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KR-1 KR-2
NEWSLETTER

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February 1976

There are so many things happening this month I don't know where to start. First I guess is the news from Rand/Robinson. A new item is being added to the long list of parts available to KR builders. It is something as new as you would expect from the designers of the KR-1 and KR-2...a THREE BLADE, GROUND ADJUSTABLE PROPELLER FOR VW POWERED AIR CRAFT...not new you say? Well, here's the good part. It is composed of one of the new space-age plastics, light and incredibly strong. Injection molded (no long waiting list for delivery) so each blade is identical and interchangeable. A dinged blade doesn't mean replacing the whole prop. Production will begin as soon as testing and analysis is complete. Price for the prop \$190.00. Replacement blades are expected to be \$40.00 each. First delivery date is March 1976.

As you probably noticed from the last newsletter, the new KR-1 plans are out. The \$45.00 price tag is higher than expected, but necessary to help cover rising cost. However, if you purchased an earlier set of KR-1 plans, you can get the new plans for the difference in price. Just send in the serial number of your old plans or the date you purchased them. DO NOT SEND IN THE OLD PLANS. The new plans are of the same format as the KR-2 plans but more complete.

Another item of interest...new modifications to the KR-2. Finished just in time for the Lakeland, Florida fly-in was the installation of a Rajay turbo charger. The 1834 engine didn't get the dramatic hp increase a turbo charger gives a stock 1600 but it did give a 5 hp increase and raised the service ceiling to the plus side of 20,000 ft. It hasn't been flown that high yet, but Ken has installed a transponder so I expect it anytime. Oxygen anyone?

The engine article is from Wallace Mynatt Rt. 1 Box 44 Abilene, TX 79601. Wally volunteered the very fine article and with some encouragement I'm sure we could get more. Drop him a note if you have any questions.

Two things to keep in mind when building up your own engine (1) Use first quality parts...(2) Make sure any machine work is done by a reputable shop, preferably experienced with VW engines.

QUESTIONS & ANSWERS

- Q. I've been hearing a lot of stories about the landing gear castings. How could they be beefed up?
- A. The castings are strong enough to support design gross weight by a safe margin. The problems start when lightening holes are used. If your project is going to gain weight thru modifications, DON'T USE LIGHTENING HOLES!
- Q. What kind of glue are other guys using on their spruce?
- A. Most popular and easiest to use is R/R epoxy. Weldwood resin, Aero-lite and Hughes epoxy are also used.
- Q. Has anyone looked into STOL of any type...i.e.Fowler or Kruger flaps with shortened wing span--GA(PC)-1 wing with "flaperons"?
- A. The KR plans already have good short field performance so complicated Fowler and Kruger type flaps are not necessary. The GA(PC)-1 might have good possibilities.
- Q. Do I have to balance all control surfaces for a 200 mph red line?
- A. No, just ailerons.

V.W. ENGINES FOR AIRPLANES

By Wallace Mynatt

In building up the VW engine for use in an airplane you as the home-builder must make the final decision as to size and quality of your engine. With this in mind the following mixture of information is yours to use, pick over, or disregard.

Most of the KR-1 and KR-2 airplanes will use between 1500cc to 2180cc engines. A few Type IVs are being used also. All of these engines should be checked out by the users. Weak points to look for in the VW are the valves...they should be changed along with the valve guides. Stock parts are fine, but sodium filled valves are best if you can locate them.

While we are looking at the heads, check them for cracks. Any cracked head should be replaced. It can't be fixed right. Also you may consider "rocker buttons". These are swivel ball sockets which replace the stock VW valve adjusting screws. These provide constant surface contact through the swivel head and eliminate binding and chewing up of valve stem ends.

A good idea is to change from the stock oil pump to a large volume oil pump. This will help prevent oil starvation to the main and rod bearings. We all know what happens when something stops in this area! If you take the time to open the case, new bearings would go back regardless of the time on these bearings. This holds true for the rings also. Stock parts are fine in this area too.

Your crankshaft should be magnifluxed at this time, and if you intend to use a tapered shaft you will want to have this done also. If a crank is found to need turning, it would be best to find a new one. If your finances won't allow you to buy one, the VW crank can be turned 10/10 without any loss in reliability. (Don't skip the Magnaflux here.). Also do not buy a crankshaft which has been built up then turned to standard. These built up welds can soften and cause engine failure.

