

Beech on a Budget Safe, Legal, Low Cost

By Mike Caban



Hello fellow Beechcraft owners! My name is Mike Caban, and I've been a Baron B55 owner since 2004. I'm pleased to have the opportunity to author a series of "Beech on a Budget" articles for *ABS Magazine*. Now there's quite the oxymoron... a Baron owner authoring a budget article for Beechcrafts. I can understand the confusion; however, I have *double* the incentive to keep my ownership costs low while maintaining a safe and airworthy aircraft.

Given the economic climate and ever-increasing pressures on our flying budgets, we may want to consider some safe and legal alternatives to traditional shop maintenance. As a spending reduction starter let's look at oil changes. Some Bonanza owners toss the keys to the maintenance shop for oil changes and end up with a \$200 invoice. This went as high as \$300 for one owner who was billed nearly three hours' labor for the task. Do this 3-4 times per year and you've got quite a few dollars tied up. Not to mention the cost to a Baron or Travel Air owner with *two* engines to service

Fortunately, the FARs allow aircraft owners to change their own oil and log it in their engine logbook. This creates a legal opportunity to recapture some of these maintenance dollars that can be put toward other parts of your aircraft ownership budget. I will go out on a limb and say that any owner capable of adding a quart of oil to their aircraft engine is likely able to change their own oil with a briefing such as this article will provide. So if reducing your oil change expense by \$100-\$200 per event is of interest to you, read on.

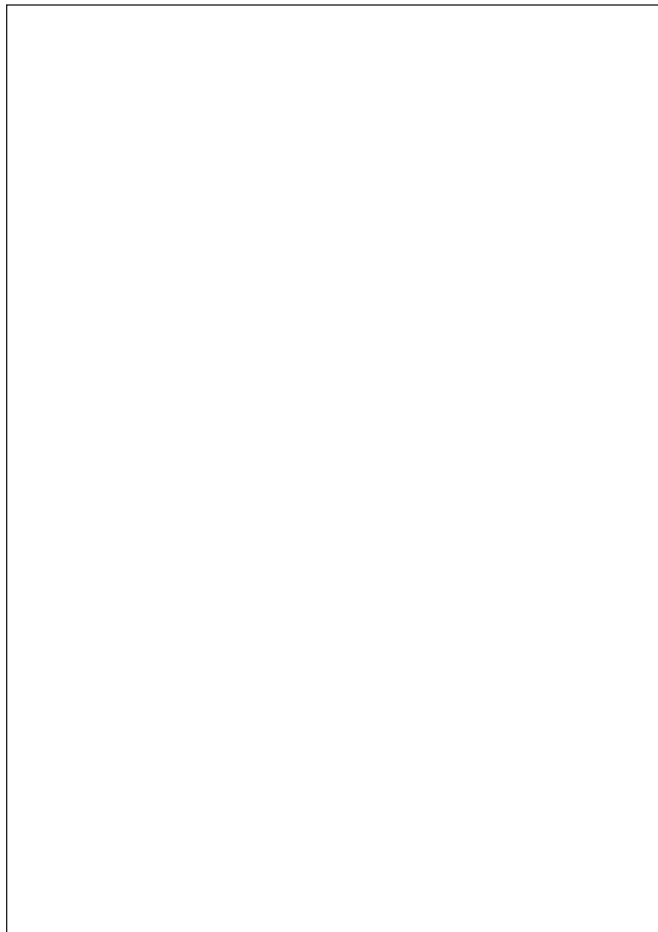
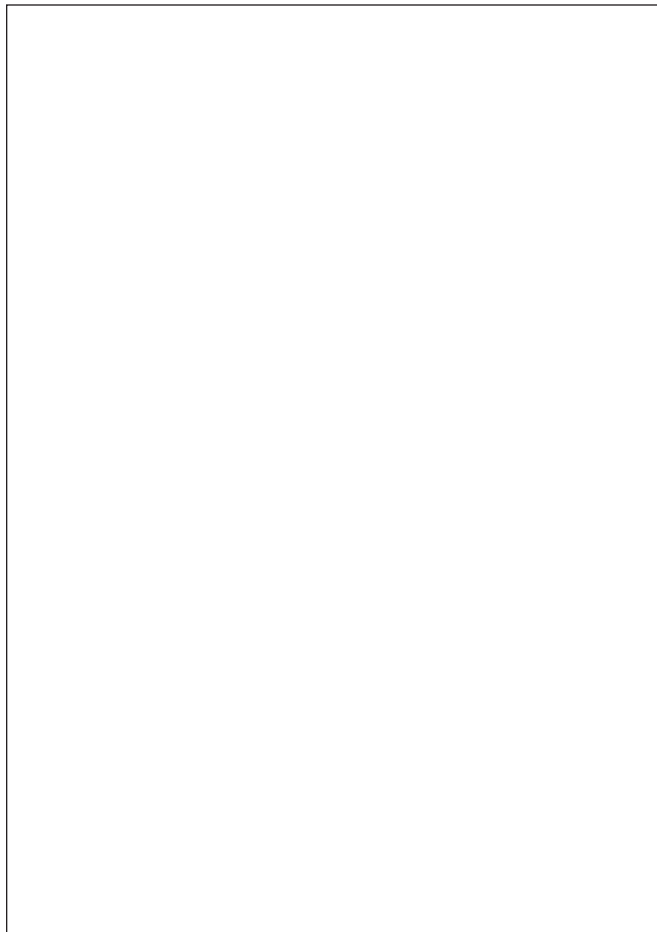
Oil change procedures are very different for dry sump E-Series engines that were original equipment on 1947-1956 Bonanzas. To learn how to do-it-yourself on one of these classics, see Lew Gage's "E-Series Oil Change" in the March 2010 *ABS Magazine*, viewable at www.bonanza.org.

