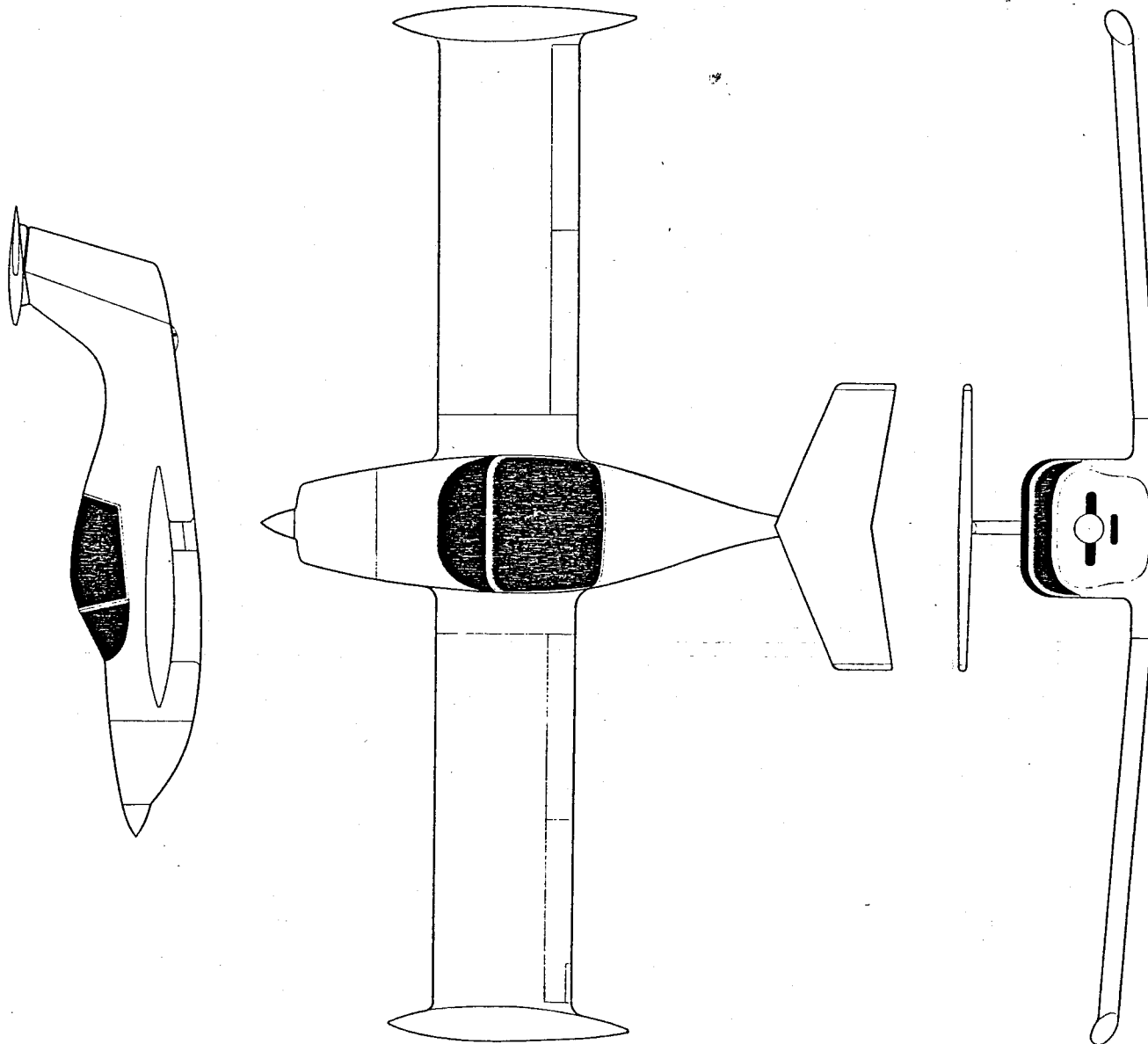


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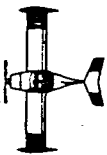


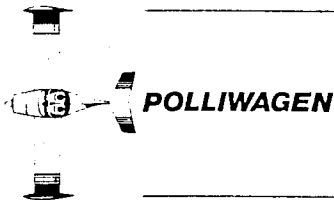
General Specifications

Engine: Turbocharged Revmaster	126 cu. in.
Gross weight	1250 lb.
Empty weight	600 lb.
Useful load	650 lb.
Wing span	26 ft.
Wing area	90 sq. ft.
Length	16 ft.
Height	5' 7"
Power loading	14.5 lb./H.P.
Wing loading	12.2 lb./sq. ft.
Span loading	42.3 lb./ft.
Fuel capacity	19 gal.+
Wheel base	3' 7"
Wheel tread	6 ft.

Performance Specifications

Cruise speed at 2600 m. (8500 ft.)	168 mph +
Cruise speed at 5800 m. (19,000 ft.) Turbo	230 mph ?
Stall speed	51 mph
Take off run	500 feet
Landing roll	500 feet
Fuel consumption	33 GPH
Range	1100 miles

		TITLE		
		Three View		
POLLIWAGEN 8782 Hewatt Place GARDEN GROVE CALIFORNIA 92844		DRAWING NO.	REV-DATE	
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
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POLLIWAGEN

The design of the Polliwagen is the culmination of many years of affectionate interest, study, and dedicated work. It is the result of countless pieces of correlated information, offering new avenues of efficiency and esthetics, filling an obviously existing need. We never imagined the task so great. It could not have been possible, without the invaluable help of Ralph Maloof, Joe Horvath, Dick Schreder, Jack Cox, Mike Machat, Charlie McHose, test pilots Phil Paul, Jim Carter and Russ Hopf; the writings of L. Pazmany and many others too numerous to mention. Sailplane pilot and humorist Herman Stiglmeier was fast to name it **Polliwagen**. Polliwog shape plus Volkswagen engine. "The nickname stuck"! Since composite aircraft structure is a fairly new science, and comparatively little has been written about it, countless test parts were built and tested to destruction prior to incorporating them to the final design. Composite materials offer new roads to easily fabricated inexpensive and efficient design concepts, impossible to attempt with the traditional aircraft materials. It should be noted, however, that a composite structure is hardly adaptable to amateur design practice. It is an entirely new field, which must be developed by structural engineers, with a composite background. Along with the positive assets of composites, the limitations must also be stressed. Prior to failure, metallic structures have a capacity to redistribute loads by plastically deforming, whereas filamentary reinforced materials do not. Failure of composites under load is

usually sudden. Before starting construction, we suggest you do some homework. Start out by reading up on the subject in the many good articles published in Sport Aviation, and Homebuilt Aircraft Magazine.

We also strongly advise that you join the E.A.A., as we believe you will find it a very worthwhile, informative and enjoyable venture.

MATERIALS

Bidirectional glass cloth - especially developed for aircraft use.

Pollitape - 100% unidirectional glass tape, sized to the Polliwagen's structural needs.

Poxipoll - Specially formulated epoxy system used in the Polliwagen construction.

Foams - Urethane 2 lbs. cu. ft. is used throughout. It is colored light green or light tan.

MIXING POXIPOLL

Mixing Poxipoll is a very simple task, once you acquire the proper technique, and always stick to it, making it a habit.

Poxipoll mixes at a 44 to 100 ratio by weight.

NEVER use styrofoam cups, cold drink paper cups or wax covered paper cups.

Stir with clean wooden coffee stick (or tongue depressor) being careful not to incorporate air bubbles. When stirring, rotate paper cup in your hand, making sure the stick scrapes bottom and sides of cup.

You will use three different Poxipoll mixtures in the Polliwagen.

- 1) **Epoxy:** (44:100 mixture by weight without additives)
- 2) **Syrup:** (Equal amounts by volume of the former Epoxy, and microballoons)
- 3) **Heavy syrup:** Epoxy (as in #1) plus as much microballoons as necessary to produce a thick paste that will

not run.

4) **Green Goop:** (Equal amounts by volume of Epoxy and 1/16" milled glass)

Note: Always add the Glass Bubbles to the previously mixed resin and hardener. It is a good habit to leave the used mixing cup very close by the area of the part being built, in which that batch was used. When inspecting the part after curing, also inspect the leftovers in the cup used. Any discrepancy found, you will know where the bad batch was used. Do not reuse cups or mixing sticks. Keep all tools clean.

Now you should get ready to start your first test part.

Remember, that once the part is finished, it is difficult to determine the quality of composite constructed parts. Prior to starting, a very careful visual inspection of the materials to be used must be made. Glass cloth must be stored, marked and cut in a clean area with clean tools and hands. Glass contaminated with dirt, grease or epoxy must not be used. We suggest using a different area for storing, marking and cutting glass. Do not expose glass cloth to foam dust. Small amounts of ink used in marking will not affect the cloth. The roll of Pollitape contains a few extra yards than needed for the construction of the Polliwagen. Mixing or working with epoxy must be undertaken in a well ventilated area, ranging from 60° to 90°F. (18° to 32°C.) 75° to 80° is best (24° to 27°C.)

First coat your hands with Ply #90 Gel skin protector, or similar. Follow directions on container. Most epoxies are water soluble before the resin starts to gel. After gelling starts, cleaning becomes a chore. Use Epocleanse 6001 or similar, for hands, tools, etc. Cut 10 strips of Pollitape exactly 457mm. (18") long. Be accurate. Weight them, and record the figure in the spaces provided on this page.

Glass weight for 10 x 18" a gr. or oz.

Glass weight for 10 x 12" = $\frac{a \times 2}{3}$ = b gr. or oz.

Total weight for 12" test part c gr. or oz.

Total weight for 10 x 12" Pollitape d gr. or oz.

Epoxy content in 12" glass part e gr. or oz.

To find epoxy percentage, use the following formula;

epoxy weight(d) x 100 =
total weight(c)

The ideal percentage should be 35%. A 35% to 40% resin content by weight makes an acceptable part; with 35% the ideal figure.

Cover a corner of your work bench with a (3") long piece of aluminum foil. Using two sections of wood, about 15mm x 15mm x 600mm (5/8" x 5/8" x 24") make a trough 76mm (3") wide as illustrated. Cover with aluminum foil again. Mix carefully, without incorporating too many air bubbles. Lay one 18" section of Pollitape inside the trough, and very sparingly pour some Poxipoll over it. With a clean 2" brush, spread it over the Pollitape with long sweeping strokes, to keep the glass rovings taut. Eliminate voids, stipp-

ling vigorously with your brush until the Pollitape is saturated with the resin. Lay a second section, and without adding more Poxipoll continue stippling. The secret is to draw epoxy from the previous lay-up without leaving dry fibers, air bubbles or voids. Add small amounts of resin only when absolutely necessary. Continue at it until you lay all 10 "plys". Make sure the top surface is smooth, and the thickness of the part is uniform. Let dry for 24 hours. Pull out of the trough. Discard aluminum foil (you may have to use a steel brush.) Trim both ends off, leaving a very accurate 304mm. (12") long test part. Now is the time to inspect the finished part. Measure thickness. It should be 6mm (.024 in.) *Detail inspection, although simple and routine, can provide valuable information, as well as indications that significant changes have occurred in the fabrication process. Assuming that satisfactory parts have been produced, on a given tool and baseline physical data established, small changes in laminate thickness might indicate improper resin flow and resulting degradation of mechanical properties. Physically marking such conditions would result in closer analysis by other inspection techniques to delineate defects that might otherwise go unobserved in normal evaluation.*

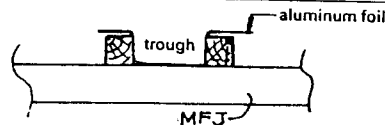
NON-DESTRUCTIVE INSPECTION

It is important that designers and homebuilders working with composite materials be familiar with NDI for the following reasons:

Visual inspection: Visual inspection methods appear to have only limited usefulness. If a part has blisters, the presence of defective areas is demonstrated and the part can be rejected or marked for salvage immediately. If no blisters are visible, however, the absence of defective areas is not proved and the part must be subjected to further tests by more dependable methods. Glass fabric facings, particularly void-free laminates permit visual inspection of the core, and sometimes aid in detecting poor bonds.

Tapping: Tapping is one of the simplest and most effective methods in use for testing for voids in the adhesive bond between the facings and the core of a sandwich part. The only equipment necessary for this test is a small metal piece, such as a coin or a small light hammer. During inspection by tapping, parts should be freely supported, as on three padded points, to eliminate sound interference from the support. A well-bonded area will produce a clear tone, while an unbonded area usually produces a lower tone or a dull thud.

If the first test part is not what you expected, don't feel bad. Make another. For those who have not tried fiberglass layups of this type, it really is not difficult, and after a little experience, one will be surprised how efficient the process is, when a little planning precedes the labor.



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NON-DESTRUCTIVE INSPECTION

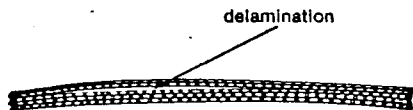


diagram of typical delamination defect (magnified)

voids or minute trapped quantities of air or gas

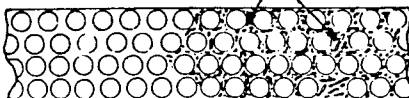
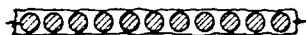


diagram of typical porosity condition (magnified)



normal



resin starved



resin rich

diagram showing effect of resin variations

Plate 1

Master Folding Jig: As any other high efficiency machine, the Polliwagen must be constructed with a high degree of accuracy. This can be accomplished by building the Master Folding Jigs (M.F.J. as it will be called from now on). This is a 14'9" long table, that folds to just over 9' long. The materials required are: 4 sheets of Crezon particle board. (Crezon is a particle board finished on one side with a hard smooth surface.) 8 legs of 2" by 4" pine, 1 lb. of 2" finishing nails, epoxy, 48" piano hinge, and some sand paper. The legs in the 66" section are adjustable, and they provide you with 4 different settings.

F1 - flat surface 177" x 40" for building the basic fuselage.

W+ - Appropriate positive dihedral for working on the wing in the normal position, +4°

W- - anhedral. To be used when working on the bottom of the wing, and on the wing spar, -4°

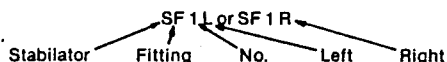
S1 - set up used to build stabilator spar, +2°

Build it following drawings, epoxy the whole structure together and nail it at 6" intervals, (counter sink nails). We recommend light sanding the Jig, and coating exterior frame (not the top) with grey cement floor epoxy paint. (Use 7" short fuzz roller.) Using a carpenter's chalk line, mark center line, with very sharp felt pen marker, draw fuselage top view. Using a different color marker, draw stabilator spar and stabilator plans. Coat whole M.F.J. with coat of clear epoxy. You are now the proud owner of a Polliwagen Master Folding Jig. In order to keep your masterpiece clean, we recommend spraying it with a very light coat of Spray Rubber Cement, and immediately roll .004 P.V.C. film over it. When the film becomes dirty, you just have to pull it off, wash the M.F.J. with solvent and re-coat it. When you Polliwagen is finished, other Polliwagen builders will probably want to buy it from you, besides, the M.F.J. makes a perfect picnic table too!

BUILDING THE STABILATOR

We recommend the Stabilator as a good starting point, as every technique used in the construction of the Polliwagen is encountered when building it. If you should make a mistake, you can always make a second unit with very little extra work and expense. Always Study plans very carefully before starting to work...Remember, measure twice, cut once...

Sample of fitting code name



When enlarging the plans to full size, we strongly recommend doing it on some thin cardboard material (or 1/16 plywood or thin aluminum). Mark accurately with felt pen and cut out with Xacto knife on straight edge. This procedure makes for very useful patterns.

It is advisable to make the necessary metal fittings first, to have them ready when needed. In the stabilator you will need:

Fittings: SF 1 (right and left) and SF 2 (right and left) We strongly suggest using the Kit parts (see attached parts catalogue) as the builder receives aircraft quality parts, for a fraction of the effort and expense it takes to make them at home.

Cut reinforcement S 1 from 6mm (1/4") aircraft plywood. Drill the 6 4.5mm (3/16") holes. Prepare wedge edges with grinder or sanding disk. Sand all surfaces with 180 grit sandpaper.

From a 25mm (1") sheet of U-210 cut spars S 2 (2 required)

From a 51mm (2") sheet of U-210 cut blocks S 3 (2 required) and triangles S 4 (2 required.)

Set Master Folding Jig (MFJ) to angle "S" (+2) Glue the two S 3 blocks with "syrup" and hold together with 3 1/2" nails. When dry, sand to conform with the front view.

Bevel ends of S 1, S 2, S 3, S 4 to the proper angles as shown in the respective top and front view drawings.

Carefully position front section of center rib S 7 between SF 1 L and SF 1 R, drill 3 3mm (1/8") holes as shown in the plans. Pop rivet with 1/2" long x 1/8" dia. rivets.

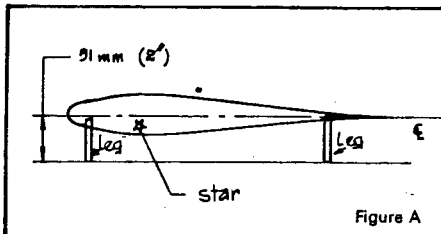


Figure A

Note: Stabilator is built upside down.

Center this unit on S 1 clamp and check the fitting of the 6 4.5mm holes. Using sections of stirring sticks, prepare 6 legs as illustrated in figure A.

Five minute epoxy them to ribs, making sure the 51mm (2") height is accurately kept.

Note: Stabilator airfoil is asymmetrical, make sure marks (stars on kit ribs) are down, because stabilator is built upside down.

Next, cut 4 each S 5 and S 6 from 51mm (2") foam. Sand 1mm (1/32") step on facing side of S 6 according to figure B.

Using syrup, glue S5 and S6 in pairs positioning 2mm x 25mm (1/16" x 1") plywood strips in aforementioned slots, see figure B. Hold "sandwich" with 3 1/2" nails, making sure plywood strips are perfectly straight. This will be the "bone" of the trailing edge, be accurate, as you would not want a sagging trailing edge. Using 20mm x 20mm (3/4" x 3/4") wood strips, prepare the "fence" necessary to accurately build the stabilator spar. Cover with Saran Wrap or Aluminum Foil. Using syrup, glue S1 to S3. Position this assembly in the spar fence, on the hinged area of the M.F.J. Add S2R and S2L holding the group together with 3 1/2" nails and weights. We call this

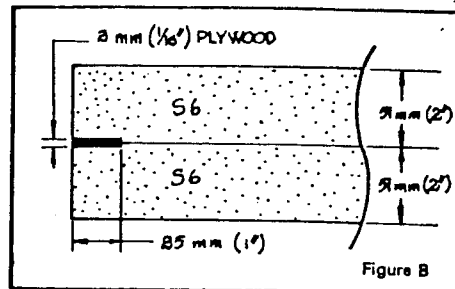
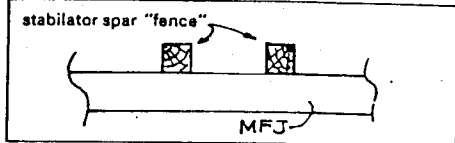
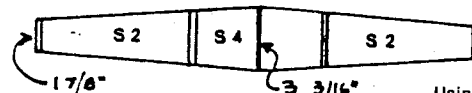


Figure B



unit the "Stabilator spar core". When drying, cut 8 fiberglass webs and carefully set aside (use temp-late S 10).

Before continuing, the whole spar core has to be sanded to the proper final dimensions. This will also even out any differences in height between S 1, S 2, S 3, and S 4s. The front view of the spar core should conform to the dimensions shown below. When the caps are added, and the final wrapup is accomplished, the stabilator spar will measure 87mm (3 7/16") height at the center (S 7) and 51mm (2") at the tips (S 8s).

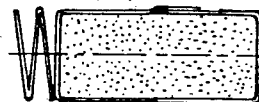


Using syrup, cover spar core with two webs as illustrated in figure C, one on the right side and one on the left, overlapping in the center about 710mm (28").

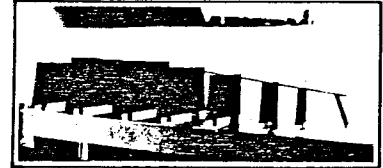
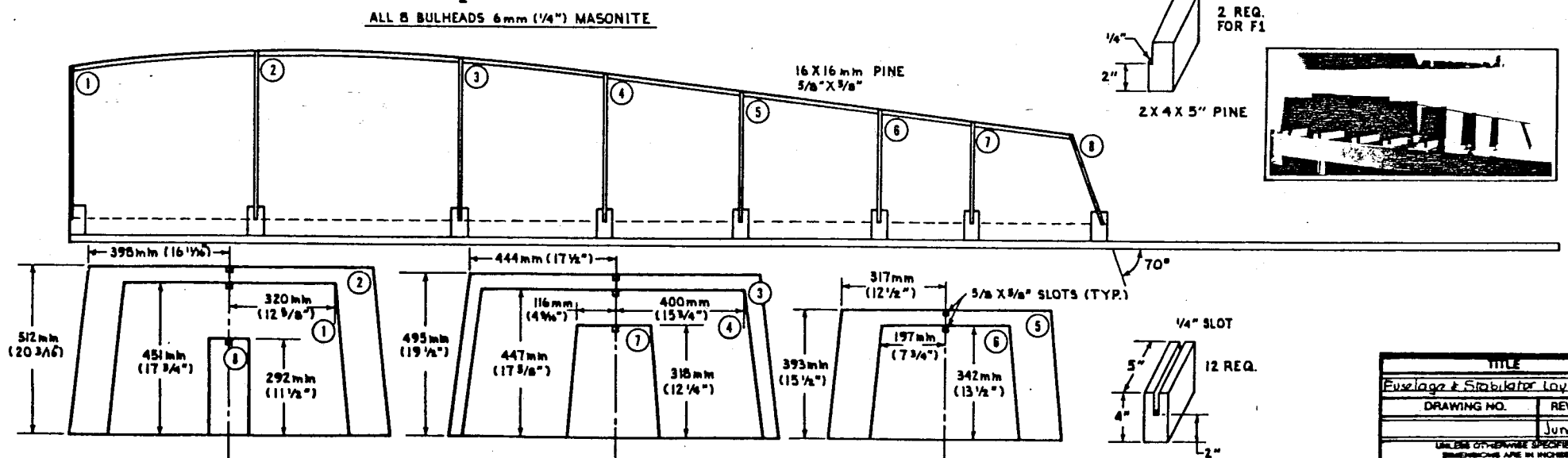
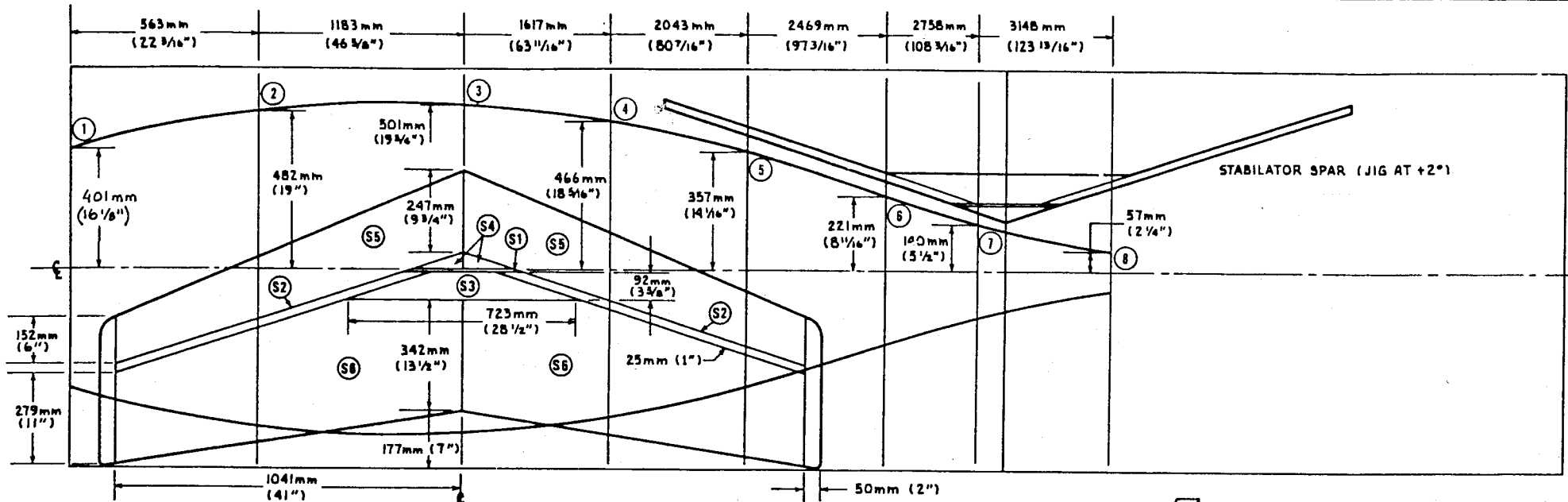
Note: Never use syrup between layers of glass. Use epoxy on overlapping sector.

Return stabilator spar to the "fence". Let dry 24 hrs. Remove from M.F.J., sand rough edges, vacuum dust and repeat operation, fixing opposite web, overlapping again over the center.

Momentarily, return spar to fence with the fresh side up. The spar cap must be layed now. Using our 3" Pollitape and epoxy, lay a 3 pleated accordion, as illustrated. 2240mm (88").



Cut a 710mm (28") length of Pollitape and lay it as in Figure E. Remove from "fence" re-cover area with new Saran Wrap, and VERY CAREFULLY flip over



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Fuselage & Stabilator Layout		
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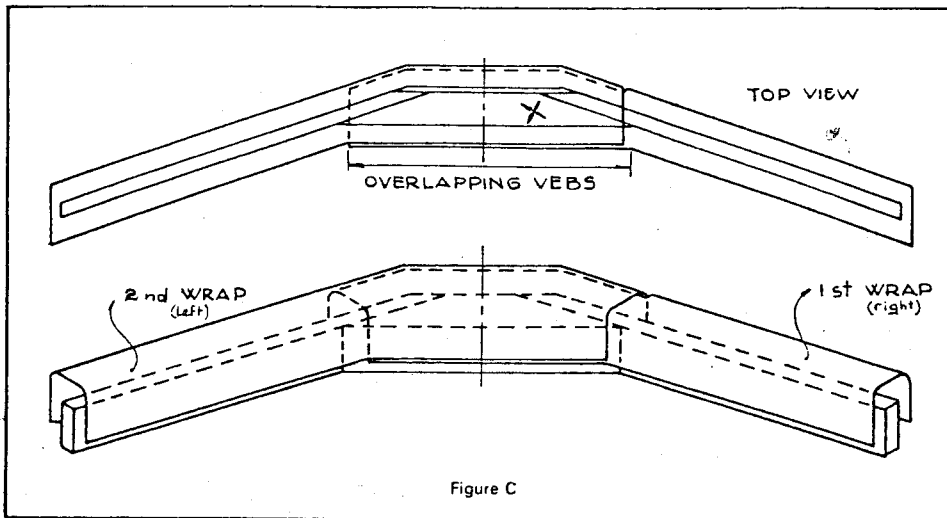


Figure C

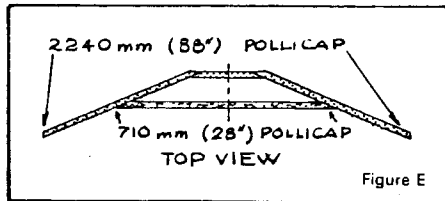


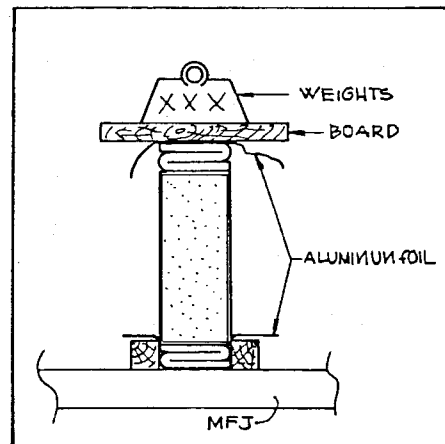
Figure E

spar into "fence" (spar cap will now be in intimate contact with your very accurate M.F.J. set at +2". Weight spar heavily in order to insure a good glue line between core and cap. Let dry 24 hrs.

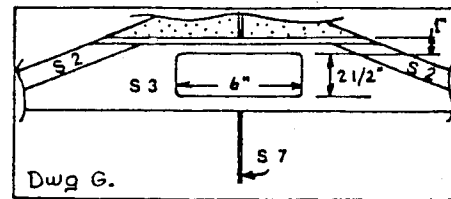
Soon we will be laying the cap on the other side of the stabilator spar. When adding fiberglass cloth to a dried (set) glass structure, we must ALWAYS prepare the area dry-sanding with 180 grit, until dull, being careful not to damage glass cloth, by blowing dust away (or vacuuming) and/or washing part with MEK or cheap laquer thinner (good laquer thinner, contains oils.) After MEK or thinner evaporates, repeat operation on the other side, and reposition in freshly Saran Wrapped fence. Weight down. Let dry 24 hrs. Repeat sanding, vacuuming, washing operation over whole stabilator spar. Round all corners as in figure F.

Using the 4 remaining glass cloth parts, cut with pattern S10, repeat operations as illustrated in pictures C and D. Let dry 24 hrs. Now, cut out opening for SF2 and R1. Following plans, mark centers of 9mm (3/8") corners, drill them and using a sabre saw, cut all four sides slightly undersize and file to proper shape. Using a tablespoon, remove foam from opening, until you reach the upper web.

(Dwg. G)



Position stabilator spar on the plans. With 5 minute epoxy, glue rear section of ribs S7 and both S8 ribs to the spar. Use 2" glass squares to reinforce corners. Using syrup glue both S5s and S6s in position. Weigh down. Check very carefully that the center line of S7, S8s and plywood trailing edge are positioned exactly 2" from the M.F.J.!!! Let dry overnight. Using T1, and with a helper holding it down, shape the underside of stabilator. (Remember, Stabilator still upside-down.) Running one of the ends of T1 exactly on Rib S7 with a chordwise stroke, going around leading edge about 1". Nail stabilator



Dwg. G.

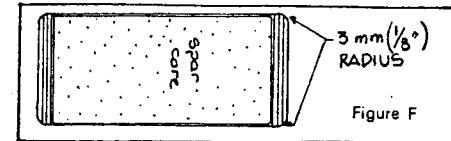


Figure F

to table, check again as indicated before. Cover stabilator with bi-directional, going around leading edge 20mm (3/4") with first layer, and 13mm (1/2") with the second ply. Let set for 48 to 72 hours. Remove from M.F.J. and flop, shimming it with U 210 scraps. Shape second side using same procedure. Feather wrap-around glass. Cover with two layers of bi-directional, overlapping on opposite side 20mm (3/4") and 13mm (1/2"). In order to insure a knife-like trailing edge, we cover it with Saran Wrap, and clamp trailing edge between two very straight strips of wood, aluminum or steel, as illustrated. Let dry 24 hrs., feather the new overlap, and you are ready to glue the tips supplied with the kit. Cup opening in the underside as shown on plans.

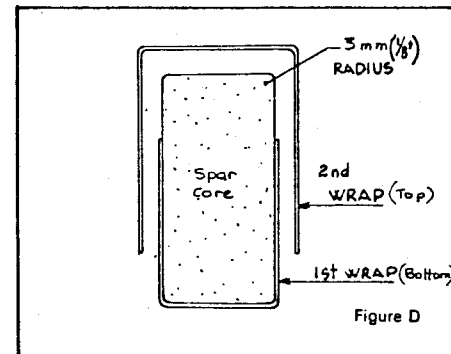
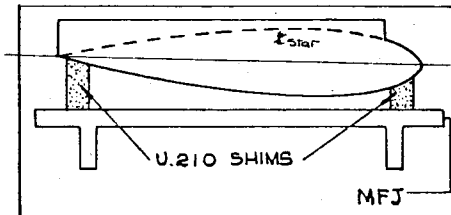
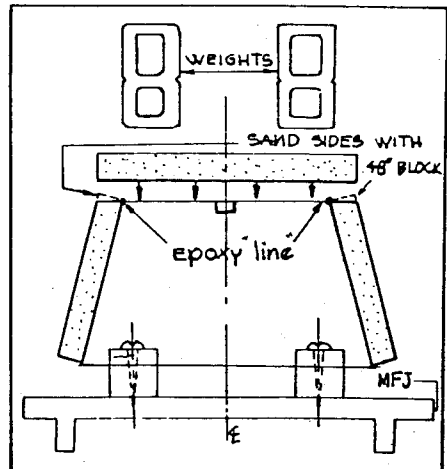


Figure D

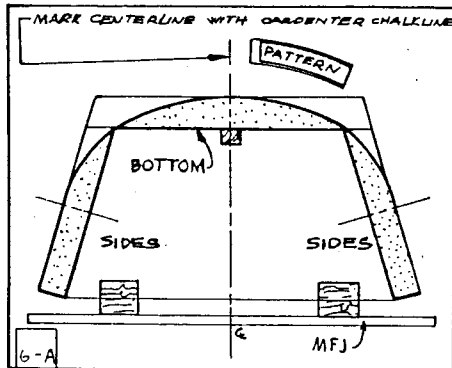
Building the Fuselage:

Before erecting the simple fuselage jig, we must prepare the three planks that will form the sides and the floor of the basic fuselage (we call it "The Tub"). Using the information on plate #5 trace the parts on 51mm (2") U210. (You will have to add a small section to the back end, to reach the full length.) With syrup for the first layer, cover the three planks. With our glass cloth at 45° following with another 45° layer. Remember, glass cloth to foam use syrup (one part epoxy and one part microballoons by volume). Glass cloth to glass cloth, use epoxy only. Let dry 24 hrs. This gives you an opportunity to assemble the fuselage jig.

Building the Fuselage: With the experience gained building the stabilator, you should be able to put the basic fuselage together with just a few days work. We must accurately cut the 8 jig bulkheads out of a sheet of 6mm (1/4") Masonite. The 15 blocks cut from a length of 2" x 4". A strip of about 5/8" x 5/8" strip through center line cut outs on bulkheads, checking perpendicularity of them to M.F.J. We used a cross rigging of wire between bulkheads 3 and 4 to keep everything square. Be accurate. Notice that #8 is tilted forward at a 70° angle. Once everything is square, secure 5/8" square strip to bulkheads with 2 drops of 5 min. epoxy. By this time, the 3 planks should be dry. Cover upper corners of the 8 bulkheads with sections of aluminum foil. You don't want your "Tub" permanently attached to the fuselage jig. The two side planks are attached to the jig first. Steel springs, strong rubber bands, or bungees and wire are used. See photo. Use small wood blocks to distribute pressure over nude foam glassed side faces in. Check for an accurate 2" gap between the bottom of sides and the M.F.J. Once satisfied with the position of both sides, using 1200mm (48") sanding block, sand the edges of both side walls to a flat surface (see picture) with strokes parallel to the fuselage axis, using the 5/8" square



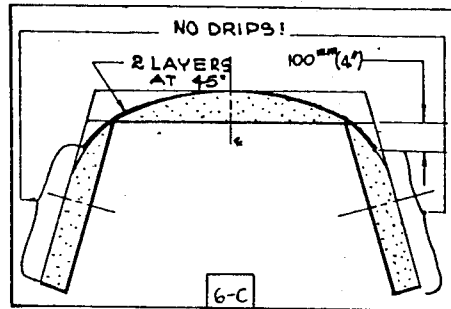
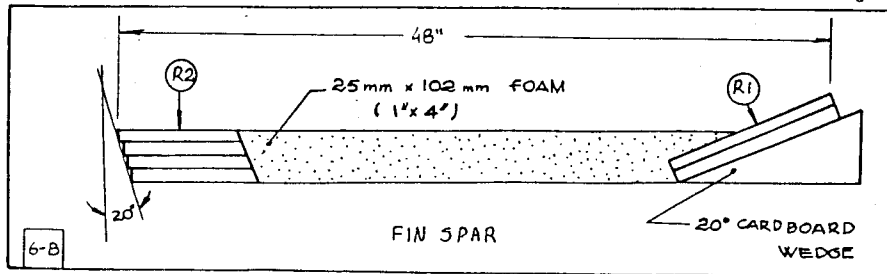
strip as a guide. This will prepare the sides to accept the bottom. Using clear epoxy, pour a thin line over the glassed (inner) corner of both sides. With some helpful hands, lay bottom plank in position, being careful not to smear the epoxy lines. Don't worry about a perfect joint, as this is just a tacking procedure. Let dry 24 hours.



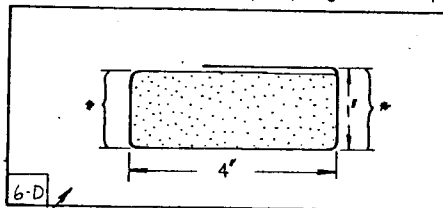
Enlarge firewall pattern on a 6mm (1/4") aircraft plywood (horizontal grain) and cut out. Using clear epoxy glue firewall to "Tub". While "Tub" is drying, you can work on the fin spar. From a 25mm (1") sheet of U210, cut a piece of 102MM (4") wide by 1200mm (48"). Cut 2 R1's from 6mm (1/4") plywood with grain at 90° of each other, and 4 R2's alternating grain direction. Epoxy the 2 R1's together, cover with aluminum foil, and stack the 4 epoxied R2 pieces on top and weigh down with concrete blocks while drying (at least 24 hours.) (See picture.) Now you can start shaping the bottom half of your "Tub".

We recommend making some plywood patterns to check symmetry. Using chalk line, mark center line of "Tub's" bottom. Carve slowly, shaving a little off each side at a time. Walk around it, observe your progress, compare, ponder.

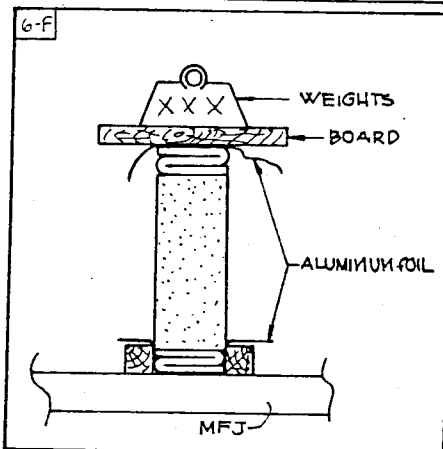
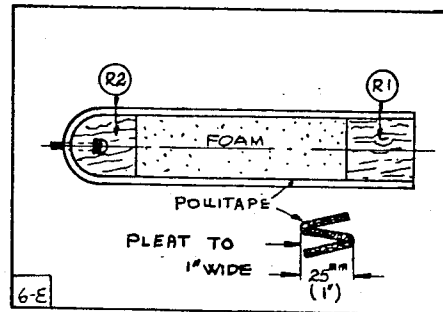
Measure twice, cut once! Continue shaping until you reach the inside corners, all along the length of the "Tub". Study picture again. When satisfied with your work, get ready to glass the outside bottom. Cut enough cloth (at 45°) to cover the bottom and about 100mm (4") section of each side. See picture. 6C



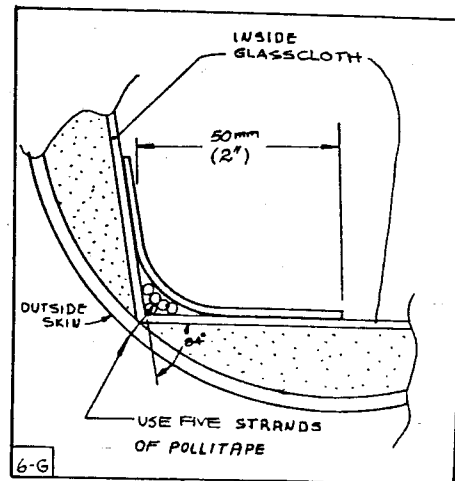
As always, use syrup to attach the first layer of glass to the foam, and clear epoxy for the second layer. Make sure outside glassing becomes attached to the inside glass at the corners! This will transform sides and bottom to very sturdy D spars. Do not drip epoxy below the 4" line, as it would make the carving operation later very difficult. Let dry 48 hours. Meanwhile, back to the fin spar!!! Cover a 1' x 5' section of the M.F.J. with Saran Wrap or aluminum foil. 5 minute epoxy R1 and R2 as illustrated. When dry (handle with care, it is very flimsy) glass at 45° with wraparound layer. Use syrup on foam and clear epoxy on wood and overlap. When drying, nail to the M.F.J. two 5/8" x 5/8" x 48" strips, 27mm (1 1/16") apart. Cut a 2540mm (100") length of Pollitape.



Sand 25mm (1") sides of glassed fin spar with 100 grit, blow (or vacuum) clean. Soak Pollitape with epoxy, squeeze excess out, and starting at the upper corner of R1, carefully pleat wet Pollitape to 25mm (1") width wrapping cap around curved bottom end and up the other side. Now set spar on (1 1/16") wide cradle, protected with Saran Wrap. Cover spar with more Saran and using a 4' long board weigh down



evenly. 24 hours later, the spar is sanded with 100 grit, it's corners rounded to the customary 3mm (1/8") radius, vacuum and with extreme care not to leave finger prints, wrap with a last layer of fiberglass at 45°. When dry, drill the 25mm (1") hole in R2. With a rasp, square hole following plans. Now drill hole, tap to 3/8" x 20". Thoroughly wet with epoxy inside thread and tie down bolt. Screw bolt in, secure with 25mm (1") washer and nut. Fill hole with heavy syrup. The fin spar is done. After 48 hours drying time, the "Tub" will be a very sturdy unit. With wire cutters cut the wires that kept the "Tub" sides in place. It will sound like a bomb!!! Next, with a helper shake the "Tub" loose, lift it and set it on the floor near by. With 100 grit, sand the interior of the "Tub" vacuum and refrain from touching. The fuselage jig can be removed now. Be careful, you probably will find a local Polli-builder that will want to buy it from you. Cut a 450cm (150") long section of Pollitape. Pull out 5 strands from it. Wet with clear epoxy, and lay in corners from nose to tail. See illustration. 6G Immediately, cover with 100mm (4") glass strip cut at 45°, making sure all air bubbles are pushed out. Using the same procedure, reinforce the junction of the firewall to the "Tub" on all 3 sides.



