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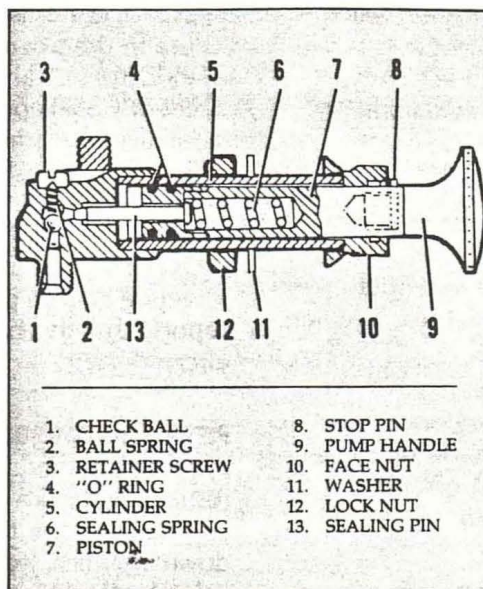
How to Repair a Kohler Primer

Of all powerplant controls, the Kohler primer has got to be the most neglected. Pilots neglect to use it; mechanics neglect to service it. Half the Cherokees and Skyhawks in this world, it seems, have primers whose O-rings develop about as much compression as a \$2.00 tire pump, but do you think for one minute that the average renter pilot (or instructor, for that matter) is going to squawk an anemic Kohler plunger? Why should he, when it's so much easier to wear out the starter?

Let's back up a minute and recall why the primer is there in the first place. It's there because (a) aviation gasoline isn't as volatile as most gasoline, (b) aircraft engines have very long intake runners (compared to car engines), and (c) aircraft carburetors are predominantly updraft types, easily defeated by gravity. The narrow distillation range and low vapor pressure of 100LL would result in poor fuel vaporization and difficult starting even in a car, but add to this updraft carburetion, total absence of any kind of choke, and up to four feet of manifolding between carburetor and distal cylinders (as on the O-470-R), and you've got a cold-start nightmare. Any attempt to "prime" the engine by pumping the throttle simply sends fuel to the pavement (and wears out throttle linkages). What you want is a way to get raw fuel to the intake ports more or less directly—and that's what the Kohler primer does.

Your primer system bypasses your carburetor. (It follows that it bypasses your mixture control.) When you pump the plunger, you're sending raw fuel to jets located mere inches from the cylinders. (Close your throttle, and you've got a manual choke.) Starting with the primer is usually much quicker, and much easier on the engine, than starting with throttle priming. Try it and see. (Don't just use the primer in winter, either. Read your Pilot's Operating Handbook and follow the procedure given in it.)

In cold weather, the manual primer is an exceedingly useful tool for keeping certain types of engines running after they fire. (Skylane and 152 owners, take note.) Try priming the engine with four to six shots of the primer (or as recommended in your owner's manual), depressing the plunger firmly to aid atomization of the fuel. Exercising due caution, hand-rotate the propeller once between each primer shot. (Keep the tail tied down, and treat that prop with due respect.) Before turning the key, pull the primer plunger all the way out. Now crank, throttle cracked no more than half an inch, and when it fires, slowly push the primer in as needed to keep the engine running. (You



The Kohler primer (sealed by two O-rings) works in syringe-like fashion to pump fuel directly to primer jets downstream of the carburetor.

may need to reapply primer several times.)

Another trick for artificially enrichening the fuel-air mixture on cold-weather starts is to apply carb heat. (Hot intake air not only aids fuel vaporization but enriches the mixture.) Carb heat begins to work as soon as the exhaust pipes heat up, which is to say, mere seconds after startup. Don't forget to turn the carb heat off when the engine is running smoothly.

Of course, you can't do any of this if your manual primer is out of commission due to bad O-rings. (If the plunger offers no resistance after several cycles, consider installing new seals.) Ask your friendly A&P if he wouldn't mind signing off a seal job done by you-know-who.

Start by turning the fuel selector off; this will eliminate any possibility of fuel siphoning out of your tanks, into your cockpit, while you're working.

Next, loosen the locknut behind the instrument panel using a *croissant* wrench or other suitable device. Have some slip-jaw pliers handy to hold the knurled panel face nut steady as you work. After loosening things, you should be able to pull the primer plunger all the way out of the pump bore. At this point, of course, there will definitely be a fuel odor in the cockpit, so keep ignition sources well away. (Note that the primer is one of only two or three possible points of fuel entry into the cockpit, the others being the fuel selector valve and—in some airplanes—the fuel-flow or fuel pressure gauge.)

Look on the end of the plunger and you'll see a pair of rubber O-rings. These seals govern the efficacy of the primer. If they've shrunk and hardened, or worn down, or (to the contrary) swollen excessively from exposure to methanol-laced autogas, you've got a problem that can only be cured by O-ring replacement.

Any FBO can supply you with replacement primer O-rings. Cessna owners should take note of the fact that in 1978, the factory went to a different kind of primer O-ring for "smoother primer operation, improved sealing, and longer service life." (See Single-Engine Service Letter SE78-73.) The new part number is NAS1593-012. Cost: about 98 cents each.

When installing new seals, be sure to wet the rubber with clean, lightweight motor oil (or equivalent, such as 3-in-1 Oil), and be extra-careful not to drag the O-rings over rough edges. Rub the O-rings back and forth with your finger tip to aid seating, and look to be sure the rings are not twisted.

If you're going to wash or inspect any other primer components (check balls, springs, etc.), now's the time to do it. Remember that a faulty check-valve spring will let fuel leak to the engine (bypassing the carburetor) fulltime, giving you an overrich condition. Replace any questionable components, and wash old ones in clean solvent (preferably avgas—keep MEK, methanol, etc. away from O-rings).

Reinstall everything in the reverse order of disassembly, and before tightening the panel face nut, make a quick check of plunger action. (Turn the fuel selector back on, of course.) Entrained air should purge itself after a few strokes. If it doesn't, call in your A&P.

With the fuel selector on, and the primer stowed, go look under the cowl to see that there is no leakage of fuel out the induction system drain point. (The low spot in your induction system will have a drain hole or snuffle valve. See that it isn't dripping.) You may want to undo a primer nozzle to make a positive check for leakage. Since your A&P will probably want to check this himself before signing the plane's books, now is a good time to round up your supervisor.

Incidentally, before making that final tightening twist of the primer face nut, do the correct thing and rotate the primer assembly as necessary so that the Kohler primer emblem (if present) reads rightside-up, left-to-right, when the knob is in and locked. This will give you an additional (visual) means of verifying "primer in and locked" for takeoff.