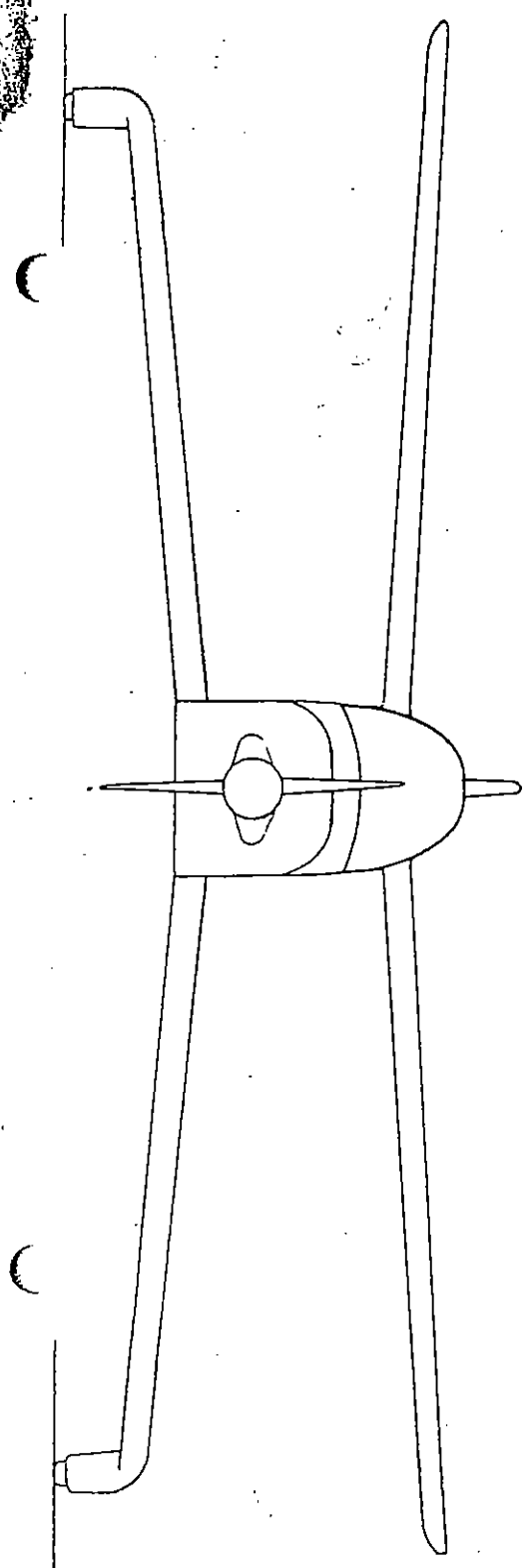
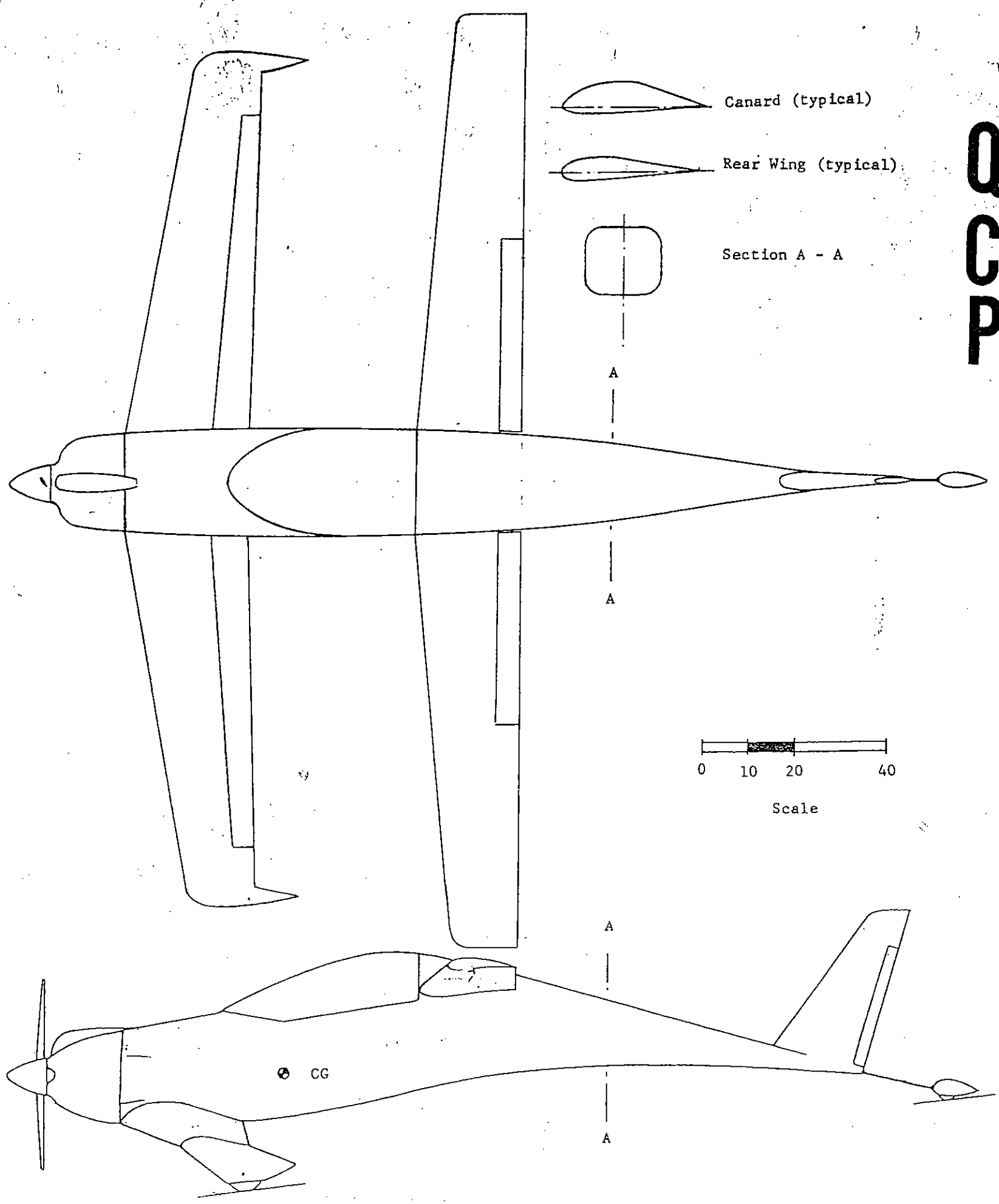




Canard (typical)

Rear Wing (typical)

Section A - A

Scale

QUICKIE CONSTRUCTION PLANS

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

QUICKIE CONSTRUCTION PLANS
TABLE OF CONTENTS

* The remaining pages of the Engine Installation section are included with the Engine Package.

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.

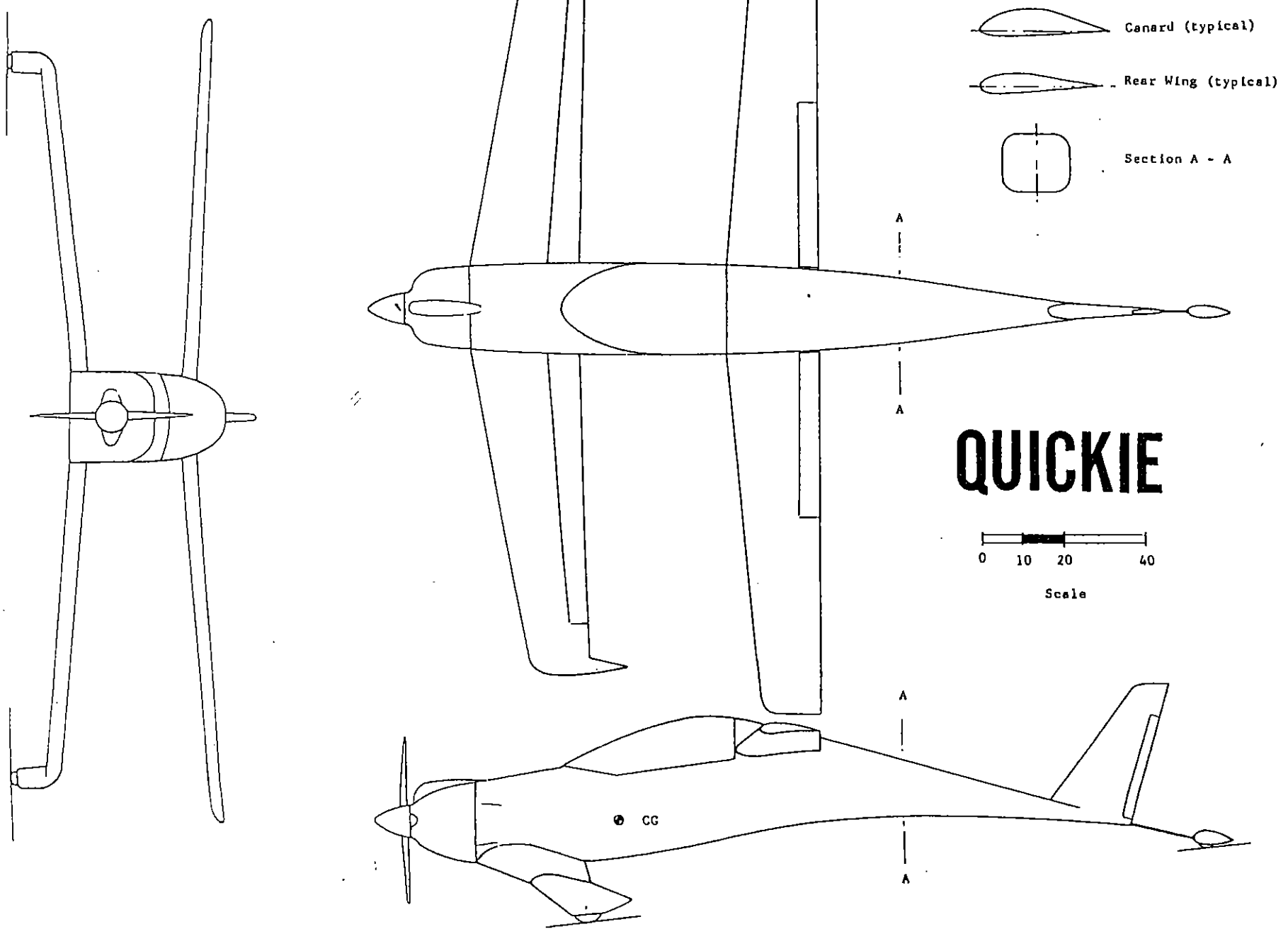
The pitch and roll capability is provided by a side stick controller on the right side of the cockpit. This feature permits precise control of the Quickie while reducing pilot fatigue and cockpit clutter.

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 tailwheel is not raised on takeoff roll like other taidraggers, this positive steering is available until the aircraft is airborne, making for very safe takeoff and landing characteristics.

Even though the Quickie has very low horsepower, it can outperform many general aviation aircraft while retaining unequalled fuel economy. The maximum speed is actually faster than a Cessna 150, and the fuel economy exceeds 100 miles per gallon.

The composite structure of your Quickie provides some important advantages over conventional metal, wood, or fabric construction. It has been tested to loads far in excess of those required for FAA certification. Fatigue margins are higher. Contour is maintained underload, the structure does not "oil can," buckle, or distort. It provides excellent insulation and damps noise. It has no hidden joints, no water traps, and is far less susceptible to corrosion. It is easier to inspect, more redundant and easier to repair. It is not susceptible to thermal stress due to temperature changes. Properly protected from UV, it has an unlimited life.

The engine that powers the Quickie is a reliable four-stroke, direct drive, two-cylinder opposed, engine developed by Quickie Aircraft Corporation specifically for The Quickie. The basic engine on which the Quickie powerplant is based, is an industrial engine made by the Onan company, which has been building engines of this configuration 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 mandatory for those building a Quickie.

Building Sequence

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 cases you can skip to another chapter and build another part while waiting. With a little planning and familiarity with the entire manual, you should be able to use all your time productively.

Questions?

Please follow the following procedure if you do not understand something and need an answer. First of all, do not be concerned if you do not understand everything the first time you read through the plans. Many things that may not be obvoius just reading the drawings, will be obvious when you have that portion of the airplane in front of you or have built a similar part in a previous chapter. Also, we will be able to help you better if you are looking at that portion of your airplane. So, do not ask for clarification until you are really working in that chapter. We have found through our Quickie experience that the majority of questions the homebuilder asks are already answered somewhere in the plans. We have made considerable effort in the Quickie manual to make the information visible. If you do not understand something, study the words in the step, study the sketches and all related sections/views/photos, then look through the full-size drawings that show that portion of the airplane. If its a methods-type question, re-read the education chapter for clarification. If the answer is still not found, it may be that, that item is covered in detail in another chapter (there is some necessary overlap). It is possible that a question related to the operation of a part of the airplane or its maintenance is answered in you owners manual. Also, check your back issues of "The Quickie Newsletter" for plans updates or clarifications. OK, you have checked everything and you are still stumped. You can do one of three things:

1. Ask a friend. Often a description of an item is unclear to one individual and clear to another.
2. Write to Quickie Aircraft Corporation, leaving room on the paper under each question for our answer. INCLUDE A SELF-ADDRESSED, STAMPED ENVELOPE and INCLUDE YOUR AIRCRAFT SERIAL NUMBER. We do our best to answer all such questions within two days of receipt. We cannot answerquestions regarding the application of non-recommended materials or regarding non-approved modifications.

   Quickie Aircraft Corporation
   P.O. Box 786
   Mojave, CA 93501
3. Call Quickie Aircraft Corporation: 805-824-4313.

Also let us know if you have found a better way of doing something. If we agree, we'll publish it in "The Quickie Newsletter" so that all Quickie builders can benefit. If it is not a good idea, we'll tell you why, if you include a self-addressed, stamped envelope.

Do keep us up to date on the progress of your project. Send us a black and white snap shot of your airplane for publication in " The Quickie Newsletter". Photos in the newsletter are particularly beneficial if they are of an area of the airplane that's not clearly shown with photos or sketches in the plans. Remember, the primary purpose of "The Quickie Newsletter" is to support your airplane project.

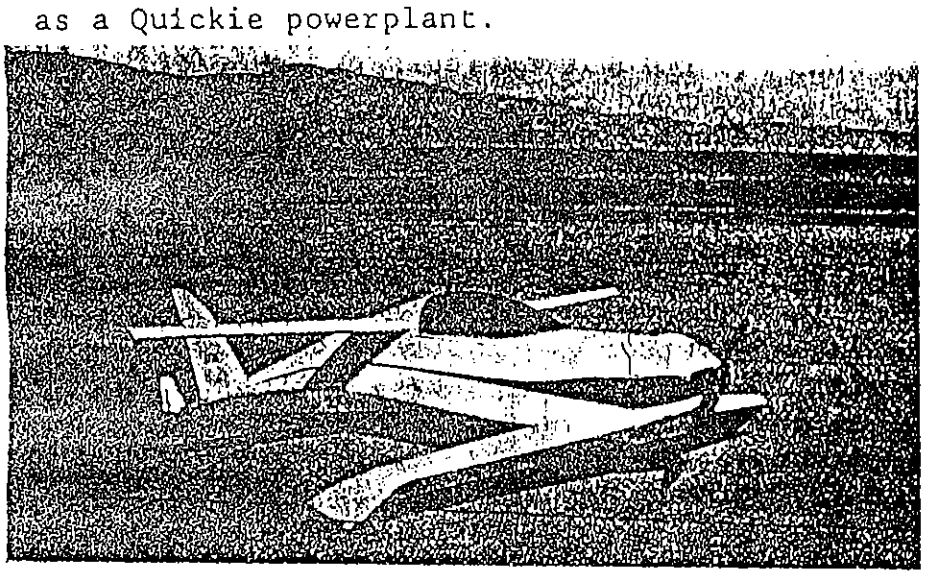
If you are not a member of The Experimental Aircraft Association (EAA), do join. This is the only organization who looks out for the homebuilder as far as FAA regulations are concerned. Membership in your local EAA can be extremely beneficial both in building your airplane and in meeting people who share your interests. Their monthly publication, "Sport Aviation," is worth the $20-per-year membership fee in itself. Write to EAA, Box 229, Hales Corners, Wisconsin 53130. EAA often publishes reports on builder's projects - send them photos and some words on your progress.

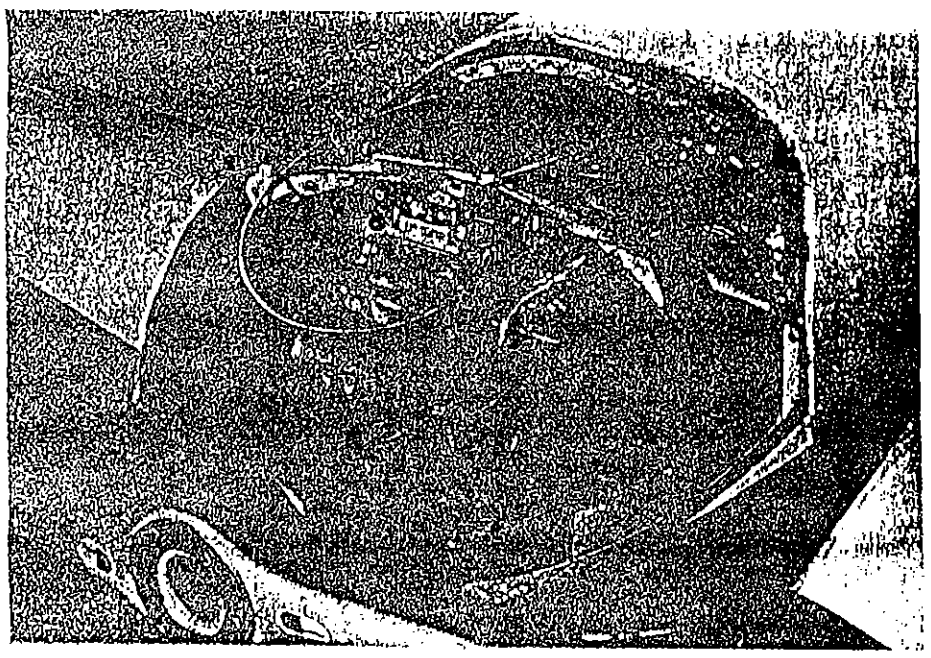
Perspective

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 U.S.A. only. The FAA has a definite procedure for registering and licensing homebuilt aircraft. There is nothing complicated about it but they insist that you follow each step carefully.

1. Contact your local FAA engineering and manufacturing district office or FAA general aviation district office. Tell them you are building a Quickie homebuilt. Give them the following information:
   - 3-View drawing of the Quickie
   - Aircraft serial number
   - Aircraft registration number, if available(see step #2)
   - Approximate date of completion
   - Engine-type

   FAA will then answer you, and give you an idea of how much notice they want for them to inspect your airplane, tell you where the approved test areas are, etc.
2. This step is optional, and applies only if you want to reserve a specific registration number (the number you will paint on the tail). You can ask for all numbers, numbers followed by a single letter or numbers followed by two letters. They are preceded by the letter "N." (For example, N77Q, N79DE etc.) Be sure to give them your second and third choice, in case the number you want is already taken. Send $10 to reserve your special number. Address: FAA Aircraft Registry, Box 25082, Oklahoma City, Ok. 73125. Do not register your aircraft yet, you don't need to pay registration fees, property taxes, etc., until your airplane is ready to fly.
3. When you are ready for inspection* contact your local FAA office. Be sure you have an airframe log book(available from Aircraft Spruce) so that FAA can make an inspection entry.
4. To prepare for your final inspection, be sure you have: the "N" number painted on, the "Experimental" sign(2" high letters) on the canopy frame, the ID plate (available from Aircraft Spruce), and an airframe log book and an engine log book. book.
   Before final inspection, fill out an application for registration (FAA form #AC8050-1), a notarized affidavit that you built the airplane from parts that you bought yourself, and include $5 registration fee. Send those three things to the FAA Registry, Box 25082, Oklahoma City, Ok. 73125
5. After you have made a final inspection of your aircraft, run the engine, conduct low speed taxi tests, etc., (see owners manual), contact your local FAA office and tell them you are ready to fly. They will: have you fill out an application for airworthiness (form #8130-6), inspect your airplane, and issue you an airwothiness certificate and a list of operating limitations, that will restrict you to an unpopulated area for your initial test period (60 hours). When you have completed your initial test period, contact FAA to get your operating limitations amended so you can fly outside your test area.

* Refer to education section - inspection is done to major areas (wing, canard, winglet, fuselage) after the glass is applied, but before the area is painted with any primer, etc., so the glass structure can be inspected. The FAA office has been supplied with the same inspection criteria that you have described in your education section.

BILL OF MATERIALS

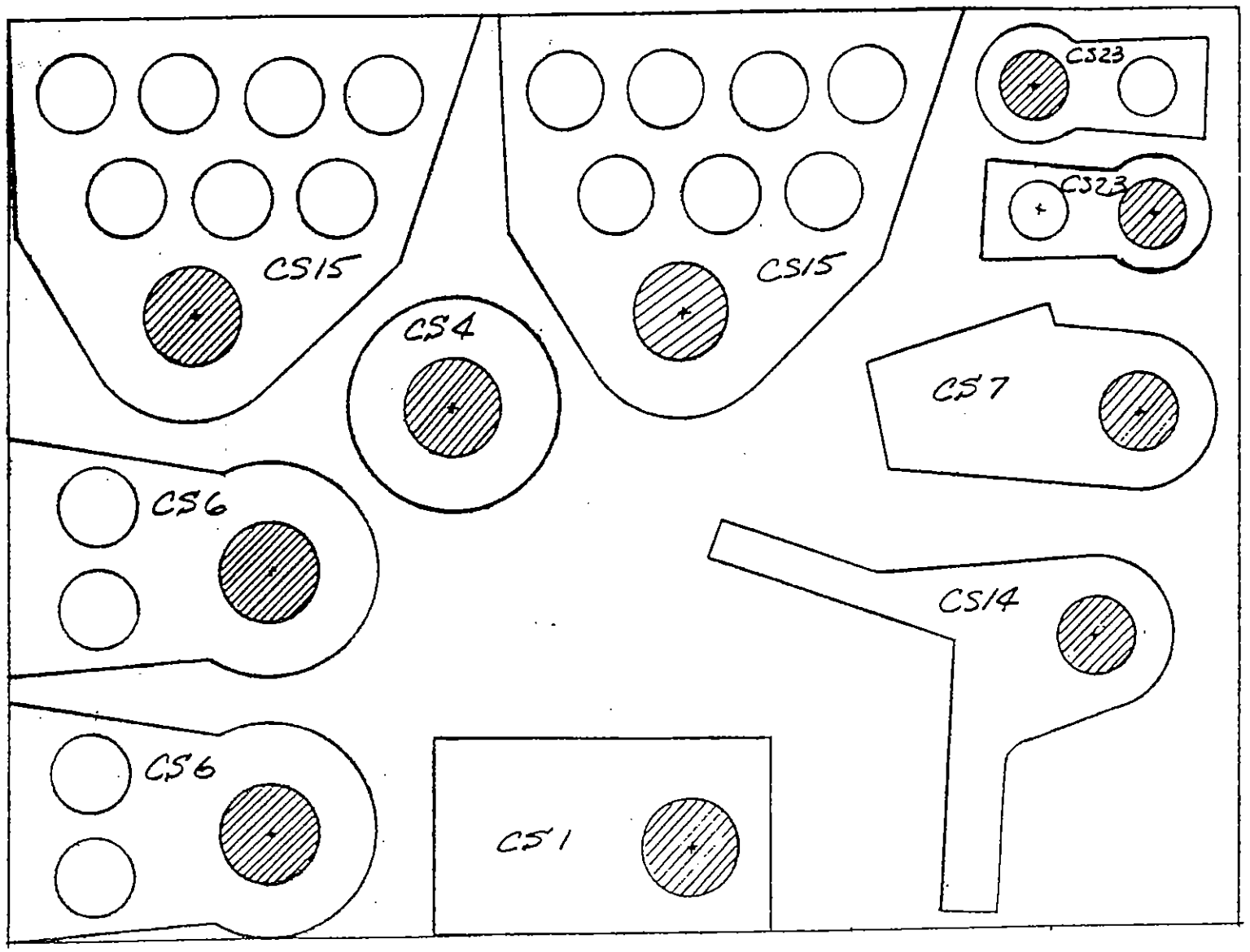
Upon receiving your Quickie kit, you should immediately match the packing list in each box against the actual contents of each box. Any descrepancies should be reported immediately to the appropriate vendor(e.g. Aircraft Spruce, etc.) We can not be responsible for shortages that go unreported for longer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

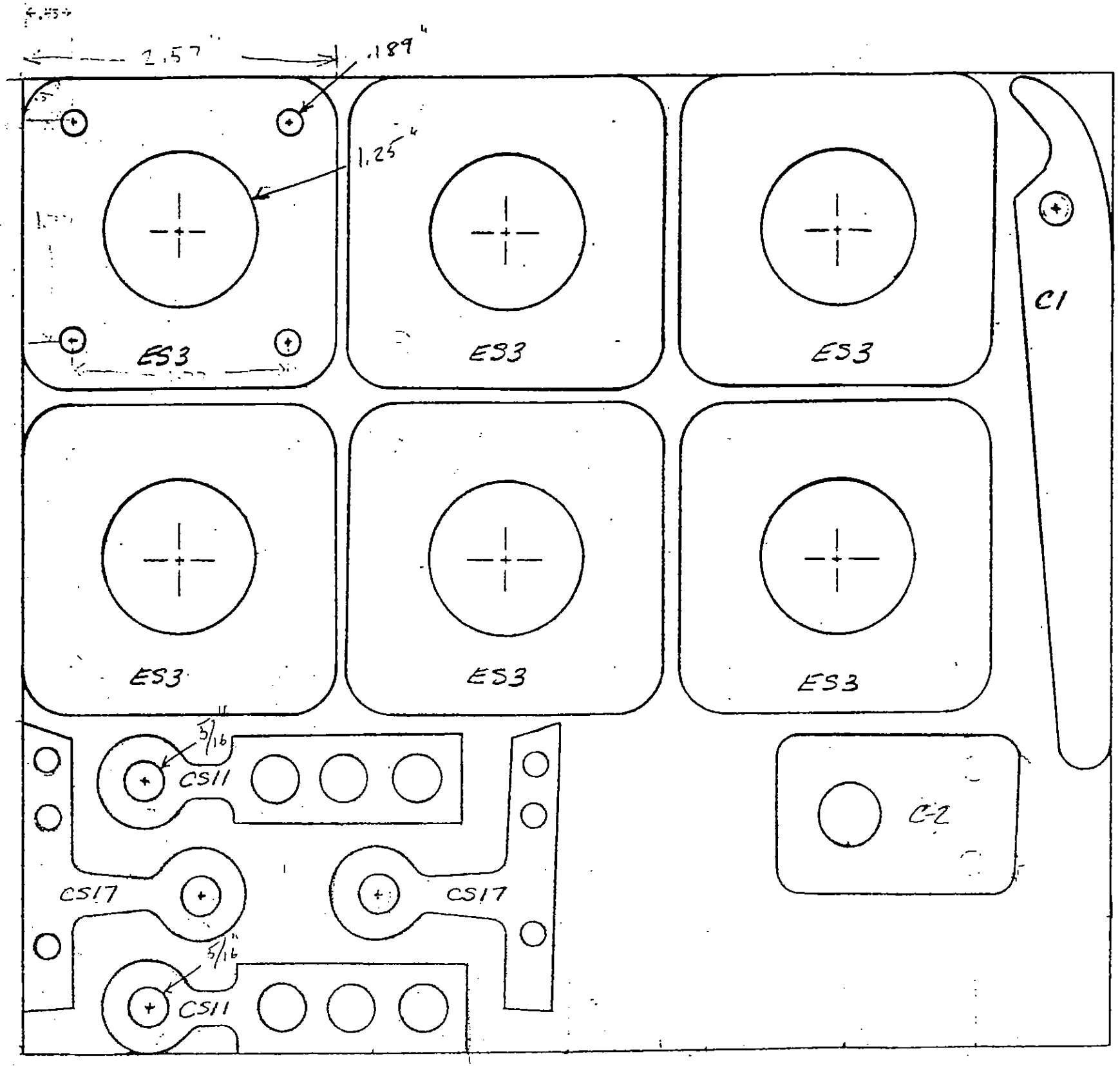


Denotes a precision hole predrilled by Quickie AIRCRAFT CORP.

Denotes a non-precision hole drilled by the homebuilder

MATERIAL: 6" x 8" x 0.25" Phenolic

Phenolic sheet is used in the Quickie for control system bearings. This section includes a full size layout of all of the phenolic bearings in the aircraft. The precision holes have been already reamed to size by Quickie Aircraft Corporation, so that by laying the pattern over the phenolic, you can cut out the parts. The remaining holes you will drill since they are non-critical on diameter and are used to improve the bond between the phenolic and the fiberglass or foam.



MATERIAL: 8"x 9" x 0.125" Aluminum

MAKING THE .125" ALUMINUM PARTS

Included in this section is a full size layout to allow you to make all of the .125" thick aluminum parts in the aircraft. All parts are numbered, and these numbers should be written on the pieces as soon as they have been made to avoid loosing track of them.

ES3 are the engine mount plates. As you can see, there are three pairs of two. The four holes on the first layout are .189" diameter. The first one should be used to drill the holes in the next two, and then these three should be labled left, right, and center, and then used to drill in the remaining one of each pair. Don't allow the pairs to become intermingled. The hole in the center of ES3 is 1.25" in diameter. It may be cut with a hole saw or fly cutter. As before, cut this hole in pairs.

The holes in the eyes of CS11 (2) and CS17 (2) are 5/16" diameter. The rest of the holes in these pieces are to help the bonding and need be only the approximate diameter shown.

The hole shown in C1 is 5/16" diameter, and a CSM4 bushing is pressed into the hole after it is drilled. The hole in C2 is 1/2" diameter.

The squares are used for nutplate mounting.

CSM4 bushings should also be pressed into the "eyes" of the two CS17's and the two CS11's.

PLYWOOD PARTS

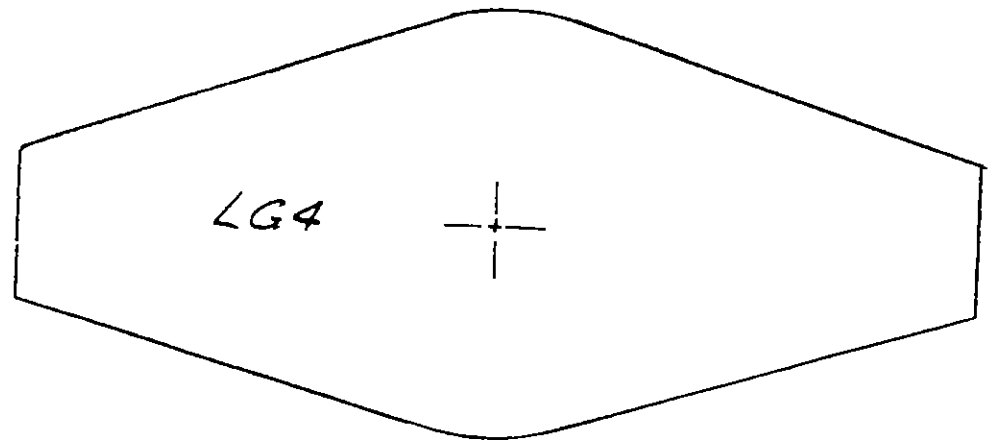
In this section, you will make all of the plywood parts in the aircraft. They are as follows:

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.

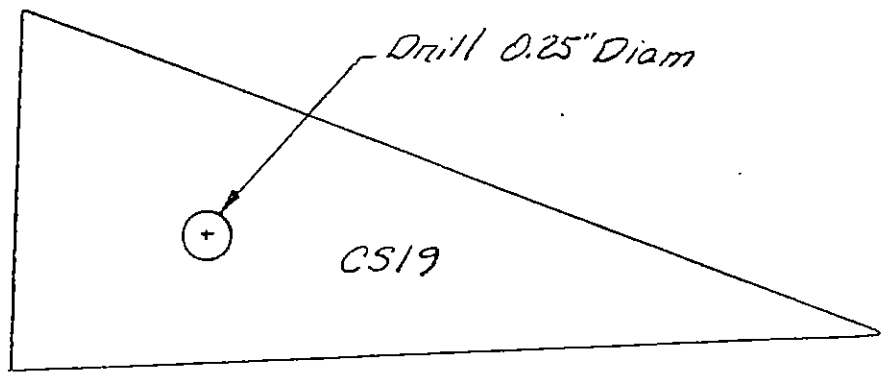
The firewall should be cut so that the wood grain runs horizontally across the firewall. Glass each face of the firewall with one ply of BID at 45 deg. to the grain. A full size flat pattern for the firewall may be found on Appendix sheet 1.

The other parts are glassed after assembly in the aircraft.



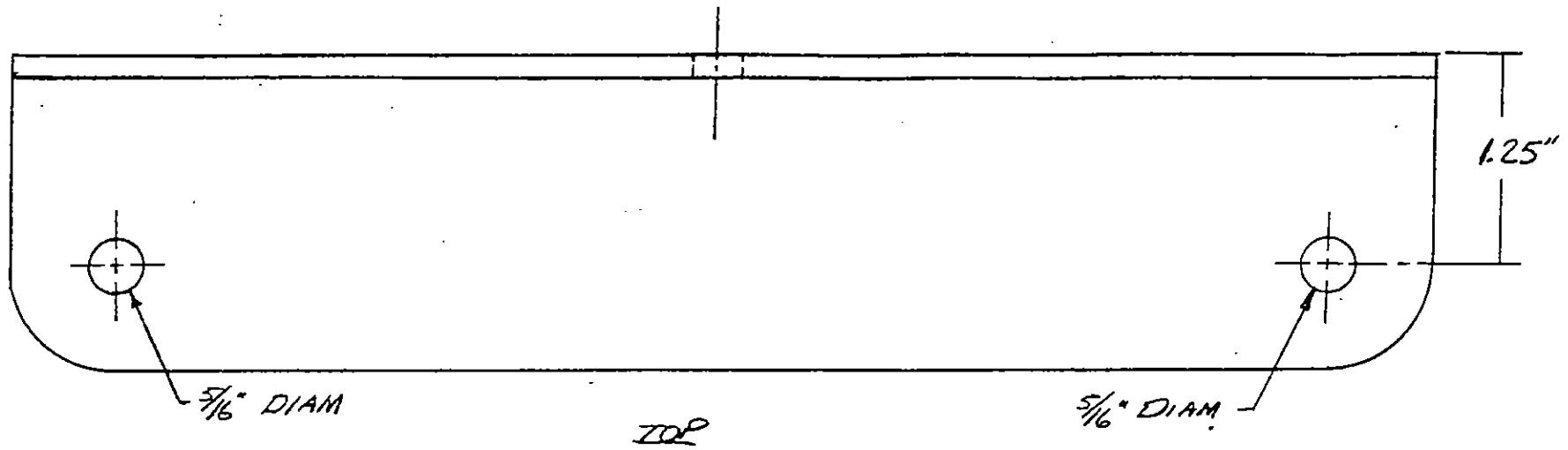
WHEEL PANT REINFORCEMENT

Make 4

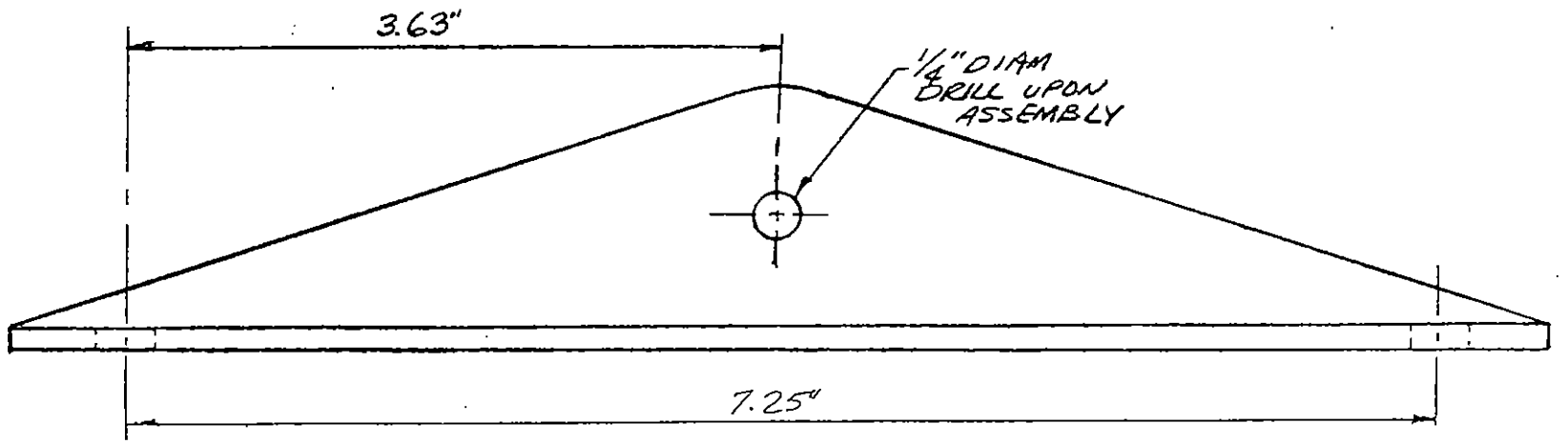


OUTBOARD ELEVATOR HINGE INSERT

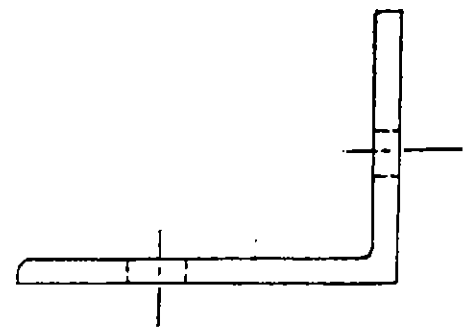
Make 2



TOP



FRONT



SIDE

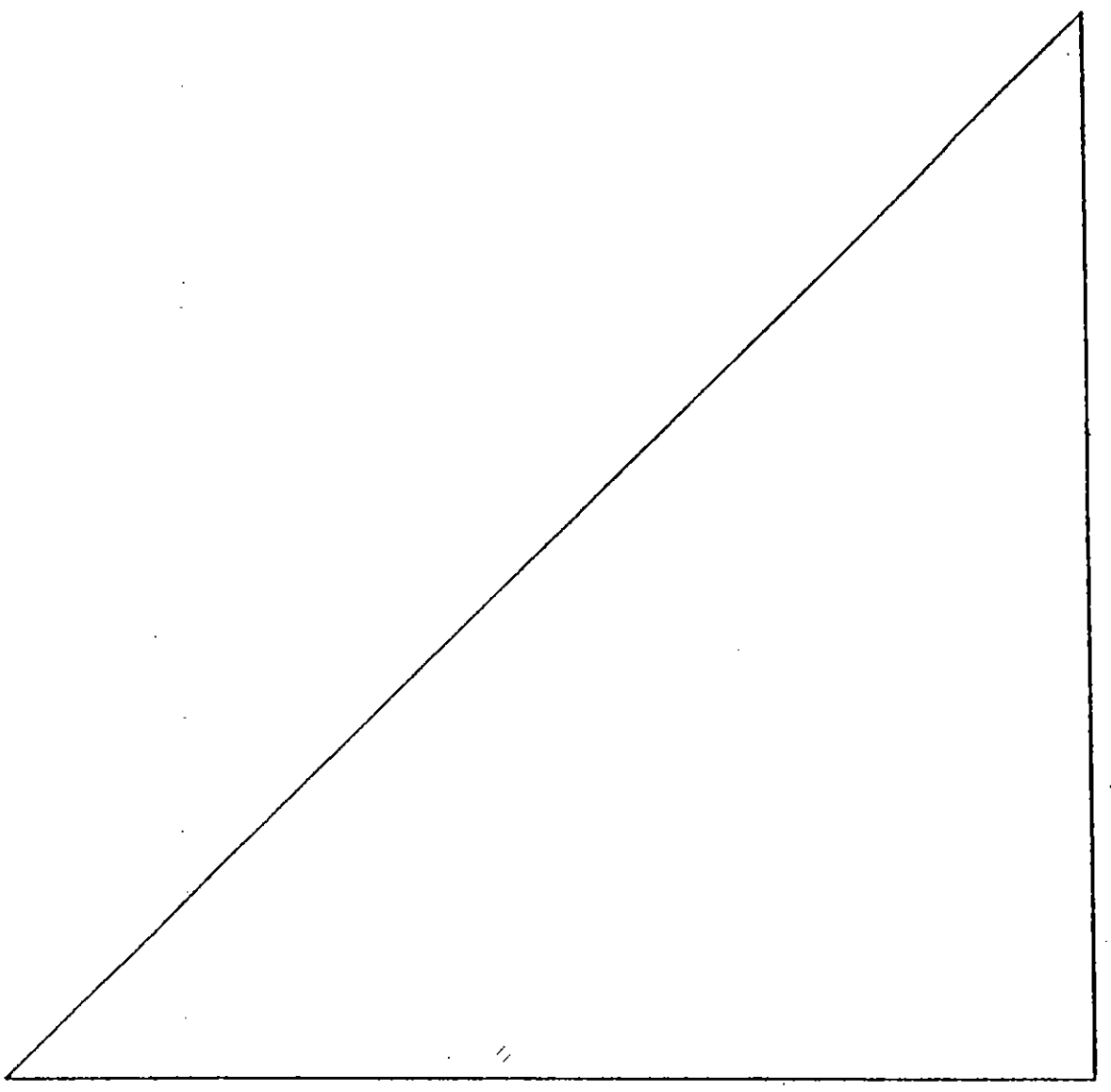
ENGINE LOWER SUPPORT BRACKET (ES6)

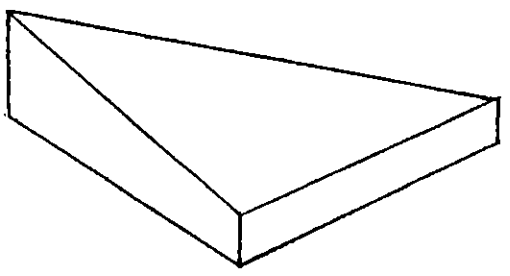
MATERIAL: 1½" x 2" x 0.125" 6061 T6 AL Angle

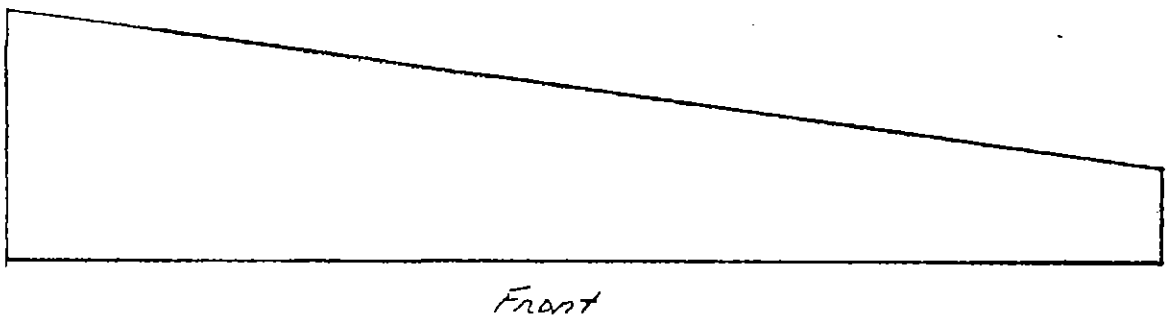
The red foam (approx. 5.9"x10.6"x1") included in your Quickie kit is used to make the following parts:

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.

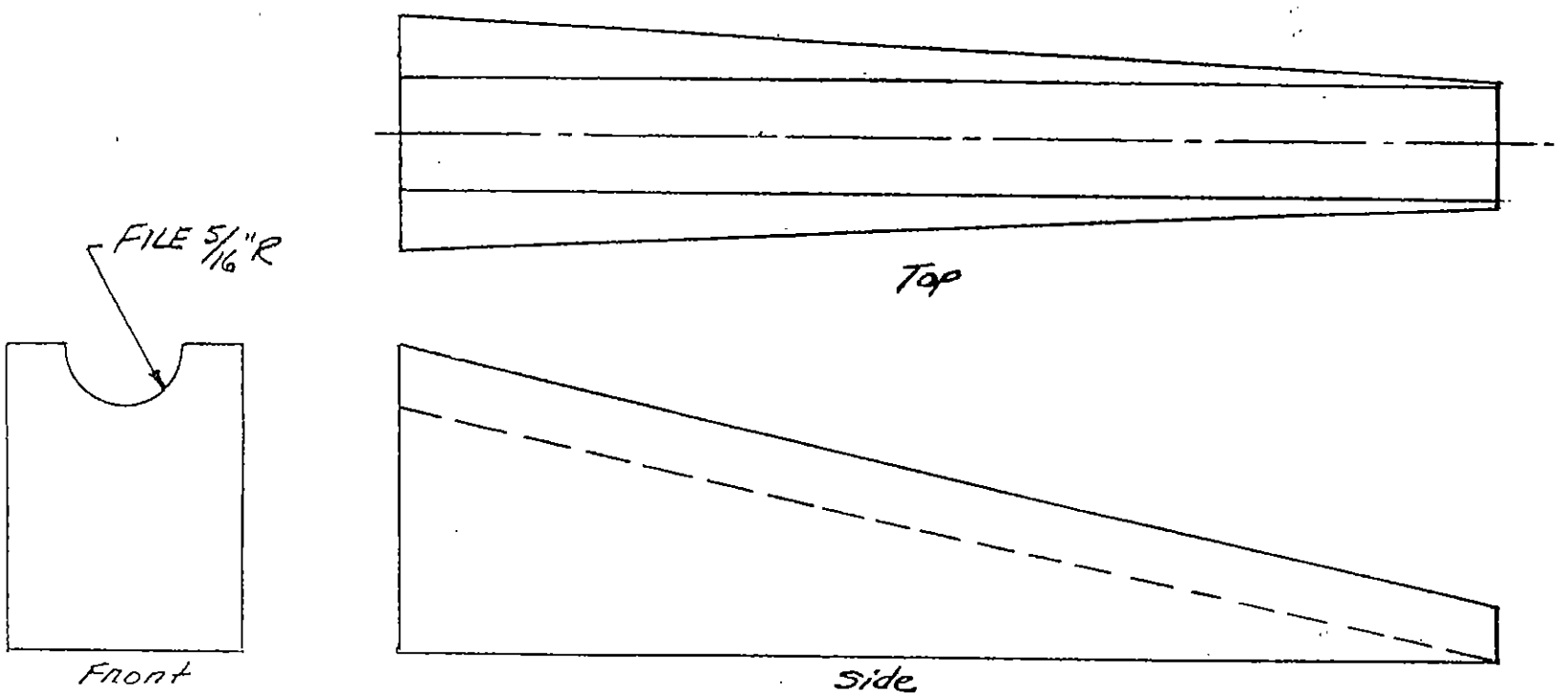




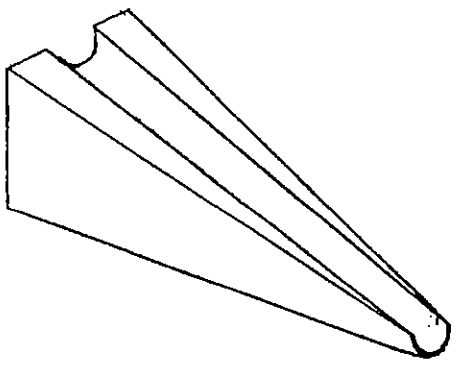


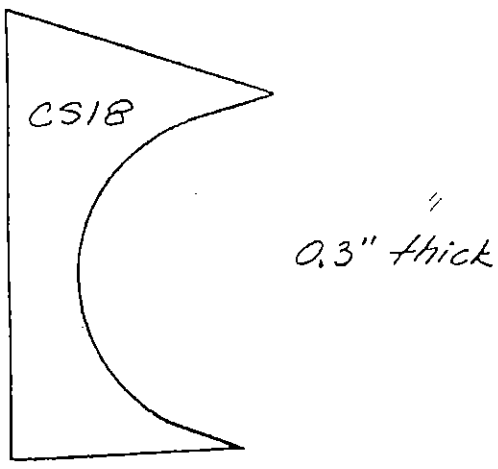
VERTICAL FIN REINFORCEMENT

CONTINUED ON NEXT SHEET



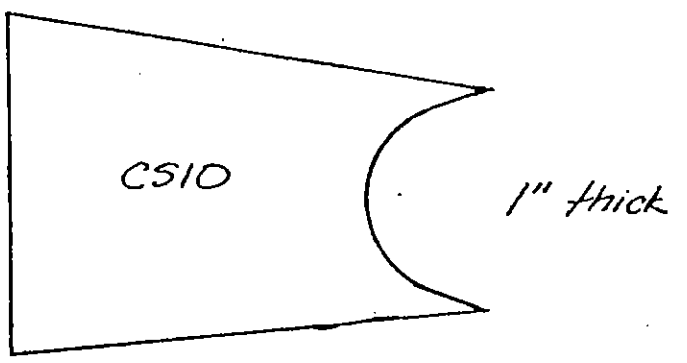
TAILSPRING SUPPORT





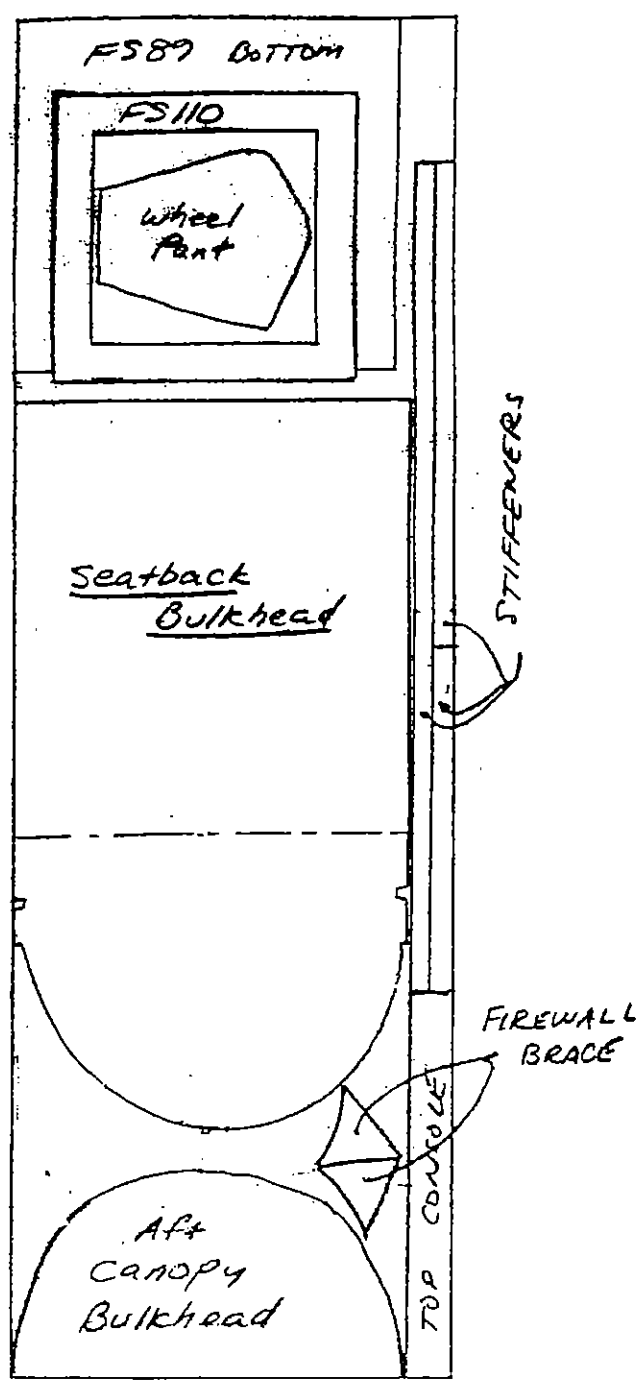
ELEVATOR CENTER HINGE SUPPORT

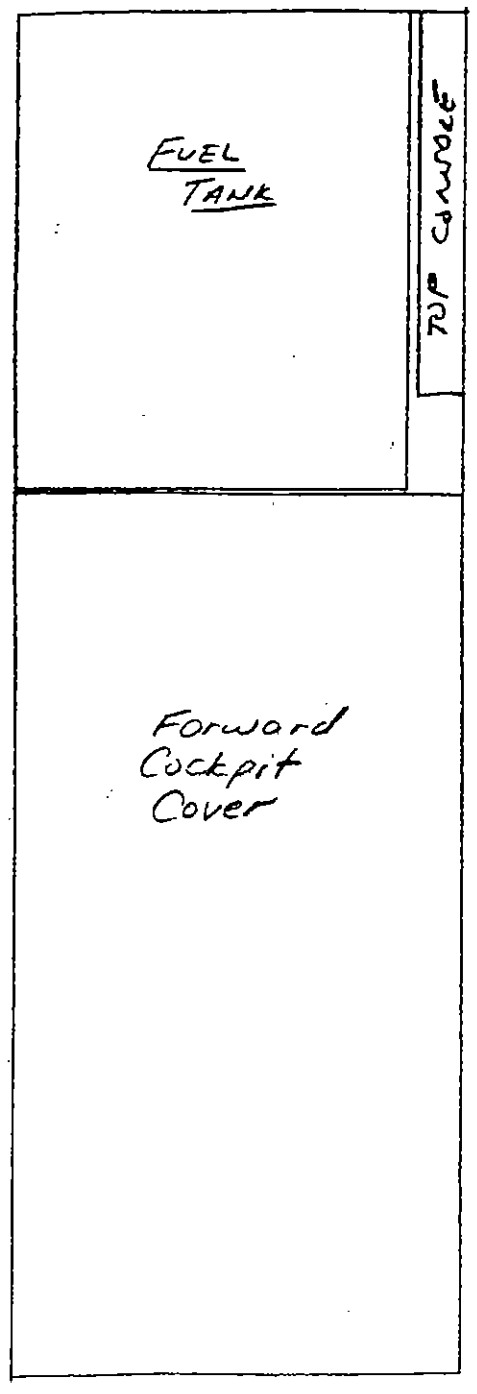
Make 4

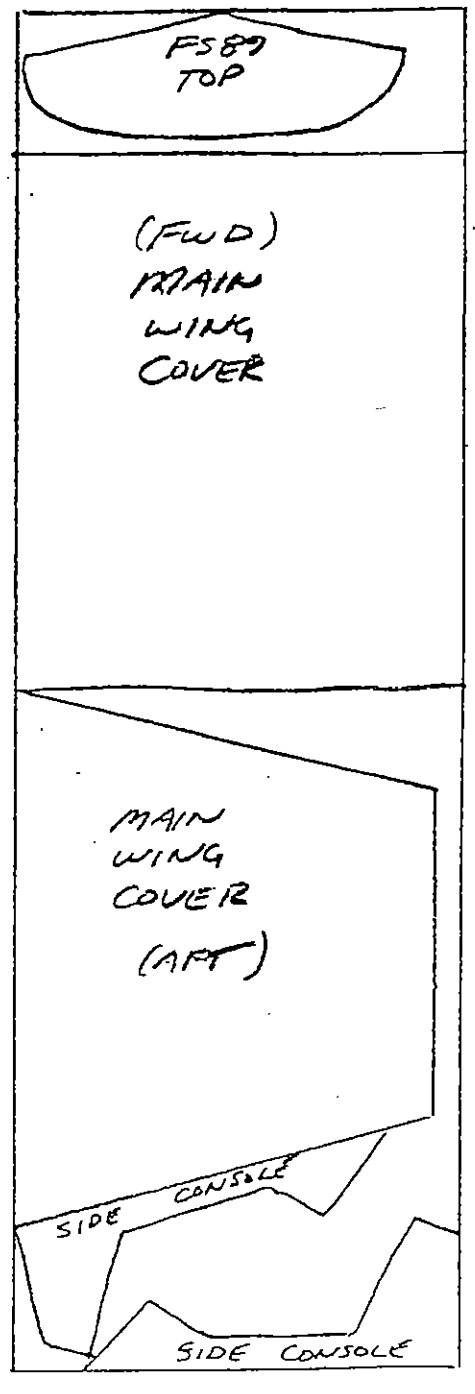


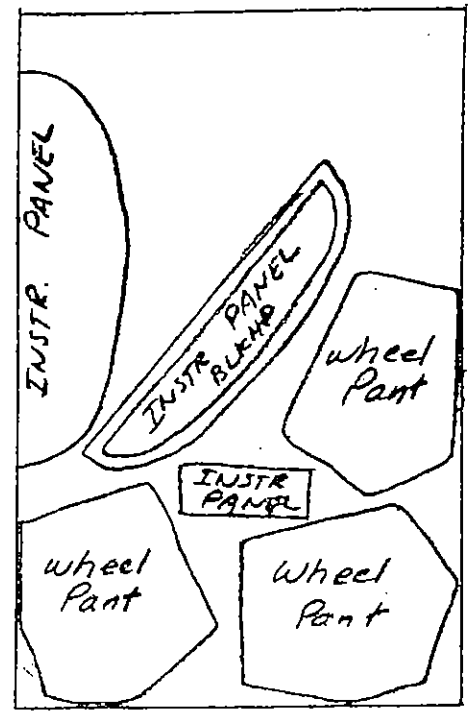
AILERON HINGE INSERT

Make 2









PAGE 4-7

SUGGESTED ORANGE FOAM LAYOUT

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, the foam cores should be left in the foam blocks until needed. This will minimize any warpage. Foam should be stored in a cool, dry place and kept out of the sun.

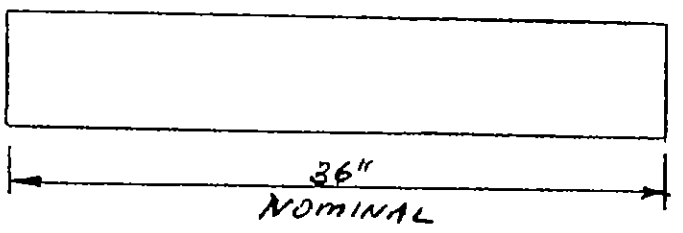
An alternate method is to only hot wire cores right before you use them. This method is suggested for those of you who plan to stretch out construction.

Now is the time to make templates of all of the cores that you will be working with. They are all included full size. We recommend either formica or masonite for the template material. Note that you need to make two of the following patterns: Canard BL10, Ailerons(inboard and outboard), and rudder.) Also, you will need to duplicate the numbers and level lines on each side.

In order to keep the foam cores stable, you should hot-wire the templates at the top of the foam core first.

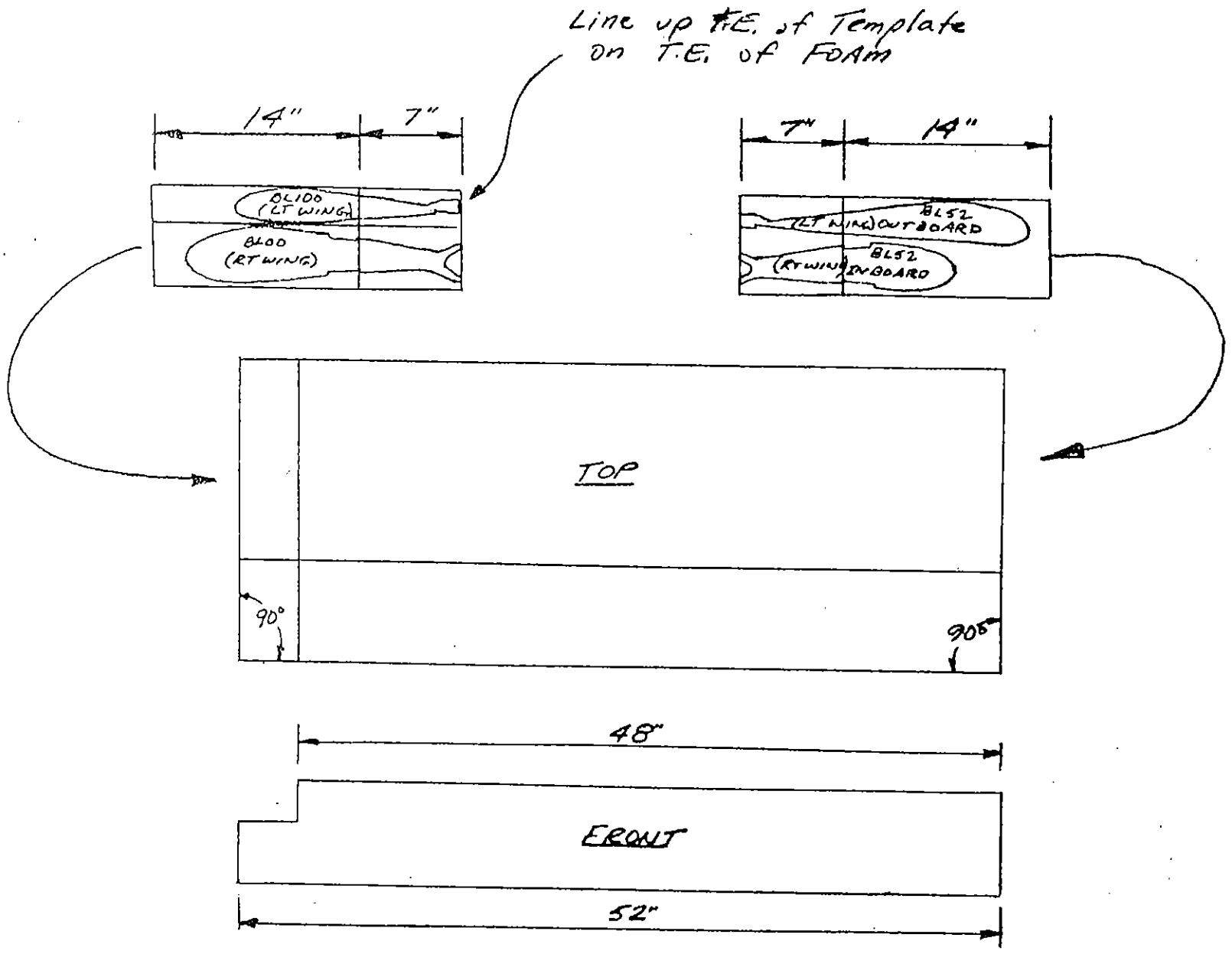
Main Wing

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.



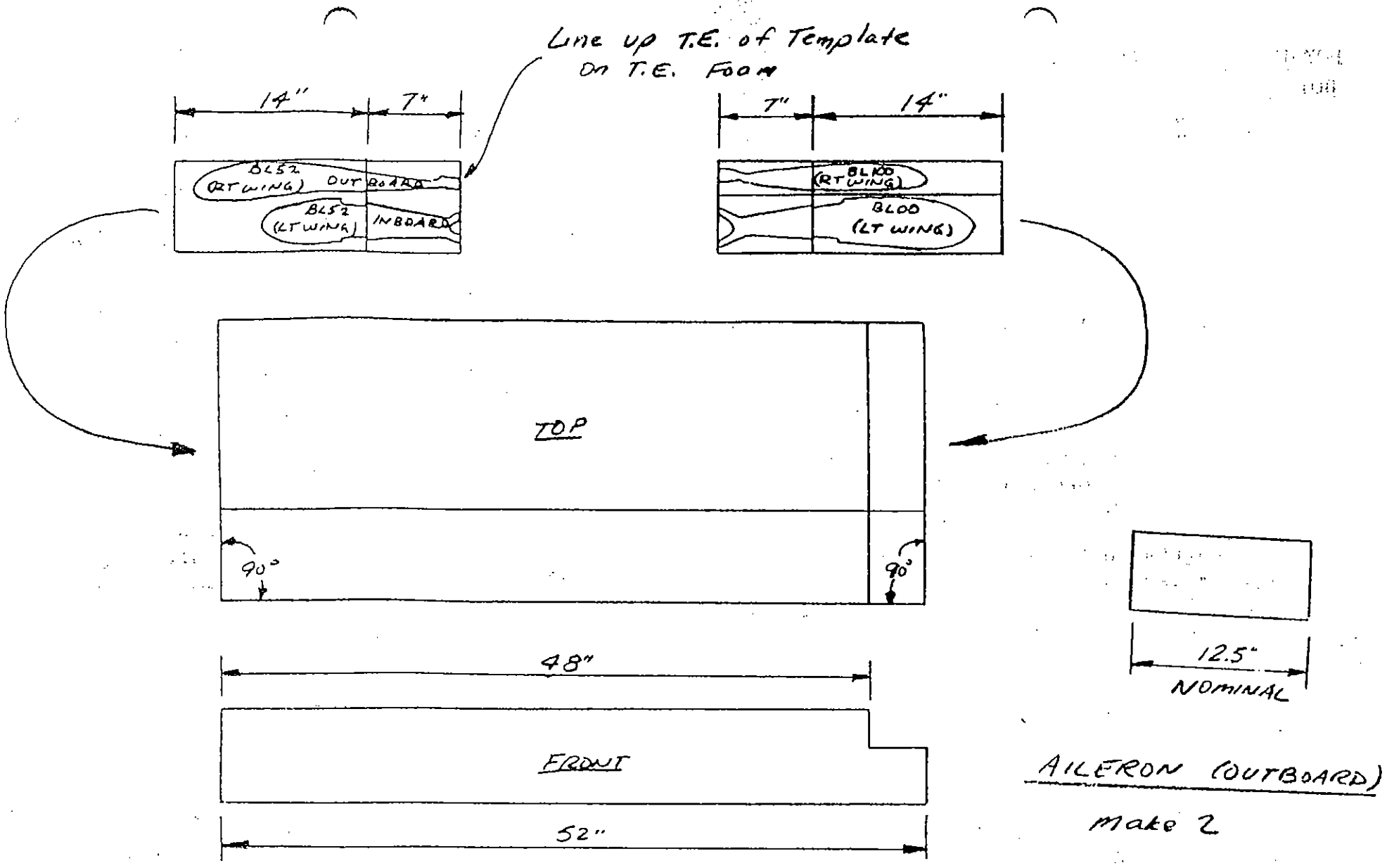
AILERON (INBOARD)

make 2



LT WING BL52 (OUTBOARD) TO BL00

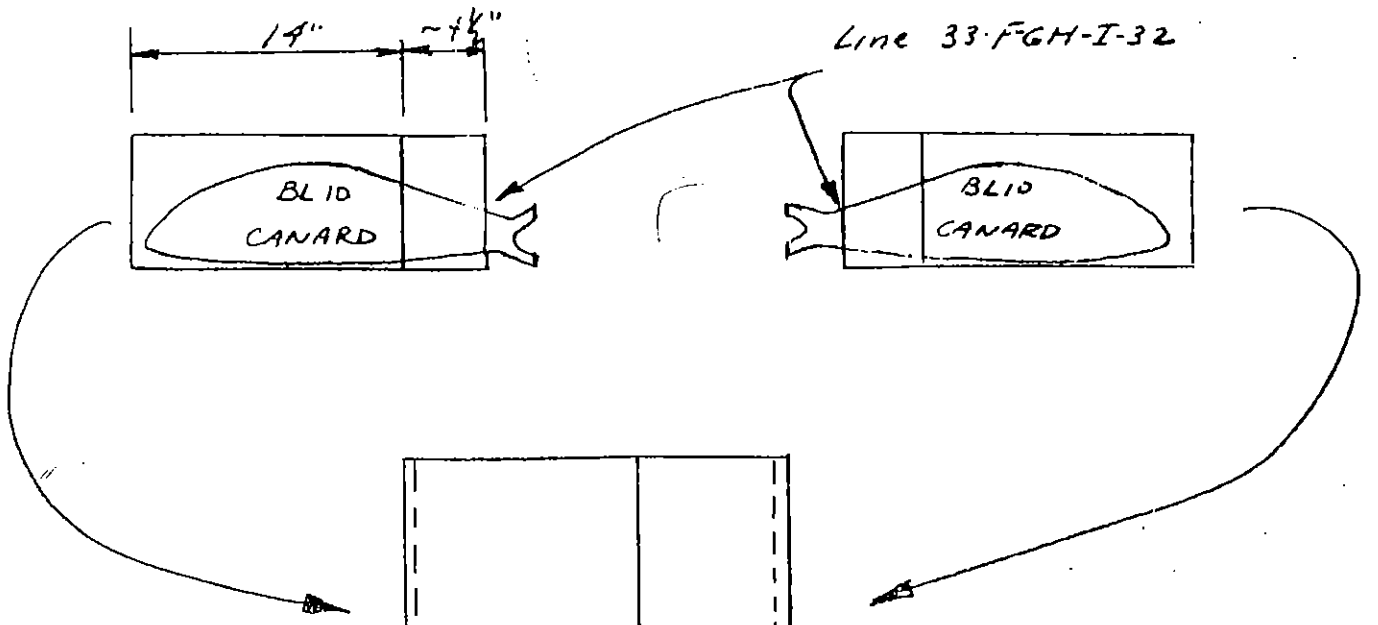
& RT WING BL00 to BL52 (INBOARD)



AILERON (OUTBOARD)

Make 2

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



CANARD CENTER SECTION
BL10 to BL10

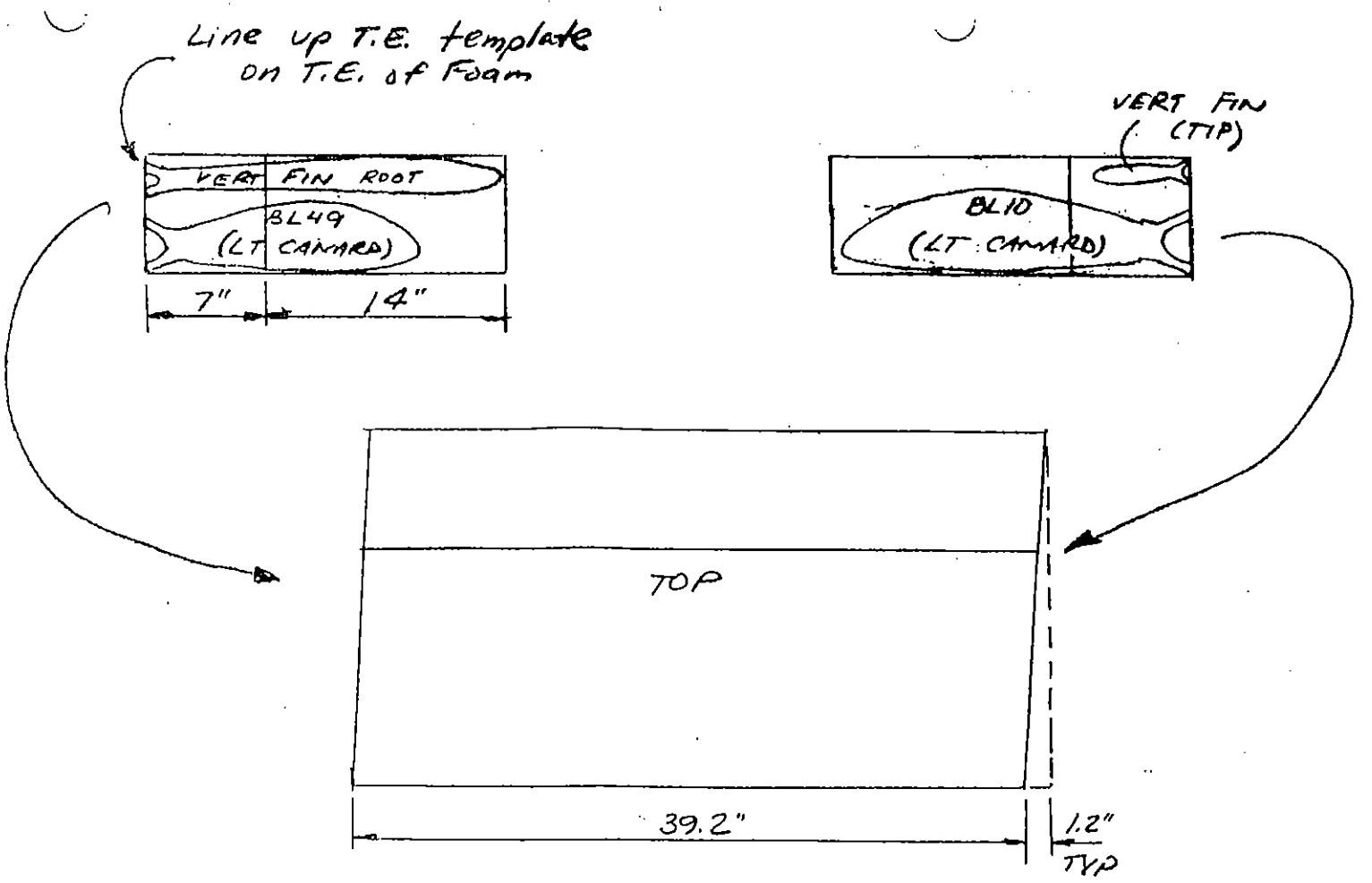
Canard

Round up the five 7" x 14" x 41" blue foam blocks. They will have to be "faced" with the hot wire, as shown, to obtain the proper trailing edge sweep.

The center section is made from the three 7" x 14" x12" blocks left over from the main wing.

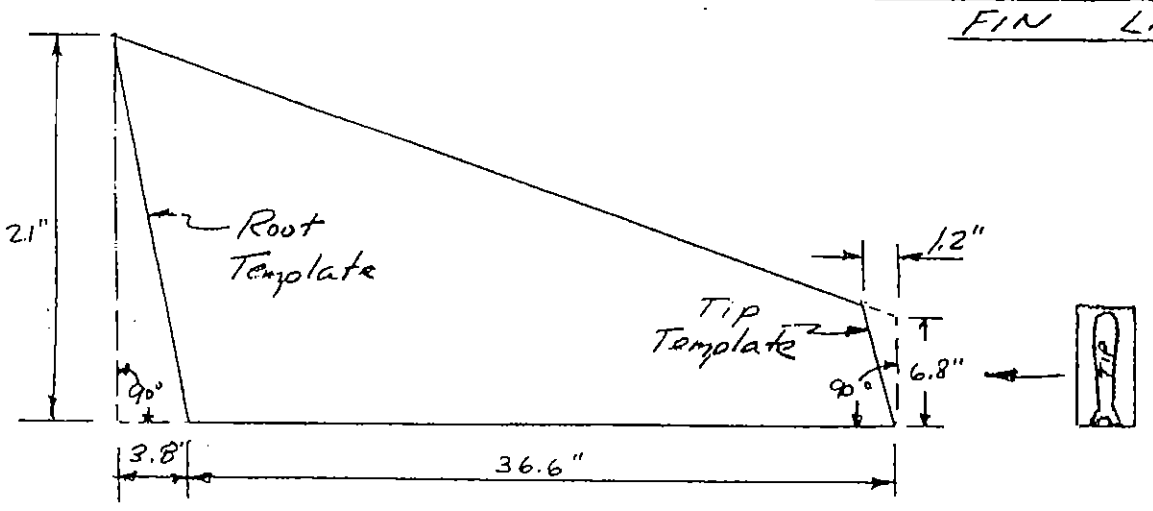
The canard stiffener(20-A-B-C-D-E-23) is made by cutting the appropriate templates and hot wiring the stiffener out of the foam cores. Be careful in handling the stiffener since it will be fragile.

A sketch is also included showing how the vertical fin templates must be laid out using the remains of the foam cores.

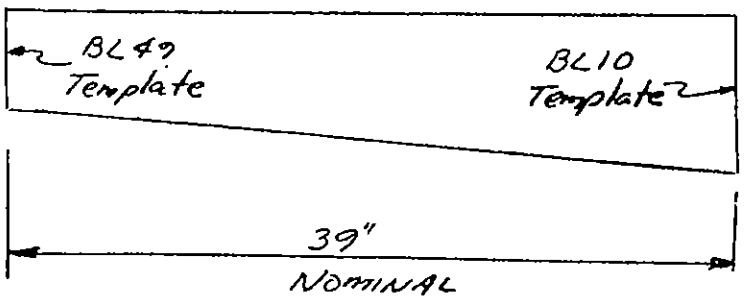


LT CANARD BL10 to BL49

VERTICAL FIN (SEE VERTICAL FIN LAYOUT).



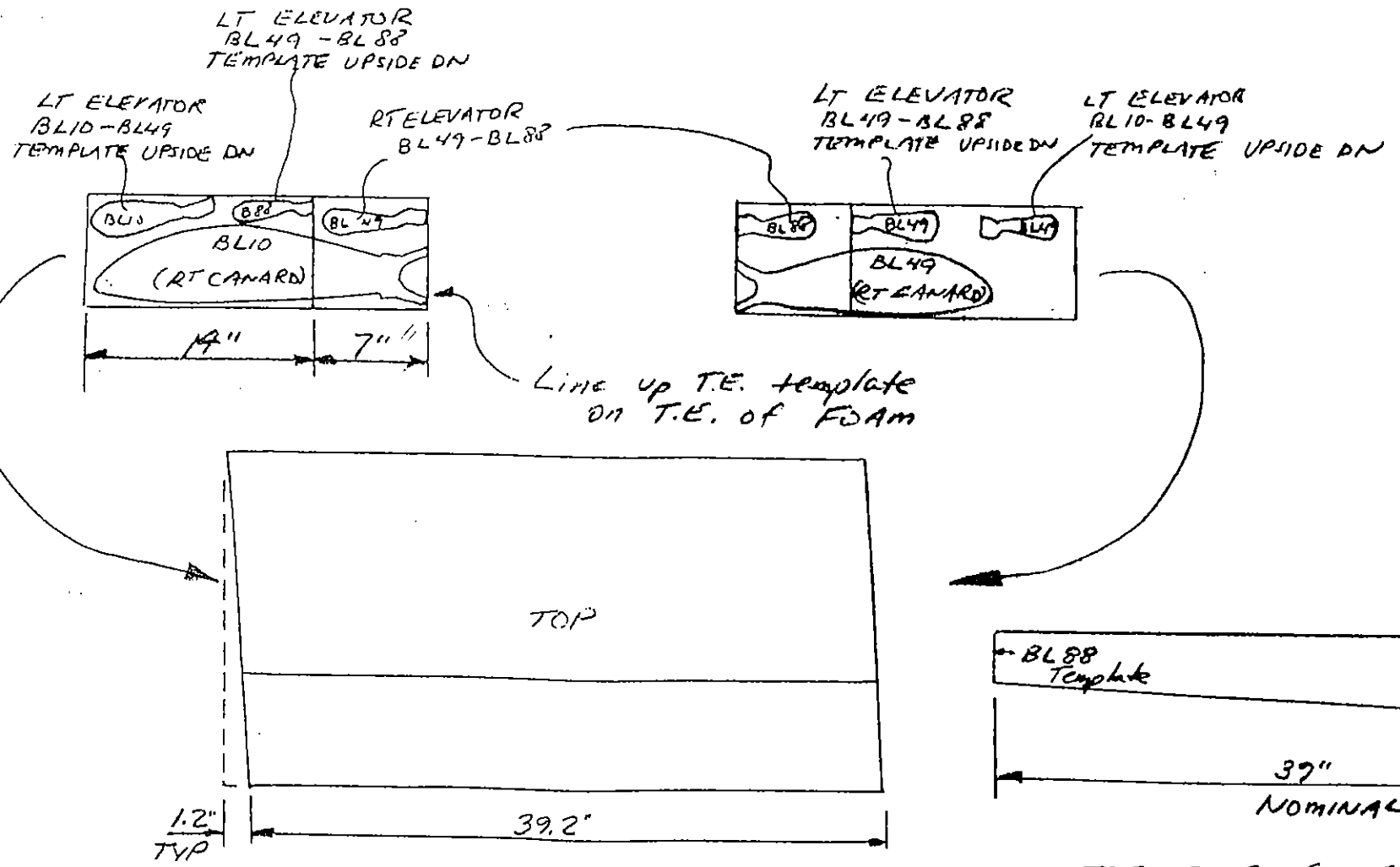
VERTICAL FIN



ELEVATOR (INBOARD)

MAKE 1 LEFT (SHOWN)

MAKE 1 RIGHT (MIRROR IMAGE)



RT CANARD BL10 to BL49

LT ELEVATOR

RT ELEVATOR (BL49 - BL88)

ELEVATOR (OUTBOARD)

MAKE 1 LEFT (SHOWN)

MAKE 1 RIGHT (MIRROR IMAGE)

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.

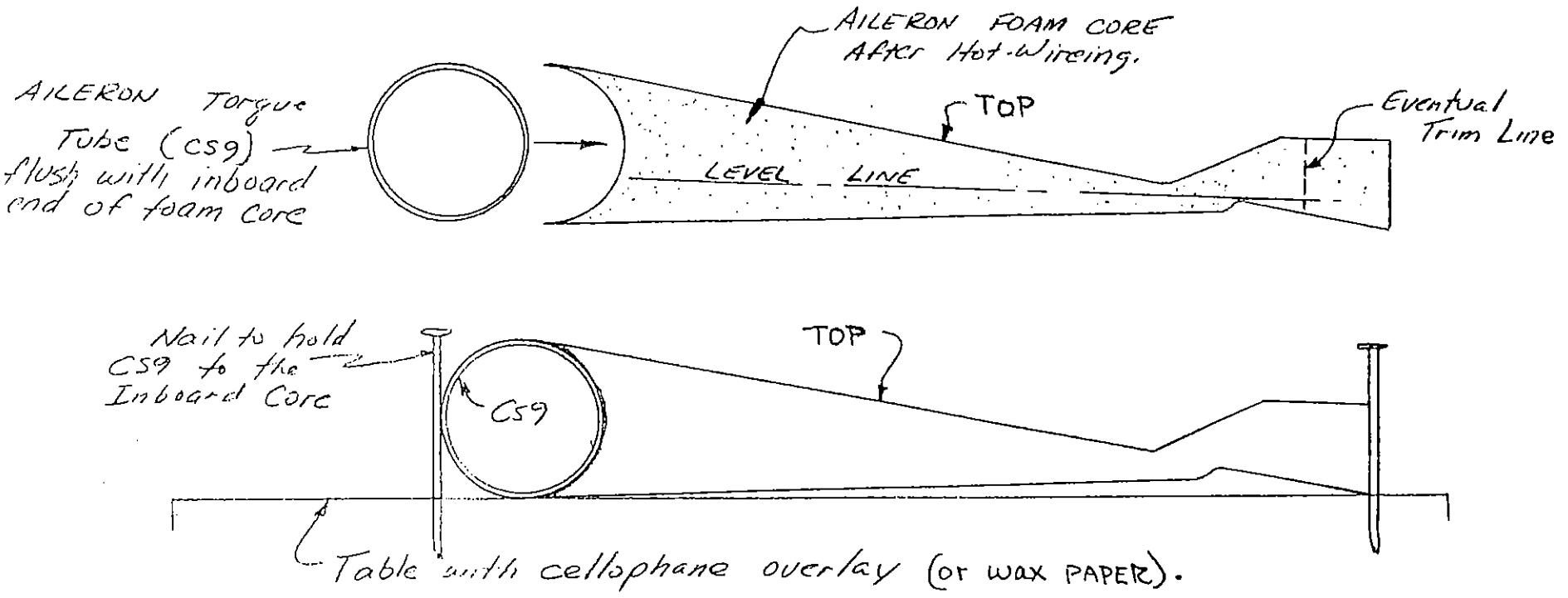
Begin by sanding CS9 to remove grease, finger prints, and the oxidation layer on the aluminum. Fit CS9 to the inboard foam core; mix up some micro slurry, and join CS9 to the inboard core on a flat surface. Use nails to hold the two pieces together.

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 has cured, you are ready to glass the bottom skin after sanding away all of the bumps and joggles. Turn the aileron over and lay it flat on the table. Put Peel Ply along the trailing edge by using small tacks to hold it in place. Layup one ply BID at 45 deg. to the trailing edge. At the leading edge, let it drop vertically to the table. Cut the trailing edge past the "eventual trim Line" that is called out.

When this layup has cured, turn the aileron over and lay it flat upon the table. At the leading edge, feather the BID ply to the foam to remove the joggle. At the trailing edge, sand off the "tail" until you reach the Peel Ply. Remove the Peel Ply, and the aileron is ready to glass. Layup one ply BID at 45 deg. to the trailing edge. At the leading edge overlap a minimum of 0.5". At the trailing edge, layup glass to glass. Leave the aileron alone until after curing to avoid tampering with the alignment.

Leave the trailing edge untrimmed until after the aileron is mounted on 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.

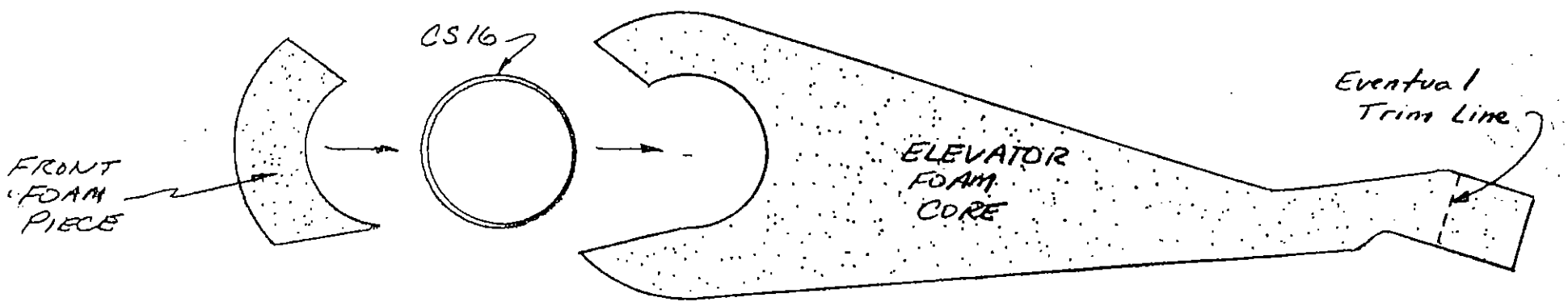
Begin by rounding up CS16, which is a 6 ft. length of 1" O.D. x .035" wall 2024T3 aluminum tubing. You have already hot wired the inboard and outboard elevator cores, so gather these together also. When the cores are joined they should total 6 ft. in length.

