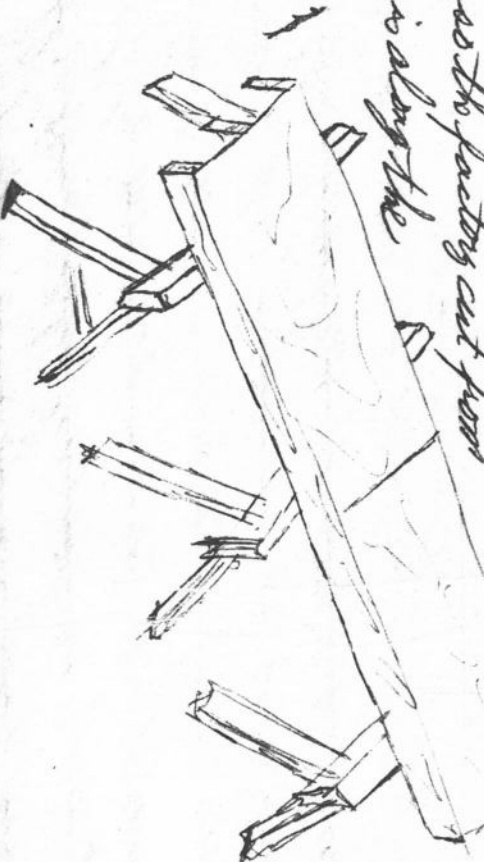
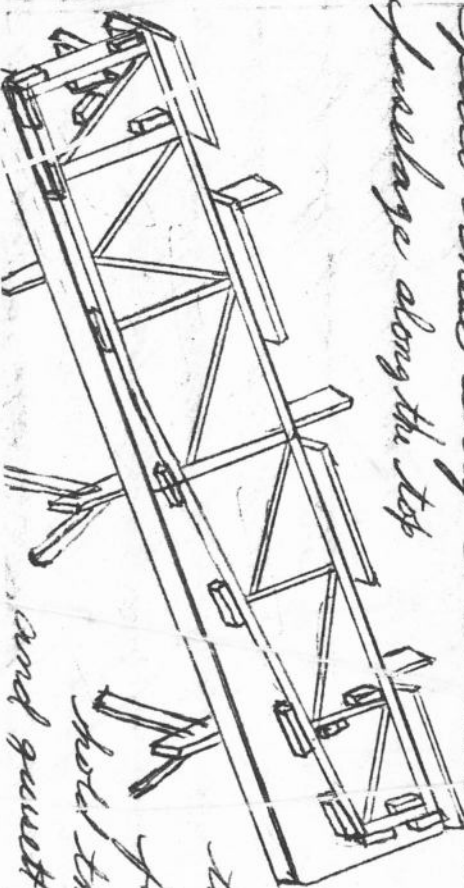


The fuselage of the Smith T-2 must build up quite similar to a giant model airplane. The first step is to study the drawings. Next you will need a sheet of either $2 \times 3\frac{3}{4}$ " plywood; $3-2 \times 4 \times 16$ " pine 2×4 ;
 $2-1 \times 2 \times 8$ " pine boards $2-1 \times 6 \times 8$ " for making up the fuselage jig and $302\frac{1}{4}$ " saw horses to support the jig. Cut the sheet of plywood down the middle so that you now have two pieces that measure $2' \times 8'$. Remove $2'$ from one of the pieces, this can be used to square up the fuselage later during assembly. Assemble as the factory cut from both pieces is along the same side.



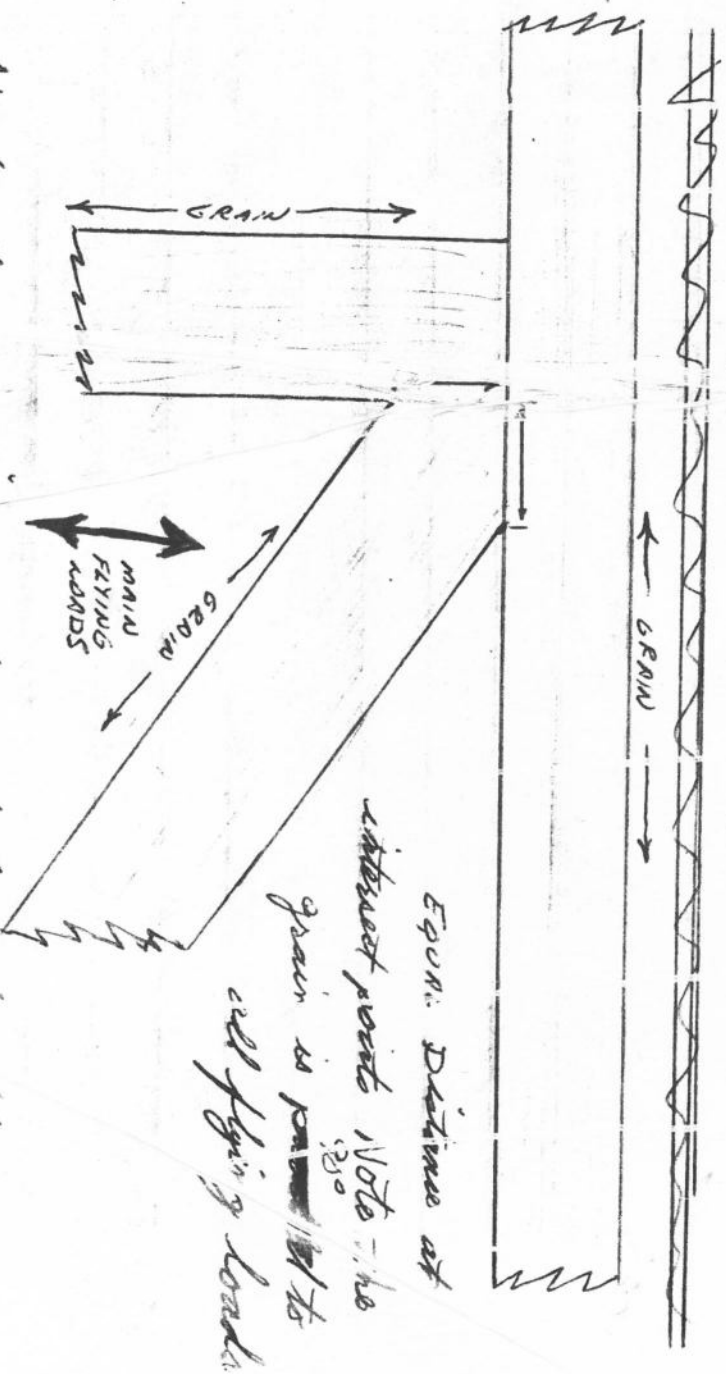
Now that you have your jig assembled dimensions the fuselage side full size on the table starting with the top longeron being flush with the factory cut plywood top. After you have a 1" of the dimension marked down in the fuselage side parts as you can see how they fit into place. Now take the $1 \times 6 \times 8$ " piece of pine and cut it into $4-2'$ pieces and secure them on the face edge of the factory cut plywood with the 2×4 supports. Space them every $3'$ to cover the length of the fuselage along the top.



blocks and secure them to your jig to fit the pieces, and to hold them until you glue and secure the pieces.

Put material from page 3' that is enclosed in this area before continuing with package construction

Now that you have your jig built, it's time to start building the package. First if you didn't purchase a kit from us for goodness sake buy all your wood from a well known reputable aircraft parts supplier. Use a very sharp fine tooth brace or good hollow ground combination blade (if you lucky enough to own a table saw) to cut all your wood. And remember this! FORCE CUT IT! You don't want any tears and fibers or jagged and angle cuts. Every part in an airplane must FIT with no ^{lose} ^{your} ^{time} and also a good quality joint ^{you will need to make a left and right package and}. First begin by carefully cutting your longsons, and place them in the jig. Next carefully and precisely cut your package uprights and place them in the jig as well. With the longsons and uprights are cut and in place, cut the diagonals and place them in the jig. Keeping in mind that the center of the diagonal should be ~~at~~ ^{the} interest where the uprights and longsons meet.



Next cut your air and ground for the side. You will save time if you do this for both. You could even cut all your edge longsons, uprights, and diagonals if you are sure they are of perfecting air.

and don't forget to label the pieces.

Now you're ready to start assembly. Don't mix up too much glue at once. Pot life isn't all that long on most ^{glue} and even though you have all the pieces set it still takes a while

CONV. OR 10 Y
Put just
after 15
assembly

for proper assembly. You will also have to decide ~~before mixing~~ ^{whether you} ~~whether you~~ will be using aircraft nails or staples to fabricate your parts as there are advantages and disadvantages to each. If you use aircraft nails make sure they are long enough to hold fast in the wood. It will take longer to fabricate the airplane but you will not need to remove the ~~the~~ nails after the structure is dry. Staples on the other hand are quicker to use so construction time is less and is important when considering portability of the glue. Always use tack pointed staples they go in easier and cause much less damage to the wood. ~~As~~ ^{As} we have a complete line of tack pointed staples ~~and~~ ^{which are 15 mil} these T-88 smaller gum is excellent for building ribs but you will need their heavy duty gum for attaching all main plywood and gussets. This gum uses tack pointed T-50 staples. ~~Before~~ ^{Before} you go off and buy your new staple gum remember that plain steel staples attract moisture so they will need to be removed before sealing and varnishing the wood. You won't need to remove brass coated aircraft nails. Either way a good glue job is what is really holding the parts together and with weldwood resin glue or T-88 the parts if protected can last a good many years (50 or so). Now you can decide to buy those staple gums or that tack hammer.