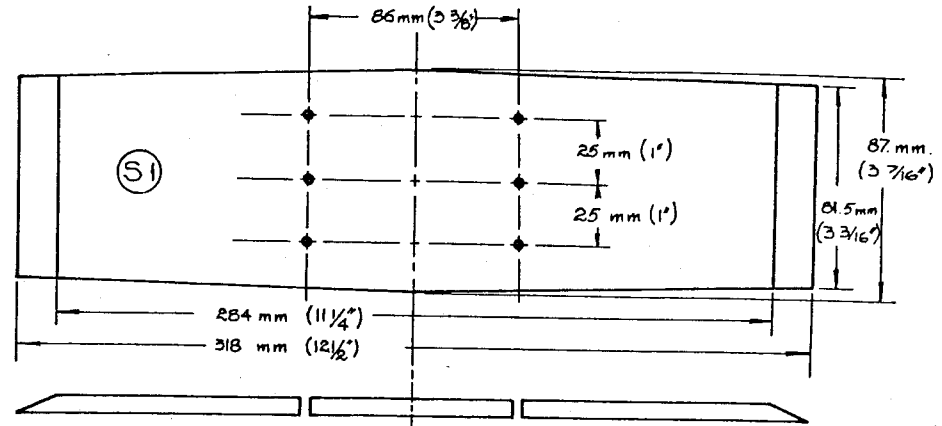
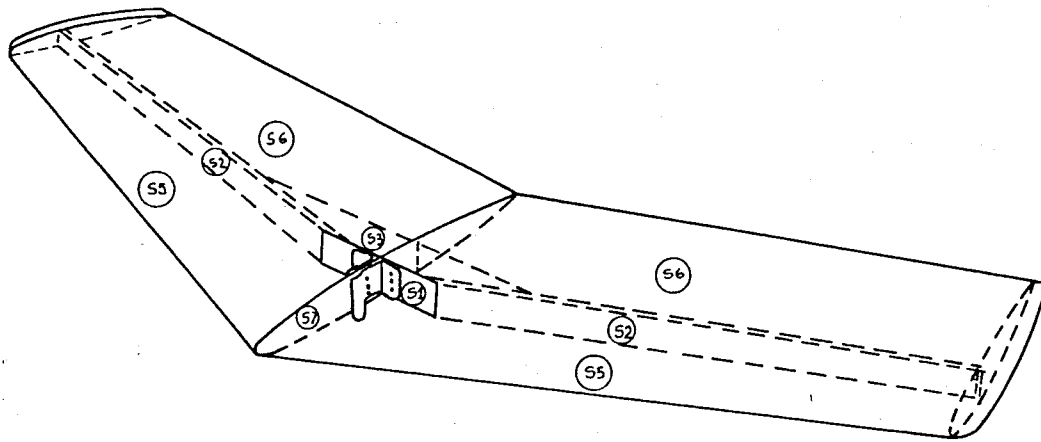
Put "Tub" back on the M.F.J. upside-down. Measure carefully the position for the tunnel (make a cardboard template, if necessary) mark it on the bottom of the fuselage and with a long bladed sabre saw cut the opening. (remember: Measure twice, cut once!) Vacuum.

Sand sides of the tunnel until dull.

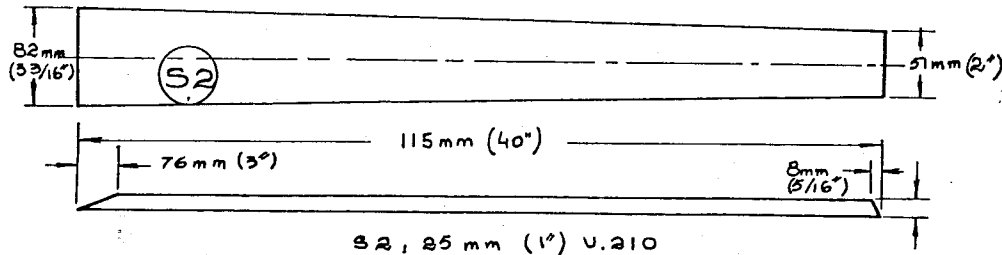
With "green goop", glue tunnel to Tub. Using some wood blocks, inside the lower edge of the tunnel, to press it against the opening in the Tub. Size of the wood blocks: nose section: 3 3/8" x 8 1/2", center part: 26" x 4 3/4" and tail end: 21" x 3 1/8". (See tunnel on page 10)

When dry, round edge to the customary 1/8" radius. Using 2" wide strips of bidirectional at 45° and five Pollitape strands, reinforce tub-tunnel joints, as shown in drawing 6-G.

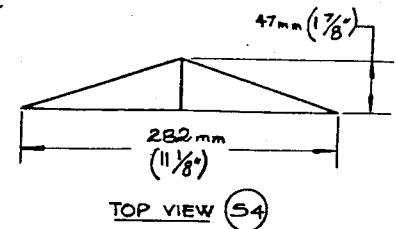
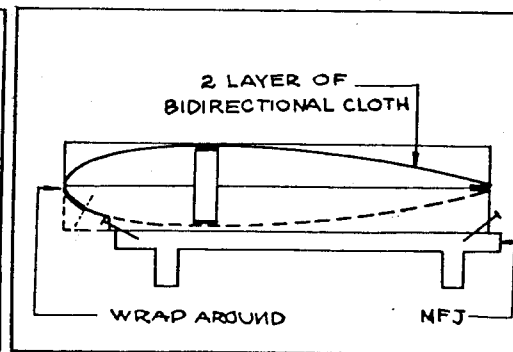
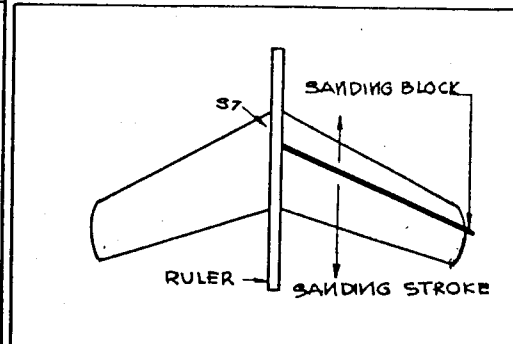
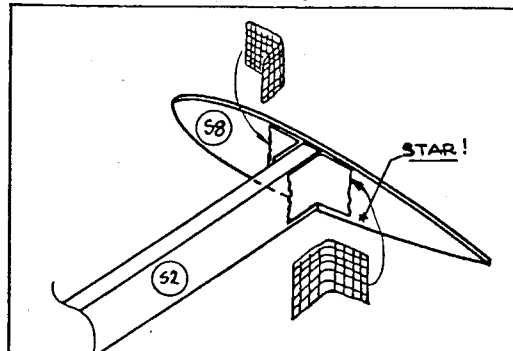
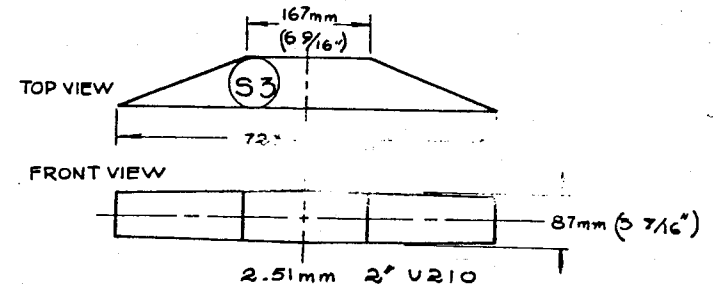
Sand fin spar, until dull (do not cut into the glass web!) Vacuum it...Using a 2' level, set "Tub" on M.F.J. Check top border (side view) for perfect horizontal setting, and in the opposite direction (front view) using the floor at about station 3. Shim with scrap foam...Load "Tub" with about 4 or 5 concrete blocks. Sand last 150mm (6") of the "Tub" and fin's insides in preparation to the attachment of the fin spar. Vacuum!!! We like making very simple jigs for all operations. A 4' long cardboard triangle is very helpful to align the fin spar. Use carpenter



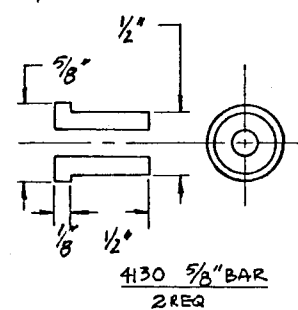
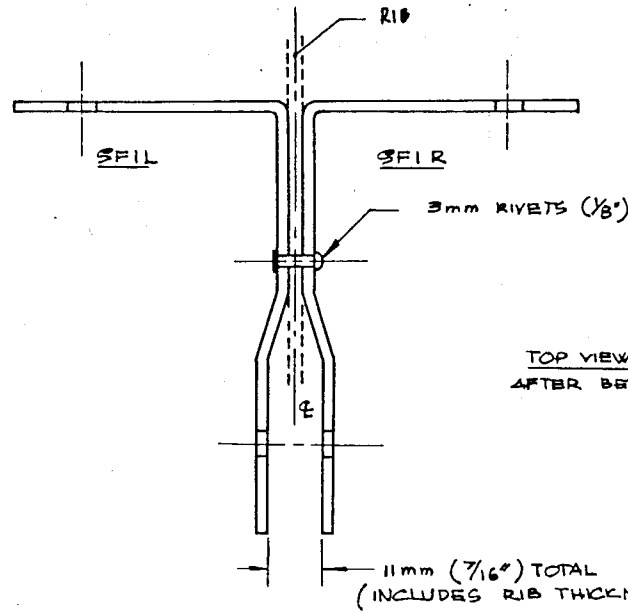
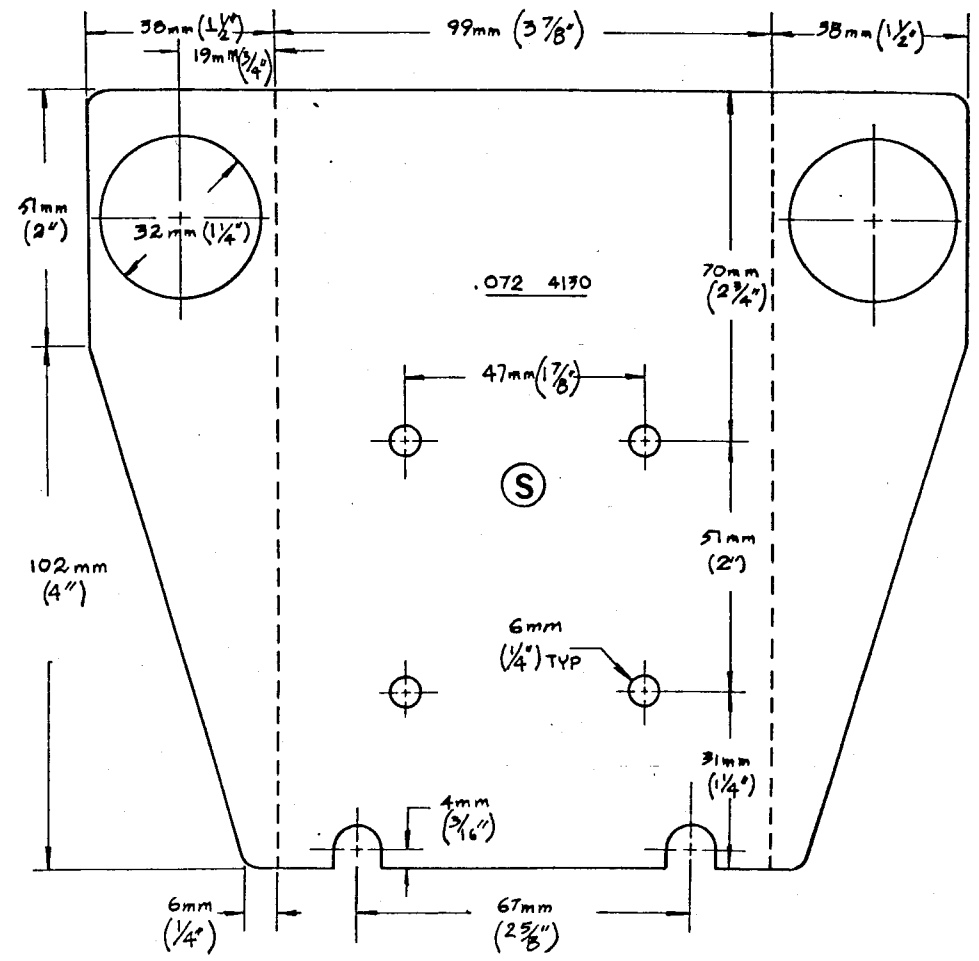
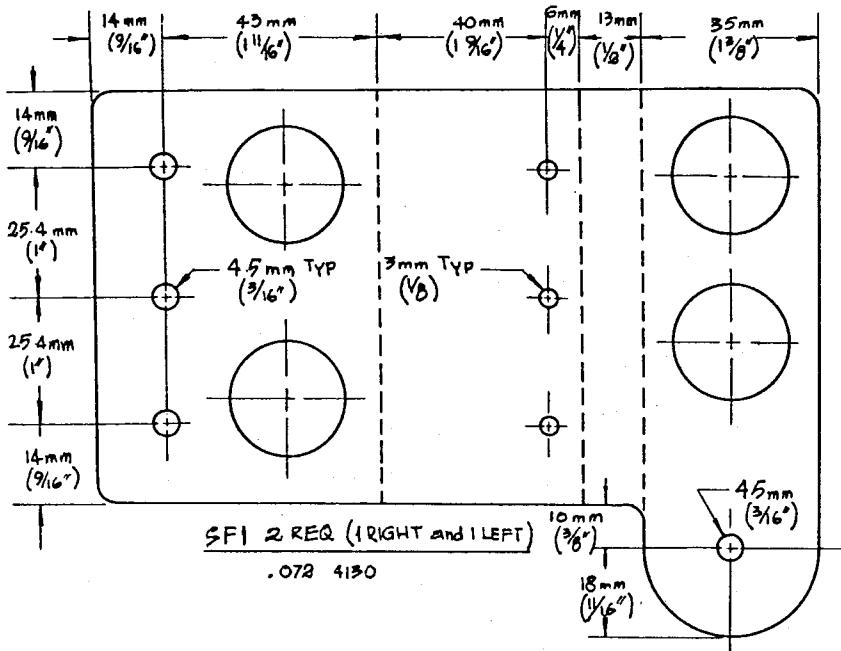
S1: 6 mm (1/4") Plywood



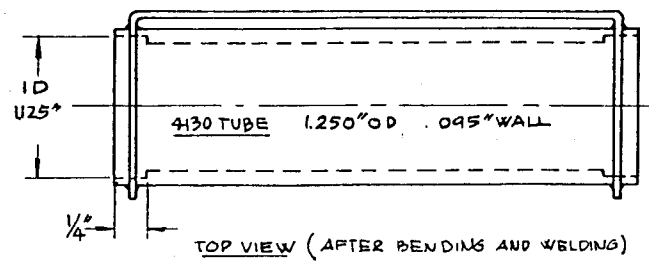
S2, 85 mm (1") U.210



POLLWAGEN PLATE NO.2a
STABILATOR LAYOUT

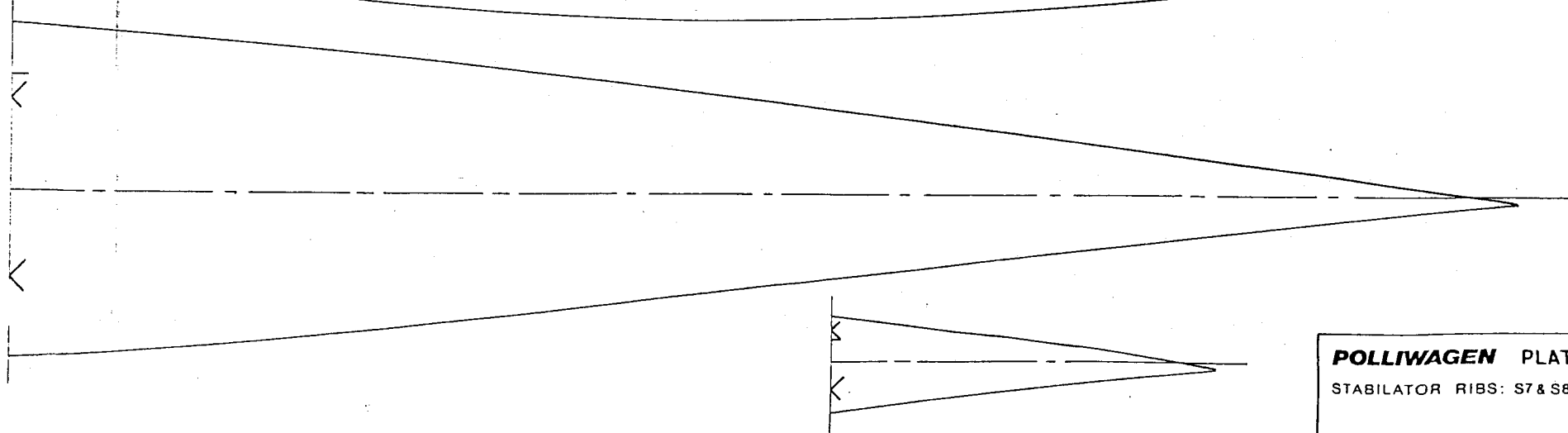
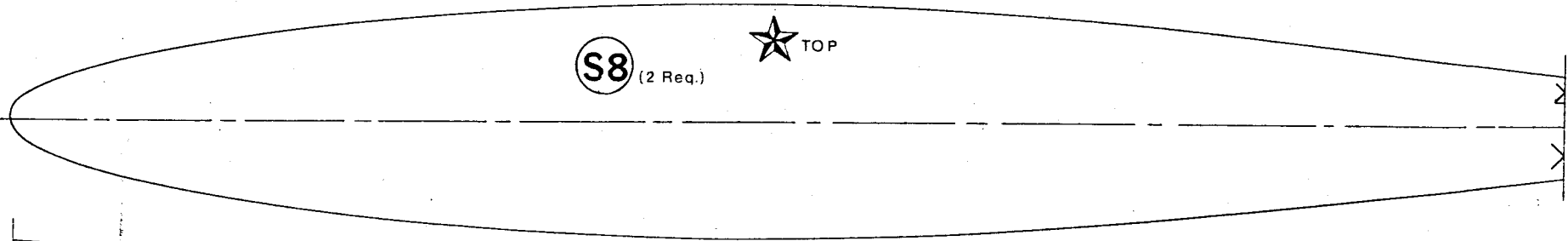
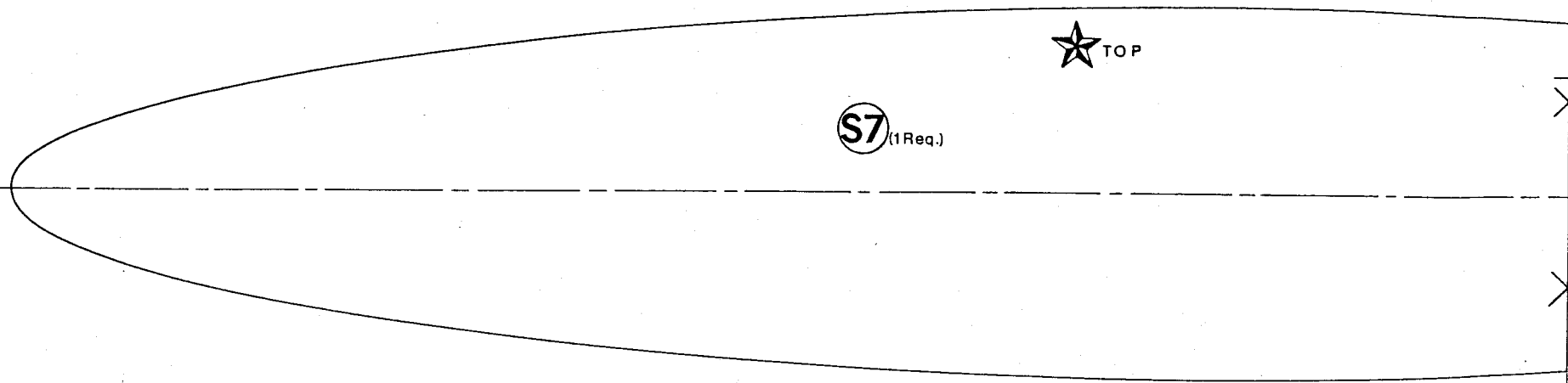


TOP VIEW AFTER BENDING

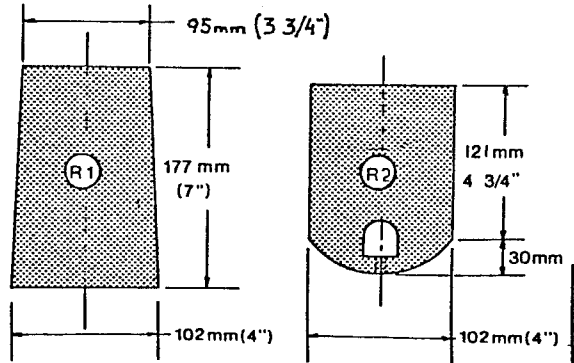
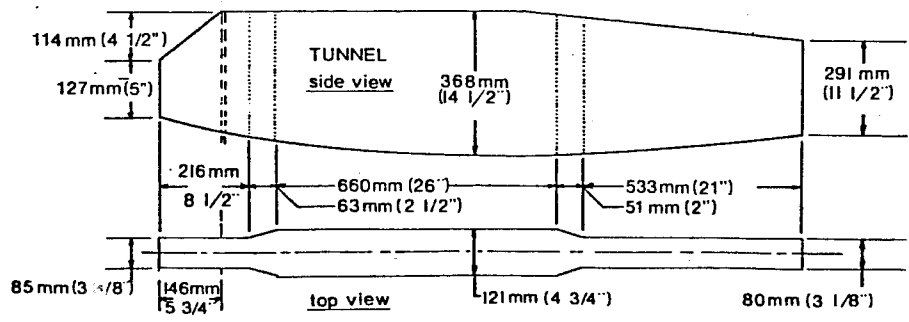
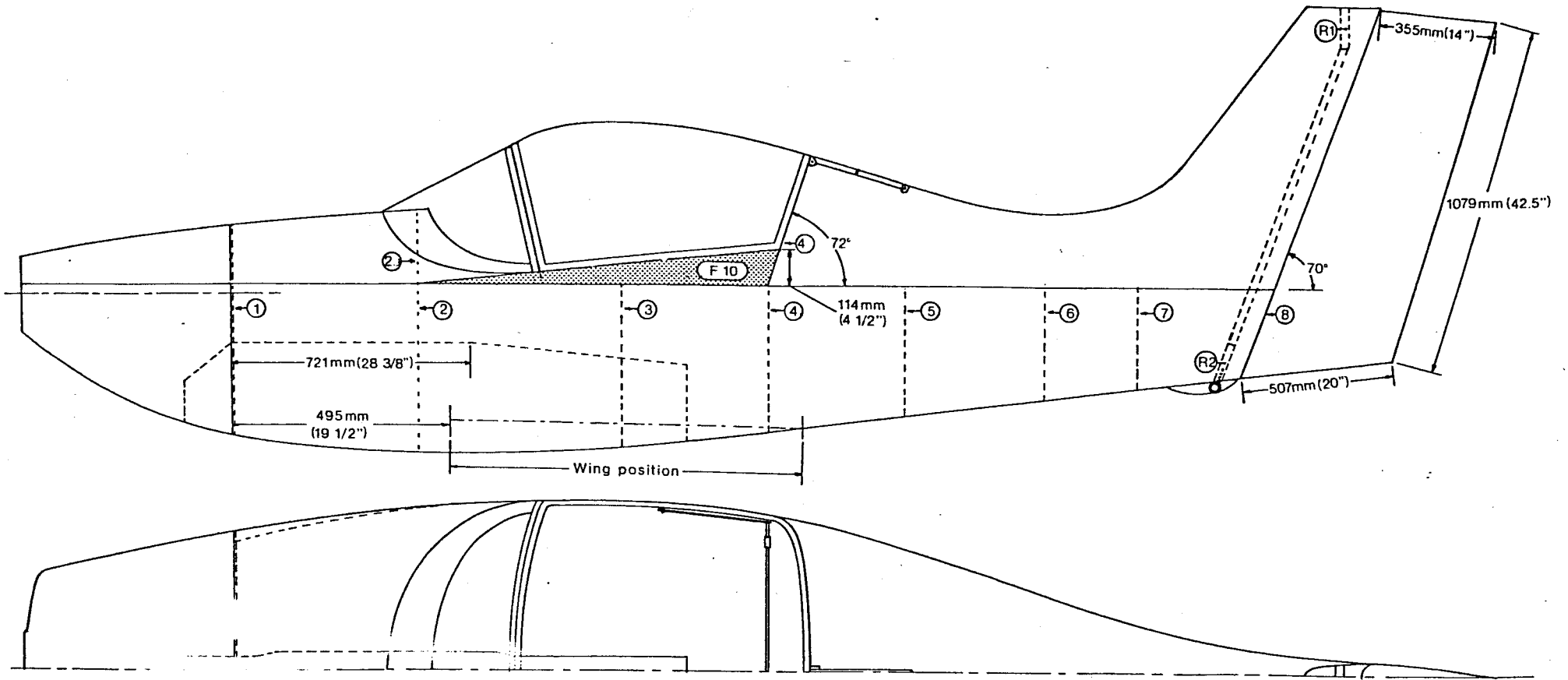


BBEARINGS.
DELCO Z 94 RBL NPH (2)

POLLIWAGEN PLATE NO.3
FITTINGS: SFIR, SFIL and S



POLLIWAGEN PLATE NO. 6
STABILATOR RIBS: S7 & S8

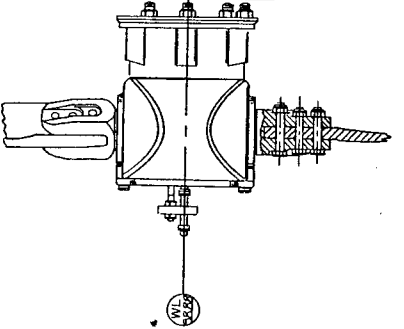
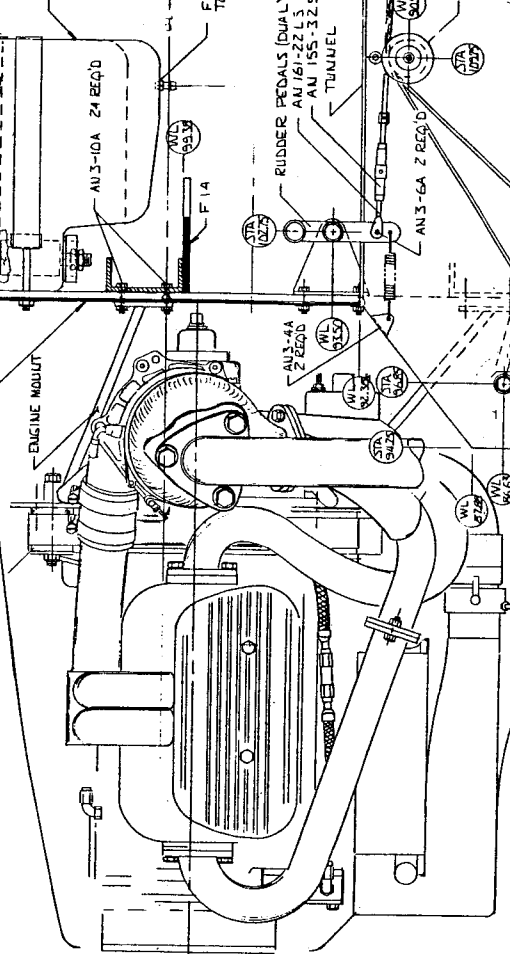


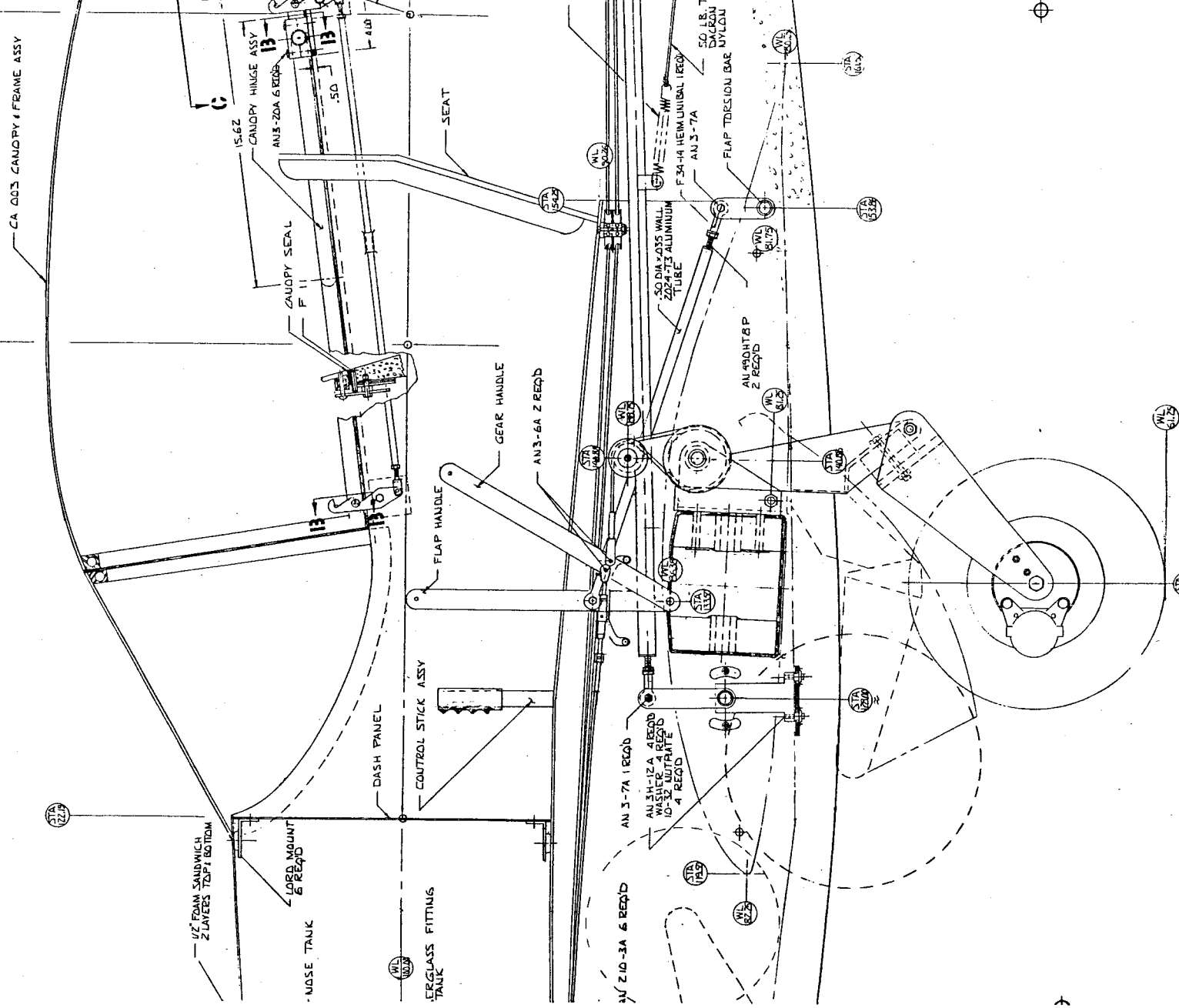
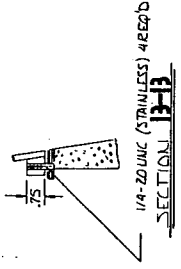
POLLIWAGEN PLATE no.4
 FUSELAGE LAYOUT

.015 STAINLESS STEEL
.03 ASBESTOS
1/4 PLYWOOD

0.0617032 BUSHING
(LYCOMBING)

COWLING MOUNTING RING
FLOAT SWITCH





CA 003 CANOPY / FRAME ASSY

1/4-20 UNC (STAINLESS) 4 REQ'D
SECTION 11-B

1/2" FOAM SANDWICH
2 LAYERS TOP / BOTTOM

MOUSE TANK

LOAD MOUNT
6 REQ'D

DASH PANEL

CONTROL STICK ASSY

WGL 210-3A 6 REQ'D

WGL 210-3A

FLAP HANDLE

GEAR HANDLE

AN 3-6A 2 REQ'D

SEAT

15.62

CANOPY HINGE ASSY

CANOPY SEAL

.50

4.00

WGL 210-3A 6 REQ'D

AN 3-7A 1 REQ'D

AL 34-12A 4 REQ'D

WASHER 4 REQ'D

10-32 NUTRATE 4 REQ'D

50 DIA 2035 WALL
2024-T3 ALUMINUM
TUBE

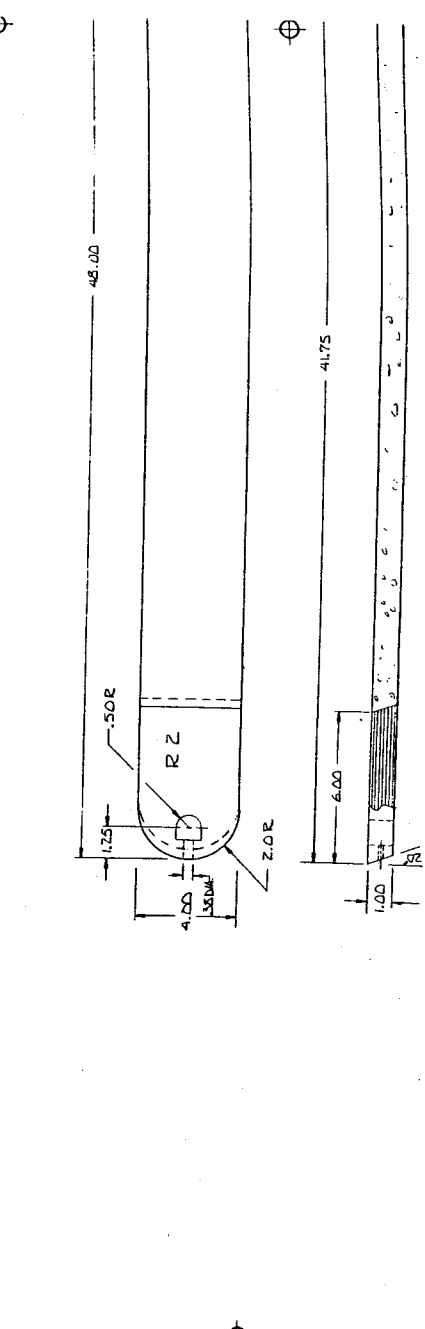
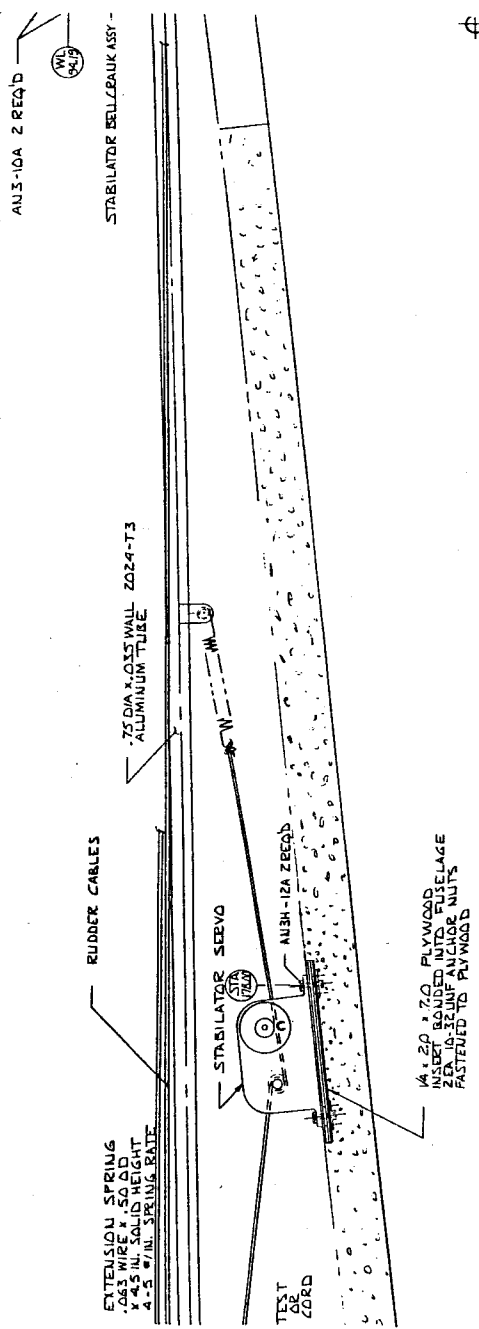
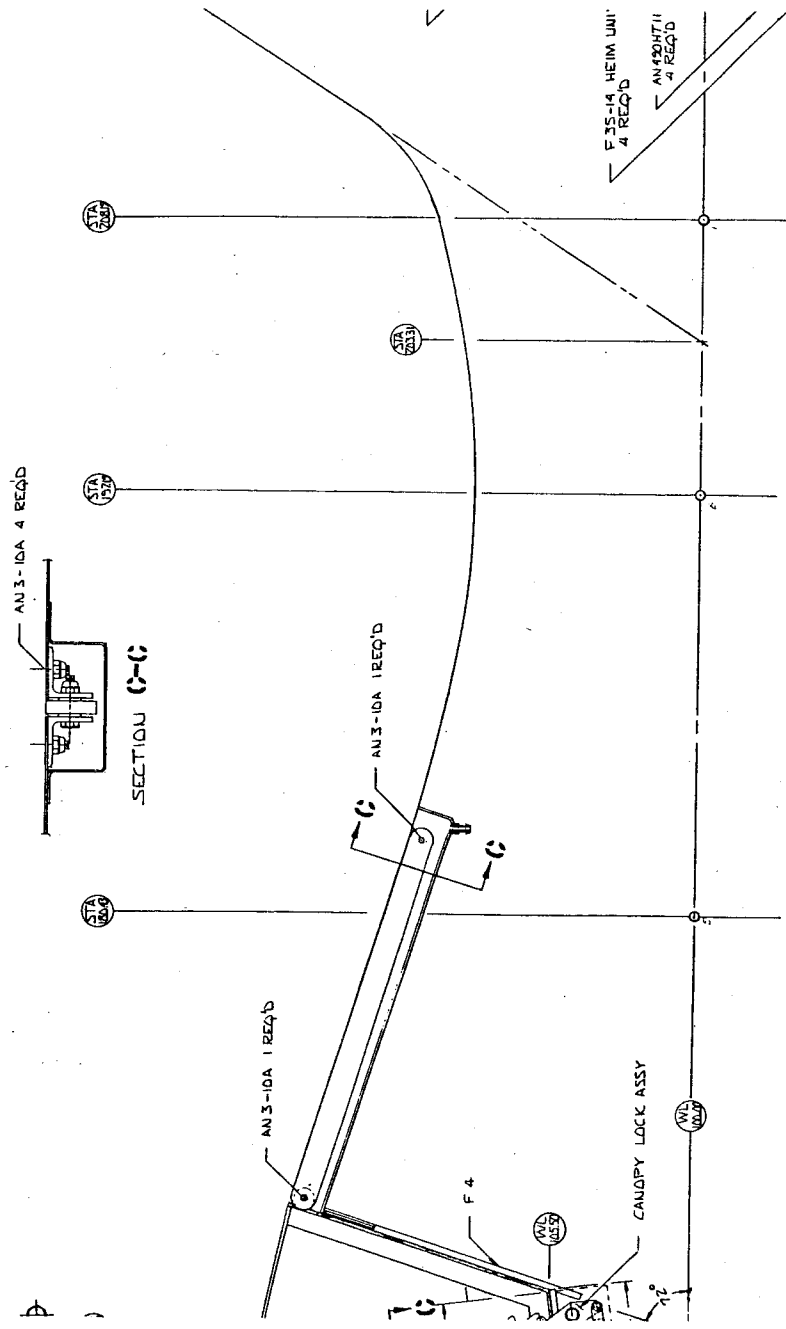
F 34-14 HEAVY DUTY UNIBAL TIE ROD

