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BULLETIN #3
of the T-18
"MUTUAL AID SOCIETY"

NEWS ON MATERIALS Our #1 bulletin contained a price list on various sizes of aluminum sheet that we were able to obtain in Dallas. Unfortunately, we can no longer get this same price. We think the rug was yanked out from under us by another buyer complaining about the price advantage we had. I had to return several checks for this reason the past week. It MAY be possible that if enough of you send me firm orders that I can get this employee friend of mine to assemble a giant order in his name and we can possibly get the original price I quoted you. If I slip him a couple of jugs of his favorite loudmouth,this may work for a one-shot deal. If you want to order, send me a list of what you want, and if I get enough response, I'll drop you a card to send me a check. You fellows that were able to order at the very low price were pretty lucky.

In the meantime, our friend, Ray Stits, has written me that he plans to stock T-18 extrusions soon. I am sending him a list of rivets, plate, and other materials and hardware that are usdd in small amounts in the T-18 and perhaps some of you boys that live in remote areas can soon have a ready source of supply for all of your needs.

For East Coast boys, I think there will soon be a source of supply in upstate New York in the near future. More on this later.

Bill of Materials Due to the fine efforts of Richard Fink (#87) of 443 W. 237 Oakridge Dr., Waukesha, Wis., we will soon have a complete bill of materials available to T-18 club members only. (If you haven't sent your contribution for mailing costs for our bulletins, tie a string around your finger, so you won't miss any bulletins. We'll soon have to cut off the free riders.) Bob Gustafson, (#115) of Chicago has also sent a materials list, so as soon as we can collate this information, we'll have it printed. There will also be a complete list of names of T-18 builders, their serial numbers, and addresses, available in the near future. We will try to include this with the Materials List.

Rivets Apparently some of the newcomers are a little confused about the use of Mi-Shear rivets and Pop rivets. Basically Mi-Shears are used instead of bolts, as they are lighter and in some other respects, superior. They can be installed very easily, using only a hammer and the little installation tool. John Thorp has no aspirations to be a hardware dealer, but if enough of you send him a check for the Mi-Shear kit, I'm sure that he can get the Mi-Shear people to make up some more "kits".

Rivets (Continued)

As to Pop rivets and Whitney punches, I'm hoping that we can induce Ray Stits or someone to carry these items. We need a T-18 "store" badly. In the meantime, if you're in a hurry, write Jim McElroy, the local rep. for United Shoe Machine, and he can supply the proper rivets and the tool. I would recommend you get the production tool (about $15) instead of the home shop tool. It sets the rivet in one squeeze, whereas the $5 tool takes 2 or 3. Multiply by the number of rivets and the advantage is plain. (Jim McElroy, 9102 Garland Rd., Dallas, Texas). The Whitney punch set, the #5 Jr., is obtainable from the Whitney Tool Co., Rockford, Ill. You should order extra #30 punches, with and without the little "nib". Again, for the beginner, you cannot put a 1/8" rivet in a 1/8" hole. It takes a #30 hole. If you dimple the skin around a 1/8" hole, the hole will enlarge enough that a 1/8" rivet will go in. Incidentally, it is accepted practice to dimple the lighter gauge skin and countersink the thicker material. If you plan to flush rivet, you may want to get a set of dimple dies for the Whitney punch. They can be removed from the tool and used with a hammer for use away from the edges of sheets.

Riveting - Part of our pictures this issue show Bob Kaergard and spouse making good use of an old steam iron. Bob is driving his rivets from the inside, using a flush rivet set against the bucktail of the rivet.

The iron is held against the manufactured head. This gives an exceptionally smooth surface. This is an especially good trick for light skins, as it is not easy to get a smooth surface in use of conventional techniques. As the rivet is driven, the set inevitably depresses the skin itself - how much varies. Bob says the noise inside the fuselage is fierce. Paul Hingtgren, another Chicago T-18er, has used a variation of Bob's technique. Instead of a steam iron, he uses a large sheet of thick plate (very smooth) and uses a hand hammer to upset the bucktail. He laid the plate on the floor, inserted rivets in his fuselage skin, laid the skin down on the plate and slugged away. He installed pre-bent stringers to fuselage sides in this manner.