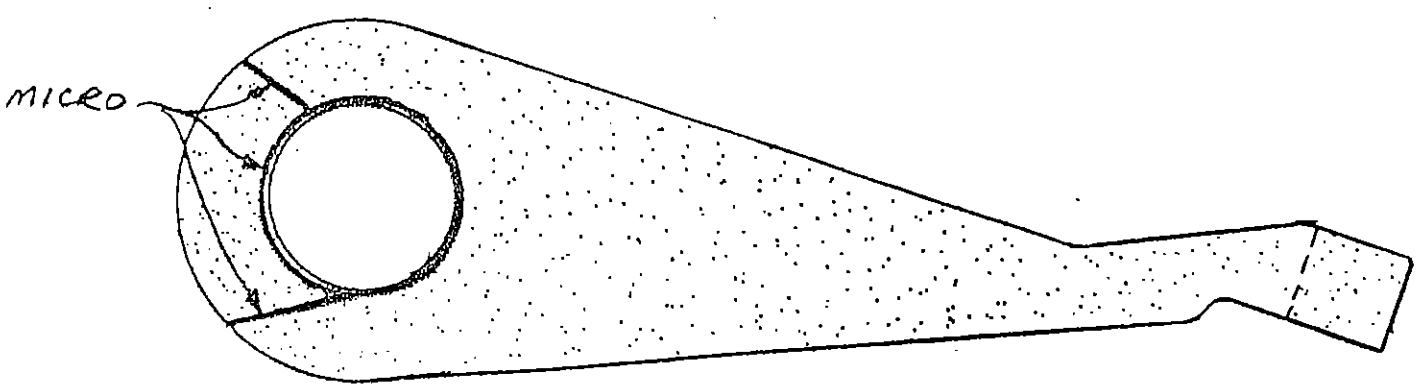
Basically, you will join the inboard and outboard core together, insert CS16, replace the front foam pieces, sand the combination after curing to remove bumps and joggles, layup the bottom skin, layup the top skin, and final trim the trailing edge after installation.

First, check to make sure that the cutout for CS16 that you hot wired in the foam cores is large enough by putting the cores, CS16, and the front piece together dry. If the front piece won't clamp up against the core, carefully enlarge the cutout for CS16 until it will.

Sand CS16. Mix up micro, paint it on both CS16 and wherever CS16 comes in contact with foam. Join the inboard and outboard foam cores together; then insert CS16; then insert the front foam piece. Do not telescope CS16 into the core by pushing it from one end; this will cause voids in the bond. Instead, it should be inserted all along the span at one time. Use nails to hold everything in place while it cures(see aileron section).

The elevator receives one BID at 45 deg. to the trailing edge. Lay up this one ply exactly like you did with the ailerons.





COMPLETED ELEVATOR (TYPICAL)

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.

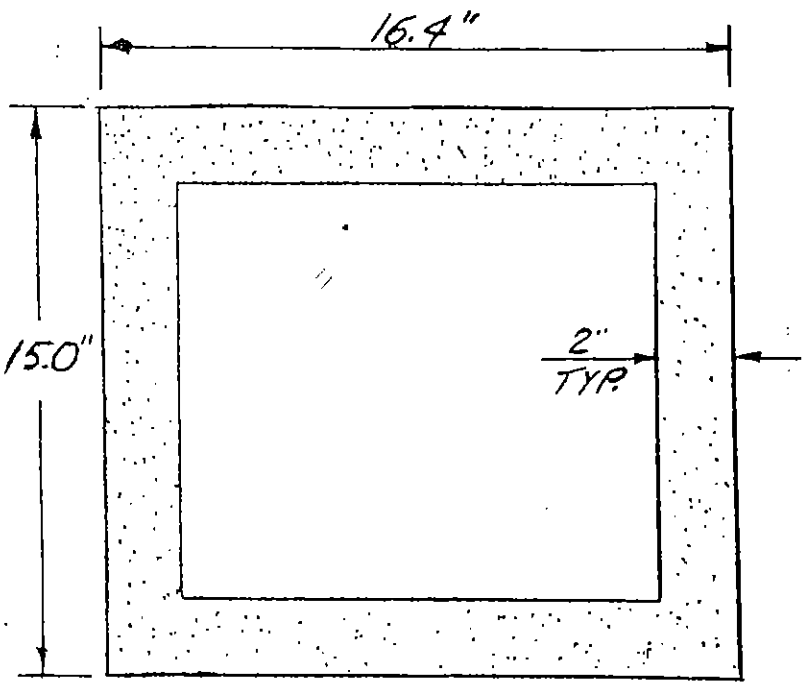
The following sheets detail the preparation and glassing of these 5 bulkheads.

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.

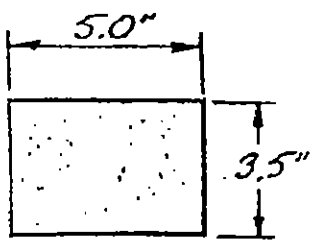
You probably will want to experiment on small scrap pieces first before tackling the two heat-formed bulkheads. Also, if your hair dryer doesnt put out sufficient heat for the job, you may find that a portable electric heater can be used to warm the foam so that the hair dryer can provide sufficient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

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



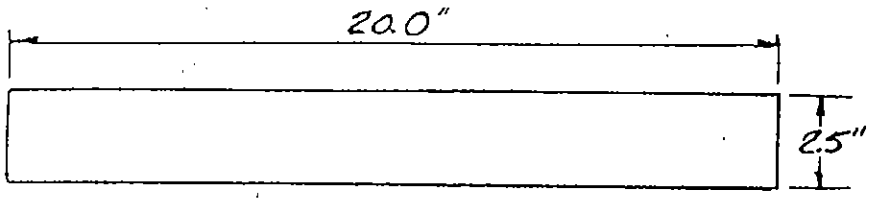
FS 110

do not glass



FS 153.7

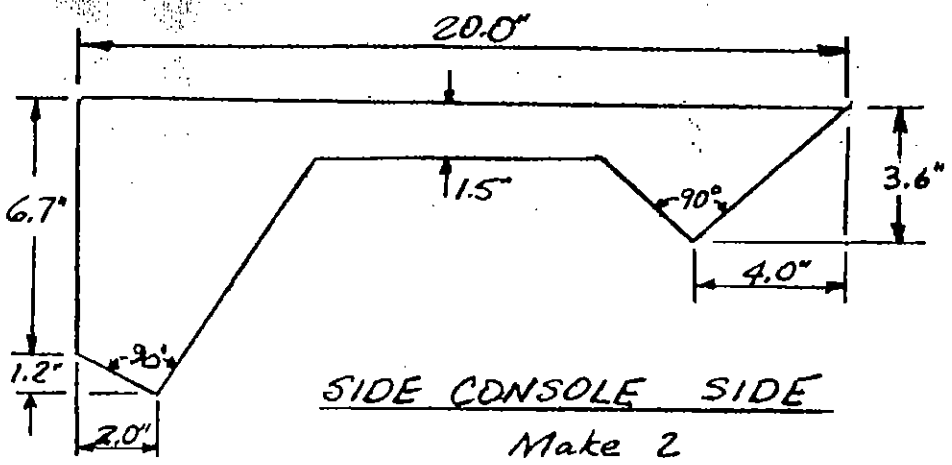
1 BID on each side



SIDE CONSOLE TOP

Make 2

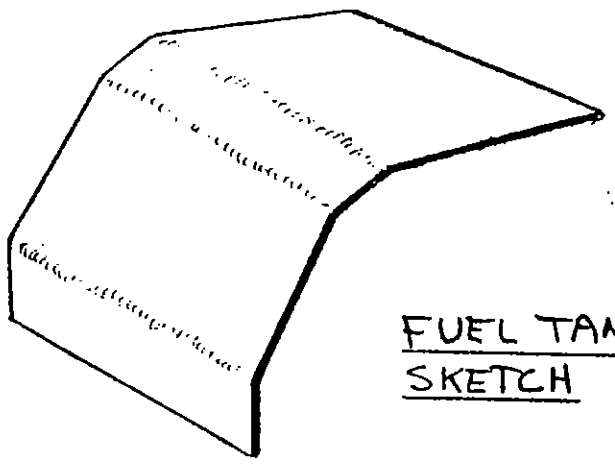
1 Ply BID on one side



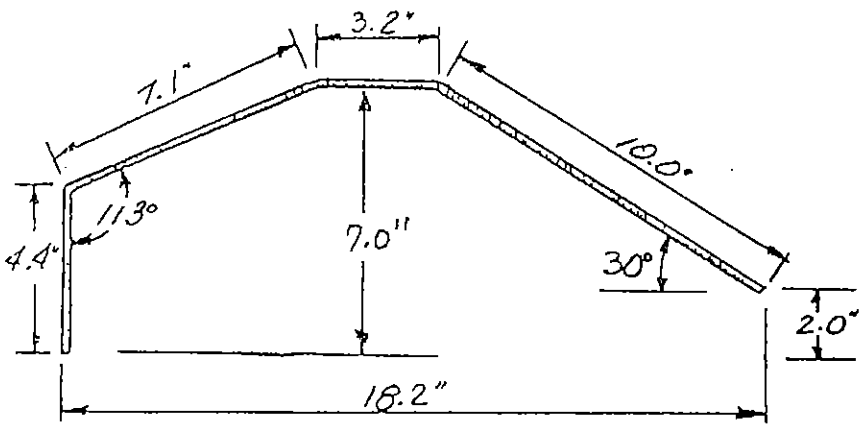
SIDE CONSOLE SIDE

Make 2

1 Ply BID on ~~one~~ side.
LT SIDE OF ONE, RT SIDE OF THE OTHER.

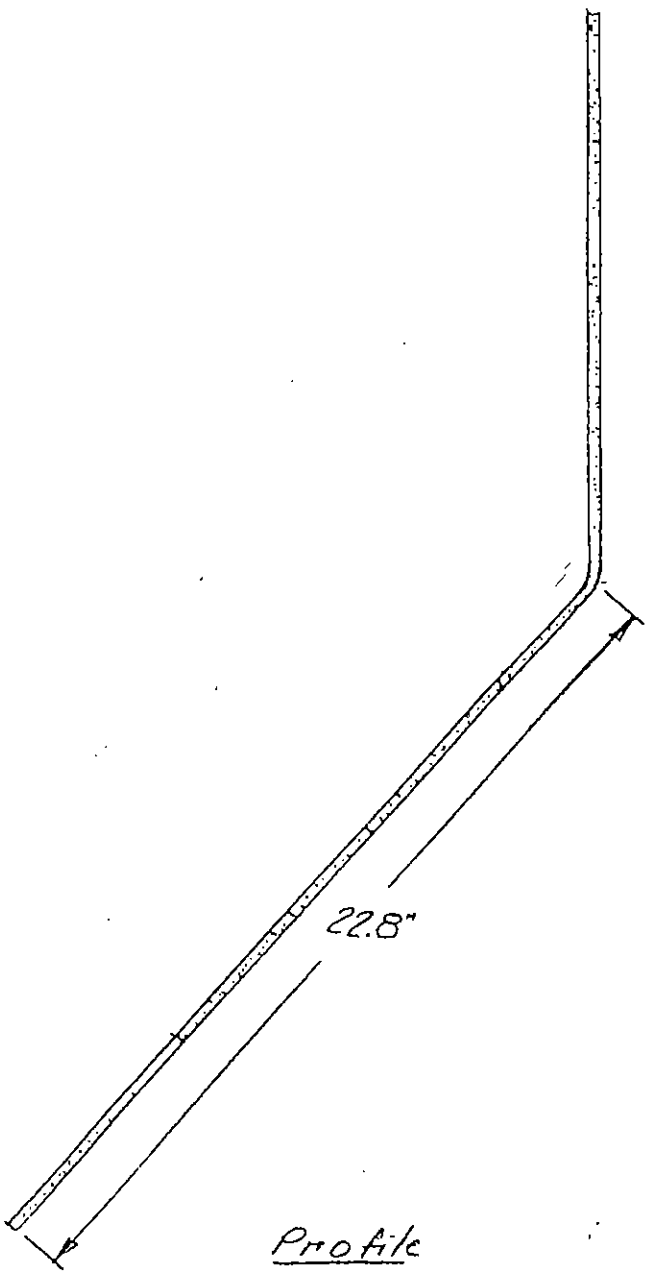


FUEL TANK SKETCH

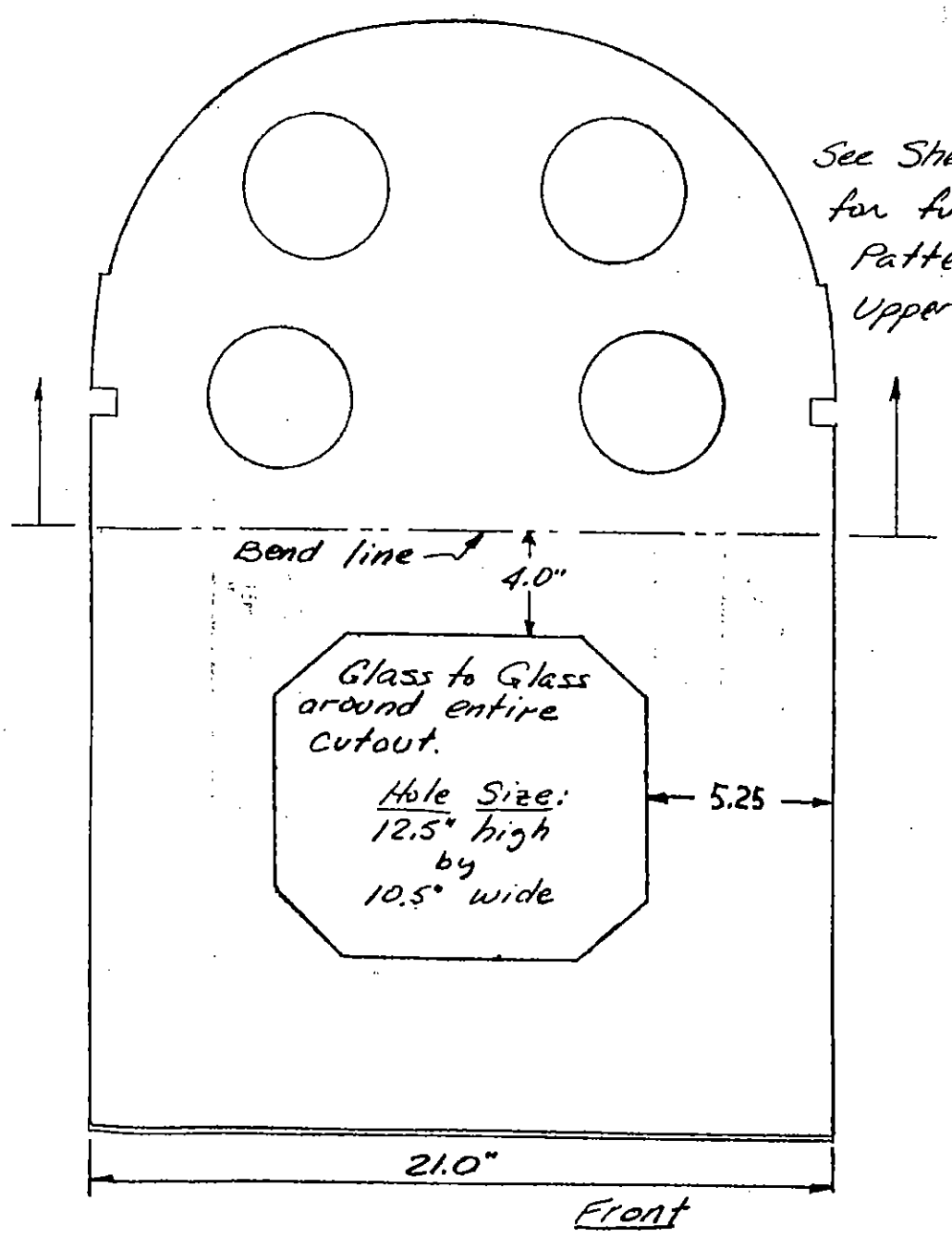


FUEL TANK PROFILE VIEW

1 Ply BID on inside
2 Ply BID on outside
Width: 20.8"
Total Length: 24.7"



Profile



See Sheet 7-3 for full-size Pattern of Upper portion

Front

SEATBACK BULKHEAD

1 Ply BID on each side; Glass ~~bound~~ ~~for~~ first

K00

Glass to Glass

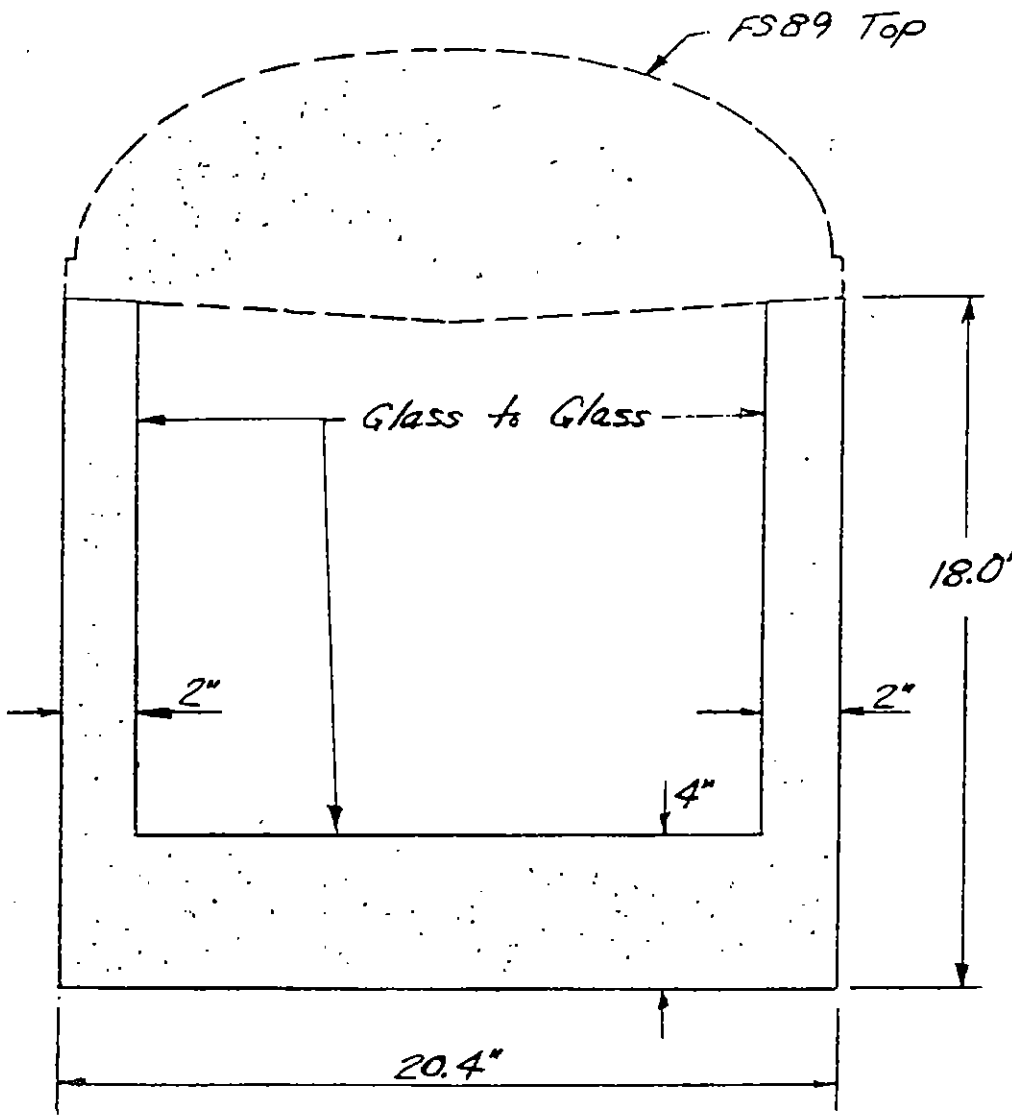
UPPER HALF OF
SEATBACK BULKHEAD

Full Size (Lt. side
mirror image)

Glass to Glass

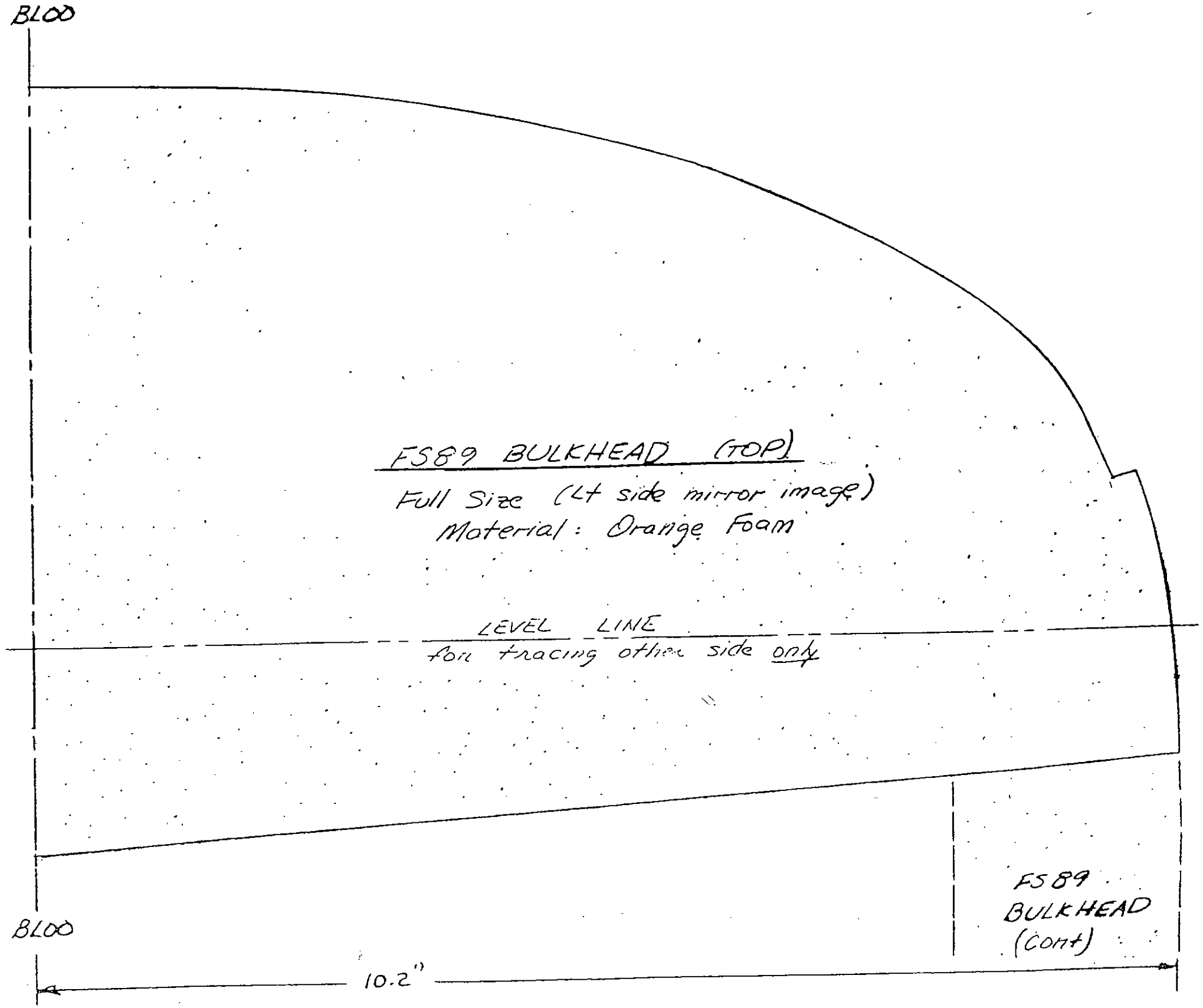
Seatback Bulkhead Bend line

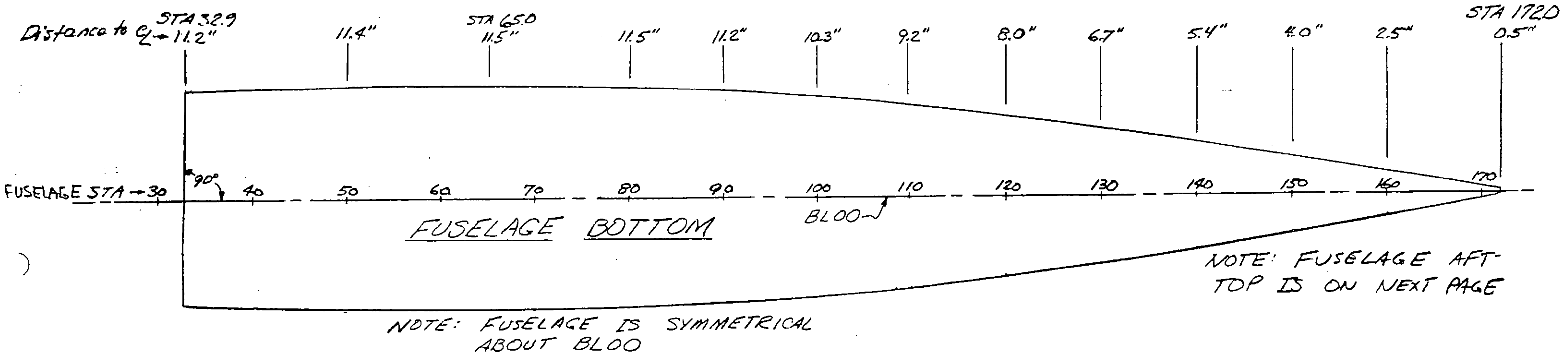
BL00



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.





FUSELAGE BOTTOM

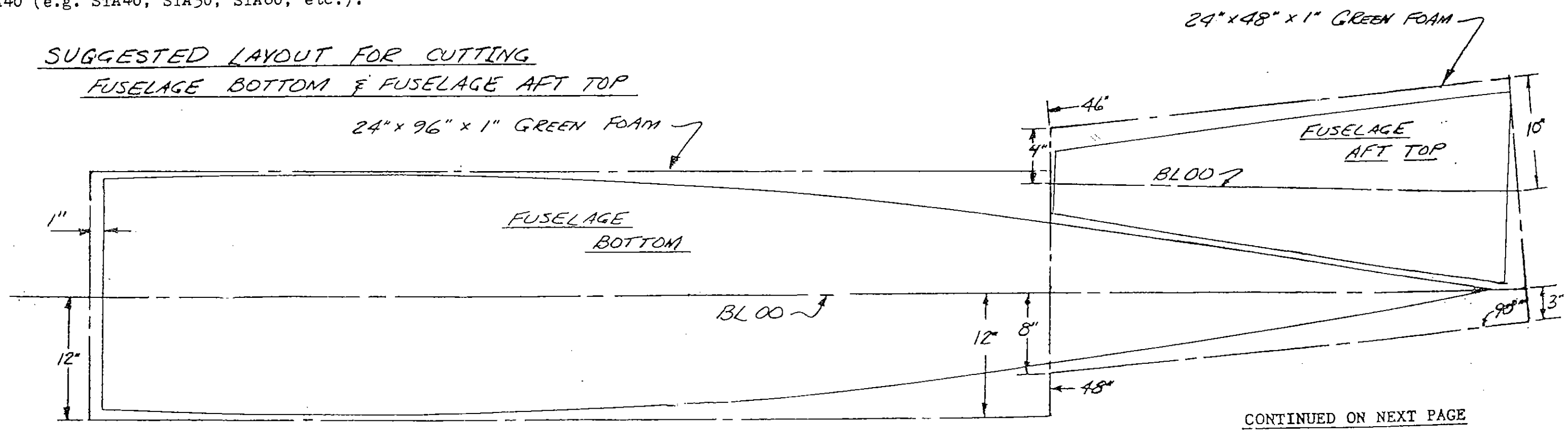
Initial Layout - Join together two pieces of green foam as shown. Locate and mark BL00 on the foam with a felt-tipped marker. Do not be afraid to gouge the foam to a depth of about 0.2" in order for the line to remain visible. Mark STA32.9 about 1" from the left edge of the first foam piece. Now, using 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.

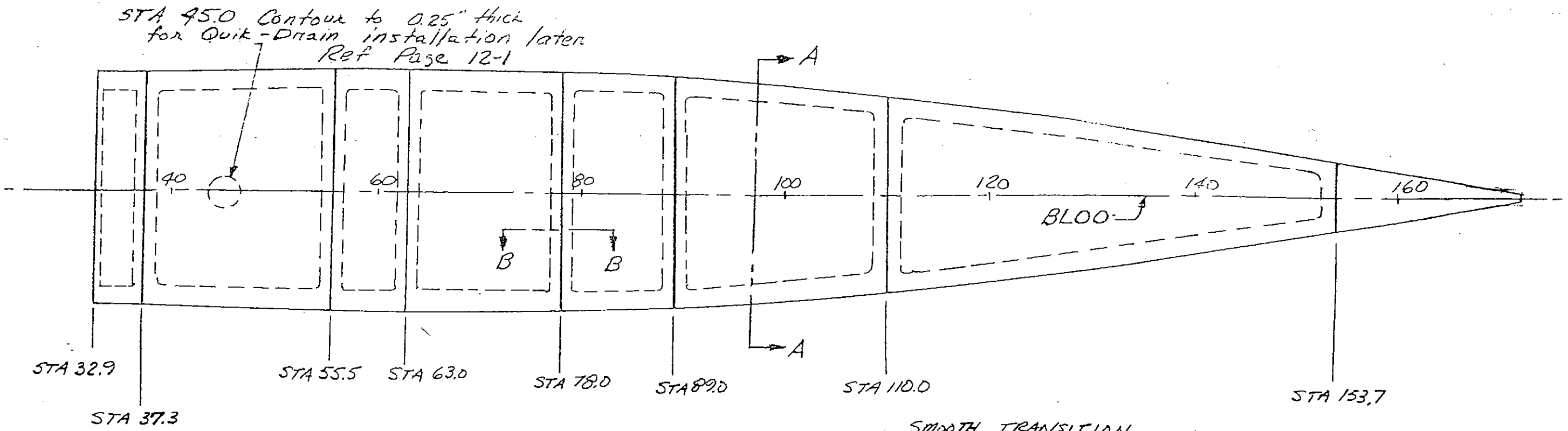
Then, using a long, flexible straight edge, fair a smooth curve thru all of the points. Since the fuselage bottom is symmetrical about BL00, this procedure can be repeated for the other edge.

A similar technique may be used to layout the FUSELAGE AFT TOP.

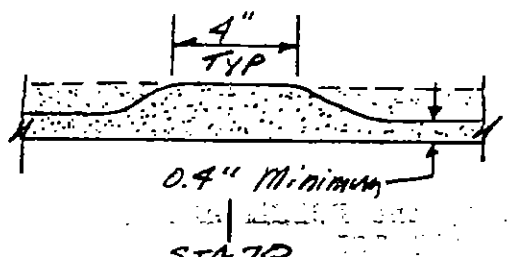
Finally, using a butcher knife, carefully cut out both the FUSELAGE BOTTOM and the FUSELAGE AFT TOP.



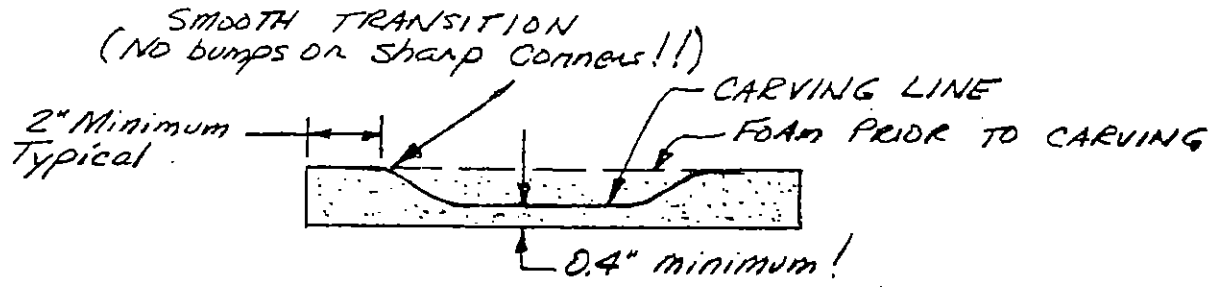
CONTINUED ON NEXT PAGE



FUSELAGE BOTTOM INSIDE CONTOURING



SECTION B-B



SECTION A-A

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.

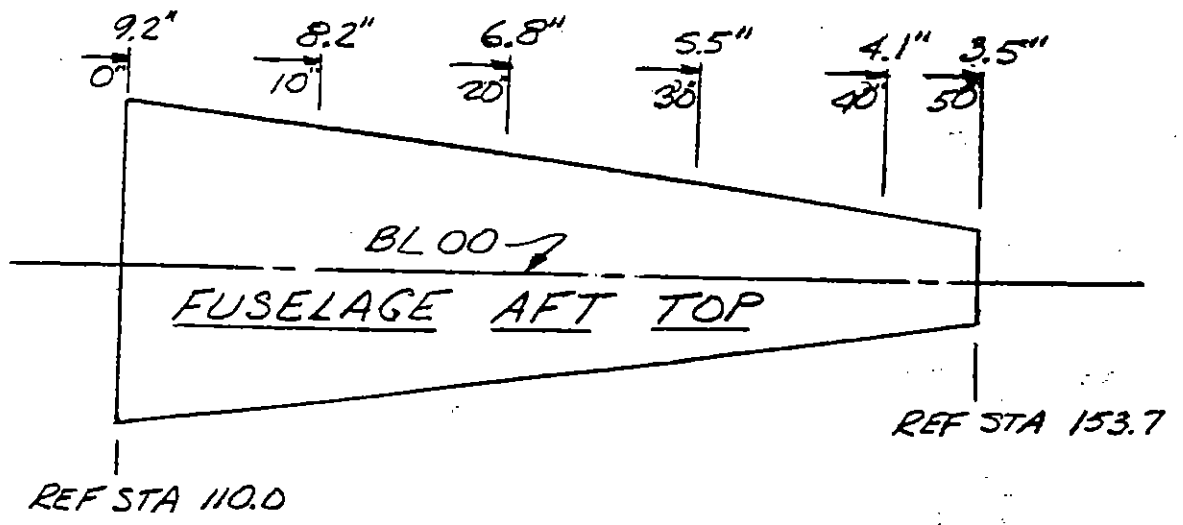
The dashed lines on that drawing enclose areas of foam that may be contoured. Section A-A shows what a typical part of the bottom looks like after contouring. In essence, the homebuilder removes foam until the thickness is reduced to a minimum of 0.4" A toothpick with a mark at 0.4" is an effective way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



CONTINUED ON NEXT PAGE

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"

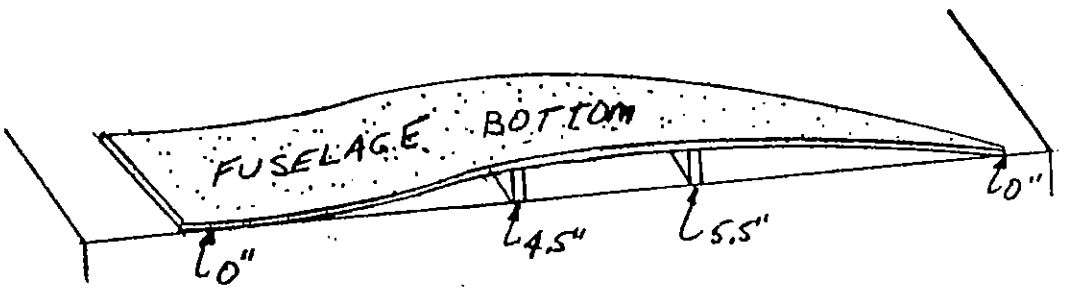
Blocks of wood can be used and the tolerance on the height can be 1/2 inch.

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 BEFORE GLASSING!



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 Fuel Tank and Seatback Bulkhead and mark where they meet the fuselage side,
3. In order to accomodate the tailspring support, taper the fuselage thickness aft of STA 166.0 from 1" at STA166 to about 0.1" at STA172.

Important points to remember!

1. Carefully mark all bulkhead locations with a felt tipped marker on each fuselage side. Make sure that the equivalent markings are in the same location on each fuselage side.
2. Contouring is done on the inside of the fuselage. Make sure that you make one right fuselage side and one left fuselage side!

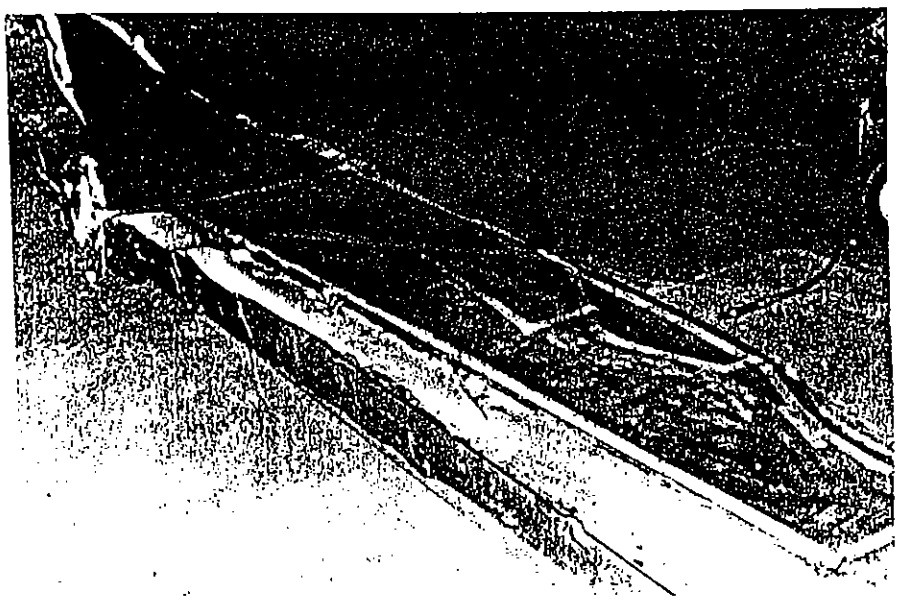
Glassing - Prepare the 0.75" x 0.75" x 72" longerons (2) by rounding the corners with sandpaper. About a 3/32" radius is sufficient. Next, using dry micro, mount the longerons to the fuselage sides by placing one end at STA79 and letting the other end protrude forward of the fuselage side. The top of the longeron should coincide with the top edge of the fuselage side. Finally, lay a dry micro radius at the fuselage/longeron junction to facilitate glassing the fuselage side. The accompanying sketch depicts the technique.

All glassing of the fuselage sides is accomplished using BID at 45 deg to WL15. Accomplish it in the following sequence:

1. Glass one ply of BID along the entire fuselage side.
2. Glass an additional ply from STA14.8 to STA90.
3. Glass another additional ply from STA14.8 to STA40.

When you have finished, the fuselage side will have 3 plies of BID on the forward part, 2 plies of BID on the intermediate section, and 1 ply of BID on the aft fuselage, all of these at 45 deg. to WL15.

The other fuselage side can be glassed in the same manner.



This is the left side of the fuselage after it has been contoured and glassed on the inside. The two fuselage sides and the bottom are all cut from 1" thick green foam and glassed on the inside to provide rigidity during the final assembly of the fuselage.

CONTINUED ON NEXT PAGE

STA 78.3
16.2"

STA 89.0 Top
17.7"

15.5"

STA 78.3
13.0"

STRAIGHT

STA 153.7
4.6"

STA 172.0
1.2"

STA 14.8
3.0"

STRAIGHT

Use Wing BL00 template with Leading Edge at STA 78.3 and template level line on WL 31.0 (16" ABOVE W.L. 15).

STRAIGHT

STRAIGHT

FUSELAGE SIDE

20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

90°

WL 15

STA 14.8
12.0"

STA 35.5
11.4"

10.0" 8.4" 6.5" 4.5" 2.6" 0.8" -0.5" -1.3" -1.4" -1.2" -1.0" -0.8"

STA 172.0
0.5"

Use Canard BL 10 template with Leading Edge at STA 14.8 and template level line on WL 3.0 (12" BELOW WL 15).

SUGGESTED LAYOUT FOR CUTTING EACH FUSELAGE SIDE

24" x 96" x 1" GREEN FOAM

6.5"

WL 15.0

96"

92"

STA 100

FUSELAGE SIDE

3.0"

Cut one for both sides
24" x 69" x 1" GREEN FOAM

Use this piece for opposite side

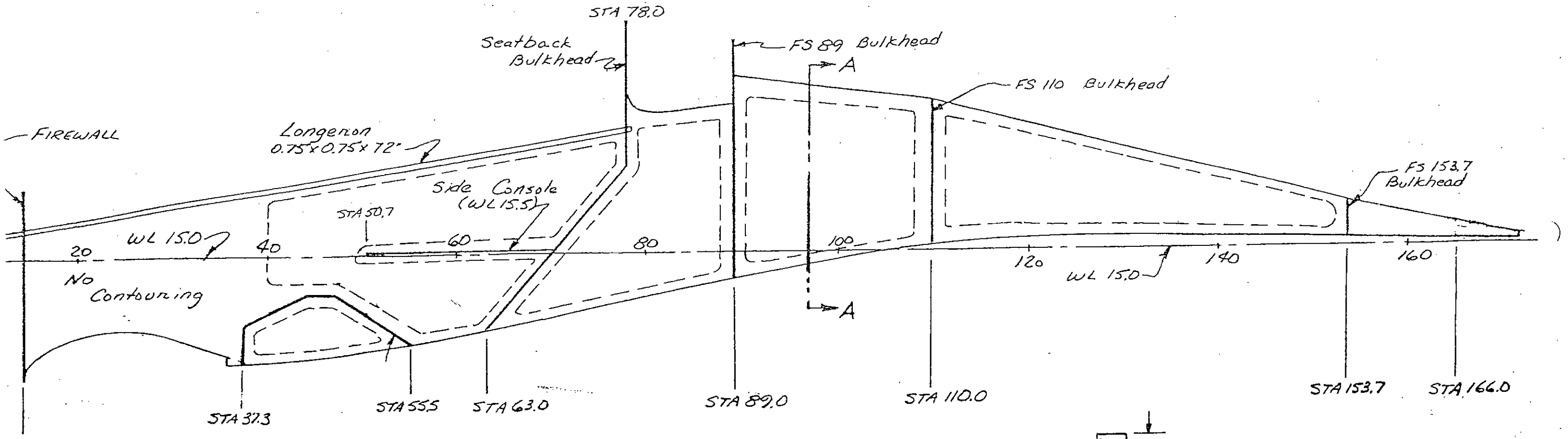
Cut line

WL 15.0

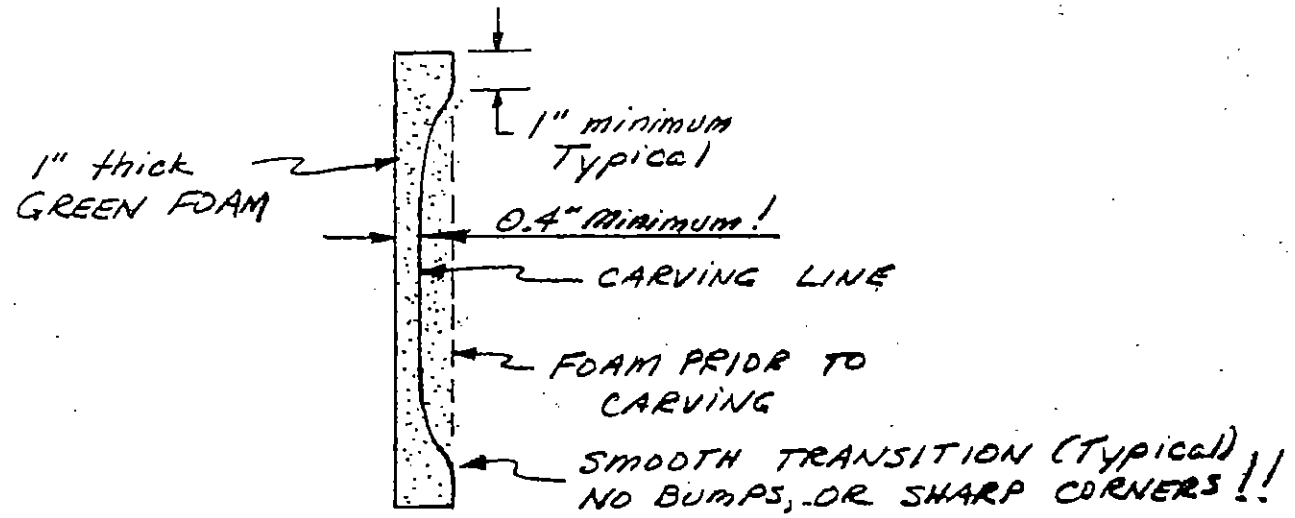
1" TYP

3"

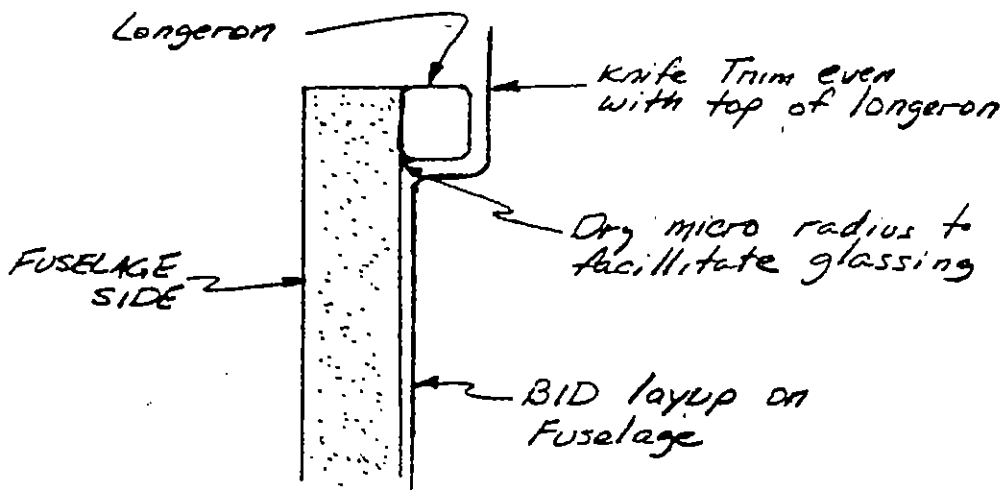
CONTINUED ON NEXT PAGE



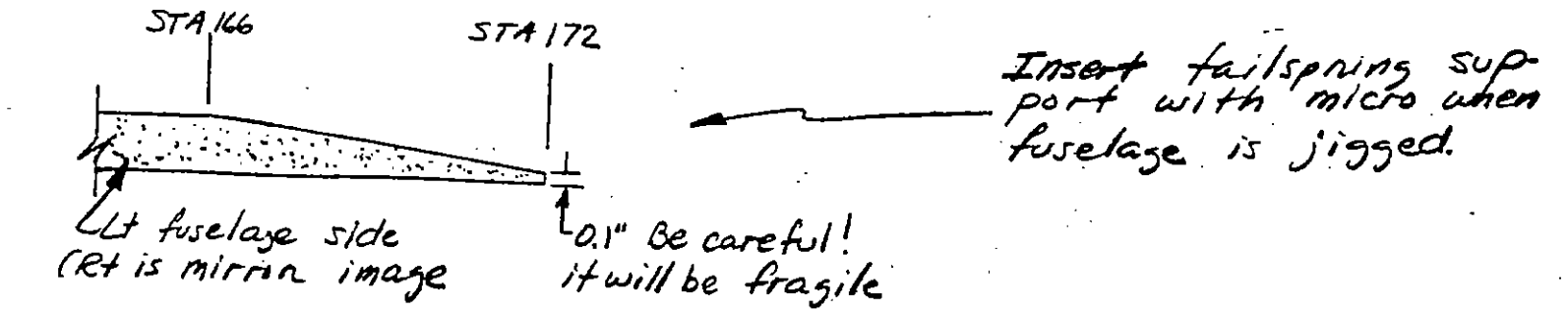
FUSELAGE SIDE INSIDE CONTOURING



SECTION AA



LONGERON MOUNTING DETAIL



TAPERING FOR TAILSPRING SUPPORT

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.

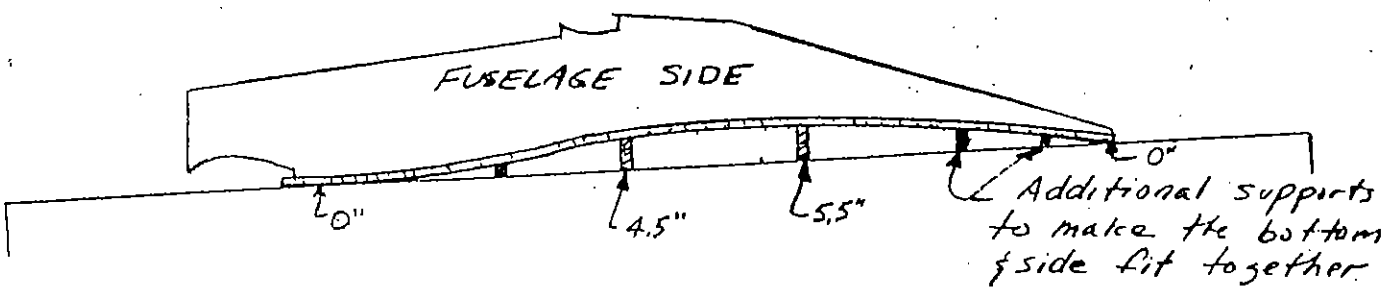
Begin by placing the fuselage bottom on the table and elevating it off of the table at the following STA:

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

Take one of the fuselage sides and trial fit it onto the fuselage bottom. Use blocks of wood and foam to get the bottom closely fitting the side profile.

Remove the side, mix up some slightly dry micro, and apply it to the side and the bottom where they meet from the front back to STA70.

In the forward fuselage area, line up a similar STA on both the bottom and the side and join the two pieces. A good basic reference is the forward face of the fuel tank. Don't worry that the STA toward the back will not line up. This is due to the curvature of the fuselage bottom. Verify good Micro squeeze out.

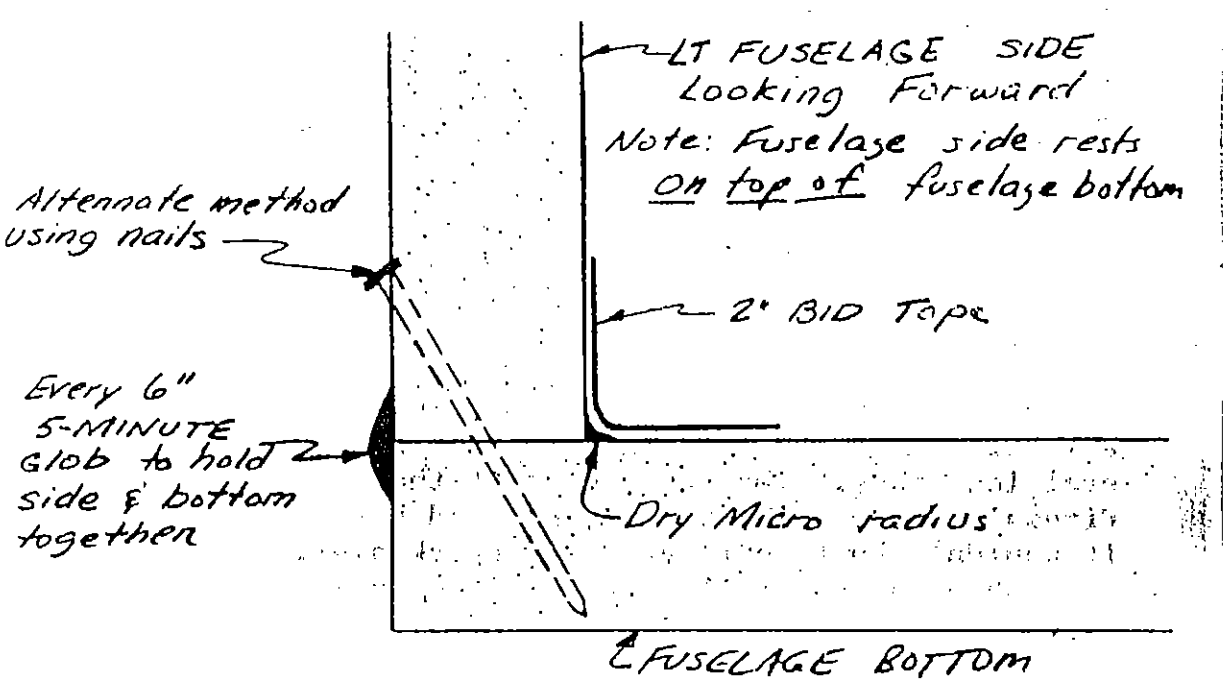


Next, while one person holds the side in place, have a helper mix up a small batch of 5-minute, and gather up some small nails. Dab 5-minute about every 6 inches on the outside to hold the side and bottom together. After this has been accomplished all of the way to the tail, the side should stand vertically 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.

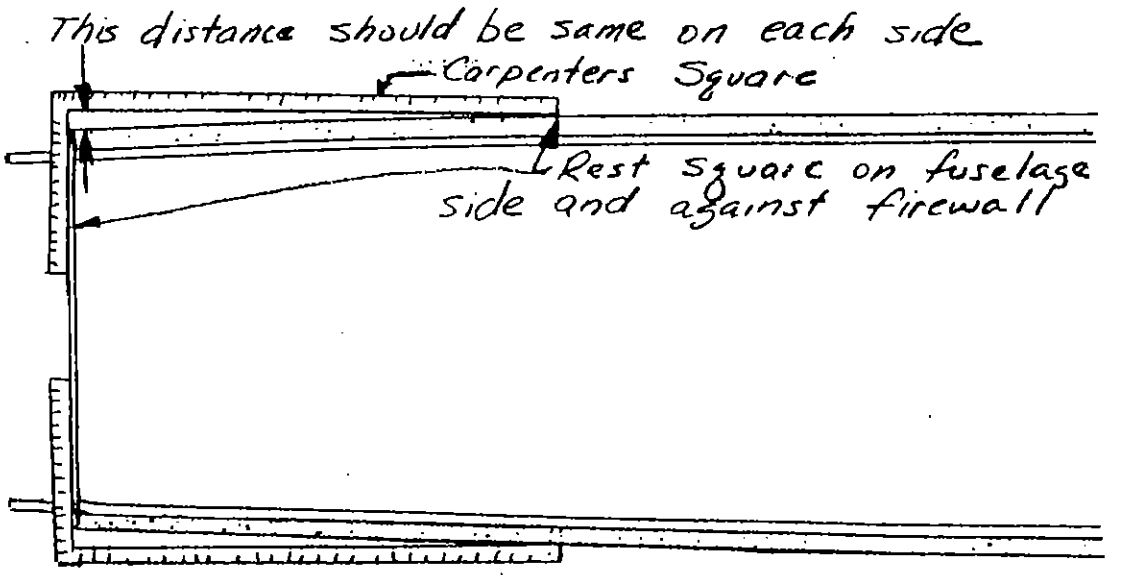
Lay a dry Micro radius along the inside joint all the way to the tail. Use a 2" BID tape to join the side and bottom together on the inside all the way to the tail. At this point, the angle between the side and the bottom should be about 90 deg.

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 the two sides are lined up equally.

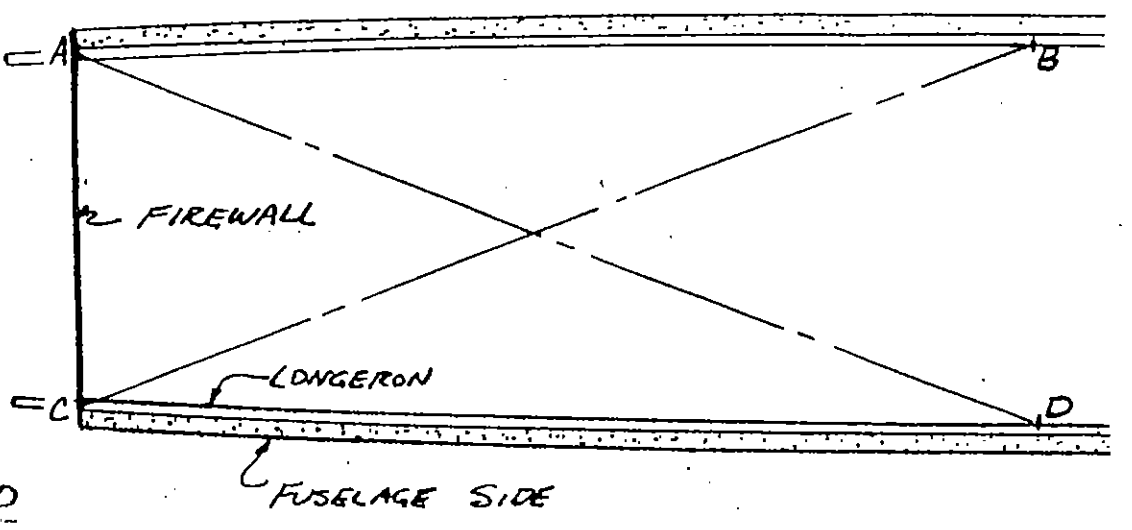


TYPICAL SECTION SHOWING FUSELAGE SIDE/BOTTOM JOINING

Next, fit the firewall and trim and sand where necessary to make it set "square" with the fuselage. Attach the firewall to the fuselage with two 2" BID tapes along each inside juction.



1. Measure back from the firewall along the longeron 50" and place a mark. This is segment AB.
2. Repeat for the other side CD.
3. Measure AD and CB; these two lengths must be equal if the firewall is square with the fuselage.
4. If not equal, adjust fuselage until firewall is square.



CONTINUED ON NEXT PAGE

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:

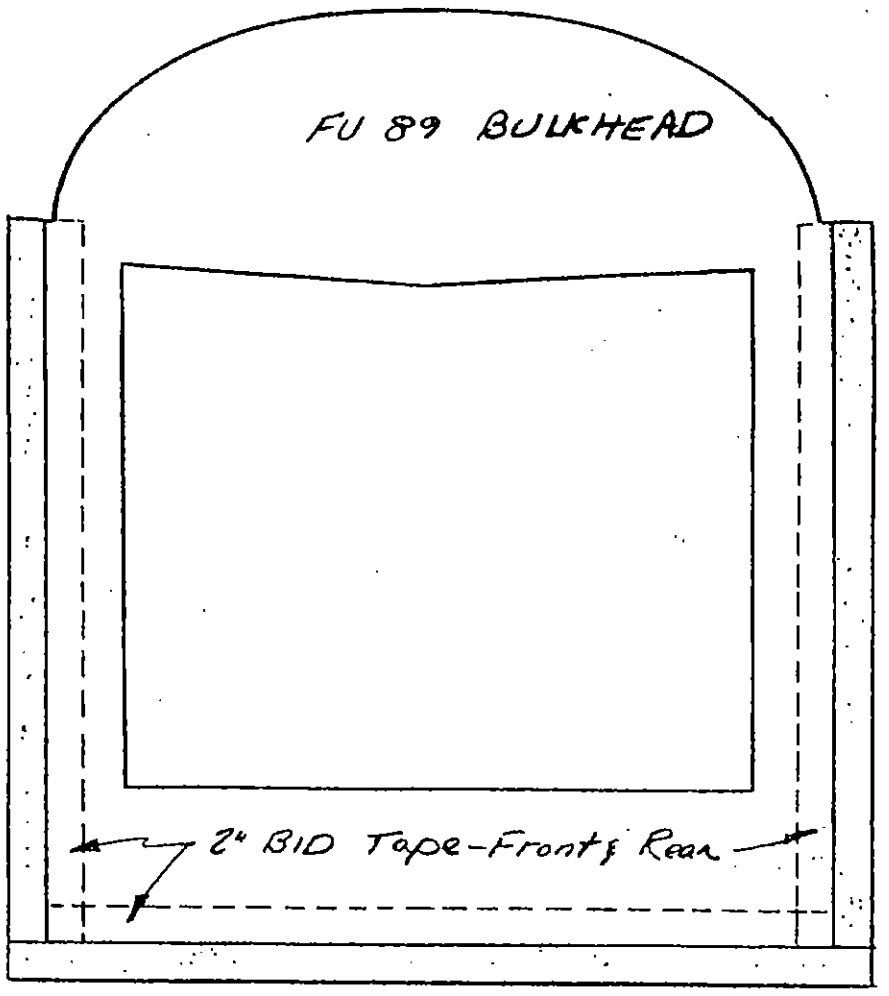
1. FU89
2. FU110
3. Seatback Bulkhead
4. FU153.7 - Leave out for now.

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 Attach Bulkheads To Fuselage

TYPICAL All BULKHEADS

CARVING THE OUTSIDE FUSELAGE

This section is one where you get to demonstrate your artistic capability. If it takes you longer than four hours to accomplish the sculpturing, then you are being too cautious and not having enough fun!

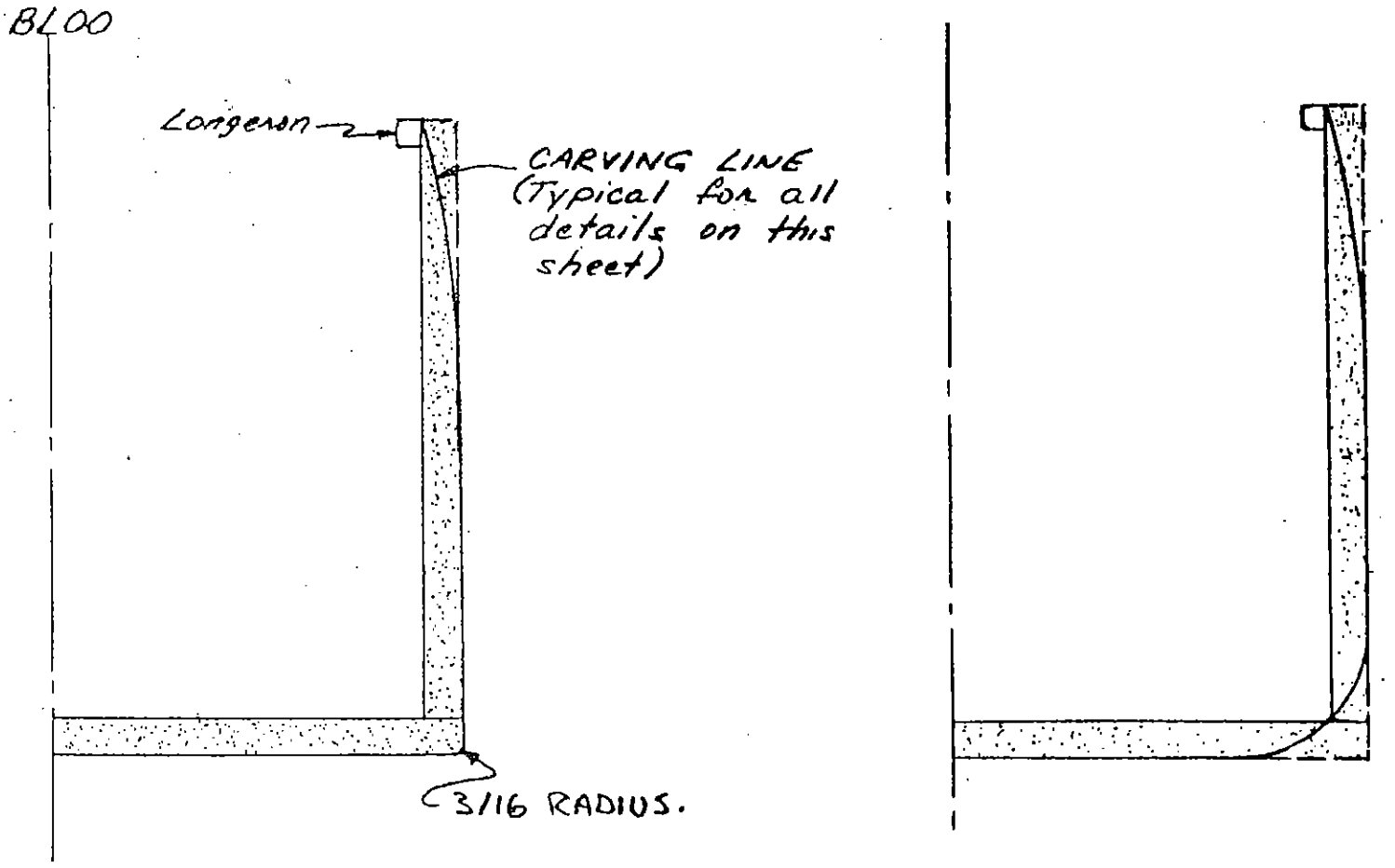
The purpose for carving the outside fuselage is to reduce weight, as well as to provide the Quickie with a sleek, rounded look. The sketches and pictures show you how to accomplish this. Basically, the corners of the fuselage are rounded by carving away the green foam. Tools that are useful in this section include a butcher knife, sandpaper, foam scraps, and a surform file. Always wear a mask, as the green foam shavings should not be inhaled.

In the corners, you can remove foam until you reach that 2" BID tape layup that you did on the inside. Do not sand any further at that point unless you want to destroy the fuselage strength!

In the rear fuselage, at the tailspring support, the green foam is removed completely so that the aft fuselage will flow smoothly into the tailsring. Therefore the red foam that is the tailspring support is rounded some also.

Remember to make the contouring as smooth and flowing as you can.

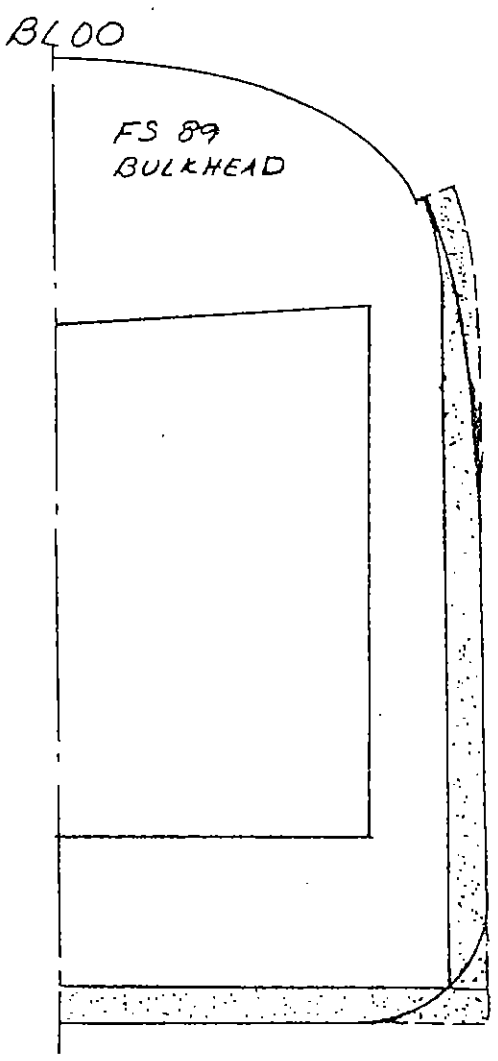
CONTINUED ON NEXT PAGE



STA 35.5

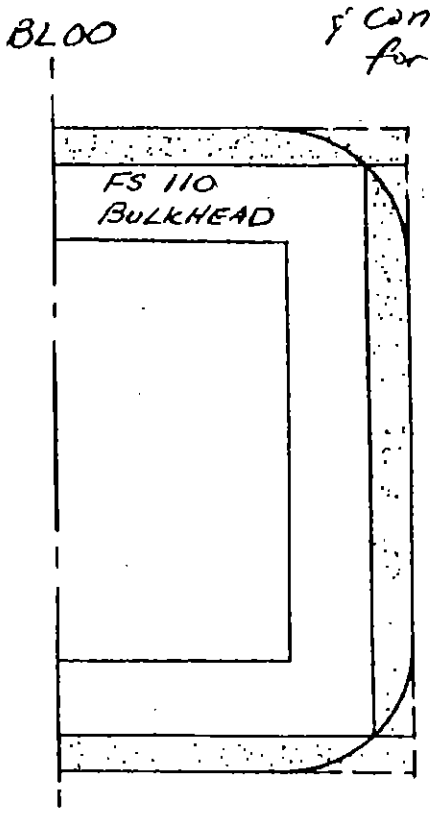
From STA 35.5 to STA 70.0 the radius on the fuselage bottom increases

STA 70.0



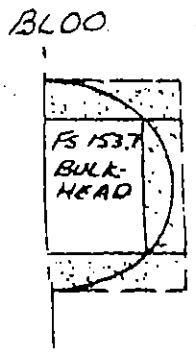
Note At the Firewall, carve a smooth exhaust air outlet shape

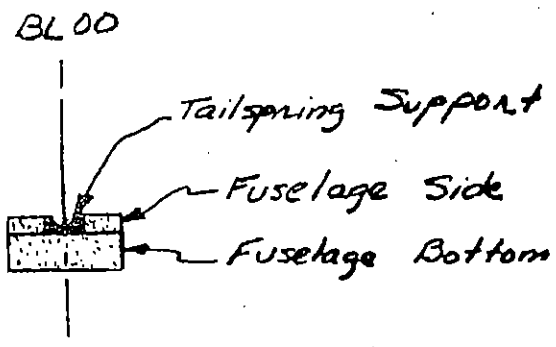
Note: At the Firewall carve & contour a smooth exit for the exhaust air outlet.



STA 89.0

STA 110.0





Note: Any inside contour carvings of the fuselage sides and fuselage bottom are omitted for clarity.

STA 153.7

STA 172.0

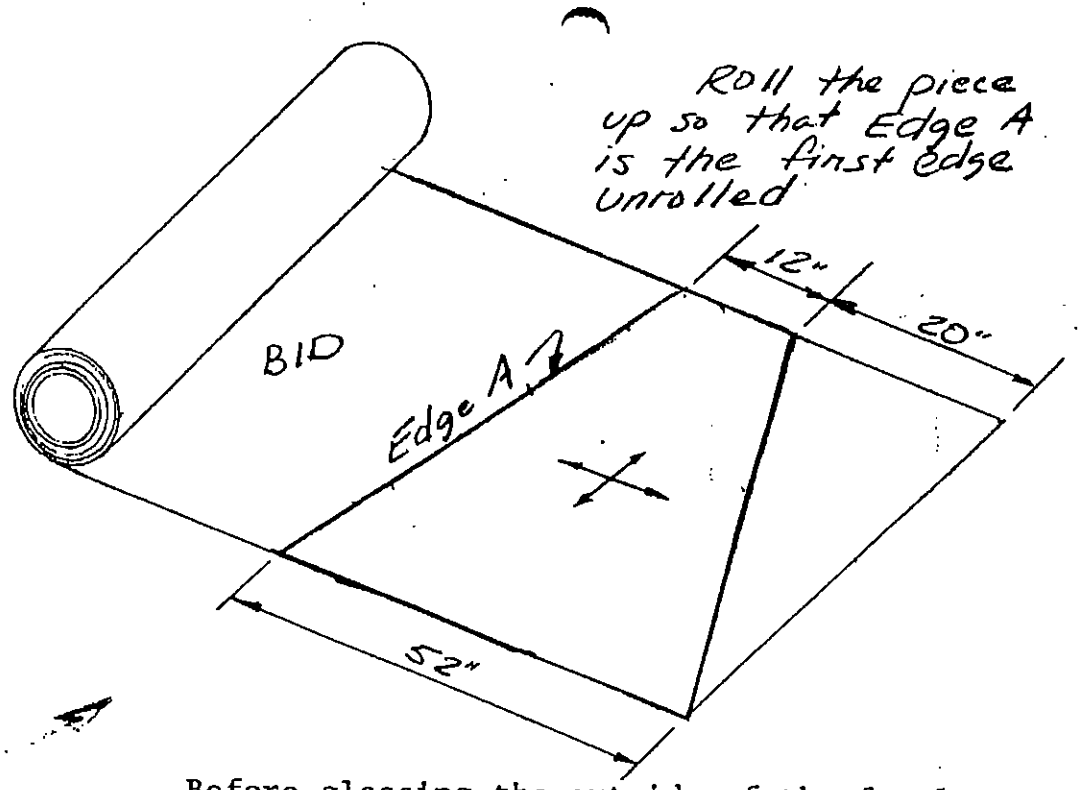
At STA 172 the green foam is removed down to the red tailspring support, which is then rounded to flow smoothly into the TAILSPRING

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 of the fuselage, install the 1" square x 1/4" thick aluminum plate for the fuel drain valve installation later. See sheet 7-6 and sheet 12-1.

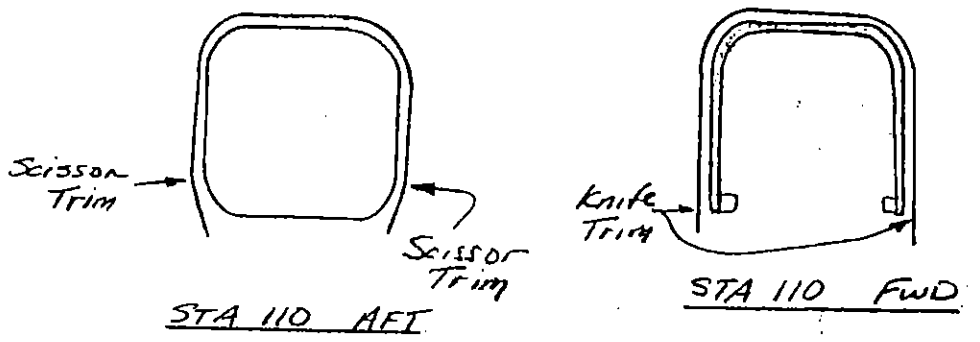
This piece wraps around the fuselage sides and bottom from approximately STA 110 to STA 154. Begin by placing Edge A parallel to the top fuselage line and along the corner where the inside fuselage tape has been exposed by previously removed urethane foam. Of course the 52" long edge should be the one 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.

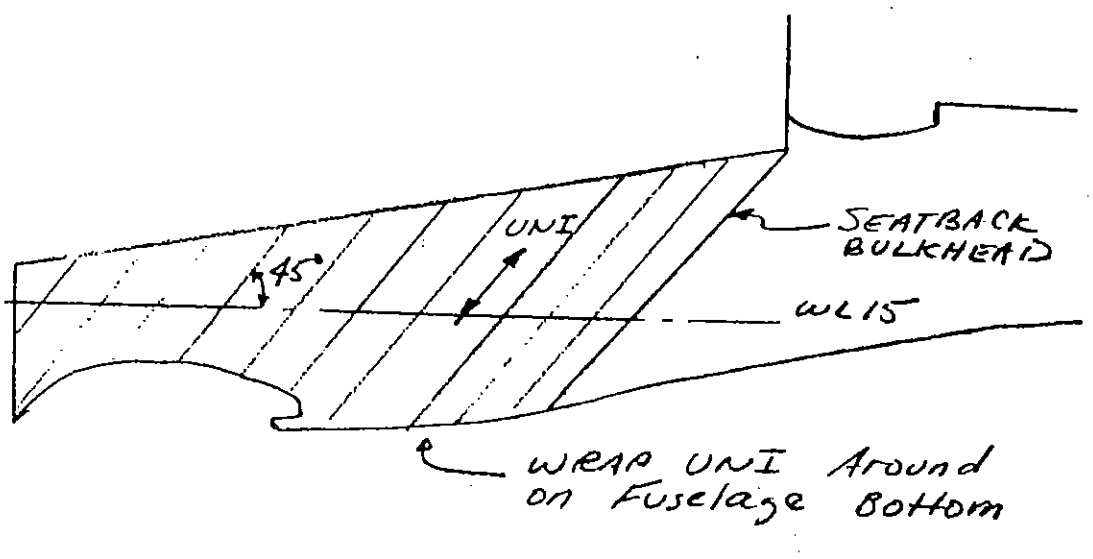
After wetting out and squeeging this first piece of cloth, you can cover the fuselage aft of STA 153 with scrap cloth and 1" overlapping.

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 be the easiest way. The cloth should be knife trimmed even with the top of each longeron.

The UNI is placed at 45 deg. to WL15 and is placed forward of the seatback bulkhead area to the firewall. Two 2" BID tapes should be used on each side to join the forward face of the Firewall to the outside fuselage skin.

Peel Ply all overlaps and knife trim the longeron areas before quitting.

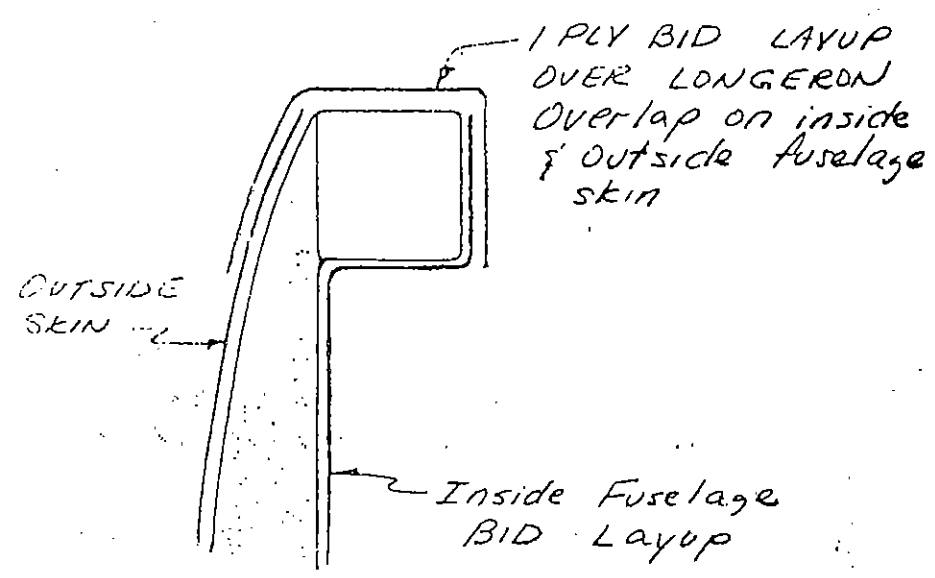




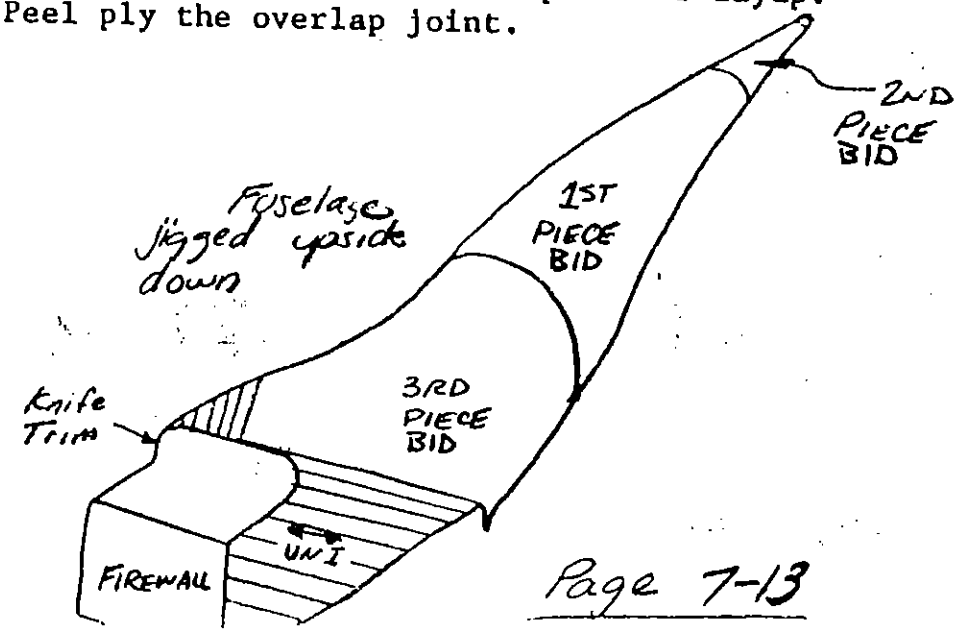
UNI SKIN

Since only one ply of BID is on much of the fuselage, it is very important never to sand that ply.

Once this main layup is cured, the fuselage can be flipped over upright and the aft top fuselage glassed with one ply of BID at 45 deg. to BL00. Use a 1" overlap on the BID from the previous layup. Peel ply the overlap joint.



Also at this time, layup one ply BID around each longeron. Peel ply this layup also.



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.

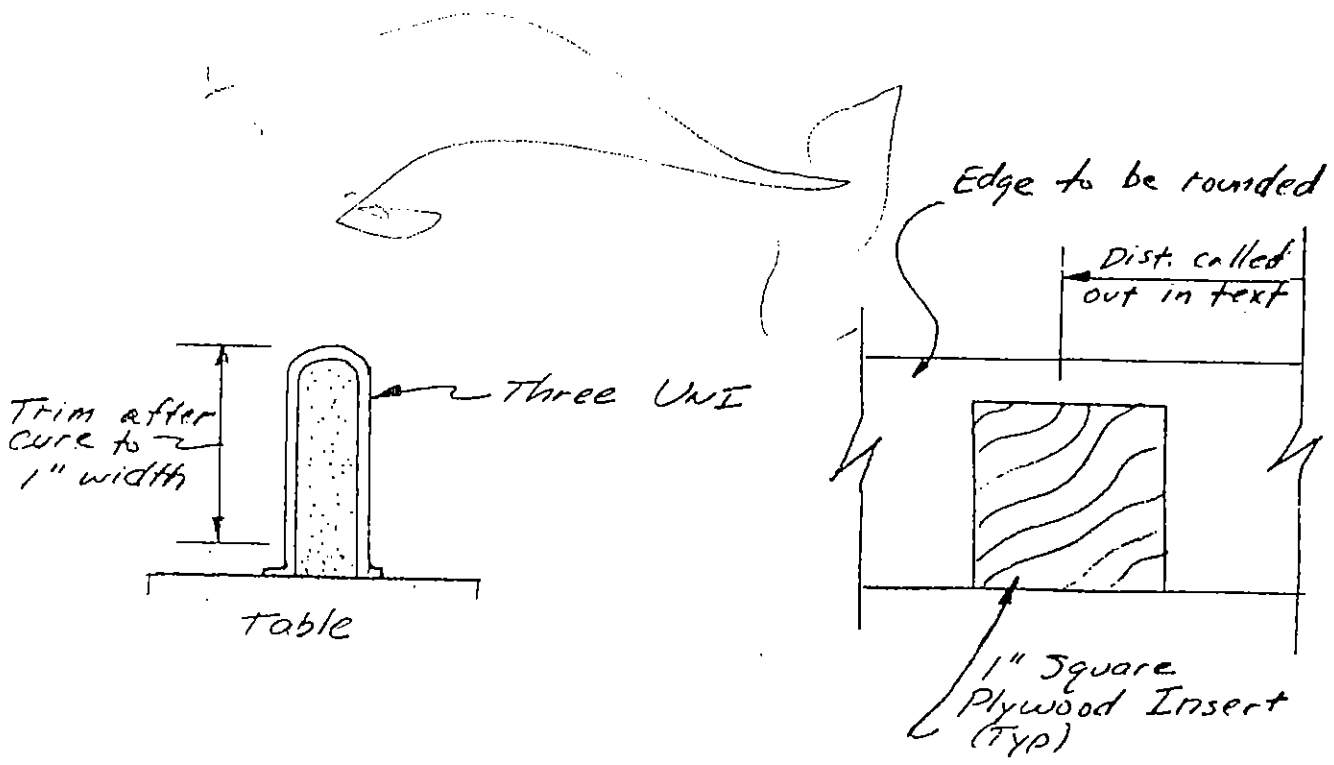
The right side canopy stiffener gets plywood inserts of 1" square at 6.9",11.2", 29.9", and 34.2" forward of the aft end. Remove the orange foam, insert the inserts with micro, and make a smooth transition with the orange foam.

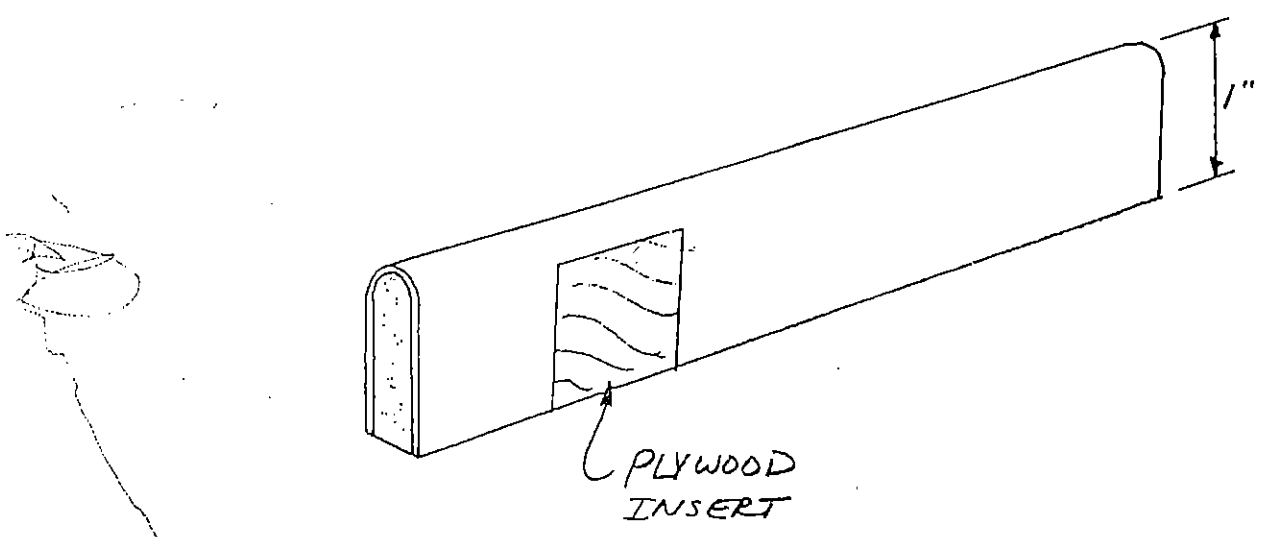
The left side canopy stiffener gets a 1" x 2" plywood insert 19" forward of its aft end, and 27" forward.

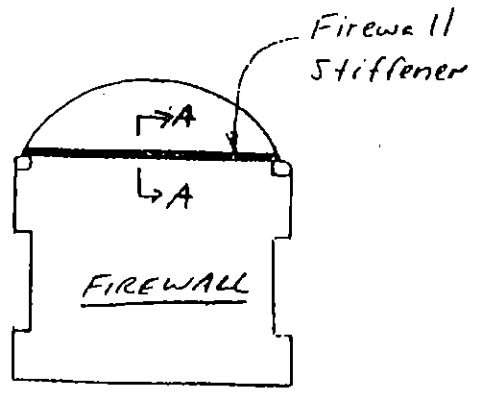
So that the glass will layup around the edge, round one of the long edges of each stiffener.

Set each stiffener vertical on the table. held in place with a few dabs of 5-MIN. Th remaining square edge should be the edge on the table. Lay up three UNI on each stiffener, with the orientation running along the length of the stiffener. Since the end resting on the table will be trimmed, you don't have to worry about the part of the stiffener within .2" of the table.

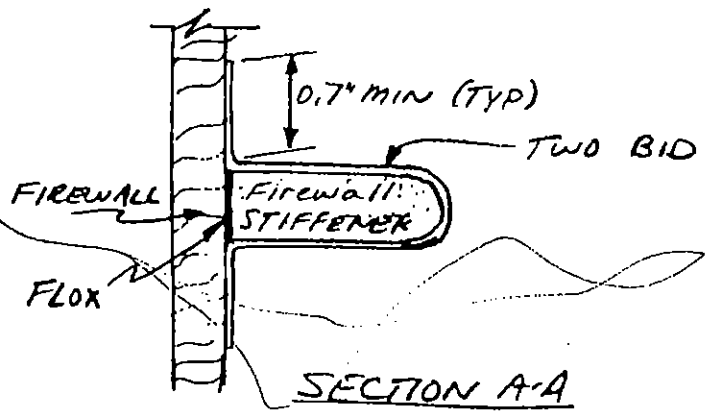
After the layups have cured, trim the square edge so that the width of each piece is about 1".







