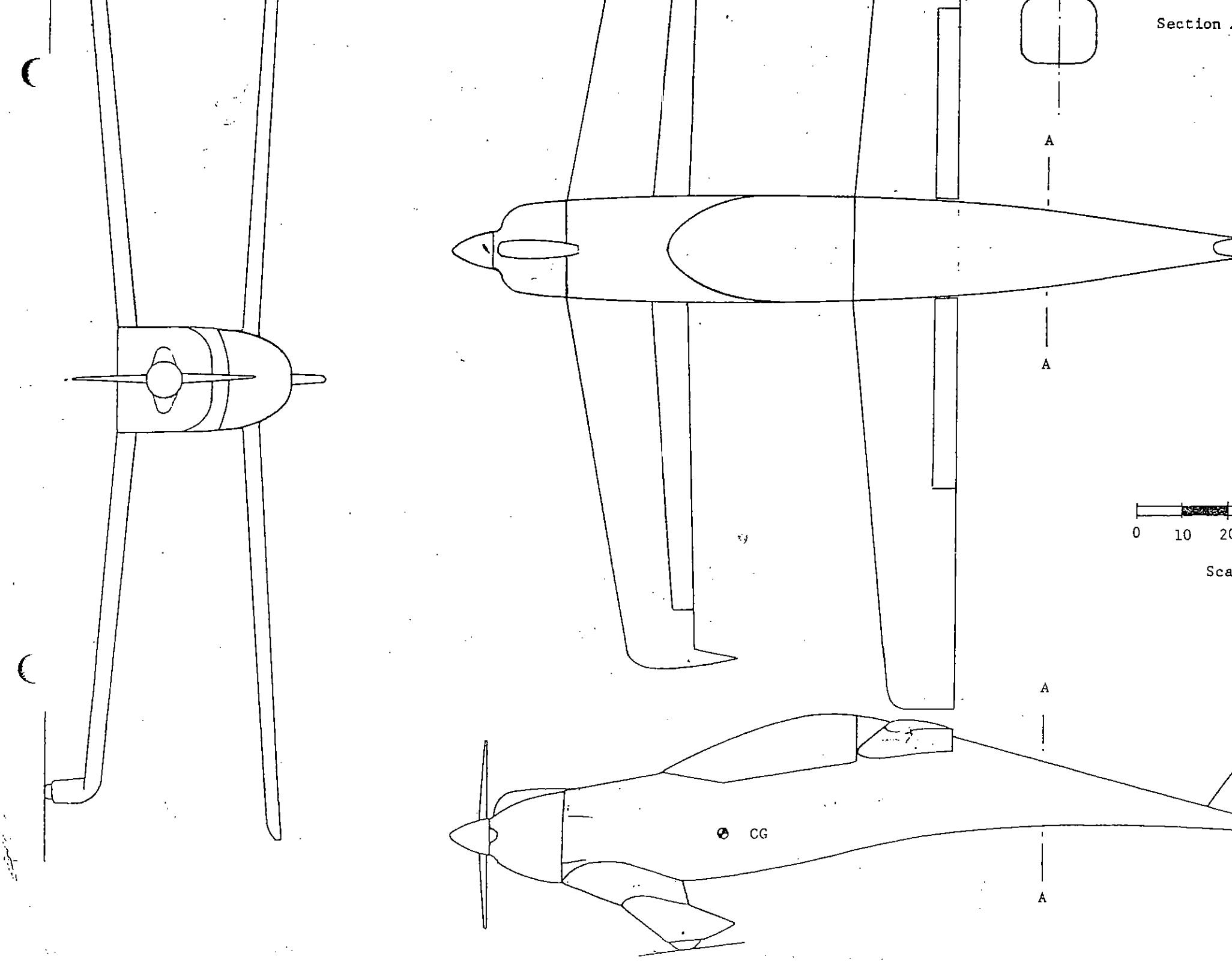
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GENERAL
TABLE OF CONTENTS

Quickie documentation is available in the following documents:

CONTENTS	DATE OF FIRST PUBLICATION
Quickie Construction Plans- includes education on composite materials and construction, and complete plans to build the Quickie airframe, except the engine installation.	30 June, 1978
Quickie Engine Installation- includes complete instructions on installing the Onan engine in the Quickie.	1 Aug., 1978
Owner's Manual-Flight and maintenance manual includes normal and emergency procedures, weight & balance, check lists, detailed flying qualities descriptions, operating limitations, performance charts, maiden flight test procedures, pilot checkout procedures, and record keeping requirements.	1 Aug., 1978
Quickie Newsletter-published quarterly (Jan., April, July, and Oct.); includes plans changes, options, future developments, and dates and locations of seminars and visits. A subscription to this publication is mandatory for all Quickie Builders.	25 May, 1978
Quickie Information Package- A 20 page, 49 photo publication that provides general information on the Quickie, and includes an 8" x 10" black and white photo.	10 Jan., 1978

Description and Introduction

The Quickie is a medium performance, homebuilt aircraft. Its compact external size and extremely efficient design results in superb performance and unequalled fuel economy using a very low horsepower engine. Inside, it provides comfort for a pilot up to 6'5" tall and 210 lb, plus some baggage capability in the roomy compartment behind the seat. Its canard configuration was designed not only for performance, but to provide improved flying qualities and safety as compared to the conventional light plane.

The Quickie's high-lift canard(forward wing) is fitted with a plain elevator that controls the aircraft's pitch attitude. The canard also serves as the main landing gear spring since the main gear is mounted on the tips of the canard. This feature results in a remarkably smooth ride as well as outstanding ground stability during taxiing, takeoff and landing.

Roll capability is provided by ailerons on the inboard portion of the main wing.

Yaw control is provided by a rudder mounted on the vertical fin, and is actuated by conventional rudder pedals.

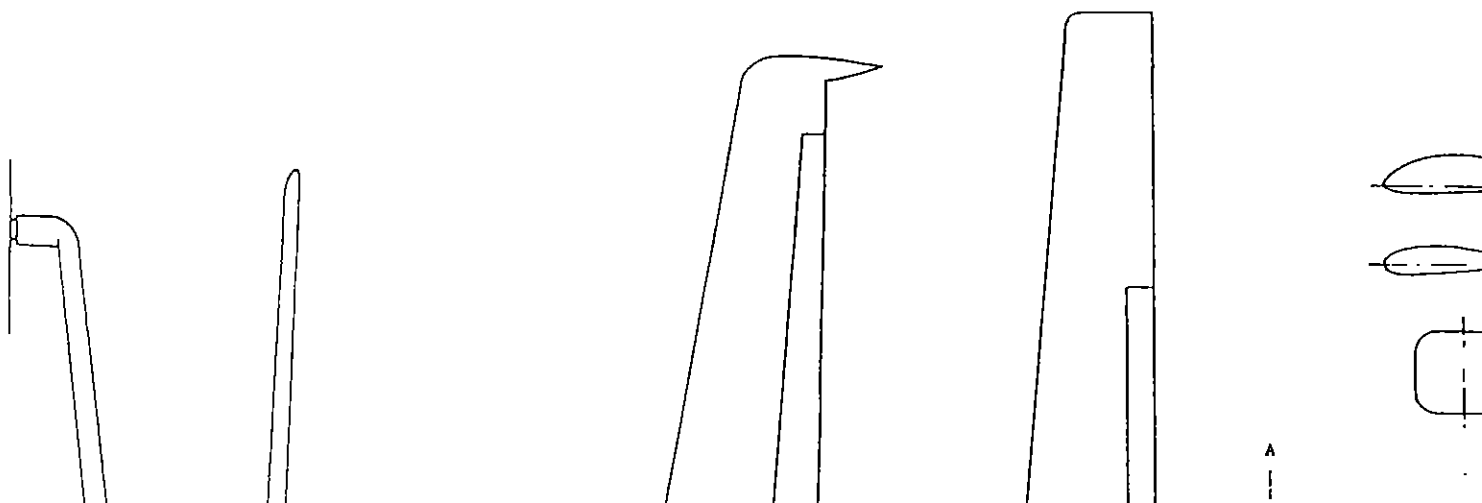
The pitch and roll capability is provided by a side stick controller on the right side of the cockpit. This feature permits precise control of the Quickie while reducing pilot fatigue and cockpit clutter.

The tailwheel is actuated directly from the rudder pedals, without any springs, thus providing positive steering at all times while on the ground. Since the ta raised on takeoff roll like this positive steering is av aircraft is airborne, making takeoff and landing characte

Even though the Quickie horsepower, it can outperfor aviation aircraft while reta fuel economy. The maximum s faster than a Cessna 150, an exceeds 100 miles per gallon

The composite structure provides some important advan conventional metal, wood, or tion. It has been tested to excess of those required for tion. Fatigue margins are hi maintained underload, the st not "oil can," buckle, or di vides excellent insulation a It has no hidden joints, no is far less susceptible to c is easier to inspect, more r er to repair. It is not sus stress due to temperature ch protected from UV, it has an

The engine that powers a reliable four-stroke, dire cylinder opposed, engine dev Aircraft Corporation specifi Quickie. The basic engine o Quickie powerplant is based, engine made by the Onan comp been building engines of thi for over 20 years.



These Quickie plans have been specifically designed to educate you in the construction materials, their use, and to guide you through each step of assembly in the most efficient manner possible. It is our intent to drastically reduce the non-completion rate* common to homebuilt aircraft. With that in mind, we have:

1. Preceded the plans with an education chapter intended to thoroughly acquaint you with the tools and materials, and how to use them.
2. Laid out the plans in a detailed, step-by-step format to answer the question of "what do I do next?".
3. Provided all appropriate information to each step adjacent to the words. Due to binding requirements, the larger drawings are grouped together in an appendix.
4. Provided full-size templates where required, to avoid the work and confusion associated with scaling up drawings.
5. Provided a complete kit from one source to eliminate time spent looking for materials.
6. Identified the difficult to build items, and included them (prefabricated and ready to install)
7. Set up our newsletter, "The Quickie Newsletter" as a continuing plans updating/correcting system.**

* Over 80% of homebuilt airplane construction projects started, are never finished and flown.

** Because plans updates occasionally are of a mandatory nature, a subscription to "The Quickie Newsletter" is <u>mandatory</u> for those building a Quickie.

<u>Building Sequence</u>

The nature of the type of Quickie structure requires that a part be left alone to cure for a longer period of time than that required to build it. Thus, you will find that when following the step-by-step order, you will often find yourself out of work, waiting for a cure. In most

that the majority of question
builder asks are already answ
in the plans. We have made c
effort in the Quickie manual t
information visible. If you
stand something, study the wo
study the sketches and all re
views/photos, then look throu
size drawings that show that
the airplane. If its a method
re-read the education chapter
fication. If the answer is s
it may be that, that item is
detail in another chapter (th
necessary overlap). It is po
question related to the opera
of the airplane or its mainte
swered in you owners manual.
your back issues of "The Quic
for plans updates or clarific
you have checked everything a
still stumped. You can do on

1. Ask a friend. Often a
of an item is unclear t
vidual and clear to anc
2. Write to Quickie Aircra
leaving room on the pap
question for our answer
<u>SELF-ADDRESSED, STAMPED</u>
<u>INCLUDE YOUR AIRCRAFT S</u>
We do our best to answe
ions within two days of
cannot answerquestions
application of non-recc
or regarding non-approv
Quickie Aircr
P.O. Box 786
Mojave, CA 93
3. Call Quickie Aircraft C
805-824-4313

Also let us know if you
better way of doing something
we'll publish it in "The Quic
so that all Quickie builders
it is <u>not</u> a good idea, we'll
<u>if</u> you include a self-address
envelope.

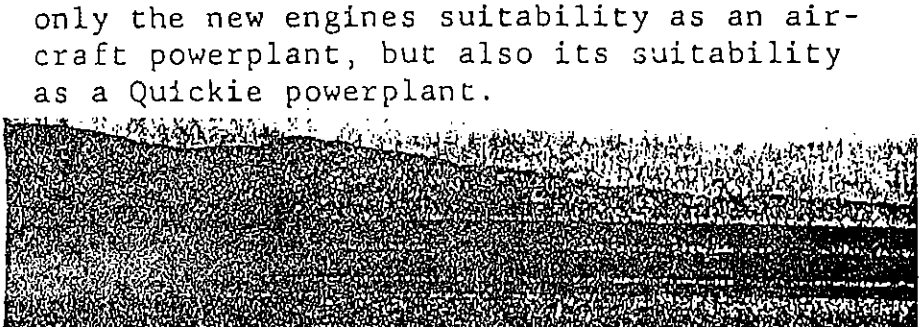
Do keep us up to date on
of your project. Send us a h

Perspective

The builder of an amateur-built aircraft is the manufacturer; he is responsible for quality control on all parts, all construction, and the conduct of his flight tests. While Quickie Aircraft Corporation is not the manufacturer of your aircraft, we do, through these plans and services, provide you with information about how our Quickie was built and how we feel is the best way for you to build a safe, reliable airplane. We do encourage you to build the airplane as shown on the plans because we have found that our airplane provides us with reliability and safety, and any problems that we experience with our aircraft are documented and reported in "The Quickie Newsletter". We have gone to a considerable effort in developing the design, the structure, and the systems, and proving their adequacy with appropriate tests.

If you modify the airplane and then ask us if your modification will work, we cannot give you an answer without conducting the appropriate tests and totally qualifying the modification. This would obviously be quite expensive. Our concern then, is that if your modification is not successful, and causes an incident or accident, this would be attributed to our design, the Quickie. Because of this, we must insist that if you modify the airplane with any major change (such as an aerodynamic change, primary structural change, or using a non-approved engine installation), you call your airplane a different name, rather than a Quickie. If you make a major change, you must consider your self involved in basic aircraft design and development, an extremely risky business. As such it is not fair to us to be associated with any results of your development. We state this not to discourage inventiveness and progress, but to release any connection of your new development efforts with our proven design, the Quickie.

We are particularly concerned about individuals using alternate engines to power their Quickies. The Quickie was designed around our engine; any change would require an exhaustive test program to determine not only the new engines suitability as an aircraft powerplant, but also its suitability as a Quickie powerplant.



FAA Licensing Procedures

This procedure applies in
The FAA has a definite pro
tering and licensing homeb
There is nothing complicat
they insist that you follo
fully:

1. Contact your local FAA
   and manufacturing dist
   or FAA general aviatio
   fice. Tell them you a
   Quickie homebuilt. Gi
   lowing information:
   - 3-View drawing of th
   - Aircraft serial numb
   - Aircraft registratio
     available(see step
   - Approximate date of
   - Engine-type

   FAA will then answer y
   an idea of how much no
   for them to inspect yo
   you where the approved
2. This step is optional,
   if you want to reserve
   gistration number (the
   paint on the tail). Y
   all numbers, numbers f
   single letter or numbe
   two letters. They are
   letter "N." (For exampl
   etc.) Be sure to give
   and third choice, in c
   you want is already ta
   to reserve your specia
   dress: FAA Aircraft R
   25082, Oklahoma City,
   Do not register your a
   don't need to pay regi
   property taxes, etc.,
   plane is ready to fly.
3. When you are ready for
   contact your local FAA
   you have an airframe l
   able from Aircraft Spru
   FAA can make an inspect
4. To prepare for your fi
   be sure you have: the
   on, the "Experimental"
   ters) on the canopy fra
   (available from Aircraf
   an airframe log book a
   book.

   Before final inspection
   application for registr
   #AC8050-1), a notarized
   that you built the airp
   that you bought yoursel
   $5 registration fee. S

BILL OF MATERIALS

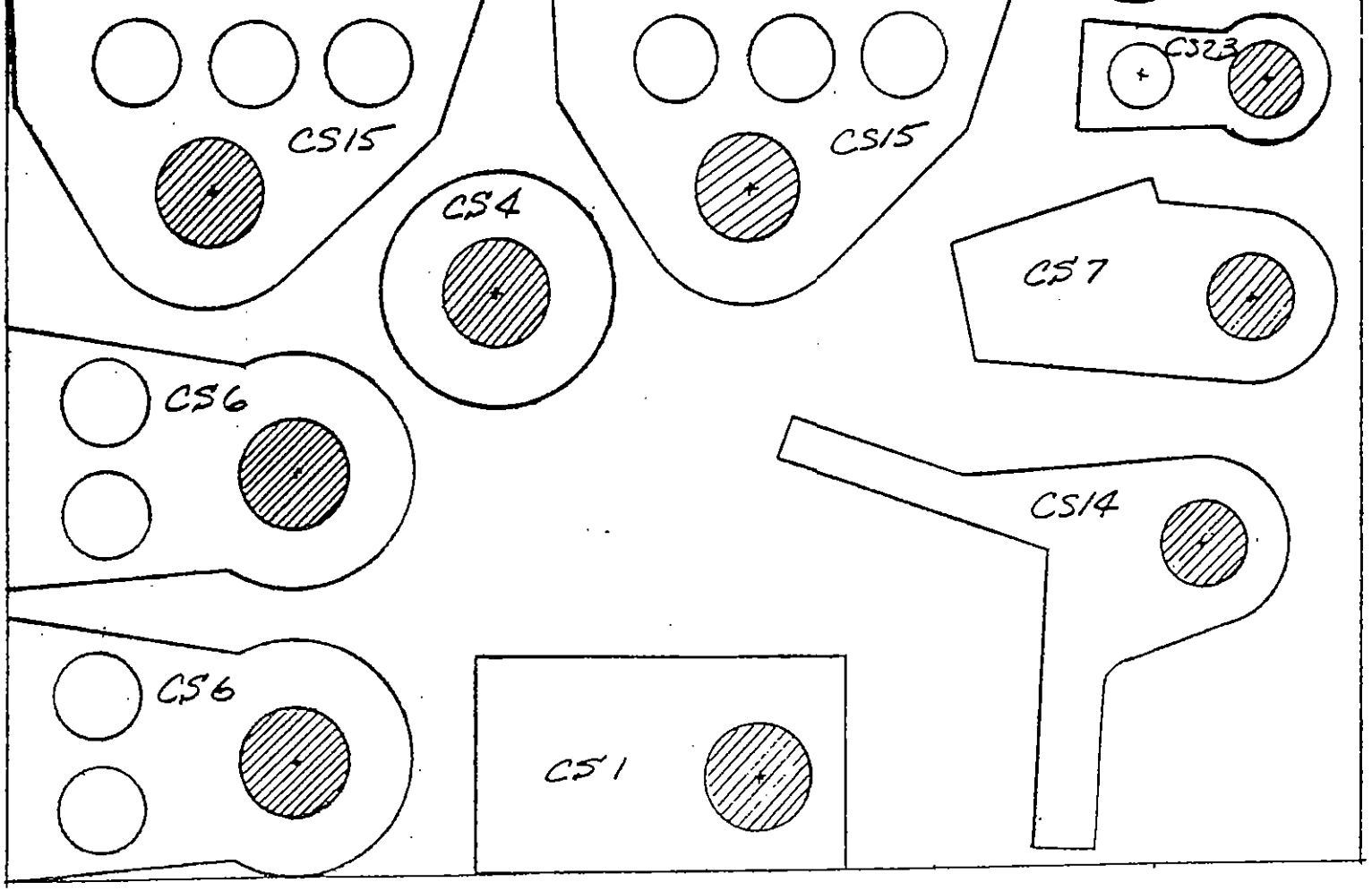
Upon receiving your Quickie kit, you should immediately match the packing list in each box against the actual contents of each box. Any descrepancies should be reported immediately to the appropriate vendor(e.g. Aircraft Spruce, etc.) We can not be responsible for shortages that go unreported for longer than 5 days after receipt of the materials.

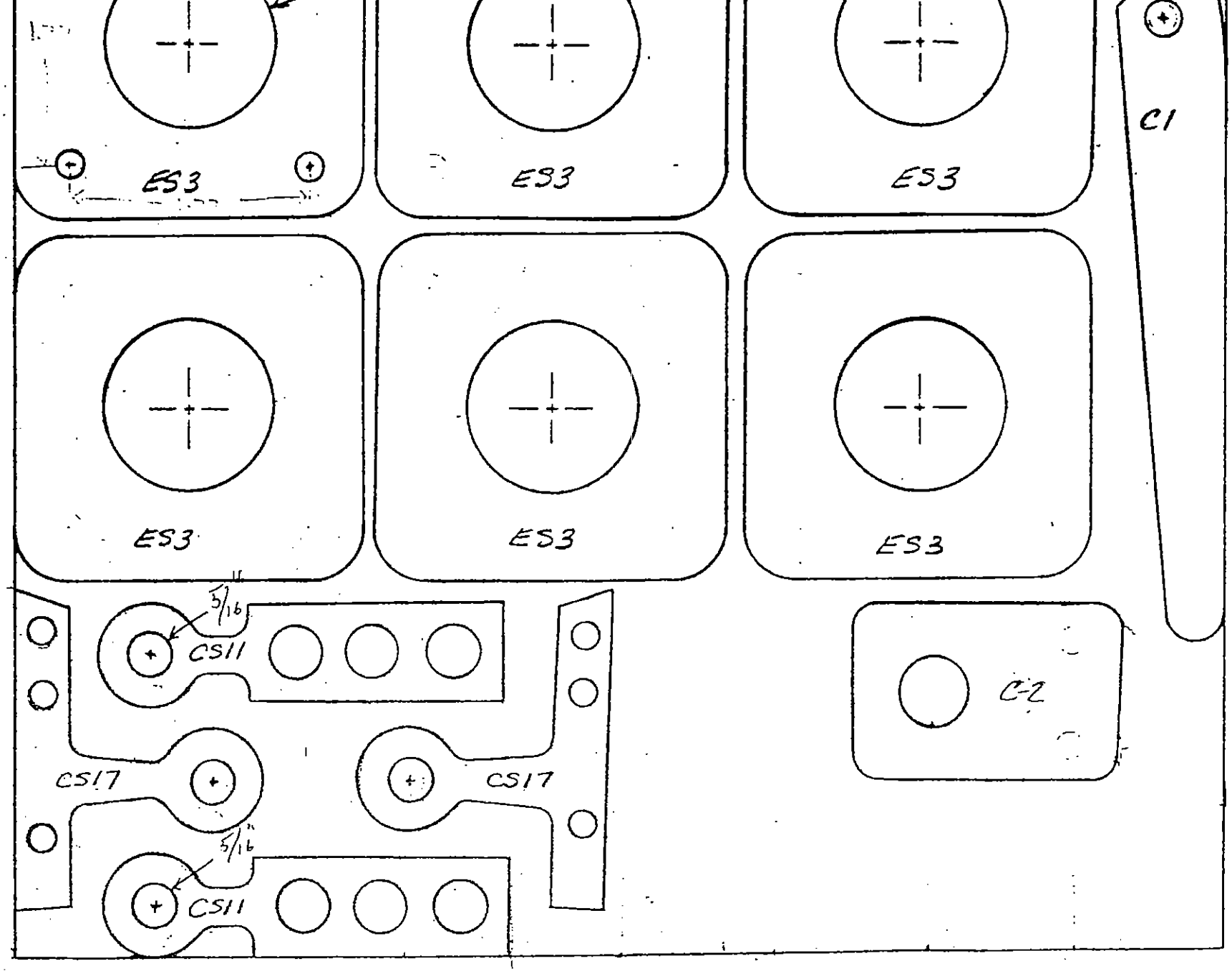
QAC maintains a close liaison with Quickie subcontractors to assure proper materials specification and quality control. Do not make substitutions for the materials provided. The materials provided were selected, developed, tested, and optimized for ease of construction and structural integrity. If you insist on making non-approved substitutions for replacement and spoilage, we insist that you do not call your aircraft a Quickie. QAC will not provide assistance in the application of substitute materials or components.

In addition to the materials provided in the kit, you will have to furnish a few items that are readily available locally. We do this to save you some money. These items are as follows:

1. 2" x 2" piece of aluminum screen door screen.
2. 10" length of 1/4" diam. wood dowell material.
3. Masonite or aircraft quality plywood for templates.
4. Lumber for a workbench and jigging.
5. Finishing Materials; Dupont 70S dark gray laquer primer surfacer, Acrylic laquer paint in the color of your choice(see Chapter 19), and Silicon Carbide or Aluminum Oxide type sandpaper in Coarse (36,40, or 60), medium (100 to 150), and fine (220 to 320).

Tools required are covered in the Education section (Chapter 3).


CS15
CS15
CS23
CS4
CS7
CS6
CS14
CS6
CS1


ES3
ES3
ES3
C1
ES3
ES3
ES3
5/16
CS11
C-2
CS17
CS17
5/16
CS11

PLYWOOD PARTS

In this section, you will make all of the plywood parts in the aircraft. They are as follows:

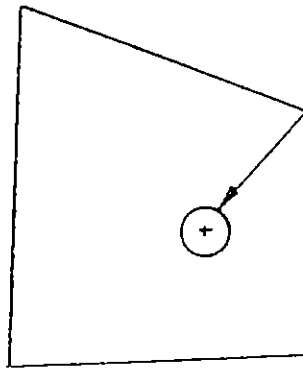
1. Firewall
2. LG4, the wheel pant reinforcement (4)
3. CS19, the outboard elevator hinge insert (2)

Careful layout will allow you to make all of these parts from the 2'x2' x1/4" piece of plywood supplied in the kit. It is suggested that you layout all of the pieces prior to cutting any of them out.

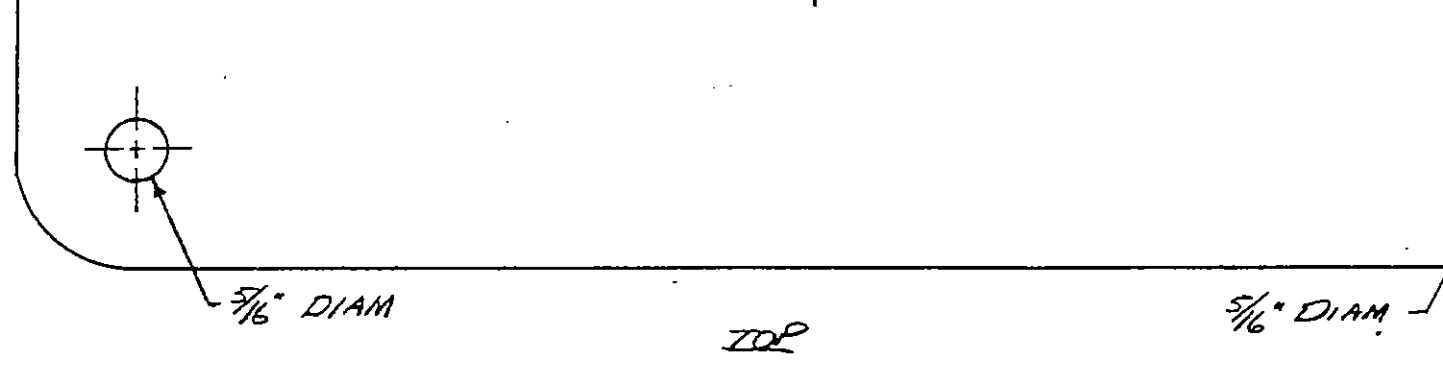
The firewall should be cut so that the wood grain runs horizontally across the firewall. Glass each face of the firewall with one ply of BID at 45 deg. to the grain. A full size flat pattern for the firewall may be found on Appendix sheet 1.

The other parts are glassed after assembly in the aircraft.

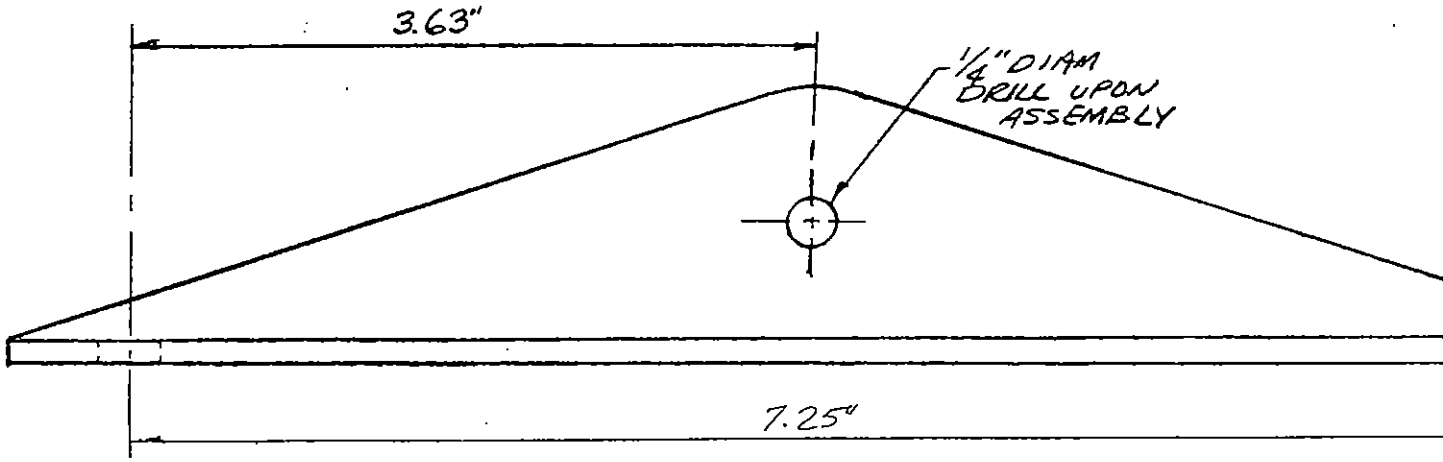
WHEEL



OUTBOAR



TOP



FRONT

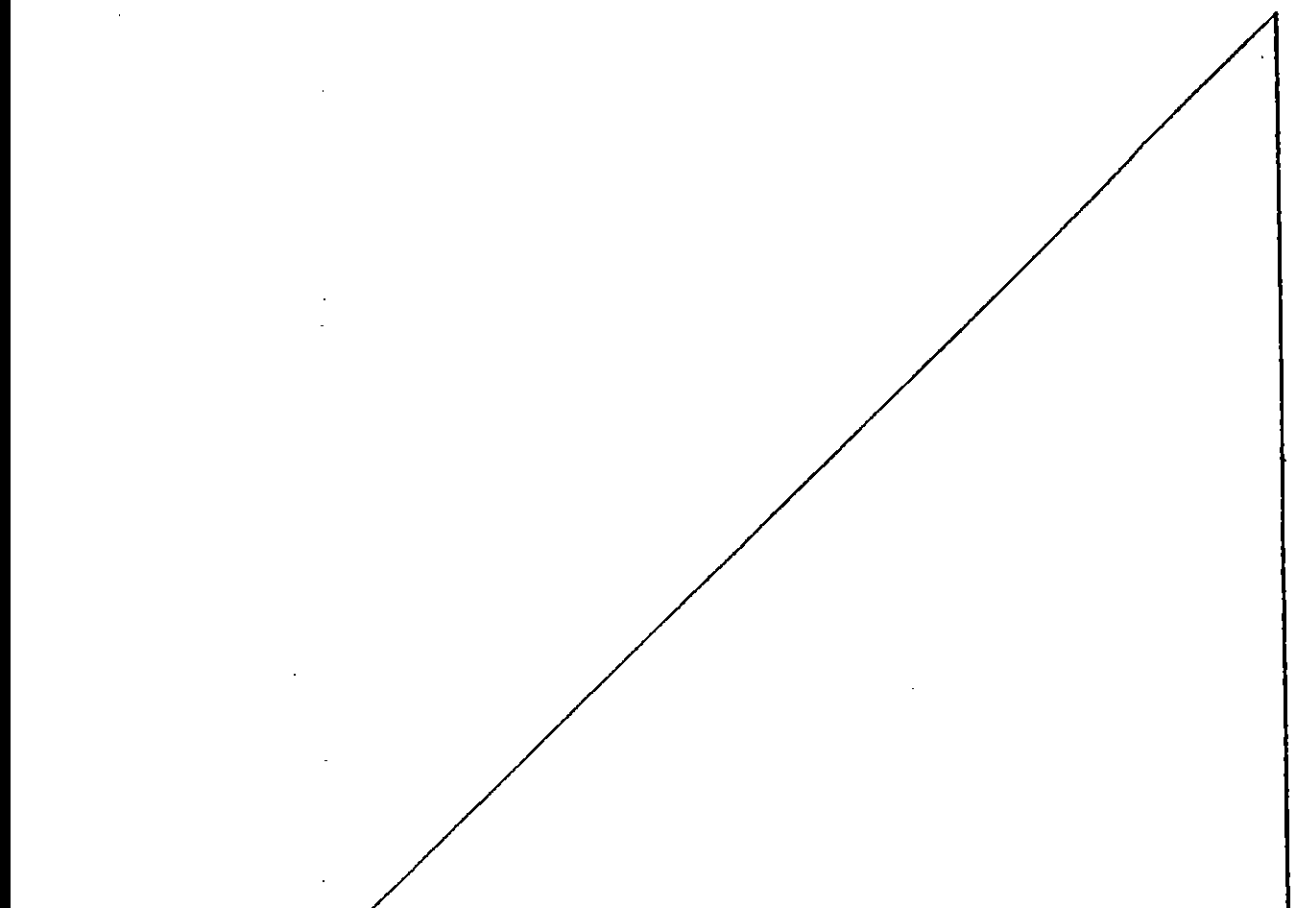
ENGINE LOWER SUPPORT BRACKET

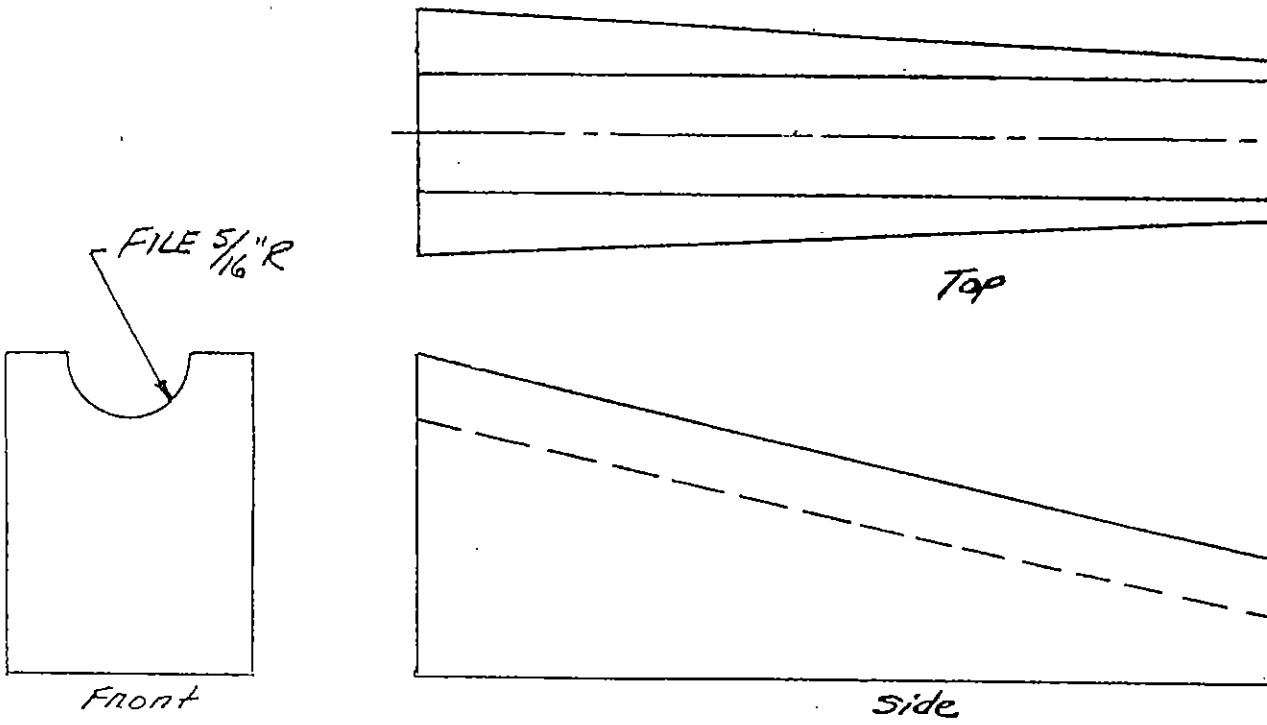
MATERIAL: 1½" x 2" x 0.125" 6061 T6 AL Angle

The red foam (approx. 5.9"x10.6"x1") included in your Quickie kit is used to make the following parts:

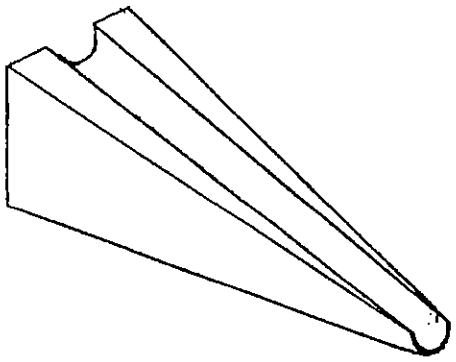
1. Vertical Fin reinforcement
2. Tailspring Support
3. CS18, elevator center hinge support (4)
4. CS10, aileron hinge insert (2)

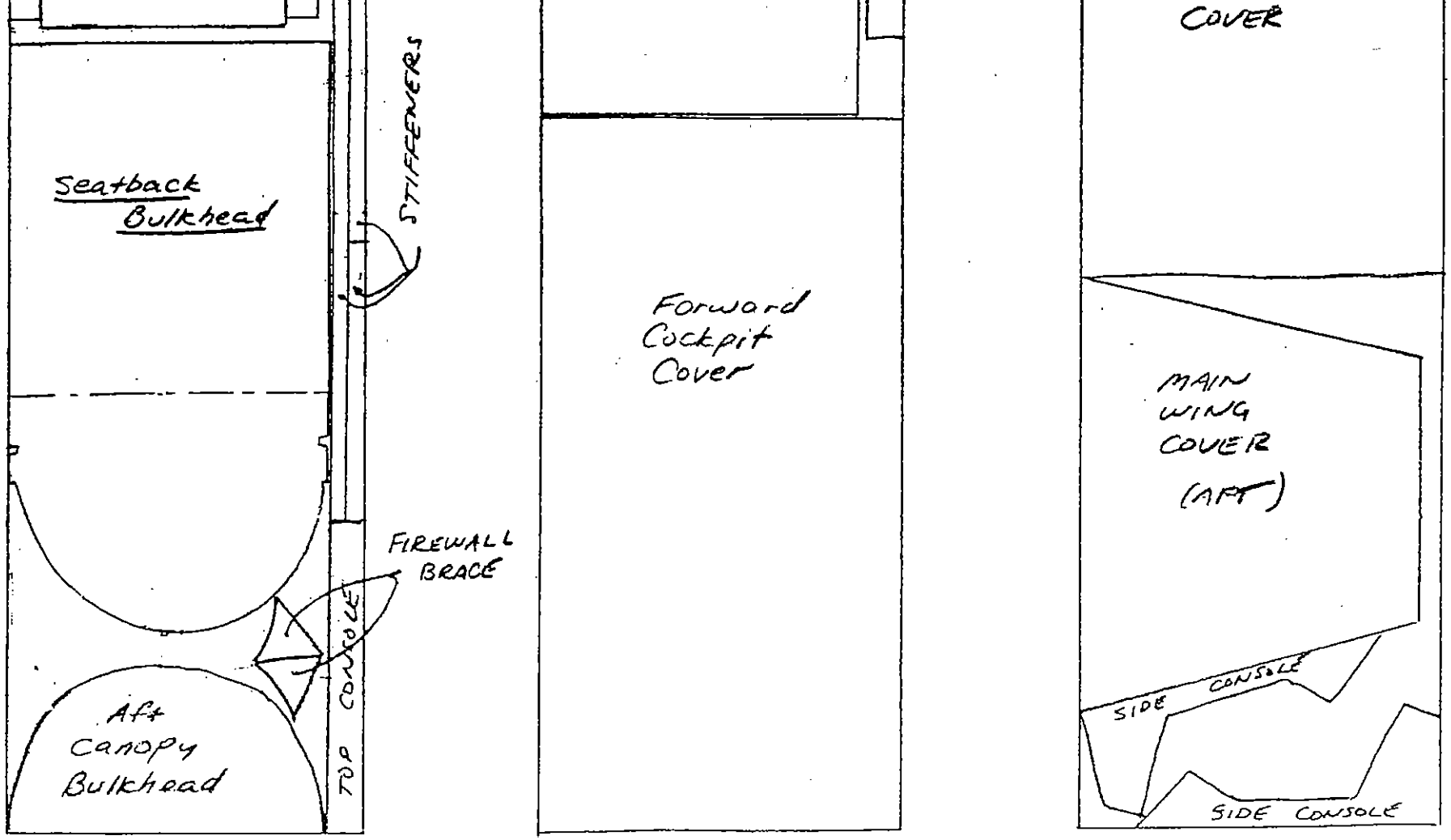
These parts are presented here in full size drawings.





TAILSPRING SUPPORT





SUGGESTED ORANGE FOAM LAY

HOT-WIRING THE FOAM CORES

In this section, you will hot wire the foam cores for the wing, canard, vertical fin, rudder, ailerons, and elevators.

Begin by reviewing the education section on the techniques for hot-wiring.

Some important points to remember are:

1. Always go slow around the leading edge of an airfoil.
2. Always pause at a notch to allow all of the wire to catch up(i.e. eliminate lag).
3. Never destroy any scraps; they will all be used later.
4. Triple check all template locations before hot-wiring; otherwise, you are likely to make errors.

Nominal lengths on the elevator, rudder and aileron segments are given. You will probably want to make the pieces slightly longer to allow for some trimming later.

After hot wiring, should be left in the f needed. This will mini Foam should be stored i place and kept out of t

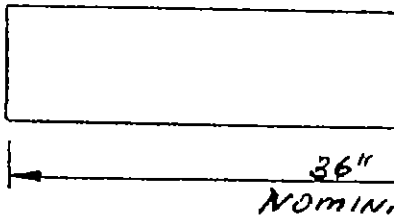
An alternate metho wire cores right before This method is suggeste you who plan to stretch

Now is the time to all of the cores that y with. They are all inc We recommend either for for the template materi you need to make two of patterns: Canard BL10, and outboard), and rudd will need to duplicate level lines on each sid

In order to keep th you should hot-wire the of the foam core first.

Main Wing

Square up the three 7" x 14" x 64" blue foam blocks so that they are each 52" long. Hot wire one of them so that it becomes two 7" x 7" x 52" blocks. The two sketches show you how to efficiently obtain the main wing cores out of the four blocks. The notch at one end of the 7" x 21" x 52" block combination is to make the outboard cores 48" long.



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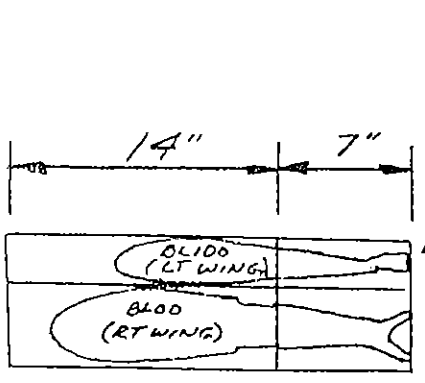
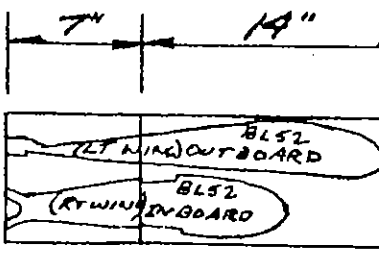
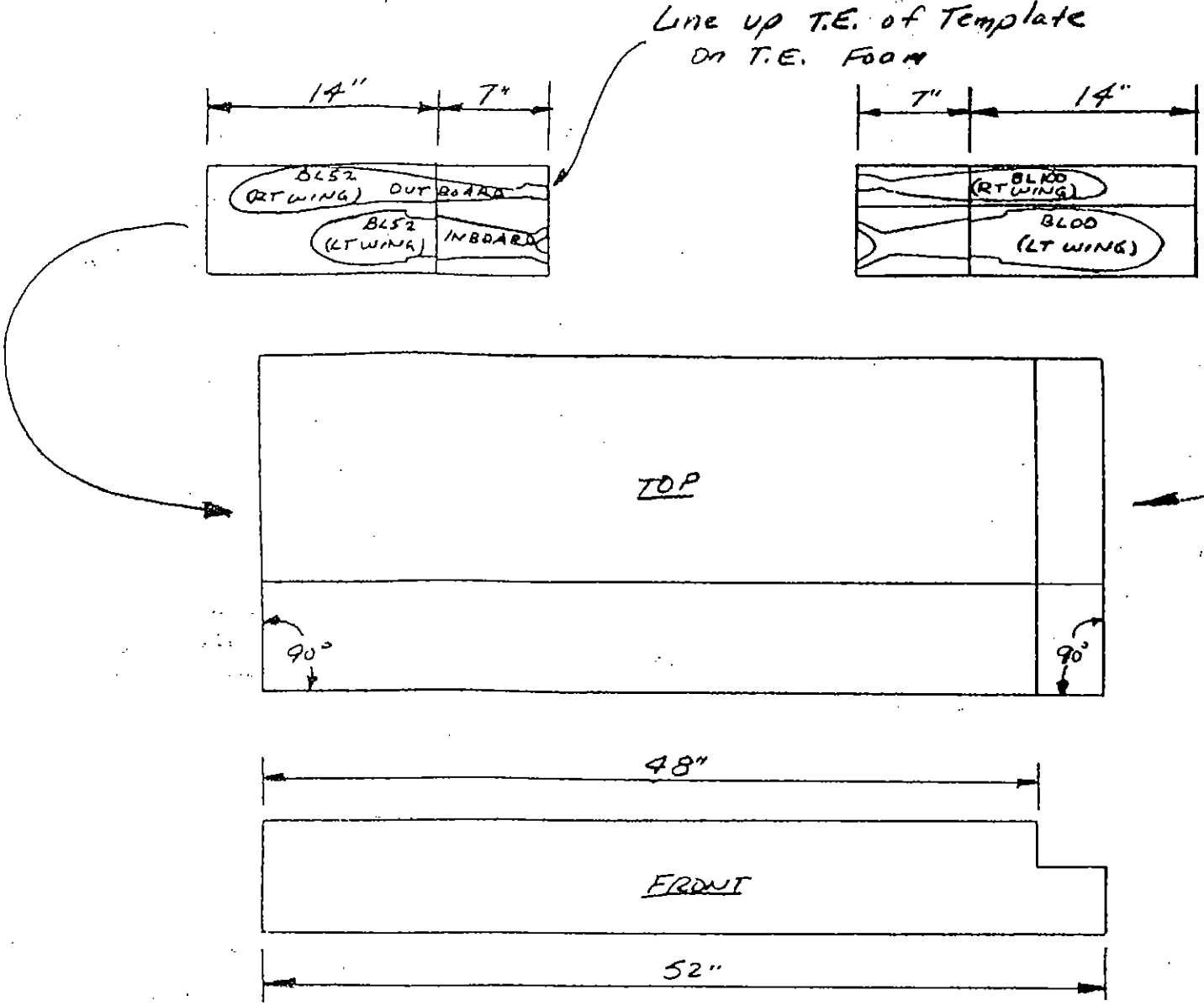


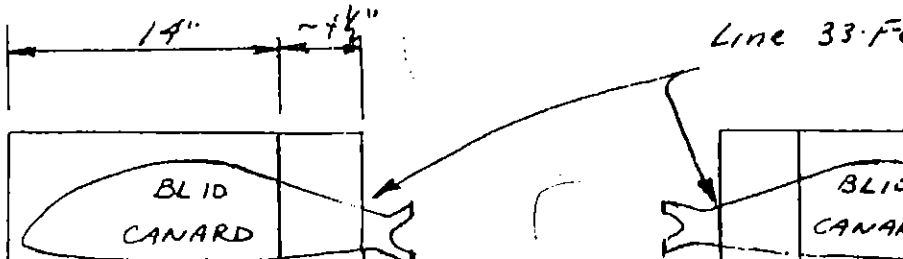


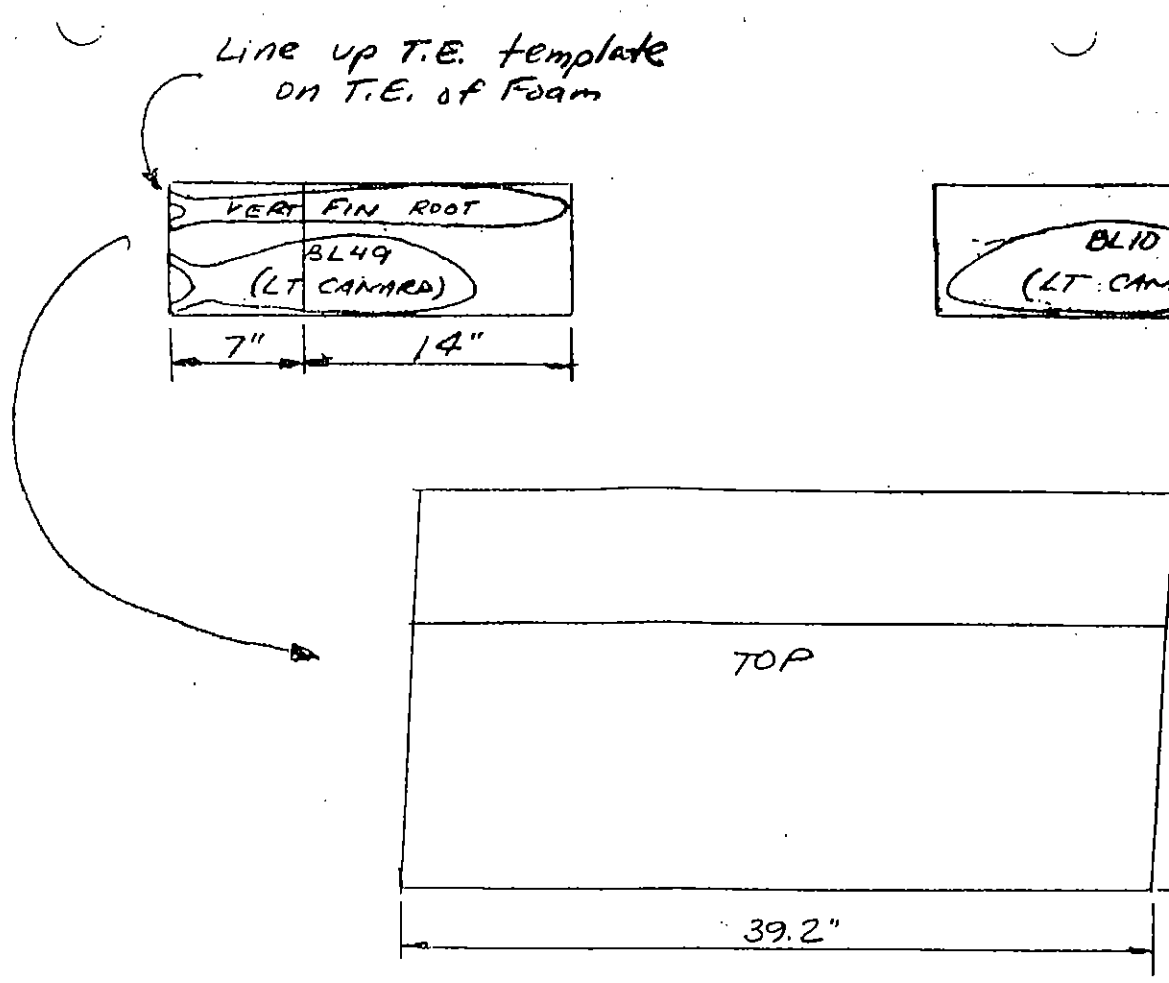


AILE

M

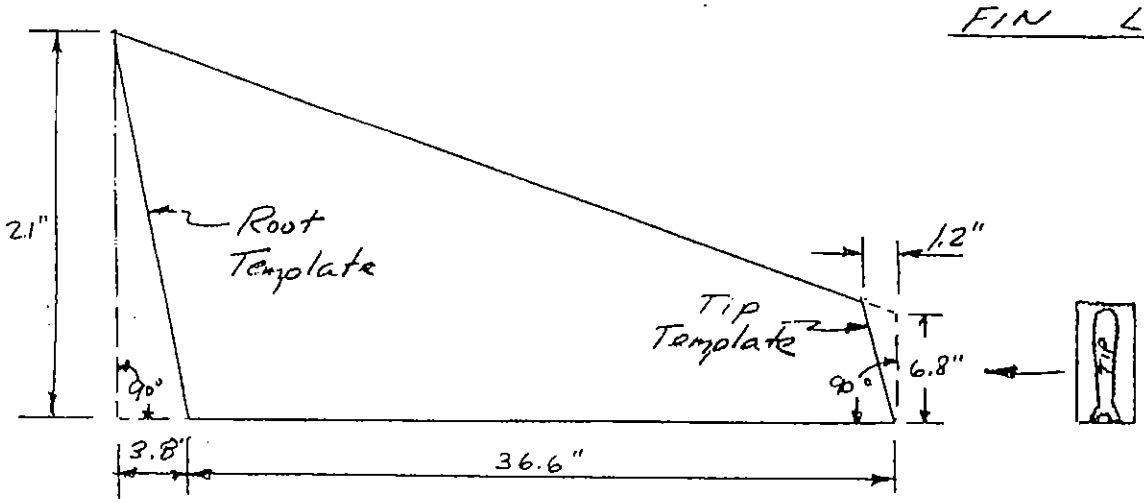
RT WING BL52 (OUTBOARD) TO BL100
& LT WING BL00 TO BL52 (INBOARD)
& AILERONS (From Scraps)



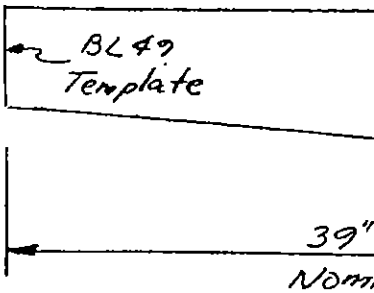


LT CANARD BL10 to BL49

VERTICAL FIN (SEE VERTI
FIN LAYOUT).



VERTICAL FIN



ELEVATOR (
MAKE
MAKE

LT ELEVATOR
BL49 - BL88
TEMPLATE UPSIDE DN

LT ELEVATOR
BL10 - BL49
TEMPLATE UPSIDE DN

RT ELEVATOR
BL49 - BL88

LT ELEVATOR
BL49 - BL88
TEMPLATE UPSIDE DN

LT ELEVATOR
BL10 - BL49
/TEMPLATE

BASIC AILERON CONSTRUCTION

Both ailerons can be constructed together to save time. These instructions will only cover the construction of the left aileron, but the right one is a mirror image.

Begin by rounding up CS9, which is a 3 ft. length of 1" O.D. x .035" wall 2024T3 Aluminum tubing. You have already hot-wired the Inboard and Outboard Aileron foam cores, so gather those together also. The inboard aileron foam core should be trimmed to 36" length; the outboard core should be trimmed to a 6" length.

Basically, you will join CS9 to the inboard core; join the outboard core to that combination; sand the leading edge to remove bumps and joggles; layup the bottom skin; layup the top skin; and finally trim the trailing edge after installation.

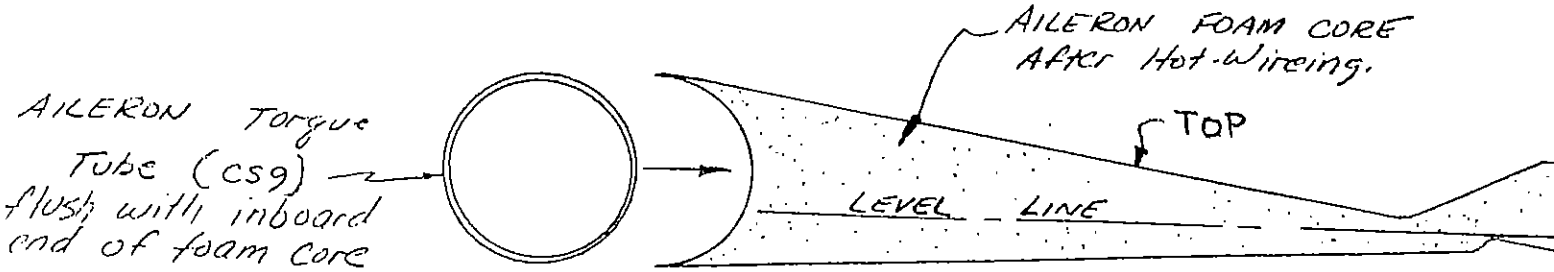
Begin by sanding CS9 to remove grease, finger prints, and the oxidation layer on the aluminum. Fit CS9 to the inboard foam core; mix up some micro slurry, and join CS9 to the inboard core on a flat surface. Use nails to hold the two pieces together.

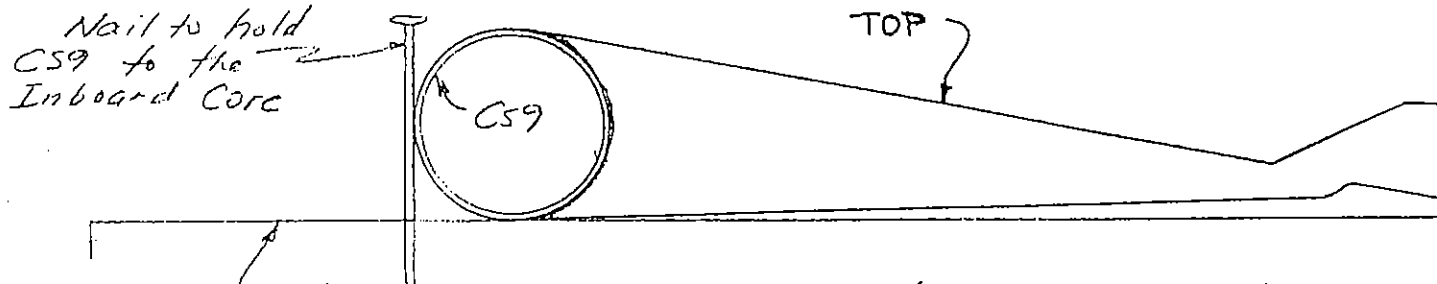
After this combination has cured, join the outboard foam core to the outboard end of the CS9-core combination with micro slurry. Grey tape can be used to help hold it tight against the inboard core.