You'll need a few basic tools and shop supplies:

- Torque wrench (F&M #5639) or other suitable filter wrench applicable to your filter (Champion also recommends a minimum of 3/4-turn past gasket contact <http://www.championaerospace.com/assets/technical/93-4.pdf>).
- Safety wire — 032" is a good general purpose diameter (Aircraft Spruce, Chief, SkyGeek, etc.).
- Safety wire pliers (Spruce, Chief, SkyGeek, Amazon, etc.).
- Filter cutter (using a hacksaw or band saw will leave metal particles on the filter element).
- Punch and hammer to pop a hole in the vertically mounted oil filter.
- Diagonal wire cutters (optional for close quarters safety wire cutting).
- Crescent wrench or specific tool for square-headed oil sump plug.
- Tube of DC-4 Silicone Grease for the filter gasket.
- Five-gallon container with sealing cover (Lowe's or Home Depot).
- 1/2-gal laundry detergent bottle also works well, easily transports in your car's trunk and seals nicely.
- Large blade screwdriver to remove gills (3/8" blade).
- Clear vinyl hose (diameter depends on funnel end or Saf-Air drain nipple, and length depends on distance from the drain plug to the container).
- Large mouth funnel for crankcase refilling (one that rests well inside the oil fill tube while allowing a quart bottle of oil to lay inside it during fill).
- Rags or shop towels (for the inevitable first time mess or spill).
- Shop gloves (to prevent nasty knuckle scrapes when the wrench slips, burns when potentially hot oil comes out of the factory square drain plug, getting finger punctured around safety wire, or minimize hand cleanup after the job is done).
- Sharpie/permanent marker for placing engine time and date on the new oil filter.



Continued on page XX



Before making your first oil change, check your oil sump and see if some conscientious prior owner had installed a Saf-Air “quick drain” in your oil sump (http://www.saf-air.com/oil_valves.html).



These valves make oil changes so much easier. A simple push and turn of the knurled base after attaching your hose, and the oil is draining right into your container. I strongly recommend this time and mess-saving valve versus wrenching off the square plug and getting hot oil on you.

Now that we’ve got all our tools lined up, let’s tackle our cost-saving project. Let’s first decide whether you are going to drain the oil hot or cold. Hot/warm oil after a flight is best for fast draining, while cold oil takes longer, but more of the oil will have dripped into the sump in the time the engine has been sitting idle. Hot oil requires a little more caution as to hands and fingers (this is where the shop gloves come in handy), as well as forearmers on hot engine components in the tight spaces near the oil filter.