Put this

After thoroughly mixing the glue according to instructions, apply a uniform coat to all mating surfaces. First the main structural members and then the plywood parts. Fasten the parts in place ~~and~~ using either nails or staples. After all pieces and parts are in place remove the side from the jig and apply glue to the other side in the same manner as before. Remember you need a left and right side so make sure the plywood that goes from forward to rear of seat is applied accordingly (one left one right).

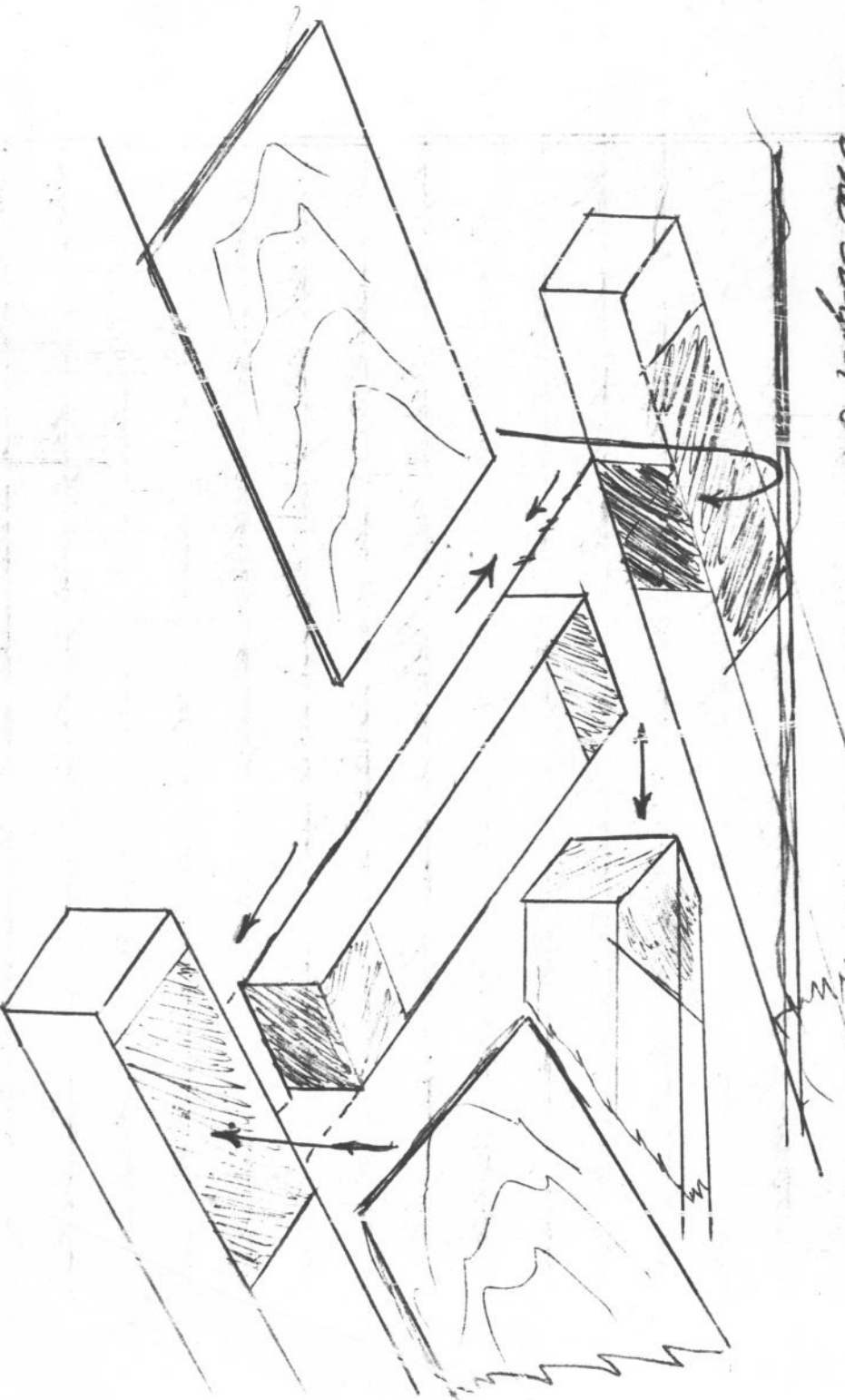
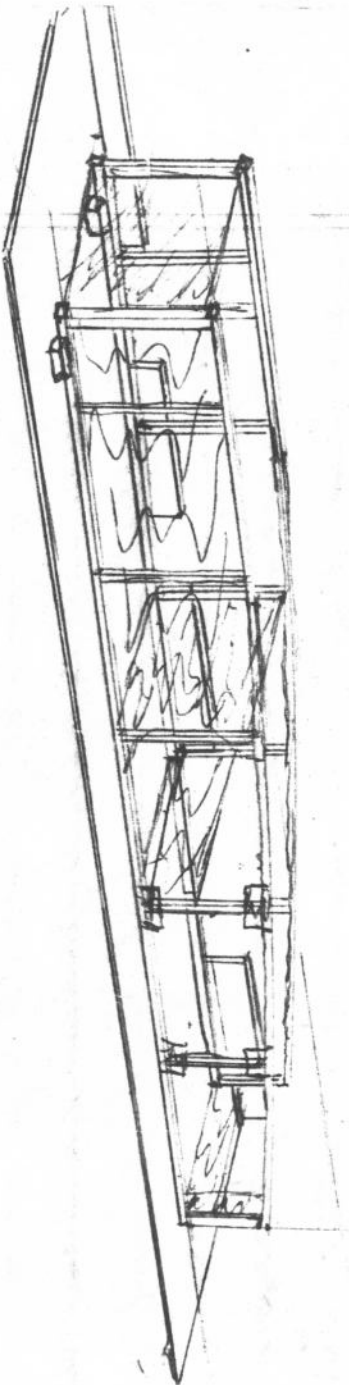


FIGURE 2 GLUE APPLICATION WHEN JOINING PARTS NOT CURVED
APPROX. 70 SHAPED REAR

Now that you have both side constructed it is time to assemble them into a complete package. Remove all jig assembly blocks except the one on the top longeron, but do not allow those away. Next cut the piece of plywood for your forward bulkhead to size everything together. It again. Next the left one only won't cover the cut it's make a 2' x 15" and a 2' x 9" piece also key

them perfectly square. Now cut the seat track support perfectly square and set them aside. ^{You will have 4 holes in seat} Now take each fuselage side and place it with the top longeron against the jig table, and secure them with blocks. Now take the forward seat back support and the other two pieces of plywood and place them in the fuselage. Secure these with clamps or temporarily with aircraft nails. Now that you have the fuselage lined up, begin at the front and start cutting your crosspiece for both the top & bottom. Only cut these the same back to station #3. ~~Station~~ Now glue in the pieces and apply the gunwale but again on back to station #3. Now that you have that done allow at least 12 hours of elapsed time before going farther (You are done for now). After the glue has been allowed to cure completely ~~then~~ remove the rear plywood of alignment jig and bring the rear of the two fuselage side together making sure that the rear of the fuselage is in $\frac{9}{16}$ with the center of the fuselage. You can take measurement on the width by reference off the $\frac{9}{16}$.



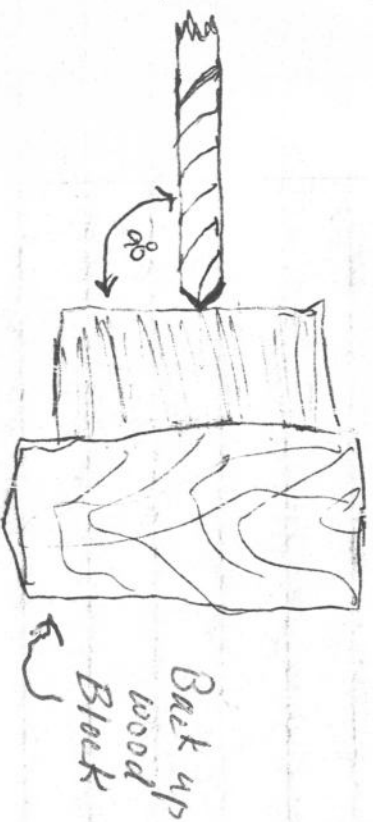
Refer to the top drawings on the plans for placement of crosspiece and gear supports. DO NOT Remove from the jig until glue is thoroughly cured.

Now that you have the fuselage built remove it from the jig. Refer to the drawings and drill all of the fitting holes in the fuselage. Be very careful to measure correctly and drill precisely.

