



NEWSLETTER

Carb Heat

Hot Air and Flying Rumours

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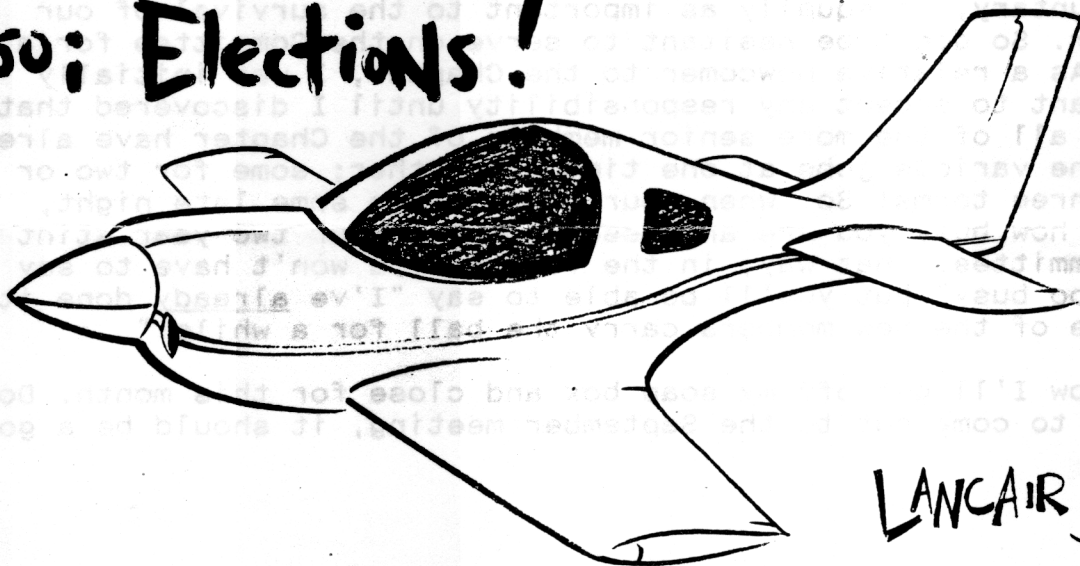
SEPTEMBER 1990

Next Meeting: Friday Sept 21

7:30 P.M. SHARP. (AT CARP!)

Topic: R.C. Models!

Also: Elections!



LANCAIR 320
J. Oliff

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SPECIAL EVENTS: Gord Standing 224-2879
PUBLISHING: Dick Moore 836-5554
MEMBERSHIP: Rodney Stead 836-1410
ROW HANGERS:

President's Corner

'Not too much to report this time around. As most of you know, both our July and August meetings were very well attended considering that it was prime vacation time. The business parts of the meetings were fairly short leaving lots of time for talking about aircraft and about flying to and from Oshkosh. We've also had half a dozen new members join the Chapter over the summer, which is very gratifying.

I've been speaking to the West Carleton Airport Authority recently. This is the group who will be our new landlords at Carp in a few months. Apparently, the negotiations for the transfer of the airport from Transport Canada are progressing well. Representatives from the Chapter will be meeting with the WCAA to discuss the past and future financial arrangements of our tenancy at the airport. I'll have more to report to you after we have the meeting with Mr. LaLande and his committee. So far, I'm waiting for a date to be set for the meeting.

The September meeting will be our last one out at Carp for this year. On October 19th, we'll meet back at 100 Sussex Street. The October meeting is our Annual General Meeting at which we elect new members of the Executive Committee to replace those whose terms are up. We also vote on any changes to our constitution which may be necessary.

Speaking of elections, you may receive a phone call some evening from a member of the Nomination Committee. If this happens, please don't try to disguise your voice and pretend that you're not home! In being part of a group such as ours, there are two types of dues to be paid. The first is the mandatory annual fee, without which we couldn't continue to operate the Chapter. But the second due is your participation, which, even though it is voluntary, is equally as important to the survival of our Chapter. So don't be hesitant to serve on the Committee for a term. As a relative newcomer to the Chapter, I was initially reluctant to accept any responsibility until I discovered that almost all of the more senior members of the Chapter have already done the various jobs at one time or another; some for two or even three terms! So, when your phone rings some late night, forget how busy you are and resolve to do your two-year stint on the Committee. That way, in the future, you won't have to say "I'm too busy" but you'll be able to say "I've already done it; let one of the new members carry the ball for a while!"

