

2201-B Instructions for Deep Sump Aluminum CNC Flight Oil Pan

Thank you for purchasing my deep sump, light weight, aluminum Oil Pan for aircraft use, Part No. OP-1. Your purchase makes possible my further research and development on the Corvair. In this way, you're investing in the future development and perfection of your chosen motor.

These notes are supplementary to my most current Conversion Manual. This Oil Pan is developed as part of the system that we use to convert aircraft motors. This system is outlined in the Conversion Manual. The parts alone, without the information contained in the Manual, will not allow you to develop as reliable an aircraft conversion. When I develop and market a part, it is fully flight tested, and designed to work in concert with the other parts in the conversion. I take into account the way that most people are capable of installing and operating the part. There's a great deal of consideration that goes into these issues, and I urge you to utilize all the information in the Manual and the parts in the way that they are intended to be used. Of course, contact me at any time with any question you may have.

To be fair, everyone needs to understand that these are not certified parts, and it's not a certified motor. Experimental is not a misnomer; everything we do in this field is of increased risk. If anyone even suspects that they have a problem, E-MAIL or CALL ME. If you have never worked with torque wrenches and precision fasteners, get help from an A&P. Let's all remember to use our heads and not take unnecessary risks. I have gone to great lengths to make these components as reliable and easy to install as possible within the bounds of affordability. I have personally flown all of these parts, because I have a low opinion of people who market aircraft parts without flying the parts themselves. I believe that each and every part I sell is the best solution to its respective aspect of converting a Corvair engine. Take your time and do good work. The system is proven and will reward you with the same type of reliable flight performance we have always had.

Oil Pan

I have been flying aluminum pans on our test aircraft for many years, and hundreds of flight hours. The Pan you have in your hands is the ultimate evolution of this rigorous testing. It is my humble opinion that no finer pan can be made at reasonable cost. This Pan has many advantages over any other type of oil pan. Some of these advantages are easy to see, like its weight being 20% of a cast pan. Other innovations are harder to detect, such as the Pan rail being cut on a CNC hydro cutter for the ultimate in accuracy. The design has been made to minimize welding, and different thicknesses of material have been employed to reduce weight.

As with every part of your aircraft, it must be installed, maintained and operated with reasonable judgment in order to be used with relative safety. The primary issues you must address are: timing gear clearance, gasket sealing, hardware retention, drain plug style, and oil pickup height. While this may sound like a lot of issues, I want to cover them in depth to minimize the problems anyone might have.

Timing Gear Clearance

The Corvair's timing gear sticks out below the level of the block. If you carefully measure it on a number of engines, you will notice that there is some variation from GM. To address this, you need to ensure that you maintain 50/1,000" clearance between the gear and the bottom of its pocket in the Pan. This is done by measuring and using a thick enough oil pan gasket. Every Corvair motor I have seen will have plenty of clearance using a cork/rubber composition oil pan gasket. But, there will be variations in the thickness of gasket manufacturing, and you need to check this on an individual basis. Keep in mind, the pocket for the gear is .125" deep. Thus, the gasket thickness and the pocket depth must be greater than the amount the gear is sticking out plus .050". If you're using a C120WW gasket set from Clark's Corvairs, it has the correct gasket in it.

Gasket Sealing

One of the advantages of the deep sump Pan is that the gasket is no longer at the bottom of the sump. With a stock oil pan, a serious leak has the capability of draining the entire sump. A deep sump Pan will retain some of the oil, even in the highly unlikely event of a pan gasket failure. Still, you must exercise extreme care in installing the correct gasket. Although Corvairs were notorious for leaking oil, two of the biggest reasons they leaked oil at the oil pan gasket were the fact that the stock oil pan was a skid plate on the bottom of the car, and that its steel construction had a different rate of expansion than the aluminum block, putting shearing forces on the gasket. Neither of these issues applies to your aluminum flight Pan. In the past, we've recommended aviation sealers with the names Fuel Lube and Tight Seal. We've recently found that both these products can be broken down by additives in automotive oils. Because of this, we have reverted to using Ultra Gray Silicone RTV by Permatex. It is sold at most auto parts stores. Use craftsmanship in applying it to both sides of the gasket. Do not put on so much that it will ooze into the Pan when the hardware is tightened. The Pan rails have been clearanced for the motor mount bushings. After the Pan is in place and the fasteners have been torqued, the protruding gasket in this area can be trimmed away with a razor blade.

Hardware Retention

The bolts around the Pan are 1/4" 20 TPI. These fasteners need some type of safetying to prevent them from getting loose. When we install a Pan, the hardware is tightened to the point where the sealer shows a very slight uniform line all the way around the gasket. I let it dry several hours like this, and later go back and tighten the fasteners slightly. If you tighten the gasket so far that it extrudes out, you've overdone it. We use Allen head stainless bolts with drilled heads that are safety wired. While many hours have been flown with no method of safetying on these bolts, this is not a good example to follow. Whatever method you use, do not overtorque the bolts. If the Pan rails are deformed and the gasket is extruded, you have it way too tight. If you lay the Oil Pan on top of your block, and the holes do not match up perfectly, do not worry. There is some minor variation in the hole pattern as drilled by GM. GM made up for this by having oversize holes in their pan. If you have a hole that's tight, take a small rat tail file and enlarge the hole in the direction necessary. I generally use good quality washers underneath the fasteners to spread out the load on the Pan rail.

Drain Plug Style

The Pan comes with a welded boss for a drain plug. There are numerous styles of drain plugs which can be used. Some people may want a small pipe plug, others an aircraft quick drain, or even the standard Corvair drain plug. Whatever method you choose, it must be safety wired. There are no excuses here. When tapping a hole in aluminum, I highly recommend using a new tap and actual tapping fluid for aluminum, then doing at least one practice hole in a piece of scrap before tapping your Pan. The boss welded on your Pan is 6061 T6 aluminum, which threads very nicely. But again, use a reasonable amount of torque to put in the tap after you thread it.

Oil Pickup Height

Your Pan is approximately 1 1/2" deeper than stock. To get the maximum benefit from the Pan, the stock oil pickup tube should be placed in the case and heated, and gently curved to lower the pickup to the point where it would have 1/4" clearance from the bottom of the Pan. If you bend the stock pickup, make sure that it remains parallel to the bottom of the Pan. The stock pan has a baffle in it to handle braking and acceleration forces generated by the car. In my experience, neither of these situations apply to aircraft. It would take an exceptionally sharp climb angle to make this oil pump suck air. I have tested this Pan at a 22 degree sustained climb angle, and it still feeds oil fine. In any coordinated flight maneuver, including a loop and a roll, it will be no problem.

Install Kit

We offer an Oil Pan Installation Kit, Part No. OP-2. It has all the fasteners and washers, a drain plug, and a modified oil pickup which reaches all the way to the bottom of the Pan. Most people who purchase a Pan opt to use this Kit. When ordering one, you need to send us your stock pickup as a core, which we will exchange for the modified pickup that's part of your Kit.

In conclusion, the Pan can be left natural, painted or anodized, but do not ever paint the inside of a Pan. When calibrating your dipstick, put 5 quarts of oil in the engine, and prime the oil pump to fill the filter. Note this as the low mark on the stick with the airplane in its ground attitude. Most airplanes can use 2 or 3 quarts more than this, but we generally fly with 6 in the plane.