P.S. Make sure you back up your wood with a

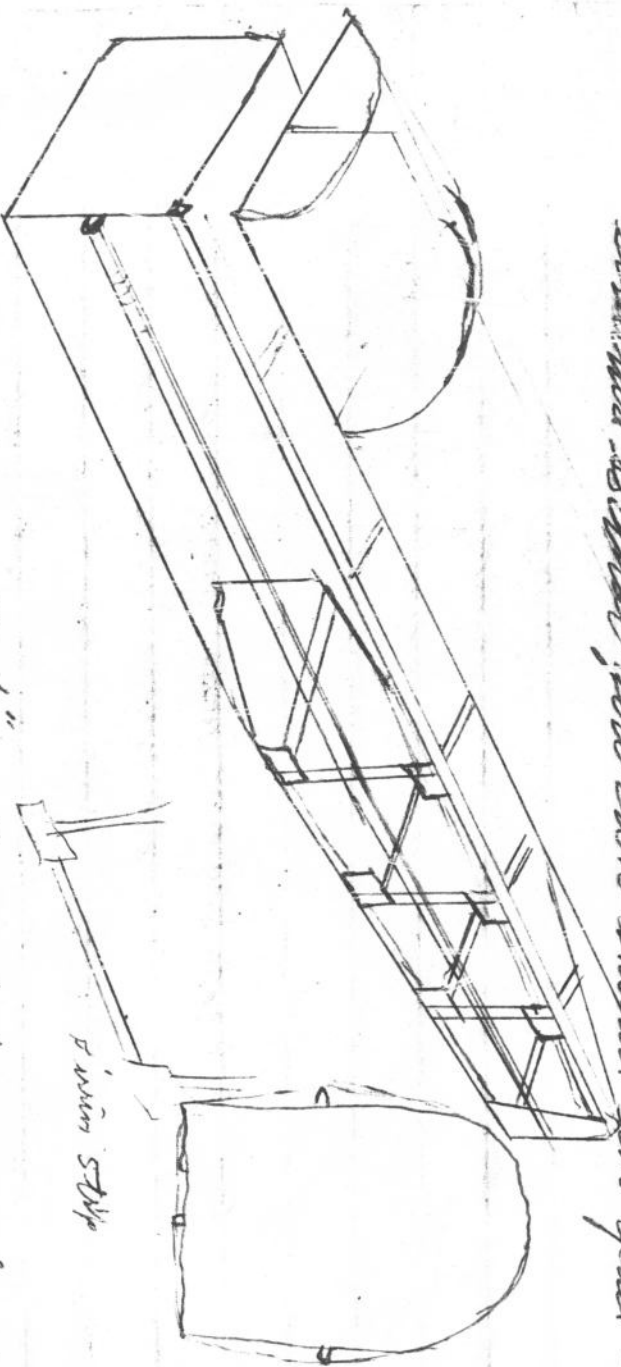
back and other two pieces of plywood to get them to fit in the fuselage. DO NOT NOTEN the forward the center the entire front of the fuselage.

P. 6 wood block to keep the shell bit from
 tearing up the wood on the way out.



Now turn the completed main fuelage over
 and support it on heels. Cut the super-
 structure paste out and glue them to the
 fuelage as indicated in the drawings.

* Remember not to install forward plywood on super
 structure as that you can install the fuel tank.



Now glue a $\frac{3}{4} \times \frac{1}{2} \times \frac{1}{2}$ " pump stop on each end and
 underneath the aircraft so that when you apply
 the paste the rising stops will keep the fuel
 away from the structure. You will also need to apply
 $\frac{1}{8} \times \frac{1}{4}$ " plywood strips between your gunwales on the
 top and bottom longwise on each side of the
 airplane. Now you can either fabricate the fuel tank
 and install it or you can fabricate the fuel tank
 complete it and fabricate your gun pieces and
 tank assembly. We feel that it is generally
 better to fabricate and fit the fittings and that
 now since this placement is fixed in your

must, ~~the~~ ^{however} it is up to the individual builder ~~to~~ to decide which he would rather do. If you decide to fabricate all of the fuselage fittings turn to the chapter on FITTING & FABRICATION.

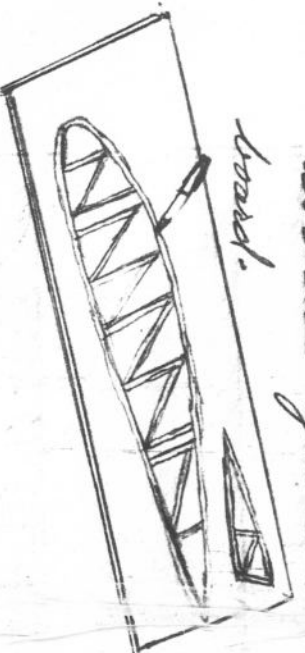
WINGS:

Before starting any construction on the wings study the main wing drawings and related fittings drawings to become familiar with the layout of the wing and its related metal fittings and hardware. Unless you have purchased a kit of ours for you wings the first thing you will need to do is acquire the proper amount and size of materials you will need for your ribs, spars, and fittings. You will undoubtedly spend the most time constructing your ribs. You will consume between 1 and 1 1/2 hours building each rib.

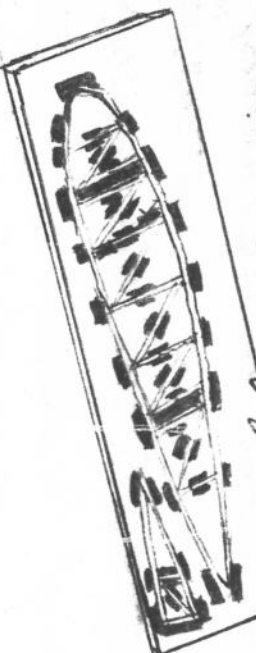
You can use one corner of your fuselage jig to lay out a rib pattern. If you haven't built the fuselage jig yet and don't really care to a good jig can be fabricated from a 3/4" x 10" x 5 piece of good or one "side plywood. Since your ribs are made from 1/4" sq. cap strip stock we suggest using either an extra piece of cap strip or a piece of 1/4" lathe or trim. You will need either a ARROW DT-21 staple gun or a tack hammer. If you use a staple gun all you will need is 1/4" staples since your ~~guarantee~~ are only 1/16" thick. If you decide to use nails they will also only need be 1/4" long (make sure they are brass aircraft nails!). You won't have to remove the staples if you use nails, but eventually there is

much quicker with staples. Just make sure you remove them after your glue has dried because they are unsightly and they will corrode and draw moisture ~~into~~ ^{from} ultimately destroying the integrity of the wood. The best way to protect your wings is by applying a good heavy coat of wood preservative and a good crosscoat (one coat with the grain the other across it) of polyurethane varnish. With a little care ~~and~~ you will end up with an airplane that could well last a lifetime.

Now is also the wing construction. First build the rib jig using the $3\frac{1}{2} \times 10 \times 5$ piece of plywood or a $1 \times 10 \times 6$. Now take the full size rib drawing and carefully outline the rib pattern on the board, making sure you carefully mark spar spacing and upright and diagonal ~~spacing~~ locations. Now using either the $\frac{1}{2}$ " lathe or a piece of 1 " board cut some blocks to help frame your ribs. You will need to place them at every location where the rib bends and will need to be kept in line, at wood intersect points, and also to help hold diagonals and upright in position until all gluing is done. You can also construct the airbrake on the board.

