

Portland Area RV Builder's Group Newsletter

Issue 92.6

February 1993

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January Meeting:

Our January meeting was combined with EAA chapter 105 in their new hangar at Twin Oaks Airpark. I saw lots of new faces at the EAA meeting. I think the move to Twin Oaks will really pump up the enthusiasm in the local chapter. I encourage all you RV builders to also be active in the EAA chapter.

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Next Meeting

Place: Lewis Aviation
3565 NE Cornell Road, Hillsboro
At the HIO airport. Fly or Drive!

Date: Thursday, Feb 11th

Time: 7:00 PM

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Calendar & Miscellaneous

- Don't forget, EAA Chapter 105 meetings are every month on the third Thursday, 7:00 PM. Twin Oaks airpark.

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Builders Tips

Brent Ohlgren has access to some construction foam that is perfect for cutting to the size of your wingtips. You just fit it inside the wingtip and it will hold the shape as you fit it to the wing. Also is probably a good idea to store your wingtips with these in place to hold the shape. Talk to Brent at the next meeting and give him \$4 if you want enough for both wings...

Fueling Your RV — — Doug Buchanan. From the Van's Airforce Ontario Wing newsletter. Article is attached.

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Address List

I plan on publishing a list of all our members in the near future. Problem is, I am quite sure that a lot of the data is pretty much out of date. I would like to get current information on everybody. So, take 5 minutes and fill out the attached form. Rip it off and send it to me — — or just give it to me at the next meeting. Thanks

FUELING YOUR RV

Doug Buchanan

Background:

Model: RV4 - C-GOMB/Serial #94
First Flight: September 1987
Engine: Lycoming O-320E2D
(High time 1960 hours logged)
Top overhaul after 52 hours of flight
Propeller: Cassidy 69P x 68D

As everyone knows RV's are a joy to fly. Mine was no exception, although during the first year of abundant joy I found it tough to cover the weekly fuel bill and thought I could save a few dollars if I used autogas. I, like a few of my friends who also flew RV's, experimented with this alternate fuel. On looking back we should have discussed our experimenting prior to proceeding. I believe we all experienced problems, some similar, some different, and this article will describe mine and the solution I came up with.

With one tank filled with autogas I went flying. It was a warm spring day so to test the fuel I did circuits. The first two were uneventful, but on the third take off roll the engine stopped abruptly, about 50 feet down the runway. After considerable fiddling a restart was accomplished using the other tank filled with 80-87 AVgas. Time to reconsider! Obviously vapor lock caused engine stoppage, caused by ground taxi between circuits!? Cure - take off on AVGAS, climb to altitude (cooler air) and all would be well on autogas.

This appeared to be the answer. After an hour or two confidence level is increasing. Let's try some performance climb tests. All right! Confidence level now peaking. Six thousand to nine thousand feet - at 80 IAS - level out - engine running smoothly. Then IT happened. The fuel pressure gauge flickered, then pegged at the top of the scale (12 psi) and the engine quit! Silence is deafening. Boost pump on - change to other tank (80-87) - should be no problem. Altitude now eight thousand feet - what is best glide? Seven thousand feet - pump throttle - fuel pressure gauge still pegged. Six thousand feet - damn, it's been quiet for a long time. Five thousand feet - still nothing - recheck selector valve - boost pump making a clunking noise - a tappet is knocking in the engine (empty fuel pump). Four thousand feet - maybe the problem is not fuel (fuel gauge is still pegged). Three thousand feet - pick a place to land! Confidence level is zero! Bright idea: the primer! Possibly partial power could be accomplished if it is full. Wow! The primer just about flew apart, the plunger pushed back the instant it was unlocked. Now five hundred feet AGL and engine is making funny putt sounds - the boost pump changed tone - the noisy tappet shut up and -JOY - almost full power! Full power as soon as I closed the primer - whew! Fly home - drain out autogas - fill with Avgas. FLY FOR FUN - FORGET AUTOGAS!

Now a strange thing started to happen some time later. The oil companies started a rumor that 80-87 fuel was costly to make and engine companies who specified this fuel did not know what they were talking about. One hundred low-lead arrived and 80-87 was hard to find. So, being a believer, as nobody in authority argued, I began filling my RV with 100LL right through the decal that stated 80-87 only. A rough engine was now something you lived with. Additives helped a little, and frequent plug changes seemed to keep all in order until May 1991, at which time, upon returning from a meet I attended to promote RV's I noticed a soft cylinder. Further examination turned up three soft cylinders! OH! \$\$\$\$! Disassembly found three pistons with stuck rings and funny ring-barrel wear patterns. 195 hours on a top overhaul is not cost effective!

What went wrong? Analysis by experts concluded that lead was the offender. Apparently, so I am told by the experts, a 150 HP engine, in a clean 900 lb. airframe, doesn't have to work too hard if you like to diddle along admiring the countryside. If the engine isn't hammering out horsepower then the excess lead in 100LL does not go out the exhaust pipe as it should. It will jam rings, cause wear problems, break down oil and destroy a perfectly good engine! The oil companies lied, the engine companies were afraid to caution us, and I was faced with a complete overhaul.

Now everyone knows RV fliers are in seventh heaven in the good weather. All RV builders go to airports and hitch rides in RV's during the summer. Here it is - May - I'm grounded and I'm MAD! Lots of time though, because engine overhauls take two things...time and money...it was October before first flight with zero-time engine. So to use my time productively, consider a project: convert to propane? Natural gas? Let's have another look at autogas. The local library had some interesting books on fuel systems used in WW2 airplanes in extreme climates. I soaked up all the information I could find, made notes, and a glimmer of an idea started forming. Snowmobiles have fuel recirculating systems, so do some cars. Why? Some WW2 warbirds could not operate in extremely hot climates due to vapor lock problems. Sound familiar? Some were equipped with condenser coolers on the return system. Virtually all jet engines have recirculating systems. Why not RV's?