Now I'll get off my soap box and close for this month. Don't forget to come out to the September meeting, it should be a good one.

CHARTER OPERATIONS: Dick Moore 538-8884
SPECIAL EVENTS: Gord Blending 324-2878
PUBLISHER: Dick Moore 330-8884
MEMBERSHIP: R. Barry 838-8884
NEW MEMBERS

PRES
VICE-PRES
SECR
TREAS
EI

Minutes of August 17 Meeting Held at Carp

President Lars Eif called the meeting to order at 8:11 and welcomed our guests, among whom were Don Crozier, John Skelton, Phil Martin, and Doug Bisson, the last of whom likes the KB3 gyrocopter (which he would register and fly in the States.)

For Your Information

Lars' summer assignment of commenting on the proposed Air Worthiness Manual had to be "re-assigned" as the concerned students spent more time flying than thinking about it. Future delinquents will have to tie 50 rib stitches on Lars' Skybolt!!

Remember that Chris Heintz's open house at Huronia Airport (Midland) is scheduled for Sept. 22. All are welcome, but Heintz designs will be especially welcome.

Congratulations! The **Stanley Chapter** in Nova Scotia will be celebrating its **twentieth anniversary Aug. 31-Sept. 3.**

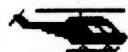
EAA Chapter 266 (Montreal) will put on a **weight and balance** demonstration on **Sept. 22.**

Those interested in maintaining (or expanding) their personal good weight and balance will hopefully have attended our own **Breakfast Fly-In** on **Sunday Sept 16.** By the time you read this, **Kaiser Gord's Standing** army will have assembled on Saturday morning at the hangar for a light military drill preparatory to doing all-out battle with enemy appetites early Sunday morning. It's worth the price of admission (\$4) just to watch **Eric and Dick** do their **famous aerial flap jack exchange** or to enjoy **Lars** deftly catching double passes from our **skeet-launching toaster.** And then there's the **split-second timing** of **Grace** and **Roger's bacon and eggs routine** and **Gord's masterful managing of the beans**—this year in separate containers so our "haute cuisine" can be fully appreciated—and **Ed's elegant carrying of the plates,** and **Helen's warm waitressing,** etc. etc. Who could ask for anything more?

Rodney Stead tempted potential new members by offering them the rest of 1990 free if they join up now for 1991. (Wonder what the **Grab Steal and Take** says about that?)

Laurent Ruel received official recognition for his generally thankless job of maintaining the grounds. The **Petersons** were also recognized for their green-thumb contributions around the hangar.

NEXT MEETING: SEPT. 21 AT CARP INTERNATIONAL We hope to have radio-controlled aircraft on display and possibly a model helicopter demo. (Remember what Elaine Summers of C.A.S.B. called a helicopter? A collection of spare parts flying in tight formation!)



FEATURE Oshkosh De-Briefing

At the July meeting, our wily President, Lars, created a highly entertaining and informative evening by surprising individuals into extemporizing about their Oshkosh Bound experiences. At the August meeting, he repeated the spontaneous format—with similarly successful results—for Oshkosh '90. **Ed Atraghji**, for example, nearly had a tall tale to tell customs officials about why he needed 3 tents, 5 sleeping bags, etc., when he was all alone at Oshkosh. Unfortunately from an entertainment point of view, Ed never had to explain. (Actually, he was carrying the camping gear for a couple of Cessna 150 crews who OD'd on Oshkosh bargains.) This was Ed's first pilgrimage and he was very impressed with the information in the forums and workshops. In one interesting demonstration of the effects of vertigo, he witnessed a vizored pilot who, when spun, corrected for the spin, but who also proceeded to correct in the opposite way when the spinning was slowed down. Flutter, he was chillingly reminded, can occur at surprisingly low speeds.

At the **Cessna forum**, **Rodney Stead** discovered that LL plug fouling can be greatly reduced by leaning at power settings below 75%. (The question of how you determine 75% power setting never arose, perhaps because the group could smell the doughnuts and coffee.) Rodney was also impressed by the advice in a forum on test flying homebuilts: **Plan your test flights "while you're sane."** Even the presenter admitted to some potentially serious oversights as the pressure of making a deadline or accomodating well-wishers interfered with his better judgment.