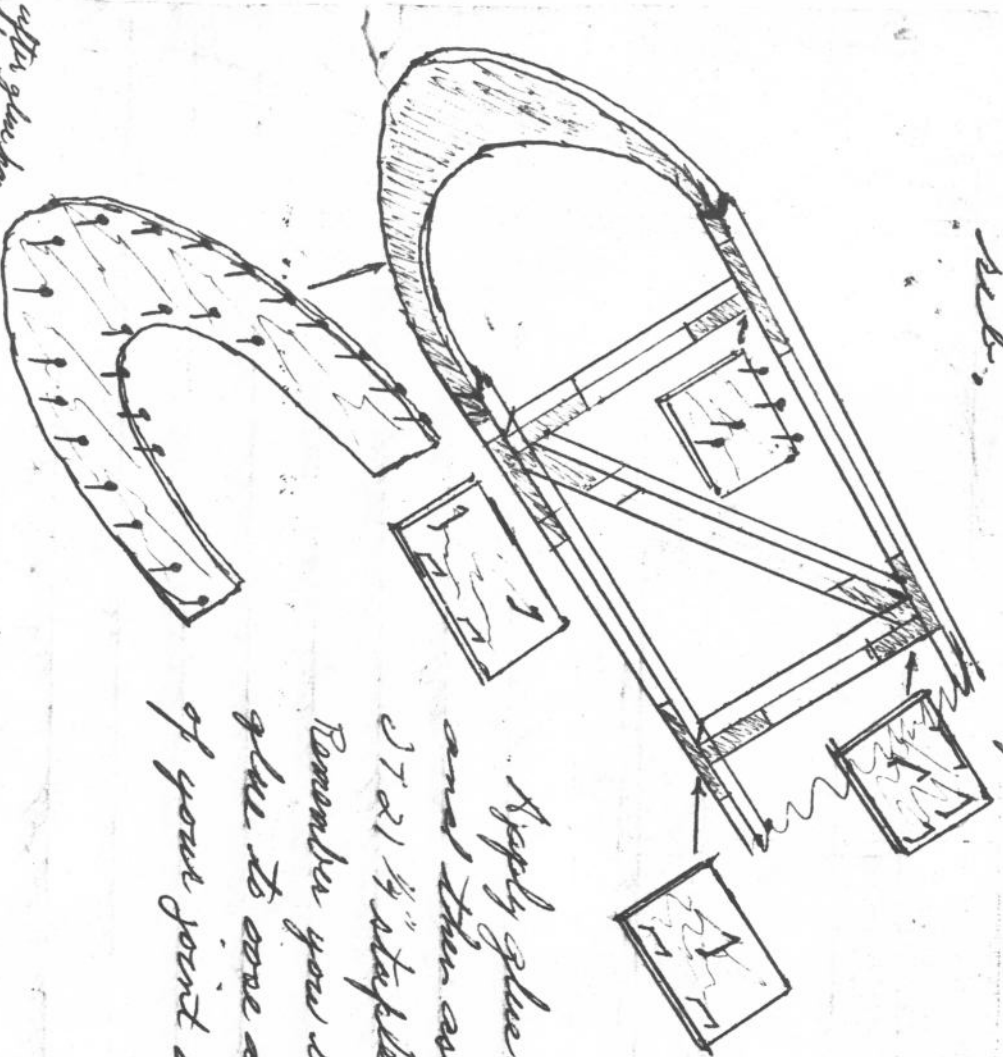


TRACE OUTLINE OF RIB ON
RIB VIG BOARD ALL PIECES
MUST BE OUTLINED



Place Blocks at shoulder in locations either with staples and glue or pinning and glue. Make where spar cut out have a piece of stock for blocks that is the same dimensions as the front & rear spars.

Remove the piece on at a time and apply glue to all areas that will be in contact with the other piece of wood and place them back in their proper location. ~~After gluing~~ Now glue the guests in their proper location and quickly remove the silk from the jig, turn it over and glue the ~~remaining~~ guests ~~to~~ on the other side. Clean your jig out with either water (if you use weldwood) or lacquer thinner (if you use T 88) ~~to~~ before proceeding to the next silk.



Apply glue to shaded areas and then assemble with either 3T 21 1/2 staples or 1/4 aircraft nails. Remember you ideally want some glue to cover along the whole edge of your joint or guest areas.

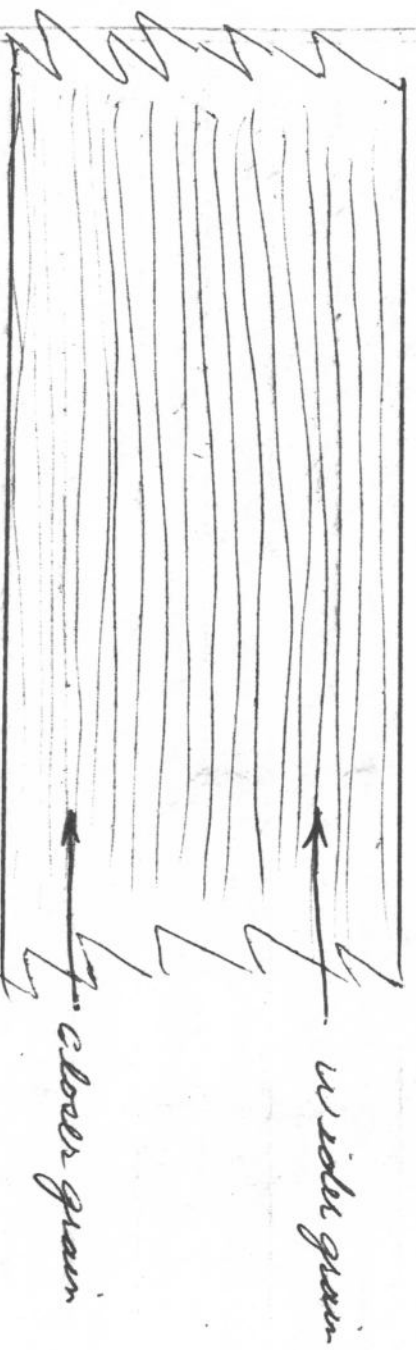
after glue has dried clean out all open spaces

opening because T grade 8 fitting as built the silk wasn't put in place

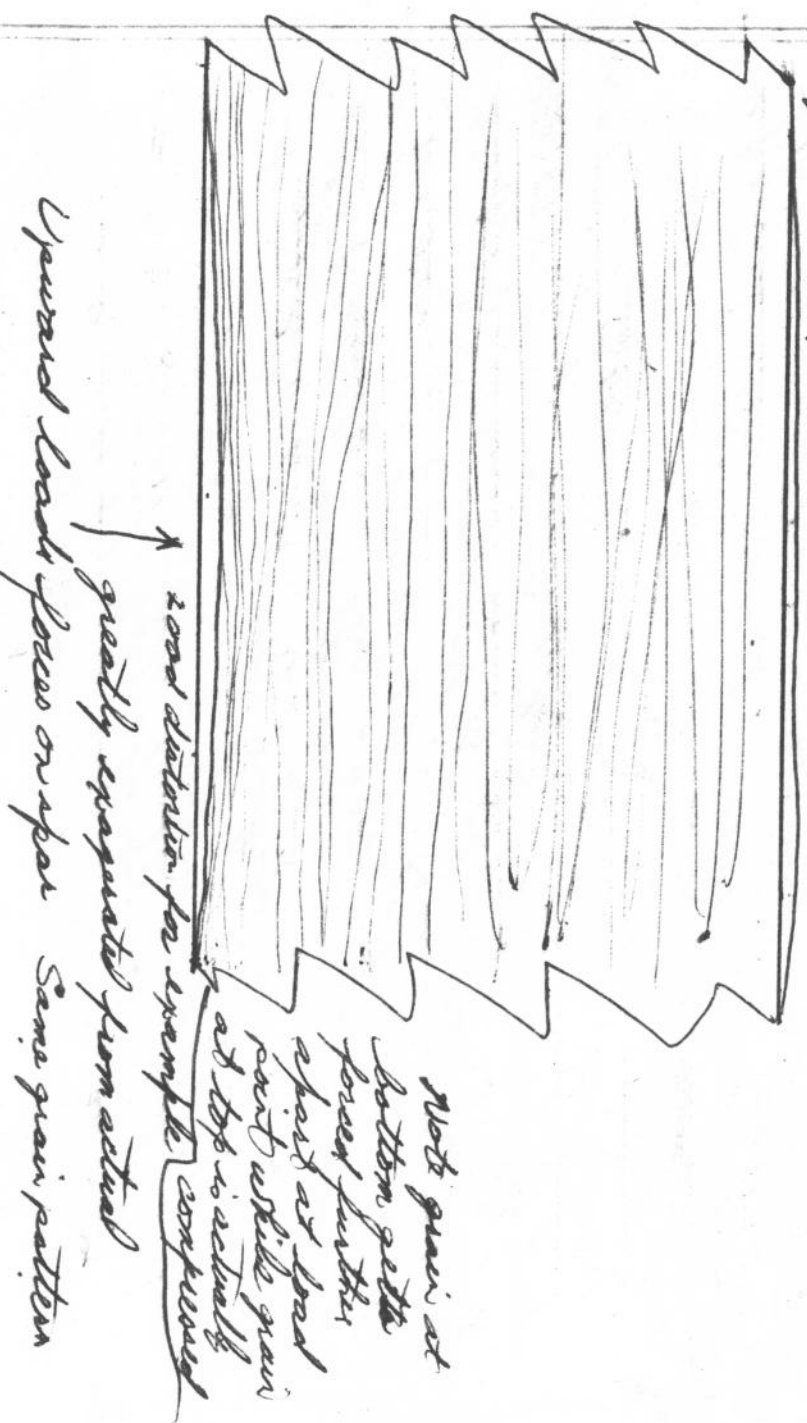
Now complete all silks including aileron ribs. Remember that you butt rib will have a wide space. Now is the time to draw your attention to your space. You have a total of 8 space to make for your wings 1 front left 1 right front 1 rear left 1 rear right 1 front left aileron spar 1 front right aileron spar 1 rear left aileron spar and finally 1 rear right aileron spar. All of these will have at least a 3° taper on the tops of the spars. So when ordering your wood make sure you use the

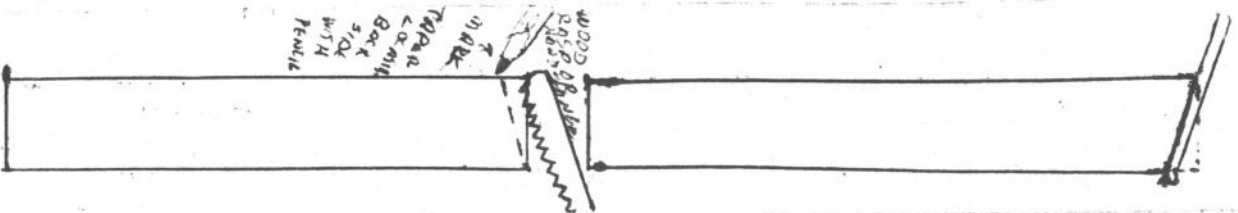
P.10

deepest part of the spar dimensions on the drawings for your wood. If you have a table saw just adjust your blade and cut your taper. Before going any further there is an explanation on determining the top and bottom of your spar stock. As a tree grows its maturity with annual rings become farther apart. So as the closest grain will be in the heart of the tree. This area of your board you need to use for the bottom of the spar (the closer grain needs to go on the bottom). See illustration below for reference.