- (1) Install a tee at carburetor.
(See drawing courtesy of Keith Fletcher.)
- (2) Insert a .028" gas orifice in return fitting (gas furnace burner orifice - View A).
- (3) 3/16" flex to firewall
- (4) 3/16" aluminum tube to tank (with shut-off valve).
- (5) 12' coil of 3/16" aluminum tube in left fuel tank (first bay "D" section).
- (6) Secure in place with PRC compound.
- (7) Check fuel system components for autogas reaction.

Test, test, and retest - October 1991 to October 1992. I now have 90 hours on mostly regular autogas (the only exception has been Avgas when autogas was not available), with the following results:

- (1) Smooth engine operation.
- (2) Clean plugs!
- (3) 100% confidence level in autogas with modified fuel system in RV4.
- (4) Fuel savings more than I expected.
- (5) By turning off vapour-recirc system I can duplicate vapour lock problems but can correct in 30 seconds by turning system back on.

NOTES:

- 1) Autogas appears to have more energy - more time in the tank than Avgas.

- 2) If you fly 100 hours per year:

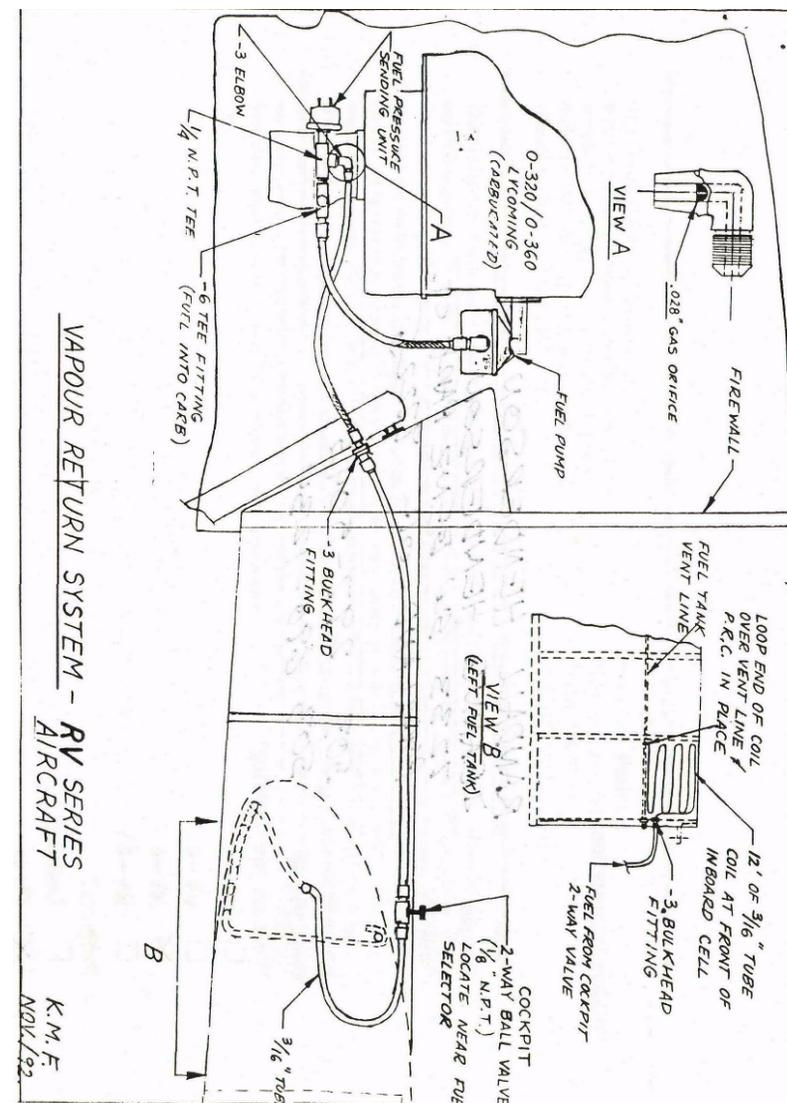
Avgas	0.80 - 0.90 per litre x 100 hours x 29LPH =	\$2320 to \$2610
Autogas	0.49 - 0.55 per litre less tax rebate	
	0.37 - 0.43 per litre x 100 hours x 29LPH =	\$1073 to \$1247
	ANNUAL SAVINGS:	\$1247 to \$1363

- 3) Vapor Lock tests: circuits, full stop, taxi back to threshold 70f+ spring gas, usually 50-60' into the takeoff roll.

Climb:	80 MPH Indicated
4000' to 9000'	70f + ground temperature, spring gas. Problem usually shows up 6000 to 6500'.

- 3) Comments by other RVators:
 - a. Move the Gascolator from the conventional firewall location to inside the fuselage belly near the boost pump.
 - b. Blast tube the engine mounted fuel pump.
 - c. Firesleeve fuel lines firewall to carburetor.

Many thanks to many RVators who encouraged this project and offered their help and suggestions. Gasoline is a rapidly change fuel that could be very different in a few years. I believe that higher octane autogas will work well in higher compression aero engines but thorough, controlled testing is imperative. Happy RV-ating!



Builders Information:

Name:

Spouse:

Address:

Home Phone:.

Work Phone:

What are you Building?

- RV-3
- RV-4
- RV-6
- RV-6A

Progress?

- Looking
- Plans
- Tail
- Wings
- Fuse
- Finishing
- Flying!

Other Information, are you flying anything now? Have you built any airplanes before? Anything else interesting?

- I Would be willing to host a meeting! — — When?*

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