Phillip Lockwood et al

To Inject or Not to Inject

This month, Phil Lockwood replies to a reader's question about oil-injection systems on the Rotax 503 engine.

Oil Injection for my 503?

Q. After 10 years of faithful service, I decided to replace my old Rotax 503 with a new one with oil injection. Oil injection was a positive, I thought. Now I'm being cautioned by some to not trust it. I'm temporarily using the injection system, but adding a bit of oil mixed with the fuel.

Should I keep the oil-injection system or remove it and go back to mixing oil? What is the reliability record of the injection system? Help!

Richard H. Snow
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A. The oil-injection system used on two-stroke Rotax aircraft engines works quite well. A lot of people don't use it because, like you, they are uncertain about its reliability. In reality, most oil-injection system failures are caused by mistakes in installation and servicing, not by the oil-injection pump, which has proven to be quite reliable.

Here is how to avoid the most common mistakes:

■ The oil-injection pump does not have the ability to draw oil through the line; therefore, it must be gravity fed all the time. That requires the oil tank to be mounted so that the bottom of the tank remains above the oil-injection pump in all possible flight attitudes, which eliminates the possibility of doing any aerobatic maneuvers.

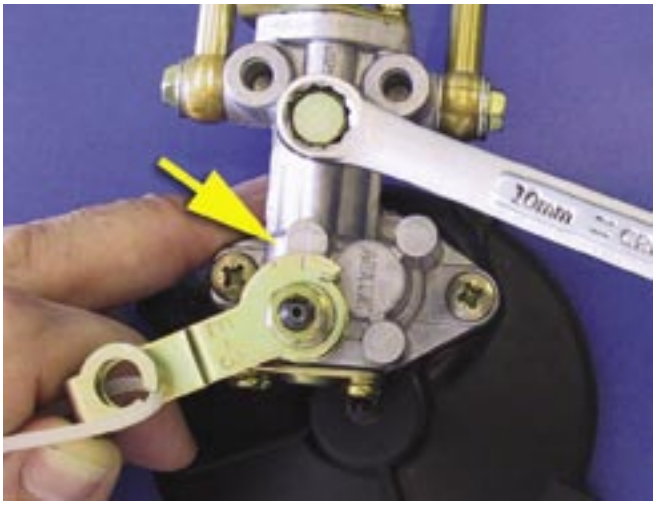
■ Make certain the oil tank is securely mounted. If the mounting brackets fail, so will the system. Several good mounting kits are available, and Rotax makes a nice translucent oil tank.

■ The oil tank must be properly vented. Replacing a vented cap with an unvented one will cause a failure of the system.

■ Use the correct oil filter in the oil feed line. Do not use a paper filter.

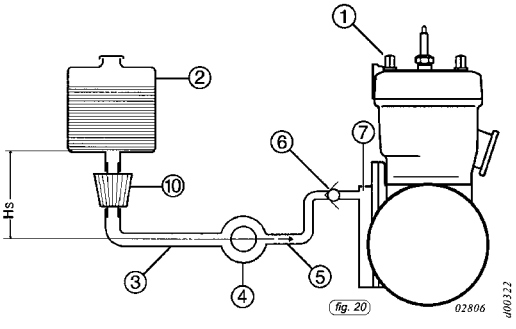
■ Do not mix different oils in the tank. The two-stroke oils designed and recommended for this application, like Pennzoil two-cycle air-cooled engine oil, may gel when mixed with outboard oil and clog the filter, causing the system to fail. If you are *forced* to use a different oil to get home, drain the tank and oil line and refill the tank with one kind of oil before your next flight.

■ Use the venting screw located on the oil-injection pump to remove all air from the oil line after installation or after draining the tank and lines. (See photo.)



This is a Rotax 503 oil-injection pump. The 10 mm wrench is shown here on the venting screw that is used to bleed air from the oil line. The lever is in the correct position for the idle throttle setting with both the hash marks lined up.

Note the oil tank (No. 2 below) is mounted higher than the oil pump (No. 4). The pump can force oil in the line from the pump to the engine; however, it cannot mechanically draw oil from the tank, thus the tank must be mounted higher than the pump. (From Rotax 447, 503, 582 Installation Manual.)



■ Use a 100-to-1 oil mix in your first tank of fuel as a backup until you are sure the system is feeding oil.

■ Check the oil level before each flight and install a low oil warning light in your panel. The Rotax tanks come with a provision for this.

