ACRO SPORT NEWS #12
& PROJECT SCHOOLFLIGHT JULY 1985
P.O. Box 462 Hales Corners, Wisconsin 53130

EDITORIAL

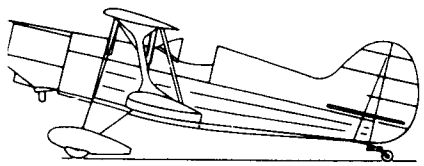
BY PAUL H. POBEREZNY

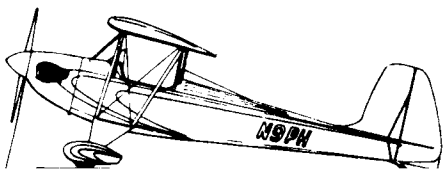
Dear Fellow Homebuilders:

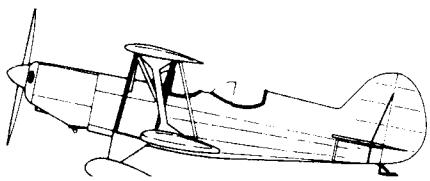
This is the time of the year that homebuilders enjoy the fruits of their efforts. Those long winter months of building, especially in the north, usually are fulfilled with the advent of warm weather and pleasantry of flight. All those winter months (or even years) at the workshop table are made worthwhile.

Each year we see more and more aircraft become airborne and an increasing number of Acro Sport I's, Acro Sport II's and Pixies. This year at Oshkosh the workshops should be extra educational with an uncovered Acro I on display, an uncovered Pixie on display, work being accomplished on the fuselage for another Pixie, the building of wing ribs and the start of the two-place, side by side, Corben Junior Ace. Drawings will be available for this aircraft which was certificated under the old Department of Commerce Bulletin 7-A back in the mid-thirties. We plan on starting the Junior Ace fuselage and wing-ribs during the Convention and powering it with (probably) an 85 Continental. Much interest has been also shown in the old Corben Super Ace that was powered by the Model A which adorned the cover of our Antique/Classic Division Vintage Airplane publication, June 1985 issue.

The Acro Sport designs were fostered by the need of Project Schoolflight, the building of aircraft in the school systems. It certainly would have been most difficult to ask any of the designers and plan sellers to produce, at no cost to the school system, a very detailed set of drawings of high quality and to provide a focal point to answer questions on the particular design as it would have been a tremendous financial burden upon them. With this in mind, we designed the single place Acro, the two-place Acro and the Pober Pixie as an educational tool. All the aircraft were flown successfully and many more have now been constructed. However, it is not the EAA Aviation Foundation's intent to make airplane mechanics out of young men and women in the school system, but to use aviation and the airplane as a tool to foster the appreciation of quality, craftsmanship and the high standards that aviation is known for. I'm sure many will agree that when these young people who have been touched by aviation go into their own fields of endeavor, they will continue to have the great appreciation for quality and the attainment of high standards in all their fields, whether it be working in automotive mechanics, sheetmetal work, wood working, or the many, many other crafts that one may go into. However, the knowledge gained will help in anything one might attempt to do; that "do it right" attitude is most important. Many of the young people who years ago were involved in the building of aircraft in the school system have gone into aviation. Many are airline pilots, key people in airline maintenance or working in other aspects of aviation. Again with motivation each individual's desire in life can be met. Where else can one involve themselves in a high-school, college or Civil Air Patrol, etc., project where the finished project will mean something more than a footstool, a hot rod automobile, or a canoe?







FUEL TANK CAPACITY

(The following note is from Steve Blake of Roswell, Georgia.)

Dear Sir,

I have just got done reading of Dave Kragnes's accident in the April '85 issue of Acro Sport News. I believe I may be able to shed some additional light on this matter.

My Acro II has a fuel tank that I purchased assembled from a well known parts supply firm. The tank was advertised as having a capacity of 24 gallons. Prior to my first flight I filled the tank and found that only 20 gallons could be pumped into it with the airplane in the three-point attitude. My 0-320 burns 8 gallons per hour which means that my airplane's fight duration is 30 minutes less than I had believed at that time. I am not aware of what capacity testing Dave performed so this information may not apply in this case. However, I would like to encourage all aircraft builders to check their fuel tank capacity despite what is advertised by even the most reputable of part suppliers.

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Jim Jackson and eight of his students, pictured left, at the last Oshkosh Convention with their Acro Sport II. They are building the aircraft under Project Schoolflight in Mundelein, Illinois, Hig' School. The aircraft is expected to fl this year.