Dick Moore knew that things go better with Coke, but he found that they go even better when you bring your aircraft keys. Accordingly, he and **James Oliff** successfully departed on their second try. They teamed up with **Rodney Stead** and **Andy Douma** in the second 150 in a loose tandem formation ("If you're so close, how come I can't see you?") all the way to Oshkosh. Thinking they had chosen a quiet airport, Dick and Rodney landed at New Holstein (rather than Fond du Lac) and rapidly found themselves in the midst of a chaotic parking situation. When the friendly FBO announced that Oshkosh was open, people dashed to their planes, jockeyed for take-off position, performed checks on the roll, and departed with minimal delay. (So much for dozy little airports!!)

On the return leg, James Oliff spotted a sunken freighter as they passed over Manitoulin Island. Dick had Loran, Rodney had Andy, so there was no accidental sight seeing (at least none that was admitted).

Just before our coffee break, Tim Robinson announced that West Air now offers dual instruction in a Stearman for \$90/hour, wet.



Your faithful scribe,
Roger Fowler

Fifth Annual Sentimental Journey-Aug. 23-26

Having been generally disappointed with Oshkosh this year and unsuccessful in tracking down a couple of F6 1/2-40 Dzus fasteners (*Does anyone know where I can get these?*), I exaggerated their importance slightly and dragged my unsuspecting family off to the annual gathering of Piper, especially, Cub lovers in Lock Haven, Penn. What better place to obtain these vital but elusive little devils, I reasoned, than the William T. Piper Airport!



This would have been a good idea, except for Murphy, who invoked a second Noah's Flood, 500' ceilings, and allowed no planes into the field the first day. (Other years, of course, they had glorious weather and a drove of Piper drivers who could have helped me in an instant). The Piper Parts place had very little inventory, and I struck out there too.

I did get a nostalgic tour of the original Piper facilities, however, and watched the fabrication of new Taylorcraft. Except that the plant is operating at a fraction of its capacity and that the near-retirement age employees had no fedoras, the scene could have been right out of the 30's or 40's.



Still, after the hype, commercialism, and mega-proportions of Oshkosh (I know I speak heresy!), it was refreshing for me to attend a grass-roots affair full of country friendliness. The ladies enjoyed a complimentary tea and the kids got a meal for \$1, and were otherwise well entertained. The wearying roar of big radials gave way to the gentle drone of A-65's. Fly-pasts consisted of J-3's lazily drifting by in formation. In addition, the Lock Haven countryside is a picturesque combination of rolling hills and meandering rivers nestled in a secluded basin. Henri Beaudoin and Ed Dobson, "this fly-in's for you."

One word of caution. Check with me before booking your motel/hotel. Unknowingly, we stayed in one which was infamous for its full-body massages!! Luckily, I registered with my 5-year old riding horsey on my shoulders and this display of family orientation probably saved us from their dreaded "room service." This motel also deserves a wide berth on numerous other grounds, however!



We subsequently lucked into a splendid nineteenth-century bed and breakfast accomodation run by a pair of charming, hospitable, and helpful sisters. We luxuriated amidst the impeccably restored and preserved Victorian decor of the rooms (23 in all), temporarily forgetting the urgency of my Dzus-quest.



Back at the fly-in, I mentioned my Dzus problem to **Willard Scholl** of the **Alexander Aeroplane Co. (900 South Pine Hill, Rd, Griffin, GA 30223)**. He promised to look into the matter and I soon got a hand-written note. The F-series has been discontinued, but he kindly sent me a sample substitute. Some companies still care! My next order will be substantially larger and you can guess where it will be headed.

Roger Fowler.

How to Mass Balance Control Surfaces

by Tony Bingelis

Editor's Note: Last month we featured an article by Tony on Control Surface Flutter; this month, Tony details how to balance those control surfaces to prevent such problems. Read on . . .

The assumption is reasonable. Flutter in ordinary flap-type control surfaces can be prevented, at least in the speed ranges most homebuilts operate, by using properly distributed mass ballast to obtain a 100 percent balanced condition. Furthermore, if you were to add just a little extra mass balance weight to provide a slight static overbalance about the hinge line, the flutter problem would almost certainly be eliminated for all flutter modes. The balancing of control surfaces has always been a good practice and it is still the best single flutter preventative the homebuilder has.