Premixing the oil and gas does work well, but it is not bulletproof, as many who have forgotten to add oil to their gas have proven. Oil injection is a wonderful convenience, and it really is nice when you can fill your tanks with unmixed fuel just like the four-strokes.

For more information, consult pages 12-1 through 12-4 of the *Rotax Installation Manual* for the 447, 503, and 582. This manual can be found on the web at *www.kodiakbs.com*. Click on Tech Info and then under Engine Manuals click on 447 503 582 Installation Manual.

Phil Lockwood

Rotax Seminars at Copperstate EAA Fly-In

Phil Lockwood of Lockwood Aviation Supply will be presenting two Rotax engine seminars at the Copperstate Regional EAA Fly-In, October 7-10.
- On Friday, October 8, he will discuss two-stroke maintenance at 11:00 a.m. in forum tent 2.
- On Saturday, October 9, he will discuss four-stroke engine maintenance at 10:00 a.m. in forum tent 3.

Engine Q&As

A reader responds to Ray Hoffmaster's problems with his Hirth F-23 engine, as reported in the July issue.

In thinking about your engine problems, I am wondering:

1. The problem of low rpm seems to have appeared only following your replacement of the rectifier.

If this is correct, then we can proceed to ask:

2. Have you compared your tachometer with another, either mechanical or optical, to confirm that the 4500 is a correct reading? If not, then that is where to start. Also, some two-stroke tachometers are driven by the ignition primary pulse (I do not believe in this approach for safety reasons), while others (like the KFM two-stroke and most diesels) are driven from alternators counting the pole pulses. A misconnected tach, in either case, is usually a candidate for your memento shelf. It shouldn't be used again. Before you can diagnose anything, you need to know if the tach reading is accurate.

3. Have you changed anything else? Yes, it seems the new gearbox. Then look for problems related to that change. Traditionally, it is best to only make one change at a time, and then test.

4. Your third point seems unrelated to your symptoms. The redrive ratio does not have any effect here, especially considering a 1000 rpm or 20-percent drop in engine speed.

You also mention "spring." I'm assuming the engine was stored for winter. Was it properly "pickled" for winter? Torello's suggestion comes into play

here; old fuel remaining in the carb, fuel filter, and fuel lines are classic causes of the problems Ray described.

What is the 5500 rpm number? It seems low for rated horsepower; two-strokes usually run higher to develop rated horsepower. Shouldn't yours? Now, to add further confusion, look on your engine's power/rpm charts and see what horsepower is developed at 4500 rpm. Most likely it's a 35-percent power reduction from peak power.

Now for the big question, what does the Hirth importer have to say? They should be able to give some help.

Don Black
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Will a Mikuni Carb Work?

Q. I have a new Mikuni butterfly valve carburetor that has been jetted for a 430-cc Cuyuna two-stroke engine. I would like to put it on a 1600-cc VW engine. I know I will have to find a bigger main jet, but do you think it will work?

Also, what about using a stock VW carb on top because I don't have a lot of room under the fuselage for a carb?

Phil Richey
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A. If you use the Mikuni carb, try to allow for modification to a different carburetor if the results do not please you.

Our VW engines (when properly matched to a propeller) like to run between 3000 to 3500 rpm. Two-cycle engines turn around 7000 to 8000 rpm, so the volumetric dynamic will be quite different, in spite of jetting corrections. Give the Mikuni a try, and you can always switch carburetors.

Automotive carburetors run up to 5000 rpm, so you still may have problems using one of those. I like the stationary engine concept as it anticipates 1800 to 3600 rpm (constant speed concept), and carburetors for this kind of application work best in aircraft installations. Without a reduction drive, hot-rod stuff tends to disappoint us when we try to apply it to aircraft applications.

Bill Bronson

Each month in Power ON, **Phillip Lockwood**, president of Lockwood Aviation Repair, will address common Rotax engine maintenance or operation issues. In addition, readers are invited to send their questions about various alternative engines to our panel of engine "answer men" or to editorial@eaa.org, or

- For HKS engines, write **Dana Persiani**, danapersiani@yahoo.com.
- For 1/2 VW engines, write **Bill Bronson**, onehalfvwguy@worldnet.att.net.
- For Corvair engines, write **William Wynne**, WilliamTCA,@aol.com.
- For Subaru engines, write **Don Bouchard**, dbouchard@earthlink.net.
- For Hirth engines, write **Matt Dandar**, rpe@bpsom.com.
- For (non-Rotax) two-stroke engines, write **Torello Tacchi**, tacchi88@bellsouth.net

We'll reprint questions and answers of interest in upcoming Power ON columns.