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ENGINE NOTES

Service Bulletins, Letters and Instructions - Those with Lycoming engines, you should be advised that you can obtain these service bulletins, letters and instructions from Avco Lycoming, Williamsport Division, 652 Oliver Street, Williamsport, PA 17701, telephone 717/323-6181. Lycoming service letters are informative only, service bulletins are mandatory, and service instructions are not mandatory, but informative in nature. They have many excellent hints and tips that are a great help in understanding the operation of your engine.

Teledyne Continental Motors, P.O. Box 90, Mobile, AL 36601, telephone 205/438-3411, has similar service bulletins on their engines that can be obtained at low cost. It is recommended that you obtain these for whatever make of engine you have. Did you know that engine failure or partial loss of power is one of the leading causes of aircraft mishaps? About 25% of the mishaps that occur to amateur-built aircraft and to factory aircraft are from this cause.

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ACRO SPORT I & ACRO SPORT II TECHNICAL TIP

Acro Sport I and Acro Sport II builders have occasionally complained to us about the flying and landing wires making hard contact. Very frequently this problem can be aleviated by loosening one wire and putting it on the other side of the other wire. However, the Acro Sport II plans - Sheet 15, Zone D5 - show the wire spreader construction. What it may not indicate is that the wire spreader can be built to separate flying and landing wires either by using oak or rubber between the flying and landing wires. It is suggested that the wire spreader be built so that the wood will keep the wires apart.

The wire spreader is also known, on this and other aircraft, as a birdie or a javelin. Its primary function is spreading the wires so that they do not rub together. For this reason, you do not want the separator made of metal. You will see metal separators on other biplanes, but they must have rubber or some other insulation device if they are made of metal. We suggest that you make them of hardwood, broomsticks work great, and then you don't need a lining device for the gap holes.

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CONGRATULATIONS TO ACRO SPORT II BUILDERS!

Cliff Schrader of Cutler, Illinois, has logged eight hours on his Acro Sport II as of 6/18/85. His Acro is equipped with a 180 HP 0360 engine and has an Allison carburetor.

Larry Stephens, RR 3, Box 139, Chrisman, IL 61924, had his first flight on the airplane April 25, 1985, and is thinking about possibly bringing it to Oshkosh, see picture below.

FLYING AN AIRPLANE ON TRIM TAB ALONE

By JIM BATTERMAN, IAC Chapter 8

(Editor's Note: Jim Batterman is a highly experienced aerobatic instructor with yea. and thousands of hours in aerobatic instruction of students. The following is his evaluation of flying a Citabria both in aerobatic flight with trim alone, and as a safety measure with trim alone.)

A few weeks back I conducted an evaluation flight to determine if in an emergency control of the aircraft could be regained useing the trim tab only should primary elevator control be lost in various unusual altitudes while flying aerobatic maneuvers. Since the greatest strain on the system occurs to the elevator linkage during recovery from looping maneuvers and vertical down lines such as hammerheads and spins I started in this area. I found that I could recover from these maneuvers trim tab only within the normal speed and G load limits. Once I had determined this could be done, I decided to see if recovery could be accomplished using the trim tab and rudder only which simulated a failure of the front stick leaving you without elevators or ailerons. Again recovery could be accomplished however in wing low or banking situations more altitude was needed and greater speed build-ups were likely to occur. I then went back to flying with aileron, rudder, and trim tab and found that I could fly loops, hammerheads, Cuban eights, and reverse Cubans from entry to completion using this combination of controls. Taking the experiment a bit farther and assuming I still had aileron control I returned to the airport where I was able to manage a good landing on a hard surface runway using the trim tab only for elevator control. A slight crosswind was corrected for using aileron and rudder in a normal manner.

In summary, keep these points in mind. Should elevator control system failure occu attempt recovery with the trim tab. Once control has been regained determine if separation has occurred between the front and rear stick and elevator. Reaching back a moving the rear stick will determine this for you. If there is response from the rear stick then you might consider flying the aircraft to a safe altitude using the trim tab and then switching to the rear seat to return for landing. I have not made this switch while in flight but did practice it on the ground and found it can be done especially if the door is unlatched to give a little room to slide past the front seat. In the event the rear stick is also not of use, you will have to decide if you want to attempt a landing with trim tab only or go to a safe altitude and use your safety chute. Since my trim tab evaluation I would probably go with the first option, however, every situation is different and requires a decision be made to cope with the problem. Possibly using the trim tab as a primary flight control during a critical situation will give you a bit more time to make that decision.

