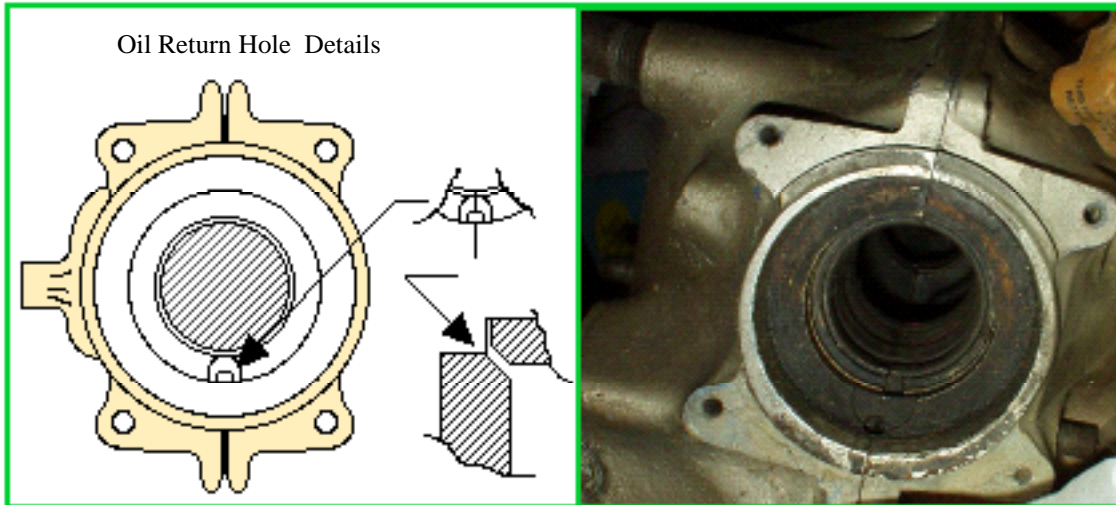
NO ABRASIVES, no "sandpaper".

Sealant of choice and whatever cleaner works with it. (And water if you use RTV, the water for finger spreading the sealant).

MEK (Methyl Ethyl Ketone) from the local hardware store.

Gloves (see note about gloves from another member)

Viva paper towels for cleanup.



Neal

Neal F. Wright
filed as Prop Seal
July 2005 cougarfww@aol.com

Earlier engines than the F model of the Continentals did not have the flange for prop mounting; those engines such as the C-85 (no F) had a tapered shaft and the front end parts must be removed to install a non-split seal. With no experience in those engines, nothing is stated about them here.

If you have suggestions for improvement in the process, send them to me for inclusion in the next version of the article.