Engine sizes and parts needed

The most reliable engines are probably the stock 1500cc and 1600cc VW. I believe the 1600cc dual port head engine will do a good job in either KR plane. But for you fellows who have to have starters, air-conditioning, and living room sofas in your KR's, then the 1834cc-2180cc might be recommended. Keep your plane light and these larger engines will make you look like Rand himself.

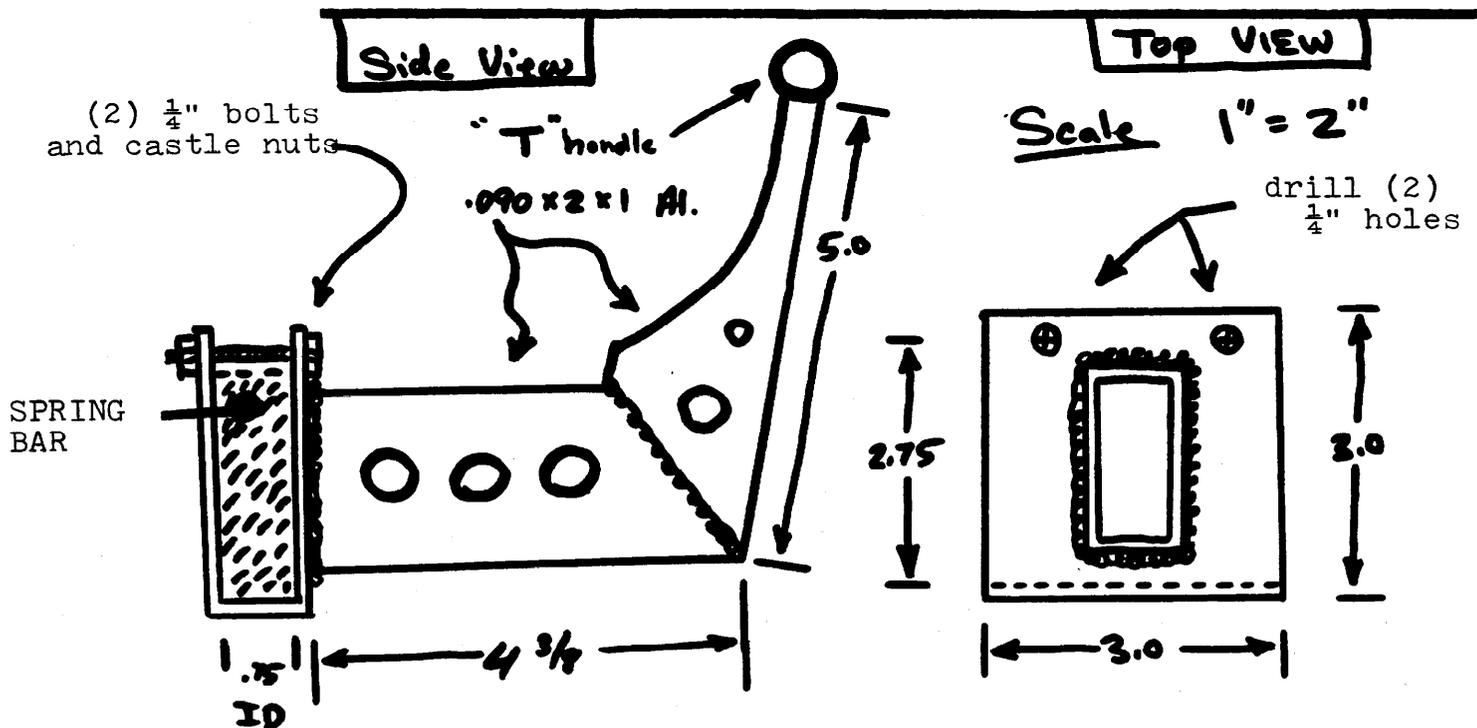
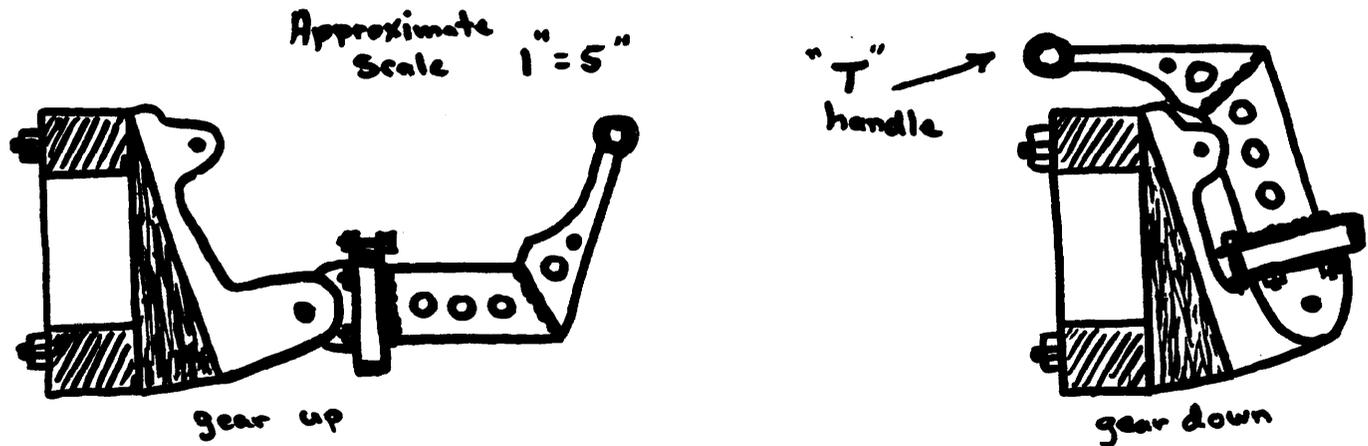
Below is a chart which tells in detail what bore and what stroke is necessary to get the engine you want. (For your reference the stock 1600cc VW has a bore of 85.5mm and a stroke of 69mm).

