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NEWSLETTER

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**** A monthly publication for communication between KR builders and pilots world wide.****
Edited & published by Ernest Koppe, 6141 Choctaw Dr., Westminster, CA 92683 714-897-2677

How reliable is the VW when used as an aircraft engine? I can't count the number of times I've been asked that question recently. The answer....? It hasn't changed. A good VW conversion is a very reliable engine when, and only when it has been properly installed. I don't mean just bolted to the firewall safely, I mean installed so that the engine gets a continuous supply of air, fuel and is adequately cooled.

All of us are aware of how important the inside of our engines are but I am finding a large number of builders that think its only what's inside the engine that counts. This is a very short-sighted viewpoint and will lead to an engine failure sooner or later, most probably sooner.

Where does a reliable engine installation begin? It begins with the systems that supply that engine and the first system built into our KR's is the fuel system. Many builders think the fuel system is simply a matter of a tank with a fuel outlet to the carburetor. This is basically true but we want to insure the fuel reaches the carburetor in a continuous manner.

My first concern is placement of the filler, vent and sump. All probable attitudes of the aircraft should be considered when locating these three items.

We all know fuel expands and contracts with temperature changes so this must be kept in mind when installing the filler. Ideal spot in a KR is top center, about 3" from aft end of fuel tank. This will leave an "expansion chamber" on the forward portion of the tank that allows for temperature changes when the tank is filled with the aircraft in a 3 point attitude.

The vent should be located as far forward and as high on the tank as practical. I usually put them on top, center, about 1" from the forward tank wall. A 1/4" thin wall tube works very nicely for the vent when bent 90° to face forward about 1" above the outer surface. Gary Boyd used the water pick-up off a R.C. motor boat for his vent pipe. Its' all chrome and gives a "finished" touch to the vents appearance.

The fuel sump/outlet should be located at the lowest point of the fuel tank. All flight attitudes must be considered when placing the fuel outlet but special emphasis should be placed on the climb configuration. We don't want to be starved for fuel in a nose down attitude though. I form the fuel tanks to take these factors into account but many builders are using the pre-molded fiberglass fuel tank. The sump in this tank is approximately in the center and slightly aft. At the bottom of the sump I epoxy a brass tank flange (available at hardware or plumbing supply stores) to accept a brass pipe thread reducer with a finger strainer.

A finger strainer should be considered mandatory for any fuel tank outlet. To make one, roll a 3"x 1 1/2" piece of brass or copper screen into a cylinder. Crimp one end and solder along the seam and the crimped end. Solder this to the pipe thread reducer and screw into the tank flange.

The fuel shut-off valve screws into the assembly you just completed. (Double check to make sure it is accessible from the pilot's seat. Starting a VW engine that has a POSA carb is difficult without a fuel shut-off valve to prevent flooding.) Should you elect to use an aircraft fuel valve, make sure the fuel line fittings are aircraft type also. Combining automotive and aircraft fittings is asking for fuel line leaks due to the different angles of the flared fittings. Use a 5/16" soft aluminum tubing (5052-0) from the fuel valve to a gascolator mounted on the firewall. Always use a gascolator!! I mount the gascolator at the lowest possible position on the firewall and still be inside the cowling. (Make sure it is well away from exhaust pipes.)

The fuel line from the gascolator to the carb should be a flexible, fuel resistant hose. Vibration will "work harden" a metal fuel line installed between these two points.

Well, there is your fuel system, or at least my version of a fuel system. It is basic and contains what I consider the fewest possible parts without jeopardizing safety and dependability. We'll discuss cooling the engine in a following Newsletter, meanwhile if you have anything to add to this article on fuel systems or ideas on cooling the engine, drop me a line.

Ernest Kopye

TIPS FROM OTHER BUILDERS

Just a note on Continental powered KR-2s. My G-75 is "on the mount".

The engine weighed 130#s as it was bolted on, it was pretty well stripped though. Two Slick mags add 10#, prop hub 5#, induction system 6#, Carb 4#, oil sump 7#, and exhaust system 10#. In any case it weighs somewhat close to what a VW weighs. A belt drive is going to drive my generator.

Reason for going Continental? Compare the power curves, time between overhaul, cost to acquire, and reliability. I hope to use a Valoof ground adjustable prop.

I feel the mount is critical and that builders should beware. If any of the KR builders have inquiries, you may give them my address. The info is free, but send a S.A.S.E. please.....Duane Aspengren, 81 E. Whitney St., Chula Vista, CA 92010 (714)420-9791.