Here are the steps I like to use:

- 1 Most Beech oil filters are mounted vertically with the opening facing the ground. Spinning off this type of filter can result in quite an oily mess. To allow the oil to drain from the filter, take a punch or a Phillips screwdriver and tap a hole in the top of the filter. Do this the night before an oil change for a long drain time, or, at the very least, as the first item of business in the oil change.
- 2 Place your funnel and clear tubing (with the other end inserted into your oil catch container) under the oil drain plug, or place your tubing onto the existing Saf-Air drain nipple and twist and lock it open. You’ll see oil begin to flow through the tubing. For square drain plug removal, loosen the plug until you can twist it by hand, and then slowly unscrew it until the last bit of threads with slight upward pressure on the plug. The last thread should be obvious; while still grasping the plug, release the upward pressure on the plug and pull it away from the area of oil flow. When done correctly, minimal oil is on you and the belly of your engine bay, and is now flowing into the funnel you placed under the drain plug.
- 3 Capture oil samples following the instructions on your analysis kit.
- 4 With the oil draining, turn your attention to the oil filter. Cut the safety wire at either end of the filter and remove all of it from the area. This is a good time to be wearing your shop gloves. Getting pricked by safety wire is not fun and can ruin your cost-saving experience. Treat the ends of safety wire with the same respect that you’d give a porcupine, and everything will be just fine.
- 5 Despite draining the filter, I suggest a generous covering of the filter base with shop towels to catch any residual oil. If you have been using a Champion filter and have the oil filter torque wrench, place the wrench on the top nut and apply counterclockwise pressure. Other oil filter loosening tools (strap wrench, band wrench, etc.) can be employed depending on the space available. Have a shop towel available when the filter finally comes off the threaded base, to cover the filter’s opening and remove it from the

engine bay. Place it where you can later cut its end off to remove the filter media for a metal particle inspection.

- 6 Using your Sharpie marker, write the engine or tach time and date on top of the filter so it is easily readable. Spread a thin coating of DC-4 silicone grease onto and all around the filter’s gasket. With a shop towel, wipe any residue of silicone grease that has fallen off the inside and outside diameters of the gasket. Only the top of the gasket should be covered.
- 7 Place the filter over the engine filter adapter base (depending on your engine configuration this may be a female thread or a male thread). Without downward pressure, slowly begin threading the filter into place by hand in a clockwise direction. At any sign of cross-threading or difficulty spinning the filter into place, stop. Do not force the filter any farther clockwise, but reverse the spin, remove the filter, and begin again. Filters should spin on easily by hand all the way until the gasket mates with the filter adapter base. Upon filter contact, use the 3/4 additional turn method (or other method specified on the filter by the manufacturer), or torque the filter with the F&M wrench. Don’t leave the oil filter area until you have safety wired the filter to the engine filter adapter base.
- 8 For first-time safety wire candidates, here is a Wikipedia primer: http://en.wikipedia.org/wiki/Safety_wire. Remember that the wire must be taut and resist the loosening of the item it is securing. After you’re done, imagine loosening (counterclockwise) the filter. If the wire goes slack, you’ve done it wrong. The wire should be taut and resist the counterclockwise turning of the filter.
- 9 Clean and completely dry the base of the engine filter adapter of all traces of old oil. This will be very important when you do the “leak check” at the end of your oil change.
- 10 By now your oil has very likely all drained out. Look into the clear tubing to determine if steady flow has stopped. After it has, remove the tubing and/or funnel from the area. Insure that you (A) twist the Saf-Air valve to the closed position; or (B) place your drain plug back into the sump, hand threading as much as possible, then tightening with your wrench. Until you get accustomed to the torque required, use a torque wrench to insure you comply with the torque specs for your engine sump plug. Clean and completely dry the area around the drain so that you can ensure no new oil has leaked during the “leak check” at the end of our your oil change.
- 11 You are now ready to refill the engine with the fresh oil of your choice. Check your POH or engine documentation for approved oils and the proper fill quantity for your engine. Our big bore Continentals, depending on the model, can be specified for full sumps of 10 quarts to 12 quarts. *Always confirm the proper oil quantity for your particular engine model.*
- 12 Just after starting to add the first quart of oil, take a peek at the base of the engine to ensure you really did secure the drain plug or Saf-Air valve. Trust, but verify.
- 13 After filling with the proper amount of oil for your engine model, remove the funnel, secure the oil cap, and secure the cowling lid or oil fill access door. Check the area for tools, rags, etc., and insure that all the panels you removed or opened are secure. Pull your plane out to a safe, clear area outside your hangar, then start the engine. Immediately check for normal oil pressure, let it idle for a couple of minutes, then shut it down. Shut the engine down immediately at any sign of abnormal oil pressure, oil temp or any signs of oil smoke.