AN 3-7A

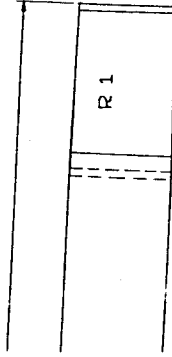
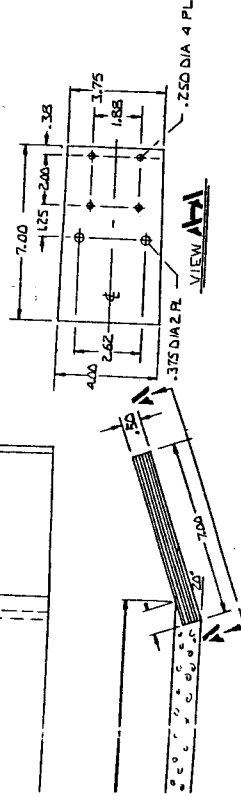
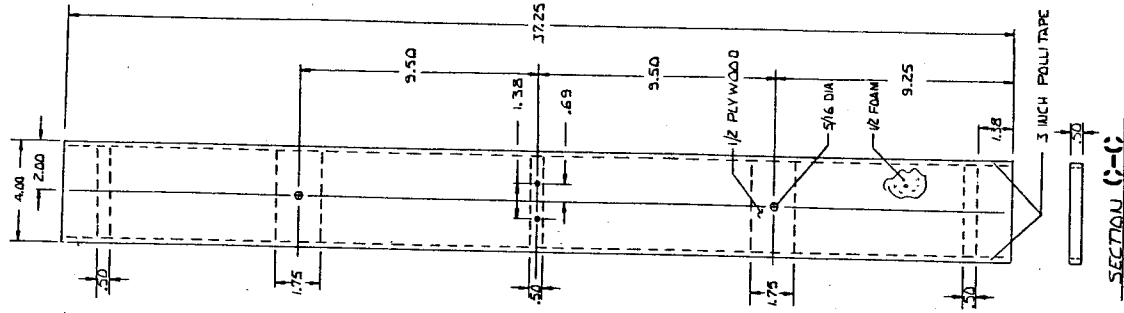
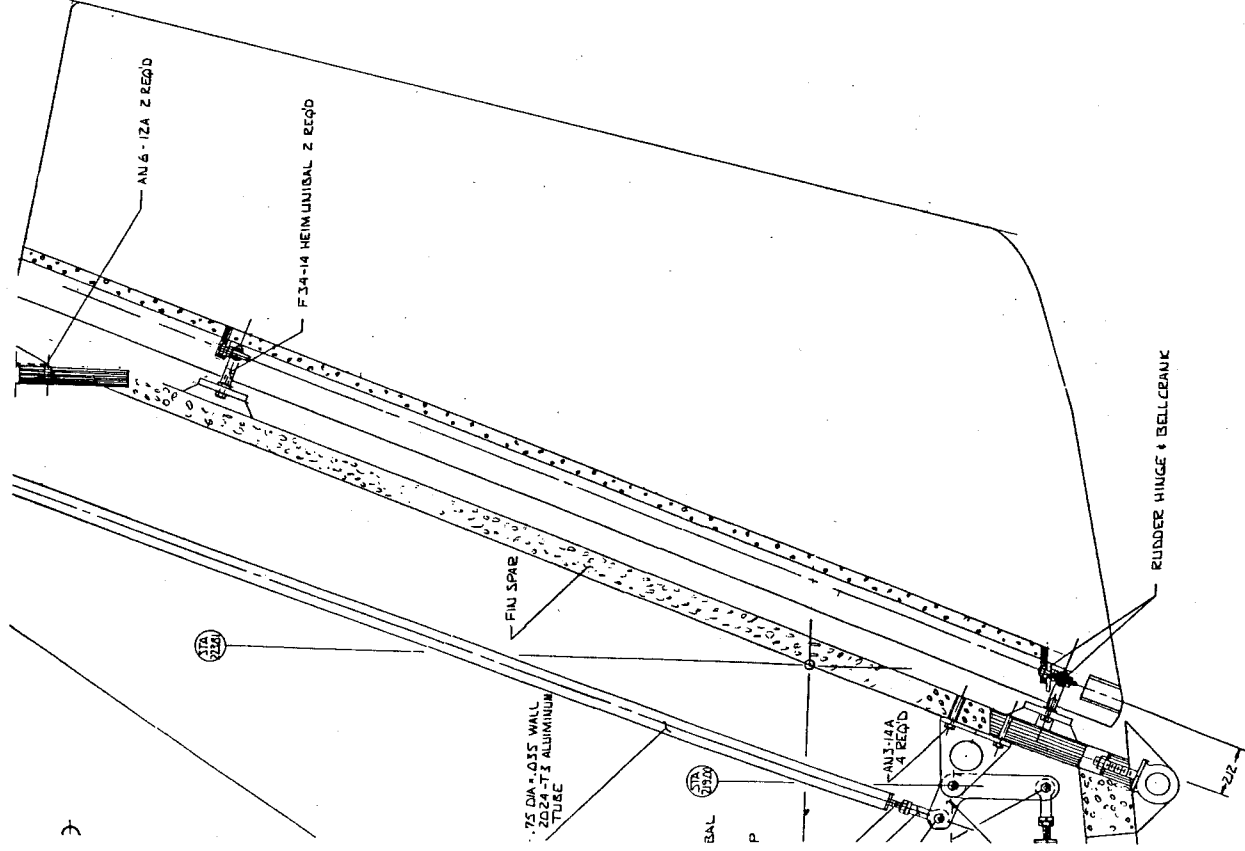
FLAP TORSION BAR

AL 400HT 8 P
2 REQ'D

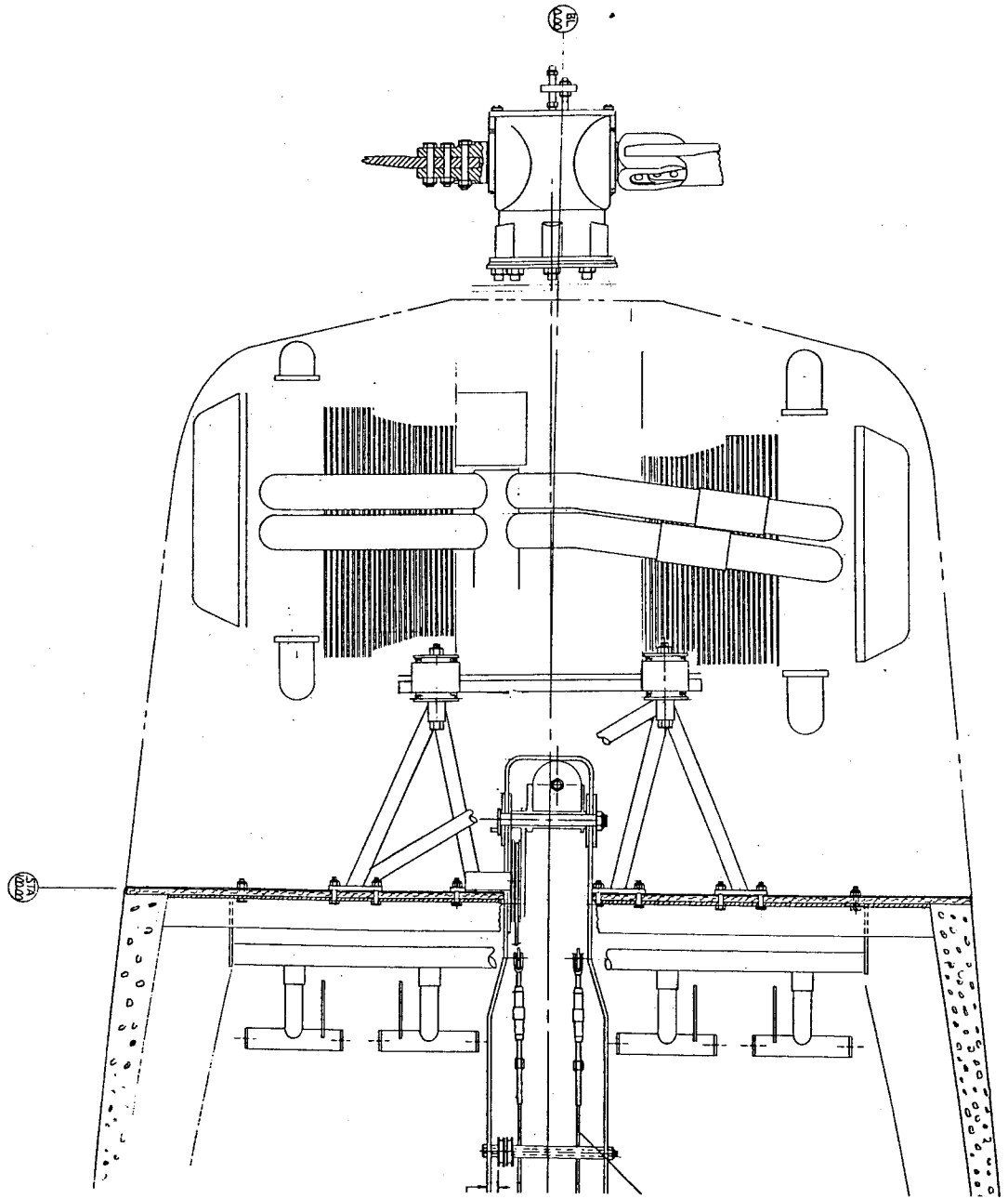
50 LB. T
WGL 210-3A
UNIBAL TIE ROD

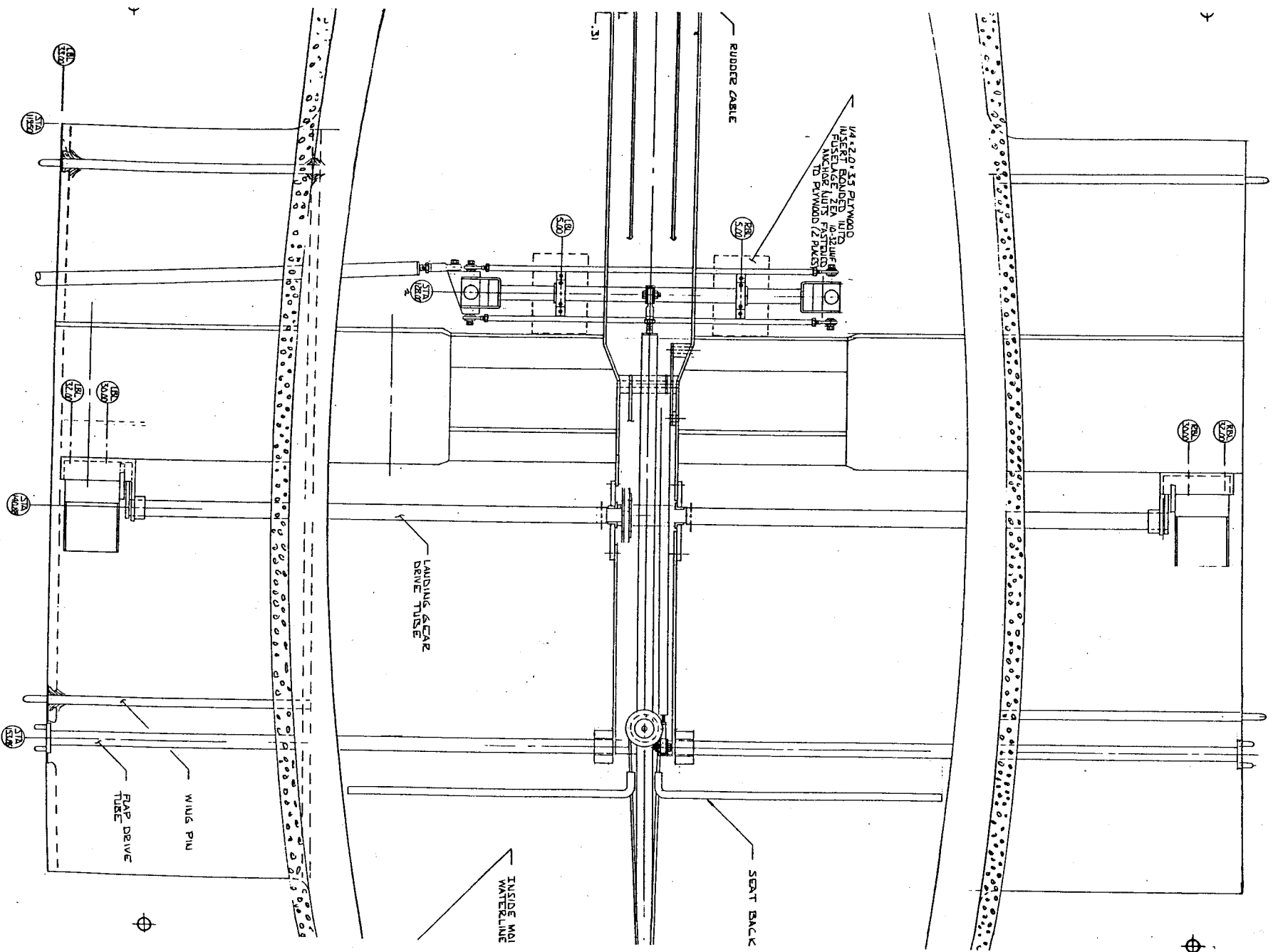


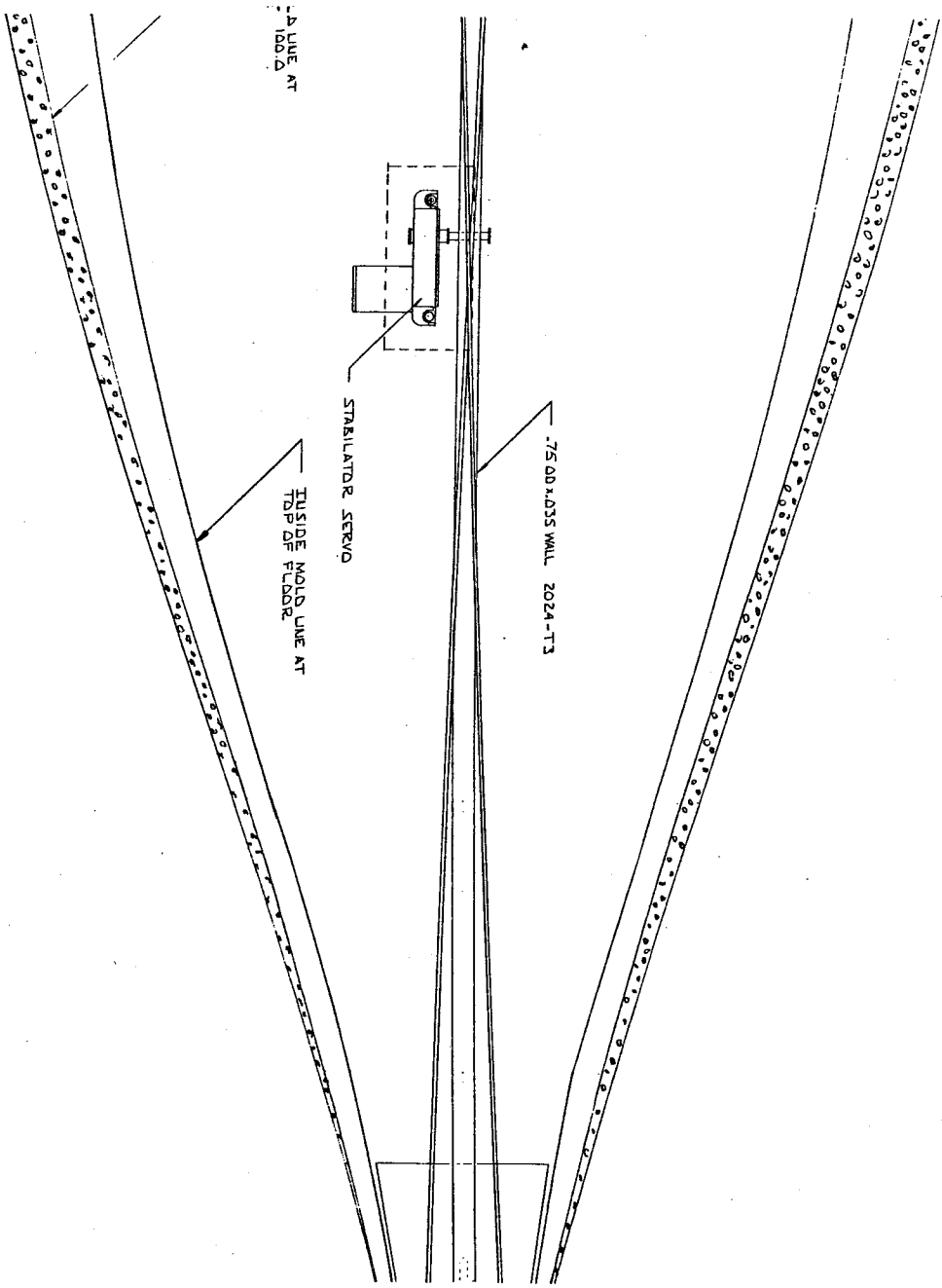
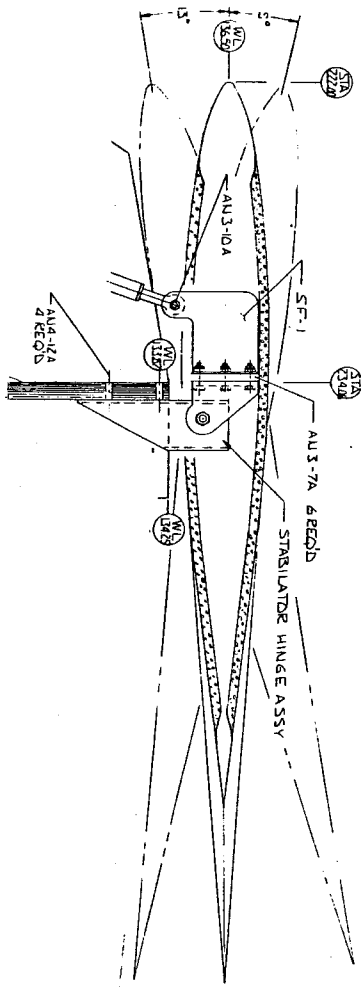
FIN SPAR



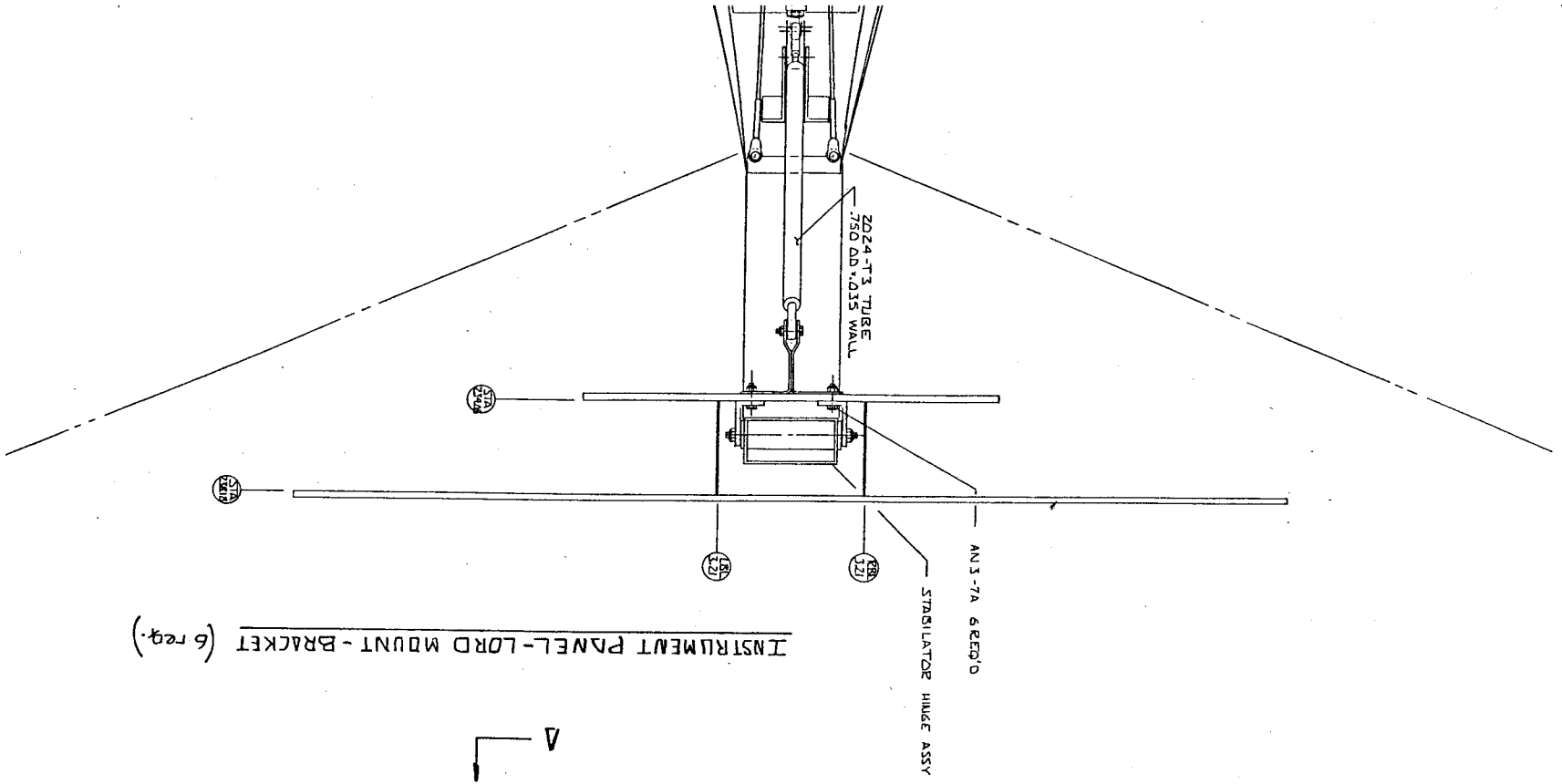
40 7



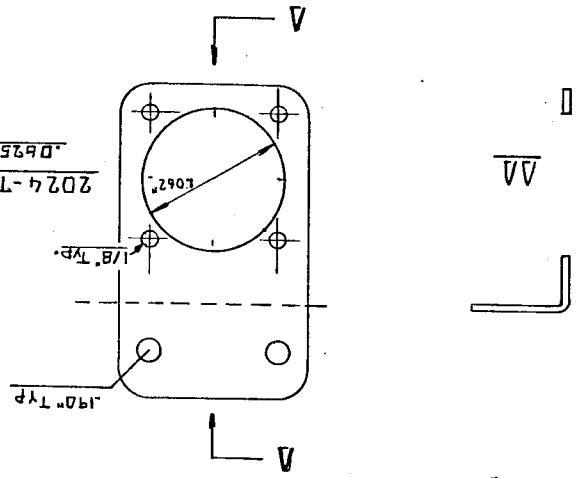




D LINE AT
 100.0



INSTRUMENT PANEL-LORD MOUNT-BRACKET (6 req.)

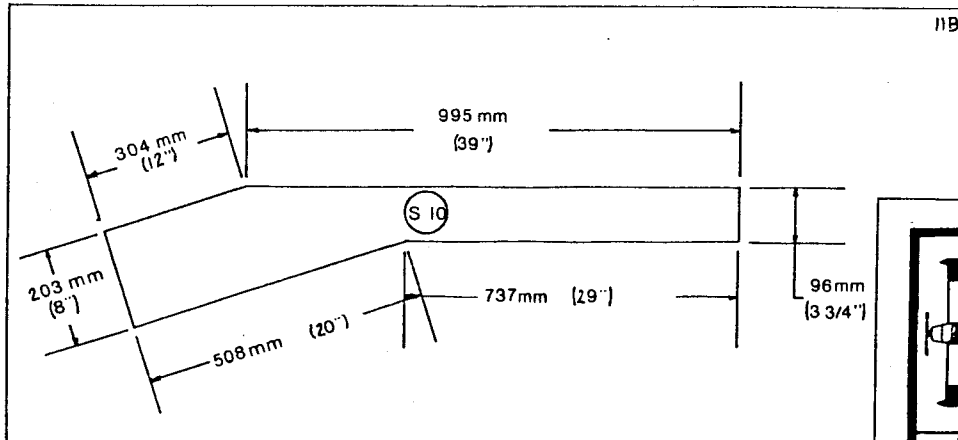
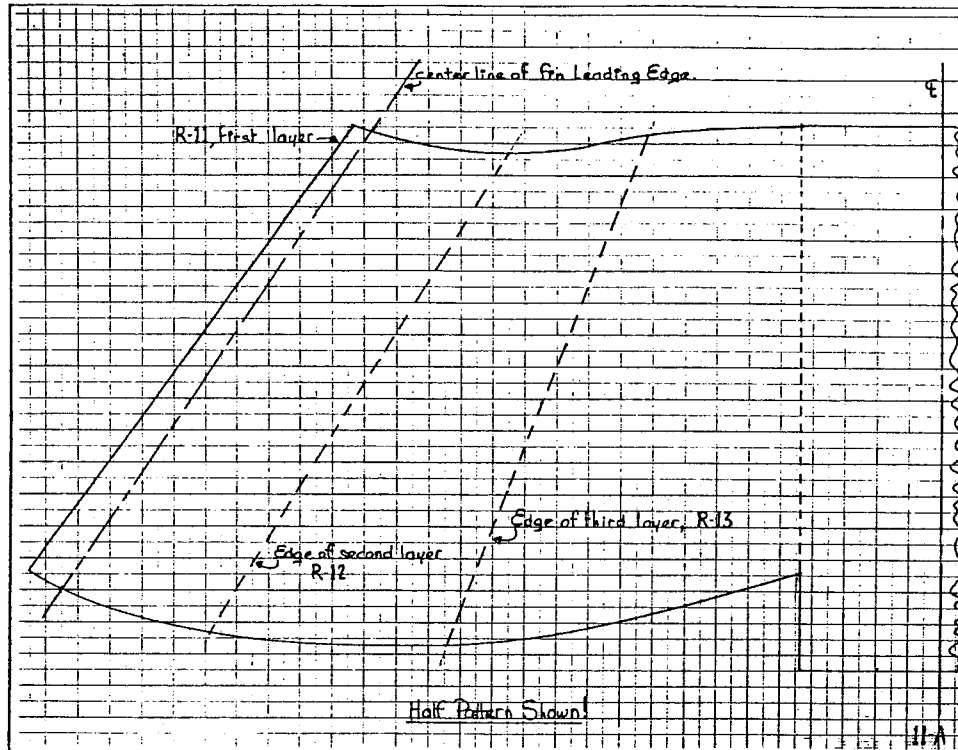


level to insure it is vertical. (Front view.) Glue with clear epoxy, repeat procedure shown on picture. From 6mm (1/4") plywood, cut F4.

Attaching the prefab front and rear deck does not require any additional work nor parts. Just trim excess from bottom edge of decks (about 50mm or 2") and epoxy to "Tub", firewall, F4 and fin spar. From 51mm (2") foam, cut two triangles per plate #3 F10. Mix some syrup and pour a 10mm (3/8") ribbon along side of glass inner border. Affix F10's to "Tub" top rims, as per plans. Hold in place with 3 1/2" nails. Note: F10's are set vertically. See bulk-head plans! When dry, glass inside of F10's, overlapping about 51mm (2") the inside border of the "Tub". When dry, you can shape the rest of the "Tub's" foam, blending the bottom's shape (already glassed) and the front and rear decks. Work carefully!! You can always sand a little bit more off, but it is very hard to add on material after you went too far. Use a flashlight to observe "crescent lines". Use long ruler to check for even curvatures. With 100 grit, sand kit parts and glassed bottom to dull finish. Round corners of firewall and F4 to the customary 3mm (1/8"). Using syrup over the foam, and clear epoxy over the glass areas, wrap entire fuselage twice with fiberglass at 45° - (Use 3 layers over fin).

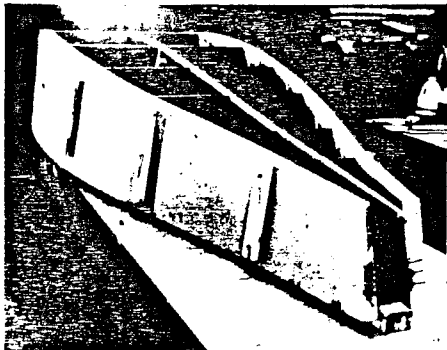
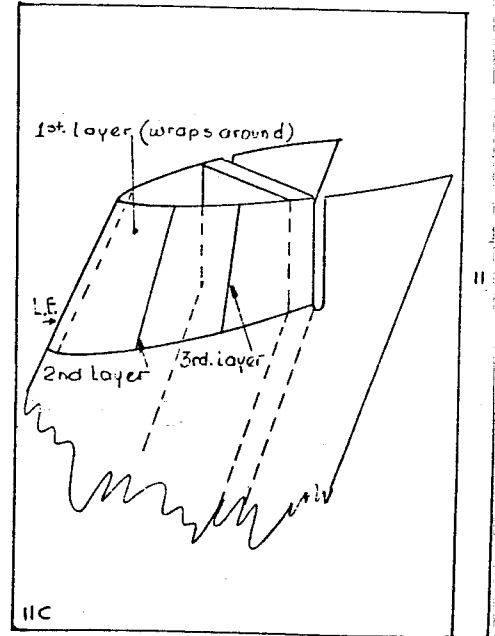
Sand the top 12" of the fin until glass fibers show, but do not go through the first layer and into the second. As shown in drawing #11-D, cut the two slots just behind the fin spar. Round the edges to a 1/8" radius (see-11-F). Cut R-11, R-12 and R-13 from bidirectional at 45°. Vacuum sanded area on the fin and with Poxipoll laminate R-11, 12 and 13 in that order, making sure no air bubbles develop at the edges of R-1. When set, feather edges of R-11, 12 and 13 to blend smoothly with surface of fin.

Install S on stabilator as in plate #5. Secure with bar and lock nuts. With

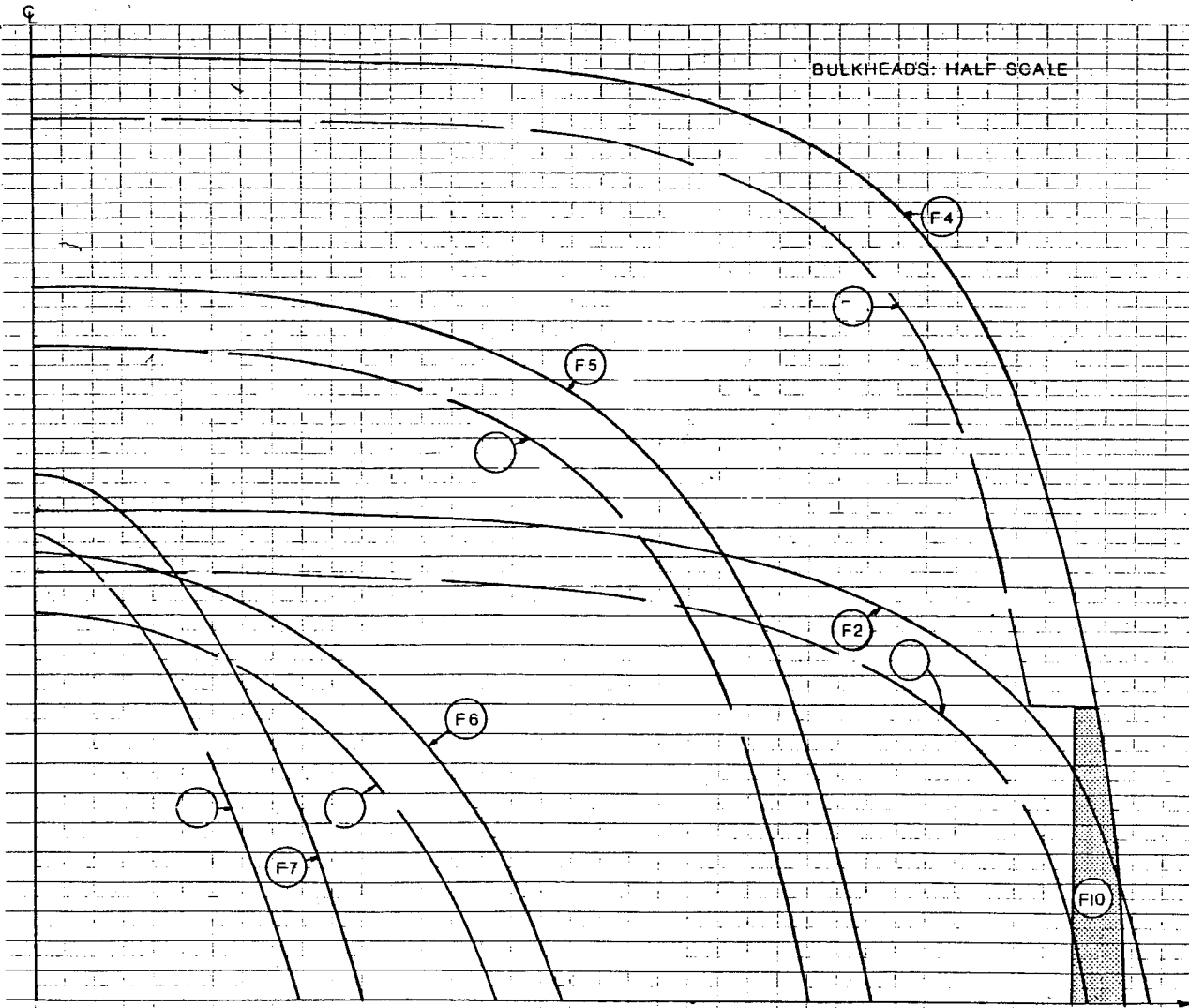


some helping hands, position total assembly against top of fin spar. Check for perpendicularity. (We hung stabilator from rafters and moved fuselage to suit). Check ad re-check!!! When satisfied, drill the four 6mm (1/4") holes and the two 9mm (3/8") holes.

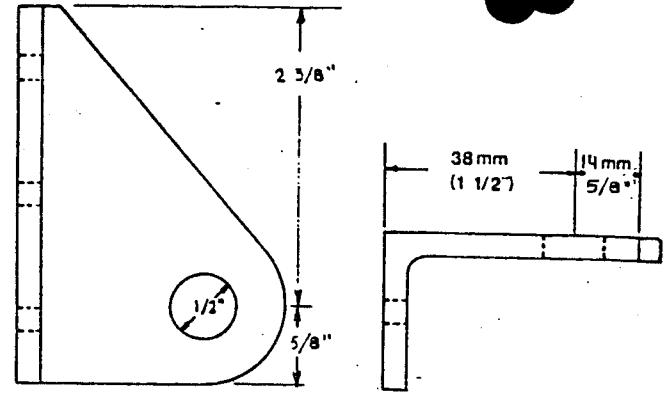
Drill through the spar. Remove the stabilator. Reinstall all six bolts with anchor nuts. (Use spacers in place of fitting S) Using screws #4 x 1/2", secure all six anchor nuts to fin spar. Remove one screw at a time, coat with epoxy and screw back.



	POLLIWAGEN		TITLE	
	8782 Hewett Place		DRAWING NO.	
	GARDEN GROVE CALIFORNIA 92644		REV DATE	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TOLERANCES ON		
DECIMALS	FRACTIONS	ANGLES		
.X ± .1	± 1/16	± 1/4°		
.XX ± .03	± 1/32	± 1/8°		
.XXX ± .010	± 1/64	± 1/16°		
APPROVED BY - DATE		SCALE		SHEET NO. OF



BULKHEADS: HALF SCALE

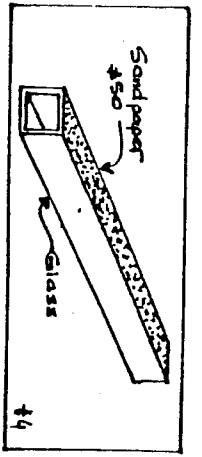


Always remove 3 1/4" nails after epoxy has hardened (they are aids used just as the straight pins used by modelers).

On plate #2 A: S 1 is made of one piece of 1/4" plywood. The top view is a cut view at the 3/16" holes, and could seem to be composed of three parts.

T 1 (Tool 1).
48" long square aluminum tube or perfectly straight wood strip, approximately 2" x 2", with 50 grit emery cloth contact cemented to one side, and glassed on the opposite side, using bidirectional glass, with most of the epoxy squeezed off (see drawing). When cured, the glass will have a very rough surface, similar to a cheese grater.

T 1 is used to shape the stabilator as per plate #2A (shown as sanding block). The sandpaper side is used for the coarse shaping. When you are getting close to the ribs (S 7 & S 8) flop T 1 over, and use the glassed side to finish your shaping. It will eat the U-210, but it will not bite into S 7 & S 8, thus not deforming the airfoil. On the same picture on plate #2 A, we show a ruler held aligned with S 7, it acts as a sanding "fence" or guide, and prevents the end of T 1 from scoring the U-210, still to be formed on the opposite half of the stabilator.
Drawing #4.

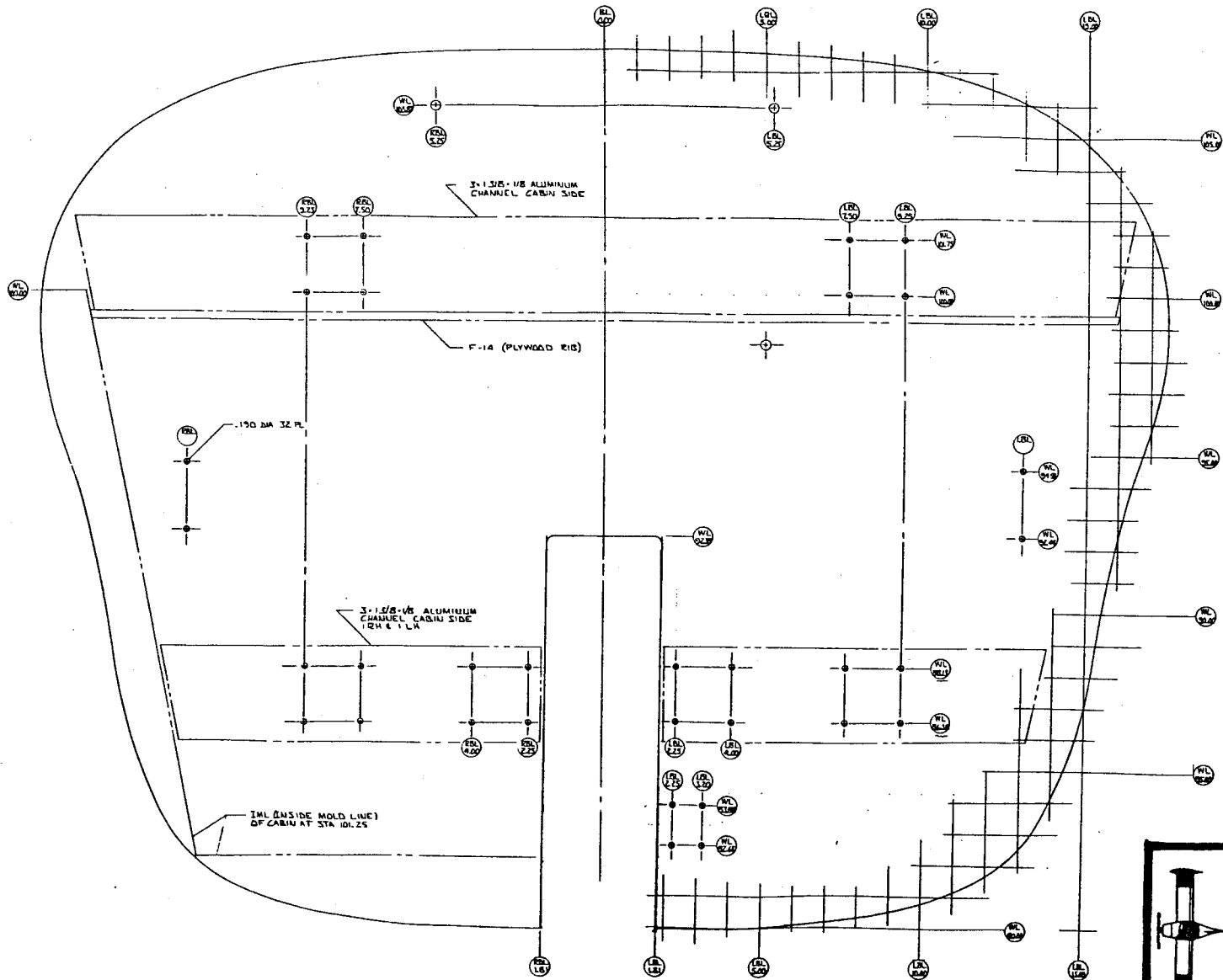


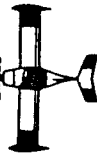
CONTINUES ON PG. 14

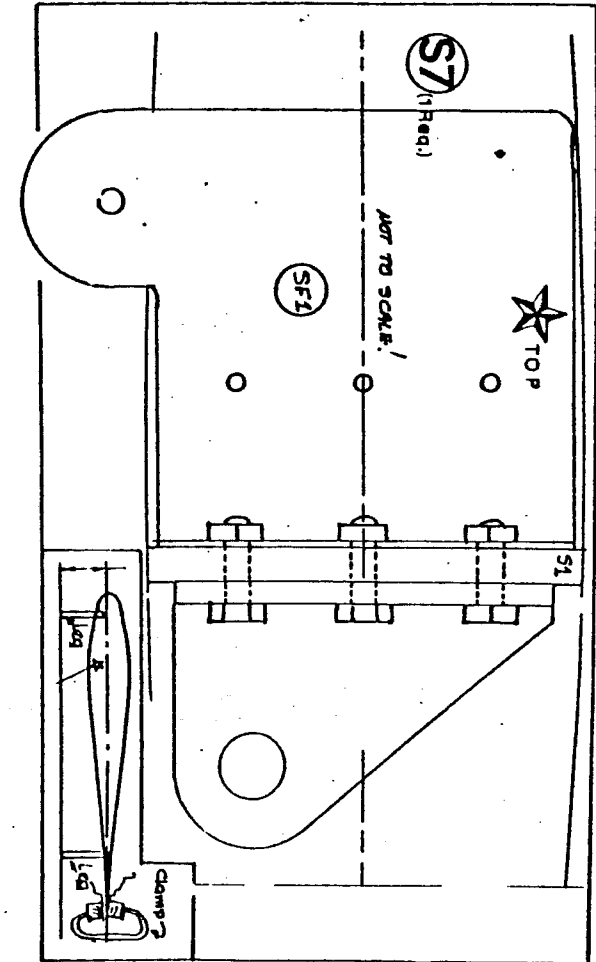
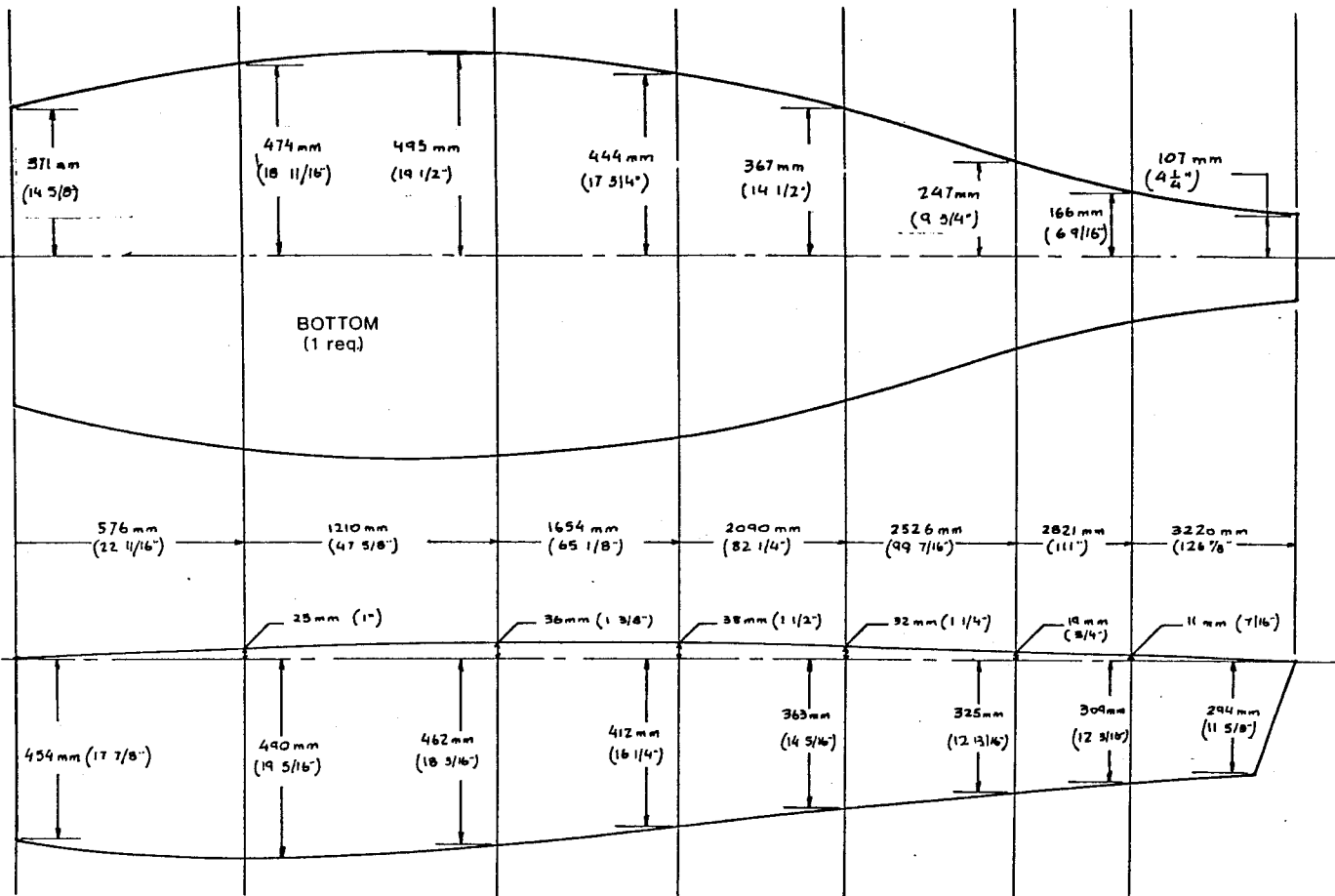
TOP of the TUB

POLLWAGEN PLATE no.8

BULKHEADS and SF2



		TITLE	
		FIRE WALL	
POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644		DRAWING NO.	REV. DATE
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
		DECIMALS	ANGLES
		X ± .1	± 1/2°
		.XX ± .03	± 1/4"
		.XXX ± .010	
APPROVED BY - DATE	SCALE	SHEET NO.	
PA June 1981		OF	



We prefer that "Pollbuilders" use kit ribs S 7 & S 8's, in order to maintain the airfoil as accurately as possible. They are precision molded in fiberglass, but 3/32" or 1/8" aircraft plywood can be used. Before installing plywood ribs, "work" epoxy in all around the edges, in order to harden the surface in which T 1 is going to ride, when forming the stabilator without deforming the airfoil.

