

KR Newsletter

ISSUE #26
AUGUST 1977

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Just came back from an EAA meeting (Chapter 92) and thought I would pass along a couple of items. We saw an old WWII training film on aircraft maintenance that dealt with flutter and how to avoid it.

Balance was considered the most crucial factor in control surfaces (which is the area that concerns us most). Static balance of a control surface is the easiest to accomplish. This is simply a matter of adding weight ahead of the hinge line until a balance point is reached.

Balance weight can be mounted in various ways, either externally or internally. External weight is the easiest to mount but is also subject to fatigue from vibration and is also a source of parasite drag. Include the balance weight in your pre-flight if you use this type of balance.

Typical KR installation (aileron)

The internal balance is more difficult but is worth the extra effort. I haven't seen any KR's utilizing internally mounted weight as yet but it could probably be mounted much the same as military aircraft. Some re-inforcement of the spar would be necessary, such as plywood webs at the attach point and continuing to the closest hinge.



Trim tabs can also be a source of flutter. A trim tab that can be moved over 1° at a fixed position should be re-worked. 1° is equal to $1/16''$ per 3" tab ($\frac{1}{4}''$ per ft.). Cable or push rod connections are generally the culprits in a loose trim tab, so check yours carefully.

Flutter is not limited to control surfaces but is usually generated from them. Wings and especially horizontal and vertical stabilizers will flutter if subjected to the right conditions. Airfoils, under load from high airspeed, a dive or turn, hit with a sudden control movement can and has retaliated with disastrous results. Total destruction of elevator and/or rudder can take less than one second once flutter develops.

To date I have heard of only one instance of flutter in a KR. That was in a KR-1 with out balanced ailerons. No damage to the aileron or wing was sustained but it could happen. So.....a few rules:

1. Balance the ailerons. You "big engine" guys ought to give serious thought to balancing the rudder and elevator.
2. Don't have excessive play in the control surface hinge or push rod connections.
3. Control stick and cables should be checked for undue free play.
4. Abrupt control movements can induce flutter and/or over stress your aircraft. Don't be heavy handed!
5. Pay attention to the airspeed redline (V_{ne}) of your aircraft; it is there for good reason.

NOTE Ken Rand says the redline on a KR-1 or KR-2 is 160 MPH IAS. Balancing the ailerons will advance the redline to 200 MPH IAS.

Inflight vibrations should be checked out to locate the source. They could be an indication of flutter and do cause fatigue in plane and pilot. If you suspect airframe or control surface vibration in your aircraft you may check it out in the following manner: Pay attention to the airspeed and engine RPM at which the vibration first occurs. Keep the engine RPM constant and gradually reduce airspeed by pulling back the control stick.

(cont. from first page)

Should the vibration disappear at slower airspeeds, you have airframe or control surface vibration. Conversely, you may check for engine/prop vibration by holding a constant airspeed and varying the engine RPM. Vibration that is intermittent with these various RPMs is probably caused by an out of balance prop.

Trouble shooting these gremlins makes for a safer plane and happier pilot. Get after them, it is worth the effort.

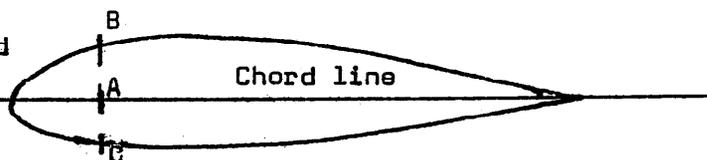
QUESTIONS & ANSWERS

- Q. I am building a KR-1 and have the engine ready to mount to the original KR mount. Can I cut off the flange or should I make up spacers?
- A. Use spacers same thickness as the flange. Removing the flange could possibly weaken the engine case.
- Q. The fuselage upper longeron doublers slant upward at a definite angle, should you sand them down so they are level across the top?
- A. Sanding the longerons so they are on an even plane with each other serves no real purpose. It does weaken them to some extent, so I don't recommend it.
- Q. Will the heat build-up caused by using a cut-off wheel to cut the 4130 steel wing attach fittings result in any weakening of the steel?
- A. The effect of heat on 4130 is to make it much harder. The only problem you might have is trying to drill the necessary holes in the fittings.
- Q. Should the wing attach fittings be finished with an anti-rust paint?
- A. Anti-rust paint would be a good idea. The attach fittings and all other metal on the aircraft should be protected from rust and corrosion. DO NOT PLATE THEM!! (chrome, etc). Plating causes hydrogen embrittlement and seriously weakens metal parts.
- Q. Has anyone done aerobatics in a KR-2 yet? What oil pump and carburation system is required?
- A. The KR-1 and KR-2 aircraft were not designed for advanced aerobatics. A "standard" VW conversion with a posa injector will do light aerobatics with no problem. (Loops, rolls, spins, etc.)
- Q. What is the recommended tire pressure on the KR-2 with R/R wheels?
- A. 22 to 24 PSI
- Q. How does one draw an airfoil from given co-ordinates?
- A. The co-ordinates are percentages of the length of the airfoil chord. Multiply the length of the airfoil by the numbers on the rib drawing or in Newsletter #4 and #8. The upper surface column is the airfoil section above the chord line, lower surface below. Example.....

