Oil Separator Quick Release

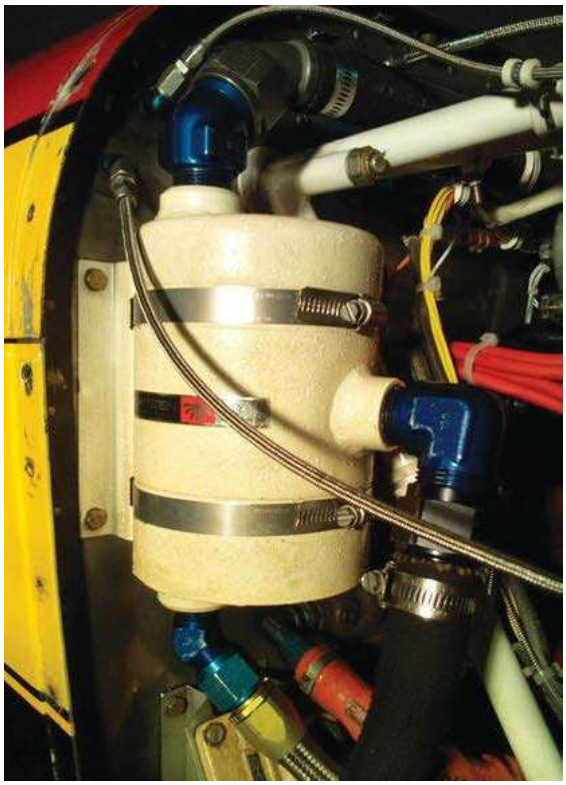
BY TOM MYERS, IAC 16830

LIKE MOST OF US, my airplane has a Christen inverted oil system. The system includes two main components: the Model 803 oil separator and the Model 802 oil valve. Normally, the Model 802 oil valve does not need much maintenance. The Model 803 oil separator, however, does require routine maintenance. This article is about how I made that routine maintenance much easier and much faster to accomplish.

Multiple sets of piston rings are used to seal the cylinder combustion chambers as the pistons translate through the cylinder bores. Piston rings slide on a thin layer of oil. Byproducts of burning aviation fuel include exhaust gases, water in the form of steam, and oil vapor. Piston rings normally seal the combustion chamber well but not absolutely perfectly. Due to the temperatures and pressures involved, there is a small amount of leakage of these combustion byproducts into the engine crankcase. Over time, high and potentially destructive pressures could build up in the crankcase if these combustion byproducts are not allowed to vent to the outside atmosphere. Thus, engine crankcases have a breather port.

An oil separator provides a chamber for the oil vapor to condense and return to the oil sump. Steam and exhaust gases escape to the outside atmosphere through a drainpipe down to either the bottom of the engine compartment or through the fuselage to the tail. Some oil does escape through the vent pipe, so having the vent pipe exit the aircraft at the tail keeps the belly much cleaner over time.

An inverted oil separator includes an additional internal valve. Without the internal valve, the oil sump could drain a lot of oil out through the drainpipe while the aircraft is flying inverted. The separator's internal valve allows the engine breather port to become the oil return port and the engine sump port to become the engine vent port during inverted flight. Far less oil is lost through the drainpipe during aerobatics thanks to this valve.



An overall view of my oil separator in place, mounted to the firewall inside of the engine compartment.

However, for the valve inside of the oil separator to work well, it must be kept clean. When enough oil residue and combustion byproducts build up inside of the separator, the internal valve gets bogged down as it transitions back and forth between its upright and inverted positions. As a