Installing SF 1 (right & left).
Cut S 7 at 11 5/8" from leading edge. Center SF 1 (right & left) on front section of S 7 (as shown on top left illustration on page #7). Drill three 1/4" holes through rib S 7 and pop rivet. Center

this unit (SF 1 left front section of S 7 and SF 1 right) on S 1 and check for alignment of the six 4.5mm or 3/16" holes. Using six AN 3 bolts, attach as shown in illustration below.

S 4 is composed of two triangular parts. They are attached to the spar (one on each side of rib S 7 and fittings SF 1). At the same time, you glue S 5's and S 6's as per page # 5, second column.

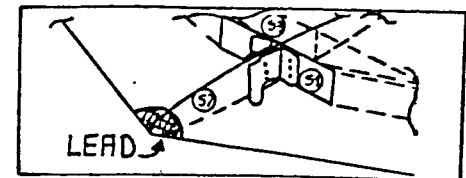
Shape front view to conform with S 1

The 2" legs, made with stirring sticks, serve to keep the axis of the three ribs parallel to the M.F.J. when attaching S 4's, S 5's and S 6's. U-210 is not always cut to exact size.

The sticks are removed just before shaping the side of the stabilator, from which they protrude.

After glassing both sides of the stabilator, clamp trailing edge as shown here (page #5, column three "in order to insure a knife-like trailing edge"). After it is set, remove clamps, wood strips, saran wrap; sand until dull, vacuum and reinforce, folding a 2" wide strip of bi-directional glass around the trailing edge.

Before glassing top of stabilator, spoon out U-210 foam from area shown below (front tip) on both sides of S 7, until bottom glass skin is reached. Mix 1 1/4 lbs. of lead shot with about 2 oz. of Poxipoll syrup, and pour into both cavities. After cured, restore airfoil shape with small pieces of foam, and finish glassing top of stabilator.



Making the Spar Molds

Two 4' x 8' x 3/4" particle boards are needed.

Cut parts shown on plans **VERY ACCURATELY.**

Using drill press and sharp 5/16" drill bit, drill holes as indicated. They must be in the exact position. Drill through mold planks very slowly in order not to be rip open the other side. Drill 3/16" holes, 2" between centers and 3/8" from borders on top and bottom planks.

Cover entire group with a coat of Poxipoll, rubbing it in with a clean rag. Make sure you coat inside of 5/16" holes. Let it soak in! When cured, "clean" holes with 5/16" bit. Sand lightly all surfaces with 180 grit sand-paper, mostly to smooth out surfaces.

Set aside in clean area.

Wax all surfaces of molds.

Letting wax dry to a haze, and buffing to a shine with clean rag.

Repeat 8 times.

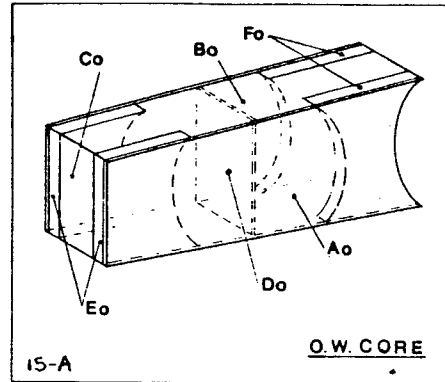
Rub on Partall #2 paste in the same fashion, 2 coats, set aside.

Apply a thin coat of Partall #2 paste to AN 5-34 AN 5-40, 10 x 1 1/2" screws, 5/16" washers and 5/16" - 24 nuts. Set aside.

The spar molds are ready!

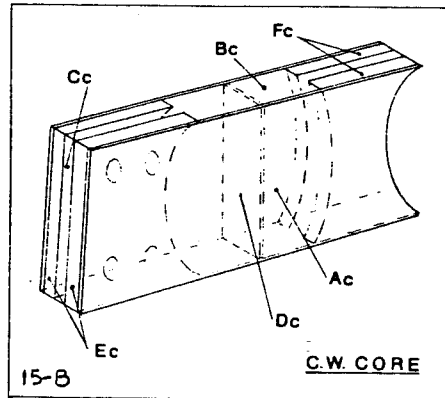
Using the precut kit parts (or the ones you prepared yourself) assemble the six required spar plywood cores, as illustrated in pictures 15A+B. Use Poxipoll 2 and slight pressure. Outside wing spar plywood core = "O. W. Core".

Center wing spar plywood core = "C. W. Core". Using remaining strips of U-210 25mm and 51mm (1" and 2") thick, (see illustration 15-C), make a 76mm (3") thick block by gluing them together with A-B Polyurethane foam. Load with concrete blocks. In 30 minutes it will be ready for trimming excess off edges and to cut the following spar cores for the outside wings.



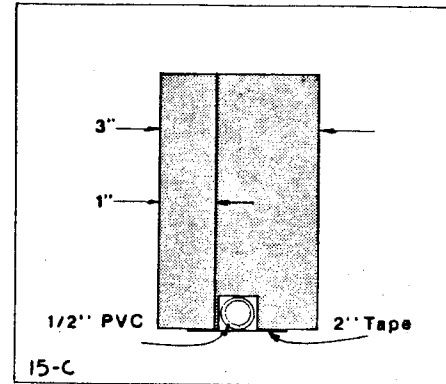
15-A

O.W. CORE

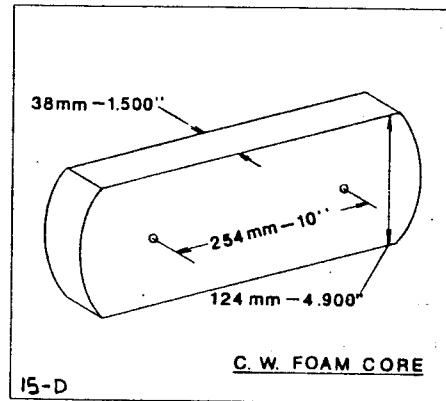


15-B

C.W. CORE

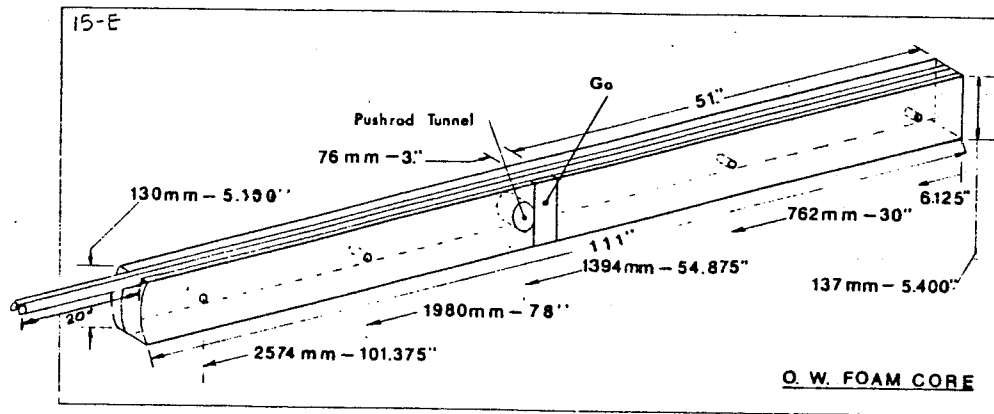


15-C



15-D

C.W. FOAM CORE



15-E

O.W. FOAM CORE

With tip of knife blade open trough big enough for 2 1/2" P.V.C. irrigation pipes (choose the pipe with the thinnest wall available). Position pipes in trough and cover with Simm (2") masking tape.

Note: Pipes run in Top face of spar.

For the center spar we need 2 U-210 blocks 38mm (1.500") thick as illustrated below. (15-D)

Now we have to cut the spacer tubes to be "implanted" in the U-210 foam spar cores from 1/2" P.V.C. irrigation pipe. You will need 10-38mm (1 1/2") long for the two center spars. Push them into position in the foam blocks. Extract the cylindrical piece of foam from inside the tubes and discard. Repeat with the 2 pushrod "Tunnels" as shown in spar plans. Install 6mm (1/4") plywood plates Go. Secure with drop of 5 minute epoxy or with masking tape. Using a section of corrugated cardboard, improvise a template of rectangular shape 165mm x 1727mm (6 1/2" x 68") and mark it "WT 1" Clean M.F.J. removing any dust, oil, grease, etc.. Using template "WT 1" cut 32 pieces of bidirectional glass cloth. See Illustration 16-A

Divide them in 4 groups of 3 each, and 4 of 5 each. Set aside, cover with clean paper and label

groups of 3: "center spar".
groups of 5: "outside spar".

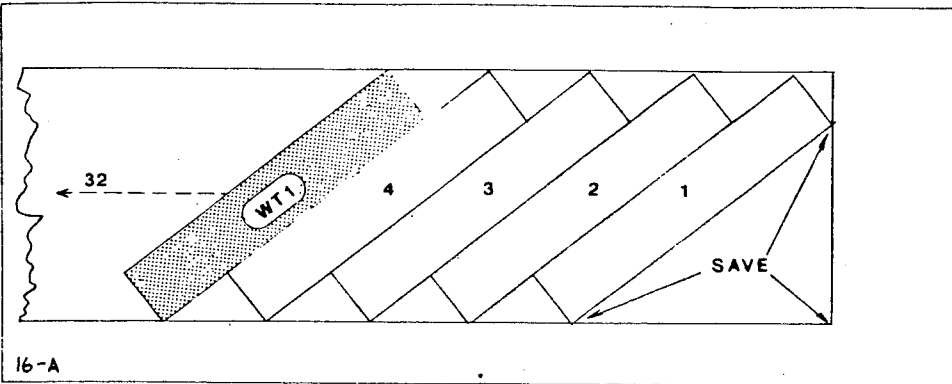
Pollipeel:

center spar
152 mm x 1727 mm (6" x 68")
4 required.
114 mm x 1727 mm (4.5" x 68")
4 required.

outside spar
152mm x 3400 mm (6" x 134")
4 required.
114mm x 3400 mm (4.5" x 134")
4 required.

Before storing away position each strip of Pollipeel over corresponding spar mold. W.M.C. or W.M.O., and with a razor blade cut X's as illustrated.



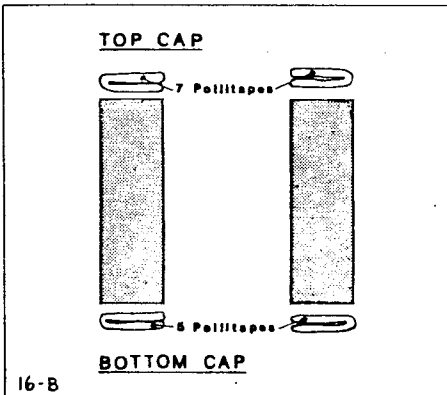


16-A

POLLITAPE REQUIREMENTS:

Center spars:

24 sections 1680mm (66") long, to be used as follows:



16-B

Outside spars:

(Right side shown. Cut twice as many for two sides)

TOP CAP:

- 3 x 3353mm (3 x 132")
- 1 x 2642mm (1 x 104")
- 1 x 1575mm (1 x 76")
- 1 x 1930mm (1 x 62")
- 1 x 1219mm (1 x 48")
- 1 x 1067mm (1 x 42")
- 1 x 914mm (1 x 36")
- 1 x 610mm (1 x 24")

BOTTOM CAPS:

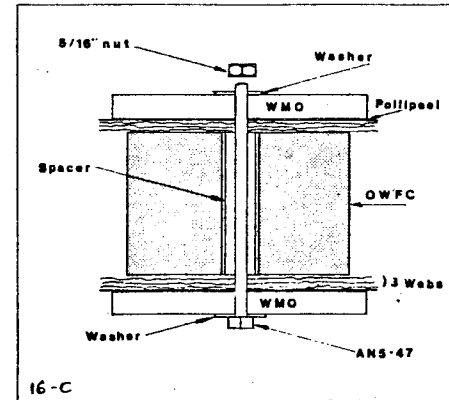
- 2 x 3353mm (2 x 132")
- 1 x 2642mm (1 x 104")
- 1 x 1930mm (1 x 76")
- 1 x 1575mm (1 x 62")
- 1 x 1219mm (1 x 48")
- 1 x 1067mm (1 x 42")
- 1 x 914mm (1 x 36")

Repeat for left side.

Divide them in four groups: Right top, right bottom, left top, and left bottom. Set aside, mark them, cover with clean paper. Cover a section of the M.F.J. with a 2134mm long (7') by 380mm wide (15") of aluminum foil. Masking tape it down on all four sides. The moment of molding the spars has arrived! You will need 2 or 3 helpers.

Start with one of the Center Spars, they are easier to handle. It will take about 1½ hours. Once you started you have to go all the way! Make (you and your helpers) a mental "dry run". Make sure you have everything you need! GO!! Position one of the W.M. Central flat on your M.F.J.. Push AN 5-34's through all 10-8mm (5/16") holes (Don't forget washers!) Using the aluminum foil covered area, one of you should start wetting with the carefully measured and mixed Poxipoll, one of the 1680mm (66") long sections of pollitape. Stipple until wetted through. Then position a second section over the first one and stipple. Continue laminating using the same procedure.

Remember, no air, no dry glass fibers, but minimum amount of Poxipoll. Try to draw resin from previous layers with your energetic stippling. You need 7 Pollitapes for the upper cap. (16-B) When this is being done, the other two of you will proceed with the mold "stuffing".

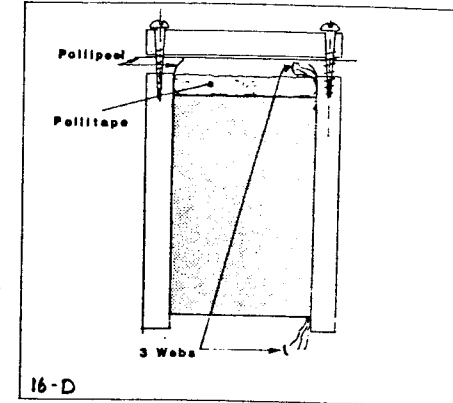


16-C

- a. Insert one Pollipeel 152 mm x 1727 mm (6" x 68")
- b. Brush Poxipoll into the Pollipeel on the mold.
- c. Insert 3 successive 165mm x 1727mm (6.500" x 68") webs, using Poxipoll and stippling air bubbles away. Make sure ANS-34 bolts pass through glass cloth webbs, disturbing glass fibers to a minimum.
- d. Brush Poxipoll into the faces of CW Cores, and insert them on the bolts. Make sure they are not upside down.
- e. Drop the U-210 foam core in place between the 2 CW Cores.
- f. Repeat step (c) and (a) in that order.
- g. Insert the other WM Central on bolts.
- h. Put washers and nuts and tighten snugly.

Now turn mold upright with the top side up.

By this time, your helper, the Pollitape wetter should have the 7 Pollitapes perfectly pre-wetted, no air bubbles, nor dry areas. Pick up all 7 layers together, with one of your assistants, fold the 76mm (3") width in two (to fit in the 38mm (1½") wide trough inside the mold) and pulling from both ends, position in mold.



16-D

Cover with 114mm x 1727mm (4½ x 68") Pollipeel and screw in the mold cover "WMC". During all this time, the "Pollitape wetter" has been enthusiastically wetting 5 Pollitape webs 1676mm (66") long over the Aluminum foil. Flop mold upside down, and repeat procedure. Tighten bolts, nuts and screws. Excess Poxipoll will drip out. Coffee break!!!!

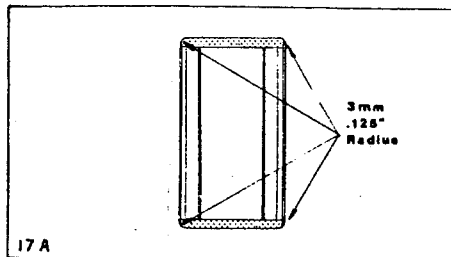
OPENING THE MOLDS:

Unscrew W.M.C.'s. Insert plastic wedge or squeegee between W.M.C. and Pollipeel on top (or bottom) of spar and separate mold from part. After first "cracking sound" slide wedge or squeegee progressively separating them. But, be very careful with the dry epoxy drippings, they cut like razors.

Remove both W.M.C.'s, then remove 5/16" nuts, washers, bolts. Repeat operation separating W.M.C.'s from spar. Pull Pollipeel from all four sides. Now trim excess epoxy and glass cloth from both ends, trimming ends up to Co's or Cc's.

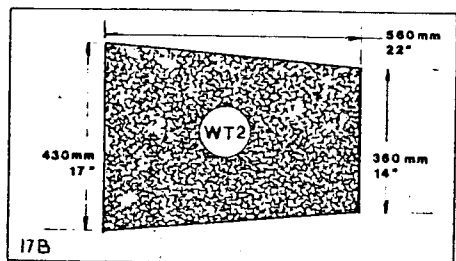
With hand grinder or with 36 or 40 grit sandpaper round all four edges of the spars in the area of the wing spar Plywood Cores: O.W.C.'s and C.W.C.'s.

Use about 3mm or .125" radius.



17A

Using same procedure as when cutting the 32 pieces of webs, make a cardboard tool:



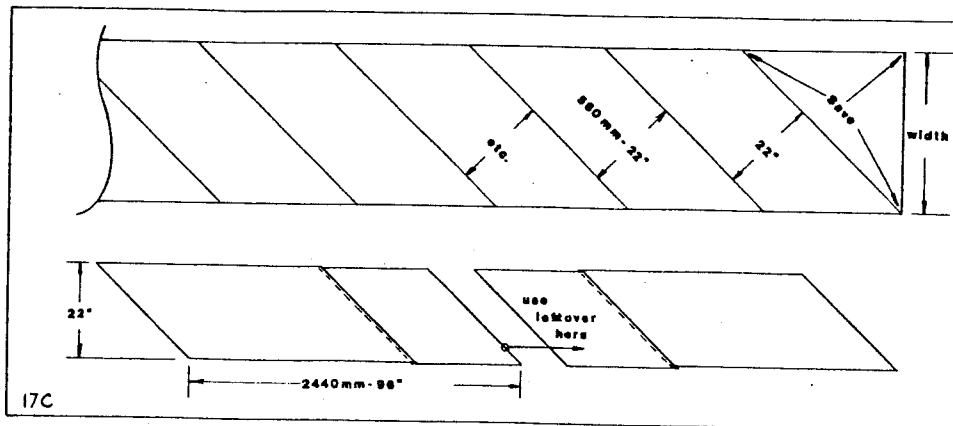
17B

Cut 12 pieces of cloth at 45°. Separate in two groups, and mark O.W. spar right, and O.W. spar left.

Next we will need to cut the wrappings for the center spars. (17C).

You will need 4 rectangular sections 560mm or 22" wide by 2440mm or 96" long. Because bidirectional cloth is produced in 38" or 50" widths, you have to decide how many 22" wide strips you will need to wrap the ends of the center spars.

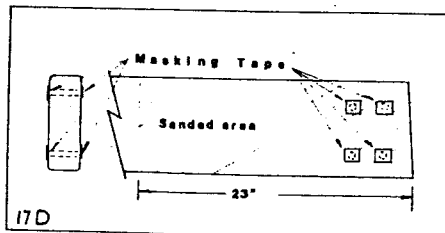
The sections of the spars that contain the plywood cores need to be wrapped with 6 turns (layers) of bidirectional glass cloth. Making sure that all traces of Poxipoll have been removed and that the four corners have been rounded as shown before, sand area to be wrapped with 80 grit sandpaper (never use sandpaper with



17C

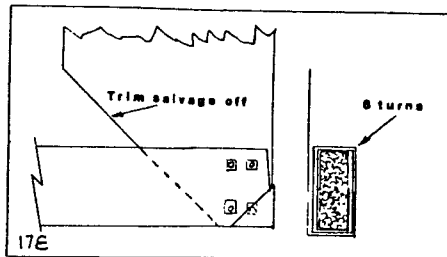
silicone coating!) Blow dust away from surface, and set aside.

Covering the Wing Center Spar: You will be wrapping one end at a time. It takes about one and one half hours. Cover 5/16" holes with small sections of masking tape. See 17D.



17D

Rub Poxipoll over area to be wrapped, making sure of wetting every pore, and cranny, etc.. Strippling vigorously, start laminating as shown in the picture.

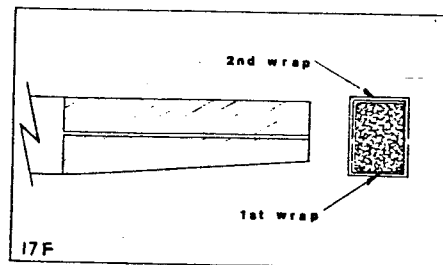


17E

Repeat over every Wing Center Spar. Remember, no air bubbles, not too much Poxipoll. See 17E.

OUTSIDE WING SPARS:

Rub Poxipoll over sanded and dusted 22" long area. Using one of six sections of glass cloth cut with pattern W.T. 2 wrap spar end as shown here. (17F)



17F

Laminate 6 alternating layers. Repeat over the other O.W.S. Two or three days later, trim excess at spar ends and sand drippings, and other imperfections, being careful not to disturb or hurt the wrappings.

Go back to your C.W.S., drill the 8 5/16" holes necessary to attach the Landing Gear. Use care, start with small drill and "grind around" without enlarging the openings over 5/16" diameter.

CENTER SPAR PAIRING:

As shown in picture the center wing spar is composed of two semi-spars, 38mm (1.500") wide, set approximately 89 mm (3.500") apart, in order to accept the outside wing spar between them like this: See 18A.

In order to affix them in a permanent position, we must follow the sequence shown next: Using the two 8mm (5/16") holes 203mm (8") away from the spar center line, and two threaded bars of 8mm (5/16") diameter, 8 washers and 8 5/16" nuts, set the two semi-spars at a distance of 89mm (3.500") measured at the tips. See 18B

Once accurately positioned, tighten nuts, and using scrap U-210 blocks, fill the space between the semi-spars by 560mm (22") measuring from the tips. Sand foam even with the top and bottom of the spars.

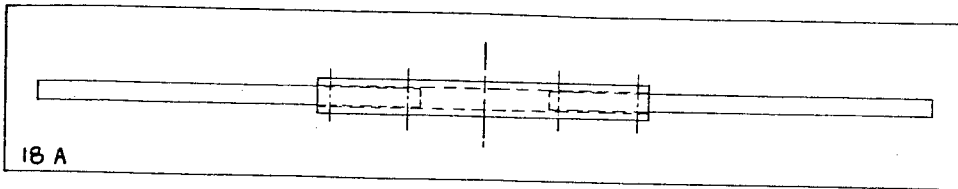
Using the same procedure followed when cutting the spar webs, cut 8 rectangular pieces of bidirectional glass cloth measuring 200mm by 560mm (8" x 22") and 8 sections of Pollitape 200mm (8") long. Remove foam spacer block from between semi spars, wrap spacers with Saran Wrap and return them to their position. Dust top and bottom of semi spars, rub Poxipoll on area to be glassed and starting with the top of the spar first cover foam plugs and end of semi spars with one 8" by 22" layer. Thoroughly wet two 8" long sections of Pollitape and stipple them into position. See illustration. (18C).

Cover with another 8" by 22" section. Stipple to remove all air bubbles. Repeat on the opposite top end.

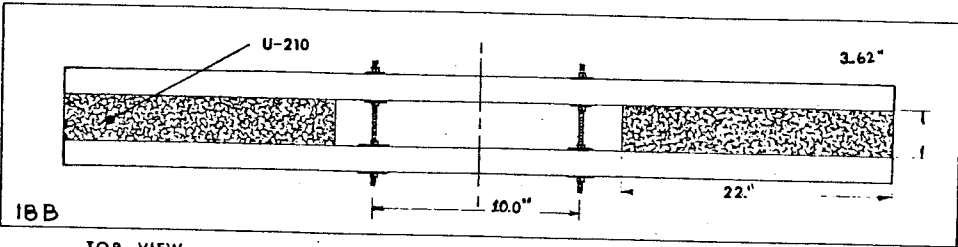
When hard, repeat both operations on bottom (notice 8" Pollitape sections go on the outside end!)

Let it all harden for two days.

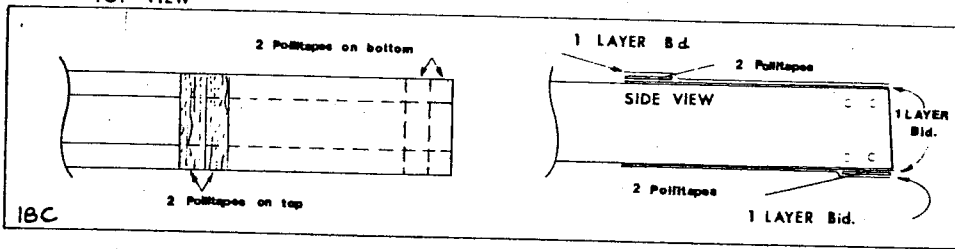
Remove U-210 plugs. (You will probably have to spoon them out) Remove Saran Wrap. Grind and/or sand all borders, making sure all sharp ends have been removed. Now is the time to set the spars at the 4° dihedral, and insert the fittings WF 1's. Set M.F.J. at 0° (flat) Study drawings carefully.



18A



18B

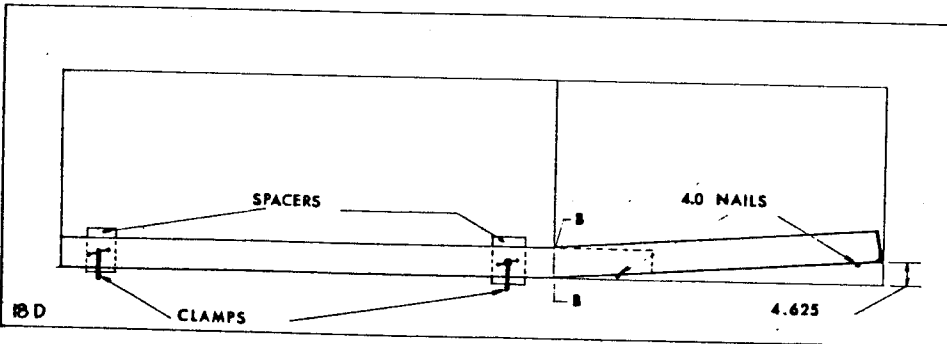


18C

Set center spar on small section of M.F.J. with left-bottom corner precisely in the corner. Measure 117mm (4.625") up from the right bottom corner of the M.F.J. and hammer two 4" nails into the table as guides. Clamp center spar to M.F.J. in that precise position.

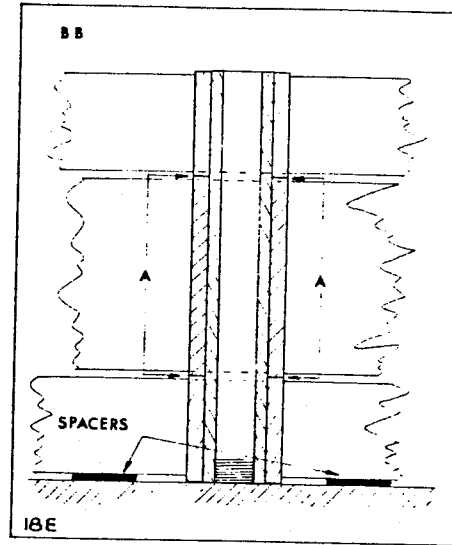
Using scrap blocks of wood as spacers, insert Left Outside Spar inside Center Spar by 508mm (20").

Adjust both spars up and/or down (use scrap plywood or metal shims) until you achieve these goals:



18D

- The spaces between spars (at both sides of the Outside Spar) are equal
- When the complete W.F. 1 cluster (pin and 3 bushings) is installed through both spars, the lines marked AA (bushings faces) should be approximately centered in the spaces between Spars. See picture 18E.



18E

- Do the same at point BB (previous figure) centering outside spar in Center Spar opening.
- Tighten all clamps.
- Recheck gaps at AA and BB, (if you drill at wrong settings, you will probably consider suicide!)

When completely convinced that everything is in the proper position, it is time to drill the spars for the fittings WF 1's.!

Blow dust away, and drop WF 1 cluster (3 bushings on the pin) in the hole. Recheck as in a, b, c, d, and e.

With the WF 1 cluster in the first hole, drill second 1 3/8" I.D. hole and after dusting it, drop another SF 1 cluster in it.

Recheck everything!

Remove both SF 1 clusters. Cover pins with Mold Release.

Insert them in bushings SF 1 B and SF 1 b.

Make sure the outside surface of the bushings are not contaminated with Mold Release. Mix 4 oz. of Poxipoll and carefully coat the inner surface of the holes. No drippings between spars! Mix milled glass with the rest of the Poxipoll to make "green goop". Coat the bushings with it, and turning the cluster "screw it" into the hole, adding more "green goop" as the cluster goes in, making sure the spar is not squeezing the "green goop" out. Make sure the grooves in the bushings are full of "green goop" as they go in.

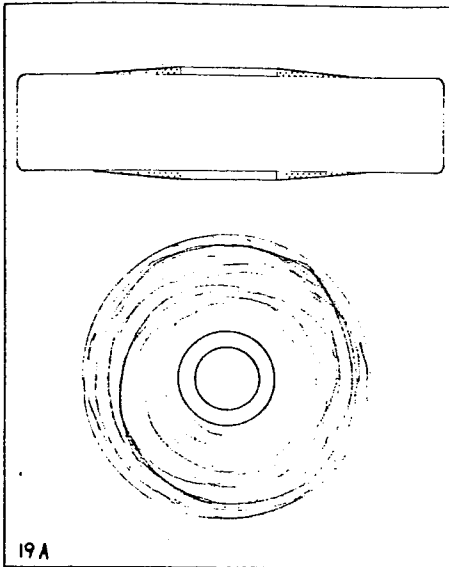
When the ends of the pins and the bottom of SF 1 b's hit the M.F.J. the job is finished.

48 hours at an average of 72°F is the minimum hardening period.

Pull pins out, wash with acetone, grease and put away in clean place. (a 3 lbs. coffee can with a plastic lid is an ideal container).

Remove clamps holding Outside Spar and shaking it up and down, back and forth, crack the film of Poxipoll that probably formed around the bushings, until the spar is freed. Remove outside spar, clean drippings, etc., being careful not to score bushings.

Mix about 1 oz of "green goop" and wet one strand pulled out of a 30" long piece of Polittape. Wrap as much of the wet rovings around each small section of bushing sticking out of the spars as needed. See Dwg. 19A



19A

When hard, sand to smooth shape. Assemble spars again to see that the wrapping did not create any interference.

Using the opposite side of the M.F.J. repeat the whole procedure, step by step. Now you have your wing spars completed, with the proper dihedral set!

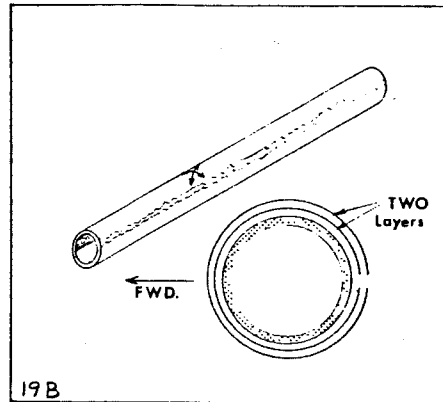
WING RIBS

We at Polliwagen strongly suggest that every builder use the kit ribs. The Wortmann airfoil requires a very accurate construction of the wing, in order to give it's unprecedented performance.

Every safeguard must be taken to insure exactness.

AILERON - FLAP SOCKET CONSTRUCTION

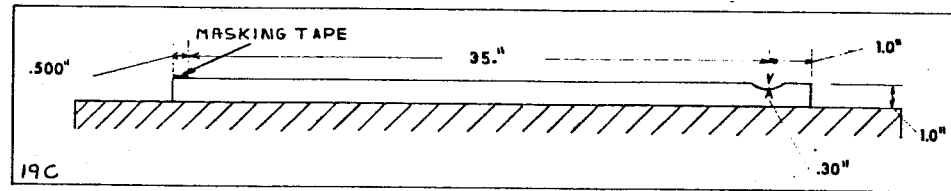
Use PVC irrigation pipe 1 1/2" I.D. Outside diameter should be 1.900". Wax 5 times and apply Partall paste #2. Glass with bidirectional at 45°, two layers as illustrated in drawing #19B



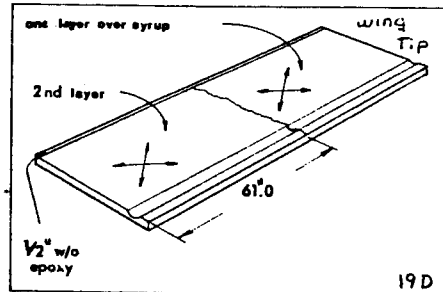
19B

Two 111" long tubes needed. Keep straight during cure.

Top skin: 1" foam U-210 (2 required)



19C

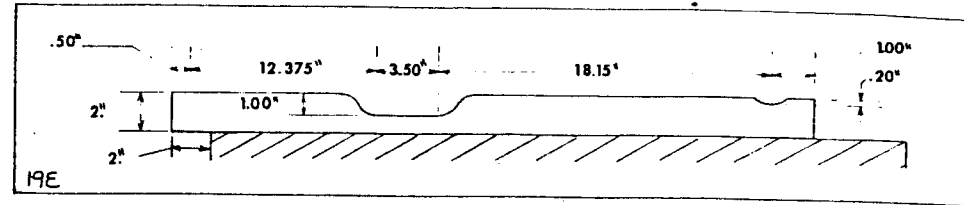


19D

When set, put both top skins away avoiding warping them. See Dwg. 19C & D.

Bottom skin: 2" (51mm) U-210 (2 required) See pg. 20A

Tack glue (Bondo) foam to table, leaving an overhang of 2" at the L.E. (19E)



19E

After the bottom of the trough is straight and flat, remove side guides and slant walls as shown in drawing #19E.

Study outside Wing plan shown in drawing #WI-004-20a

With felt pen, mark position of false ribs, spar, plywood plates Io and Jo, inspection hole, etc.. Dig a 6mm (.250") rectangular hole to accept plywood plate Io.

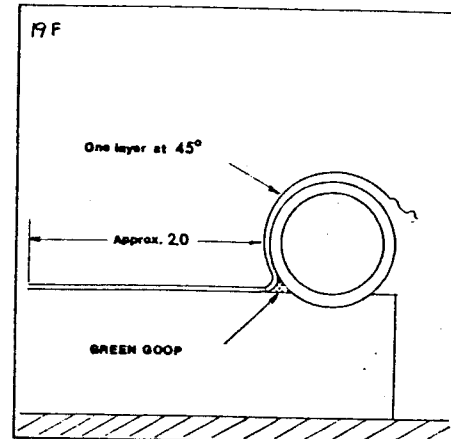
Mount brackets AI-003-G with four AN3H6A bolts, washers, and nuts.

Glue the spar with green goop. Position IS CRITICAL. (21-A).

Remember there is RIGHT and LEFT spars.

To insure that they are parallel between: leading edge 1" x 2" block, spar and socket, use tool WT3. Start by checking distances at each end of the wing, and continue making checks every foot or so.

Glue the socket preformed with green goop. Assure it remains straight while setting. Hold position with nails. (19-F)

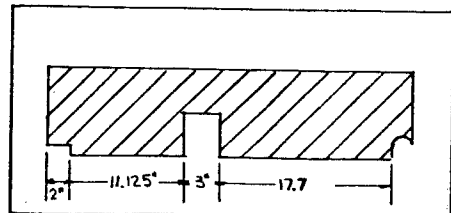


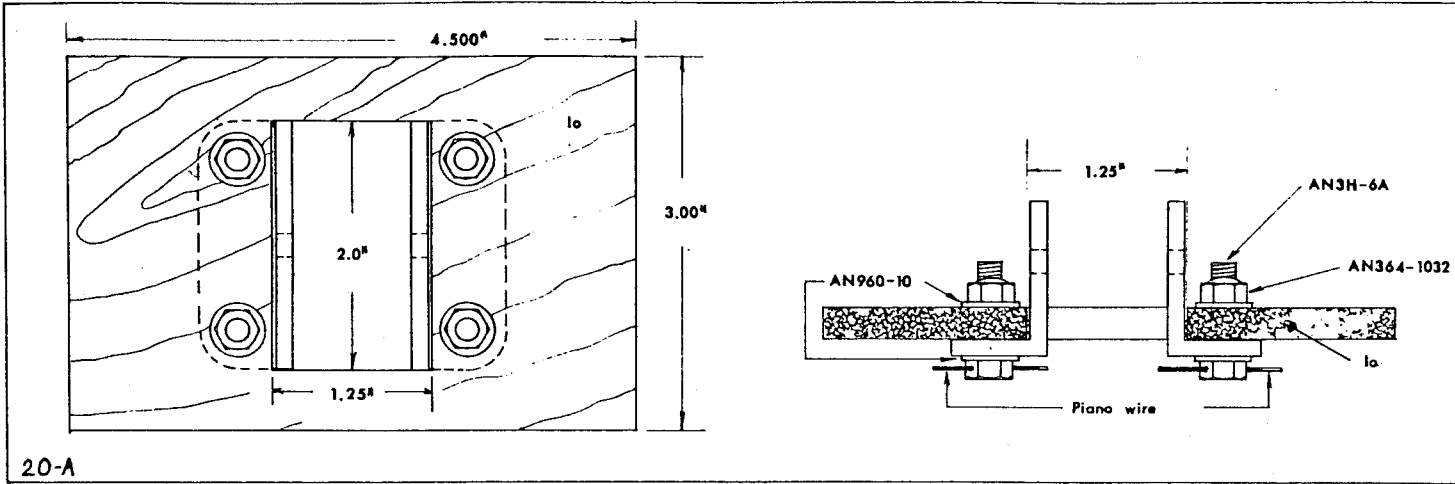
19F

Insert 25mm (1") long sections of piano wire through the hole in the head of the bolts, and follow procedure shown in drawing #20A

Do same with the inside of the hole dug in the foam. Position Io inside hole, making sure top of Io is even with the top of surface of the foam. Now we are ready to glass the bottom inner skin.