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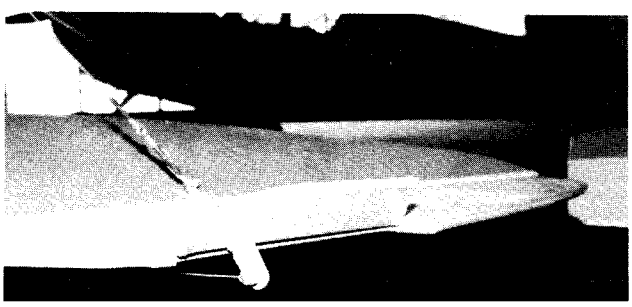
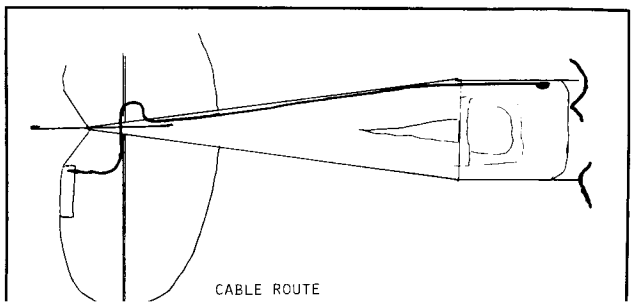
PIXIE TRIM TAB

By JOHN LEITIS, 817 Roosevelt Ave., Roaring Spring, PA 16673

The tab is 2" x 12" and is controlled by a long choke cable type control. John found it very useful on long cross-country trips, and recommends its installation in the plans of the Pober Pixie.





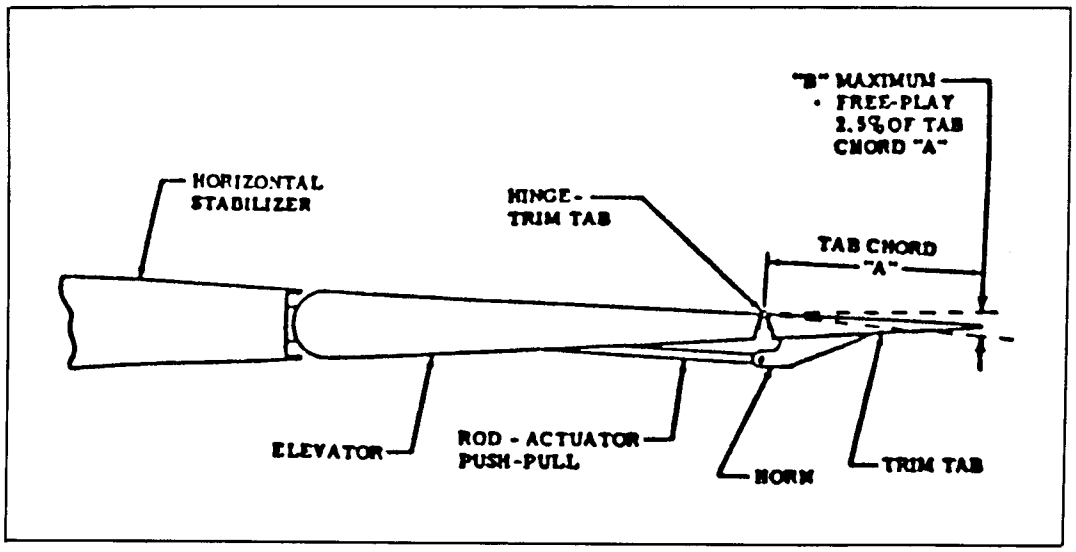
TECH TIPS: TRIM TAB FREE-PLAY

By JIM BALDWIN
EAA Chapter 443
Columbus, OH

How much is too much? How about 2.5% of the tab chord? That is the tolerance based on AC43.13-1A. Sloppy trim tabs should not be ignored, or you might end up with a divergent flutter condition that could leave you tailless (no fun when flying).

Cessna recommends that the trim tab actuator be removed from the aircraft (regardless of model) every 1000 hours or every three years, whichever comes first. They also recommend that the free-play be measured every 100 hours of operation!

If trim tab tolerances are not called out in your airplane's service manual, the following procedure may be used, based on the FAA maintenance booklet AC43.13-1A (paragraph 55). Place the elevator trim tab and the elevator in a neutral (trailing) position. Using moderate pressure, move the tab trailing edge up and down by hand. Measure the total free-play at the trailing edge with a ruler. See the sketch below. Determine whether the measured free play is acceptable by comparing it to 2.5% of the tab chord (hinge to trailing edge). If less than 2.5% of the chord, the system is within prescribed limits. If more than 2.5% of the chord, the source of the free-play has to be found and corrected.