There is another alternative. Quite possibly a worthwhile weight savings could be realized if the builder were able to first make a flutter analysis of his aircraft instead of arbitrarily going ahead with a mass balance of its surfaces . . . whether they need it or not. A flutter analysis could reveal, for instance, that the structural resonance frequencies of the control surfaces and the support structure are such that little or no mass is necessary.

Unfortunately, most of us do not have the capability to exercise that alternative. Instead, we either balance the control surfaces or go to the opposite alternative and postpone any further thinking on the matter until flight test time rolls around.

Working from a good set of plans helps resolve the dilemma. The designer will have already investigated and eliminated the problem in the construction and subsequent flight test evaluations of the prototype. If mass balancing is required, the plans probably will contain instructions regarding the exact degree of balance which must be obtained. The designer might state this requirement as "Balance 100%"

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or, "Add weight until X number of degrees (usually 10 to 20 degrees) nose-down attitude of the surface is obtained."

The least useful instruction might be one specifying an exact weight to be installed for the balance, with no information regarding the required balance attitude. This would not be a good practice because subsequent aircraft could turn out to be heavier than the original prototype upon which the designer based his calculations. In that event, the weight specified would, most likely prove to be insufficient.

Static Balance

Remove the control surface from the aircraft structure and take it to a cleared-off space on your workbench . . . if you can find such a place. This work area must be in a draft free area to insure accurate results.

Mount the control surface on its own hinges, using the regular hinge bolts inserted in blocks or brackets secured to the workbench for the purpose. If, after slipping in the hinge bolts, the control surface does not rotate freely about its hinge axis because of friction, you may have to resort to substituting a couple of knife edge mandrels or supports made especially for the purpose.

You may prefer to suspend the control surface from the ceiling or garage door tracks on strings or wires looped through the hinges or around the hinge bolts. Suspending the control surface from wires through the hinges would mean that for some designs (those with the hinge axis below the control surface) the surface would be hanging upside-down for the balancing. This doesn't matter one bit as you will be using the chordline as a horizontal alignment reference. Regardless of which mounting method is used, assure yourself that the control surface hinge axis is horizontal and that the control surface pivots freely. Too often control surfaces are balanced during construction and the builder forgets that, later, additional weight will be

picked up in the finishing of the unit, resulting in an underbalanced condition. Therefore, it is well to remember that it is the balance of the control surface in its "as installed" condition that really matters. This means that ideally, a surface should be fully painted and equipped with all fittings, tabs, seals and attachment hardware for its final weighing.

Now, For the Balancing

Although there are several methods used in balancing control surfaces, most are impractical for the homebuilder. There is no need to go into a time-consuming mathematic weight and balance computation, unless, of course, you are in the pencil, paper and computer stages of a new design.

The old trial and error method is effective and hard to fault. That is, you simply add pieces of lead (old wheel balance weights are handy for this purpose) to the location where the weight is to be affixed, until the desired level of balance, or overbalance, is reached. You can do this by temporarily taping the lead pieces to the control surface or you can suspend a tin can (or any kind of small container) from the point where the lead weight is to be ultimately secured. Ducting tape, wire or a similar means should hold things in place during the process.

Keep putting pieces of lead in the can until the control surface reaches the proper level attitude. Remove the can and weigh the whole thing on a scale. Now you know exactly how much weight it takes to balance the control surface.

If you have no weighing scale you can still balance the surfaces although you may never know how much dead weight you'll be hauling around.

Dump the lead pieces into a ladle or other container and melt them down for casting. Add a little extra lead to allow for the weight of the can, trimming and sloppy pouring. Skim the surface impurities from the molten lead with a "metal stick." The molten lead