Lay one layer of bidirectional over syrup. Be extra careful at the leading edge. No drips, no glass overhang; if the glass does not get all the way to the edge, it is O.K. Reinforce area where inspection hole will be cut with an additional layer of glass 7" in diameter. Glue a strip of foam 51mm (2") wide by 25mm (1") thick using syrup sparingly. Avoid drips at the leading edge.





20-A

and for aileron push rod in the T.E. tube as per drawing #AI-003.

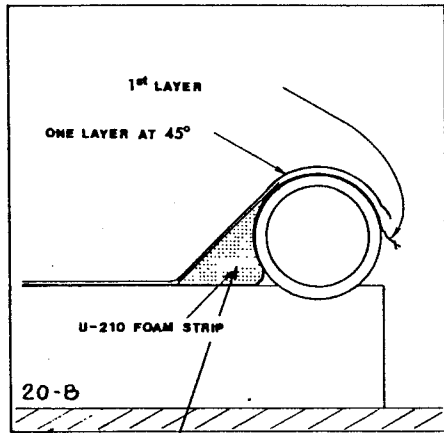
Install push rods Ko and Lo

Wrap forks at the ends of Lo with masking tape to protect them during future building steps.

To check for clearances and to adjust push rods at the proper setting. Install long push rods Mo.

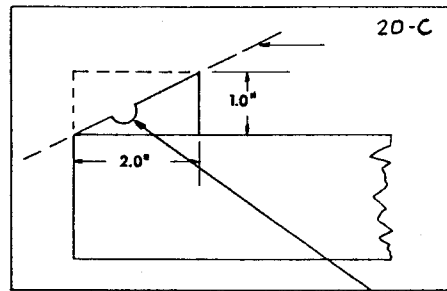
Study neutral positions of ailerons and idle bellcranks. Do not change length of pushrod Ko. Make adjustments at points "A and B". Sand/grind off any interfering area on the ribs or aileron socket. Contact your F.A.A. inspector and ask if he would like to inspect your work at this point.

The next step, is the "closing" of the wings!



20-B

Strip of foam. Fit by rubbing it in place. Glue with syrup. When set, cover with glass cloth.



This groove is approximately 1/4" deep. It is to catch excess epoxy when joining the top skin. (20-C) and (20-E)

False Ribs made of 1/2" foam with one layer of cloth on each side. 7 nose ribs, and 3 tail ribs are required. See drawing # 20-D.

Affix the false ribs in place using green goop. Check that the holes in the false ribs allow enough clearance for the controls.

INSTALLING THE CONTROLS:

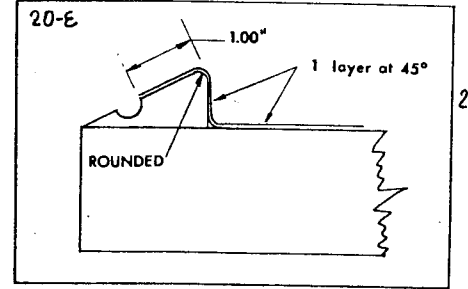
Clear 2 openings of the "Tunnel" in the OW spars, removing overlapping webs.

Drill appropriate clearance holes for anchor nuts in plywood piece.

Go already affixed in spar. Drill pilot holes for 4 #6 1/2" screws following drawing 21-B cover anchor nuts A-50000-3 on plywood blocks Ho with masking tape, to protect them from the epoxy. Using green goop, affix Ho in the proper position over Go plates on both OW spars. Screw 4 #6 x 1/2" as indicated in drawing # 21-B. When set, glass Ho plates to spar with small strips of bidirectional glass. Let set. Mount aileron and idle bellcranks. Using 3 each screws, nuts and washers attach No to Jo as per drawing #AI-003 glass.

Jo to bottom skin using two bidirectional strips, (later green goop will be used to attach Jo to upper skin.)

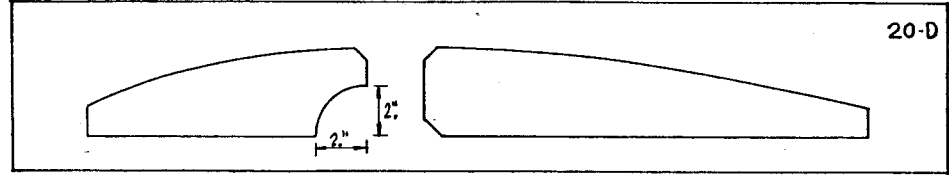
Open slots for ailerons support No



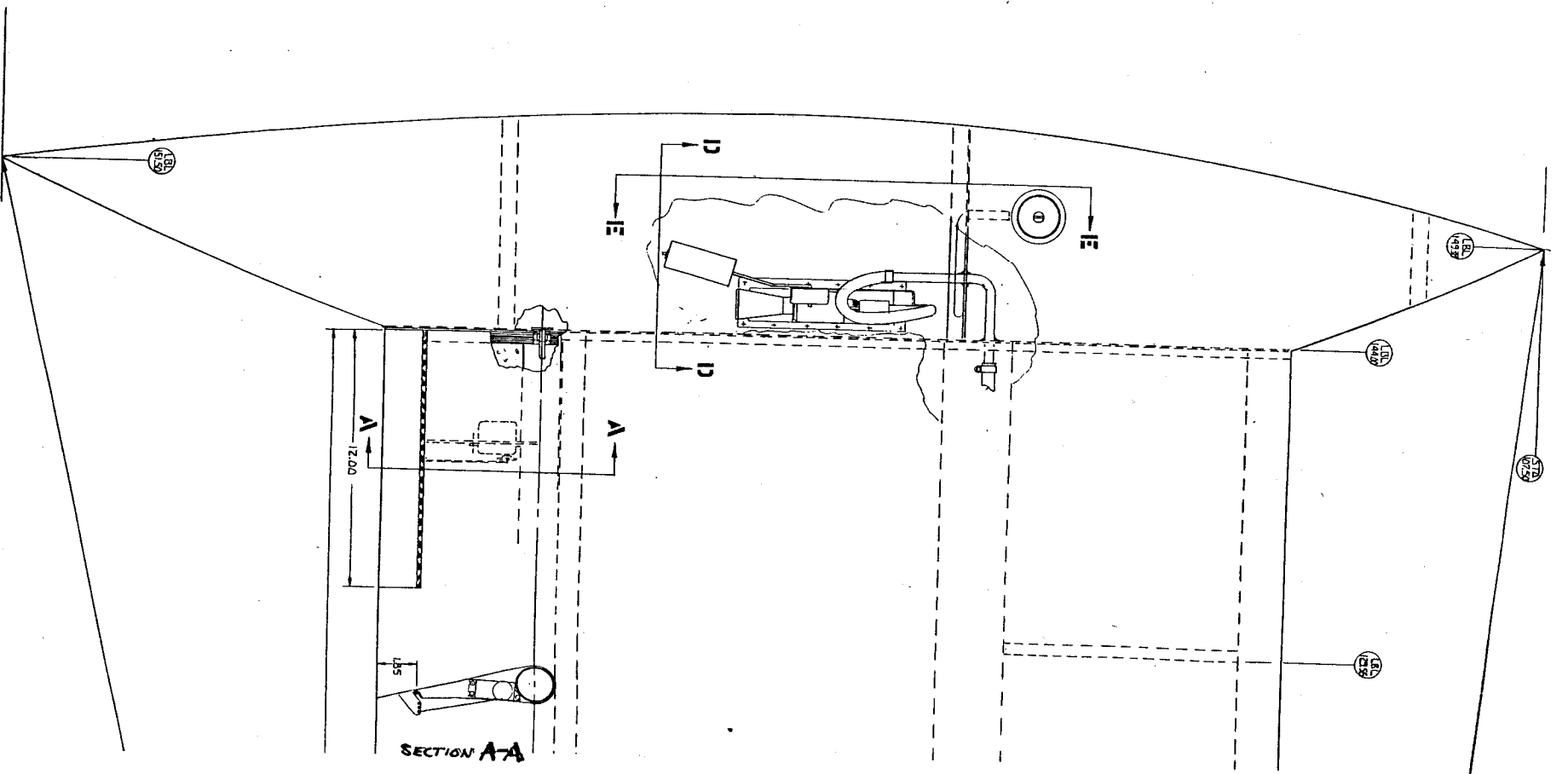
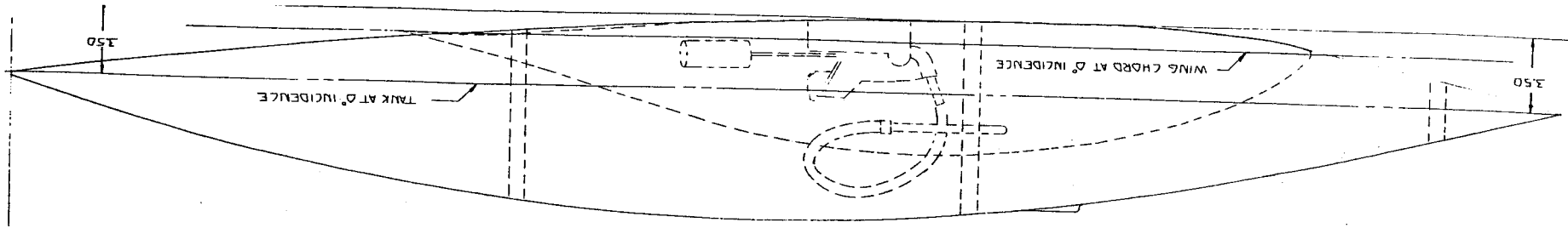
Sand all mating surfaces. See 21-C.

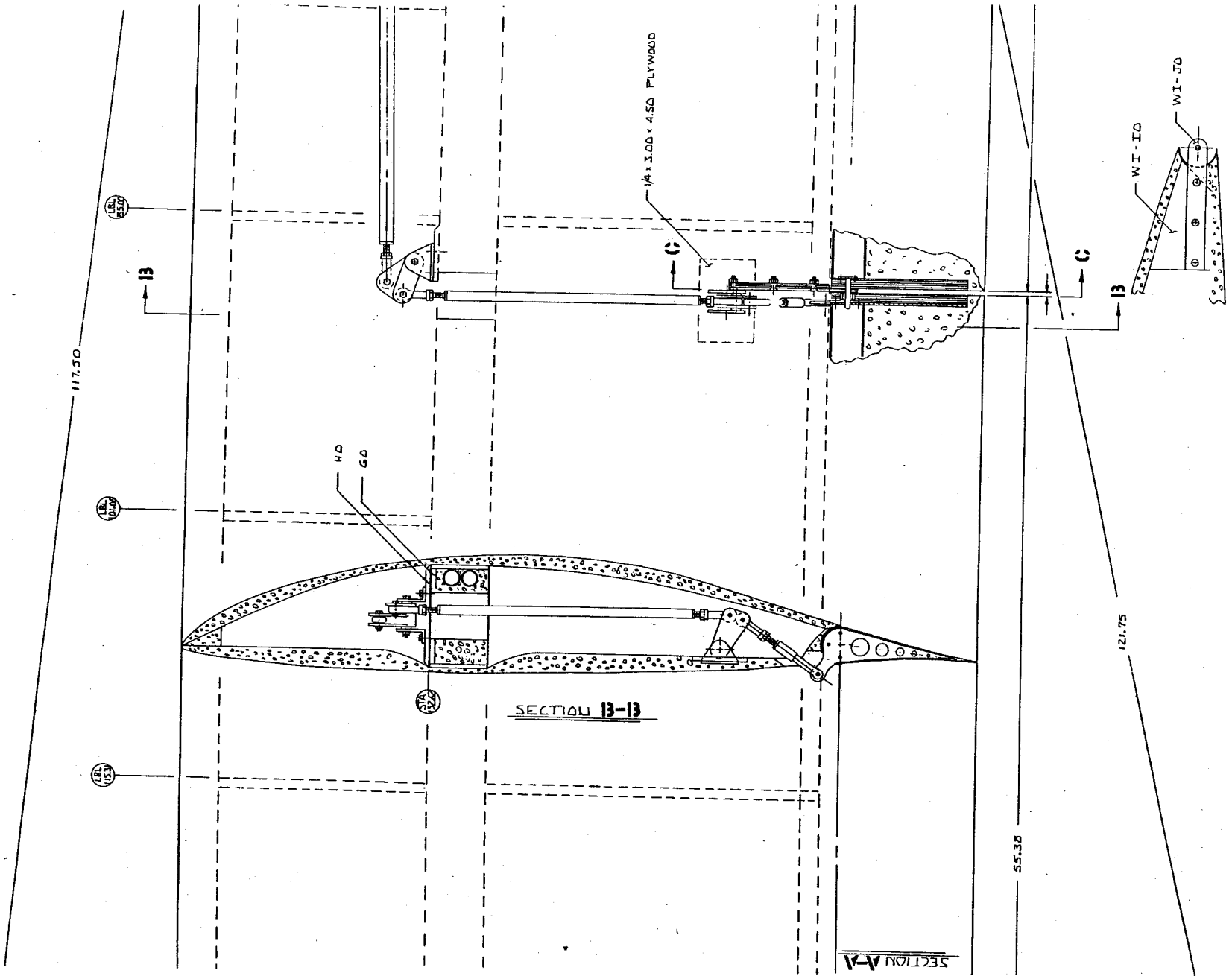
Using green goop, start putting a generous bead at the trailing edge (the upper side of the tube) Be also generous on top of the spar and ribs. Use the stuff sparingly at the leading edge.

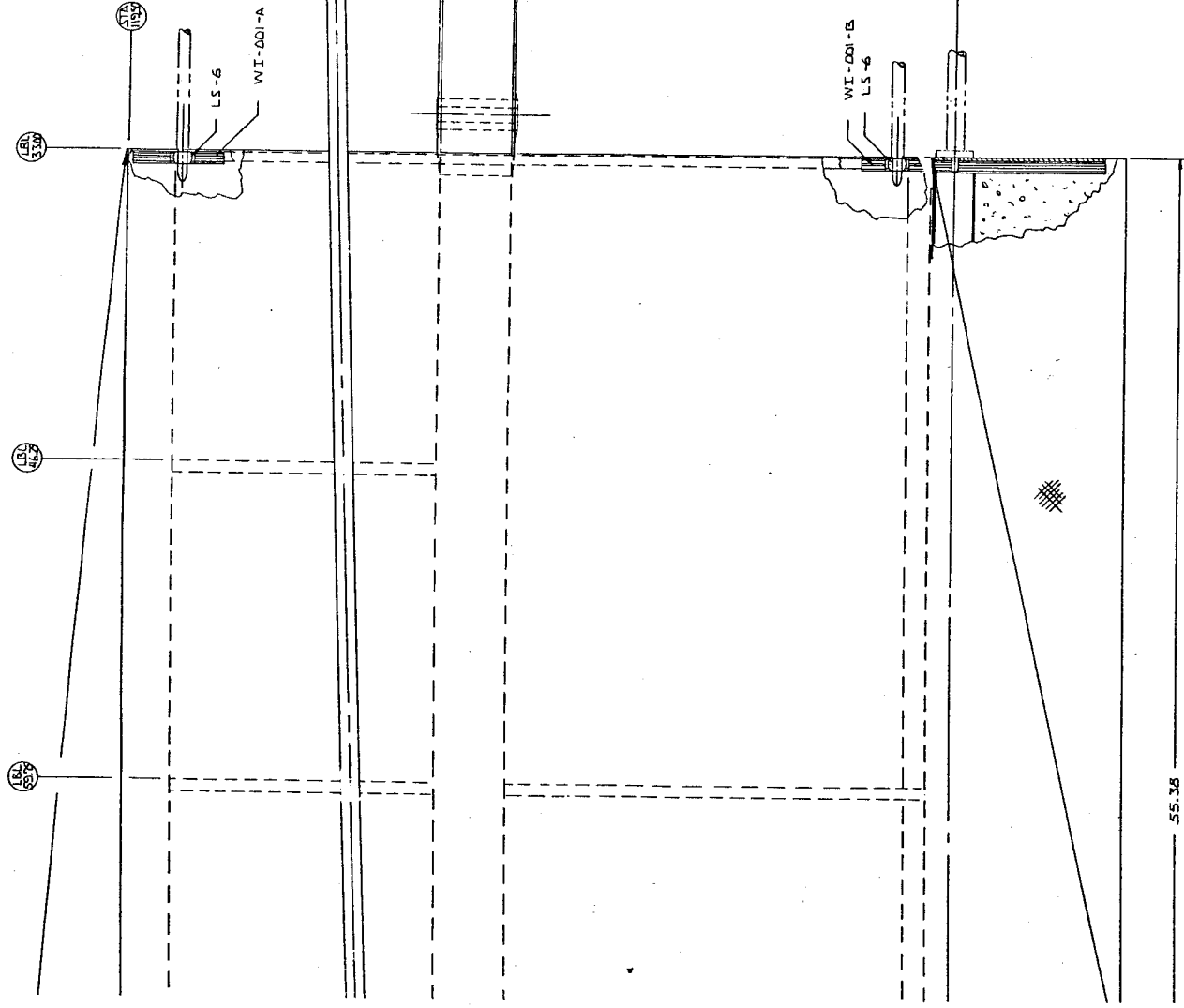
Start setting the top skin over the trailing edge. Put boards to distribute the weight evenly, and put weights over it. Then gradually set the top skin down over the spar, board it and weigh it. Finally fit the leading edge the same way. Let set at least 48 hours (at or over 70° F) before starting the next step.



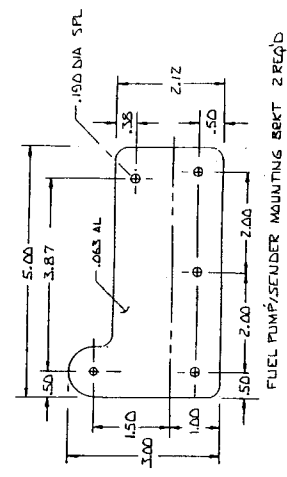
20-D







GAS CAP
 VENT TUBE
 FUEL TANK BAFFLE

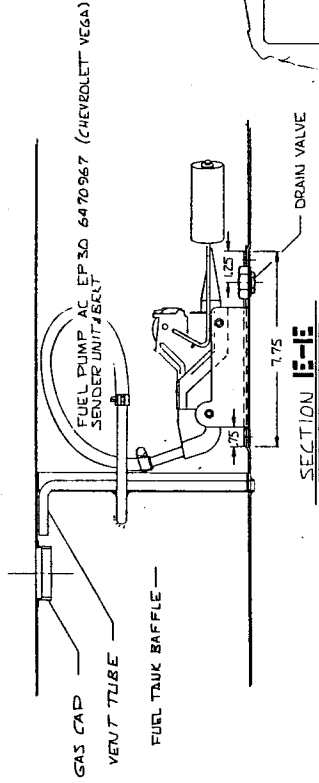
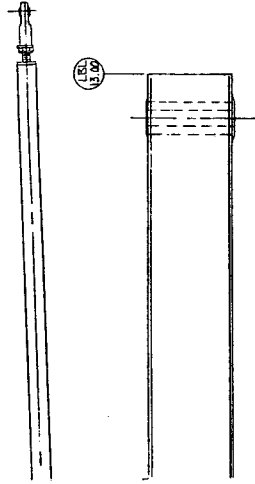


FUEL PUMP/SENDER MOUNTING BRKT 2 REQ'D

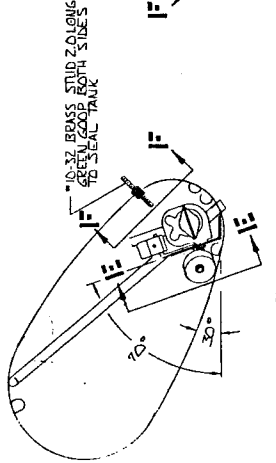
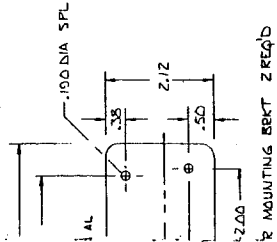
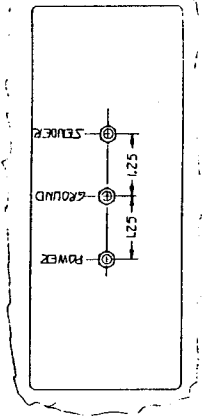
55.38



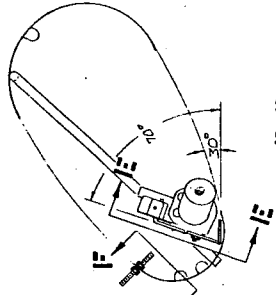
001-B
5



SECTION E-E

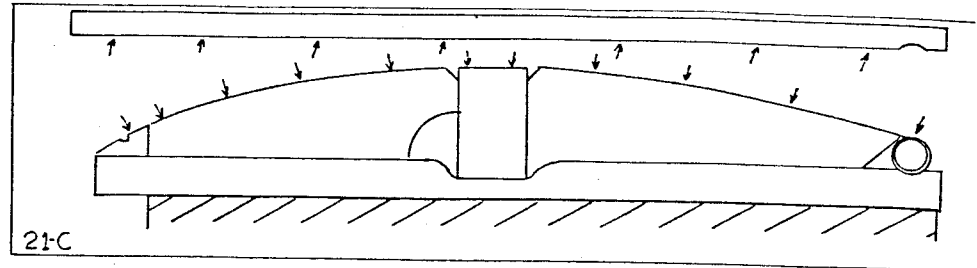
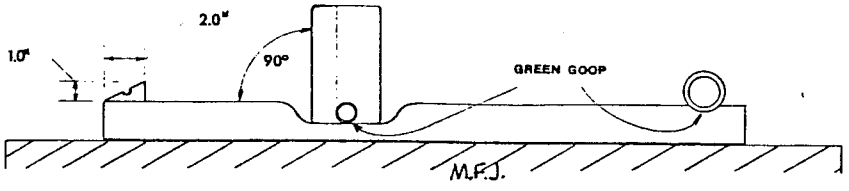


SECTION D-D
LEFT WING

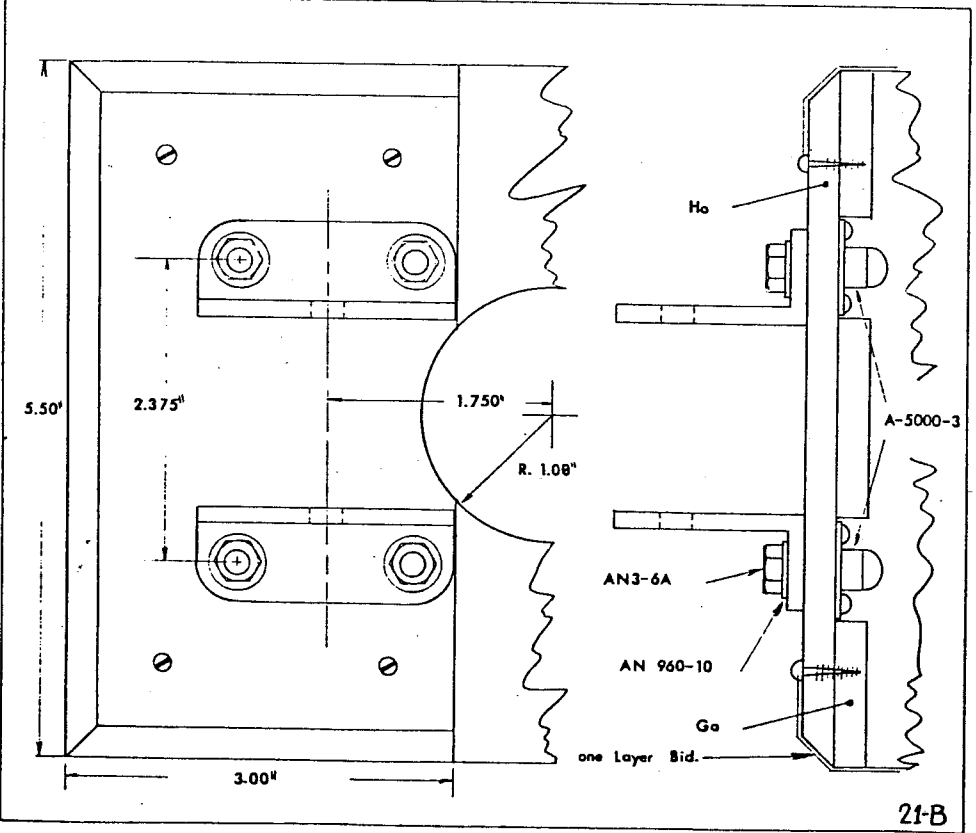


SECTION D-D
RIGHT WING

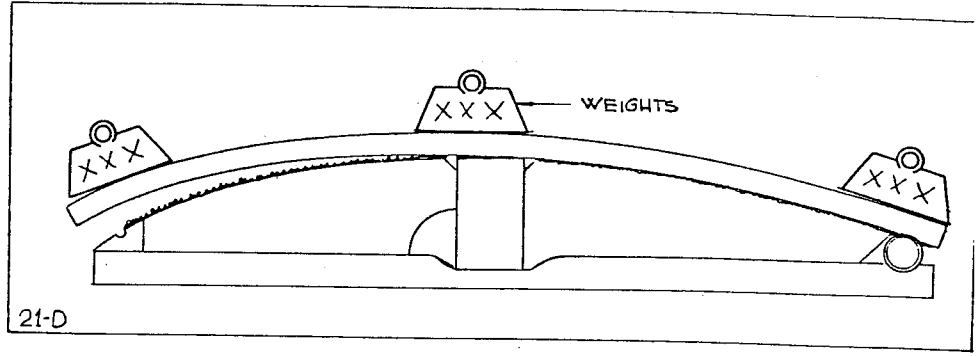
21A



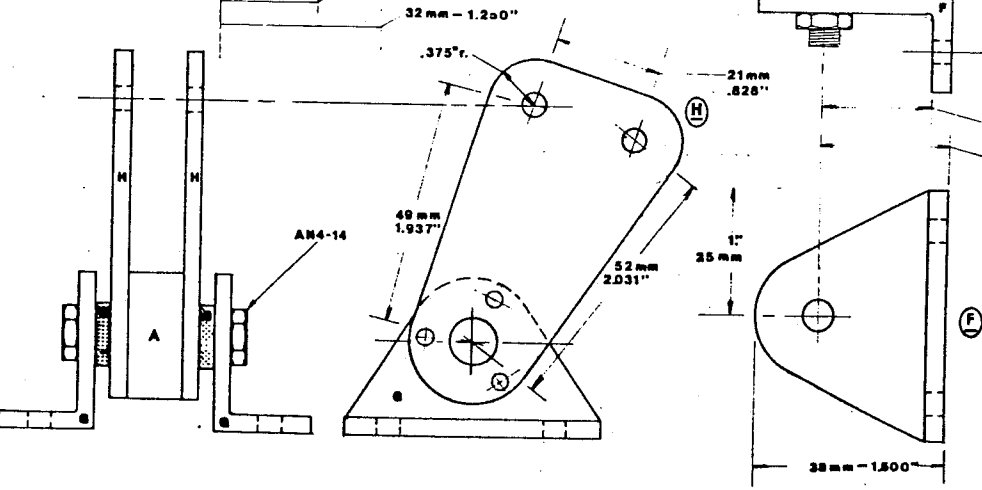
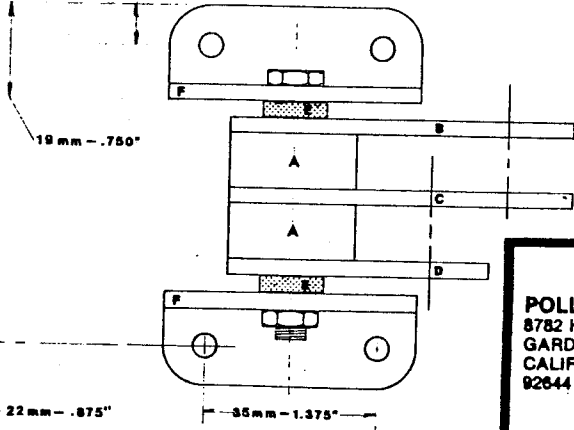
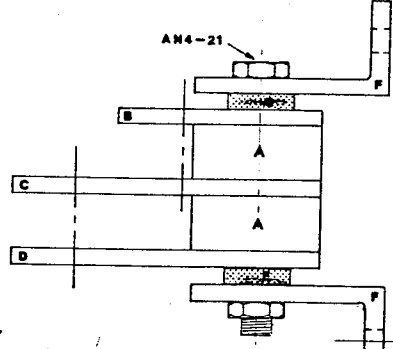
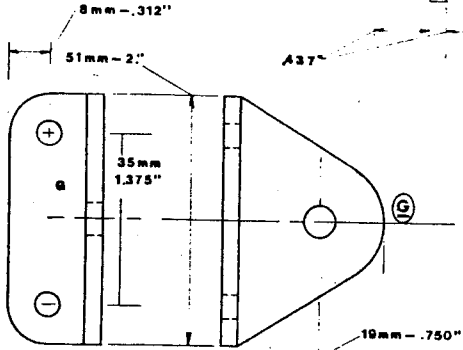
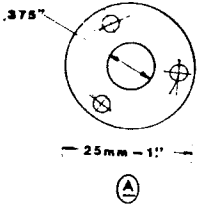
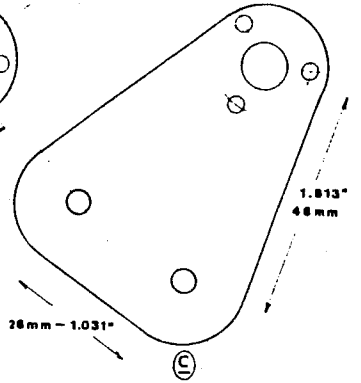
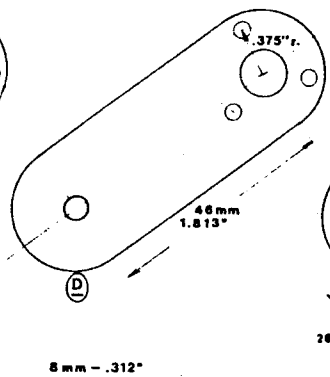
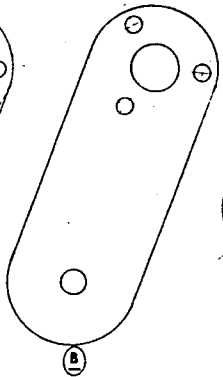
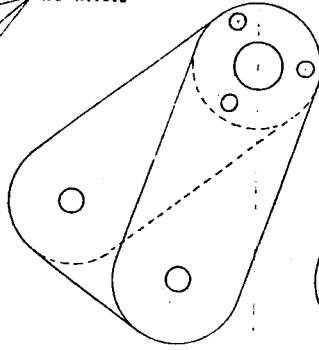
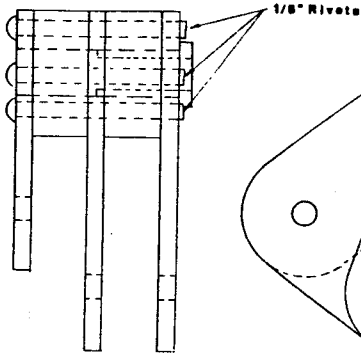
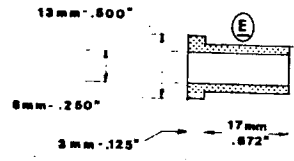
21-C



21-B

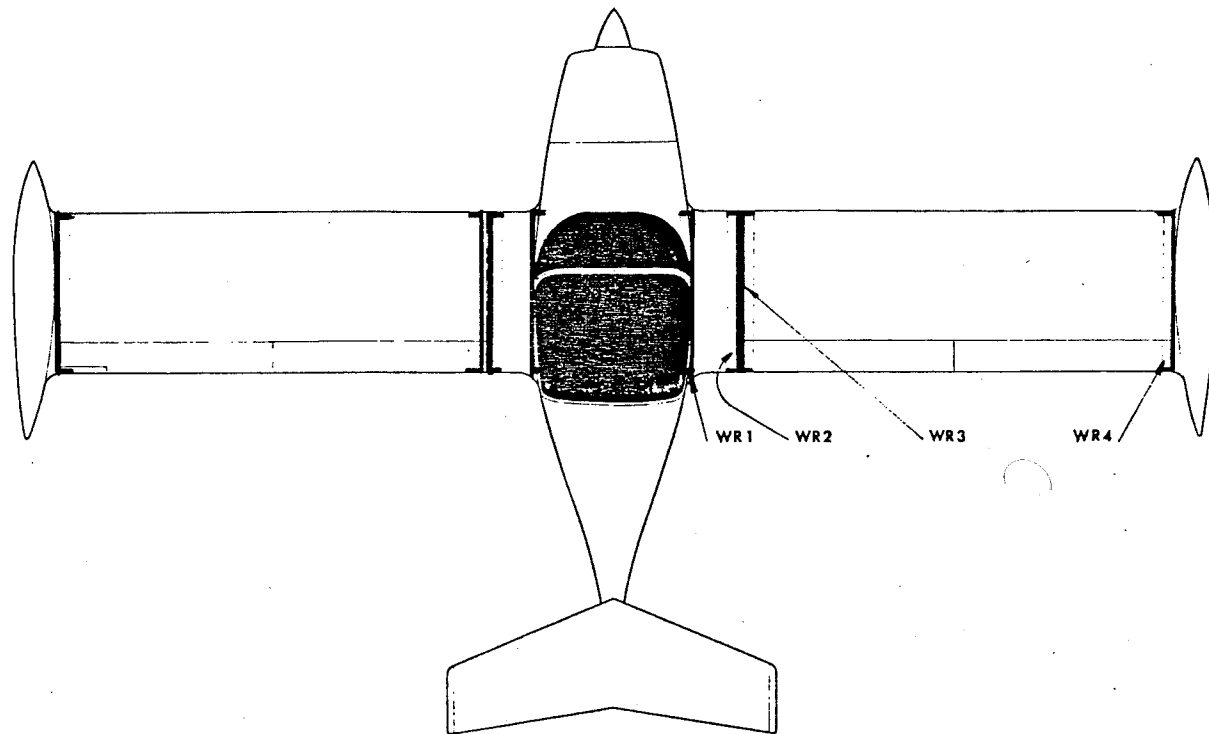


21-D



POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644		TITLE Aileron Bellcranks	
DRAWING NO.		REV-DATE	
AI-003-			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
DECIMALS	FRACTIONS	ANGLES	
.x ± .1	± 1/16	± 1/2°	
.xx ± .03			
.xxx ± .010			
DATE 1990	SCALE 1:1	SHEET NO. 1 OF 1	

Part#	Qty	Description	Material	Cond./Ht. Trt.		Notes
				Initial	Final	
A	6	Aileron Bellcrank	2024		3	
B	2					
C	2					
D	2					
E	8	Bushing	Brass			
F	4	Idle Bellcrank	2024		3	For Idle Bellcrank cut .072" length to .344"
G	4					
	4 (See size)	Fasteners: AN4-21 & AN4-14				Add 4 AN364-428 Nuts



- a. Epoxy spherical bearing LSS-6 into the .0125" holes of WI-001-A and WI-001-B use green goop.
- b. When set, cover spherical bearing with vaseline or Partall #2. be careful not to contaminate WI-001-A and B with the vaseline. Sand the inside of WR3 until you expose some glass fibers. Dust!
- c. Insert pins WI-002-A's in the 3/8" perforations on WR3 and with green goop attach WI-001-A + WI-001-B to the inside of both WR3's. Remember one right and one left. Clamp!
- d. When set, remove pins WI-002-A and sand entire surface of rib except for the outside of the 1/2" rim (in order not to disturb airfoil shape)

Cut the webs of WR3 to clear spar. The opening should be big enough to allow for accurate alignment. The alignment points are shown in drawing #24-A. Insert stub spar through WR3 and mark the rib contour on the foam. Carve 1/2" deep slot in the foam to accept WR3 lip.

Using the same procedure, carve slot for WR4 at the wing tip. (WR4 does not need a cut out for the spar.)

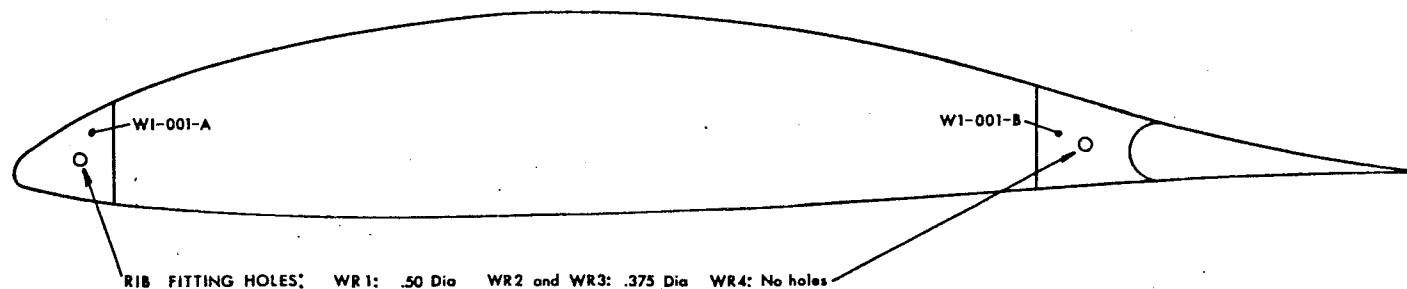
When convinced that both ribs are parallel to each other (both from top view and side view) glue them to the wing using green goop in the junction of the ribs to the inner skin of the wing and the wing spar. (24-A)

Now we have to prepare T4. This is a square aluminum tube 10' long and PERFECTLY straight, very similar to T1 (used for the elevator). (See Polidirective #1) Using the same procedure, sand the upper surface using very little pressure, to prevent deformation of the upper skin and/or bending of T4.

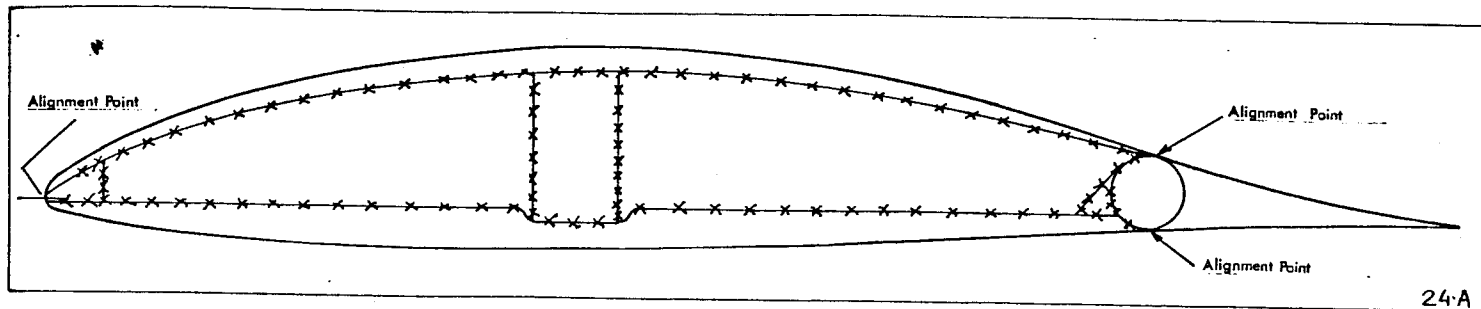
Contour the leading edge and the forward 2" of the bottom of the wing. Be Accurate! Extra care is required when sanding over hard edges, like the leading edge, and the tube at the trailing edge.