The following table shows maximum allowable tolerance for a few popular aircraft:

AIRCRAFT TYPE	TAB LENGTH (INCHES)	MAX. ALLOWABLE (0.025 x TAB LENGTH)
Cessna 120	4.6	0.12 inches
Cessna 150	5.75	0.14 "
Cessna 170	5.0	0.13 "
Cessna 172	5.9	0.15 "
Aeronca 7AC	4.5	0.11 "
American TR-2	5.1	0.13 "
Ercoupe	0.75	0.02 "

CUTTING TUBING

By LARRY and KENNETH STEPHENS

When we began fitting the pieces for the fuselage of our Acro II, we found it wasn't too difficult to shape each end of a tube, but getting the two ends in proper relation to each other was another matter. We completely eliminated this problem with the simple clamp shown in the photograph. We quickly realized that for the kind of results we wanted, good fit for easier welding and minimum added rod, the clamp was nothing short of miraculous.

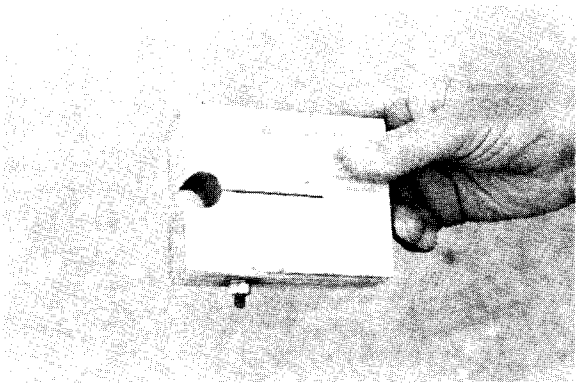
To try the idea, we picked up a scrap of 2x4 about 4 inches long, and we stuck with that material for the 6 or 8 clamps we eventually put into use. We drilled a tube diameter hole near one end (through the 2-inch dimension) then belt sanded the end until the hole just broke through. To provide clamping action, we sawed a slot past the hole about 2 inches and cross-drilled a hole for a 1/4 inch bolt about 1 inch above the hole for the tube.

We used the clamps to fit cross tubes for the fuselage in the following manner. Remove one longeron from the jig. Secure a piece of stock in the clamp. (If the cross piece is smaller diameter than the longeron, tape shims on the jig near the longeron and on the bottom of the clamp to line up the centerlines. If the jig is not quite flat, more or less shim will correct the situation so that the clamp doesn't rock.) Fit the first end of the tube to the longeron or cluster. You should find this to be easier and faster than without a clamp, and this is only the beginning.

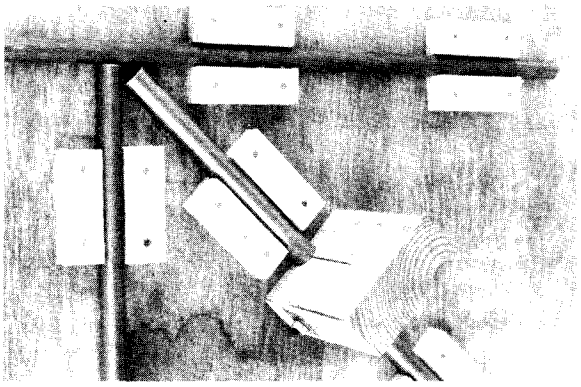
Now comes a benefit that we had not anticipated. The clamp can easily be used to produce a finished piece which is the correct length, as well as with ends that are fo the same airplane. Nail a jig block on the jig so that it touches the back side of th clamp. Remove the longeron and other cross pieces required at the second end. Work o the second end of the piece until the clamp block touches the extra jig block and you will have the correct length. If you want the piece to have some clearance, temporarily attach a shim to the extra jig block before you position it behind the clamp block. Remove the shim before you start fitting the second end.

We also used the clamps on diagonal pieces at transverse stations, but it has been a while, and the details are a little murky. I'm sure a builder who likes the clamp can figure it out.

We got a lot of favorable comments on our fuselage, and I think the excellent fits we were able to achieve with the clamp had a lot to do with that.