Once this combination
are ready to glass the bott
sanding away all of the bum
Turn the aileron over and l
on the table. Put Peel Ply
trailing edge by using smal
hold it in place. Layup on
45 deg. to the trailing edg
leading edge, let it drop v
the table. Cut the trailin
the "eventual trim Line" th
out.

When this layup has cu
the aileron over and lay it
the table. At the leading
the BID ply to the foam to
joggle. At the trailing ed
the "tail" until you reach
Remove the Peel Ply, and th
ready to glass. Layup one
45 deg. to the trailing edg
leading edge overlap a mini
At the trailing edge, layup
Leave the aileron alone unt
curing to avoid tampering w
alignment.

Leave the trailing edg
until after the aileron is
the main wing.





BASIC ELEVATOR CONSTRUCTION

The basic elevator construction is very similar to the basic aileron construction that you have already accomplished. Reread the "Basic Aileron Construction" section before proceeding further.

These instructions only cover the construction of the left elevator, but the right one is a mirror image.

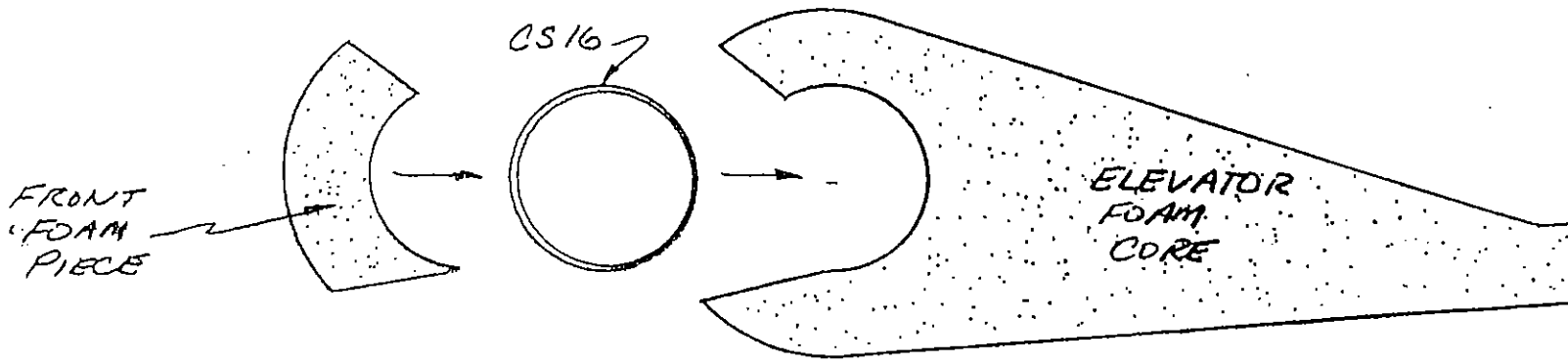
Begin by rounding up CS16, which is a 6 ft. length of 1" O.D. x .035" wall 2024T3 aluminum tubing. You have already hot wired the inboard and outboard elevator cores, so gather these together also. When the cores are joined they should total 6 ft. in length.

Basically, you will join the inboard and outboard core together, insert CS16, replace the front foam pieces, sand the combination after curing to remove bumps and joggles, layup the bottom skin, layup the top skin, and final trim the trailing edge after installation.

First, check to make s
cutout for CS16 that you ho
foam cores is large enough
cores, CS16, and the front
dry. If the front piece wo
against the core, carefully
cutout for CS16 until it wi

Sand CS16. Mix up mic
on both CS16 and wherever C
contact with foam. Join th
outboard foam cores togethe
CS16; then insert the front
Do not telescope CS16 into
pushing it from one end; th
voids in the bond. Instead,
be inserted all along the s
time. Use nails to hold ev
place while it cures(see ai

The elevator receives
45 deg. to the trailing edg
one ply exactly like you di
ailerons.



FUSELAGE BULKHEADS

The fuselage bulkheads that you will be making in this section are as follows:

1. Seatback Bulkhead
2. Fuel Tank
3. FS89 Bulkhead
4. FS110 Bulkhead
5. FS153.7 Bulkhead

All of these bulkheads are cut from the orange foam.

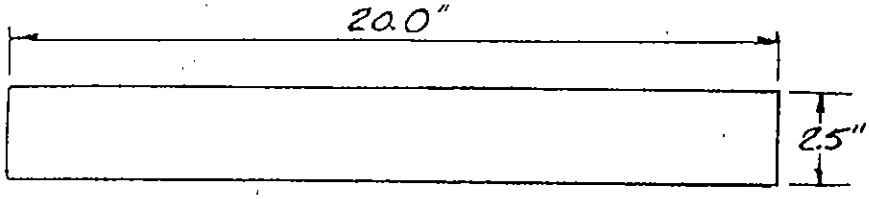
The following sheets detail the preparation and glassing of these 5 bulkheads.

The Fuel Tank and Seatback Bulkhead require that the foam be bent before it is glassed. To do this, use a heat gun or a high wattage hair dryer in the following manner:

a. Hold the heat gun approximately 6" from the foam and pass it back and forth along the bend line. Be careful not to "scorch" the foam by getting the gun too close or by concentrating the gun for too long in one area.
b. As the foam warms up, it will bend easily to the desired shape. Using a 1"O.D. tube along the bend line may facilitate the process.
c. When the foam has been bent to the desired shape, allow it to cool for 30 seconds in that position. It will then hold its new shape.

You probably will want to experiment on small scrap pieces first before tackling the two heat-formed bulkheads. Also, if your hair dryer doesnt put out sufficient heat for the job, you may find that a portable electric heater can be used to warm the foam so that the hair dryer can provide sufficient extra heat for bending.

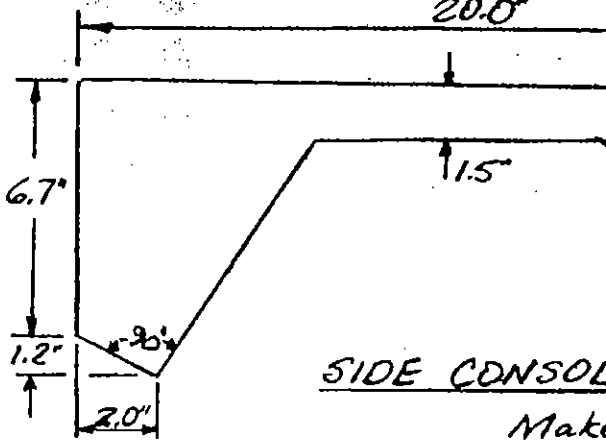
Details for making the side console pieces are also included in this section.



SIDE CONSOLE TOP

Make 2

1 Ply BID on one side



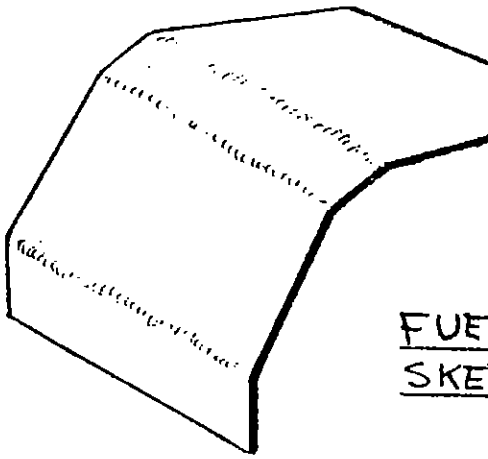
SIDE CONSOL

Mak

1 Ply BID

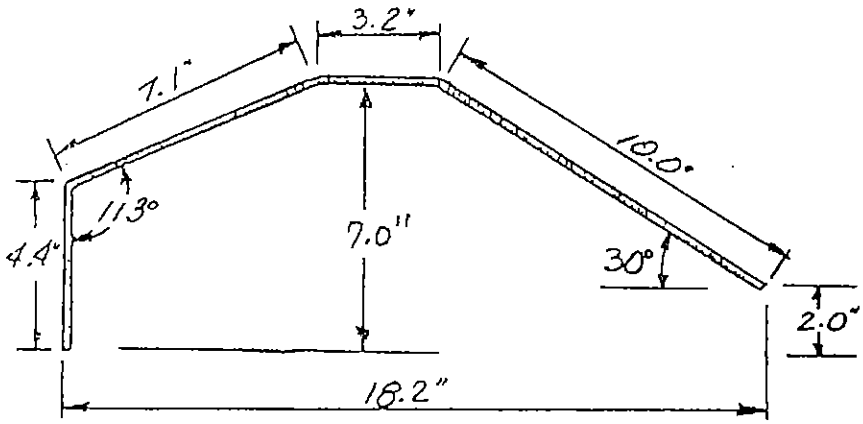
LT SIDE OF ON

THE OTHER.



FUE

SKE



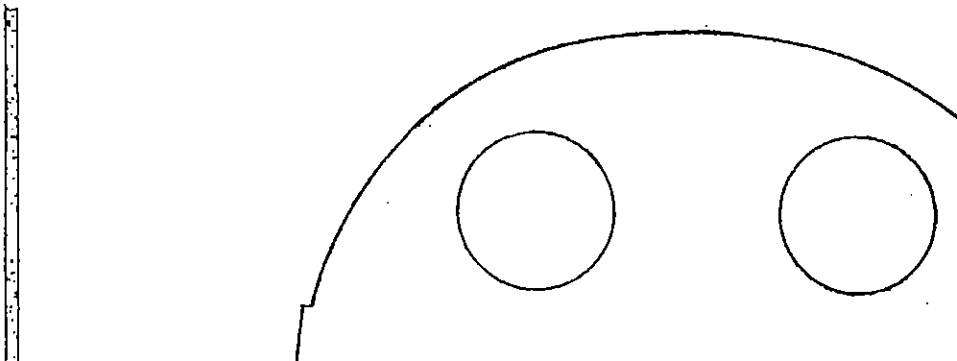
FUEL TANK PROFILE VIEW

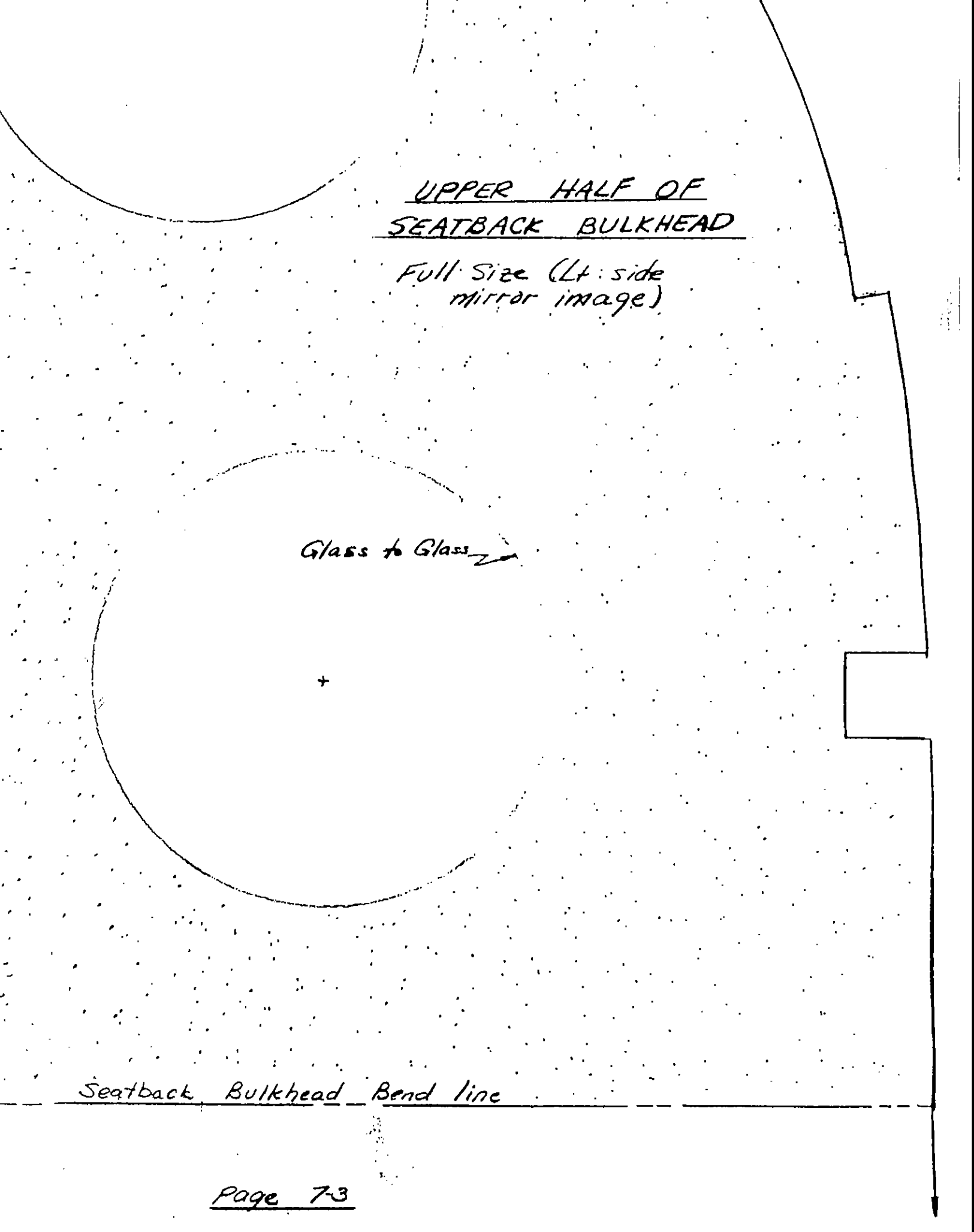
1 Ply BID on inside

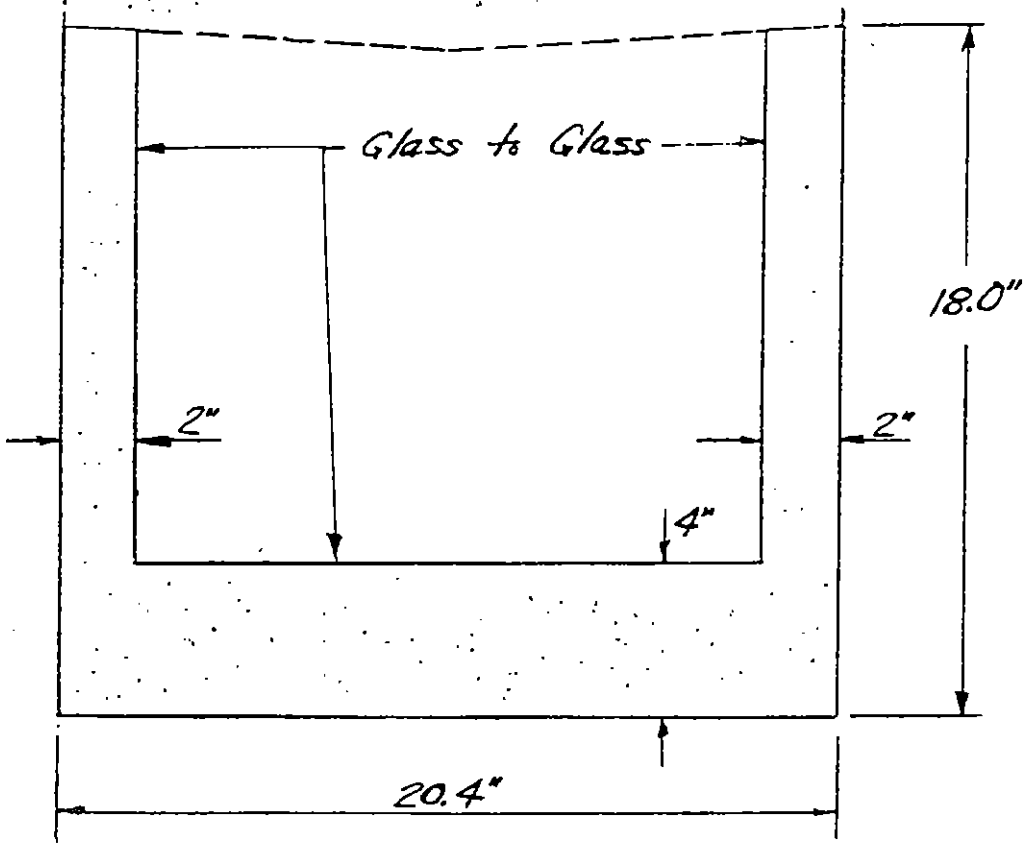
2 Ply BID on outside

Width: 20.8"

Total Length: 24.7"




UPPER HALF OF
SEATBACK BULKHEAD
Full Size (Lt: side
mirror image)
Glass to Glass
Seatback Bulkhead Bend line



FS 89

1. Join FS89 top to FS89 bottom.
2. Glass the forward face with one BID.
3. Glass the back face with one BID, noting the GLass-to-Glass areas.

FS89 BULK

Full Size (L

Material :

LEVEL

for tracin

BLOO

10.2"

FUSELAGE BOTTOM

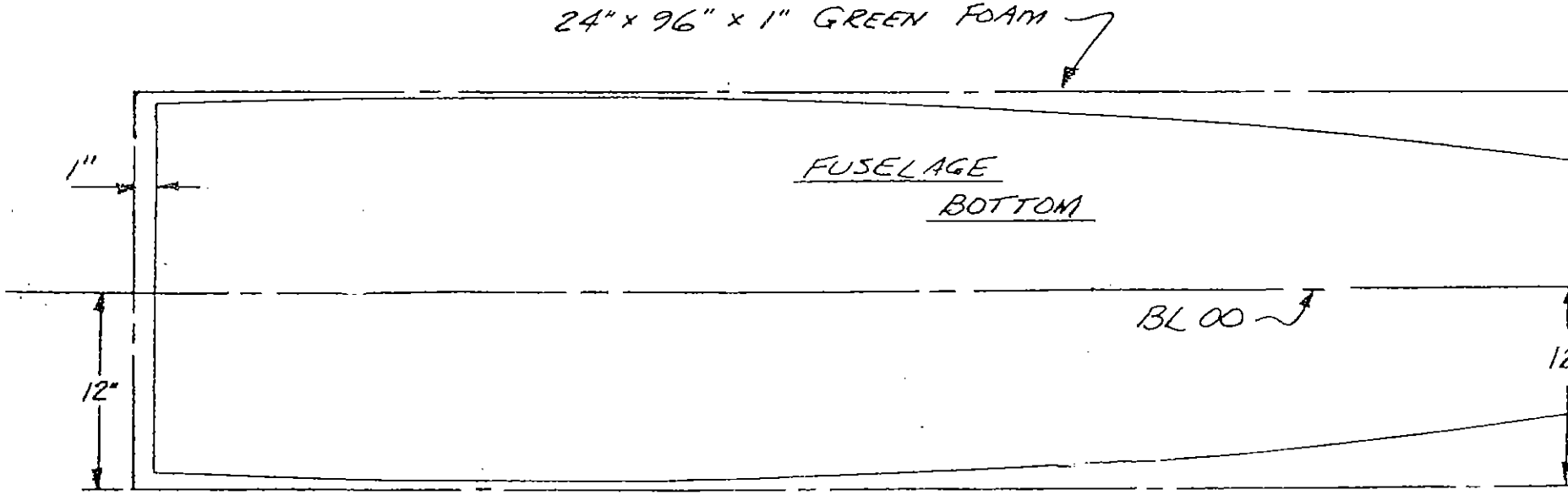
NOTE: FUSELAGE IS SYMMETRICAL ABOUT BL00

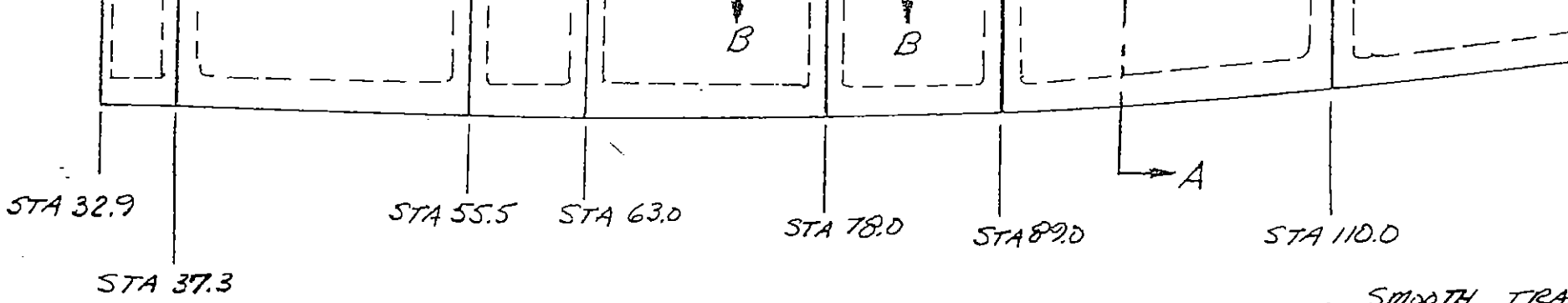
FUSELAGE BOTTOM

Initial Layout - Join together two pieces of green foam as shown. Locate and mark BL00 on the foam with a felt-tipped marker. Do not be afraid to gouge the foam to a depth of about 0.2" in order for the line to remain visible. Mark STA32.9 about 1" from the left edge of the first foam piece. Now, using STA32.9 as a reference, mark and label stations every 10 inches starting with STA40 (e.g. STA40, STA50, STA60, etc.).

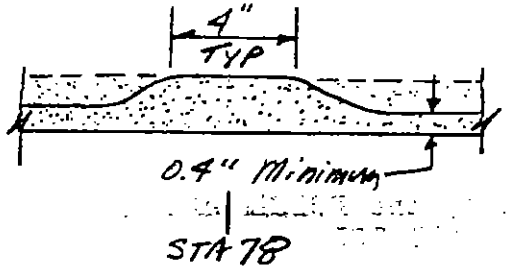
The next step is to layout the fuselage bottom using the given offsets. As an example, at STA50, draw a line perpendicular to BL00. Measure along that line 11.4" from BL00 and place a mark. That mark defines the outside edge of the fuselage bottom at STA50. This procedure should be repeated for each STA/Offset listed.

SUGGESTED LAYOUT FOR CUTTING FUSELAGE BOTTOM & FUSELAGE AFT TOP

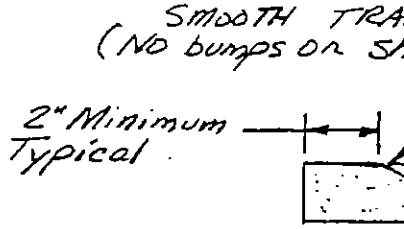




FUSELAGE BOTTOM
INSIDE
CONTOURING



SECTION B-B



Contouring - In order to reduce weight and increase the interior room, the fuselage bottom is contoured on top side.

The drawing above shows the STA of each bulkhead that attaches to the bottom of the fuselage. These locations should be marked on the foam.

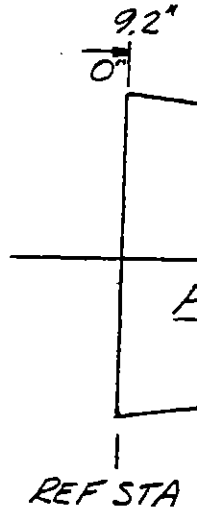
The dashed lines on that drawing enclose areas of foam that may be contoured. Section A-A shows what a typical part of the bottom looks like after contouring. In essence, the homebuilder removes foam until the thickness is reduced to a minimum of 0.4" A toothpick with a mark at 0.4" is an effective way to check your progress.

Areas that are not contoured include:

1. Within 2" of the edge of the fuselage bottom
2. Within 1" of the bulkheads that you marked earlier.

Furthermore, all contouring must involve smooth transitions, i.e. no sharp corners or bumps are permitted. Section A-A details what the contouring should look like.

A wire brush, sandpaper, and scraps of green foam, are useful for contouring the bottom. Always wear a mask and vacuum often during the contouring.



Glassing - In order to better simulate the final curvature of the bottom (see a side view of the aircraft), the foam should be elevated off the table at the following STA:

STA	Ht. off table
40	0"
90	4.5"
125	5.5"
172	0"

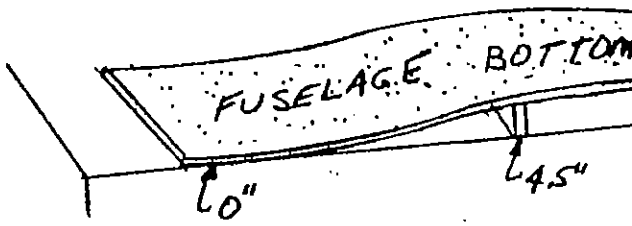
Blocks of wood can be used and the tolerance on the height can be 1/2 inch.

One ply of BID at 45 deg to BL00 is used to cover the bottom on the contoured side. You may wish to peel ply the locations of the bulkheads to save future sanding as well as all edges.

Once this layup is cured, the bottom should be handled with considerable care to avoid overstressing the foam. Until the outside ply is glassed, the structure remains flexible and prone to damage.

The FUSELAGE AFT TOP should be glassed on a flat surface with one ply of BID at 45 deg to BL00 on the bottom side(i.e. the side that will be inside the fuselage after assembly). Peel ply the edges.

READ THE EDUCATION SECTION BE



FUSELAGE SIDES

Initial Layout - Laying out a fuselage side is very similar to laying out the fuselage bottom. WL15.0 replaces BL00 as the primary layout line.

You will have to make the canard BL10 template and the Wing BL00 template in order to complete the layout.

After cutting out one fuselage side, use it to trace around and cut out the other fuselage side. It is important for jigging the fuselage later that the sides be equal.

Contouring - The fuselage sides are also contoured to reduce weight and increase interior room.

The procedure is the same as what you did on the fuselage bottom with these exceptions:

1. Contouring to within 1" of the edge is acceptable.
2. You should trial fit both the

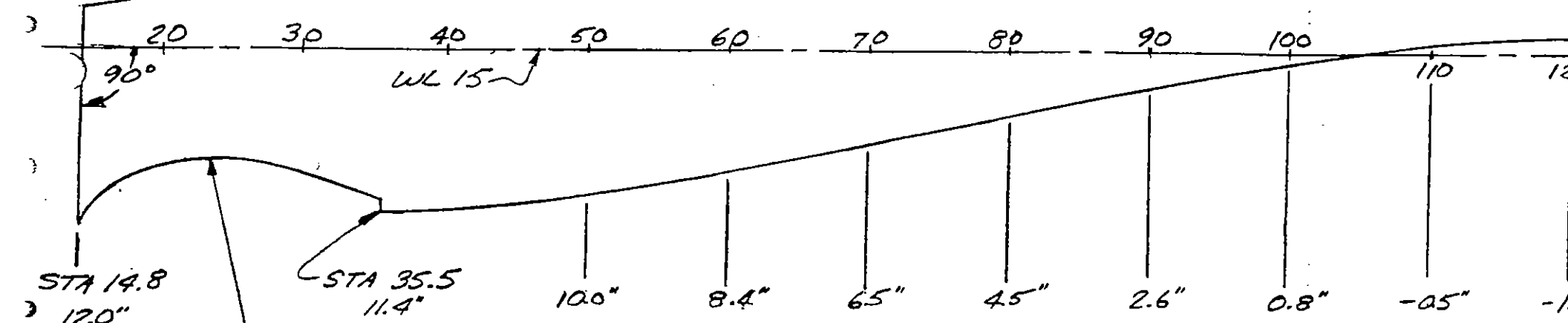
accompanying sketch depic technique.

All glassing of the sides is accomplished usi 45 deg to WL15. Accompli the following sequence:

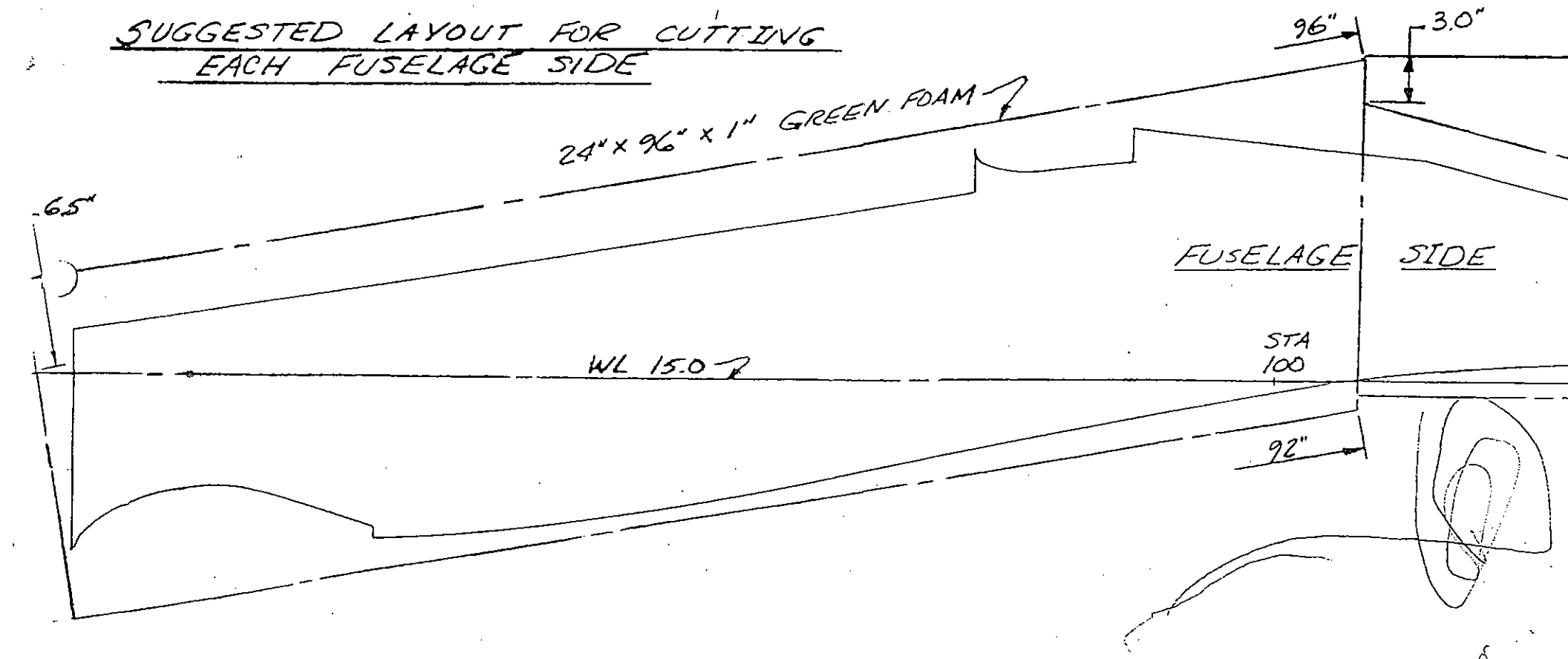
1. Glass one ply o the entire fuse
2. Glass an additi STA14.8 to STA
3. Glass another from STA14.8 t

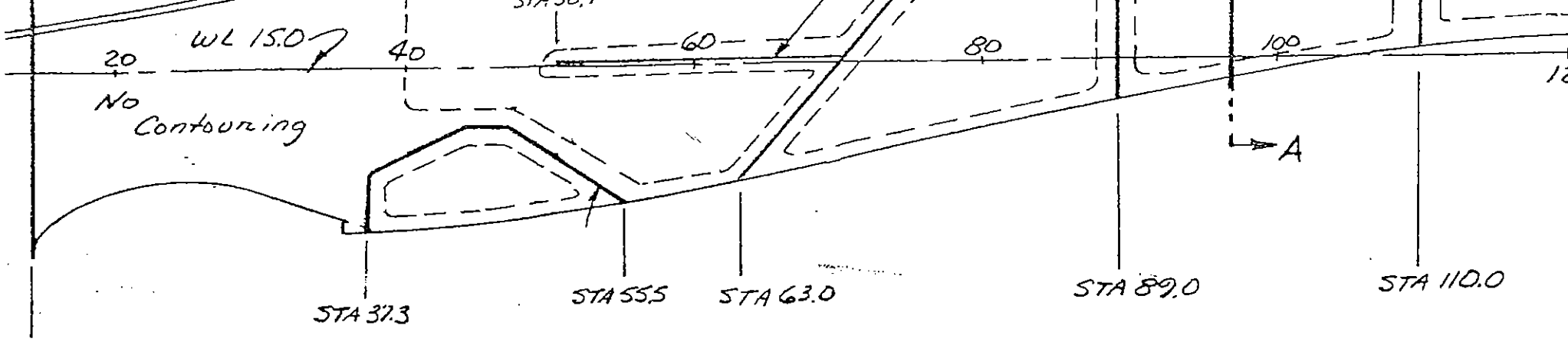
When you have finished, side will have 3 plies o forward part, 2 plies of mediate section, and 1 pl aft fuselage, all of thes to WL15.

The other fuselage glassed in the same manne



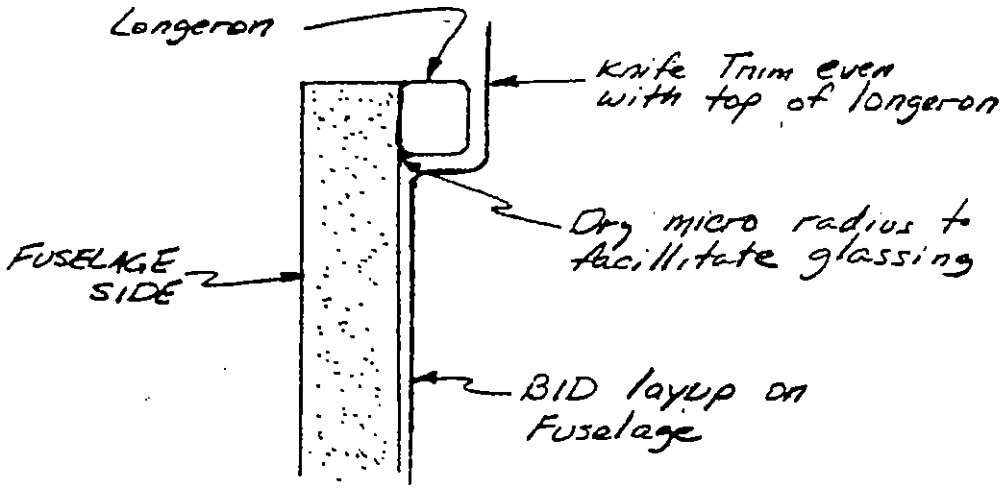
SUGGESTED LAYOUT FOR CUTTING EACH FUSELAGE SIDE



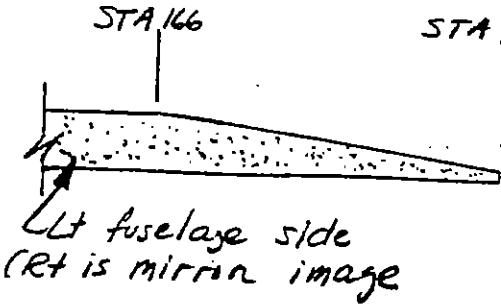


FUSELAGE SIDE
INSIDE
CONTOURING

1" thick
GREEN FOAM



LONGERON MOUNTING DETAIL



TAPERING FOR TAILSI

TOP VIEW

ASSEMBLING THE FUSELAGE

Before beginning this step, you should have both fuselage sides, the fuselage bottom, and the fuselage aft top piece, contoured and glassed on the inside. Also, the Firewall and all fuselage bulkheads should be completed.

Jigging the basic fuselage will require about 4 hours of work.

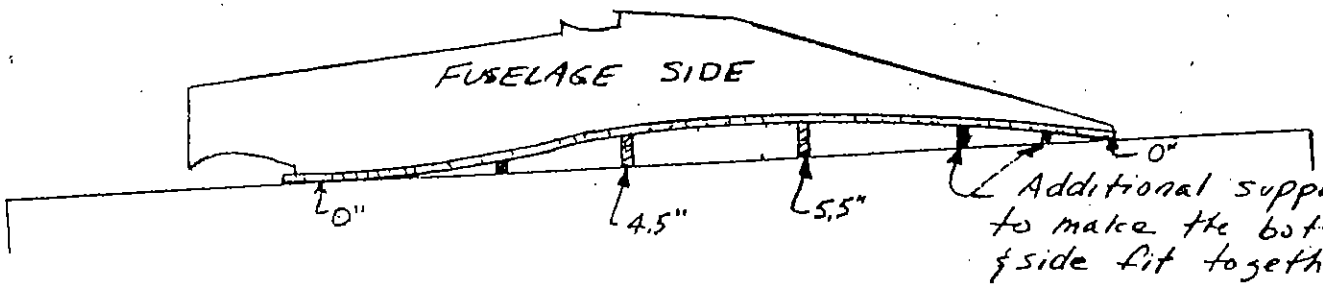
Begin by placing the fuselage bottom on the table and elevating it off of the table at the following STA:

STA	HT. OFF TABLE
40	0"
90	4.5"
125	5.5"
172	0"

Take one of the fusela
trial fit it onto the fusel
Use blocks of wood and foa
bottom closely fitting the

Remove the side, mix
dry micro, and apply it to
the bottom where they meet
back to STA70.

In the forward fuselag
up a similar STA on both t
the side and join the two
basic reference is the forw
the fuel tank. Don't worry
toward the back will not li
due to the curvature of the
tom. Verify good Micro sque

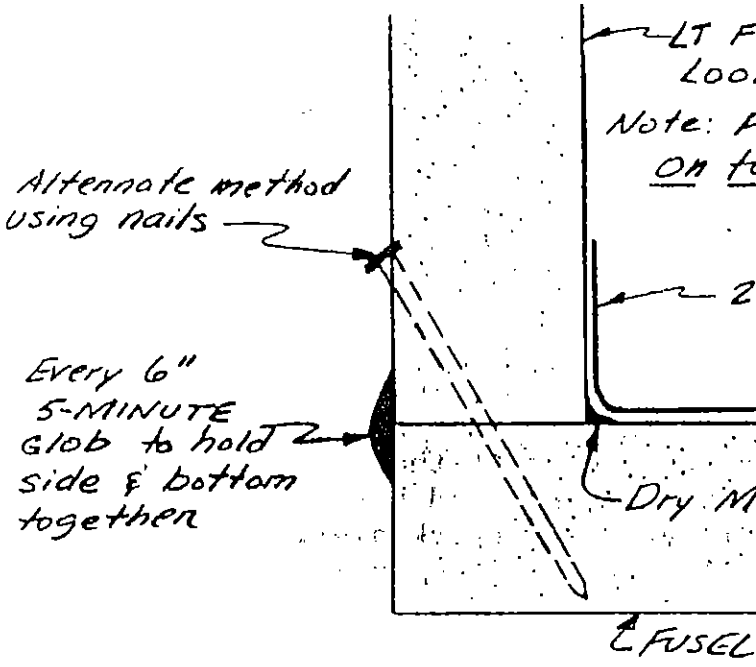


Next, while one person holds the side in place, have a helper mix up a small batch of 5-minute, and gather up some small nails. Dab 5-minute about every 6 inches on the outside to hold the side and bottom together. After this has been accomplished all of the way to the tail, the side should stand vertically without holding it. An alternate method is to use nails to hold the two pieces together.

Look along the inside seam of the bottom/side and verify a good fit. Verify good squeeze out on the Micro at the forward fuselage area.

Lay a dry Micro radius along the inside joint all the way to the tail. Use a 2" BID tape to join the side and bottom together on the inside all the way to the tail. At this point, the angle between the side and the bottom should be about 90 deg.

Carefully repeat this operation with the other fuselage side. Be sure that the same forward fuselage marks are used to line up the side and bottom so that



TYPICAL SEC
FUSELAGE SIDE/BOTT

This distance should be same

Take a 30 minute break to allow all the tapes to begin getting tacky.

When you return, carefully begin trial fitting all of the fuselage bulkheads except for the Fuel Tank. Sand and Trim these where necessary. Be careful not to damage the tapes that were recently put in.

Carefully insert the fuselage bulkheads with dry micro wherever the bulkheads meet the fuselage. Use the following order:

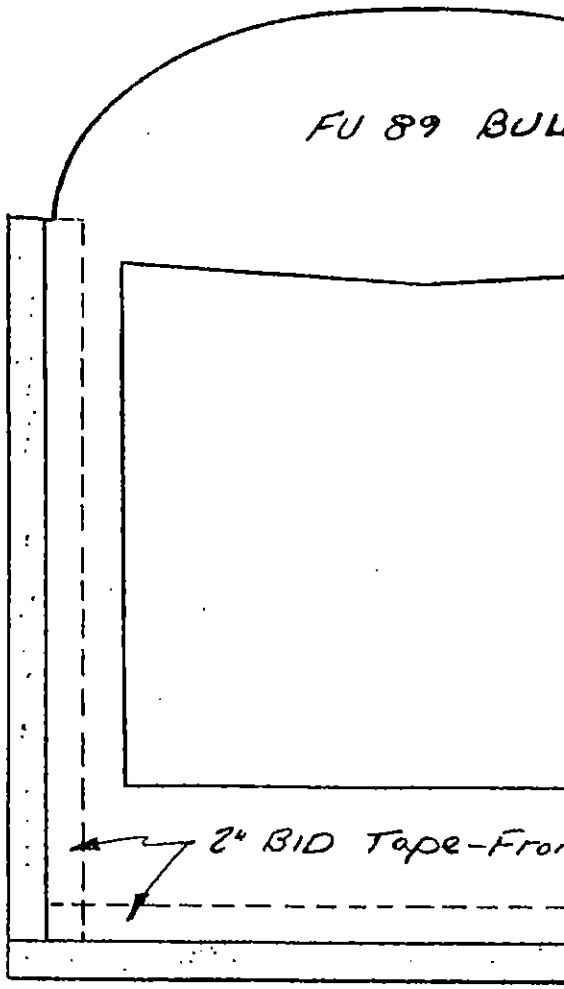
1. FU89
2. FU110
3. Seatback Bulkhead
4. FU153.7 - Leave out for now.

Use the bulkhead position lines on each fuselage side to position each bulkhead. Ignore the lines on the fuselage bottom. After inserting each bulkhead, run a 2" BID tape along both front and rear face before proceeding to the next bulkhead. Make sure that you get good micro squeeze out and form a micro radius wherever the tapes go.

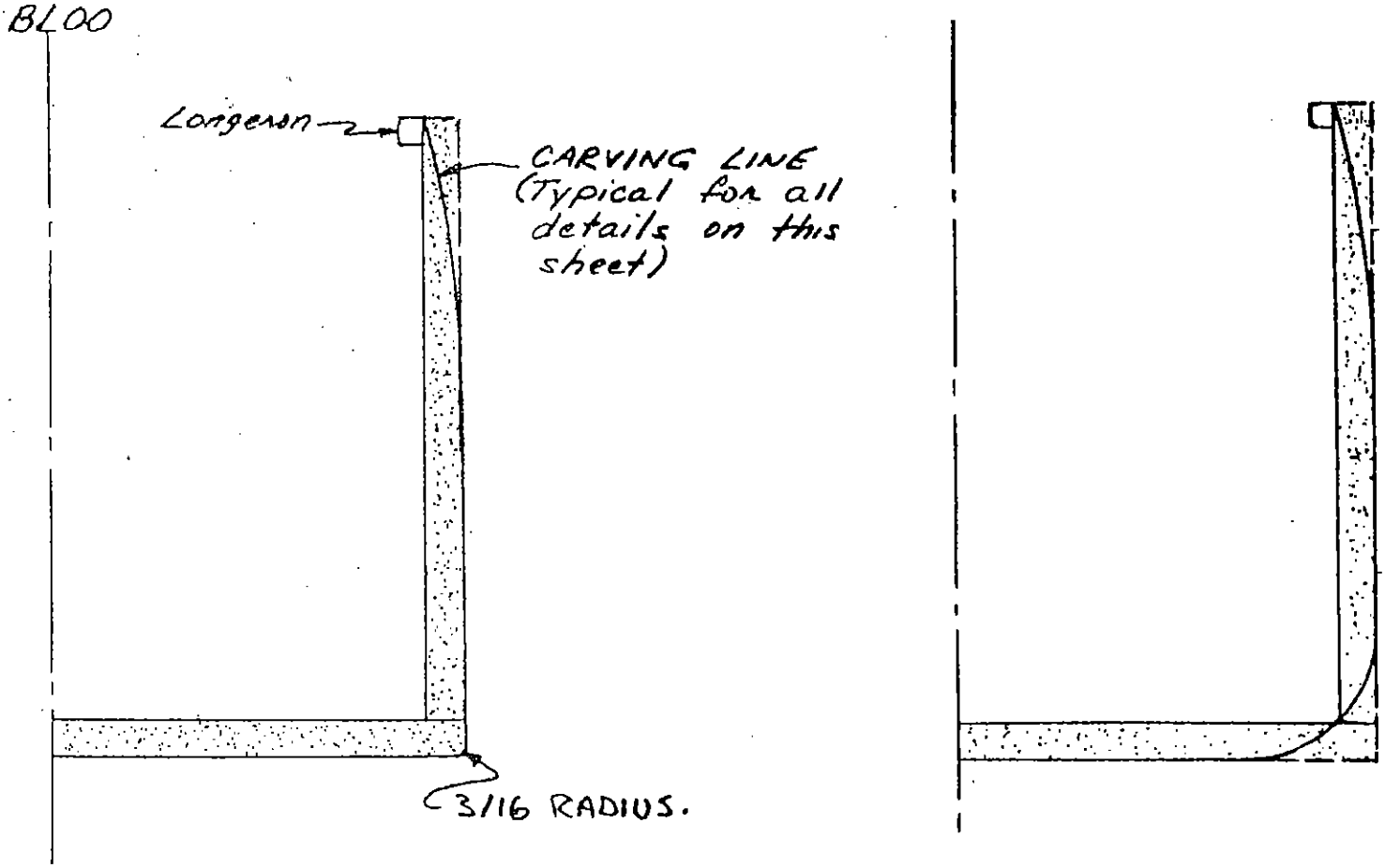
The fuselage aft top can now be put on. Use 5-minute or nails to hold it in place, a micro radius along the inside edge, and a 2" BID tape along the joints on the inside. Then insert and tape the FU153.7 bulkhead in place.

The final step, checking the Fuselage alignment, is important. Since the tapes haven't kicked yet, the fuselage can still be tweaked to obtain the proper alignment. Since the two fuselage sides were made and fitted identically, check the basic level of the fuselage by laying a level across the fuselage sides at several locations. The squareness of the Firewall had been previously checked but it wouldn't hurt to repeat that check also.

When you are satisfied that the fuselage is jigged and level, walk away from it for at least one day to let it cure.



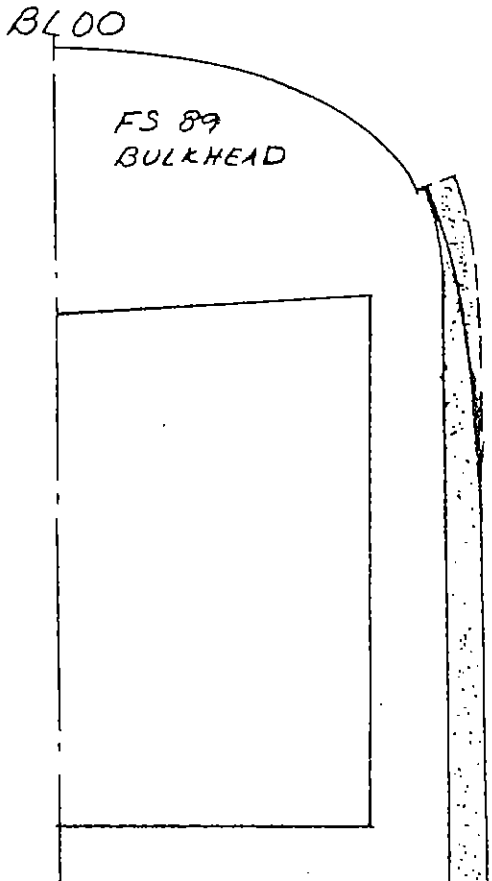
2" BID Tapes to Af
TO FUSEL
TYPICAL All



STA 35.5

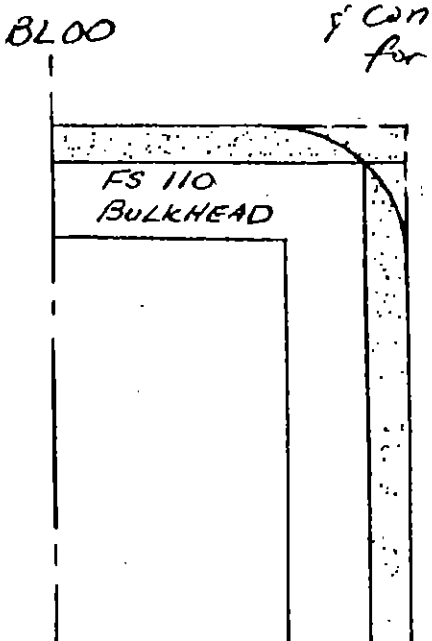
From STA 35.5 to STA 70.0 the radius on the fuselage bottom increases

STA 70.0



Note At the
a smooth
shape

Note: At th
5' contour
for the

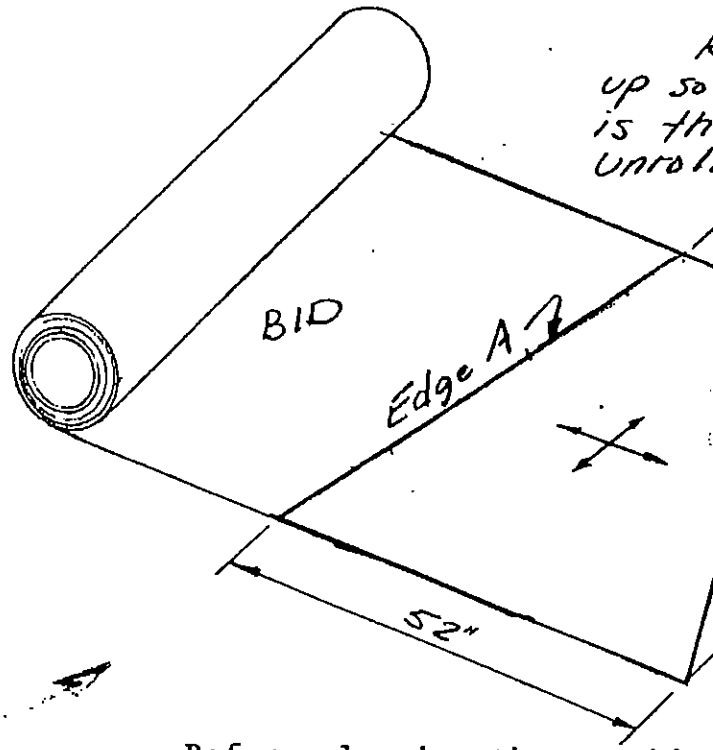


GLASSING THE OUTSIDE FUSELAGE

Glassing the outside fuselage skin will consume about six manhours. At least two people should be present; preferably three so that one individual can just mix the epoxy.

The fuselage receives one ply of BID over its entire length plus one ply of UNI at 45 deg. to WL15 from the seatback bulkhead area forward. The glassing progresses from the aft fuselage forward. The top of the fuselage as well as the longerons, are glassed after this first layup has cured.

Begin by jigging the fuselage level in an upside down position. Cut a piece of BID with these dimensions:

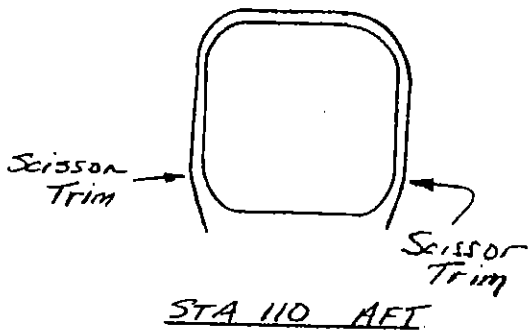


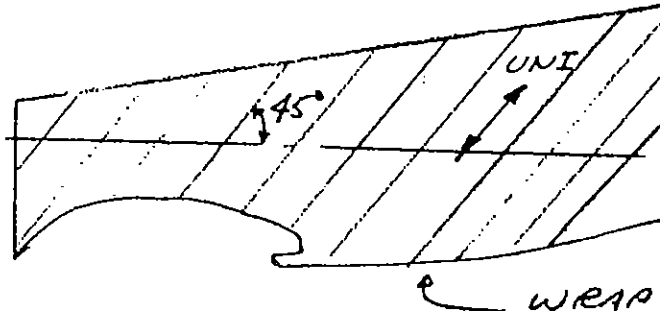
Before glassing the outside
install the 1" square x 1/4" thic
for the fuel drain valve installa
See sheet 7-6 and sheet 12-1.

This piece wraps around the fuselage sides and bottom from approximately STA 110 to STA 154. Begin by placing Edge A parallel to the top fuselage line and along the corner where the inside fuselage tape has been exposed by previously removed urethane foam. Of course the 52" long edge should be the one at STA110. Once that Edge A has been attached all the way back to STA153, begin to unroll the piece around the fuselage accross the bottom to the same corner on the other side. Remember that since the fuselage is jigged upside down, that the fuselage bottom is actually on top. Also, be liberal with the micro slurry that you cover the green foam with prior to laying the cloth down.

After wetting out and squeeging this first piece of cloth, you can cover the fuselage aft of STA 153 with scrap cloth and 1" overlapping.

Next, cut out additional BID for the area forward of STA110. Remember that the cloth should be at about 45 deg to WL15 on the sides, that 1" is the minimum overlap, and that wrapping the cloth around the fuselage from longeron to longeron will





STIFFENERS

In this section, you will make the firewall stiffener, and the left and right canopy stiffeners. The canopy stiffeners will be used later in the canopy section.

Begin by cutting three pieces of orange foam with the following dimensions:

1. 1.2" x 18" (Firewall stiffener)
2. 1.2" x 25" (Lt. canopy stiffener)
3. 1.2" x 43" (Rt. canopy stiffener)

Mark each piece with the proper name and mark one end of the canopy stiffeners as the aft end.

Before glassing, some plywood inserts need to be located in the canopy stifferners. The firewall does not receive any of these.

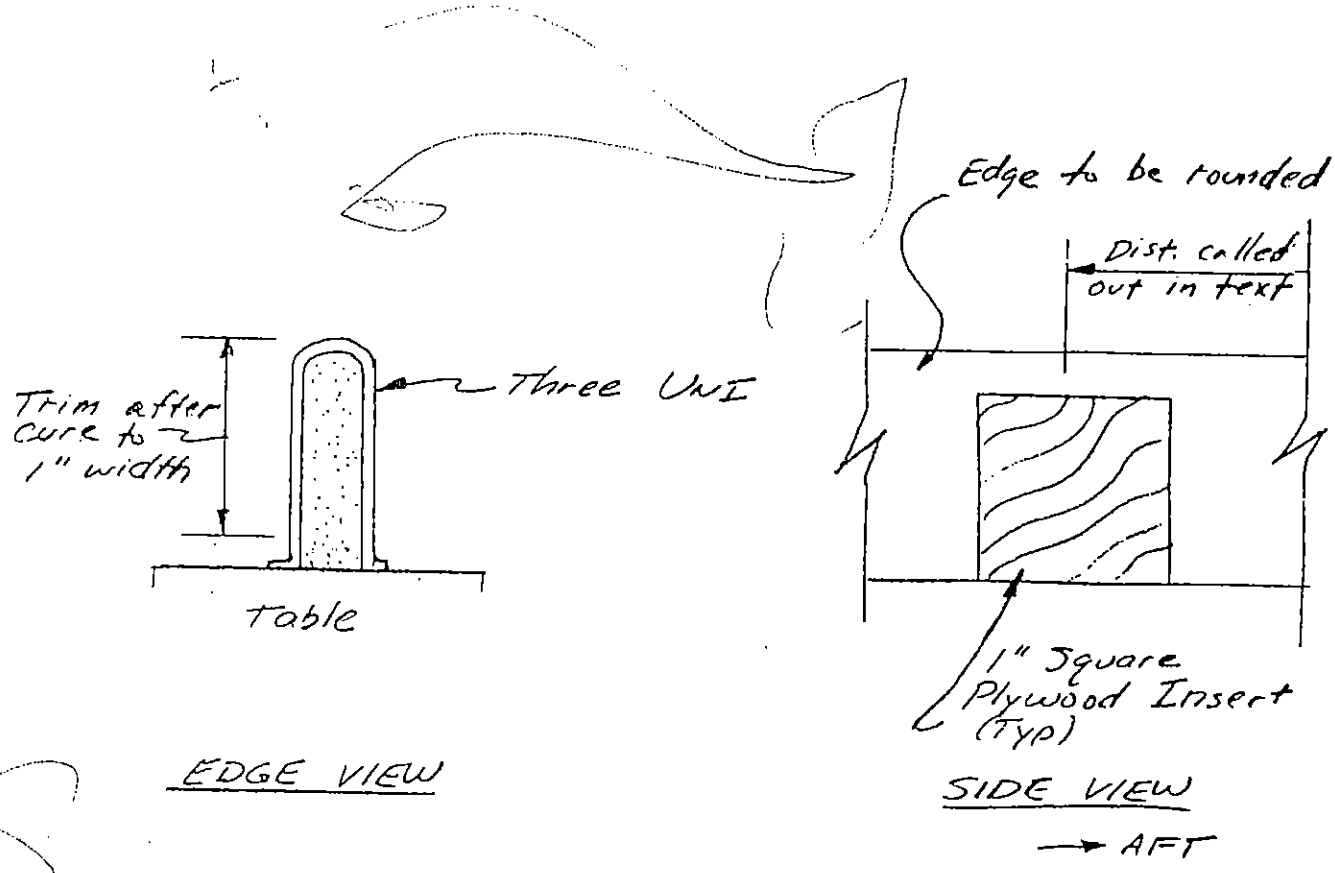
The right side canopy stiffener gets plywood inserts of 1" square at 6.9",11.2", 29.9", and 34.2" forward of the aft end. Remove the orange foam, insert the inserts with micro, and make a smooth transition with the orange foam.

The left side canopy
1" x 2" plywood insert 19"
aft end, and 27" forwar

So that the glass wil
the edge, round one of the
each stiffener.

Set each stiffener ve
held in place with a few d
remaining square edge shou
on the table. Lay up thre
stiffener, with the orient
along the length of the st
the end resting on the tab
trimmed, you don't have to
the part of the stiffener
the table.