This way the bottom of the spar are in tension and the top of the spar are in compression. The loads on the wing are trying to pull at the bottom of the spar and push at the top of the spar. This bottom in tension top in compression.





It is in a
position as
shown by
the arrow
which is
cut into
the wood.

Now if you have a table saw ~~just~~ ^{you} ~~make~~ ^{make} sure you use a very sharp carbide tip hollow ground blade. These types of blades will give a very fine and precise cut. Now angle your blade to match the taper in the rib; set up your fence and begin to cut your spar stock. REMEMBER LEFT WINS & RIGHT WINS SPARS & RIGHT WINS & ALL EXON SPARS. If you don't have a table saw, don't try to cut the taper with a circular saw unless you have an ~~extra~~ ^{very} good rip guide for it. Probably the quickest and safest way to taper the spar if you don't have power tools is to mark the depth of the taper on the spar and then take a hand wood plane or rasp and remove the excess. Then follow up by sanding smooth with either a power sander or hand sand. Next take and make sure your spars are 90° at the ends of the ~~boards~~ ^{spars}. If there is any indication of tears in the end fibers either sand smooth and check to see if they have disappeared and if not slowly cut off 1/2"-1" of material and recheck the spar; if they are still present after sanding repeat the previous step. Now measure the length of the spar ~~and~~ and mark the taper of your spar using tips. Now take your time and carefully cut these with a hand saw.

Now you have your spars ready for assembly but ~~if~~ before you proceed go over all surfaces of your spars with 80 grit sand paper and then 120 grit or 160 grit paper. Gently round the edges of your spars. This will keep them from splintering and maybe tearing if they get caught on clothes, tools, etc, and clean them off.

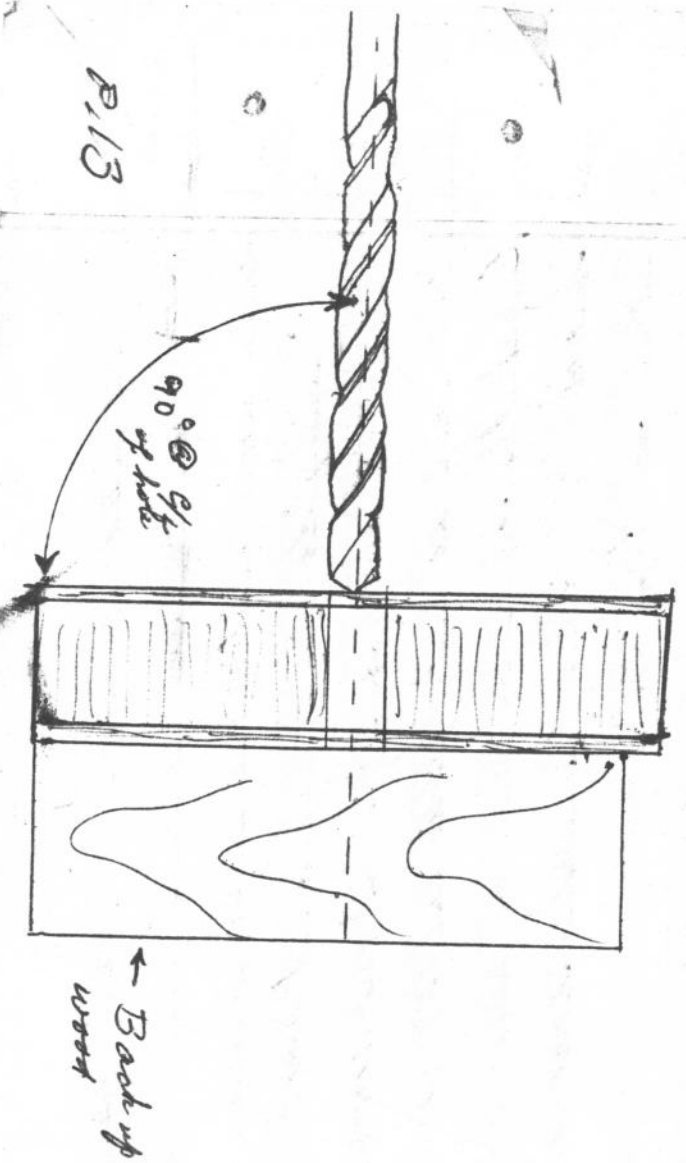
Next mark the locations of your plywood reinforcing pads and your ribs and compression

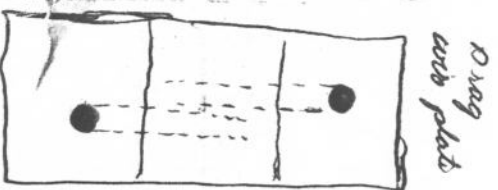
about location. Also mark the location of your
drags and dragwire fittings. Now cut out all of your
plywood pads for your spars (but fittings, lift
about fittings, just about fittings if as used, etc.).

~~Now to be and apply glue to each pad and to
the fittings. The glue is to be applied to the
mating surfaces of the pads and fittings. The
glue is to be applied to the mating surfaces of
the pads and fittings. The glue is to be applied
to the mating surfaces of the pads and fittings.
You will now have a set of spars and fittings
which are ready to be installed in the plane.~~

Place the pads in their proper locations
and temporarily fasten to the spars with
either aircraft nails or staples in each corner.

Now very carefully measure the location
of the fittings on your spars and mark their
mounting hole locations. Do this on all spars
keeping in mind you have a LEFT WING and a RIGHT
WING. ^{After double checking all of your measurements and locations} Now place your spars flat and carefully
check the proper size holes in your spars for
the fittings making sure the holes are at 90° with
the surface of the spars and on center, also don't forget
to back up your work with old plywood ^{wood} to keep
from tearing the spar & pad stock as the drill bit
passes through it.

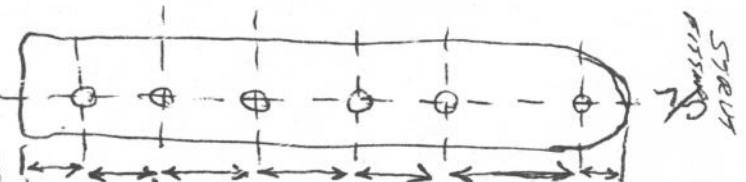




Now that you have your spare drilled lets ~~start~~ fabricate the drag wire and drag wire fittings and compression struts.

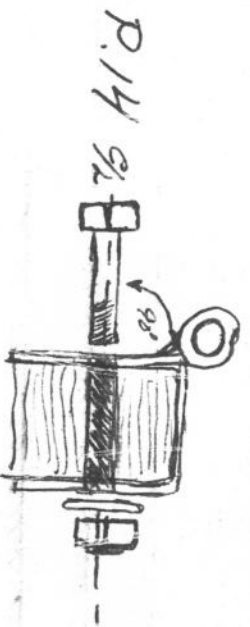
Study the drawings and well get the drag wire out of the way first. You want a tight fit but not so tight as to distort the spar with debris.

Carefully measure and cut your compression struts from 1"x1" stock. Remember that the compression struts in the Butt area of the spar and lift strut fittings area of the spar will have to be reduced by 1/4" because of the thickness of the two pads in these areas. When you have all of these made label their location with a pencil pen & marking tape and set them aside. Now study the drawings for the drag wire and the related fittings. Fabricate the drag wire spar backing blocks being very careful to cut and drill the phenolic according to drawings. Now cut and thread the drag wire and label their locations and remember you need a set for left and right wings. Finish up by fabricating your butt and lift strut fittings. Take your time marking and drilling these and make sure the hole pattern perfectly match those in the spar. It takes patience to perfectly drill these from 090 11.00 steel but it is the only way to go!