Mount the firewall stiffener with two BID as shown. The stiffener is located on the aft side of the firewall (i.e. the cockpit side) and rests on top of the longerons. Use the BID to join the stiffener to the longeron.



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.

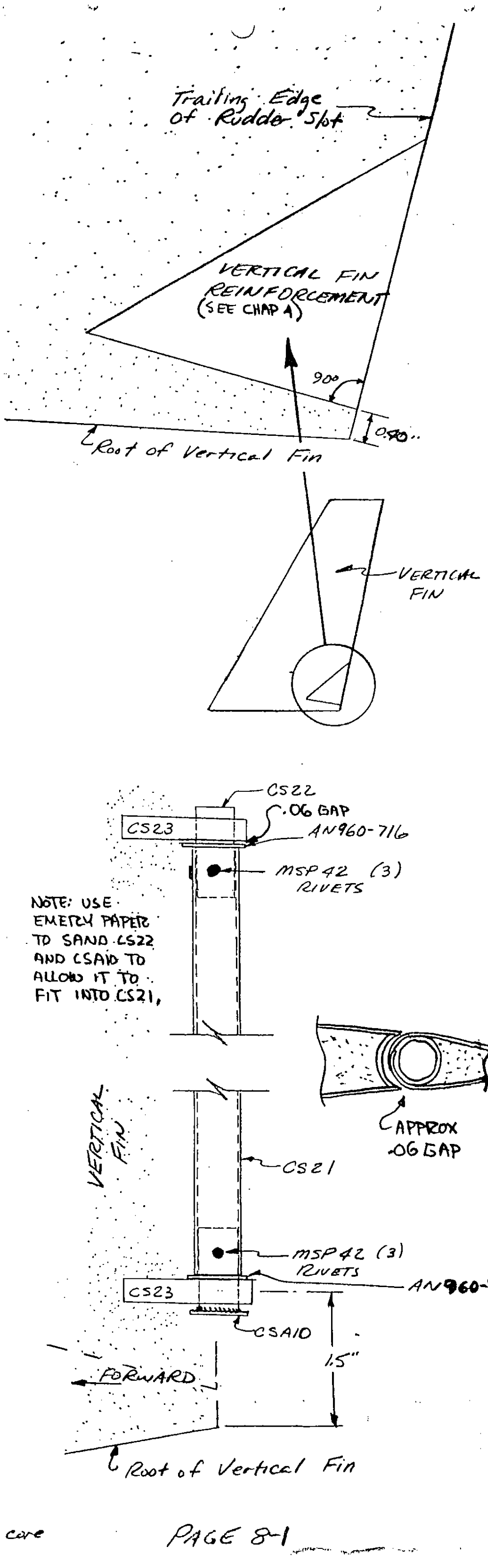
Now layup one BID over the vertical fin, in the same manner as the ailerons. A second piece can be used for the tip area.

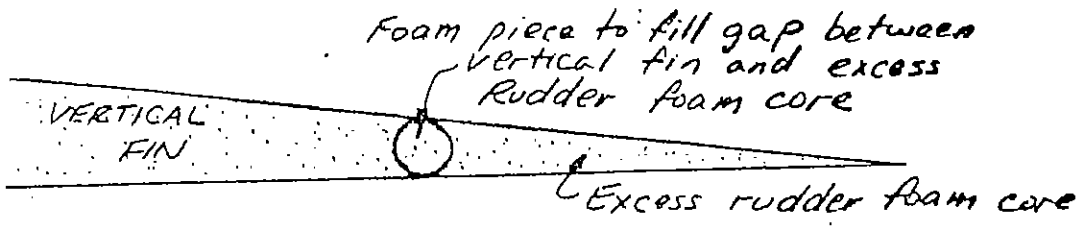
Next on the agenda is installing the rudder. The centerline of the lower pivot is located 1.5" along the rudder slot from the base of the vertical fin. Dry fit a CS23 at that location, and then, using the rudder, locate the other CS23 at the top. The rudder should have about .06" freeplay.

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 in place on CS21. After verifying that the rudder horn part of CSA10 is perpindicular to the chord of the rudder, go ahead and drill it in place. Also drill in and rivet CS22 in place.

Review the section of the plans on installing the ailerons, and then mount the two CS23's permanently with micro, checking the gap between the rudder and the vertical fin. After the micro has cured, layup one BID over the CS23 bearings on each side to permanently attach them to the vertical fin.

To complete the vertical fin, take the excess rudder foam core, make up a foam piece that will fill the gap between the core and the vertical fin, and use micro to construct the top part of the vertical fin. Layup one BID over the foam to join it to the already glassed vertical fin.

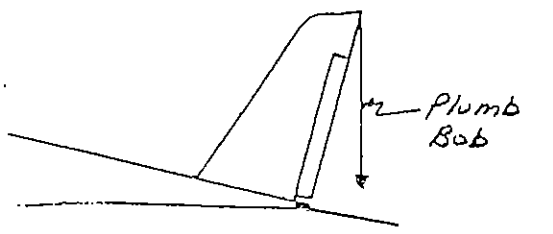




INSTALLING THE VERTICAL FIN

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.



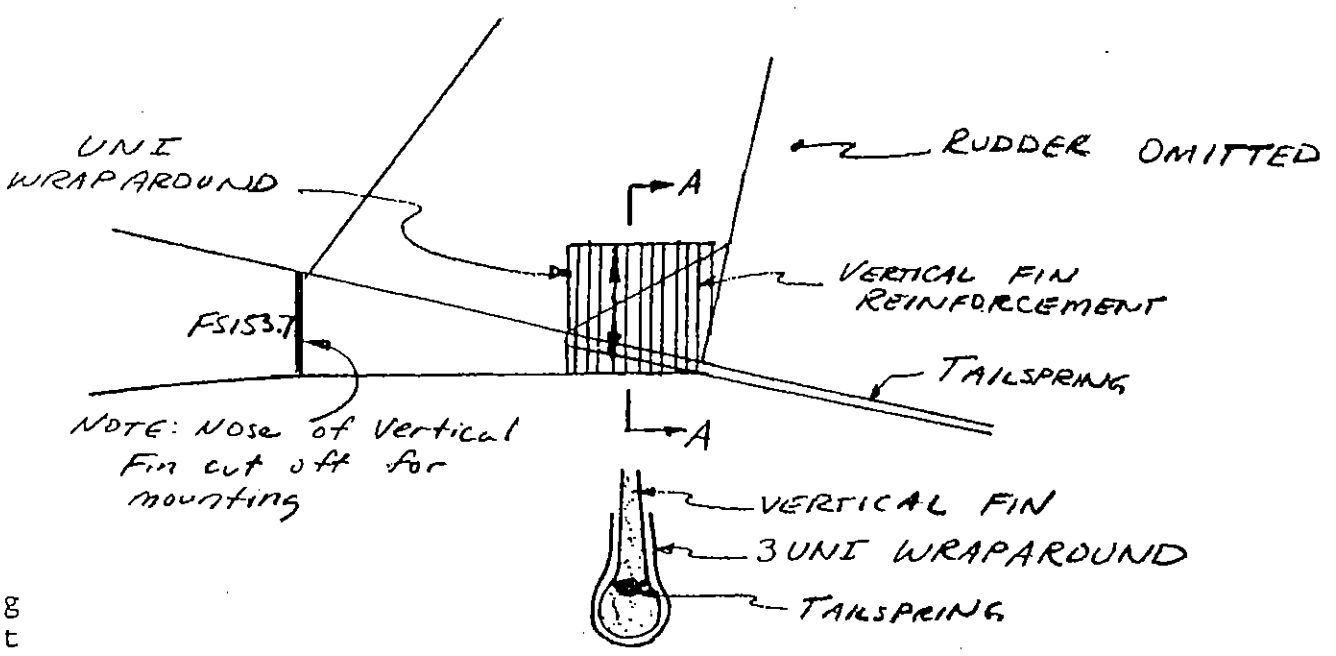
ALIGNING THE FIN

Use micro wherever the fuselage and fin join to mate except for the tailspring. At the tailspring, use flox to permanently mount the tailspring.

After mating, recheck the fuselage leveling laterally, and then the vertical alignment and tracking of the vertical fin. When satisfied, let cure for one day.

The next task is to make a filet to cover the gaps between the vertical fin and the aft fuselage. It is probably easiest to use several pieces of green and orange foam, 5-Minute them in place, and then sand and contour them to obtain an pleasing shaped filet. Avoid letting the foam get less than 0.3" thick during the carving process. You can check the thickness with a nail or toothpick like you did when you were carving the fuselage sides. Layup 2 BID on the filet, overlapping by 1" both the fuselage and vertical fin.

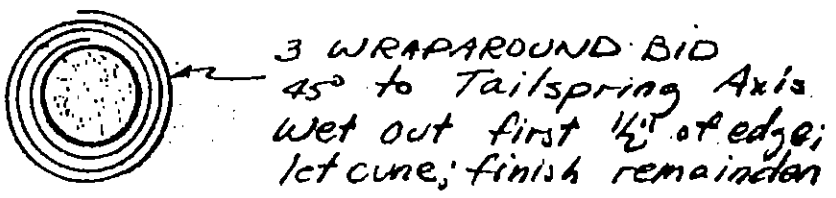
Next, layup 3 UNI in a wrap around style around the tailspring area. This UNI strengthen the aft fuselage for the high tailwheel loads.



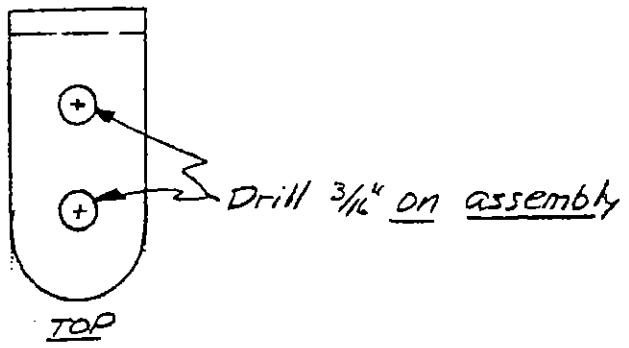
UNI REINFORCEMENT

Finally, wrap BID around the tailspring with the orientation at 45 deg. to the long axis of the tailspring. Three times around is sufficient to provide the necessary torsional stiffness for the tailspring.

Peel Ply the joints before quitting.



TAILSPRING LAYUP



CS20

Make 2

Material: 1½"x 2"x0.125 AL Angle

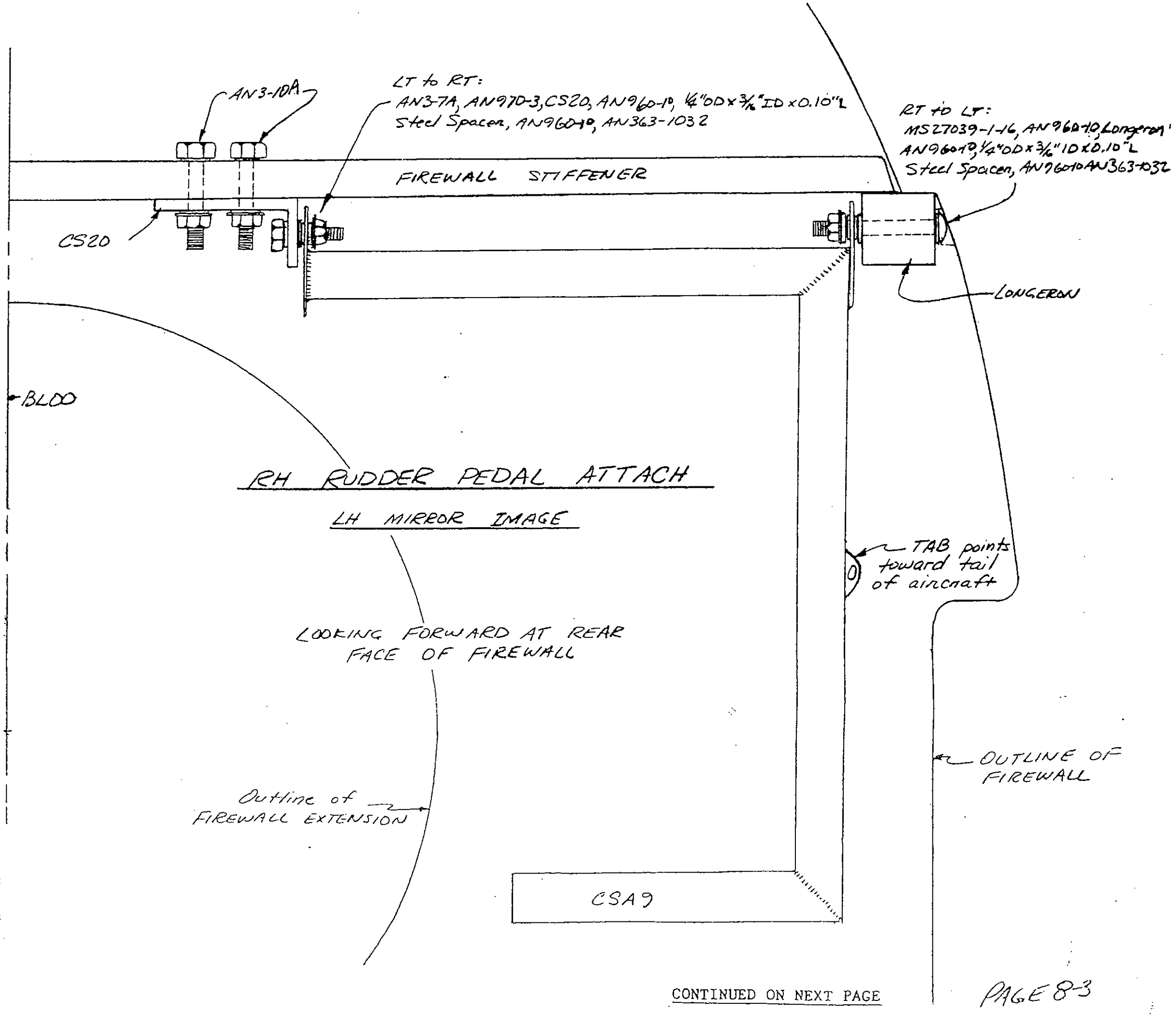
RUDDER CONTROL SYSTEM

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.

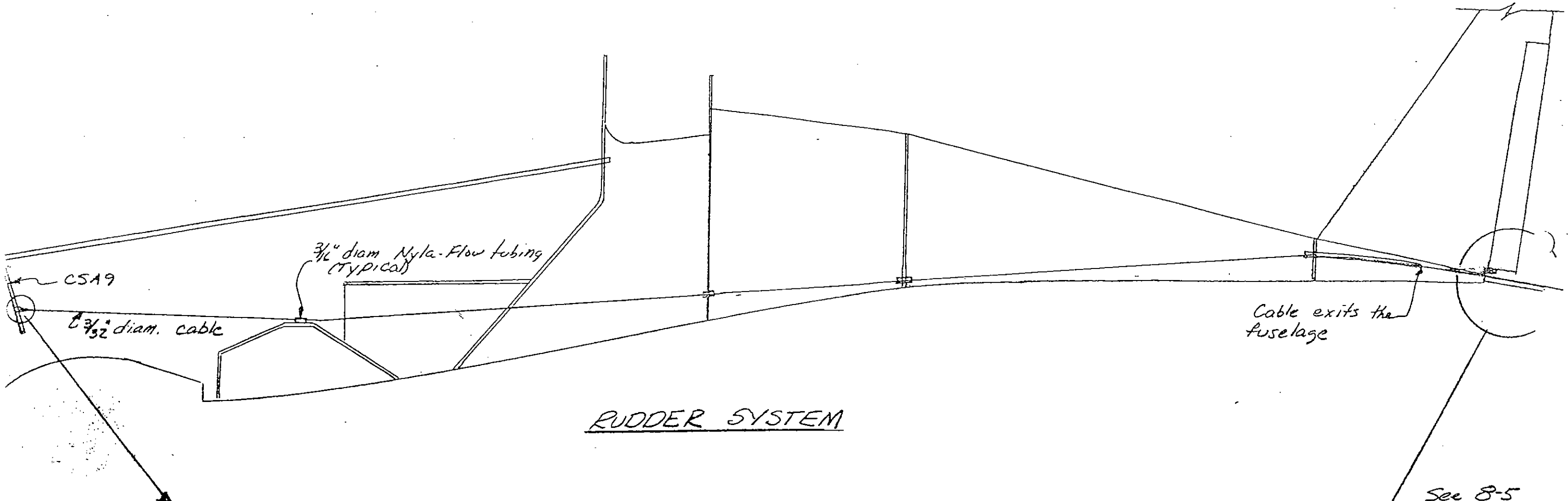
Begin by mounting the rudder pedals. It will be necessary first to make two CS20's out of the aluminum extrusion. Note the tab on CSA9 points toward the aft end of the aircraft.

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.

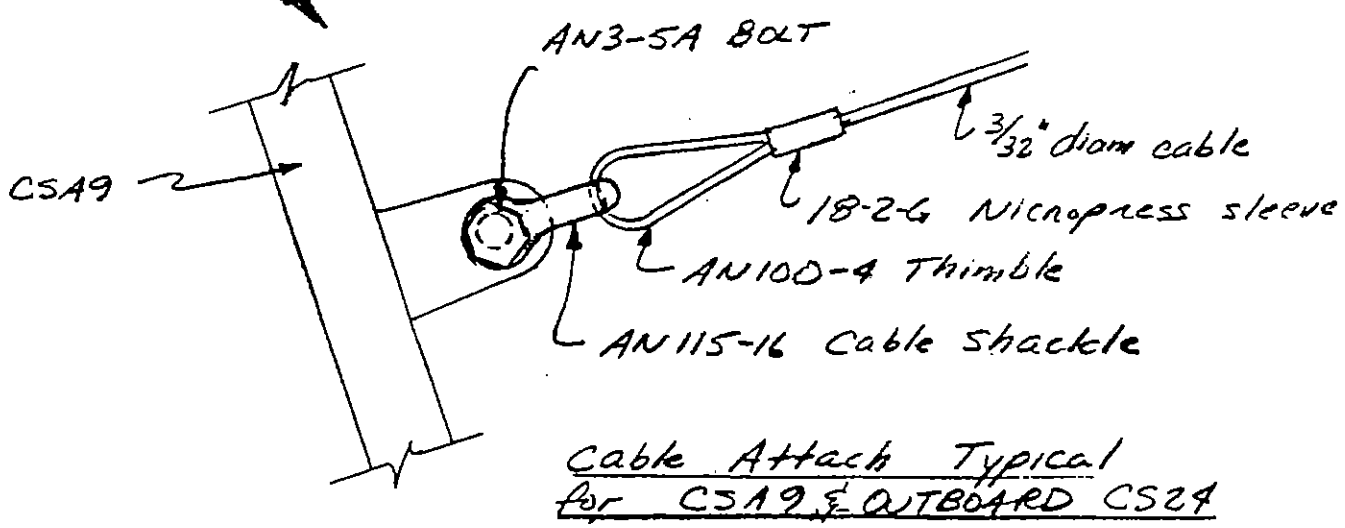
Note that the AN115-16 cable shackle is used only with the rudder pedals and the outboard CS24 attachments; the other four points, because of much lower loads, delete the shackle and pull directly against the Thimble.



CONTINUED ON NEXT PAGE

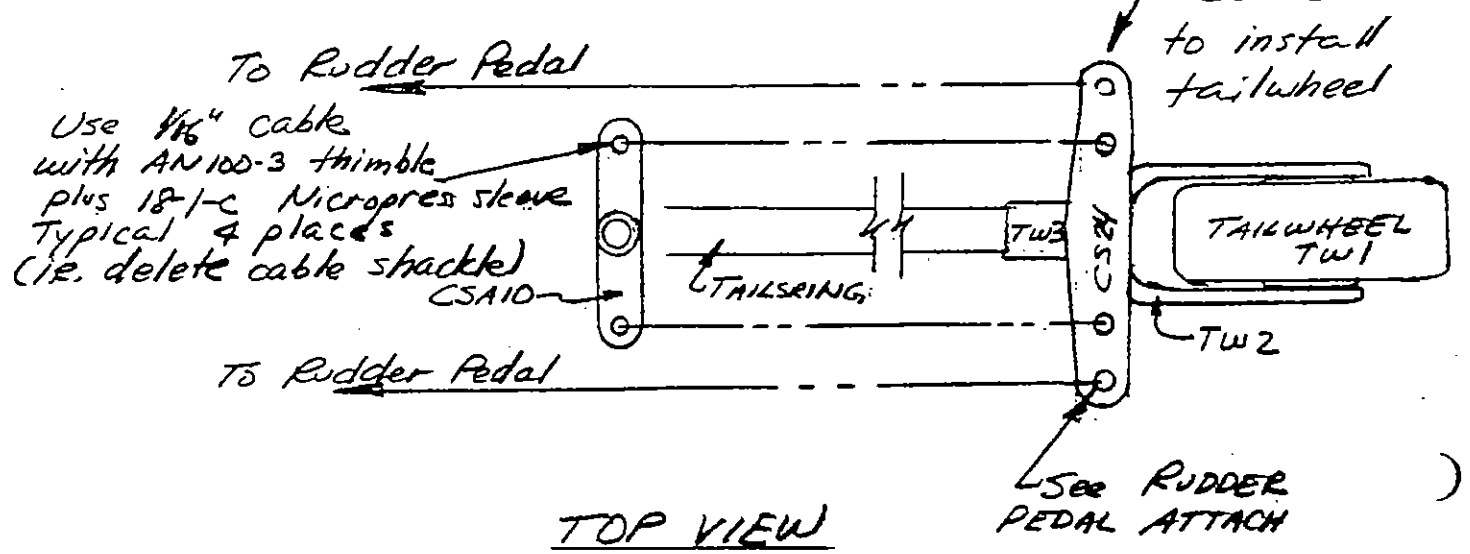


RUDDER SYSTEM

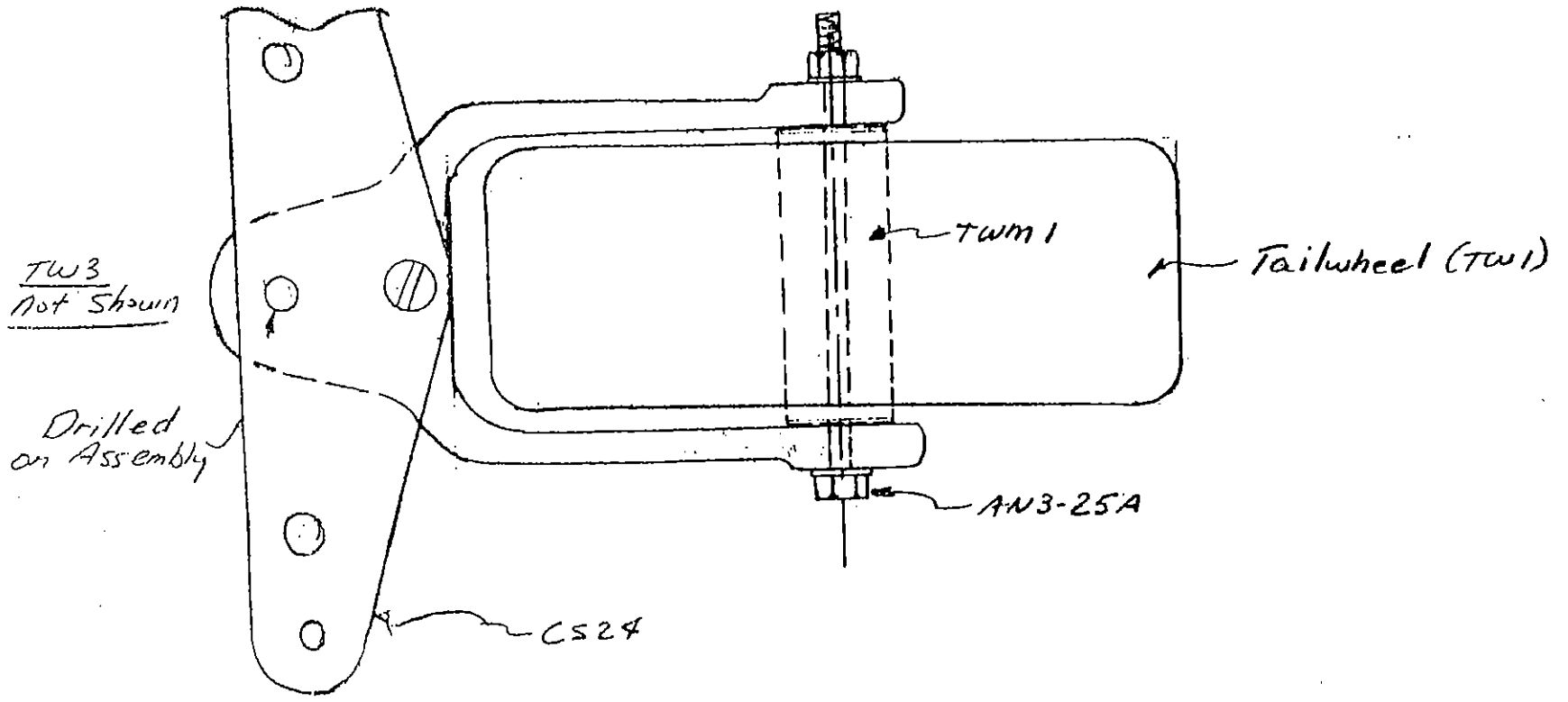


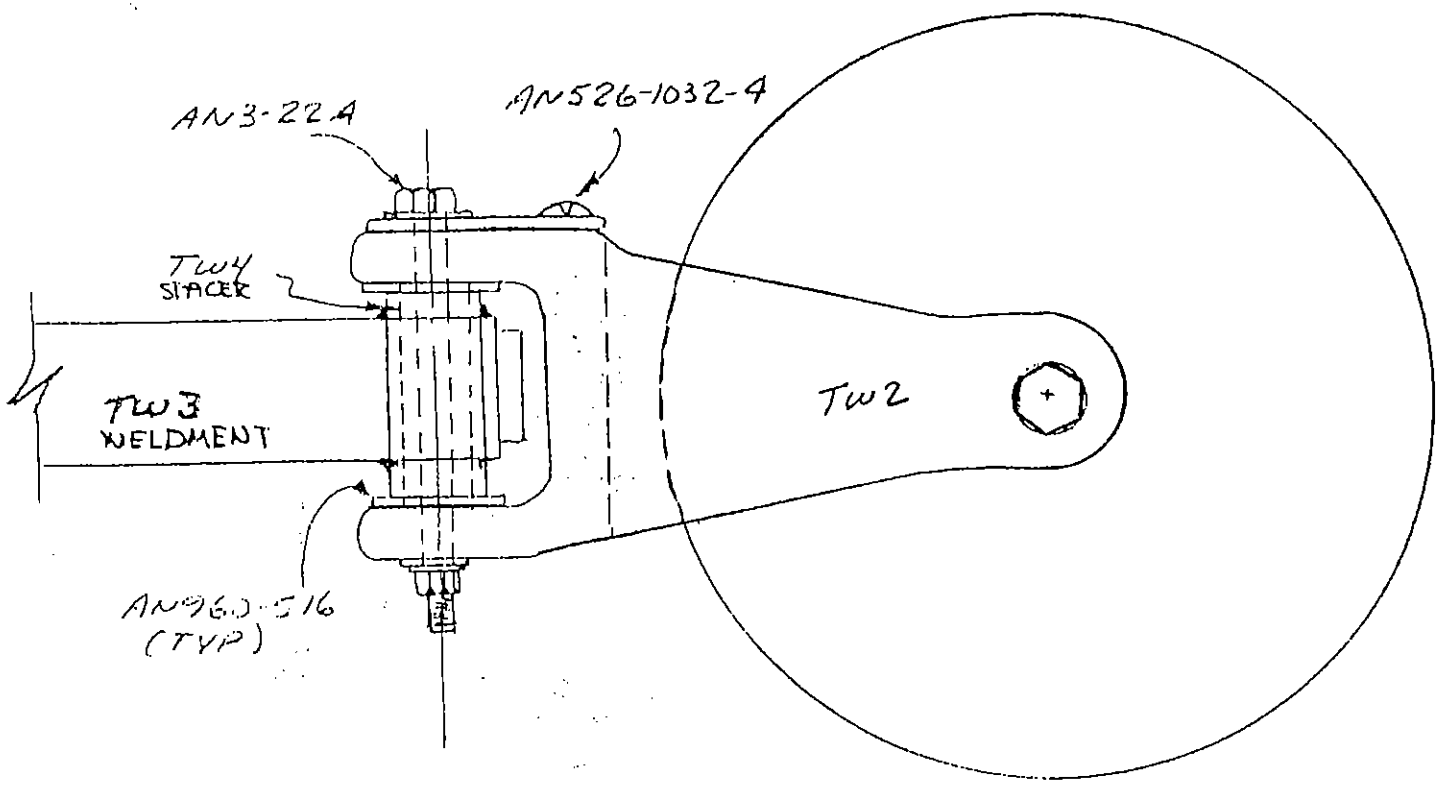
Cable Attach Typical for CSA9 & OUTBOARD CS24

RUDDER PEDAL ATTACH



TOP VIEW



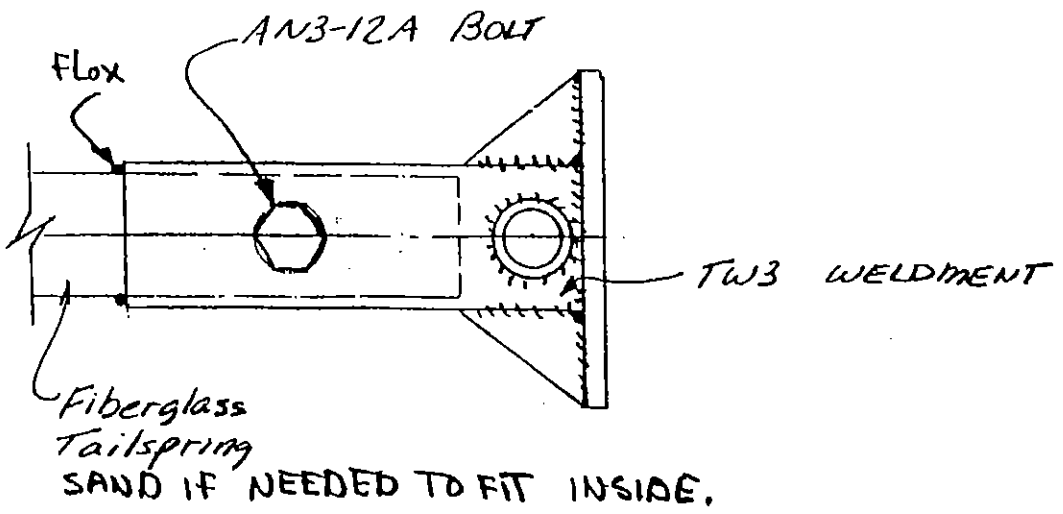


INSTALLING THE TAIL WHEEL

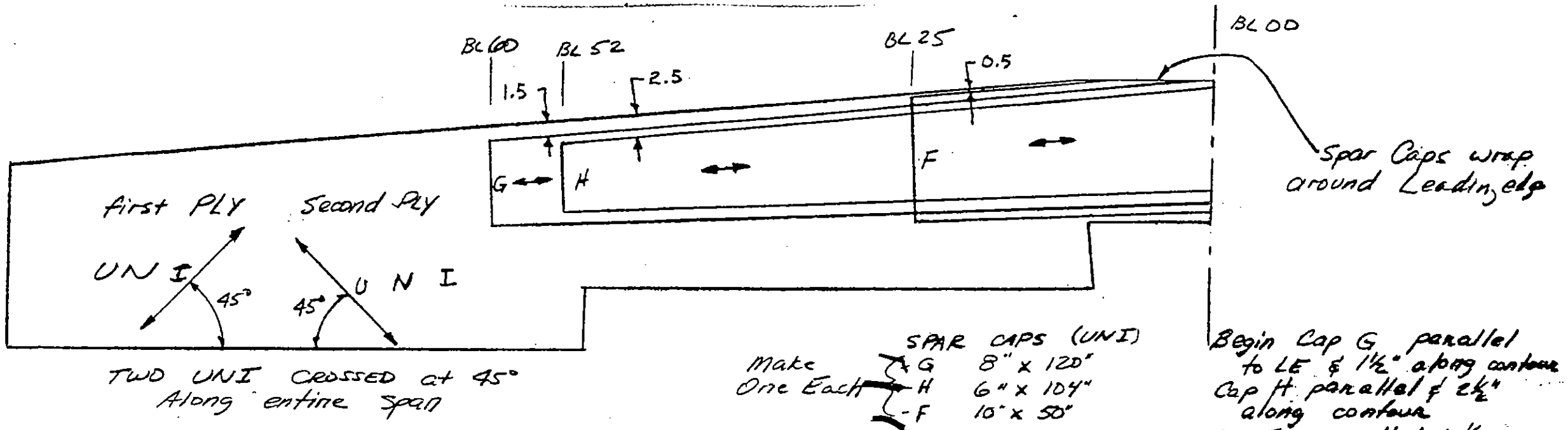
Begin by inserting TWM1 through the tailwheel(TW1). Next, trial fit the assembly in position. There should be a freeplay of about .02" between TWM1 and TW2. Once you have done this, you can install the tailwheel with the AN3 bolt, tightening it until it snubs up against TWM1, which should not pivot when the wheel rotates.

Then, install CS24 with the aft screw and drill in the front hole for the AN3 bolt. Now, you can assemble TW3, TW4, and TW2 as shown. TW3 will have to be sanded to permit a slight amount of freeplay between it and TW2. After assembly, TW2 and TW4 rotate together inside of TW3.

Finally, install TW3 onto the tailspring. Be sure to level the aircraft laterally first and to make sure that the tailwheel will be perpendicular to the ground. TW3 IS installed with Flox and The AN3-12A BOLT.



TOP VIEW

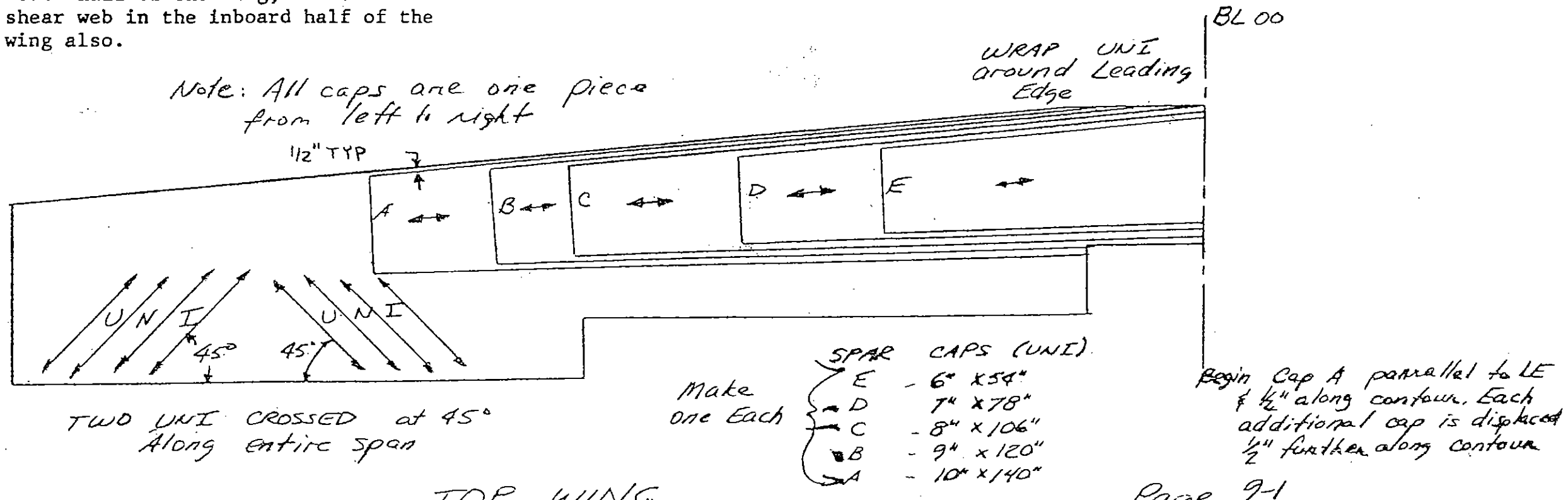


BUILDING THE MAIN WING

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.

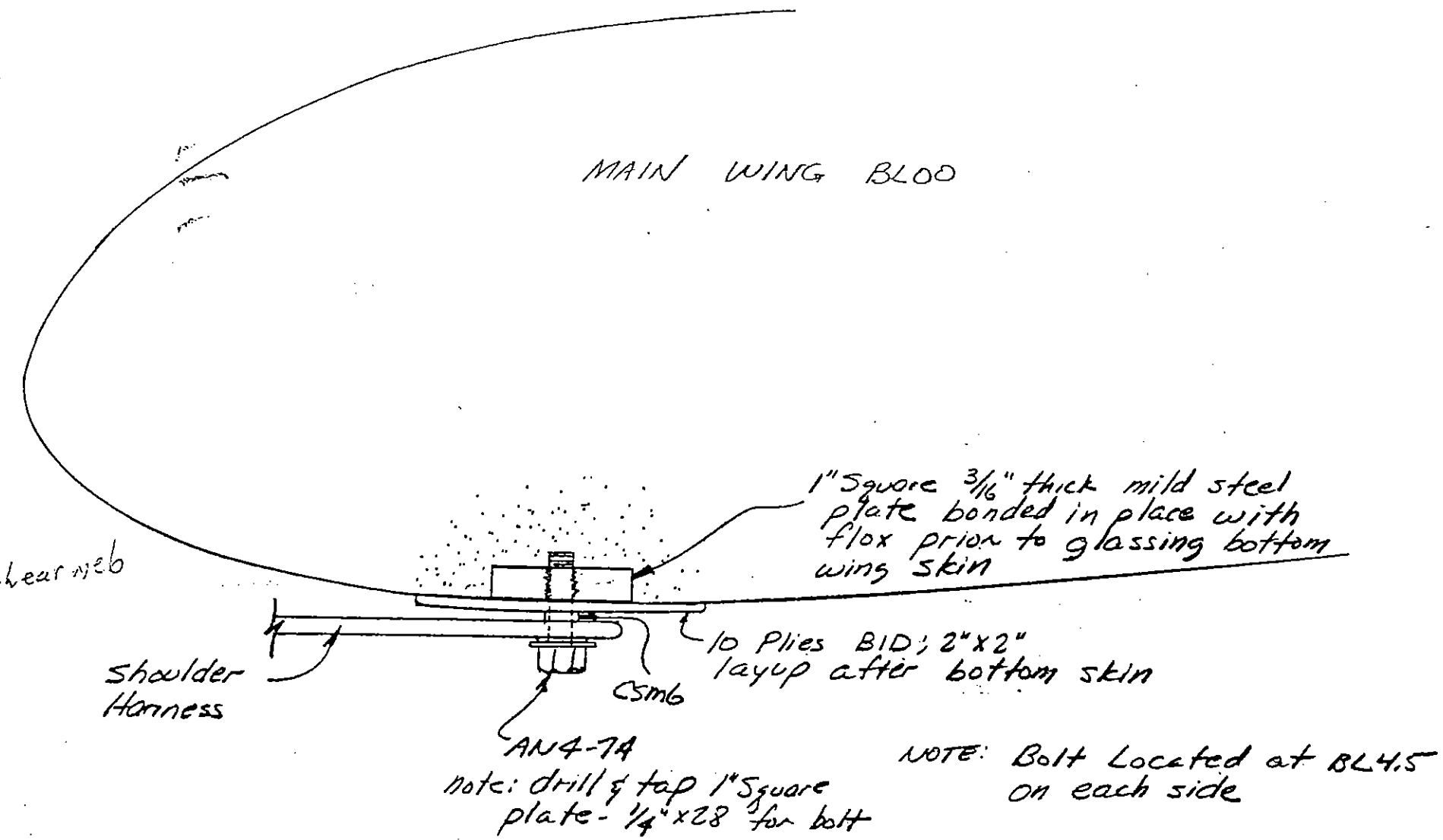
CONTINUED ON NEXT PAGE



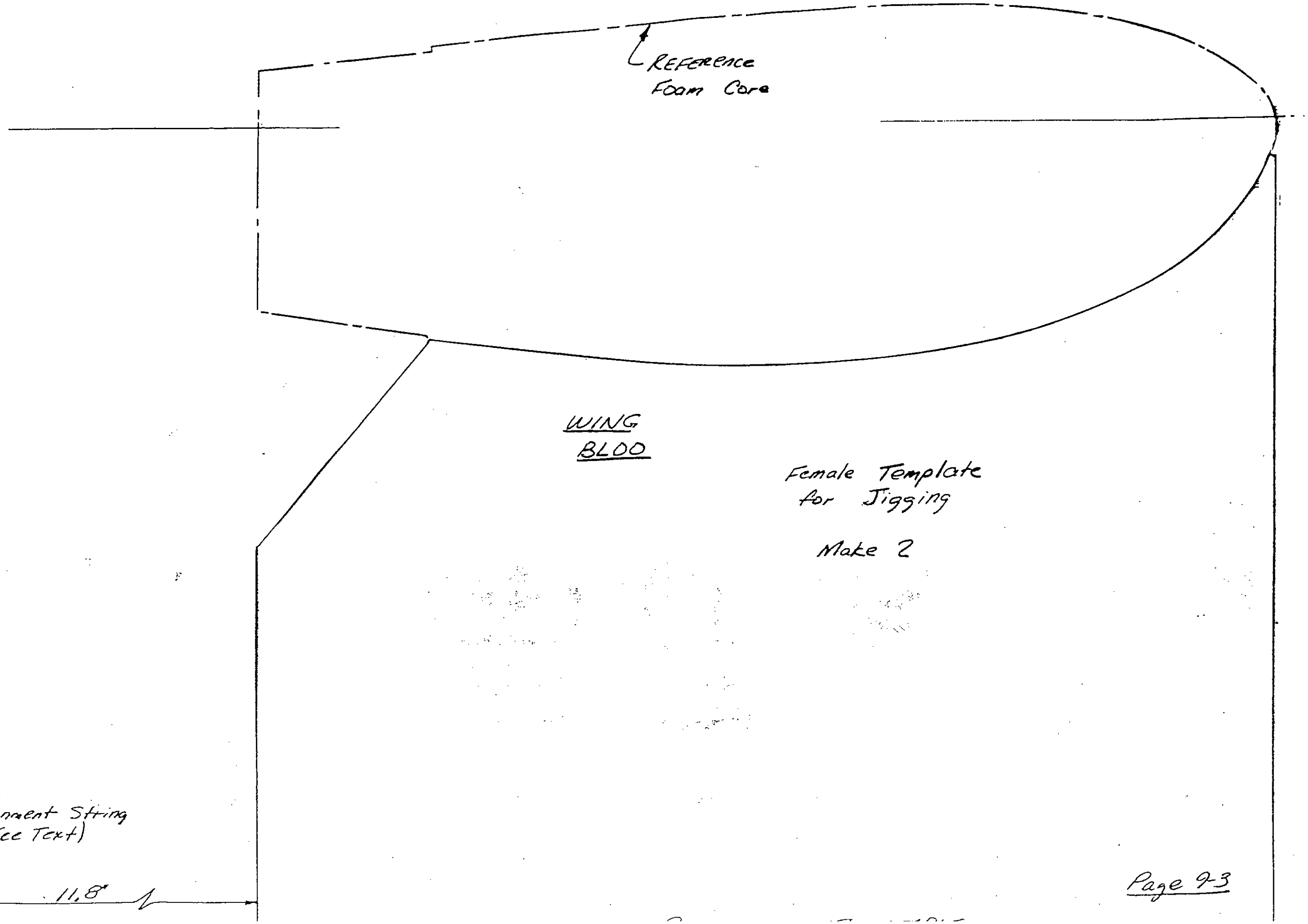
SHOULDER HARNESS INSTALLATION

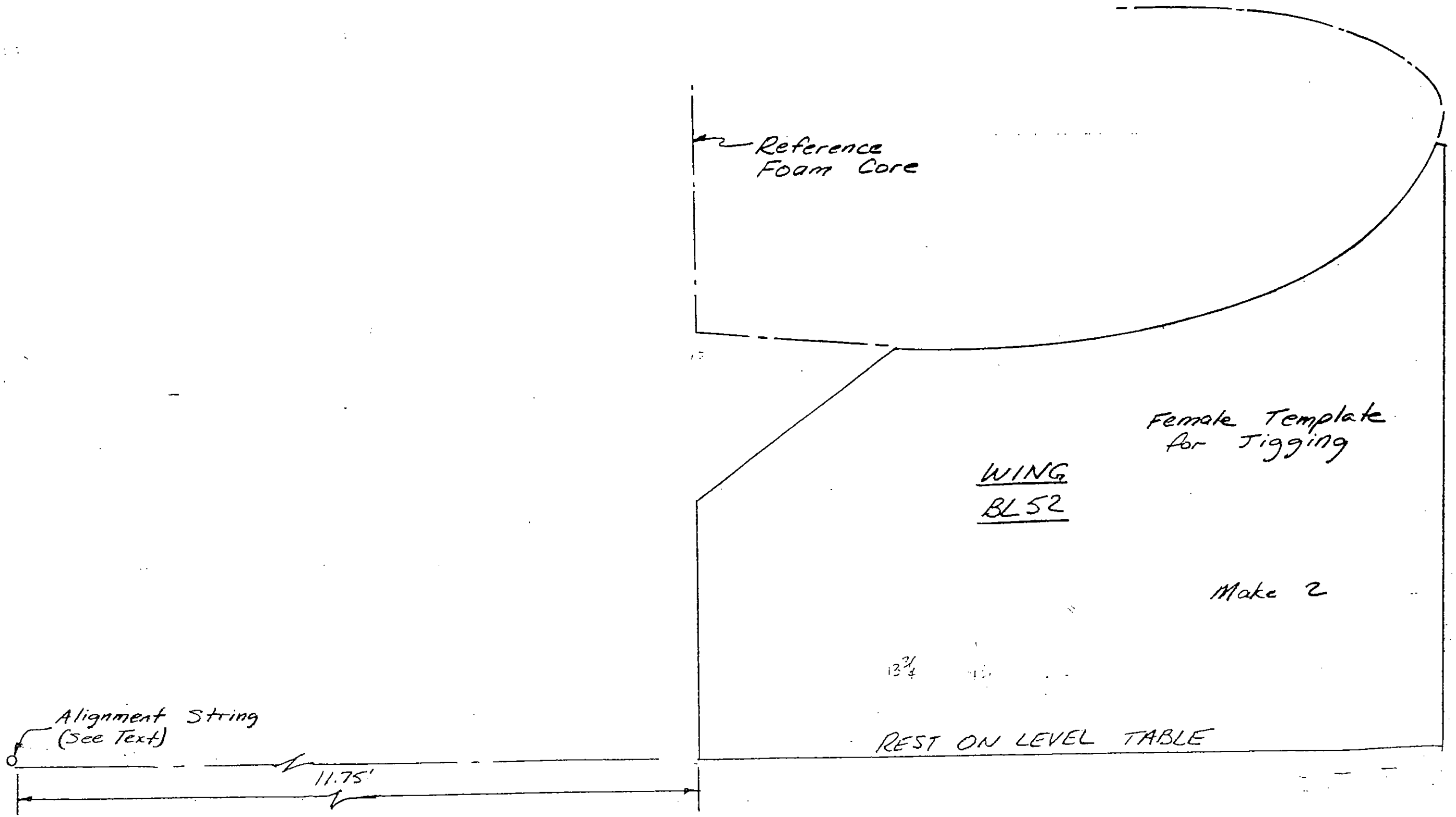
Prior to glassing the bottom skin on the main wing, you will have to install two 1" square, 3/16" thick mild steel plates for installing the shoulder harnesses later. The plates should fit flush with the bottom wing foam line.

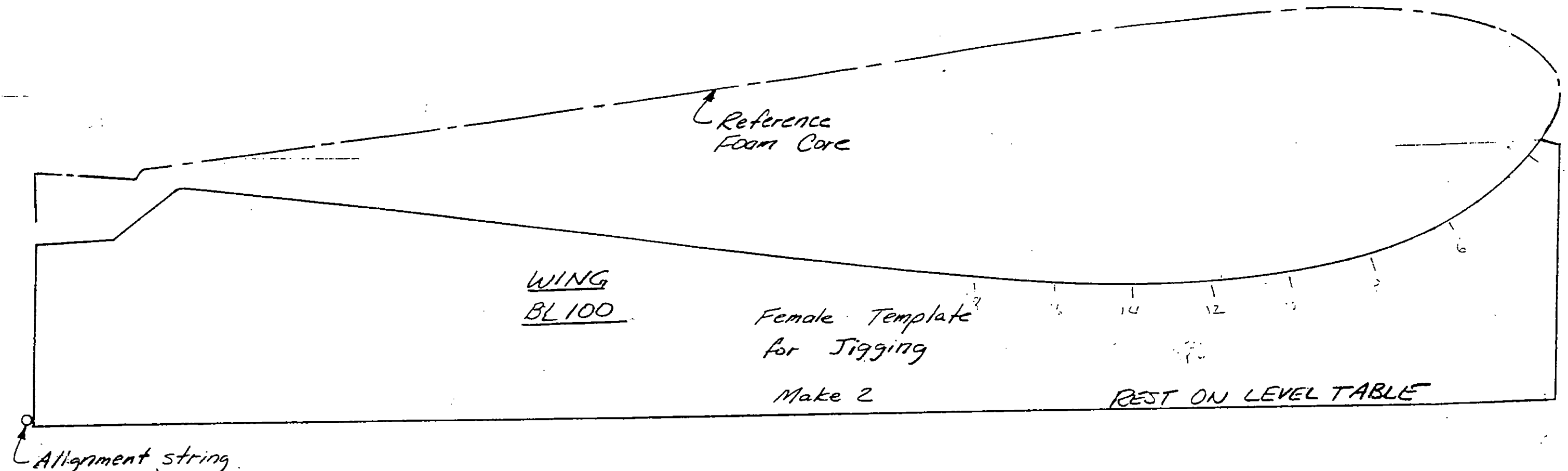
Following glassing the bottom skin on the main wing, layup ten plies of BID 2" square over each steel plate. Once the layup has cured, drill and tap for a AN4 bolt in each plate. An assembly drawing is included. Remember that the shoulder harness bolts are at BL4.5 on each side.



x 8" from shear web


Reference
Foam Core
WING
BLOO
Female Template
for Jigging
Make 2
Alignment String
(See Text)
11.8"


Reference
Foam Core
Female Template
for Jigging
WING
BL52
Make 2
13 3/4
REST ON LEVEL TABLE
Alignment String
(See Text)
11.75'


Reference
Foam Core
WING
BL100
Female Template
for Jigging
Make 2
REST ON LEVEL TABLE
Alignment string
(See Text)

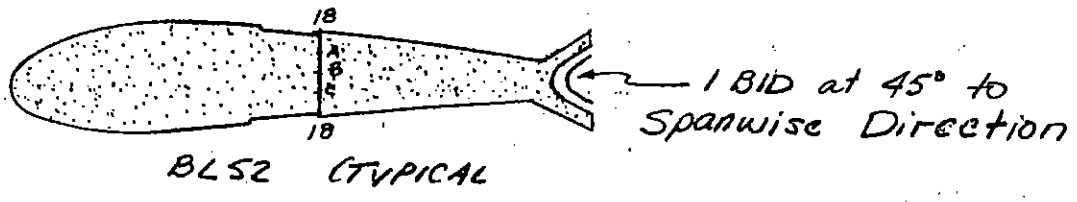
Construction begins by glassing the aileron slots on both inboard pieces. When the layups are cured, cut the BL52 and BL00 templates at the 18-A-B-C-18 line. Use these templates to hot wire the inboard foam cores into two pieces each in preparation for laying in the shear web.

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 the cores in position, check to verify that the level lines on the cores are level. This is important so be careful.

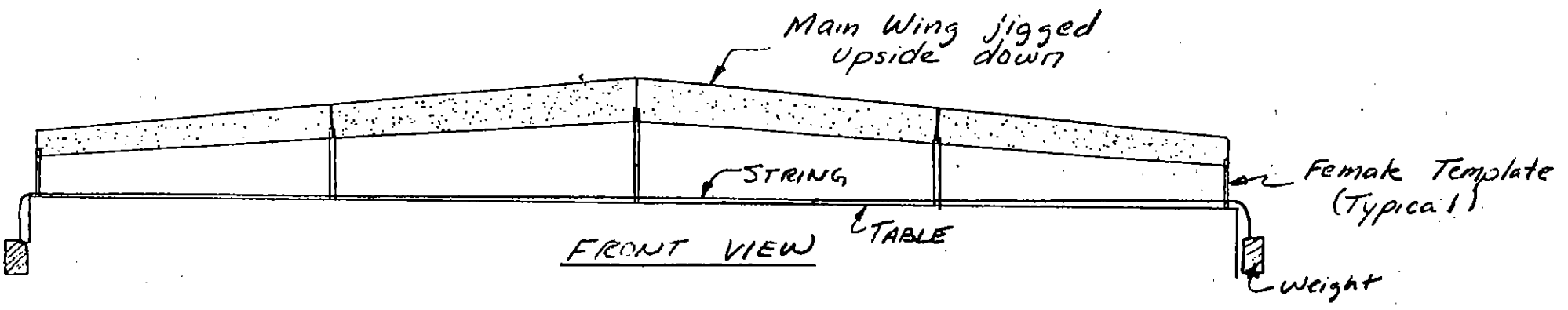
At BL00, you will have to bevel the two inboard wing foam cores to allow them to fit together flush at the proper dihedral angle.

Also, stand back and sight spanwise along the wing to verify that the wing is not bowed or kinked. A straight edge laid spanwise is also useful for this.

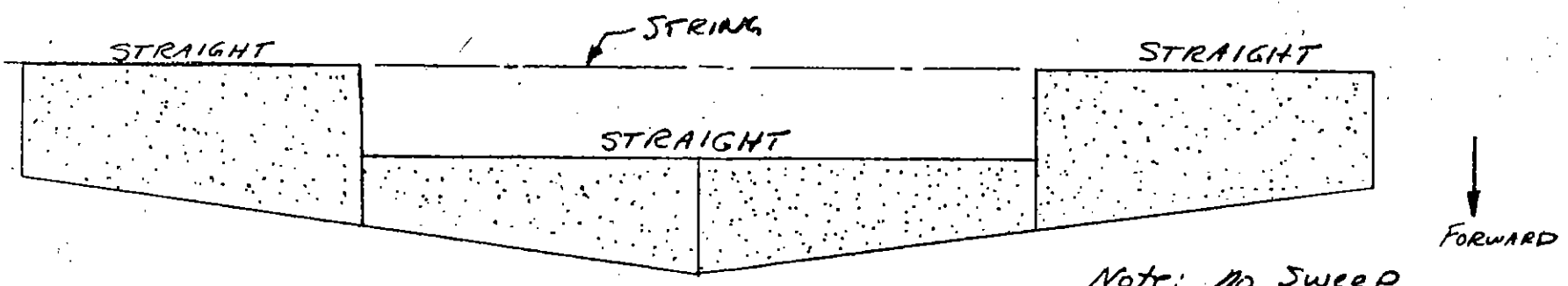
Don't be concerned if the templates need to be moved inboard or outboard slightly to remove any bows or kinks. When everything is satisfactory, mix up some bondo and bondo the templates to the table top in the proper locations. After that is accomplished, the foam cores should be just resting on the templates.

The next step is to join the foam cores together with micro slurry. Check each level line as you do this. Before stopping, 5-MIN the foam cores to the templates with small dabs and being careful not to move the cores.

CAUTION! The foam cores must fit within 1/16", and the slow epoxy must be used to join them, or exotherm damage will result.

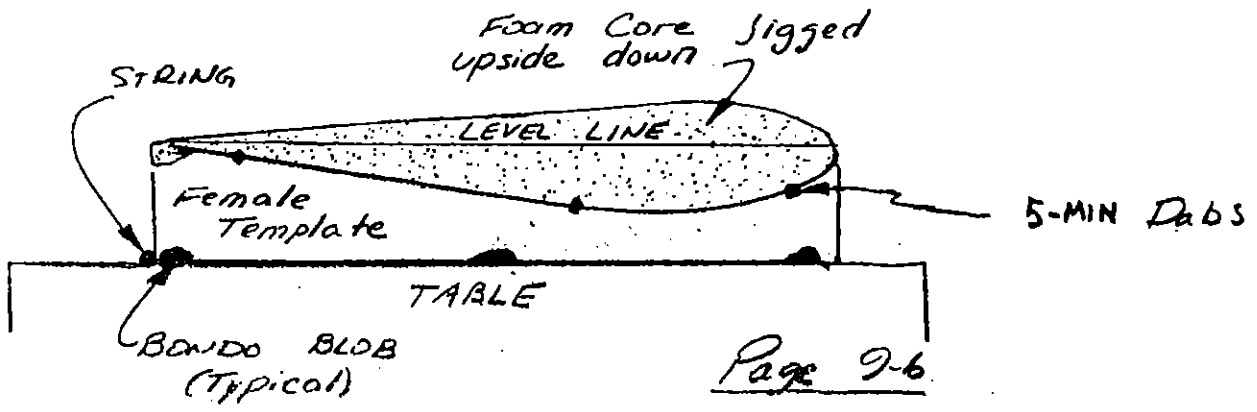


FRONT VIEW



Note: no sweep on trailing edge

TOP VIEW



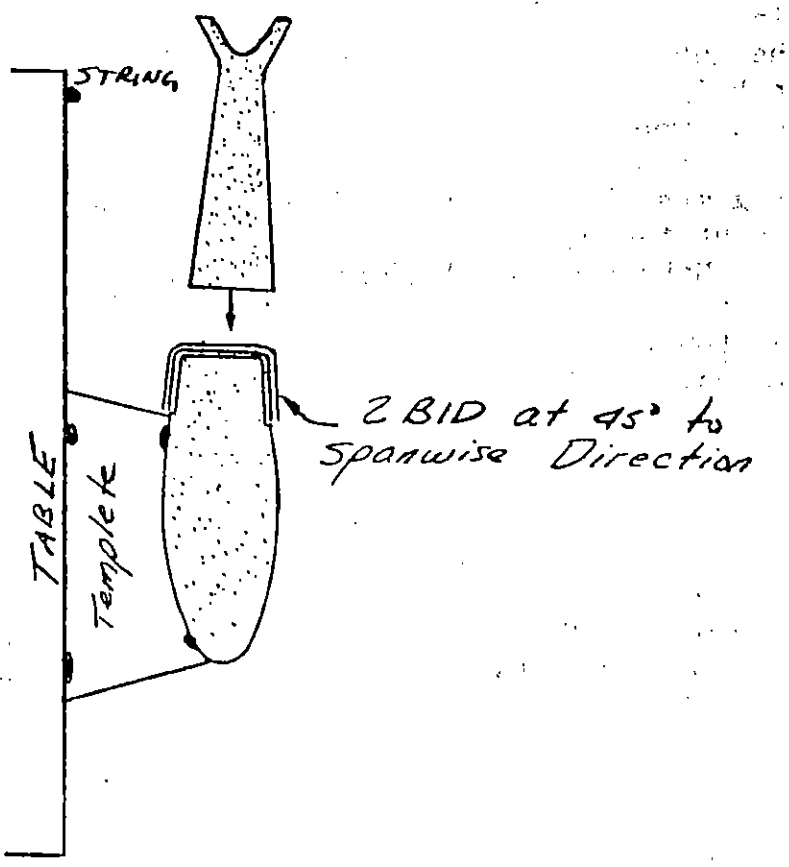
CONTINUED ON NEXT PAGE

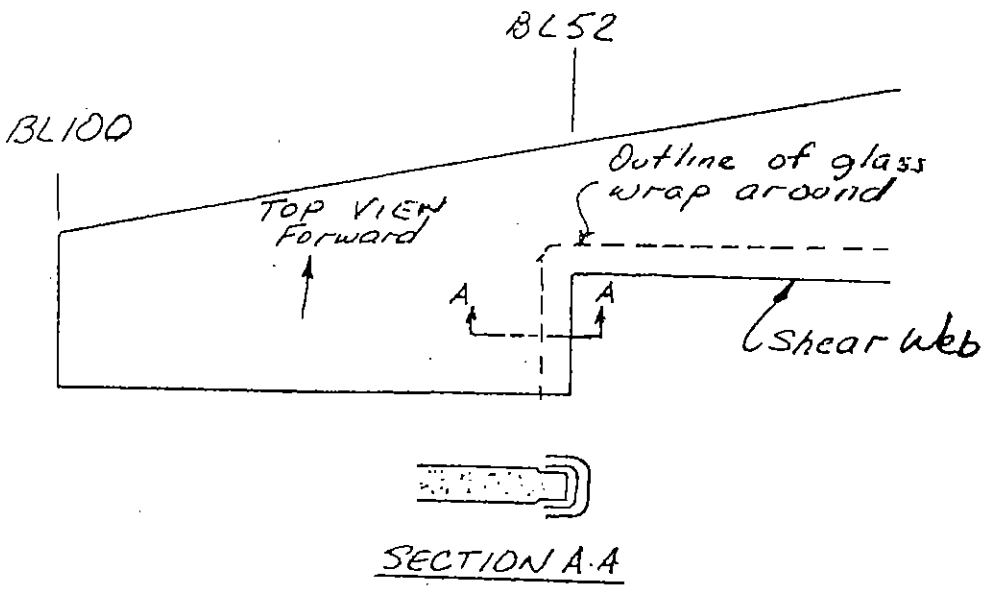
When the micro has cured, rotate the table 90 deg nose down so that the shear web can be done.

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.





TRIMMING THE FOAM CORE

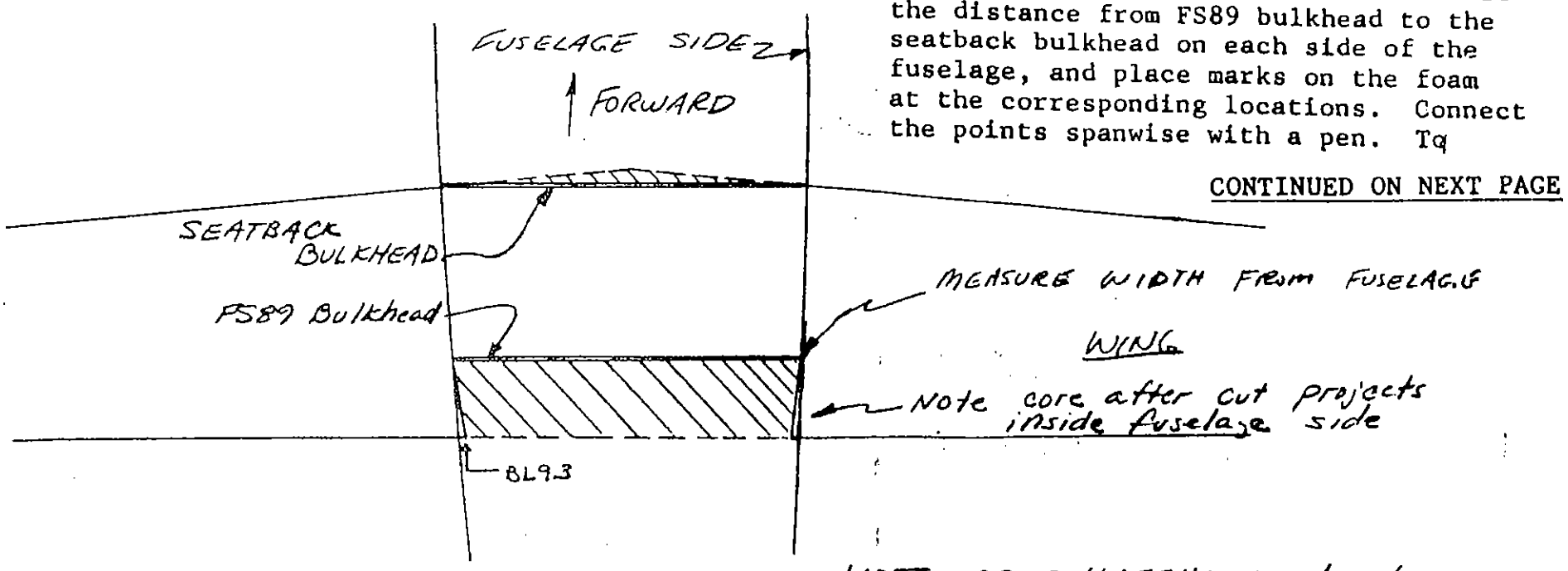
At this point, the wing should be jigged on your layout table upside down. Using a hard block on the foam core, clean up all joggles, excess micro, and bumps. At BL00, round that joint so that the glass can flow smoothly across BL00.

Read over the section on "Mounting the Main Wing" to understand how the wing fits on the fuselage.

The shear web that you previously laid up fits against the forward face of the FS89 bulkhead. Measure the width of the fuselage at that point and mark it on the wing foam core with a pen. Mark BL9.3 on each side at the trailing edge of the foam cores and connect up the BL marks. Before cutting out this section of the foam core, measure the fuselage to verify that after the cutting, the foam core will project inside the fuselage to the aft of the FS89 bulkhead. If not, change the BL9.3 mark so that the core will project inside the fuselage in that area.

Next, you need to cut off the "nose" of the main wing so that it will fit against the seatback bulkhead. Measure the distance from FS89 bulkhead to the seatback bulkhead on each side of the fuselage, and place marks on the foam at the corresponding locations. Connect the points spanwise with a pen. To

CONTINUED ON NEXT PAGE

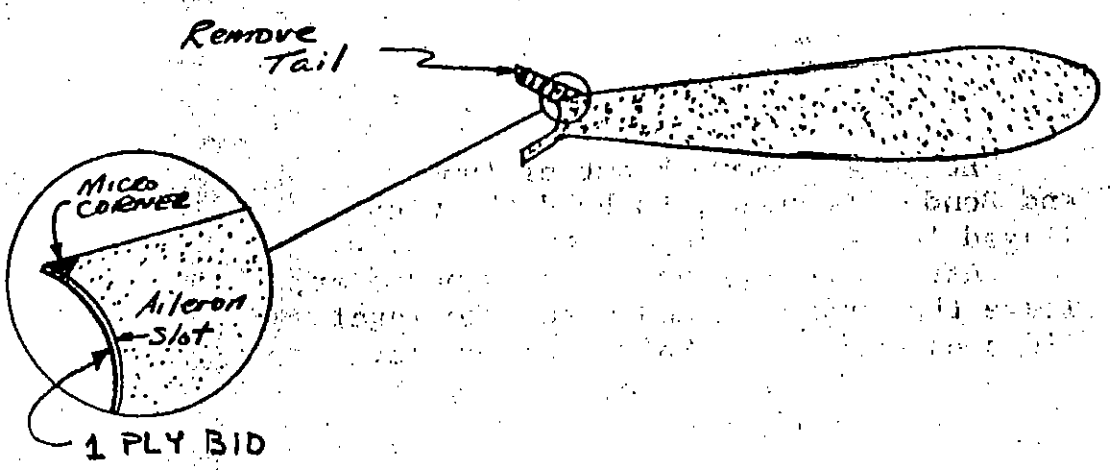


NOTE: CROSS-HATCHING denotes area of foam core to be removed prior to glassing

TOP VIEW

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.

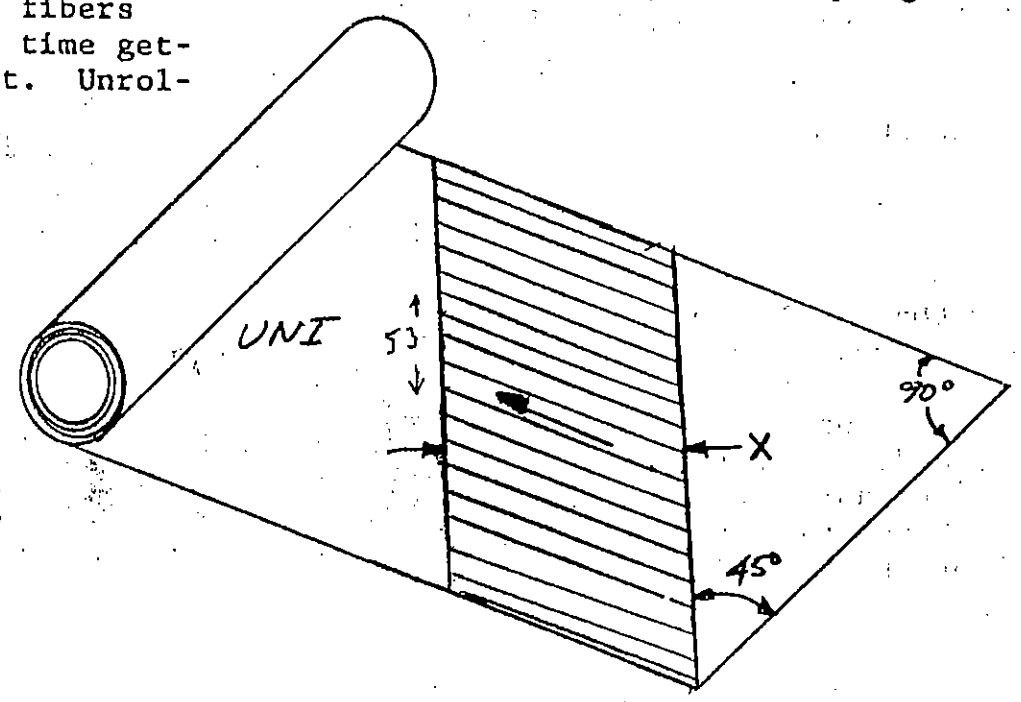
Next, reread the aileron construction section and peel ply the trailing edge of the wing outboard of BL52 the same way.

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 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, let the cloth hang down vertically. Trim to within 1" of the tangent pt. Trim the rest of the edges to within 1" also. At the inboard portion where you cut the core for the seatback bulkhead fitting, permit the UNI to wraparound to the bottom of the face.

No overlap is required; just butt fit the skins together. Squeege the cloth well to avoid building up excess resin.

X	Number
22"	8
17"	4

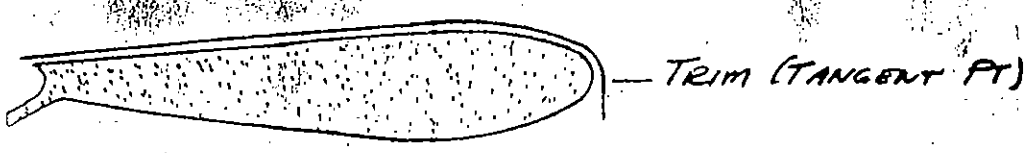


FOR SPAR CAP POSITIONS, See Sheet 9-1

Find the main wing spar caps F,G, and H. These will be put on in that order. The easiest way to accomplish this is with three people: two hold the ends of the unrolled cloth while the third removes the frazzles; then the third man stands at BL00 and positions the cap in the proper location (centerline on BL00 and proper distance from leading edge) while the other two individuals keep the cloth off the foam. When the center man is ready, one of the people holding the ends lays down his end of the cloth spanwise and helps remove the wrinkles and kinks. Then, the other individual on the other end does the same thing. Squeege the spar cap well before repeating the process with the next one. Always squeege from BL00 outboard to keep the UNI fibers straight.

Peel ply all of the joints. Peel ply the first two inches of the leading edge.

Knife trim the leading edge at the tangent point before quitting.



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:

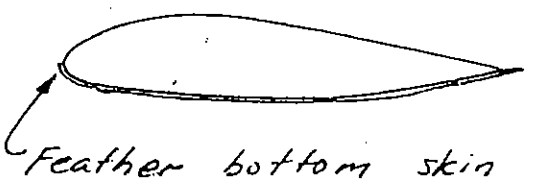
1. The top of the wing has more spar caps.
2. At the leading edge, the top skin must wrap around the leading edge and overlap the bottom skin by about 1"

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

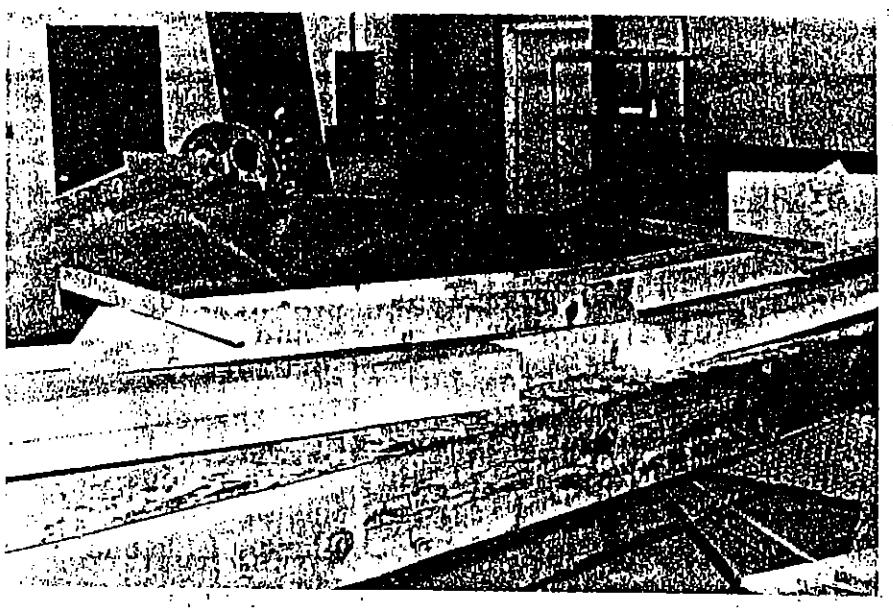
Permit the wing to set for two days before breaking loose the lumber. Before moving the wing, Bondo a board onto the wing surface in the level position (i.e. so that a level set on top of the board will be level with the tip level lines). This will allow you to easily tell when the wing is level as you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

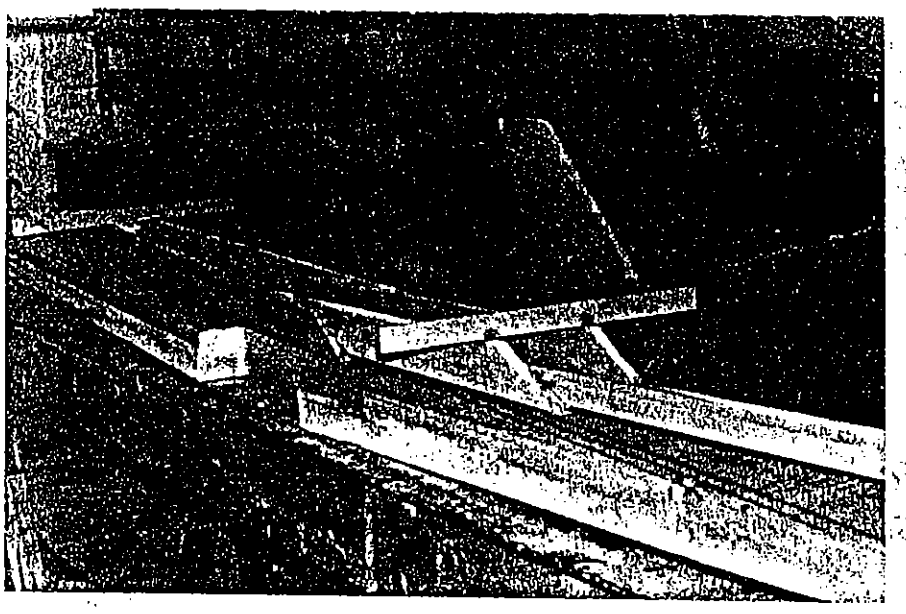
By the way, to avoid letters and phone calls to us, it should be noted that the photos accompanying these words show the level board and lumber framework on the canard. The principle is identical, however.

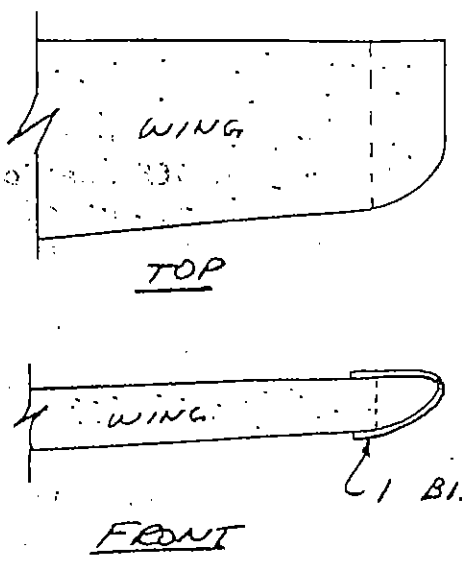
After the level board has been bonded to the canard, you may carve the wing tip to a pleasing shape and glass over it with one BID, overlapping onto the wing skin at least 1".

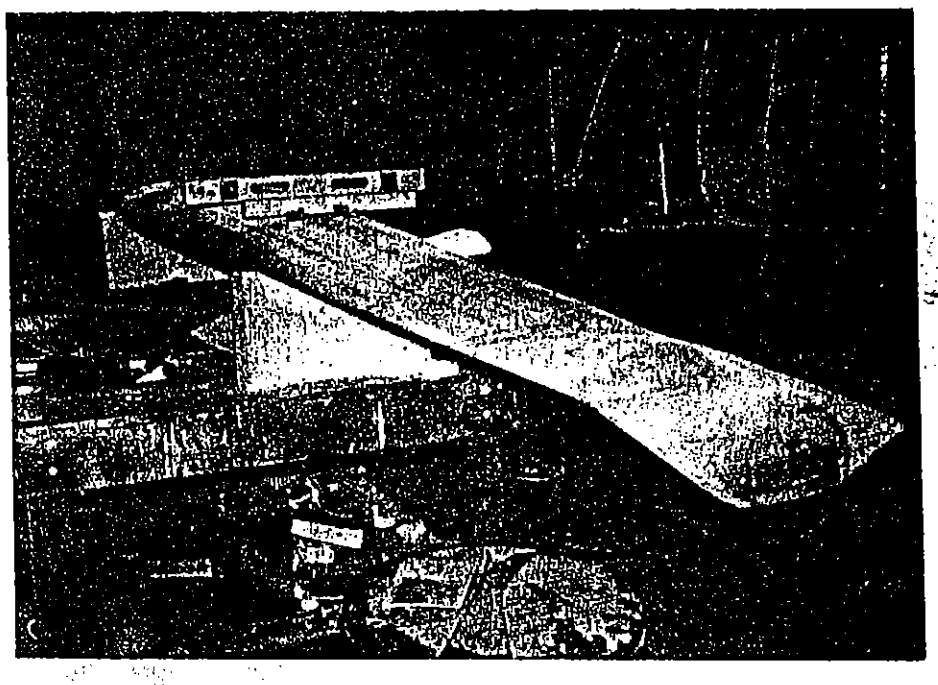


Feather bottom skin before glassing top skin; similar to aileron construction









MOUNTING THE OUTBOARD AILERON PIVOT

The outboard pivot is mounted at approximately BL38.

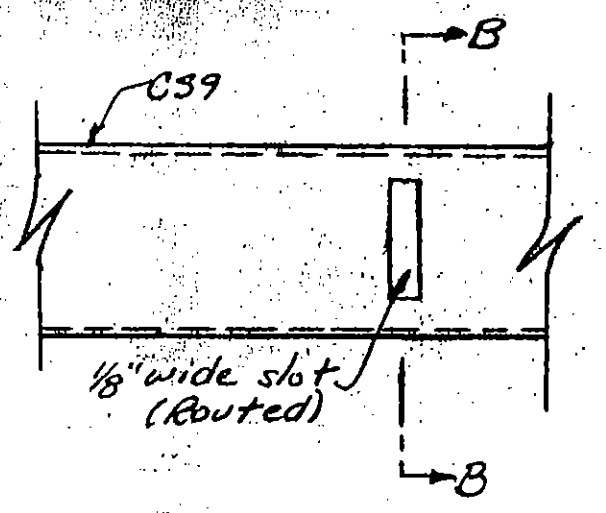
Screw CSM3 into CSM2 and retain it with a locknut, as shown. It must be tight. Round the end of CSM3 slightly.

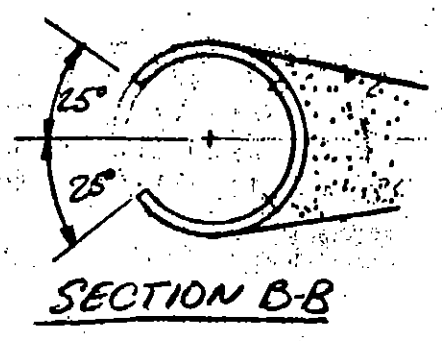
Measure 28" outboard from the inboard end of the aileron(that's the end which still has CS9 visible). Using a router bit, route a slot 1/8" wide for about plus or minus 25 deg. of rotation. (see sketch). Next, insert CSM2 into CS9 with the flange pointing inboard. You may have to sand CSM2 to get a snug 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



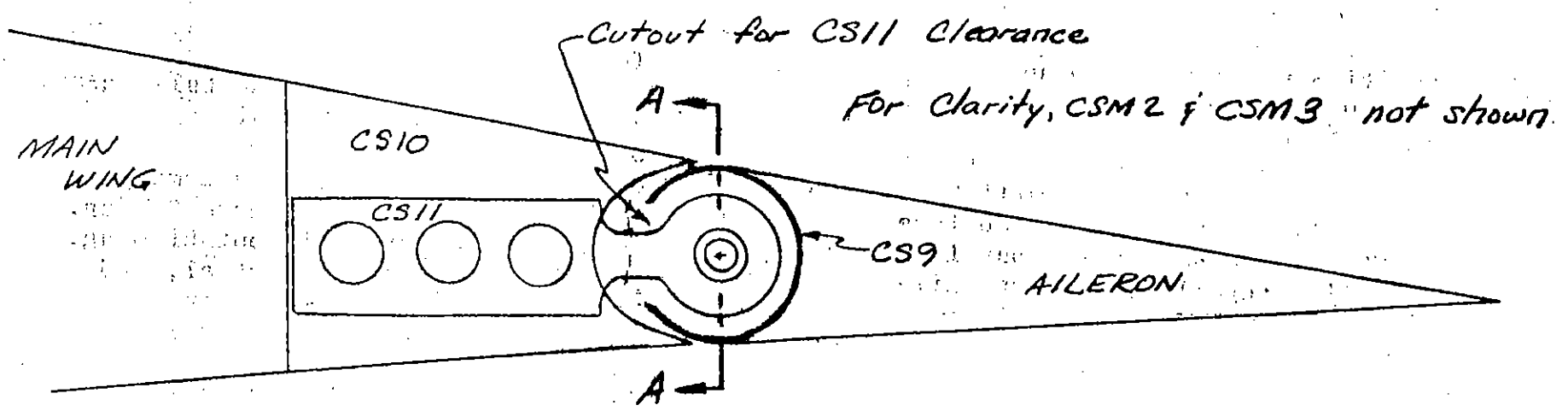


SECTION B-B

position on the wing, with the inboard aileron edge at BL10. CS11 should be against CSM2. Now you can mark where CS10 must go to capture CS11. Remember that to remove the ailerons, they are moved inboard(while CS11 remains fixed in CS10) until CS11 slides off CSM3; then the aileron can be pulled off. If you don't stand back and think about this, you are likely to error during the installation.

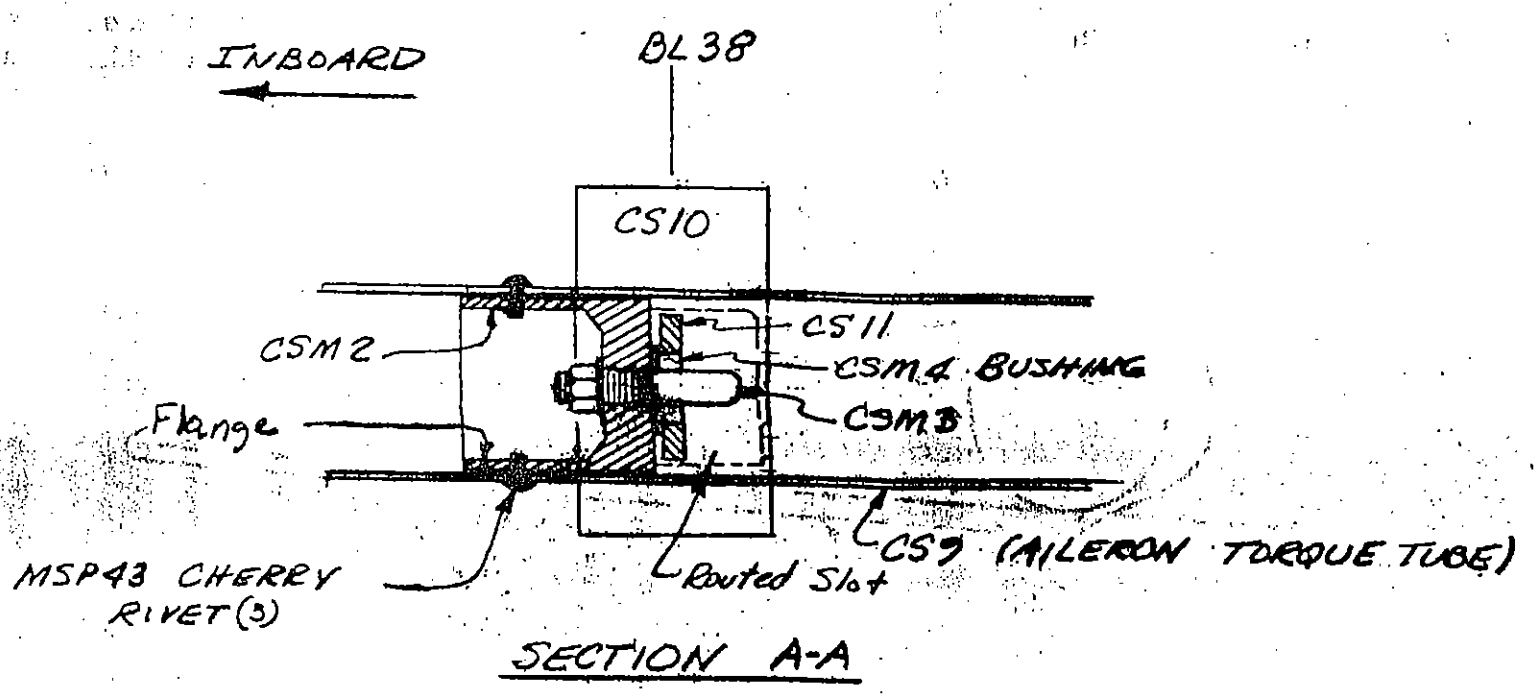
Once you know where CS10 goes, remove the blue foam of the wing core and install CS10 with dry micro, and sand to remove bumps and joggles. CS11 will be permanently installed into CS10 later during the aileron installation and rigging.