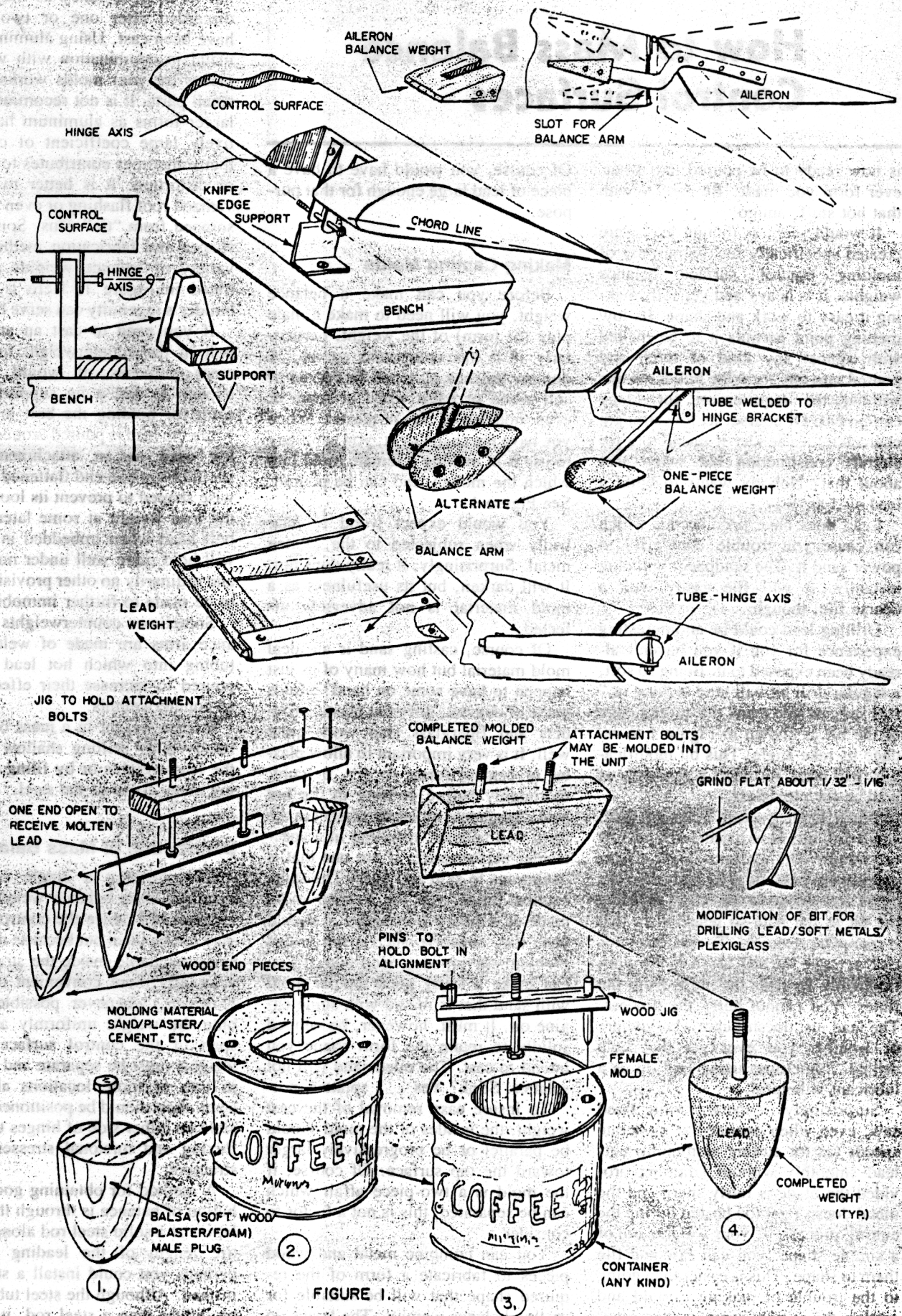


FIGURE 1.

MAKING BALANCE WEIGHTS FOR CONTROL SURFACES

How to Mass Balance Control Surfaces

is now ready to be poured into whatever form you made. Be careful with that hot stuff, amigo!

It would seem as though lead were created specifically for the purpose of molding control surface balance weights. It is heavy and yet soft, making it easy to work and shape. Its low melting point permits it to be melted with almost any kind of torch and poured into any form the builder wants without the requirement for fancy equipment. Of course, its low strength characteristics render it unsuitable for aircraft construction but who cares about that? Nobody wants to build a lead sled anyway.

Lead does have peculiarities which can cause you trouble. Don't try to power sand it. The sandpaper will clog instantly. It will file easily with a coarse file, though.

Drilling lead could be an interesting experience for you if you haven't already been exposed to it. Being so soft, a regular drill bit will tend to "hog in," so I suggest you grind the cutting edge of the bit as shown in Figure 1 to reduce its rake angle. This bit modification will work for other soft metals as well as for plexiglass.