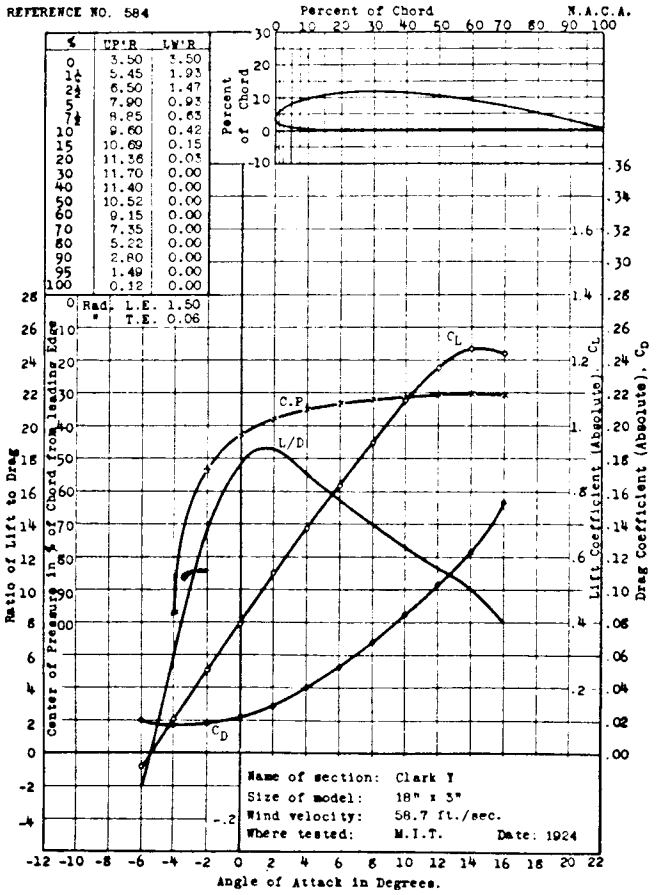


Sand the end of the block so the tubing just lies flat on the fuselage jig.



One big advantage? The tube won't roll so one end can be cut to fit and the second end is easier to make.

PIXIE CLARK Y AIRFOIL



Pixie uses a Clark Y airfoil. With the Clark Y airfoil the flat bottom and the zero degree angle of incidence line are equal. However, zero lift does not occur until nearly -5.5 degrees. For this reason, we have determined that the previously mentioned 1-1/2 angle up incidence on the Pixie is unnecessary. All of the Pixies built and flying to date have been built with equal height on the cabane struts. The builders have ignored the recommended 1-1/2 degree angle up on the wing, and the airplanes have flown quite successfully. This adjusted change to the Pixie plans eliminates the 1-1/2 degree angle of incidence on those plans, and suggest a zero angle of incidence on the Pixies which is currently being flown. John Leitus probably has more hours on a Pixie than anyone else, over 400, and recommends that others use zero angle of incidence. He believes if we put the 1-1/2 degrees in that the aircraft will be flying with the fuselage nose down in cruise, and that the airplane will climb like a homesick angel unless the corresponding change is made to the horizontal stabilizer. In talking this over with Paul Poberezny, he agrees that the aircraft should be built as the plans show, which is actually zero angle of incidence. Note the Clark Y airfoil has substantial lift at zero degrees.

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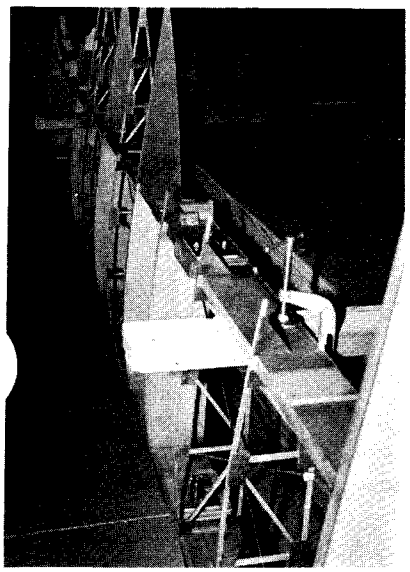
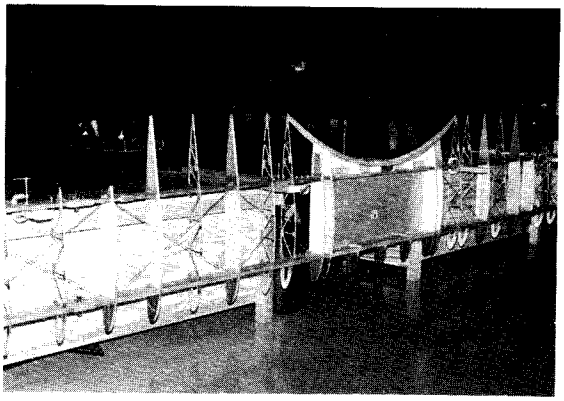
ALIGNING THE ACRO SPORT II WINGS STRAIGHT

After setting the center section on the aircraft and determining that the center section and the cabanes are built properly and that you have the proper angle of incidence to the center section and the proper side to side and fore and aft displacement, if you have a long work bench as we do, the center section to outer panel connection can be done as we did it by hanging it off a very straight work bench. It makes it much easier to drill the fittings and to align the wing center lines and incidence all along the wing. The photos show how this is done.





THIS ACRO SPORT II WING HAS A CENTER SECTION BUILT FOR USE OF A CENTER SECTION TANK.