One BID over CS10, top and bottom is used to permanently attach CS10 to the main wing



AILERON OUTBOARD HINGE DETAIL

CS11 at BL38



SECTION A-A

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.

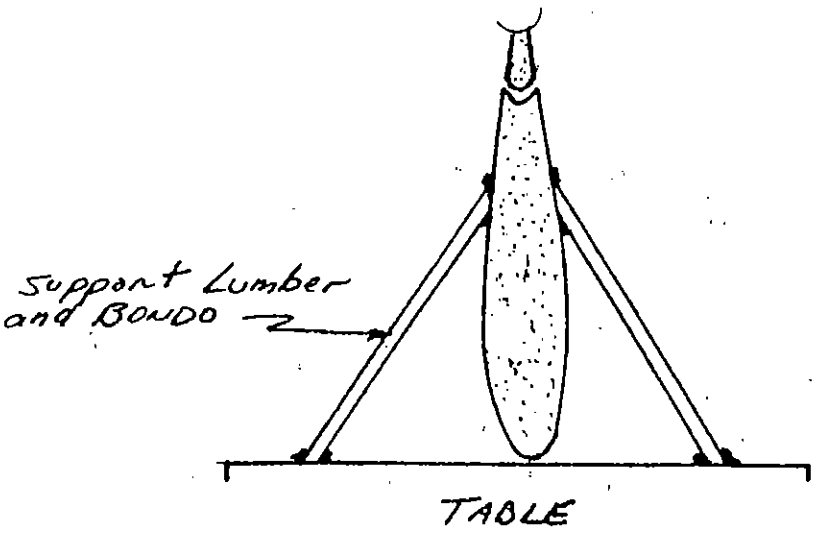
Find phenolic bearings CS6 (2) and CS7. Dull the phenolic with sandpaper.

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 the wing core.
6. Be careful not to break the 5-Minute bond between any of these pieces. Now lay up the BID that permanently joins the bearings to the wing cores. Be careful not to get any epoxy in the bearing holes.

The CS8 spacers on each side restrain the aileron from moving inboard and falling off of the outboard pivot(CSM3). These spacers are installed after CS11 is permanently attached to CS10.



JIG WING VERTICALLY ON TABLE

Begin by positioning the aileron on the wing, leaving about 1/2" gap between CS6 and the aileron for the future CS8 spacer. With CS11 up against the CSM3, mark where CS11 will enter CS10. Using a router, route out CS10 so that CS11 will fit. CS11 is inserted with flox. It is very important that there be no air spaces in the joining. Before inserting CS11, stuff flox into the slot until it wont hold any more. Paint CS11 with epoxy & slowly insert it into the slot, moving it around to promote good squeeze out. If you have any doubts, remove CS11 and repeat the process. When you are satisfied, wipe away the squeeze out and carefully slide CS11 onto CSM2 and slide CSA4(or CSA5, depending on the side) thru CS6 to complete the jigging. The idea is to use CS6 and the aileron to jig where CS11 will cure. Use tape wrapped around the aileron chordwise, stirring sticks, and maybe even Bondo to hold the aileron in the proper position with the proper gap(about .06").

Once the layup has cured, remove the aileron and carefully inspect everything.

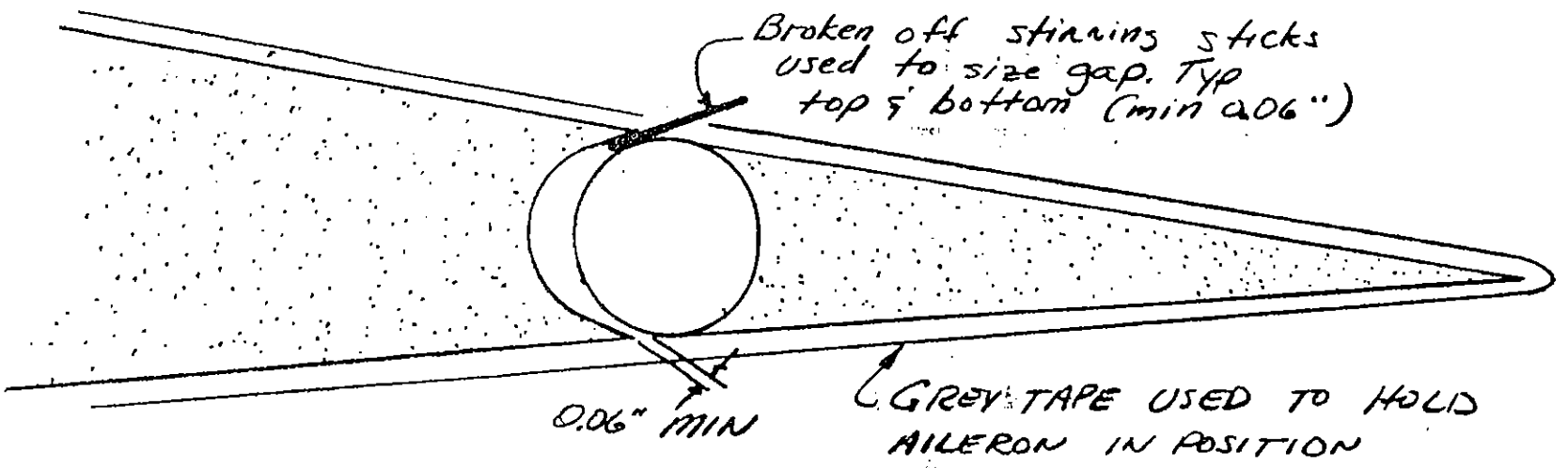
The only operations remaining are to fit the CS8 spacers, and to install the AN3-14A bolts that join the aileron to CSA4 or CSA5.

Using the aileron rigging template, verify that the aileron can move 25 deg. up or down from neutral without binding. With the aileron taped at neutral, and the arms on CSA4 and CSA5 pointing toward the leading edge of the wing, drill in the AN3-14A bolts.

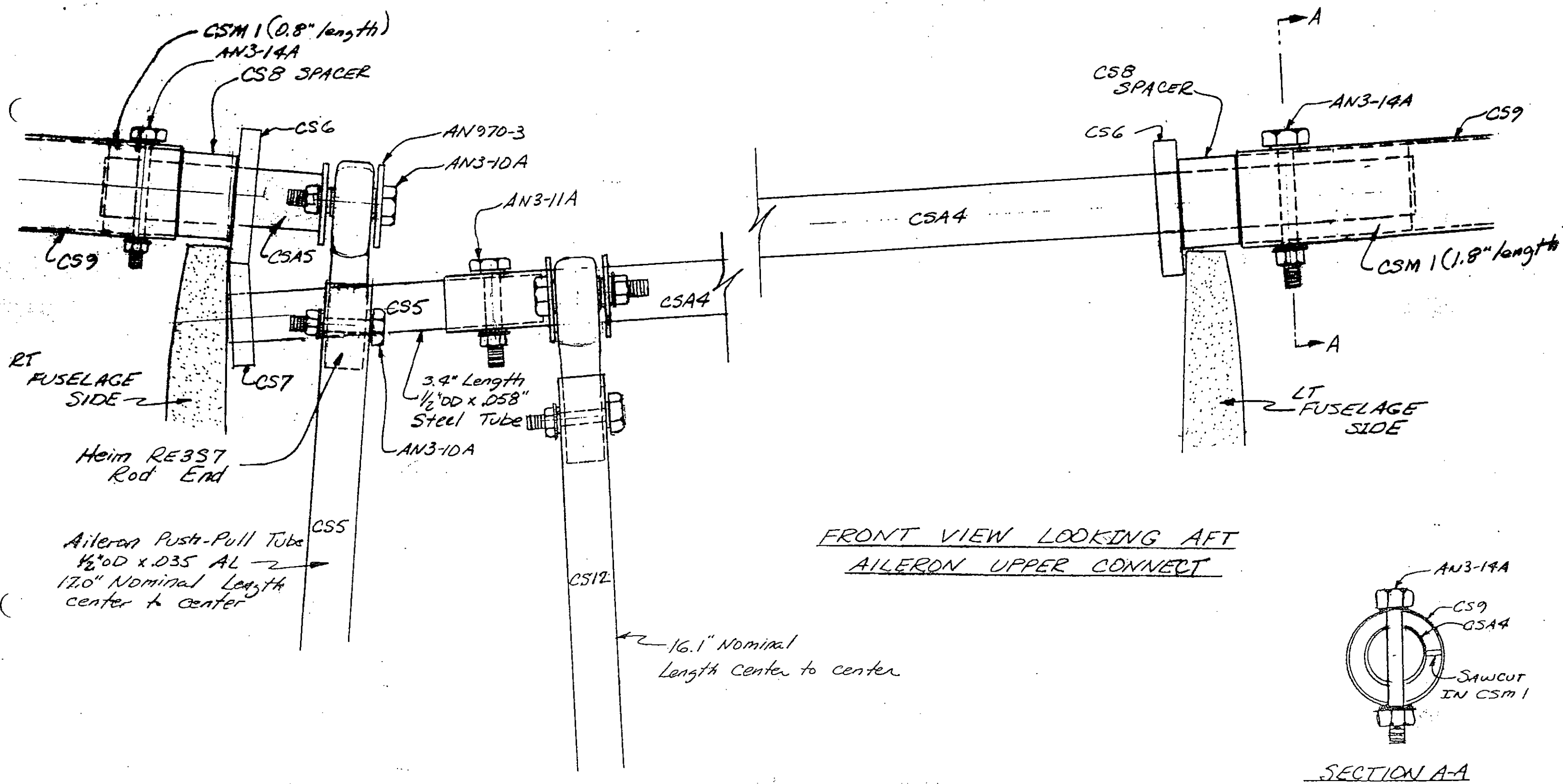
Next, make up the CS8 spacers. Allow about 1/32" to 1/16" play in the system by sanding the spacer and trial fitting until this is acheived.

Note also that CS5 projects thru CS7 to keep it from inadvertently falling out.

As a final check of your workmanship and skill, hook everything up and verify that there is no binding anywhere, that the play is within limits, and that full aileron travel is available.



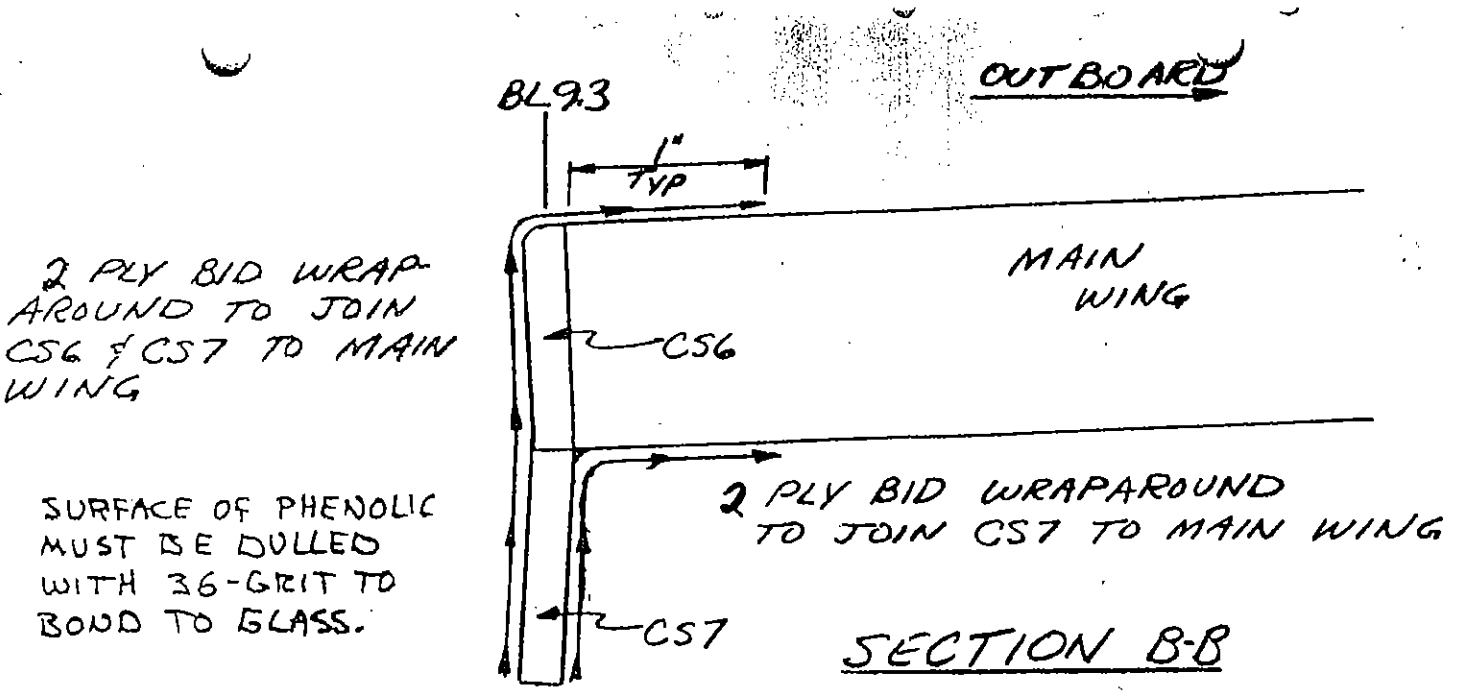
CONTINUED ON NEXT PAGE



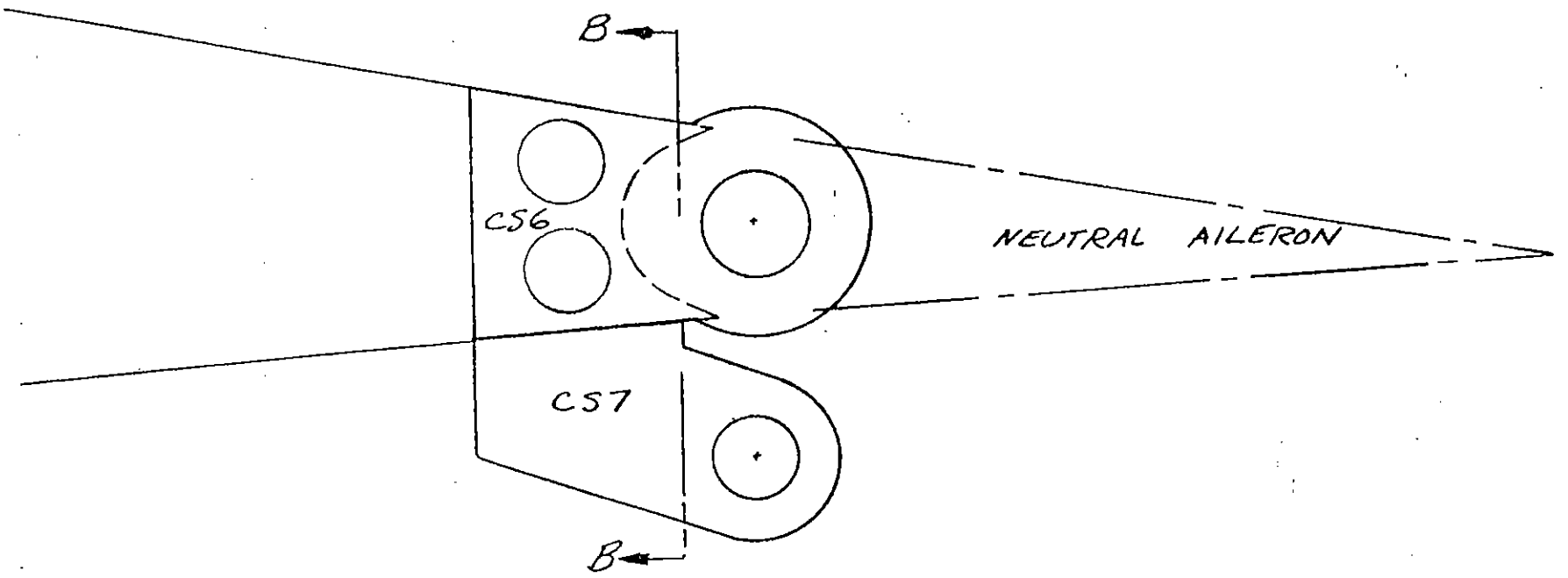
FRONT VIEW LOOKING AFT
AILERON UPPER CONNECT

SECTION A-A

CONTINUED ON NEXT PAGE

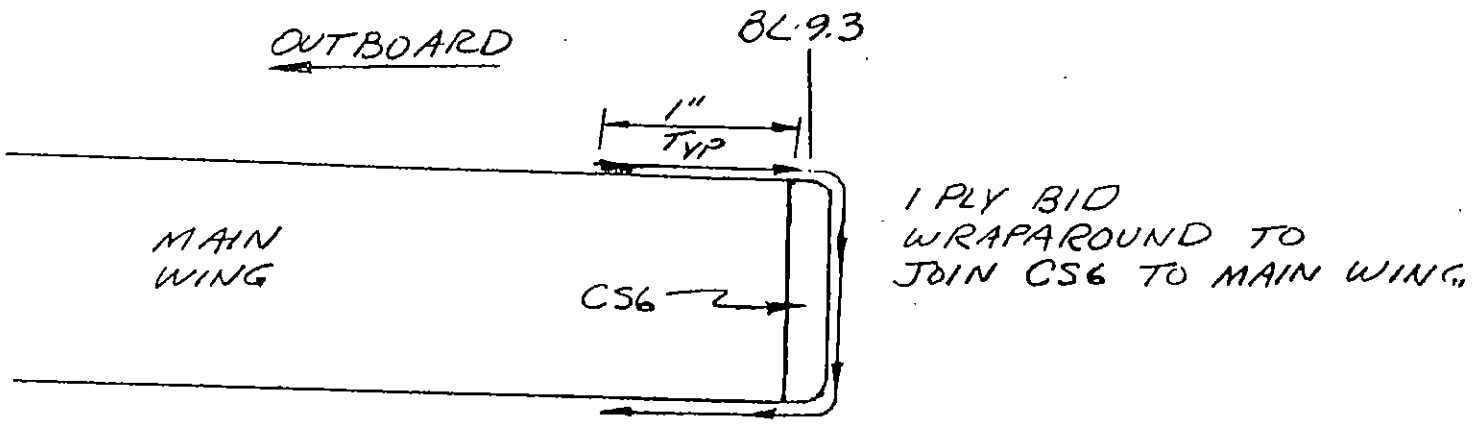


SECTION B-B

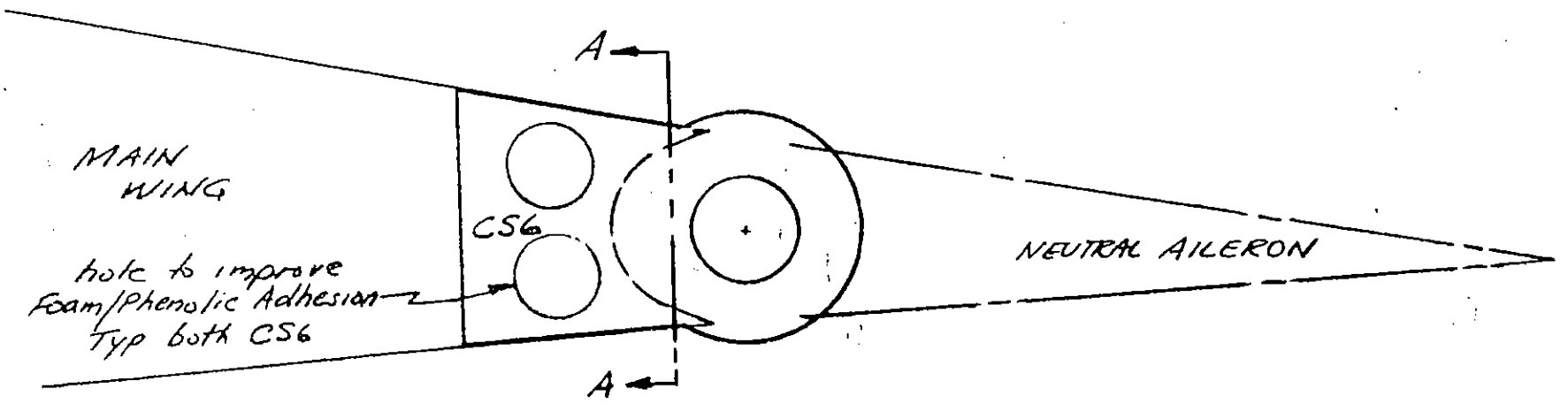


CS6 & CS7 MOUNTING

RT WING

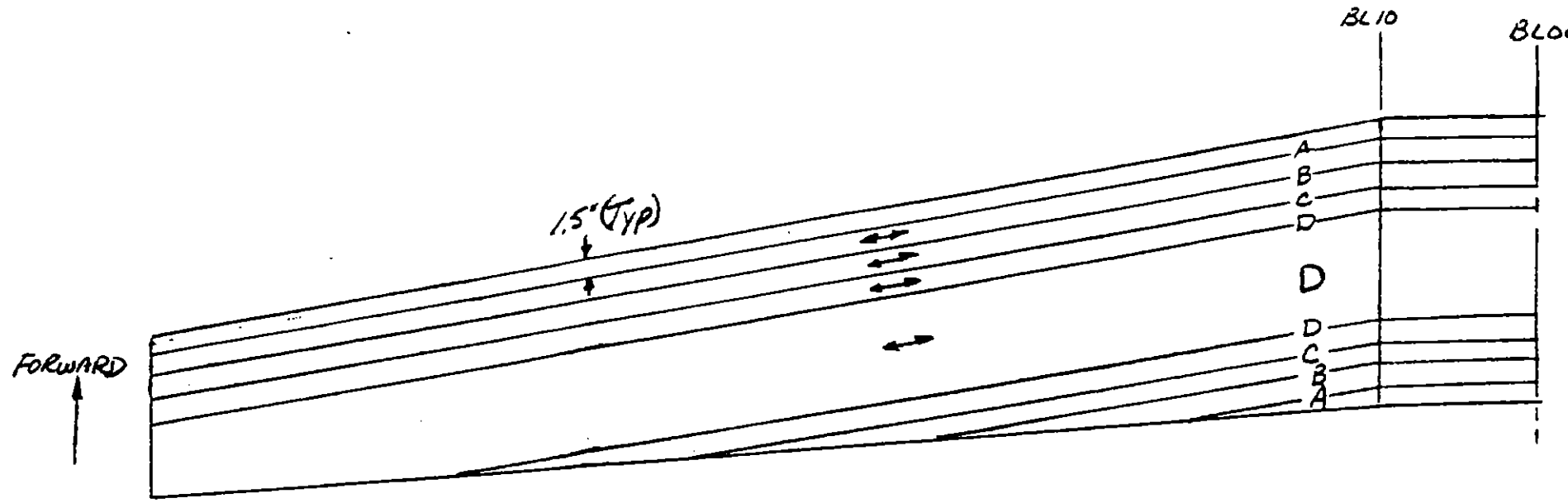


SECTION AA



CS6 MOUNTING

LT WING



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

BOTTOM CANARD

SPAR CAPS (UNI)

A	15" x 180"
B	12" x 180"
C	9" x 180"
D	6" x 180"

Begin Cap A parrallel to LE & 1.5" along contour. Each additional cap is displaced 1.5" further along contour

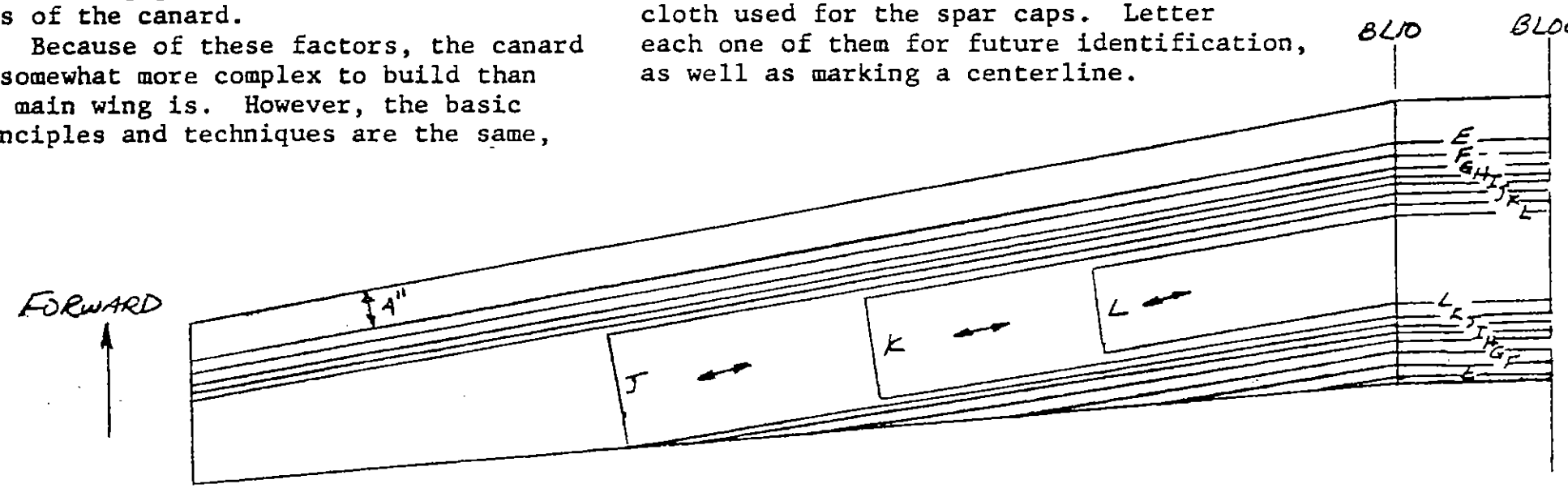
BUILDING THE CANARD

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.

CONTINUED ON NEXT PAGE



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

TOP CANARD

SPAR CAPS (UNI)

E	14" x 180"
F	12" x 180"
G	10" x 180"
H	9" x 180"
I	8" x 180"
J	7" x 60"
K	6" x 86"
L	5" x 120"

Begin Cap E 4" along contour (a.c.)
Cap F 1" further a.c.
Cap G 1" further a.c.
Caps H thru L ½" further a.c. each

REFERENCE
FOAM CORE

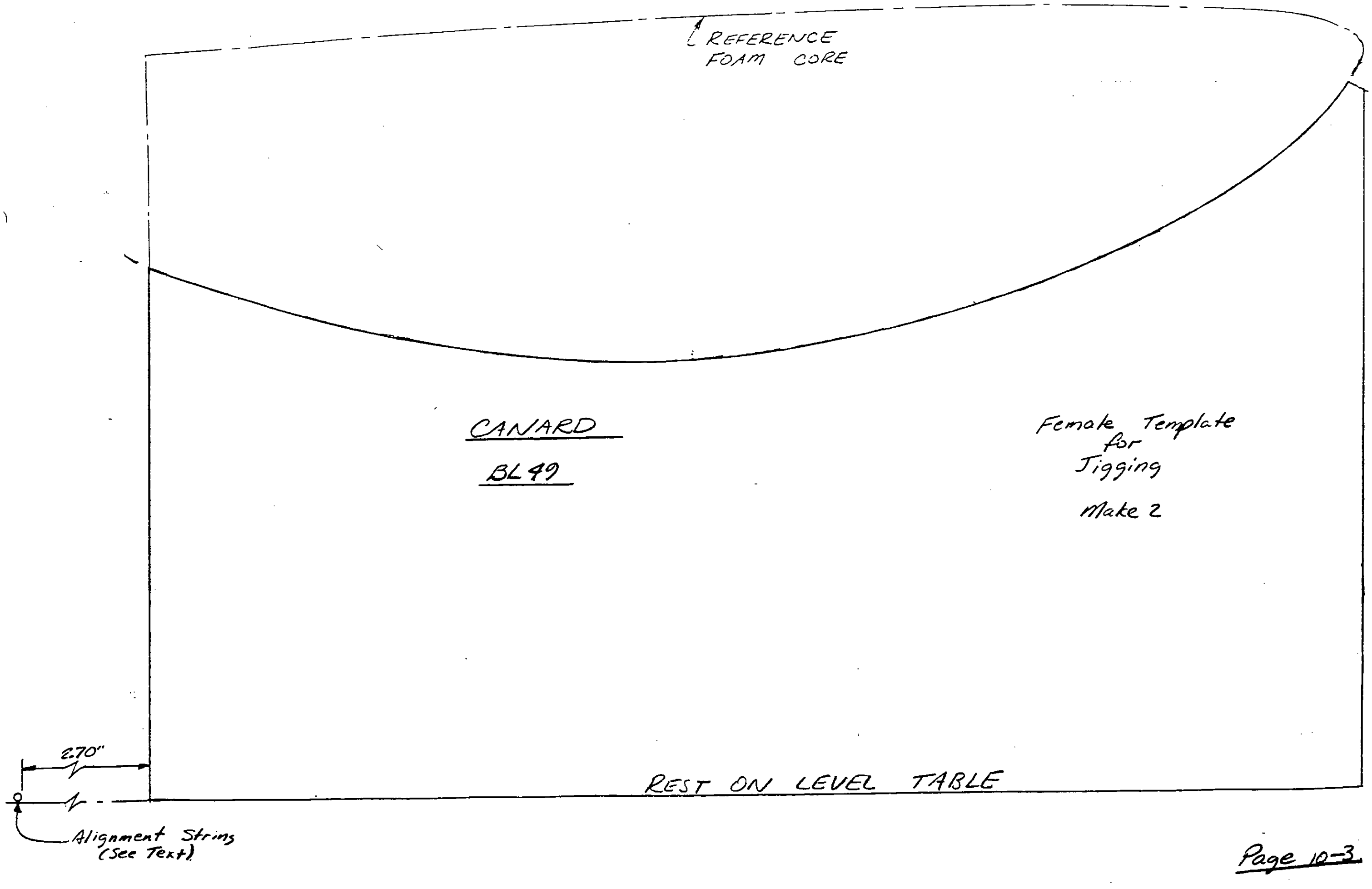
BECAUSE OF SIZE LIMITATIONS
BL 10 Shear WEB FACE
NOT SHOWN HERE

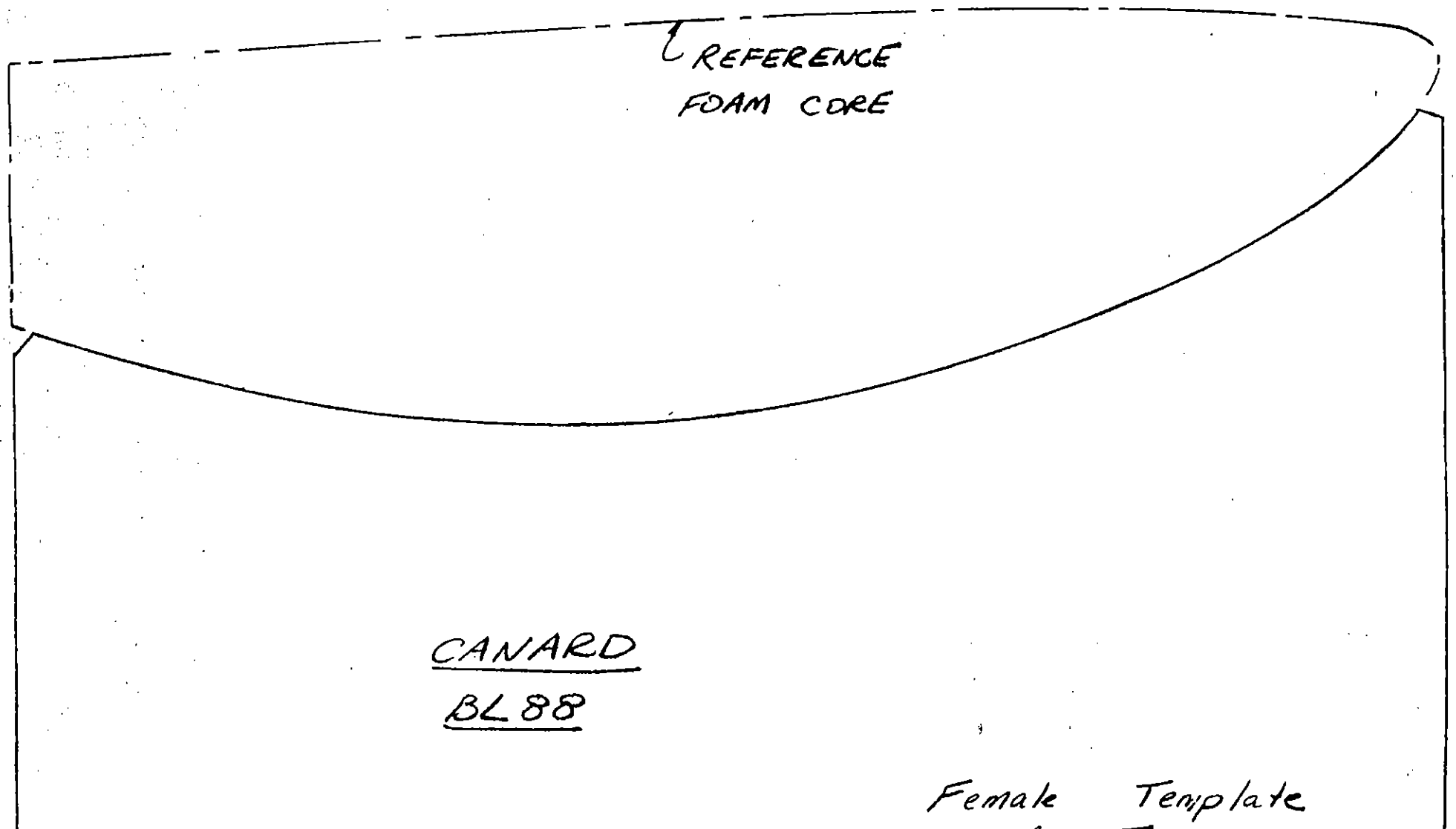
CANARD BL10

Female Template
for Jigging
Make 2

REST ON LEVEL TABLE.

Note: distance from Alignment String (not shown)
to this aft face of BL10 template is 7.0"
(See Text)


REFERENCE
FOAM CORE
CANARD
BL 49
Female Template
for
Jigging
Make 2
REST ON LEVEL TABLE
2.70"
Alignment String
(See Text)



CANARD

BL 88

Female Template
for Jigging

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.

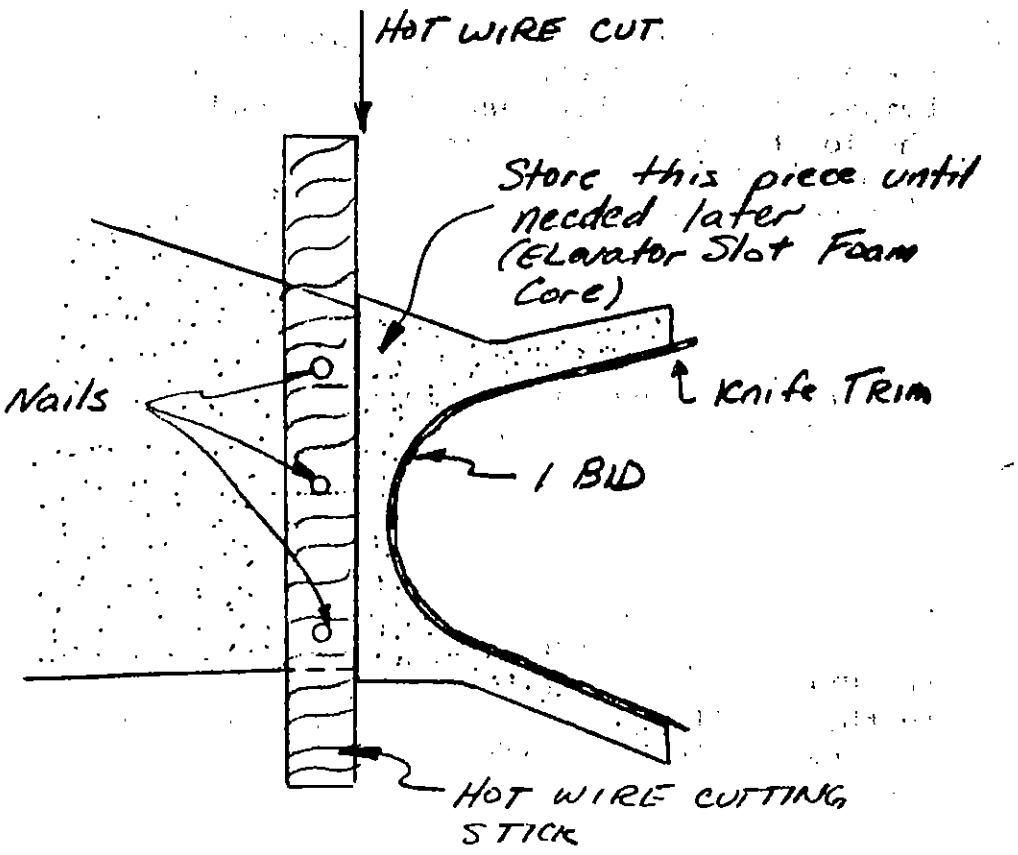
The canard must first be jigged upside down on the table. Note that since the canard has anhedral rather than dihedral, the canard tips will be higher than the root, which is opposite of the main wing. Full size patterns of the female jigging templates are included, and these should be made at this time.

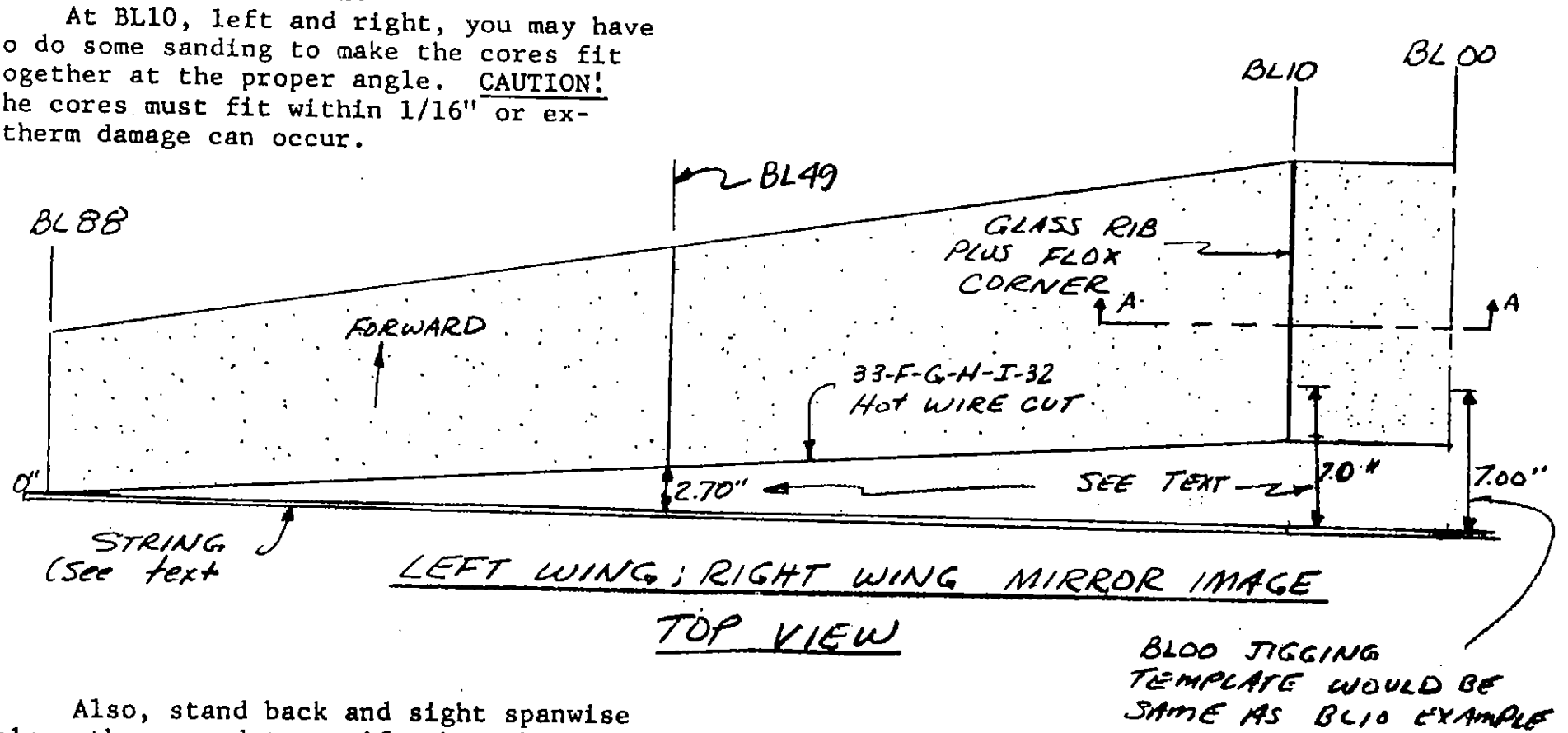
Also included is a top view of the canard, showing the sweepback on the trailing edge. Reread the main wing construction section to review the use of a string to help jig the cores. The dimensions given on the canard top view are duplicates of those on the female jigging templates for the canard and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



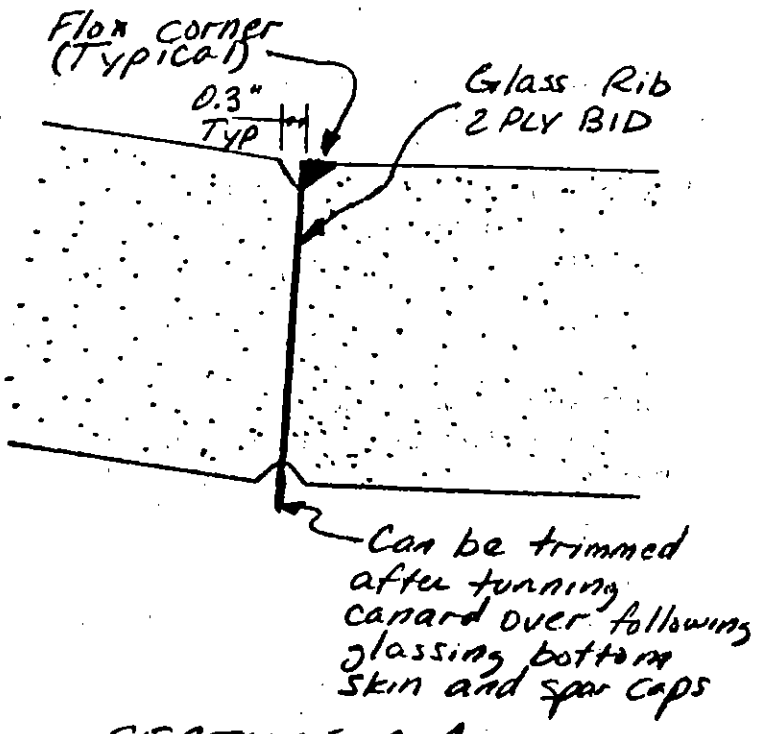


Also, stand back and sight spanwise along the canard to verify that the canard is not bowed or kinked. A straight edge laid spanwise is also useful for this.

Don't be concerned if the templates need to be moved inboard or outboard slightly to remove any bows or kinks in the canard. When everything is satisfactory, mix up some bondo and bondo the templates to the table top in the proper locations. After that is accomplished, the foam cores should be just resting on the templates.

The next step is to join the foam cores together. Glass ribs are layed up at the BL10 joint on each side. The BL49 joint is accomplished with micro slurry. Be sure to use slow epoxy. Refer to the education section for core joining information.

After the combination has cured, cut in the Flox Corners at the BL10 joints. Before doing the Flox corners, however, recheck the level lines at the tips and 5 minute the cores to the templates.



CONTINUED ON NEXT PAGE

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, let the cloth hang down vertically. Trim to within 1" of the tangent point. Trim the rest of the edges to within 1" also. At the trailing edge(the shear web) the UNI must wrap around down to the bottom of the face.

No overlap is required;just butt fit the skins together. Squeege the cloth well to avoid the buildup of excess resin.

Find the canard spar caps A, B, C, and D. These will be put on in that order. Use the technique used on the main wing to put them on. In order to reduce the buildup of material on the canard shear web, trim B and D even with the trailing edge so that only A and C wrap around down to the bottom of the shear web.

Peel ply the joints, the entire shear web, and the initial 2" of the leading edge.

Knife trim the leading edge at the tangent point before quitting.

Let this bottom skin cure for at 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 such that it overlaps the bottom skin by about 2".

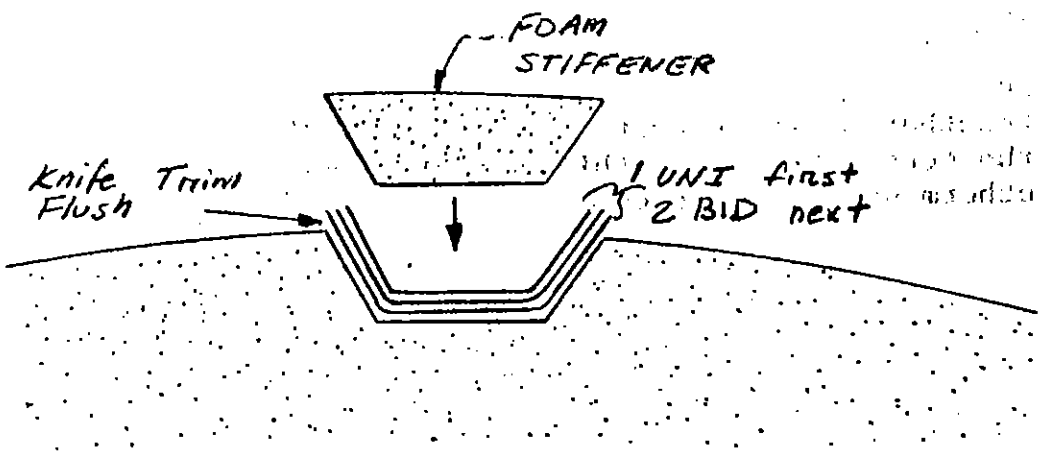
Before glassing the skin and spar caps, however, you will have to complete the spanwise stiffener. To do this, lay in the one UNI(with the fibers running in the spanwise direction), the two BID (with the fibers at 45 deg to the spanwise direction), and the foam stiffener. Hold the stiffener down with nails through the stiffener into the canard foam core. Knife trim the excess glass and sand the area smooth so that it blends in nicely with the canard core.

Although the layup involves more spar caps than the bottom, you should still be able to finish it in about 3 hours with two or three people.

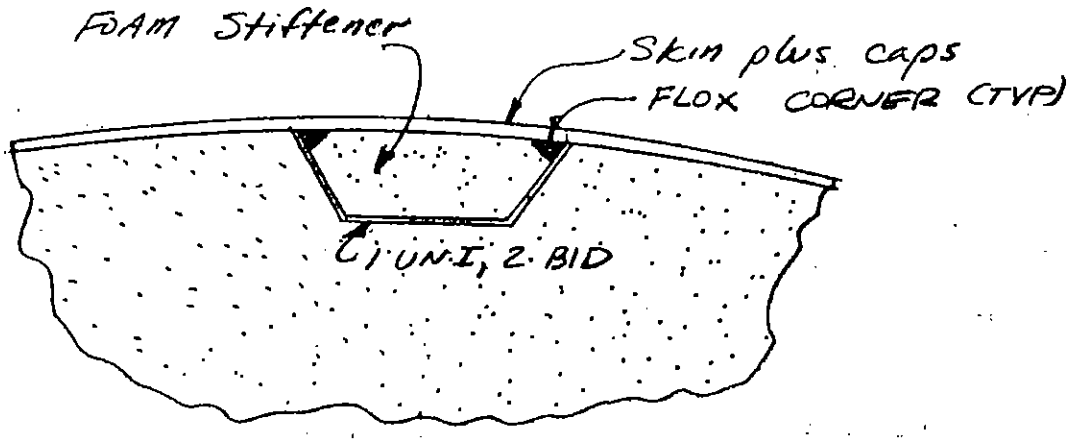
As before, trim every other spar cap at the trailing edge(i.e. let E,G,I, and K wrap around).

Knife trim the glass at the tips and leave the canard tips square.

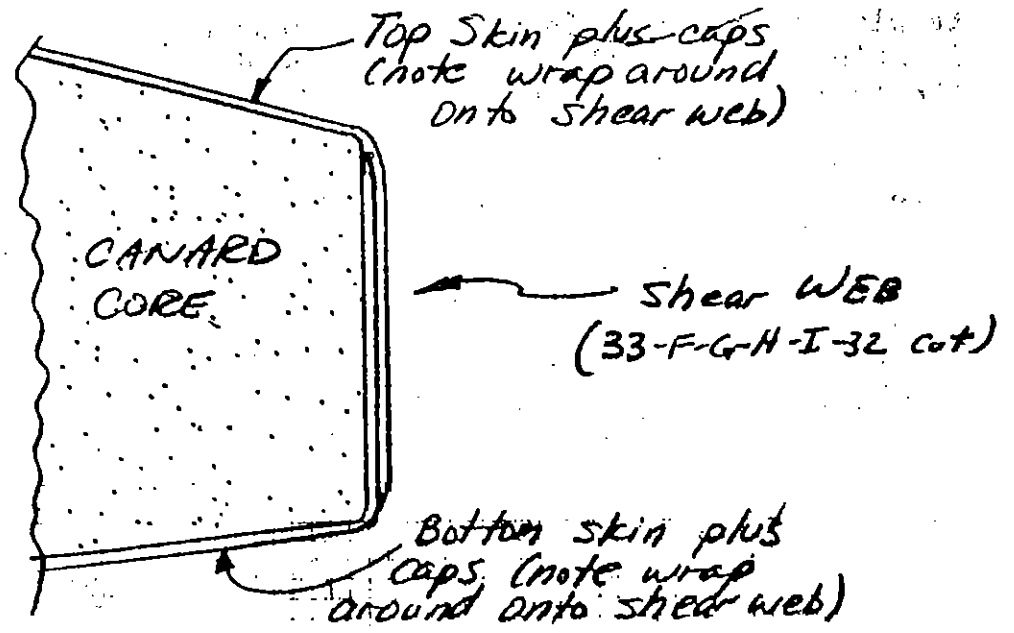
Permit the canard to set for two days before breaking the lumber loose. Before doing that, bondo a board onto the wing in the level position so that you will be able to easily tell when the canard is level as you mount it later to the fuselage.



SPANWISE STIFFENER
BL 49 left to BL49 right



STIFFENER ON FINISHED CANARD



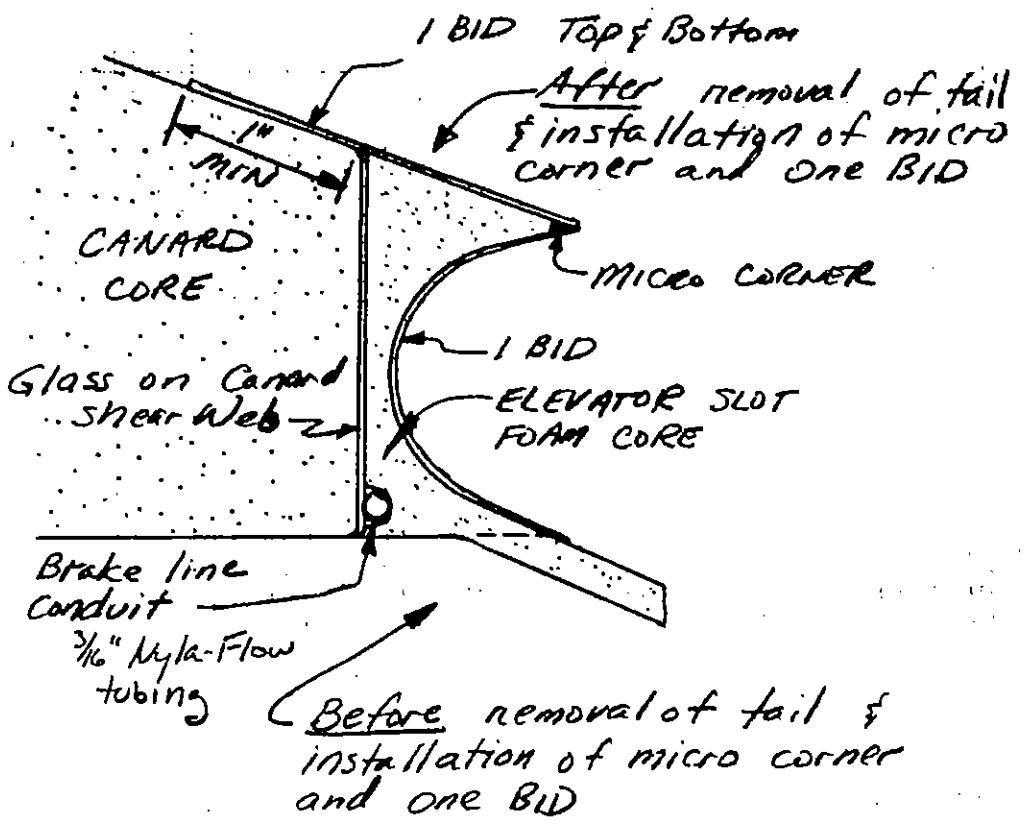
INSTALLING THE ELEVATOR SLOT FOAM CORES

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.

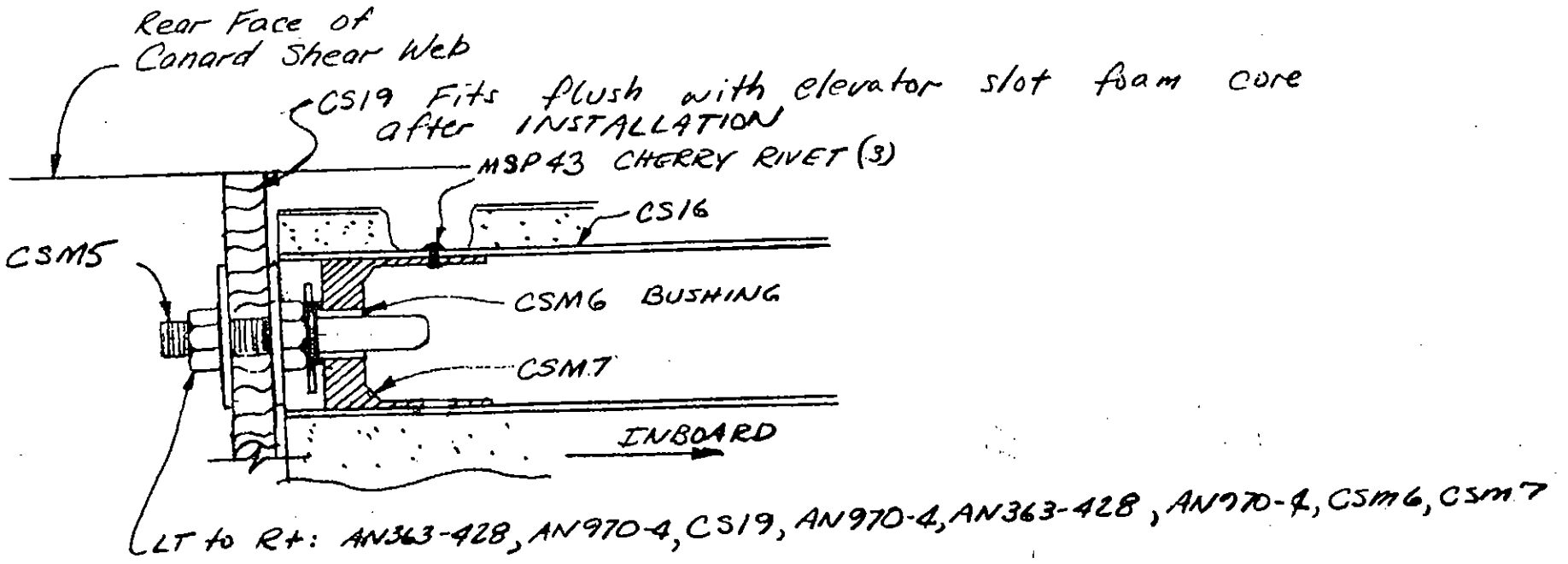


MOUNTING THE OUTBOARD ELEVATOR PIVOT

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.



VIEW LOOKING DOWN ON OUTBOARD ELEVATOR PIVOT LEFT CANARD (RT MIRROR IMAGE)

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.

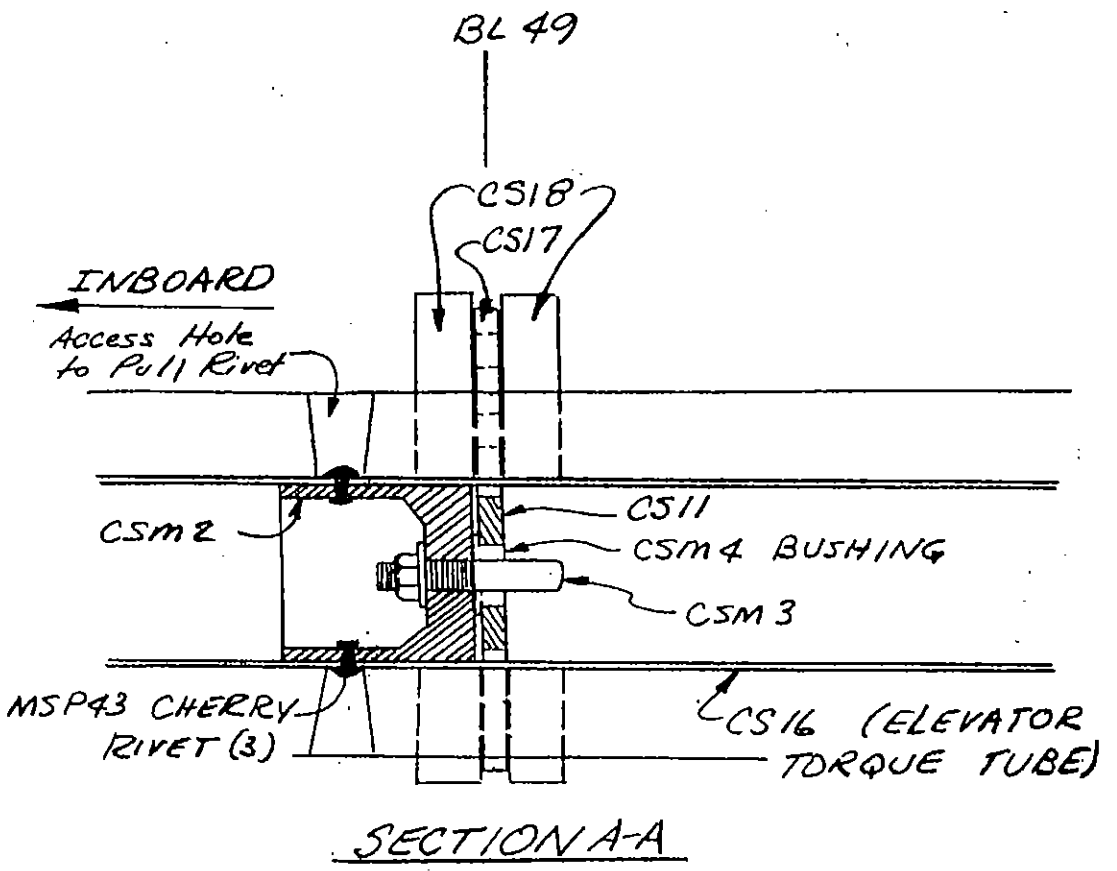
Measure 38" outboard from the inboard end of the elevator. Using a router bit, route a slot 1/8" wide for about plus or minus 17 deg. of rotation. Next, insert CSM2 into CS16 with the flange pointing inboard. You may have to sand CSM2 to get a snug fit. Push CSM2 outboard thru the tube with a stick until 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.

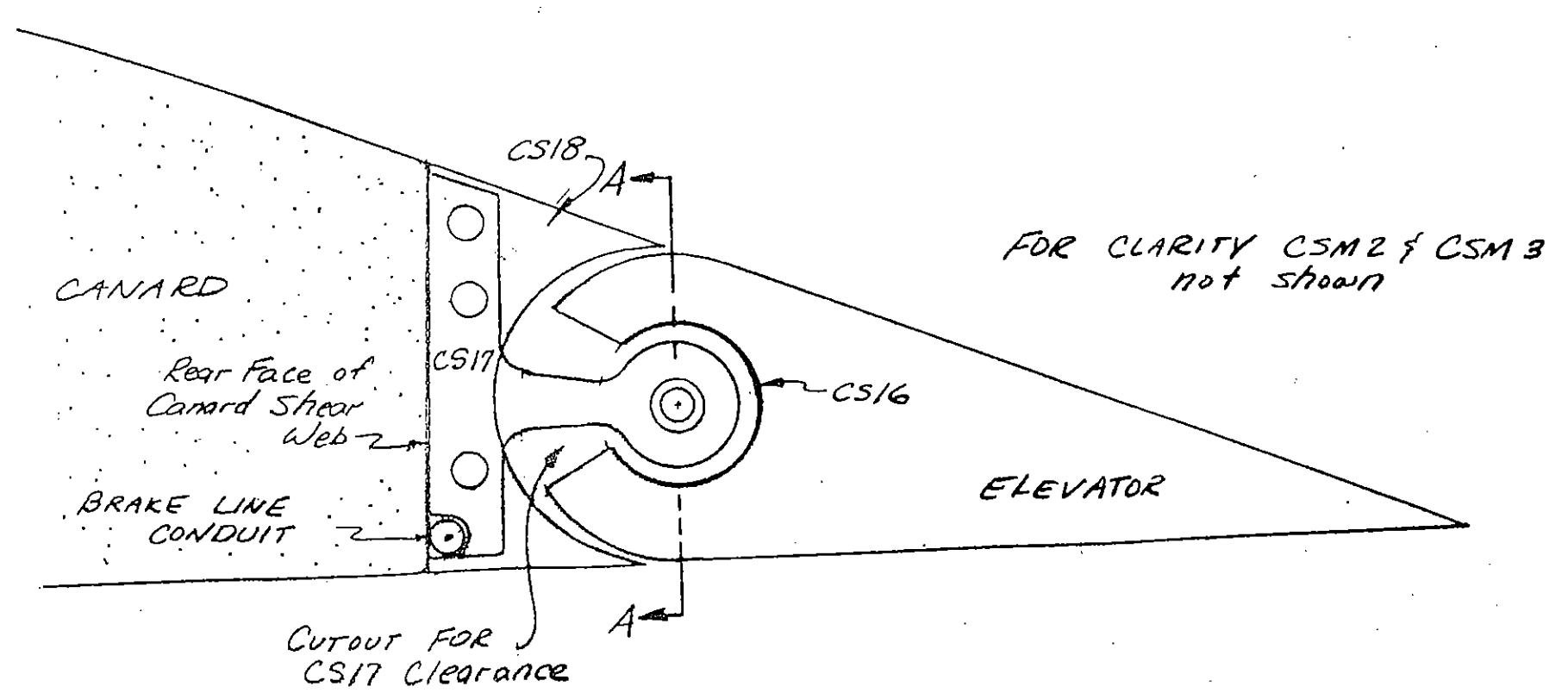
Repeat this procedure with the other elevator. Be careful that the flange on CSM2 points inboard so that CS17 will slide off CSM3 as the elevator is moved inboard.

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 between the pair of CS18's) until CS17 slides off CSM3; then the elevator can be pulled off. If you don't stand back and think about this, you are likely to error during the installation.

Once you know where the CS18's go, use a router as you did with the ailerons, to remove that portion of the elevator slot foam core, including the BID on top and bottom



SECTION A-A



ELEVATOR CENTER HINGE DETAIL
CS17 at BL49

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 that can be corrected when CS17 is installed permanently. The gap inboard and outboard should be about 0.06" top and Bottom, just like the ailerons.
6. Mix up some 5-Minute in order to join CS15 to the core and CS19 to the shear web. Repeat Step 5 and hold everything in the proper position until the 5-Minute has cured; then remove CSA7 and the elevator.
7. Repeat Steps 1-6 with the left elevator except that CS14 will have to be aligned also.
8. Be careful not to break the 5-Minute bond between any of these pieces. Now lay up the BID that permanently joins the phenolic bearings to the wing core. Be careful not to get any epoxy in the holes.

For Additional details, See Sheets 10-10 & 10-11

INSTALLING THE MIDSPAN PIVOT

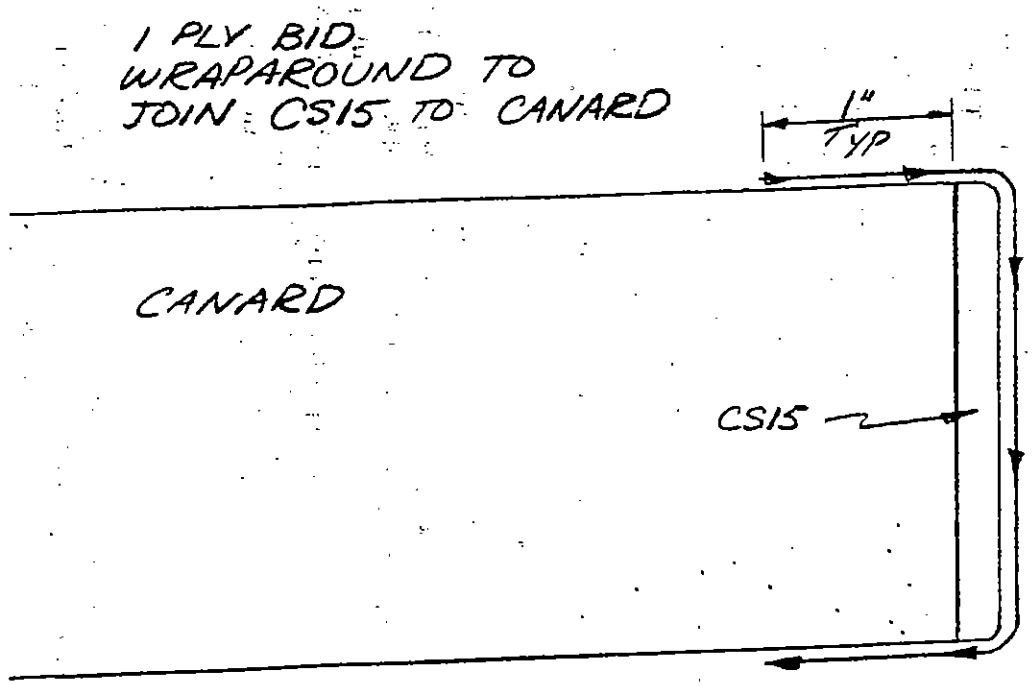
Once the inboard and outboard layups over the bearings are cured, you will want to permanently install CS17 between each pair of CS18's. The elevator gap, which should be min. 0.06" top and bottom, can be set by where CS17 is installed vertically.

Begin by installing the elevators on the inboard and outboard pivots. Remember to leave a gap of about 0.5" inboard for CS8 spacers later on. Next install CS17 on CSM3 against the face of CSM2. Make it the core of a sandwich with a pair of CS18's, and trial fit the sandwich in the canard against the shear web(the cutout for the sandwich should have been done earlier). When satisfied with the fit, permanently mount the CS18's and CS17 with flox. Use tape and stirring sticks to maintain the elevator gap top and bottom at about 0.06". Permit the combination to cure one day, then lay up one BID across the sandwich top and bottom to smoothly join them to the canard core. Some sanding of CS18 may be necessary to make a smooth transition. Repeat this procedure with the other elevator.

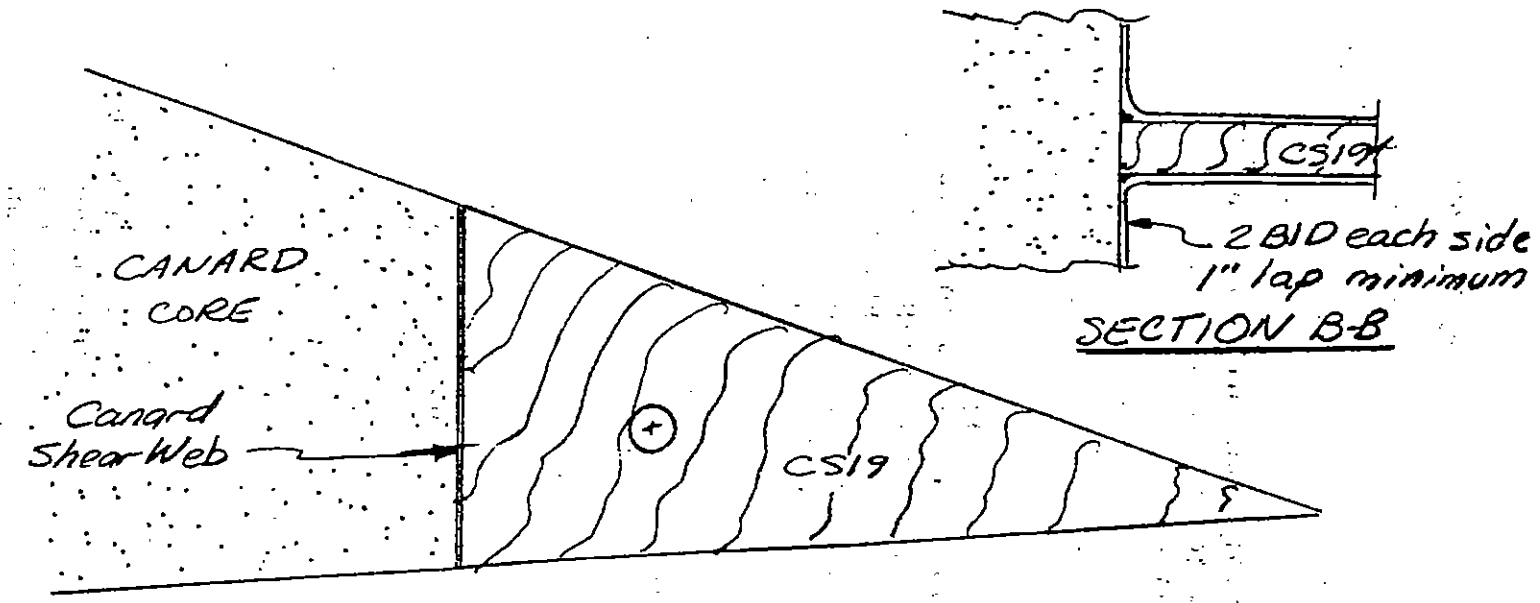
INSTALLING THE CS8 SPACERS

The CS8 spacers prevent the elevators from sliding off the pivots inboard. The installation is the same as what you did for the ailerons. Allow about 1/32" to 1/16" free play in the system. Remember that the elevator must not fall off CSM5 and CSM3 until it has moved inboard at least 0.3" inboard.

CONTINUED ON NEXT PAGE

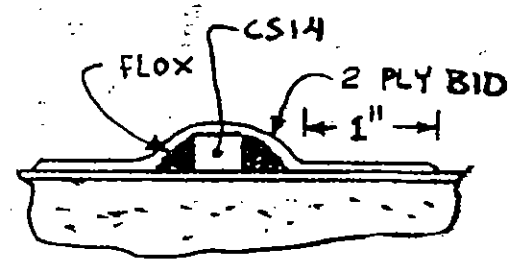


CS15 MOUNTING BACK VIEW

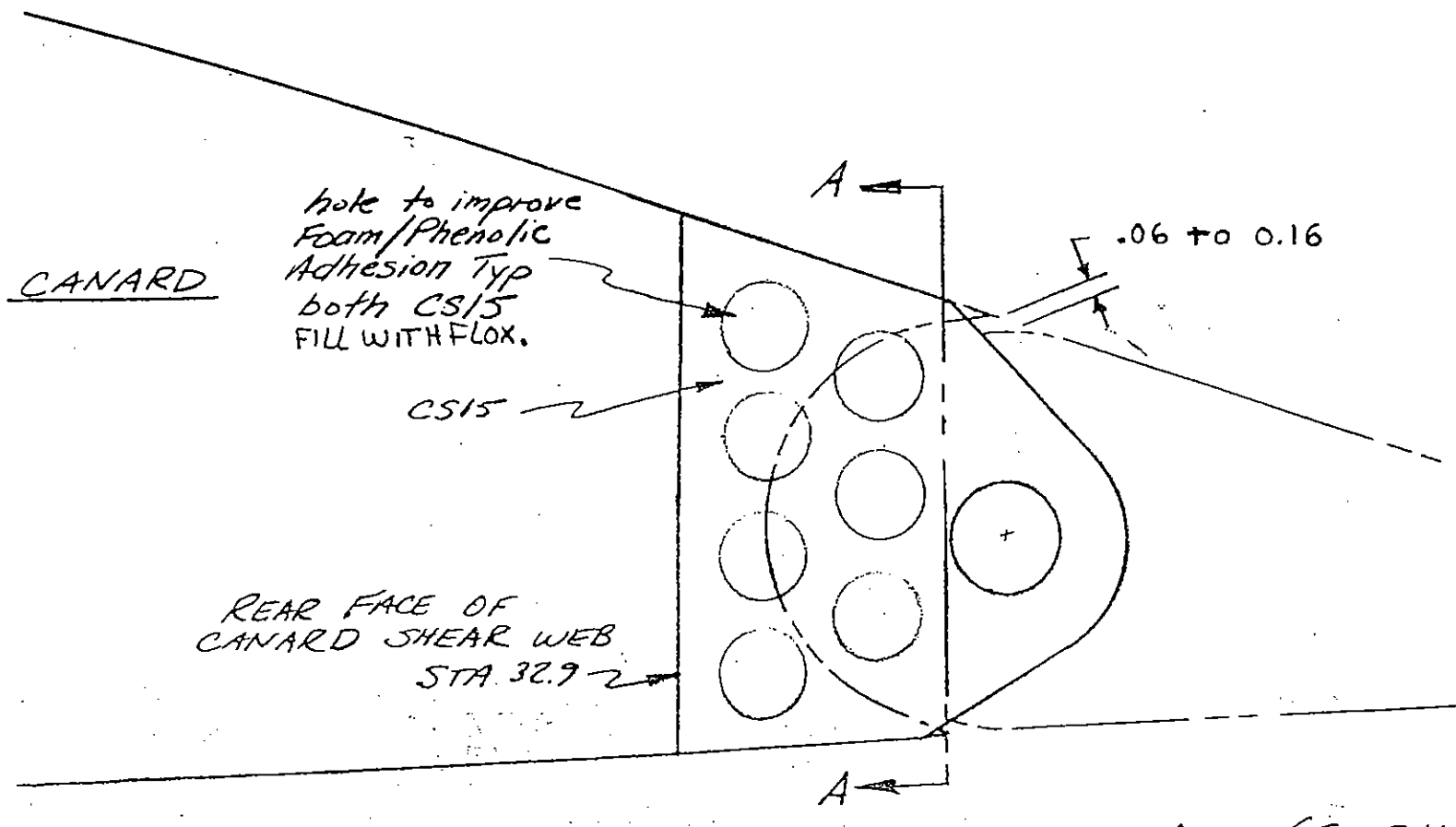


SECTION B-B

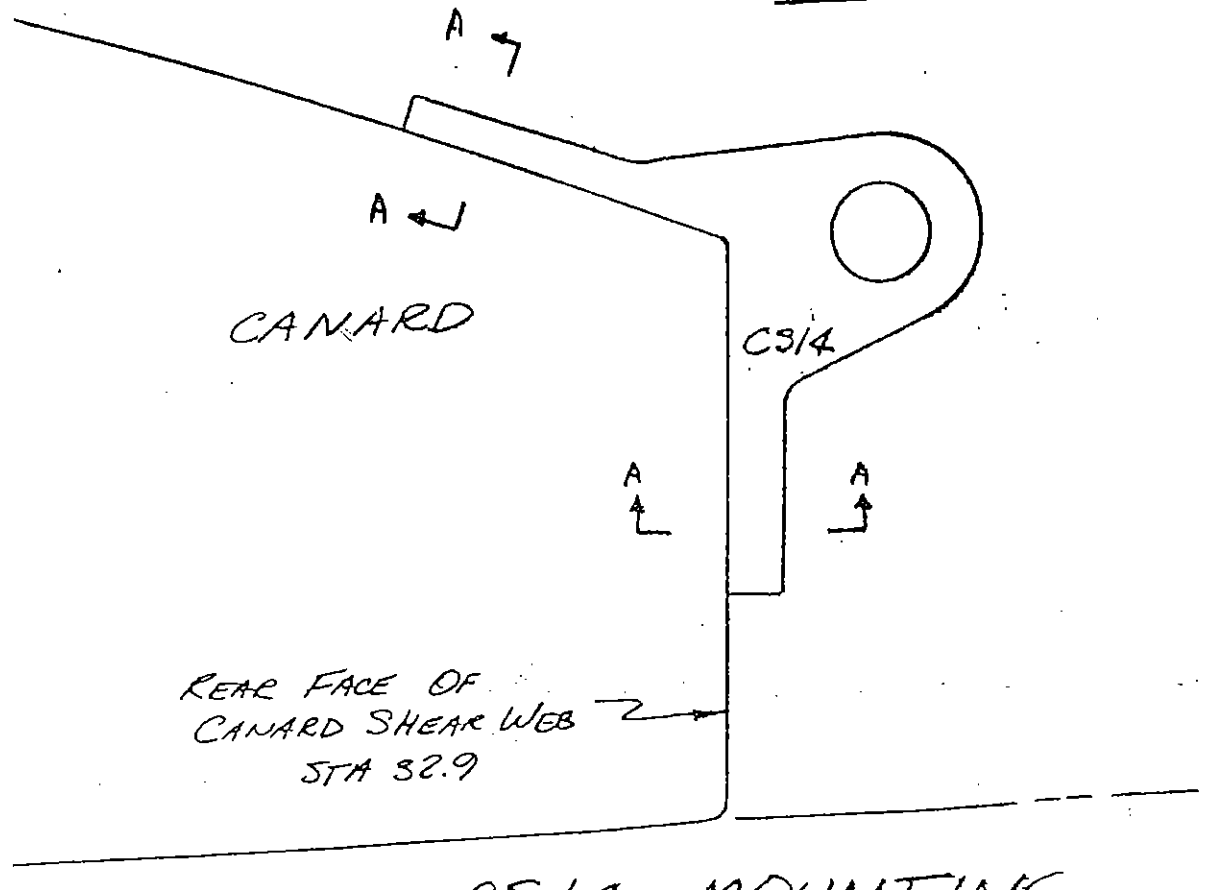
CS19 MOUNTING



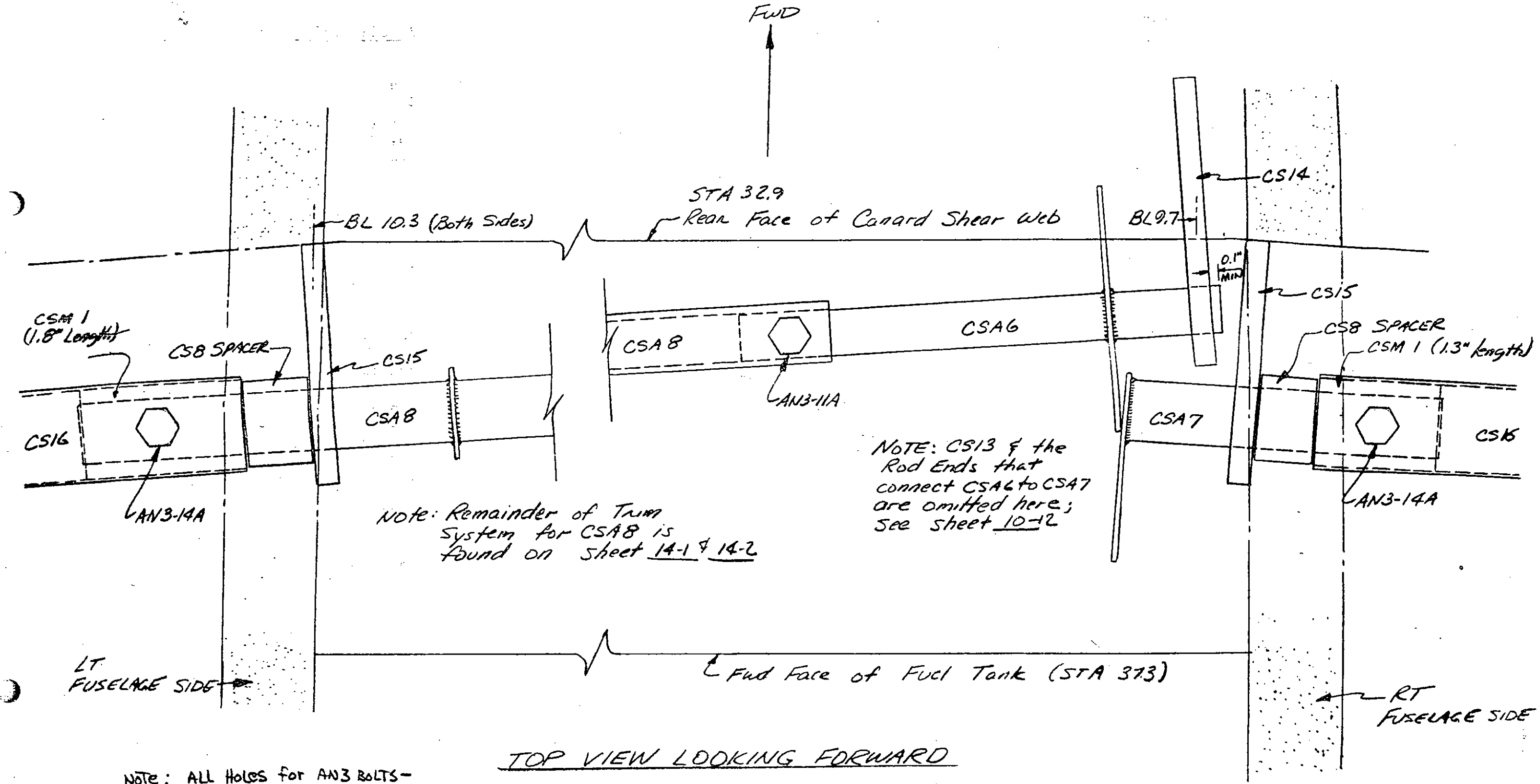
SECTION A-A



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



CS14 MOUNTING
SIDEVIEW



Note: Remainder of Trim System for CSA8 is found on Sheet 14-1 & 14-2

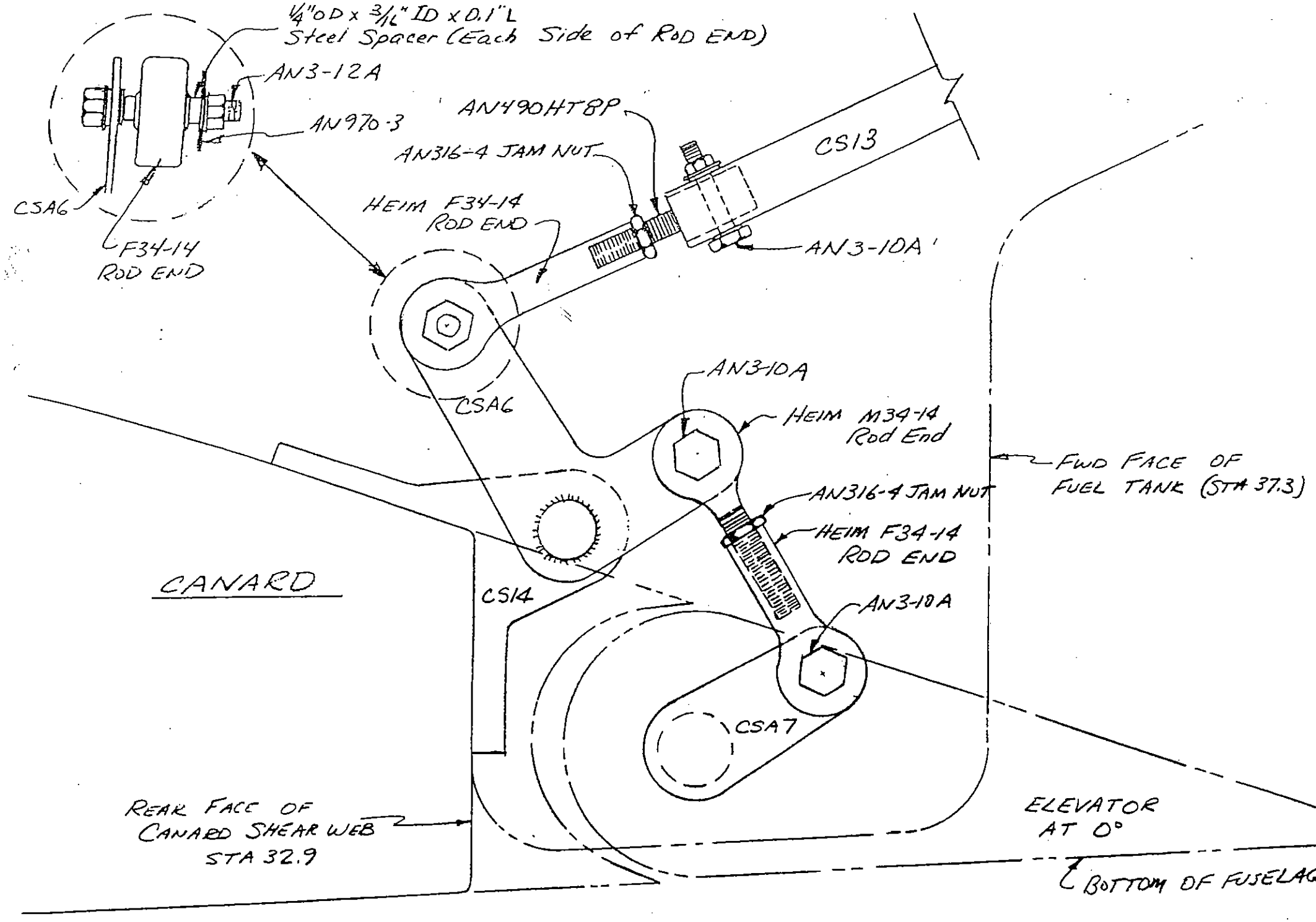
NOTE: CS13 & the Rod Ends that connect CSA6 to CSA7 are omitted here; See Sheet 10-2

Note: ALL Holes for AN3 BOLTS - drill PILOT Hole #40, Then drill #12.

TOP VIEW LOOKING FORWARD

ELEVATOR CONTROL SYSTEM

CONTINUED ON NEXT PAGE



SIDE VIEW
CS14, CSA6, CSA7 CONNECTIONS

FOR TOP VIEW, SEE PAGE 10-11

RIGGING THE ELEVATOR SYSTEM

In this section, you will drill in the AN3-14A (2) and AN3-11A bolts joining CSA7 to CSM1, CSA8 to CSM1, and CSA6 to CSA8. Before drilling any of these bolts in, you must make sure that proper elevator travel is available.

Make the Elevator Rigging Template.

Mount the elevators onto the canard, and set the elevator rigging template in place. Tape the elevator at 0 deg.