After the layups have
square edge so that the wi
is about 1".



BUILDING THE VERTICAL FIN AND RUDDER

The rudder is constructed exactly like the aileron was so review that section on the "Basic Aileron Construction" before proceeding.

Begin by making CS21, which is a 26" long piece of 1/2"O.D. x .035 wall 2024T3 Aluminum tubing. Also make CS22 which is a 1" length of 7/16" x .063" steel tube. Find the two CS23 phenolic bearings, and the CSA10 rudder horn assembly.

The hot wired rudder foam core will have to be cut to a 26" length. Save the excess as this will become part of the upper vertical fin. Now, layup one BID over the rudder just like you did with the ailerons.

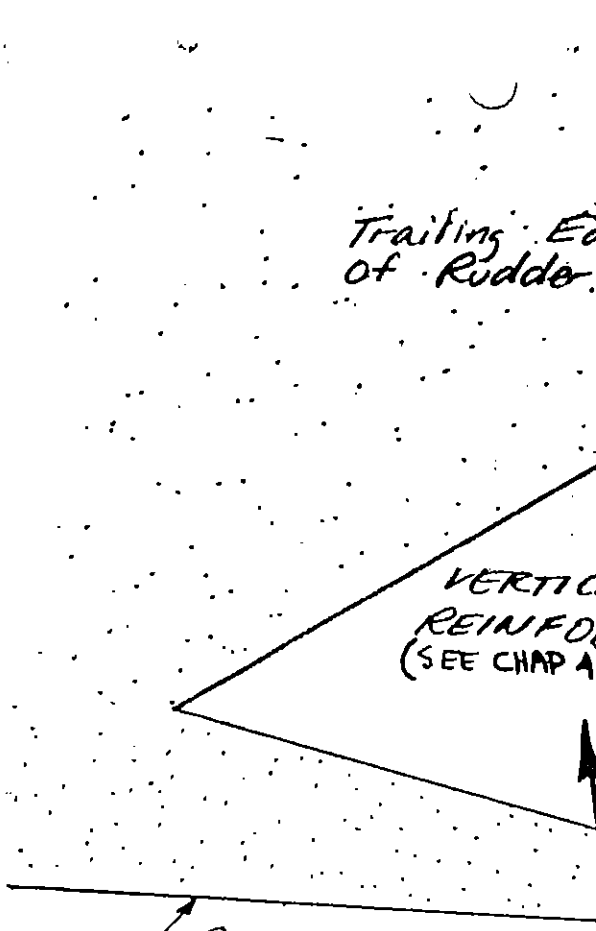
Begin building the vertical fin by laying up one BID in the rudder slot at 45 deg to, and parrallel to, the trailing edge. After that layup has cured, sand off one of the tails so that the top flows smoothly into the rudder slot. Shape the vertical fin tip to a pleasing shape.

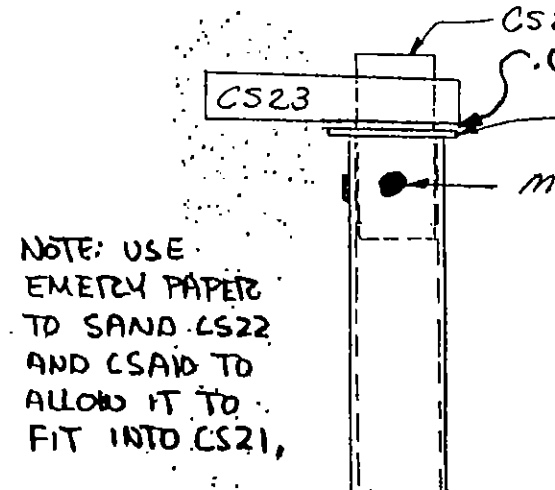
Next, install the Vertical Fin Reinforcement by removing the blue foam where necessary and using micro. The red foam will have to be sanded to obtain the same airfoil shaped contour. Sand the rudder slot into it also.

Now layup one BID over the vertical fin, in the same manner as the ailerons. A second piece can be used for the tip area.

Next on the agenda is installing the rudder. The centerline of the lower pivot is located 1.5" along the rudder slot from the base of the vertical fin. Dry fit a CS23 at that location, and then, using the rudder, locate the other CS23 at the top. The rudder should have about .06" freeplay.

Before mounting the CS23 bearings permanently, you will have to verify proper gap between the rudder and the vertical fin. Insert CSA10 into the bottom end of CS21, and CS22 into the top end of CS21, with the CS23 bearings





INSTALLING THE VERTICAL FIN

Before beginning this section, the fuselage whould be glassed on the outside, the tailspring support installed, and the Vertical Fin/Rudder combination completed and working. Begin by leveling the fuselage laterally.

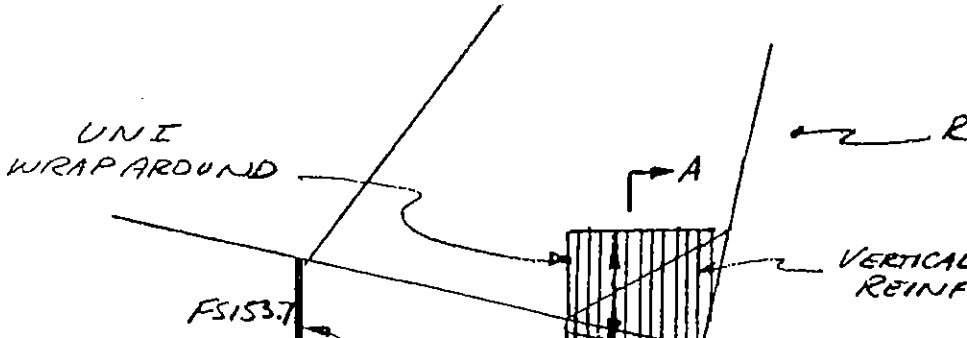
The vertical fin may have to be trimmed both front and back so that it will fit snuggly into the fuselage. When in position, the bottom of the fin should be resting on the bottom of the fuselage, and the tailspring should be resting against the bottom of the vertical fin reinforcement. When you are satisfied with the fit, check the vertical alignment. If you stand back and eyeball the fin, you probably can estimate within 1 deg. when the fin is vertical. A more accurate way of doing it is to use a plumb bob. Since the fuselage has been leveled laterally, the plumb bob hanging vertically should follow the vertical trailing edge of the fin when the fin is level vertically. Finally, check that the fin tracks straight along BL00.

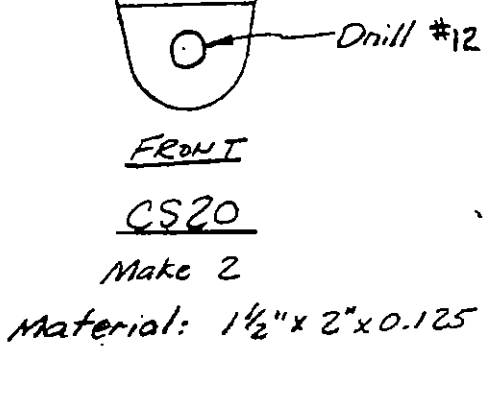
ALIGNING THE FIN

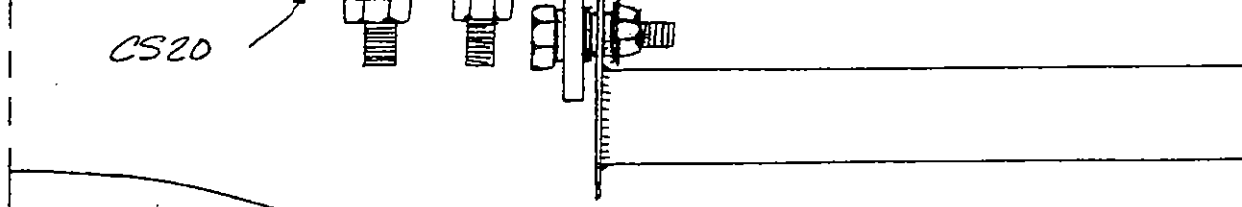
Use micro wherever the f
fin join to mate except for t
spring. At the tailspring, u
to permanently mount the tail

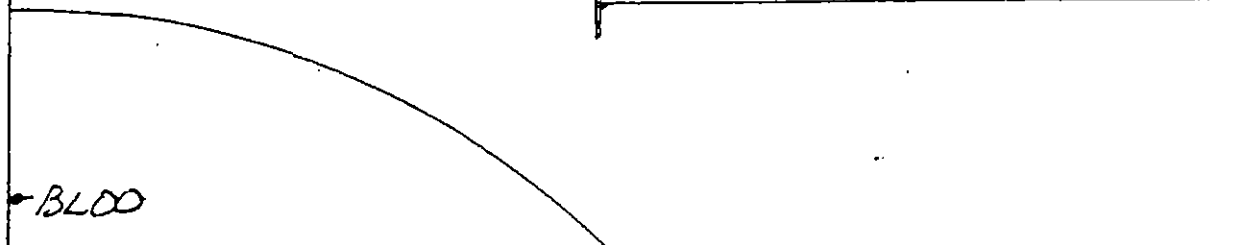
After mating, recheck th
leveling laterally, and then
alignment and tracking of the
fin. When satisfied, let cur
day.

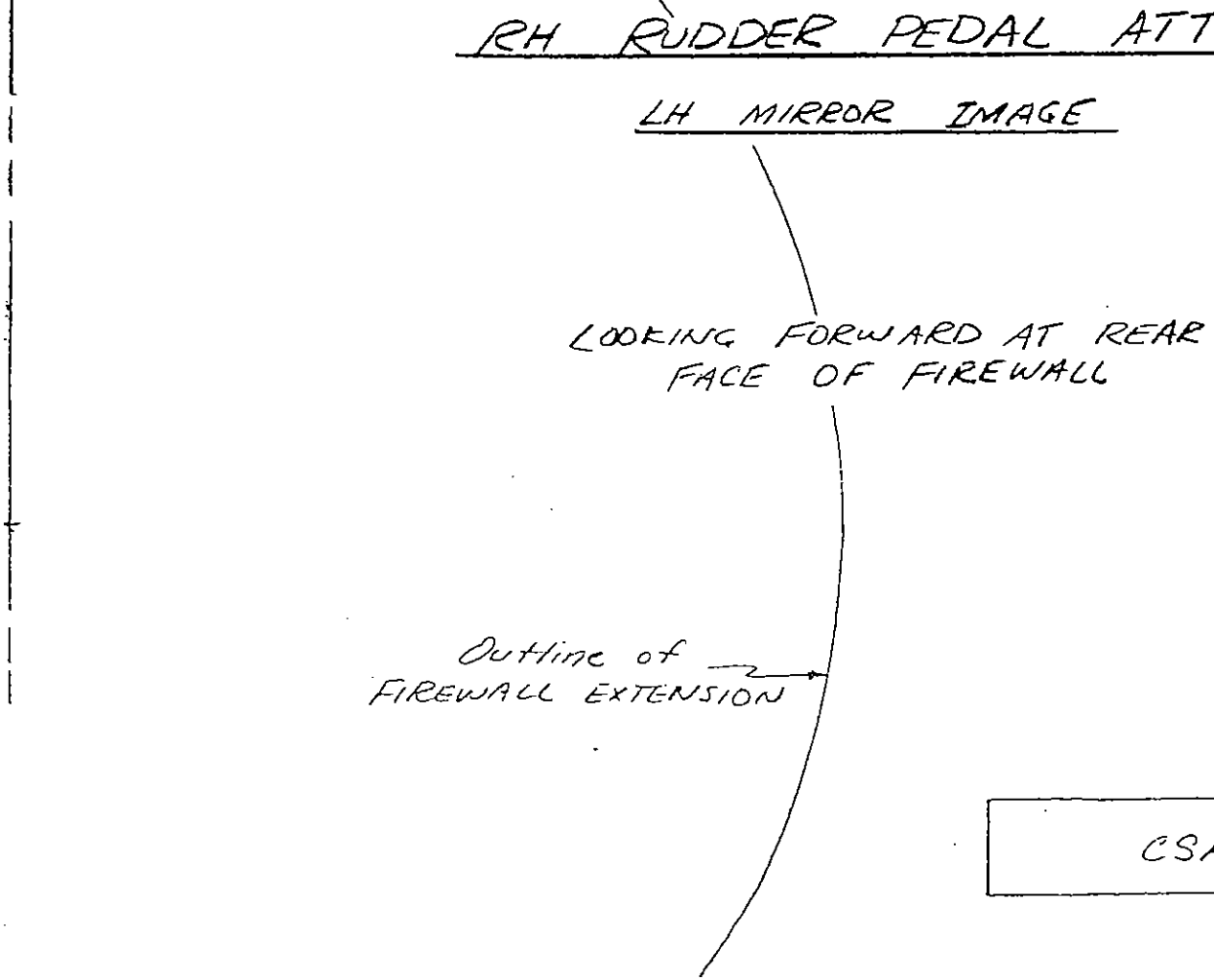
The next task is to make
to cover the gaps between the
fin and the aft fuselage. It
ably easiest to use several p
green and orange foam, 5-Minu
in place, and then sand and c
to obtain an pleasing shaped
Avoid letting the foam get le
0.3" thick during the carving
cess. You can check the thic
with a nail or toothpick like
did when you were carving the
elage sides. Layup 2 BID on
filet, overlapping by 1" both
fuselage and vertical fin.











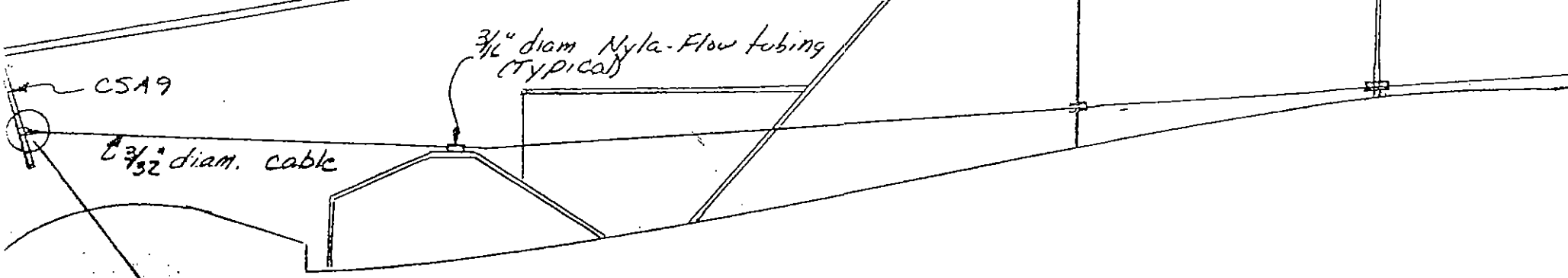
RUDDER CONTROL SYSTEM

The rudder control system consists of rudder pedals, 3/32" cable running directly to the tailwheel, and then 1/16" cable running from the tailwheel assembly to the rudder. The 3/16" Nylo-flow tubing is used for cable fairleads.

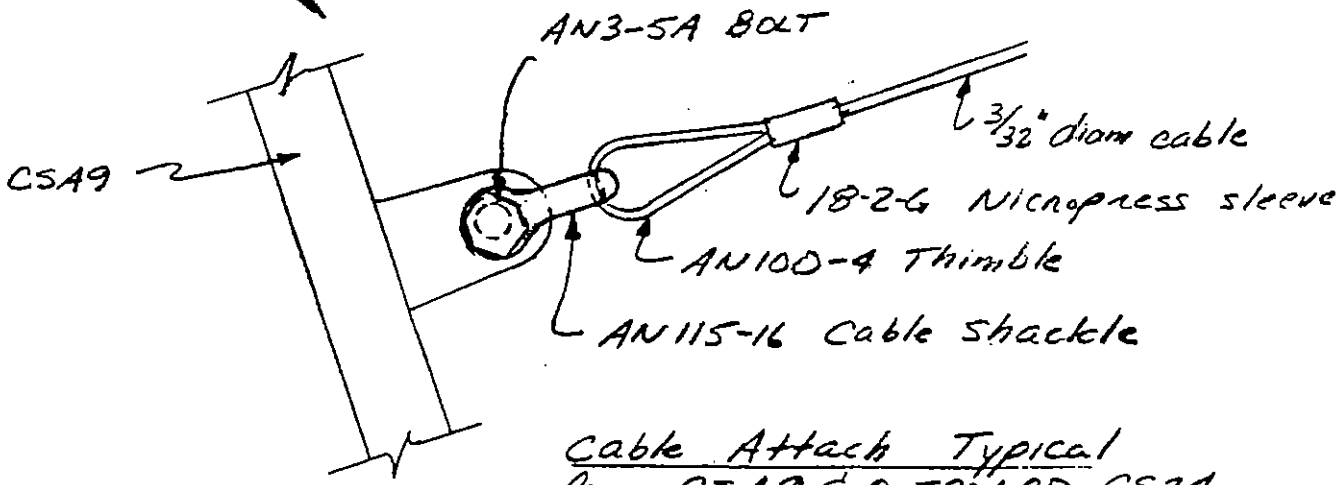
Begin by mounting the rudder pedals. It will be necessary first to make two CS20's out of the aluminum extrusion. Note the tab on CSA9 points toward the aft end of the aircraft.

The side view included with these plans shows the general routing of the cable. Avoid sharp turns through the fairleads, and at the location where the cable exits the fuselage, position the exit so that the cable will run parrallel to the tailspring. This is to prevent being able to pull the cable at an angle, which would put excess loads on the structure.

Note that the AN115-16 cable shackle is used only with the rudder pedals and the outboard CS24 attachments; the other four points, because of much lower loads, delete the shackle and pull directly against the Thimble.



RUDDER SYSTEM



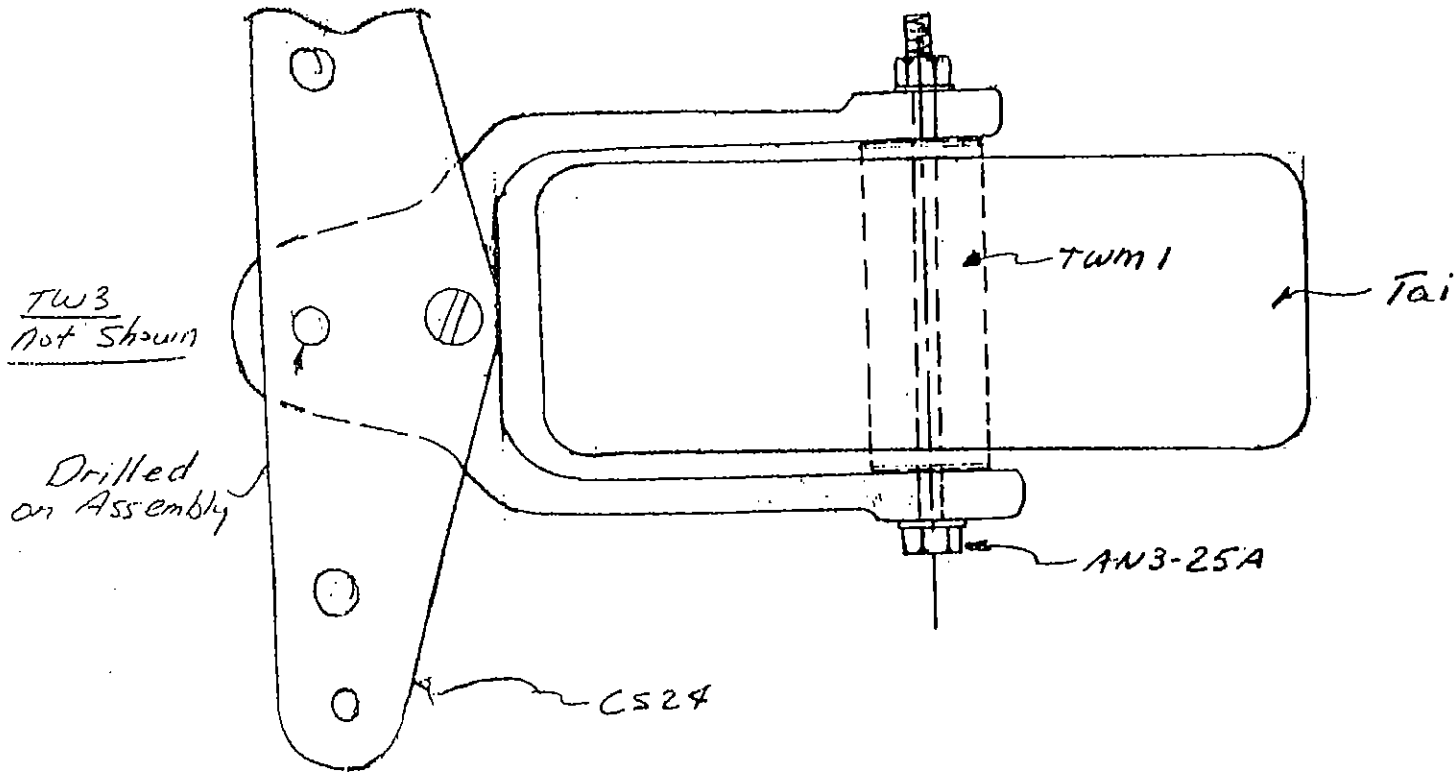
Cable Attach Typical
for CS19 & OUTBOARD CS24

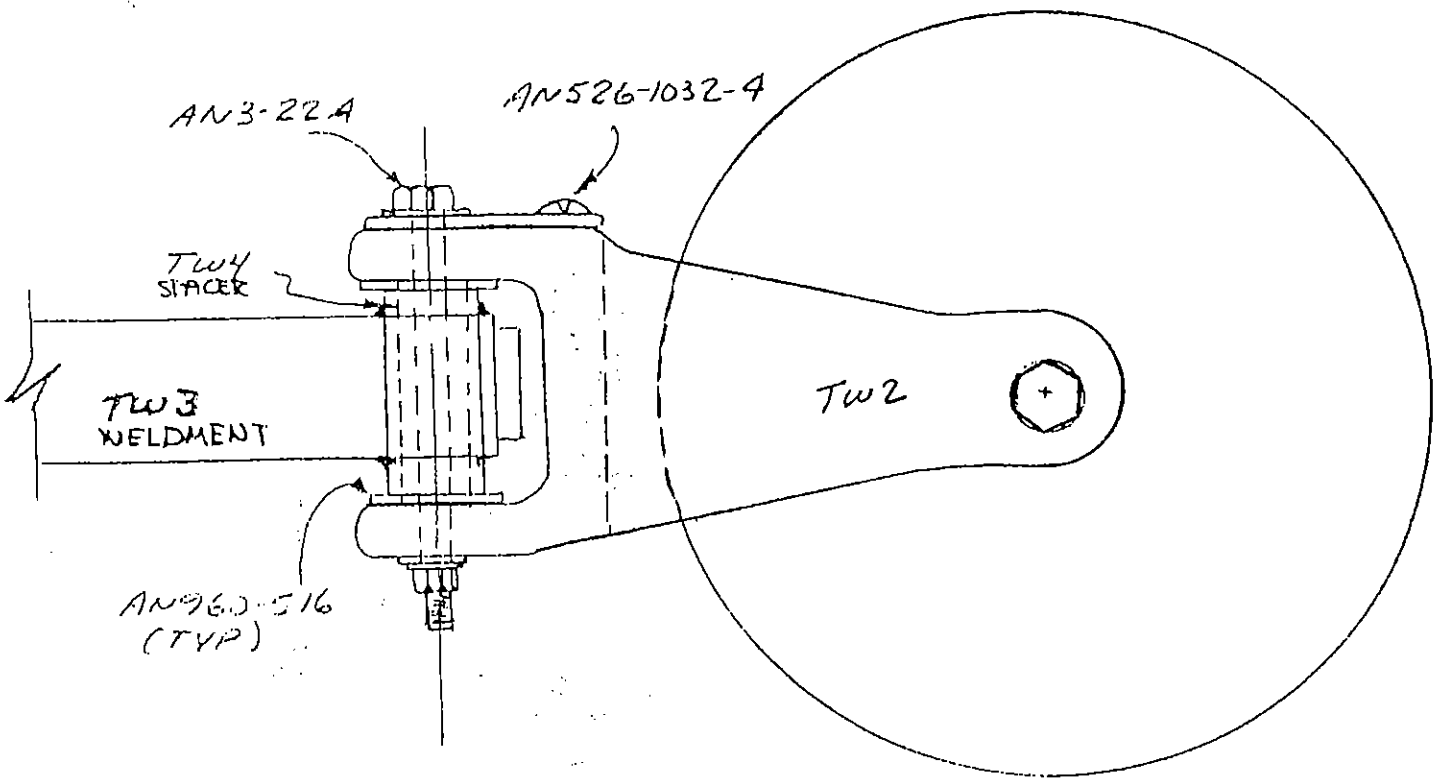
RUDDER PEDAL ATTACH

To Ruda

Use 1/16" cable
with AN100-3 thimb
plus 18-1-C Nicropr
Typical 4 places
(i.e. delete cable sh

To Rudde


TW3
Not Shown
Drilled
on Assembly
TWM1
AN3-25A
CS24


AN3-22A
AN526-1032-4
TW4
SPACER
TW3
WELDMENT
TW2
AN960-516
(TYP)

TWO UNI CROSSED at 45°
Along entire span

SPAR CAPS
Make One Each
G 8" x
H 6" x
F 10" x

NOTE: ALL SPAR CAPS ARE ONE PIECE FROM LEFT TO RIGHT.

BOTTOM WING

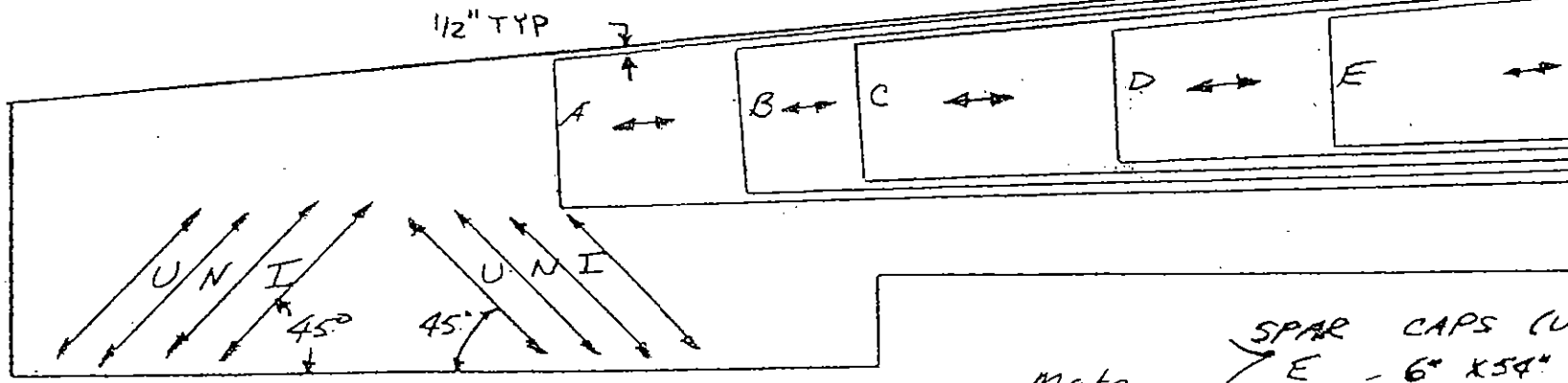
BUILDING THE MAIN WING

The main wing is a composite structure with solid foam core, spanwise tapes of UNI for bending strength, and two layers of UNI at 45 deg. to the trailing edge for torsional stiffness and surface durability. The trailing edge of the wing is perpendicular to BL00, i.e. the trailing edge of the wing has no sweep. The ailerons are attached to the inboard half of the wing, and there is a shear web in the inboard half of the wing also.

First, you should cut out the UNI spar caps. Letter each one of them for identifying later, as well as placing a centerline in the middle(where the UNI will cross BL00). For cutting the spar caps out, use the technique described in the basic education section.

Note: All caps are one piece from left to right

WRA
arou
E



TWO UNI CROSSED at 45°
Along entire span

SPAR CAPS (U
Make One Each
E - 6" x54"
D - 7" x78"
C - 8" x106"
B - 9" x120"
A - 10" x140"

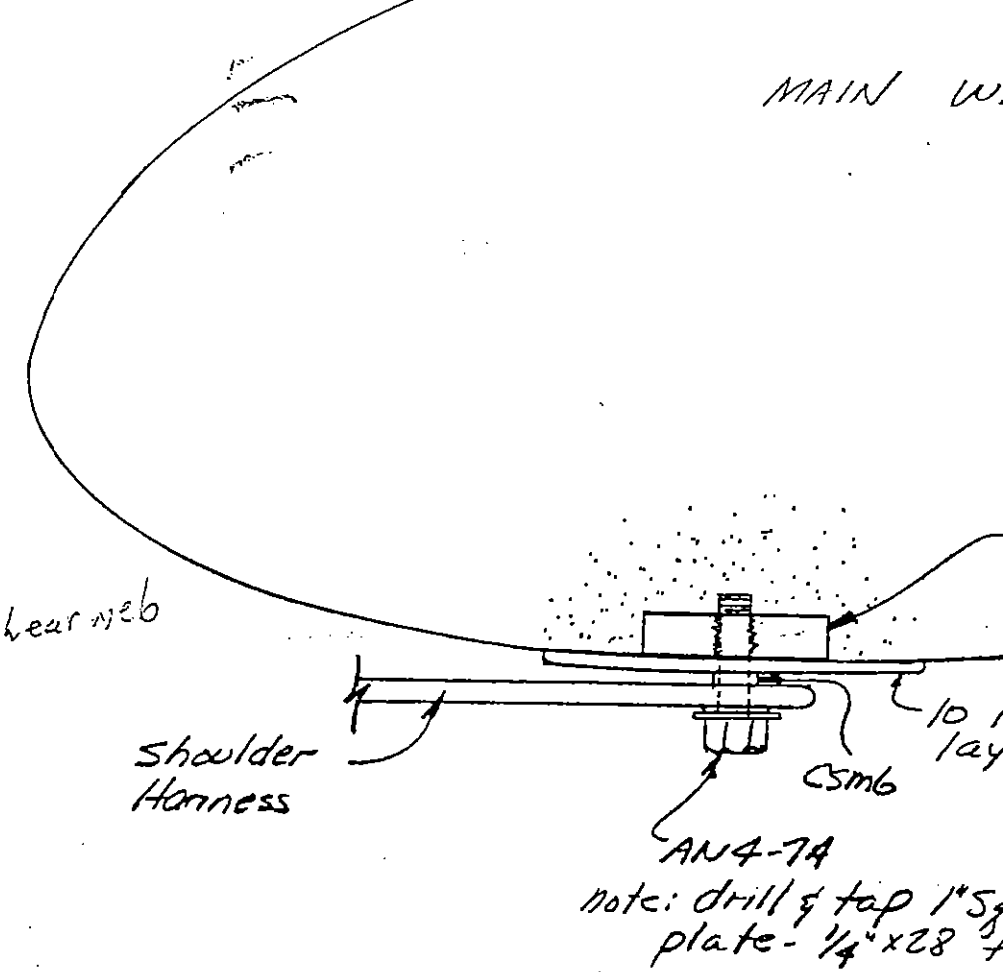
TOP WING

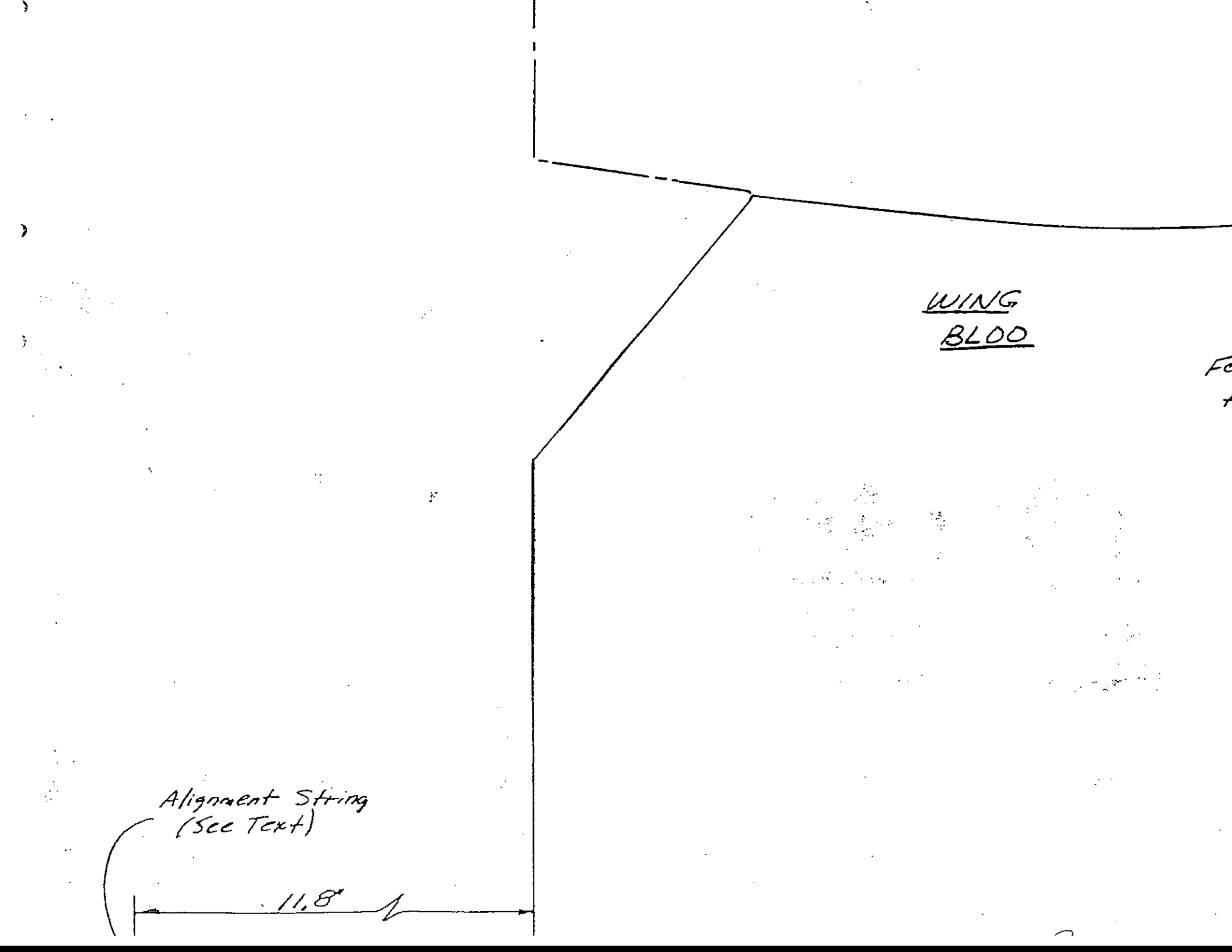
SHOULDER HARNESS INSTALLATION

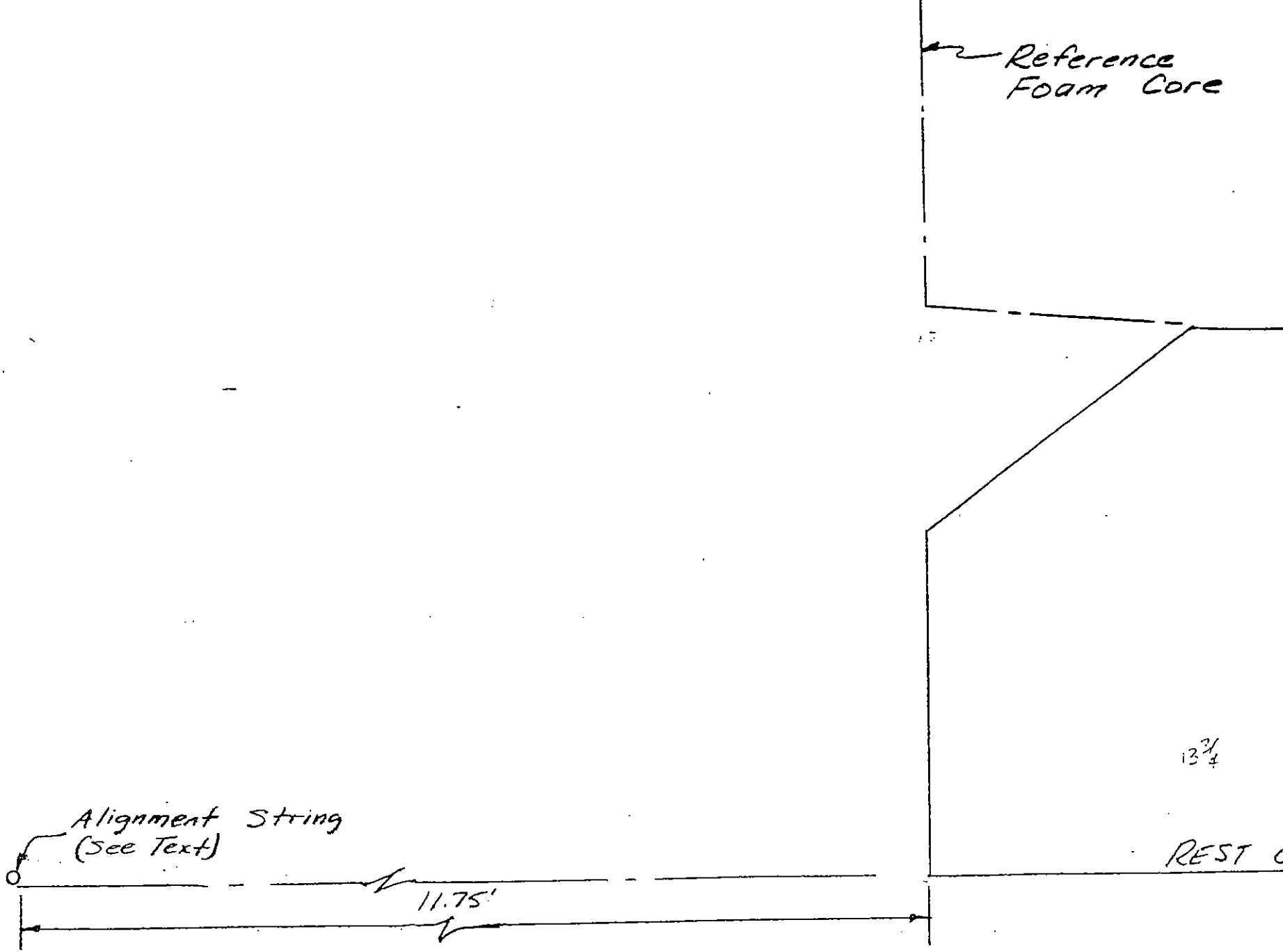
Prior to glassing the bottom skin on the main wing, you will have to install two 1" square, 3/16" thick mild steel plates for installing the shoulder harnesses later. The plates should fit flush with the bottom wing foam line.

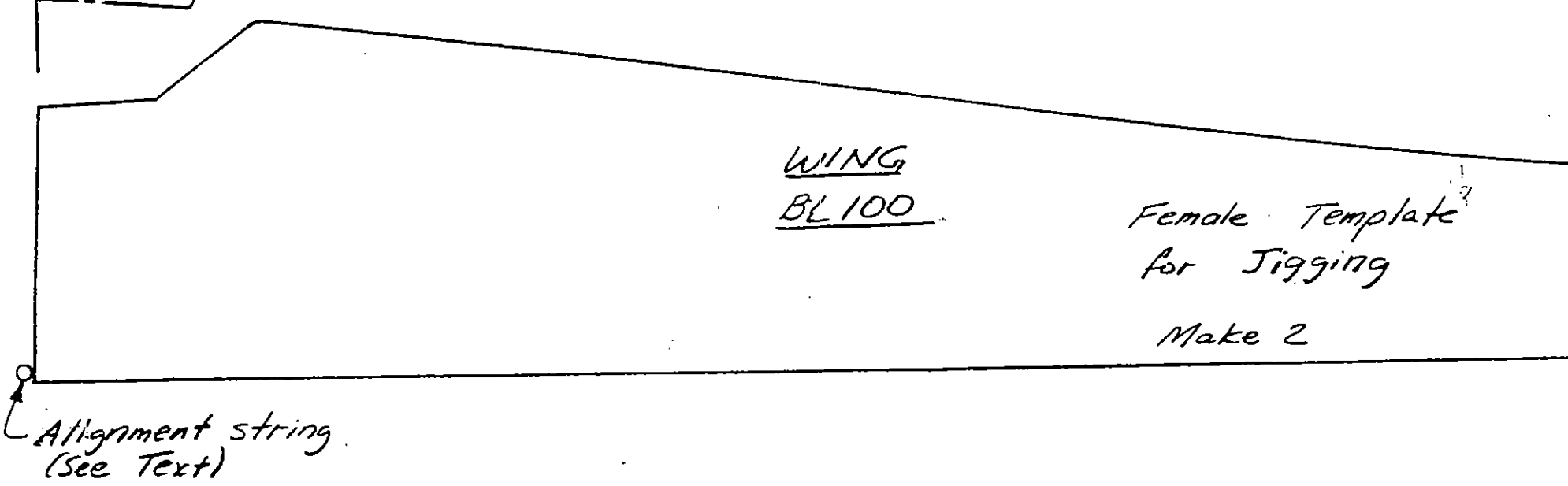
Following glassing the bottom skin on the main wing, layup ten plies of BID 2" square over each steel plate. Once the layup has cured, drill and tap for a AN4 bolt in each plate. An assembly drawing is included. Remember that the shoulder harness bolts are at BL4.5 on each side.

x 8" from shear web




WING
BLOO
Alignment String
(See Text)
11.8"


Reference
Foam Core
13 3/4
REST
Alignment String
(See Text)
11.75'


WING
BL100
Female Template
for Jigging
Make 2
Alignment string
(See Text)

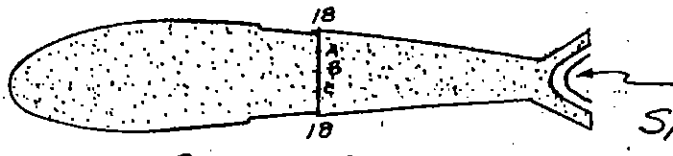
Construction begins by glassing the aileron slots on both inboard pieces. When the layups are cured, cut the BL52 and BL00 templates at the 18-A-B-C-18 line. Use these templates to hot wire the inboard foam cores into two pieces each in preparation for laying in the shear web.

Before doing that, however, the wing must be jigged upside down on the layout table.

Make some wood templates roughly cut to represent female versions of the top portions of the hot wire templates. Full size drawings for these are included. These templates are used to jig the wing cores with the correct dihedral.

To help in getting the trailing edge of the main wing straight(i.e. perpindicular to BL00), the following procedure has been developed:

1. Run a taut string from one end of the table to the other. To get it taut, you may want to let it extend over the side of the table and hang weights from it. Its location should be at the aft end of the BL100 female jigging template.
2. Study the full size female jigging templates for BL100, BL52, and BL00. Notice that a deminsion is given from the string to the aft edge of each female jigging template; e.g. the distance is 0" for BL100 because you set it that way.
3. By using the distance given, you can set the inboard female jigging templates to give a straight trailing edge when the foam cores are placed in position.

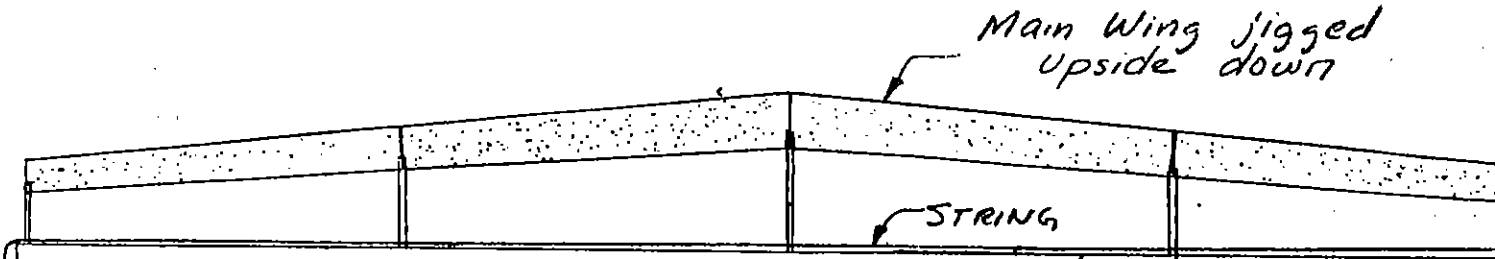


BL52 (TYPICAL

As you are locating
position, check to verif
level lines on the cores
This is important so be
At BL00, you will ha
the two inboard wing foa
allow them to fit togethe
the proper dihedral angl
Also, stand back an
along the wing to verify
is not bowed or kinked.
laid spanwise is also use
Don't be concerned i
need to be moved inboard
slightly to remove any bo
When everything is satisf
up some bondo and bondo t
to the table top in the p
After that is accomplishe
cores should be just rest
templates.

The next step is to
cores together with micro
each level line as you do
stopping, 5-MIN the foam
templates with small dabs
careful not to move the c

CAUTION! The foam c
within 1/16", and the slo
used to join them, or exo
result.

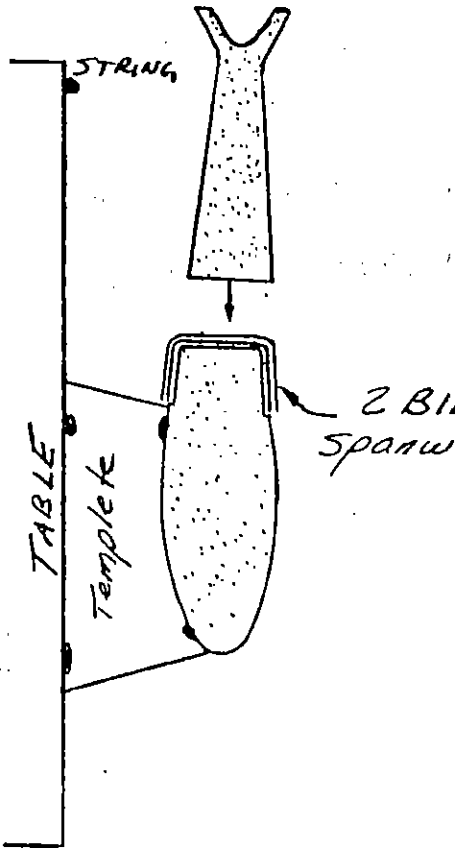


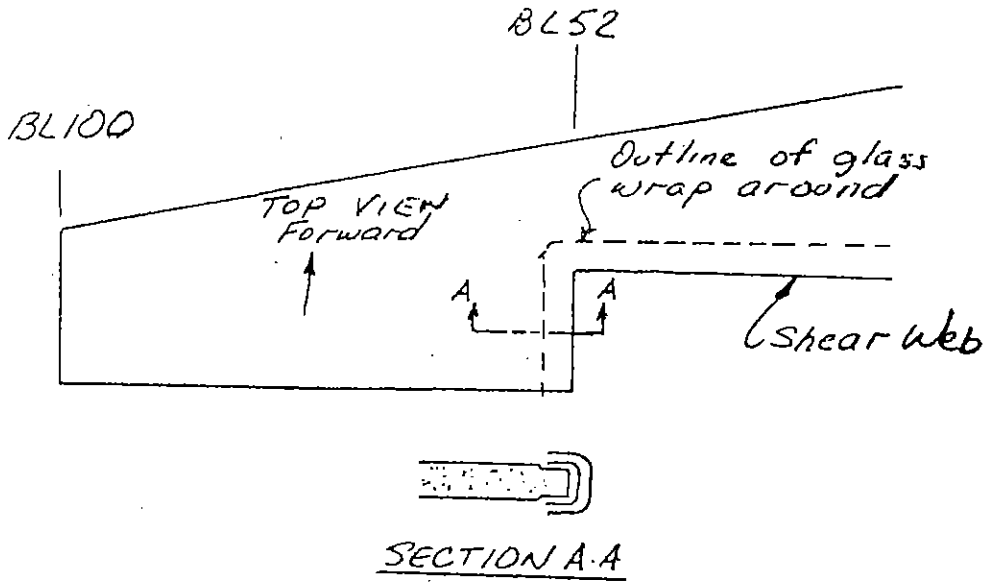
When the micro has cured, rotate the table 90 deg nose down so that the shear web can be done.

The shear web extends from BL52 left to BL52 right.

Note that the glass wraps around both the top and the bottom of the wing, so that the shear web corner will have to be rounded slightly to get the glass to lay down. Also, at BL52, the layup turns 90 deg, and follows to the trailing edge of the wing, still wrapping up over the top and bottom surface(which, therefore must be 'scooped' out .026" so that the two plies will fit flush with the rest of the core.

After laying up the two BID at 45 deg. for the shear web, the rear half of the 18-A-B-C-18 hot-wired piece can be reattached with micro. Use tape to hold the combination together until it cures.





SECTION A-A

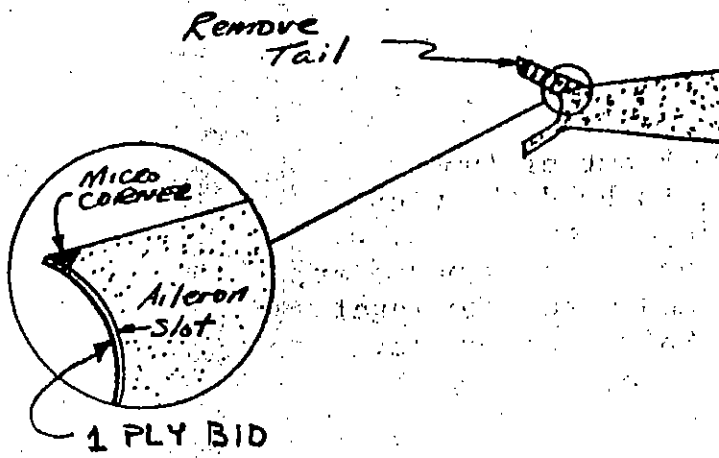
TRIMMING THE FOAM CORE

At this point, the wing should be jigged on your layout table upside down. Using a hard block on the foam core, clean up all joggles, excess micro, and bumps. At BL00, round that joint so that the glass can flow smoothly across

on the wing foam core with
BL9.3 on each side at the
of the foam cores and conn
marks. Before cutting out
of the foam core, measure
verify that after the cutt

account for the buildup of glass later on, move the line aft 0.1" . That is the cut line; it should intersect the leading edge of the wing at, or inside of, the fuselage sides. Check this to be sure. If it intersects the leading edge outside the fuselage, you will have to taper and round the core area outside the fuselage sides to avoid a flat spot. Cut off the foam core along the cut line and round the corners slightly so that the glass will lay down properly.

Sand off the "tails" at the aileron slots and smoothly contour the airfoil back to the aileron slot. Put a micro corner in as shown.



LAYING UP THE BOTTOM SKIN AND SPAR CAPS

You are now ready to lay up the bottom skin and spar caps. This layup will require about 2.5 hours and take at least 2 individuals, and preferably 3.

Begin by cutting UNI glass cloth for the skin. Roll the cloth along the cut direction and mark it with the width. The wide pieces(22") go outboard while the narrower pieces(17") go inboard.

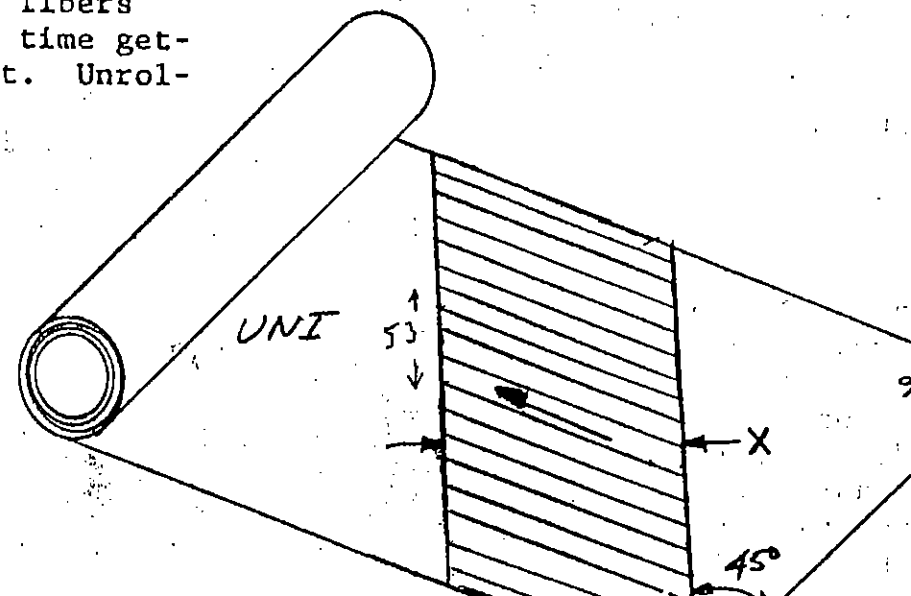
Next, reread the aileron construction section and peel ply the trailing edge of the wing outboard of BL52 the same way.

The UNI layup is crossed at 45 deg. to the trailing edge of the wing to provide torsional stiffness. The fibers must be straight, so take your time getting the wrinkles and kinks out. Unrolling the cloth as you need also to reduce the awkwardn scrap UNI oriented in the s to fill any spots not cover skins.

At the leading edge, l hang down vertically. Trim of the tangent pt. Trim th the edges to within 1" also. board portion where you cut the seatback bulkhead fitti UNI to wraparound to the bo face.

No overlap is required the skins together. Squeeg

X	Number
22"	8
17"	4



FOR SPAR CAP POSITIONS, See Sheet 9-1

LAYING UP THE TOP SKIN & SPAR CAPS

Let the bottom skin cure for at least one day.

Build a framework out of lumber and Bondo, as shown, to hold the wing jigged in place while you turn it over.

After the wing has been turned over, leave the lumber on and check the level lines on each tip. Shim as necessary to get the tip level lines absolutely level; then Bondo the jigging to the table in preparation for glassing the top skin.

At the leading edge, feather the bottom skin to a feather edge at the tangent point just like you did with the ailerons.

Glassing the top skin and spar caps is just like what you accomplished on the bottom skin with these changes:

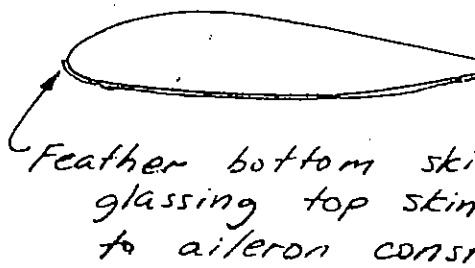
1. The top of the wing has more spar caps.
2. At the leading edge, the top skin must wrap around the leading edge and overlap the bottom skin by about 1"

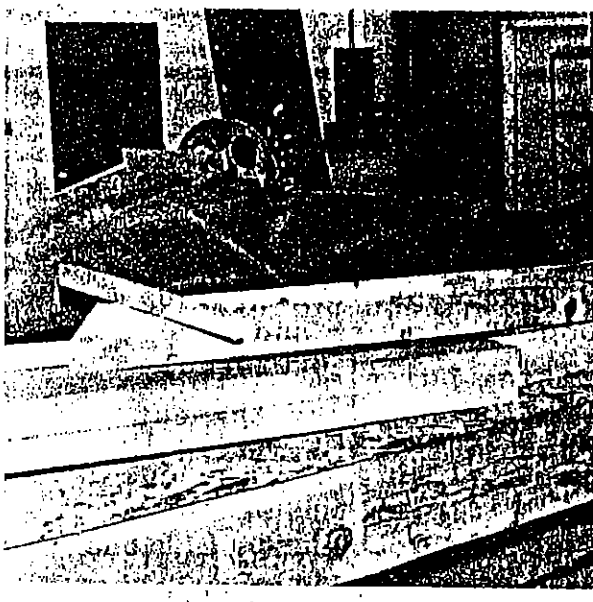
Although this layup involves more cloth, you should still be able to finish it in about 2.5 hours with two or three people.

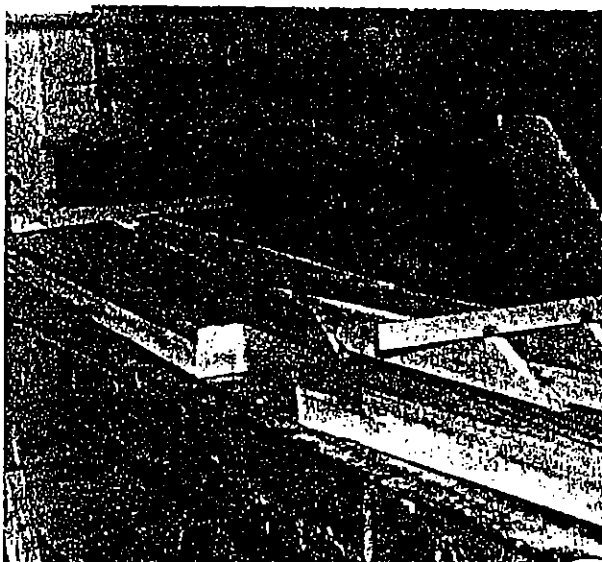
Permit the wing to set for two days before breaking loose the lumber. Before moving the wing, Bondo a board onto the wing surface in the level position (i.e. so that a level set on top of the board will be level with the tip level lines). This will allow you to easily tell when the wing is level as you mount the wing to the fuselage later.

By the way, to avoid letters and phone calls to us, it should be noted that the photos accompanying these words show the level board and lumber framework on the canard. The principle is identical, however.

After the level board has been bonded to the canard, you may carve the wing tip to a pleasing shape and glass over it with one BID, overlapping onto the wing skin at least 1".







MOUNTING THE OUTBOARD AILERON PIVOT

The outboard pivot is mounted at approximately BL38.