23-A

23-B



RIB FITTING HOLES: WR1: .50 Dia WR2 and WR3: .375 Dia WR4: No holes

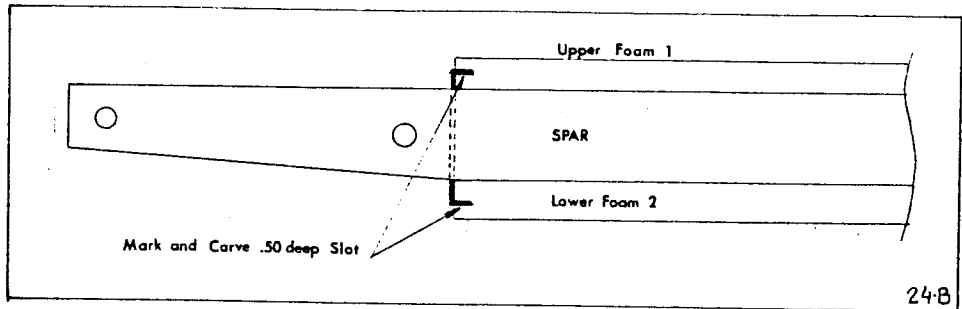


24-A

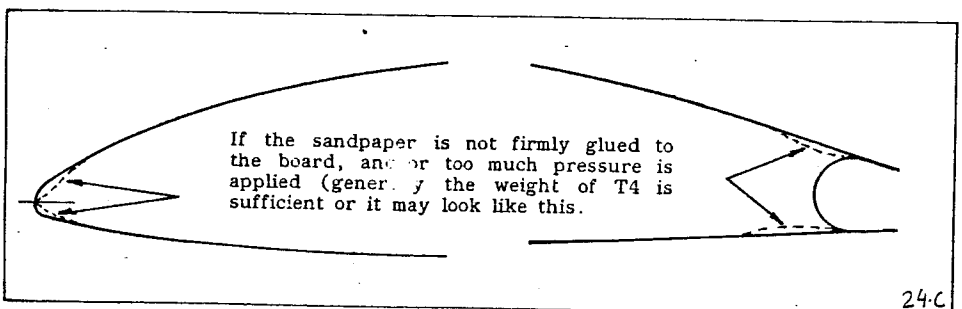
glass on the leading edge to a smooth taper. Vacuum carefully!

After carving groove along the trailing edge tube of the foam, vacuum! Using squeegee, fill groove with "green goop" and immediately proceed to glass the bottom of the wing with 2 layers of bidirectional cloth at 45°.

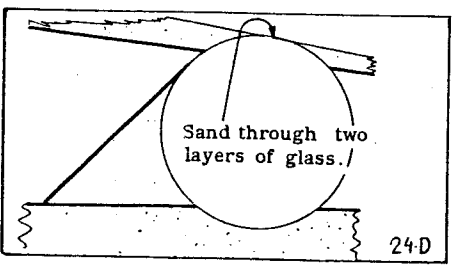
Remember: Use syrup for attaching glass to foam and Poxipoll for glass to glass. Overlap entirely WR3.



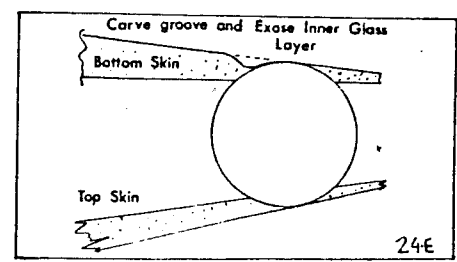
24-B



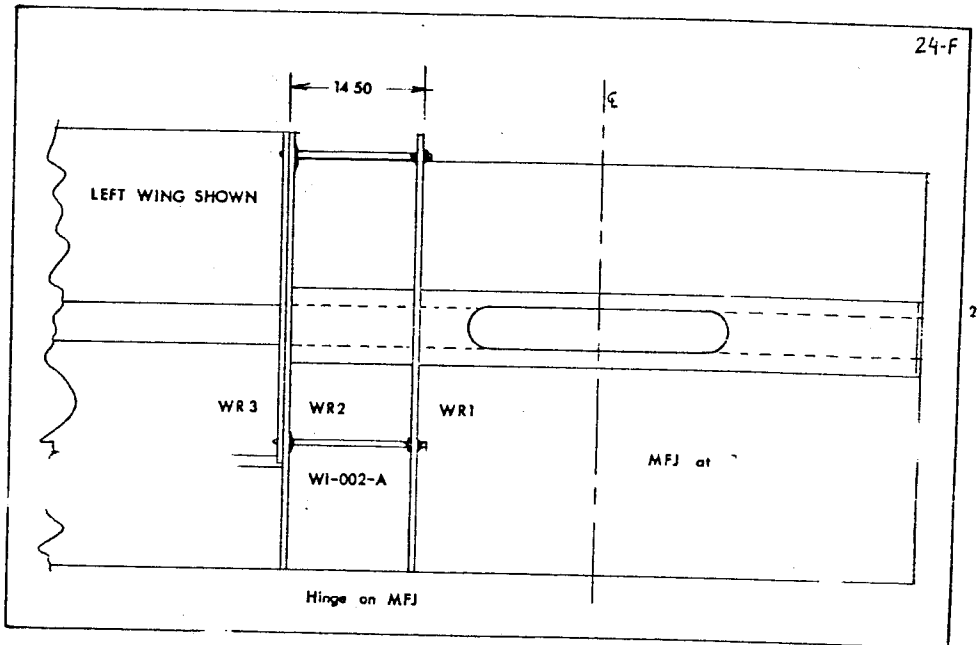
24-C



24-D



24-E

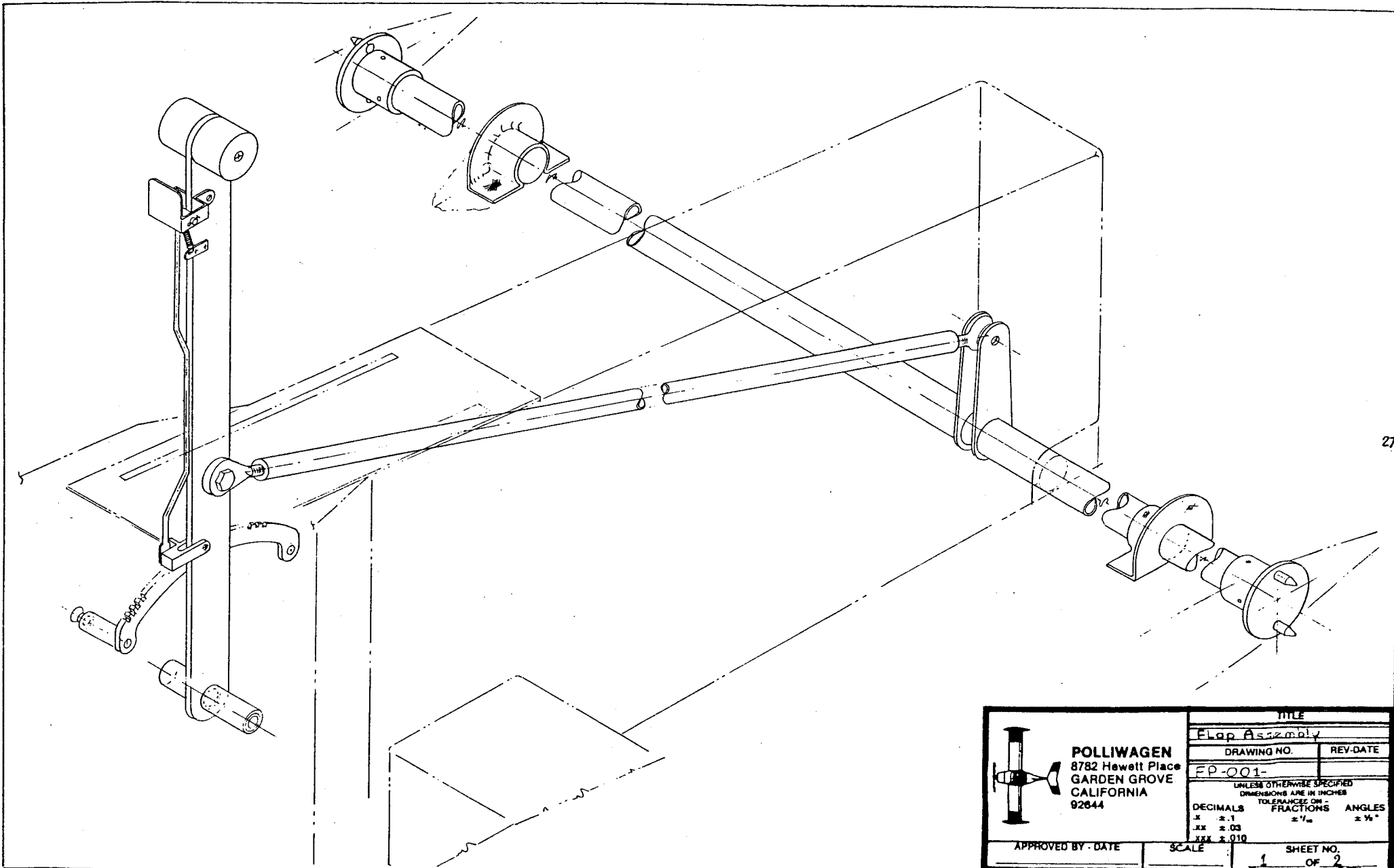


24-F

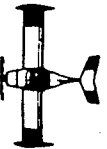
Apply one layer of bidirectional at 45° over syrup. Go around the leading edge about 1 1/2". Go around rib WR3 and overlap entire rib. When all the air bubbles have been worked out, apply a second layer overlapping leading edge. Again overlap wing rib with totally. Give at least 48 hours of setting time. Remove from M.F.J., flip over and block it. Sand the bottom of the wing using T4 in the same way you did with the top. Grind the overlapping

When glassing the bottom, go around leading edge by 1 1/2" with the first layer, and by 1" with the second.

When set, sand leading edge overlap carefully, to avoid damaging the glass layer under it, go over the entire surface correcting bubbles, high spots, etc. After 48 hours setting time, flip wing over and go over entire surface inspecting and correcting little details with 'green goop'.



27

 <p>POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>		TITLE	
		Flap Assembly	
DRAWING NO.		REV-DATE	
EP-001-			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
DECIMALS	TOLERANCES ON -	ANGLES	
X ± .1	FRACTIONS	± 1/2°	
XX ± .03			
XXX ± .010			
APPROVED BY - DATE	SCALE	SHEET NO.	
		1 OF 2	

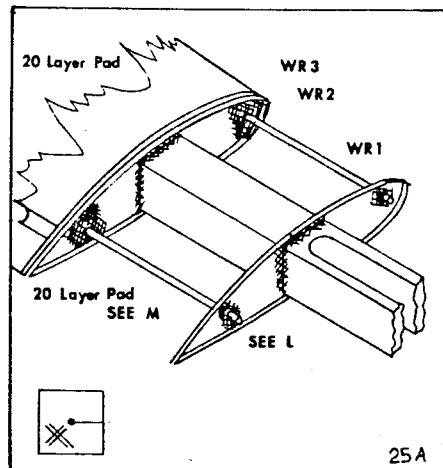
After curing, sand entire wing, mark with a straight line the trailing edge (over the tube) as in drawing WI-003-, and with a very fine toothed sabre saw cut excess off. Flop wing over, and repeat cutting operation. Cut about 1/16" outside of final line in order to finish to correct dimensions with sanding block.

After the plastic tube is taken off the wing, sand the two edges of the aileron-flap socket to the final dimension, then thin them from the inside to a sharp edge. At the flap section, sand to smooth contour as shown here. Repeat the same procedure with the other wing panel. Be sure to make one right and one left, or you will end up having to build two Polliwagens!

We are now ready to build the center section:

- Set M.F.J. at +4 angle. Check with strings for a 4 5/8" dihedral on both edges of the table. Check for warps!
- Select one each WR2 and WR1.
- Sand inside and outside surfaces until dull, (remember not to touch outside 1/2" wide rim, in order not to disturb airfoil.)
- Put right wing panel on the 11" long section of the M.F.J. with the leading edge protruding 2". Glue wing in position and weigh it down.
- Insert Center Wing Spar and pin in position.
- Cut the webs of WR1 and WR2 to clear spar. The opening should be big enough to allow for accurate alignment.
- Using pins WI-002A pin WR2 to wing panel. **IMPORTANT:** in order to have space for the final glassing of the web of WR2, separate WR2 from WR3 with a .040" (1mm) skin. Please use this opportunity to protect Outside Wing panel with Saran Wrap.

- Insert WR1 (with the 3/8" holes enlarged to 1/2") in the spar. Distance between WR1 and WR2 is 14.5". (Aluminum tube butts against WR2 only the pin passes through.)
- With masking tape, tape WR2 to the finished wing panel all around the perimeter.
- When satisfied that WR3, WR2 and WR1 are perfectly aligned to each other and up and down, fore and aft incidence, when assured that perfect alignment has been achieved, secure the spar to the table.
- Remove pins WI-002-A from ribs and sand the whole length of the aluminum tube, (cover steel pins with tape in order to protect them against construction hazards). Put a small amount of green goop around the ends that fit against WR2 and WR1. Insert!
- Recheck alignment, avoid distortions. Attach WR2 and WR1 to spar with green goop. Cover all joints with strips of bidirectional at 45°. See drawing #



- Epoxy four small patches of bidirectional over the ends of the aluminum tube on both sides of WR1; on both aluminum tubes (16 patches total).
- Using rectangular sections of bidirectional approximately 4 1/2 x 4 1/2 in size, build up a pad of solid Poxipoll-Glass Cloth around the aluminum tube at WR2 of about 1/2" to 3/8" thickness (see drawing #

Let set for 48 hours.

Remove spar pins, remove outside wing panel and set aside.

Detach center spar and its two ribs from M.F.J.

Now put left outside wing panel on the 11" long section of the M.F.J. as in item (d). Note: Leading edge will now point in the opposite direction. Turn center spar around and plug into stub spar of left wing.

Repeat procedures (a) to (n)

Another 48 hours setting period, and you can remove your work from the table.

Now we have to cover the two winglets.

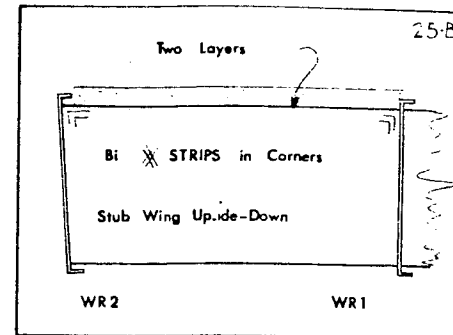
This requires 4 preglassed skins to be prepared in one operation, using 1/2" Urethane foam.

Glass a 58" x 36" section of 1/2" foam with 2 layers of bidirectional at 45° on one side only. When set, cut in four slabs 14.500" x 36". Sand glassed side lightly for future assembly.

Set M.F.J. at 4°, plug center section on right panel, and using foam scraps, block in position. (Both center section and right panel will be upside-down.) Take one of the four slabs 14.500" x 36". Trim and sand to fit between WR1 and WR2 to form the upper stub wing skin.

It should make contact with the bottom of the spar, and both ribs. See 25A-B.

When set, using strips of bidirectional at 45°, reinforce the corners between the



slab and both ribs. (you will be walking on this skin!) Once set, disassemble and repeat with the left side.

When set, remove left wing panel, reset M.F.J. at +4

Using bidirectional strips reinforce whichever area you could not reach before. Now is the time to do the bottom. Use the same method as the top.

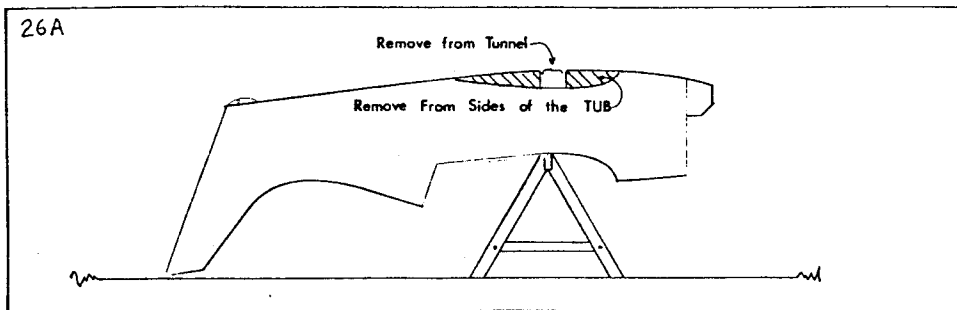
From 14 1/2" long scraps of foam, make a 2 solid leading edge and trailing edges. Attach with A+B liquid Urethane foam. When thoroughly set, sand the foam to the airfoil contour and vacuum surfaces. Using syrup, glass the foam surfaces (top and bottom) with a layer of bidirectional, and right away a second layer using Poxipoll. Keep edges over the ribs neat, but do not go over WR2 web at this time.

After 48 hours, you are ready for cutting the access holes for the aileron control push rod, the landing gear assembly windows, and the wheel wells. (The wheel wells are also used to remove the wing spar pins.)

Attaching the stub or central section of the wing to the fuselage.

Set fuselage upside down on one saw-horse. Set saw-horse across the canopy opening, on both F-11's. Use the top of the fin spar as the other support. Change shims under the fin spar until firewall is vertical. Measure 19 1/2" from the firewall back and trace a line across the "belly" of fuselage. That is the position of the leading edge. From this leading edge line, measure 11 1/8" back,

26A



and draw another line parallel to the firewall, to be the front of the wing spar. Another line at 18 1/8" from the leading edge, this is the back of the spar, and one at 42" from the leading edge. This is the trailing edge.

Recheck everything! (measure twice, cut once)

Using a sabre saw with a long blade (3"+) remove the section of the fuselage bottom between the 11 1/8" and the 18 1/8" lines to make room for the spar. To be able to insert the stub wing into the proper placement, you will have to remove a rectangular section out from both sides of the tunnel. Considering that the bottom of the spar will end up even with the floor of the cockpit, and that the finished spar measures approximately 5 7/8" in height, and is 7" wide, using the same sabre saw, cut away and remove that amount from the tunnel.

Next, you will cut the sections of the WALLS of the tub that interfere with the insertion of the stub wing. Cut a little at a time! DO NOT remove the floor or tub bottom except where the spar goes across! The wing sits at angle of attack, with relation to the upper edge of the TUB (Note: Do not confuse F-11, the frame of the cockpit with the upper edge of the Tub!) From this reference line to the center of the leading edge should be and from the same line to the trailing edge should be if your airplane measures different, make sure that the difference between both measurements is with the leading measurement being the smallest.

Once you have dug the openings in the bottom, tunnel and sides of the fuselage, and you have the upper skin of the stub wing mating smoothly with the outer walls of the fuselage, and you checked that the inner floor of the fuselage is in line with the bottom of the spar (no crooked wings, please) it is time to attach the wing to the fuselage!

Put the wing in place and with a marker draw on the upper surface of the wing the line in which the fuselage makes contact with it. Crawl under the fuselage and mark on the spar the tunnel position. Same with the inner wall - wing upper surf surface line of contact.

Sand the areas to be epoxied, vacuum, and proceed to brush with Poxipoll. Now mix some green goop, and using the cake decorators technique, deposit a stream of green goop on the exact points of contact.

Lower the wing in position and with the tip of your gloved finger, push the green goop into the cracks and crannies. No air bubbles accepted!! Come back every few minutes and check for runs. Restuff the goop back into the empty spaces. Once it starts to gel, using 2" wide strips of bidirectional at 45 and fresh Poxipoll, reinforce all joining surfaces with two layers of cloth.

- Spar to tunnel, in every possible way (inside and out)
- Spar to floor, inside.
- Upper wing surface to inside and outside of tub's walls.

After 48 hours, fill the opening in the belly with foam, sand and shape. Using foam scraps, streamline the bottom of the wing to the bottom of the fuselage junction. Sand all glass surfaces on the bottom of "Tub"! stub wing and WR2's webs, and the first 2" inside the tunnel. With Poxipoll and bidirectional at 45 glass wing-fuselage junction, including WR2's webs, going into the tunnel by at least 2". No air bubbles!! (Remember to radius sharp corners with 36 grit to 1/8" radius.)

24 hours later, flop fuselage right side up. With green goop, attach the kit parts "wing Fillets" in position.

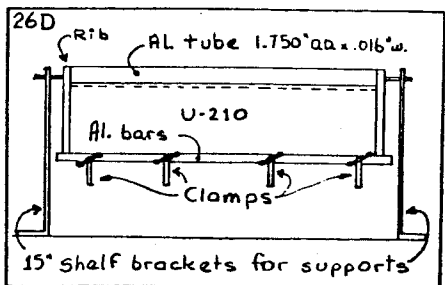
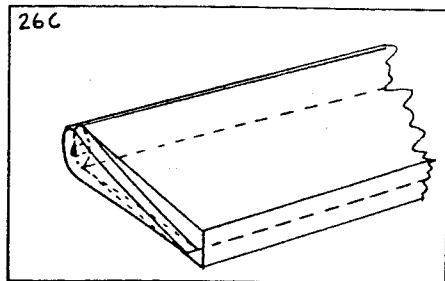
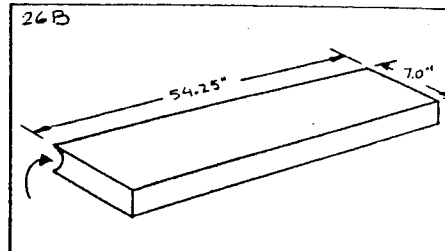
24 hours later, feather the kit parts edge to the wing and fuselage surfaces. Sand kit parts and surrounding areas dull. Round sharp edges to a 1/8" radius. Vacuum! Glass with 2 layers at 45 including the WR2's webs.

FLAPS AND AILERONS

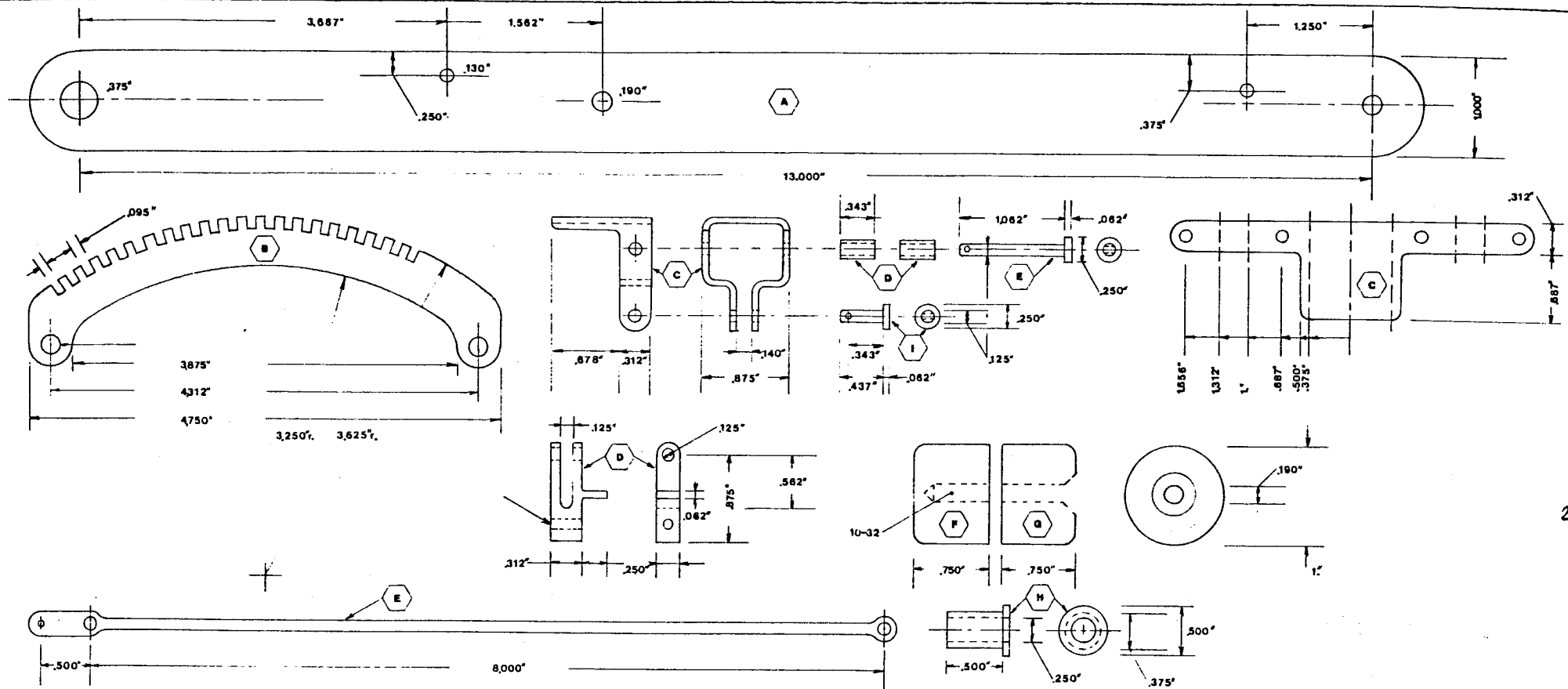
The flaps and the ailerons are identical, with the exception of the aileron control horn. They are built using a 1.750" x .016" wall aluminum tube as a spar-leading edge, U-210 foam for the rest. Two layers of bidirectional at 45° cover both sides in one operation.

- Cut four slabs of U-210 54.25" by 7.00"
- Tape some 80 grit sandpaper to one of the 1.750" diameter aluminum tubes and sand a groove on one of the 54.25" sides of each slab. (26C)
- Remove the sandpaper and with Poxipoll glue a tube to each slab.
- Using ailerons and flap kit ribs, attach them to the ends of the slabs as shown in drawing # 26C.
- When Poxipoll is set, use T1 to sand U-210 to proper aileron airfoil, being very careful when sanding the second side, it is very thin and breaks easily. Use ribs as a guide.

- Pin uncovered control surface on illustrated jig, and cover with two layers of bidirectional cloth at 45°. NOTE: These layers must overhang the foam and ribs trailing edge by at least 750". (Study drawings.) (26D).
- Clamp this overhang with two bars or strips of aluminum or wood (they must be perfectly straight) to insure a knife perfect trailing edge. (26D)



THE GLASSING OF THE AIRFRAME IS DONE!



28

Part#	Reqmts.	Description	Material	Cond. / Mt. Trt.		Notes
				Initial	Final	
A	1	Flap Handle	2024		3	
B	1	Ratchet	Steel			
C	1					
D	2	Spacers				
E	1	Pin				
F&G	teach	Handle	Drain			1/8 Rod (Flatten ends)
H	1	Bushing	Steel			
I	1	Pin				

POLLIWAGEN
8782 Hewett Place
GARDEN GROVE
CALIFORNIA
92644

TITLE

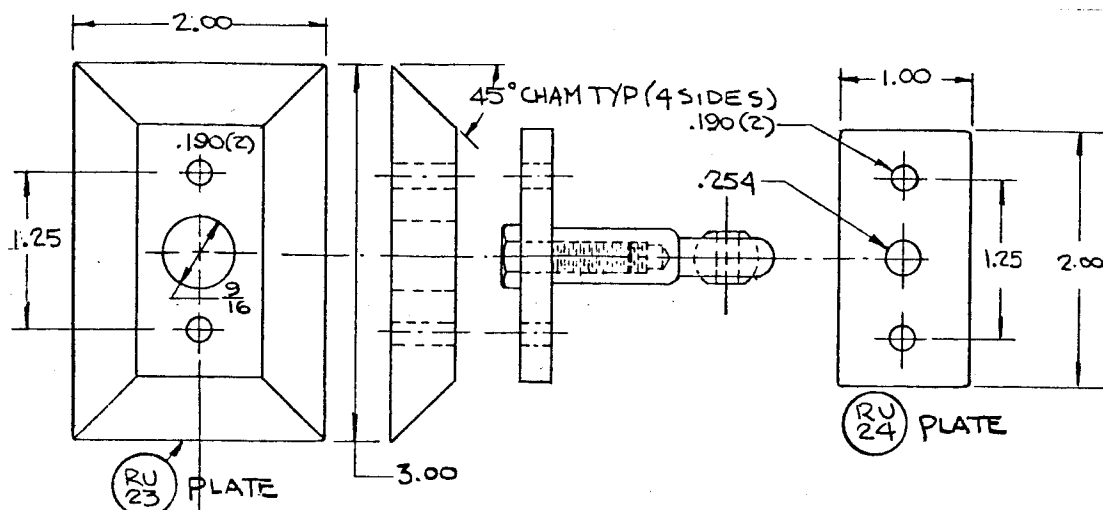
Flap Handle

DRAWING NO.	REV-DATE
FP-002	

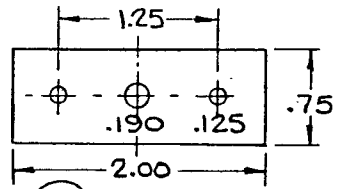
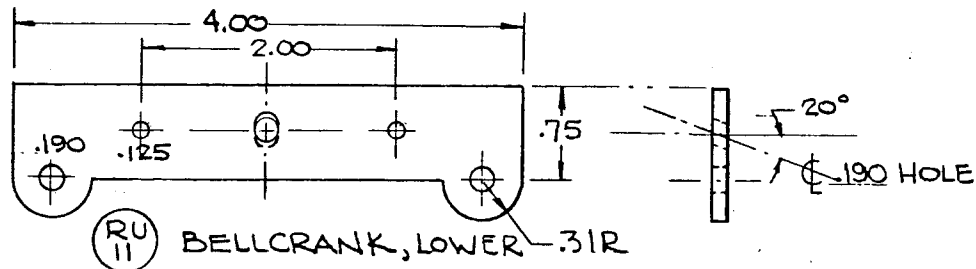
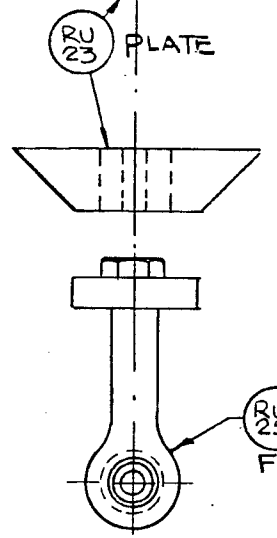
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

DECIMALS	TOLERANCES ON FRACTIONS	ANGLES
.x ± .1	± 1/16	± 1/2°
.xx ± .03		
.xxx ± .010		

APPROVED BY - DATE
SCALE
SHEET NO. OF

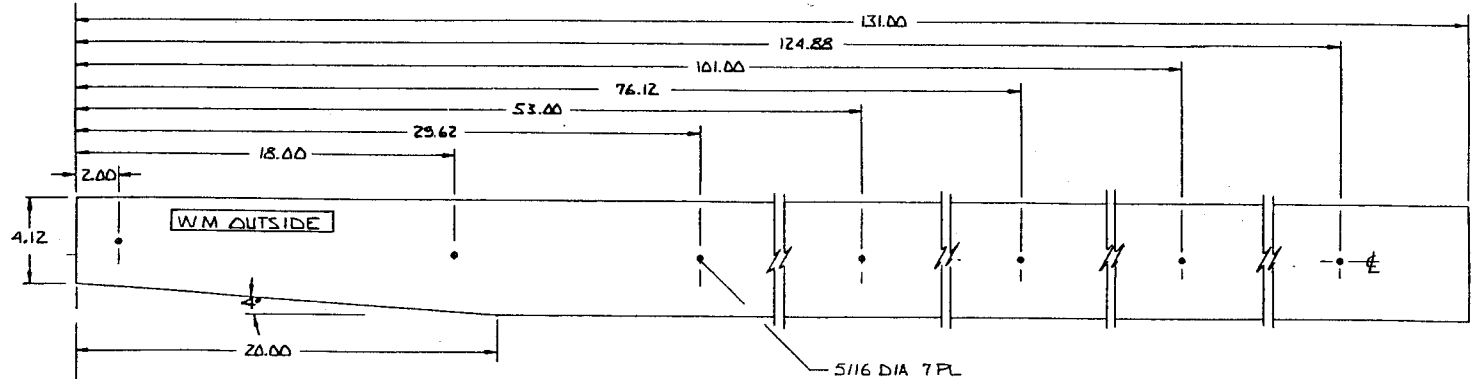
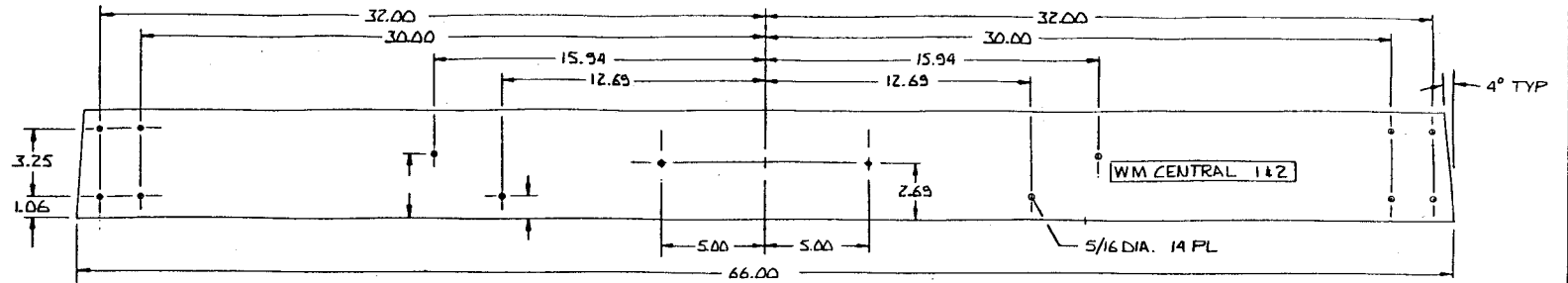
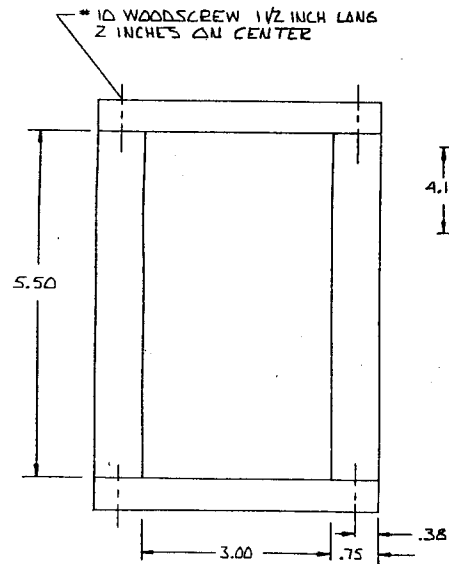
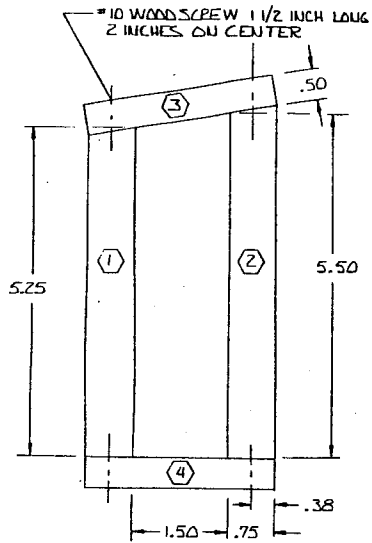


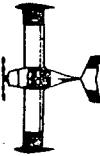
PART NO.	REQ	DESCRIPTION	STOCK SIZE	MATL	COND. INT.	COND. FINL.	REMAI
10	1	PLATE, UPPER	1/8 x 3/4 x 2.0	2024	T3	T3	
11	1	BELLCRANK	1/8 x 1.07 x 4.9	2024	T3	T3	
23	2	PLATE	1/2 x 2.0 x 3.0	"	"	"	
24	2	PLATE	1/4 x 1.0 x 2.0	"	"	"	
25	2	BEARING	—				OR "FAI RE B3

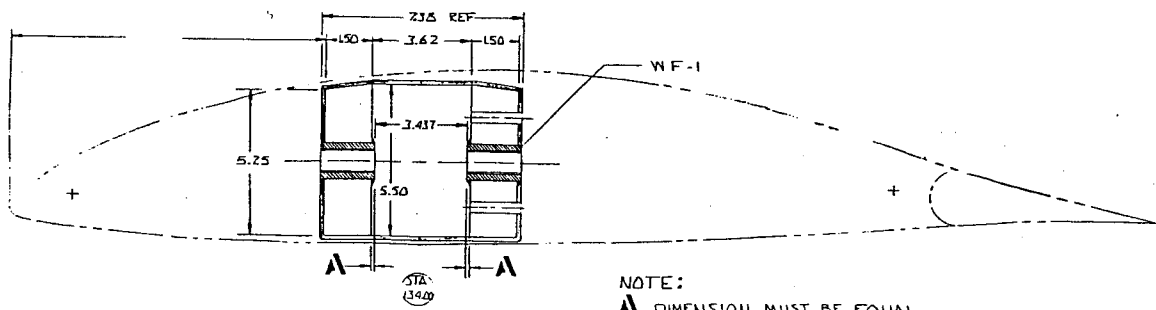
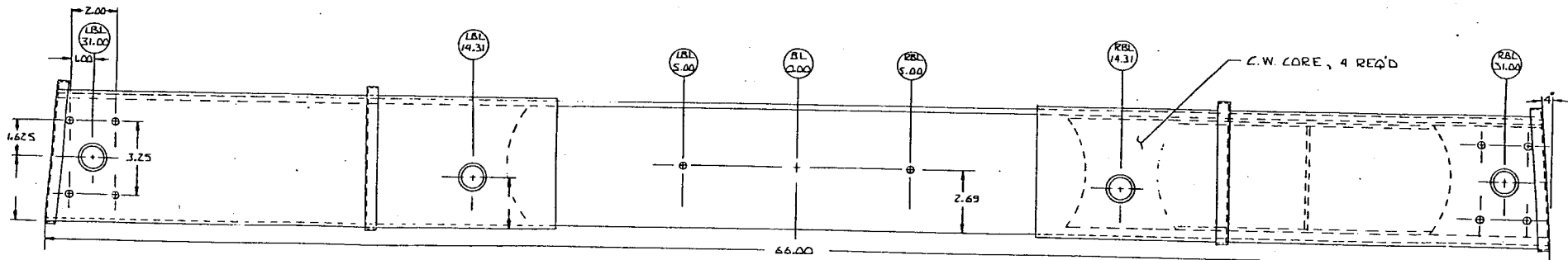
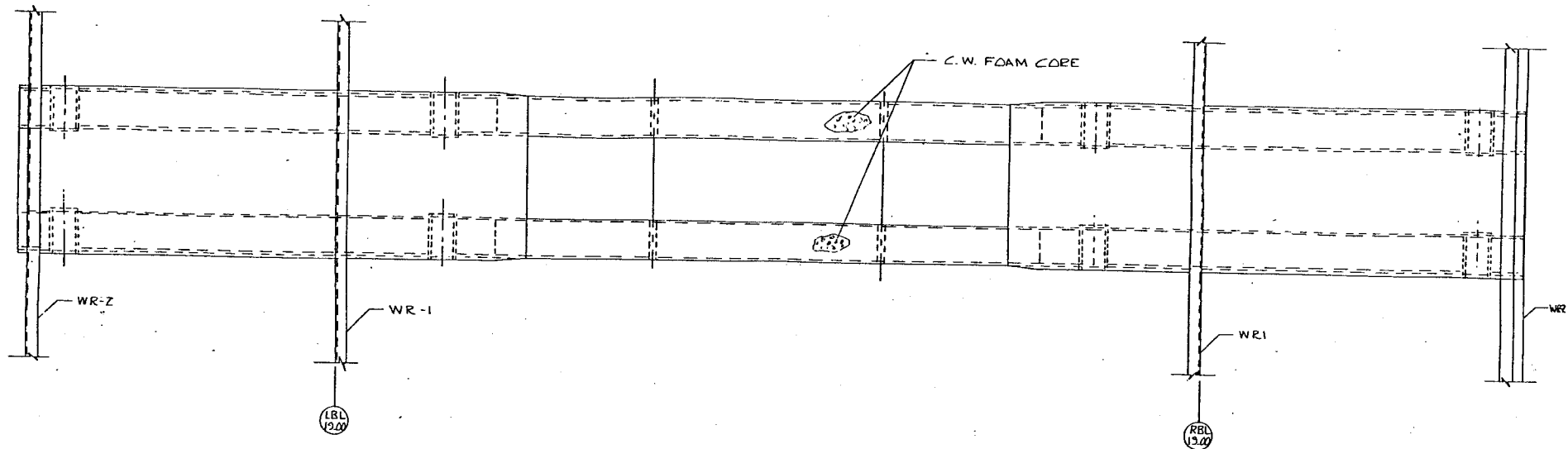


1. FINISH: AL ALY PARTS
HARD ANODIZE - COMML SPEC
NOTES:

<p>POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>	TITLE	
	RUDDER DETAIL	
	DRAWING NO.	REV. DATE
	RU-003	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
DECIMALS	FRACTIONS	ANGLE
.X ± .1	± 1/16	± 1°
.XX ± .03		
.XXX ± .010		
APPROVED BY - DATE	SCALE	SHEET NO. OF
	1/1	2 OF 3



		TITLE	
		SPAR HOLDS	
DRAWING NO.		REV-DATE	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON -			
DECIMALS	FRACTIONS	ANGLES	
.x ± .1	± 1/16"	± 1/2°	
.xx ± .03			
.xxx ± .010			
APPROVED BY - DATE	SCALE	SHEET NO.	
PA June 1981	none	ONE OF ONE	



NOTE:
A DIMENSION MUST BE EQUAL
 AT BOTH WING PIN LOCATIONS

	TITLE	
	CWATER SPAA	
POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644	DRAWING NO.	REV-DATE
	<small>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES</small>	
<small>DECIMALS</small> .x ± .1 .xx ± .03 .xxx ± .010	<small>TOLERANCES ON -</small> FRACTIONS ± 1/16 ANGLES ± 1/2°	
APPROVED BY - DATE <i>John B. 8/85</i>	SCALE	SHEET NO. OF

ATTACHING THE LANDING GEAR:

Main Landing Gear

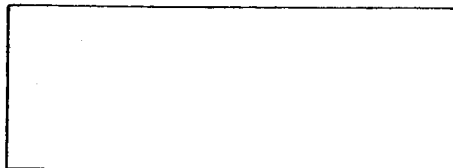
Install landing gear brackets temporarily, drill a $\frac{1}{2}$ " hole in both sides of the tunnel in the position indicated. Pass a string from the axle of one crank to the other, through the holes in the tunnel. The taut string in the reference to mark the holes accurately, for the left and right plates. Remove left landing gear bracket, insert the aluminum tube shaft in the right side crank. Pass the cables through the big hole in the tunnel, insert the pulley assembly, put the right plate over the shaft, engage with the aluminum tube. Put the screws in the right plate loosely, insert the left plate (also loosely) and the left aluminum tube. Install the left bracket again. With both legs extended and the cranks in the locked position, push the aluminum tubes outward against the cranks as far as they will go. Drill a passing hole as shown in the drawings, debur and install the 5/32" bolts and nuts. Tighten the screws holding the plates. Check for binding!