Begin by connecting CSA6 and CSA7 together with the Heim M34-14 and F34-14 rod ends. Notice that the arms on CSA6 and CSA7 must be parallel. You accomplish this by adjusting the length of the rod-end combination.

The elevator must travel 17 deg. up before stopping. The drawing shows the proper orientation of the arms at an elevator position of 0 deg.(about 30 deg. from the horizontal). Before drilling in the AN3-14A bolt in CSA7, verify that the assembly can go 17 deg. up or down without restriction or binding. If there is a restriction, it will probably be CSA6 hitting the canard in the 17 deg up elevator direction. When you are sure that the right elevator has the proper travel up and down, drill in the AN3-14A bolt that joins CSA7 to CSM1.

Next, with the left elevator at 0 deg., set CSA8 so that its trim arm is vertical. Now you can drill in the AN3-14A bolt that connects CSA8 to CSM1.

Finally, with both elevators at 0 deg., drill in the AN3-11A bolt that connects CSA6 to CSA8.

Now do a final check of the elevator system to verify that the elevator will travel 17 deg. up and down without binding or interference.

WHEEL PANT CONSTRUCTION

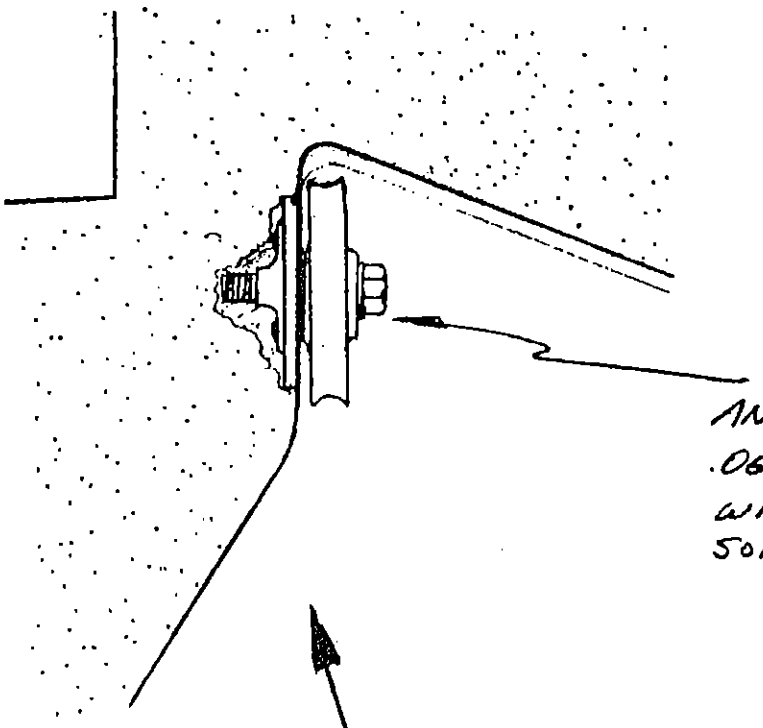
In this section, you will make one left wheel pant and one right wheel pant.

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 each LG1, LG2, and LG3. LG2 and LG3 are made from the orange foam. The LG1 cores are made from the blue foam. Mark one set Left and one set Right to avoid confusion.

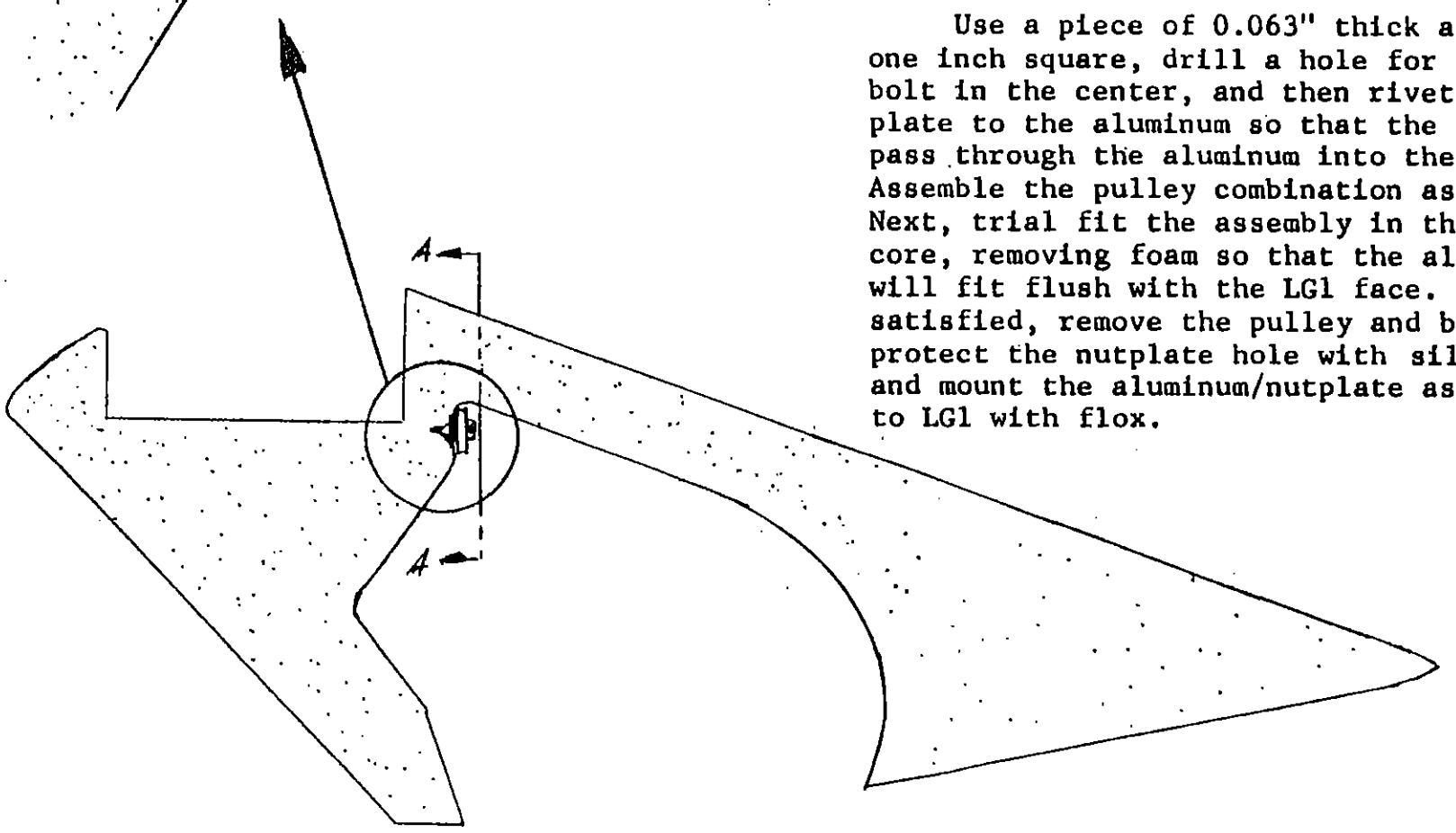
The following procedure will be used to make the left wheel pant. However, the right wheel pant is just a mirror image so that the same basic instructions will cover it also. You will probably find it easier to do both of them at the same time.

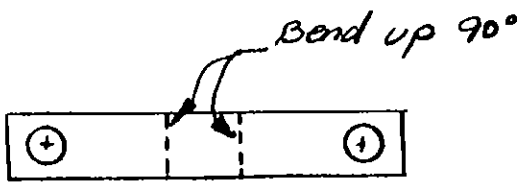
See Appendix Sheets 5 & 6



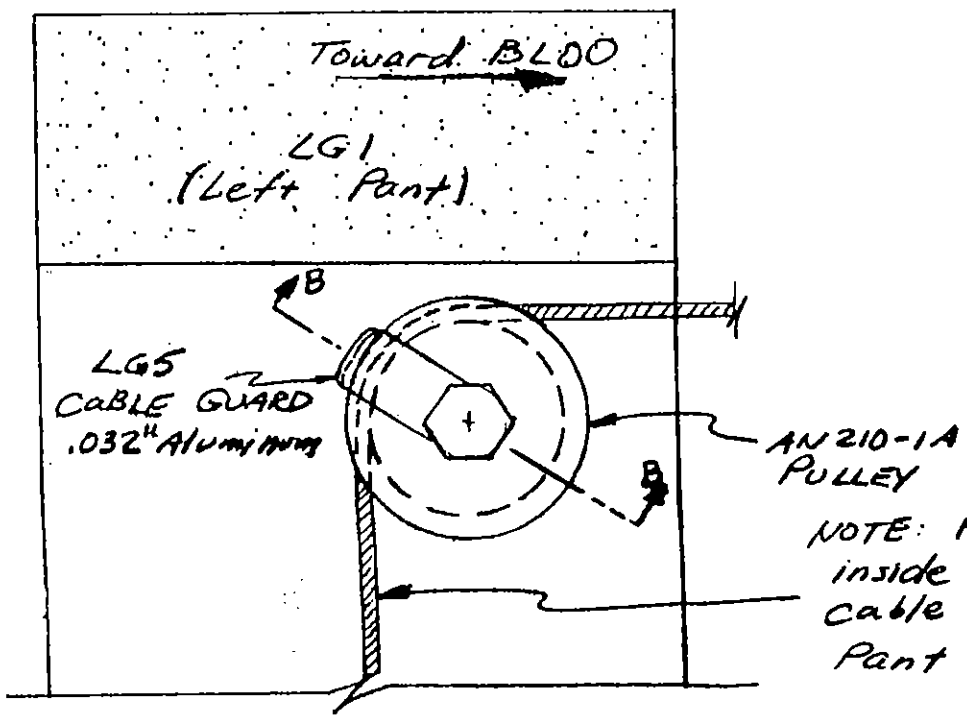
From Right to Left:
AN3-7A Bolt, AN960-10, AN210-1A Pulley, AN960-10, .063" 1 inch square Aluminum, K1000-3 nutplate with 2 countersunk (from pulley side) AN426-3-5 solid rivets

Use a piece of 0.063" thick aluminum one inch square, drill a hole for an AN3 bolt in the center, and then rivet a nutplate to the aluminum so that the bolt can pass through the aluminum into the nutplate. Assemble the pulley combination as shown. Next, trial fit the assembly in the LG1 core, removing foam so that the aluminum will fit flush with the LG1 face. When satisfied, remove the pulley and bolt, protect the nutplate hole with silicone, and mount the aluminum/nutplate assembly to LG1 with flox.



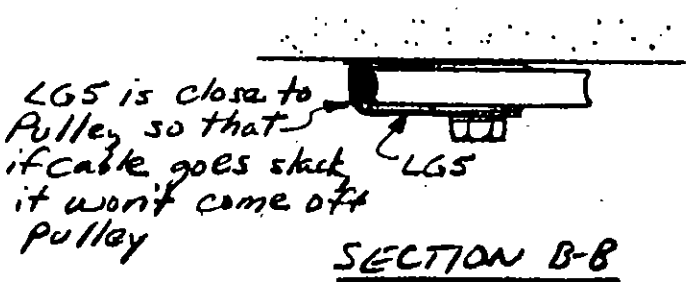


LG5



NOTE: Pulley offset to inside of pant so that cable pulls along Pant centerline

SECTION A-A



SECTION B-B

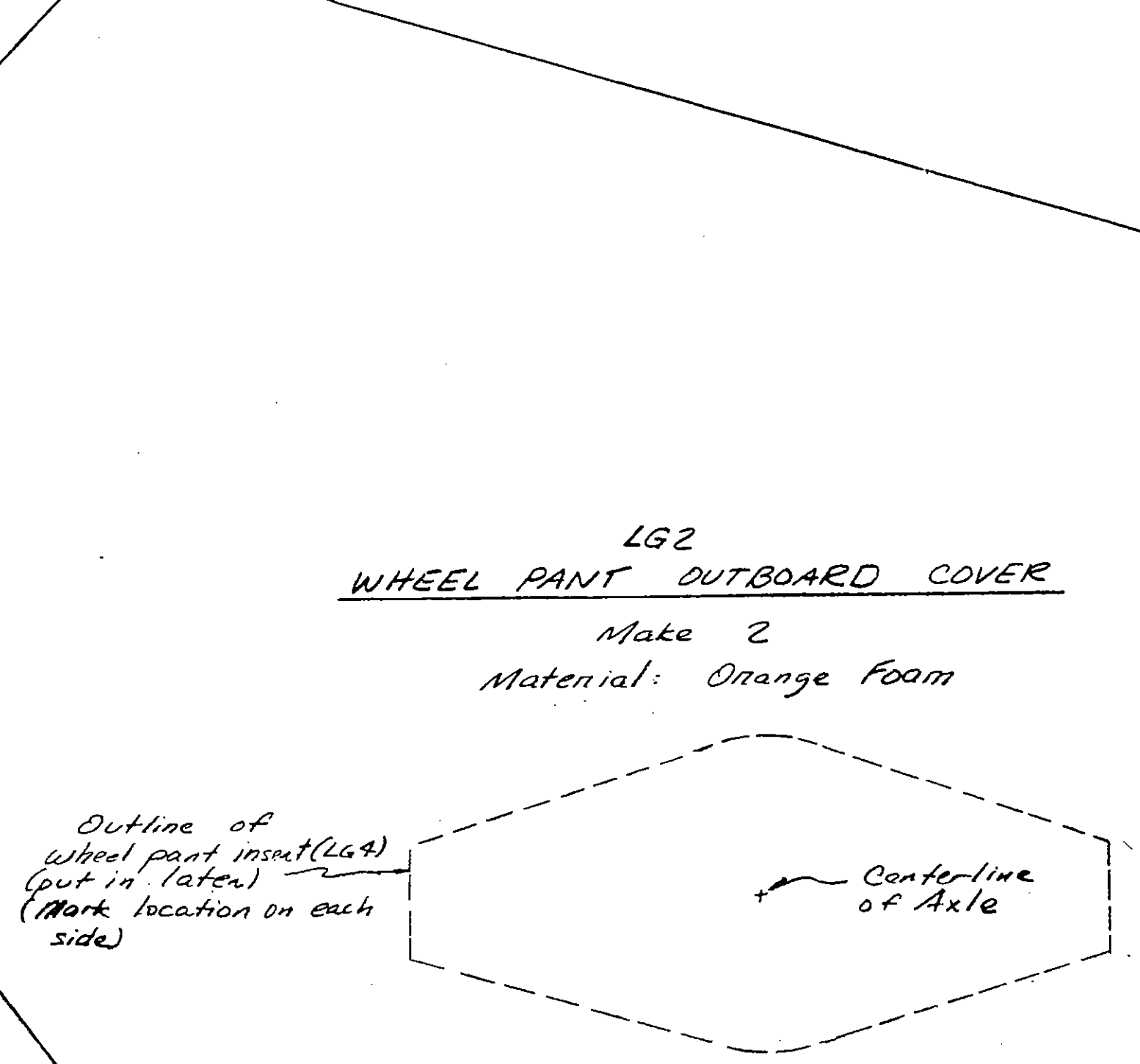
CONTINUED ON NEXT SHEET

LG2

WHEEL PANT OUTBOARD COVER

Make 2

Material: Orange Foam

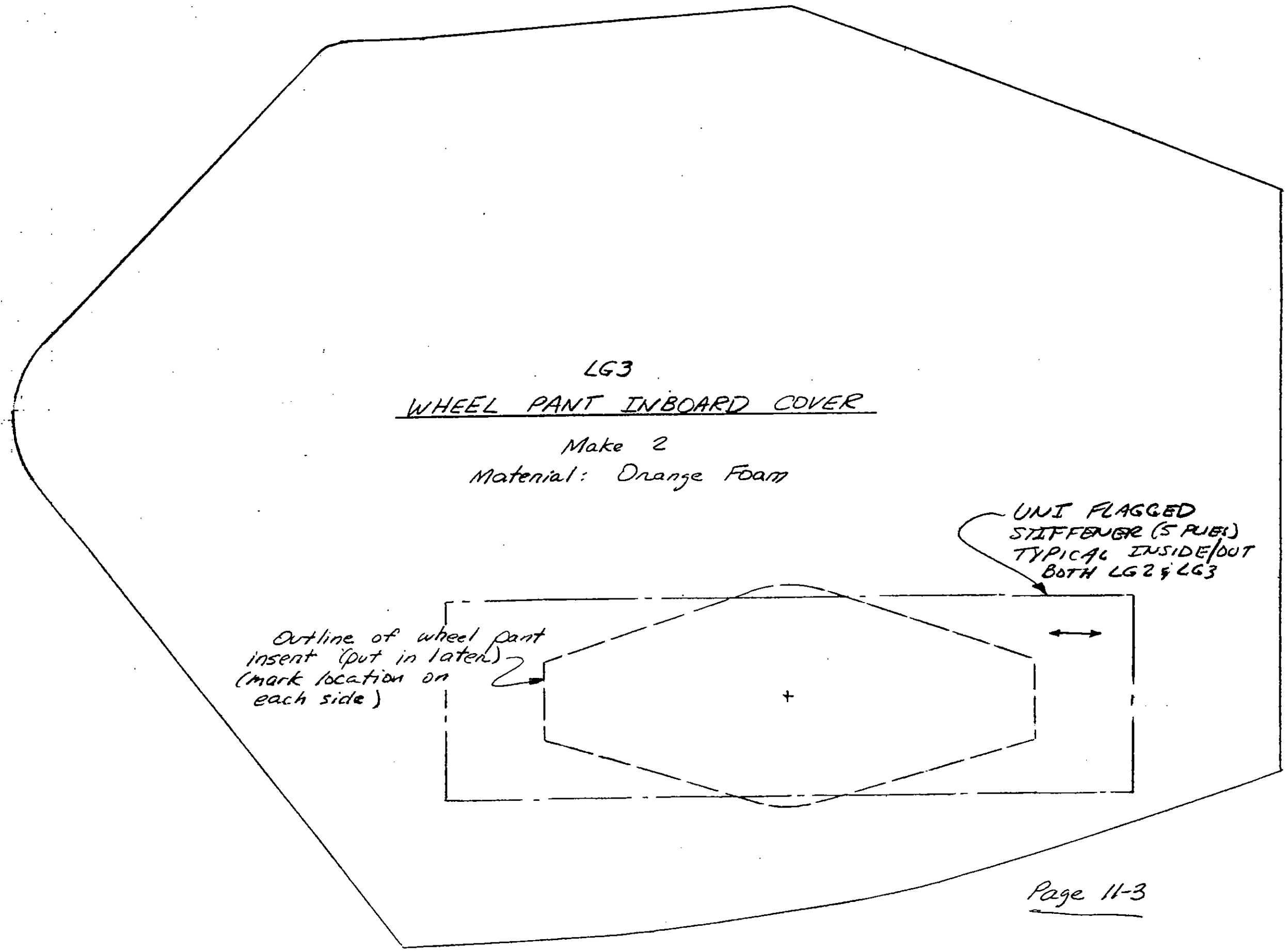


LG3

WHEEL PANT INBOARD COVER

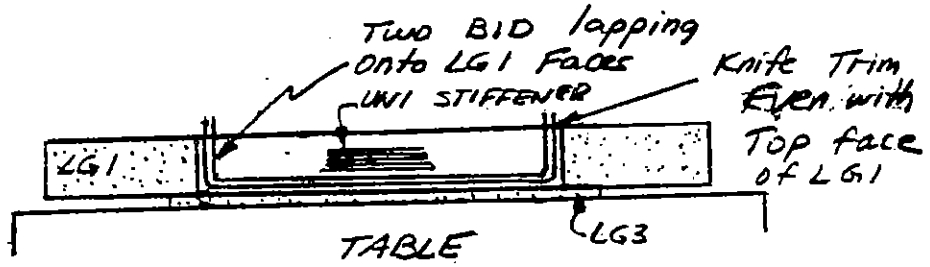
Make 2

Material: Orange Foam



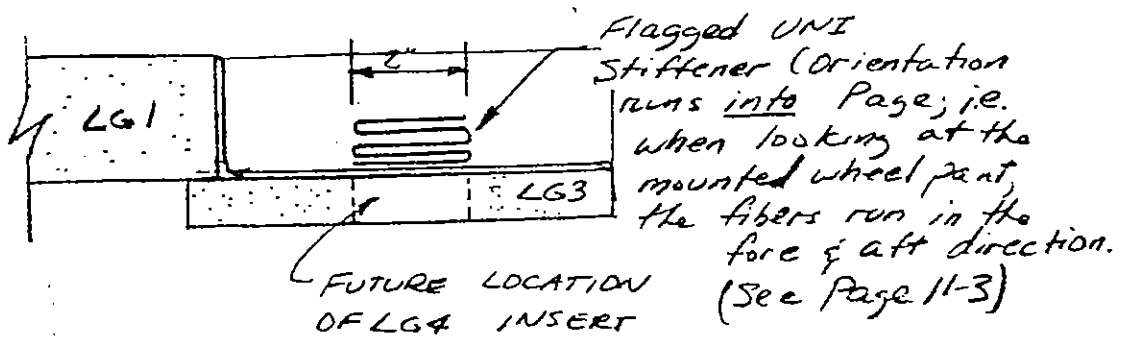
Next, you will need to join LG1 and LG3 with micro. Remember that the LG3 goes on the inboard face of LG1(i.e. as you visualize the wheel pant mounted on the canard, LG3 is on the same side of the LG1 as the fuselage is). Leading edge and trailing edge marks have been included on the LG1 sketch to allow you to line up the pieces; basically, LG3 covers up the LG1 cutout. You may need to use some weight to hold the pieces together 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)

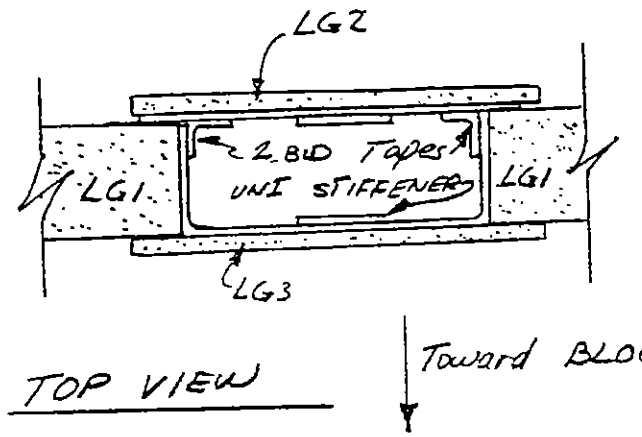


While the layup is curing, take LG2 and layup two BID on the inside face(i.e. the face that will be inside the LG1 cutout when it is attached. Roughly trim the glass so that it doesn't extend beyond the edges of LG2, but don't be concerned if you trim somewhat inside the edges. Flag a UNI stiffener to LG2 just like you did with LG3, remembering that the stiffener is on the side of LG2 that will be inside the LG1 cutout when LG2 is joined to LG1.

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.

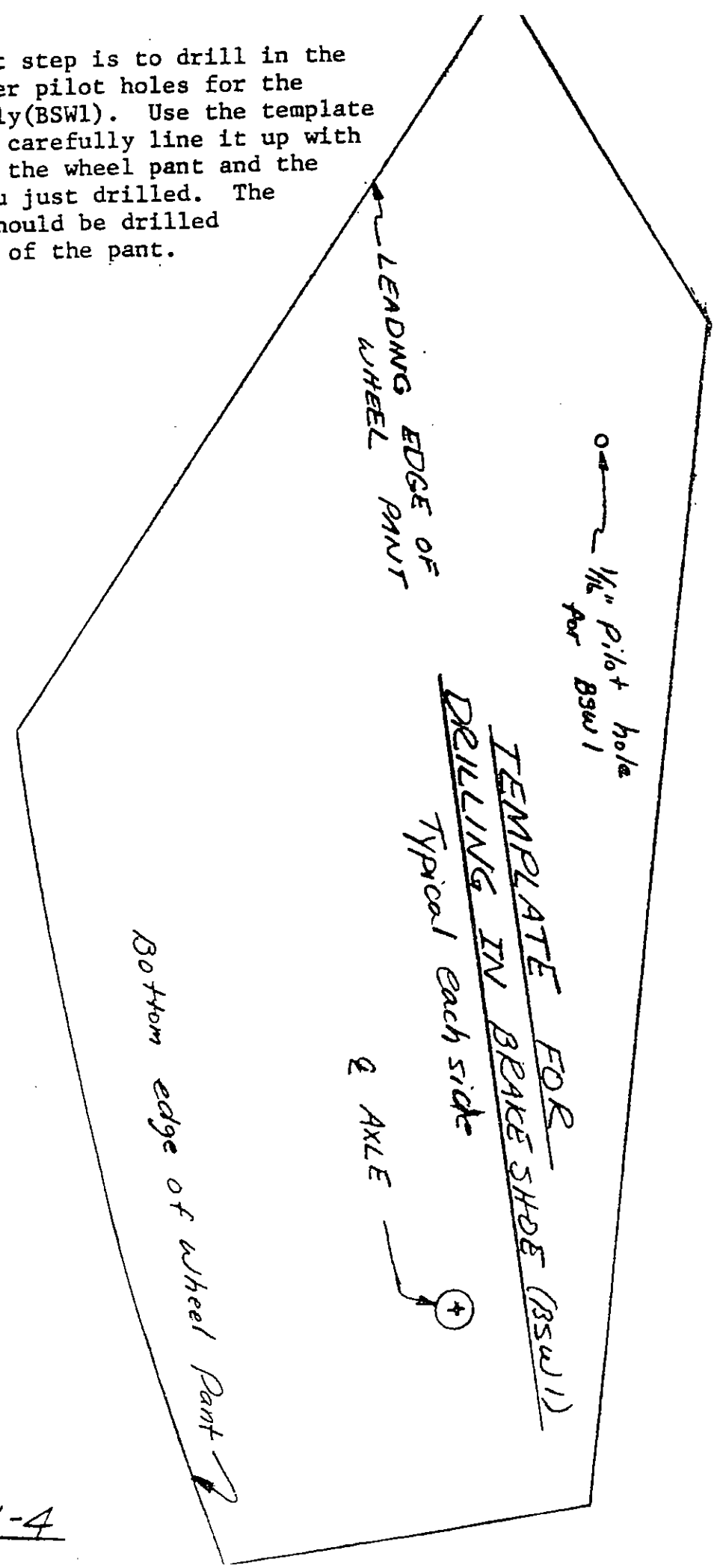
Drill in the pulley hole with a short angle drill. If you don't have one, cut the hole with a small exacto knife.



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.

The next step is to drill in the 1/16" diameter pilot holes for the brake assembly(BSW1). Use the template provided and carefully line it up with the edges of the wheel pant and the axle hole you just drilled. The pilot hole should be drilled on each side of the pant.



MOUNTING THE WHEEL PANT

At this point, the completed canard should be jigged upside down.

Basically, each wheel pant is jigged in place using lumber for bracing, then the toe-in and camber is checked, which usually necessitates some adjustment to the lumber bracing. When everything is 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.

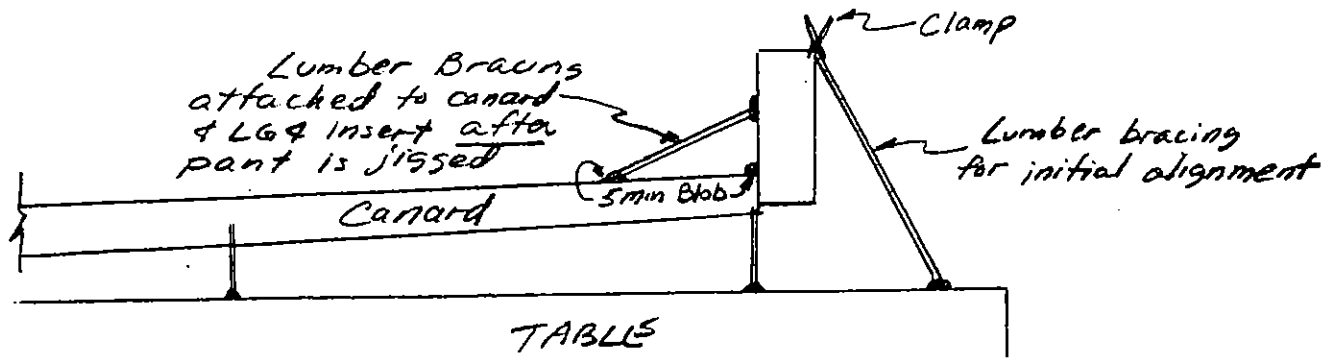
Begin by rigging the wheel pant in the approximate position. Bracing is used to keep it firmly fixed. Sight thru the axle holes, keeping the two holes in the wheel pant concentric (like sighting thru the sights on a gun). Move the wheel pant until the line of sight approximately intersects the other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

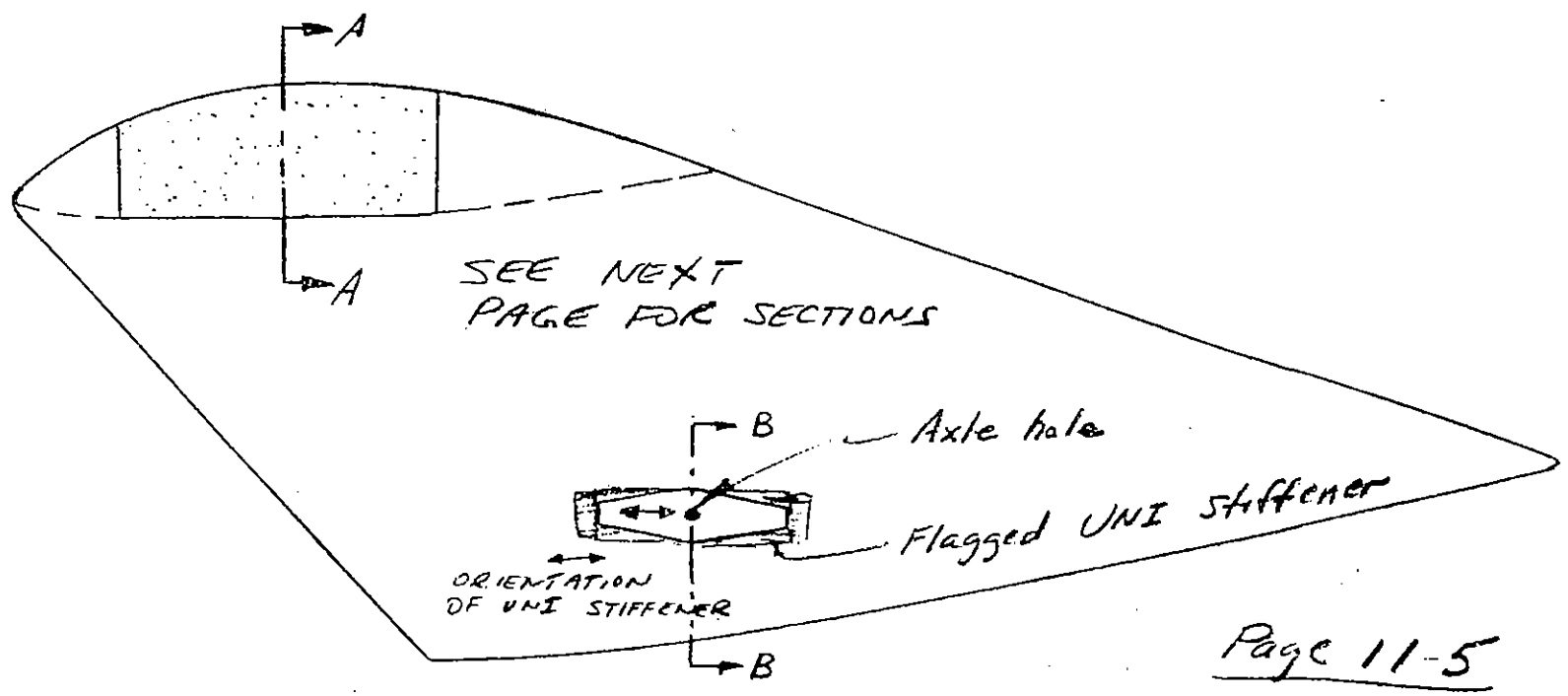
Next, repeat the operation with the other wheel pant except that now you can actually sight on the opposing wheel pant axle holes.

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



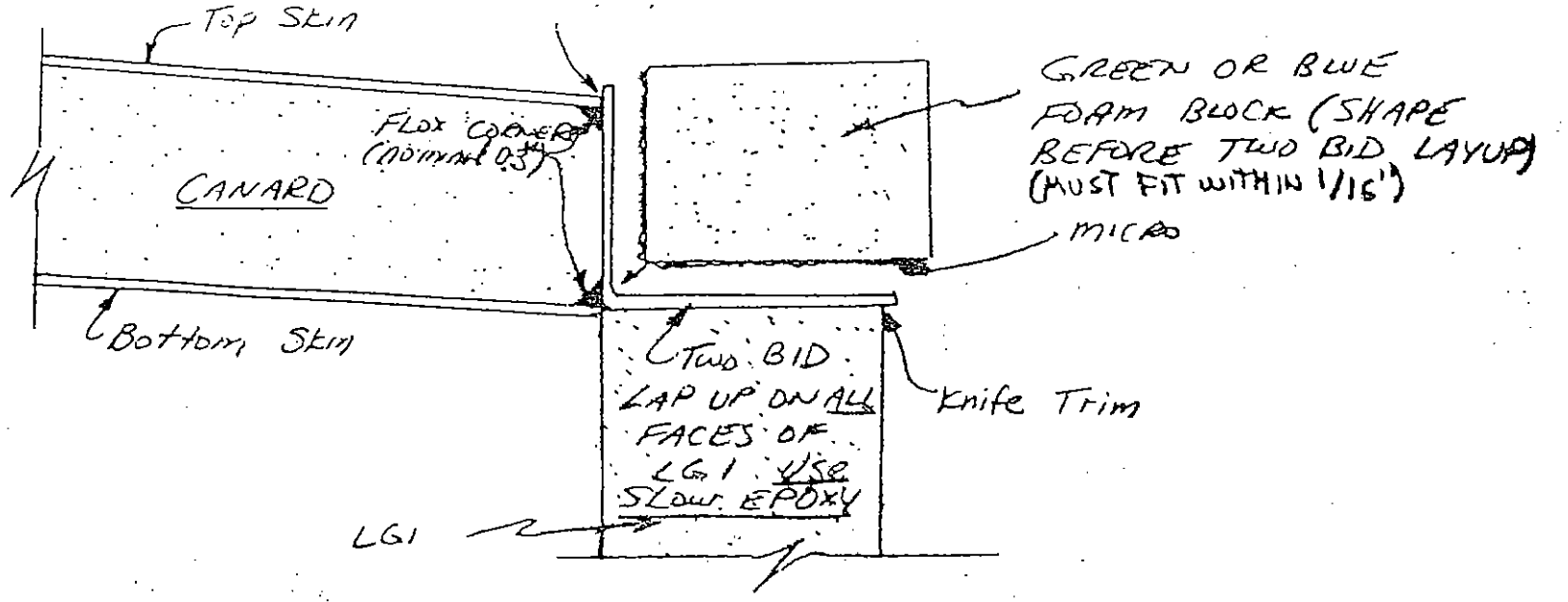


to fit the hole in the top of LG1 where it joins the canard tip. Next, remove the foam, put in flox corners where shown, and layup two BID, lapping up on all faces of LG1, as well as the canard tip. Before the layup becomes tacky, position the foam block with micro in place. Make sure that no voids larger than 1/16" exist in the bonding. Let this setup cure.

Now you are ready for the fun part, contouring the wheel pant! Several templates are provided to help with the task. 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.

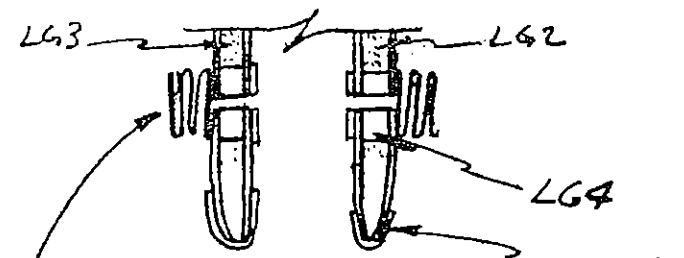
After the wheel pant is carved you are ready to glass the wheel pant. First, put in the flox corners as shown; then layup two BID over the outside face of the canard. Lap up on the canard a minimum of 1.5" and use a minimum of 1" overlap



SECTION A-A STEP 1

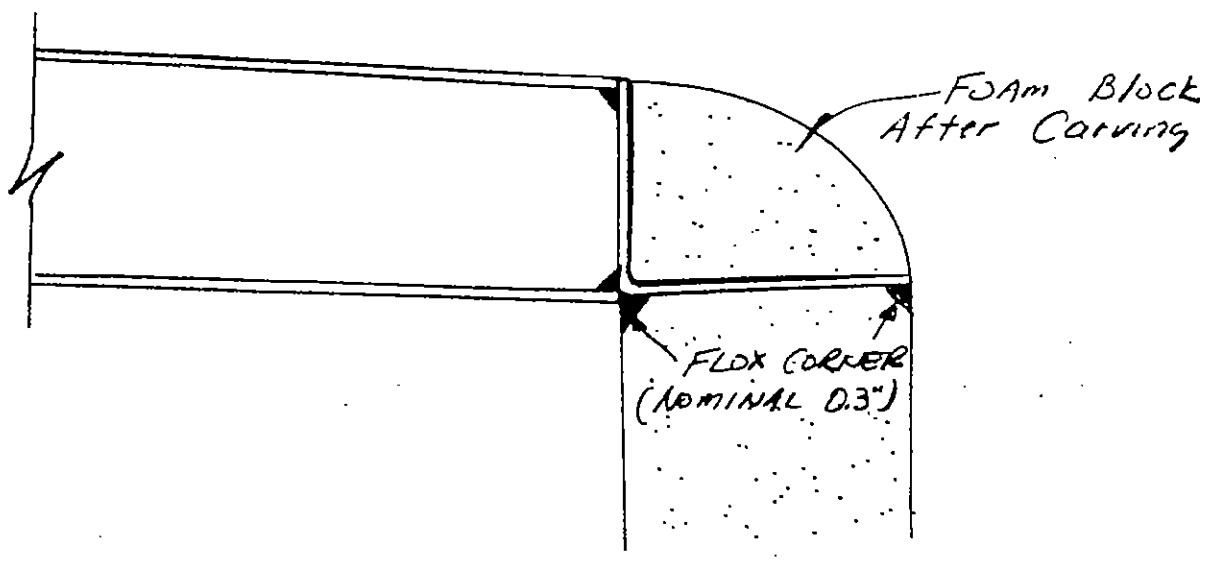
wherever else you overlap the cloth. After this layup has cured, remove the lumber jigging from the inside face of the wheel pant, touchup the inside face contouring if needed, and then glass two BID on the inside face..

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



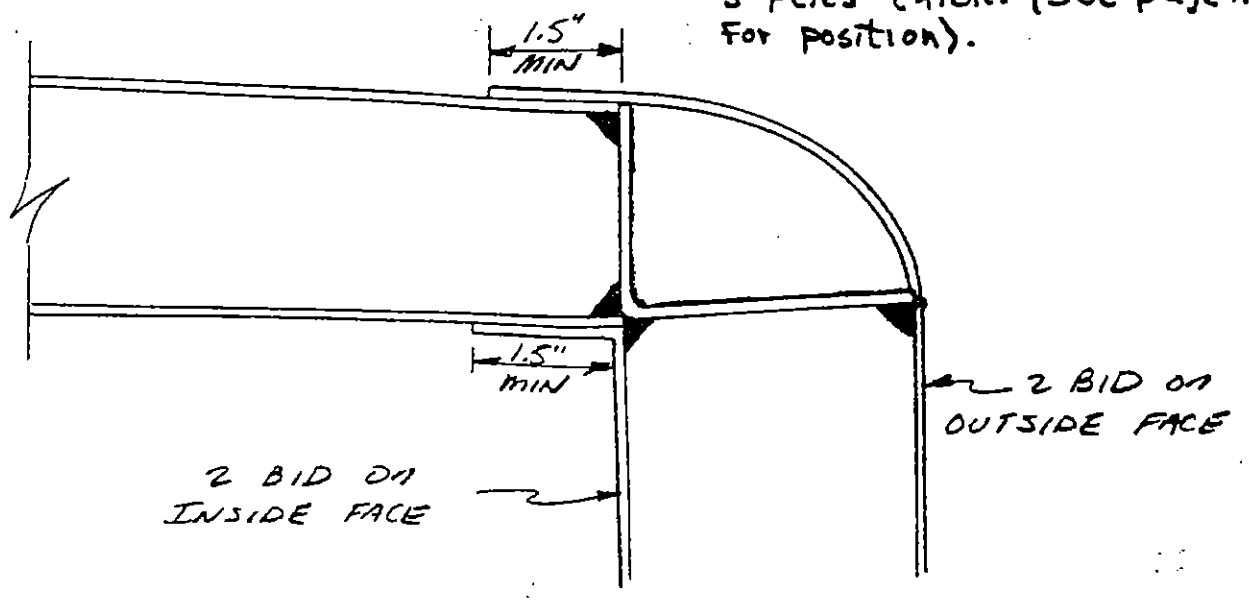
SECTION B-B

Flagged UNI Stiffener 2" high x 7" long; flagged 5 plies Thick. (See page 11-3 For position).



SECTION A-A STEP 2

CARVING & PREPARING FOR GLASSING

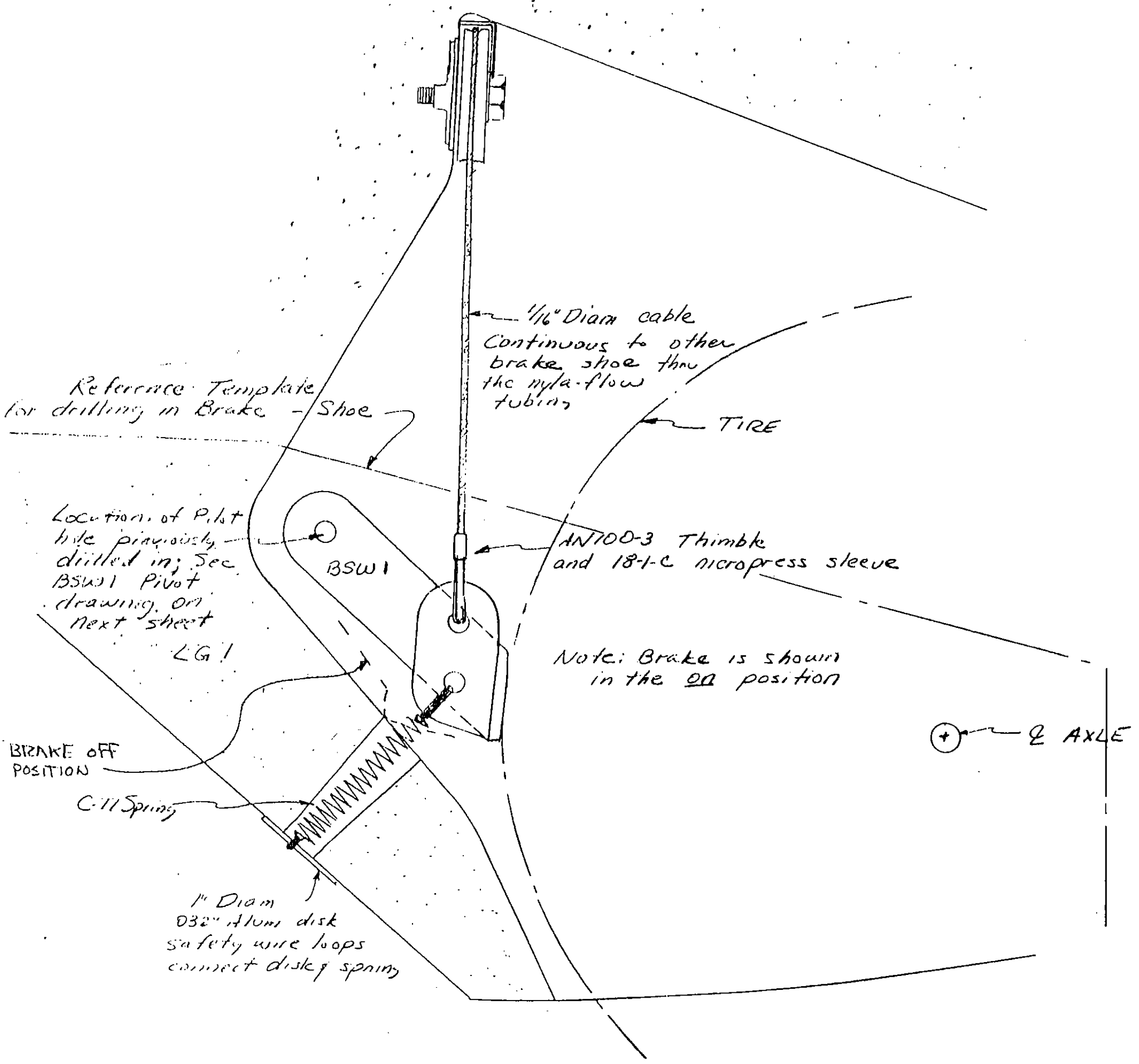


SECTION A-A AFTER GLASSING

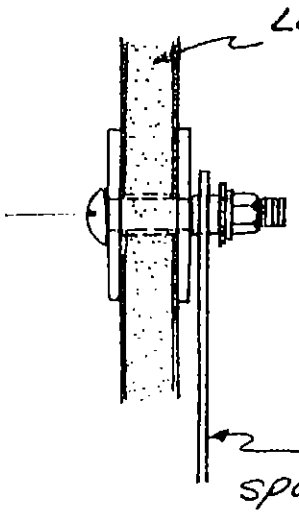
Look At this sketch carefully and make sure your aircraft is exactly the same

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.



CONTINUED ON NEXT SHEET

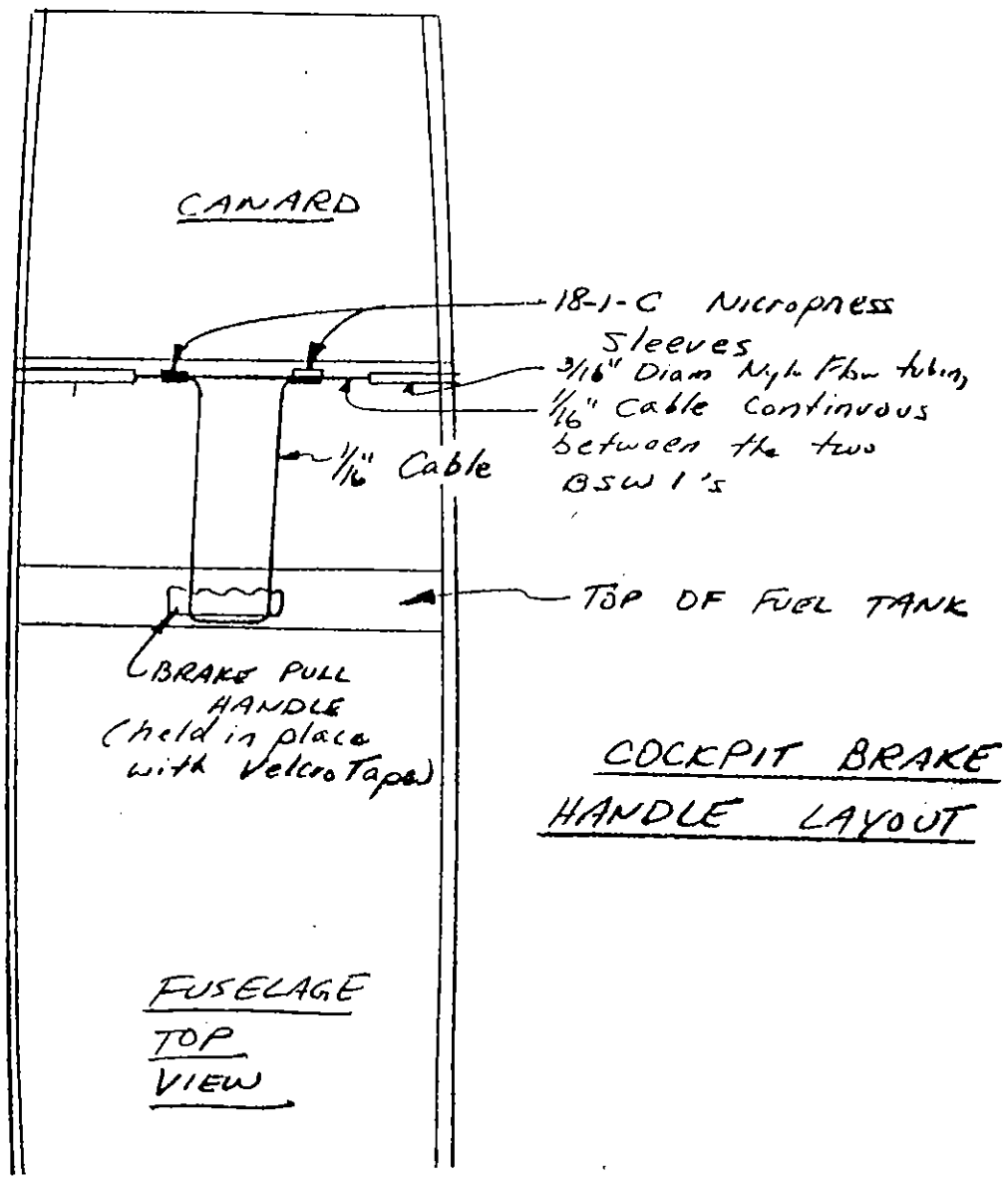


From Left to Right:

AN525-10R16, AN970-3, SPACER (Bonded in LG2 or LG3), AN970-3, SPACER (which BSW1 rotates about), AN960-10, AN363-1032 nut

SPACER MATERIAL: 1/4"OD x 3/16" ID 4130 Steel

INSTALLATION OF BSW 1 PIVOTS
(Typical four places)



COCKPIT BRAKE HANDLE LAYOUT

The brake pull handle is carved out of pine, or any other durable wood. The 1/16" cable is looped through a hole in each end of the handle and then is connected with two nicropress sleeves to the 1/16" brake cable that runs continuously from the left pant to the right pant. Remember to thread the two nicropress sleeves for the brake handle cable before hooking up the two BSW1's.

The brake pull handle is positioned conveniently on top of the fuel tank with Velcro tape.

After installation, check that the brakes do not drag against the tire in the "off" position.

Also, brake efficiency will be poor until the shoes and tires have worn in somewhat.

MOUNTING THE WHEEL

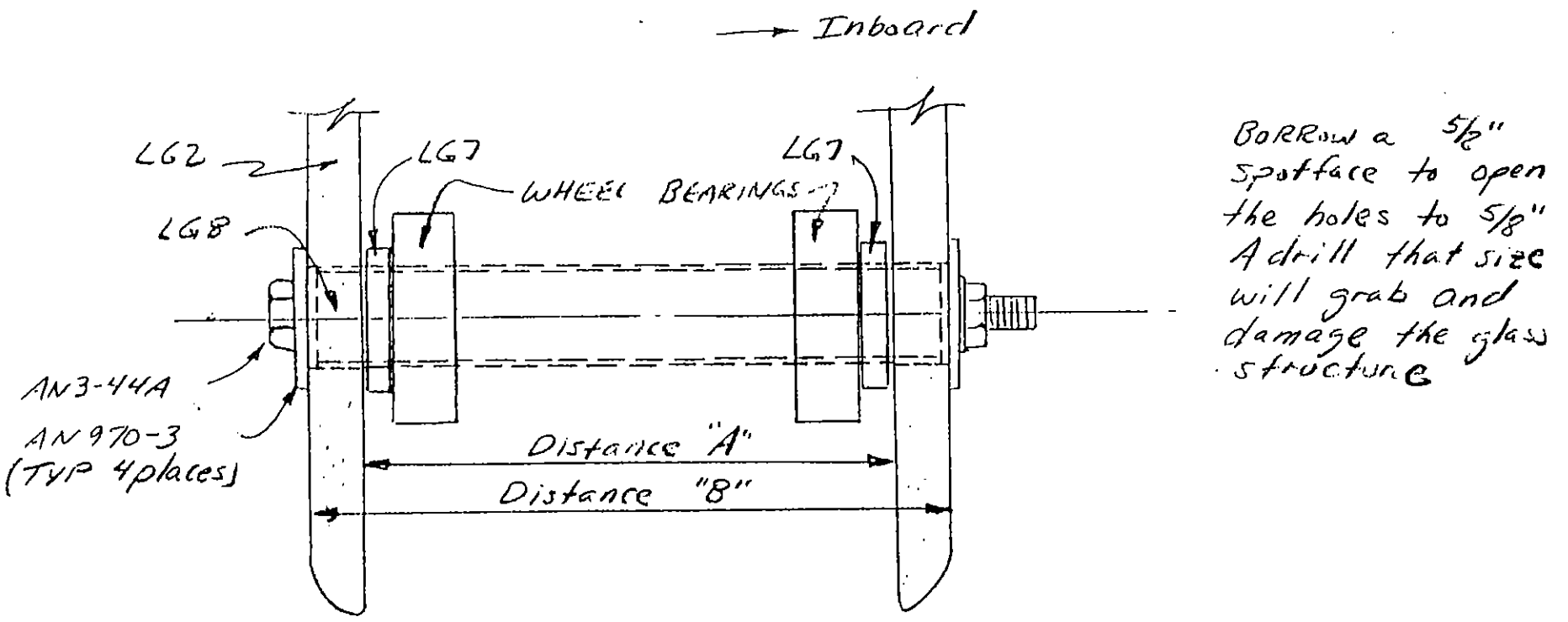
Begin by mounting the tires on the wheels. To do this, take the two wheel halves apart (note that an allen head tool is required), slide the two halves over LG8 (see below) after mounting the tire, and rotate the two halves until the 1/2" diameter tire tube hole (at the wheel halve split line) are lined 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 through the pieces to keep them in the proper position, you can slide the assembly up into the proper position inside the wheel pant. Next, slide and push LG8 from left to right slowly, pushing LG6 out the other side of LG3. When LG8 is resting between LG2 and LG3, center the AN970-3 washers on the holes and insert the AN3-44A bolt. The bolt must be tightened until it clamps up the LG7 spacers against the bearings. If LG8 is too long, it will prevent the clamping effect; if the LG7 spacers are too short, they son't clamp up either. Therefore, you will have to do some trial and fitting to make things come out right. In the future, whenever you want to remove the wheel, use the LG6 piece, just reversing the above procedure.



Note: This section replaces the original "Mounting the Wheel" section in the QUICKIE AIRCRAFT PLANS

ELEVATOR- WHEELPANT FAIRINGS

You currently have a large gap between the elevator and the wheelpant. Fill it by carving a block of blue or green foam to shape and glassing two plies over it, lapping up on the wheelpant and the face of CS19. Since the elevator will be at about -5 deg. at cruise, you may want to set the elevator in that position before carving.

POST-CURING THE CANARD

In order to prevent the canard from creeping because of the weight on it, it should be post cured before it is mounted on the fuselage.

Creeping is when the epoxy deforms because of heat and load. It can be minimized by heating the glass above the highest temperature that the glass will see in operation. If you were a multi-million dollar company, you would use a very large oven; however, painting the canard black with primer and setting it in bright sun will accomplish the same thing.

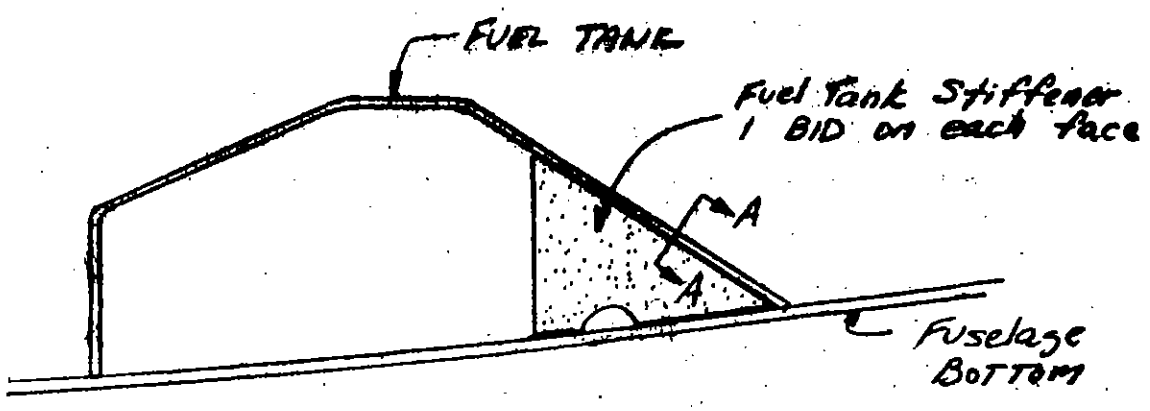
If you desire, you may want to skip to the finishing section and put the smooth finish on the canard before priming it. However, if you would prefer to do all of the finishing work on the aircraft at one time, you can just shoot some black primer on it and then clean it off later.

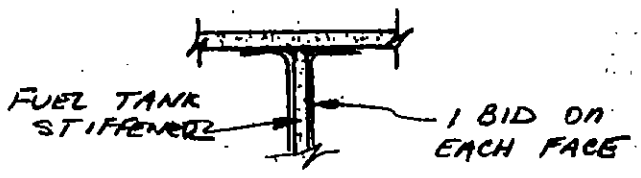
Black is used because it absorbs more heat and therefore gets the glass hotter. Expose the top and bottom of the canard to the sun. Check the temperature by placing the palm of your hand on several locations. If you can hold your hand on the surface for about 5 seconds, the temperature is right. Let the canard set like that for about 10 minutes. <u>Do not let it get too hot.</u>

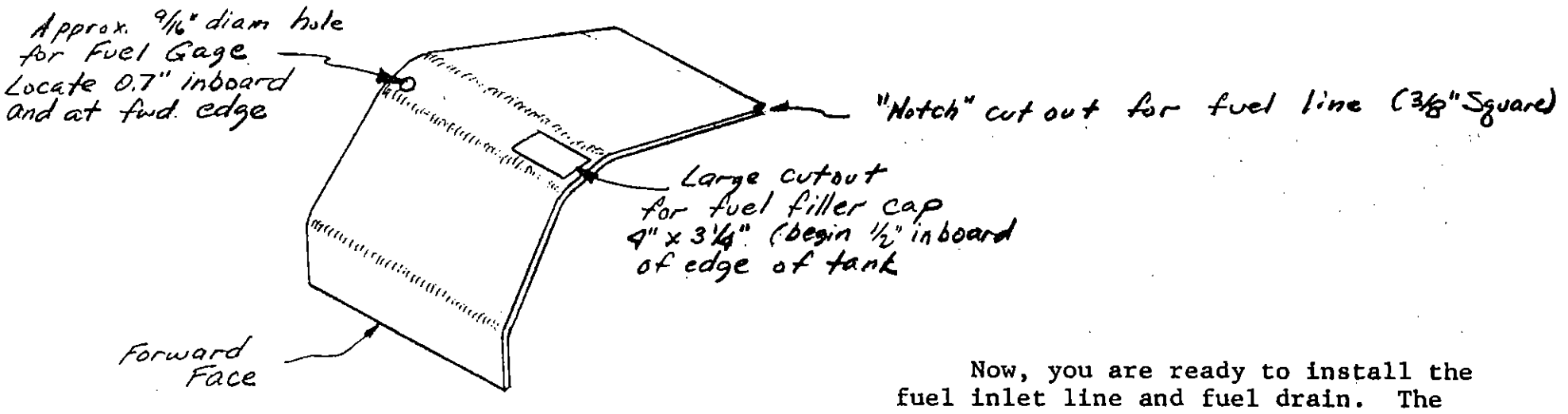
FUEL TANK INSTALLATION

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

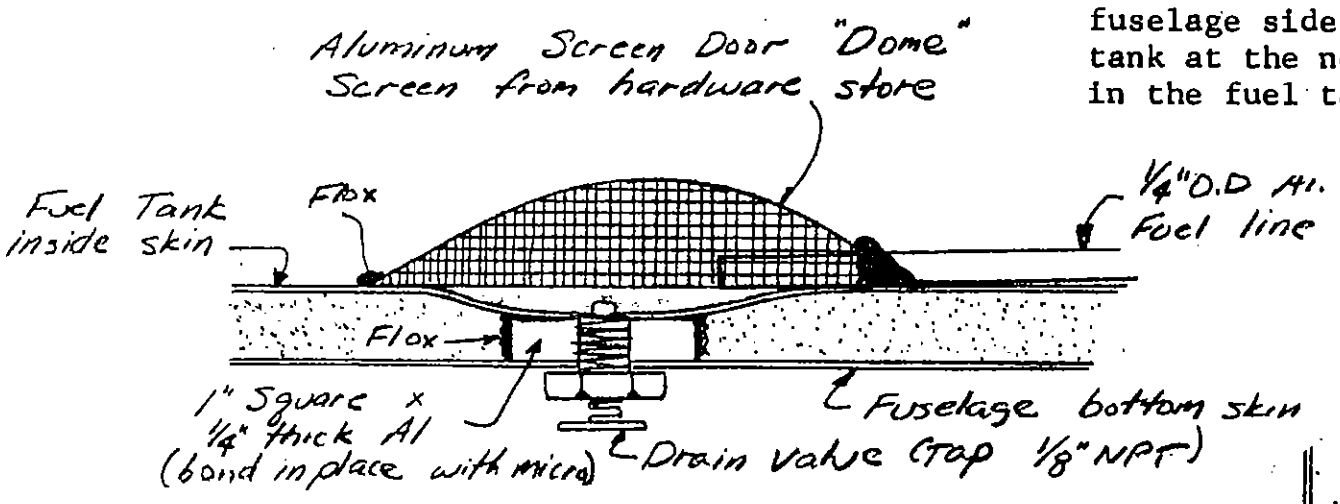
Next, fabricate the fuel tank stiffener from orange foam. The semicircle in it is to allow fuel to drain from one side to the other. Once you have the approximate shape, join it to the fuel tank with one BID on each side.



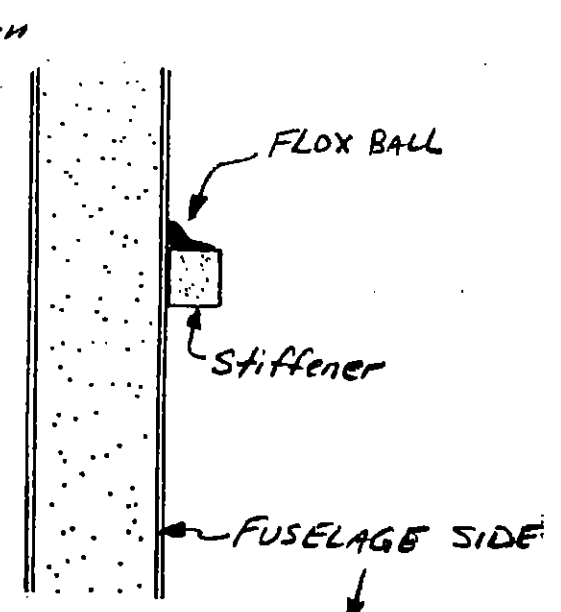




Now, you are ready to install the fuel inlet line and fuel drain. The fuel drain is threaded into the 1/4" thick aluminum plate you installed prior to glassing the outside of the fuselage. The screen is used to encompass the fuel inlet to keep out FOD. It is dome shaped and held in place with Flox. The fuel inlet line is 1/4" diameter Aluminum tubing. Use lots of flox where the tubing meets the screen. The line is run to the left rear part of the tank at the fuselage side, so that it can exit the tank at the notch you previously made in the fuel tank.



FUEL INLET & FUEL DRAIN INSTALLATION

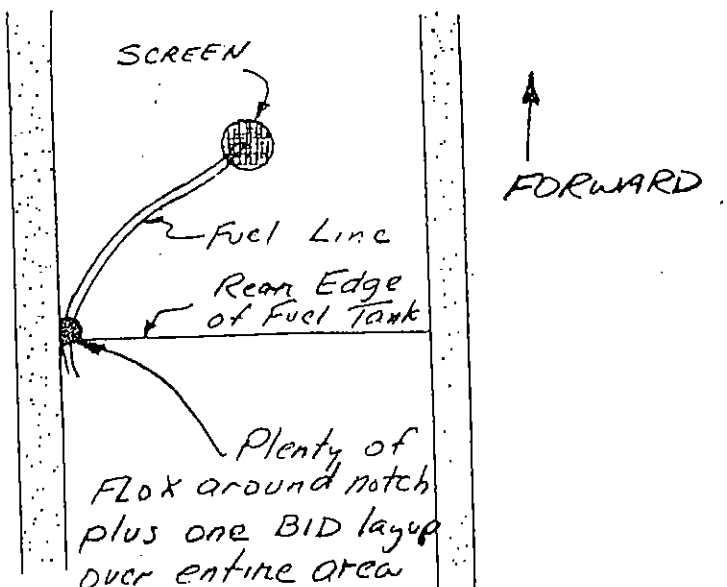


In order to provide a good leak-proof seal around the fuel tank after installation, small stiffeners are placed along the fuselage side so that upon installation, the fuel tank will sit down on them, thus assuring good squeeze out of the flox. These stiffeners are nominally .3" x .3". They are located in place by dry fitting the fuel tank in place, tracing around the fuel tank on the fuselage side, removing the fuel tank, lowering the traced lines about .3" to allow for the fuel tank thickness, and then installing stiffeners with flox. Let stiffeners cure before installing Tank.

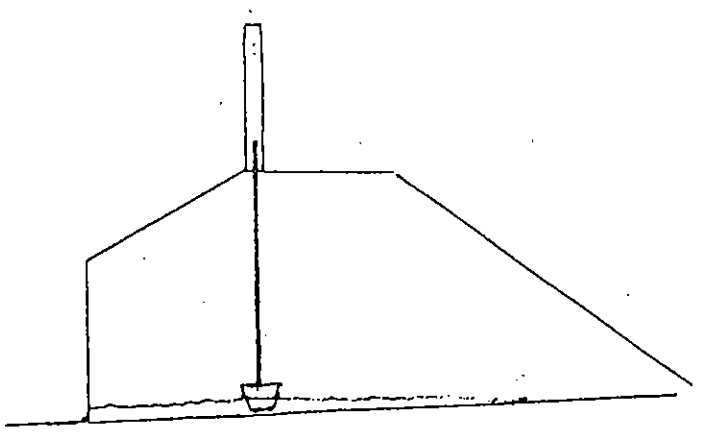
The fuel gauge is made by shaping a piece of green foam to the shape shown, sticking an 8" long 1/4" wood dowell into the foam, and then coating the assembly with leftover epoxy, and hanging it up to drip-dry. The clear PVC pipe should be mounted after the fuel tank has been installed.

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.

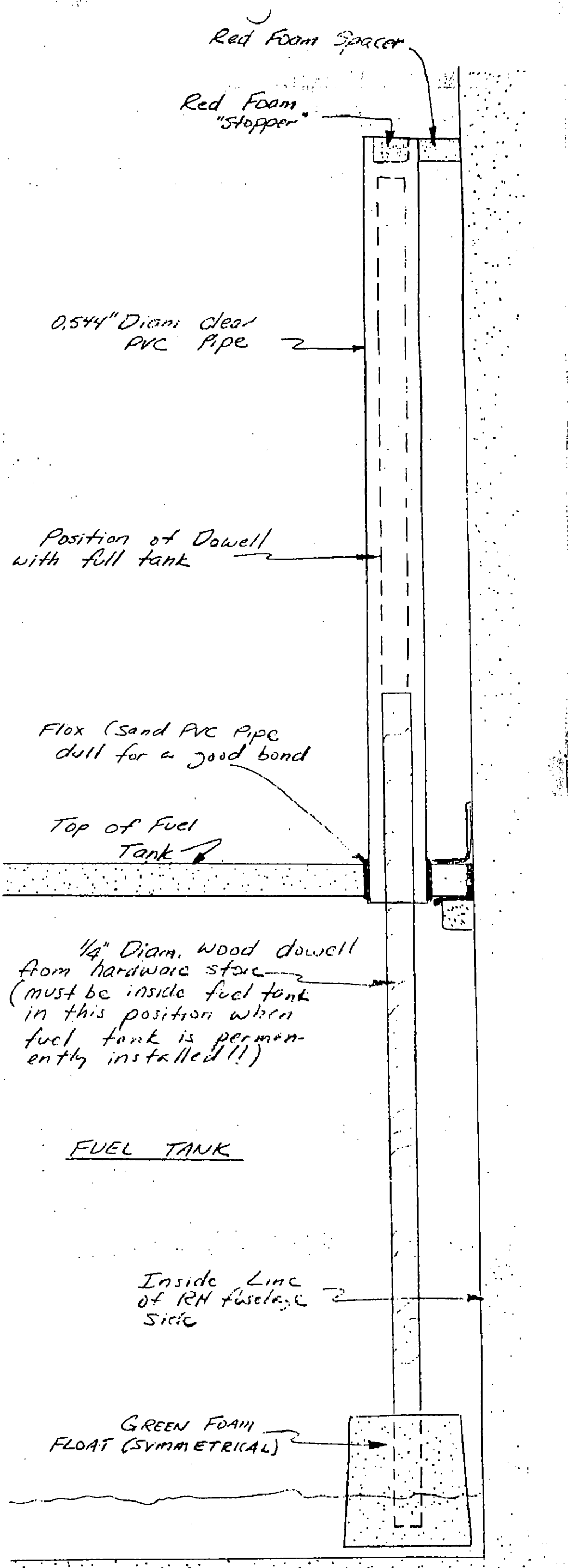
To complete the fuel gauge, install the clear PVC pipe with flox and use a red foam stopper for the top and a red foam spacer for additional rigidity. Before attaching the PVC pipe permanently, verify that the float will not hit the stopper when the fuel tank is full.



TOP VIEW



Fuel tank Profile



FUEL TANK

CONTINUED ON NEXT SHEET

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.

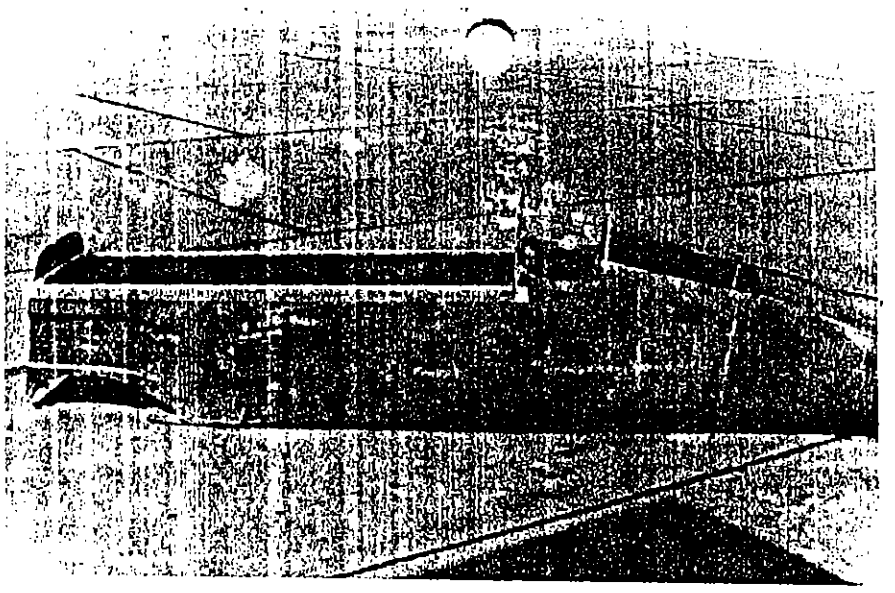
Begin by cutting the storage bottle at the neck(right before it widens out). Next, for a filler neck mold, find a household bottle with a compatible diameter. After placing some Saram Wrap around the bottle, lay up 3 plies of BID around the bottle and allow to cure. Then trim it(after removing the bottle,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

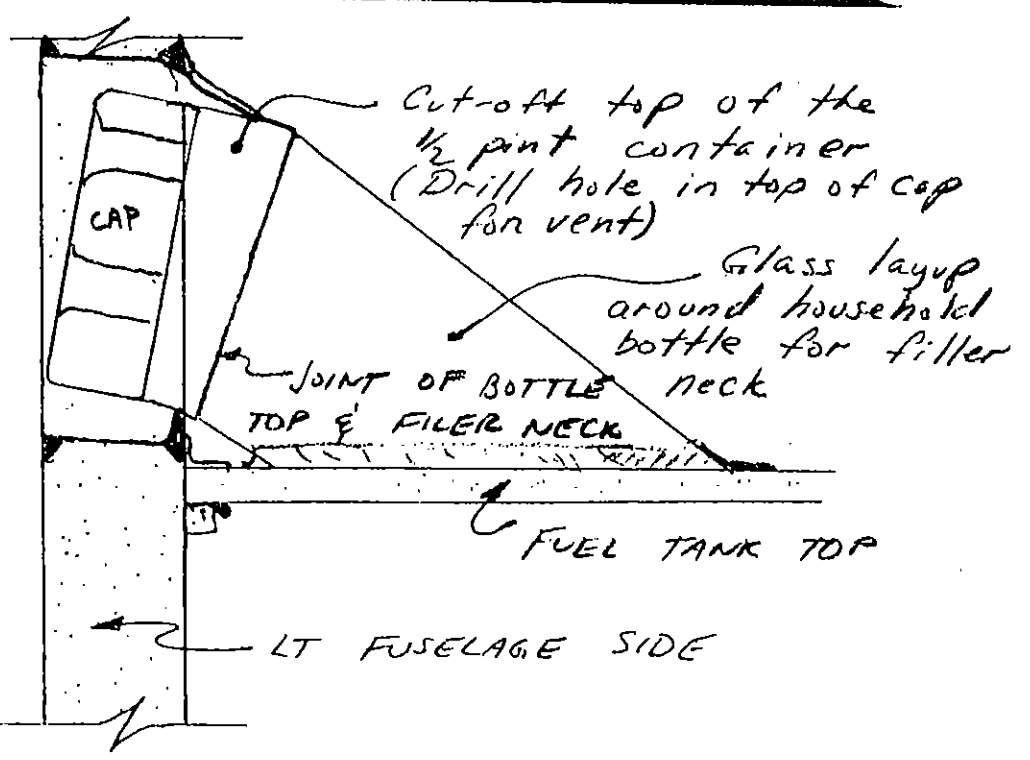
The pictures included in this section show you what the finished product looks like. Basically, you must cut a hole in the fuselage side, and angle the filler neck and cap so that it will stay as low as possible to avoid taking up space occupied by the side console and left hand instrument stack. The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

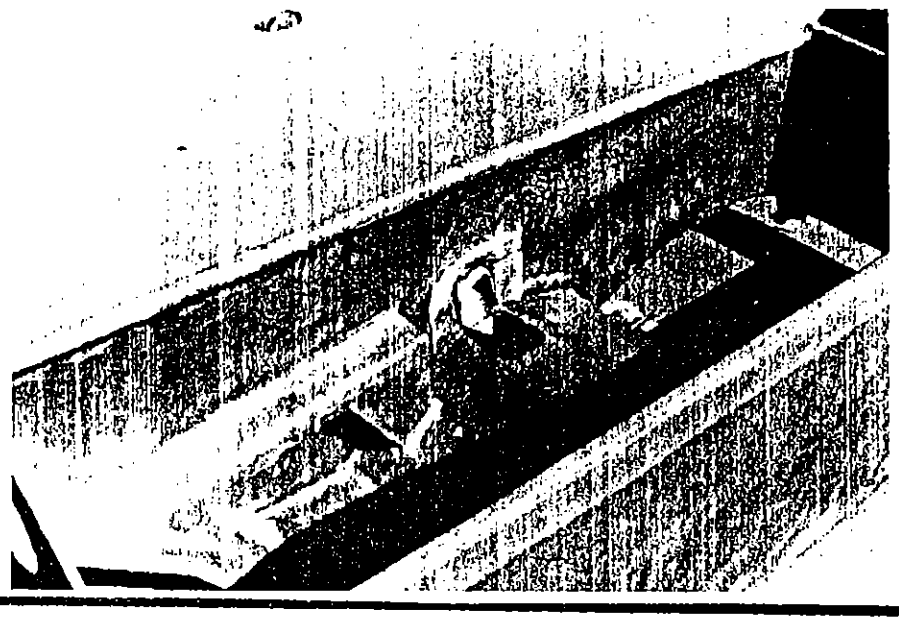
The hole through the fuselage side is protected by using a micro corner inside and out, and a BID layup around the hole to protect the bare foam.

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

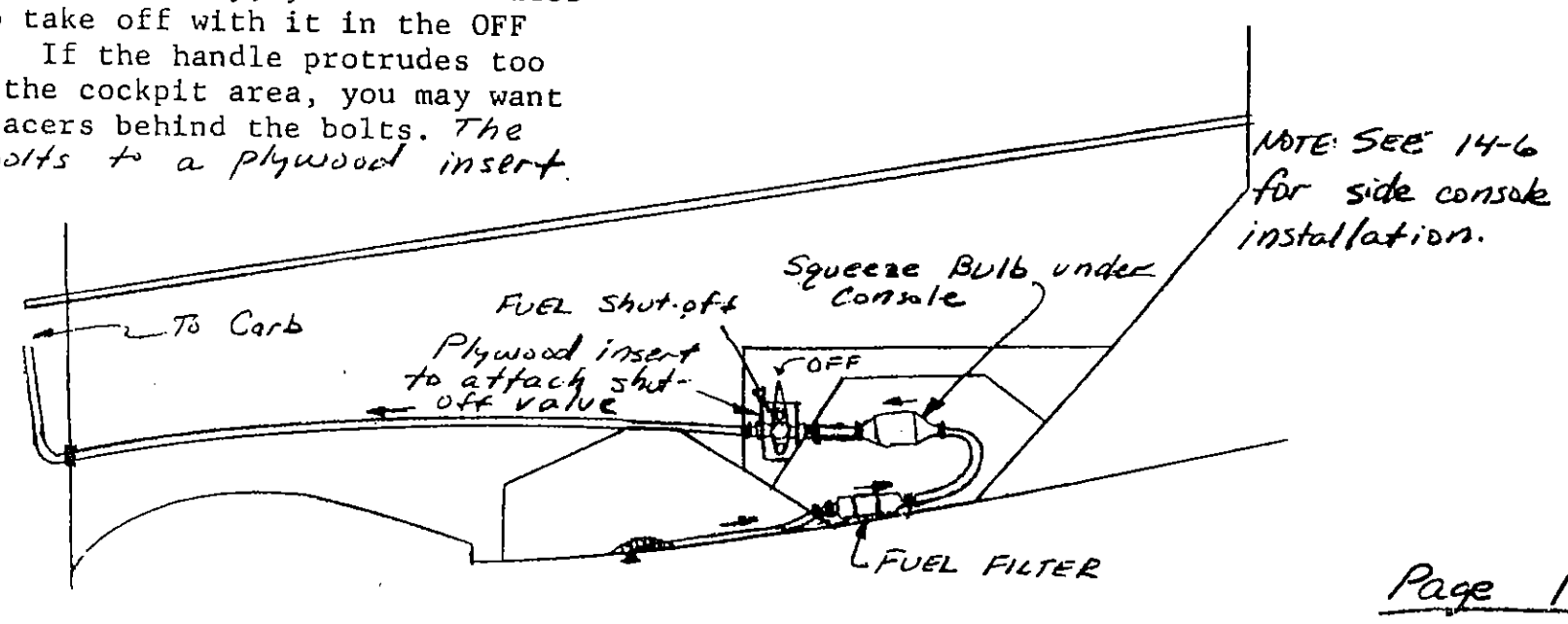
The fuel filter and squeeze bulb are located as shown. Make sure that you look at the parts and get the fuel flow going in the proper direction. Hose clamps are used to connect the 3/8" diam. Nylo-Seal tubing to the parts.

The fuel shut-off valve is located on the left side console with the handle sticking through into the cockpit area so that it can be actuated in flight. We suggest that the handle be clocked so that the fuel valve is OFF when the handle is vertical. That way, you will be less likely to take off with it in the OFF position. If the handle protrudes too far into the cockpit area, you may want to use spacers behind the bolts. The valve bolts to a plywood insert.

Sit in the cockpit(you probably have already been sleeping in it), and verify that you can reach the squeeze bulb and the fuel shut-off valve in flight. If not, relocate them to where you can.

The Nylo-Seal tubing is also used to run the fuel up to the carb from the fuel shut off valve. An AN931-6-10 grommet is used at the firewall where the tube goes through.

Use hose clamps to secure the fuel line connections.



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.

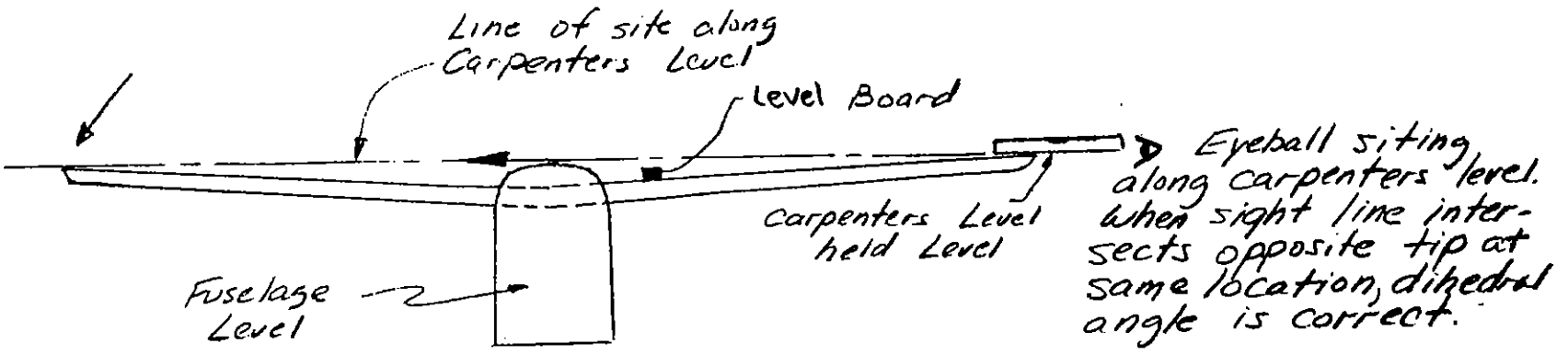
Some important considerations are:

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.

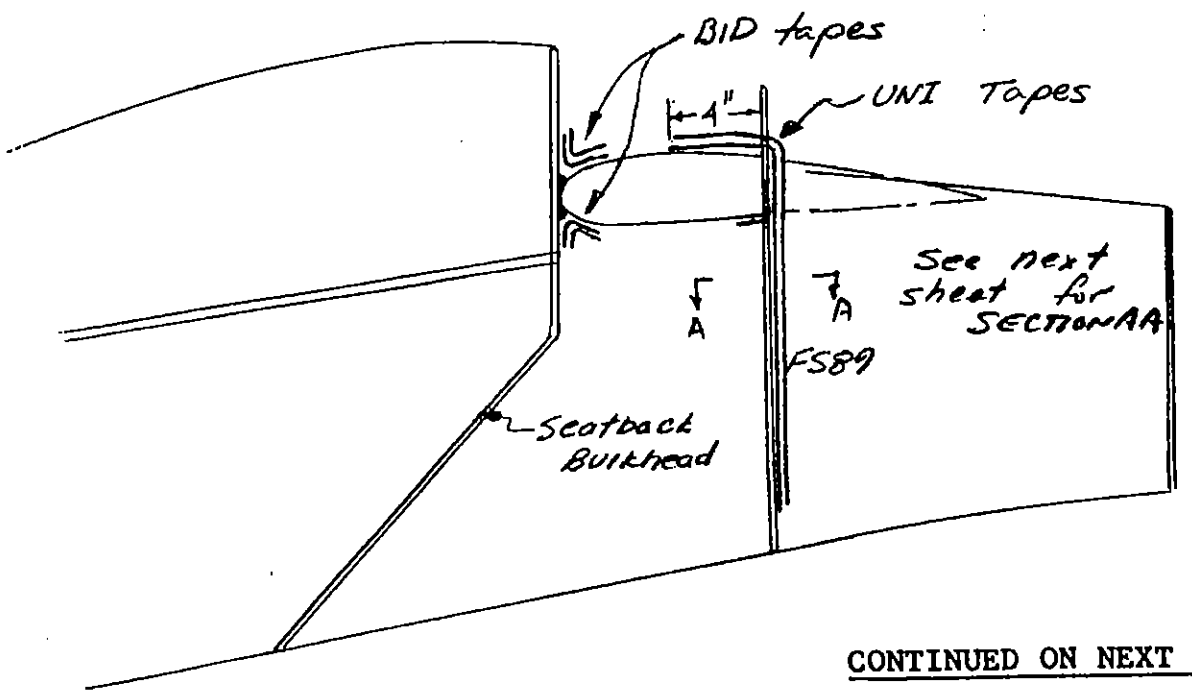
When everything is ready, dull the glass wherever the fuselage and wing will meet, and then mix up some micro for the areas on the left and right fuselage sides where the mating occurs. Paint pure epoxy on the front and rear faces of the wing where it will meet the FS89 bulkhead and the seatback bulkhead. Trowell on plenty of flox to fill any voids between the bulkhead and the wing. Lower the main wing onto the fuselage; verify good squeeze out and then remove the excess.

Now, check the level of the fuselage and wing again, as well as the dihedral angle. When satisfied, leave the aircraft alone for one day in order for the epoxy to cure.