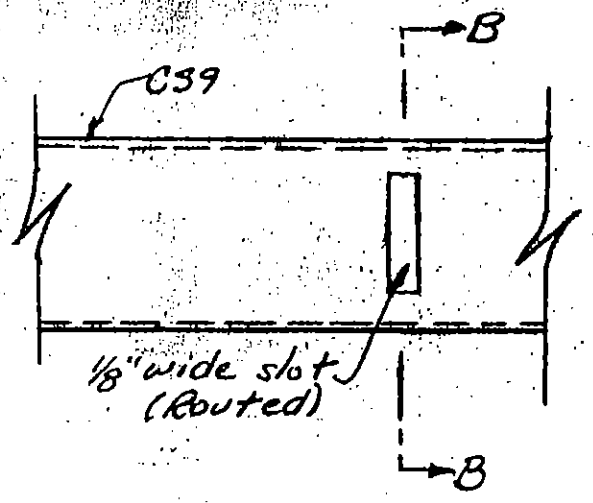
Screw CSM3 into CSM2 and retain it with a locknut, as shown. It must be tight. Round the end of CSM3 slightly.

Measure 28" outboard from the inboard end of the aileron(that's the end which still has CS9 visible). Using a router bit, route a slot 1/8" wide for about plus or minus 25 deg. of rotation. (see sketch). Next, insert CSM2 into CS9 with the flange pointing inboard. You may have to sand CSM2 to get a snug fit. Push CSM2 outboard thru the tube with a stick until you just see it flush with the routed slot. Rivet 3 MSP43 cherry rivets to hold it in place.

The routed slot must be opened up so that CS11 can slide off of CSM3 and out of CS9 while remaining perpindicular to CS9. This means that the slot must be about 0.5" to 0.6" wide. Also, check to see that CS11 can rotate about CSM3 approximately 25 deg. in each direction while inside CS9. Debur the slot and round all corners to avoid stress cracks. Do not make the slot any larger than you have to.

Repeat this procedure with the other aileron. Be careful that the flange on CSM2 points inboard so that CS11 will slide off CSM3 as the aileron is moved inboard.

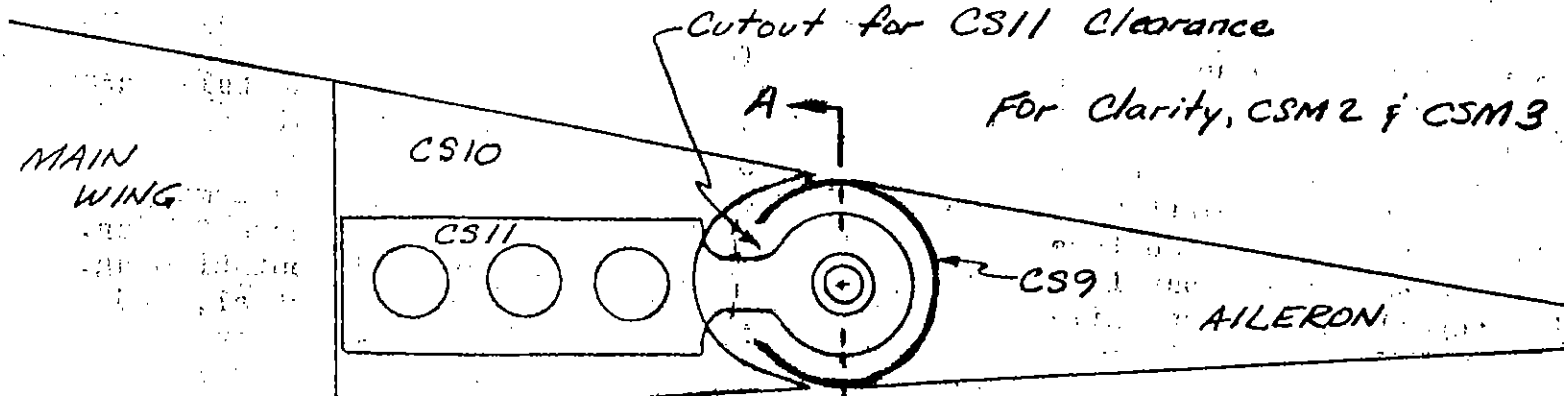
CS10 is a shaped block of red foam which is mounted in the wing. Later on, CS11 will be mounted in CS10 permanently. To find out where CS10 should go, temporarily set each aileron in its approximate



position on the wing, with t
aileron edge at BL10. CS11
against CSM2. Now you can m
CS10 must go to capture CS11
that to remove the ailerons,
moved inboard(while CS11 rem
in CS10) until CS11 slides o
then the aileron can be pull
you don't stand back and thi
this, you are likely to erro
the installation.

Once you know where CS1
the blue foam of the wing co
CS10 with dry micro, and sand
bumps and joggles. CS11 wi
manently installed into CS1
during the aileron installa
rigging.

One BID over CS10, top
is used to permanently atta
the main wing



INSTALLING THE AILERONS

The ailerons are installed and rigged prior to the wing being mated to the fuselage. Therefore, after mating, only CS5 and CS12 need to be hooked up for the aileron system to function.

Begin by jigging the main wing vertically with the leading edge at the table. This will make the following techniques much easier.

Take CSM1 and make a 0.8" length piece for the Right Aileron, and a 1.8" piece for the Left Aileron. If necessary, sand these to allow them to snugly fit inside CS9, flush with the inboard end of CS9.

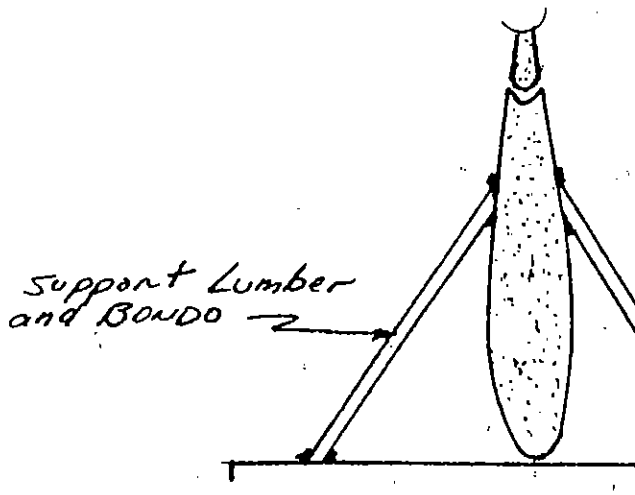
Remove CS11 from the outboard pivot so that it doesn't get in the way.

Find phenolic bearings CS6 (2) and CS7. Dull the phenolic with sandpaper.

Find CSA5 and CSA4. These two welded assemblies will be used with the ailerons to jig both CS6 bearings.

The purpose of the following description, which applies to the right aileron, is to allow you to jig CS6 without risking aileron binding:

1. Trim the wing core locally so that CS6 can be positioned at BL9.3
2. Have one individual hold CS6 against the core while you hold the aileron in position and push CSA5 thru CS6 into CSM1
3. Verify that the orientation of CS6 does not cause any binding during aileron actuation. If it does, beveling the wing core slightly should allow CS6 to line up properly.
4. Mix up some 5-Minute in order to join CS6 to the core. Repeat the first part of Step 3 and hold everything in the proper position until the 5-Minute has cured; then remove CSA5 and the aileron.
5. Repeat Steps 1-4 with the left aileron except that CS7 will have to be aligned also. The top face of CS7 can be sanded so that it will fit properly to CS6(rt. Aileron). 5-Minute CS7 to CS6(rt. aileron) and CS6(lt. aileron) to



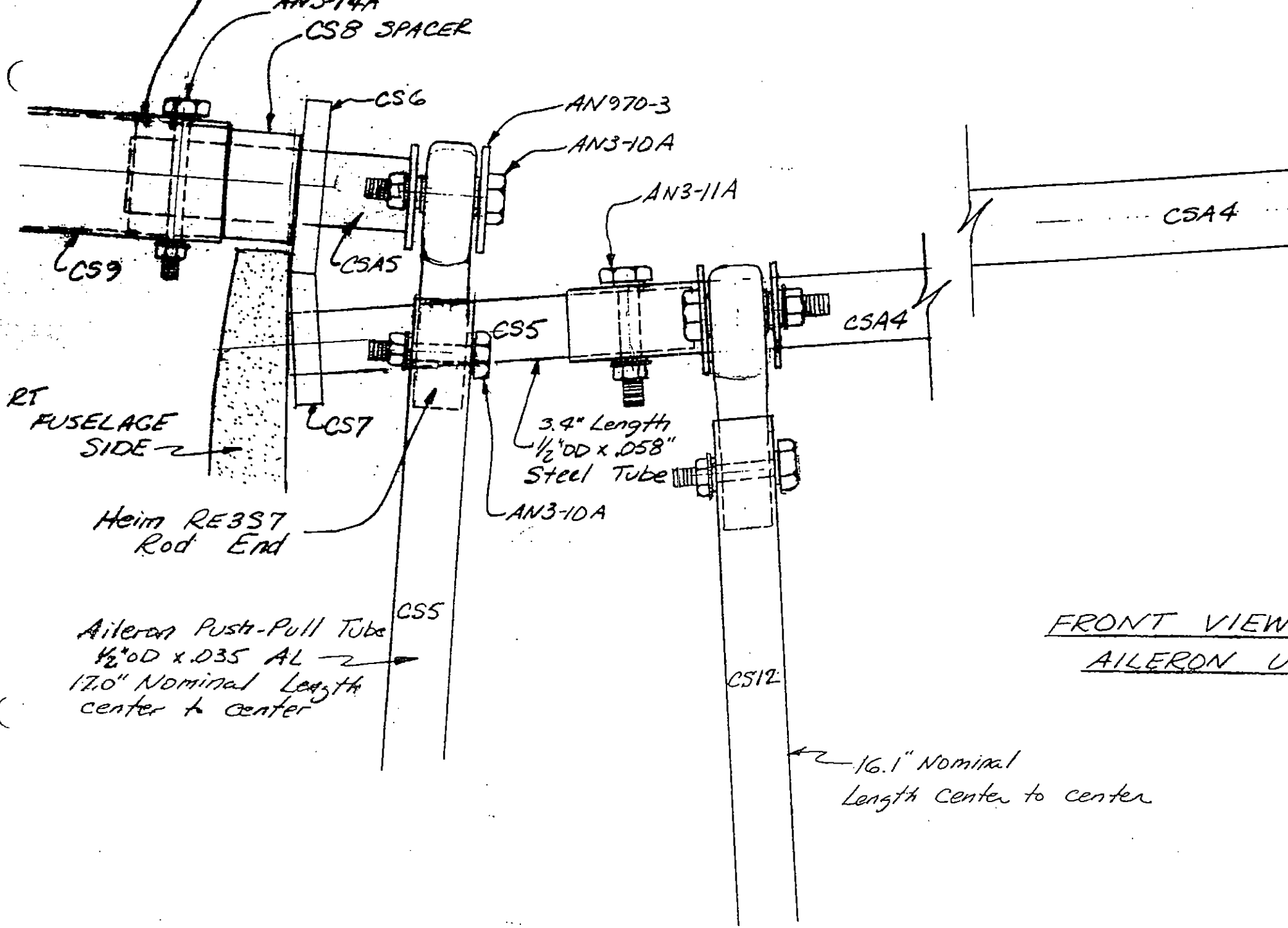
JIG WING VE
ON TABL

Begin by positioning
the wing, leaving about 1/
CS6 and the aileron for th
spacer. With CS11 up agai
mark where CS11 will enter
a router, route out CS10 s
will fit. CS11 is inserte
It is very important that
air spaces in the joining.
serting CS11, stuff flox i
until it wont hold any mor
CS11 with epoxy & slowly
the slot, moving it around
good squeeze out. If you
remove CS11 and repeat the
When you are satisfied, wi
squeeze out and carefully
CSM2 and slide CSA4(or CSA
the side) thru CS6 to comp
ging. The idea is to use
aileron to jig where CS11
tape wrapped around the ai
wise, stirring sticks, and
Bondo to hold the aileron
position with the proper

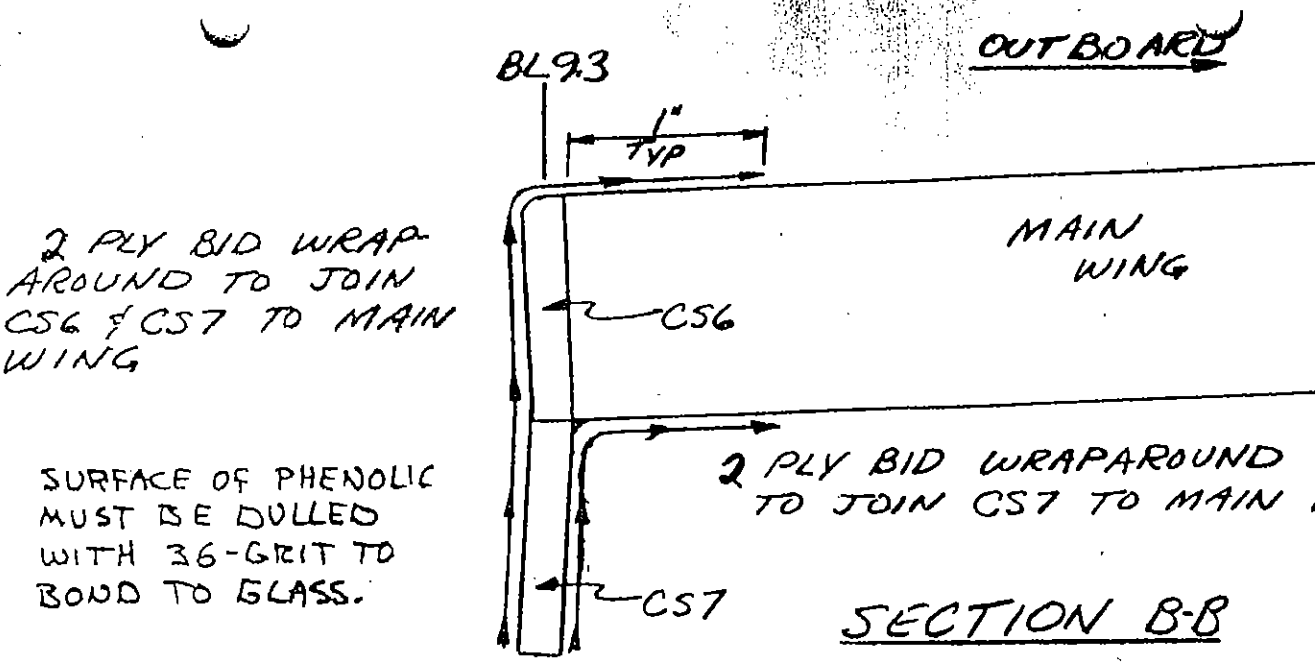
Once the layup has c
aileron and carefully insp

The only operations
fit the CS8 spacers, and
AN3-14A bolts that join t
CSA4 or CSA5.

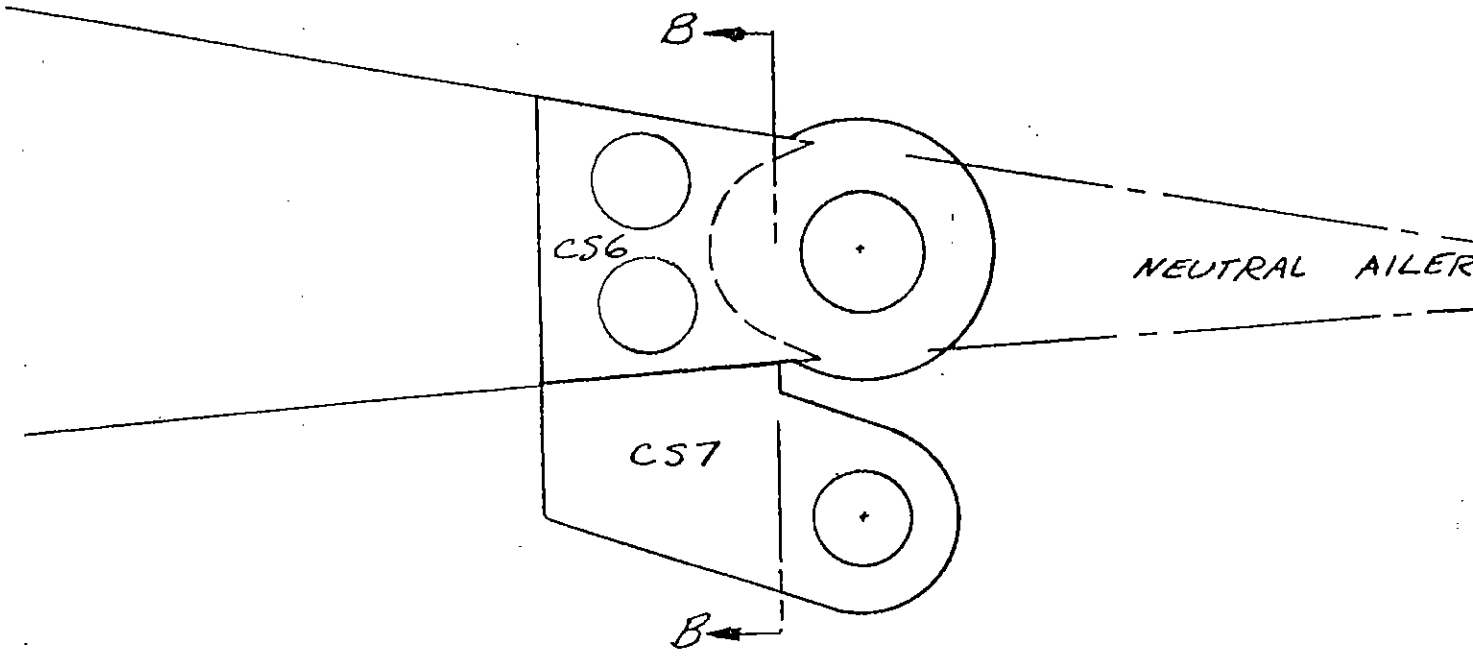
Using the aileron ri
verify that the aileron c
up or down from neutral w
With the aileron taped at
the arms on CSA4 and CSA5
the leading edge of the w



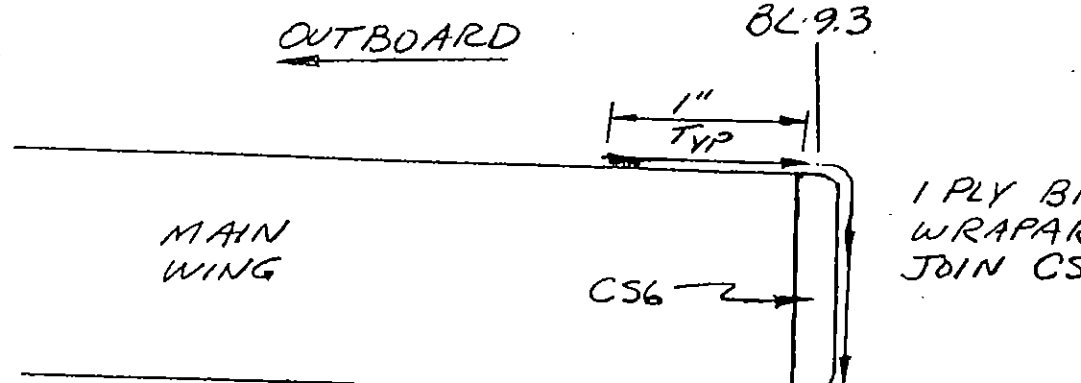
FRONT VIEW
AILERON U

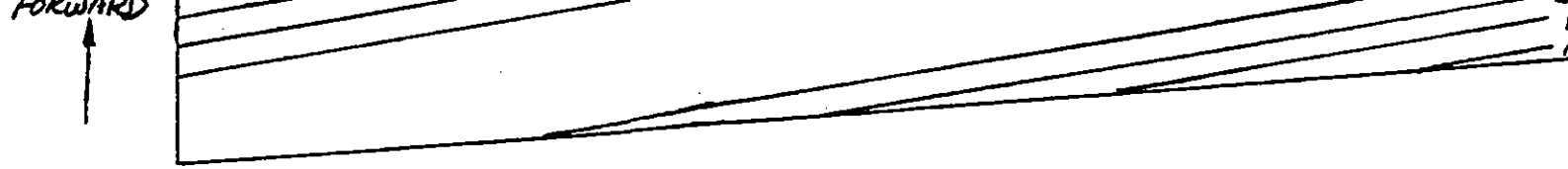


SECTION B-B



CS6 & CS7 MOUNTING
RT WING





NOTE: UNI SKIN at 45° to TRAILING EDGE OMITTED for clarity

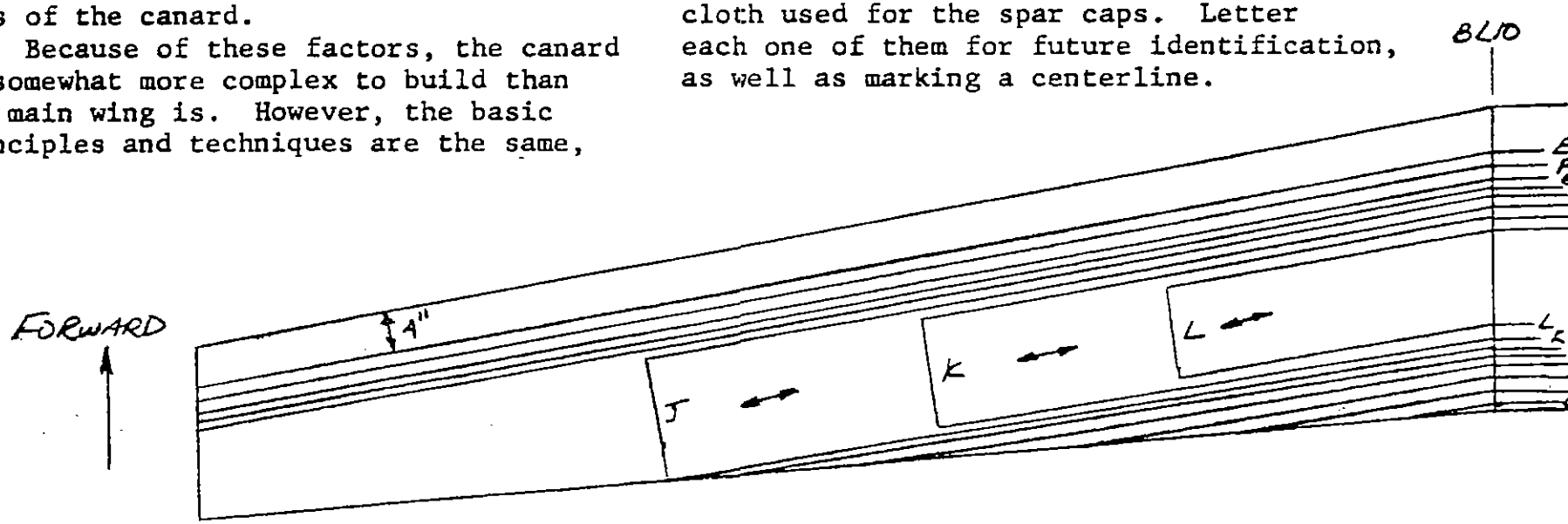
BOTTOM CANARD

BUILDING THE CANARD

The Quickie canard has swept leading and trailing edges, anhedral, a plain elevator which also serves as a flap, and in addition to carrying about 60% of the aircraft weight, it provides the energy absorption(i.e. "spring") for the main landing gear that is mounted at the tips of the canard.

Because of these factors, the canard is somewhat more complex to build than the main wing is. However, the basic principles and techniques are the same, and the experience that you have gained from building the main wing should enable you to build the canard in about the same amount of time. It is best to reread the sections on building the main wing to review the procedures.

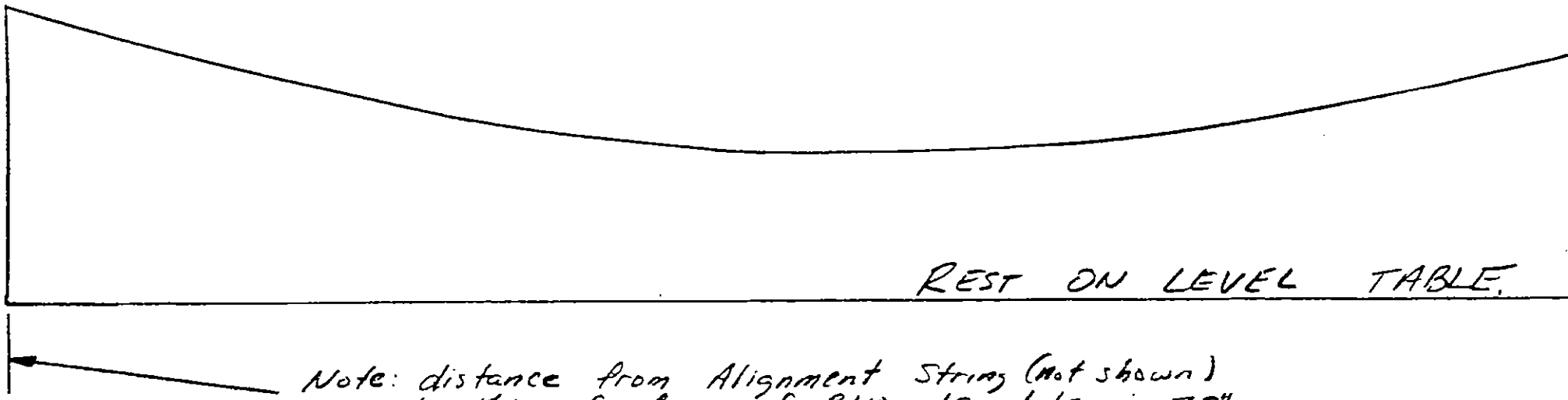
First, you should cut out the UNI cloth used for the spar caps. Letter each one of them for future identification, as well as marking a centerline.



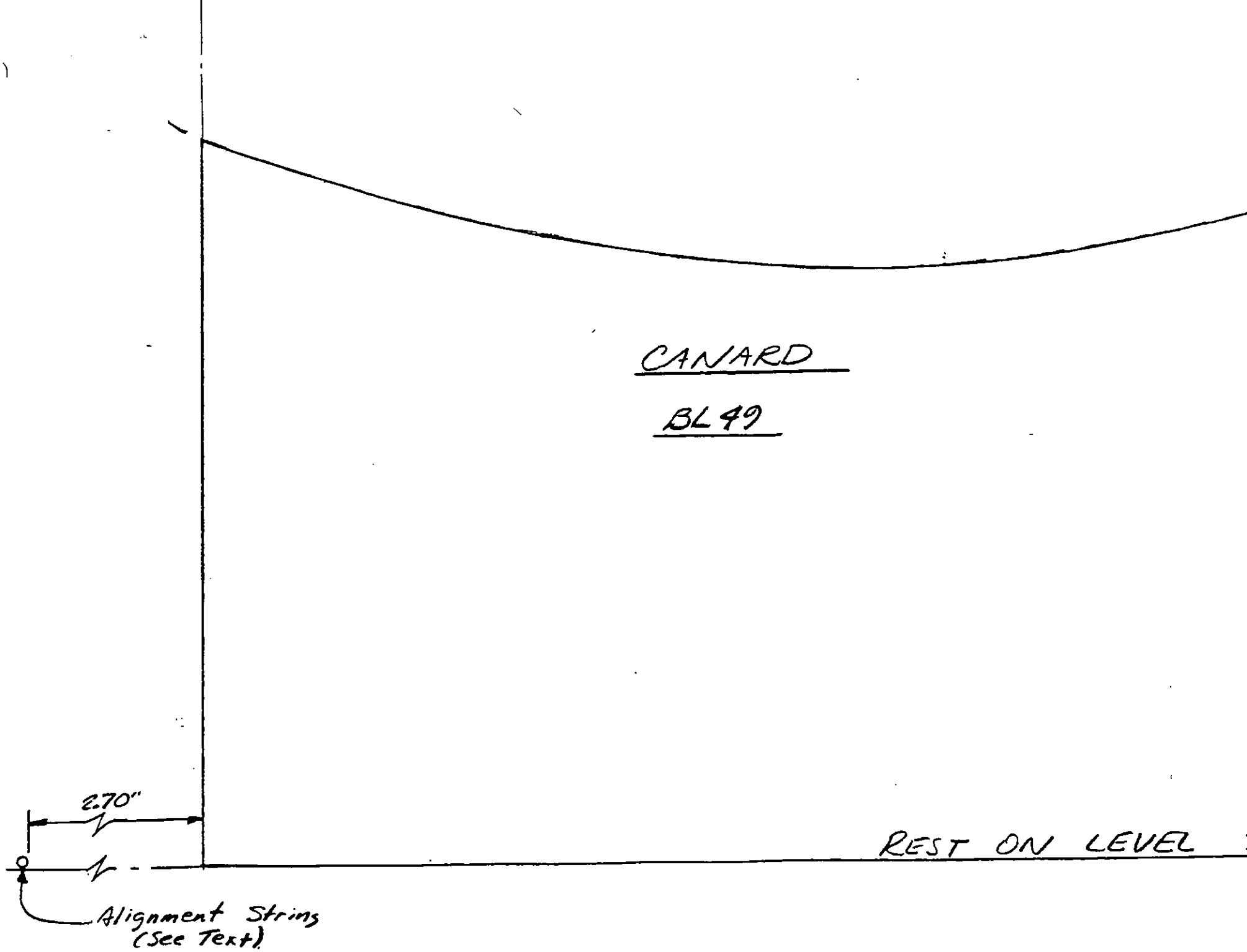
NOTE: UNI Skin at 45° to Trailing Edge omitted for clarity

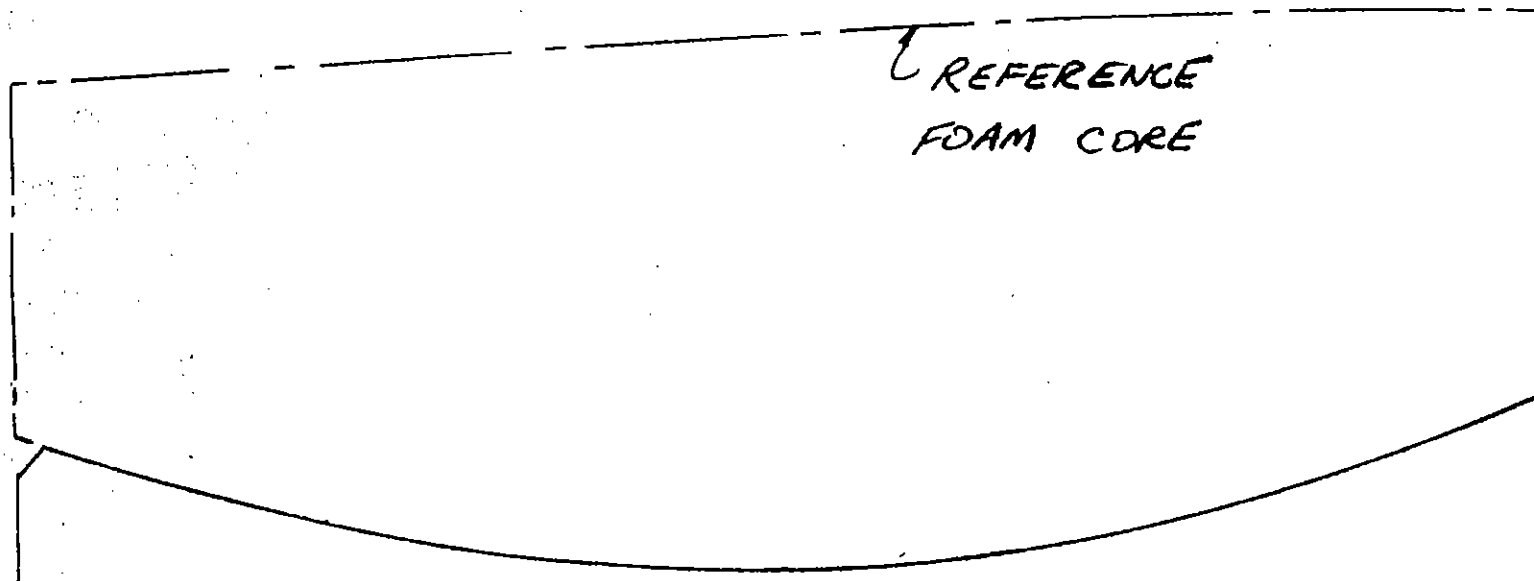
TOP CANARD

BL 70 SHEAR WEB FACE
NOT SHOWN HERE



Note: distance from Alignment String (not shown)
to this aft face of BL70 template is 7.0"
(See Text)


CANARD
BL 49
2.70"
REST ON LEVEL
Alignment String
(See Text)



CANARD
BL88

Female
for J

Make 2

Construction begins by glassing the elevator slots with one BID at 45 deg. to the spanwise direction, just like the aileron slots. When the layup has cured, cut the BL10, BL49, and BL88 templates at the 33-F-G-H-I-32 line. Use these templates to hot wire the foam cores into two pieces each in preparation for glassing the canard.

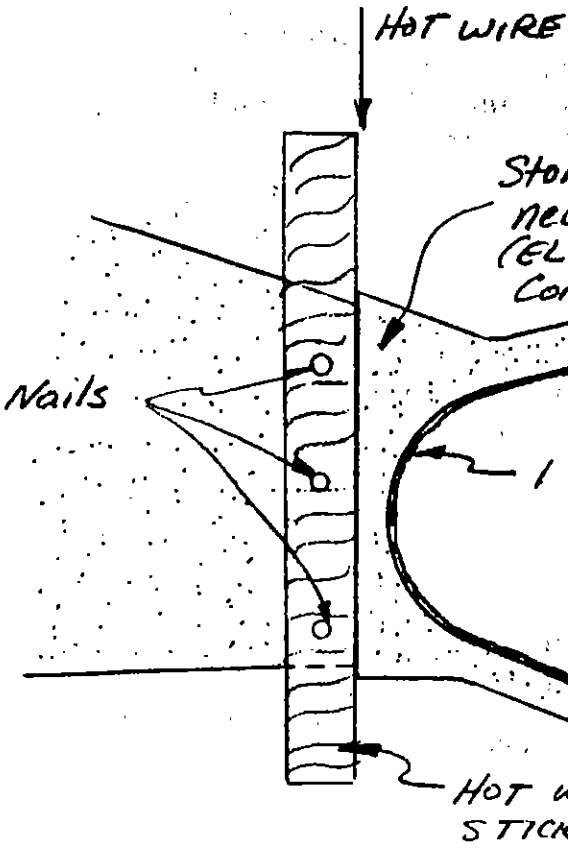
The canard must first be jigged upside down on the table. Note that since the canard has anhedral rather than dihedral, the canard tips will be higher than the root, which is opposite of the main wing. Full size patterns of the female jigging templates are included, and these should be made at this time.

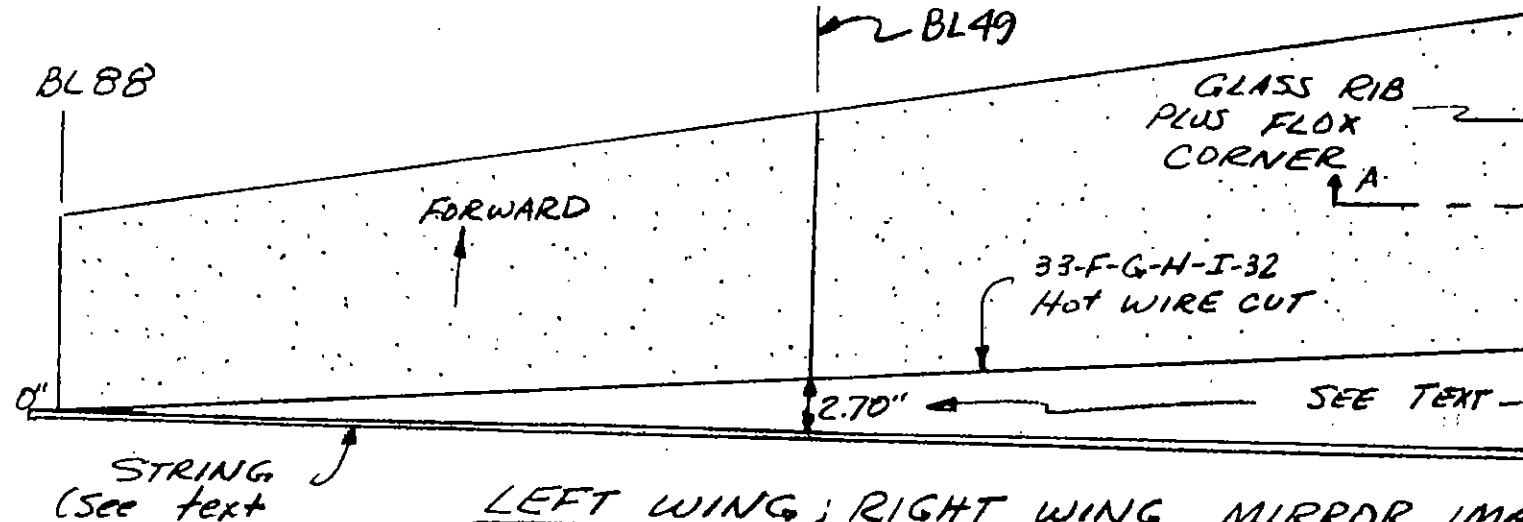
Also included is a top view of the canard, showing the sweepback on the trailing edge. Reread the main wing construction section to review the use of a string to help jig the cores. The dimensions given on the canard top view are duplicates of those on the female jigging templates for the canard and represent the distance from the string to the aft end of the jigging template.

The elevator slot foam cores should be stored since they will not be jigged at this time.

As you are locating the cores into position, check to verify that the level line on each core is level. This is important so be careful.

At BL10, left and right, you may have to do some sanding to make the cores fit together at the proper angle. CAUTION! the cores must fit within 1/16" or exotherm damage can occur.





LAYING UP THE BOTTOM SKIN AND SPAR CAPS

Using a hard block on the foam cores, clean up all joggles, excess micro, and bumps. At BL10, left and right, round the joints so that the glass can flow smoothly across BL10.

Round the aft face of the shear web slightly so that the glass will turn the corner ok.

You are now ready to lay up the bottom skin and spar caps. This layup will require about 3 hours and take at least 2 individuals, and preferably 3.

The procedure used is identical to that used on the main wing. Begin by measuring, and then cutting the UNI cloth for the skin. As before, roll the cloth along the cut direction and mark it with the width. Remember that the UNI plies are crossed at 45 deg. to the trailing edge of the canard to provide torsional stiffness. The fibers must be straight, so take your time getting the wrinkles and kinks out. Unrolling the cloth as you need it is advised also to reduce the awkwardness. Use scrap UNI oriented in the same directions to fill any spots not covered by the main skins.

At the leading edge, le
hang down vertically. Trim
of the tangent point. Trim
of the edges to within 1" al
trailing edge(the shear web)
must wrap around down to the
the face.

No overlap is required;
fit the skins together. Sque
cloth well to avoid the build
excess resin.

Find the canard spar cap
and D. These will be put on
Use the technique used on the
to put them on. In order to
buildup of material on the ca
web, trim B and D even with t
edge so that only A and C wra
down to the bottom of the she

Peel ply the joints, the
web, and the initial 2" of th

Knife trim the leading e
tangent point before quitting

Let this bottom skin cur
least one day.

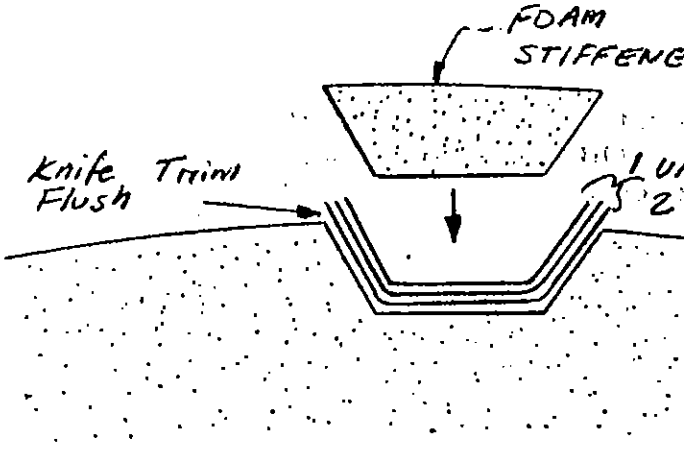
LAYING UP THE TOP SKIN & SPAR CAPS

Build a framework out of lumber and bondo to hold the canard jigged in place while you turn it over.

After the canard has been turned over, leave the lumber on and check the level of the tips. Shim as necessary to get the tips level; then bondo the jigging to the table in preparation for glassing the top skin.

Lay in a flox corner at both BL10 left and right, just like you did on the bottom of the canard.

Clean up all joggles, excess micro, and bumps. At the leading edge, feather the bottom skin to a feather edge at the tangent point. Remember that the top skin must wrap around the leading edge



SPANWISE STIF

BL 49 left to

FOAM Stiffener

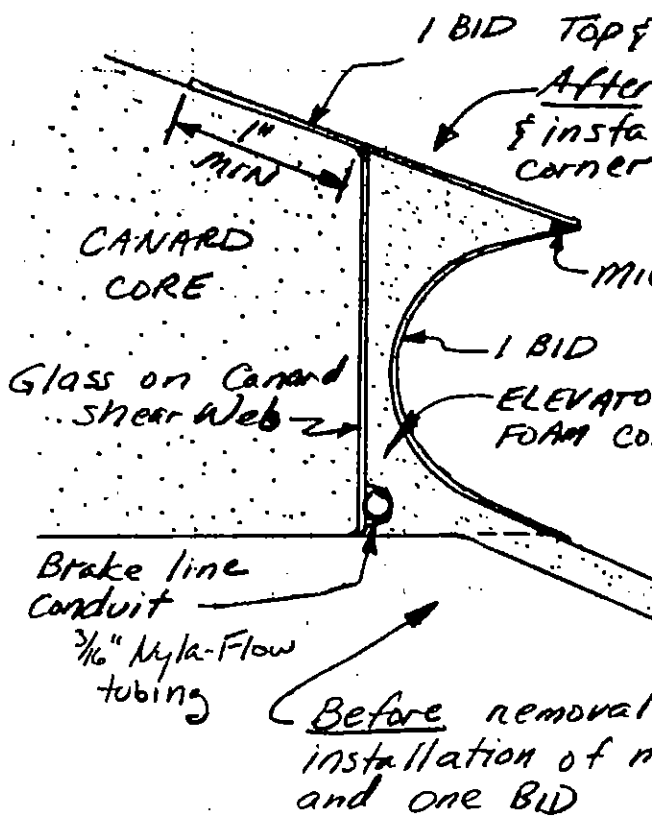
INSTALLING THE ELEVATOR SLOT FOAM CORES

Before installing the elevator slot foam cores to the canard core shear web, dig out for, and micro in place, the 3/16" diam. brake line conduit. Allow it to overhang each end by about 8-10".

The installation will be easier if the canard is jigged vertically.

After mounting, the inboard end of the elevator slot foam core should be no further outboard than BL10.2

Review the section of the main wing plans on TRIMMING THE FOAM CORE as it applies to sanding down the "tails". Do that with the elevator slots, including the micro corner, and then layup one BID top and bottom to join the elevator slot foam cores to the main portion of the canard. Lap the BID a minimum of 1" onto the main canard skin.



MOUNTING THE OUTBOARD ELEVATOR PIVOT

Find CSM7 and locate it about 0.25" inboard from the outboard end of CS16. Use 3 pop rivets to hold it in position.

Find CS19, and insert CSM5 as shown with the three washers and the AN363-428 nuts. There must be a minimum of 0.6" from the last washer to the end of CSM5 so that CS16 will have to be moved inboard quite a ways before it can fall off CSM5. Round the end of CSM5 as shown.

Later, when CS19 is installed against the canard shear web permanently, the elevator slot foam core will be trimmed spanwise so that CS19 will fit flush against the end of it.

FITTING THE MIDSPAN ELEVATOR PIVOT

This section is quite similar to what you had to do to mount the outboard aileron pivot previously, so review that work before reading any further. .

The midspan pivot is mounted at BL49.

Screw CSM3 into CSM2 and retain it with a locknut. It must be tight. Round the end of CSM3 slightly.

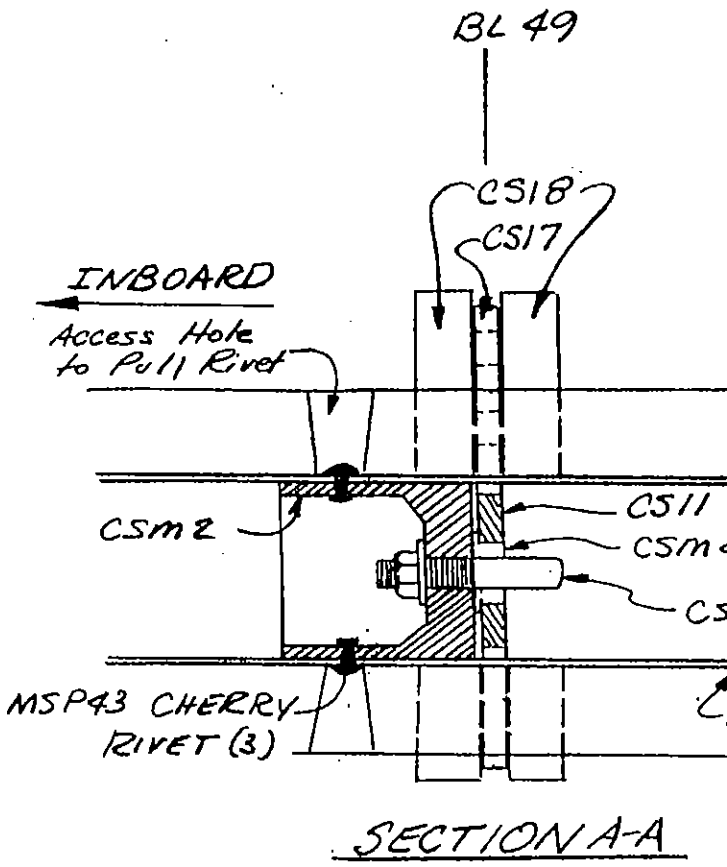
Measure 38" outboard from the inboard end of the elevator. Using a router bit, route a slot 1/8" wide for about plus or minus 17 deg. of rotation. Next, insert CSM2 into CS16 with the flange pointing inboard. You may have to sand CSM2 to get a snug fit. Push CSM2 outboard thru the tube with a stick until you just see it flush with the routed slot. Rivet 3 MSP43 cherry rivets to hold it in place. Note that the rivets grip the tube/CSM2 assembly, To do this you will have to drill access holes thru the foam so that the rivet gun can reach the rivet. These holes can be filled later with foam and micro.

The routed slot must be opened up so that CS17 can slide off of CSM3 and out of CS16 while remaining perpindicular to CS16. This means that the slot must be about 0.5" to 0.6" wide. Also, check to see that CS17 can rotate about CSM3 approximately 17 deg. in each direction while inside CS16.

Repeat this procedure with the other elevator. Be careful that the flange on CSM2 points inboard so that CS17 will slide off CSM3 as the elevator is moved inboard.

CS18 are shaped blocks of red foam which are mounted in the wing, butting up against the rear face of the canard shear web. Later on, CS17 will be sandwiched between a pair of CS18's. To find out where the pair of CS18's should go, temporarily set each elevator in its approximate postion on the canard, with the inboard elevator edge at BL11. CS17 should be against CSM2. Now you can mark where the pair of CS18's must go to capture CS17. Remember that to remove the elevators, they are moved inboard (while CS17 remains fixed be pair of CS18's) until CS17 CSM3; then the elevator can off. If you don't stand bac about this, you are likely during the installation.

Once you know where the go, use a router as you did ailerons, to remove that por the elevator slot foam core, the BID on top and bottom



SECTION A-A

INSTALLING THE ELEVATORS

The elevators are installed and rigged prior to the canard being mated to the fuselage. Therefore, after mating, only CS13 needs to be hooked up for a functioning pitch control system.

This section is also quite similar to what you had to do to install the ailerons previously, so review that section before reading any further.

Begin by jigging the canard vertically, with the leading edge at the table.

Take CSM1 and make a 1.3" length piece for the right elevator and a 1.8" length to the left elevator. If necessary, sand these to allow them to snugly fit inside CS16 flush with the inboard end of CS16.

Remove CS17 from the midspan pivot so that it doesn't get in the way.

Find phenolic bearings CS15 (2) and CS14. Dull the phenolic with sandpaper.

Find CSA8, CSA6, and CSA7. These three welded assemblies will be used with the elevators to jig the phenolic bearings.

The purpose of the following description is to allow you to fit the elevator in a way so as to prevent binding:

1. Trim the canard core locally so that CS15 can be positioned at BL10.3
2. Find CS19
3. Have one individual hold CS15 against the core while you hold the elevator in position and push CSA7 thru CS15 into CSM1. The inboard elevator should be about 0.5" outboard of CS15 so that the CS8 spacer will fit.
4. Slip CS19 into CSM7 and position CS19 against the rear face of the canard shear web
5. Verify that no binding occurs during elevator movement. If it does, modify CS15 and CS19 till they allow the elevator to rotate freely. Don't be too concerned with the elevator gap near the midspan hinge since

INSTALLING THE MIDSPAN PIV

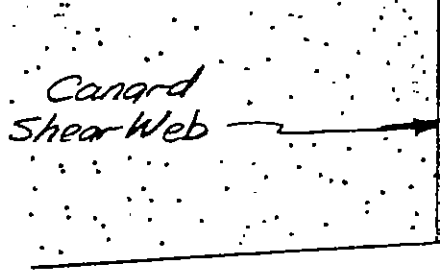
Once the inboard and over the bearings are cure want to permanently instal each pair of CS18's. The which should be min. 0.06 can be set by where CS17 i vertically.

Begin by installing on the inboard and outboa member to leave a gap of board for CS8 spacers lat install CS17 on CSM3 agai of CSM2. Make it the cor wich with a pair of CS18' fit the sandwich in the c the shear web(the cutout wich should have been don When satisfied with the f mount the CS18's and CS17 Use tape and stirring sti tain the elevator gap top at about 0.06". Permit t to cure one day, then lay across the sandwich top a smoothly join them to the Some sanding of CS18 may to make a smooth transit this procedure with the

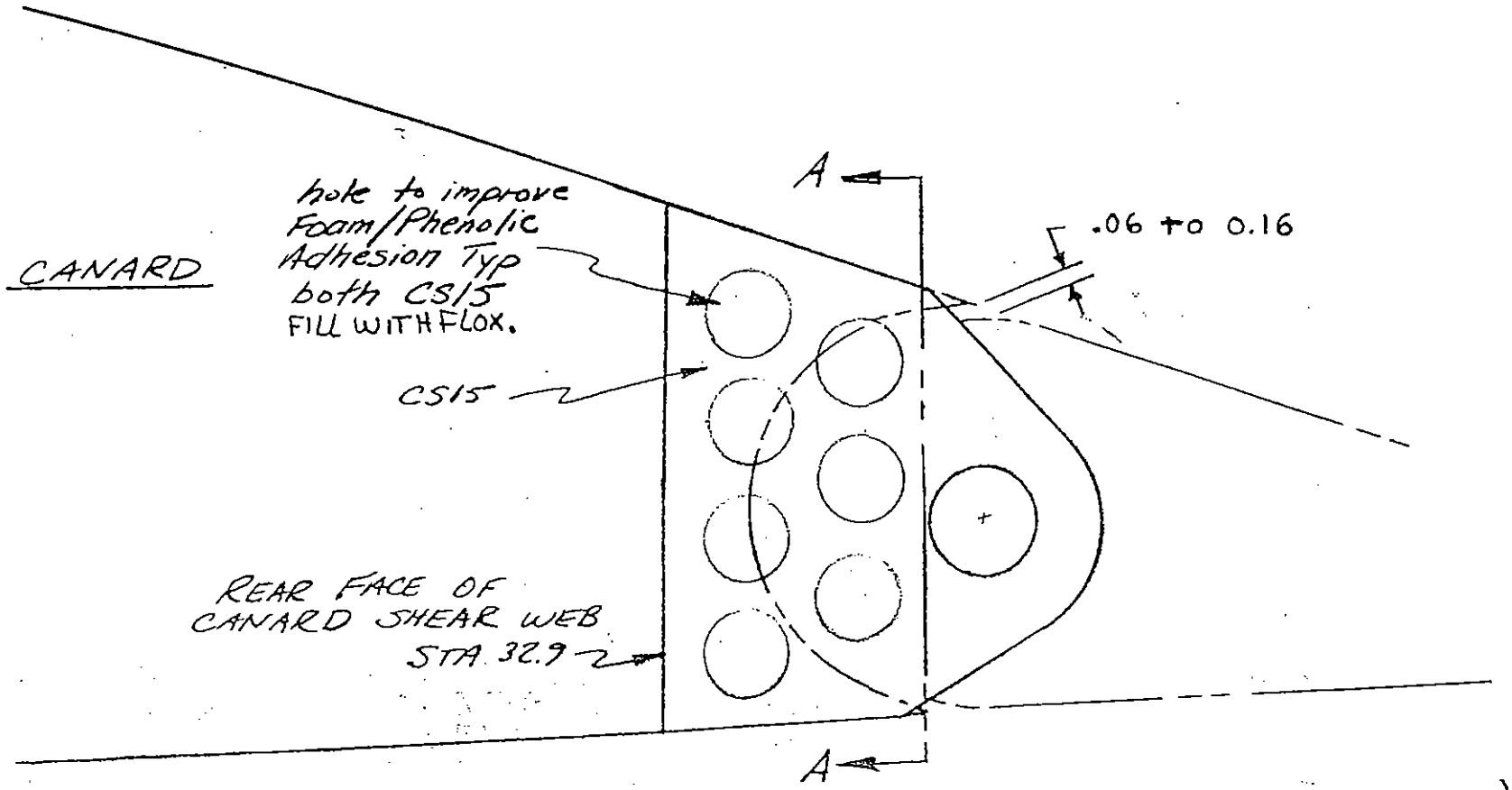
INSTALLING THE CS8 SPACE

The CS8 spacers pre from sliding off the piv installation is the same for the ailerons. Allow 1/16" free play in the s that the elevator must r and CSM3 until it has mo least 0.3" inboard.

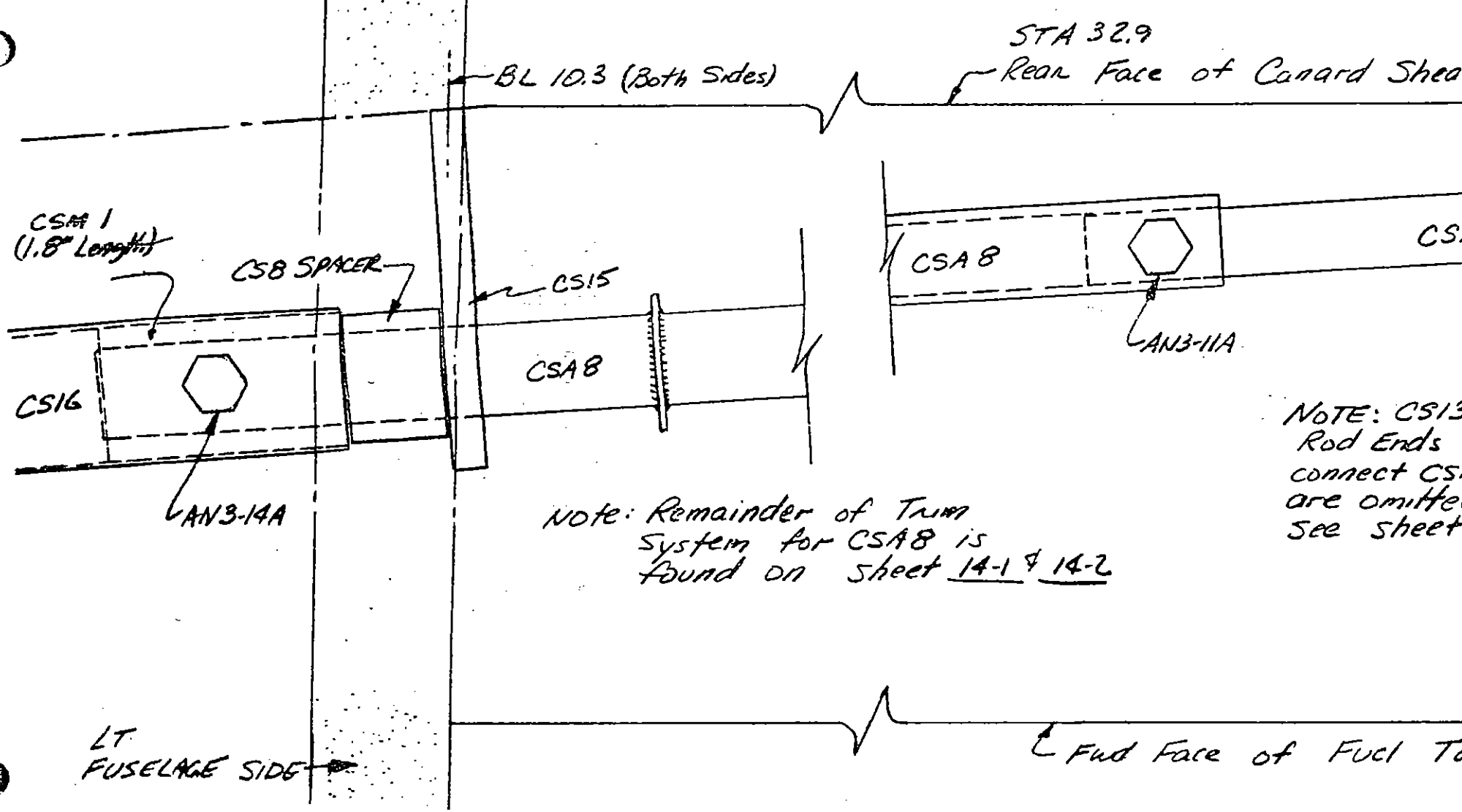
CS15 MOUNTING BACK VIEW



CS19



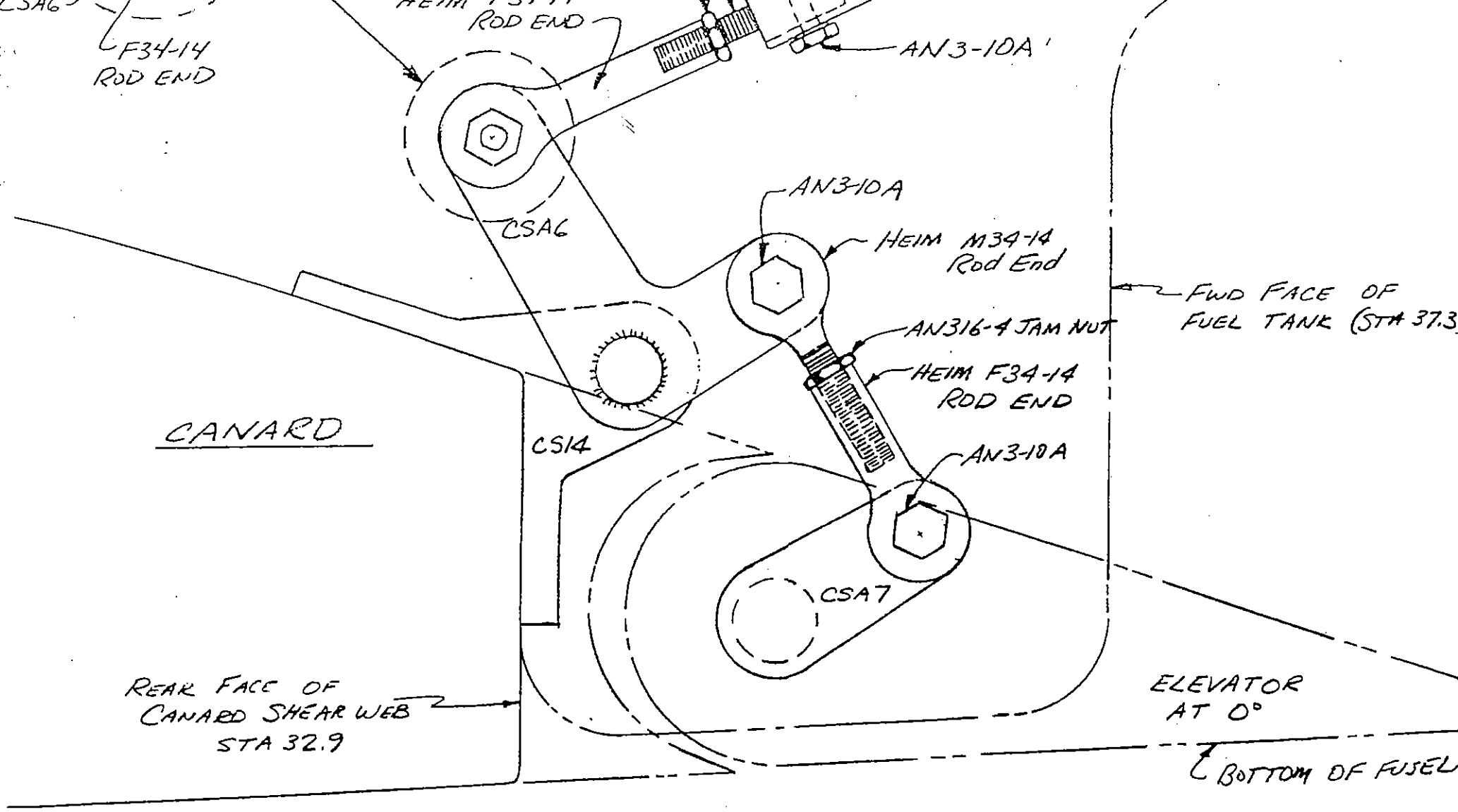
CS15 MOUNTING (SIDEVIEW)
LT WING (RT WING SIMILAR)



NOTE: ALL Holes for AN3 BOLTS - drill pilot Hole #10, Then drill #12.