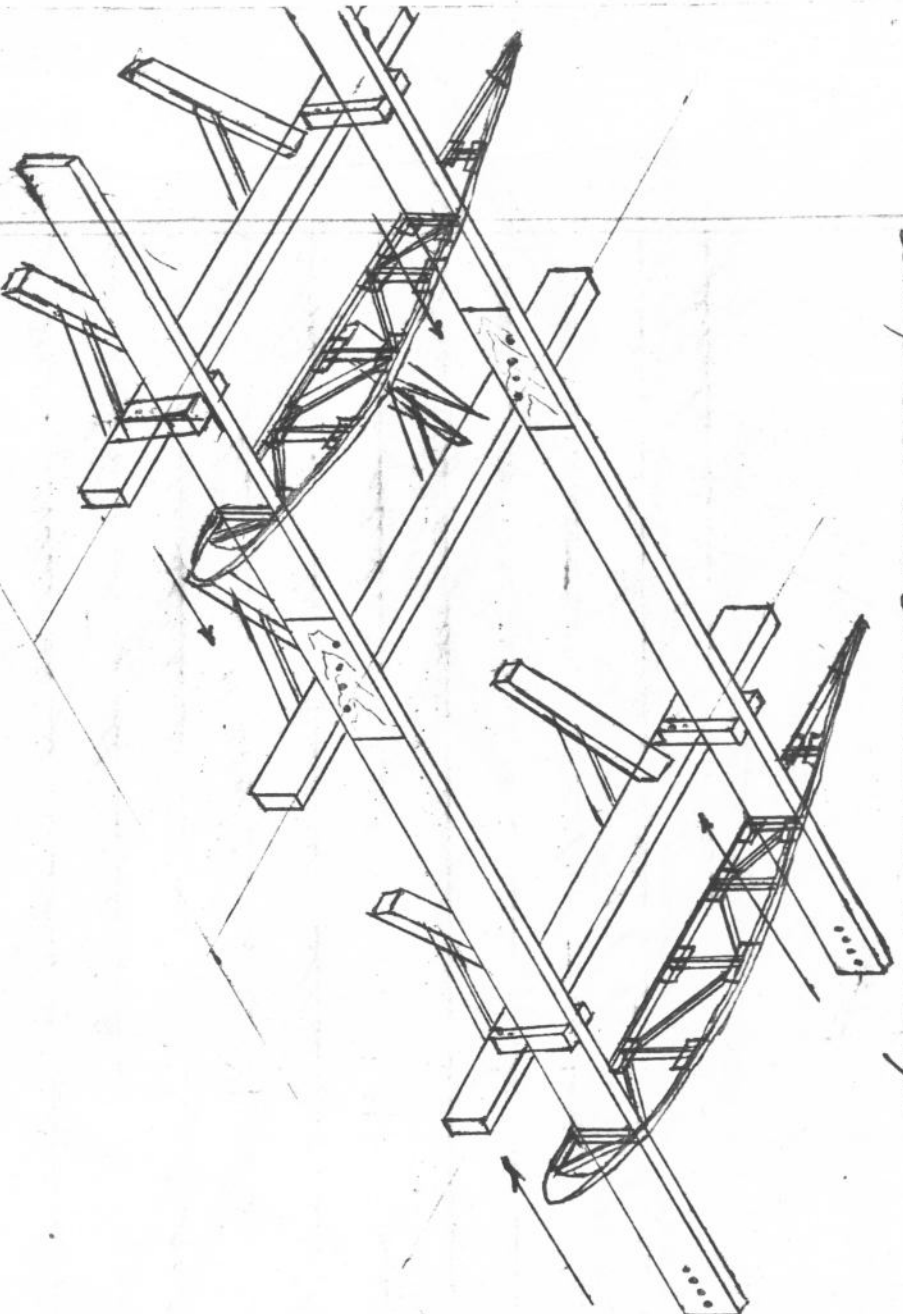


Now place these with your compression struts, and drag wire as they don't get misplaced.

Now fabricate your aileron hinges, & horns, and your pulley fittings. Make sure that all of your fitting holes line up perfectly with those that you already have drilled in your spar.

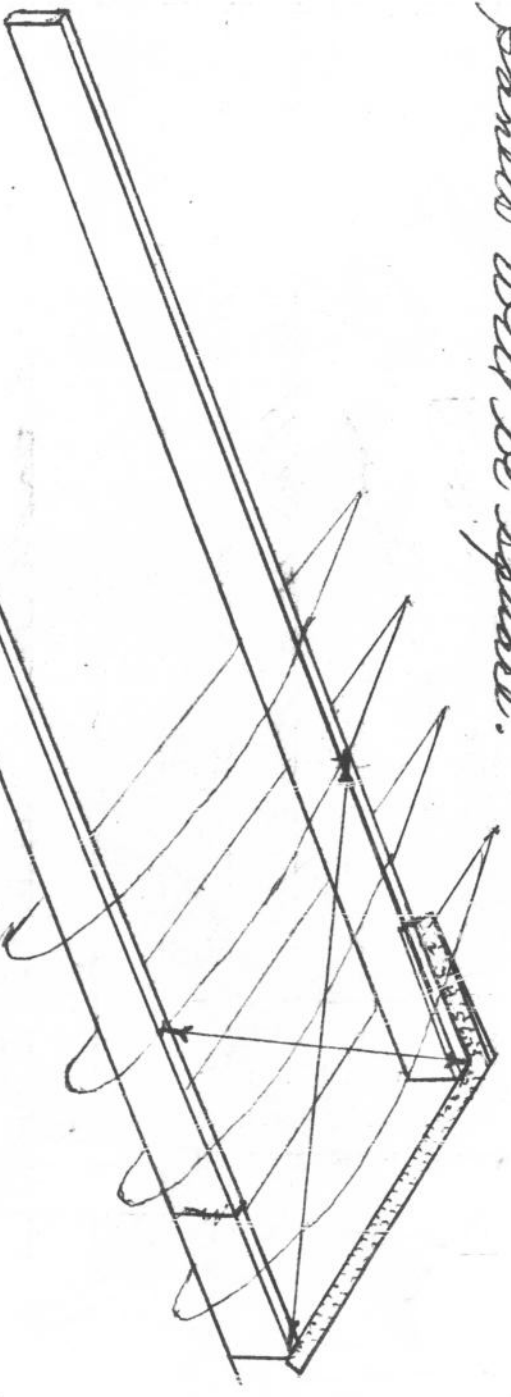


When you begin assembling the wings you will need at least 2 and preferably 3 saw horses to hold your wing. Make sure that all of your saw horses are the same height. Place your saw horses evenly apart as to distribute the weight of your spars and to keep them from sagging during assembly. Place a straight spar on the sawhorses and if you have a sawhorse that is short when it is up as they are all equal. Now take your 2 front and 2 rear wing spars and glue the outer left and right plywood panels on the spars. Now take and cut 8 or 12 2" x 2" x 12' spar supports. Take these and space them 34" apart on each sawhorse front and rear for each spar. Either fasten these in place with nails or C-clamps.



To have a strong wing structure your ribs have been designed with a snug fit so that when the uprights have been nailed and glued to the spar all of the flying loads are directly distributed to the spars. Before you can actually assemble the wings mix up some glue for your outside left and

plywood reinforcing plates. Support your spars where the pads will be inserted and either nail, staple, or nail & clamp these pads on all for spars "Only Blue These Pads on For Right Now!" After you glue the pads on carefully place the spars between the 2"x2" uprights that you have fastened to the saw horses. Now after cleaning all spar openings in your ribs of excess glue slide the ribs on from each end of the spars according to the drawings. Pull ribs from butt section in and outboard ribs from tips in. Slide these in place where they are to be located but do not glue. Next glue ~~your~~ the remaining plywood reinforcing pads in place. Now that all of the pads are in place it is time to ~~glue the ribs on~~ ~~place~~ align the spars at the butt ends so that the wing panels will be square.