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FOR SALE...KR-2 project. Value over \$1730.00. Excellent workmanship. Asking \$1495.00. Jack Montague, 5609 Cochin, Arcadia, CA 91006, or phone (eves) (213)575-4601 no collect.

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FOR SALE...KR-2 project. On its wheels, all controls installed, some fiberglass work done, have all instruments including Genave Beta/5000 transponder and GA/1000 Nav Com plus 2100 Revmaster. Have put over \$7400.00 in parts and materials. Gilbert F. Shue, 1372 Kitchen Rd., Pinconning, MI 48650 or phone (517) 697-5183 after 5 pm.

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Ernest Koppe

6141 Choctaw Dr.

Westminster, CA 92683

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(918)492-5111.

HEY GUYS!

Do you buy parts & supplies from a
business that the rest of the KR
builders might benefit knowing
about? Would it benefit that
business to have the thousands of
KR builders as potential customers?
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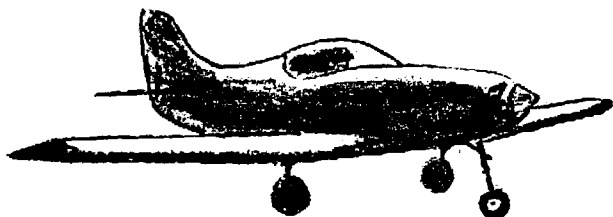
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FOR SALE...KR-2 project. Fuselage
built, on gear, spars signed off.
Stab/elev. covered, Rand Engine
mount, canopy, all foam, fabric
and epoxy to complete..\$1200.00.
Gary Thompson, 235 Ben St.,
Williamson, WV (304)235-1653 eves.

FOR SALE...KR-2 project, 60% completed.
Major part of controls installed.
Outer wing panels to be constructed,
outer spars finished and all has been
certified, excellent workmanship, tinted
canopy, new 2100 Revmaster and mount,
Dynel and foam to finish...\$4000.00
invested. Contact Mike (416)922-6091,
Toronto, Ontario Canada.



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HELP!

I want to rent a motorhome in the Oshkosh vicinity during the E.A.A. Convention this summer. Prefer within 25 mile radius of Oshkosh but Milwaukee area O.K. If you have a motorhome for rent (or know of one) please send the information to me. Many thanks.

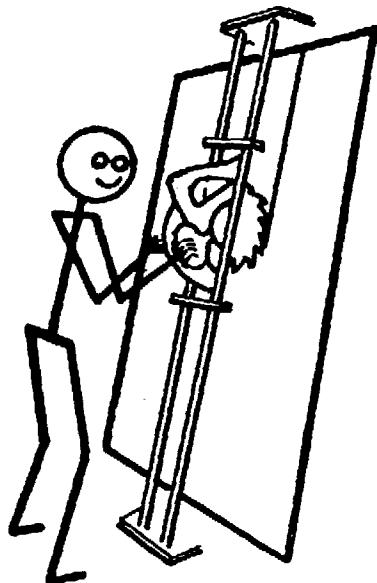
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KR CLUB NEWS

Good news! The KR Club in the San Francisco area is alive and well. Right now they are gathering slides of KR's under construction and will assemble them in a "how to" slide program on building a KR. If you have some slides of your KR under construction you could share...send them to Lisle Knight, 33 Farnum, San Francisco, CA 94131 or phone (415)239-0536. Meetings are on the 1st Tuesday each month, call Lisle to get the location.

The L.A. area KR Club meets this month at Steve Collins, 9131 Healey Dr., Garden Grove, CA 92641, 2nd Monday at 7:30 pm. Paul Venne says he is bringing some slides and I'll bring the slides of Gary Boyd's airplane at 4000' over Corona.

The Kansas KR Club meets Saturday, March 8th at the home of Bob Brice-Nash, 324 Kansas, Hutchinson, KS 67501. They meet every two months at a different member's project.

I hear Ron Sorrell is trying to get a group of KR's to make the trip to the Lakeland Florida "Sun-N-Fun" Fly-in. Contact Ron at 6505 Sassafras Dr., Independence, KY 41051 phone (606)356-6242. Rand/Robinson is going to have the KR-1B and the KR-3 at Lakeland (March 16-22) so there should be something for the KR buffs to see.

