

A STEP-BY-STEP GUIDE TO CHANGING AN SR22'S OIL

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Photos by Alex Gruber

A while ago, I posted on the COPA forum the steps I used to change N1MR's oil. I hoped to get feedback and suggestions on improving my process - and I did. I've included many of those tips in this article.

My Cirrus is a late 2003 SR22. There are slight differences among models, particularly in the design of the cowling. Some of the sequences could easily be done in a different order; others make sense (to me) the way I do them. An oil change provides a great opportunity to do a lot of other things, and I've documented a few.

Here are the steps that I take:

1. Prepare for "surgery" by having all of the supplies I need gathered and ready.
2. Remove the four screws that hold the upper and lower cowl halves together behind the propeller and orient the propeller with one blade down in preparation for upper cowl removal.
3. Undo the quick-release catches along the sides and top of the upper cowl and remove it carefully.
4. Place the cowl shell on a piece of cardboard, carpeting, etc. Inspect inside for evidence of scuffing, scraping, friction, heat, etc.
5. Unscrew and remove plate behind the nose wheel strut and re-orient the propeller with one blade straight up for lower cowl removal.
6. Apply masking tape to the nosewheel strut (or "stinger") to protect it from damage should the lower cowl scrape it during removal and re-attachment.
7. Disconnect the landing light connector near the external power connector/MCU. Release all but the two topmost quick-release catches for the lower cowl shell.



2 Orient prop for upper cowl removal.



3 Removing cowl.



5 Orient prop for lower cowl removal.

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On my airplane, the final step in removing the lower cowl takes two people. Each stands on one side, releases the top catch, sticks the screwdriver in their back pocket and “persuades” the cowl down the nose wheel strut. Some pulling by each away from the longitudinal centerline of the airplane is needed to spread the cowl so that it doesn’t scrape the blades of the propeller as it comes off.

8. Next, I tape the landing light connector to the side of the plane, so that I don’t forget to connect it later.
9. Inspect the inside of the lower cowl shell as done with the upper shell and stow on the same soft surface.
10. Set up the container for receiving the oil. I use one I bought at a car parts store, designed for oil changes. I use a couple of small garbage cans to stand below the engine, mostly because I keep forgetting to buy a longer hose than the one I’ve been using for the last four years! I attach the hose to the quick-drain, push it up and give it a twist to start the oil flow.
11. After the oil has been flowing for about 30 seconds, I capture a small sample to send to Blackstone Labs for analysis.
12. Using an awl and a small hammer, I punch a couple of holes in the oil filter so that it can empty properly. Fred Sponsler and Roger Whittier suggested waiting overnight after this step, but sometimes I get impatient. In this particular instance, I waited about an hour and I had minimal oil mess when I finally removed the filter.
13. While the oil has a chance to drain completely, I do the other things. I start by giving the entire engine a good ‘rub’ with my Mark I eyeballs.
14. I open the brake master cylinder and check the level using a homemade “dip stick”. A cable tie works well for this. I’ve also used one that is cut out from the stuff that is used as a strap around a cardboard carton. The stick has a “shoulder” that stops it at the top of the cylinder, which makes it easier to judge how far the MIL-H5606 is from the top. When brake fluid is needed, I use a kitchen baster to add it.



10 Oil starting to flow.



12 Punch holes in filter.



14 Open brake master cylinder.

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15. Next, I check the battery electrolyte levels. I start by removing the battery cover and then remove the individual caps for the cells. The difference is usually vivid to the eye. The clue is that if the level is low, the surface of the electrolyte in the cell is flat, while there is a complex-shape meniscus in the ones that have enough. I use a turkey-baster to add distilled water to bring up the level where needed before I put the caps back and dry up the inevitable spills.

Note: There are a lot of places to get distilled water -grocery and drug stores sell it for ironing; automotive stores sell it for radiators and batteries. As far as I know, any distilled water is fine.

16. This is a good time to lube the throttle and propeller governor cables. This step pays dividends - it can prevent the power and mixture levers from sticking and

generally becoming stiff. Start by advancing both levers fully forward to expose as much cable as possible (see step 16 photos). Next, use a clean paper towel to clean the cable ends thoroughly. Finally, apply a small amount of lubricant (I use LPS-2), and exercise both levers a few times. Be sure to leave them in their normal fully-aft positions.

17. After I've completed ALL the "engine housekeeping" - including inspecting the air filter - it's time to finish the oil change. I start by putting some rolled-up paper towels under the oil filter to catch oil drips (much the way my barber puts a rolled towel around my neck). This step can be painful if the engine is still hot!