TOP VIEW LOOKING FORWARD

ELEVATOR CONTROL SYSTEM



SIDE VIEW
CS14, CSA6, CSA7 CONNECTIONS

FOR TOP VIEW, SEE PAGE 10-11

WHEEL PANT CONSTRUCTION

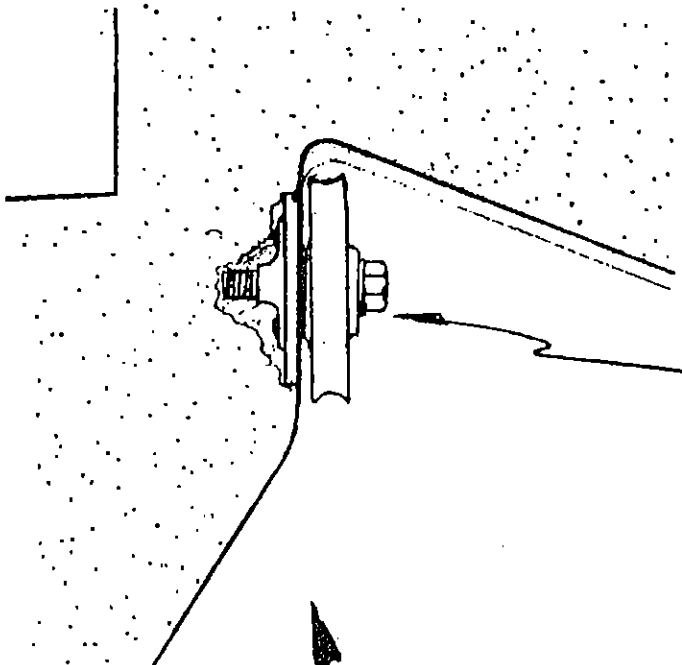
In this section, you will make one left wheel pant and one right wheel pant.

The wheel pants are composite structural shapes that must carry all landing gear loads into the canard. Therefore, they are made much stronger than the ordinary cosmetic type wheel pants found on many homebuilts. There is some carving required, but after having finished the fuselage, you will find that easy.

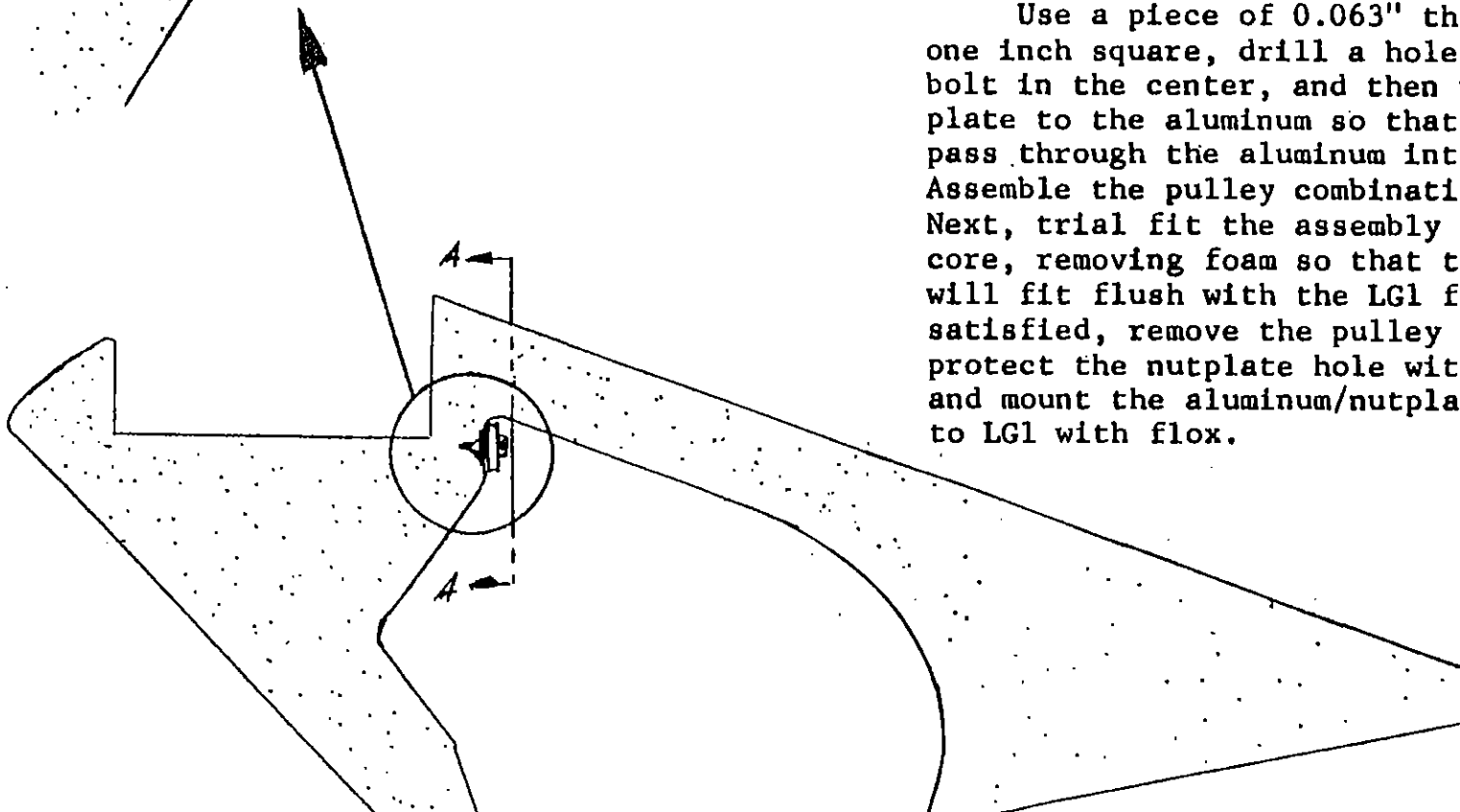
Begin by making two
and LG3. LG2 and LG3 ar
orange foam. The LG1 co
from the blue foam. Mar
and one set Right to avo

The following proce
to make the left wheel p
right wheel pant is just
so that the same basic i
cover it also. You will
it easier to do both of
time.

See Appendix



From Right to Left:
AN3-7A Bolt, AN960-10, AN210-1A P
.063" 1 inch square Aluminum, K1000
with 2 countersunk (from pulley si
solid rivets



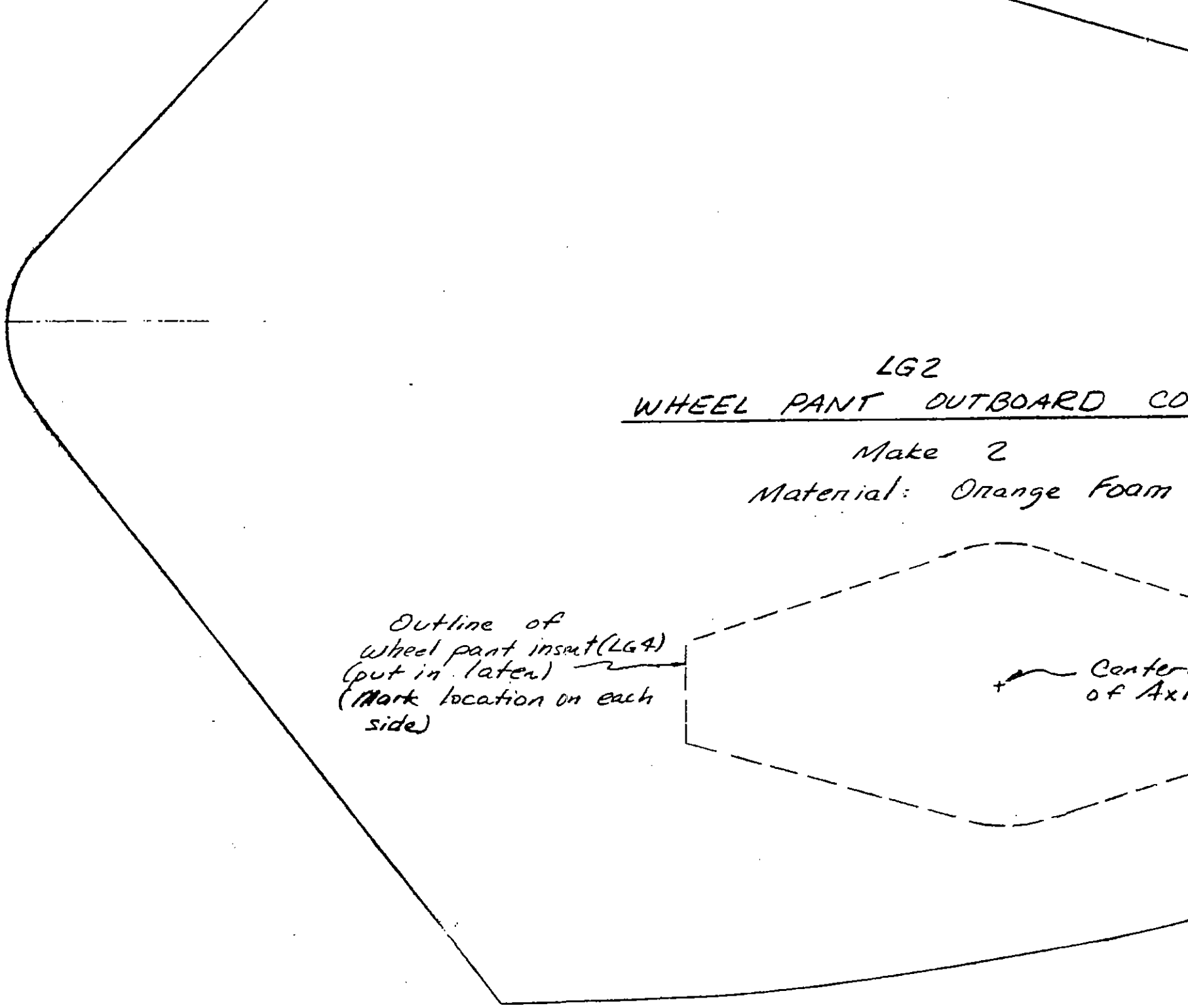
Use a piece of 0.063" th
one inch square, drill a hole
bolt in the center, and then
plate to the aluminum so that
pass through the aluminum int
Assemble the pulley combinati
Next, trial fit the assembly
core, removing foam so that t
will fit flush with the LG1 f
satisfied, remove the pulley
protect the nutplate hole wit
and mount the aluminum/nutpla
to LG1 with flox.

LG2

WHEEL PANT OUTBOARD CO

Make 2

Material: Orange Foam

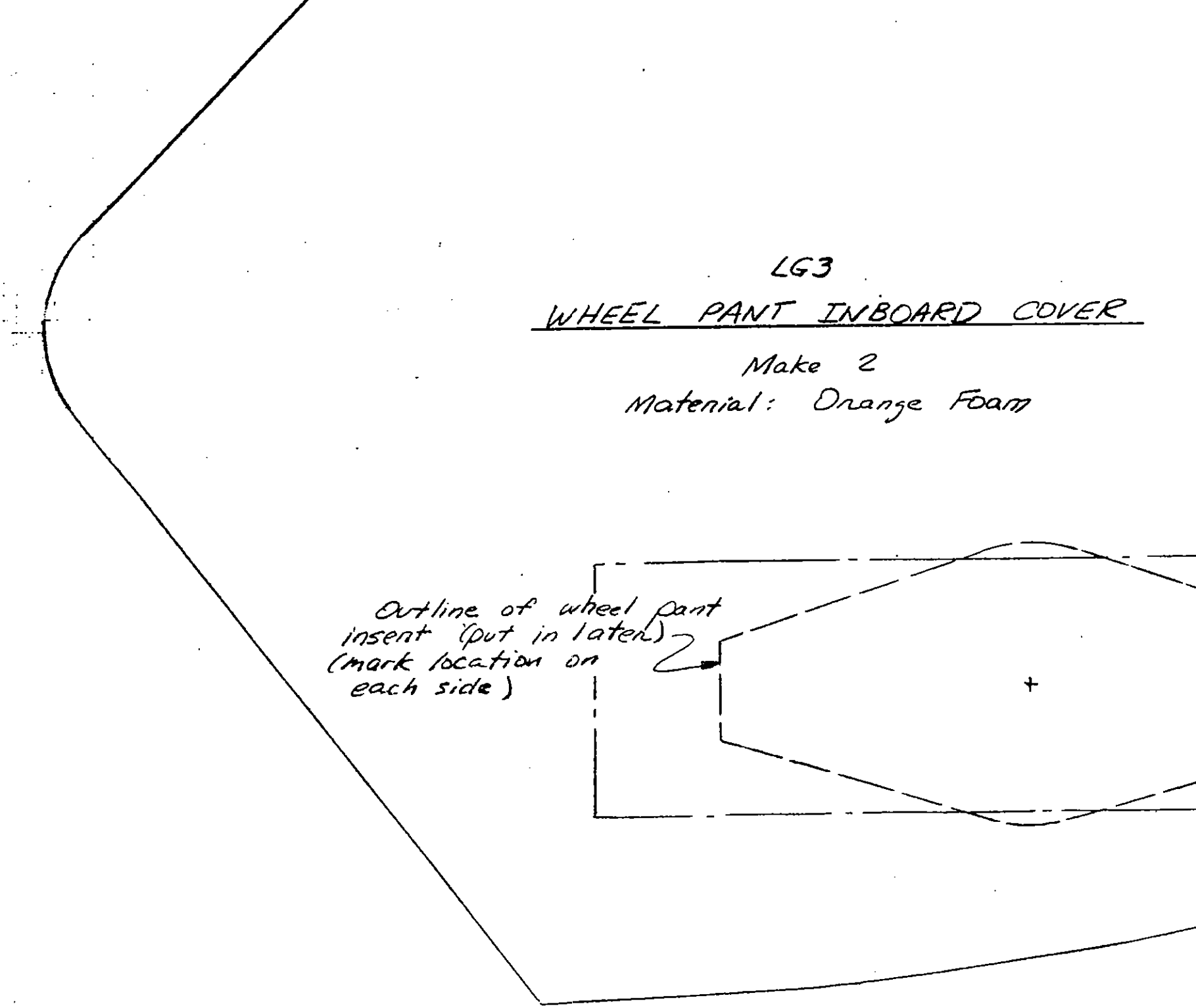


LG3

WHEEL PANT INBOARD COVER

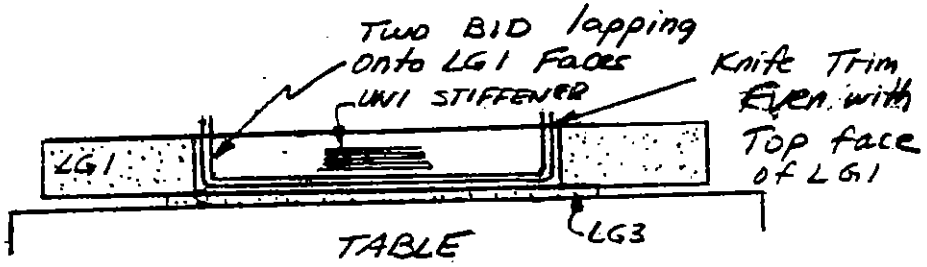
Make 2

Material: Orange Foam



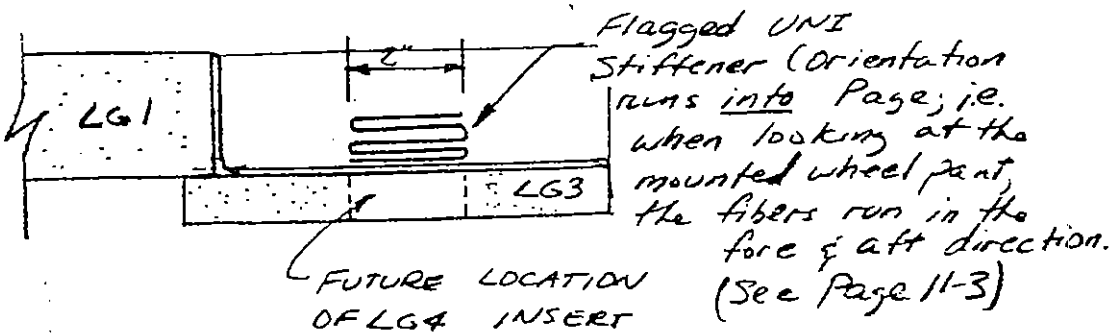
gether until they have cured.

Once that curing is accomplished, lay the combination on the table with LG3 face down, and layup two plies of BID on the inside of LG3, allowing the cloth to lap up on the LG1 faces that surround LG3.



Now, you are ready to flag the UNI stiffener over the location of the LG4 inserts. Begin with a piece of UNI cloth 10" x 7" with the orientation along the 7" edge. Flag the piece 5 times along the 7" edge (i.e. every 2"). Flagging consists of the following procedure:

1. Fold the cloth over on itself
2. Wet out the cloth
3. Lightly run a new razor blade across the bubble
4. Stipple the cloth down
5. Repeat steps 1-4 as many times as needed. (5 times)

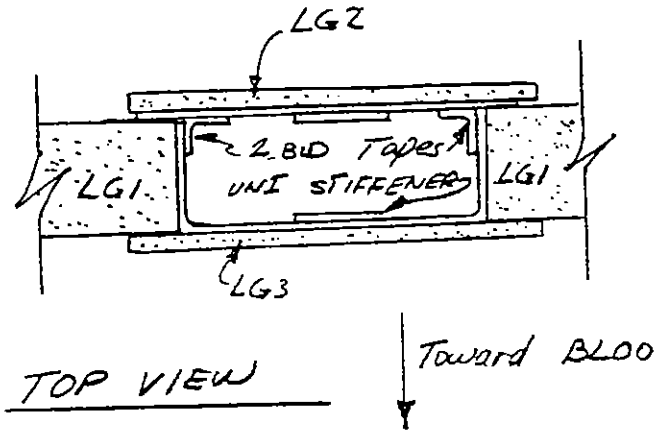


edge view

While the LG2 layup is still tacky, join LG2 to LG1 with micro. Now, layup two BID tapes on the inside to join the LG2 glass layup to the LG1 glass.

At this point, you should have a sandwich, with LG1 as the core, LG2 as the outboard face, and LG3 as the inboard face.

Drill in the pulley hole with a short angle drill. If you don't have one, cut the hole with a small exacto knife.



TOP VIEW

Next, the two LG4 inserts must be placed into postition after the previous layups have cured. Remove orange foam from LG2 and LG3 down to the inside glass layup in the areas on the LG2 and LG3 patterns which denote the locations of the LG4 inserts. Then use micro to permanently insert the LG4 inserts.

After these layups are cured, drill in the pilot holes for the axle with a long 1/4" drill. To do this, with the wheel pant laying flat on the table, drill through both faces, keeping the drill perpindicular to the pant.

Pa

jigged properly, 5 minute blobs are used to attach the pant to the canard and a piece of lumber is attached between the LG4 insert and the canard so that the assembly will not move.

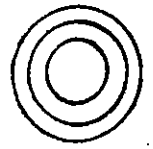
Begin by rigging the wheel pant in the approximate position. Bracing is used to keep it firmly fixed. Sight thru the axle holes,keeping the two holes in the wheel pant concentric(like sighting thru the sights on a gun). Move the wheel pant until the line of sight approximately intersects the other canard tip where the axle holes on that wheel pant will be located. Bondo the lumber in place.

Next, repeat the operation with the other wheel pant except that now you can actually sight on the opposing wheel pant axle holes.

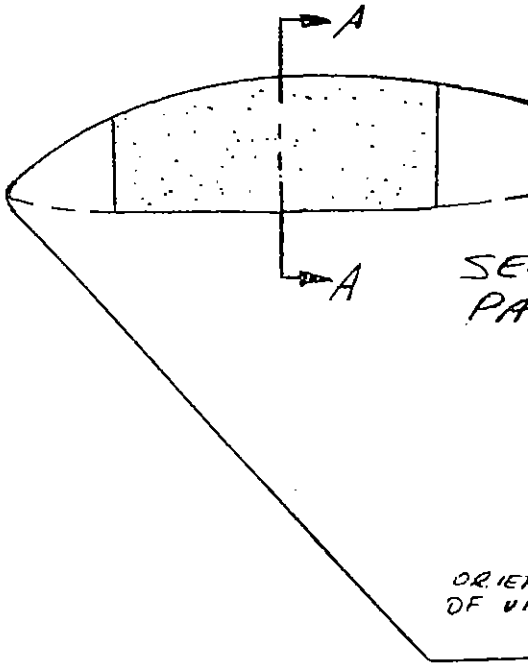
The objective is to be able to sight through each wheel pant and see the other wheel pant axle hole lined up in the "sight". The process is iterative until you can confirm that a bullet fired along the sightline through each wheel pant will go right thru the opposite wheelpant axle holes. At this point you have 0 toe-in and 0 camber, which is what you want. Some minor trimming of the canard tip may be necessary so that the wheelpant fits flush against the canard tips.

Now, turn the canard over and jig it right side up, being careful not to change the alignment of the wheel pants.

CONTINUED ON NEXT SHEET



Sight picture thru the Axle holes

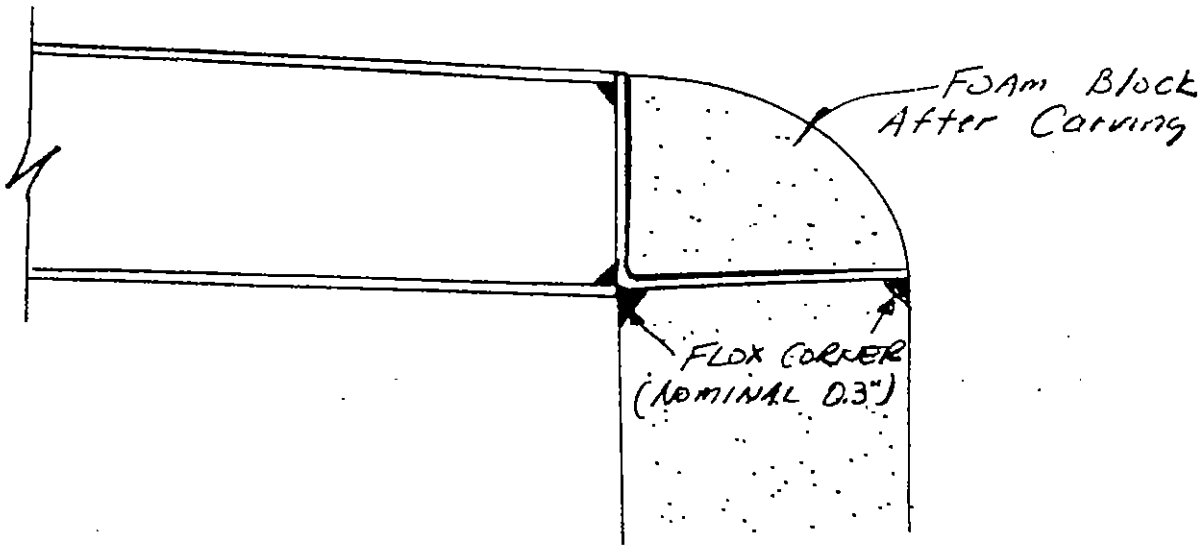


Before starting, look at the canard tips and the pictures provided to visualize what you want the finished product to look like. The templates are provided to help, but use your eyeballs to develop a pleasing shape. Some points to remember are as follows:

1. LG4 should remain .250" thick at the axle hole.
2. A smaller pant will be lighter and cleaner looking, so don't leave excess foam on the pant.

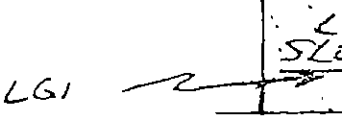
After the wheel pant is carved you are ready to glass the wheel pant. First, put in the flox corners as shown; then layup two BID over the outside face of the canard. Lap up on the canard a minimum of 1.5" and use a minimum of 1" overlap wherever else you overlap the cloth. After this layup has cured, remove the lumber jigging from the inside face of the wheel pant, touchup the inside face contouring if needed, and then glass two BID on the inside face..

Also, the flagged UNI stiffeners will have to be laid up, using the same technique as you did earlier.(See Section B-B)

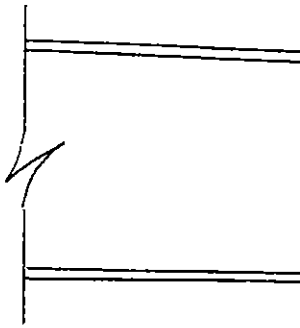


SECTION A-A STEP 2

CARVING & PREPARING FOR GLASSING



SECTION A-A STEP 1



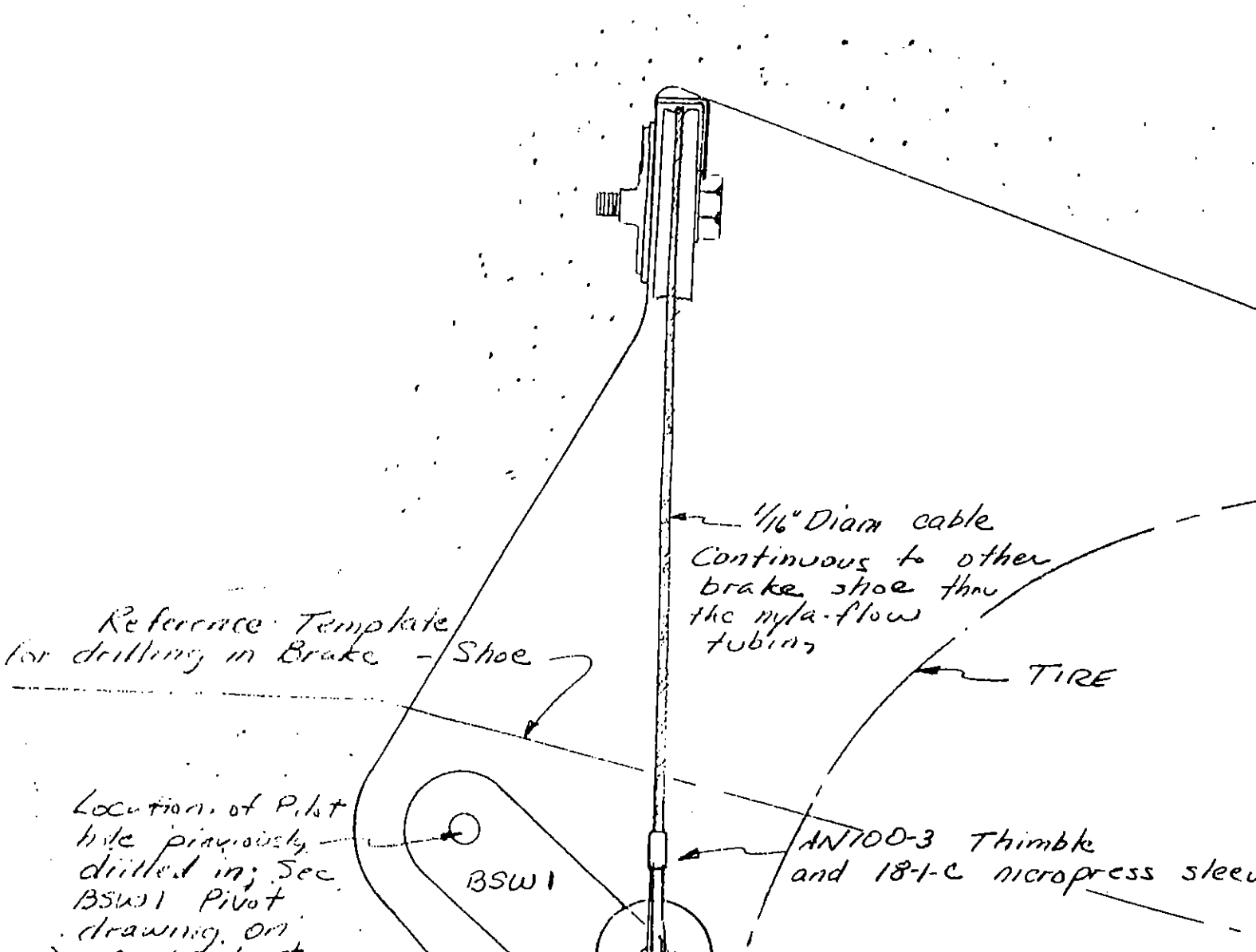
2 BI
INSIDE

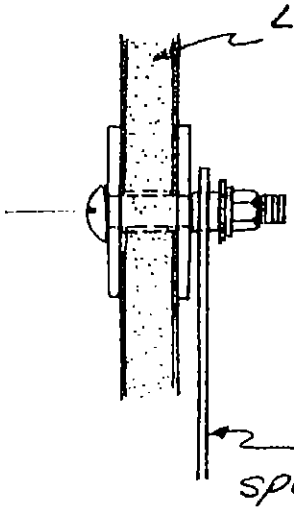
SECTION

Look At th
make sure
exact

BRAKE INSTALLATION

The brake system consists of one mechanical tire scrubber per tire (BSW1), actuated by a 1/16" cable that runs over a pulley (AN210-1A) in the wheel pant, through the 3/16" diameter Nylaflow tubing to the opposite wheel pant where it connects up to another BSW1 in the same fashion. The system is actuated by a pull handle in the cockpit. The brake shoes (BSW1) are spring loaded in the "off" position.



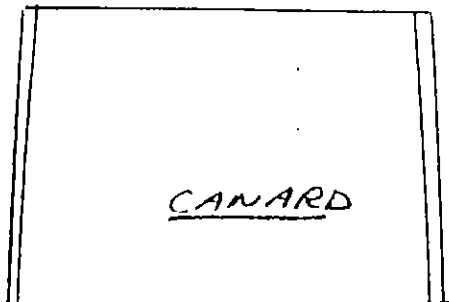


From Left to Right:

AN525-10R16, AN970-3, SPACER (Bonded in
AN970-3, SPACER (which BSW1 rota
AN960-10, AN363-1032 NUT

SPACER MATERIAL: 1/4"OD x

INSTALLATION OF BSW 1 PIVOTS
(Typical four places)



The brake pull handle
of pine, or any other dura
cable is looped through a
end of the handle and then
with two nicropress sleeve
brake cable that runs cont
the left pant to the right
ber to thread the two nic
for the brake handle cable

MOUNTING THE WHEEL

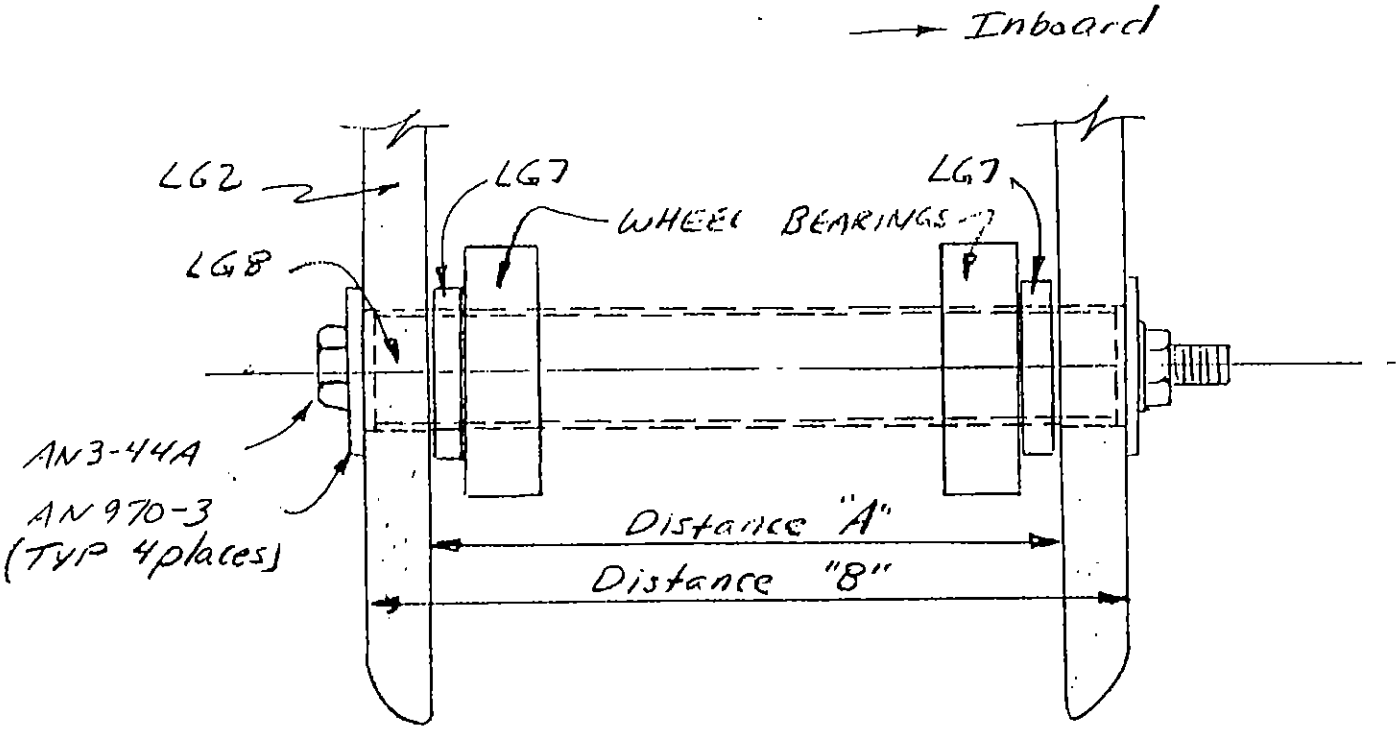
Begin by mounting the tires on the wheels. To do this, take the two wheel halves apart (note that an allen head tool is required), slide the two halves over LG8 (see below) after mounting the tire, and rotate the two halves until the 1/2" diameter tire tube hole (at the wheel halve split line) are lined up. Then, reassemble the halves with the allen head screws.

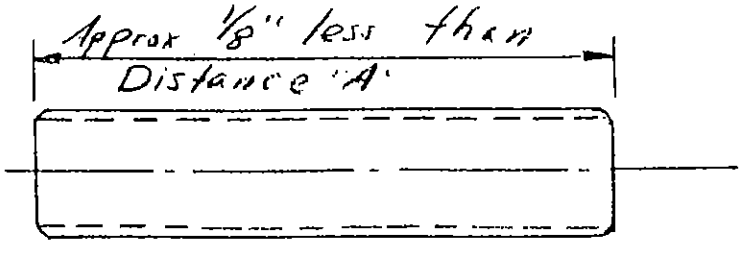
Open up the 1/4" axle pilot holes in the wheel pants to 5/8" diameter.

The following procedure and sketches are for the left wheel, but the right wheel is a mirror image.

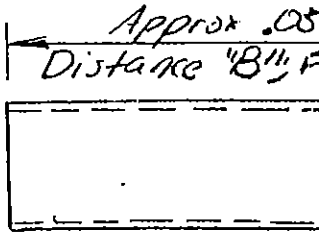
Make LG8 after carefully measuring the appropriate distance off of the wheel pant. The LG7 spacers are made out of 6061T6 Aluminum tubing of 7/8" diameter and 0.125" wall. The LG7-bearing-wheel-bearing-LG7 length should be about 0.02" less than Distance "A".

By inserting LG6 throu
keep them in the proper pos
slide the assembly up into
ition inside the wheel pant
and push LG8 from left to r
pushing LG6 out the other s
LG8 is resting between LG2
the AN970-3 washers on the
the AN3-44A bolt. The bolt
until it clamps up the LG7
the bearings. If LG8 is to
prevent the clamping effect
spacers are too short, they
either. Therefore, you wil
trial and fitting to make t
right. In the future, when
remove the wheel, use the I
reversing the above procedu





LG6 (one required)
Material 6061T6 Aluminum Tube
5/8" O.D. x 0.065" wall

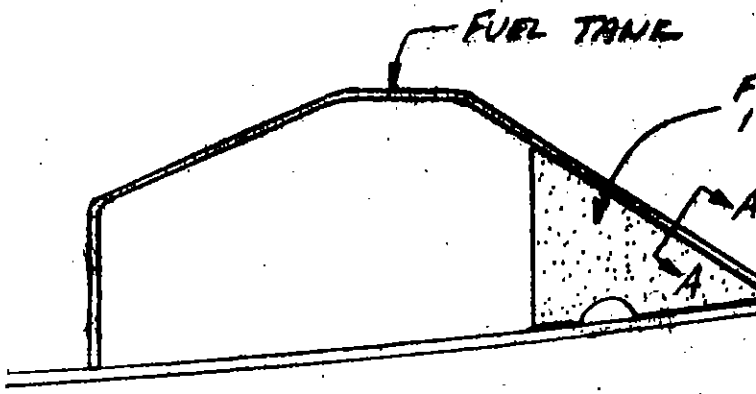


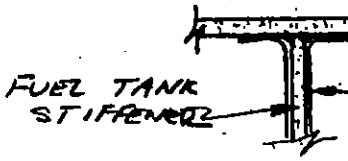
Two
Material 6061

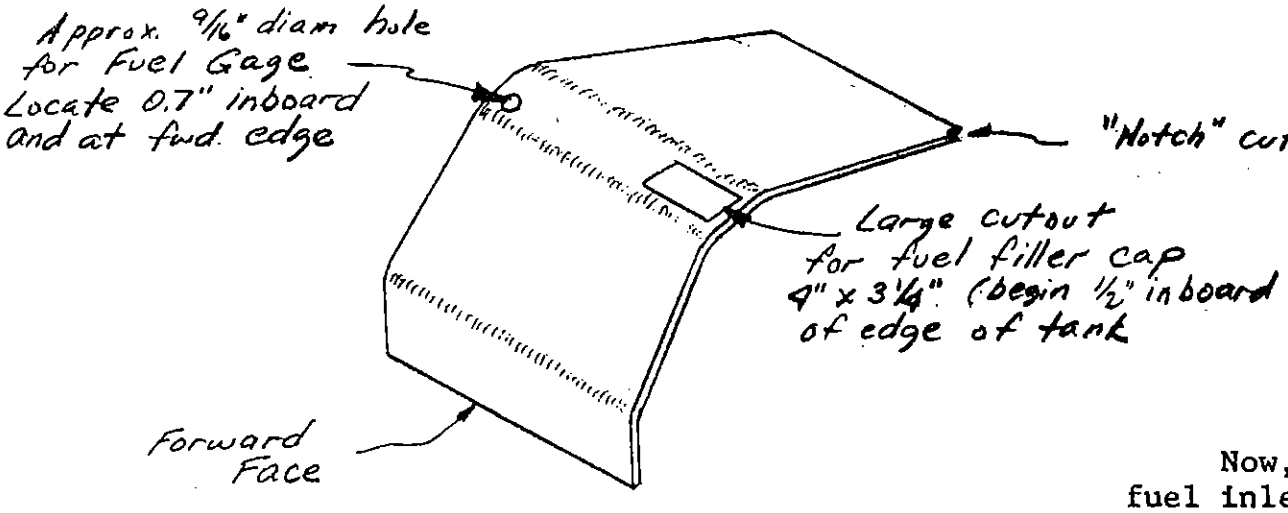
FUEL TANK INSTALLATION

Begin by cutting the openings for the fuel gauge and filler cap assembly, and the notch for the fuel line.

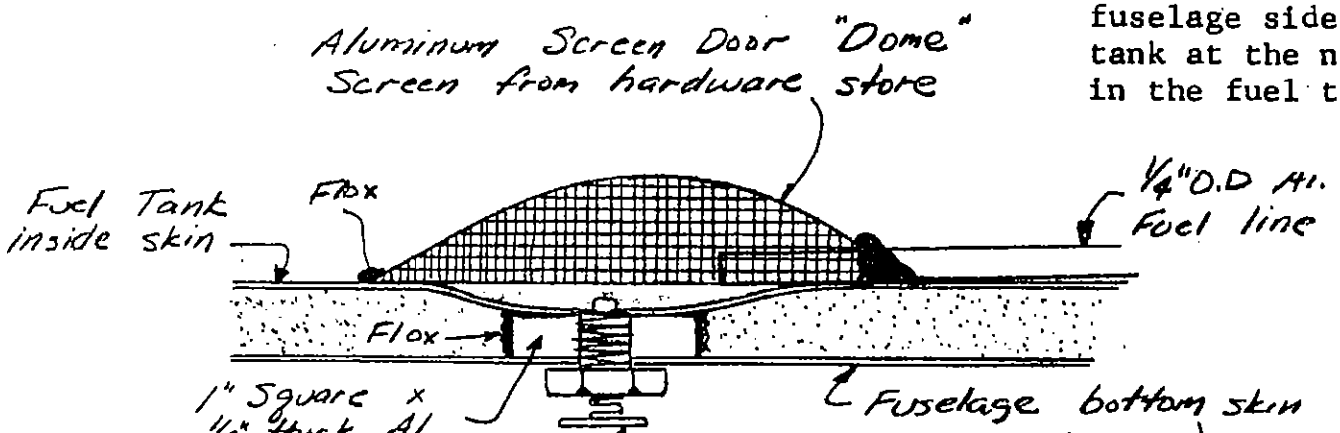
Next, fabricate the fuel tank stiffener from orange foam. The semicircle in it is to allow fuel to drain from one side to the other. Once you have the approximate shape, join it to the fuel tank with one BID on each side.







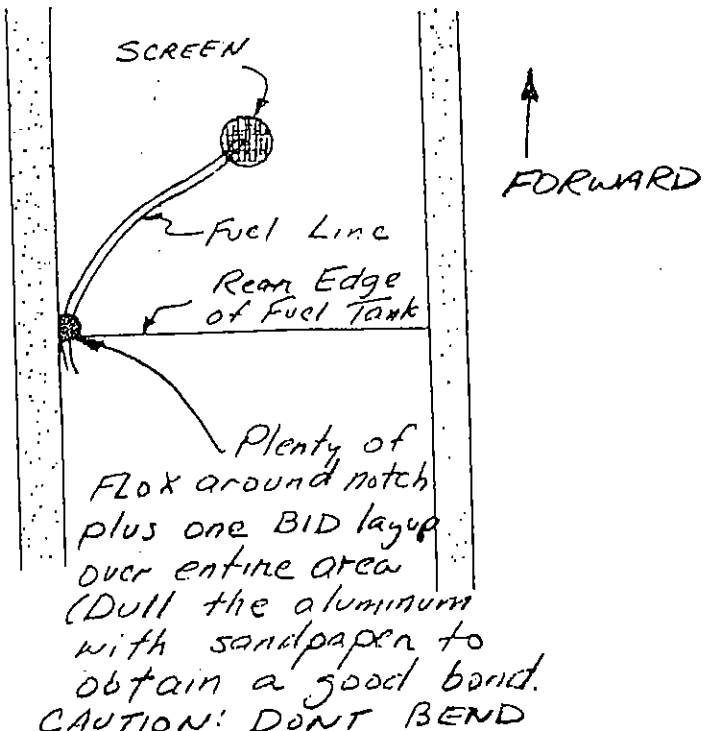
Now, you are ready
fuel inlet line and fuel
fuel drain is threaded i
thick aluminum plate you
to glassing the outside
The screen is used to en
inlet to keep out FOD.
and held in place with F
inlet line is 1/4" diame
ing. Use lots of flox w
meets the screen. The l
the left rear part of th
fuselage side, so that i
tank at the notch you pr
in the fuel tank.

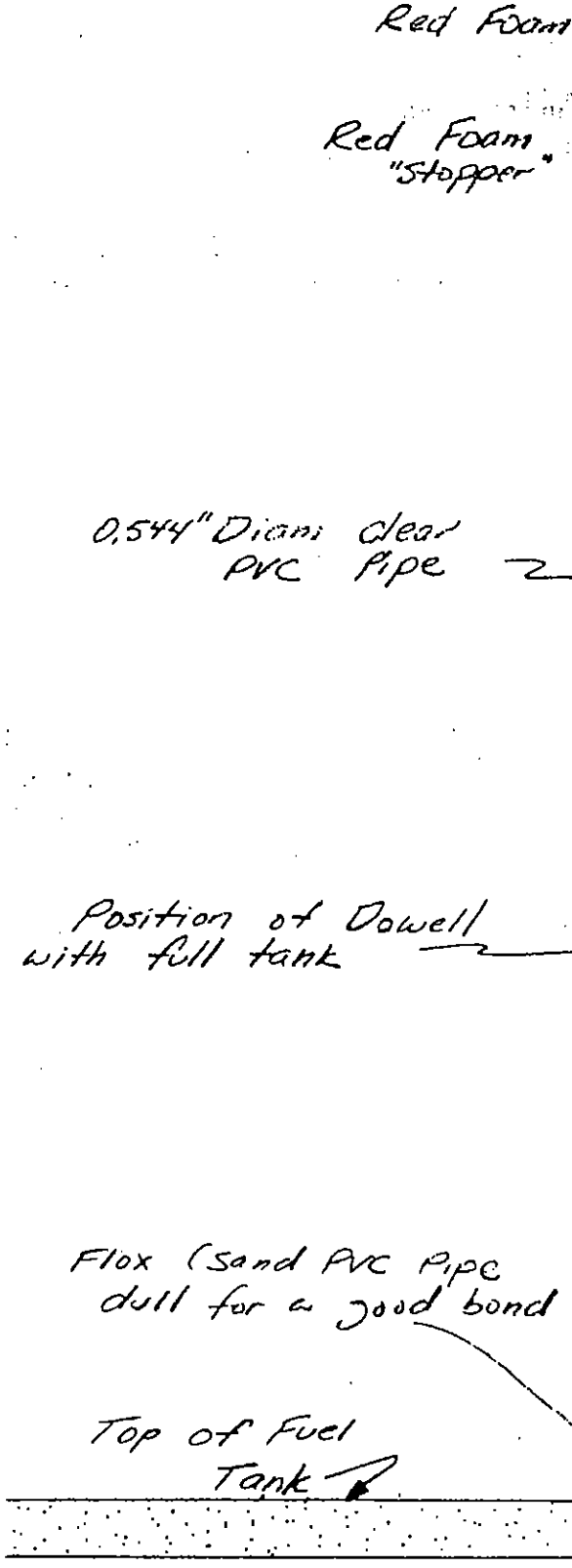


The fuel gauge is made by shaping a piece of green foam to the shape shown, sticking an 8" long 1/4" wood dowell into the foam, and then coating the assembly with leftover epoxy, and hanging it up to drip-dry. The clear PVC pipe should be mounted after the fuel tank has been installed.

To install the fuel tank, use plenty of Flox all around the tank and on the fuselage where the tank joins it, and then carefully lower the tank into position, making sure that you get very good flox squeeze-out everywhere. That is the best way to prevent fuel leaks later on. At the back left corner where the fuel line exits, use a lot of flox and then one BID over the area to seal it well. Layup two BID tapes at every seam, except along the trailing edge of the tank, where you should lay up two BID pieces that overlap onto the seatback bulkhead, to provide some additional protection as you step into the cockpit.

To complete the fuel gauge, install the clear PVC pipe with flox and use a red foam stopper for the top and a red foam spacer for additional rigidity. Before attaching the PVC pipe permanently, verify that the float will not hit the stopper when the fuel tank is full.





FUEL CAP

The fuel cap is made from a top off of a 1 pint storage bottle. This is because the plastic will bond good to the composite fuel tank.

If you don't mind occasionally spilling fuel inside the cockpit, and if your FAA inspector permits, you may elect to mount the cap directly to the tank inside the fuselage. However, we feel that it is worth the extra trouble to make a filler pipe and mount the cap on the fuselage side where it is accessible only from the outside. By the way, if you elect to use the inside fuel cap idea, you will have to plumb a separate fuel tank vent line;otherwise, a small hole in the cap will vent the vapors to the outside air if the cap is mounted on the fuselage side.

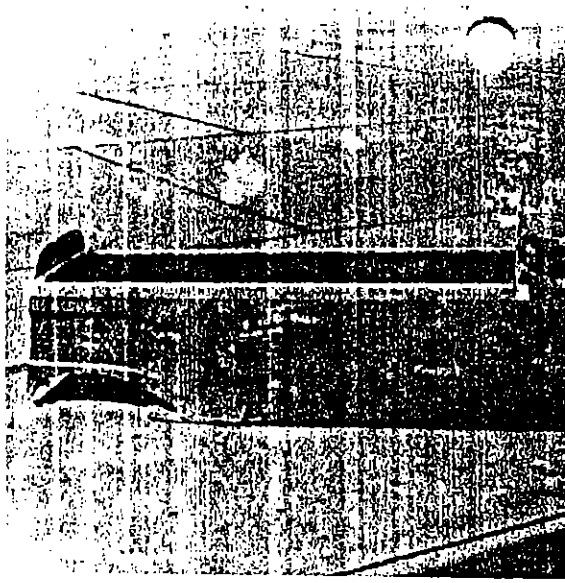
Begin by cutting the storage bottle at the neck(right before it widens out). Next, for a filler neck mold, find a household bottle with a compatible diameter. After placing some Saram Wrap around the bottle, lay up 3 plies of BID around the bottle and allow to cure. Then trim it(after removing the bottle, of course).

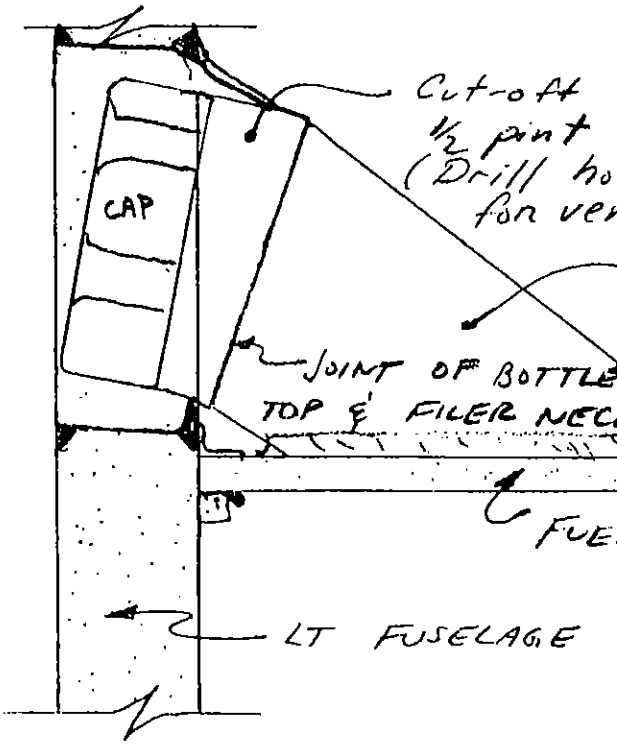
The pictures included in this section show you what the finished product looks like. Basically, you must cut a hole in the fuselage side, and angle the filler neck and cap so that it will stay as low as possible to avoid taking up space occupied by the side console and left hand instrument stack. The fuel cap is mounted on the left fuselage side.

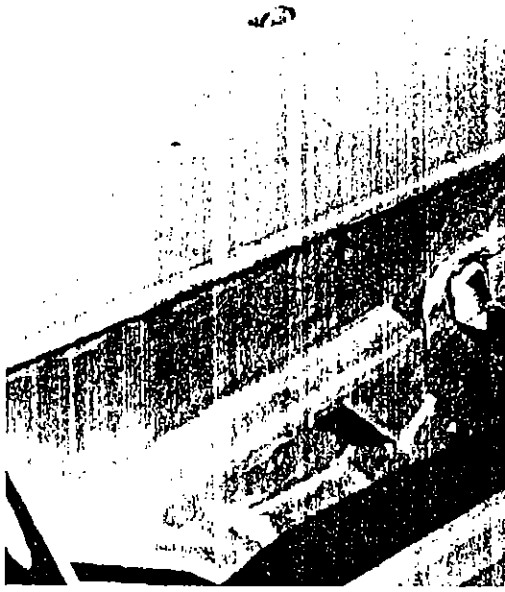
The hole through the fuselage side is protected by using a micro corner inside and out, and a BID layup around the hole to protect the bare foam.

Later on, you may wish to fabricate a light metal cover for the hole.

Use two plies of BID to join the filler neck to the tank and the cap to the filler neck. Work carefully to avoid leaks which might allow fuel vapors into the cockpit.







FUEL SYSTEM PLUMBING

MOUNTING THE MAIN WING

The main wing is permanently attached to the fuselage with 2" BID tapes on both the inside and outside of the fuselage, and 2" UNI tapes on the inside.

Begin by leveling the fuselage, both longitudinally using WL15, and laterally using the longerons.

The procedure for fitting the main wing is one of fitting, then trimming, then refitting until the main wing fits properly.

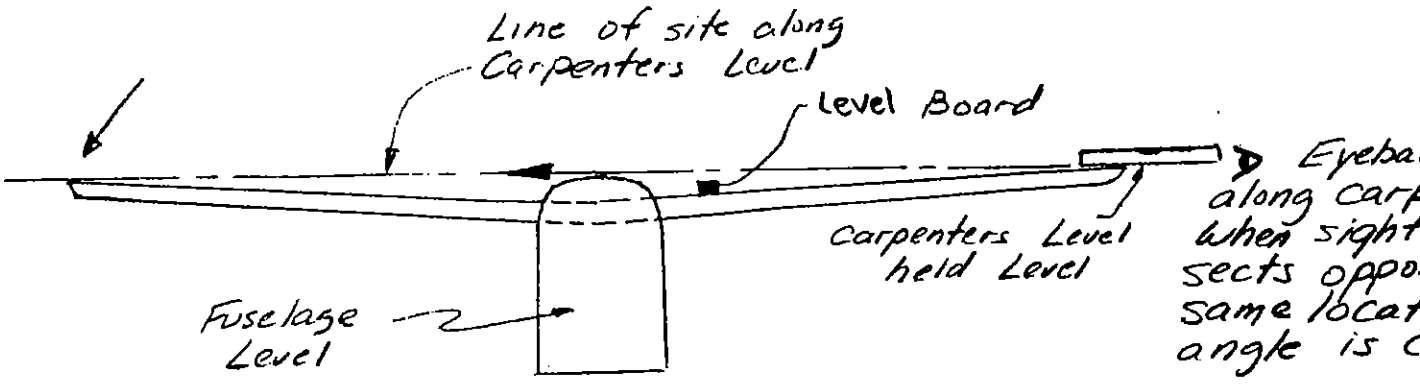
Some important considerations are:

1. When the fuselage sides were made, the BL00 main wing template was used to approximate the cutout. This cutout must be trimmed to make it fit the actual wing.
2. The level board on the main wing must be level when the main wing is in the proper position. Recheck the fuselage leveling also.
3. Avoid having to use lots of flox to fill voids during the mating process by being careful in the trimming.
4. Check to make sure that the main wing centerline is on the fuselage centerline.
5. Check the dihedral of the wing by siting across the span with a level as shown.