Chino, (April 26 & 27) has always drawn more KR's than any other fly-in and this year promises to be the greatest KR gathering ever. Ray Ellis, Steve Bennett, and Dan Diehl are flying their KR's here from the east and are looking for more company. If you want to join the flight, contact them at the addresses below. There will be 15 to 20 KR's at Chino this year, an amazing turnout for a two day show. Oh, yes, Bill DeFreze will be coming to Chino from up north by motorhome. He is bringing his tri-gear KR on a trailer. Contact him if you wish to join the caravan. Don't forget..free banquet tickets to all KR owner/pilots flying their KR's to Chino.

Rialto California is having their 2nd annual airshow, etc. at the Rialto Airport on May 31-June 1.

REMINDER.....There are five KR Designees... all willing to help you with your problems. We've all built and flown at least one KR and we've helped on dozens of others. Below are our names, addresses and phone numbers. Call or write the designee nearest you (or all of us for that matter). We can help!

Bill DeFreze
7530 Ironwood Dr.
Dublin, CA 94566
(415) 828-2111

Dan Diehl
4132 E. 72nd St.
Tulsa, OK 74136
(918) 492-5111

Ray Ellis
2416 E. Douglas
Des Moines, IA 50317
(515) 265-3007

Ron Sorrell
6505 Sassafras Dr.
Independence, KY 41051
(606) 356-6242

Ernest Koppe
6141 Choctaw Dr.
Westminster, CA 92683
(714) 897-2677

QUESTIONS & ANSWERS

- Q. Could you list the engines other than VW KR builders are using and the amount of success they're having? How about the RW 100?
- A. I ran a survey some few issues back and was really surprised at the varied selection of engines. There were several Corvair and Mazda conversions planned, many Lycoming and Continentals from 65 to 100 hp and a few McCulloch drone engines. None of these engines have performed any better than a good VW conversion however.
- Q. How do you adjust the R/R 3-blade prop for a faster cruise?
- A. Loosen the clamps on the prop hub, and the bolts holding the hub to the prop flange. You will need a protractor level and a straight flat stick to gauge the position in a manner you can repeat exactly with each blade. Twist the blade clockwise slightly and check this new angle with the protractor on the flat side of the blade. Tighten the clamp to hold the blade in this position. Repeat this procedure with the other two blades, then re-torque all bolts and clamps per instructions with prop. The static rpm for best cruise will be approx. 2900. You will have to experiment to find what is best for your engine.
- Q. Where can I get a larger spinner and back-up plate for the Maloof prop?
- A. Most supply houses listed in "Sport Aviation" carry spinners, I know Aircraft Spruce & Specialty does. Their address is Box 424, Fullerton, CA 92632.

Dan Diehl probably has more hours in a Turbocharged KR-2 than anyone else at present and is in a position to compare the turbo performance with an engine that is normally aspirated. He wrote this article to help answer the many questions he gets about his Turbo KR-2 performance. Dan has also promised a full "how to" article on installing a turbo on the VW conversions, complete with photos, hopefully in the next Newsletter.

TURBOCHARGING--IS IT FOR ME?

There has been a lot of talk lately about turbocharging. Many questions have been asked, many answers are given. With over 600 hours on N400, over 100 hours since installation of the turbo, I will try to give some comparative comments on performance that may help you decide whether or not you want it. In your decision making process, you should ask yourself these questions: 1. What do I want to do with the airplane? Do I want it for a lot of cross country flights or simply fly around the patch on 100-150 mile trips or less? 2. Do I plan to fly at 3000' or 10,000'? 3. Am I after a high initial climb or high cruise speed? 4. Do I usually take off from my home base at 600' or 5,000'? 5. How complex do I want the airplane to get and am I experienced enough for it? And finally, 6. How much money do I want to spend on the power plant?

These were the questions that entered my mind in March '79. I had flown the KR-2 for four years with the normally aspirated 2180 cc VW. I became very familiar with its handling characteristics and performance. A number of long distance trips were made as well as many 15 minute short hops to shake off the dust. One hot 105^o day, I even took the KR-2 up to 16,000' to find cooler air and found that the plane was still climbing at 300' per minute! As my barefoot toes became brittle and my teeth began to rattle, I pulled the power from 30 miles out and still crossed the airport at 5500'. Loops and rolls became routine. Diving high speed passes were made for the many spectators.