When drilling deep holes in lead, small drill bits have a decided tendency to wander off center. Their flutes quickly become clogged and often the chips will wedge in the flutes, gripping the bit in the hole so tenaciously that it cannot be removed. To minimize this risk, remove the drill bit from the work frequently to clear the chips from the flutes. You cannot hurry the process. The lead just doesn't care who you are or whether you ever get that hole drilled. Sometimes using lard oil as a lubricant is helpful.

Surprisingly, a metal cutting band saw, even when operated at moderate speeds (as for cutting aluminum) cuts lead smoothly without jamming provided the blade is fairly sharp and the metal doesn't get too heated during the cutting process. If your weights are of a simple shape, you can saw and file them to shape. This is easier than going to the trouble of making a mold and casting the weight from molten lead.

Of course, you would have to have a piece of lead large enough for that purpose.

Making Casting Molds

Before you can make a balance weight, you will need to make a male plug (or form) of the weight, particularly if it has compound curves. A dummy balance plug can be carved of soft wood or balsa wood or foam or even modeled of clay or plaster. When you have the shape right, you are ready to use it in making a female mold into which the molten lead can be poured. See Figure 1.

You would expect wood to char badly when subjected to the molten metal. Surprisingly, it really does not. It will darken, but its usefulness as a mold material is not adversely affected.

Of course, casting sand is an ideal mold material but how many of us just happen to have some on hand? Molds made of cement, different plastic products and fiberglass also work quite well. It is very important to allow plaster or cement forms to dry, or cure, thoroughly before pouring in the hot lead. Any latent moisture present in the form will splatter, resulting in a spectacular performance, if not one that is dangerous to skin and eyes. The same caution holds true for a sand mold made of ordinary wet sand . . . should you, too, conceive such a misguided problem-solving idea. Don't do it! You can make a fairly good simple mold with sand that is mixed with some engine oil. It must, however, be tamped solidly to retain the form shape you intend to cast. The oiled sand will not splatter. Stink? Yes . . . splatter, no.

To insure easy removal of the cast weight, the insides of the mold should be parallel or be progressively larger toward the top surface. Of course, if the mold is a two-piece affair which can be separated, this is not a factor to consider.

You can combine metal and wood pieces to fabricate a form of the required shape that will be suitable for casting balance weights. The forms do

not have to be fancy as they will be discarded after one or two weights have been cast. Using aluminum sheet metal in combination with wood end pieces for your molds works well for small parts. It is not recommended for larger forms as aluminum has a relatively large coefficient of expansion that sometimes contributes to buckling or distortion. It is better to use galvanized roof flashing or even the metal snipped from "tin" cans. Some useful shapes and fabrication methods for a variety of balance weights are illustrated in Figure 1. Here is where a builder's ingenuity can serve him well.

If you need to cast an attachment bolt in the counterweight for attachment purposes, it would be easy enough to add a jig support to your form for holding the bolt in position while the lead is poured around it. Tubing used as an attachment mount should have one end flattened or otherwise shaped to prevent its loosening in the lead weight at some later date. A bolt head when imbedded in the lead will hold quite well under normal use and ordinarily no other provisions need to be made to further immobilize it.

Sometimes counterweights and balance arms are made of welded steel tubing into which hot lead may be poured to increase their effectiveness as counterweights.

Excess weight in a mass balance is removed by drilling shallow holes in the lead weights or by filing or grinding away some of the steel.

Distribution of Mass Balance

Concentrating a single externally mounted mass balance weight in one location to balance the control surface may not be ideal but because of limited space available inside the structure, it is usually more convenient to do so. However, whenever possible, distribute the weight uniformly along the span of the control surface. If the weights must be separate and attached in two or more locations along the span, they should be positioned, if possible on either side of hinges to reduce flexing and torsional stresses on the structure.

A method for obtaining good distribution of balance is through the installation of a solid steel rod along the entire length of the leading edge or perhaps you could install a steel tube instead. Although the steel tube would be lighter than a steel rod, its weight

could be increased to exceed that of the solid rod by pouring in molten lead to obtain whatever additional weight is needed. You may have to pre-heat the tube to achieve this objective. (Naturally, you will remember to plug the open end?)