A. Distance from L.E. = $.10 (\%) \times 48'' \text{chord}$
 $= 4.8''$

B. Upper surface = $7.30 \times 48''$ Station 0
 $= 3.504''$

C. Lower surface = $4.03 \times 48'' = 1.9344''$



Repeat this procedure for each of the stations given in the "distance from leading edge" column then connect the stations as you would a "dot to dot" game.

- Q. Is the Posa carburetor the same as the Revmaster fuel injector carburetor?
- A. Yes.
- Q. Can one paint the metal fittings before the FAA inspection? Would an epoxy paint be O.K.?
- A. Yes, most inspectors will require the parts to be protected. An epoxy paint would be fine.
- Q. My old KR-1 plans show the landing gear hinge bolt as $3/8''$ and the new plans show it as $1/4''$. Which is correct?
- A. $1/4''$ is correct. A larger bolt won't hurt, especially in the heavier aircraft (400+ lbs).
- Q. There was a modification for the aileron bellcrank in Issue #4. Are these pieces riveted together or bolted? Any idea of size?
- A. They are riveted or bolted. I riveted mine with hard rivets. Some builders bolt them together using $3/16''$ bolts.

PILOT REPORT
7-11-77

KR-2 N27JL Serial #492
10.5 hrs TT

Weights 535# w/Revmaster 2100 D and electrics. 2" added to motor mount for dual mags. 1" would have been tight. 4" added to fuselage between wing trailing edge and stab leading edge. Tail wheel spring installed per view on plans so additional leaf added to keep from destroying rudder. Wheel base is 130" and CG is 56". Weight on tail wheel is 5# empty. Use some method to hold stick back (elevator up) when starting or she will go on her nose.

Have been flying at 800# (185-190# pilot and 12 gal fuel).

Ground handling is far better than led to believe, it's even good. Yes-it is very responsive (quick, sensitive or what have you). Visibility is excellent in flight attitude but dismal in 3 point attitude. A 65-70 MPH final eliminates most of the floating on landing. An 80 MPH final will float you for 2000 feet. R/R brakes are marginal so never get into a position where you must rely on them. This would be a swell plane for a young person with conventional gear time working into high performance aircraft but is not for the average tri gear trained student pilot. I think I would sell it to the first one that offered \$5,000 because it is not a family plane in any way, shape or form. You fly this plane-you don't just go along for the ride.....John Lorence, 853 Cessna, Independence, OR 97391.

BUY-SELL-TRADE

FOR SALE....two KR-1s. One, on landing gear, 95% of woodwork completed, polyurethane foam kit (still in boxes), 30 yds dynel, 2 gal. epoxy, modified 1600cc VW (unassembled), some instruments, all fittings, etc....\$1,700.00. The other, fuselage box finished, all wood to finish, plus Rand extrusion & landing gear kits...\$500.00 or both for \$2050.00. Call Mike (602) 888-3534 after 6:30 p.m. (no collect calls please).

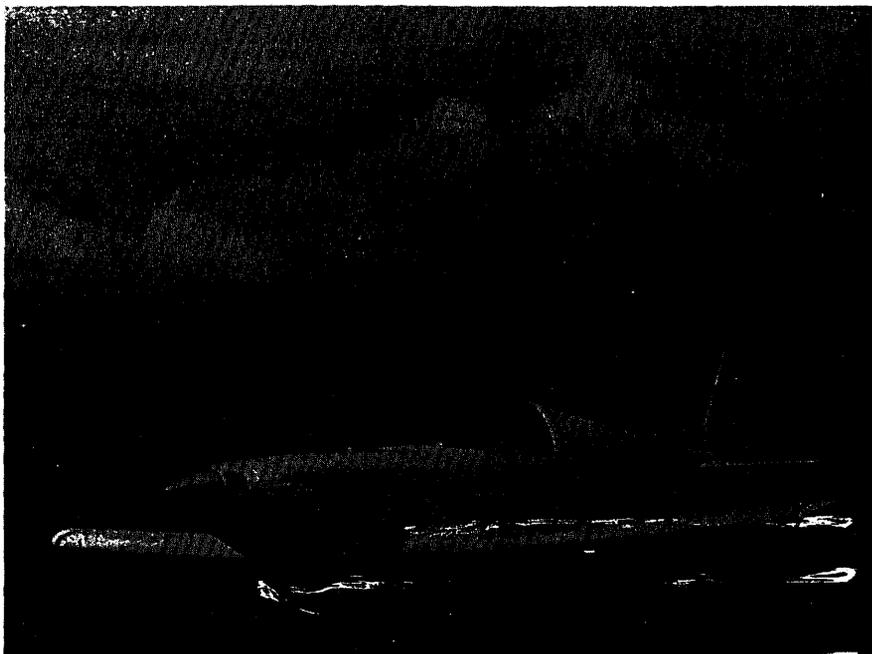
Precision aircraft parts to your specs. Also KR hardware. KOOYERS MACHINE AND TOOL, 30001 N. Hwy 101, Willits, CA 94590 (707) 459-5422.