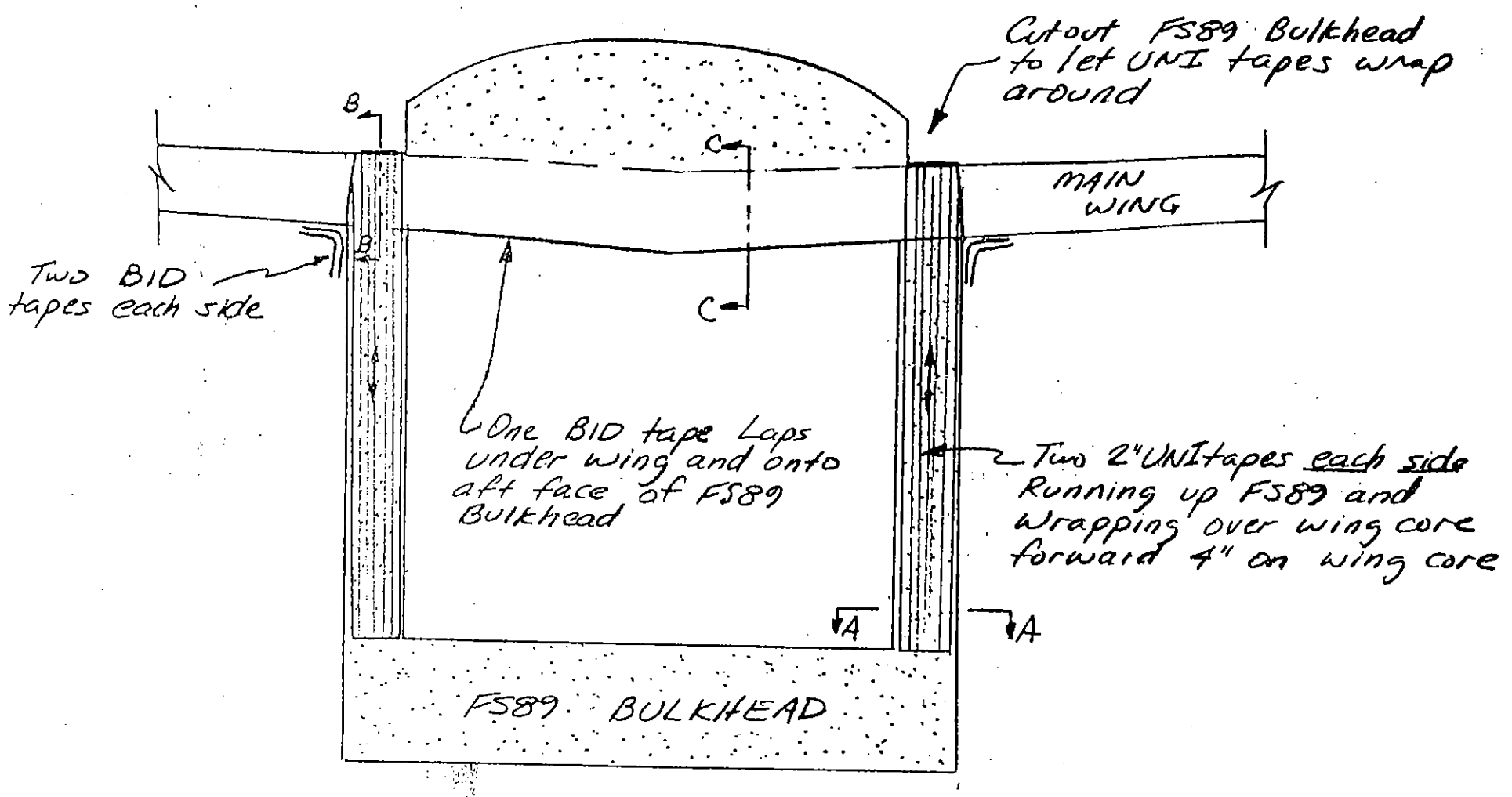
Then, you can begin applying the BID and UNI tapes that provide the real strength. Note that two tapes are used everywhere.



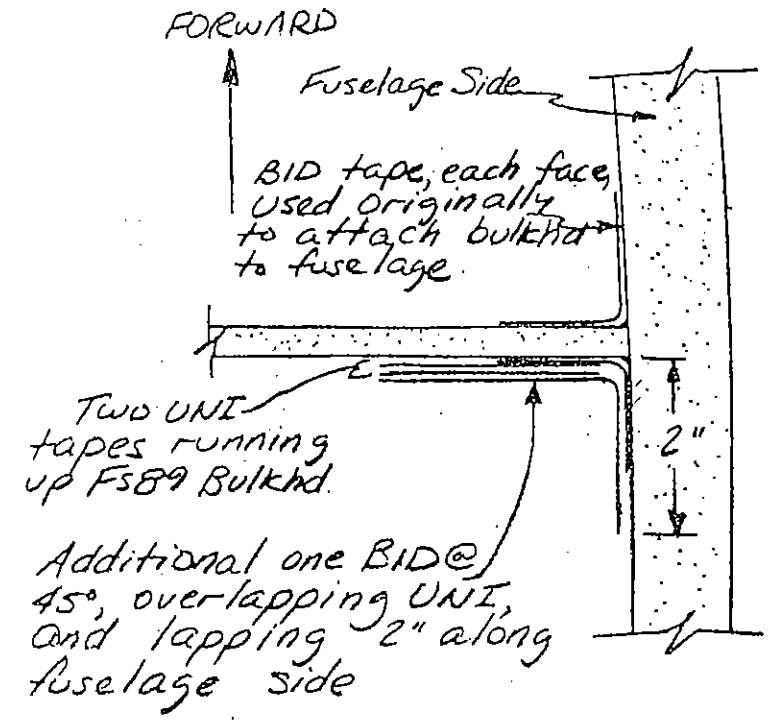
SETTING DIHEDRAL ANGLE ON REAR WING



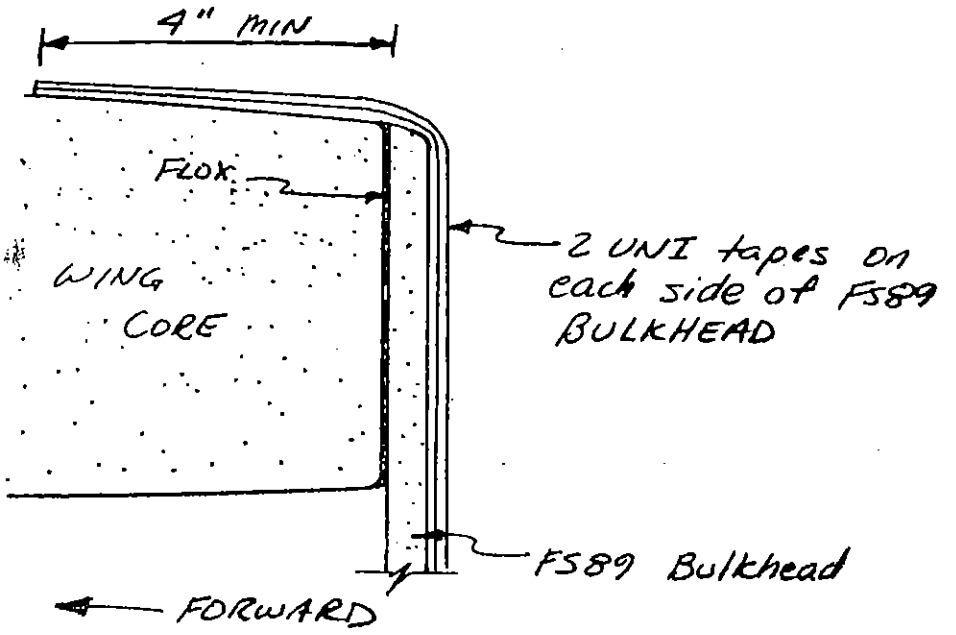
CONTINUED ON NEXT SHEET



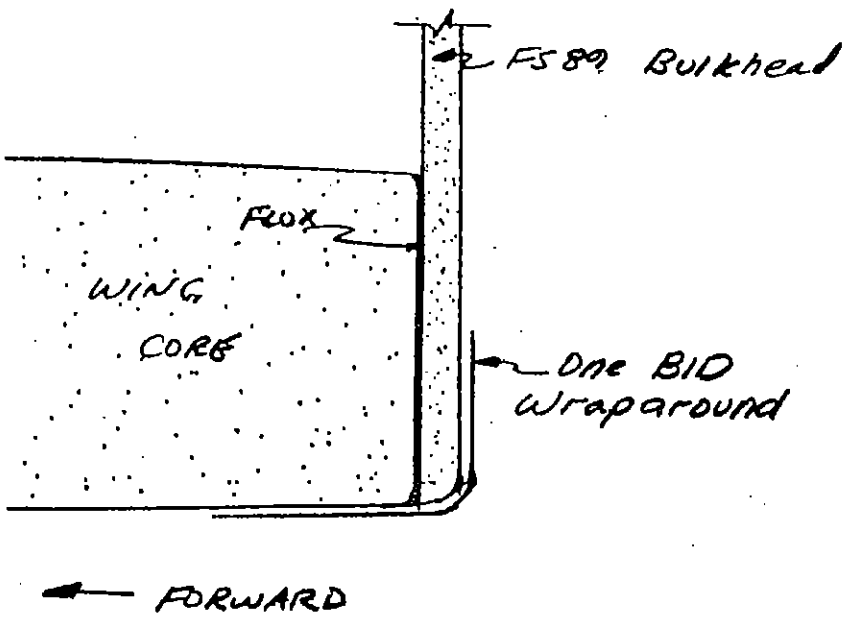
FS89 BULKHEAD
Looking Forward from Aft Face



SECTION A-A



SECTION B-B



SECTION C-C

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.

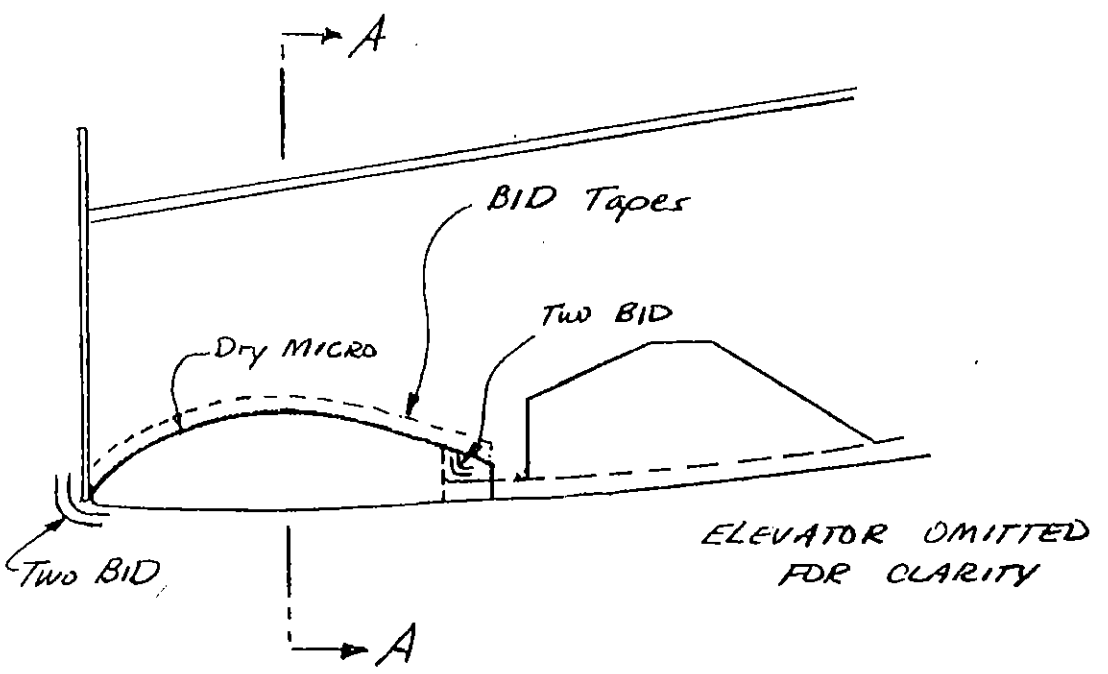
Some important points to remember as you are doing this work are:

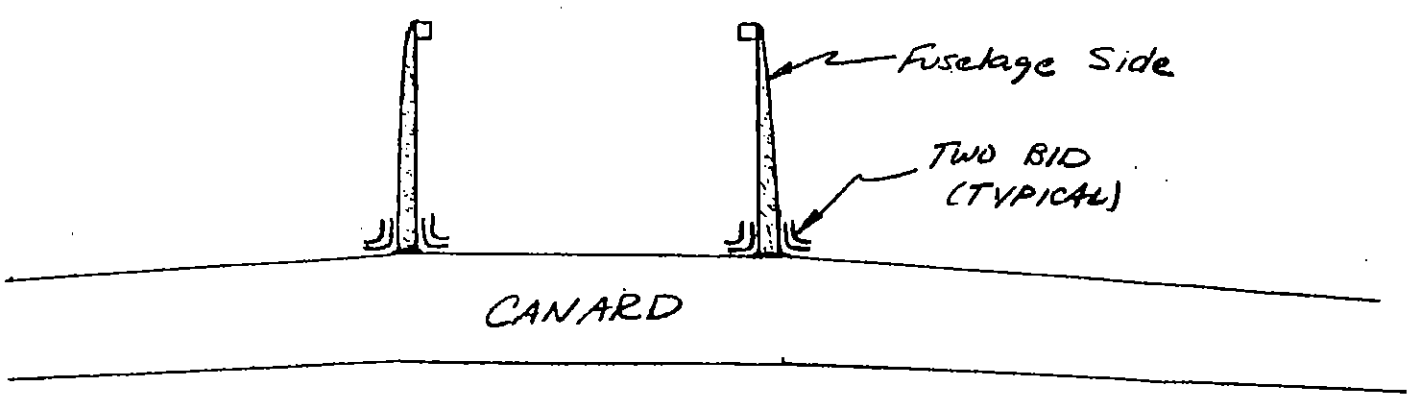
1. When the fuselage sides were made, the BL10 canard template was used to approximate the cutout. This cutout will have to be trimmed to fit the real canard.
2. The level board on the canard must be level when the canard is joined to the fuselage. Recheck fuselage level also.
3. Avoid having to use lots of dry micro to fill voids during the final mating process by being careful in the trimming process.
4. Check to make sure that the canard centerline is on the fuselage centerline.
5. Check the skew of the canard by measuring the distance from the axle to STA172(where the tailspring meets the fuselage) on each side. They should be equal.

When everything is ready, mix up dry micro and apply it liberally to both the canard and to the fuselage wherever the two will mate. Gently lower the fuselage into position on top of the canard. Make sure that you obtain good squeeze out everywhere and then remove the excess.

Now, once again check the level of the canard and fuselage, as well as the skew of the canard. When you are sure that everything is absolutely perfectly lined up, leave the aircraft alone for about a day in order for the micro to cure.

Then, you can begin applying the BID tapes that provide the real strength. Note that two tapes are used everywhere both inside and out.



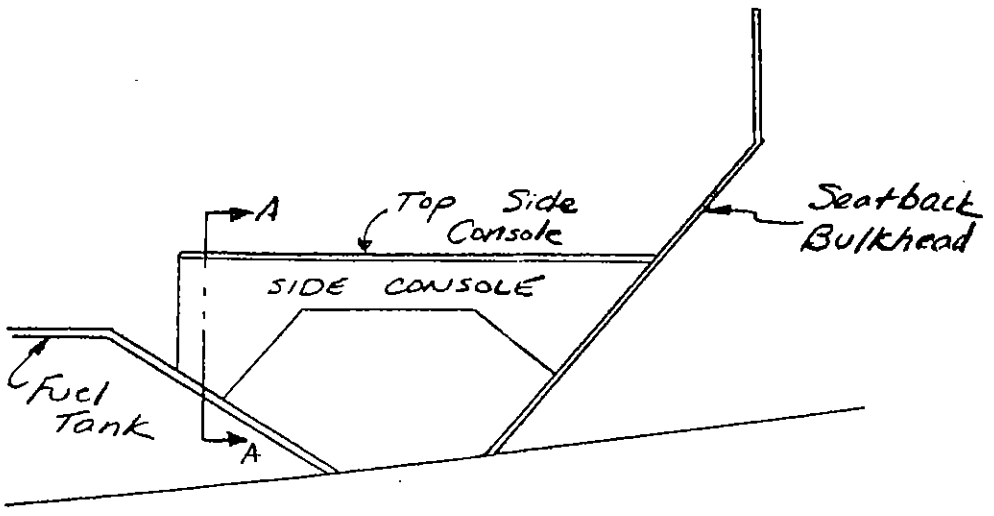


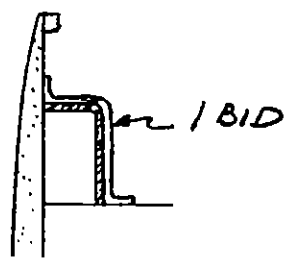
SECTION AA

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.





SECTION A-A

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 <u>left</u>. The rudder trim should only be installed if flight test proves it necessary.

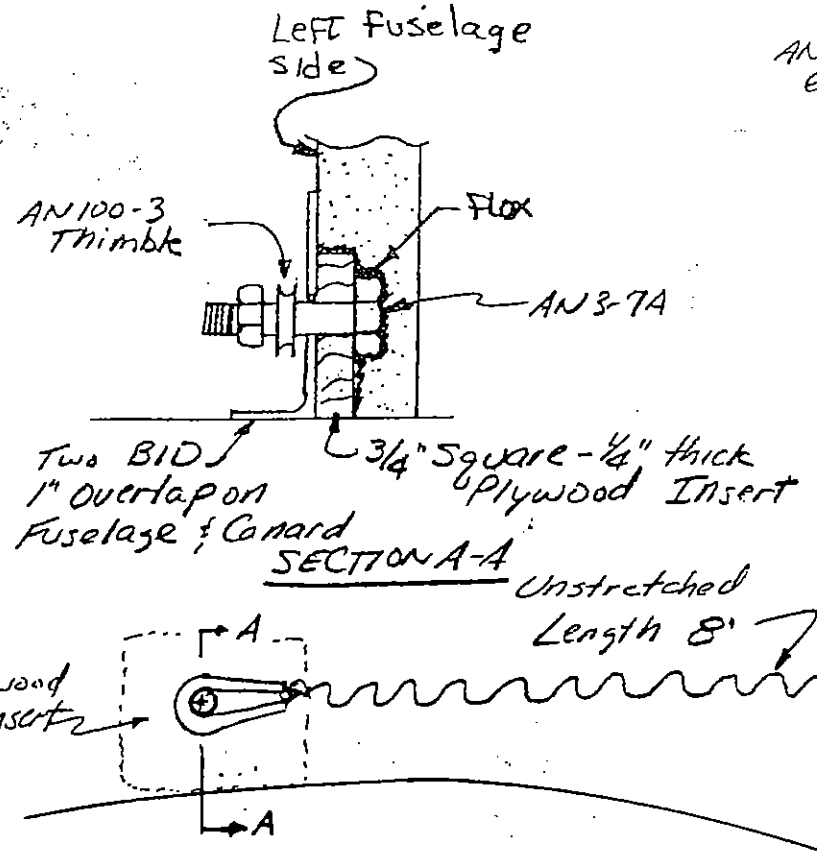
Pitch trim is actuated by an arm on CSA8 with two springs attached to it. The tension in the aft spring can be varied by the position of the trim handle, which is a sawed-off hacksaw blade. Changing the tension in the aft spring will cause the CSA8 trim arm to rotate to a new position, which means that the elevators have rotated to a new position. Look at the sketch and understand the last few sentances.

The details show you how to hook up the system. There are several things that should be noted. The springs are fastened to the AN100-3 thimbes and the hacksaw blade by looping safety wire around the combination two times. Of course, the last loop of the spring should be closed so that the safety wire cannot slip out. With the elevator at neutral position, the CSA8 trim arm should be approximately vertical. The lengths given for the springs are the unstreched lengths and are approximate; once the trim system is installed you may have to stretch, or shorten one or both springs to get the proper trim travel. Without touching the stick, the trim system should be able to trim the elevator within a plus or minus 10 deg. range from neutral. If necessary, favor the down elevator condition slightly.

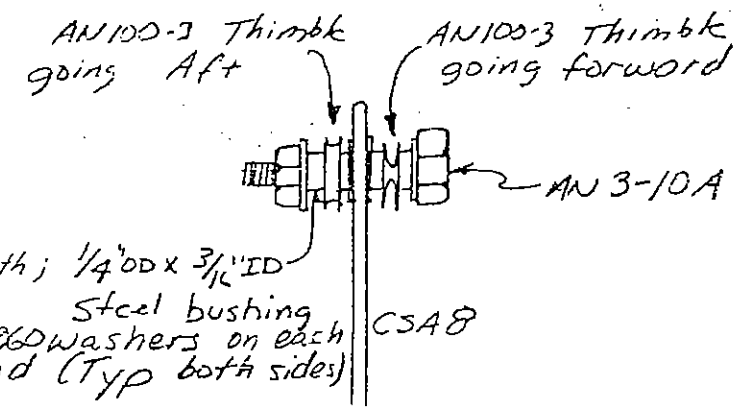
For the trim arm, cut a hacksaw blade from the local hardware store to the correct length. Deepen the notches with a file so that they are at least 1/8" deep. This will mean that you will end up with half as many teeth in order to get the proper depth.

Another piece of hacksaw blade is attached with 5-Min to an orange foam bulkhead, which is mounted at the fwd. end of the fuel tank using 2-BID on each side. A slot in the foam allows the hacksaw blade to rest on the blade attached to the orange foam. To trim the aircraft in pitch, you just lift up and move the hacksaw blade until a different notch rests in the blade attached to the orange foam. Macrame beads from the variety store are attached to the hacksaw blade as a handle. Make sure that throughout the full travel of the trim system, no interference exists with the side console or fuel filler tube.

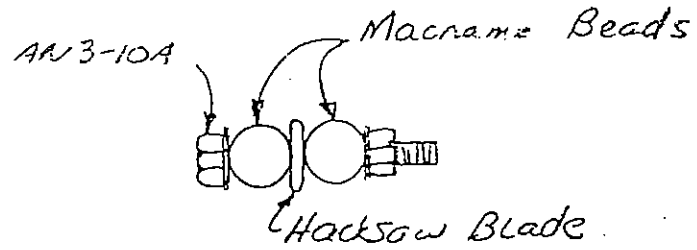
SEE NEXT PAGE FOR SKETCHES AND DETAILS



SECTION A-A

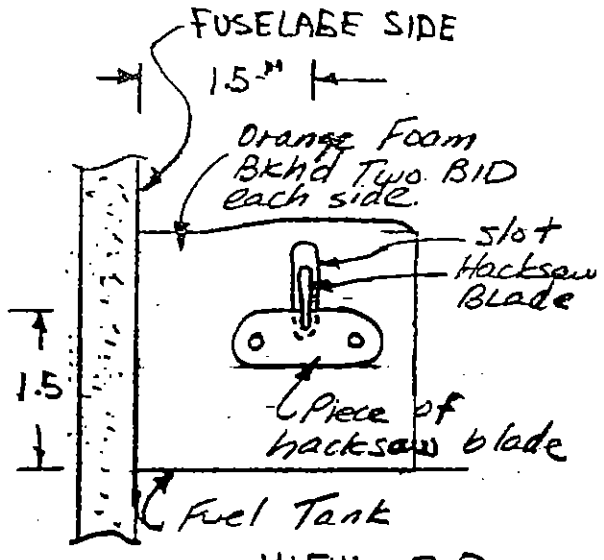


SECTION B-B



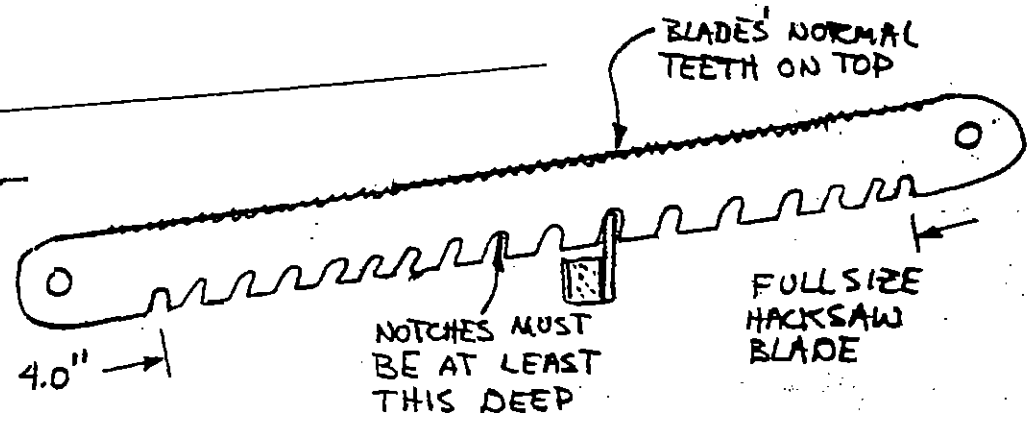
SECTION C-C

PITCH TRIM SYSTEM
(Installed on left side of aircraft)



VIEW D-D

FUEL TANK

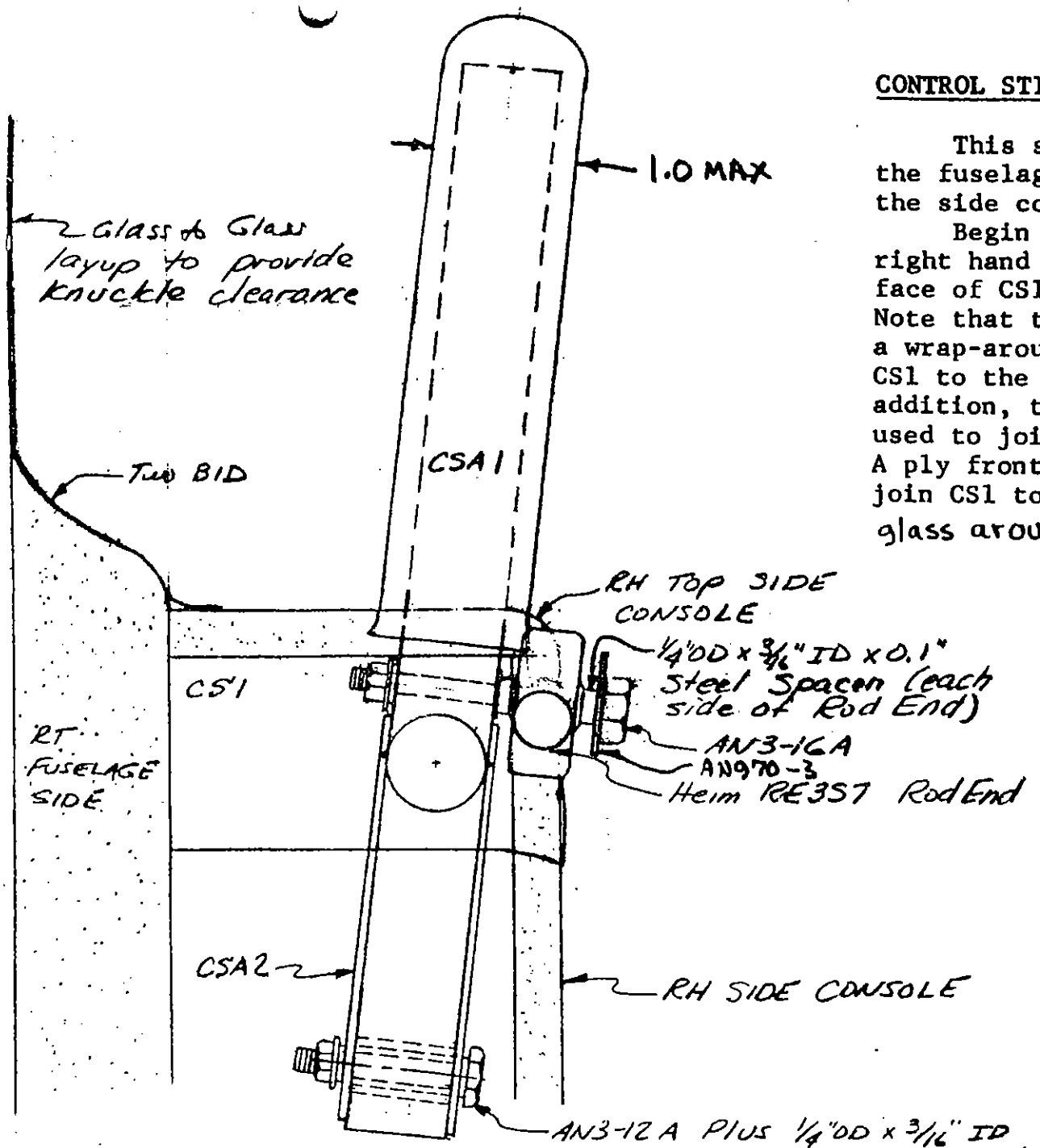


CONTROL STICK INSTALLATION

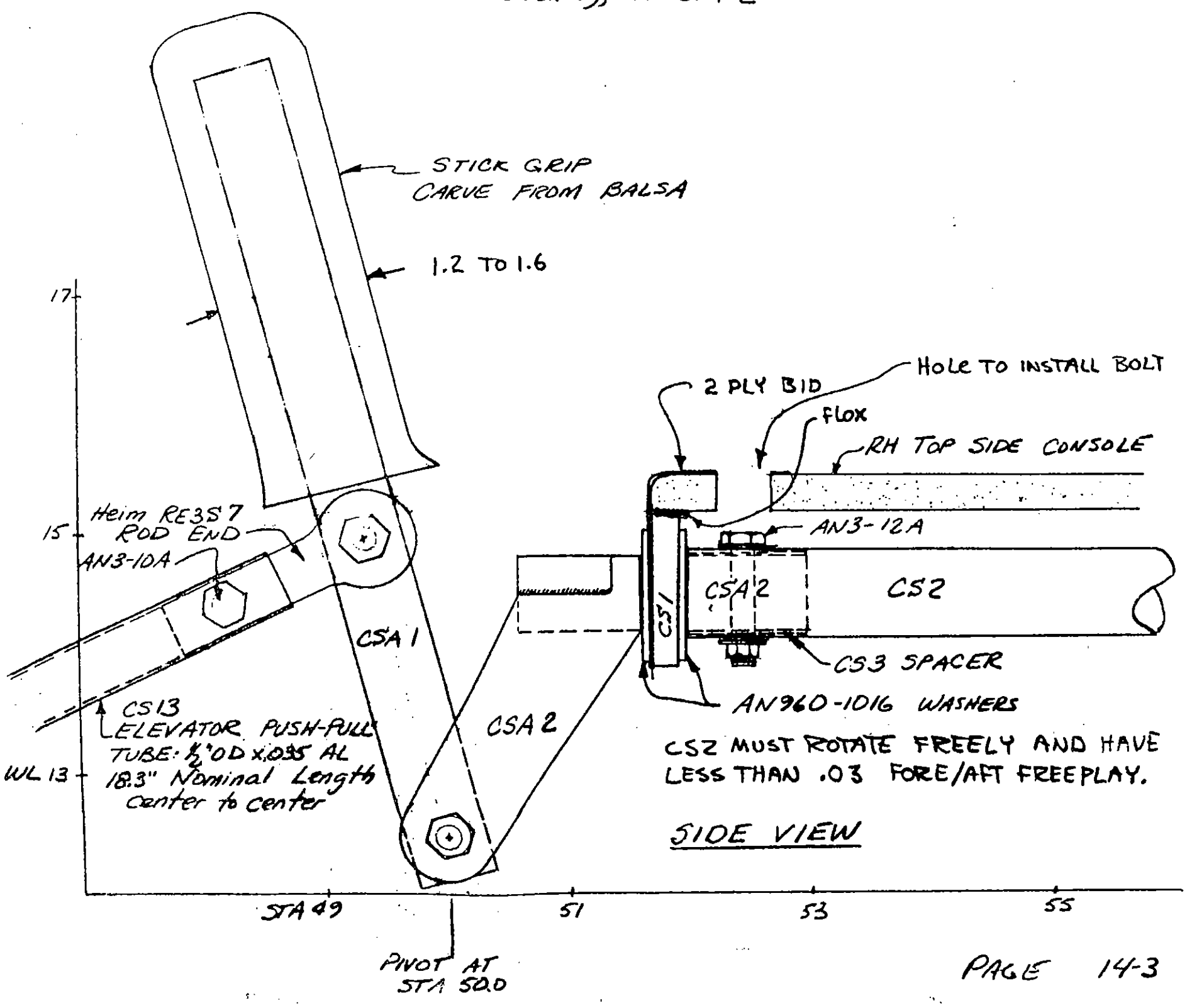
This section is to be done after the fuselage has been assembled and the side consoles installed.

Begin by installing CS1 in the right hand side console. The forward face of CS1 should be at about STA51.7 Note that two plies of BID are used in a wrap-around configuration to attach CS1 to the RH top side console. In addition, the same procedure should be used to join CS1 to the RH side console. A ply front and back should be used to join CS1 to the fuselage side. Trim glass around hole after cure.

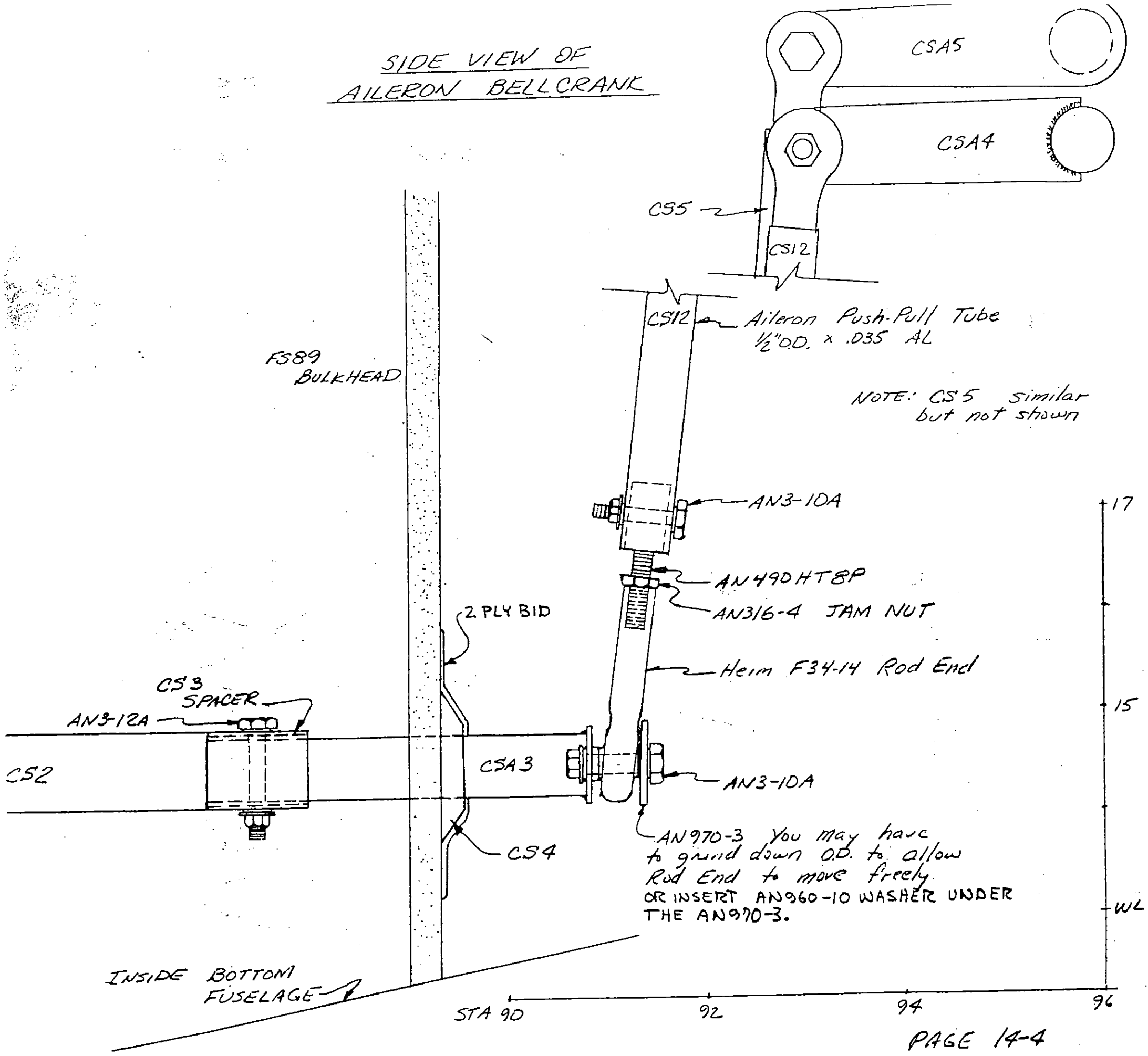
CONTINUED ON NEXT PAGE



VIEW LOOKING AFT



SIDE VIEW



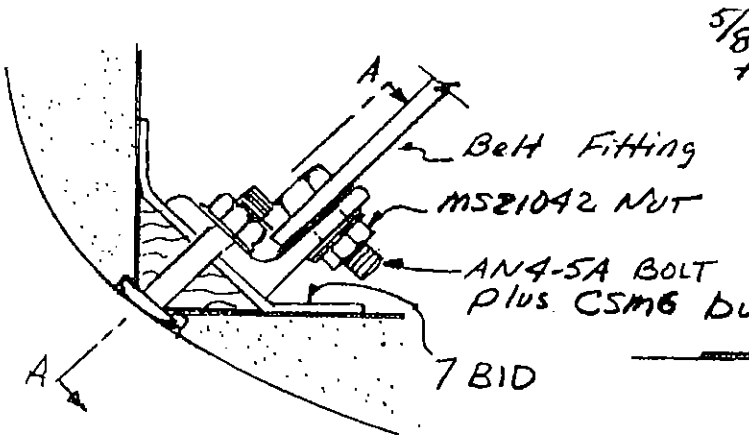
cockpit end, a 1" length of CS3 spacer is used to join it to CSA2. At the aft end, another 1" length of CS3 spacer is used to join CS2 to CSA3.

First, however, you must route CS2 through the fuselage and install CS4 bearing. The center of CS4 should be located at WL14.5, and about 3" inboard of the fuselage side. CSA3 must be able to pivot freely without hitting the fuselage side. Also, you will have to route holes in the seatback bulkhead and the FS89 bulkhead to permit CS2 to pass through without interference. To install CS4, it is best to jig CSA2-CS2-CSA3 together and temporarily 5 minute CS4 in place. Then you can remove them and layup 2 BID over CS4 to attach it to the FS89 bulkhead, remembering to keep epoxy out of the bearing hole.

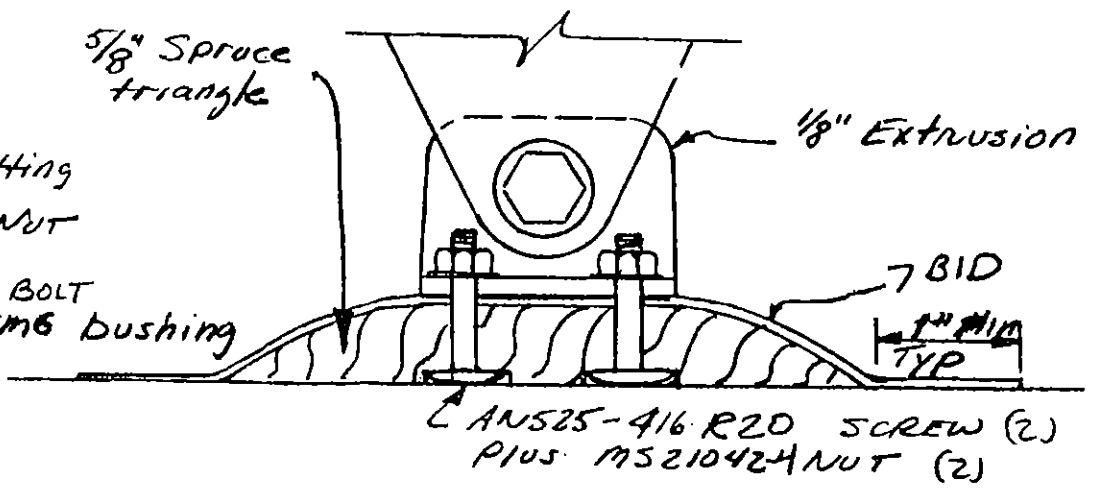
Once CS4 has cured, the rest of the control system can be hooked up as shown. The CS13 elevator pushrod, and the CS5 and CS12 aileron pushrods should not be installed until after the canard and main wing are mounted on the fuselage so that accurate lengths can be measured.

The AN3-12A bolts that go through CS2 deserve some special attention also. Looking at the front view of CSA1, you will notice that it is canted inboard toward the center of the cockpit. Note also that the fuselage side around the stick is carved out to the outside fuselage skin. These two items are necessary to provide hand and knuckle clearance for the pilot to get full right aileron. To set this up properly, sit in the cockpit and move the stick around, marking on the fuselage side where you need additional knuckle clearance. Then, simply grind down to the outside skin in that area and layup two BID as a patch. Of course, remember to keep the contouring smooth and to avoid bumps and joggles. The AN3-12A bolt connecting CS2 and CSA2 should be drilled in now. The AN3-12A bolt that connects CSA3 to CS2 should not be drilled in until the rear wing has been mounted and the aileron system is hooked up. In this fashion, you will be able to orient CSA2 so that you can obtain full right aileron travel at the stick.

The stick grip is carved from balsa wood and mounted to CSA1 with epoxy.

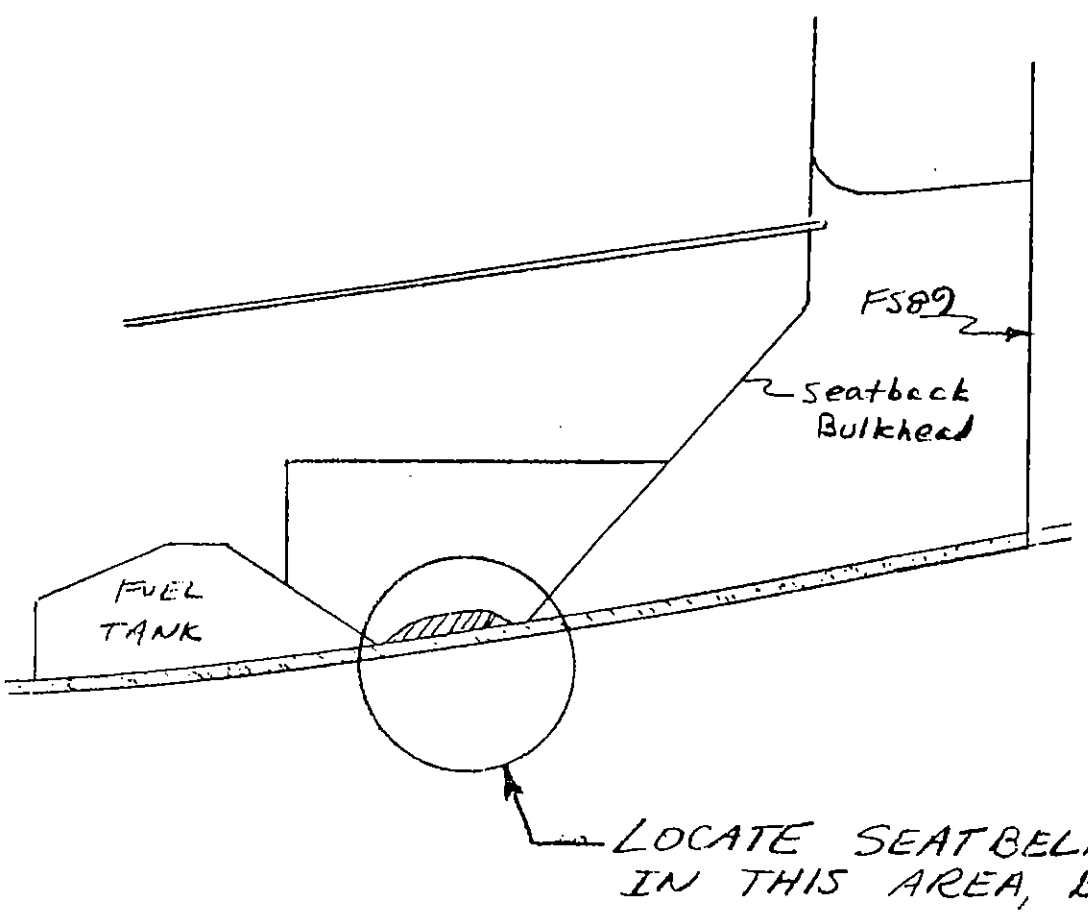


FRONT VIEW



SECTION A-A

SEATBELT ATTACHMENT



Begin by cutting 2 four-inch lengths of the 5/8" triangular spruce piece. These two pieces go on either side of the bottom fuselage corners between the fuel tank and the seatback bulkhead. They must be rounded on both ends so that the glass layup will flow smoothly around the corners. Mount them in place with micro.

Next, you will layup seven plies of BID cloth over the spruce pieces. The cloth must lap up on the fuselage at least one inch everywhere.

While that layup is curing, make the aluminum angle pieces out of the extrusion stock. The hole for the AN4 bolt can be drilled before mounting. The AN525 screw holes must be drilled in place, from the inside of the fuselage out. The drawings show countersinking the AN525 screws on the outside of the fuselage. This is ok, but it does reduce the strength some.

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.

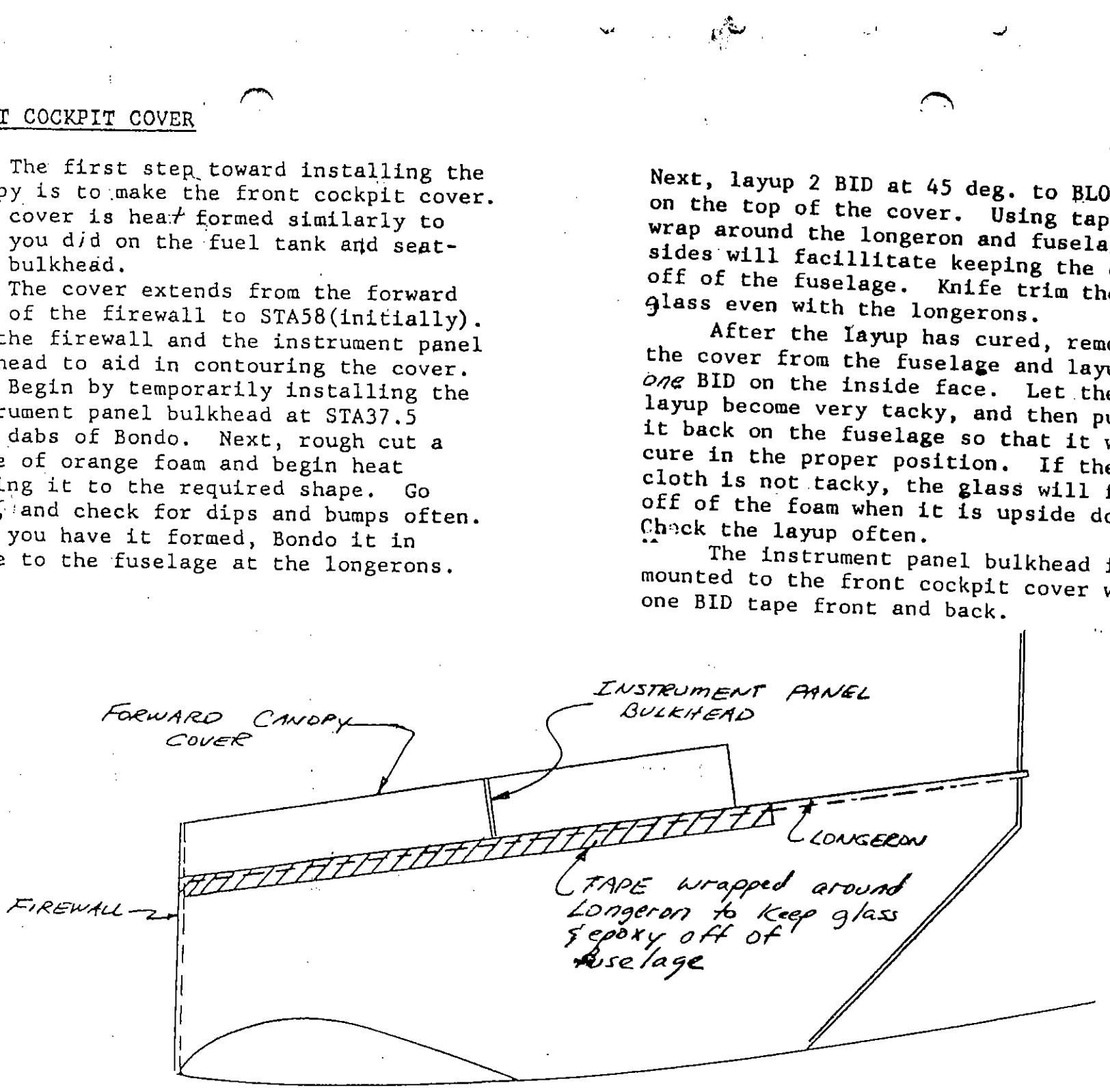
The cover extends from the forward face of the firewall to STA58(initially). Use the firewall and the instrument panel bulkhead to aid in contouring the cover.

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. to BLOO on the top of the cover. Using tape to wrap around the longeron and fuselage sides will facillitate keeping the epoxy off of the fuselage. Knife trim the glass even with the longerons.

After the layup has cured, remove the cover from the fuselage and layup one BID on the inside face. Let the layup become very tacky, and then put it back on the fuselage so that it will cure in the proper position. If the cloth is not tacky, the glass will fall off of the foam when it is upside down. Check the layup often.

The instrument panel bulkhead is mounted to the front cockpit cover with 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.

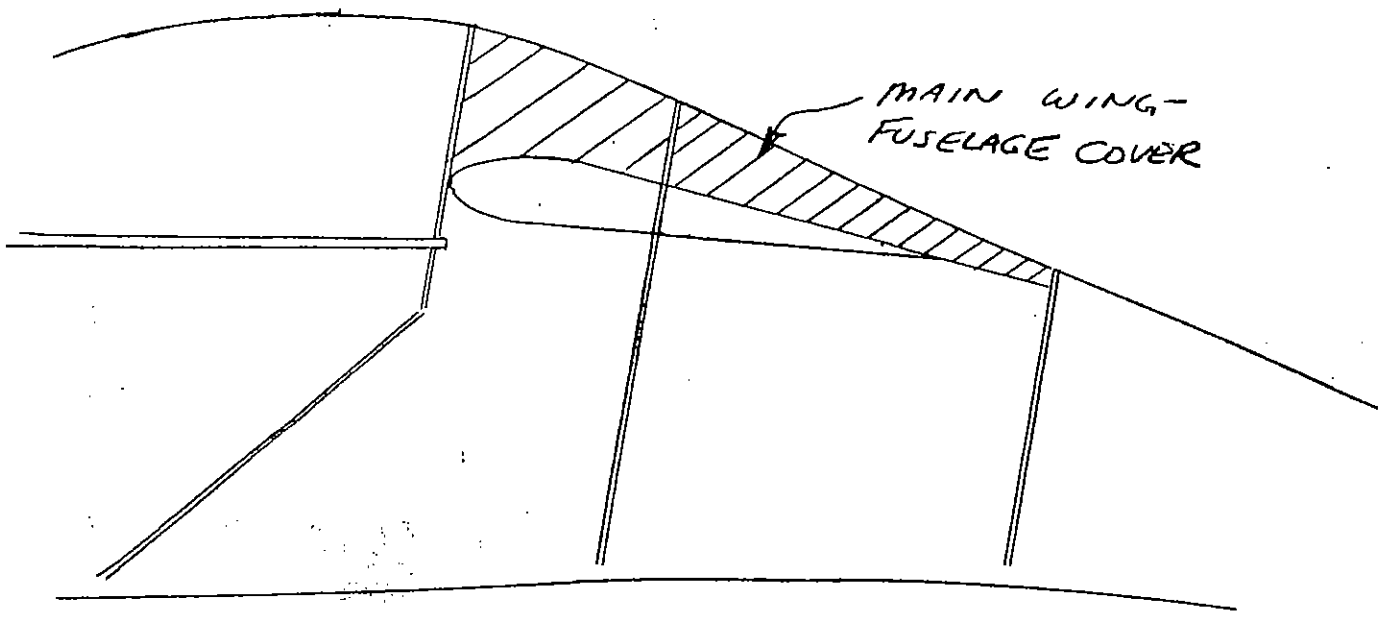
The material used is the orange foam. You will probably find it easier to make the top in two pieces: one piece from the canopy to the FS89 bulkhead, and the second piece from the FS89 bulkhead to the FS110 bulkhead.

The foam must, of course, be heat formed to the desired shape. In some cases, a heat gun may have to be borrowed to supplement hair dryer and electric heater.

The foam is formed using the bulkheads as well as using the contouring of the existing fuselage, in order to come up with a shape that is pleasing.

Once the shape is developed, layup one BID on the inside face of the cover. Let it become tacky, so that it won't fall off if turned over, and then position the wing-fuselage cover on the fuselage. You may either use some Bondo to hold the cover in place, or you may go right ahead and layup one BID over the outside face using a typical 1" overlap. Use dry micro before the layup to fill the voids around the joints.

Make sure that you don't get epoxy on the aileron system.



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)

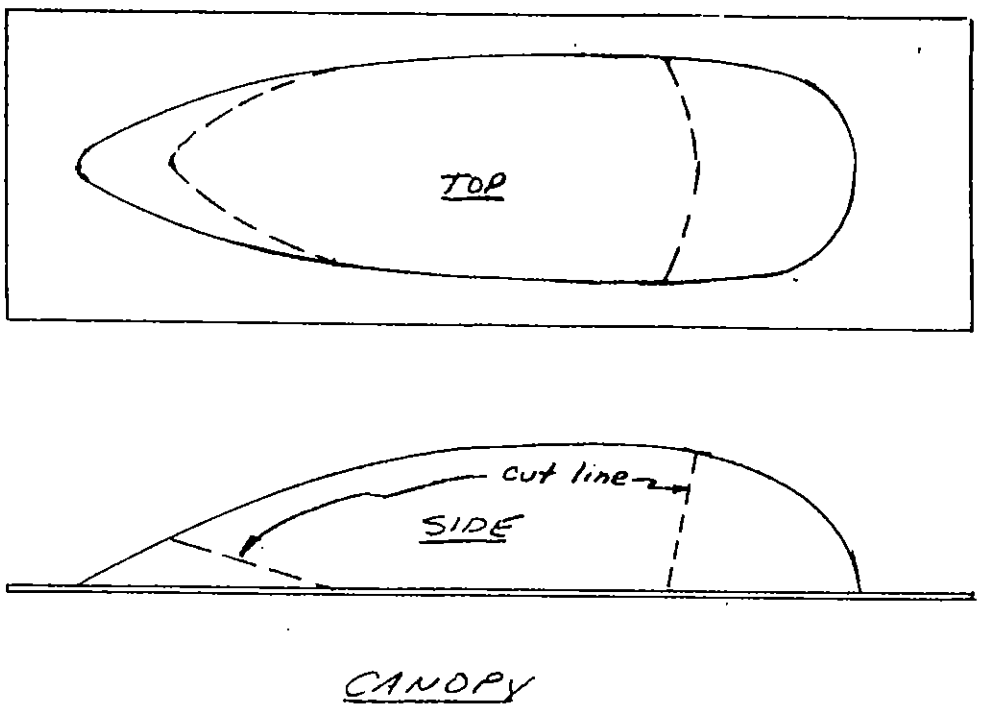
Lay three layers of grey duct tape along each longeron from the seatback bulkhead to the instrument panel bulkhead on the right side, and 4" forward of the aft edge of the forward fuselage cover on the left side.

What you will do next is to jig the Aft Canopy Bulkhead and the two canopy stiffeners in position on the fuselage. You will then do the final fitting and trimming of the canopy on the fuselage, and then permanently mount the canopy to the stiffeners, the Aft Canopy Bulkhead, and the front cockpit cover.

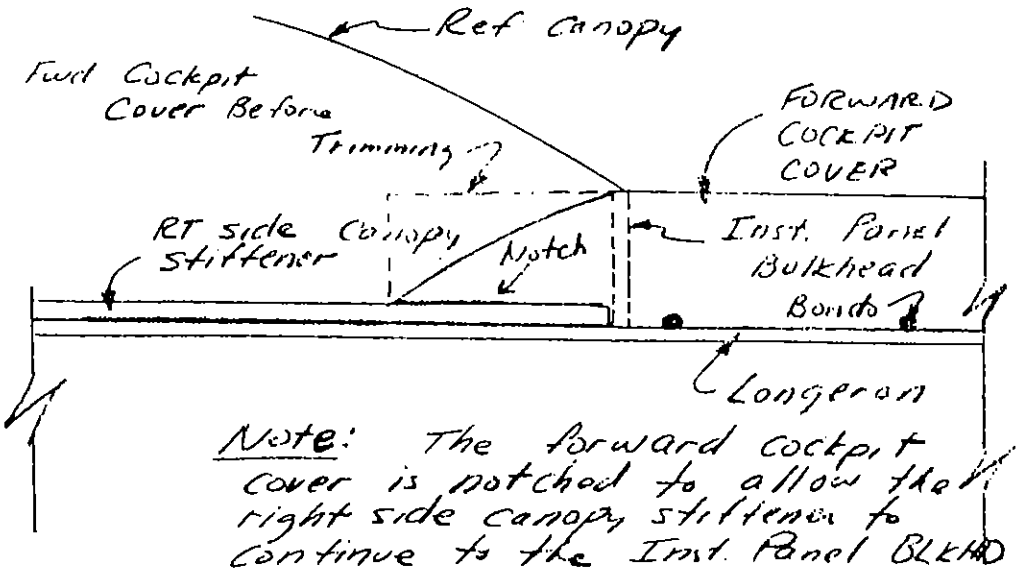
The Aft Canopy Bulkhead is located 0.3" forward of the top of the seatback bulkhead. This is to allow for the later installation of a aft canopy seal. Several foam chips can be used to space the bulkhead out.

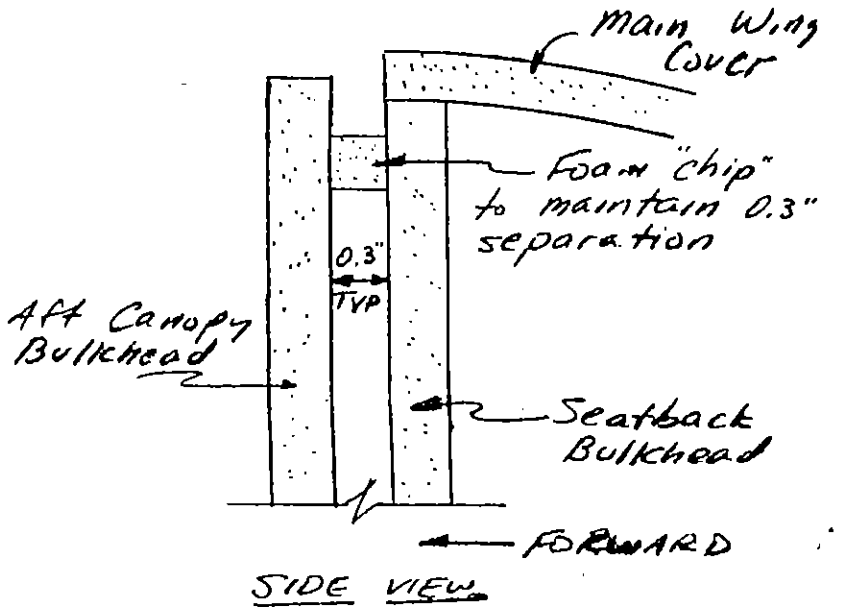
The right side canopy stiffener extends all the way forward to the instrument panel. The left side canopy stiffener extends forward to the rear edge of the forward cockpit cover. These stiffeners rest on the grey tape that you previously place on the longerons. Note that the right side canopy stiffener requires a notch in the forward cockpit cover so that it can pass forward. Use Bondo or five-minute dabs to join the stiffeners to the aft canopy bulkhead and the front cockpit cover.

* For "peel coat", you can use Spraylat "A". you need about 1 qt. - Cowley, Inc. Bldg 170, Mojave Airport, Mojave, CA 93501 805-824-2368



CANOPY





SIDE VIEW

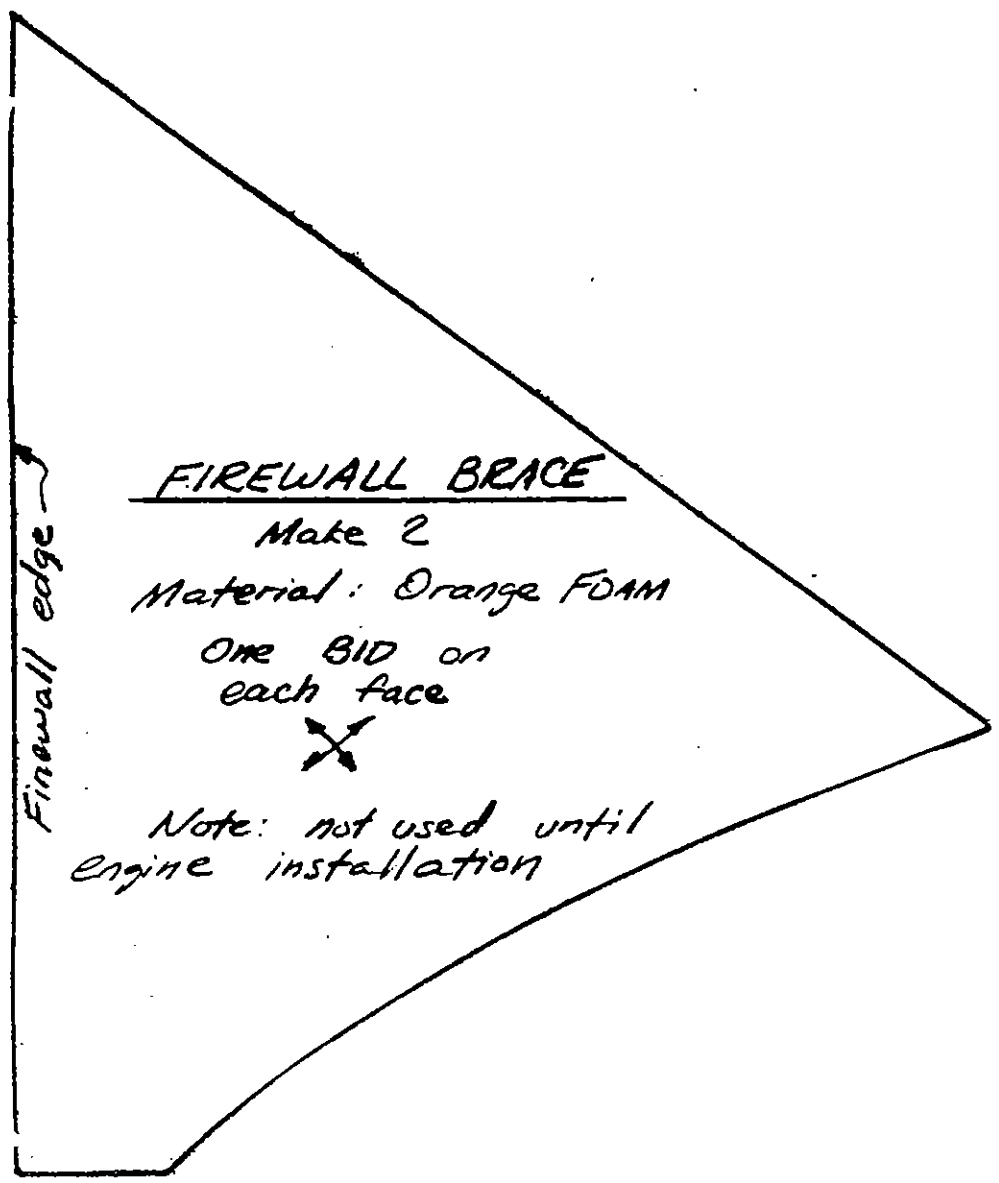
FIREWALL BRACE

Make 2

Material: Orange FOAM

One BID on each face

Note: not used until engine installation

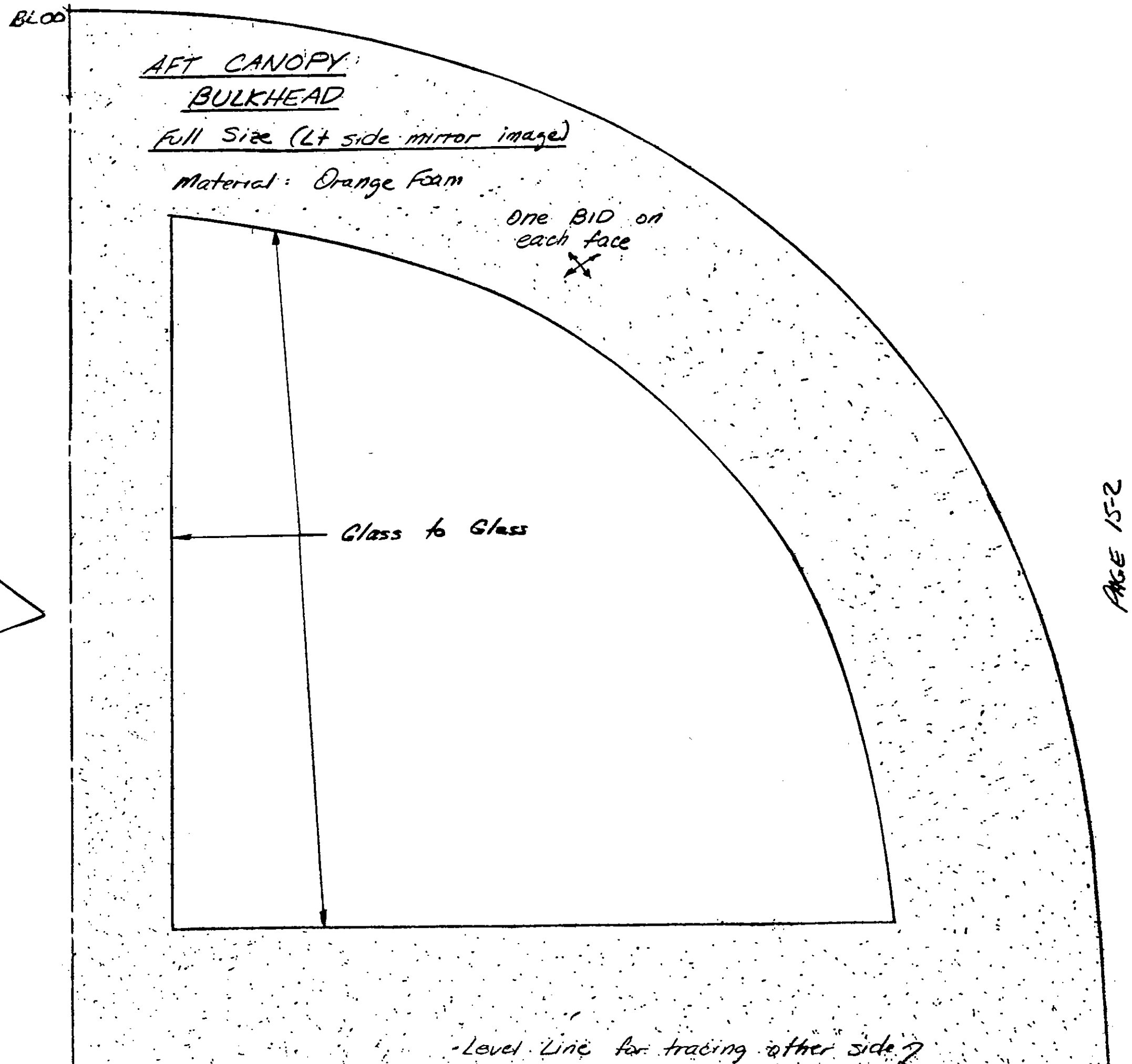


AFT CANOPY BULKHEAD

Full Size (Lt side mirror image)

Material: Orange Foam

One BID on each face



FORWARD CANOPY SEAL

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

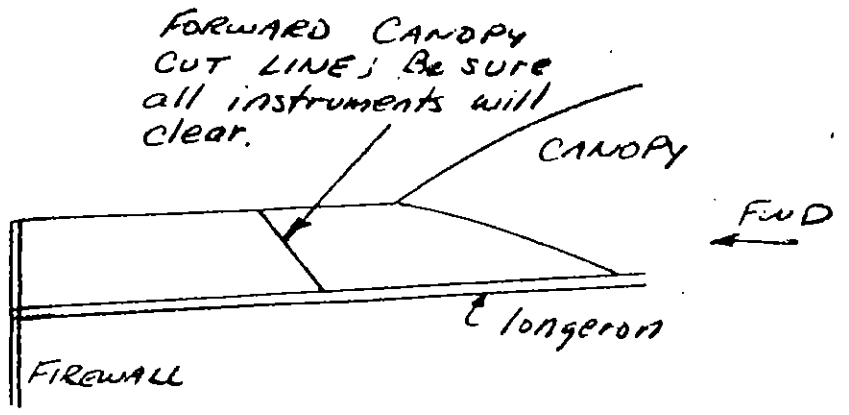
The forward cockpit cover is cut so that the canopy can swing open after the front part of the forward cockpit cover has been glassed to the aircraft. Included in this section are the details for making a seal for this joint to minimize air leaks.

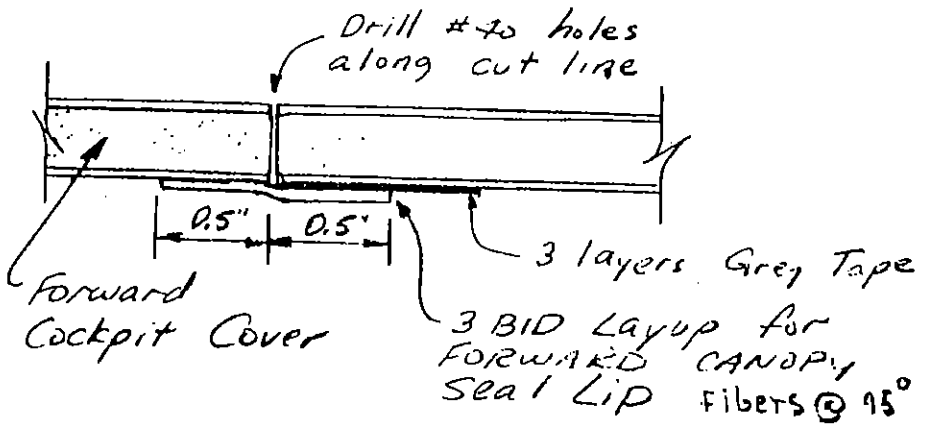
Begin by deciding where to cut the forward cockpit cover. To do this, trial fit the instruments and note how far forward they project, including the pitot static tubing(see Chapter 16). Since the instruments remain with the canopy as it is opened, you must make sure that they will clear the front(fixed) 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.

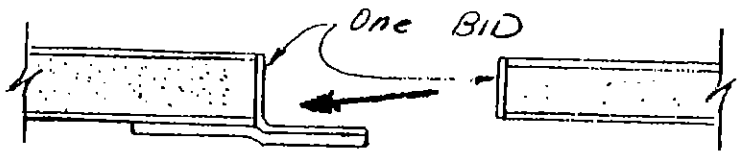
Next, drill several #40 holes along the cut line so that it may be redrawn on the inside face. Then layup grey tape as shown. Finally, layup a three BID lip, as shown, on the inside face of the forward cockpit cover. Let it cure for a day.

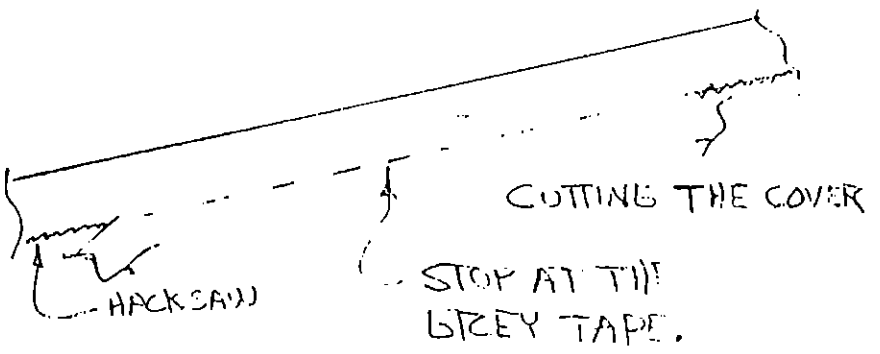
Now you can go ahead and carefully cut the forward cockpit cover along the cut line, being careful not to cut through the lip. *Use a hacksaw.*

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.









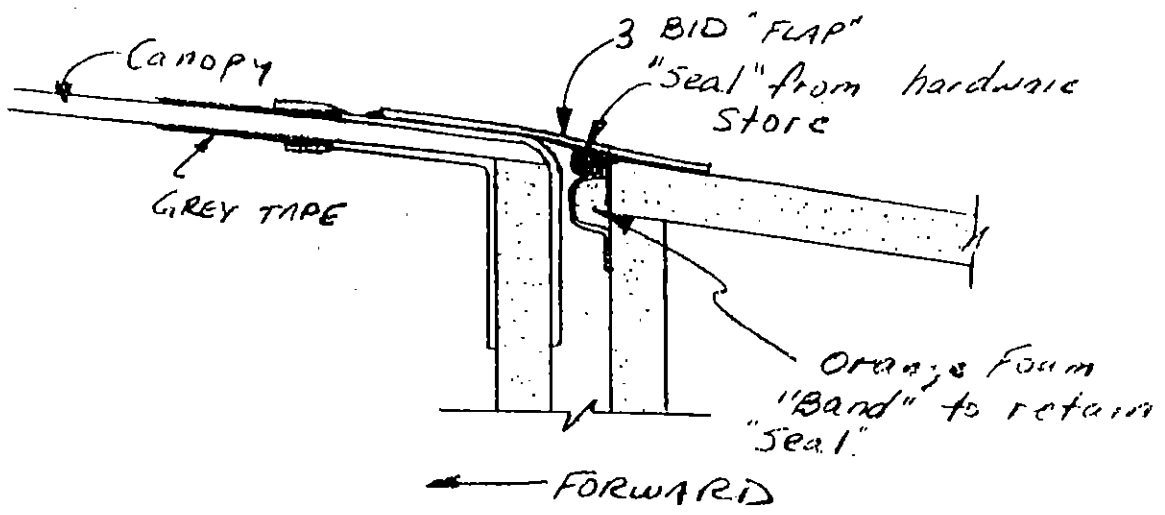
AFT CANOPY SEAL

The aft canopy seal prevents air leakage into the cockpit.

The three BID flap can be laid up on the aircraft using Siran wrap on the seatback bulkhead to keep the glass from sticking.

The orange foam band retains the seal that you obtain from any hardware store. The foam can be glassed or just painted with epoxy.

The flap alone will prevent most of the air leakage.



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.

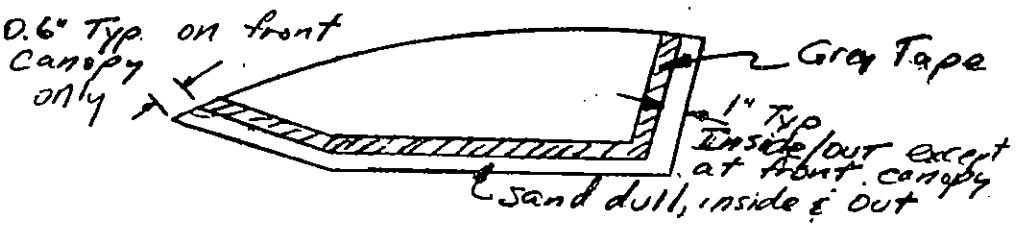
If the main wing cover has already been made, you might set that in place to judge the canopy height at the aft canopy bulkhead; if not, just remember that the cover is about .33" thick.

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.

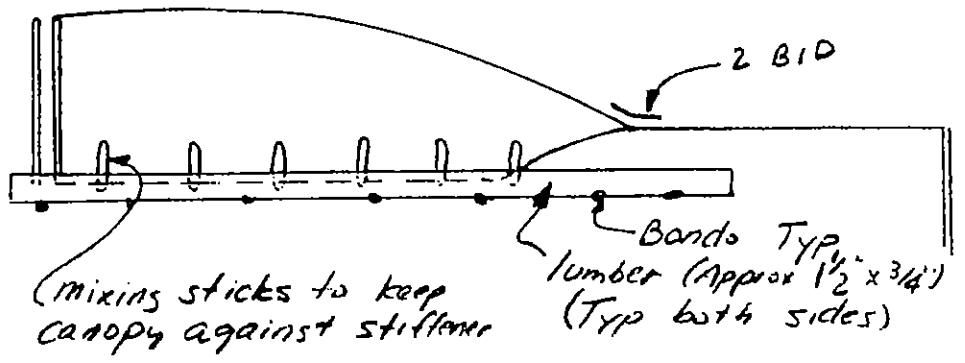
After you have established the final canopy trim line, place a layer of grey tape as shown, inside and out. This grey tape will help control the glass layup that you will be doing on the canopy. You won't have to worry about the layup portion on the grey tape. Next, sand the plexiglass dull inside and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

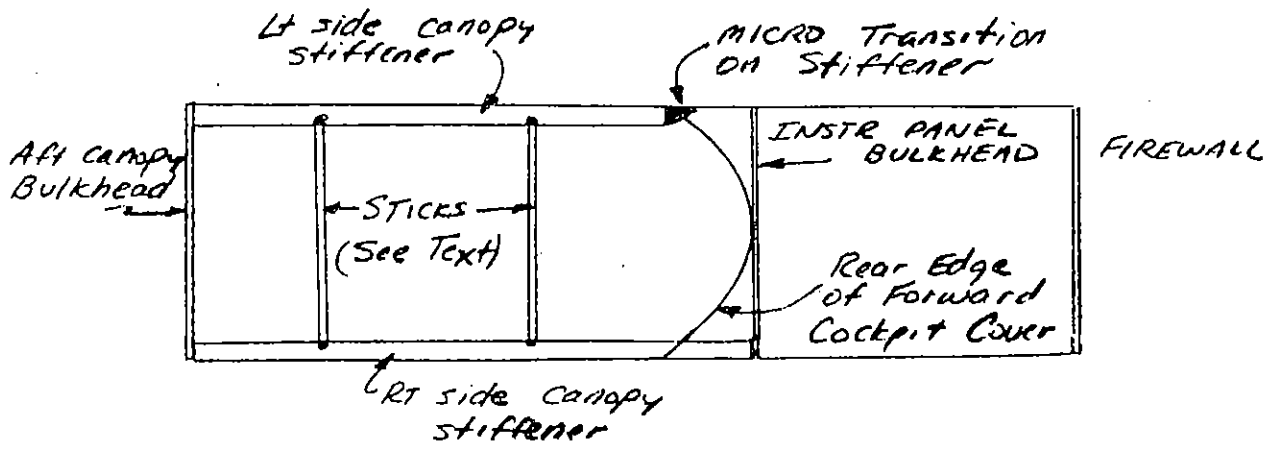
Next, Bondo a board(nominally 1-1/2" by 3/4") to each side such that by wedging mixing sticks in between the board and the canopy, the canopy will be positioned against the stiffeners.



GREY TAPE LAYOUT
(used to control glass layup on canopy)

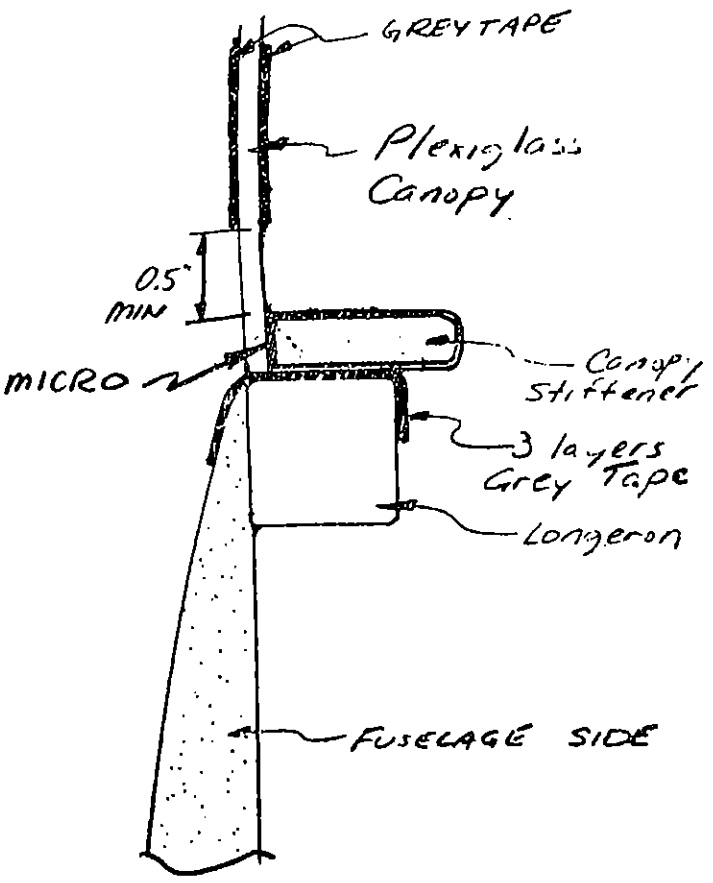


SIDE VIEW



TOP VIEW

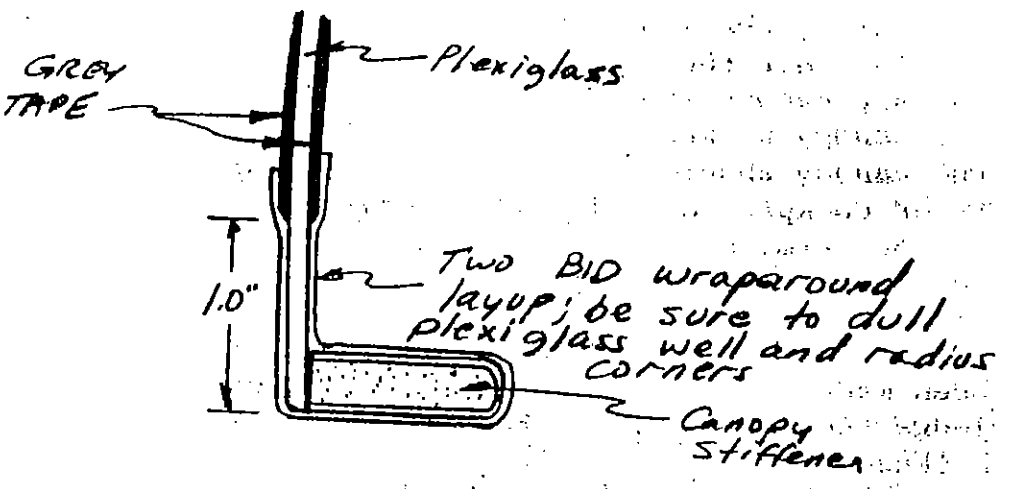
You will want to join the canopy to the stiffeners and the aft canopy bulkhead with micro. After fitting the canopy dry, you can mix up the micro, spread it on the stiffeners and bulkheads, and use the mixing sticks to force the plexiglass against the bulkhead and the stiffeners to get a good bond. Let the combination cure overnight. The purpose of this whole exercise is to secure the canopy to the frame so that when the whole works is removed, the alignment will not change.

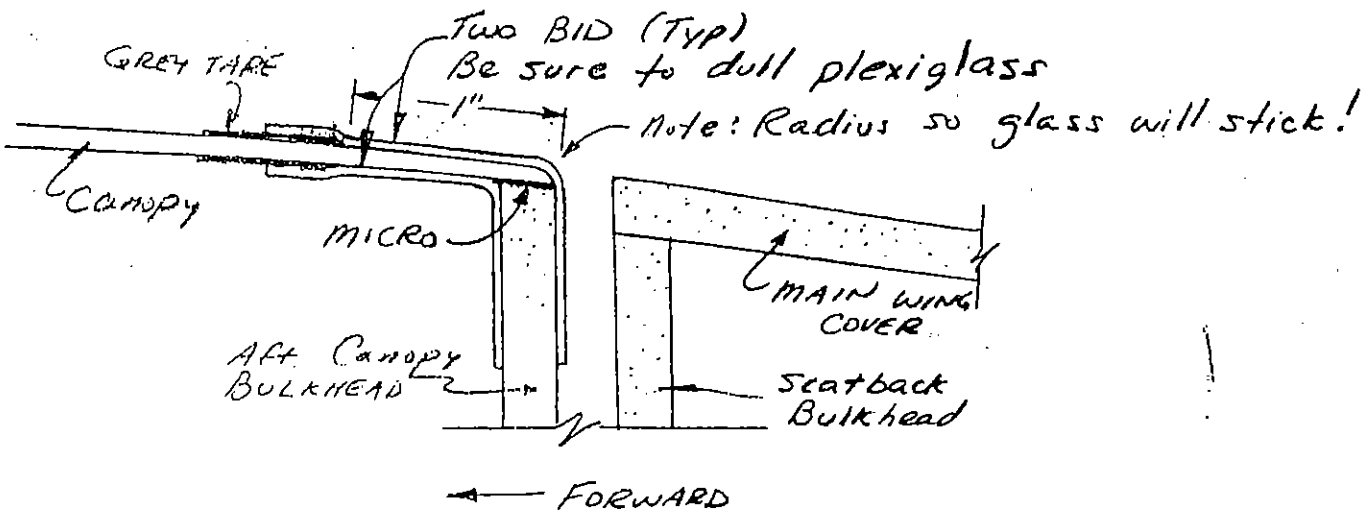


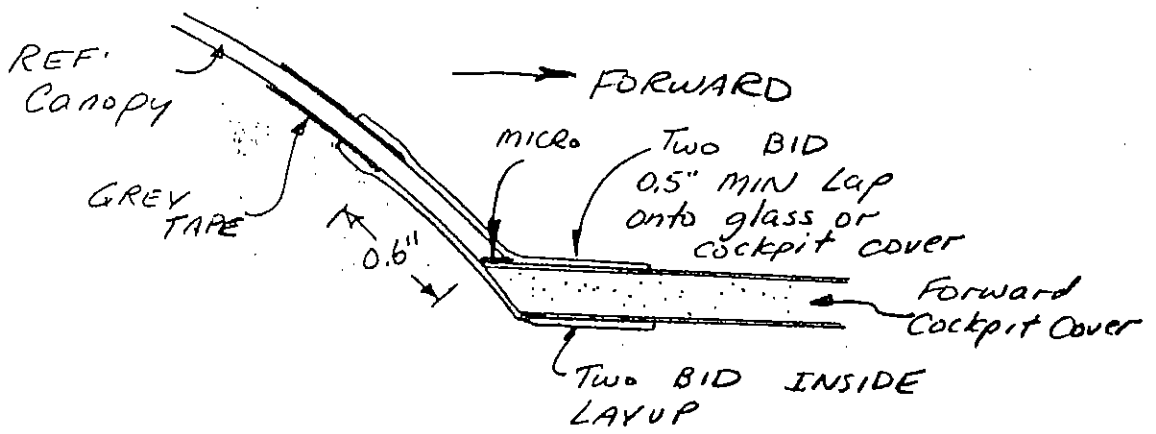
After the layup has cured for one day, remove the lumber, break the bondo joints, and remove the canopy-forward cockpit cover assembly.

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.