Nose Landing Gear

Locate the bearing position resting it on the fire-wall against the tunnel. Mark the center of the bearing on the tunnel wall. With a compass centered on the mark, draw an arc of 4.275 in. radius. Draw a perpendicular line to the fire-wall 3.392 in. above the bearing center, crossing the arc. This is the center of the leg bolt hole. Enlarge the bearing hole to let the flanged end of the bearing go through freely (the tunnel wall does not have to touch the bearing) The bearing should protrude inside the tunnel, enough to pass through the main plate (.125 in.) and between .025 and .050 more. Check that the bore of the bearing is perpendicular to the tunnel's wall. Mark the holes and secure the bearing to the firewall with the four bolts. Temporarily insert the crank and check if it turns in a plane parallel to the tunnel's wall.

The main plate is attached next. Insert the larger hole over the bearing, and using a strong light from inside, move the plate until the .375 in. hole matches

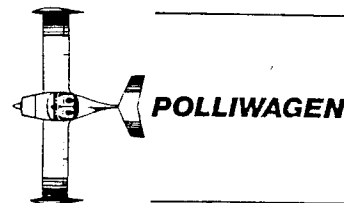
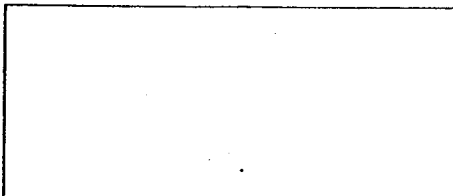
the mark, as explained above. Mark the holes for the 3/16" bolts, drill and install with a plate from the outside. Insert the crank. Place the leg with the spacer tube inserted into the pivot tube, engaged to the crank pin in position to pass the bolt. Checking that the leg is straight, mark the position of the hole, on the wall of the other side. Using the plate as a template, drill the holes for the 3/18" bolt and the 3/8" bolt. Make the holes oversize, (like $\frac{1}{8}$ " and $\frac{1}{2}$ "). Assemble the plate and nut plate loosely, reassembly the whole thing using a brass washer between the crank and the leg slide. The plate-nut plate being loose, will allow for minor corrections until the leg is straight, when extended and fits the well correctly when retracted, moving smoothly along it's travel. Use washers as needed between the pulley and bearing, and on both sides of the pivot tube to obtain enough clearance for smooth movement avoiding excessive sloppiness. The brass washer between the crank and the slide should be thin. Do not use any extra washers at this point! When satisfied, take the leg and the crank out, install the cables in the pulley and reassembly. The spacer tube is clamped firmly between the main plate and nut plate.



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ed by sunlight. Study them carefully. You will soon realize your preferences. (Some may now even look ridiculous - weed them out.) Keep in mind that you may combine two sketches to produce a better one.

5. Decide on your five favorites. (We suggest that you invite comments from people whose taste you trust, without mentioning the one you prefer.)
6. Reach a final decision, and stick to it!

BASIC RULES

If you want your fuselage to look longer, your design should follow the fuselage axis. On the other hand, if you want to make it look shorter, you should divide the area in two or three sections.

Simplicity is your best approach.

Do not use more than three colors.

Think safety! Whites, yellows, oranges and bright reds are the most visible.

Always follow the instructions on the color wheel.

Automotive striping tape is very useful, but can create a lot of drag. Use only when following the direction of the airflow. A laminar flow airfoil, with tape spanwise, will cease to be laminar.

In particular cases, as in our Polliwagen, or in the Starduster line, you have a ready theme to work with.

Design on wing and stabilizer must be complementary.

LIST OF MATERIALS

Set of felt pen markers, 24 colors if possible.

Tracing paper.

Colored chalk.

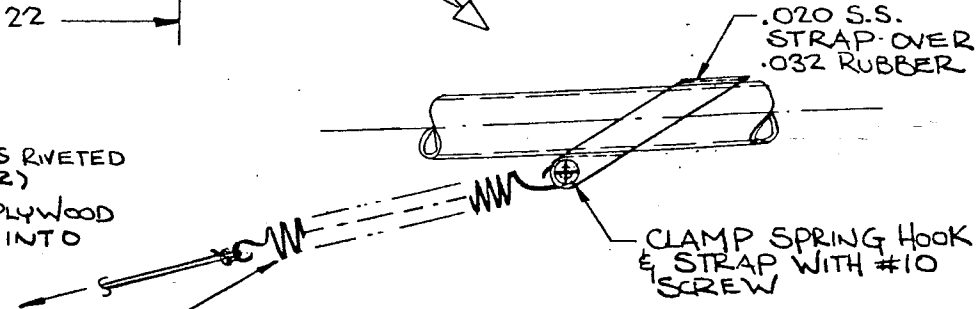
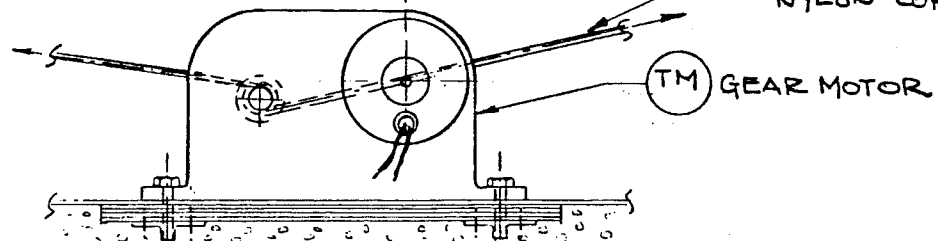
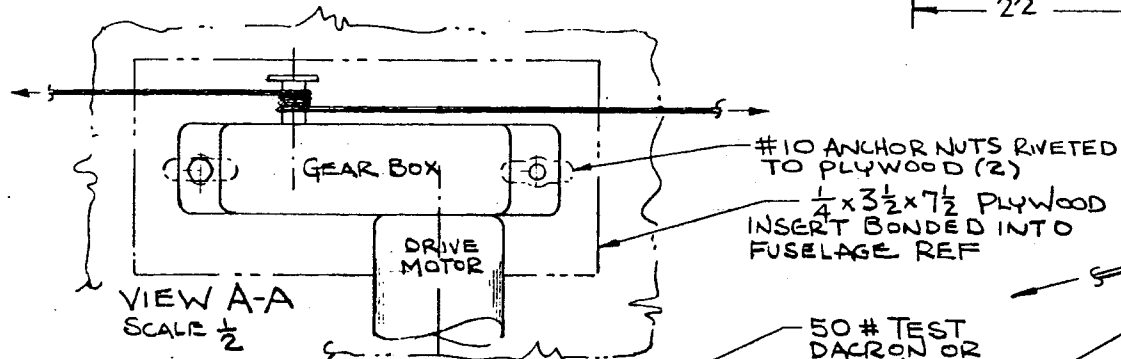
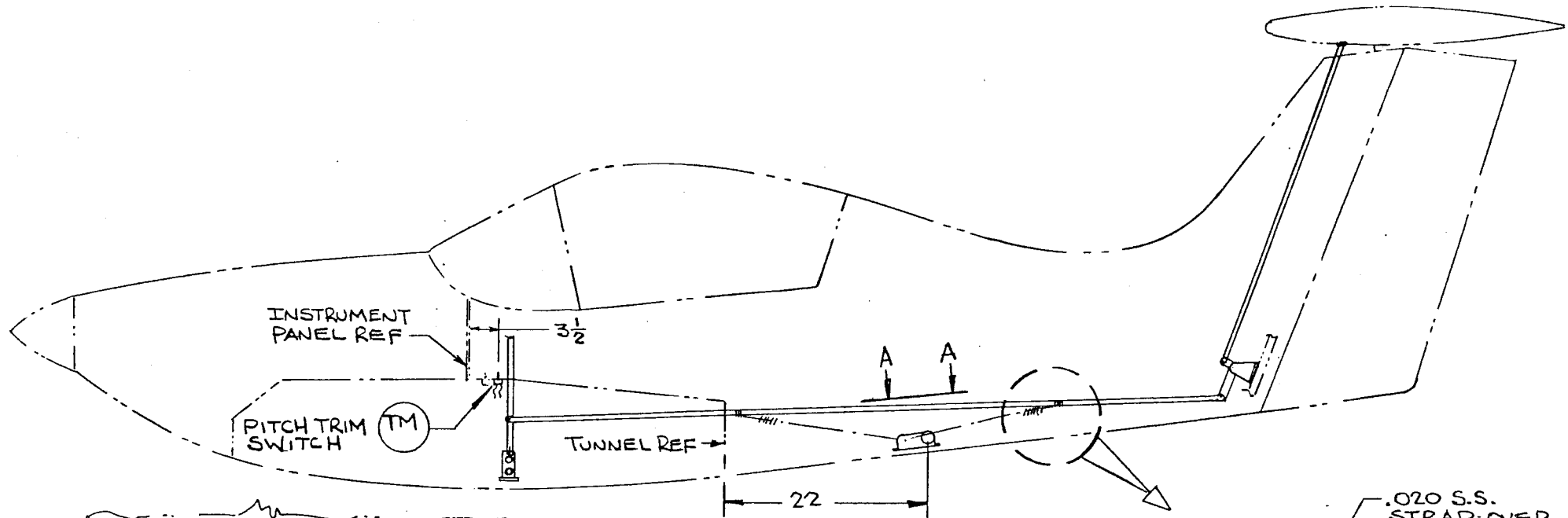
Color wheel.


SECRETS TO A PERFECT PAINT SCHEME

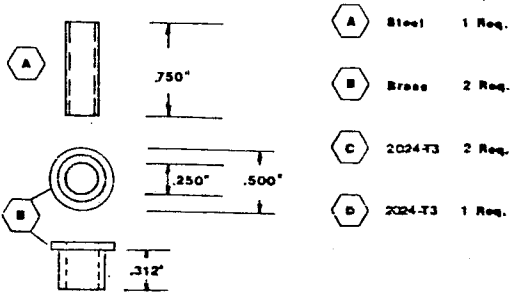
From Article by J. P. Alvarez, "Sport Aviation" May 1976.

When building the test model for the all-new Polliwagen, we eventually arrived at the point in which we had to decide the way we were going to paint it. We were lucky to have among our friends, one of the top industrial designers in the nation. We showed him our quarter size model, which at the time was painted white, and this is what he told us:

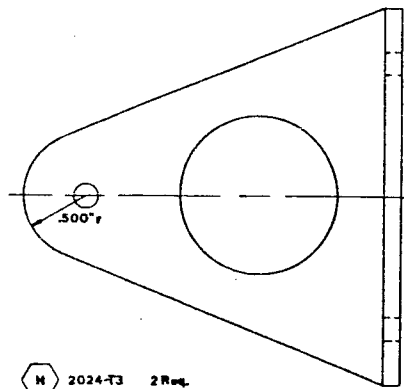
1. Obtain two or three pictures of the airplane, or use three view page of the plans.
2. Xerox copy that page, 10 or more times.
3. Using colored markers and colored chalk, express your own ideas, always remembering the basic rules.
4. Tack colored drawings at eye level on a wall that is illuminat-



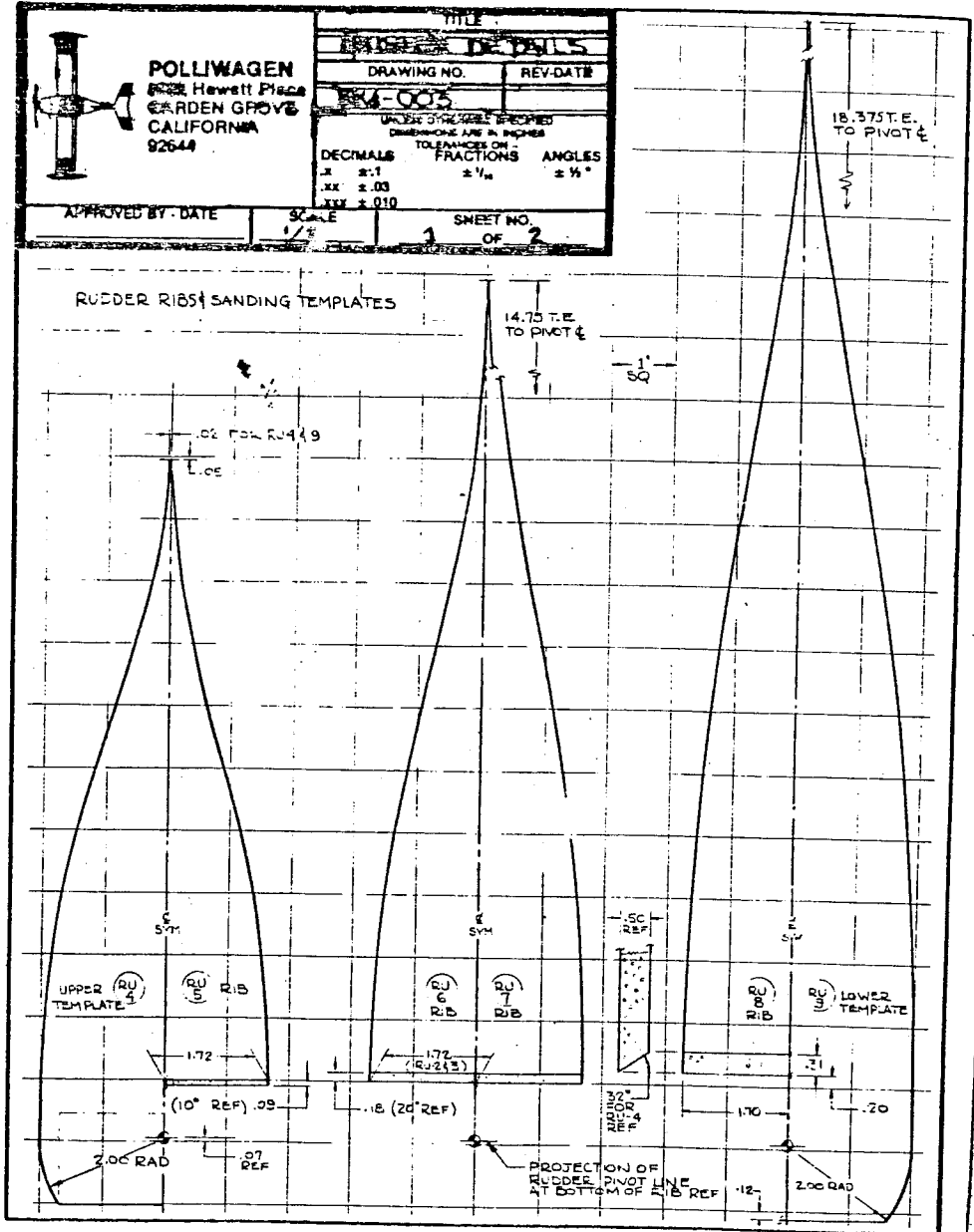
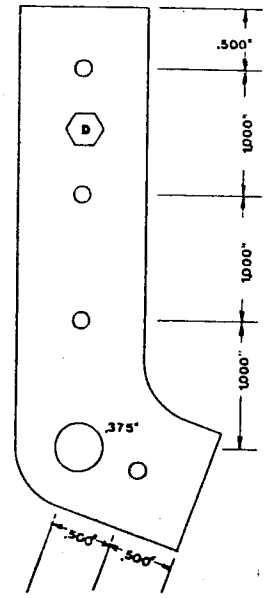
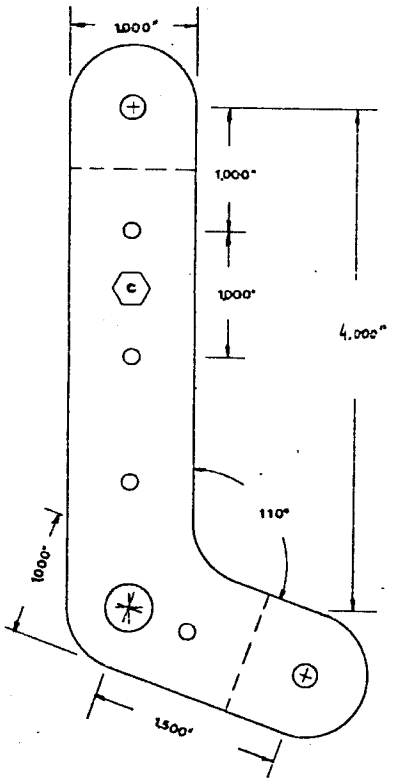
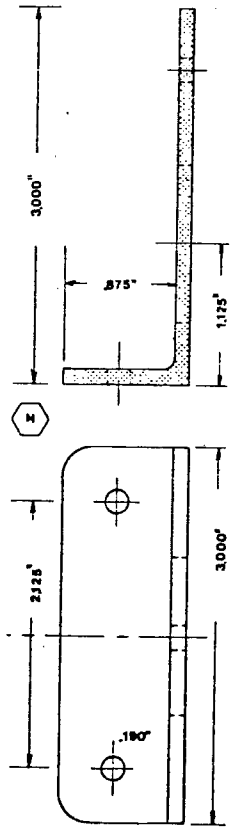
 <p>POLLWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>		TITLE	
		PITCH TRIM INSTL	
DRAWING NO.		REV-DATE	
TM-001			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
DECIMALS	FRACTIONS	ANGLES	
± .1	± 1/16"	± 1/2°	
± .05	± 1/32"	± 1/4°	
± .010	± 1/64"	± 1/8°	
APPROVED BY - DATE	SCALE	SHEET NO.	
	1/2" = 1"	1 OF 1	

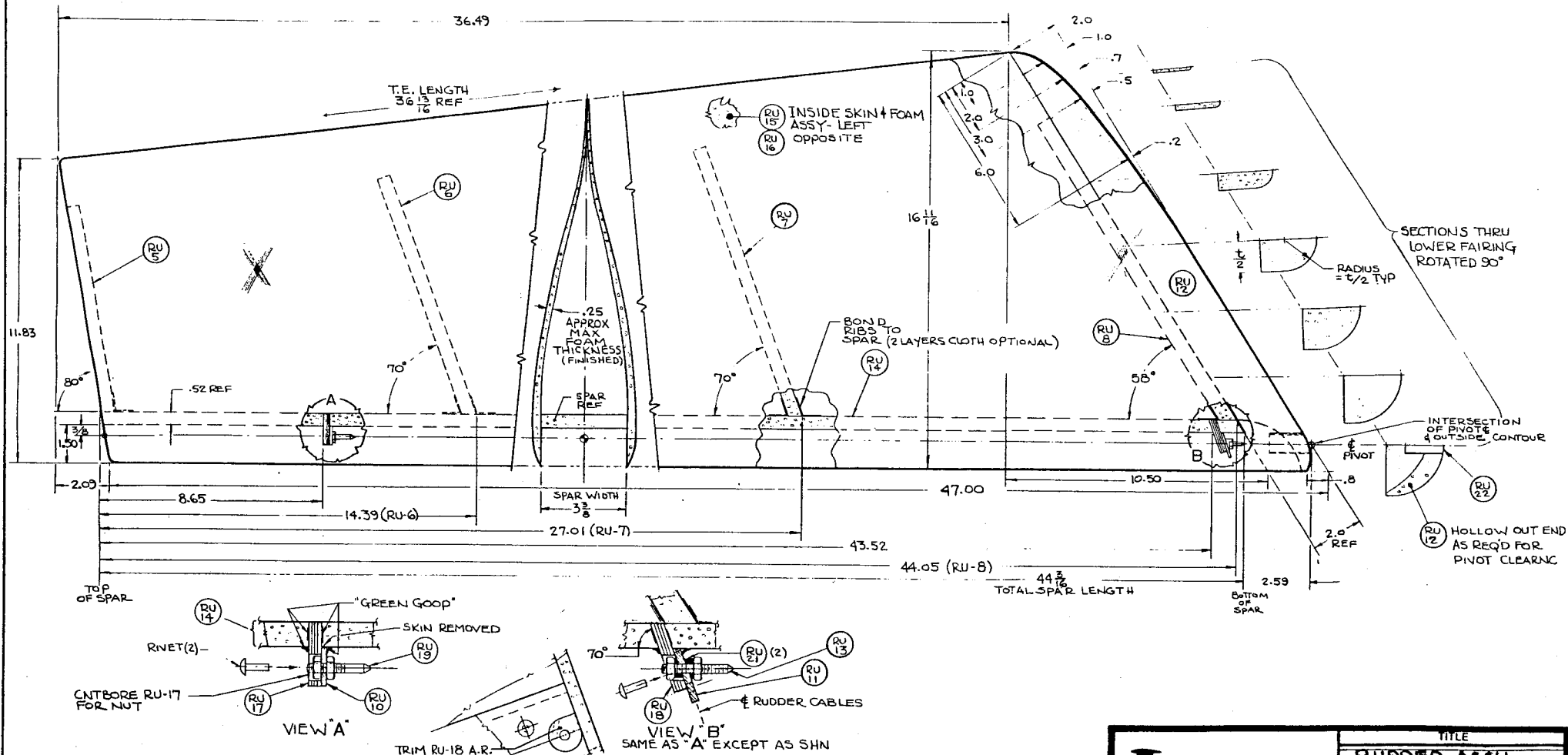


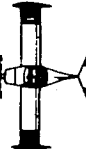
- A Steel 1 Req.
- B Brass 2 Req.
- C 2024-T3 2 Req.
- D 2024-T3 1 Req.

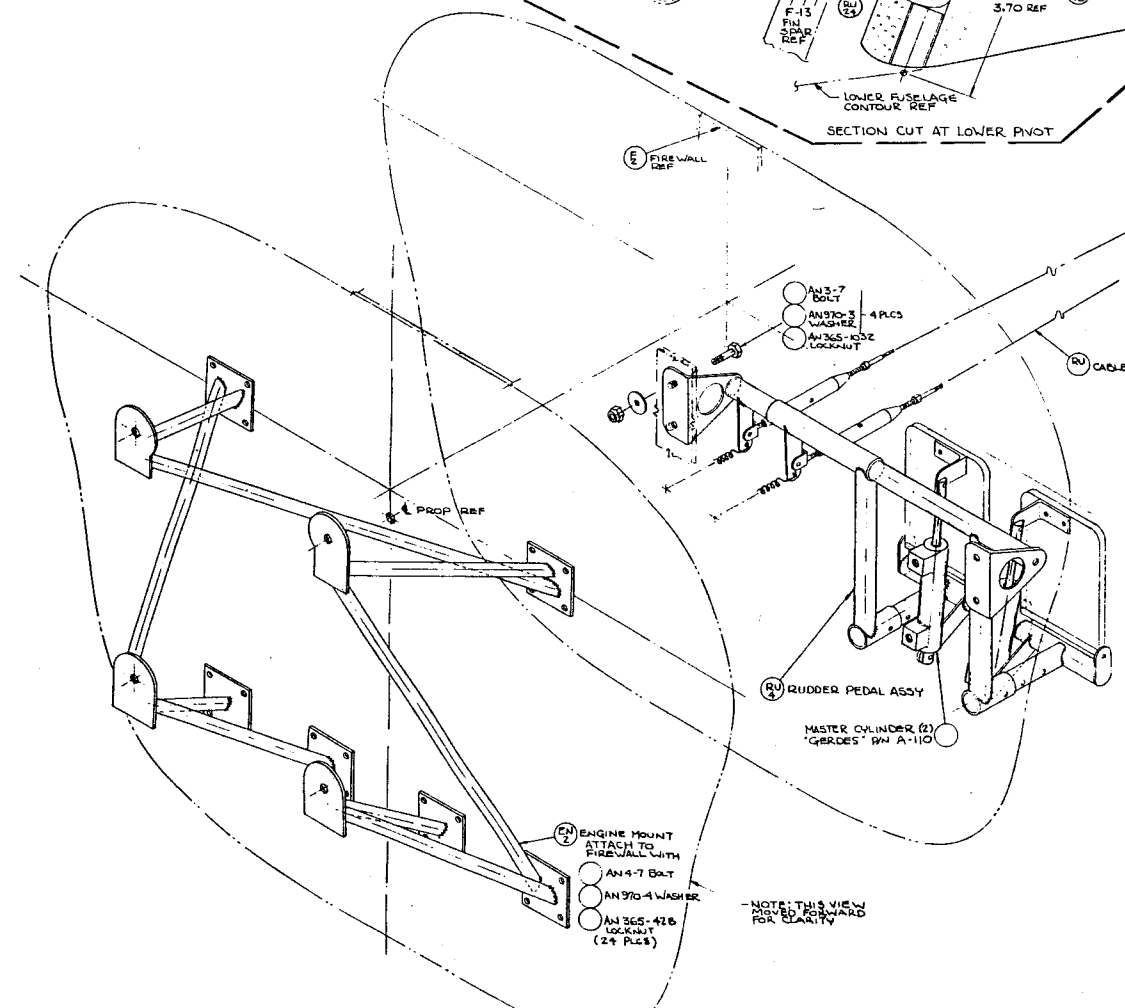
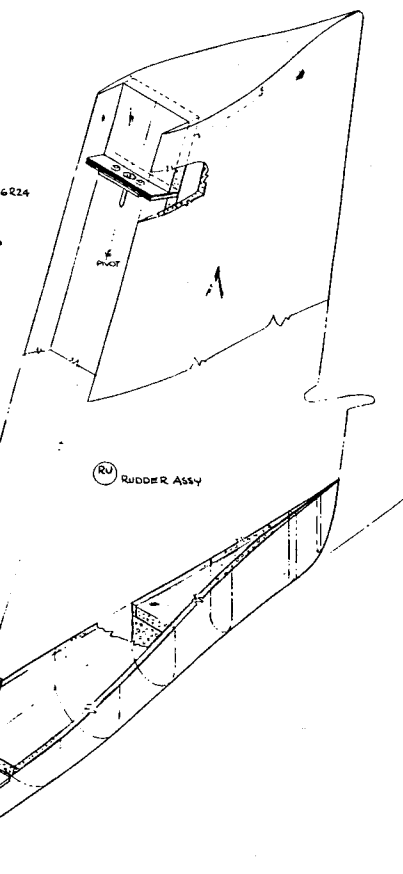
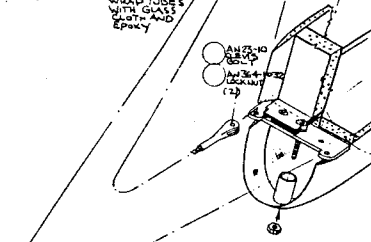
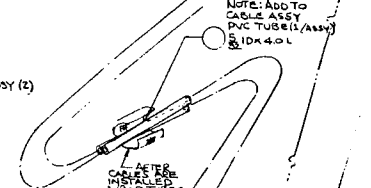
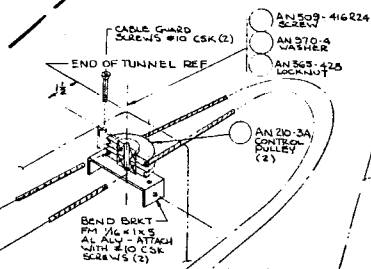
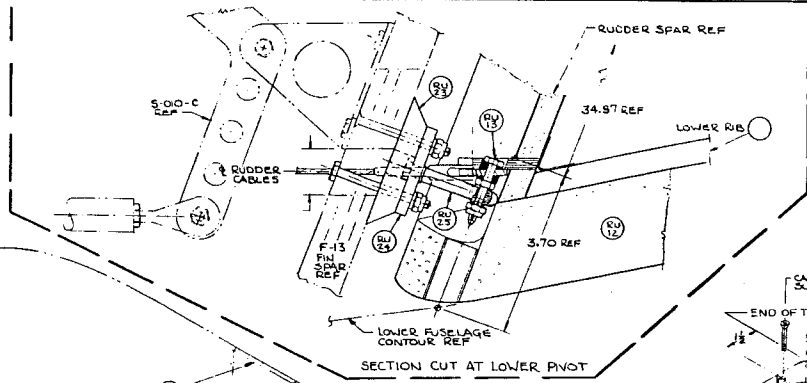


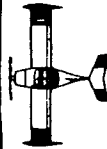
- H 2024-T3 2 Req.

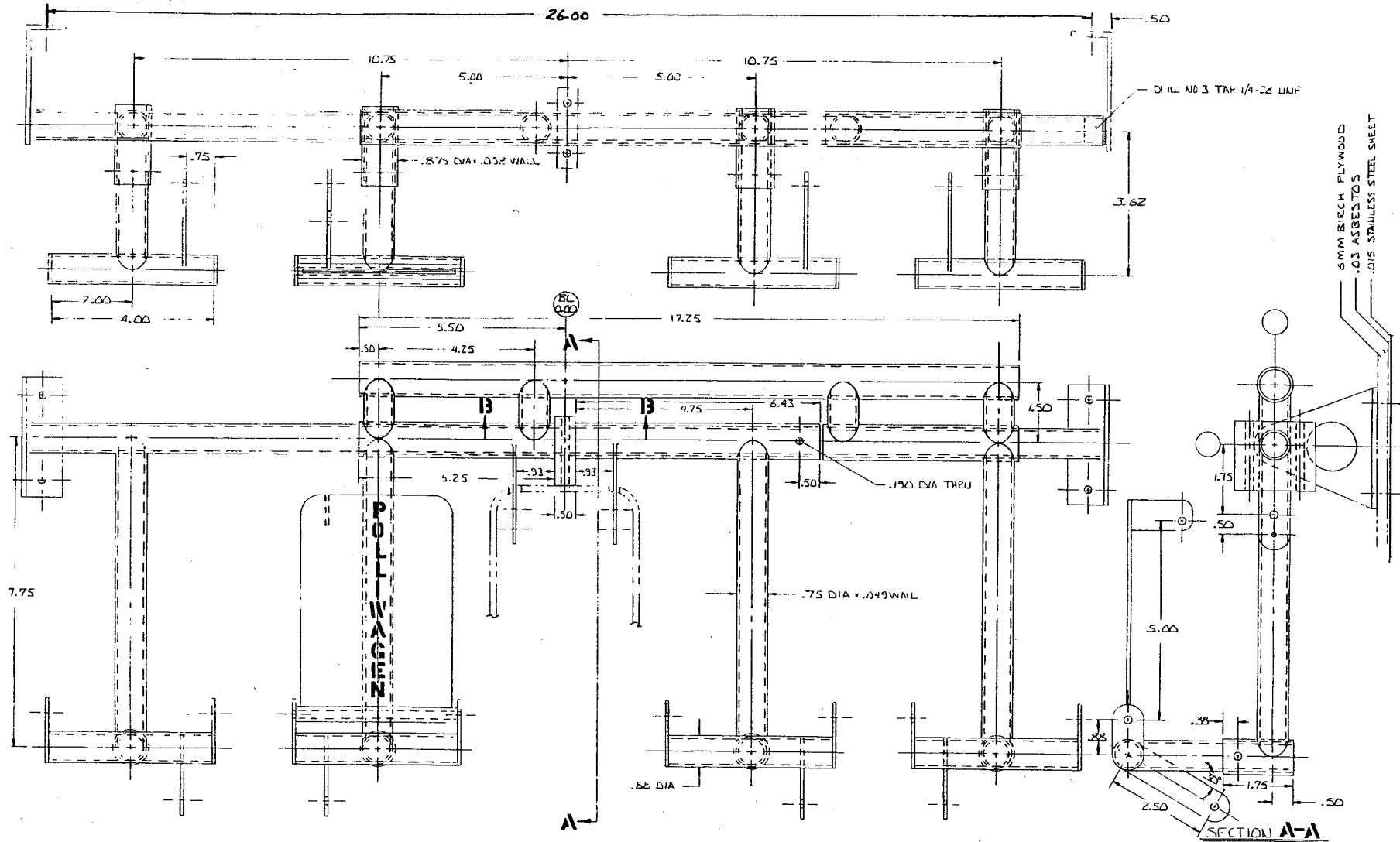




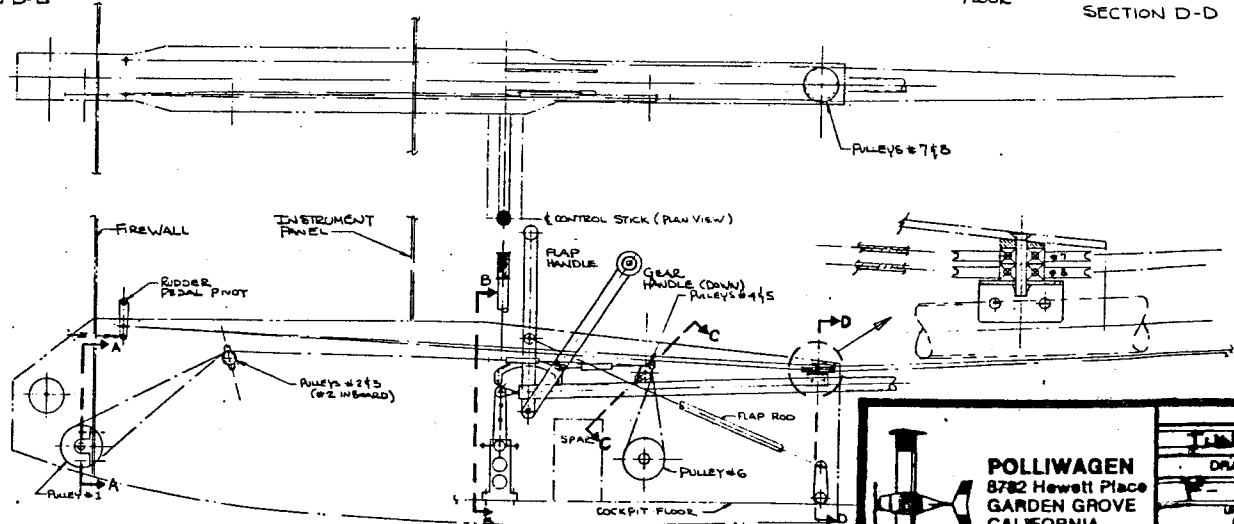
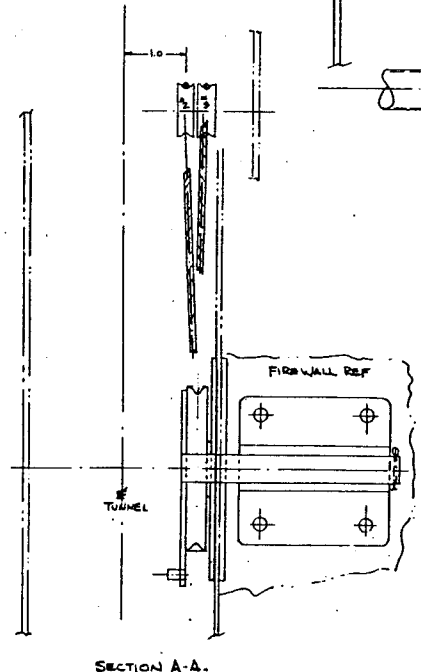
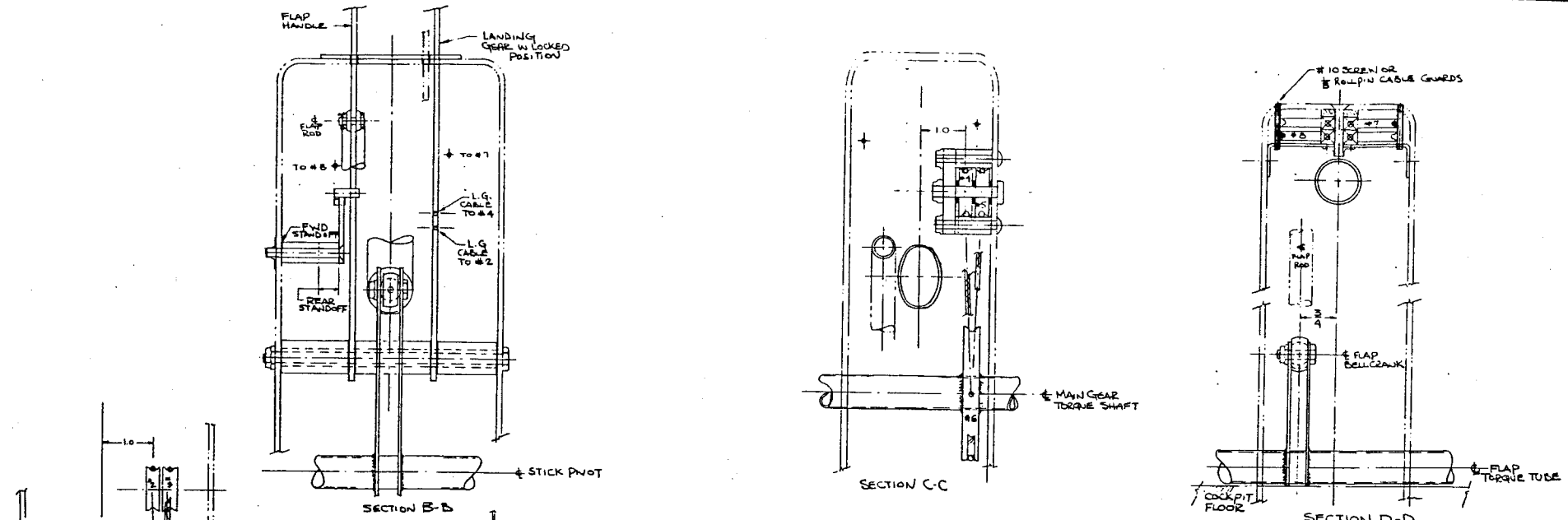
		TITLE	
		RUDDER ASSY	
POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644		DRAWING NO.	REV-DATE
		RU-002	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
DECIMALS	FRACTIONS	ANGLES	
.x ± .1	± 1/16	± 1/2°	
.xx ± .03			
.xxx ± .010			
APPROVED BY - DATE	SCALE	SHEET NO. 1 OF 1	



 <p>POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>	TITLE	
	RUDDER SYSTEM INST	
	DRAWING NO.	REV. DATE
	RU-001	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
DECIMALS	FRACTIONS	ANGLES
X ± .1	± 1/16	± 1/2°
XX ± .03		
XXX ± .010		
APPROVED BY - DATE	SCALE	SHEET NO. OF

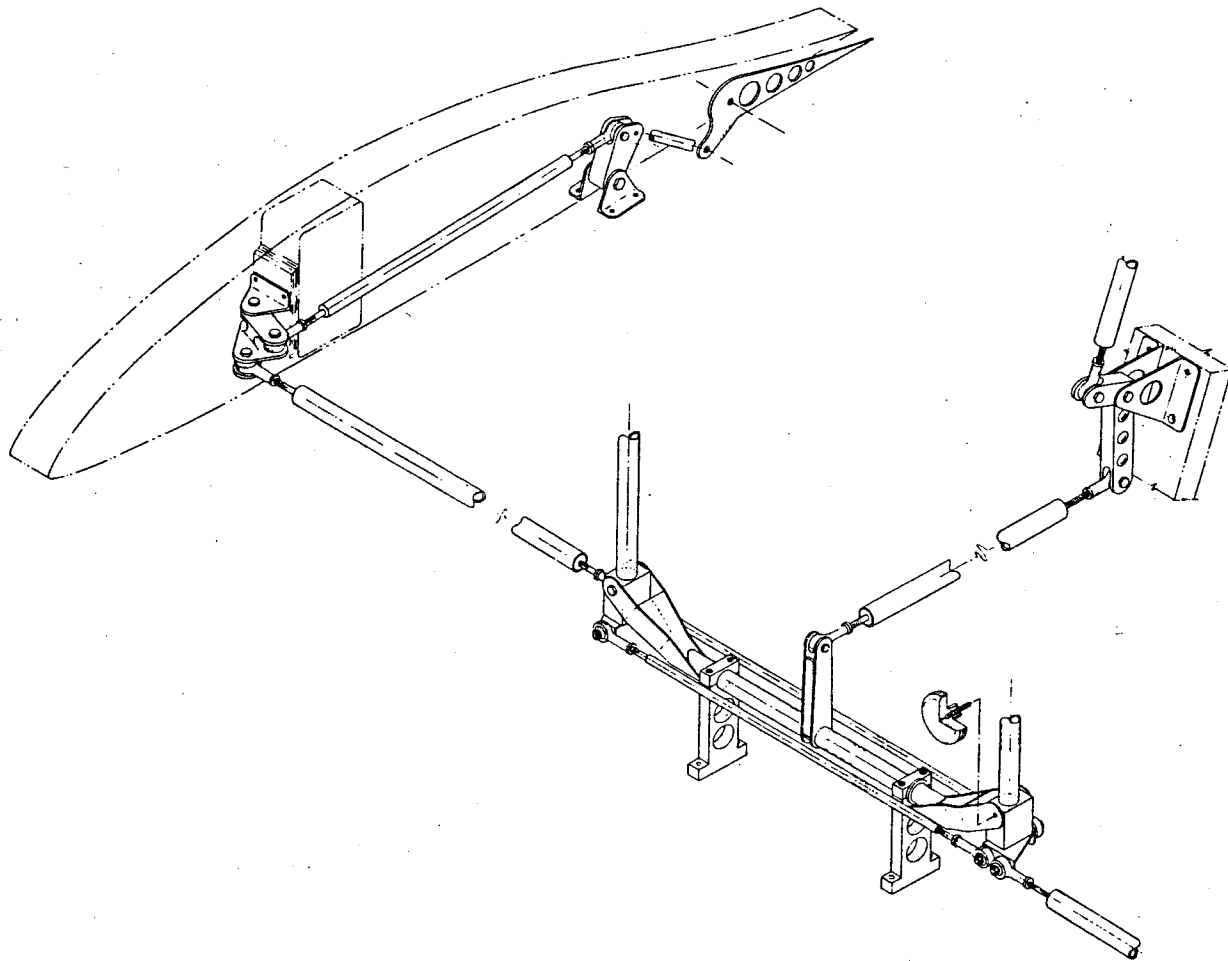


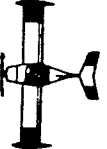
TITLE	
DUAL RUDDER PED.	
DRAWING NO.	REV. DATE
RU-00	June 93

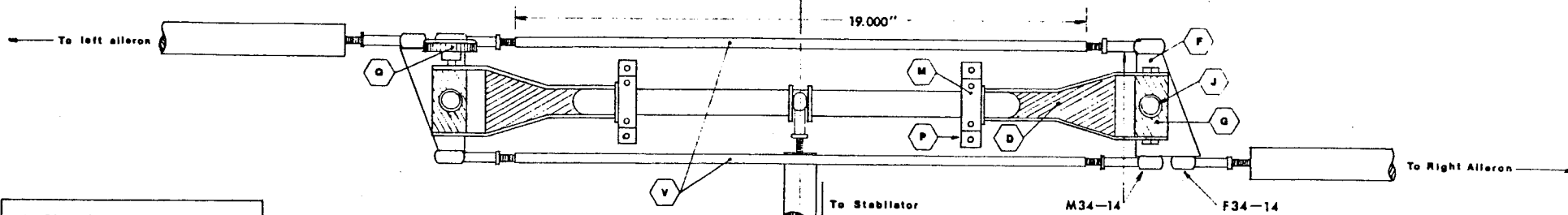


TUNNEL ASSY
VIEW LKG INJUB LEFTSIDE
SCALE 1/4"
USE FULL SIZE TEMPLATE FOR DRILLING

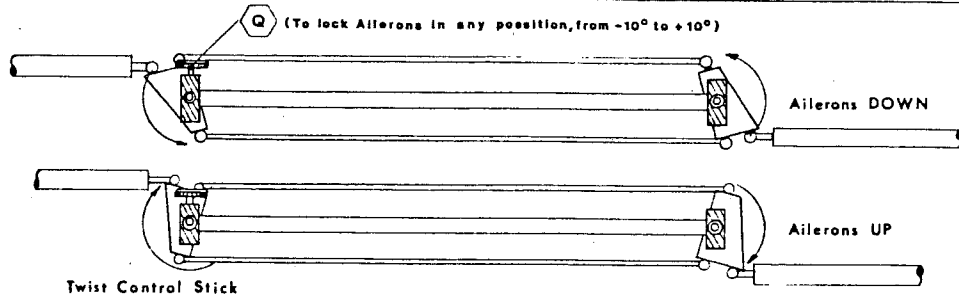
	POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644		TITLE TUNNEL ASSY	
	DRAWING NO.	REV-DATE	<small>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS ON ANGLES</small>	
	DECIMALS .1 ± .1 .01 ± .01 .001 ± .01	FRACTIONS 1/16 ± 1/32 1/32 ± 1/64 1/64 ± .010	ANGLES ± 1/2° ± 1/4° ± 1/8°	APPROVED BY: DATE SCALE 1/4" NOTED
SHEET NO. 1 OF 1				



 <p>POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>		TITLE	
		Control Stick	
DRAWING NO.		REV-DATE	
AX-001			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON			
DECIMALS	FRACTIONS	ANGLES	
.x ±.1	±1/16	±1/2°	
.xx ±.03			
.xxx ±.010			
APPROVED BY - DATE	SCALE	SHEET NO.	
PX		OF	



VARIABLE GEOMETRY WING



On our utilization of the Wortman FX 67-K-150

Adjustable twist: The Polliwagen ailerons neutral position can be adjusted from minus 10° (up) to plus 10° (down).