As time went on I found I was going on more and more cross country trips and less and less on the 15 minute hops. It was then I decided to try turbocharging to learn and experience a whole new type of flying. After some research I realized that my engine would require some modifications before installing the turbo. The engine was torn down after nearly 500 hrs. of trouble free service. The welded stroker crank (thought to be better than a cast one as forged cranks were not available in '75 when the engine was built) showed less than 2/10 wear, bearings looked good, case journals in fine shape, pistons and cylinders good. I felt I had a good engine. In putting it back together all I would do would be reduce the compression from 8.5^o to 7.0 -1, install stainless exhaust valves, change the cam from .410 lift and 285^o duration to .390 lift and 275^o duration, install new rings and bearings and I would be in shape. With the engine and turbo installed, I ran into some problems while test running the engine...primarily with oil in the turbo. Oil kept coming out of the exhaust pipe. After I finally thought I had the problem solved, flight testing showed I did not. More research! Because of the low mounting position of the turbo and internal pressures within the engine the oil just would not drain back into the engine. Consumption (or loss) of about one quart per hour was common. I've been told that if I had given the turbo more time to break in it would reduce this amount. After discussing the problem with the guys at Revmaster and Scat I learned that a scavenge pump was necessary to put the oil back in the engine instead of on the bottom of the airplane. The pump solved the problem. About another ten or more hrs. were flown before I headed for Chino. The prop was left as was before the turbo. I found that at altitude I could only run about 20-21" manifold pressure to avoid over revving. While cruising at 12,000' 20" m.p., the crank broke and most know the rest of the story. Obviously at this power and 3300 rpm, the turbo played no part in the fracture. I returned home in a borrowed Cessna 150 with the bad engine in the passenger seat and returned with a spare engine from my new airplane. This engine is still running fine. Now with over 100 hrs. I have had time to experiment with prop settings, oils, power settings and can supply a good set of comparative performances. I might add that I change the oil and adjust the valves every 25 hrs. A chemical oil analysis has been run on each oil change to get a comparison with the original engine. After the first oil change and break-in wear, the results showed at 100 hrs. about the same as the original at 400 hrs., so less wear is showing up. On the next page is a comparative list showing both engines' performance:

2180 cc VW in KR-2 at 800 pounds

NORMALLY ASPIRATED		TURBO CHARGED
R/C 600' alt.	1800-2000 ft/min	1200-1300 ft/min
R/C 5000' alt.	800-900 ft/min	1100-1200 ft/min
T/O dist. 600' alt.	Somewhat less than turbo	
T/O dist. 5000' alt.		Almost half non turbo
Cruise spd. 3000'	160 IAS 3400 RPM	160 IAS 3100 RPM
Cruise spd. 10,000'	125 IAS 3400 RPM	160 IAS 3400 RPM
Fuel consumption at cruise	3.9-4.0 g/hr	4.4-4.5 g/hr
Oil temp. at cruise	190°	195° - 205°
Cyl. head temp at cruise	350°	375° - 400°

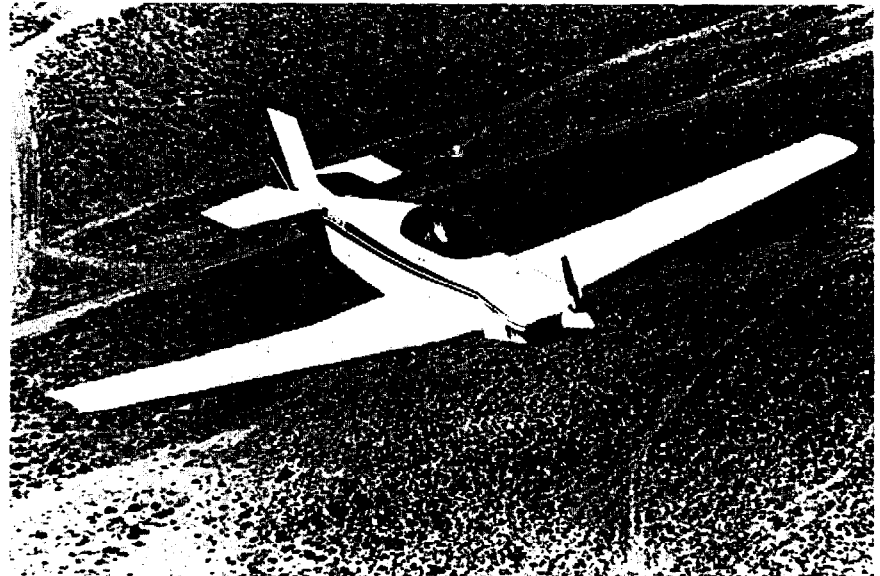
It should be noted that my airspeed has been found to be slow. So figures should be used for comparison only and not for actual speed. Note the decrease in climb at lower altitude. This is due to the much greater pitch in the prop for high altitude performance. Also, these figures are for 30"m.p. Similar climb rates are possible for VERY SHORT duration with 35-40" m/p/ By overboosting, the engine will put out more power than the non-turbo. These burst should be limited to emergency obstacle clearance only for about 15 seconds maximum. Climb from Colorado Springs or Albuquerque is far better with the turbo. Note the difference between cruise at 3000' and 10,000' and also the RPM. The higher pitch prop comes in handy up high. The difference in the prop setting is at full throttle non-turbo static RPM is 3000, at 30"m.p. with turbo, static RPM is 2750. It was also found that a 1" shorter prop on the turbo version let me increase the pitch much higher.