Engine	Bore Size	Stroke	Displacement	Remarks
			Increase to	
40 HP	83mm	64mm	1385cc	No mach. req'd--bolt on
1300	85.5mm	69mm	1585cc	Heads must be bored for cyls.
1500	85.5mm	69mm	1585cc	No mach. req'd--bolt on
1200-4OHP	92mm	64mm	1702cc	Heads and cases must be bored
1300-1600	92mm	69mm	1835cc	Heads and cases must be bored
1300	87mm	69mm	1641cc	Heads must be bored for cyls.
1500	87mm	69mm	1641cc	No mach. req'd--bolt on
1300-1600	92mm	74mm	1968cc	Heads and case must be bored
1300-1600	92mm	78mm	2074cc	Heads and case must be bored
1300-1600	92mm	80mm	2127cc	Heads and case must be bored
1300-1600	92mm	82mm	2180cc	Heads and case must be bored

Modified KR-2 Gear Handle

by Larry Zepp and Craig Elvey--Bowling Green, OH

A welded gear handle of 2" x 1" aluminum extrusion (from KR-2 kit) is welded onto a "U" shaped spring bar clamp. This slides onto the spring bar and clamps around it. Ideal position on spring bar is between center and left hinges.



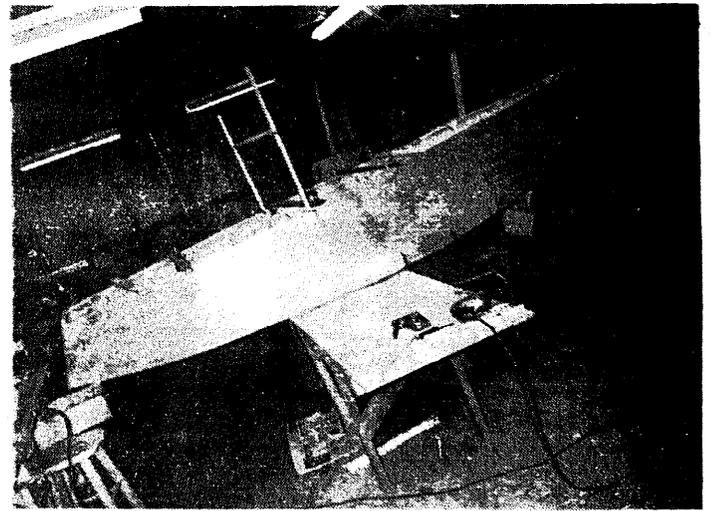
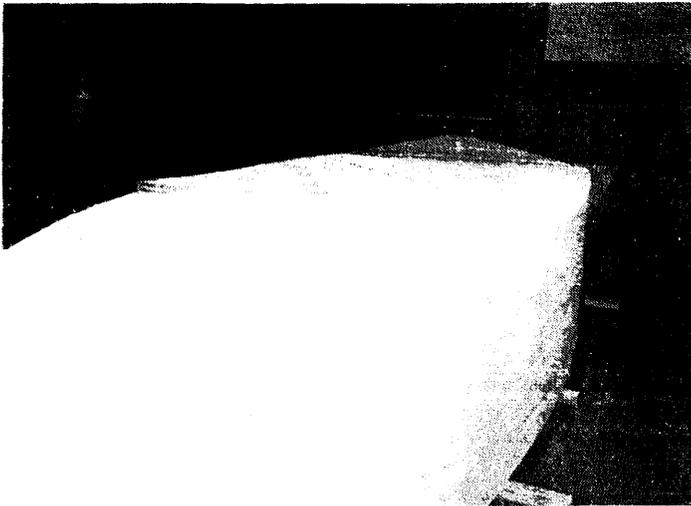
MATERIAL - Spring bar... 1/8" aluminum plate 2024-T3 heliarc welded, or.. use aluminum extrusion 2024-T3