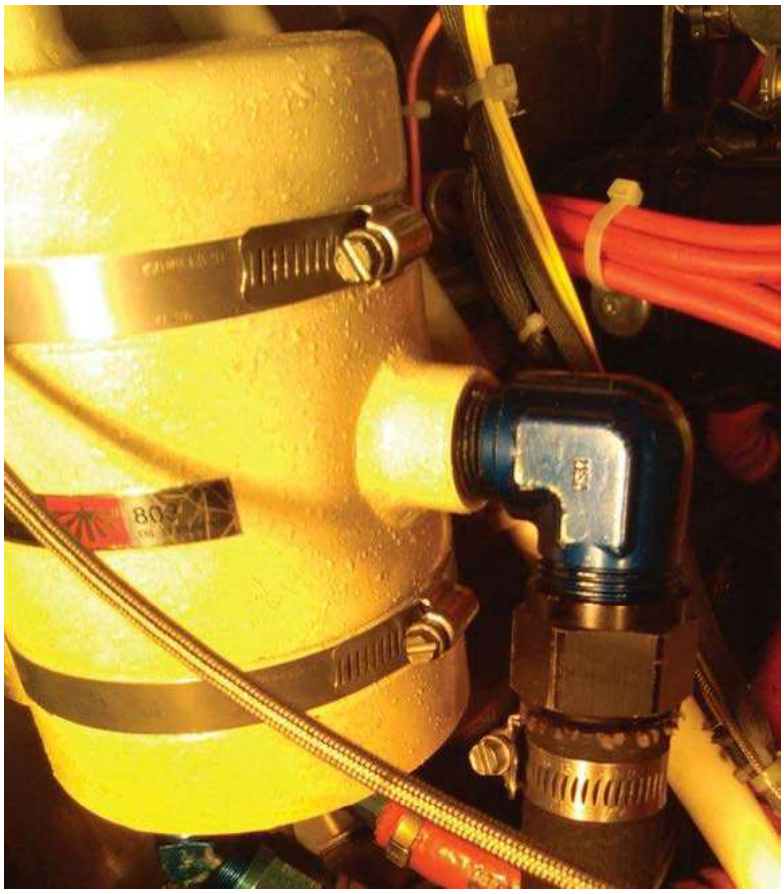
PHOTOGRAPHY BY **TOM MYERS**

When I first bought my airplane eight-plus years ago, cleaning out the oil separator was a real project …. I needed to come up with an easier way.

The top of the oil separator and the new fittings. The blue fitting attached to the separator top is a 3/4-inch male NPT to 1-inch (-16) male AN flared aluminum 45-degree fitting, XRP part number 982317. The black fitting attached to the 1-inch ID aviation MIL type 6000 oil hose is a 1-inch (-16) female AN flared to 1-inch ID hose nipple aluminum 45-degree normal-profile fitting, Earl's part number 674616. The fitting is secured to the hose with a standard aviation rotary hose clamp.

result, a little oil can escape out of the separator drain port during each attitude transition. The result is increasing oil consumption during aerobatics.

Typically, I see nothing or just a little condensed water dripping out of the tail drainpipe of

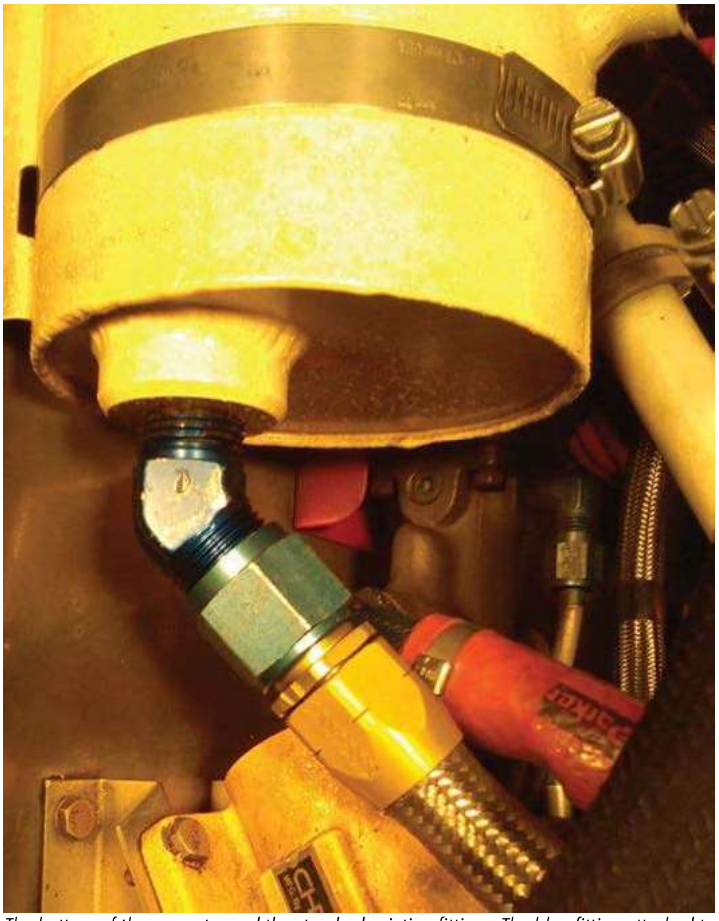


Shows the side of the separator and the new fittings. The blue fitting attached to the separator side is a 3/4-inch male NPT to 1-inch (-16) male AN flared aluminum 90-degree fitting, XRP part number 982217. The black fitting attached to the 1-inch ID aviation MIL type 6000 oil hose is a 1-inch (-16) female AN flared to 1-inch ID hose nipple aluminum straight fitting, Earl's part number 670116. The fitting is secured to the hose with a standard aviation rotary hose clamp.

my airplane after I land. When I start to see oil dripping out of the drainpipe, I know it is time to clean out the oil separator. It is easy enough to tell the difference between dripping water and dripping oil by rubbing a little between two fingers. There is a noticeable difference between water with a little oil in it and oil with a little water in it.