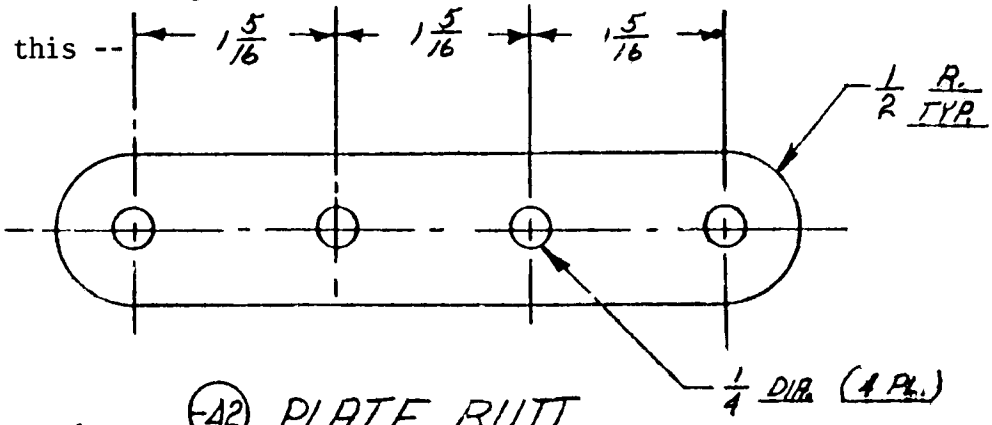
(LEFT) THIS PHOTO SHOWS HOW 2X4'S AND CLAMPS ARE USED TO CLAMP THE WING IN PLACE FOR DRILLING OF THE FITTING.

CUTTING FITTINGS

By GREG MANUEL, Monmouth, Illinois

I have used the following idea in construction of my Pitts S1-D on all wing and contro. fittings and find it far superior in both accuracy and ease to trying to scribe directly to metal. I am sure other members will find it most useful. I've also enclosed the template I used to make the pictured fitting.

1. Plans call for fitting like this --



2. Transfer to light cardboard stock.

3. This step is MOST IMPORTANT! Cut cardboard fitting template out with SHARP scissors to exact dimensions.

4. Glue, with rubber cement, cardboard template to steel.

5. a. Grind or cut fitting out using glued on cardboard template as a cutting guide. Compass pin holes can also be used to guide center. Punch holes before removing template.

   b. Always finish - file or sand all surfaces and edges to remove burrs/scratches.

   c. Use very fine pencil to make all lines and sharp point on compass - this will hold deviation in measurements to a acceptable minimum (a fat pencil line can be as wide as 1/8" or more - NEVER).

   d. When finished, cardboard template can be peeled off and reused to duplicate more or passed on to a friend building same aircraft.

6. Use accurate ruler and compass to layout fittings.

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ACRO SPORT NEWS -- RENEW TODAY!

Acro Sport News, published quarterly, is available at $10.00 per year. RENEW YOUR SUBSCRIPTION TODAY!

For information on availability of back issues contact Ben Owen, Editor, Acro Sport News, P.O. Box 2591, Oshkosh, WI 54903, 414/426-4800.

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CUTTING CORNERS

By TOM SOERNES, Waukesha, Wisconsin
and DON TOEPPEN, St. Charles, Illinois

(Editor's note: Two mechanics, Tom Soernes of Waukesha, Wisconsin, and Don Toeppen of St. Charles, Illinois, have been volunteering on the Ford Trimotor project. They have developed a method to help in cutting aluminum.)

The material used was .032, 2024-T3 aluminum; however, the method works well on most types of aluminum, which have some degree of hardness.

Most projects will require cutting an inside corner in the metal. Many times, when you cut the material right up to the corner, you end up with an overcut on the material, shown by the arrows in Figure 1. Cuts like this can crack further under vibration or stress, so the usual remedy is to "stress relieve" the area, usually file the corner out. The end result, Figure 2, shows how far away from 90 degrees the corner has gotten.

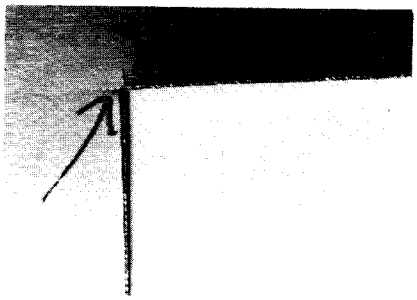

FIG. 1

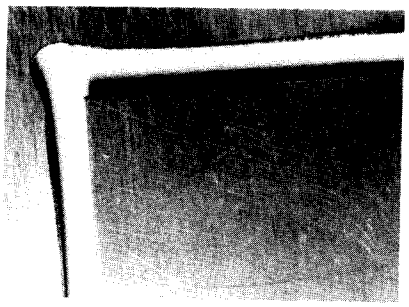

FIG. 2

An easier way to accomplish the corner, and take care of corner stress cracks, is as follows. Cut the lines as shown in Figure 3, stopping the cuts about 1/4" from the corner. This distance is determined by the eye, not with a ruler. Now grasp the waste stock and "lift" it out of the corner, causing the metal to fatigue, Figure 4.