In summary, I would have to say that the turbo has taken some of the fun from the low altitude loops and rolls and 15 minute hops to the local grass strip, but since I don't do this much anymore, the great performance increase at cruise has really been appreciated on the long trips to Oshkosh, Tennessee, Indiana, Colorado, south Texas, Nebraska, etc. Actual cost of the turbo installation will run around \$500-600 depending on your cost of the plating on the pipes and type of oil lines used on the turbo and scavenge pump. I hope these comments will interest you and draw to your attention the advantages and disadvantages of the turbo. Please feel free to call or write if I can answer any more of your questions.

Dan Diehl, 4132 E. 72nd St. Tulsa, OK 74136 (918)492-5111.

The KR-1B has been sign-off by the FAA to give demo flights anywhere in the country. This photo was taken by Don Dwiggins over Mojave, CA. Pilot is Jim Loudon, a KR-2 builder currently employed by R/R to work on the KR-3.

Plans for the long wing modification to the KR-1 are \$30.00 from R/R. They're to be used with the regular KR-1 plans which are \$55.00.



TIPS FROM OTHER BUILDERS

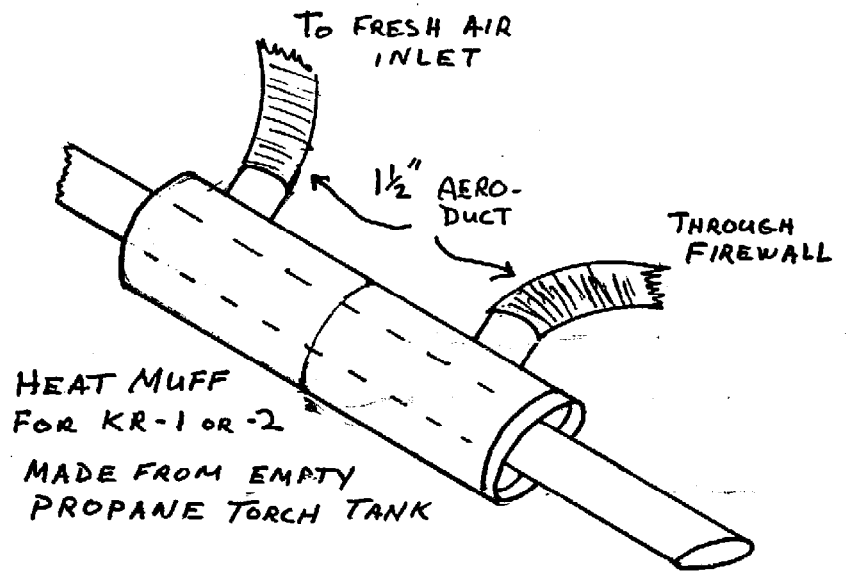
Ray Ellis
2416 E Douglas Des Moines, IA 50317

I'm sending along a couple of ideas for the Newsletter. They may help someone to fly a little more in winter weather.

I've got my KR-1 home in the shop this week. Installed the pump and plumbing for the wing tanks. I've never used them since the plane was finished but have an idea they'll be put to use on the trip to Chino.

We're flying here in weather even below 0° and stay warm. Try and avoid the inlet blowing directly on your feet as it is hot.

Pre-heat. Try a 1200 watt hair dryer such as the Pro Mac or the like. Scoot it in through one of the inlets on top of the engine and stuff a shop towel in each opening. 15-20 minutes will do the job. We're really looking forward to the Chino fly-in. The trip ought to be fun.



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