When I first bought my airplane eight-plus years ago, cleaning out the oil separator was a real project. The top and side fitting coupled directly to clamped hose fittings. Clamped hose fittings are not easy to remove or insert. It involves warming up the hose and wrestling the fittings out or in. I usually end up cleaning out my oil separator two or three times a year. I needed to come up with an easier way.

Fortunately, the oil separator is on the non-pressurized sump portion of the engine oil system. It means that whatever solution I come up with does not have to be able to withstand the 80 or so PSI at which the pressurized portion of the oil system nominally runs. In addition, the bottom fittings of the separator were already a set of standard aviation



The bottom of the separator and the standard aviation fittings. The blue fitting attached to the separator bottom is an MS20823-10D 1/2-inch male NPT to 5/8-inch (-10) male AN flared aluminum 45-degree fitting. The oil hose is Parker Stratoflex type 156 with a 5/8-inch (-10) female AN flared straight end fitting.

Two inexpensive open-ended wrenches that I purchased and slightly modified (chopped short) with an angle grinder to loosen and tighten the new flared fittings within the available clearances of my engine compartment. I use a second wrench to assure that I do not disturb the sealing of the separator NPT threads.

AN (Army-Navy) flared and MS (military standard) fittings that are easily loosened and tightened with a 1-inch open-ended wrench. I only needed to come up with solutions for the top and side fittings.

I also benefited from the fact that while flying in the upright attitude, there is no oil in the top or side fittings. Even if there was a leak in my solution while flying inverted, I could roll upright and continue to fly without further issues.

At first, I did not make much progress in finding a solution to the problem. I pored through a lot of aircraft part catalogs. I was unable to find a combination of AN or MS fittings that would allow for flared fitting couplings between the oil separator and the hoses in the space that I had available or without replumbing a large swath of the engine compartment.

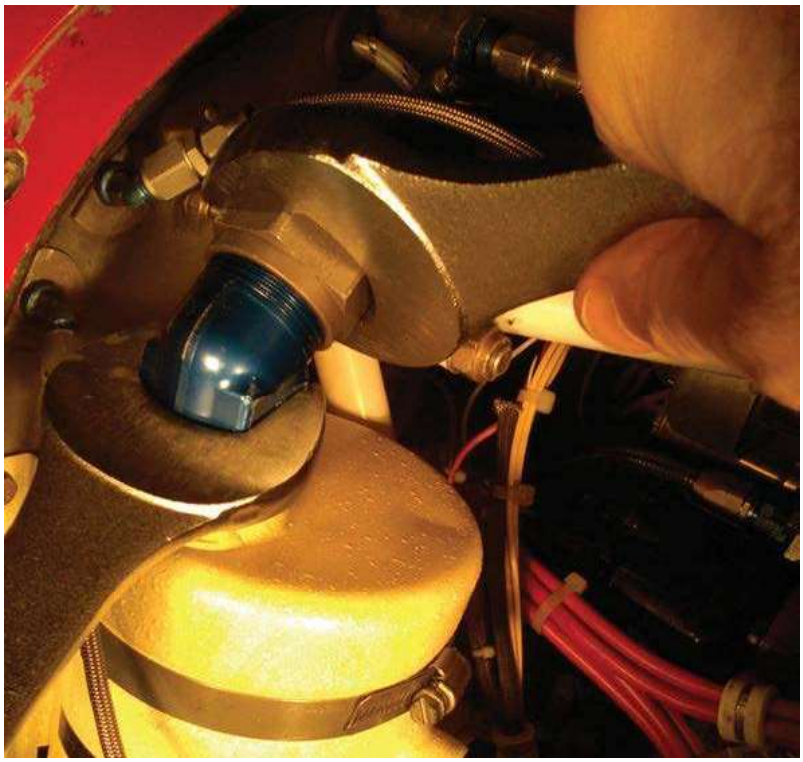
The aha moment occurred a few months after I bought the airplane. I was hanging out with a buddy of mine in the pits at the Sears Point racetrack. He drives an open-wheeled formula car in Sports Car Club of America (SCCA) races. As you can imagine, we compare a lot of notes concerning our individual pursuits. I took the opportunity to look carefully at the plumbing inside of his car. His car has to stand up to the same sorts of punishing conditions as my airplane, so I considered it a great chance to learn something useful and applicable.