Handle..... .090 x 2" x 1" 7075-T6 or 2024-T3 from kit.

NOTE- Lightening holes: (4) 3/4" (1) 1/2", Use aluminum tubing over bolts to protect spring bar.

MAG TIMING PROCEEDURE

1. Remove the spark plug from #1 cyl. and connect the cable from the #1 Mag position. Flip the Mag thru to find the #1 firing position.
2. With an ohmmeter between the stud and case move the drive pulley slowly back and forth to find the exact point opening position. Open points is about $\frac{1}{2}$ ohm. Mark this position permanently on the drive pulley. If the impulse is still on, do not turn back far enough to engage it.
3. Turn Prop. to find the compression stroke of #1 cylinder. With a rod stuck into #1 spark plug hole find top dead center. Permanently mark the prop. hub on top when at top dead center at the engine case split.
4. Move prop. back 25 degrees and with the Mag. set with the drive pulley mark still on top. Install the drive belt.
5. Mag. output rotation is opposite engine rotation so facing to rear, next wire going left will go to cylinder #4, next to #3 and next to #2.
6. If impulse is on, a check can be made of the 25° by moving the prop back to engage it, then forward slowly. The impulse should click exactly when the top dead center hub mark is lined up with the engine case split.
7. Set spark plug gap to .018.



First newsletter pictures are of the KR-3 fuselage under construction. Note the wing rib at mid fuselage. The clamped on crossbar is 16" above the top longeron, that is the height of the bubble canopy. Wing spars have been installed since pictures were taken.

Target completion date is still Oshkosh '76!

BITS & PIECES...in response to queries--the January issue was late due to mails and the holidays. Also, I'm still receiving many questions that want and need immediate answering. If a self-addressed stamped envelope is enclosed, I will answer by return mail. All others will be answered in future newsletters. One other item--the newsletter is now being sent bulk rate. This is 3rd class mail. The Post Office will not forward without a postage guarantee from the addressee. If a change of address is sent to me early, this problem will not arise and there shouldn't be any disruption in your subscription.

TIPS FROM OTHER BUILDERS

More ideas from Larry Zepp in Ohio.....use a spring return key chain (key back) for canopy. No string, cord or sticks continually in the way.

Also Larry is planning on installing landing lights in the gear legs of his KR-2 and has found the ideal unit in a J.C. Whitney catalog for \$1.79 each. A small (2") bulb that draws 2.5 amps and puts out a focused beam brighter than a car's headlight. It uses a standard bayonet socket.

EPOXIES---one problem continuing to arise with a number of builders is epoxy that either refuses to harden or hardened so fast as to become brittle. Without exception, all builders reporting these problems were using an epoxy that required careful measuring of part "A" and part "B". (i.e....4 to 1, 8 to 1, 10 to 1, etc.). The epoxy from Rand/Robinson is a 1 to 1 mix and almost mistake proof. (All epoxy requires thorough mixing). It can be used for the wood structure as well as the foam and dynel. You don't have to use another glue throughout your project.

This epoxy sells for \$19.50 per gallon in two gallon lots. As a special offer to newsletter subscribers you can buy this epoxy at \$17.50 per gallon.* Send your order to Rand/Robinson 5842 "K" McFadden Ave. Huntington Beach, CA 92649 Be sure to let them know you subscribe to the newsletter to get this discount.

*in the above mentioned lots of two gallons.