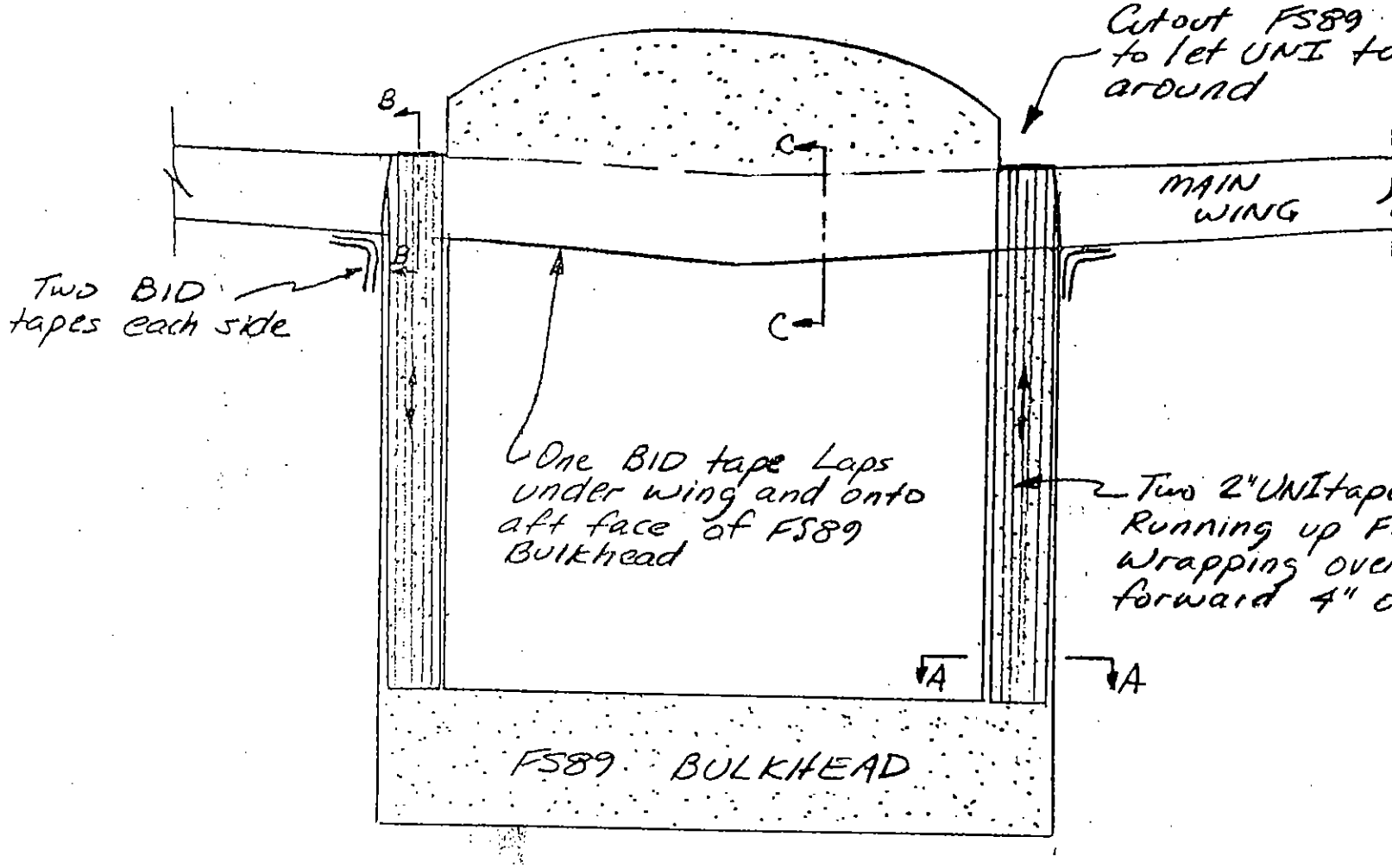
When everything is re
glass wherever the fuselag
meet, and then mix up some
areas on the left and righ
where the mating occurs.
on the front and rear face
where it will meet the FS
and the seatback bulkhead
plenty of flox to fill an
the bulkhead and the wing
main wing onto the fusela
squeeze out and then remo

Now, check the level
and wing again, as well a
angle. When satisfied, l
alone for one day in orde
to cure.

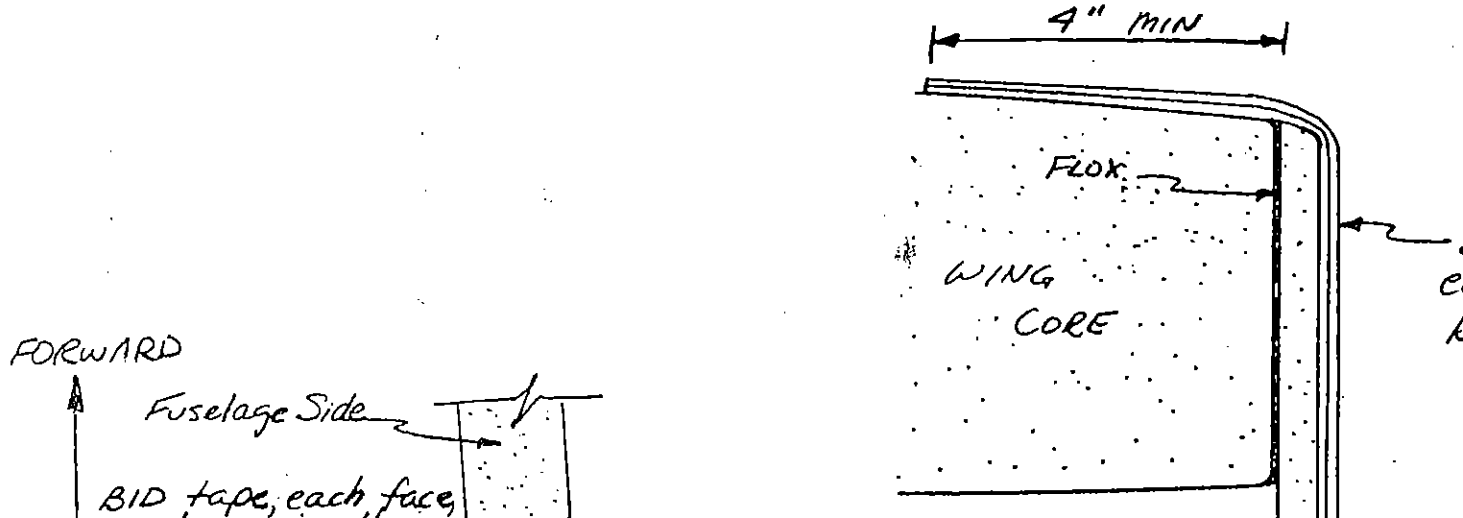
Then, you can begin
BID and UNI tapes that pr
strength. Note that two
everywhere.



SETTING DIHEDRAL ANGLE ON REAR WING



FS89 BULKHEAD
Looking Forward from
Aft Face



MOUNTING THE CANARD TO THE FUSELAGE

The canard is permanently attached to the fuselage with 2" BID tapes on both the inside and the outside of the fuselage.

Begin by leveling the fuselage both longitudinally and laterally. The fuselage should be high enough off the ground that the canard can be slipped under it and up into position without moving the fuselage.

The procedure for fitting the canard to the fuselage is oneof fitting, then trimming, then fitting again until the canard smoothly mates to the fuselage.

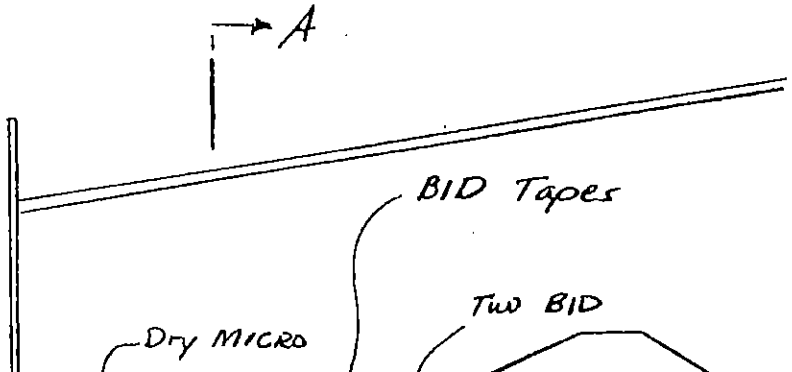
Some important points to remember as you are doing this work are:

1. When the fuselage sides were made, the BL10 canard template was used to approximate the cutout. This cutout will have to be trimmed to fit the real canard.
2. The level board on the canard must be level when the canard is joined to the fuselage. Recheck fuselage level also.
3. Avoid having to use lots of dry micro to fill voids during the final mating process by being careful in the trimming process.
4. Check to make s
   canard centerli
   fuselage center
5. Check the skew
   measuring the d
   axle to STA172(
   spring meets th
   each side. The

When everything is r
micro and apply it libera
canard and to the fuselag
two will mate. Gently lo
into position on top of t
sure that you obtain good
everywhere and then remov

Now, once again chec
the canard and fuselage,
skew of the canard. When
that everything is absolu
lined up, leave the aircr
about a day in order for
cure.

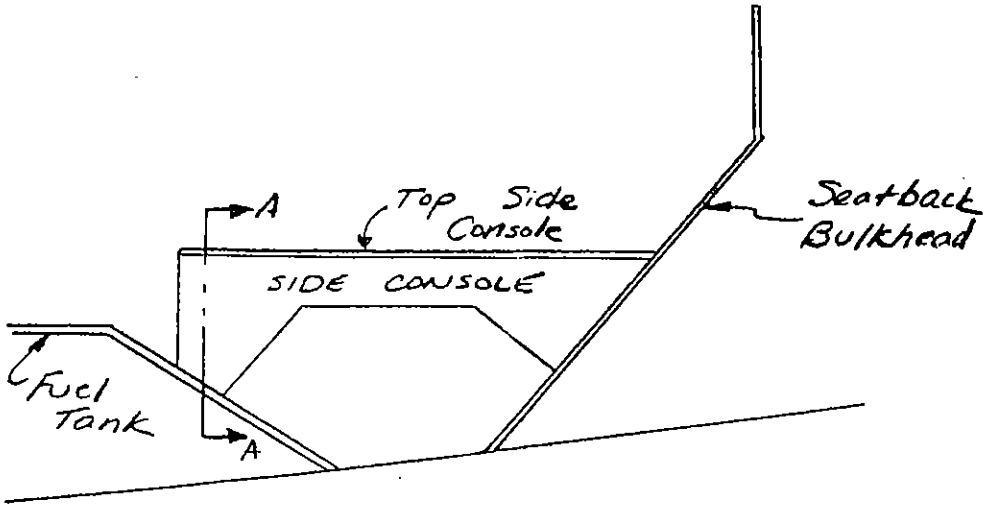
Then, you can begin
BID tapes that provide th
Note that two tapes are u
both inside and out.



SIDE CONSOLE INSTALLATION

The side consoles can now be installed. Use one BID over the bare orange foam side, overlapping onto the fuselage, fuel tank, and seatback bulkhead. Some trimming of the sides may be necessary because of differences in your locations of the fuel tank, etc. Also, the top side console rests <u>on top of</u> the side console.

After installation, therefore, you will have one ply of BID on each face of the consoles.



TRIM SYSTEM

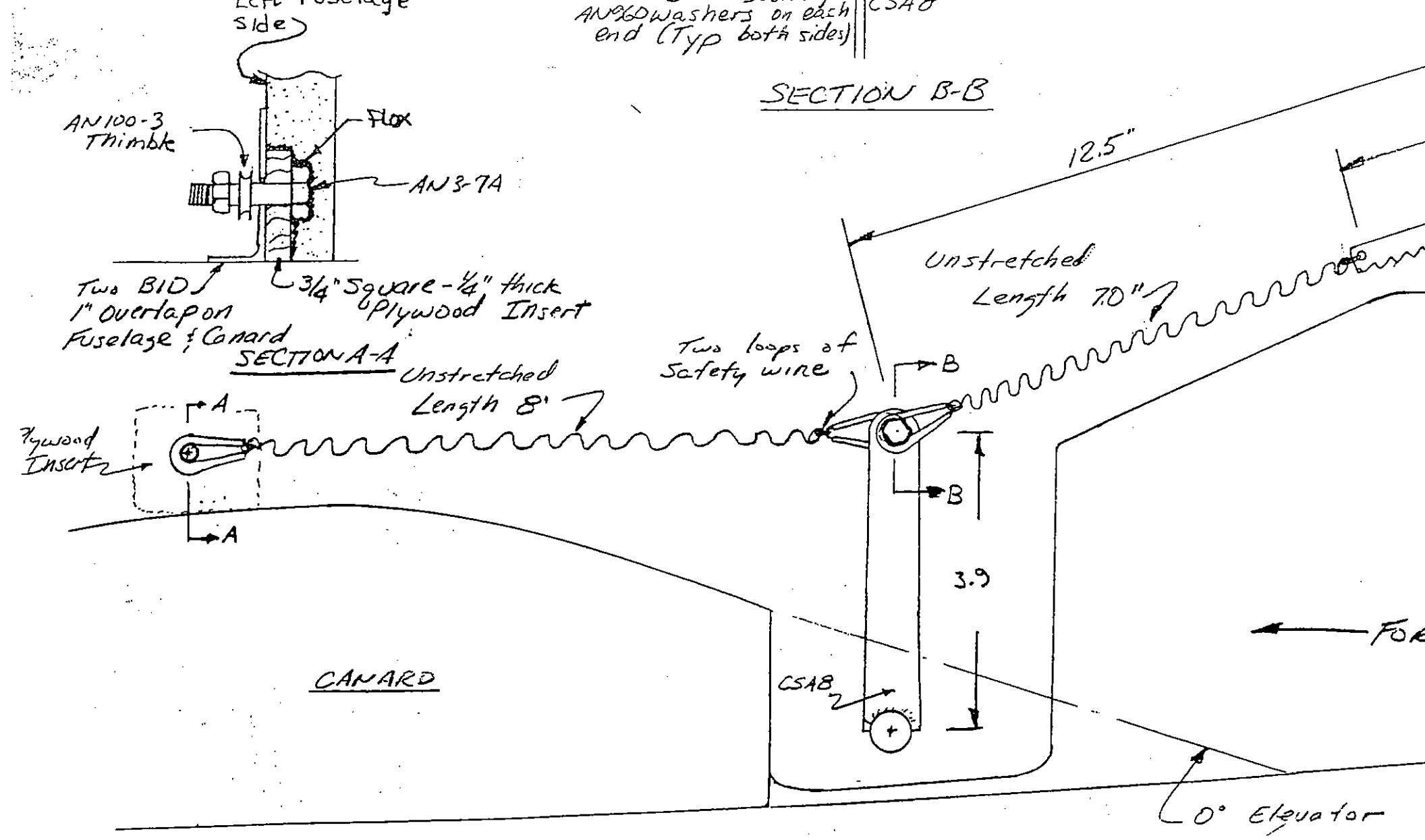
Roll trim and rudder trim are by ground ajustments. The pitch trim can be altered in flight, even though for most flying, you will probably find that you don't retrim very often.

Roll trim is adjusted by changing the length of the rod end combination that joins CSA6 and CSA7. This must be done on the ground, of course.

Rudder trim should be accomplished by placing a small tab on the rudder and bending it to make the rudder trim at the desired angle. Remember that bending the tab right will make the nose go left. The rudder trim should only be

may have to stretch, c
both springs to get th
travel. Without touch
trim system should be
elevator within a plu
range from neutral.
the down elevator con

For the trim arm
blade from the local
to the correct length
notches with a file
at least 1/8" deep.
that you will end up



PITCH TRIM SYSTEM

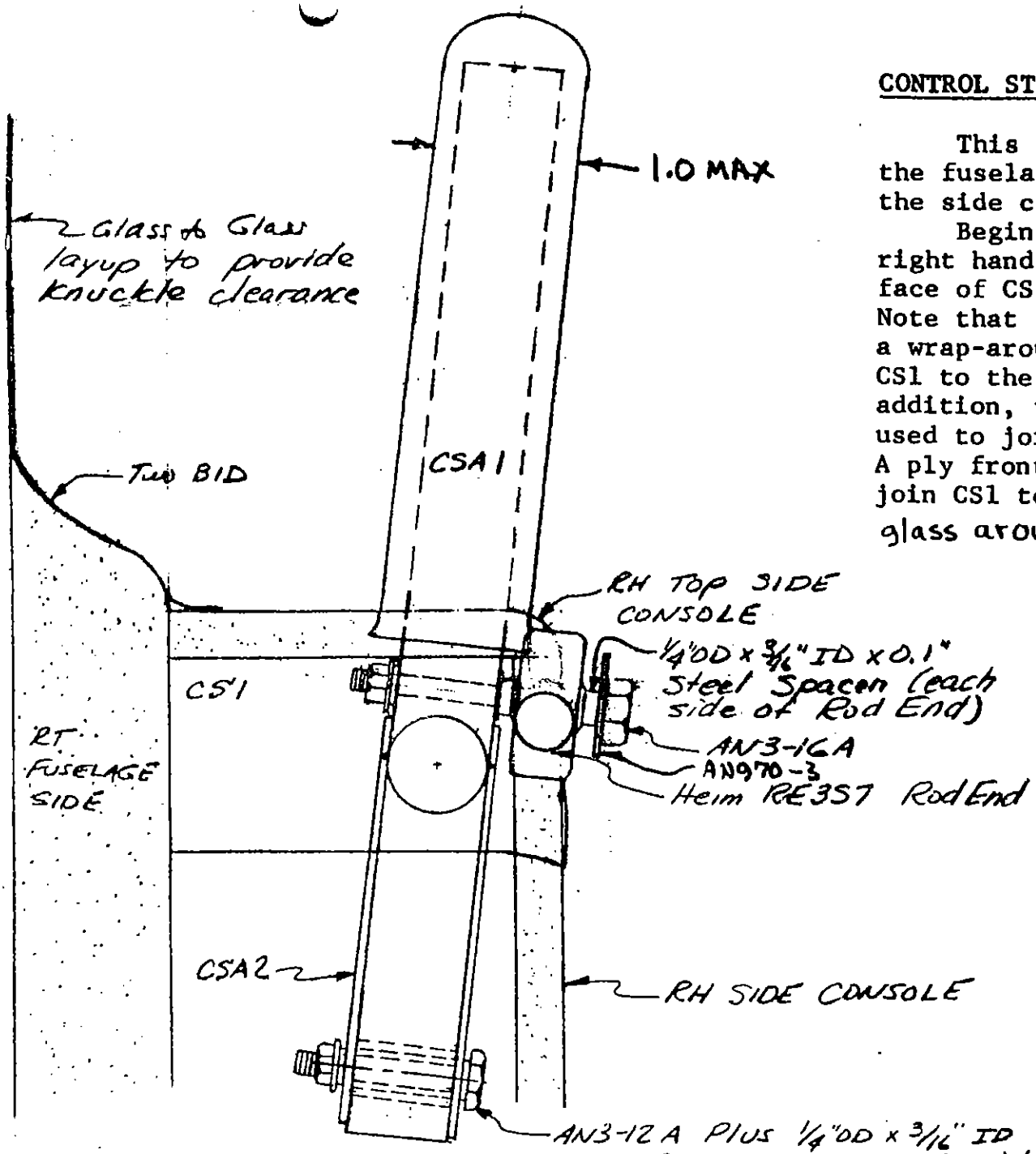
(Installed on left side of aircraft)

CONTROL STICK INSTALL

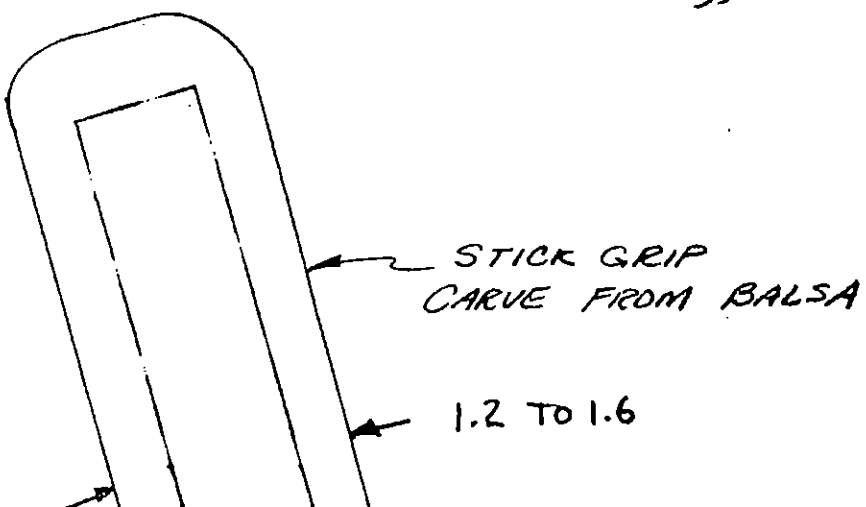
This section is
the fuselage has bee
the side consoles in

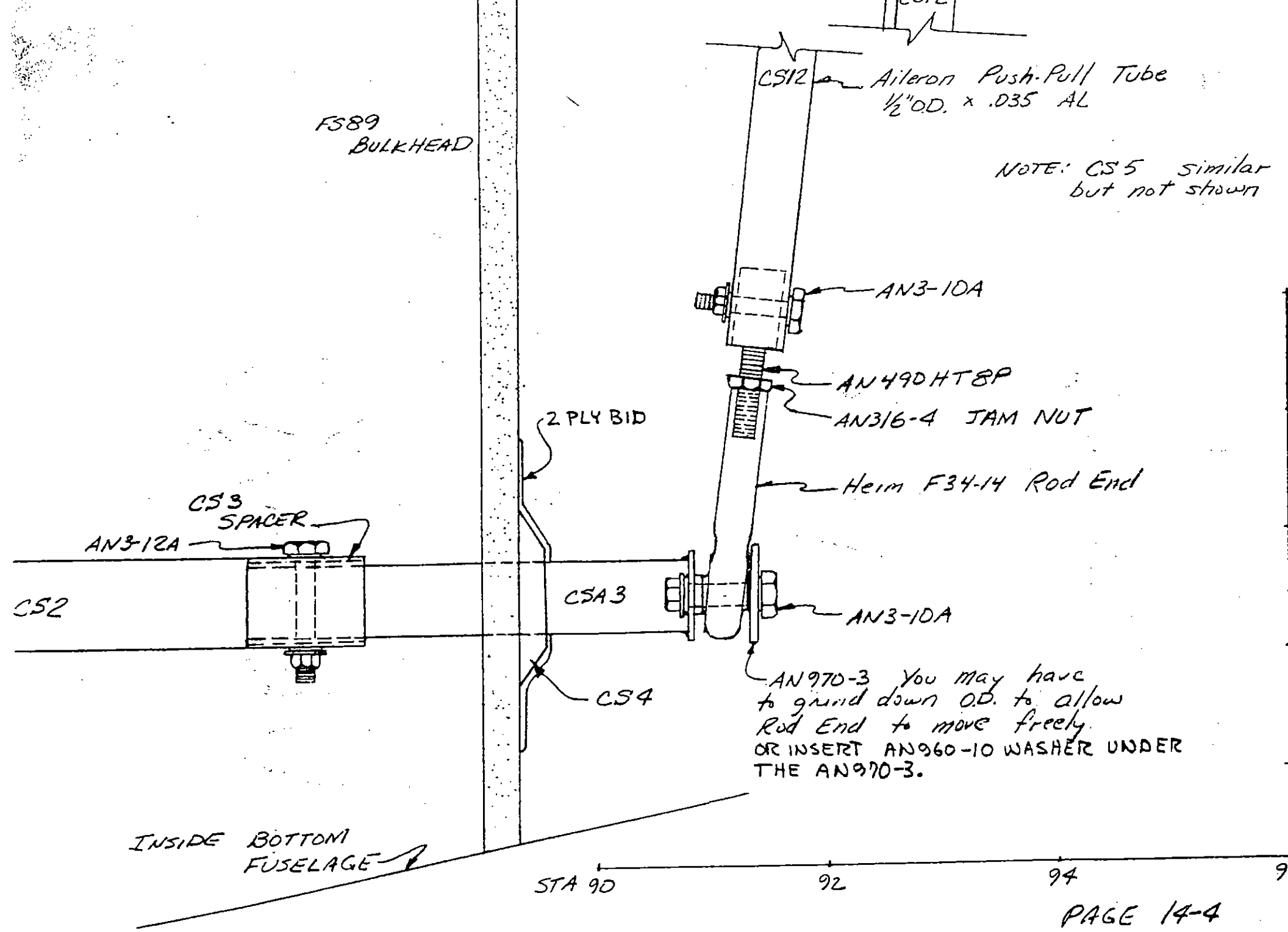
Begin by instal
right hand side cons
face of CS1 should b
Note that two plies
a wrap-around config
CS1 to the RH top si
addition, the same p
used to join CS1 to
A ply front and back
join CS1 to the fuse
glass around HOLE

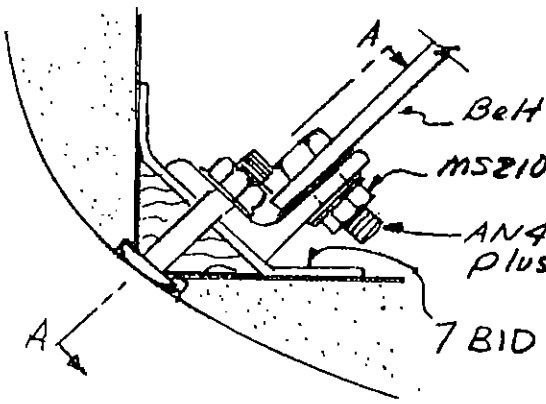
CONTIN



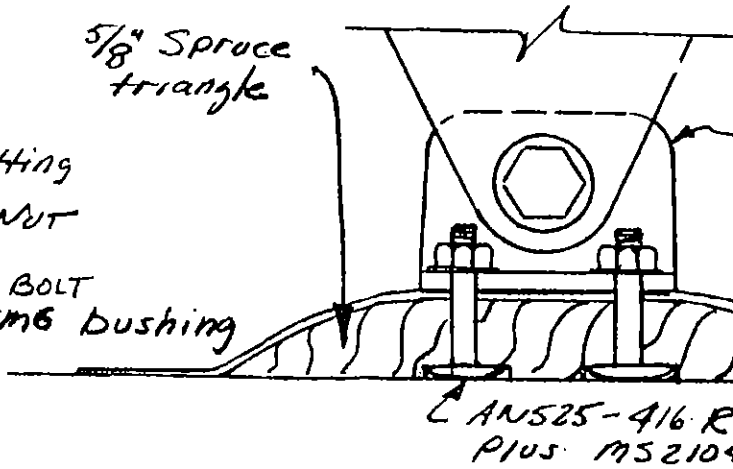
VIEW LOOKING AFT



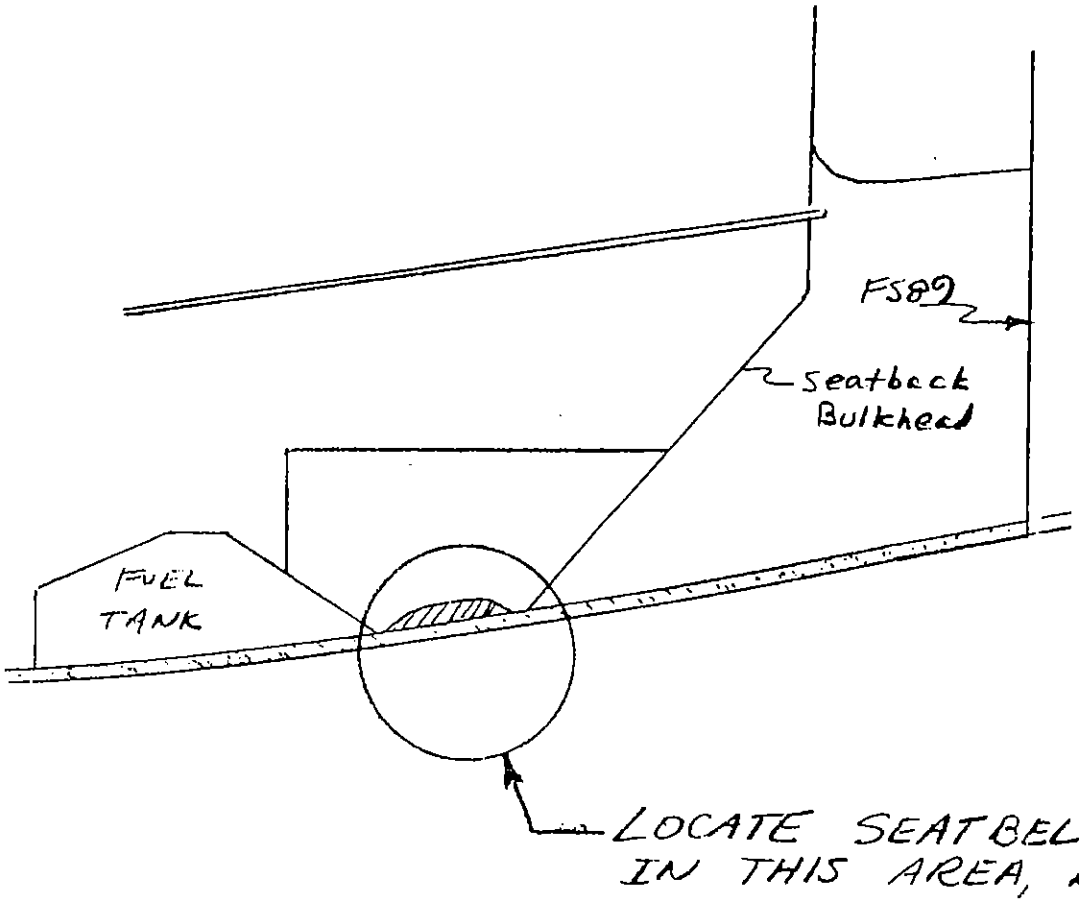

CS12
Aileron Push-Pull Tube
½"O.D. x .035 AL
FS89
BULKHEAD
NOTE: CS5 similar
but not shown
AN3-10A
AN490HT8P
AN316-4 JAM NUT
2 PLY BID
Heim F34-14 Rod End
CS3
SPACER
AN3-12A
CS2
CSA3
AN3-10A
CS4
AN970-3 You may have
to grind down O.D. to allow
Rod End to move freely.
OR INSERT AN960-10 WASHER UNDER
THE AN970-3.
INSIDE BOTTOM
FUSELAGE
STA 90
92
94



FRONT VIEW



SECTION A-A



SEATBELT ATTACHMENT

Begin by cutting 2
of the 5/8" triangular
two pieces go on either
tom fuselage corners be
and the seatback bulkhe
rounded on both ends so
up will flow smoothly a
Mount them in place wit

Next, you will lay
BID cloth over the spru
cloth must lap up on th
one inch everywhere.

While that layup i
aluminum angle pieces c
stock. The hole for th
drilled before mounting
holes must be drilled i
inside of the fuselage
show countersinking the
the outside of the fuse
but it does reduce the

FRONT COCKPIT COVER

The first step toward installing the canopy is to make the front cockpit cover. This cover is heat formed similarly to what you did on the fuel tank and seat-back bulkhead.

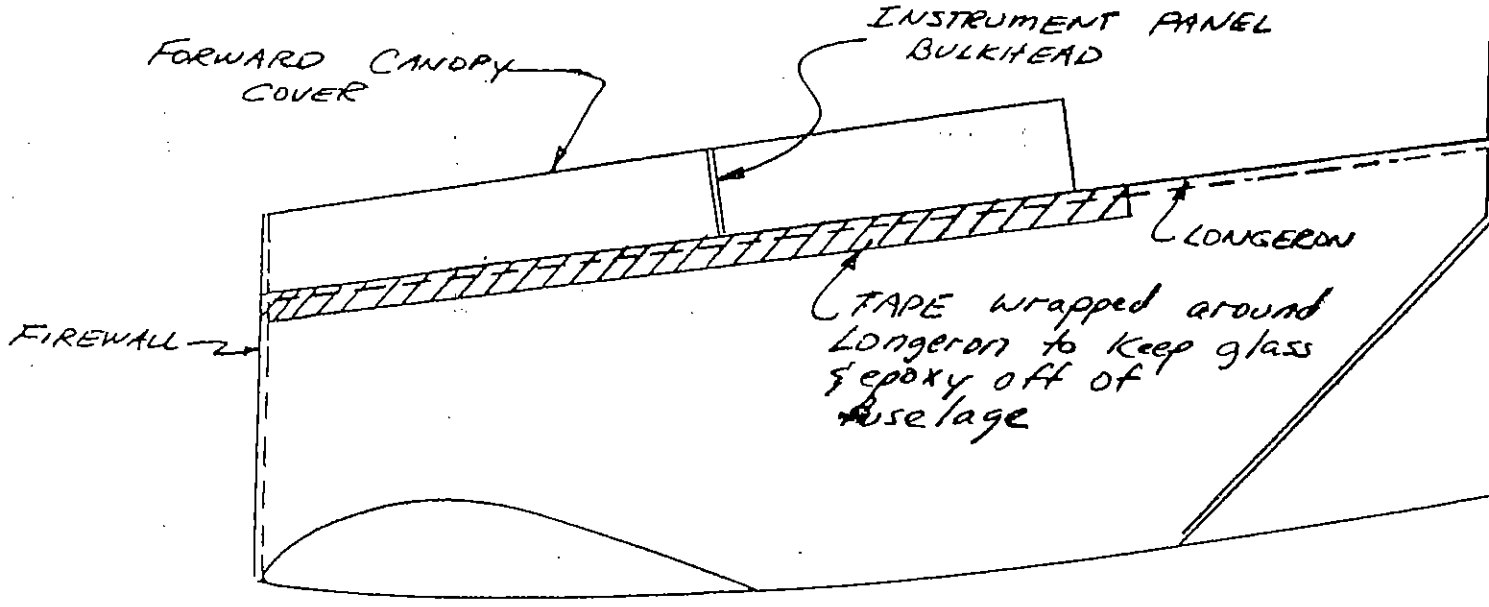
The cover extends from the forward face of the firewall to STA58(initially). Use the firewall and the instrument panel bulkhead to aid in contouring the cover.

Begin by temporarily installing the instrument panel bulkhead at STA37.5 with dabs of Bondo. Next, rough cut a piece of orange foam and begin heat forming it to the required shape. Go slow, and check for dips and bumps often. When you have it formed, Bondo it in place to the fuselage at the longerons.

Next, layup 2 BID at 45 deg. on the top of the cover. Us wrap around the longeron and sides will facillitate keepi off of the fuselage. Knife glass even with the longeron

After the layup has cur the cover from the fuselage one BID on the inside face. layup become very tacky, and it back on the fuselage so t cure in the proper position. cloth is not tacky, the glass off of the foam when it is u Check the layup often.

The instrument panel bu mounted to the front cockpit one BID tape front and back.



MAIN WING-FUSELAGE COVER

Once the main wing has been mounted to the fuselage, and the aileron control system permanently installed, and the canopy mounted, the main wing-fuselage cover can be formed and installed.

The material used is the orange foam. You will probably find it easier to make

The foam is formed using as well as using the contourin existing fuselage, in order to with a shape that is pleasing.

Once the shape is develope one BID on the inside face of Let it become tacky, so that i

THE CANOPY

The canopy is sent to you molded to shape. It is crated to protect it from scratches during shipment. We suggest that you protect your canopy from scratches by spraying or brushing on a "peel coat"* or by taping paper or plastic over it for protection while you are building the frame and while you paint the aircraft. Leave this peel coat in place except where you need to remove it to lay down grey tape or lay up glass. When your canopy is complete and the airplane is painted, this coating will peel off easily.

Trim the canopy plexiglass along the premarked lines provided. A band saw, an abrasive cutoff disc in a hand held grinder or skill saw, or a saber saw, will do the job, but in any case, go slow or you'll ruin your whole day(not to mention your canopy). We've found that the abrasive disc is the easier method. Another excellent tool is the number 406 steel saw blade(about 1" diam. disc) that's available as an accessory for your dremel hand grinder.

Laying down a layer of grey tape on both sides of the cut line will not only help guide you, but also help minimize breakage.

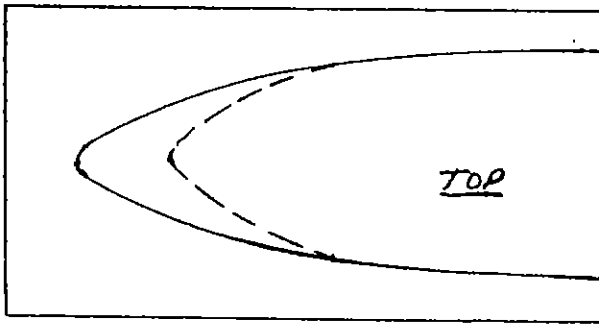
Remove all nicks from the plexiglass edges with a file. Polish the edges with 320 grit sandpaper. Nicks or scratches can start cracks in the plexiglass.

Next, make the aft canopy bulkhead, and locate the left side and right side canopy stiffeners that you made back in the fuselage section.

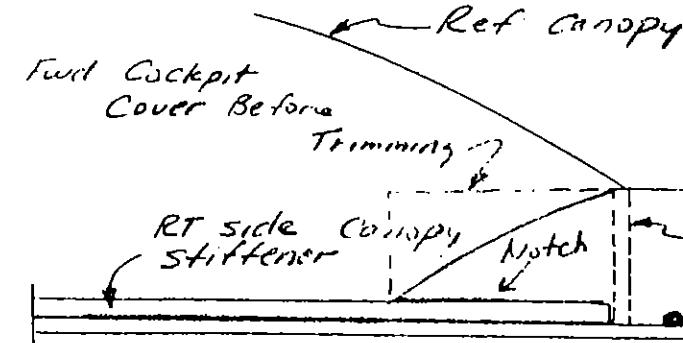
The canopy must be fit to your aircraft. You will find that you have to fit and trim several times before you are satisfied. Read over this entire chapter before preceeding to understand what it is you are trying to accomplish. Basically, the tighter that the canopy fits the fuselage, the more airtight and attractive it will be.

Bondo the forward fuselage cover to the forward fuselage. (Several dabs)

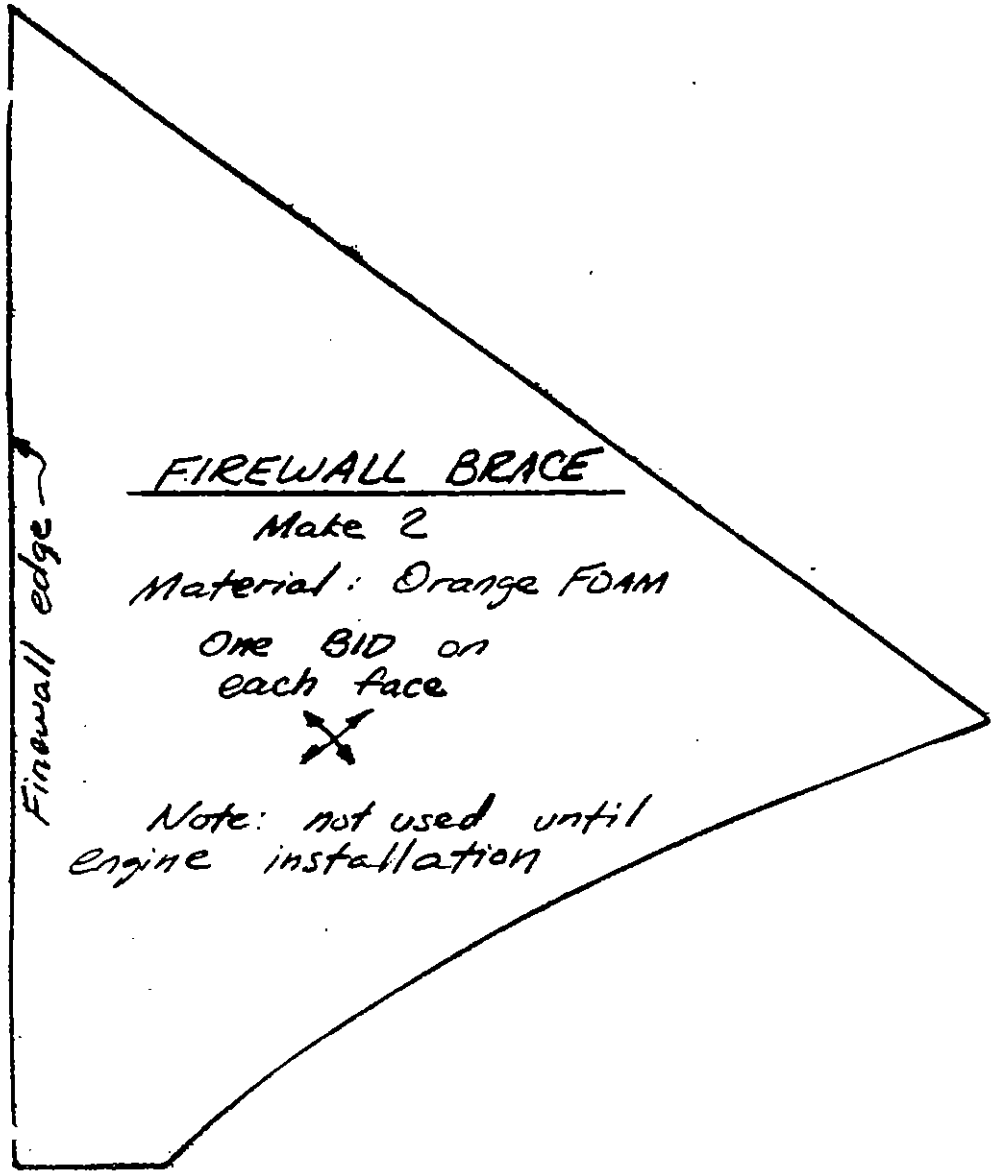
Lay three layers of grey duct tape along each longeron from the seatback bulkhead to the instrument panel bulkhead on the right side, and 4" forward of the aft edge of the forward fuselage cover on the left side.



CANOPY



Note: The forwa
cover is notched f
right side canopy s
continue to the In
(The left side c
stops at the fo
cover



FIREWALL BRACE

Make 2

Material: Orange FOAM

One BID on each face

Note: not used until engine installation

each

Glass to Glass

-Level Lin

FORWARD CANOPY SEAL

Before doing this step, the canopy should be permanently attached to the forward cockpit cover.

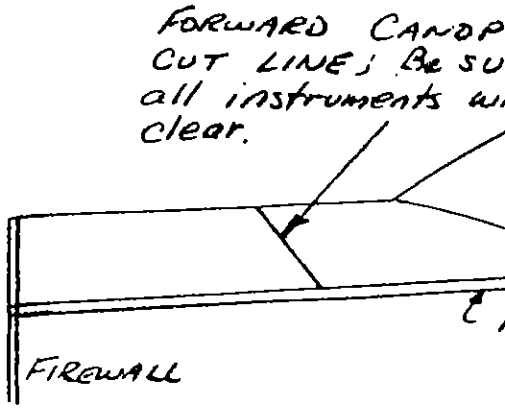
The forward cockpit cover is cut so that the canopy can swing open after the front part of the forward cockpit cover has been glassed to the aircraft. Included in this section are the details for making a seal for this joint to minimize air leaks.

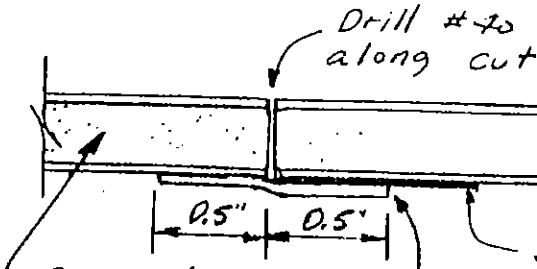
Begin by deciding where to cut the forward cockpit cover. To do this, trial fit the instruments and note how far forward they project, including the pitot static tubing(see Chapter 16). Since the instruments remain with the canopy as it is opened, you must make sure that they will clear the front(fixed) part of the forward cockpit cover. Draw a line on the cover to represent the cut line. It is suggested that you make this line slant aft, as shown, in order to provide a "clamping" effect as the canopy is closed.

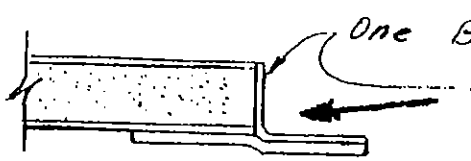
Next, drill several #40 holes along the cut line so that it may be redrawn on the inside face. Then layup grey tape as shown. Finally, layup a three BID lip, as shown, on the inside face of the forward cockpit cover. Let it cure for a day.

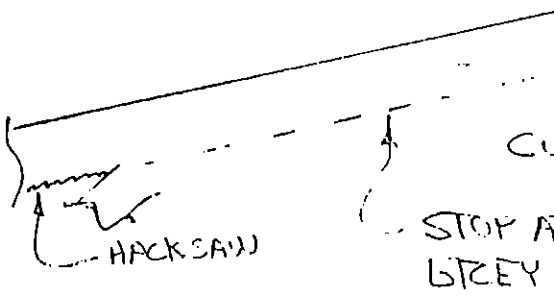
Now you can go ahead and carefully cut the forward cockpit cover along the cut line, being careful not to cut through the lip. Use a hacksaw.

Lay up one BID lapping onto the lip to protect the orange foam. Another layup of one BID protects the bare foam of the edge of the canopy.









AFT CANOPY SEAL

The aft canopy seal prevents air

With this framework now mounted securely in place, you can now begin the final trimming of the canopy. The various sketches in this section should be studied to help. Basically, the sides of the canopy should rest against the grey tape on the longerons, the aft canopy should fit flush with the aft canopy bulkhead, and the front part of the canopy should follow the contour of the front cockpit cover. Don't be discouraged as you trim, cut, and sand several times. The better job you do here, the nicer the finished canopy will look.

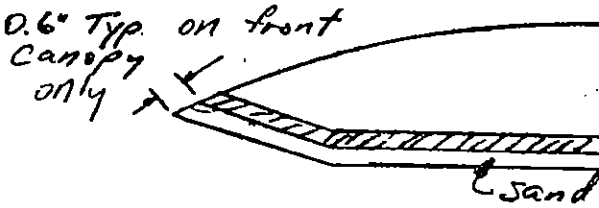
If the main wing cover has already been made, you might set that in place to judge the canopy height at the aft canopy bulkhead; if not, just remember that the cover is about .33" thick.

The aft end of the forward cockpit cover will have to be trimmed so that the edge conincides with the canopy edge. This is so that glass tapes can be wrapped around the corner joint later.

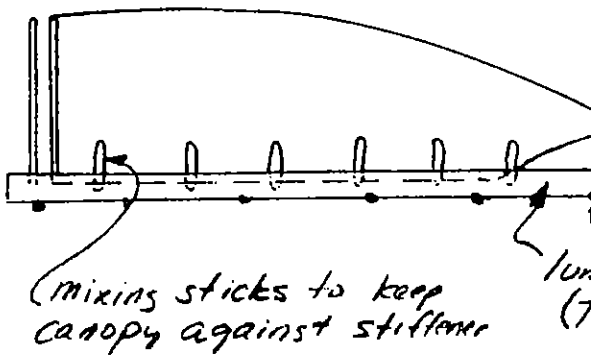
After you have established the final canopy trim line, place a layer of grey tape as shown, inside and out. This grey tape will help control the glass layup that you will be doing on the canopy. You won't have to worry about the layup portion on the grey tape. Next, sand the plexiglass dull inside and out within that zone. Round all the edges of the plexiglass so that the glass will flow smoothly around the corners.

Bondo two wood sticks(nominally 1/2" square) across the canopy stiffeners, as shown. These sticks will prevent the stiffener from bowing in.

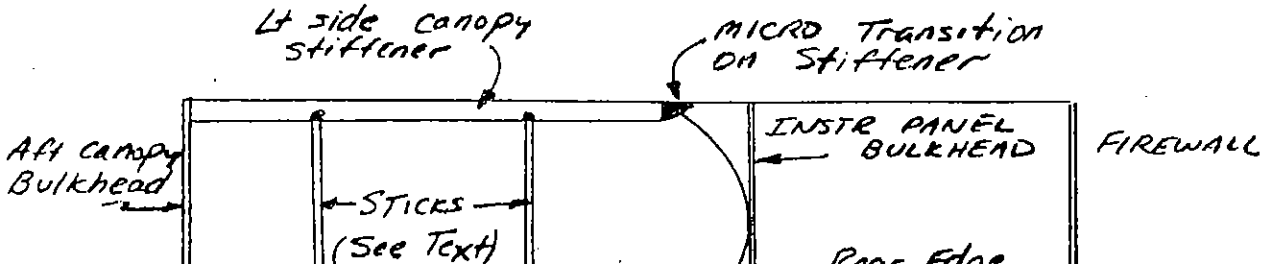
Next, Bondo a board(nominally 1-1/2" by 3/4") to each side such that by wedging mixing sticks in between the board and the canopy, the canopy will be positioned against the stiffeners.



GREY TAPE LAY
(used to control
layup on canopy)



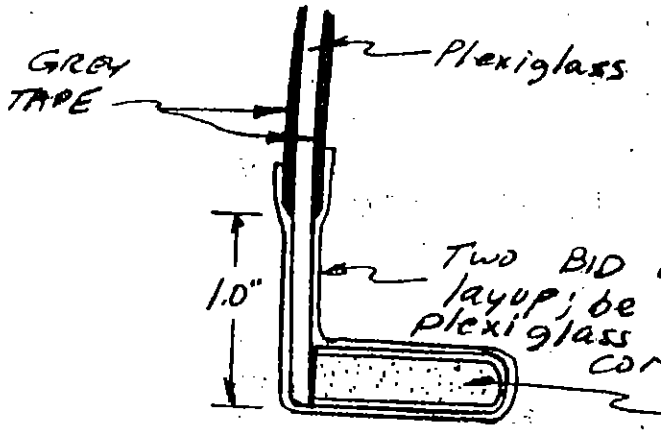
SIDE VIEW

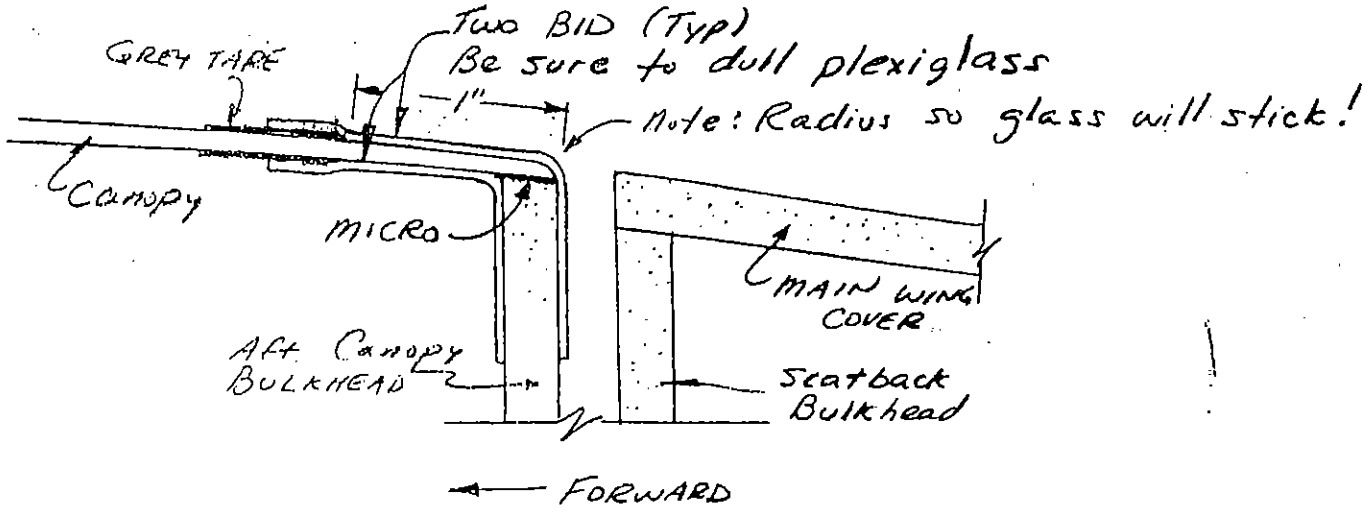


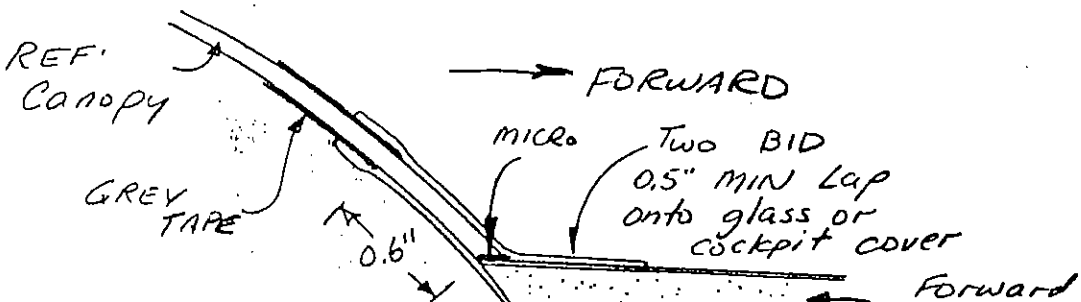
After the layup has cured for one day, remove the lumber, break the bondo joints, and remove the canopy-forward cockpit cover assembly.

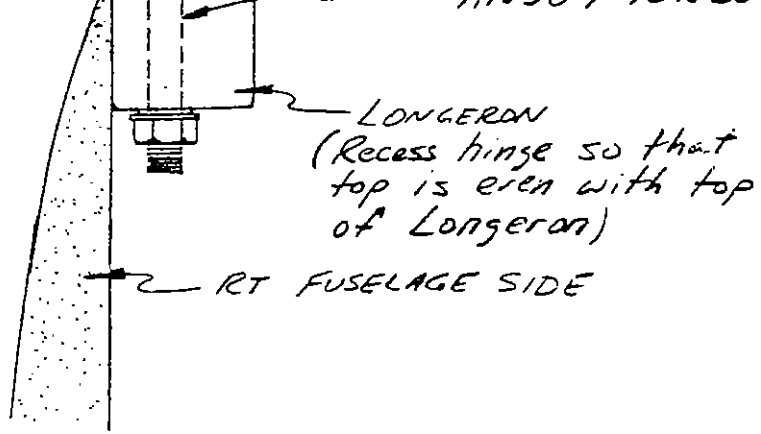
Make sure that all edges of the plexiglass are radiused, and that the plexiglass that will be glassed onto is dulled. As the sketch shows, two BID tapes are wrapped around from the inside plexiglass around the stiffener onto the outside plexiglass. As you can see, the grey tape controls how far up the plexiglass the layup will go. At the aft canopy bulkhead, two BID are wrapped around inside and out. At the forward, curved edge of the canopy, you have already laid up the outside two BID, but radius the inside edge and lay up two BID there also.

In order to make sure that the canopy doesn't warp during curing, place siran wrap on the fuselage longerons and place the canopy-forward cockpit cover in the proper position until cured.

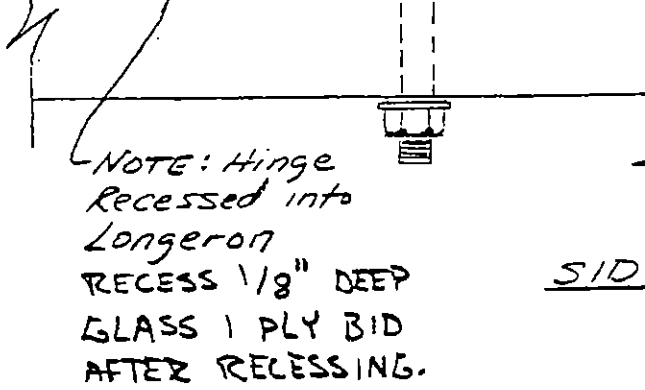








FRONT VIEW LOOKING AFT



SID

CANOPY INSTALLATION (HINGE)

HINGING THE CANOPY

The canopy is hinged on the right hand side with two 6" hinges. The installation drawing gives all of the necessary details.

Remember that you previously had put in some plywood stiffeners(4) into the right side stiffener. The bolts holding the hinge to the canopy should go through these inserts. The 7" and 30" distances on the installation drawing are approximate; as you can see, the important item is for the plywood inserts to be used.

Note also that the right side longeron is carved out so that the hinge is even with the top of the longeron. Be careful not to overtorque the bolts.

CANOPY LATCH

The canopy latch is located on the left hand side.

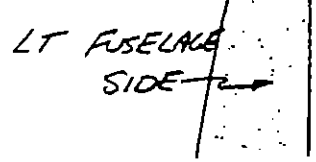
Begin by making C3, and rounding up C1, and C2.

Install C1 as shown. Next, take the C3 part, a batch of Bondo, climb into the cockpit, close the canopy, and position C3 on the left canopy stiffener to match the position of C1, as shown. Hold the C3 in place until the Bondo hardens, then gently open the canopy and drill in C3. Depending on the location initially of C1, it may be necessary to recess C3 somewhat into the plywood insert(the insert was put in when the stiffener was made).

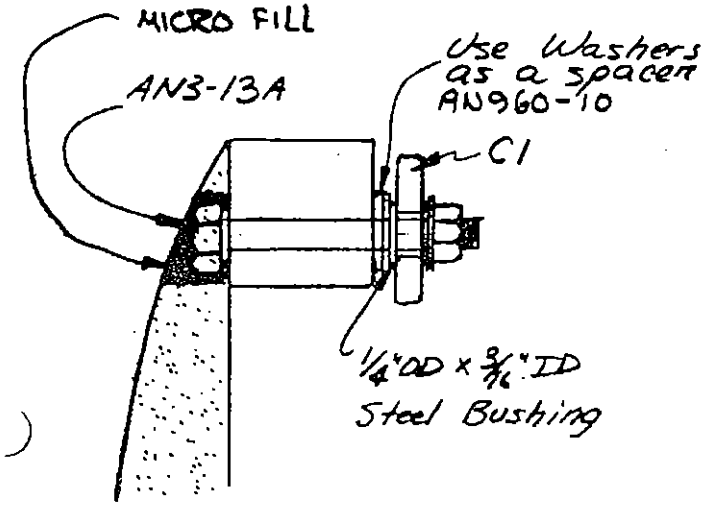
Finally, after climbing back inside the aircraft with the canopy closed, Bondo C2 in place so that the canopy is clamped down tight when the AN525 head is slipped into the hole in C2. Then drill C2 in place. The Macrame Bead is available from any variety store).