No surprise — his car was full of the same AN and MS hardware you will find in any aircraft. However, his car was also full of hardware manufactured to AN and MS standards in configurations I did not see in any aircraft AN and MS component catalog. Welcome to the world of race car components.

As soon as I got home that day, I started downloading and reading race car plumbing catalogs from cover to cover. Transitions to and from AN flared fittings appeared to be a piece of cake. You can do it this way. Or this way. Or that way. I quickly went from no choices to almost too many choices.

What I ended up doing was buying a couple of combinations of fittings that looked like they would work. With the actual parts in hand, it became easy to see what would work the best and

At first, I did not make much progress in finding a solution to the problem. ... The aha moment occurred a few months after I bought the airplane. I was hanging out with a buddy of mine in the pits at the Sears Point racetrack. ... Welcome to the world of race car components.



The wrenches on the separator top fittings.

what would not. I was careful with the unused parts and was able to return them as a result.

I installed the fittings shortly thereafter during my first annual inspection. I am happy to report that I have had the fittings in the airplane for more than eight years now, and they have performed flawlessly. It takes me less than half an hour to remove the separator, flush it out thoroughly with solvent, and reinstall it.

The remainder of this article documents the components that I used in my airplane. The constraints of every airplane are different. If this solution looks interesting to you, I encourage you to use this article as a starting point for how you get it done. The exact components that you choose may be different.

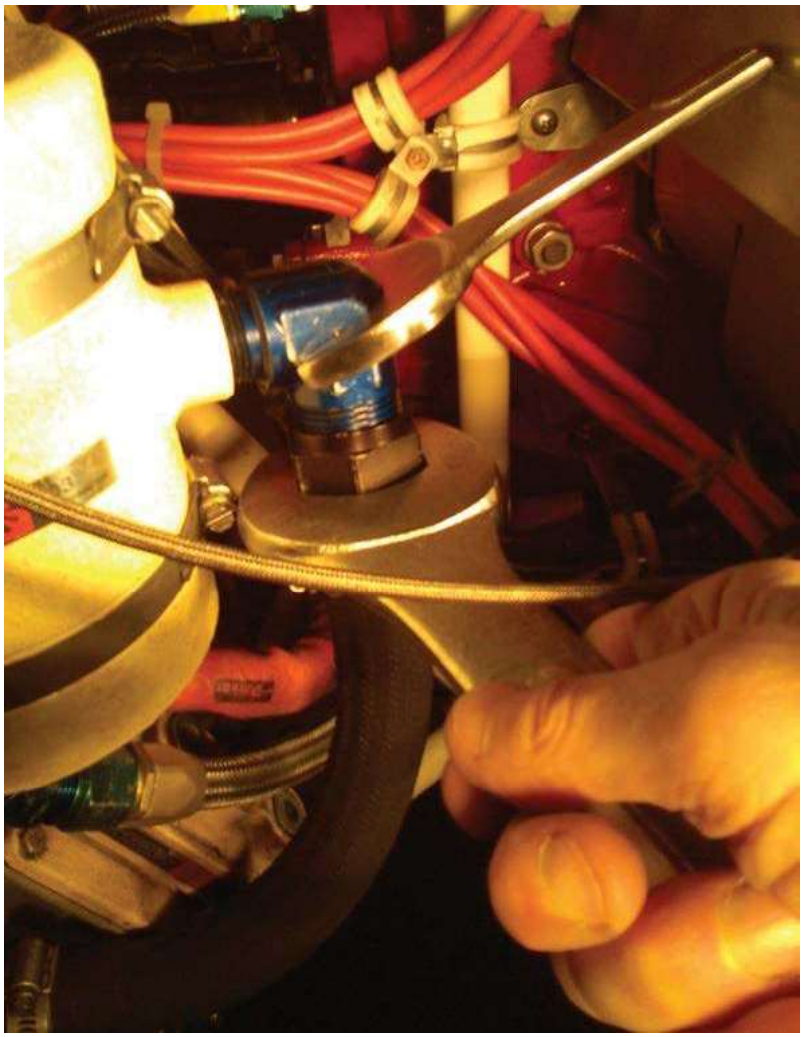
AN fittings are specified in sixteenths-of-an-inch increments. Thus a -16 fitting size is 16/16 inch, or 1 inch. NPT means tapered National Pipe Thread. ID is inside diameter.

XRP is Xtreme Racing Products, and its website is XRP.com.

Earl's is Earl's Performance Plumbing, a division of Holley Performance Products, and its website is Holley.com/Brands/Earls.

I purchased the fittings from ANplumbing.com.

Fly safe. ***IAC+***



The wrenches on the separator side fittings.