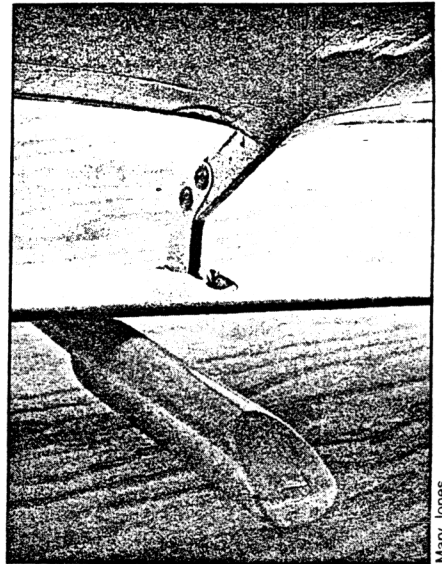
Not only must balance weights be attached solidly, they must also be capable of withstanding high G loads. How high's high? Well, in a yesteryear study conducted at the NASA Langley Research Center by Arthur A. Regier (Flutter of Control Surfaces and Tabs), it was determined that the balance weights should be capable of withstanding 36 Gs normal to the surface. However, more recently (1979), the FAA, in its AC 23.629-1 "Means of Compliance with FAR 23.629, Flutter," states that all balance weight supporting structure should be designed for a limit static load of 24 Gs normal to a plane containing the hinge and the weight and 12 Gs within that plane parallel with the hinge. FAA also points out that proof of these criteria

can be accomplished by simple static tests of the control surface mounted in a jig. That's really not too much as a 2 lb. weight need only be static tested to 48 lbs. to equal the requirement imposed on store bought aircraft.

Now that you have all this under control, take care that the weights will not work loose under prolonged use and vibration or all that G load capability will be for naught.

A Summary on Balancing Controls

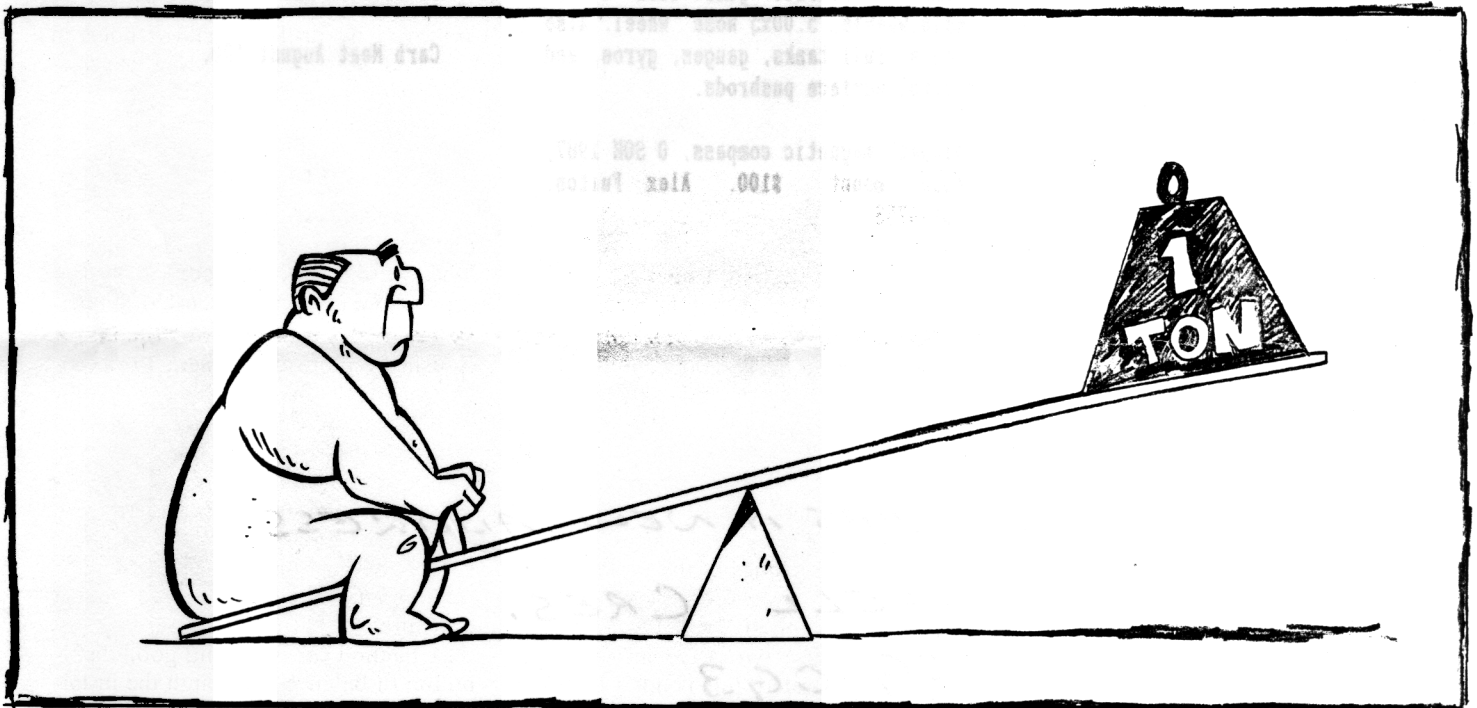
Many aircraft currently flying do not have balanced ailerons or elevators or rudders. These designs, however, have proven to be inherently free from flutter problems for the most part. So, I can't say with any conviction that the designer intended for them to be balanced or that they need it. However, and of this you may be sure, regardless of whether your plans require mass balancing of one or more control surfaces, you will never be sure they are