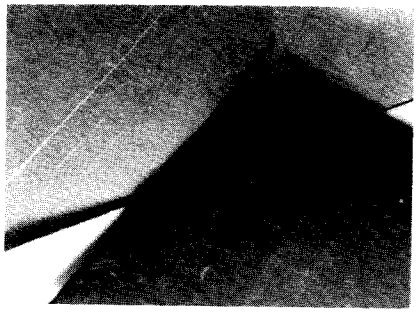

FIG. 3

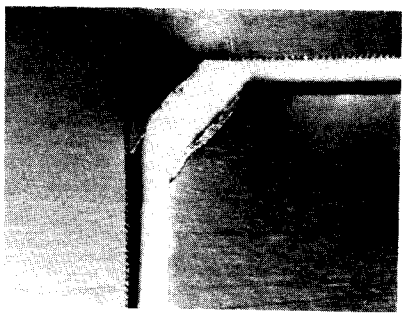

FIG. 4

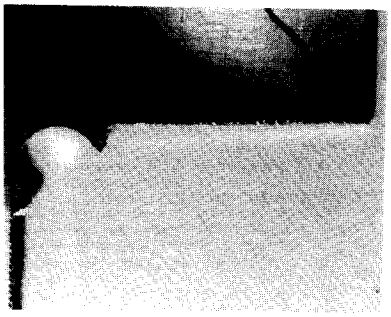

FIG. 5

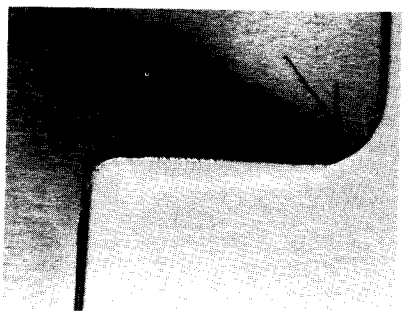

FIG. 6

Next, take a round file and "walk" it to your corner, Figure 5, until it touches both sides of the line. A round file has a constant diameter, where a rattail file is tapered. Both work well, except a round file is a smooth cut. If you have difficulty finding a round file at the hardware store, look in the chain saw section. A round file is used to sharpen the chain.

After the corner has been established, file off the nubs, Figure 5. Dress the entire edge at the same time. A common mill file works good for this. In Figure 5, an arrow shows a 45 degree line across the corner. Cut this off with your snips. Eyeball the distance to determine how round you want your corner. Then, Figure 6, round this off for the outside corner.

How much should the piece be filed? The edges will be shiny, and you won't be scared to run your hand along the edge, a good confidence builder in your workmanship.

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ACRO UPDATE

A number of special Acro Sport activities have been planned for the 33rd Annual International Fly-In Convention and Sport Aviation Exhibition (July 26 - August 2, 1985). You may be especially interested in the Acro Sport and Pober Pixie forums.

EAA Forums

Monday, July 29th - Pober Pixie, 10:15 AM to 11:30 AM, Tent #8
Tuesday, July 30th - Acro Sport I & II, 11:45 AM to 1 AM, Tent #6

Wicks Aircraft Supply Forums

Monday, July 29th - Acro Sport I & II, 9 AM to 10 AM, Wicks Display Area
Wednesday, July 31st - Pober Pixie, 9 AM to 10 AM, Wicks Display Area

Once again Bob Stagner will be our Program Chairman and he will be assisted by a number of dedicated volunteers. They will have a panel discussion and question and answer sessions in both forums. Bud Judy, who will fly the Acro Sport II during the evening air shows, will also be on the panel to discuss the flight performance characteristics of the Acro II.

"No-Host" Dinner

Wednesday evening at 8 PM a "no-host" dinner is being organized at Butch's Anchor Inn for all Acro Sport and Pober Pixie builders, enthusiasts and their families. We will be able to get together and discuss our interests and progress. However, we need a count of those interested in attending the "no-host" dinner. If you plan to attend, please drop a note to Acro Sport, P.O. Box 462, Hales Corners, WI 53130 as soon as possible. We're looking forward to seeing you there.

Come Visit Us!

All of you who are interested in visiting us at the EAA Oshkosh '85 Convention should drop by the Stits tent in the workshop area. An uncovered Pixie will be on display -- and ongoing Pixie fuselage work and wing rib work. The Acro II will also be in the tent ... uncovered. Acro II builders will be able to observe, take pictures and ask questions. This workshop is an excellent opportunity for you to have a "hands on" learning experience.

Awards

Don't forget that the awards will be given out on "Designer Night" -- Thursday evening (August 1) at the Theatre In The Woods.