- 14 Take a few minutes to push the aircraft back into its hangar (hopefully a relatively level surface). This will allow a good amount of the oil that was circulated during your engine run to drip back down into the sump. Re-inspect the base of the sump at the drain as well as the oil filter area for any signs of oil leakage. If none, congratulations, you've successfully completed an approved owner-performed maintenance item. If you see evidence of fresh oil leaks, check the filter and drain plug for the proper torque. Make any adjustments needed, then perform another engine run and leak check.
- 15 After a few minutes have passed, remove your oil dipstick and give it a fresh wipe. Reinsert the dipstick and fully seat it into its position, then allow it to linger in the sump for a few seconds. Remove the dipstick and note the oil level. This will be your personal "FULL" oil level that can be used as a comparison for after-flight oil checks when the engine is warm. You may wish to check the oil the next day for the cold "FULL" dipstick mark. This will give you two key reference points on your dipstick, for "dead cold" oil level and just "shut down" oil level. Depending on the condition of your dipstick factory markings you may want to make Sharpie markings at these levels. The Sharpie markings are reasonably durable, but they won't last forever.
- 16 Make the required entry in the engine log. Here is a sample: 1/1/2012 @ XXXX AFTT Hours (Engine Hours) Changed Oil and Filter. Filled with XX quarts of Brand X oil and Brand Y Filter #12345. Run up and leak check good. Signed: Beechcraft Owner / Pilot Certificate #123456
- 17 Cut the spin on end of your filter off and remove the filter media and visually inspect for metallic particles. Passing a magnet over the filter media will capture magnetic particles. If any metallic particles are found consult your A&P/IA or engine builder for their opinion on next steps.
- 18 Send your oil samples off for analysis per the instruction on your oil analysis kit.

Your used oil is easily disposed of at no charge at many national automotive chain stores (Auto Zone, Pep Boys, Advance Auto, etc.) as well as Wal-Mart locations with auto service centers. Or, in some colder areas of the country, you may find a service station that uses waste oil heaters for their shop. They will gladly take your used oil to fire their heaters in the winter.

As far as sourcing the oil and filter consumables, here are some thoughts for low-cost solutions:

- *Aircraft Oil Sources:* In my area of Dallas, Texas, I have found a local Sam's Club that stocks my favorite oil AeroShell 100W, currently at about \$62/case. I have also found local oil distributors who will sell cases of Phillips Aviation oils at very attractive prices. Due to the cost of shipping, it appears to be getting increasingly difficult to source these oils at prices that can compete with local sources, so researching a local oil distributor can be worth the effort.
- *Aircraft Oil Filters:* Tempest, Champion, and other aircraft oil filters can be purchased through the usual aviation distribution sources for around \$16 to \$21 plus shipping.

Given shipping costs, it might make sense to order three or four at a time. Several manufacturers offer multi-pack discounts.

- Come to EAA AirVenture at Oshkosh, source your oil and filters at special prices from the vendors, and bring it back in your airplane.

With these consumable sourcing approaches I keep my direct oil change costs down into the \$80/oil change area per engine. Compared to some shop rates this can free up as much as \$100 or more, something on the order of 20 gallons of avgas.

To make maximum use of my time in the hangar, I use my oil change time to give the engine bay a good visual inspection for chaffing hoses and wires, as well as looking at fuel injection line integrity at the welds, checking tire pressures, looking at brake pad thickness, checking the brake lines for signs of cracking, and looking at brake calipers for signs of leaky O-rings.

Feel free to visit <http://www.csobeech.com/OilChange.html> for additional do-it-yourself oil change details and sourcing tips.

Happy skies! 