Mary Jones

This counterweight was added to the flaperon on the Avid Flyer after flaperon flutter was experienced in a couple of the aircraft. Correct positioning of the counterweight is very important in this installation.

flutter free until they have been tested in flight — for that tendency. **EXP**



CLASSIFIED SECTION

AIRCRAFT FOR SALE:

Two-Place Lazair. KFM engines, less than 10 hours TT. \$3900 negotiable. Contact owner through George Reid 749-0792.

1941 Aeronca Chief, 65 hp, 1650 TTSN. C of A to June 90. Totally restored in 1986. Always hangared. Asking \$11,995 or best reasonable offer. Contact Gord Coleman at (416) 298-1360.

Piper Pawnee, 150 hp, \$17,000. Call Mike at (613) 729-3774.

PROJECTS AND PLANS FOR SALE:

Everyone interested in Group Building or Group Ownership of Amateur-Built Aircraft, please contact Peter Patton at 731-2269.

Zenith CH701 Project. Plans, wing fittings, spars and ribs cut. Some sheet metal, rivets and tools. Asking \$1000. Peter Plaunt, Carp, Ont. (613)839-2283.

KR-2 restoration project. No time to finish. Revmaster 2100 cc. New wings and canopy. Valued at \$11,000. Will sell for HALF or reasonable offer. Contact Mike Proulx (819) 827-1930.

Baby Great Lakes Project: Fuselage 90% complete; all ribs and spars; Continental C-85; MacCauley metal prop; all instruments. \$6500. James Oliff 724-6123.

Zenith CH 250, 75% complete, trike gear. Signed off by DOT, ready to finish closing. Wings and tail nearly complete. Includes gear, cowling and fairings. Asking \$6000 or will consider trade for CH 701. Call Jim Robinson at 830-4317.

Davis D2A plans. Call Russ Robinson. 831-2485.

PARTS FOR SALE

Contact Mike Sacoutis at 729-3774 for the following parts:

- Propellers - 0 time constant speed
- Wood pusher prop.
- Zenair wood 68x46.

Hanlon Wilson mufflers, Mooney Parts: Complete retract gear with 6.00x6 main wheels, 5.00x5 nose wheel. Also seats, fuel tanks, gauges, gyros, and control surface pushrods.

Airpath magnetic compass, 0 SOH 1987, base mount. \$100. Alex Fulton, 234-6753.

Brakes and wheels, Rosenhan, Suitable for Vari-Eze, Davis, etc. Offers welcome. Eric Taada 749-4264.

Vari-Eze landing gear legs. New. Contact Peter Plaunt, Carp, Ont. (613)839-2283.

Original WW II RAF Aircraft ID charts for HE 111, Do 217E2, ME 110, Ju 88, Do 17Z, ME 109. Each chart 28"x40". Also WW II Turn & Bank indicator available. Offers considered on all items. Contact Doug Bisson at 819-777-8787 evenings.

FOR RENT: Hangar space for one aircraft at Carp. \$100 per month. EAA members only. Call 832-2691.

CLUB NEEDS

Platform weigh scale like type to weigh feed sacks. We have one, need a second one. Gas-powered snowblower needed.

Classified Editor: Lars Eif 837-6680.

Carb Heat August '90.

TED SLACK HAS A NEW ADDRESS

201-15 GRENFELL CRES.

NEPEAN K2G 0G3

613-226-8373