Bending Extrusion The fuselage stringers must be pre-bent in a compound curve. One way that it can be done rather easily is to put stock in a vise (smooth, soft jaws) and using a rubber mallet, hit stock on each side of the vise, move stock along an inch at a time. Don't try to get the entire bend on the first pass thru the vise. Do a little at a time. Those of you that have already done this - how did you go about it? Is there an easier or more desirable way than this?

Templates There are now two sets of fuselage skin templates available to T-18 M. A. S. members. About a year ago several of us got together and got Bill Warwick to make us up a set of templates from John Thorp's master. Just recently, when a brand new T-18er here started his fuselage, I made up two sets of templates at the same time. They are now incirculation. If If you want the use of these templates, here's how to go about it -- Each man buys the templates with the agreement to re-sell them to the next man in line - for about $3 less than he paid for them. The first 'sold' for $37.50. When the price gets down to about $20.00, let's keep it there and at that time, I hope that we can get a complete set of templates for practically all parts of the airplane. Perhaps we can come up with form blocks for some parts, too. Anyway, I'll act as coordinator on these templates. I'll put you on the list and give you the name and address of the present "owner". In turn, I'll advise him to ship templates freight collect to you upon receipt of your check for X$. If anyone has any further or better ideas along this line, let's hear from you. As to you fellows that are quite far along, how about doing just a little for some of your fellow T-18ers that are trying to get started? Will you make up a few templates for say ribs, fittings, aileron skins, fuselage frames, or just any part that can logically use a template? Not, Geroge - YOU! We need templates to lay out form blocks, and we need templates for layout (including flange, etc.). We don't ask you to give anything away. Set your own price, for there are plenty of fellows now and in the future that would be tickled to death to be able to pay a little for the use of these templates. As you all know, it takes a heck of a lot of hours to build any airplane, so anything that any of us can do to cut off a few of those hours is well worth it. Also, would you "old-timers" take a little time to pass on a few tips, comments, opinions, short cuts, handy tools, etc. Would also appreciate any photos you may have - of components, action shots of you making parts, completed assemblies, etc. One of these days, we'll all have a lot of fun and make a lot of new friends when we can all get together with our T-18. I'm an airline pilot and I've already had a little taste of this, talking to T-18 builders in various cities. So would YOU give just a little time and trouble to help the next guy? You'll be surprised how many times it turns out to be a two-way street. After all, the one and ONLY reason there is an EAA is to GIVE and RECEIVE information. Oh yes, the templates mentioned above are for sides, top, bottom, and quarter panels.

USING TEMPLATES It takes a little practice and skill, believe it or not, to properly use the Whitney duplicator punch. Hold it between the thumb and middle finger and sort of rock it in the hole. Don't try to push it straight down into the hole. Won't work. Tap the punch with a hammer, not too hard. Be sure the punch is in the hole before tapping, so as to avoid damage to template. Absolutely do not punch or drill through the ... template. Always use the punch with the little center nib to transfer the hole centers, then remove template from worksheet before you actually punch out or drill holes. Place your transfer strips underneath bulkhead rivet lines before you drill or punch holes. Take care to keep your drill at 90° to sheet and in case of fuselage sides, drill both sides and transfer strip at one time. Make a simple little steady rest for your drill, using scrap wood, so you can deep drill vertical. To transfer the hole pattern from the skins to the bulkheads, the important thing is to VERY accurately locate a starting point. We cannot transfer hole patterns at points where bulkheads are joggled, as this would cause mismatch.