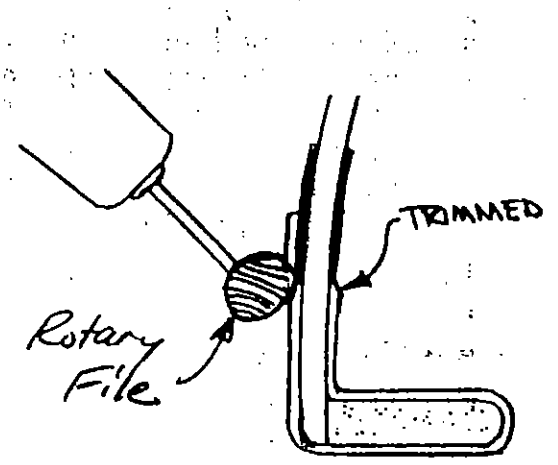




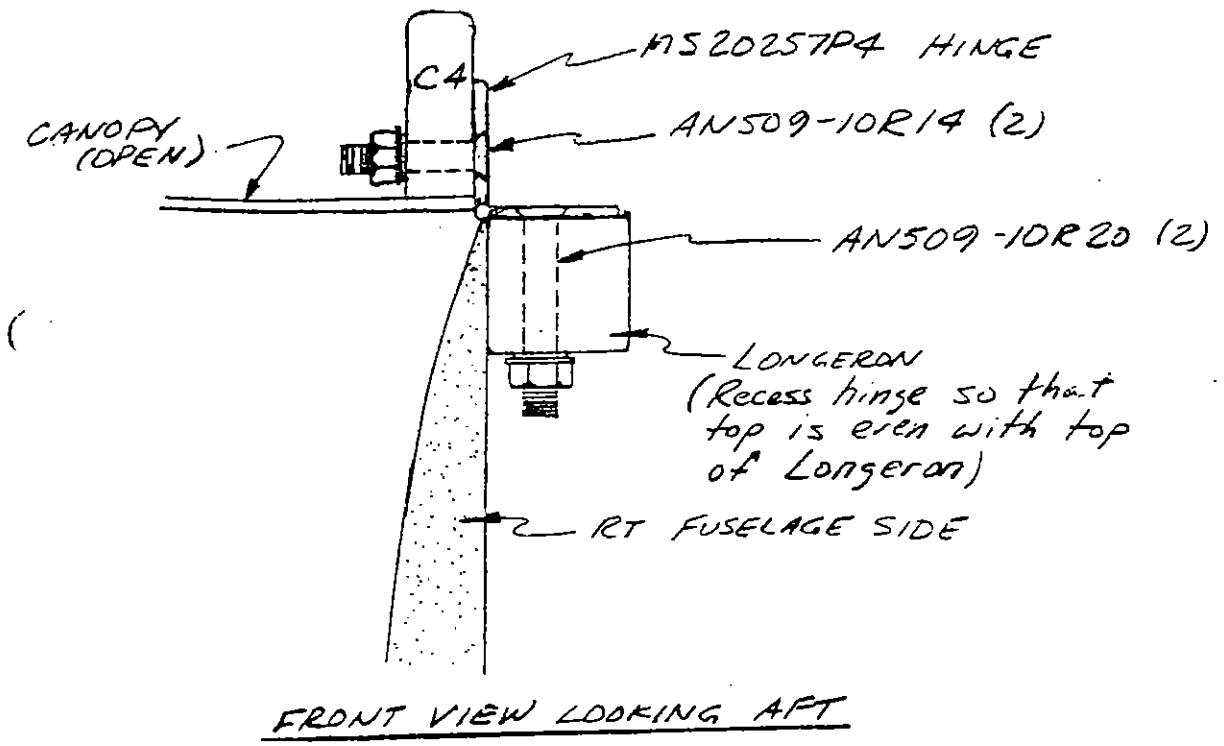


TYPICAL SECTION SHOWING FORWARD CANOPY ATTACHMENT TO THE FORWARD COCKPIT COVER

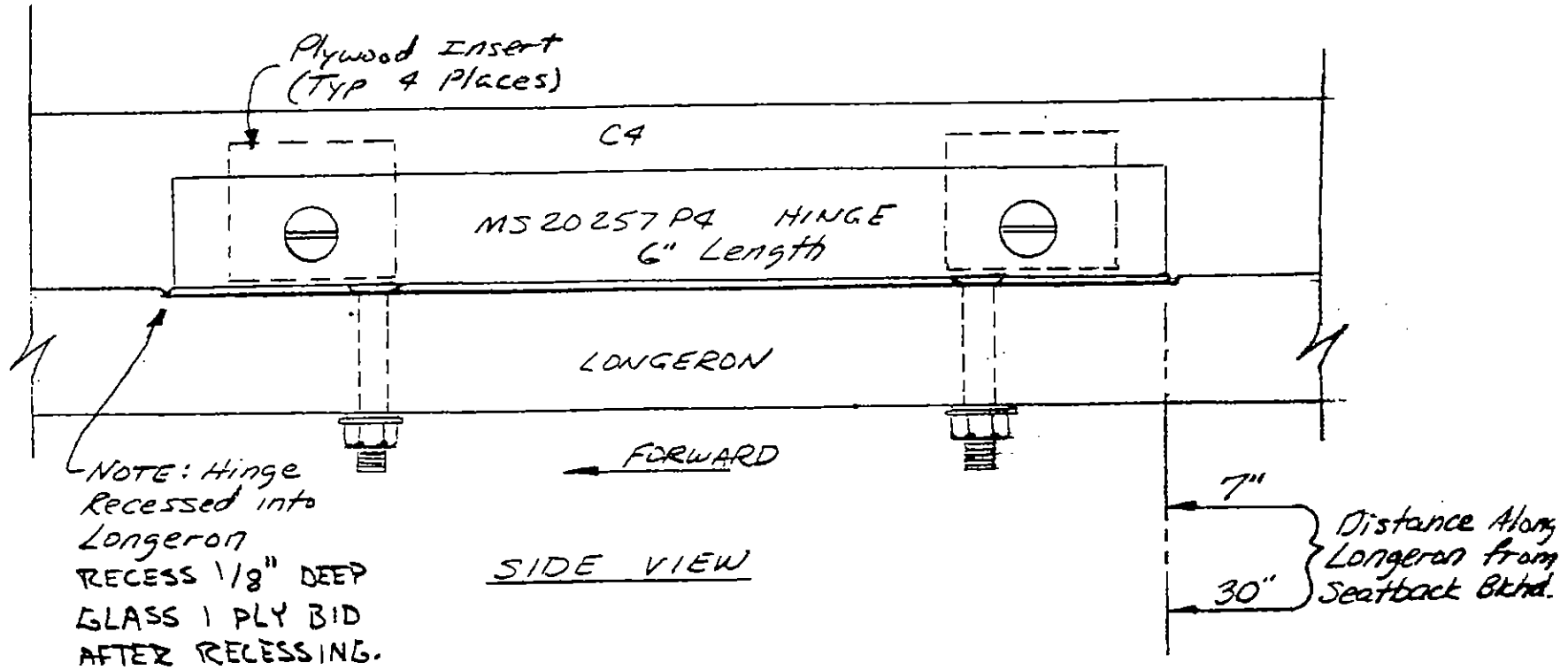
Trimming the glass layups that overlap the grey tape is best done with the rotary file attachment and the Dremel. If you don't have a Dremel, you can buy a rotary file attachment for your 1/4" drill. In any case, be very carefull that you don't nick the glass while removing the excess layup. A nick in the plexiglass could very easily cause a crack to develop. Use the bottom edge of the grey tape as the trim line.



TRIMMING THE GLASS



FRONT VIEW LOOKING AFT



SIDE VIEW

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.

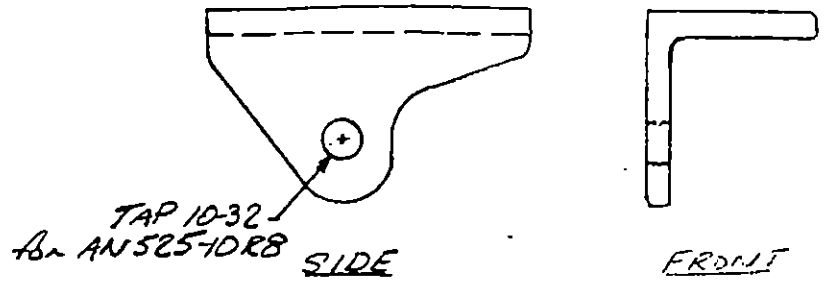
Install C1 as shown. Next, take the C3 part, a batch of Bondo, climb into the cockpit, close the canopy, and position C3 on the left canopy stiffener to match the position of C1, as shown. Hold the C3 in place until the Bondo hardens, then gently open the canopy and drill in C3. Depending on the location 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).

The canopy latch is very important. If closing the latch does not clamp the canopy down securely, you run the risk of possibly loosing the canopy in flight. Take your time and be careful.

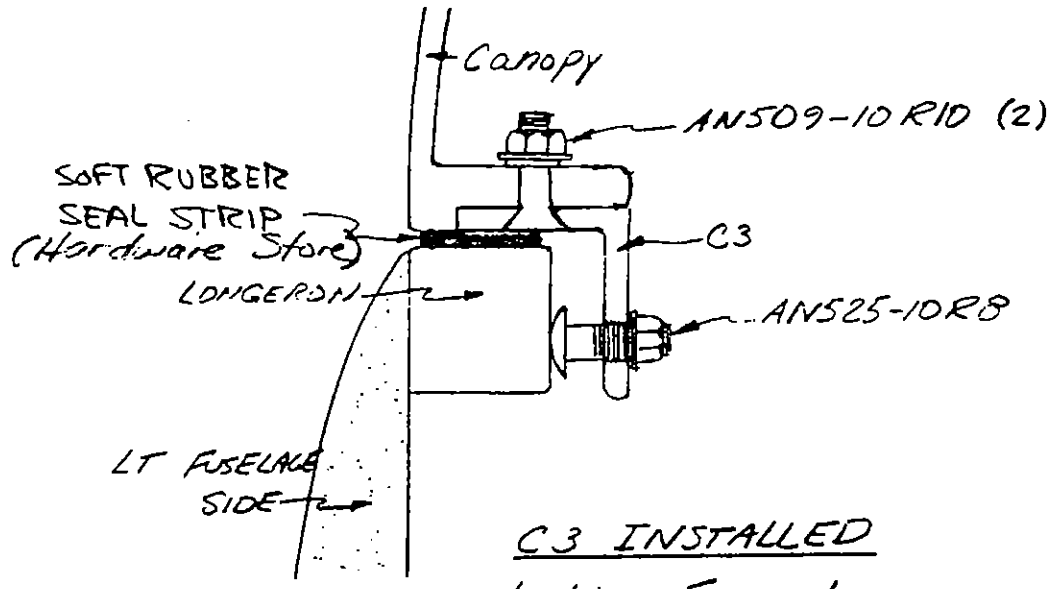
Adjust the latch so that it snubs the rubber seal when engaged. The handle must be forced up and in to engage C2 (latch and handle rigged to preload toward each other). Thus, it is impossible to inadvertently open the canopy by bumping the handle. If you omit the rubber seal, the canopy can rattle and wear the engaging surface of C1.

See next page for Canopy Latch Details

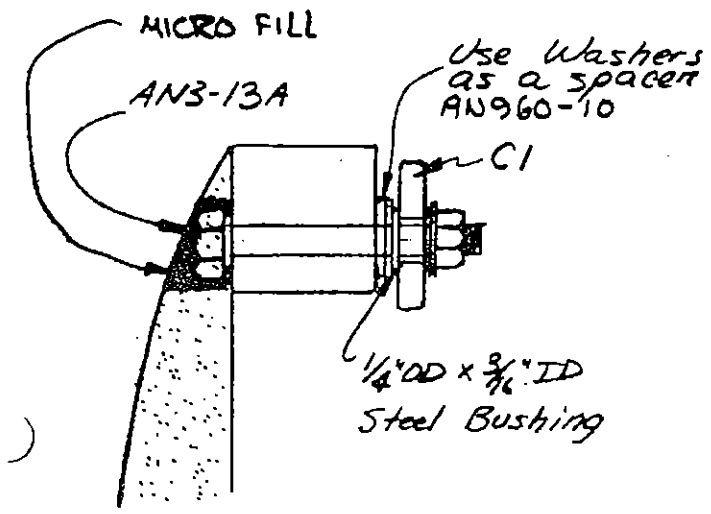


C3
LATCH

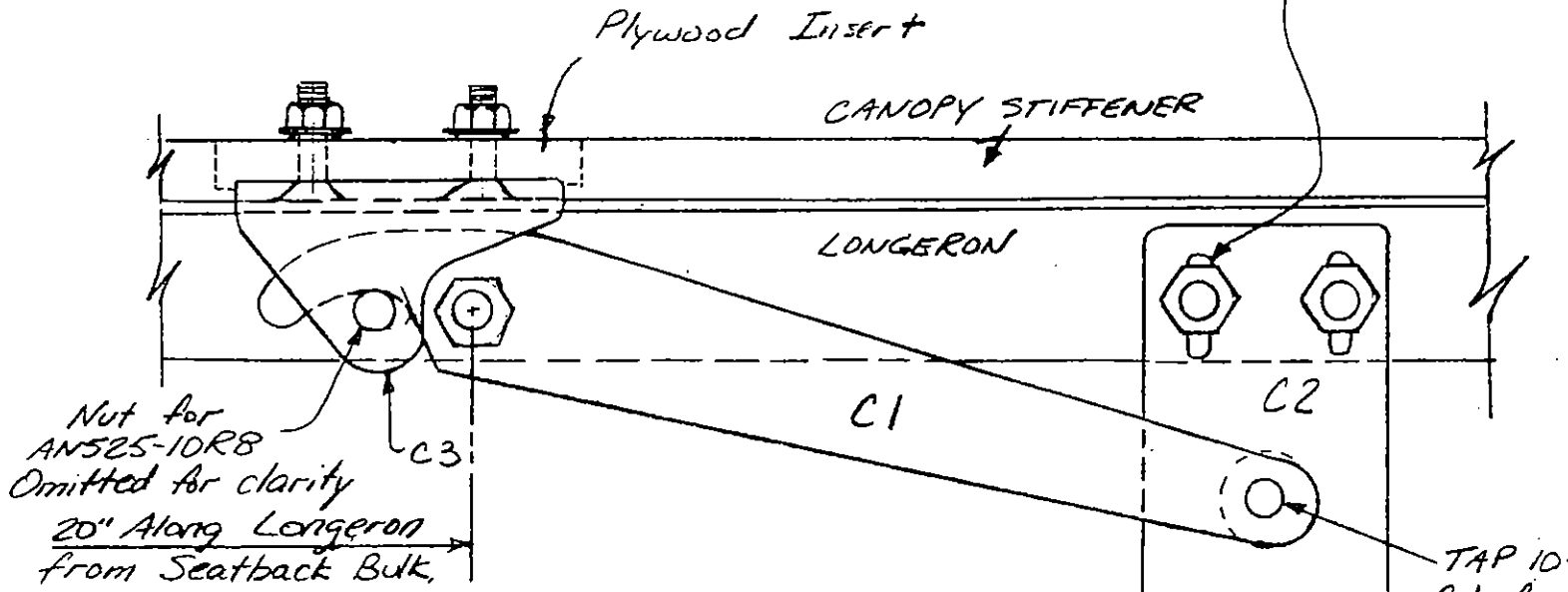
1½" x 2" x 0.125" AL angle



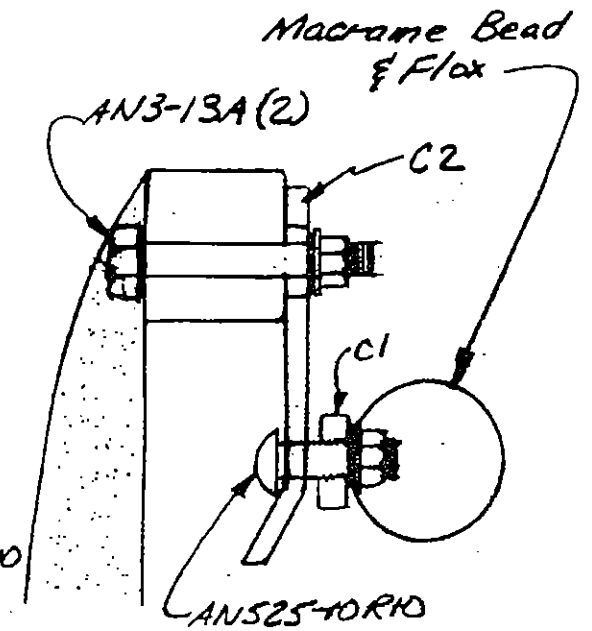
C3 INSTALLED
Looking Forward



C1 INSTALLATION
Looking Forward



MOUNTING DETAIL
LT FUSELAGE



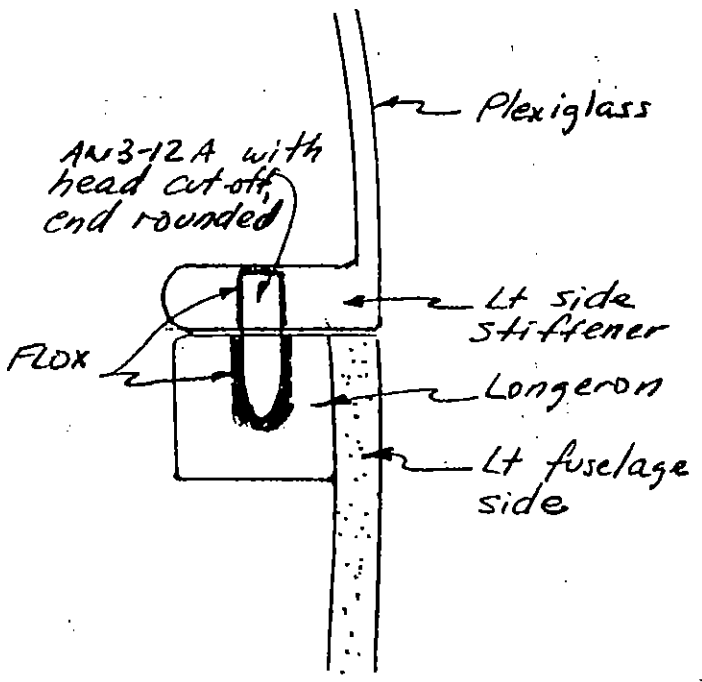
C2 INSTALLATION
Looking Forward

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 DETAIL
Typ front & back

INSTALLING THE FORWARD COCKPIT COVER

Once the canopy has been installed on the aircraft, the forward cockpit cover which is not part of the canopy frame can be permanently attached to the fuselage. Use two BID tapes on each side and two BID tapes at the firewall. It is necessary only to do this on the outside of the fuselage.

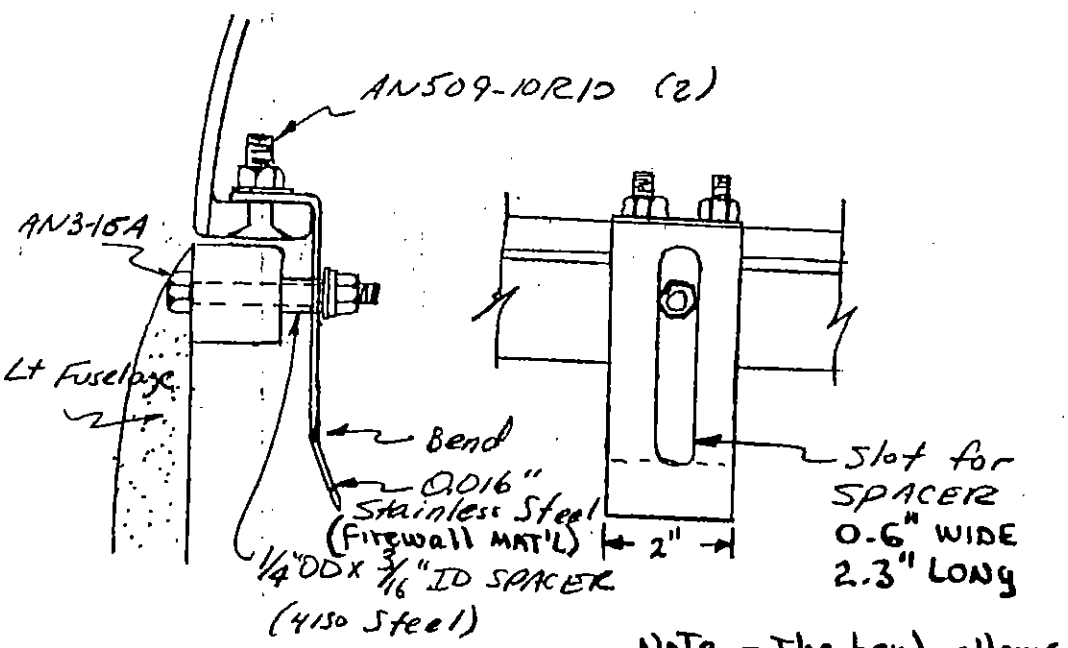
SECONDARY CANOPY LATCH

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 prior to glassing at 27" forward of the aft end of the stiffener. This location is in front of the canopy latch and should not interfere with its movement.



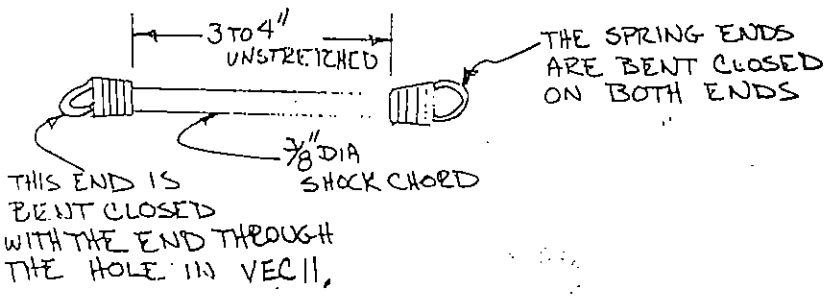
LOOKING FWD

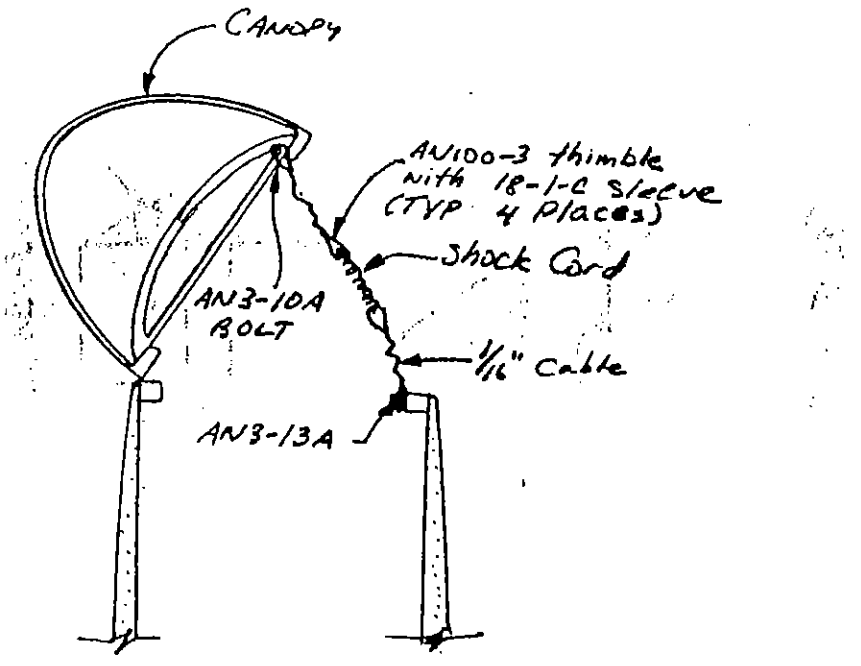
NOTE - The bend allows the latch TO SNAP OVER The Bolt during canopy closing.

SIDE VIEW

CANOPY RETENTION CABLE

In order to retain the canopy in the open position, as well as to prevent damage to it if the wind catches it and throws it open while taxiing, a canopy retention cable and piece of shock cord is used. The sketches show you how to install it. The cable is attached to the longeron and the instrument panel bulkhead. The cable should be long enough so that the canopy can open far enough so that it will stay open with tension against the shock cord. (canopy almost 90°).





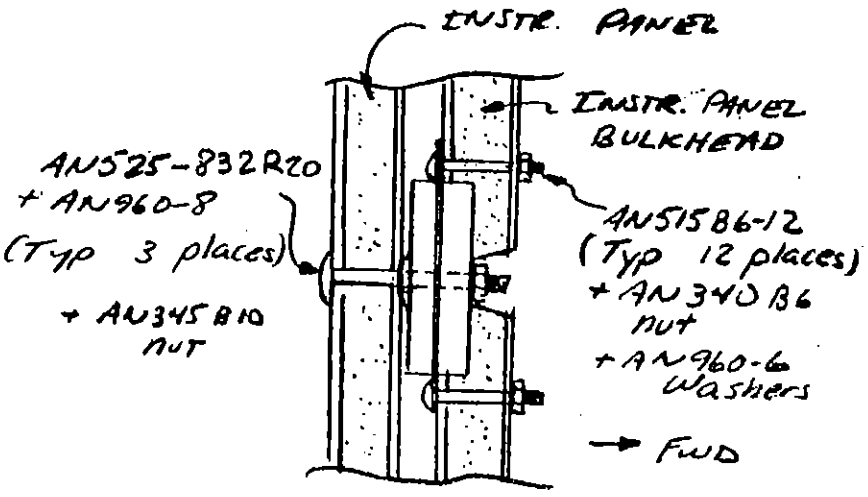
INSTRUMENT PANEL

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.



100PM6 INSTALLATION

PITOT-STATIC SYSTEM

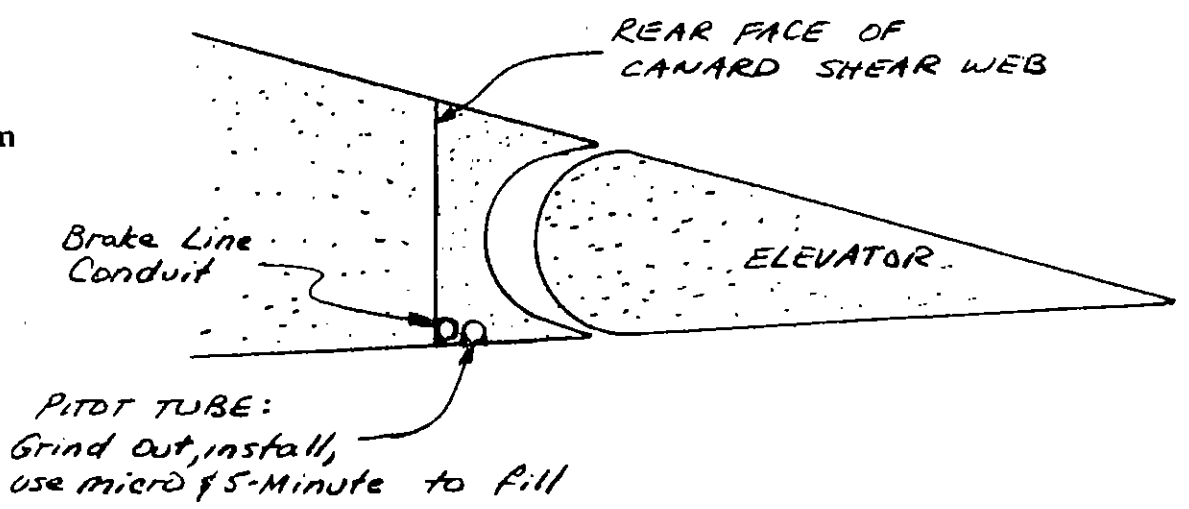
The pitot-static system consists of a cockpit static source and a pitot tube mounted on the right wing.

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 for the pitot tube and route it to inside the fuselage from that point.

Then use the Poly-Flo Polyethylene tubing(3/8" OD x .062") to run inside the fuselage up to the elbow fitting (710-153) on the airspeed indicator. Use hose clamp (0750-004) at the junction of the aluminum tube and the Poly-Flo tube. Safety wire may be used at the elbow junction to prevent leaks. To do this, wrap the safety wire around the junction at least three times and then twist the ends with a pair of pliers so that the loops tighten up around the tubing.

As a check of your pitot system, have one individual watch the airspeed indicator while you blow into the pitot tube and then hold your finger over the end. If the airspeed indicator returns to 0 quickly, then there is a leak somewhere in the pitot static system. If this is the case, recheck all connections and retest until you are able to pass the test procedure.



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.

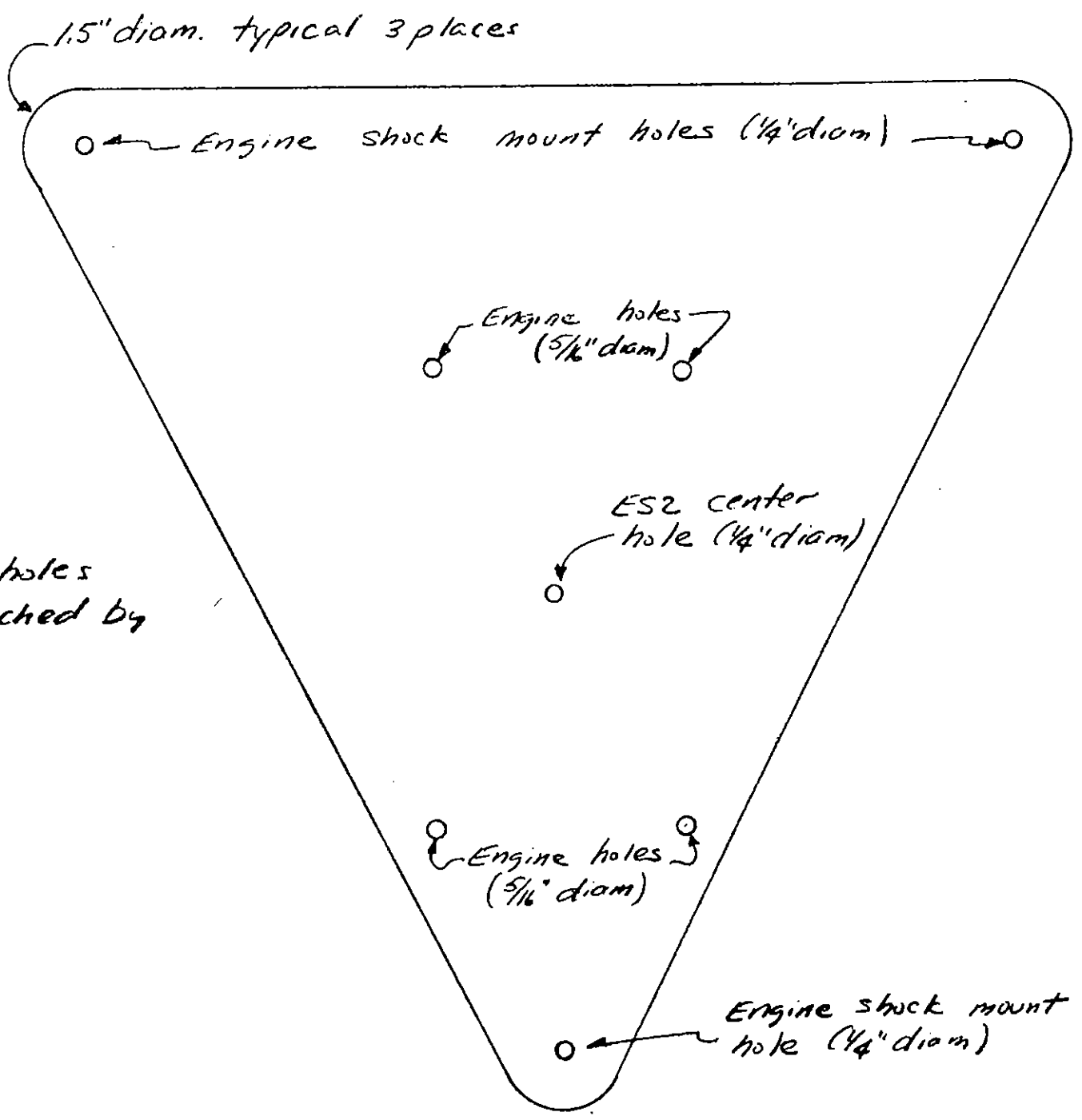
First, lay out the center hole of 5.9" diameter with a pair of dividers using the centerpunch mark provided. Do no cut this hole out at this time.

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.



ES2

1/4" thick Aluminum

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.

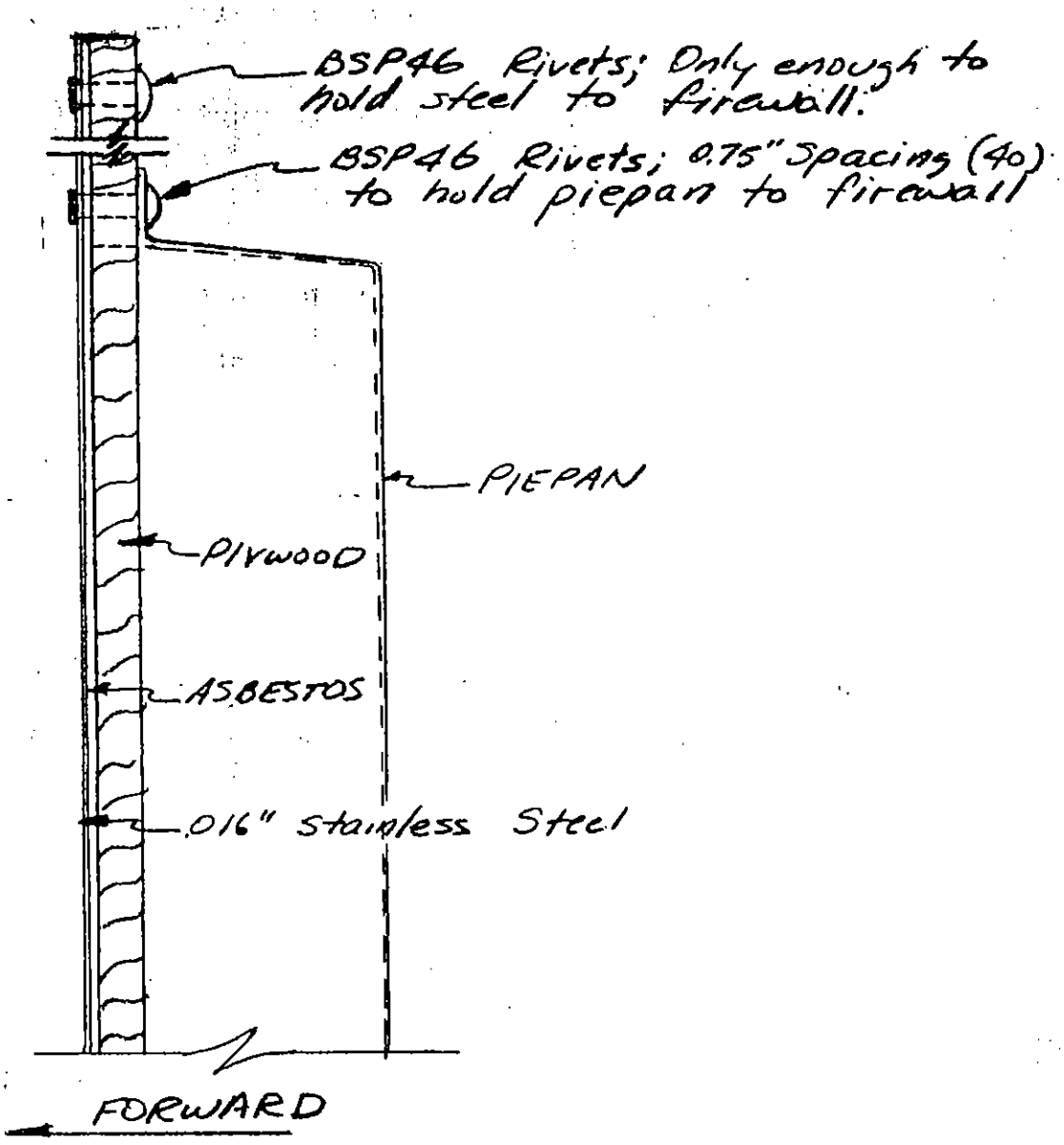
Next, do the same thing with the asbestos material.

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.

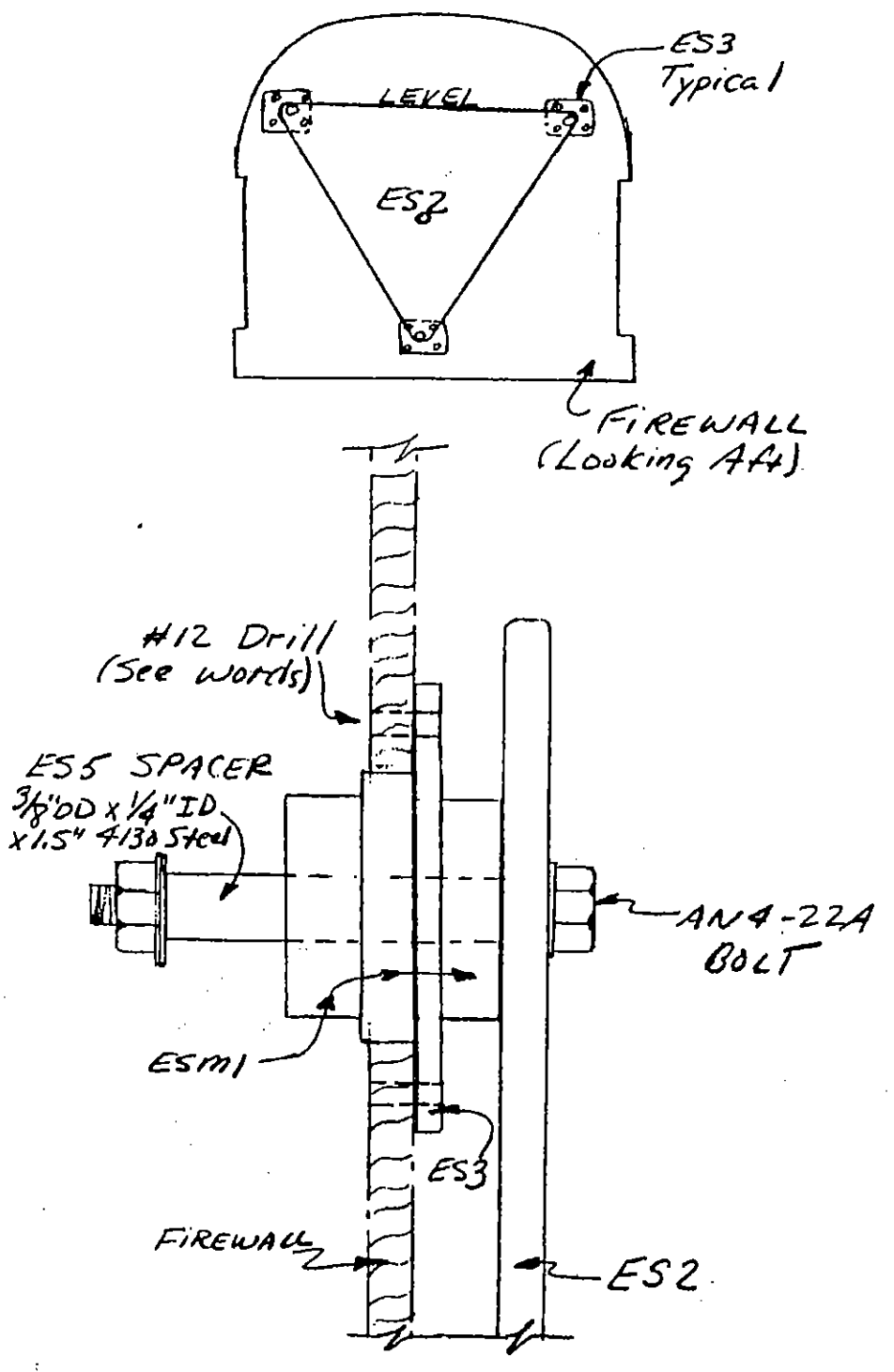
Begin by leveling the fuselage across the canopy rails so that the fuselage is level in roll. Mount ES2 on the firewall, using a 1/4" bolt through the centerline hole to hold it in position. Level ES2 and check the level on the fuselage again. When satisfied, drill a 1/4" hole through the three engine mount holes through the firewall.

Next, use a flycutter to cut the three mounting holes out to a 1.50" diameter. You may want to experiment with scrap plywood because the diameter is critical. An alternate method would be to use a hole saw.

Make up three partial engine mounts as shown, and bolt them to the ES2 plate, using as many washers as necessary.

Place the ES2 plate with mounts up against the firewall, pushing the mounts into the holes. Orient the ES3 plates as shown and drill all the holes that you can reach with a number 12 drill by drilling from the front side through ES3 through the firewall. You will be able to drill 2 of the holes in each ES3; the other 2 will be obscured by ES2.

When finished, unbolt the mounts, and position each ES3 plate back on the firewall, using AN3 bolts to align them. Drill the remaining two mount holes per ES3 plate. Make sure each plate is marked with its position and orientation so that you can put everything together again later.



DETAIL FOR DRILLING IN ES3 PLATES

ELECTRICAL SYSTEM

CHAPTER 18

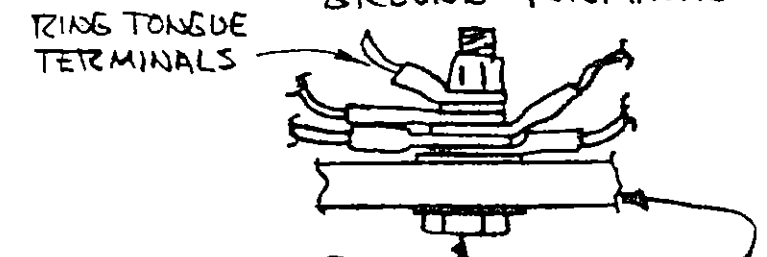
TACH
RED
BLACK
GREEN
NOT USED
#22
#22 WIRE
IGNITION SWITCH
VOLT METER
0
15
-
+
#22
GROUND TERMINAL SEE DETAIL 'A'.
COIL
TO SPARK PLUGS
BREAKER BOX
20 AMP FUSE
20
MASTER AND ALT. SWITCH
REGULATOR
AC
AC
B+
12 VOLT BATTERY
#22 WIRE
ALTERNATOR
OPTIONAL
ES2 PLATE
ENGINE GROUND
(TWO AN3-7A BOLTS)
FIREWALL

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; FU89 BULKHEAD AFT FOR LIGHTER PILOT.

OPTIONAL WIRING IF RADIO and/or TURN & BANK GYRO IS USED

RADIO
+12
-
5
TURN & BANK
-
5
To GROUND

DETAIL A
GROUND TERMINAL



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.

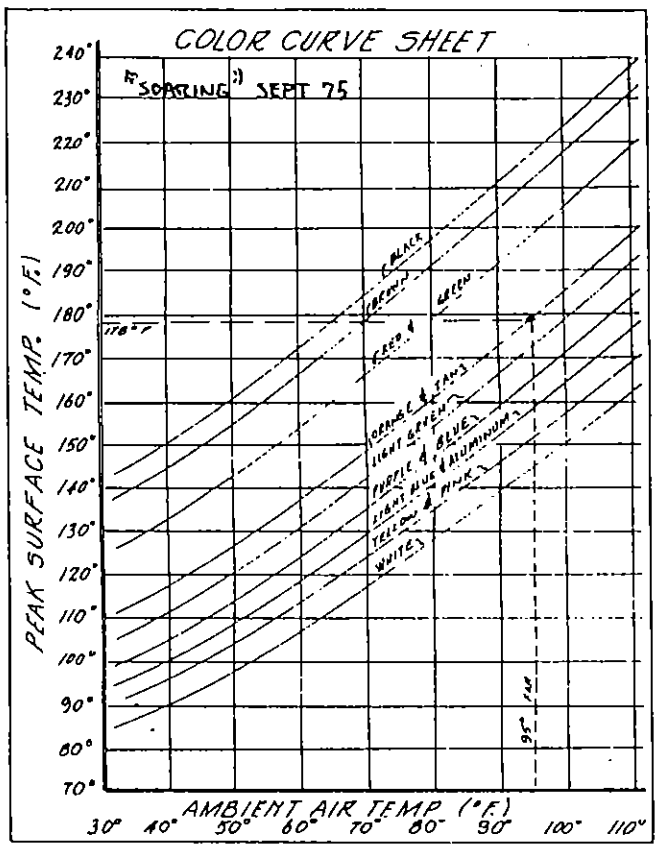
There is one part of the aircraft that must be finished to a smooth and wave-free surface - the canard. We have found that unless the canard is smooth and wave-free, serious degradation of performance and flying qualities results. This section will tell you how to obtain a smooth and wave-free finish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

FINISH COLORS AND HEAT

The materials used in amateur-built composite airframes are predominately epoxy resin systems with fiberglass reinforcement over a variety of plastic foam cores. The epoxies and the foams are all sensitive to high temperatures. Some epoxies, cured at elevated temperatures, retain their physical strength to temperatures not found outside an oven. Others, including most room temperature curing epoxies such as the RAES and RAEF systems, soften and loose their rigidity at only moderate temperatures. The common plastic foams are also heat sensitive and tend to soften and (some) swell with moderately elevated temperature. Elevated temperatures could potentially cause a softening of the fiberglass load bearing material, a swelling of the foam core, and general distortion of the airframe. To achieve elevated temperatures you would have to bake your airplane or find some other means of heating it. The sun is a potential source for this heat. In still air, on a hot sunny day it is possible to obtain surface temperatures that approach 250° F. The color of the surface determines how much solar heat it will absorb. White surfaces absorb very little (10%) of the sun's heat while a black surface (95% absorbsion) will heat up tremendously. The accompanying graph shows the relationship between color and surface temperature. White has been choosen as the standard color for fiberglass sailplanes to preclude any possibility of excess temperature due to solar heating. The same criteria apply to the Quickie, and white is recommended. Trim colors in non-critical areas are acceptable as desired. Such as the fuselage, vertical ~~winglet~~ surfaces, and the underside of wings and canard. Dark trim colors are definately not recommended on the upper surface of the wings and canard! If you would like further information on the subject read the September 1975 issues of "Soaring" magazine.



TOOLS AND MATERIALS

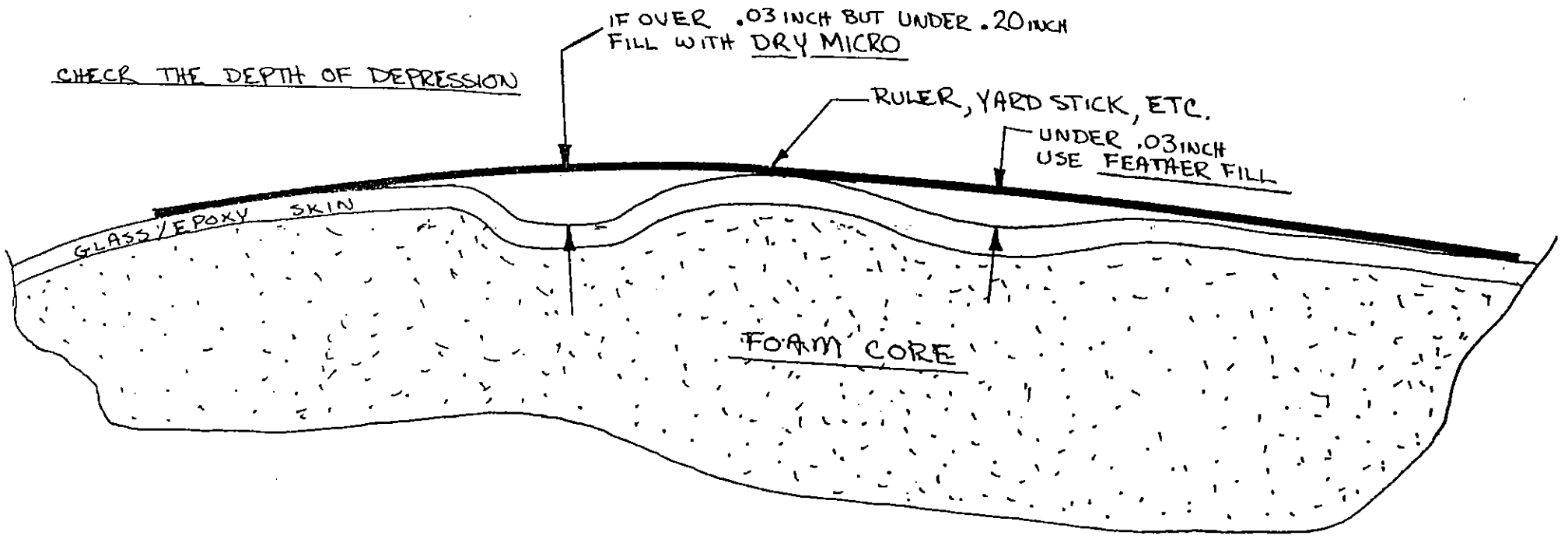
The tools and materials used in finishing the composite airplane are simple and straight foreward. A low density microsphere/epoxy mixture (dry micro) is used for coarse filling requirements. Automotive type polyester body fillers (Bondo) are very heavy and not recommended for aircraft finishing work. Medium to light surface filling (less than .030 in) is done with a light weight polyester spray (or brush) filler/primer called Feather-Fill. Feather-Fill is noteworthy for its ability to fill medium thicknesses in a single spray or brush coat and for its easy sanding to a smooth surface. Dupont 70S dark gray laquer primer/surfacer provides an effective ultra violet radiation barrier with its 15% carbon-black content as well as an excellent finish sanding surface in preparation for the finish paint. The actual finish paint type is largely a matter of the builder's personal preference. Automotive finishes in laquer, enamel, acrylic laquers, acrylic enamels, and the polyurethanes are all acceptable. We find the acrylic laquer is easy to work with, easily patched and readily polished to a high gloss.

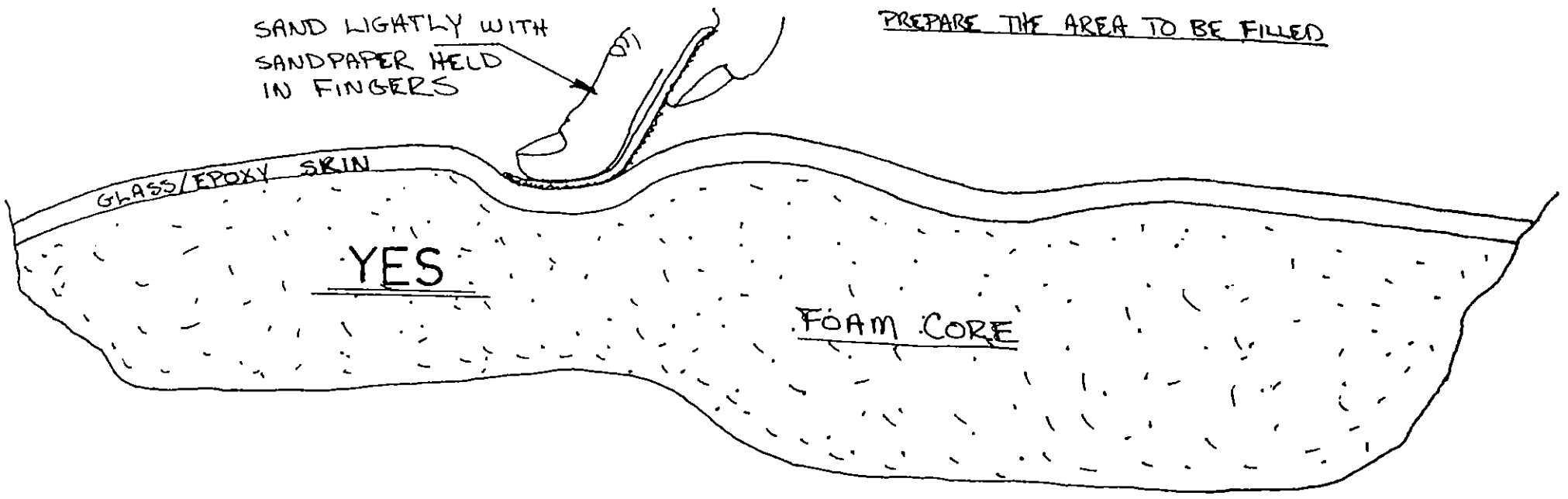
The enamels and acrylic enamels are low cost and easy to apply, however, they are not readily repairable if chipped. The polyurethane finishes offer the best gloss for the longest life, but they are high cost and virtually impossible to repair. There is a polyester paint, known as Prestek, commonly used in sailplane circles to achieve a glass-smooth finish, but

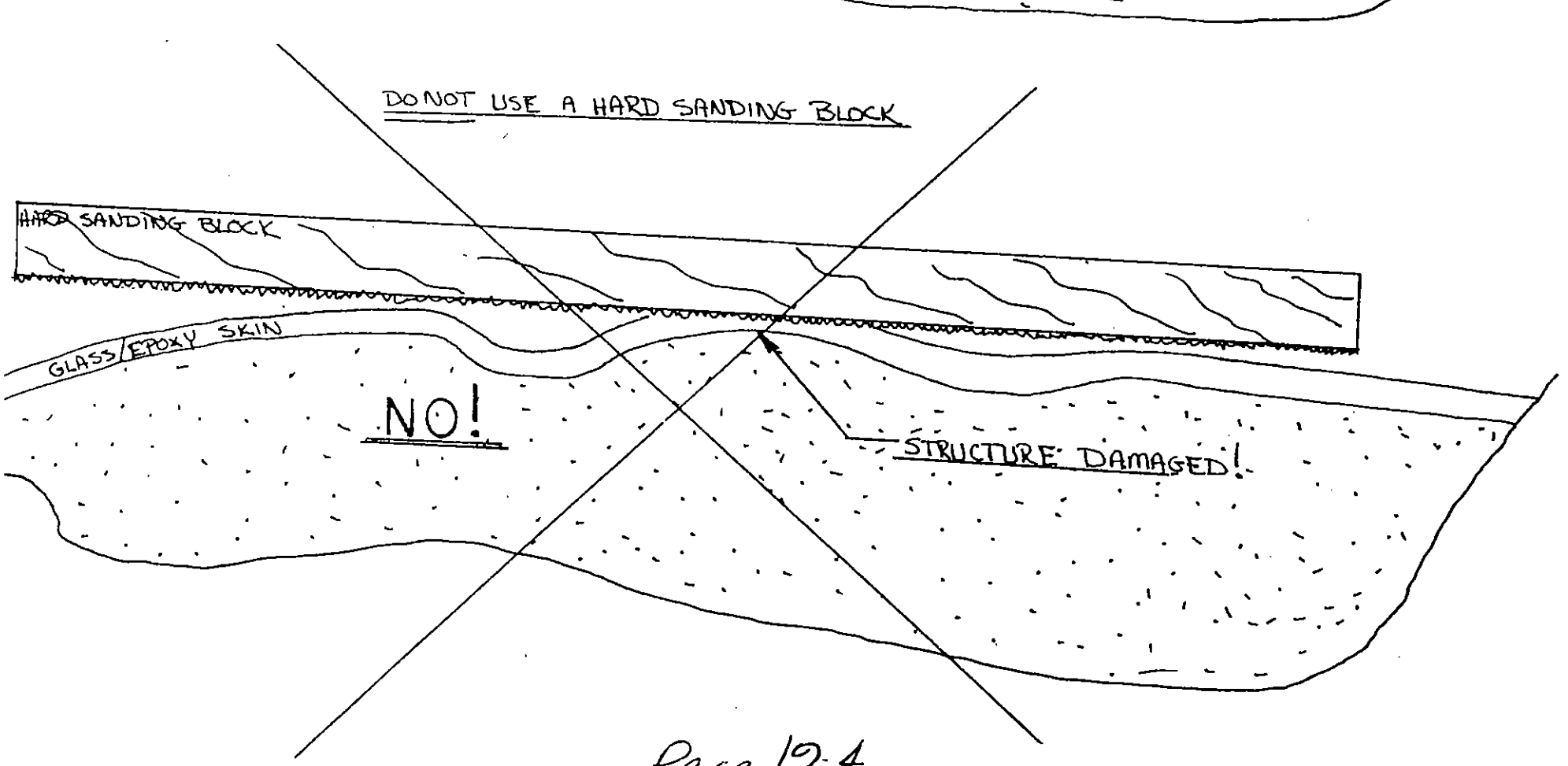
Step Two: Coarse Filling

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.



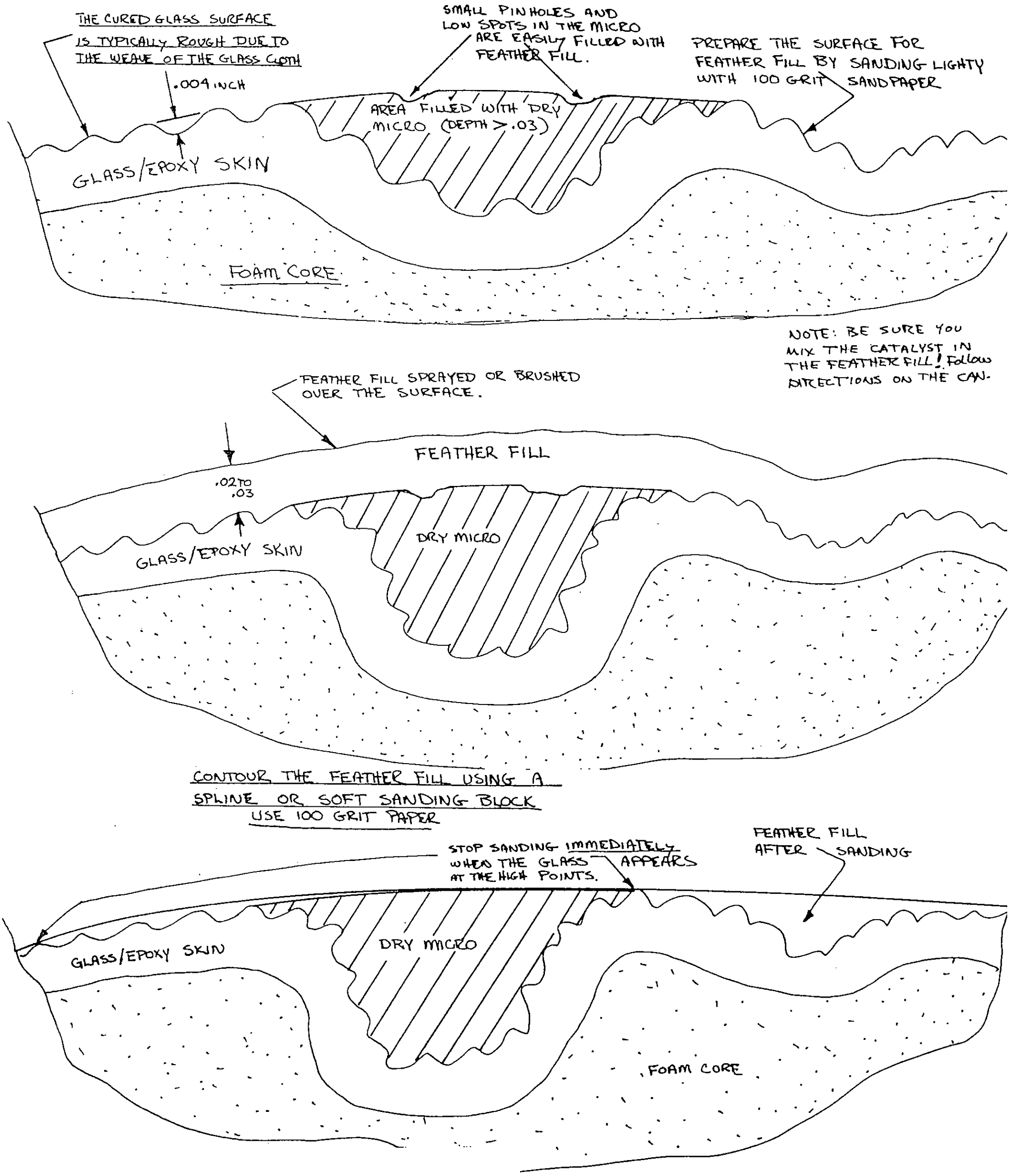




Step Three: Feather Fill

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 the feather fill is sanded away.

If you find that you have underestimated the fill required or just have a thin coat, don't hesitate to use a second coat of feather fill. A well prepared surface generally won't need more than one coat. When you have finished contouring the feather fill, the surface should be basically smooth and fair. The primer to follow is not intended to be contoured heavily, just smoothed with finer sandpaper for a smooth finish while leaving a substantial ultra violet barrier.



After you have filled and contoured, reinspect for sanding damage, it is an easy thing to do! Remember you are only allowed to sand into the first skin ply in local areas no greater than 2 inches in diameter and all of these areas must total less than 10% of the surface area. Wherever there is only one ply, or where the UNI cloth is crossed for strength(e.g. the canard and wing skins), no sanding of the ply is allowed. Be Careful!

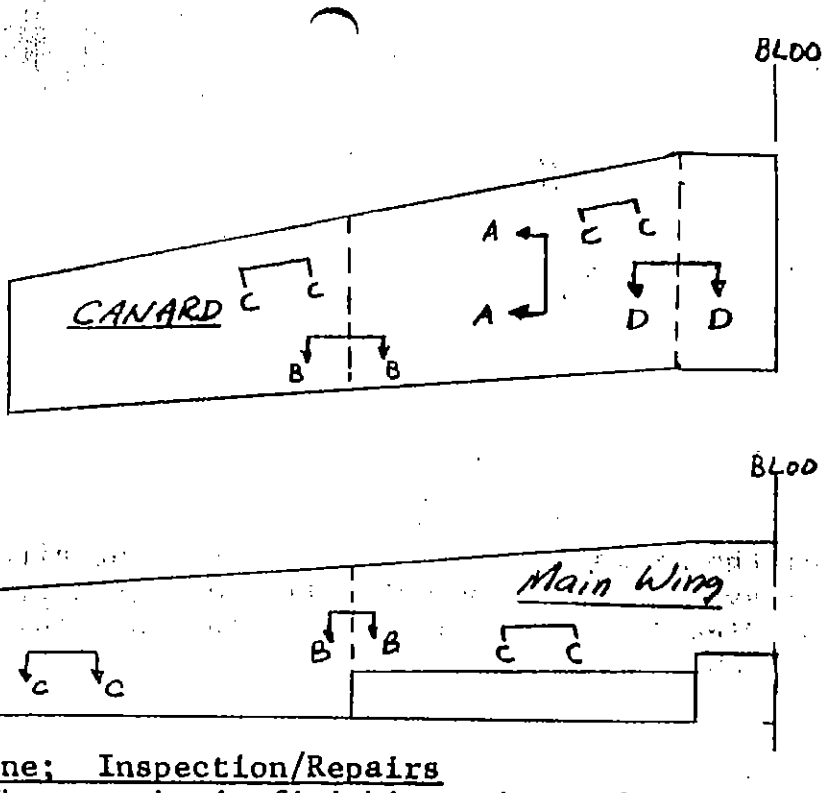
it is heavy, requires a tremendous amount of work to get a high gloss finish, and chips easily (brittle).

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 of an ultra violet barrier primer. Fifth, the final finish paint is applied.

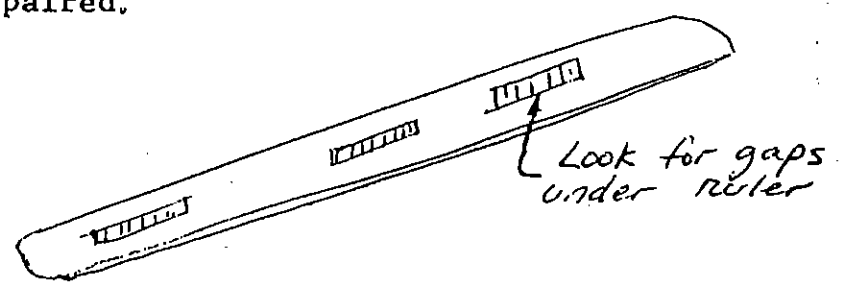
The following sketches are descriptive of the finishing process and its potential pit falls. The sketches are grossly exaggerated scale to show details more clearly.



Step One; Inspection/Repairs

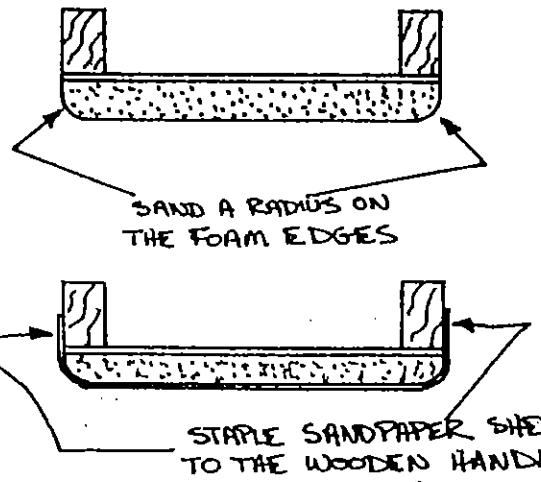
When you begin finishing, the entire structure must be airworthy. You can hide poor workmanship from your own eyes and from the inspector who will finally approve your first flight, but you can't fool mother nature! Everything has to be structurally sound before finish materials are applied. The following sketches are a review and clarification of the quality control criteria found in chapter 3. Each airplane must have a thorough inspection and required repairs completed as the first step in finishing.

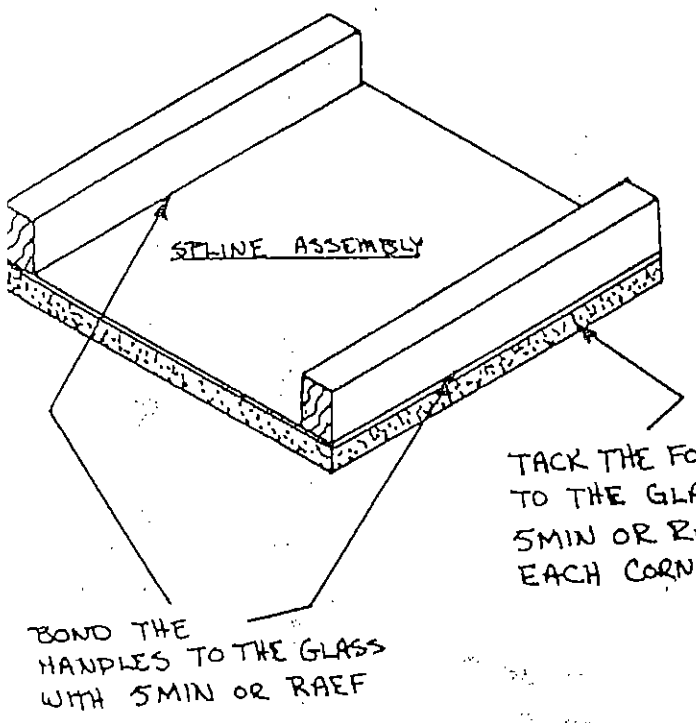
The best way to inspect the structure for bumps or dips is to place a 12" ruler on the wing or canard span-wise, as shown. Gaps under it approaching 1/16" height must be repaired.

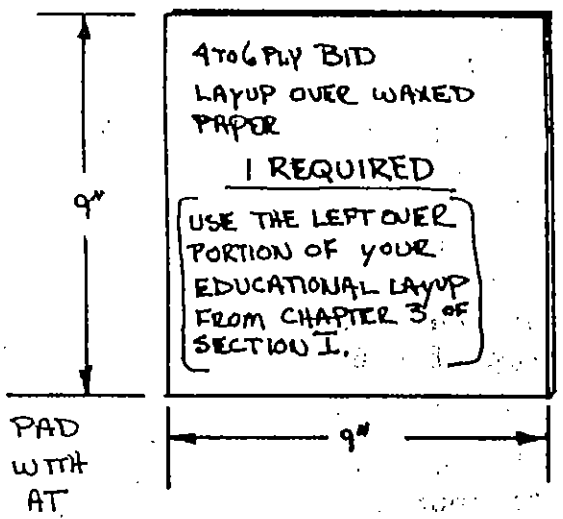


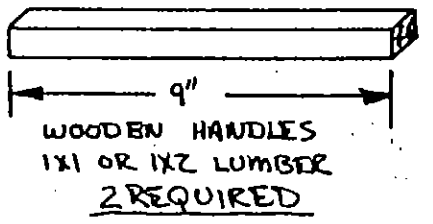
The Spline

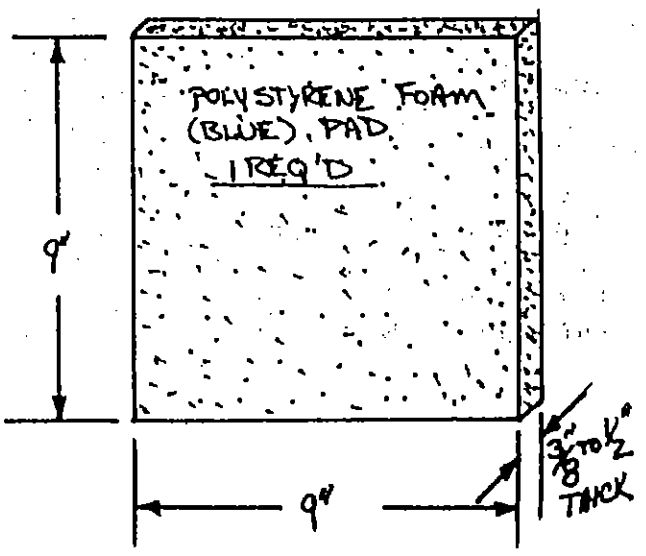
The sanding spline is a finishing tool common to the sailplane industry. It is an easy tool to make and does an excellent job of contouring. You may find it handy to make two, one for coarse grit sandpaper and one for medium or fine sanding. The spline is an easy tool to use but it may require your close attention at first. The spline is always held with handles parallel to the leading edge of an airfoil surface (wing, canard, etc.) as shown in the sketch. The sanding motion is on a diagonal to the leading edge while the spline's handles are held parallel. This takes a little getting used to but becomes second nature after a little practice.

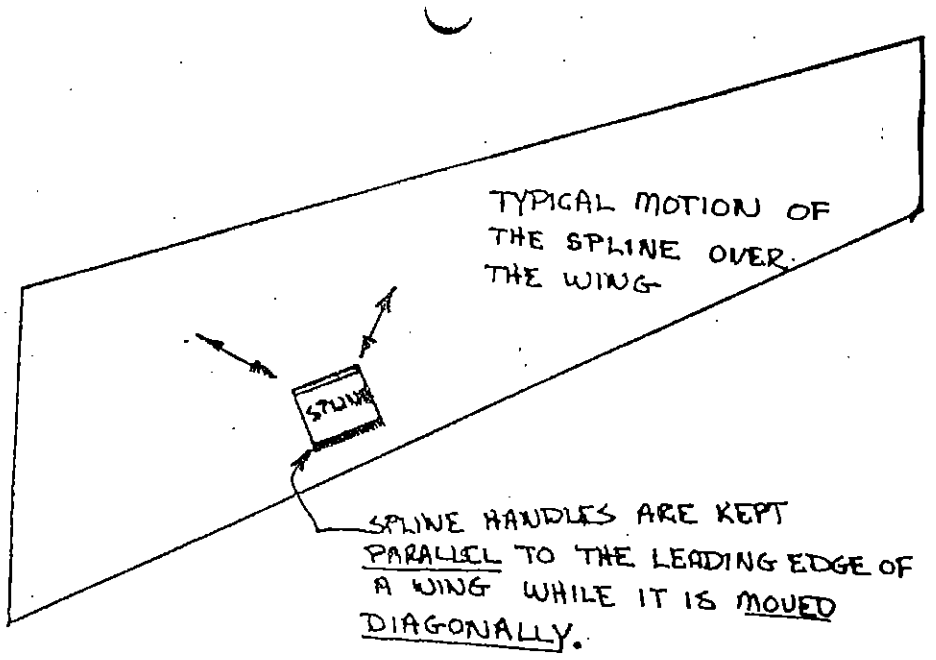


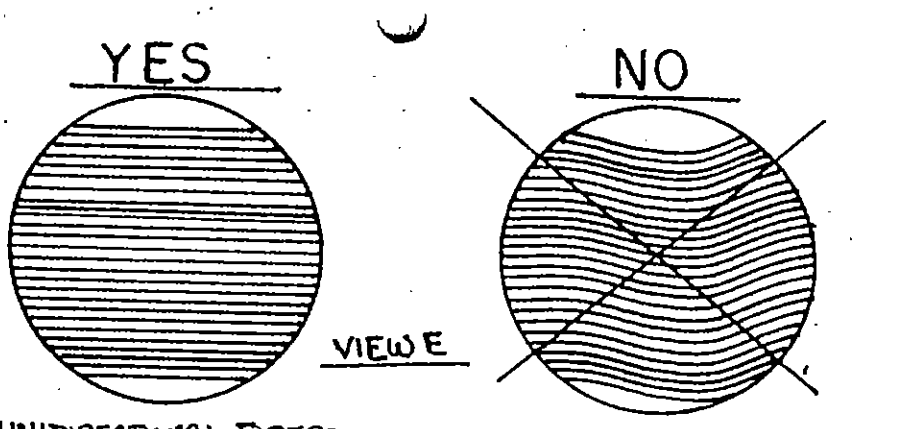


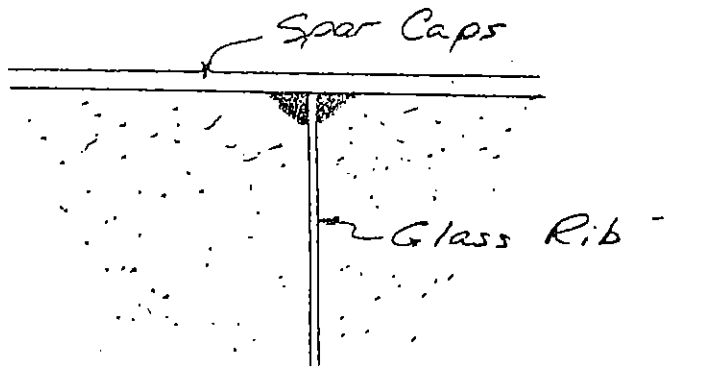




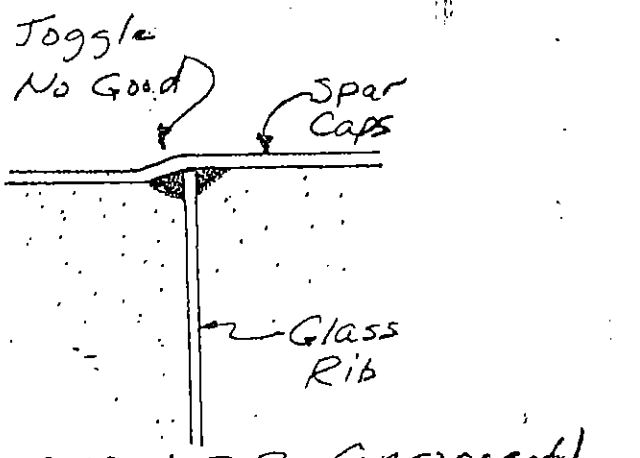




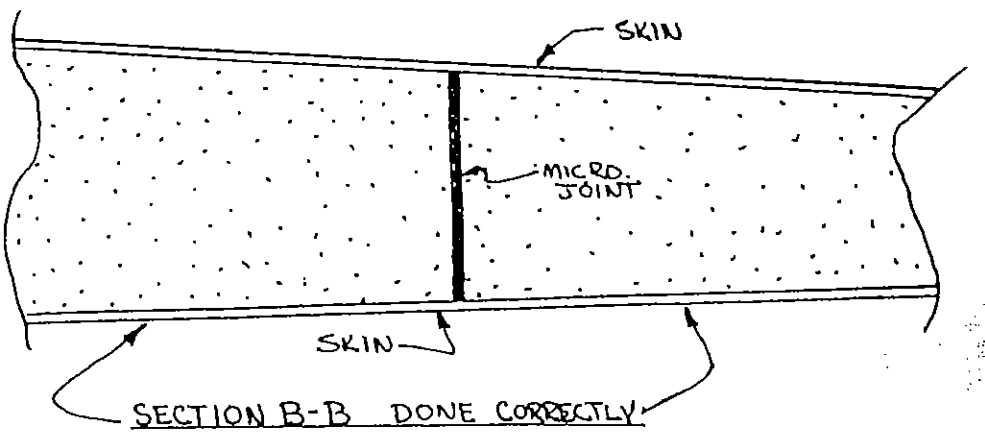




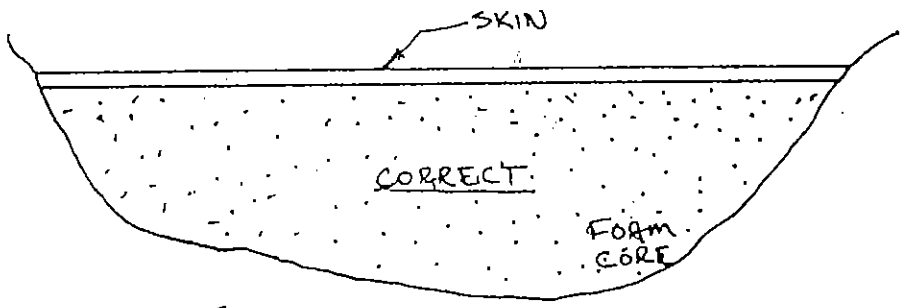
SECTION D-D (correct)



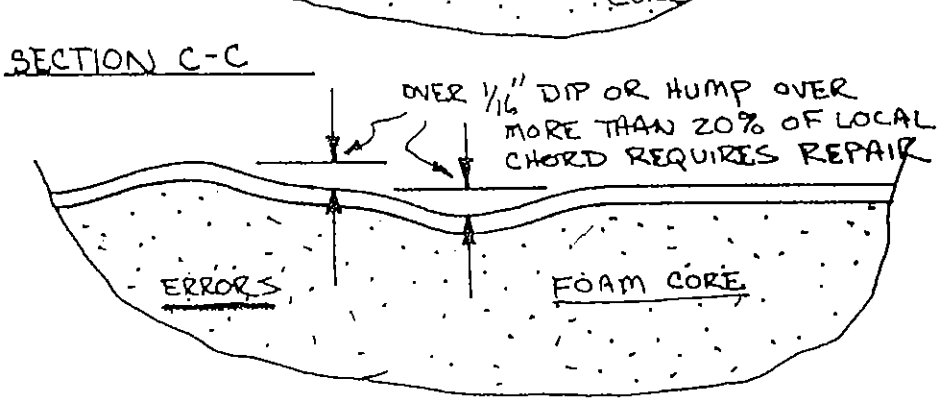
SECTION D-D (incorrect)

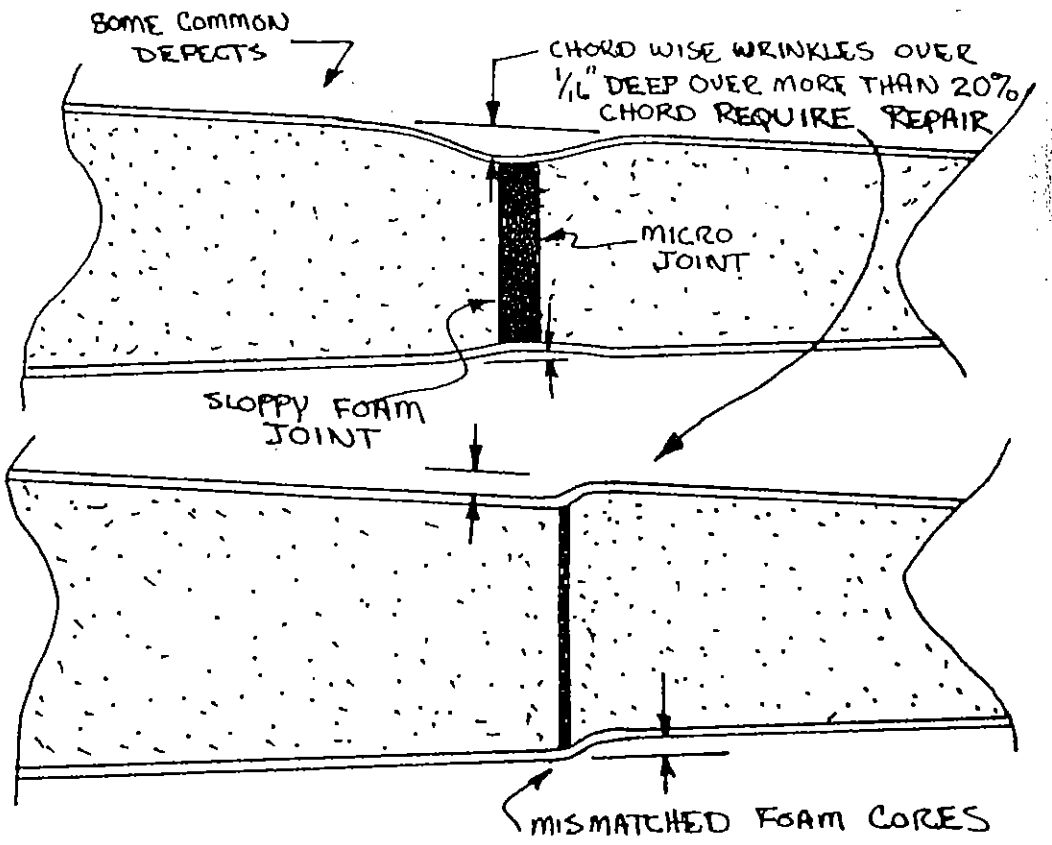


SECTION B-B DONE CORRECTLY

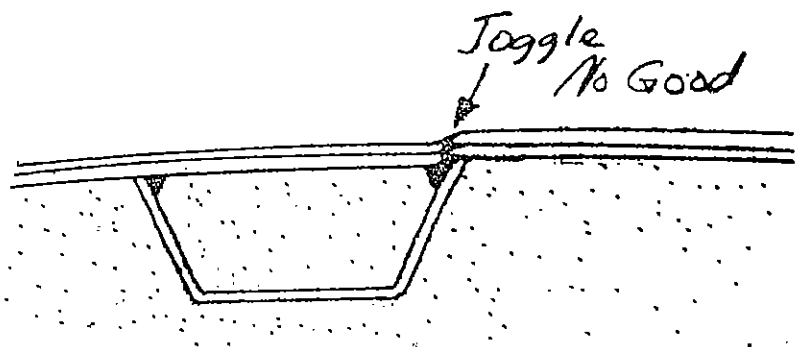


SECTION C-C

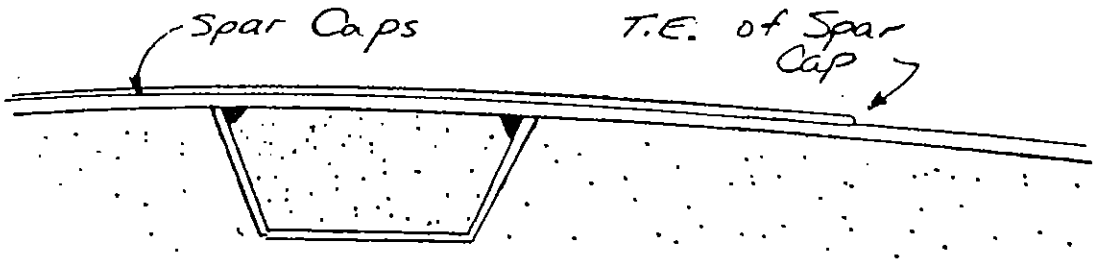




STEP ONE: DETAILED STRUCTURAL INSPECTION

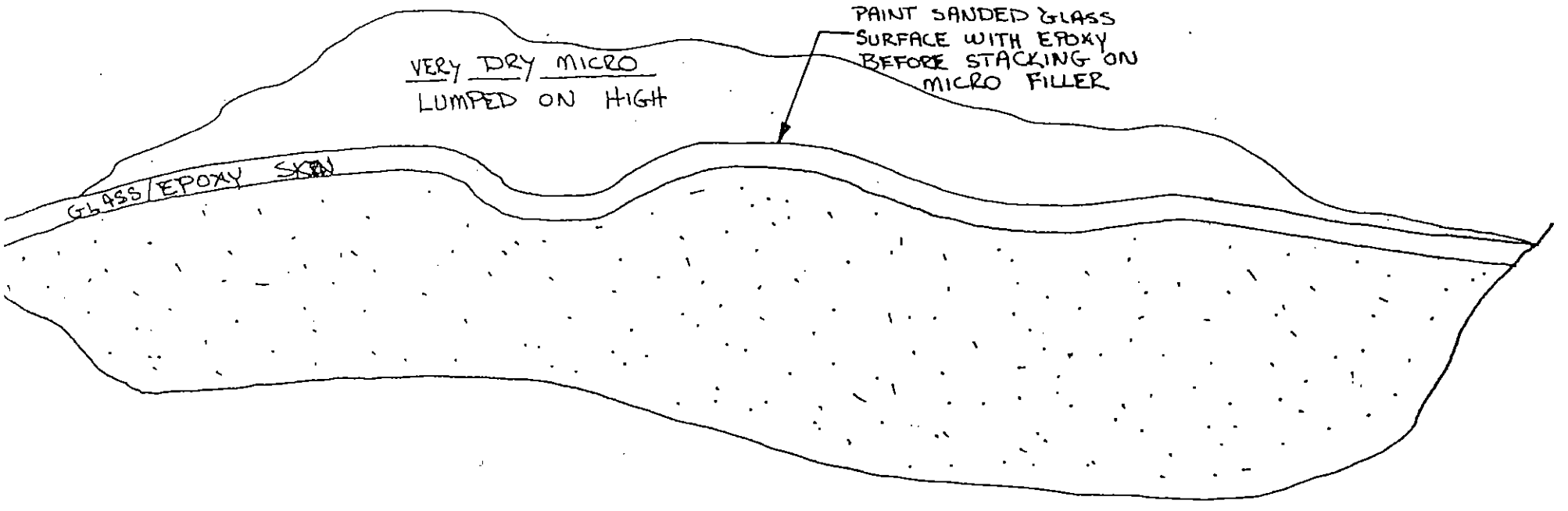


SECTION A-A (incorrect)

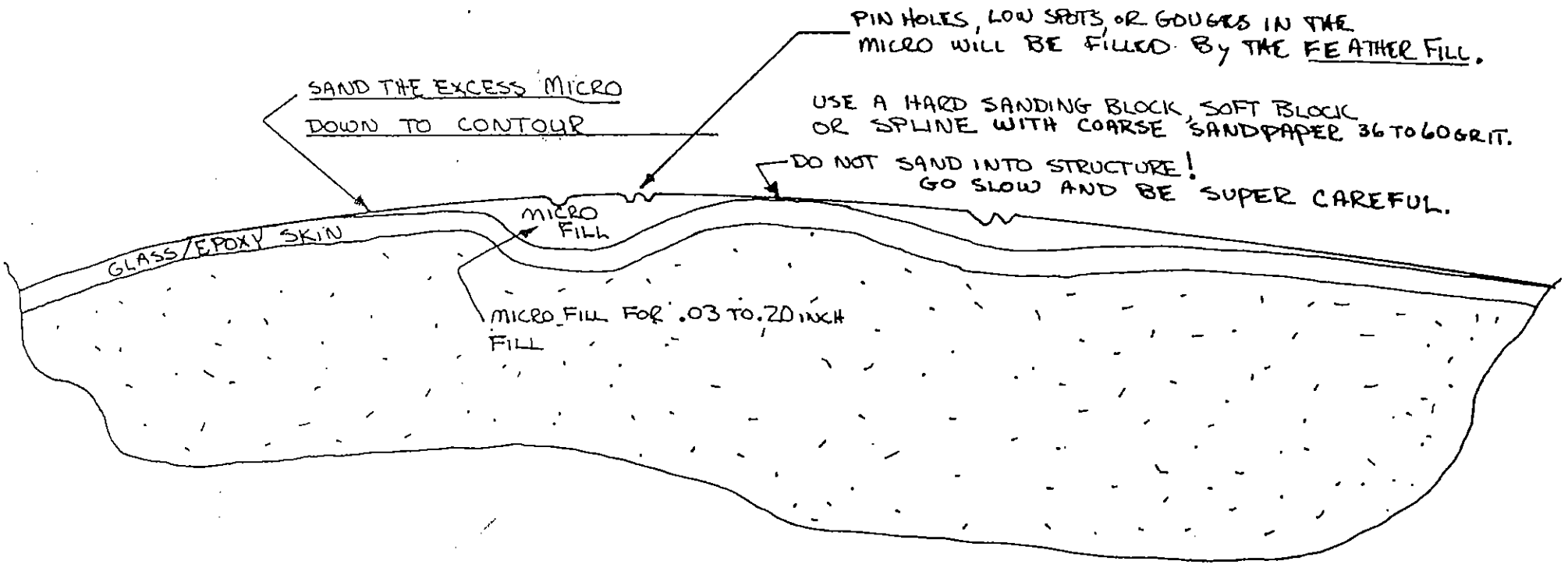


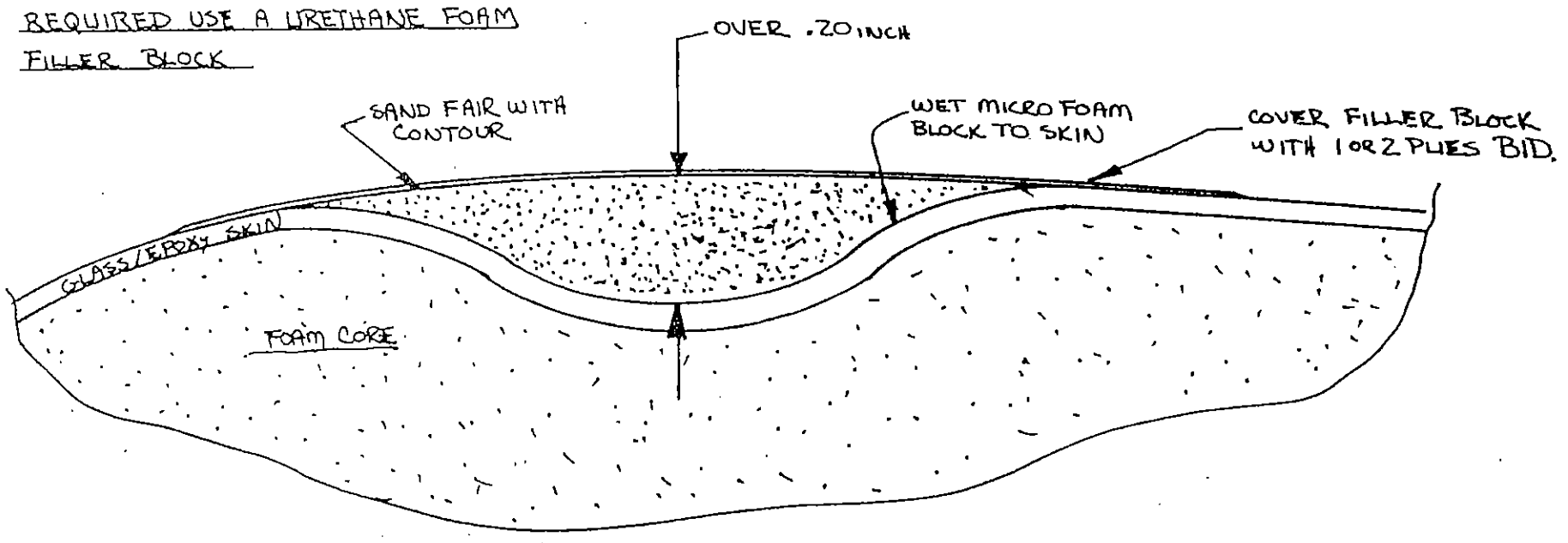
SECTION A-A (correct)

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

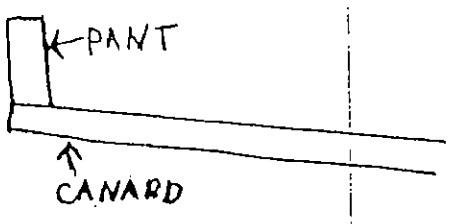
Review the Q2/Q200 plans included, pages 1-7. Disregard the last page (8) dealing with the pitch control system as the Quickie pitch control system is identical to the original except for the bearing blocks. Even the original bearing blocks can be used by adding additional material.