C3
LATCH

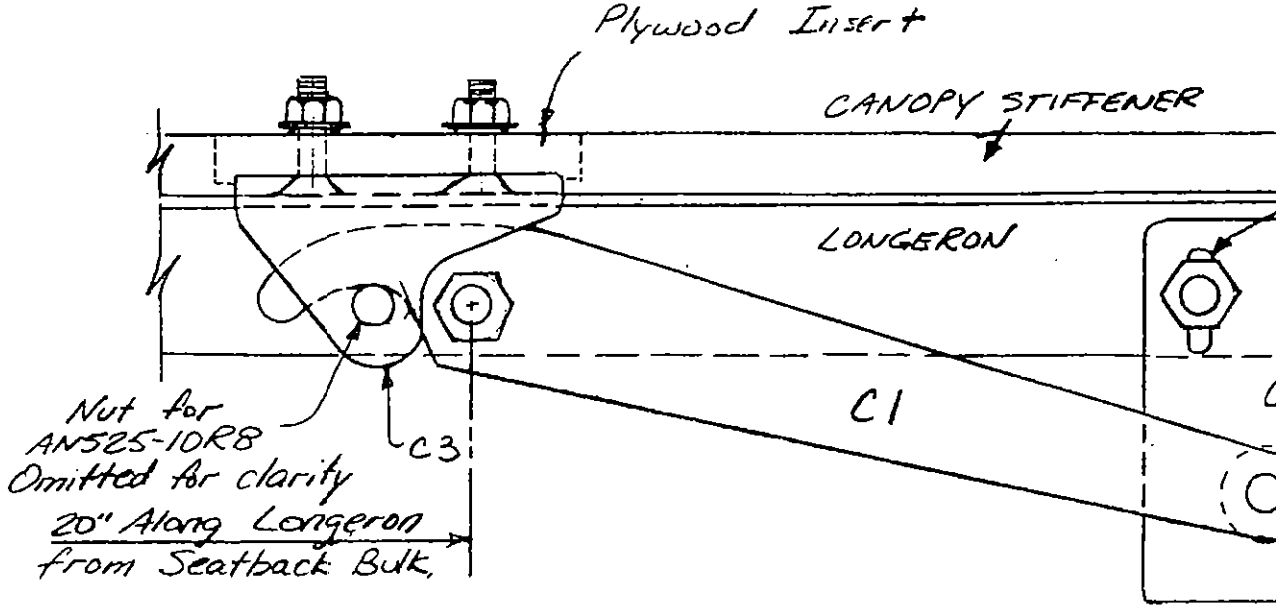
1½" x 2" x 0.125" AL angle



C3 INSTALLED
Looking Forward



C1 INSTALLATION
Looking Forward



MOUNTING DETAIL
LT FUSELAGE

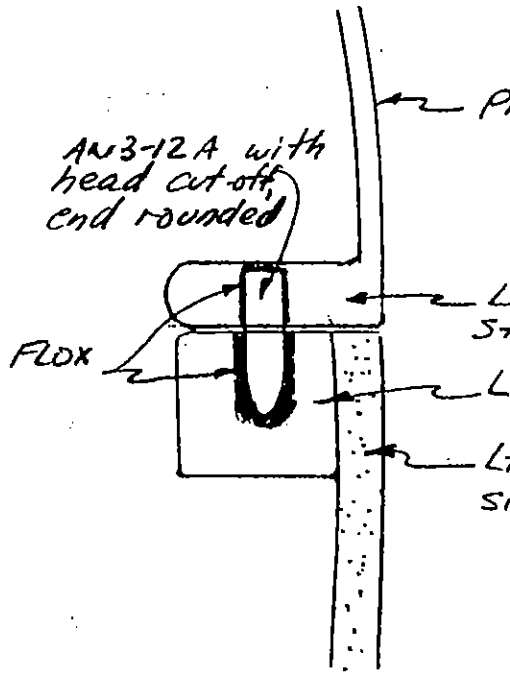
FORM

ANOPY PINS

In order to increase the stiffness f the fuselage with the canopy closed, wo pins, one at the front of the canopy nd one at the back of the canopy, are ermanently mounted to the left side anopy stiffener and rest in a hole in he longeron when the canopy is closed, hus providing some extra rigidity for ateral flexing of the fuselage.

Begin by cutting the heads off of wo AN3-12A bolts, then cutting off the hanks (the threaded portion), and then ounding one end of each. At the forward nd aft end of the left side canopy stiffener, drill a hole and permanently mount he cut off bolt with flox.

Next, mark where the bolt intersects he longeron as the canopy is closed. Drill a 5/16" hole there and fill the hole with flox. After the hole full of flox has cured, drill it out so that the bolt will slide in. Repeat this procedure for both bolts.



CANOPY PIN DETA
Typ front & back

INSTALLING THE FORWARD COCKPIT

Once the canopy has been i on the aircraft, the forward co cover which is not part of the frame can be permanently attach the fuselage. Use two BID tape each side and two BID tapes at firewall. It is necessary only this on the outside of the fuse

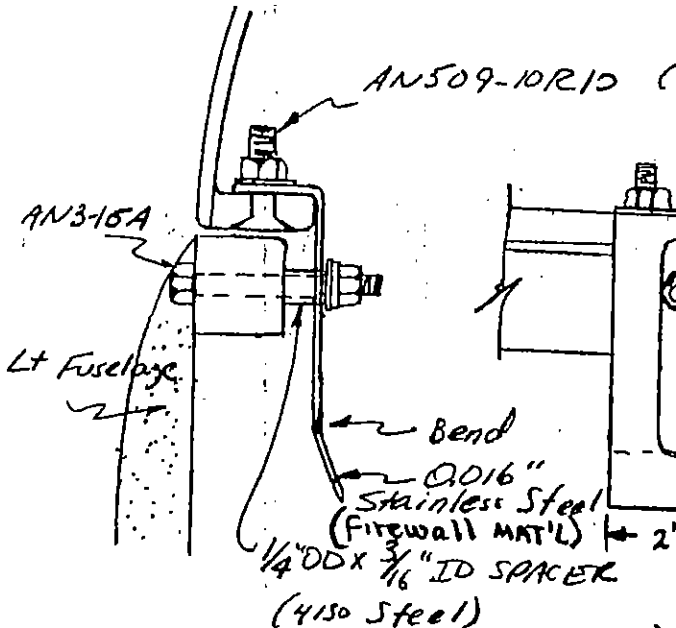
SECONDARY CANOPY LATCH

Failing to securely latch the canopy before takeoff will probably cause it to open in flight. The flight characteristics of a Quickie with the canopy open are unknown; however, it is potentially a very dangerous situation and could result in the aircraft becoming very difficult to fly.

For that reason, these plans reflect a secondary canopy latch similar to an auto hood latch. Make sure that you install it, even though you probably think, "it won't happen to me."

This secondary latch catches the canopy in case you forget to latch it. To open the canopy, raise it 2" then push in on the stainless piece, then open.

The AN509-10R10 screws are installed through the plywood insert that you put into the left cockpit stiffener



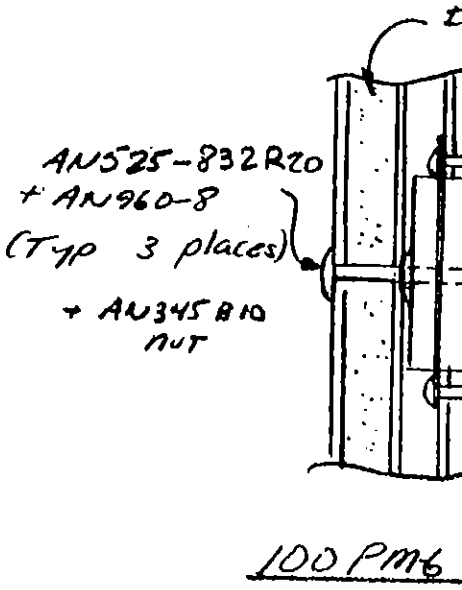
INSTRUMENT PANEL

The instrument panel is made out of orange foam using 2 BID on each side for rigidity. A full size pattern is included. Don't get carried away with installing too many instruments; you will be much happier with the aircraft if you keep everything light and simple. The suggested panel layout should be considered as having the maximum amount of instrumentation; the instruments supplied with the kit are all that are required.

The instrument panel is mounted to the instrument panel bulkhead using the three 100PM-6 shock mounts.

The small panel containing oil temperature and oil pressure gauges is mounted on the right side of the cockpit at the same station as the instrument panel. One ply of BID on each face, and one BID on each side to join the panel to the fuselage side should be sufficient.

NOTE: The Instr. Panel Bulkhead may have to be modified to allow the instruments to project forward through it.



PITOT-STATIC SYSTEM

The pitot-static system consists of a cockpit static source and a pitot tube mounted on the right wing.

Since a cockpit static source is used, simply drill some small holes in the static hole plugs on the back of the altimeter and airspeed.

The pitot tube should point forward at about BL34 on the right wing. Use the 1/4" OD x .035" aluminum tubing

ENGINE INSTALLATION - PART 1

Note; Engine Installation - Part 2 covers the complete installation of the ONAN engine in the Quickie airframe, and is included with the Engine Package.

ES2

A triangular piece of 1/4" Aluminum is provided with the kit. It is made into the ES2 engine mounting plate. The plate comes to you with centerpunch marks for the center hole, the engine mount holes, and for the three 1/4" shock mount holes at the corners.

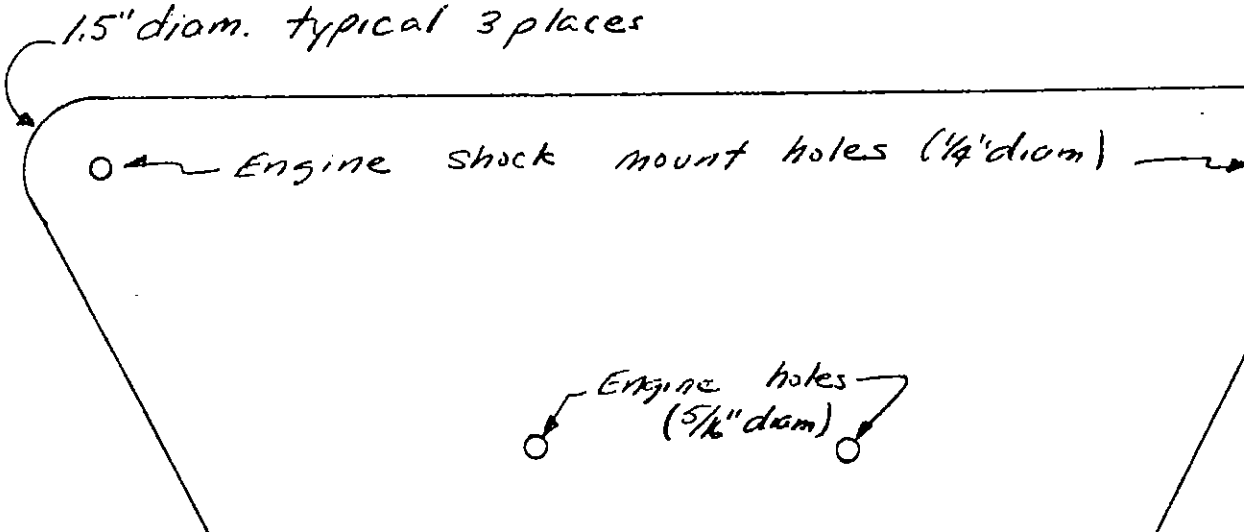
First, lay out the center hole of 5.9" diameter with a pair of dividers using the centerpunch mark provided. Do no cut this hole out at this time.

Next, you will want to drill out all of the centerpunched holes with a #40 drill bit. This is best done with a drill press but can be accomplished with a hand drill if you are very careful.

Finally, you will open up the holes as follows:

1. Engine holes - 5/16" diam.
2. Engine shock mount holes - 1/4" diam.
3. Center hole of ES2 - 1/4" diam.

The next section on "Installing the Engine Mounts" refers to installing the shock mounts between ES2 and the firewall. Later, using the plans accompanying the Engine Package, you will install the Engine onto the ES2 Engine mount holes that you have just drilled out to 5/16" diameter.



FORWARD FACE OF THE FIREWALL

On the forward face of the firewall, it will be necessary to place asbestos and stainless steel(.016" thick) as well as to mount the steel firewall extension(referred to as the "piepan").

Begin by measuring and cutting the .016" stainless steel to the shape of the firewall. It is probably easiest to use the firewall on the airplane for a template.

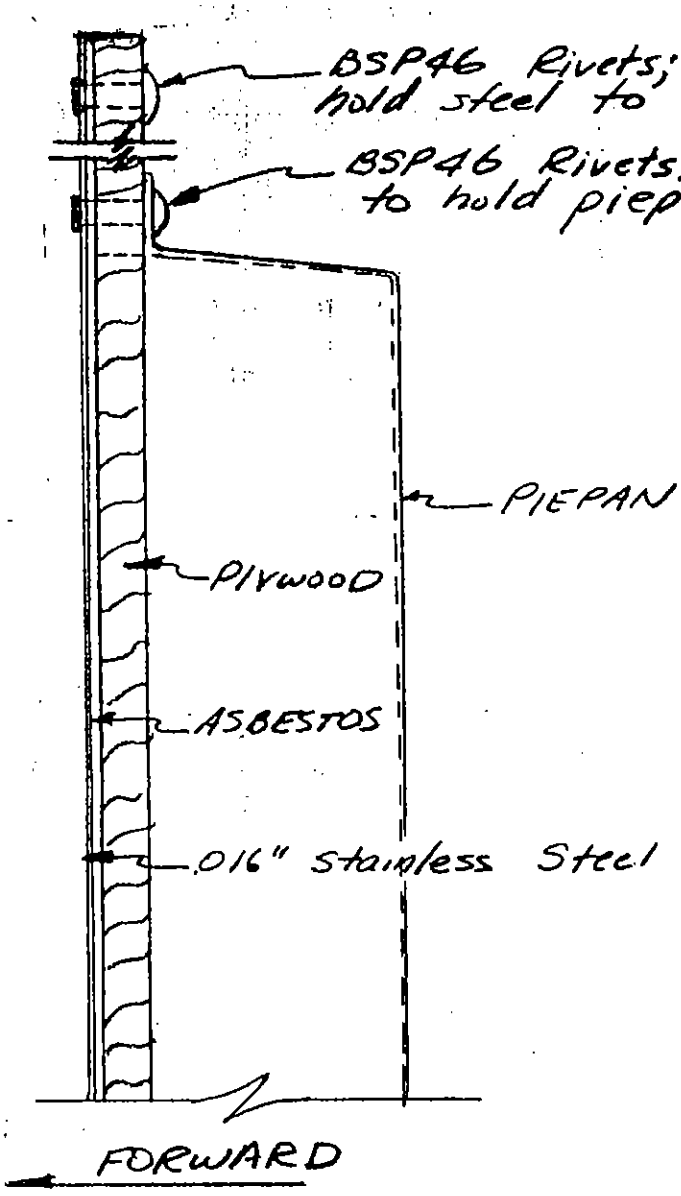
Next, do the same thing with the asbestos material.

When you originally cut the plywood firewall out, you drilled a pilot hole for the centerline of the crankshaft. Working from the cockpit side with a pen, carefully mark this point on the steel.

Round up the steel piepan and use it to cut out both the plywood firewall and the stainless steel piece. The piepan should be a loose fit in the plywood and the stainless steel. However, since you will be riveting the piepan to the firewall, be careful not to make too big of a hole or you will have insufficient edge distance for the rivets.

The drawing shows what the combination looks like. Use .75" spacing on the rivets all the way around on the piepan and enough rivets to join the stainless steel-asbestos-plywood together. It is easier to do the piepan last. Be sure to rivet the stainless in the corners so that it won't pull up.

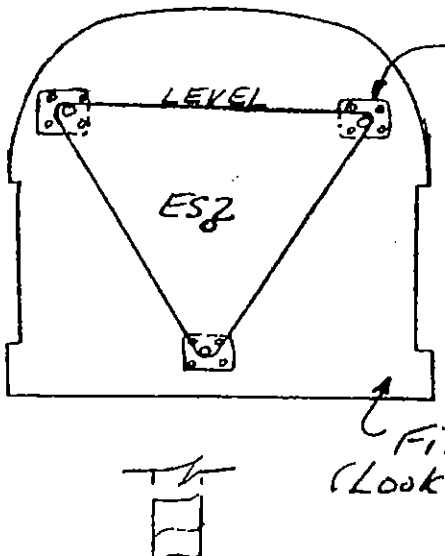
Finally, open up all of the engine mounting holes in the firewall that were covered up when the asbestos and steel was put on the forward face. Drill thru from the back side of the firewall.

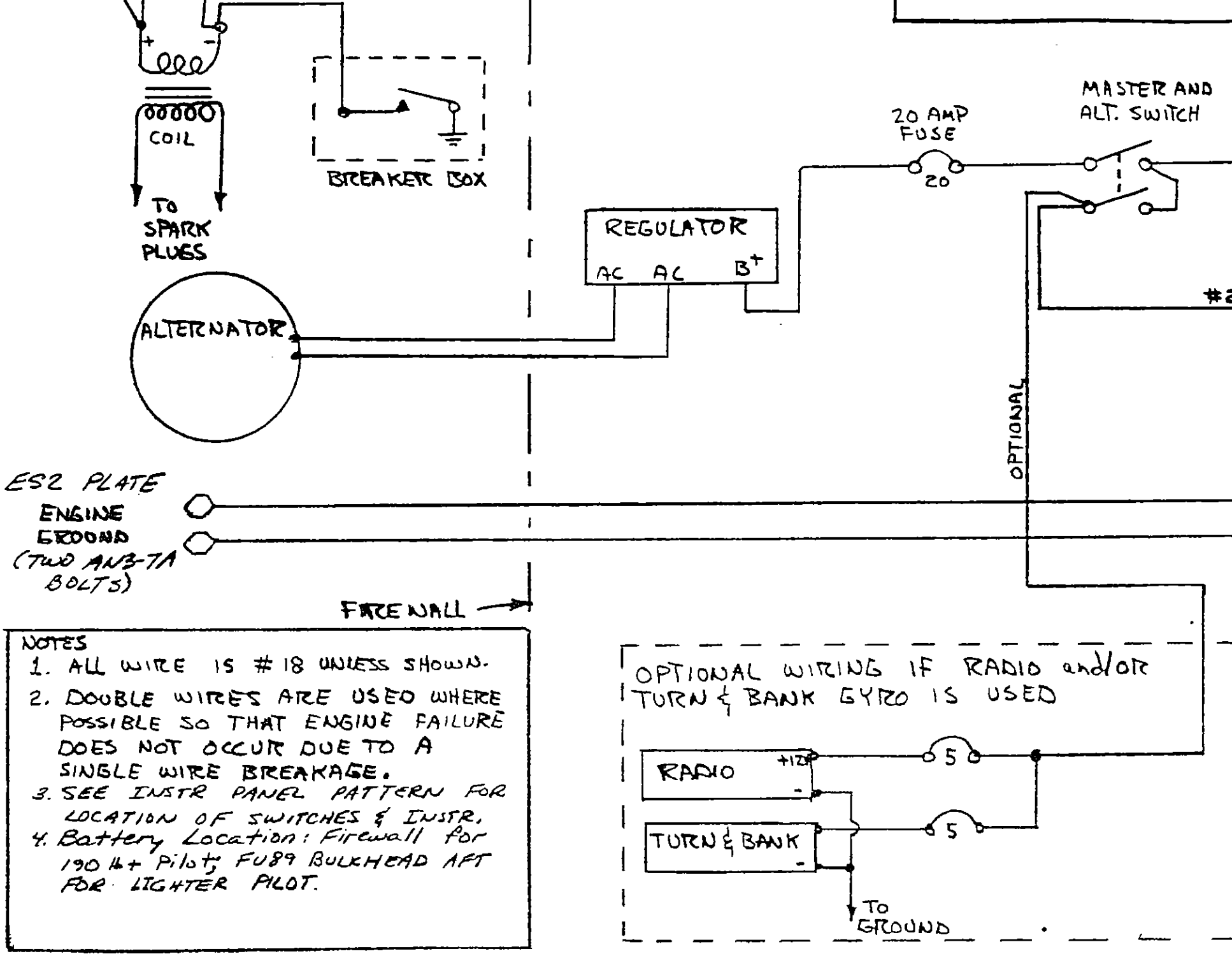


INSTALLING THE ENGINE MOUNTS

When you originally cut out the firewall, you drilled a 1/4" pilot hole that represented the centerline of the engine crankshaft. You also previously drilled a 1/4" pilot hole through the engine mounting plate (ES2) center, as well as 1/4" holes in ES2 to represent the locations of the three engine mounts.

Begin by leveling the fuselage across the canopy rails so that the fuselage is level in roll. Mount ES2 on the





NOTES

1. ALL WIRE IS #18 UNLESS SHOWN.
2. DOUBLE WIRES ARE USED WHERE POSSIBLE SO THAT ENGINE FAILURE DOES NOT OCCUR DUE TO A SINGLE WIRE BREAKAGE.
3. SEE INSTR PANEL PATTERN FOR LOCATION OF SWITCHES & INSTR.
4. Battery Location: Firewall for 190 lb+ Pilot; FUS9 BULKHEAD AFT FOR LIGHTER PILOT.

INTRODUCTION

Finishing the composite airplane is quite a bit more important than simply obtaining an attractive paint job. The finish on a composite aircraft serves to protect the structure from weathering and deterioration from ultra violet radiation (sunlight). The finishing materials also give the airplane its final aerodynamic shape. Using the proper materials and techniques, the finishing process is fast, pleasing (both esthetically and aerodynamically), and provides for long maintenance-free service. Use of sub-standard materials can limit the life of the finish, result in an overweight airplane, or even limit the service life of the airframe. Sanding is done constantly during the finishing process and extreme caution must be exercised to avoid damaging the structure. A poorly executed finishing job can destroy the structural integrity of the airframe. Even the finished color of the composite aircraft can effect its structure. The finishing process is as important to the structure of the composite airplane as basic materials and techniques used in fabrication are. Proper techniques must be adhered to for safety as well as to obtain an attractive airplane.

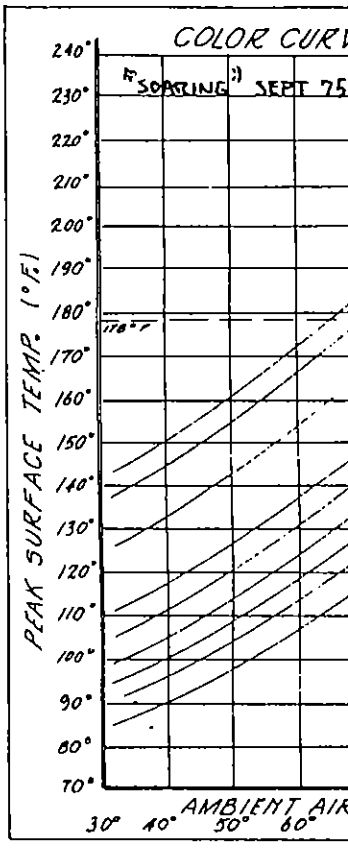
The Quickie is very sensitive to weight growth. You may easily add 20+ pounds during the finishing process if you try to finish the entire aircraft to sailplane standards (smooth, wave-free surfaces). For that reason, we think that only light pilots (under 160 lb. should consider finishing their entire Quickie to those standards.

There is one part of the aircraft that must be finished to a smooth and wave-free surface - the canard. We have found that unless the canard is smooth and wave-free, serious degradation of performance and flying qualities results. This section will tell you how to obtain a smooth and wave-free finish on the canard.

The rest of the airplane, in order to keep it as light as possible, should be sanded with very little filling, then primed, and then painted. This will allow some of the fiberglass weave to remain showing, but your Quickie will still look good.

Remember, build it light and finish it light; every pound of weight that you save during the construction and finishing will make the aircraft much more fun to fly in the coming years.

determines how much solar h
White surfaces absorb very
sun's heat while a black su
will heat up tremendously.
graph shows the relationshi
surface temperature. White
the standard color for fibe
preclude any possibility of
due to solar heating. The
ply to the Quickie, and whi
Trim colors in non-critical
as desired. Such as the fu
surfaces, and the underside
Dark trim colors are defina
on the upper surface of the
If you would like further i
ject read the September 197
magazine.



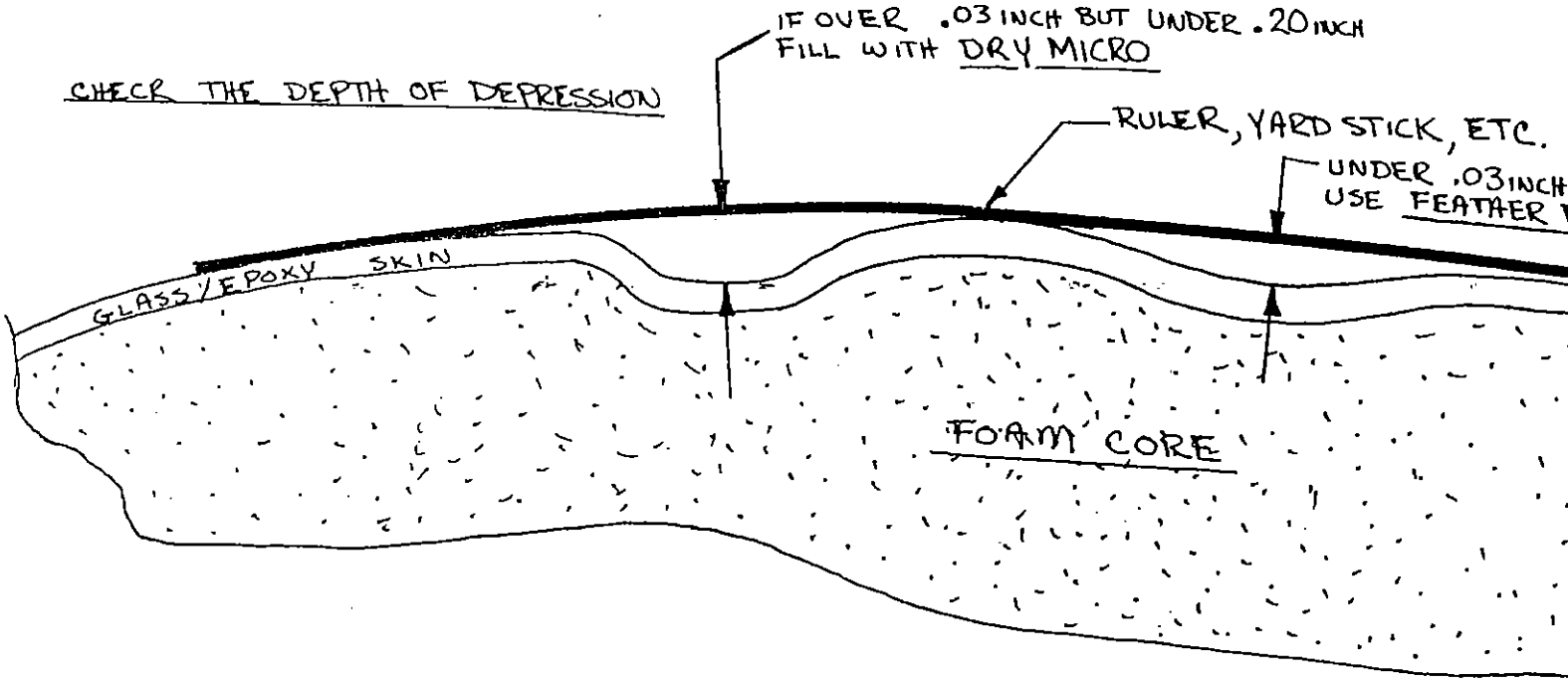
TOOLS AND M

The tools and material
the composite airplane are
foreward. A low density mi
(dry micro) is used for coa
ments. Automotive type pol
(Bondo) are very heavy and

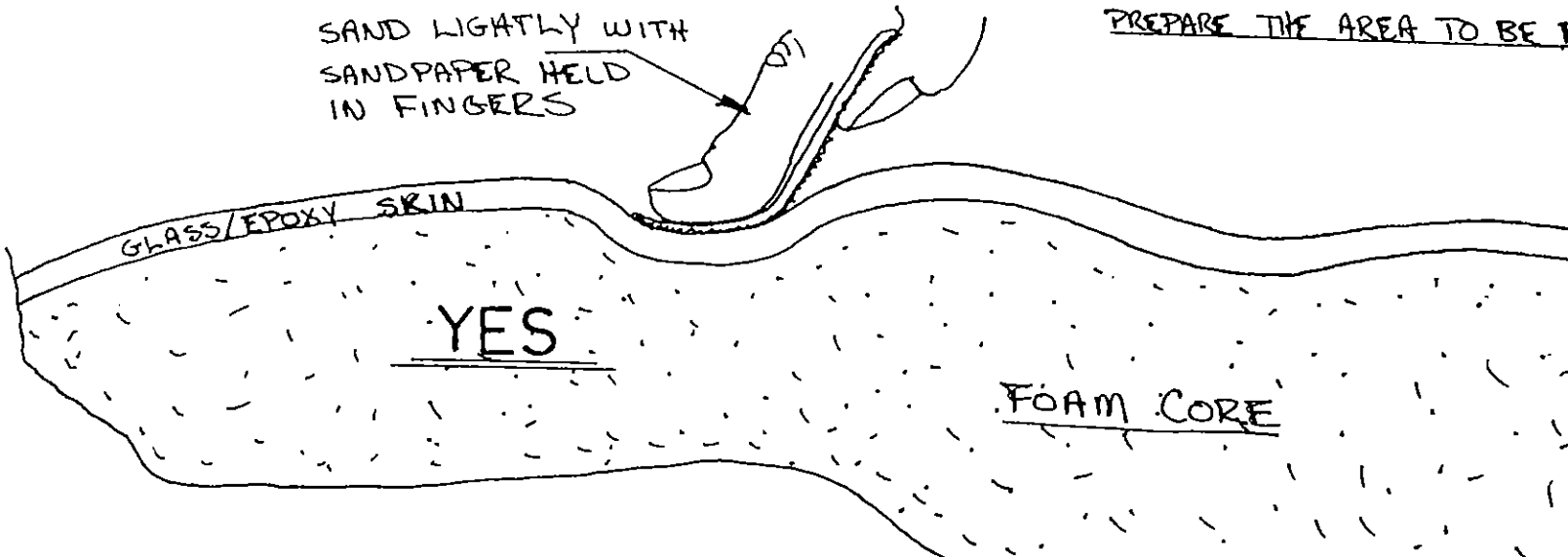
Step Two: Coarse Filling

You must be extra cautious in this step or you may destory your structure. When you take a piece of sandpaper and start grinding on your composite structure it's like using acid to clean a metal wing spar. It must be done carefully!

Start by determining which areas require



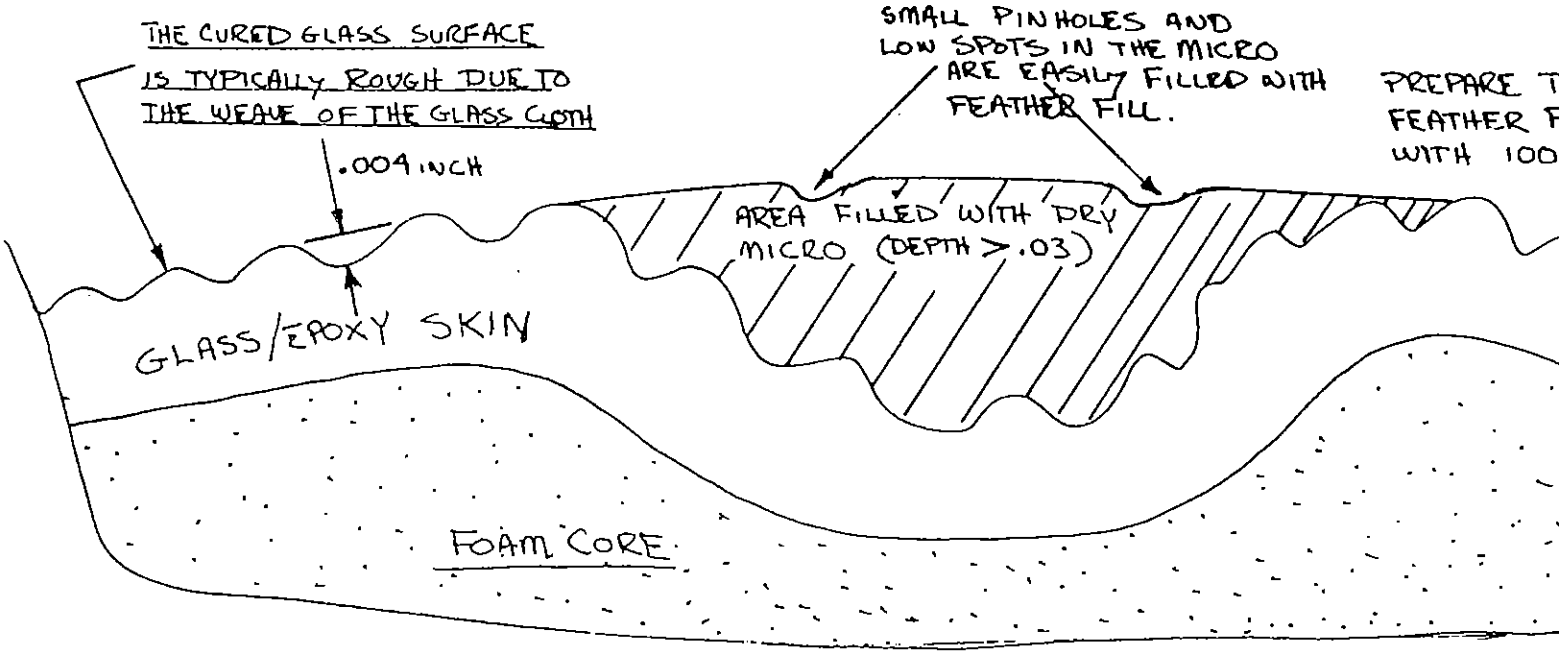
micro filler as shown using a flexible yard stick and a scale. Prepare the areas to be filled by hand-sanding lightly. Do not try to use a sanding block or spline on these areas.

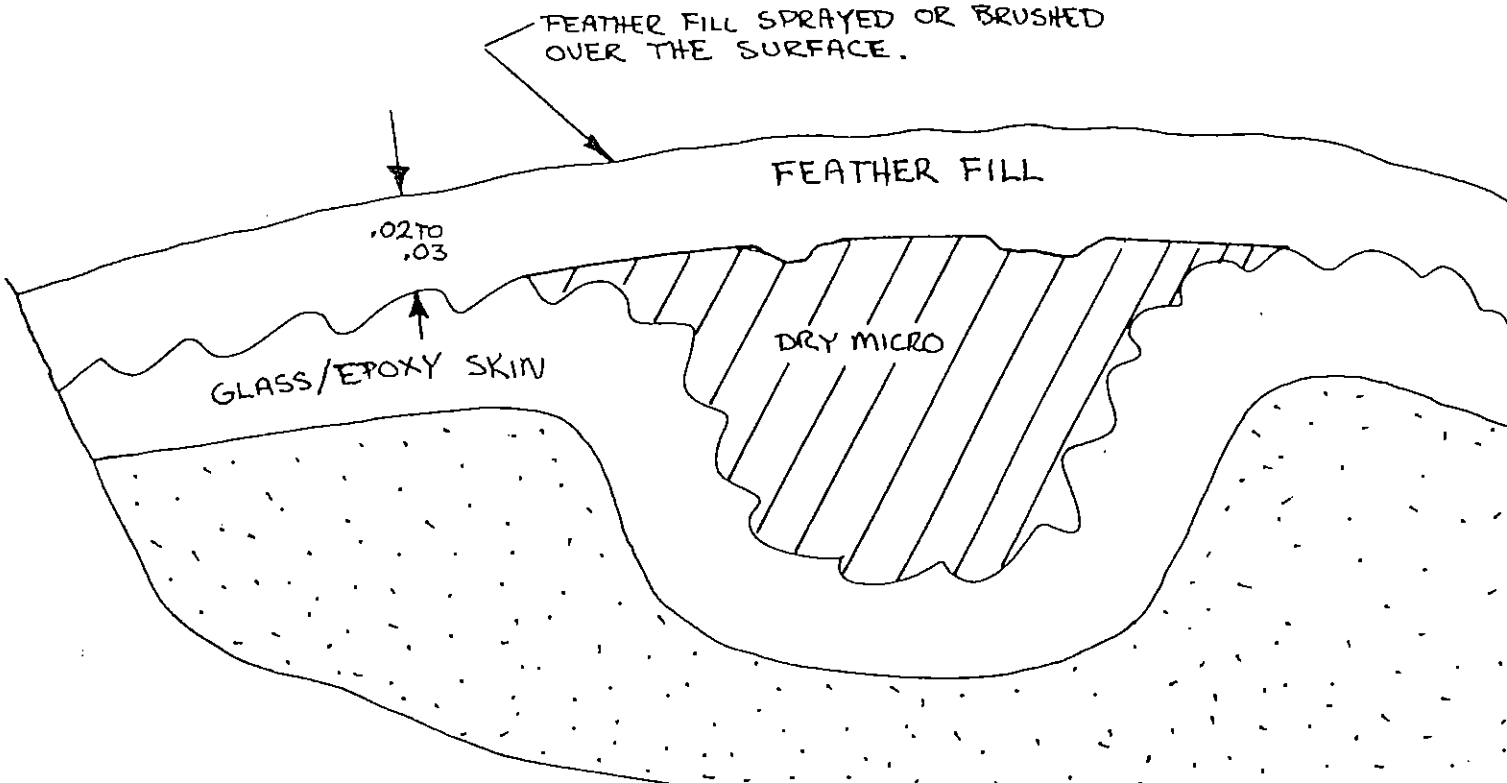


Step Three: Feather Fill

Sand the surfaces lightly by hand or with a soft foam sanding block in preparation for feather fill. A spray or brush coat of feather fill will build up .02" to .03" thick, fill the glass weave and any medium sized out of contour spots. Feather fill will require several hours curing time before it can be sanded. The cured feather fill is sanded to contour using a spline or soft block and 100-grit sandpaper. Again, extreme caution must be exercised not to damage the glass structure in persuit of a good finish. The contouring must stop immediately when the highest glass peaks begin to be visible as sanded away.

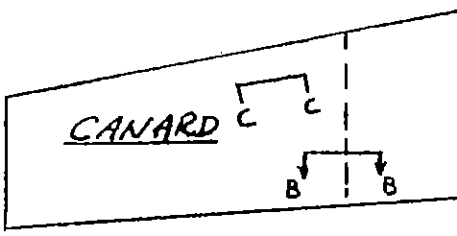
If you find that you ha the fill required or just ha hesitate to use a second coa A well prepared surface gene than one coat. When you hav the feather fill, the surfac smooth and fair. The primer intended to be contoured he with finer sandpaper for a s leaving a substantial ultra

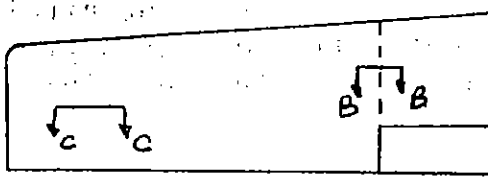




it is heavy, requires a tremendous amount of work to get a high gloss finish, and chips easily (brittle).

Sanding will occupy a large percentage of the time spent finishing the composite aircraft. Sandpaper in 36 to 60-grit, 100-grit, 220-grit, and 320-grit roughnesses will be used. Standard 9"x11" sheets are the most versitile. Use a good quality aluminum oxide, or silicon carbide sandpaper. Don't waste your money on the cheap flint-type sandpapers. Power sanders are not recommended; it is too easy to damage the structure while using them. Hard (wood) and soft (foam) sanding blocks and the sanding spline shown on page 2 will be your primary finishing tools. A paint-spraying setup will be desirable for feather-fill, U.V. barrier primer and finish painting. Some hand brushing of feather fill and U.V. primer will also be done.





THE FINISHING PROCESS

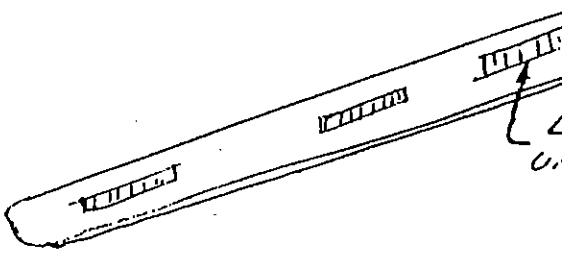
Finishing the composite airplane is a five-step operation. Repairs or rework of structure must be completed first before the obscuring finish is applied, and final structural inspections must be complete. Second, coarse contour filling is done with microspheres/mixed with epoxy (dry micro) as required in areas requiring .03 inch to .20 inch of fill. Any exceptionally gross filling (over .20 in) is also accomplished at this stage using a foam filler. The initial contour sanding begins with the cured microsphere filler, and exceptional caution must be exercised to avoid damaging the structural skins while sanding. Third, featherfill is applied to fill medium sized surface defects up to .03, and as a general fill of the glass surface weave. The fourth step is the application ofan ultra violet barrier primer. Fifth, the final finish paint is applied.

The following sketches are descriptive of the finishing process and its potential pit falls. The sketches are grossly exaggerated scale to show details more clearly.

Step One; Inspection/Repairs

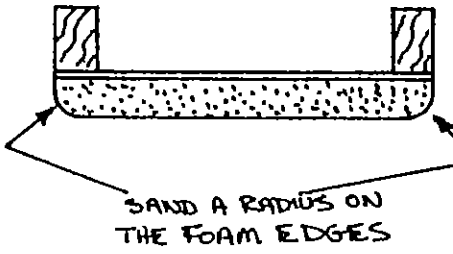
When you begin finishing, ture must be airworthy. You c manship from your own eyes and who will finally approve your you can't fool mother nature! be structurally sound before f applied. The following sketch and clarification of the quali teria found in chapter 3. Eac have a thorough inspection and completed as the first step in

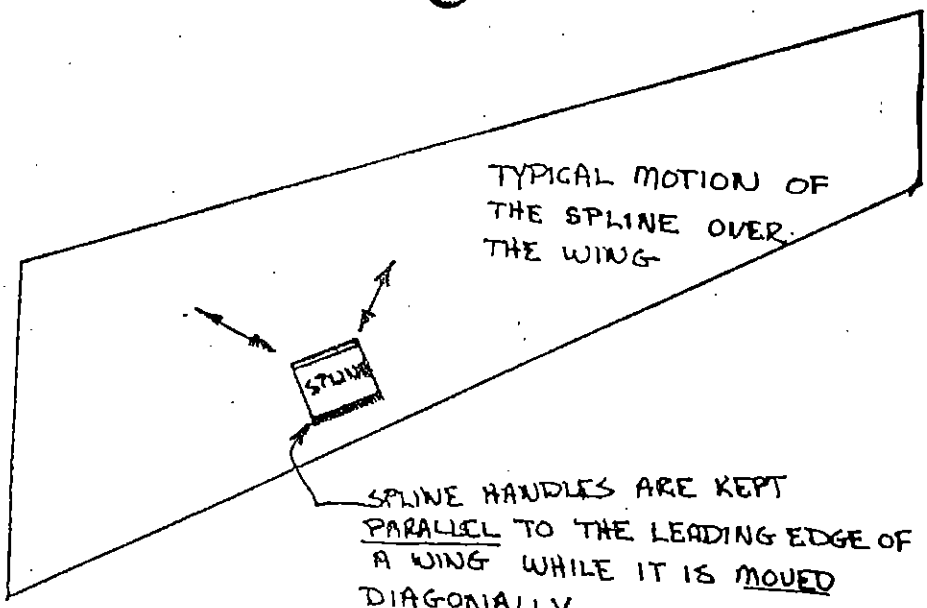
The best way to inspect t for bumps or dips is to place the wing or canard span-wise, under it approaching 1/16" hei paired.



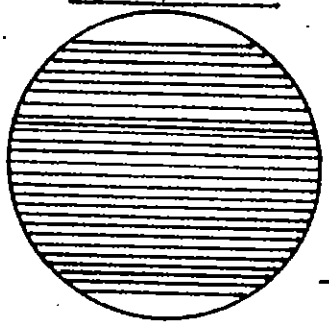
The Spline

The sanding spline is a finishing tool common to the sailplane industry. It is an easy tool to make and does an excellent job of contouring. You may find it handy to make two, one for coarse grit sandpaper and one for medium or fine sanding. The spline is an easy tool to use but it





YES



VIEW E

THE UNIDIRECTIONAL FIBERS SHOULD BE STRAIGHT AS SHOWN ABOVE

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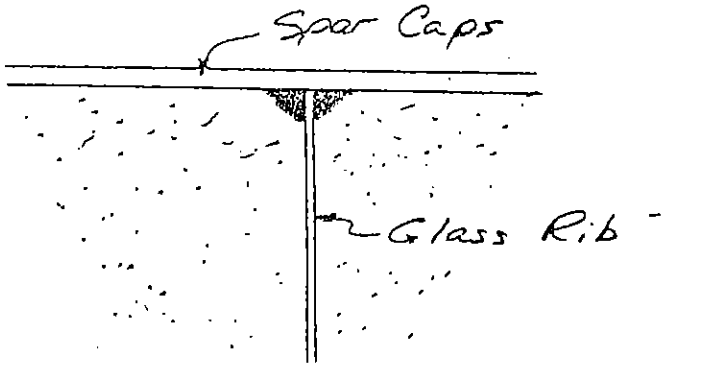
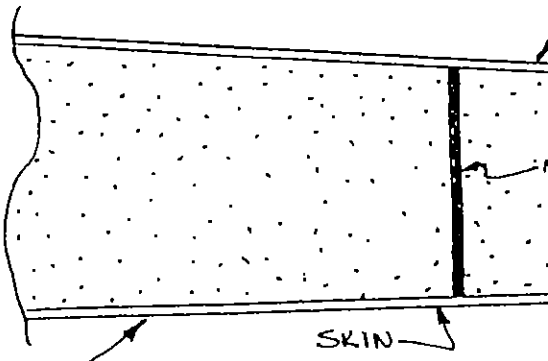
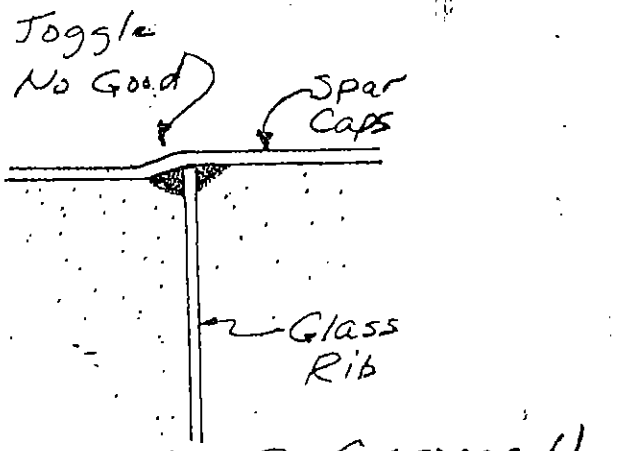


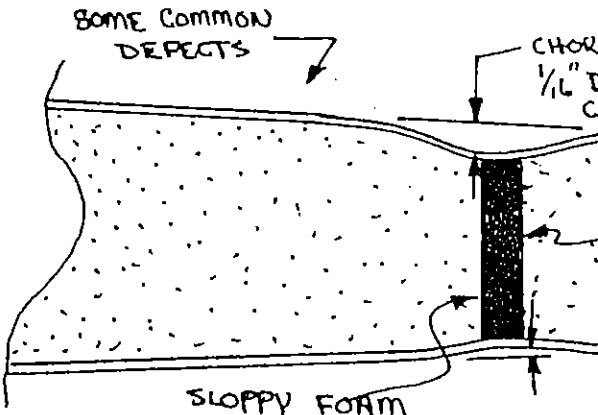
SECTION D-D (correct)

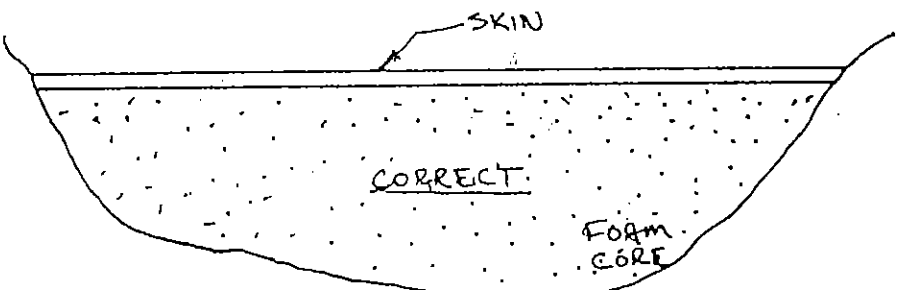


SECTION B-B DONE COR

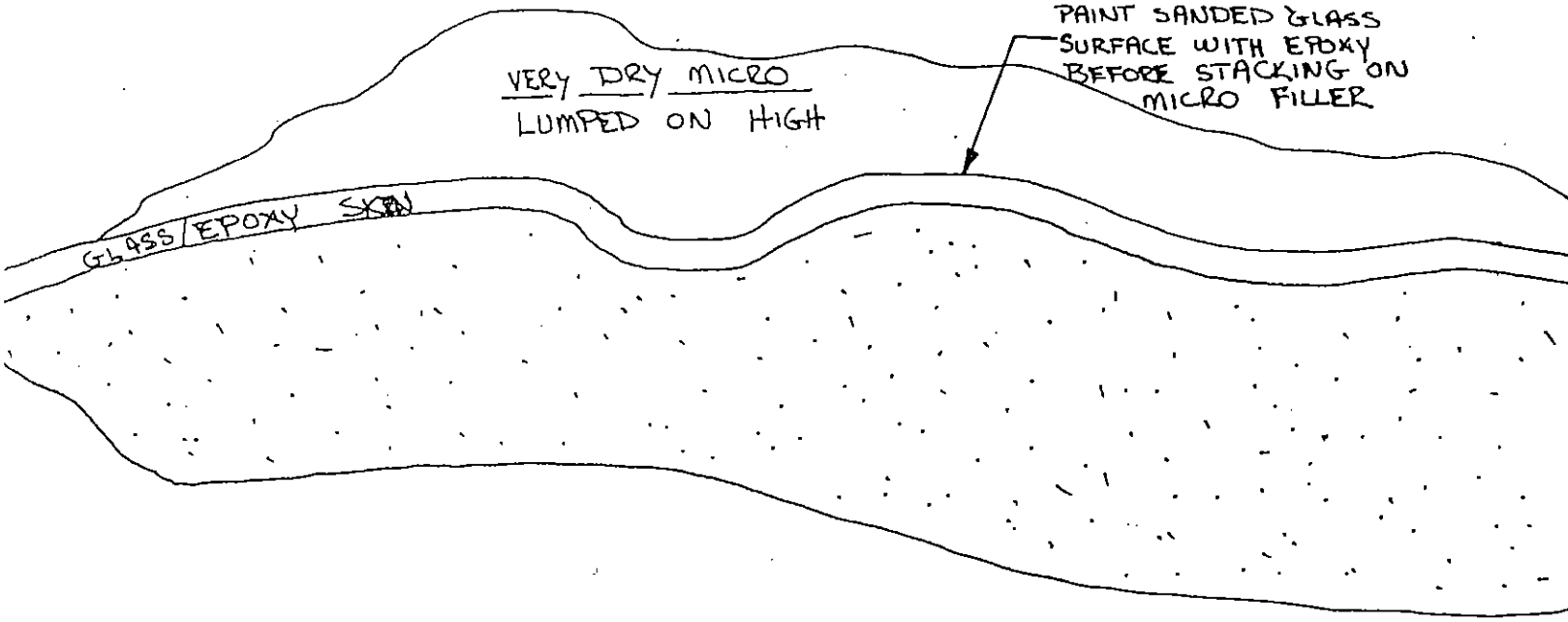


SECTION D-D (incorrect)

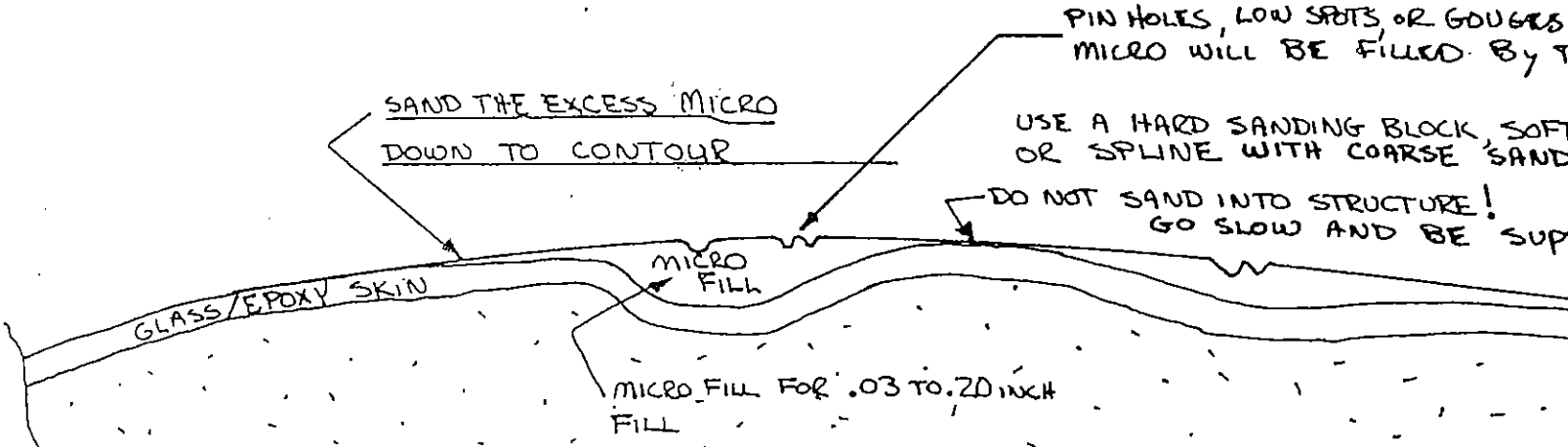




Paint a thin coat of epoxy over the area to be filled. Dry micro is then lumped over the area. The fill must be high, such that material is sanded away to bring the area into contour. The micro should be mixed very dry (lots of microspheres) to save weight). Let the micro cure at least 24 hours.



Sand the micro overfill into contour using a hard sanding block, or spline with coarse (36 to 60-grit) sandpaper. Exercise extreme caution while sanding. A few careless strokes with coarse paper can ruin your structure!



Rec'd 9/12/86

Construction of the LS(1) 0417 Mod Quickie canard

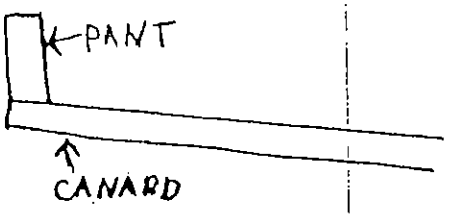
Review the Q2/Q200 plans included, pages 1-7. Disregard the last page (8) dealing with the pitch control system as the Quickie pitch control system is identical to the original except for the bearing blocks. Even the original bearing blocks can be used by adding additional material.

The construction techniques of the Quickie canard are almos identical to the Q2/Q200 version.

Hotwiring:

Lay out your foam blocks similar to your original patt except note that they are slightly longer. This is so that wheel pant can be attached under the canard tip rather than to the end:

ORIGINAL CUT IS BL 88
MOUNT BOLT IS BL 92



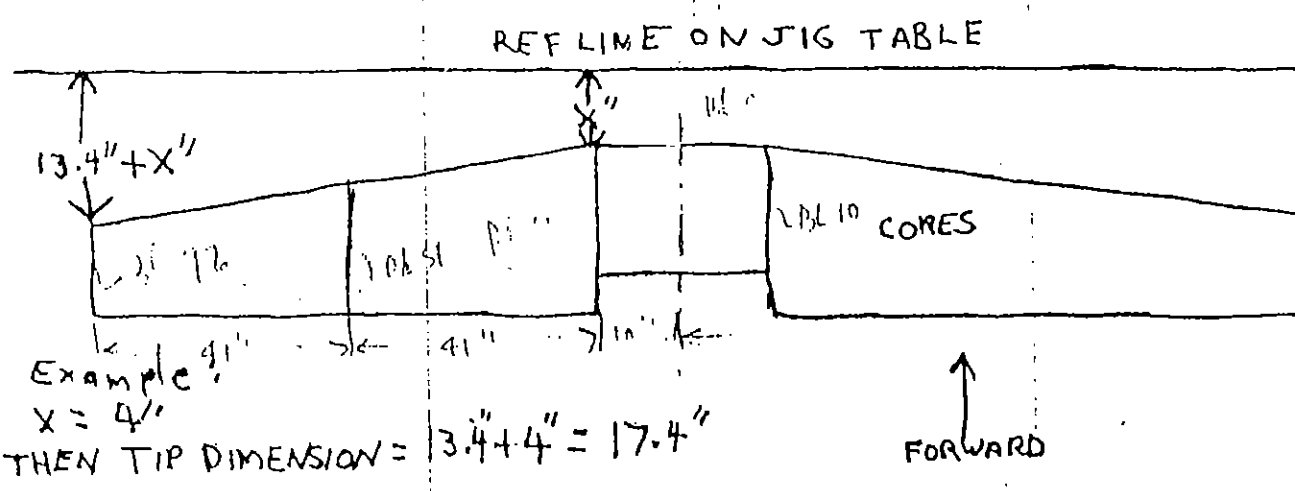
(CORE TEMPLATES: BL 41" BL 10 41" BL 51 41" BL 92

You will need to add counting numbers to the templates. Us your original Quickie canard templates as a guide.