USING TEMPLATES (Continued)

I chose the first rivet hole above W. L. 42 as my "anchor" hole. On my form blocks, I drilled a tiny hole a t this point. I tapped a wire brad lightly through this hole, making a tiny mark on frames. On a penciled rivet hole center line, I punched the rivet hole. Next, a rivet dowel used and skin transfer strip and frame pinned together. Hole pattern then transferred with nib punch. Sounds complicated, but it really isn't. Transfer strips should be labeled as to "up" or "out", etc. and extreme care should be used so that transfer strips are always turned the same way. THINK.

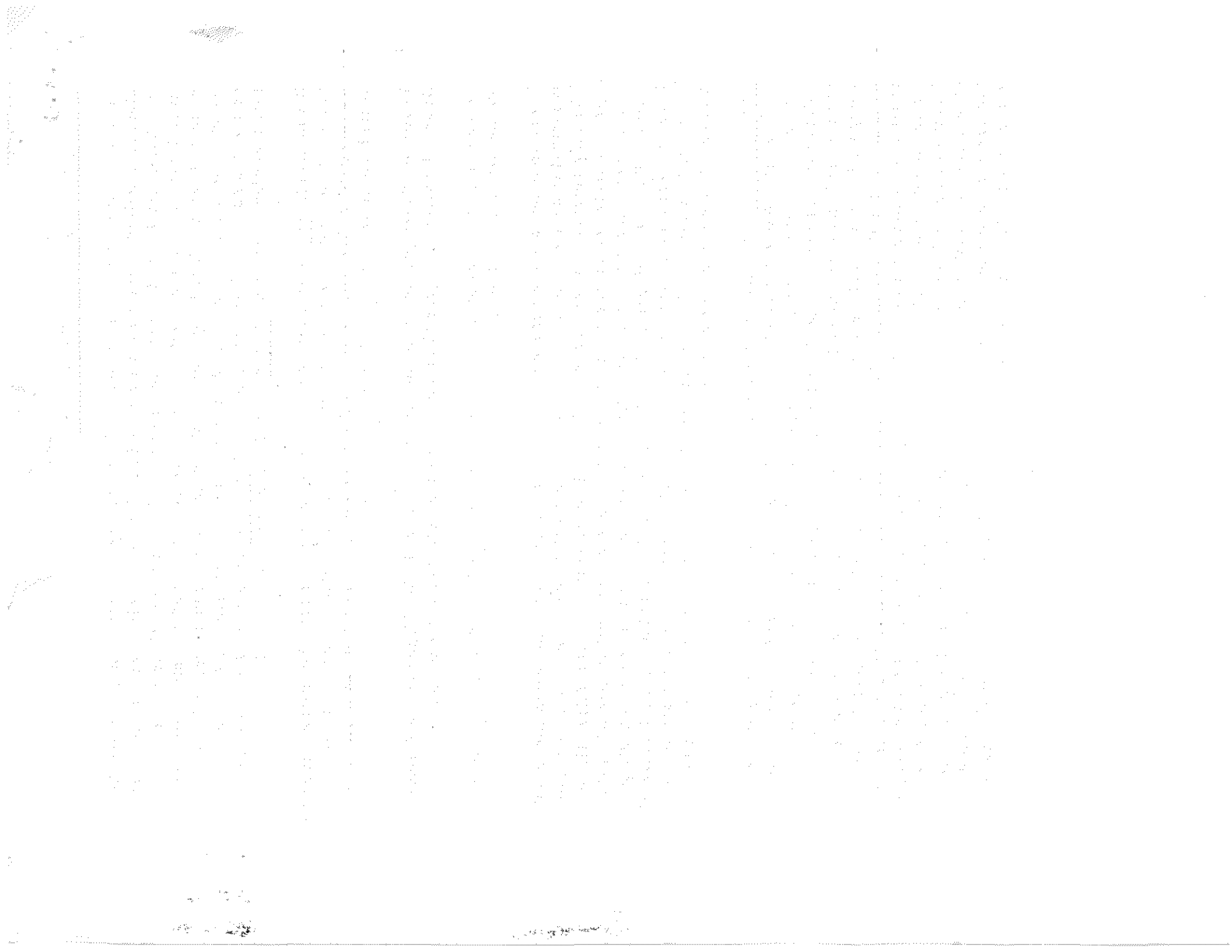
If you decide not to purchase one of the extra large sheets that make 2 fuselage sides, make your splice just aft of Sta. 179.2007, using either .032 or .040 T-3 strip as a doubler. AN426 AD 4 rivets on .75" centers are used. Centers should not be less than .25" from sheet edges.