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

Hotwiring:

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

ORIGINAL CORE IS BL 88
MOUNT BASE IS BL 92



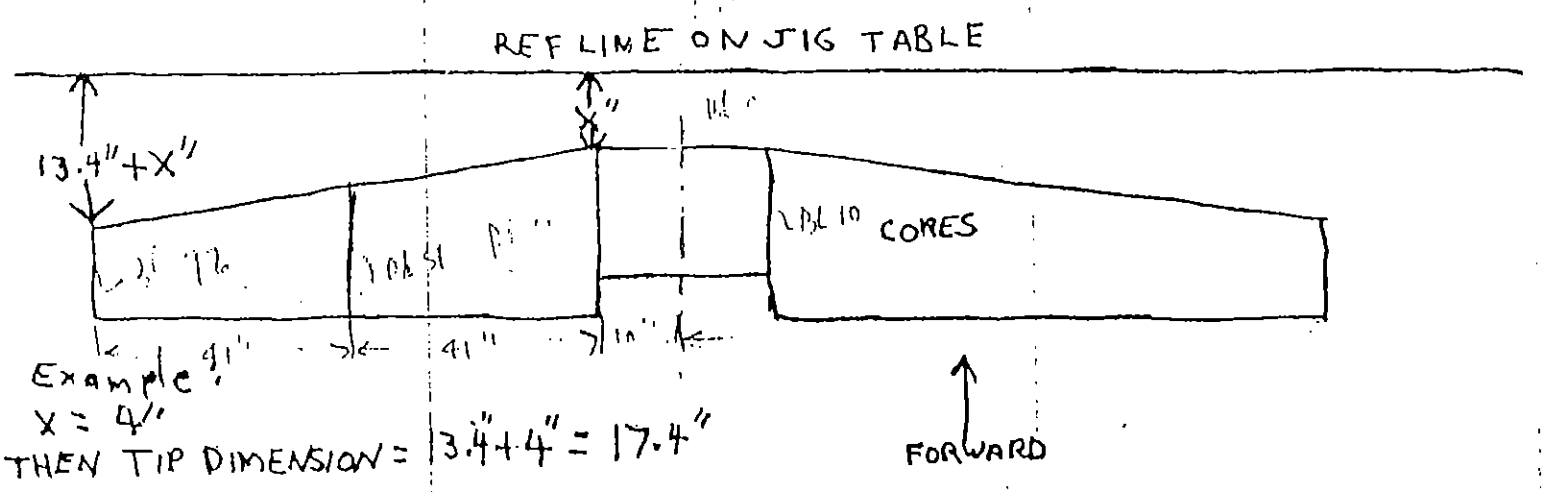
CORE TEMPLATES: BL 92 41"
BL 10 41"
BL 51 41"

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

BL 92, BL 51, BL 10

Jigging the foam cores:

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

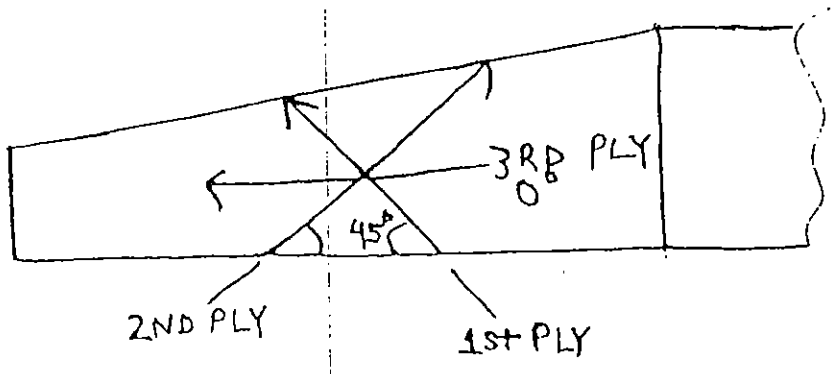


You can jig the templates and spars temporarily with bondo to set this dimension.

Follow the procedure in the Q2/Q200 instructions for bonding the spars together. Use the 3 ply on the bottom and 18 ply on the top, stagger each ply in length with the longest terminating at the fuselage sides, make all plies about 3.0" wide.

Laminating skin plies:

Three plies of uni are used top and bottom:



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

Elevators:

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

Sparrow Strainers:

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

Wheel pants:

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

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

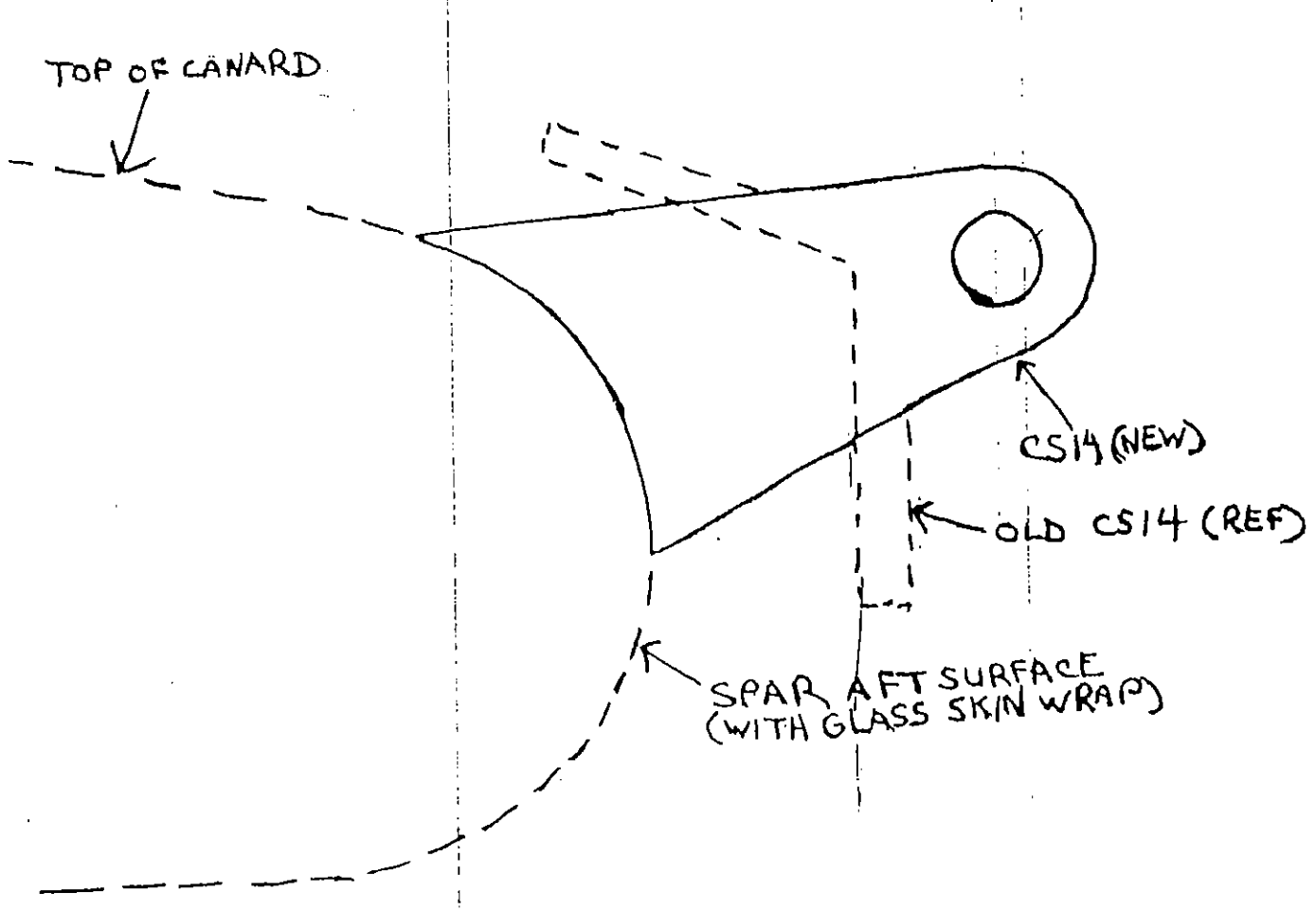
Mounting the canard:

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

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.



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 suggest that the bottom cap be laminated at this time and that you wait until the bottom surface of the canard has been covered to do the top.

The lamination schedule for the caps is:

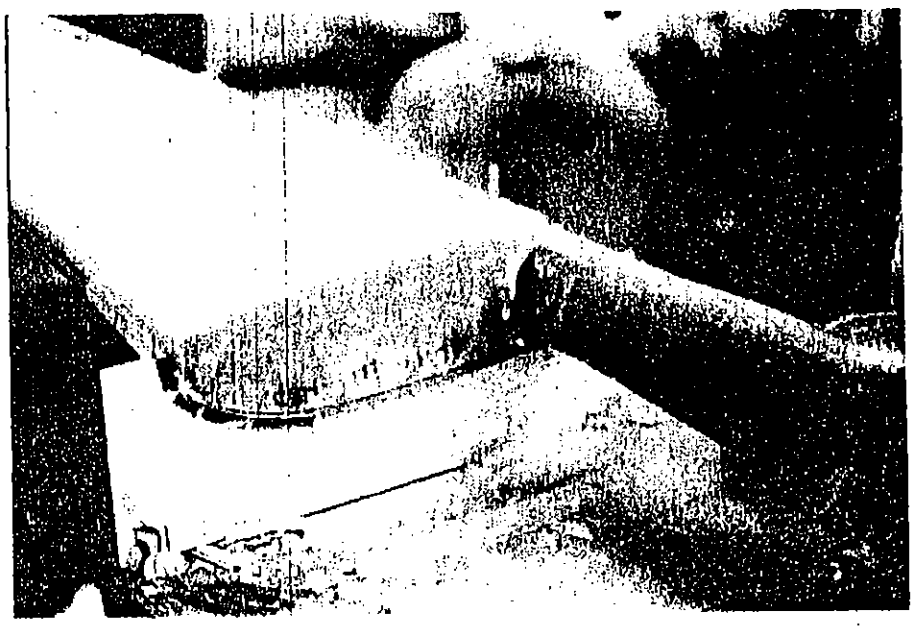
Bottom: 5 ply - 18"x3.5"
5 ply - 16"x3.5"
5 ply - 14"x3.5"
5 ply - 12"x3.5"
5 ply - 10"x3.5"

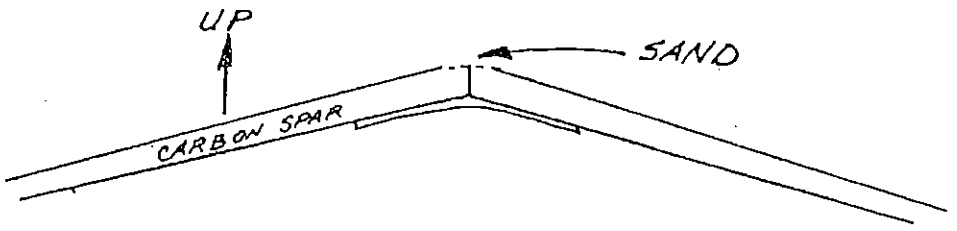
Top: 5 ply - 20"x3.5"
5 ply - 18"x3.5"
5 ply - 16"x3.5"
5 ply - 14"x3.5"
5 ply - 12"x3.5"
5 ply - 10"x3.5"

After the caps are cured, sand for bonding the skins.

The center section cores will need to be modified to allow for these caps.

The canard cores may now be jigged and bonded together. Refer to the Q2 Plans. Laminate ribs of 2 BID at 45° at the B.L.15 joints. Jig the B.L.15 to B.L.'0-0' cores after the ribs are semi-cured (still tacky). Sand the tabs on the cores tangent to the spars. Fair the surface of the core to the caps with very dry micro. Do not get any micro on the caps.





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.)

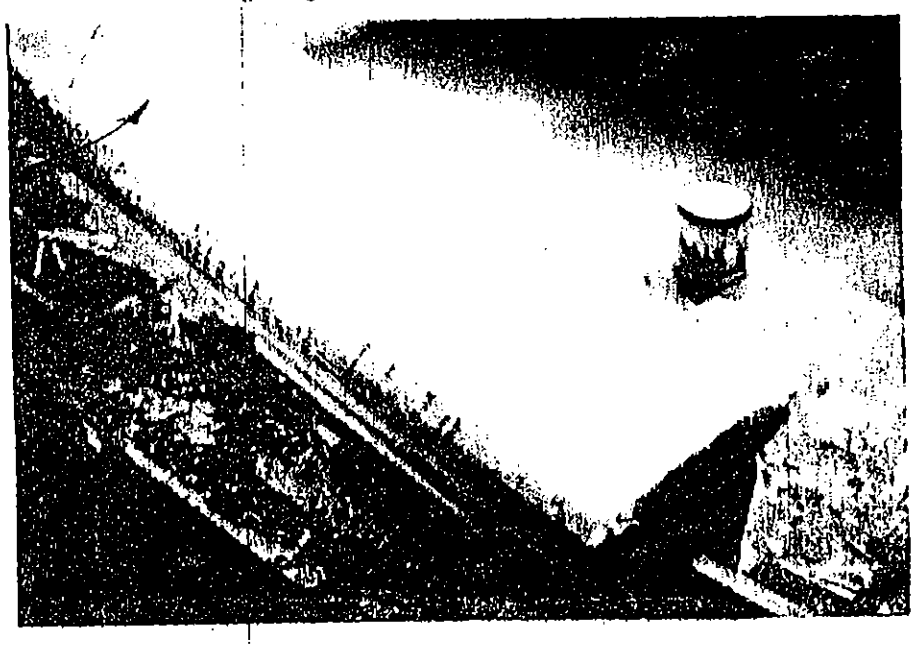
Allow UND. to wrap spar at T.E. and let cloth drape tangent at L.E.

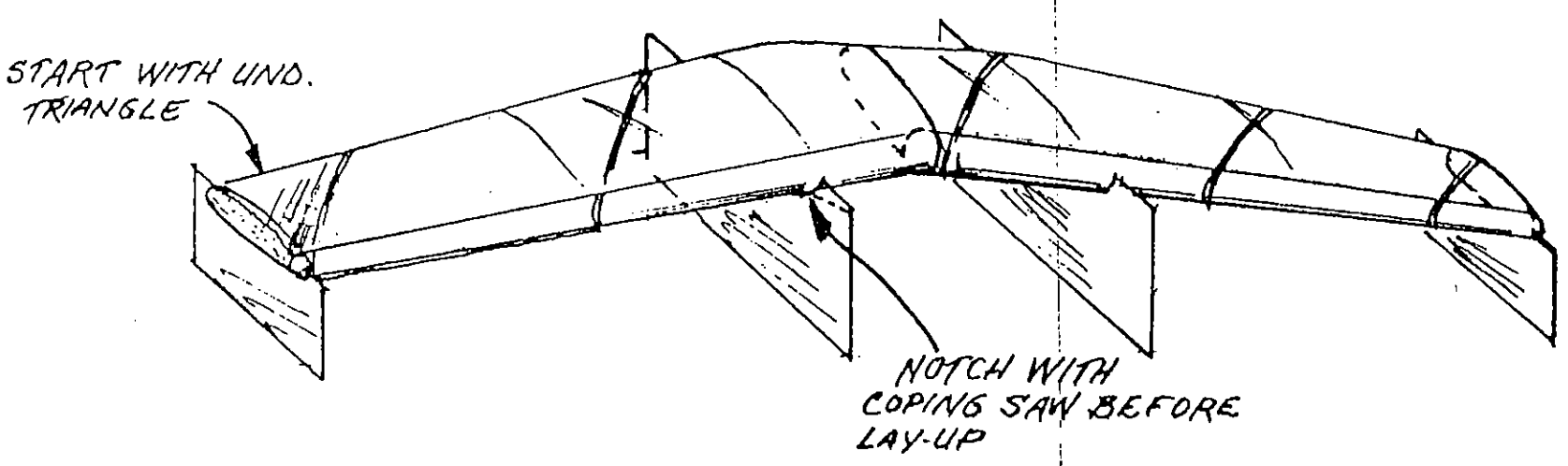
Canard skin lamination schedule:

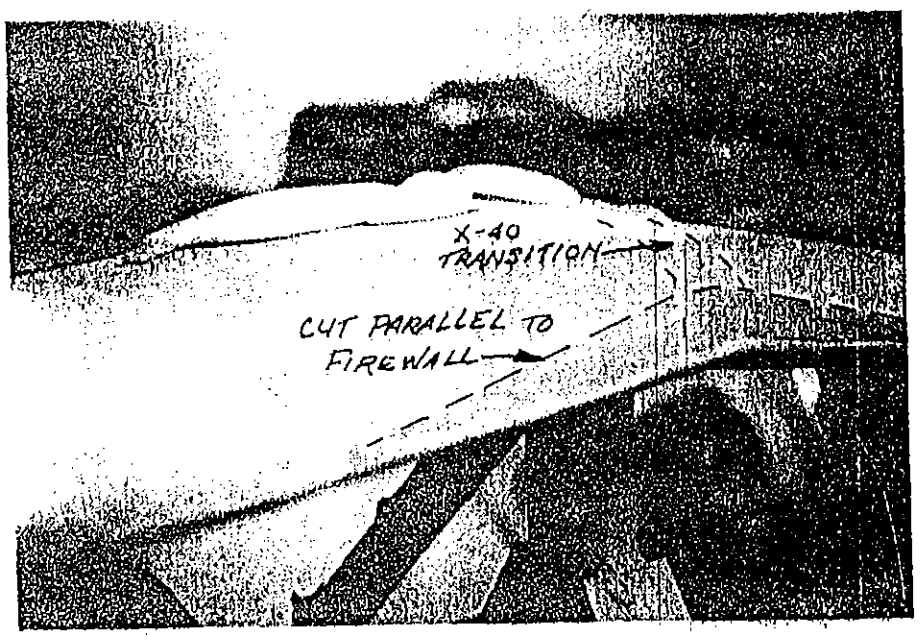
Bottom - 2 ply at 45° to the spars (90° to each other)
1 ply spanwise
Overlap the spars with all 3 plies outboard of the caps and overlap the caps.
Knife trim the skins at the leading edge. After curing, sand to taper the skins between 0 and 1 on the hotwire templates.

Top - 2 ply at 45° to the spars (90° to each other)
1 ply spanwise. We let selvage edge parallel L.E.
1 ply spanwise to B.L.15 each side for extra "heel" protection. Overlap the spars and the bottom skins on the spar by about 1½". Overlap the caps. Overlap the leading edge of the bottom to about 1½ on the hotwire templates.

Knife trim leading edge, let cure 24 hrs.

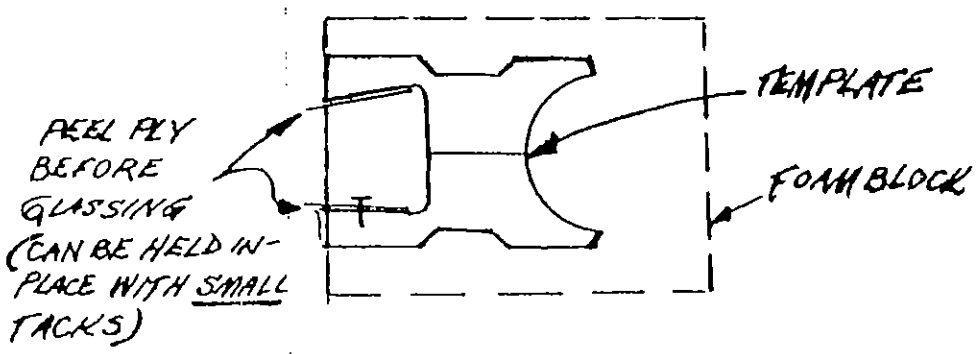






SLOT CORES:

Place the trailing edges of the slot core templates at the edge of the foam blocks and hotwire only the elevator slot areas. Next, glass these with 2 BID. Note: Put down some peel ply in the area shown before glassing. Let cure.



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.

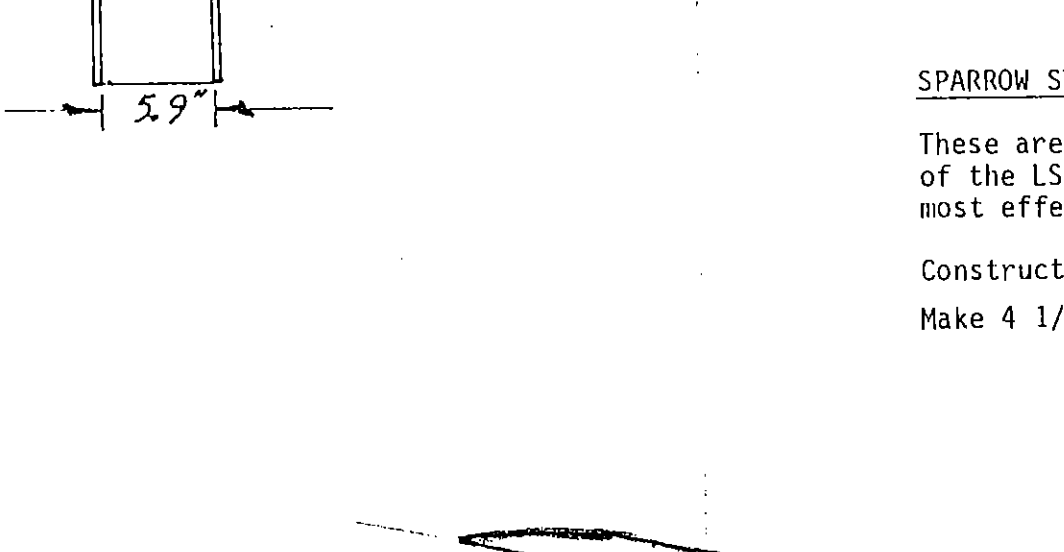
> Note: It may be easier for you to build the elevators before installing the slot cores & trial fit the attach structure. The slot cores can be treated as fairing, sectioned, & installed around CS 15, 17, & 19 with one ply BID. Be sure to micro high density white foam blocks in place as hard parts detailed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

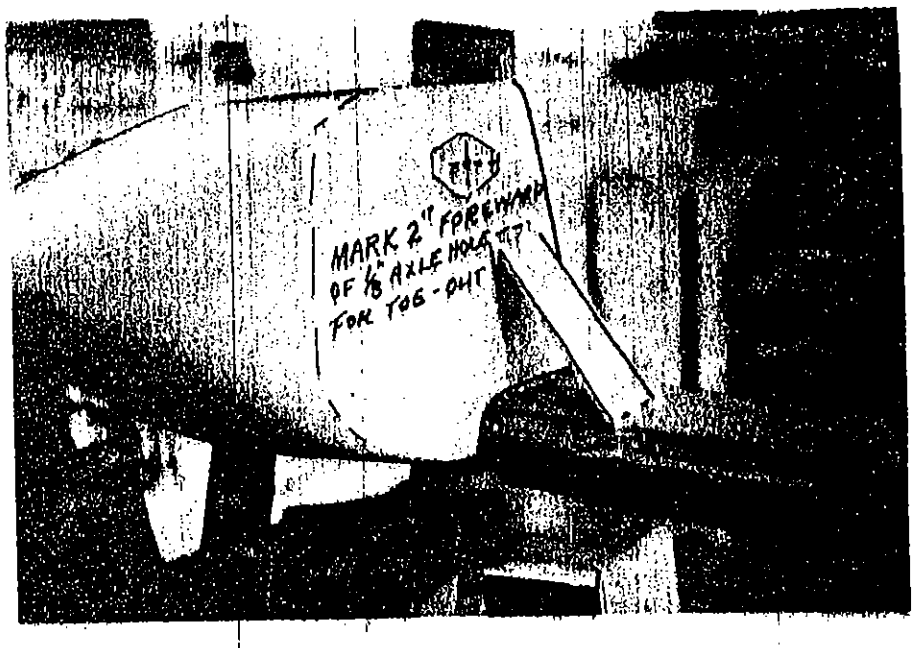
Next, build the elevators. Hotwire cores are the same as is shown in the Q2 Plans. Note that there is only 1 slot for cutting the hole for the torque tube. When bonding the torque tubes in the elevator cores, use a brush and micro down this slot.

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.

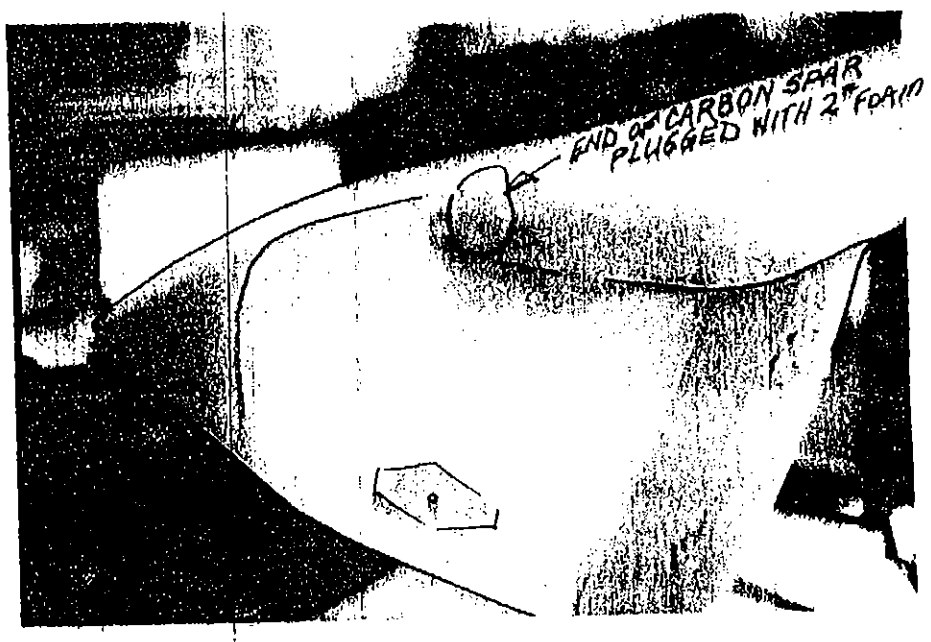
Build the wheel pants using the templates provided. Refer to the Q2 Plans for detailed instructions. Note that these pants are designed to fit the standard tires only. We will design pants for the 500x5 tires later. You may modify the design yourself by referring to the Q2 Plans.

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





Install the wheel pants in the same manner as is detailed in the Q2 Plans. Note extra UND plys. We recommend establishing about 1/2 to 3/4° toe out. This is accomplished by placing a mark on the inside face of each pant that is 2" forward of the axle hole centers, then sighting on the marks for alignment. This seems to improve ground handling.

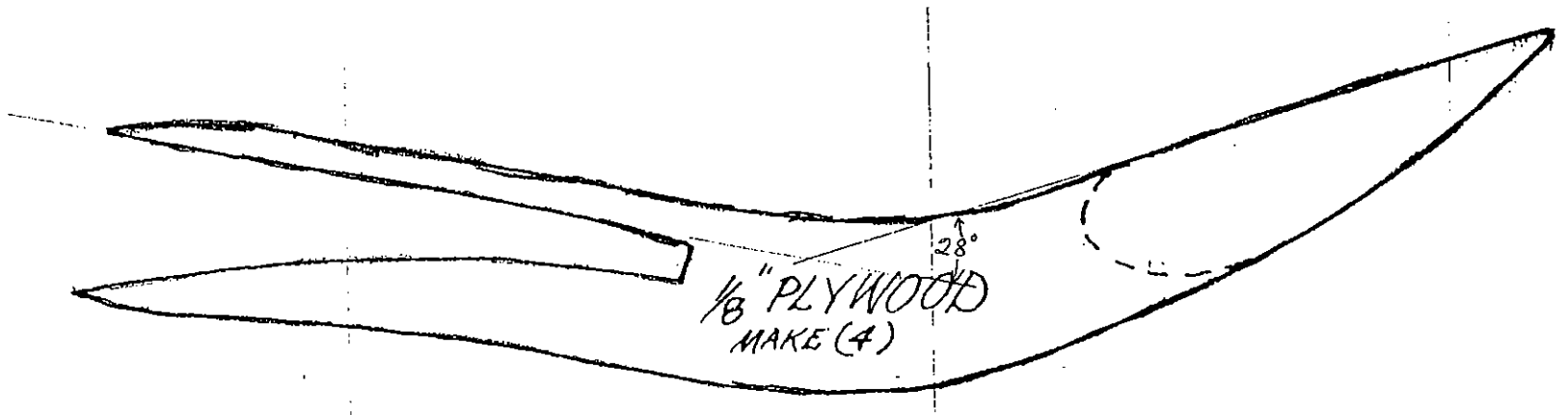


SPARROW STRAINERS:

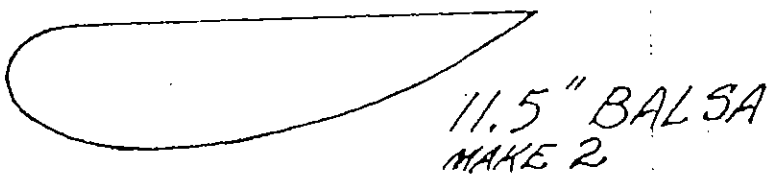
These are trim devices required due to the pressure distribution of the LS(1) 0417 Mod Airfoil. Thru testing, we have found the most effective position to be inboard (both sides of course).

Construct as follows:

Make 4 1/8" plywood stringers.



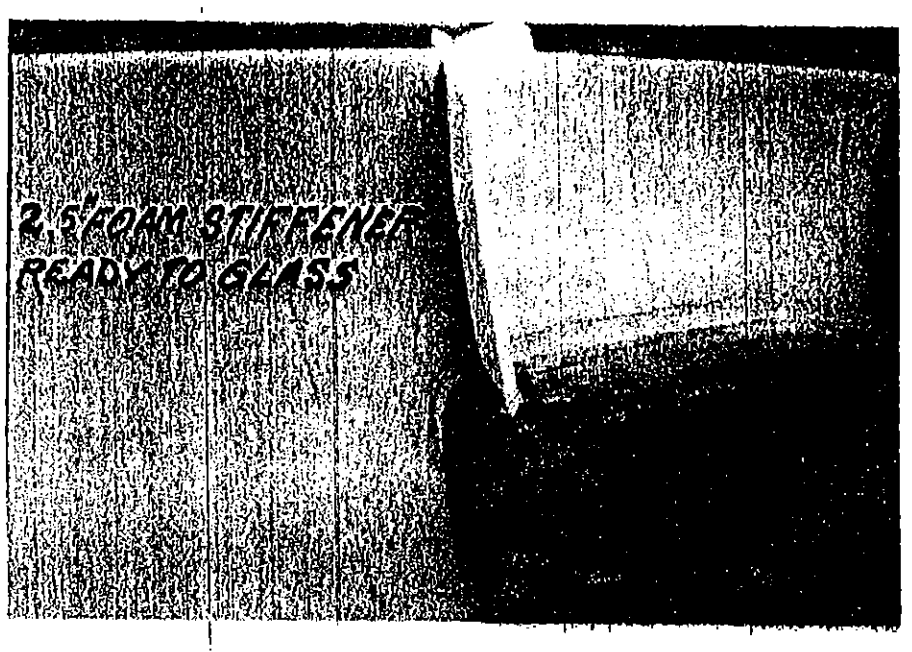
Also, 2 11.5" balsa wing sections.



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.

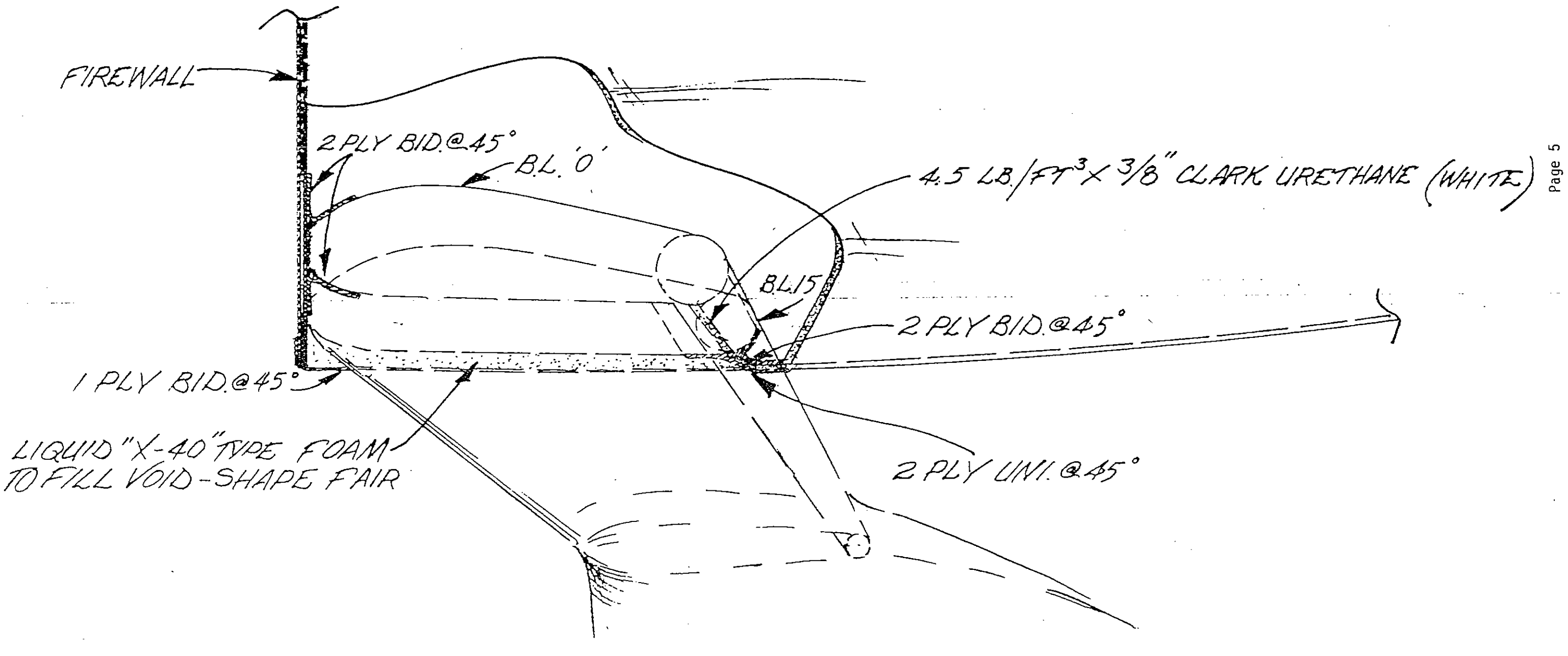
After canard is installed with liberal dry micro radius and 2 ply BID, micro transition blocks from fuselage bottom to canard (4#x3/8 white urethane) and 2 ply BID inside and outside lapping at least 1" everywhere. (see drawings and photo).

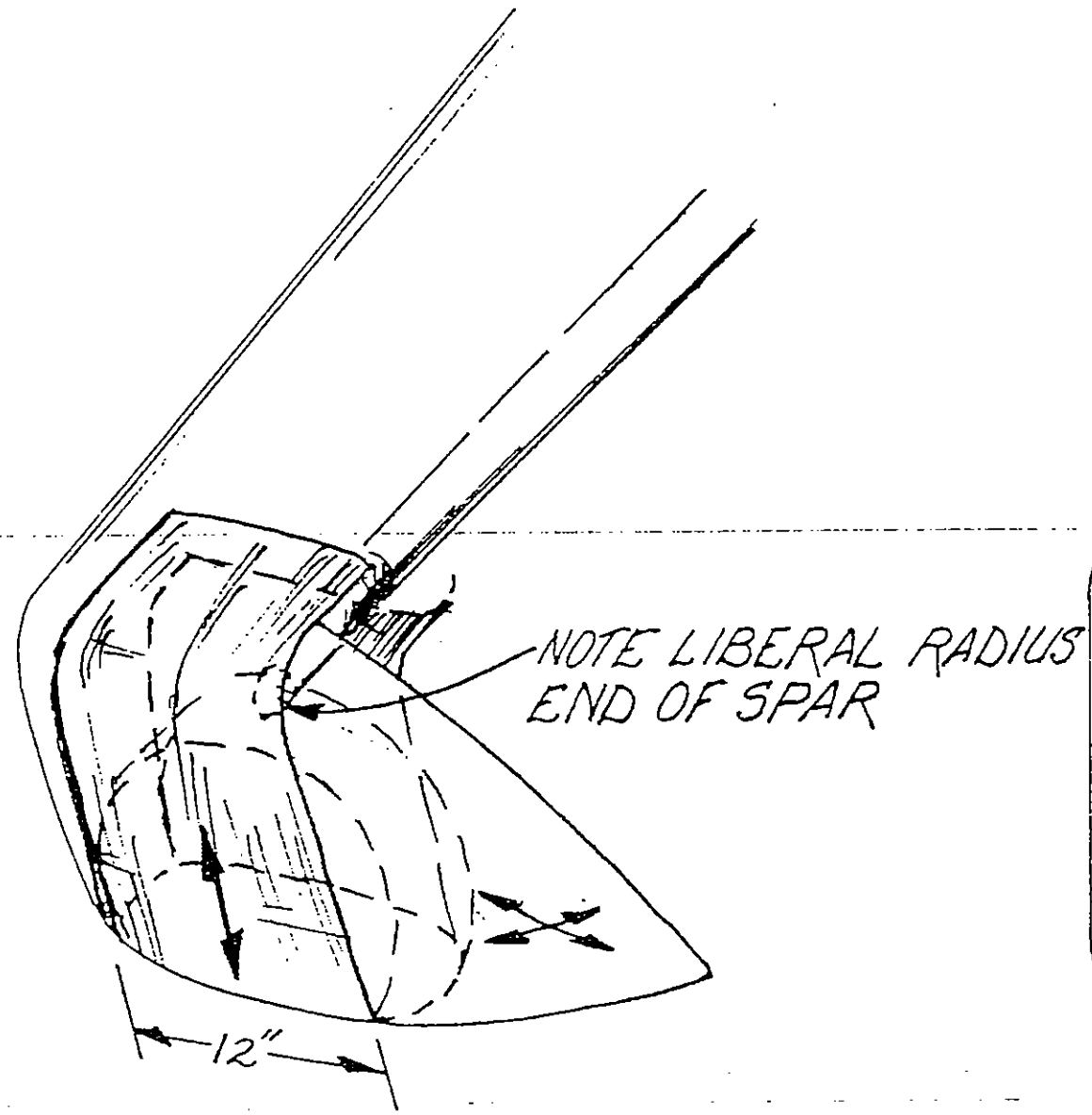


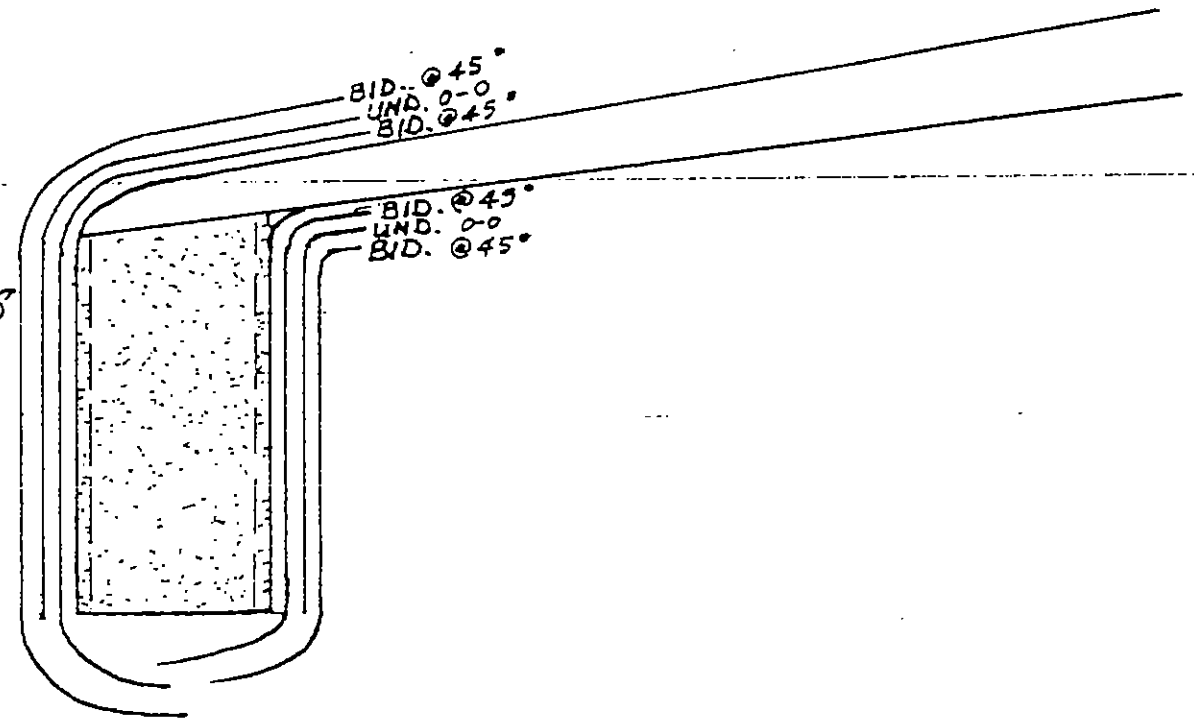
Then, with 2# urethane block or, better still, X-40 pour-in-place, fair bottom of fuselage cut-out to firewall and closeout with 1 ply BID @ 45°. Next, install additional 2.5" stiffeners left and right sides of fuselage centered over spars as per drawing.

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.

Q.A.C.
CANARD INSTALLATION
SIDE VIEW
9/12/83
NOT TO SCALE
LARRY LOMBARD

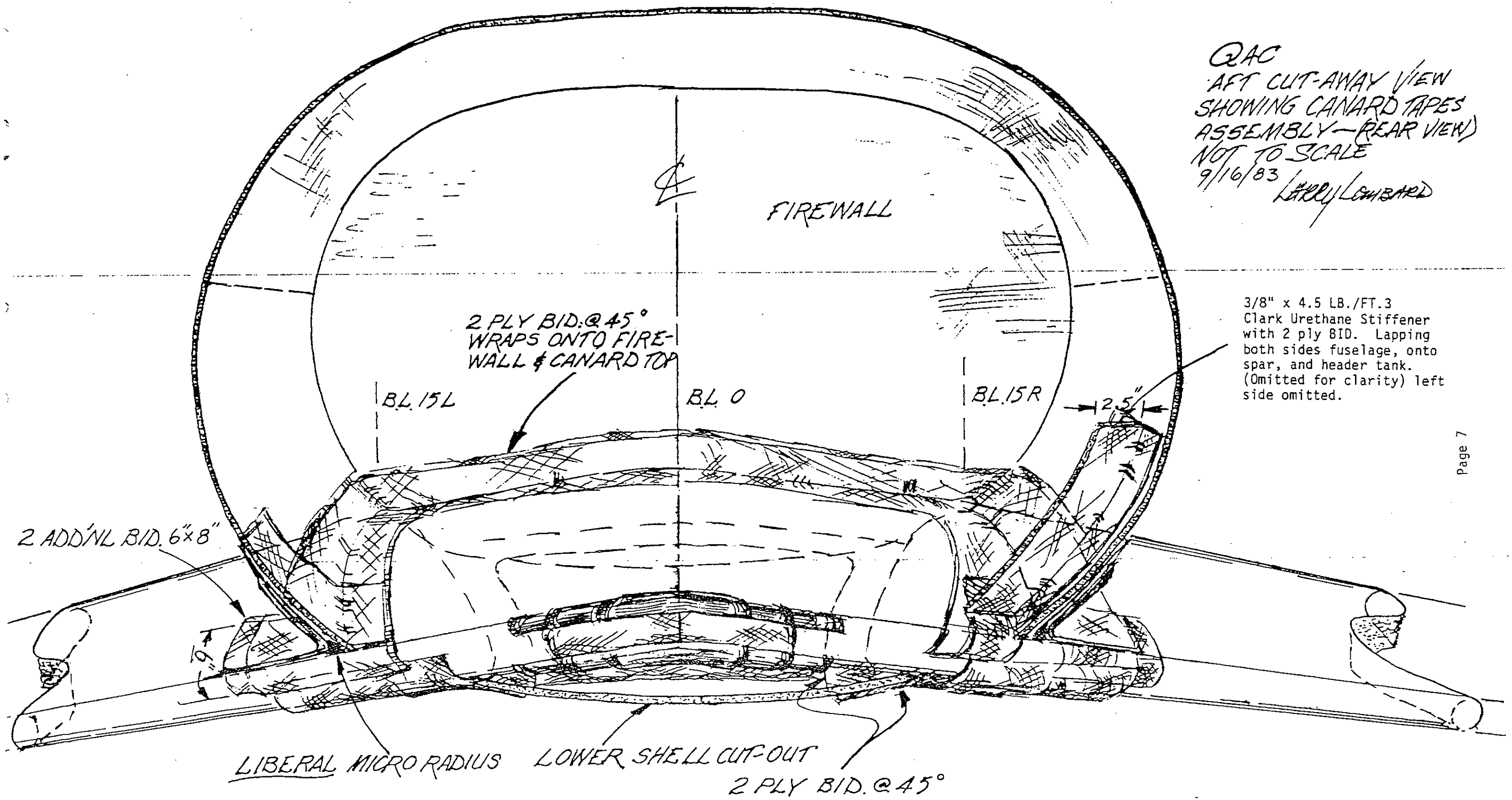




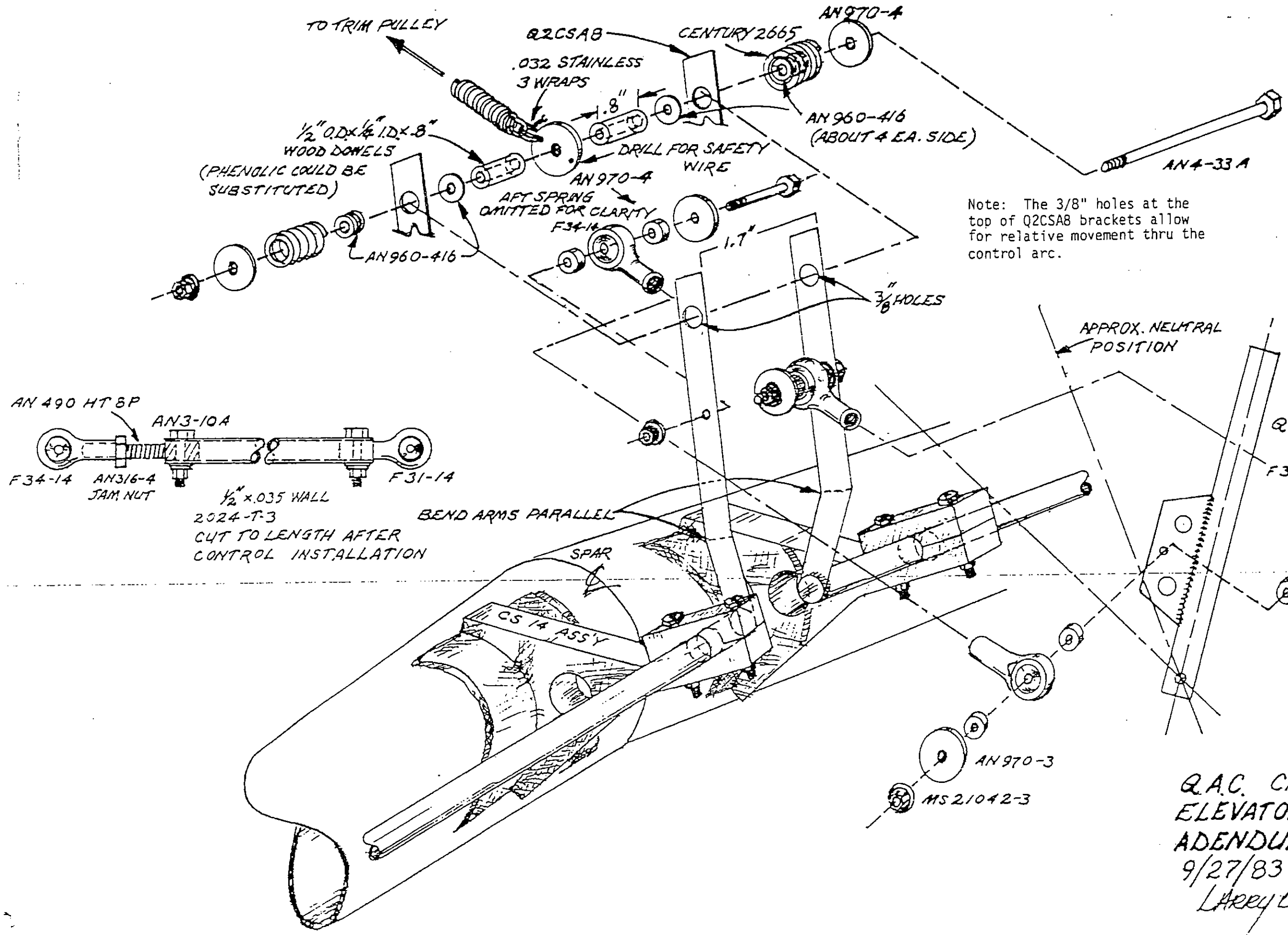


QAC
ADD'NL UND. PLY @
WHEEL PANT
9/19/83
LARRY LOMBARD

QAC
AFT CUT-AWAY VIEW
SHOWING CANARD TAPES
ASSEMBLY—(REAR VIEW)
NOT TO SCALE
9/16/83
LARRY LOMBARD



3/8" x 4.5 LB./FT.3 Clark Urethane Stiffener with 2 ply BID. Lapping both sides fuselage, onto spar, and header tank. (Omitted for clarity) left side omitted.

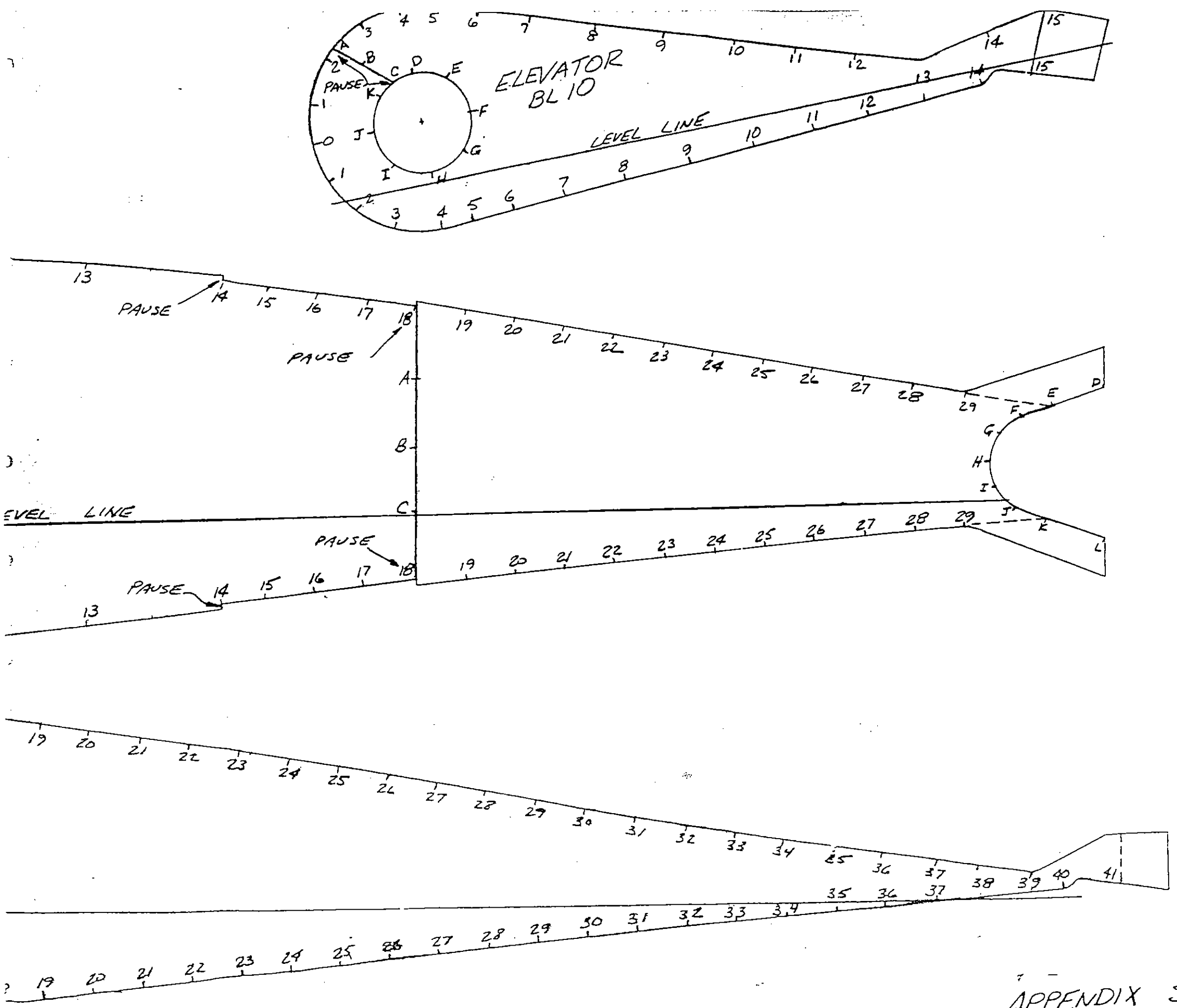


Note: The 3/8" holes at the top of Q2CSA8 brackets allow for relative movement thru the control arc.

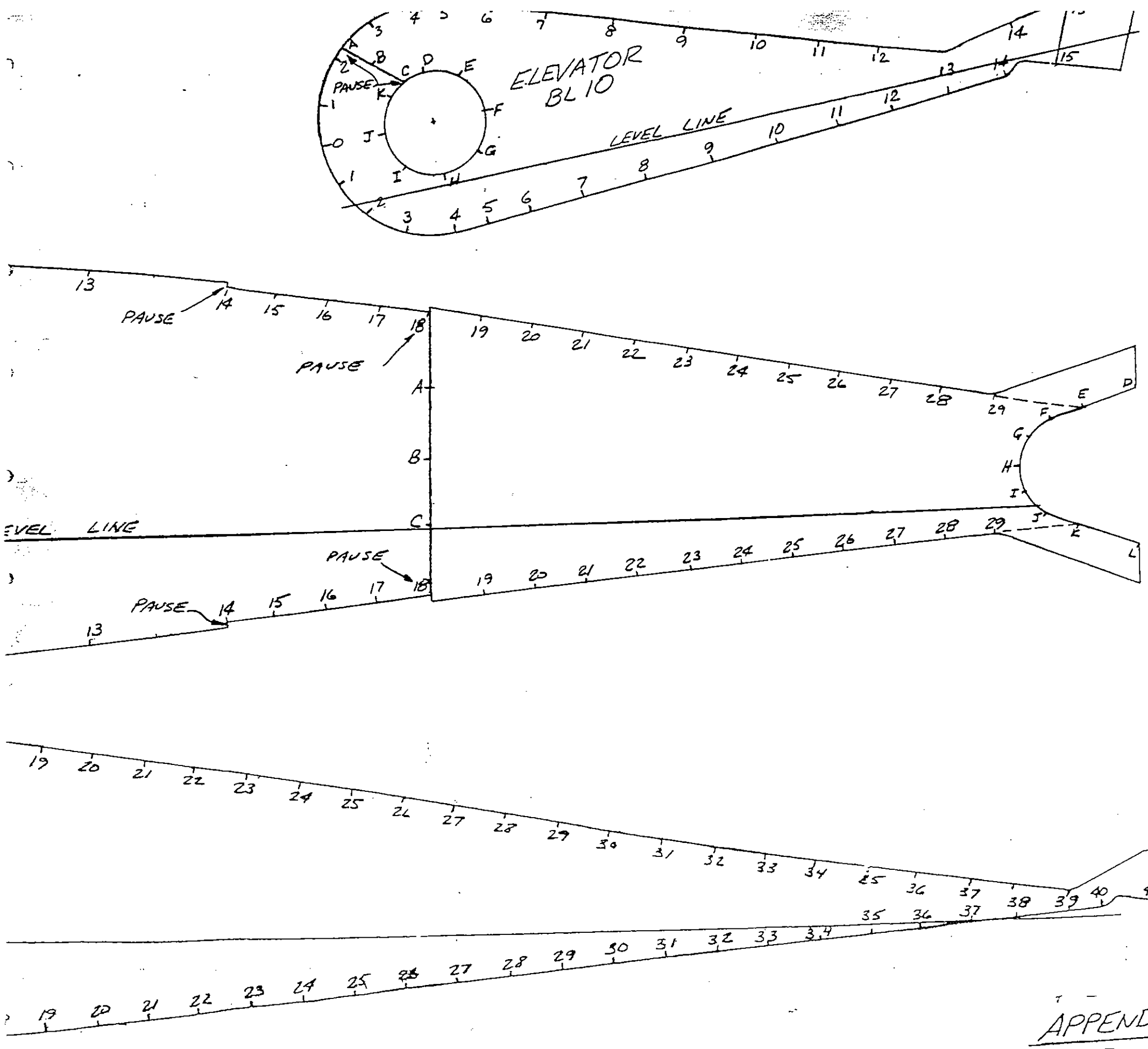
Q.A.C. CHAPTER 10(A)
ELEVATOR CONTROL
ADENDUM

9/27/83

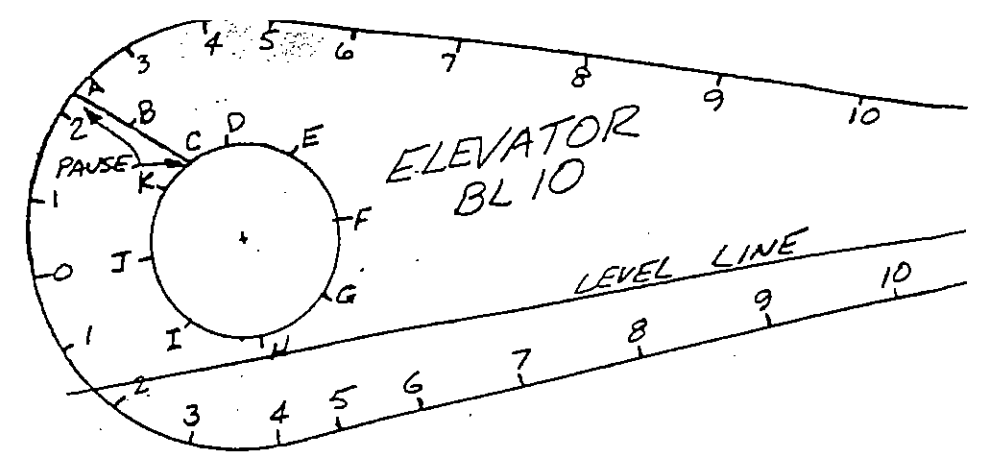
LARRY LOMBARD

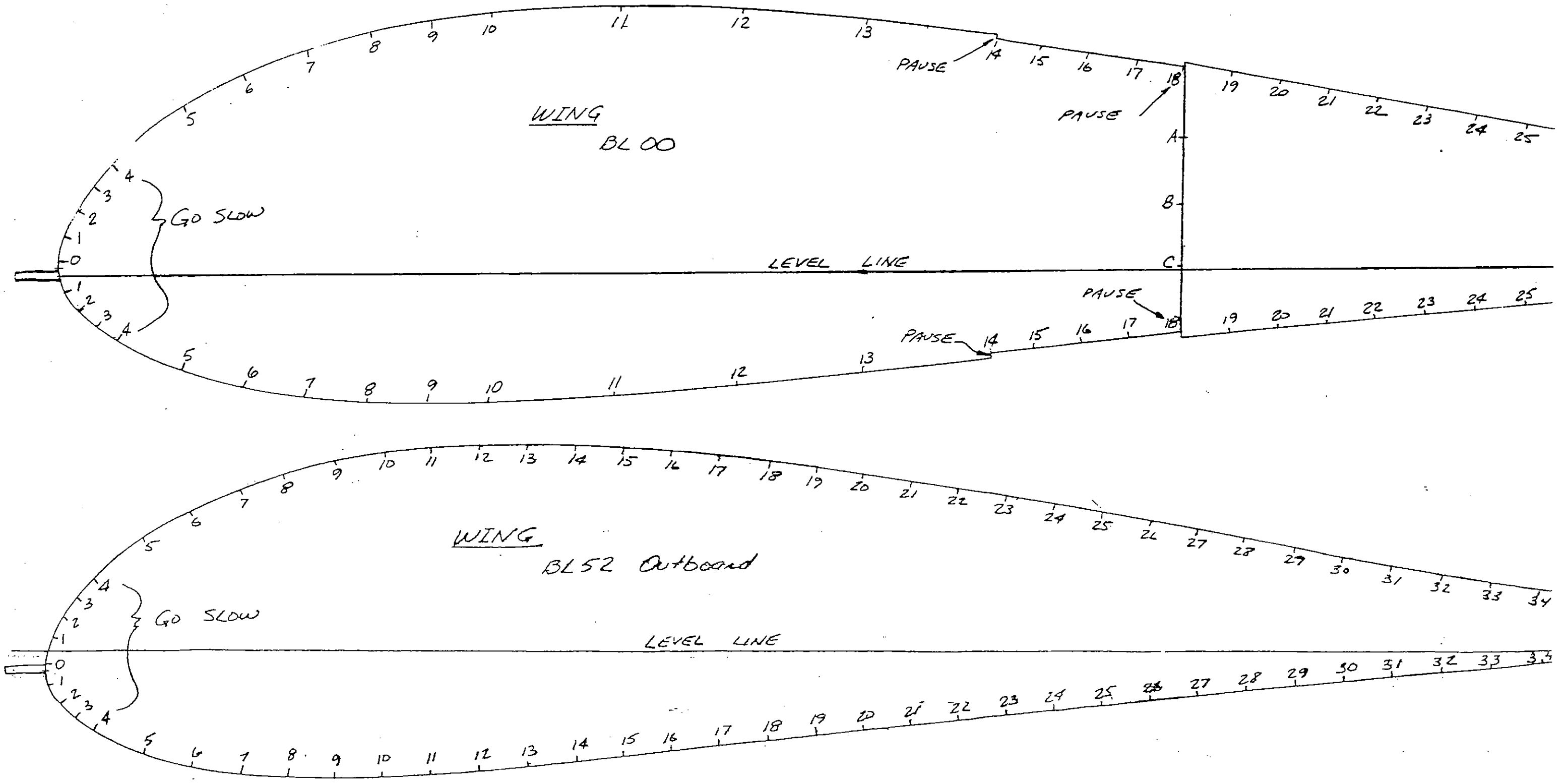


APPENDIX SHEET 2
REF CHAPT 5

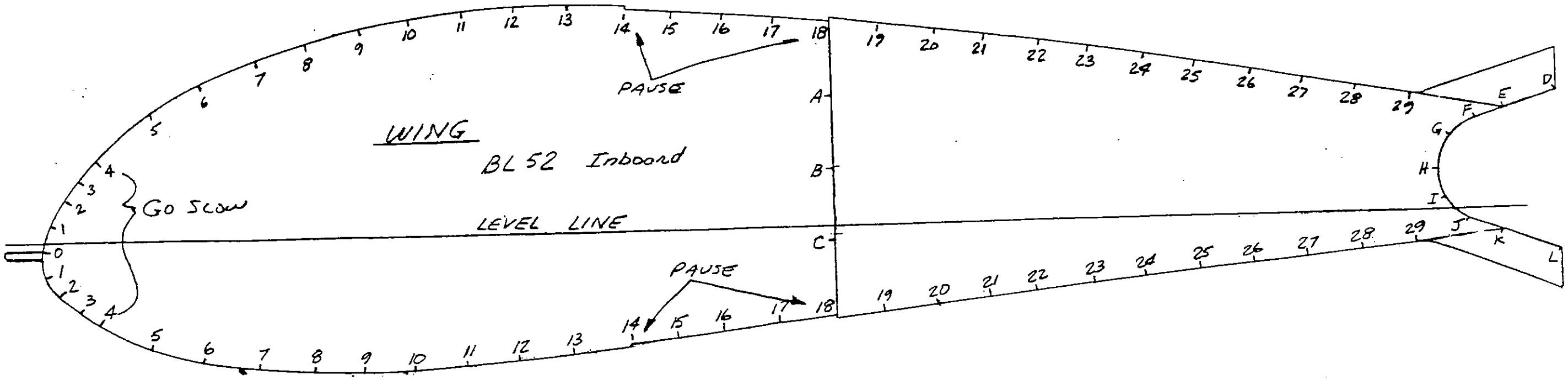


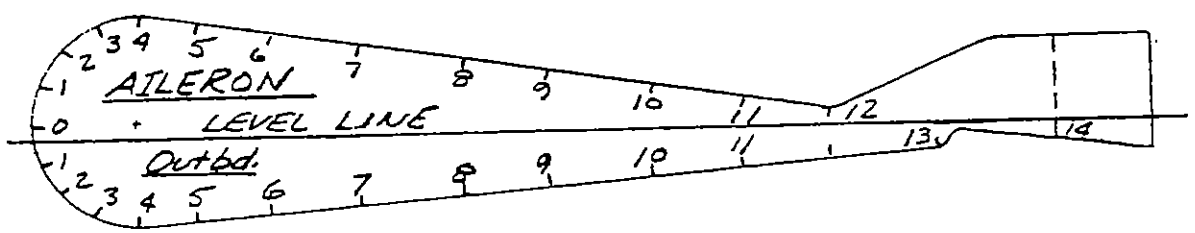
APPENDIX SHEET 2
REF CHAPT 5


ELEVATOR
BL 10
PAUSE
LEVEL LINE

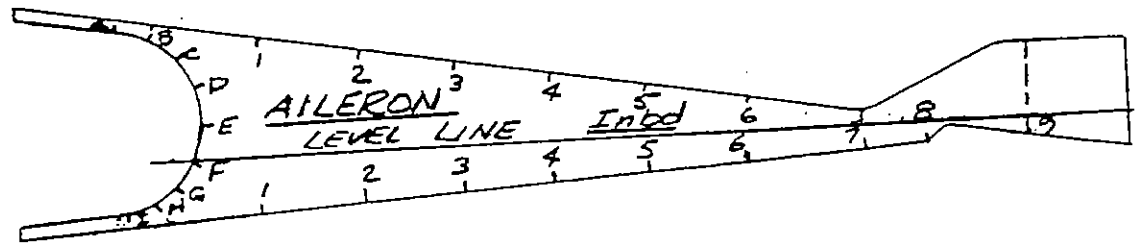

WING
BL 00
GO SLOW
LEVEL LINE
PAUSE
PAUSE
PAUSE

WING
BL 52 Outboard
GO SLOW
LEVEL LINE

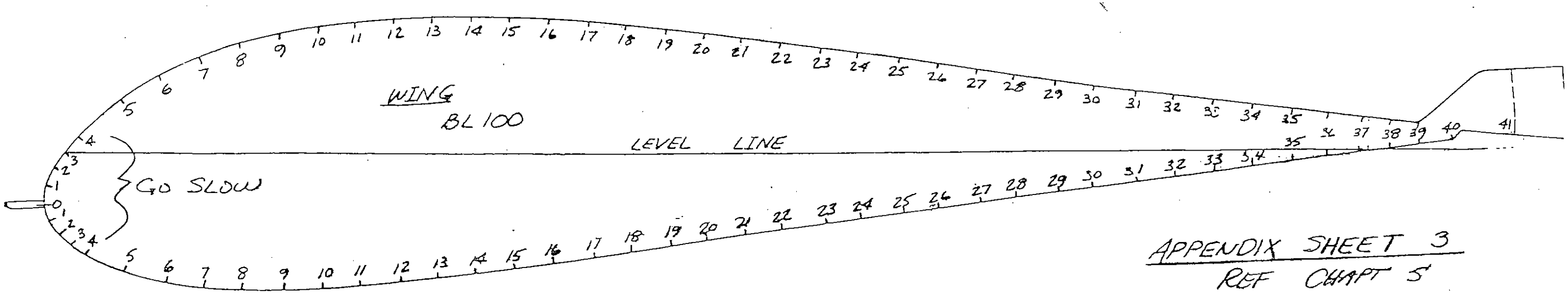




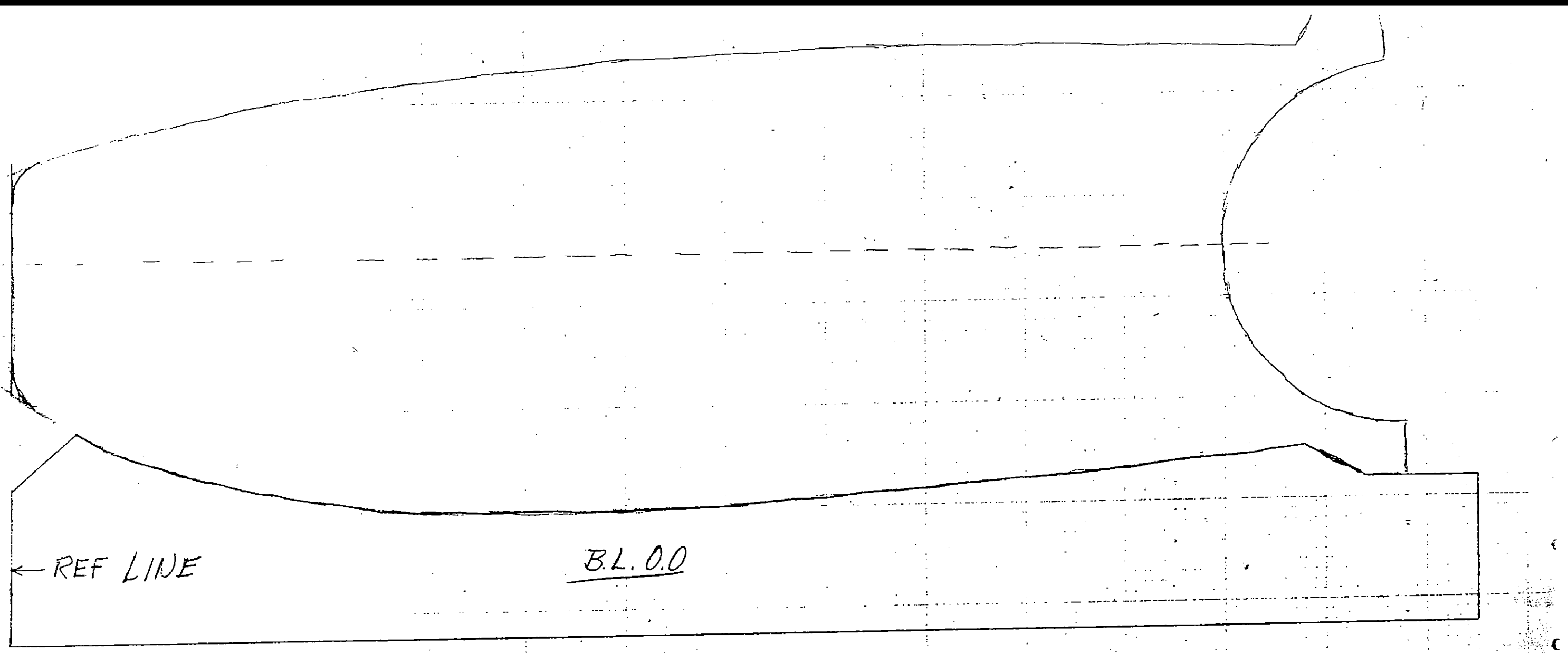
Make 2

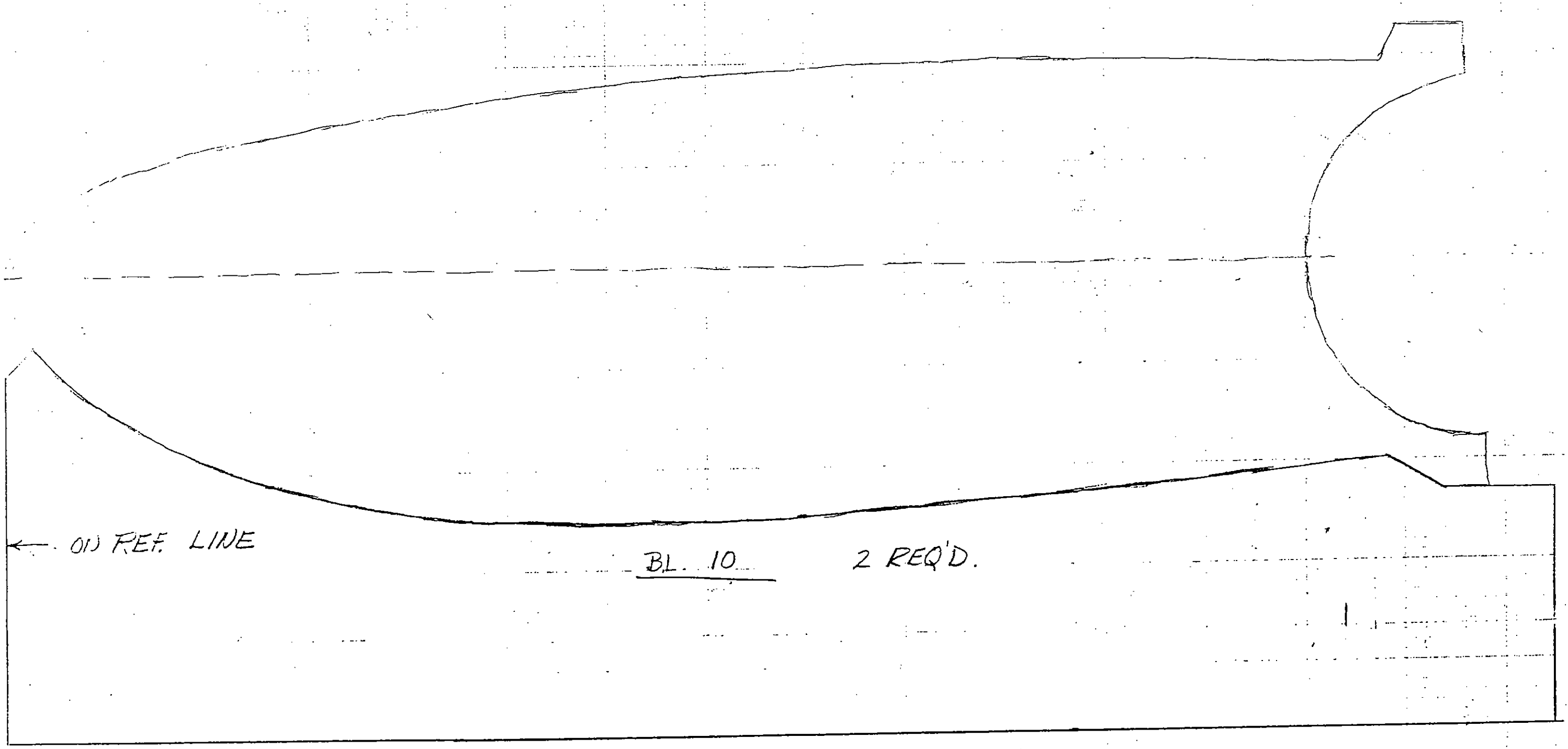


Make 2

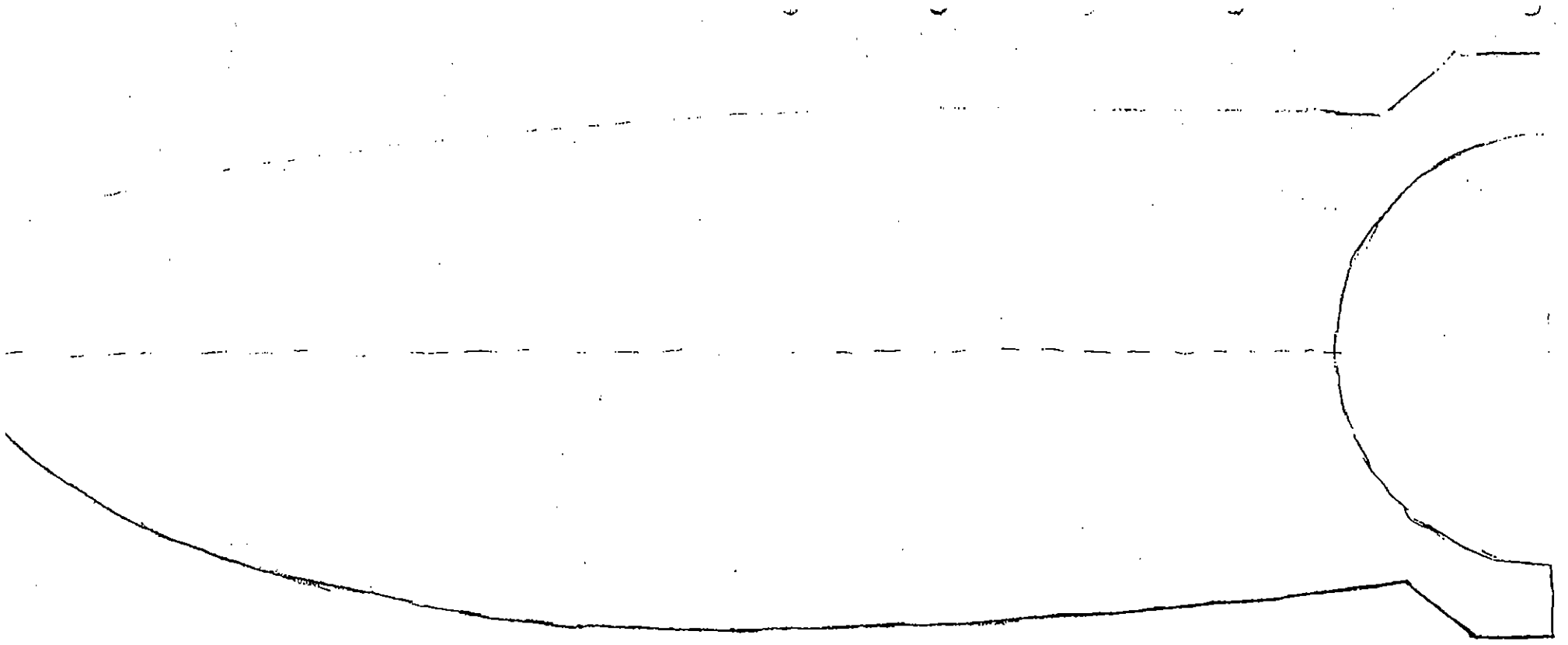


APPENDIX SHEET 3
REF CHAPT 5


REF LINE
B.L. 0.0



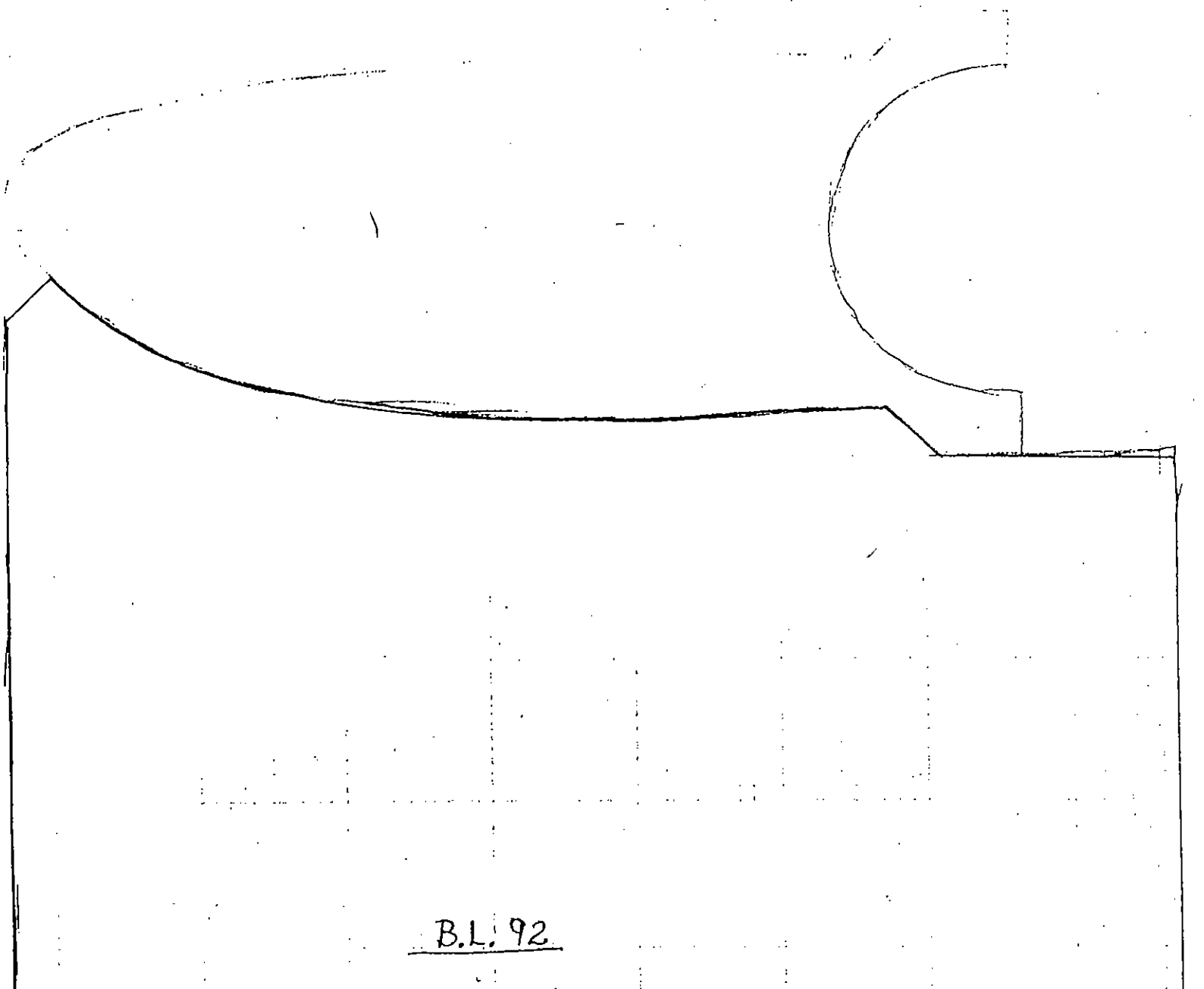
BL. 10 2 REQ'D.



B.L. 51

2 REQ'D

- 6.6" from REF. LINE


B.L. 92
2 Req'd.
← 13.4" from REF. LINE