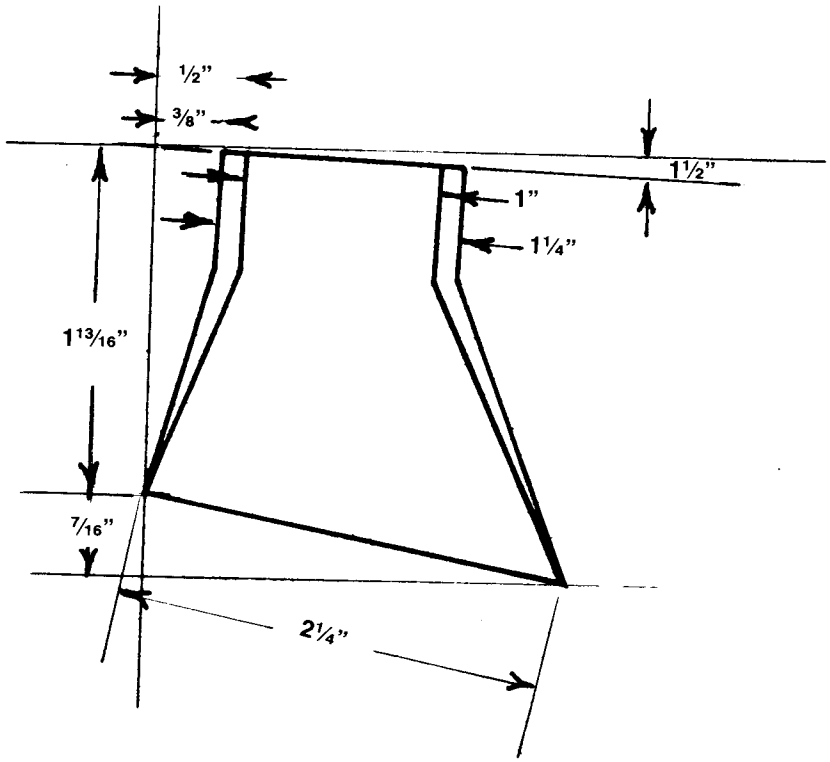
Acro Clothing

Throughout the year, we receive a number of questions about clothing with Acro Sport emblems, etc. Once again, Acro Sport clothing items will be available at the EAA Sales Building during the 1985 Convention. In the workshop area, clothing, plans, info packs, EAA videos, and the Acro Sport manual will all be on sale.

Our Acro Sport activities for the 1985 EAA Convention will certainly be enjoyable, entertaining, and most of all, educational. See you there!

CABANE BUILDING TIPS

Acro Sport II builders have had difficulty building the cabane insert. The cabane insert is built as the following full-size plan indicates.



The bushing is positioned on top of the cabane insert, and it is recommended that the bushing be welded to the insert before it is installed on the cabane. It is then tacked in place while forming the cabanes around it. Before final welding any cabane part, the center section should be fitted to the wing with the fuselage in the level position. The Acro Sport I drawing is essentially the same.

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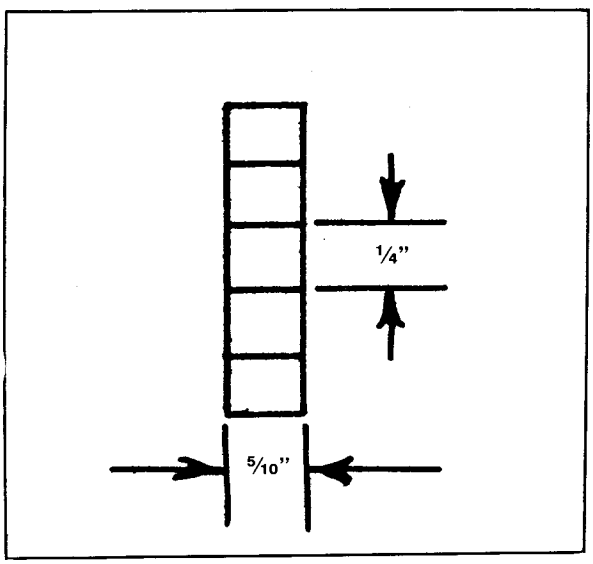
ACRO SPORT II
ORIENTATION OF STRINGER

Width 5/16, height of each lamination 1/4".



COUGAR PLANS AVAILABLE

Cougar plans are now available through Acro Sport, Inc. Complete plans for the Nesmith Cougar I, a two-place, side-by-side aircraft usually powered by an 85-150 HP engine, are sold for $60.00, which include full-sized wing rib drawings and folding wing plans.

DON'T FORGET!

SEE YOU AT THE OSHKOSH FORUMS.

BE SURE AND RESPOND FOR THE ACRO SPORT DINNER AT BUTCH'S, WEDNESDAY, 8 P.M.

DON'T FORGET!

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