Leave the "spar pocket" area of the bottom sheet in for alignment of forward floor. Important. After alignment, drilling, clecoing, cut it out.

To use rivet as a dowel through worksheet, put head on bottom, and secure on top with tiny C clamp.

These templates are a real privilege. Please show your appreciation by taking painstaking care of them. Take care of them not as your very own, but more like they belonged to your boss. When shipping, coil them carefully, tie or tape securely and either put in small crate or wrap several layers of cardboard around them and see that edges are protected against rough handling. I would like to be informed of condition you receive templates .... Incidentally, if you do write to me (or anyone else in EAA), please include a stamped, self-addressed envelope. Correspondence in any volume is an onerous burden. You can do your part to lighten it.

Form Blocks Have had a considerable number of you ask "What material do I use to make form blocks out of "? I used a select grade of maple for all my small parts (ribs, etc.) I used 3/4" fir plywood for the fuselage bulkheads. I have · of Benoflex being recommended, but also know it is hard to find and very expensive. The upstate N. Y. boys used a wood chip composition board and were pleased with it. Actually, most anything will do if it won't splinter badly. And of course, most of you know that it is most important to make all form blocks in duplicate, as you must ALWAYS have a clamp to hold your block-metal-block sandwich together tightly while forming. Metal will creep from forming stress if not tight. Also use index pins like clevis pins or small bolts. Clevis pins are much better. Put pins completely through the "sandwich". These index, or tooling pins are important, as they serve to both align parts and restrain them.



Heat Treating In the #1 bulletin, I recommended the use of 2024-0 with subsequent heat treatment for parts of compound curves. John scolded me in a recent letter thusly: "In my opinion, the use of 6061 T-4 makes the use of 2024-0 archaic for all but extreme cases." He also pointed out the problem of correcting warpage and additional cost. He is a pro and his reasons are valid, of course, so I stand corrected. In my humble opinion, there are some T-18 parts that can be much more easily formed of 2024-0 by an absolute beginner, but perhaps that word "easily" is the wr ng yardstick. Perhaps, it would be better to lay out a few extra parts to practice on in order that we acquire a higher level of skill in this area. One further word: Technically, I was correct when I said that heat treated 2024-0 was much strongwr than 6061 T-4, but I should qualify the statement by pointing out that most aircraft parts are design limited by crippling compression stresses, rather than tensile strength. This means that ultimate and yield strengths are relatively less important in these parts than the modulus of elasticity. The M. O. E. of 6061 is very close to that of 2024, so for practical considerations 6061 is just as strong for FORMED PARTS. Now don't get confused and go out and substitute 6061 where John specified 2024. Where he specifies 2024, don't substitute.

Before dropping the subject of heat treating 0, I would like to relate how one group of T-18 builders have used 0. All of us had a metal experience level of zero when we started, but we did have the advice of local metal men of long experience.

After a demonstration of forming under their supervision, we had confidence in our ability to form ribs, so we chose 0 because it is almost ridiculously easy for a rank amateur to form and because we have fine heat treat facilities locally. It cost us only $7 to heat treat all the wing ribs, some fin and rudder ribs, and a couple of fuselage bulkheads for 3 airplanes, but costs are higher in some parts of the country. There was some warpage, of course, but we put all parts back on form blocks immediately and lightly "re-formed" them, taking only a few seconds per part. Large parts, like the dash panel bulkhead, are much more likely to warp, so we attached a series of flat steel straps (1/8" x 1/2") horizontally and vertically, to restrain the warpage. This worked out well. I will no longer say I recommend 0 over 6061, because as a beginner, I haven't any right to recommend anything. I'll simply say that if you have nearby heat-treat facilities and you don't want to take the time and trouble to learn to form 6061 well, this is a possible solution. Subject now permanently closed and I again apologize if any of you have been mislead.