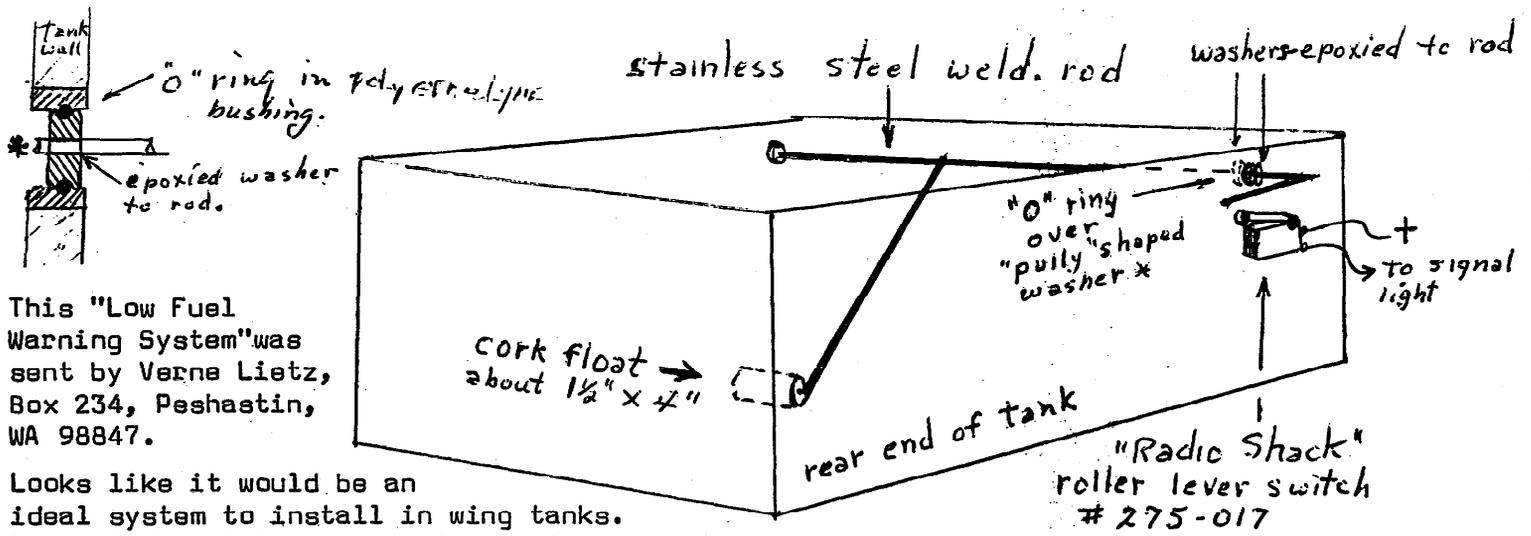
FOR SALE....Partially finished KR-2. Passed first inspection. Contact Mrs. Terrel D. Repp, 2410 NW Grandview Dr., Albany, OR 97321.

FOR SALE....KR-1 project 60% complete. Fuselage complete except for foam and dynel. Spars, control surfaces signed off. Landing gear installed. Rudder mounted, stab. and elevator ready to mount. All aircraft materials. Most material to complete including canopy except engine, prop and instruments...\$950.00. Ray Backstrom, 7721 N. Soledad Ave., Tucson, AZ 85704. Or call, nights only (602) 297-6087.

Liquid foam. If you can't find it cheaper there, send \$33.50 for 2 gal. kit, \$12.95 for 2 qt. kit, \$9.50 for 2 pt. kit, UPS prepaid. Dual sticks, toe brakes, all metal, 8 pgs plans...\$1.25. Spar drilling jig, \$12.00 deposit with \$10.00 refunded on return less postage. Englemann spruce kits with Sitka wing spars...\$135.00. Poly vinyl chloride gas tank filler neck, cap, gasket and key set, set of three...\$16.00 prepaid. Verne Lietz, Box 234, Peshastin, WA 98847.

Freon operated gear retract & extend. Less than 3¢ cost per cycle. Manual back-up. Send SASE for details. Kit available. Paul Pryor, P.O. Box 435, Mayaguez, Puerto Rico 00708.





This "Low Fuel Warning System" was sent by Verne Lietz, Box 234, Peshastin, WA 98847.

Looks like it would be an ideal system to install in wing tanks. A sending unit & gauge could easily be adapted.

Received some pictures of part of a tricycle gear system for a KR-2. As soon as development & testing is complete the system will be put on the market if enough interest is shown. Don't know about you but I'm interested. Write to Mike Lamb, 5327 West Ave., L-10, Quartz Hill, CA 93534.

I am making preparations for Oshkosh and am running behind answering SASE questions. Will catch up on them when I get back. See ya' there.....

Ernest Koppe

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