You can also have

SPARES ENTER BY USING A LANCE

EXPENSES ARE BY APPROX 2

REFERENCES MARKS IN THE CENTER OF THE SPAR AND

THENBY USING A GOOD RULER OR TAPE CROSS REFERENCE YOUR

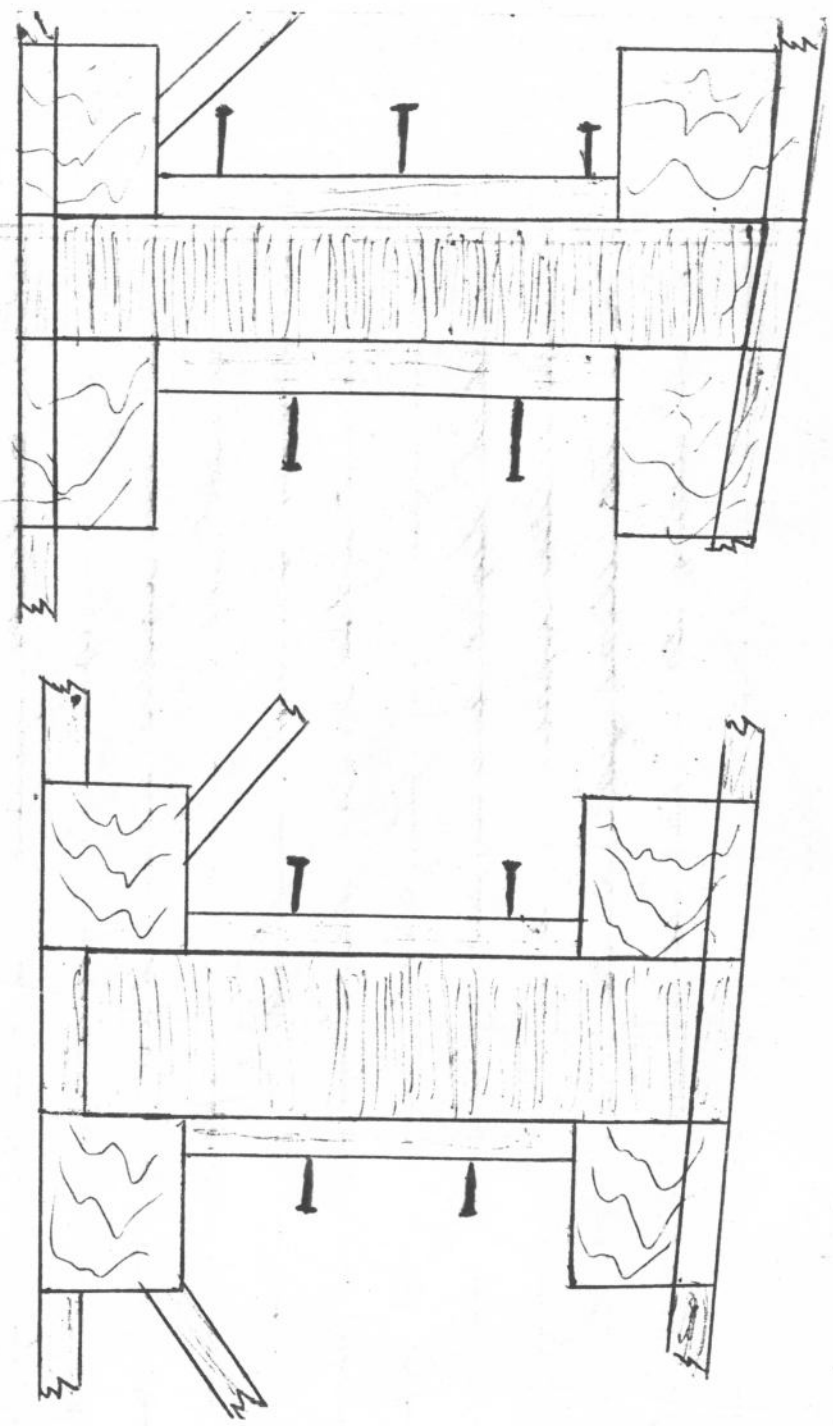
THESE DISCREPANCIES AS SHOWN ABOVE

~~Not the confidential informant (you said)~~
~~not the all~~

Now ~~off by~~ ~~the~~ ~~fastening~~ apply wood nails
and 2 coats of varnish to all areas that will
have steel fittings attached to them, but keep the

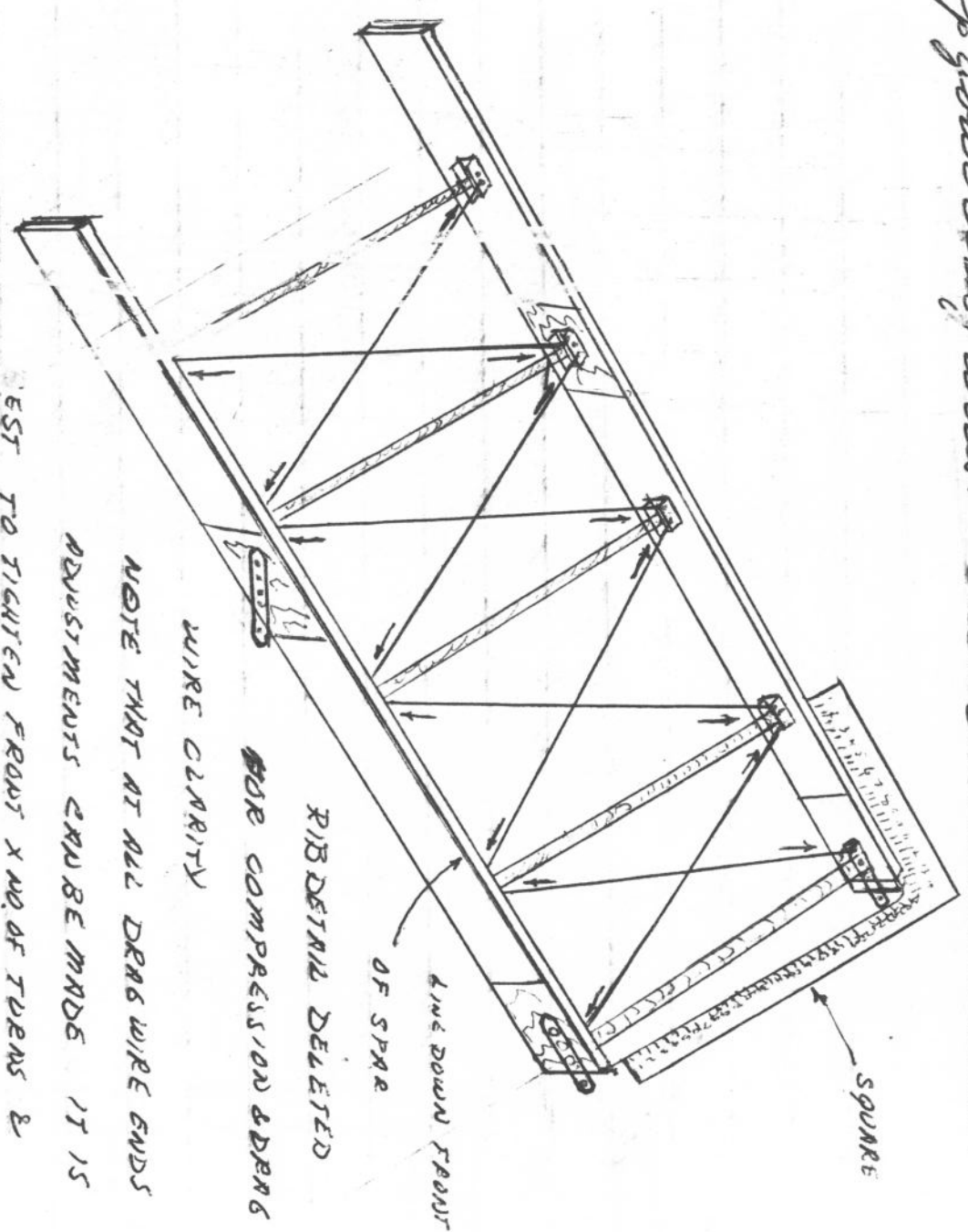
seals and varnish away from any glue areas.

After these have thoroughly dried attach the zinc chromated fittings to the spars. ^{Remember, do not over tighten but make sure they are good and snug.} Slide drag wires or tubing in place being careful not to disturb the location of the ribs. Also note that the wires or tubing do not come in contact with the ribs when they are in position and snug. *THIS IS VERY IMPORTANT!* If you use steel tubing for compression, attach or drag struts place these in place on their proper fittings. After all of these fittings are in place again check alignment of the spars. Now mix up some glue and glue and nail your ribs in place using 2 nails on the front of the front spar ~~and 2 on the rear of the rear spar and 3 on the back~~ ~~and 3 on the back of the front spar and 2 on the back of the rear spar.~~ and 3 on the back side of the front spar. and 3 on the back side of the rear spar. Next tack 2 on the front of the rear spar and 4 screws 3 on the back of the rear spar.



P.17 After you have all of your ribs secured in place, go back and tighten up all of your drag

wires. Do this as evenly as possible and pull them all up the same from the front to the back and from butt end to tip. Make sure the wiring stays perfectly square and that the spars remain perfectly straight. A n easy way to do this is to take your square to the butt rib and maintain alignment on the spar and its stake a string (colored if possible) and fasten it with a staple at the front edge of the front spar and run it across wire down the front edge of the spar and pull it tight and again staple it to the front edge of the spar. Now by referencing off of these two lines you should be able to keep your wiring in total alignment while tightening up your other wires. See illustration below.