SAFETY NOTE

WARNING! Builders using a Vega type fuel pump for fuel transfer should look for another system. The armature of this pump is designed to always be immersed in fuel. Should it ever pump a tank completely dry, sparking of the brushes could ignite the remaining fumes!!!!

FEBRUARY COMING EVENTS

Feb. 28-29 Annual Open House and EAA fly-in at Riverside, CA Fla-Bob Airport.

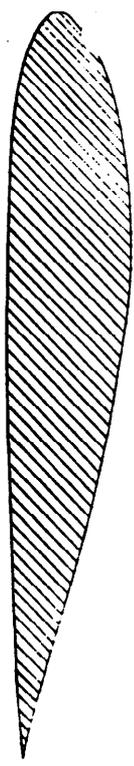
This is a new dept. If you know of a fly-in around your area, let me know at least 30 days ahead and I will list it here.

BUY-SELL-TRADE

WANTED for KR-2...Engine cowling, control stick, fuel tank. If you have any one or all items, contact G. MICHAEL EVEN R.R. 1 Box 218 Barrington, IL 60010

WANTED.....Low time, factory Monnet, Barker, or Revmaster VW B.J. LEMPA Rt. 4 Box 247C Lake Charles, LA 70601

FOR SALE.....KR-2 project. Fuselage nearly complete (mahogany plywood), spars under construction. Also have most materials kits. Write William Meyer at 1630 Central Alton, IL 62002



(a) Without flap. (b) With flap.

One of the R.A.F. 40 series, being a modification of the symmetrical R.A.F. 40 which is of 15 per cent thickness as compared with the 13 per cent of R.A.F. 30.

(a) Shows the results of the plain aerofoil section.
 (b) Shows the effect of a 10 per cent split flap in the fully lowered position.

Notice how the flap—

- (i) Increases C_L at all angles of attack.
- (ii) Increases C_D at all angles of attack.
- (iii) Completely spoils the L/D ratio, making it nearly constant at about 6 throughout the flying range.
- (iv) Causes the C.P. to be further back at positive angles of attack.

Approx. Reynolds' Number of tests—
 Plain aerofoil—7 million.
 Flapped aerofoil—34 million.

Distance from L.R.	Upper Surface		Lower Surface	
	(a)	(b)	(a)	(b)
0	0	0	0	0
1.35	2.60	2.60	1.65	1.65
3.65	3.65	3.65	2.34	2.34
5	5.20	5.20	3.16	3.16
7.5	6.39	6.39	3.69	3.69
10	7.30	7.30	4.03	4.03
15	8.63	8.63	4.41	4.41
20	9.53	9.53	4.58	4.58
30	10.40	10.40	4.66	4.66
40	10.90	10.90	4.33	4.33
50	9.38	9.38	3.90	3.90
60	7.94	7.94	3.66	3.66
70	6.05	6.05	2.65	2.65
80	4.02	4.02	1.83	1.83
90	1.95	1.95	1.00	1.00
95	1.05	1.05	0.60	0.60
100	0	0	0	0

Angle of Attack	C_L		C_D		L/D		Position of C.P. Fraction of Chord	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
4°	0.14	0.53	0.009	0.119	-11.5	+4.6	—	0.595
3°	0	0.40	0.008	0.123	+0.5	5.3	0.515	0.51
2°	0.16	0.44	0.010	0.141	13.3	5.3	0.384	0.47
1°	0.32	0.49	0.016	0.157	21.4	6.4	0.335	0.44
0°	0.40	0.53	0.021	0.170	21.6	6.4	0.315	0.415
5°	0.70	1.23	0.031	0.197	19.9	6.3	0.31	0.40
10°	0.91	1.42	0.044	0.219	17.7	6.3	0.30	0.395
12°	1.04	1.56	0.053	0.243	15.7	6.3	0.29	0.385
14°	1.19	1.70	0.075	0.270	12.2	6.1	0.285	0.385
16°	1.33	1.82	0.117	0.323	10.1	6.0	0.28	0.345
18°	1.42	2.03	0.165	0.375	7.3	5.9	0.28	0.345
20°	1.38	2.14	0.187	0.422	4.9	5.9	0.29	0.245
25°	1.21	1.59	0.235	0.470	2.2	5.9	0.28	0.245
30°	0.90	1.29	0.319	0.760	1.3	5.9	0.26	0.48

The above R.A.F. 48 co-ordinates were sent in by H.D. Garner of Newport News, VA

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