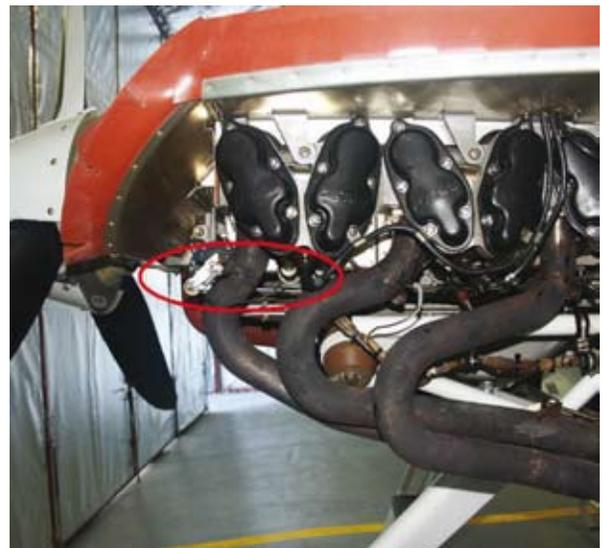
15 Low electrolyte in cell on right.



17 Cut safety wire.



16 Exposed cables on throttle cable.



Exposed prop cable.

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Now I cut the safety wire that would otherwise prevent the oil filter from being removed. I use a socket wrench to remove the filter and clean the base of the oil filter mount with a paper towel, taking care not to leave any residue behind. I place the oil filter on the oil drain pan, so that any remaining oil can exit.

18. I get the new CH48108-1 filter and record the date, Hobbs and oil type (who knows who might be doing the next oil change). Robert Apenis suggested I use filter CH48109-1, which is fully and legally interchangeable with the 108 (it is one-and-a-half inches longer and has about 25% more filter media surface).

Before installing the new filter, the safety wire must be put in place and "started".

I cut a piece about three times as long as the filter itself. I feel for the hole at the base of the filter mount by Braille - it's impossible to see - and thread the wire through. Then I use a safety-wire-twist tool to twist just enough to reach the top of the filter.

19. I wipe my finger clean (honest!) then spread a thin layer of Dow Corning 4 (aka DC-4) paste onto the filter gasket. Installing the filter is simply a question of spinning it onto its screw thread until it's "wrist tight", then tightening it a little more with a socket wrench. Technically, one should tighten to the correct torque (I used to do that, until I found that I can get it just about "on the money" every time, by feel).



18 Twisting safety wire.

After it's in place, the other end of the safety wire needs to be attached to an "ear" on the filter, in a direction that would prevent the filter from *loosening*. Sometimes those ears are practically flat against the filter top, so I have to raise the ear a tad to get the wire through.

20. I use the safety-wire-twist tool to finalize the safety wire. To be strictly correct, the wire should be twisted in the opposite direction after passing the 'node', but I've been assured by an IA friend that this rule is among many that are commonly ignored in most shops. What's important is that it's not going to come undone ... and that the end is bent over, so that it doesn't impale the next hand that wanders by.



19 Apply DC-4 to filter gasket.



New filter in place.

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21. Now it's time to start adding back oil. It's very important to remove the tube that runs to the drain pan below - you don't want to pour eight quarts THROUGH your engine, into the drain pan! With the tube removed, any leak from my quick drain will be very obvious. I give each quart a good long time. There's no rush because I've still got plenty to do. I leave the quart bottle in the funnel to drain while I go about the rest of the steps, and come back from time to time to add another quart.
22. My main remaining job is to cut open the filter, so that I can get a good look at the filter element and send a sample off to Howard Fenton at SECOND OilPINION. I use a simple cutter that I bought from Aircraft Spruce & Specialty Company. Don't improvise with a hacksaw - the name of the game is to avoid generating your own metal particles.

A sharp knife is needed to cut some of the pleats so that they can be removed. Four cuts are needed -along sides, then front and back. Oil spatters all over as the filter concertina is spread, so you have a good excuse to be wearing a grungy T-shirt!

The Q & D examination should be done in sunlight -look for glints of metal on the surface on the outside of the filter. There's always some, and after a few oil changes, you get a feel for what's normal.

23. I don't throw the empty quart bottles away until I think I'm done; then I count them, to be sure I've added as much oil as I meant to.
24. The final step is to start the engine and run it for a few minutes. I watch the oil pressure gauge with extra vigilance on the first start after the oil change. The book says to shut down if there's no oil pressure within 30 seconds, but I've never come close. Three or four seconds usually does it. When I remember, I crank the engine with the mixture at idle cutoff for a few blades, wait to see oil pressure, and then let the engine start. I'm not sure whether that's good, but it works within just a few blades. I don't like starting the engine unless I'm going flying, so this step sometimes waits until the next day. Cowling gets replaced only AFTER the leak test.

This actual oil change can be done in an hour or so, if you hustle. I never hustle, and I think of the time required as "a morning" or "an afternoon". The estimated costs are:

- Oil - estimated at \$4 per quart, YMMV, is about \$30.
- Filter - estimated at \$17.

Some other consumables that are used in negligible quantities at each change:

- DC-4 - a tube that will last a lifetime costs about \$8.
- Safety wire - a roll that will last half a lifetime costs about \$6.
- LPS #2 spray lubricant - a can costs about \$7.50

Specialized tools:

- Safety wire twister - will last forever; \$20 to \$80.
- Oil filter cutter - again, a wide range of prices, starting at around \$50.

Useful info:

Howard Fenton can be reached at:

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22 About to cut filter.



Examine Filter in sunlight.