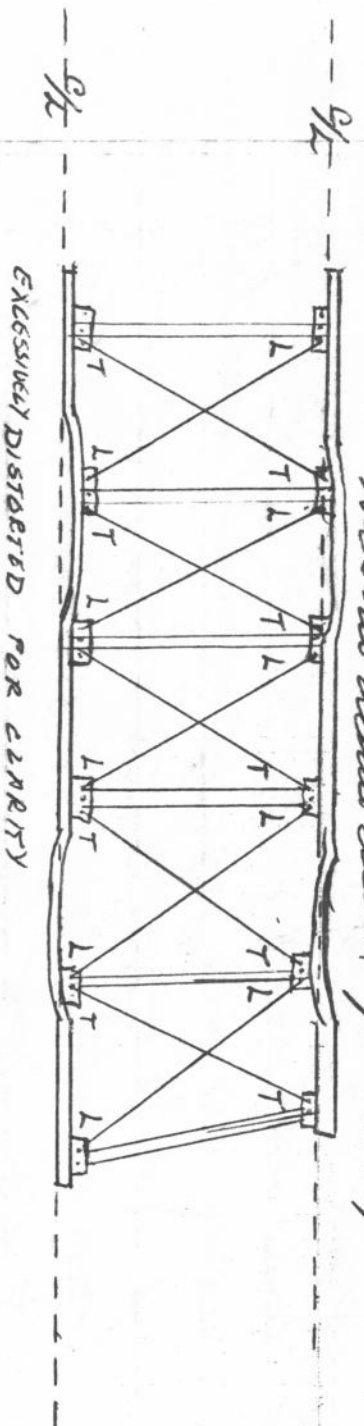


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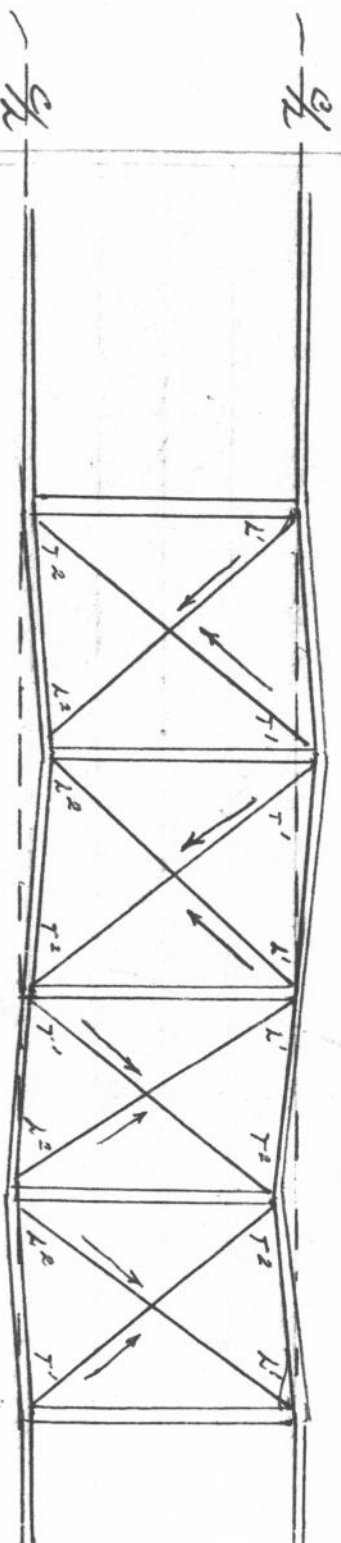
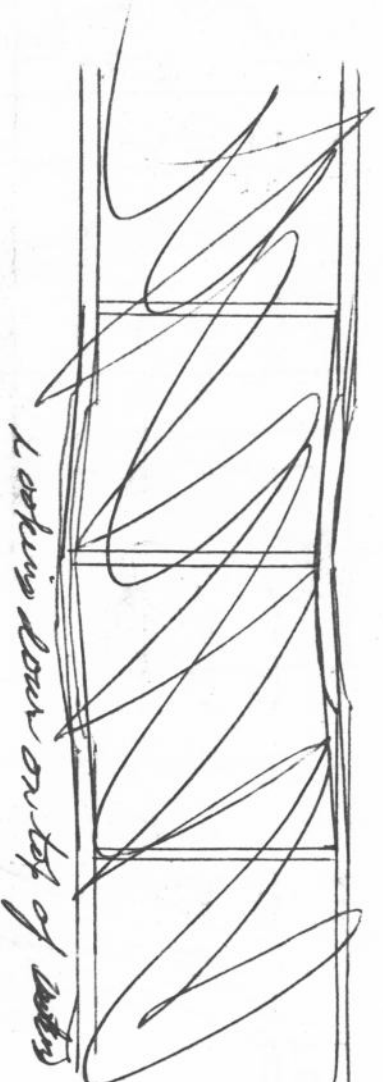
NOTE THAT AT ALL DRAG WIRE ENDS
ADJUSTMENTS CAN BE MADE IT IS
EASY TO TIGHTEN FRONT X NO. OF TURNS &
TURN BACK ONES SAME NO. OF TURNS & WORK
DOWN 2 1/2 INCHES WHEN TIGHT THEY SHOULD BE AS
TIGHT AS 1 INCH STRESSING BOW (VERY LITTLE TANGING WHEN
TIGHTENED) REFERENCE OFF OF STRINGS & SQUARE TO
KEEP EVERY THING SQUARE & STRAIGHT

If while you assemble the wire the wing comes out of square as the spars do not remain straight, the illustration below will help you to correct the problem.

~~Looking down on top of wing~~
~~All the detail details for clarity~~



Not to align problem wing above ~~for~~ just lower wire with "L" by it and tighten wire with "T" by it



EXCESSIVELY DISTORTED FOR CLARITY

After re-assembling the wing as in diagram above now you can tune up the spars and get them straight again. The best to do adjoining legs together lower wire with "L" 1-2 and tighten wire with "T" 1-2. Arrows indicate which way spars will be pulled to align only lower or tighten join nuts on wire 1 or 2 them at a time to replace from overadjusting.

Now make a bow tip ^{tip} ~~as~~ from the other side of your rib jig. ~~Take some pieces of 1/2" x 1/2" x 7"~~ ~~of~~ ~~the~~ ~~blocks~~ Take and make a full size bow tip pattern and trace it out on your jig board. After tracing your pattern cut some 1" x 2" x 2" blocks and fasten them down on the jig. You could also take a piece of 1/2" or 3/4" plywood and take your rib pattern and cut the plywood to the contour of the inside of the bow tip pattern and fasten the plywood on to the pattern. Next cut out some 1" x 1" x 2" blocks or plywood blocks and fasten the blocks to the jig leaving a little gap to allow for your bow tip pieces and wedges.

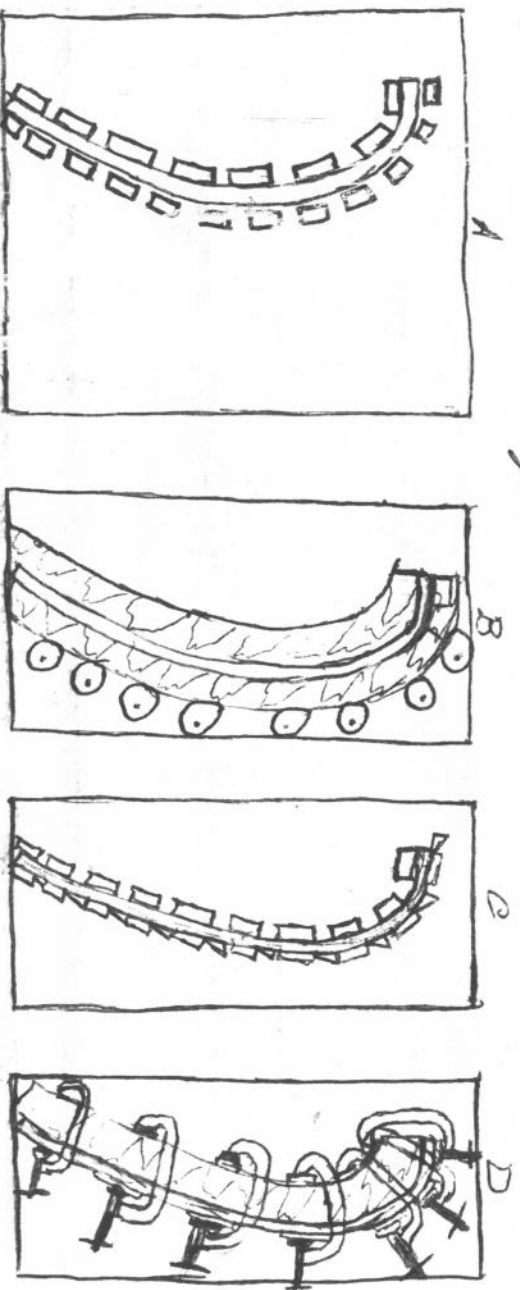
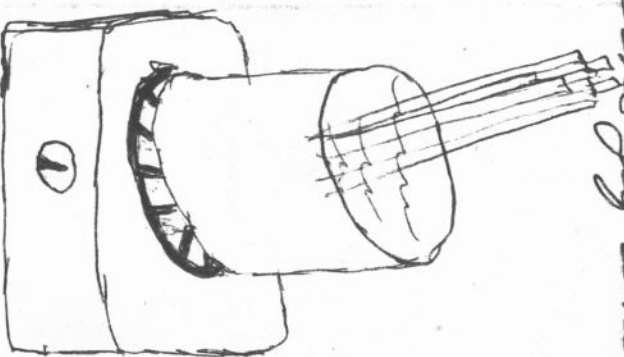


Figure "A" shows the bow tip jig with 1" x 1" x 2" blocks for supporting the spine while it is shaping in jig. Figure "B" shows plywood formers on the tip jig. The one on the right is fastened to the jig board while the one on the right side of the board fits up against the bow tip ribs and is forced tight in the jig using either air or electric plywood clamps as shown or nail it in it until the bow tip comes out.

Figure "C" shows rib jig using 1" x 1" x 2" blocks on both sides of the bow tip pattern. Fasten them down with a small gap on the ones on the right hand side of the jig. Cut some 1" x 2" wedges, ~~and after the gluing is done to make good splices bow tip pieces~~ ~~in the jig before, for a better shape and for~~

to be used to force the laminates of the brow tip together while the cure out. Now take 8 pieces of brow tip stock and soak them in steaming hot water for 15-20 minutes. Next place these in your jig and clamp or wedge them in place ~~so~~ until they dry out (1st next day) Now they will be bent and will make it much easier to glue and place ~~them~~ in the jig when you are ready to assemble them.



Now place either wax paper or plastic wrap over your brow tip jig. Mix up either your welded or T-88 epoxy according to directions and apply an even coat to all mating surfaces. Now place the pieces in the jig and immediately clamp or apply pressure to remove all gaps in your brow tip. Clean all excess from the top of the brow tip and place somewhere safe until thoroughly dry. See ~~now~~ it won't be bad.

Now all you have to do is make 13 more. After you have glued all of the brow tips and ~~you~~ ~~the~~ ~~these~~ ~~them~~ ~~thin~~ ~~fit~~ ~~it~~ ~~on~~ ~~the~~ ~~apex~~. If you need to taper the tip of the apex a bit for a nice fit do so, however, be careful and take your time doing so and use just a fine word file or jewellers saw since it is very easy to tear the ~~gum~~ ~~exposed~~ and

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grain on the apex tips. After you are satisfied (and be picky) that the fit is right!