One other word on the subject from John: "If you have local heat treat facilities close by then S-W forming makes sense. You use 2024 T-3 sheet (not 0) heat to about 960° F and quench in cold water. It is then formed (while soft) and allowed to harden on its own. The soft period can be extended by freezing. You get no warping this way and the anneal is much less expensive." .....
So now most of us are somewhat better informed on the subject.

Heat Treating (Continued)

Now, John, if you'll devise a pneumatically operated hammer with a chisel head that we can plug in our rivet gun, specifically for lazy people to use in forming 6061, we'll strike the colors for 2024-0. Personally speaking, I have tremendously enjoyed learning about a completely new subject and I'm sure most of you have also achieved considerable satisfaction in the acquisition of a complete new skill. I'm sure that EAA is more mature and forward looking as a result of John Thorp's brainchild, the T-18.

Reading Blueprints Nothing on an airplane is perpendicular or parallel to anything unless an arbitrary system of perpendiculars and parallels was set up. This system was handed down to aircraft people many years ago from marin architects as the flying boat came into being. B.L.C. for instance means Buttock Line Zero, or more popularly Butt Line Zero. W.L. means Water Line, Sta. means Station Line, etc. You may also notice that on outer wing panels, where dihedral causes lines to depart from perpendicular, you will note that there are Wing Station Lines. Also you may note that on certain bulkheads that depart from the vertical that actual dimensions are shown. A little thought will clarify this. Look on this dimension as the hypotenuse of a right triangle, which is always longer than the vertical leg.

Another point that might need clarification is a phantom line. It will be shown on the plans as -- _____ --. This line shows the beginning and end of a flat, or straight line. It may also be interpreted to mean where a curve, or bent area, begins and ends. In the case of a part made on a form block, it will show where the radius begins and ends. This radius, incidentally, comprise your bend allowance, or more simply, the amount of material used in making a bend.

Tolerances As in everything we do, we should strive for accuracy. Metal work is no exception. When a Station Line is given as 73.0312, TRY to get as close to that figure as possible, even tho tolerances of 1/64" are acceptable and workable. Many of us in the Bifocal Brigade have a shop aid called Opti-visor. They are magnifying glasses set in a head-band that can be worn over regular galsses for further magnification. Using a sharp scribe, you can locate a point to three places easily. You should get a rule, of course, that is measured in 100ths.

Swap/Sale Corner As some of you fellows finish your airplanes, you may want to recover some of your investment in tools or materials that you have left over. For instance, an air compressor is a big investment for most, so if yours is for sale let's hear about it. Want to get rid of the 3 or 4 hundred clecos that you have left over? Etc. Happen to stumble on a large piece of hard-to-find material? Have enough left over to sell to some of the other boys? Or did you find that of some material, that you could get a good price break by buying just a little more? You are doing yourself and someone else a favor if some of you will make a practice of doing this. There are 7 of us T-18ers in Dallas, and we make it almost a rule that anything we buy to buy enough for the rest of the guys. Here's one little item to start the ball rolling. We found a hunk of extrusion big enough to make 30 of the lower rudder hinges, so I now have 23 left that are bandsawed slightly oversize, so the first 23 fellows that send me a dollar bill, I'll send you the part (#577) pre-paid parcel post and there will be some change from the dollar inside. M. A. S. members only, or if you're not a member yet, slip another buck or so in and you're in.