BL 92, BL 51, BL

Jigging the foam cores:

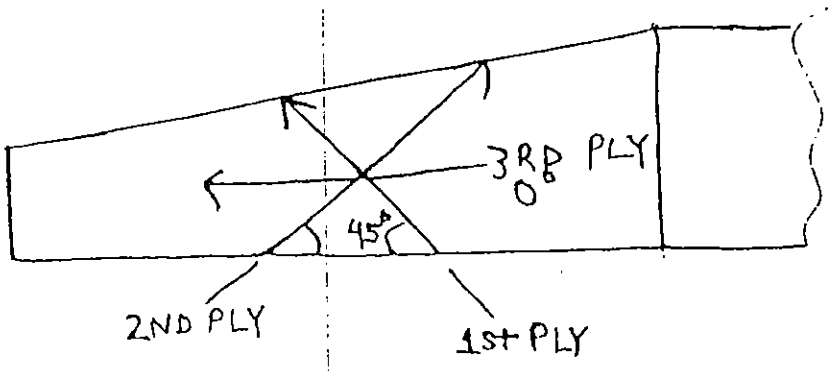
The sweep and anhedral of the new canard are identica the original. When you set up your jig on your table, the ing edge of the foam cores should measure 13.4" from BL 10 92:



Example:
X = 4"
THEN TIP DIMENSION = 13.4"+4" = 17.4"

Laminating skin plies:

Three plies of uni are used top and bottom:



Add one additional ply on the top surface in the fuselage a extending about 8" past the fuselage sides.

Elevators:

Construction of the elevators is the same as your orig plans show. Please note that the aft edge of the elevator a discrete thickness instead of a sharp edge as on the orig This is a very important feature of the LS(1) 0417 mod airf so don't change it.

Sparrow Strainers:

These devicer put an aerodynamic download on the eleva and are very important. Do not fly without them, make them ing the same airfoil shown in the Q2/Q200 instructions. In of 11.5" long make them 8" long. Some experimentation may necessary to determine optimum mounting angle. Contact QAC details.

Wheel pants:

These are constructed similar to your originals. Rev your Quickie construction plans for details. Note in the n plans that the axles have been moved forward about 2 inches

Make new LG1's as shown in the new plans. Use your ol drawings for LG2 and LG3 as they have not been changed. LG moves LG2 and LG3 forward from the original location which rults in the axles moving forward the proper amount. Be su and redo your weight and balance after installation of the canard and drop new reaction points as shown in The "Initi Flight Test Guide".

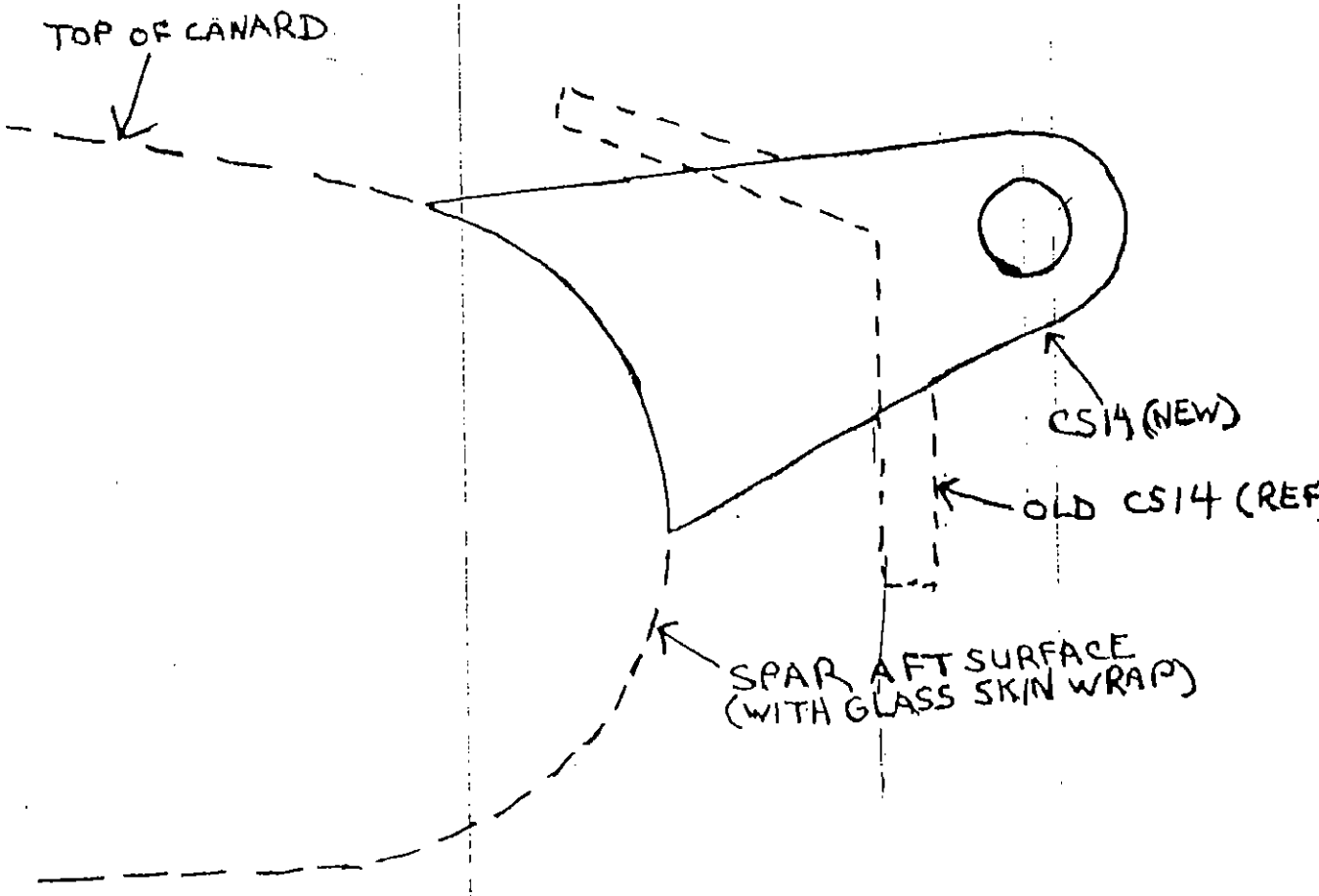
Mounting the canard:

Mount following the Q2/Q200 instructions. Be sure an add a fairing on the bottom using pour in place foam or cu scrap foam to fit and cover with 1 BID, this area is not s tural.

Control System:

Fabricate or modify CS14 as shown in these drawings. Your old CS15, CS16, and CS19's can be used but some modifications will need to be made. Install these parts and the elevators using the jigging templates provided.

NOTE OLD CS14 MAY BE USED BY TRIMMING + ADDING A NEW SECTION EXTENDING TO THE SPAR. GLASS WITH 3 BID, BOTH SIDES.



1 of 2.

CONSTRUCTION OF LS(1) 0417 MOD CANARD.

JIGGING THE CANARD:

Establish a B.L.15 reference line on the topside of your canard jigging table. This can be done with a long straight edge or chalk line. Locate and mark on your table B.L.'0-0', 15, 48.8, and 100, both sides. Place jig blocks B.L.15, 48.8, and 100 in their respective places (they are glued to ¼" or thinner plywood, fiberboard, etc.). 5 minute or bondo to table shimming for level, proper anhederal, and sweep (see addendum to appendix sheet W-4-8/26/83). (*Also, disregard string hole alignment methods aft end of jig blocks). Note: B.L. 100 blocks will extend slightly outboard of B.L.100 foam cores since foam core measurement was flat, not at anhedral angle. You can move the B.L.100 jig blocks inboard to match the cores when trial fitting to spars.

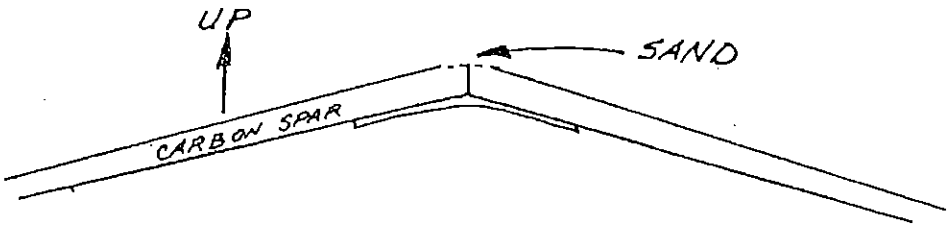
Trial fit both spars at trailing edges (we held ours in place with large rubber bands). Some custom fitting will likely be needed @ B.L.'0-0'. Note, 3.5° + sweep aft of spars at outboard tips.

Sand spars completely for bonding. There is an extra ply of fiberglass on the surface for this purpose. Grind center portion of spars (B.L.'0-0'") at apex to minimize bump. Wear a dust mask when sanding the black carbon fiber. *See 1st sketch page 2.

From B.L.15 to B.L.100, the hotwire block sizes are exactly the same as called out in the Q2 Construction Plans. From B.L.0 to B.L.15, we use 2 pieces instead of 1. The blocks for these should be sized to 15.70" long. These sections are jigged after the spars and other hotwired sections have been located. A bevel will need to be sanded to allow for the canard's anhedral. Trial fit cores in place, check transition alignment, and sweep aft. From B.L.15 to B.L.100, you should measure about 10.5" at L.E. foam cores.

Coat the ends of the spars with flox, then bond to the jigs with 5-min micro dabs. Remember the spars must join together perfectly with no joggles. Wipe the excess flox off and if there are no gaps, you may proceed with glassing the spars together. Otherwise, wait until the flox has cured and sand.

Laminate the spars together first with 3 ply BID at 45° extending about 6" either side of the joint. Stagger the plies about ½" to 1". Next, the caps are laminated using UNI. These caps are a minimum of 3½" wide and may be laminated on a clean plastic surface prior to transferring to the spars. since these tapes are narrow and short, you may find it easier to use the selvage edge for one side of each ply. This will reduce the fraying.



We didn't attempt to shape B.L.'0-0' cores for a micro joint, but instead, left a gap to be filled with pour-in-place #2 density (x-40 available from Aircraft Spruce). Build a dam with cardboard and duct tape bottom gap. Sand fair after cure (usually about 30 minutes).

Note: Center blocks (B.L.15-'0-0') are shown with straight leading edge (B.L.100-B.L.'0-0') B.L.15-B.L.'0-0' blocks should be parallel to firewall at leading edges, thus eliminating approximately .9" sweep B.L.'0-0' - B.L.15. You can hand shape the inboard blocks since surface contour is not a critical flying surface.

Do a final check top and bottom of cores for transition errors, warpage, etc. Place additional support members (blocks 31.9 & 74.4) in appropriate positions to assist core support for glassing. We made random felt pen - - - marks on cored ±45° to assist unidirectional cloth alignment.

Micro foam cores and allow an hour or 2 set up time before glassing.

THE LAYUP:

Better conservation of cloth can be employed by fitting scrap triangle with selvage edge inboard for first pull. (e.g.)

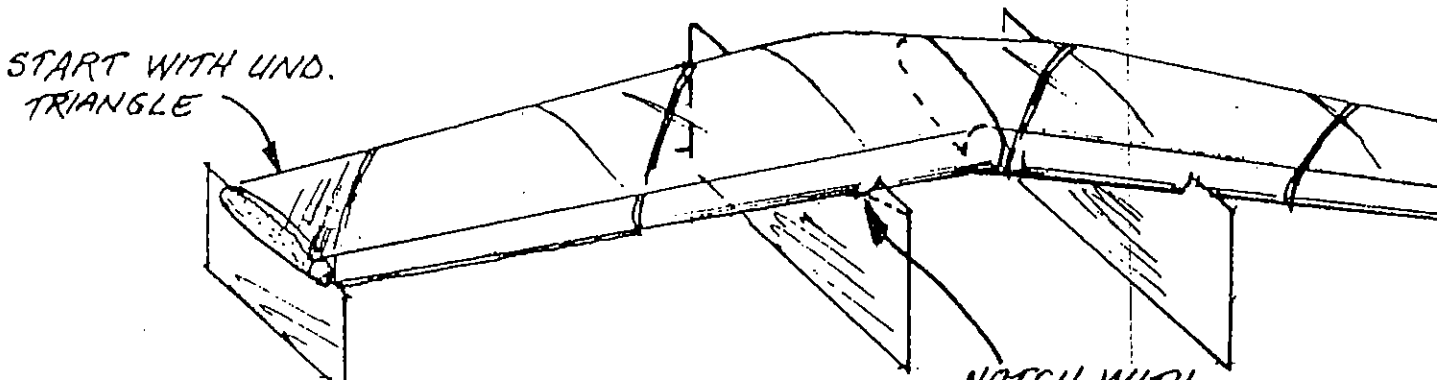
Allow UND. to wrap spar at T.E. and le
at L.E.

Canard skin lamination schedule:

Bottom - 2 ply at 45° to the spars (90
1 ply spanwise
Overlap the spars with all 3
caps and overlap the caps.
Knife trim the skins at the
curing, sand to taper the sk
the hotwire templates.

Top - 2 ply at 45° to the spars (90
1 ply spanwise. We let selv
1 ply spanwise to B.L.15 eac
protection. Overlap the spa
on the spar by about 1½". O
lap the leading edge of the
the hotwire templates.

Knife trim leading edge, let cure 24



Use lumber as shown in the Q2 Plans before turning the canard over. Not as much will be required due to the stiffness of the spars.

After the canard has been covered, attach the slot cores with micro. Some sanding may be required to allow for the skin overlap on the spars. Both the slot cores and the elevators are exactly the same size and in the same position as in the Q2 Plans. After the micro has cured, sand the tabs on the cores down to the canard surface and glass with 2 BID.

Note: It may be easier for you to build the elevators before installing the slot cores & trial fit the attach structure. The slot cores can be treated as fairing, sectioned, & installed around CS 15, 17, & 19 with one ply BID. Be sure to micro high density white foam blocks in place as hard parts detailed in Q2 Plans.

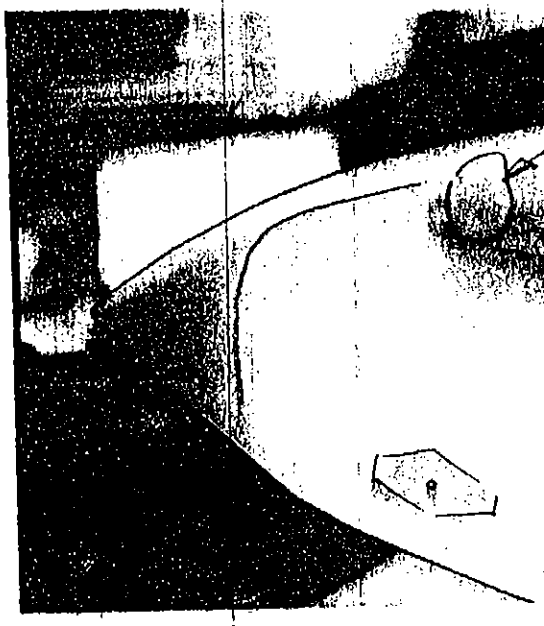
Next, build the elevators. Hotwire cores are the same as is shown in the Q2 Plans. Note that there is only 1 slot for cutting the hole for the torque tube. When bonding the torque tubes in the elevator cores, use a brush and micro down this slot.

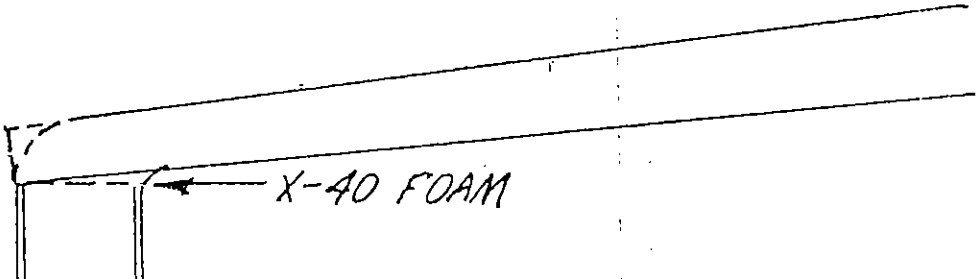
Use the templates provided for jigging the elevators for glassing. It is probably best to jig them after the torque tubes are installed, but before the micro has cured. Apply peel ply to bare foam trailing edge 1/4" to 3/8" before glassing for a stippled close-out. Glass with 2 UNI at ±45°. When you sand down the tabs for glassing the top surfaces, note that the elevator has a blunt trailing edge. Refer to the hotwire templates. After glassing, sand the elevator trailing edges to length. Then remove some foam (¼") and fill with dry micro to prevent the skins from peeling. Coat w/pure epoxy first.
Refer to the Q2 Plans for installation of the elevators, QCSM2's, CS17, CS14, CS15, etc.

Build the wheel pants using the templates provided. Refer to the Q2 Plans for detailed instructions. Note that these pants are designed to fit the standard tires only. We will design pants for the 500x5 tires later. You may modify the design yourself by referring to the Q2 Plans.

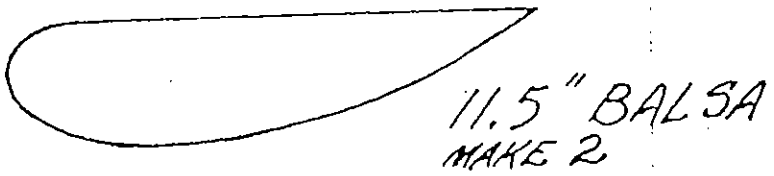
To fit pants to wing, you may want to fill taper with X-40 foam.

Install the wheel pants in the same m
the Q2 Plans. Note extra UND plys.
about 1/2 to 3/4° toe out. This is a
mark on the inside face of each pant
axle hole centers, then sighting on t
This seems to improve ground handling





Also, 2 11.5" balsa wing sections.



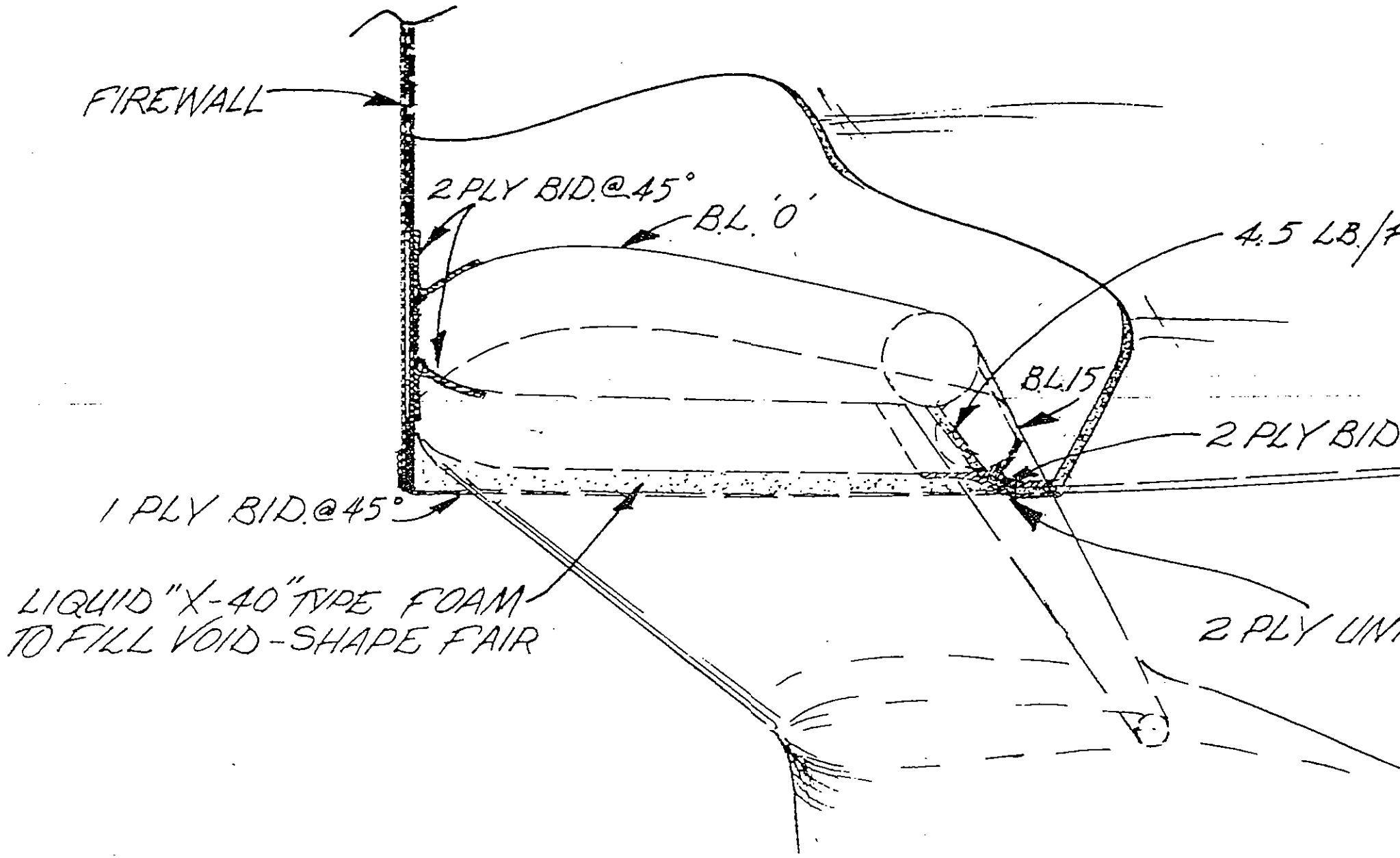
5 minute epoxy 2 plywood stringers and airfoil section on elevator about 1" outboard from inboard but line. (duct tape and large rubber bands are helpful here). Make small micro radius at stringer attach to elevator. Cover everywhere with 1 ply BID. (we used a lighter weight tooling cloth available at most hobby houses - about 4 oz.). This cloth is also a good choice for antenna close-outs.

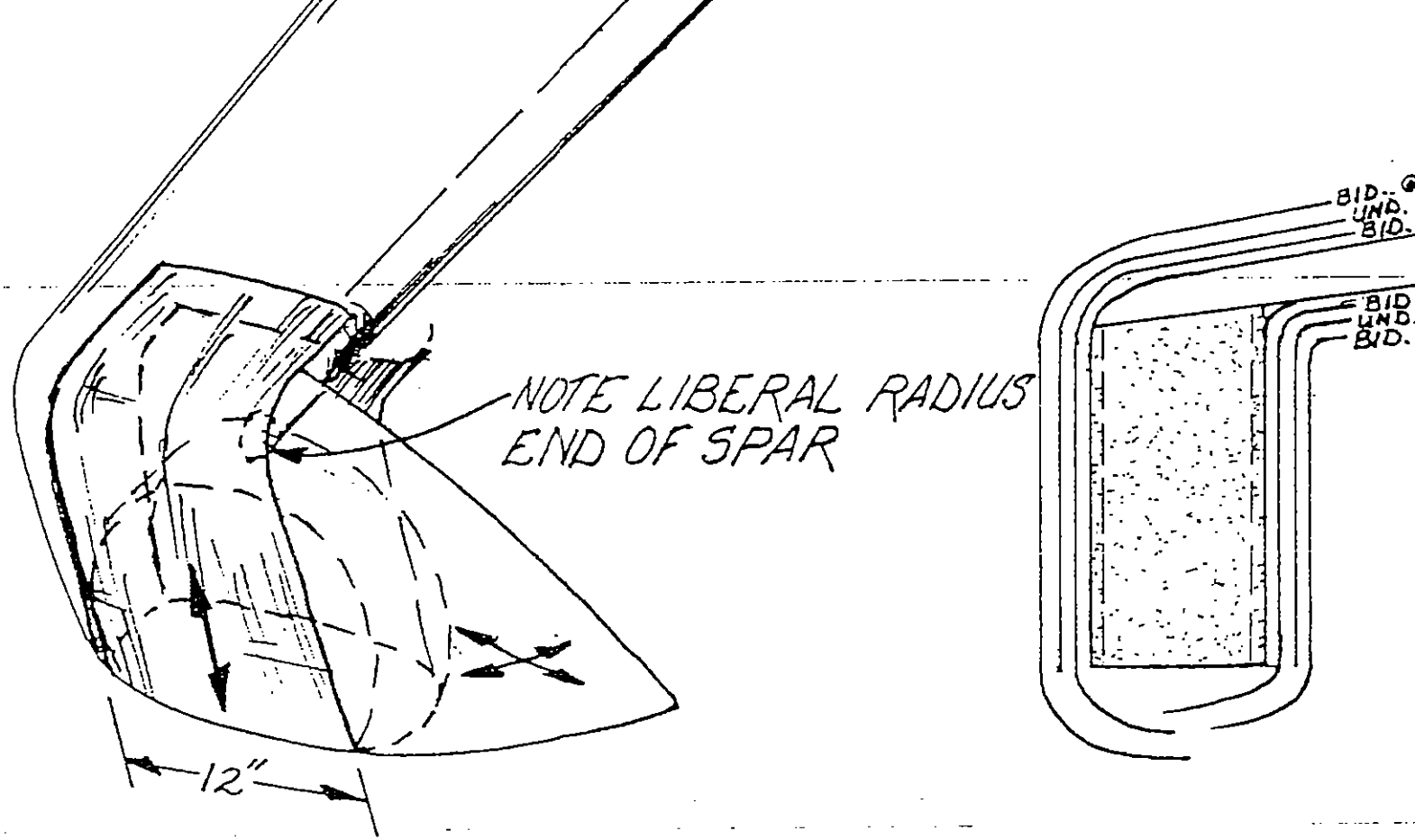
Installing the new canard to the fuselage will tax your imagination. Not unlike Chapter 12-2 of the Construction Plans, it may take several hours to trim and jig the canard to the fuselage and in reference to the wing. You should exercise extreme caution in leveling the fuselage in all quadrants and jigging the canard. (You did bond reference levels to canard while it was jigged for glassing, didn't you?) Please note: your LS-1 mod. canard mounts at zero incidence as opposed to the G.U. Also, without a straight center section as on the G.U., there is no bottom reference to the fuselage. Therefore, it would be best to have the magneto box cut-out completed as a reference to the apex of the LS-1 for final canard-to-fuselage assembly.

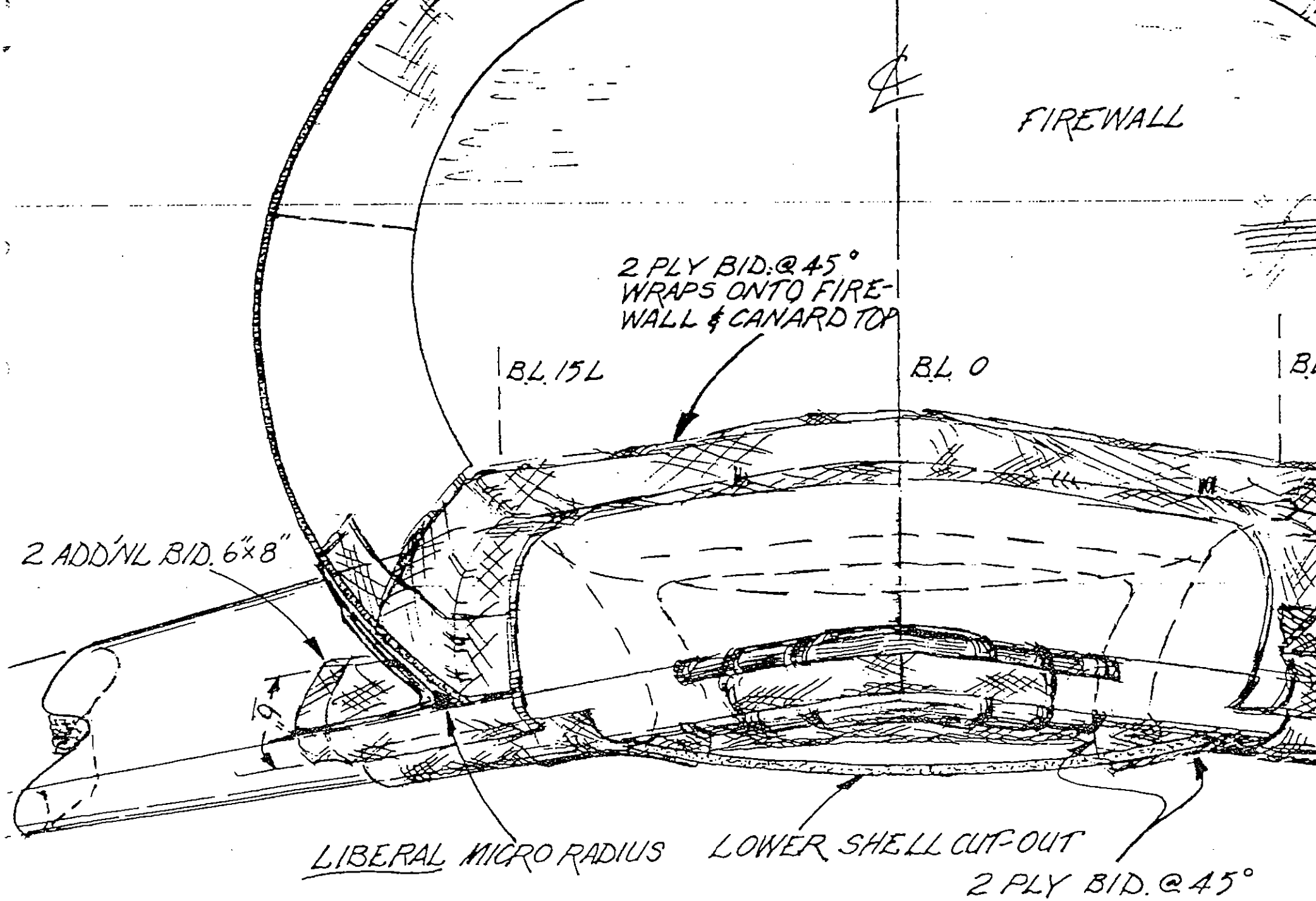
After canard is installed with
and 2 ply BID, micro transition
bottom to canard (4#x3/8 white
inside and outside lapping at le
(see drawings and photo).

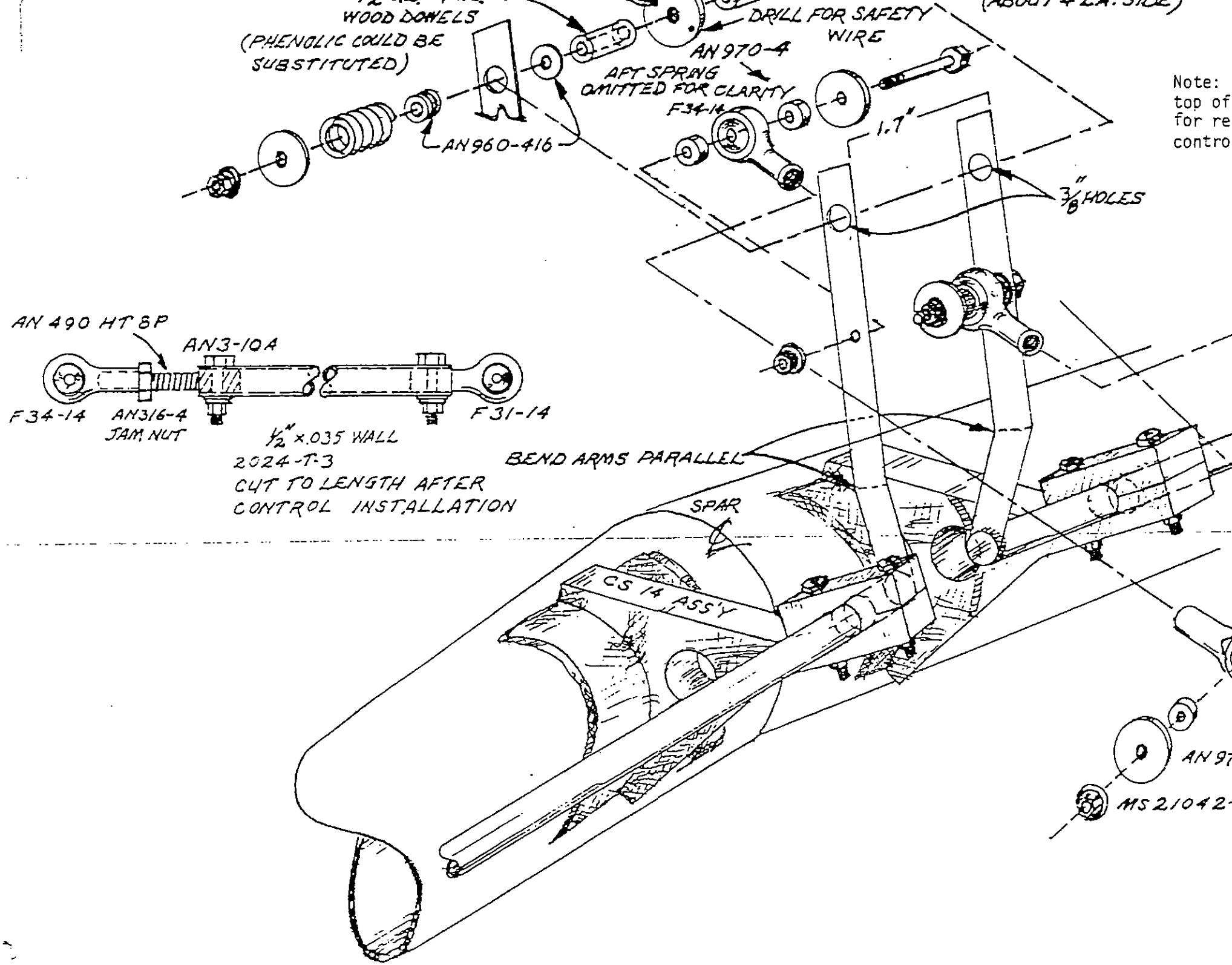
Then, with 2# urethane block o
pour-in-place, fair bottom of
firewall and closeout with 1 p
install additional 2.5" stiffe
sides of fuselage centered ove

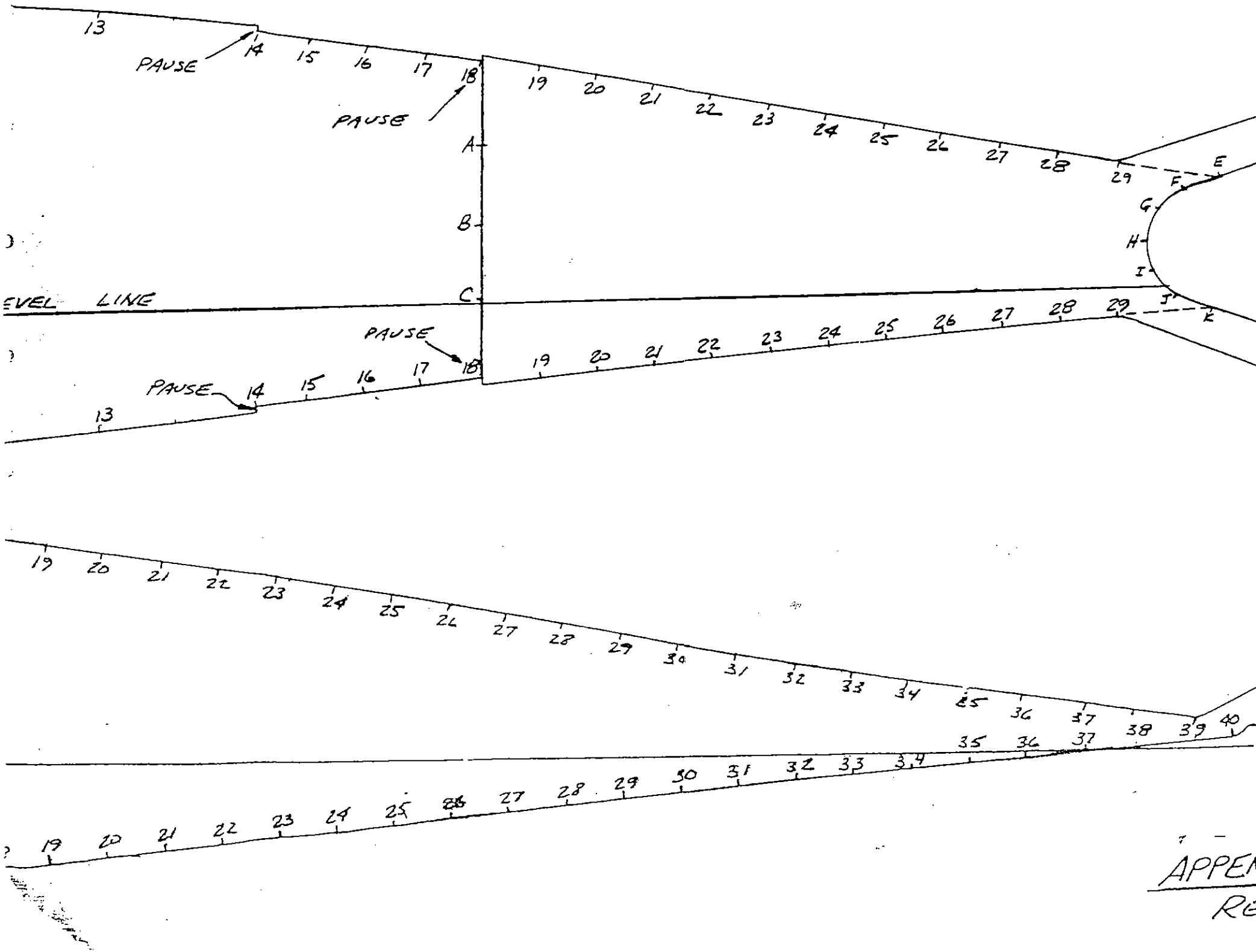
Note: We've found only one 'BOB' weight to be necessary. It can be positioned anywhere convenient from B.L. '0' to B.L. 15.




NOTE LIBERAL RADIUS
END OF SPAR
12"
BID.
UND.
BID.
BID
UND.
BID.


FIREWALL
2 PLY BID. @ 45°
WRAPS ONTO FIRE-
WALL & CANARD TOP
B.L. 15L
B.L. 0
2 ADD'NL BID. 6"×8"
LIBERAL MICRO RADIUS
LOWER SHELL CUT-OUT
2 PLY BID. @ 45°


WOOD DOWELS
(PHENOLIC COULD BE SUBSTITUTED)
DRILL FOR SAFETY WIRE
AN970-4
AFT SPRING OMITTED FOR CLARITY
F34-14
AN960-416
1.7"
3/8" HOLES
Note: top of for re contro
AN 490 HT 8P
AN3-10A
F34-14
AN316-4 JAM NUT
F31-14
1/2" x .035 WALL 2024-T-3 CUT TO LENGTH AFTER CONTROL INSTALLATION
BEND ARMS PARALLEL
SPAR
CS 14 ASS'Y
AN 97
MS21042-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PAUSE
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EVEL LINE
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PAUSE
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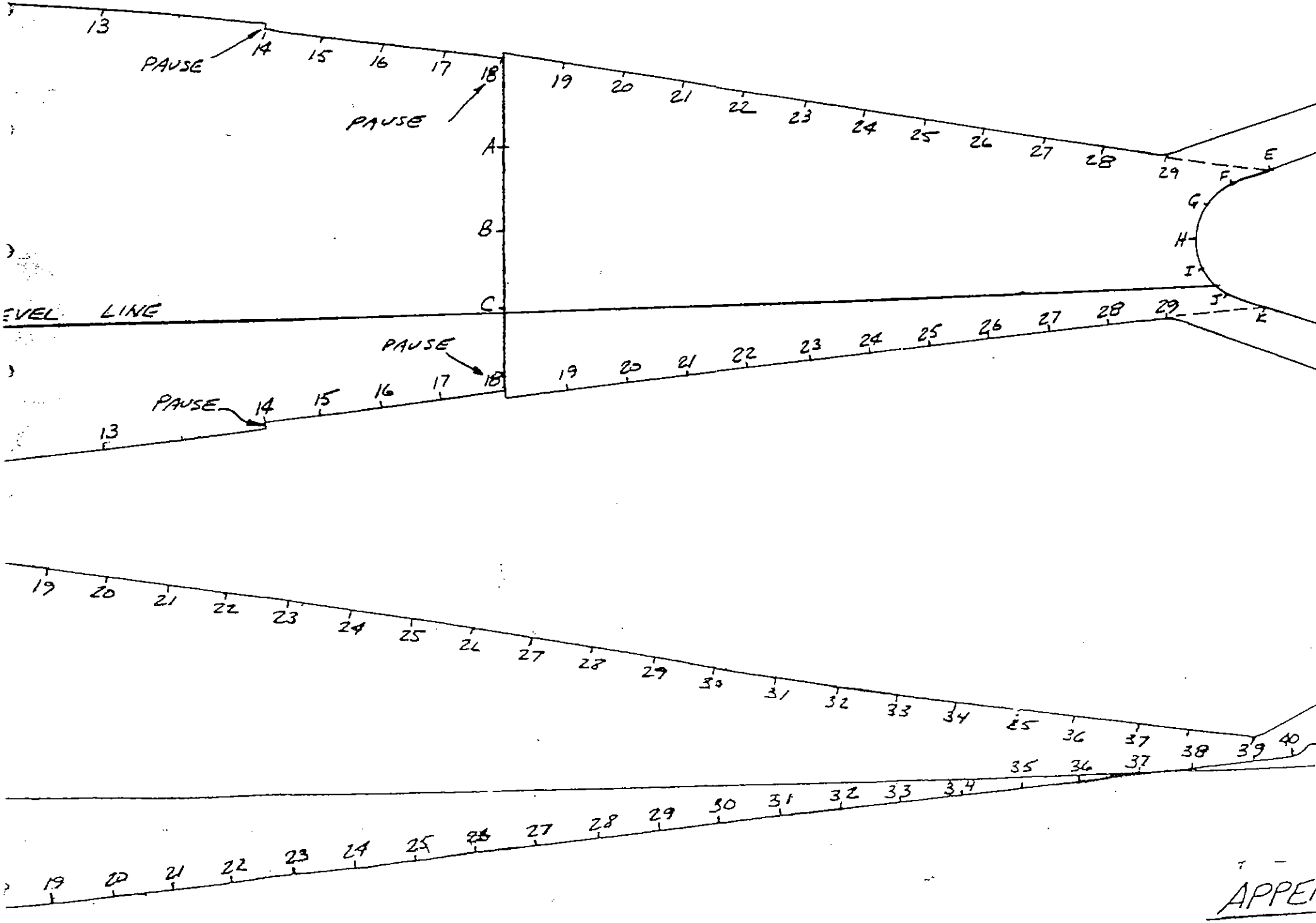
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PAUSE
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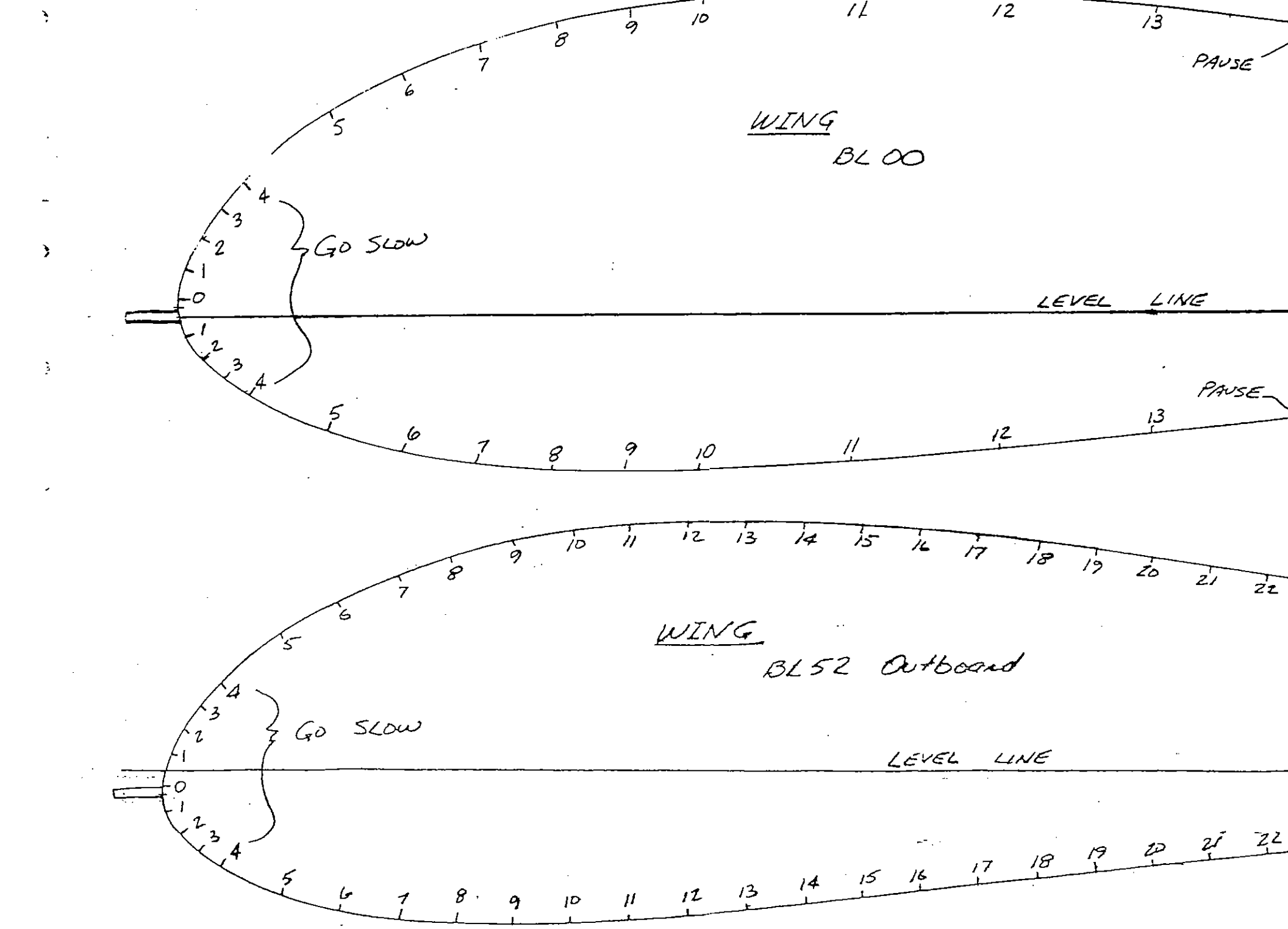
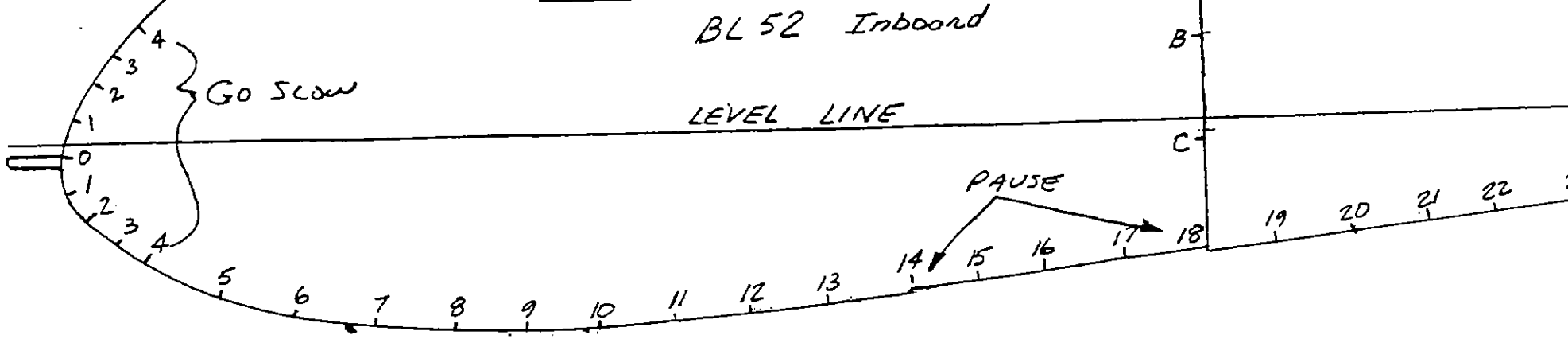
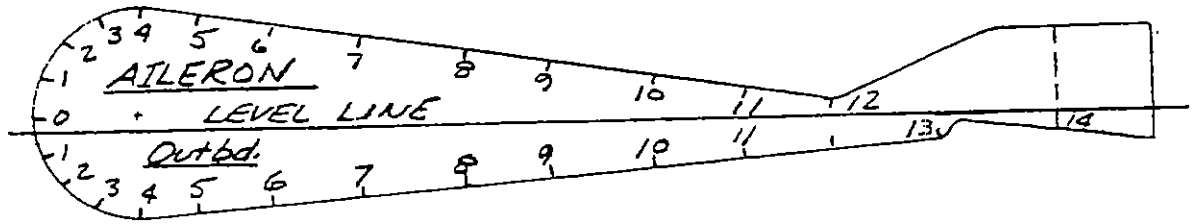
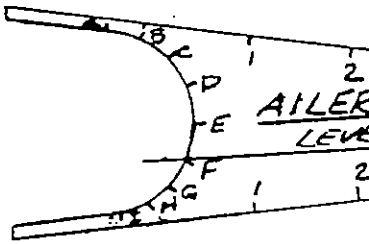
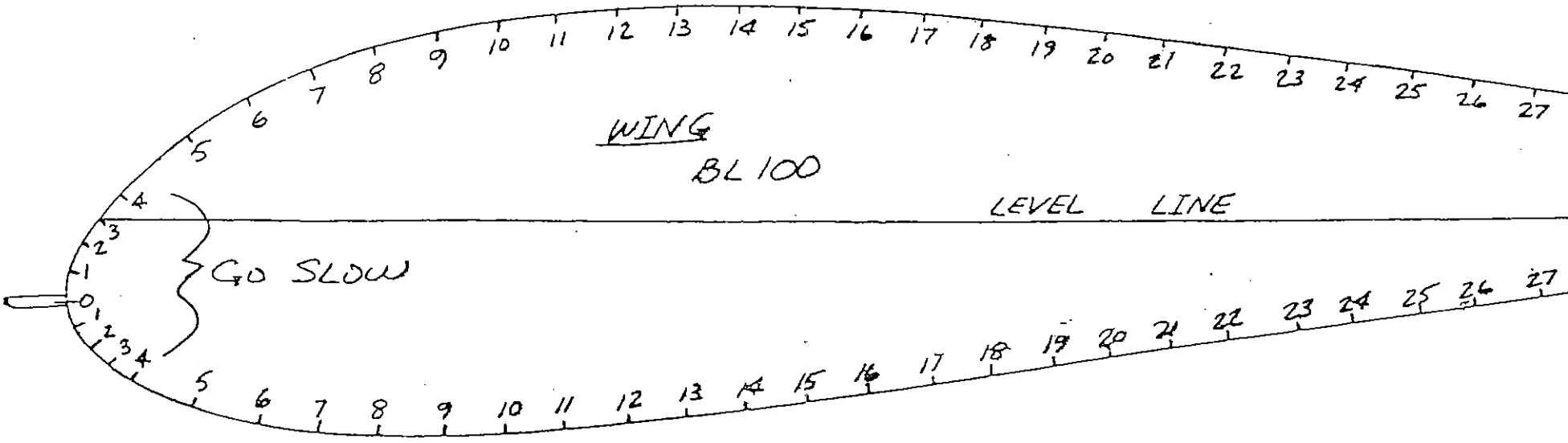

WING
BL 00
GO SLOW
LEVEL LINE
PAUSE
WING
BL 52 Outboard
GO SLOW
LEVEL LINE

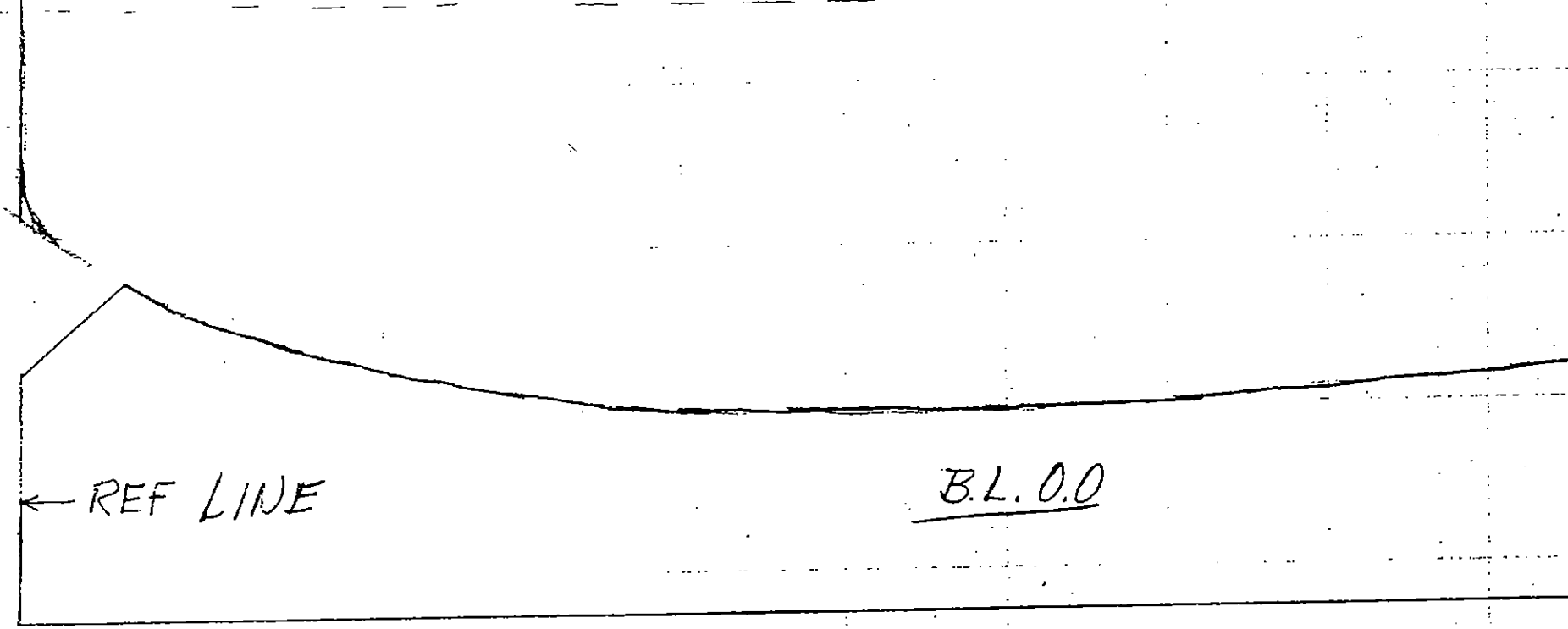

BL 52 Inboard
B
C
LEVEL LINE
GO SLOW
PAUSE
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

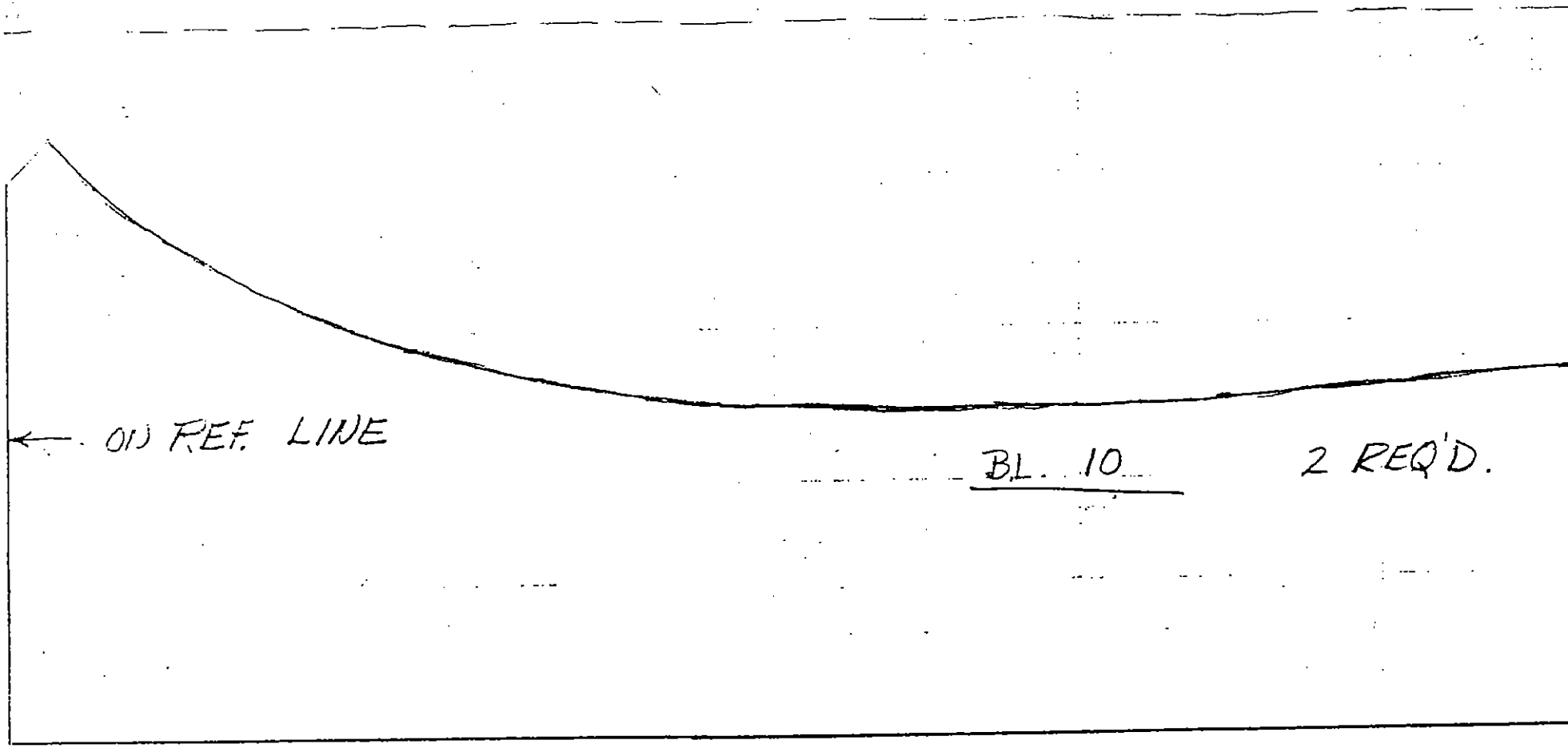

AILERON
LEVEL LINE
Outbd.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Make 2


B
C
D
E
F
G
H
AILER
LEVE


WING
BL 100
LEVEL LINE
GO SLOW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27


REF LINE
B.L. 0.0


OD REF. LINE
BL. 10
2 REQ'D.

B.L. 51

2 REQ'D

WE

B.L. 92

2 Req'd.