If any of you fellows in the area of Charlotte, Mich. need some 6061 t-4 sheet, Merlin Miller (#107), or Rt. #2 Tirrell Rd. has 2 sheets of .025, 1 sheet of .032, and a 4 x 7 pc. of .040 that are left over that he would like to sell.

Merle Soule, 3263 Camelot, Dallas, Texas, 75229, (#11) has like new 0-290-G-4 engine for sale that he bought from Banks-Maxwell as a spare. He paid $250 for it. These engines are getting scarce and good ones are getting expensive, so if any of you fellows have any leads on these engines send them to me. There are still a lot of the plan purchasers that don't have engines.

Leonard Barreca, 32 Adlon Place, Buffalo, N. Y. 14225 has a source of Lyc. 150 and 160 hp. engines available starting at $600. These are engines that have been removed from Apaches for larger engines and have varying amounts of time on them. The prices range from $600 to $1200. If you are interested, send him your name and phone number and he will call you. He also has 0-290 oil pans that were factory rejects because of cracks. These are heli-arced and are available for $20. They are also running an ad in Sport Aviation on brakes, bench punches. The brakes are great. I have one and I'm ordering one of the punches. Brakes are $20, have 18" throat.

TOOLS

I would like to highly recommend another tool that I have. It is the Mead Bandsander. I call it indispensable-almost a must for a metal aircraft builder. It looks like a small band saw and it de-burrs, sands, shapes, profiles, etc. Usec 1" x 42" belts that can be torn to 1/2 or 1/4 widths for small areas. It is used in every aircraft factory and is tremendous for sanding the edges of aluminum parts. Here's something else that will save you many hours of tedious labor. You can write Mead Specialties, Chicago, Ill. or to Barreca above. He is getting a dealership on them. They are priced at #37.95 for the industrial model with ball bearings and $27.95 for the home workshop model with oilite bearings. Van White, 1512 6th St., Lubbock, Texas, also has a dealership for them.

If you want to saw aluminum, Sears has a blade (both 6" & 8") that does a beautiful job (about $5). It is their Kromedge Non-Ferrous cutting blade. If you have a bandsaw, get a skip-tooth blade for best results, altho' you can use ordinary wood cutting blades if you use a wax or grease stick to lubricate them and keep the teeth from clogging.

Making Fittings You can make your own fittings of aluminum plate quite easily. Saw them oversize and sand or file down to your scribe line. An ordinary disk sander works fine. I used a rubber-backed 5" one in areas that I couldn't get to with sander, followed by sanding with the little Mead bandsander. If you turn the rotary files very fast they won't chatter. Take very light cuts, too. Final sanding is by hand using wet-or-dry sandpaper in progressively finer grades. Sprinkle a little Bon-Ami on the sandpaper. This (or toothpaste) makes a fine light abrasive. If you want to get fancy and do real first class work, buff your fittings with a cloth buffing wheel, using emery buffing compound, working down to tripoli or jeweler's rouge for a true mirror finish that rivals chrome plate in brilliance. Actually you should always finish ANY aluminum edge to as fine a finish as possible, so as to eliminate starting places for cracks. This gets very important on thin sheet parts (ribs, etc.) that do more flexing. ALWAYS finish the edge of sheet parts to the extent that there are no visible scratches or nicks. This also applies to deburring holes. Always deburr holes before dimpling, as the forming stress of dimpling may possible crack light skin. If this happens you'll have to drill it out and use an oversize rivet.

This about does it for this issue, fellows. From now on we'll have a question and answer session with John Thorp. Send your questions to me, I'll classify them and send them to John for comment. This will save considerable duplication of effort. Perhaps I will know the answer to some of the simpler ones and can help to conserve his valuable time for important things like designing airplanes. Again I must repeat, please do not send questions that require a time-consuming and personal answer. For instance- we will find material sources for everything and when we do you'll read about it in our bulletin. If you want to know how to do something, sound off, and the answer will be of general interest to all.

Dick Cavin, 10529 Somerton, Dallas, Texas, 75229
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