The planes flaps can be deployed from minus 10° (up) to plus 80° (down). The angle of incidence of the wing changes when the center line of the airfoil is changed up or down.

Minus 6° ailerons will decrease the incidence of that outer section of the wing by one degree.

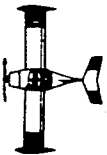
Plus 12° ailerons will increase the incidence of that section of the wing by two degrees, "creating" a 3° wing twist.

The center section of the wing will stall first, with the stall progressing towards the tips. Recovery can be attained without losing aileron control. When flaps and ailerons are set at the minus 10° setting, both lift and drag are reduced by approximately 7%; thus: cruise setting.

Plus 10° setting of the flaps and ailerons will produce a marked increase in lift and a similar in drag. So, perfect slow flying setting!

Dropping 30° flaps will increase lift a little more, but will increase drag by a large amount.

Between 30° and 80° flaps positions are used like spoilers for path control.



POLLIWAGEN
8782 Hewett Place
GARDEN GROVE
CALIFORNIA
92644

TITLE		
Control Stick		
DRAWING NO.	REV-DATE	
AI-002		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
DECIMALS	FRACTIONS	ANGLES
.x ±.1	± 1/16	± 1/2°
.xx ±.03		
.xxx ±.010		

APPROVED BY: DATE	SCALE	SHEET NO.
		1 OF

Part#	Reqmts.	Description	Material	Cond. Ht. Tr.		Notes
				Inic.	Final	
A	2	Bellcrank Comp.	4130		N	
B	1	"	"		N	
C	4	"	"		N	2R & 2L
D	2	"	"		N	1R & 1L
E	2	"	"		N	
F	2	"	"		N	
G	2	Control S. Base	6061	T6		
H	12	Spacers	Al.			.190 ID x .062"
J	2	Control Stick	4130		N	.750" x .049"
K	1	Cross Member	4130		N	.750" x .049"
L	2	Washers	Steel			.755" x .062"
M	2	Pylon Cap	6061	T6		
N	2	Pylon	6061	T6		
P	2	Pylon Base	6061	T6		
Q	1	"Magic Knob"				2" Dia.
R	6	AN3-7A				
S	4	MS24693-S276				
T	4	AN3-7A				Weld to F
U	3	AN3-H4A				
V	2	5/16" x .065" w.	6061	T6		



POLLWAGEN
8782 Hewett Place
GARDEN GROVE
CALIFORNIA
92644

APPROVED BY - DATE

1980

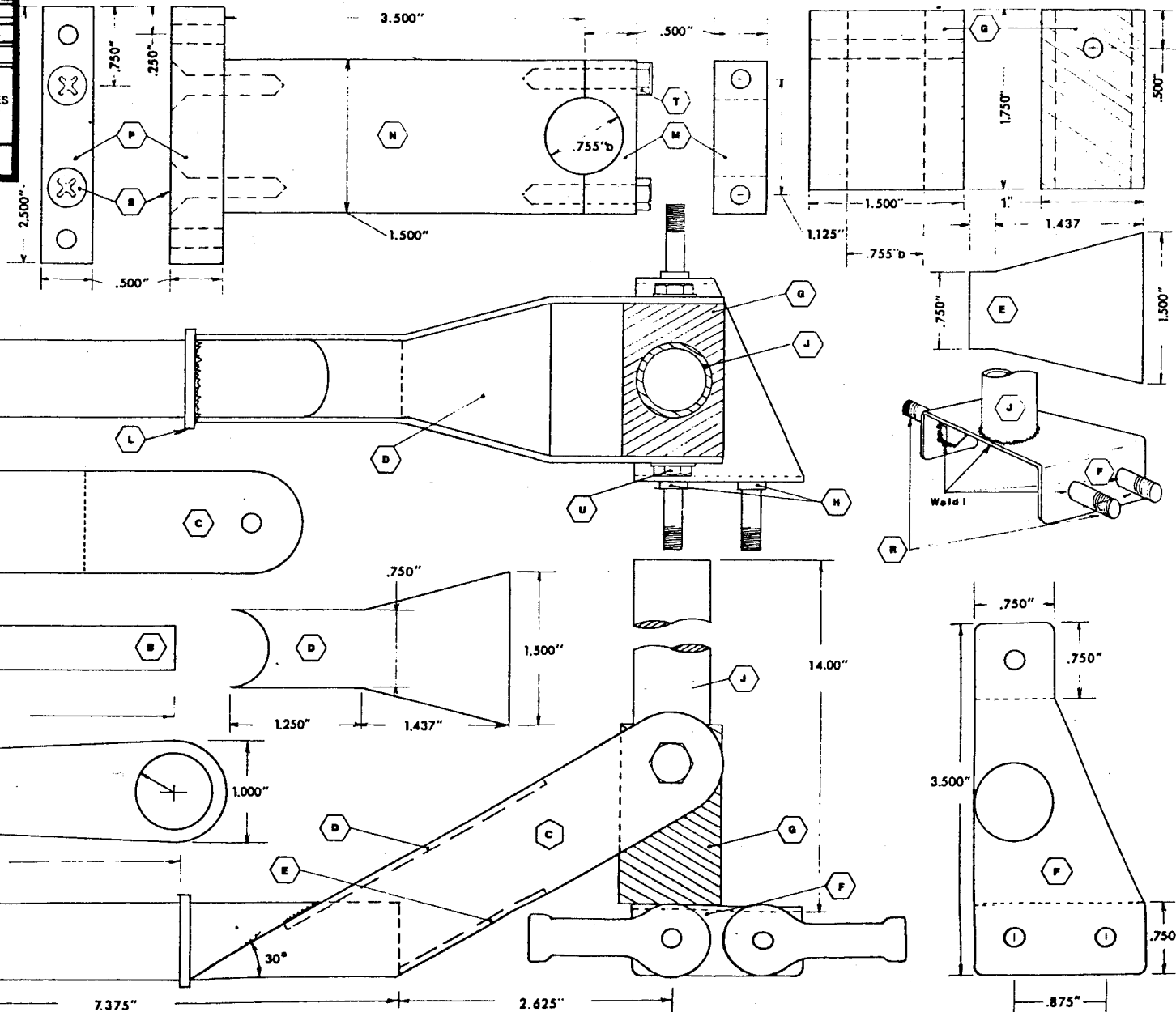
SCALE

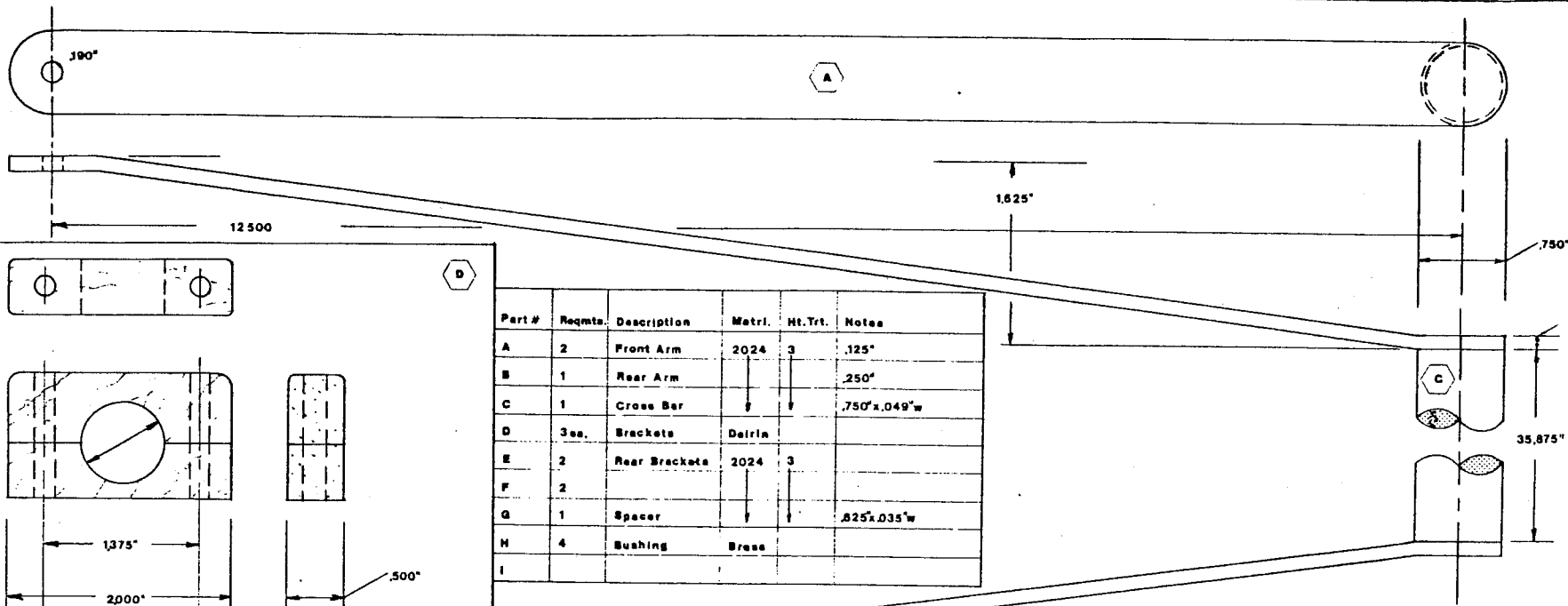
SHEET NO.

2

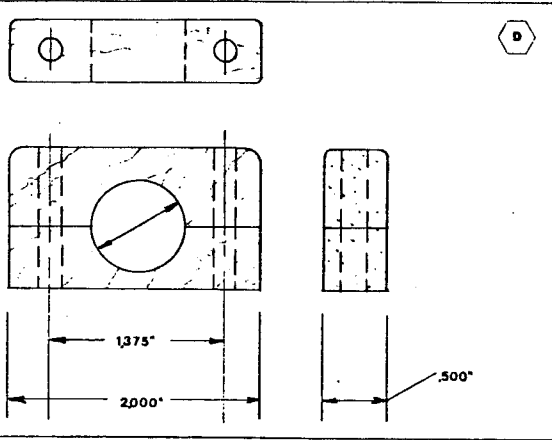
OF

TITLE		
Central Stick		
DRAWING NO.	REV. DATE	
AI-002		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
DECIMALS	FRACTIONS	ANGLES
.X ± .1	± 1/16	± 1/2°
.XX ± .03		
.XXX ± .010		





Part #	Reqmts.	Description	Matrl.	Ht. Trt.	Notes
A	2	Front Arm	2024	3	.125"
B	1	Rear Arm			.250"
C	1	Cross Bar			.750" x .049" w
D	3 ea.	Brackets	Delrin		
E	2	Rear Brackets	2024	3	
F	2				
G	1	Spacer			.825" x .035" w
H	4	Bushing	Brass		
I					



TITLE
Cassidy Hinges

DRAWING NO. CA-004

REV. DATE

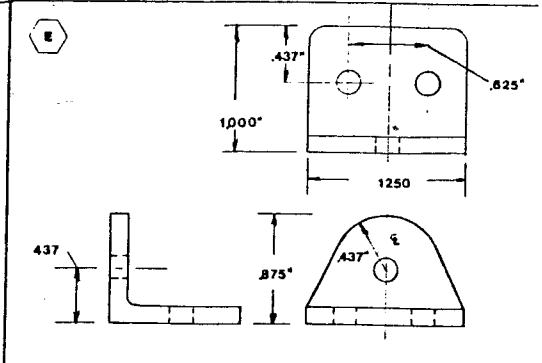
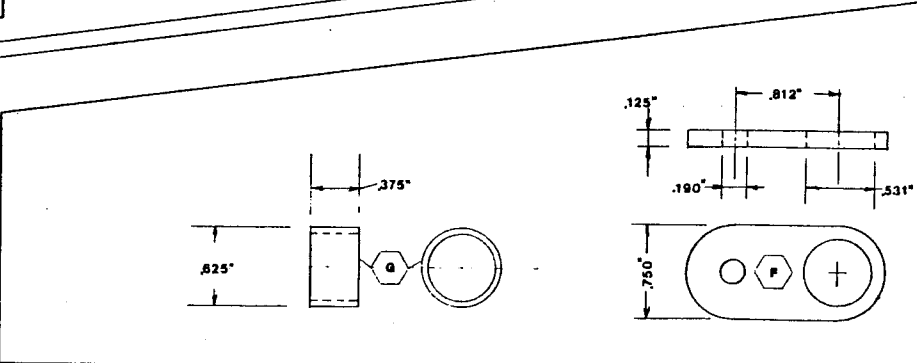
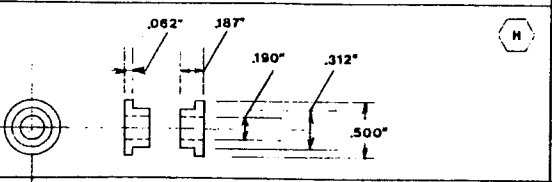
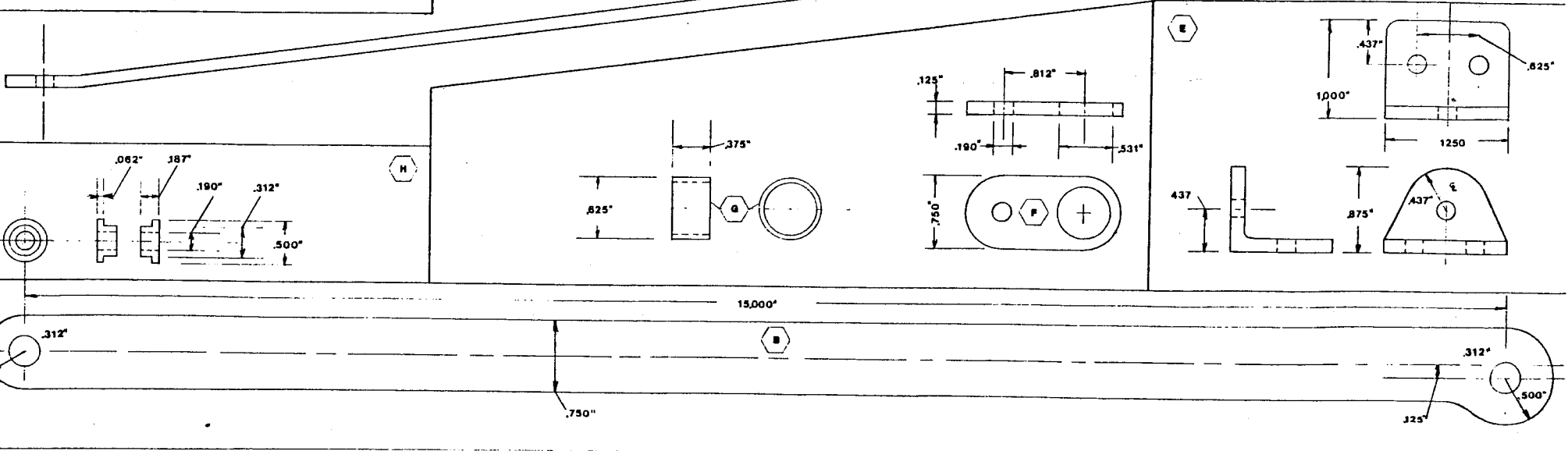
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
FRACTIONS ANGLES
DECIMALS
.X ± .1
.XX ± .03
XXX ± .010

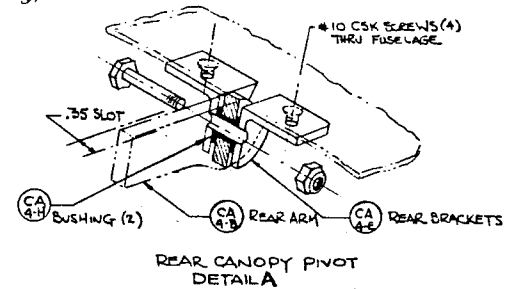
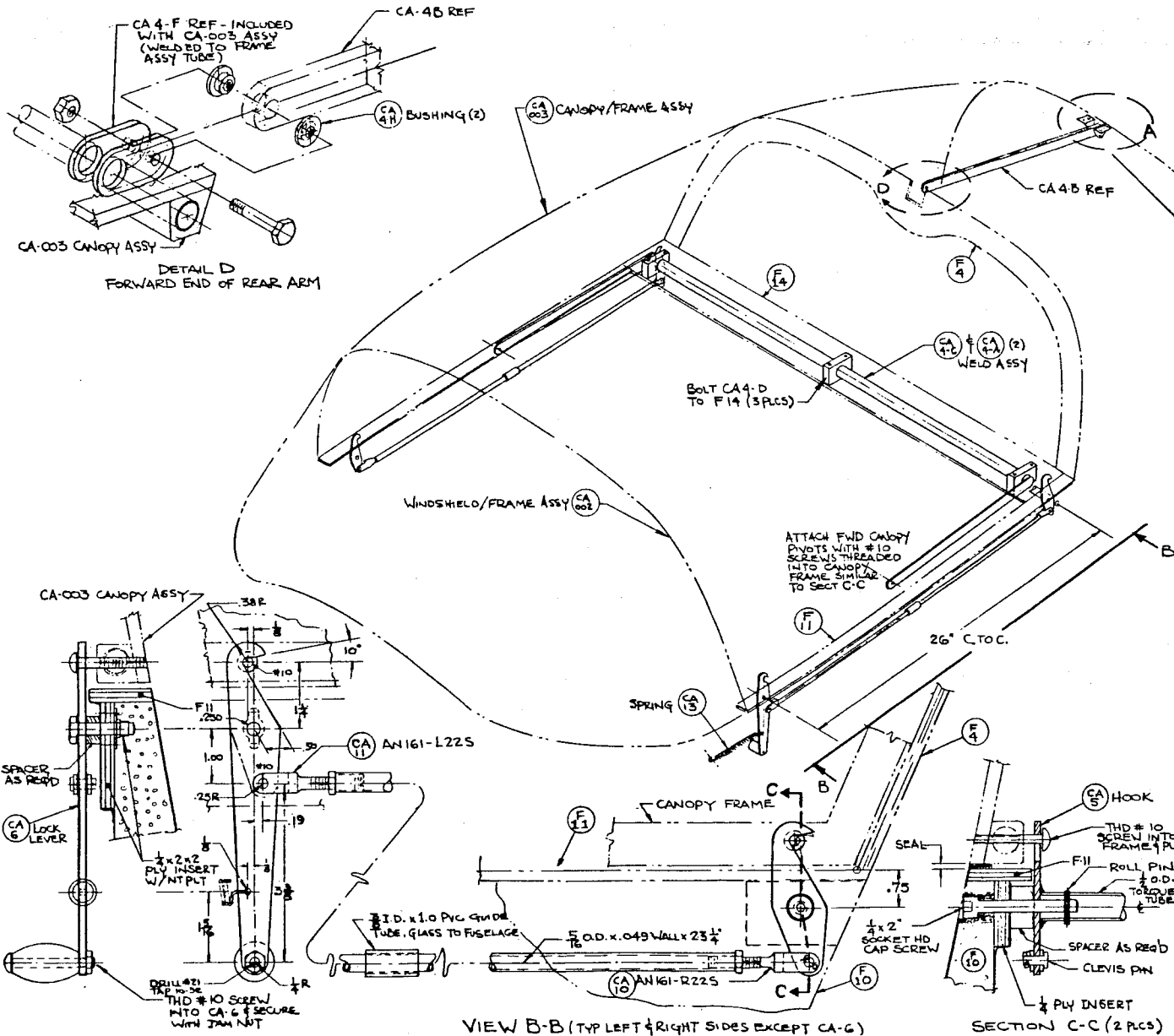
SCALE

APPROVED BY: DATE

SHEET NO.

POLLWAGEN
8782 Hewett Place
GARDEN GROVE
CALIFORNIA
92644

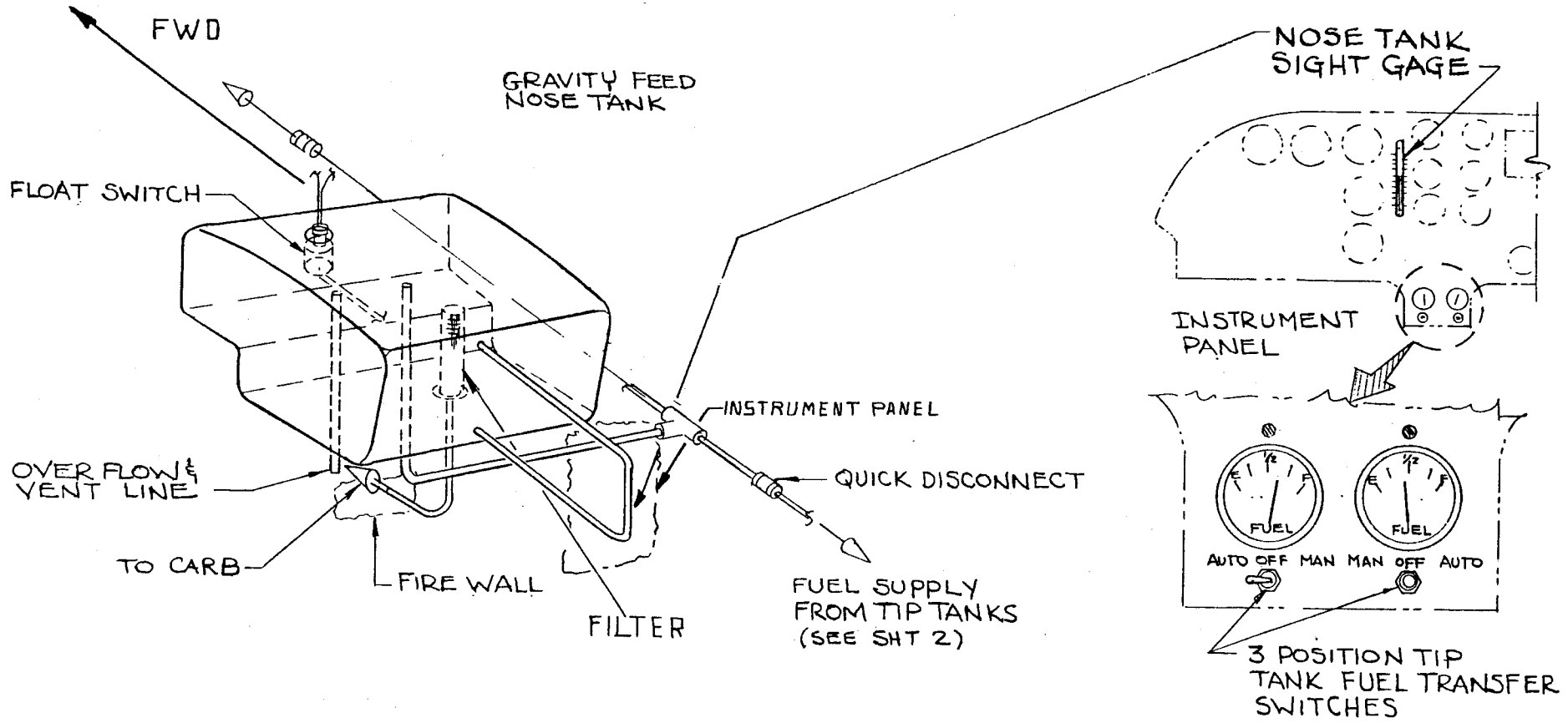




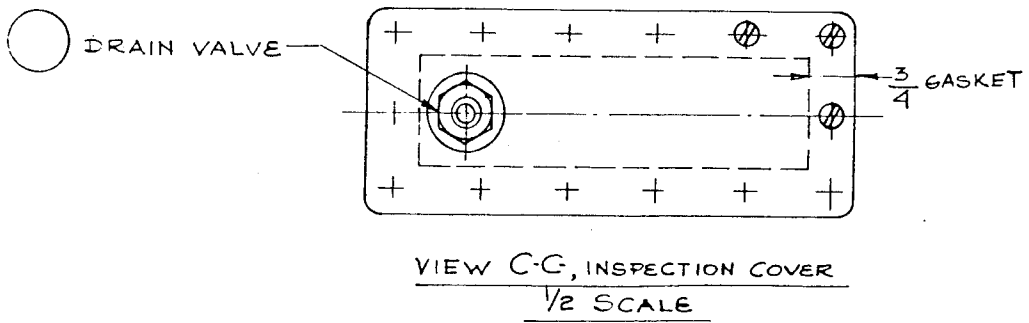
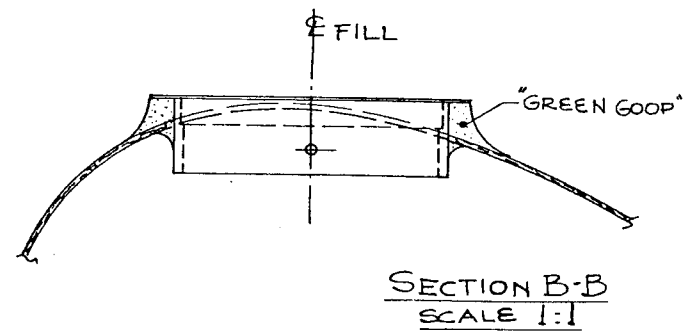
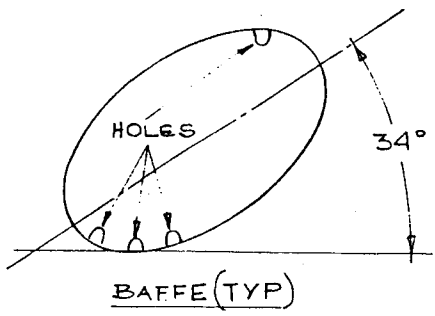
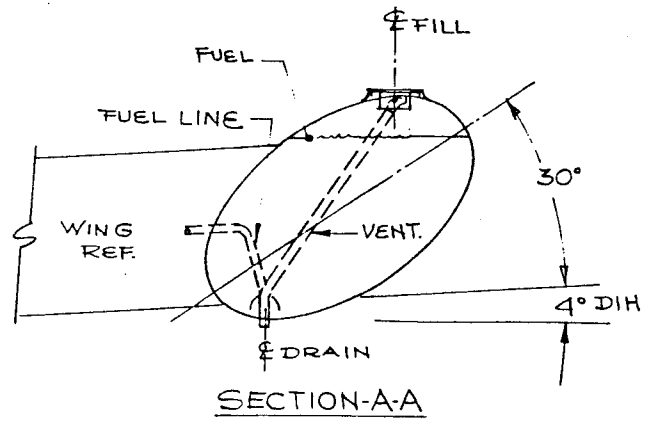
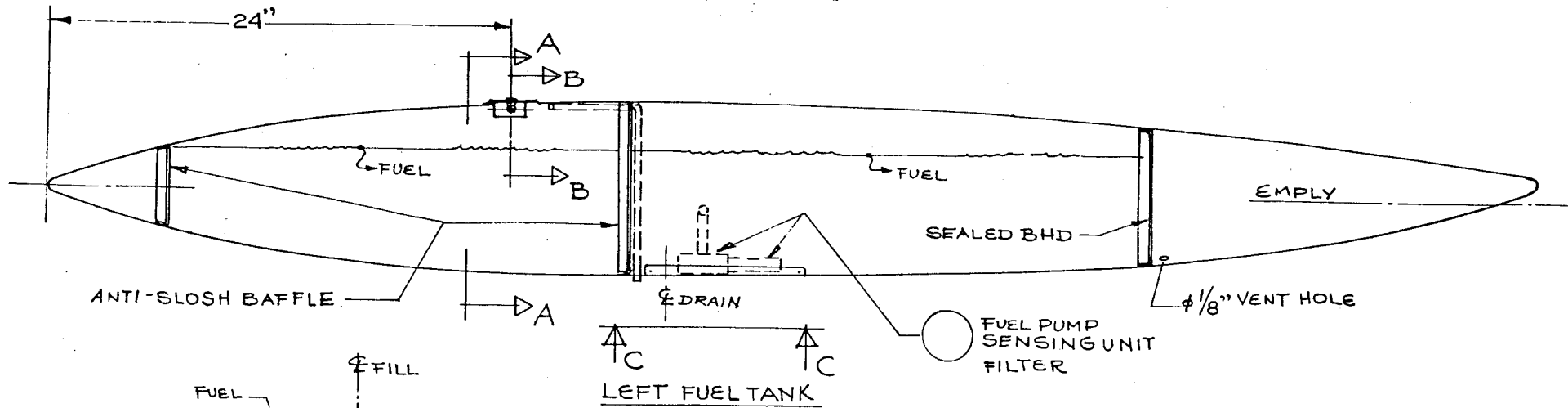
VIEW B-B (TYP LEFT & RIGHT SIDES EXCEPT CA-6)

SECTION C-C (2 PLCS)

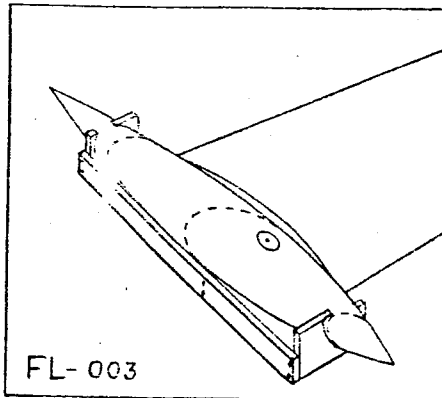
<p>POLLIWAGEN 8782 Hewitt Place GARDEN GROVE CALIFORNIA 92644</p>	TITLE	
	CANOPY INSTL	
	DRAWING NO.	REV DATE
	CA-001	
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ANGLES	
DECIMALS	± .1	± 1/16
XX	± .03	± 1/32
XXX	± .010	± 1/64
APPROVED BY - DATE	SCALE	SHEET NO.
	1/2" = 1"	1 OF 1



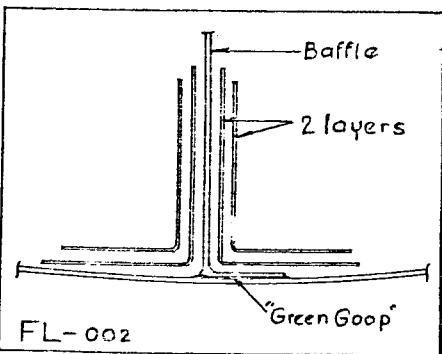
	POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644		TITLE FUEL SYS ASSY	
	DRAWING NO.	REV. DATE		
	FL-001		<small>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON -</small>	
	<small>DECIMALS</small> .x ±.1 .xx ±.03 .xxx ±.010	<small>FRACTIONS</small> ±1/16 ±1/8	<small>ANGLES</small> ±1/2° ±1°	
APPROVED BY - DATE PA June 81	SCALE NONE	SHEET NO. 1 OF 2		



<p>POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>	TITLE	
	TIP TANK	
	DRAWING NO.	REV. DATE
	FU-002	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
DECIMALS	FRACTIONS	ANGLES
.x ± .1	± 1/16	± 1/2°
.xx ± .03		
.xxx ± .010		
APPROVED BY: DATE	SCALE	SHEET NO. OF
M. J. B. 82	NONE	2 OF 2



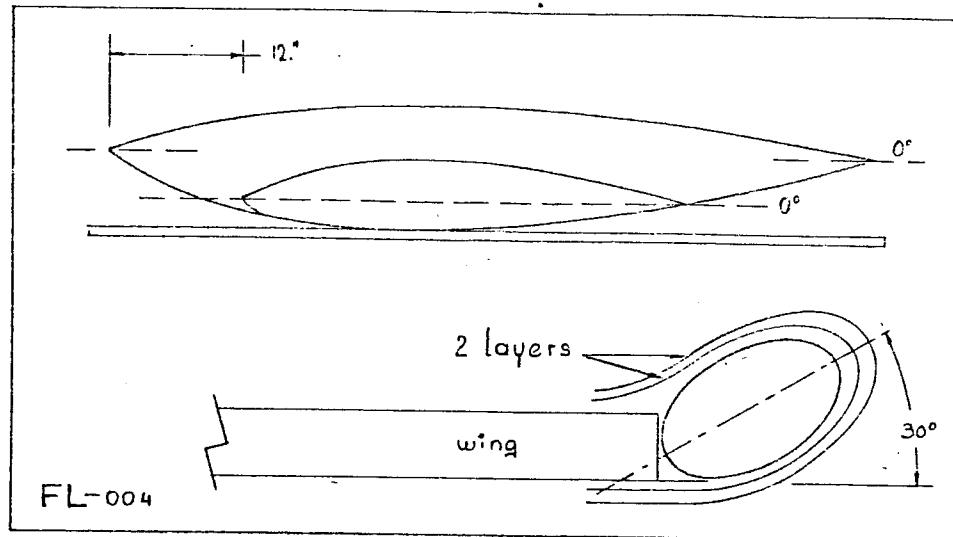
FL-003



FL-002

INSTALLING THE WING TIP TANKS

- a) Using #80 grit sandpaper (DONOT use silicone sandpaper) sand entire outside surface of all four halves, until dull (don't harm fiberglass fibres) Sand both surfaces of all 4 baffles and 2 bulkheads. Sand a 4" wide area in the inside of the tanks centered where the baffles and the bulkhead are to be attached and 2" wide area inside the tanks, around the outside perimeter.
- b) Cut holes in the baffles (2 baffles per tank). Remember to construct tanks so as to produce one right and one left.



FL-004

- c) Using "green goop" (1/2 epoxy and 1/2 milled glass) glue baffles and bulkheads to one right and one left tank skins. Tape the other half in place to insure the "green goop" will set with the tank holding the proper shape. Use plenty of masking tape, but make sure that the second tank half does not get glued to the first half, nor to the bulkhead-baffles.
- d) After a minimum of 24 hrs. setting time, remove masking tape and with 2" wide strips of bidirectional glass cut at 45°, reinforce all tank to baffles-bulkheads joints with two layers. See Dwg. FL-002.
- e) Install 1/4" aluminum tube vents. Reinforcing with 2" wide strip of Bid. cloth to center baffle. Tube should extend through tank about 1" at bottom and should run along highest point of top of tank, to insure filling tank to highest level. Use jig as in Dwg. FL-003 to determine highest point. Use "green goop" to seal around tube where it passes through bottom of tank.
- f) After a minimum of 24 Hrs. setting, it is time to close the tanks. Apply a generous amount of "green goop" to the lip of the baffles and bulkhead and the front and

- rear tank tips. Drop the other half tank in position and masking tape in place.
- g) When set, sand the entire outside surfaces, and seal the seams with 2" wide strips of bidirectional cloth. At this point, an inspection cover should be made of 1/16 aluminum on which the chosen fuel pumps are mounted. This cover is fitted into the recess on bottom of tank. Through the opening for this cover you should radius the joint of the sealed Bhd. to insure fuel tightness of the compartment.
- h) When installing the wing tip tanks to the Polliwagen (or to any other aircraft) we must insure that the 30° dihedral and the 0° angle of incidence are carefully kept. Use a simple jig (as in Dwg. FL-003).

1) Tack-glue the tank to the wing tip with "green goop". When set, fill the gap between wing tip and tank with urethane foam blocks. Shape to smooth contour

Shape to smooth contour and wrap with two layers of bidirectional cloth at 45 overlapping wing tip by 4". (If installed to a metal wing, sand the 4" wide area with #180 grit sand paper, vacuum and wash with acetone DO NOT allow finger prints on the gluing area.

	POLLIWAGEN 8725 Hewett Place GARDEN GROVE CALIFORNIA 92644		TITLE FUEL SYS ASSY.	
	DRAWING NO. FL-003		REV. DATE 4-3-81	
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
	DECIMALS .X ± .1 .XX ± .03 .XXX ± .010	FRACTIONS ± 1/16"	ANGLES ± 1'	
APPROVED BY - DATE PA	SCALE	SHEET NO. OF		

WINDSHIELD INSTALLATION

1. With the canopy in position, a 62" length of .75 x .035 2024 T3 aluminum tubing, should be bent to frame the windshield. The end of the frame should pass 2" through holes drilled in F-11 and fuselage sides. These ends should be green-gooped in place, after satisfied with shape. The tubing should be solidly packed with sand before bending. NO "kinks" please!!!

2. From the top center of the firewall, measure back on the front deck, 21". This is where the windshield contacts the front deck.

3. A windshield template should be made of thin aluminum or tin. Using the template as a guide, mark and then notch the front deck, to accept the edge of the windshield. Be careful not to cut too deeply through the front deck when notching.

4. Trim the front deck 1.50 inches all around from the notch, and paint the area covered by the windshield flat black or any color of your choice, as it would be difficult to paint after glueing windshield.

5. Using the windshield template, trim the windshield. One method of trimming is accomplished with a sabre saw, set to a very slow speed, using a blade specified for plexiglas. BE extremely careful trimming!!!!

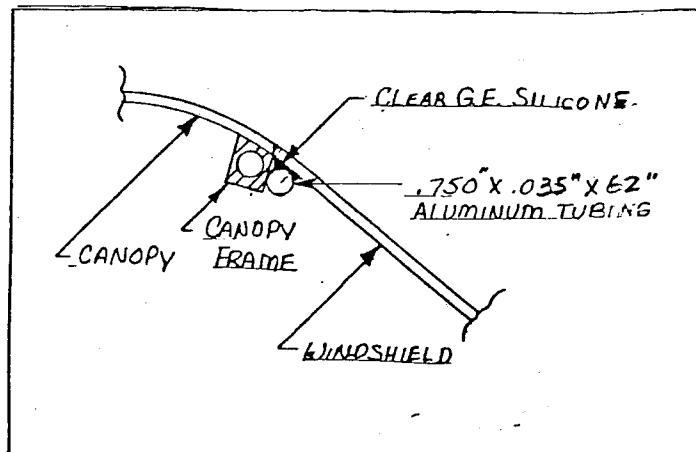
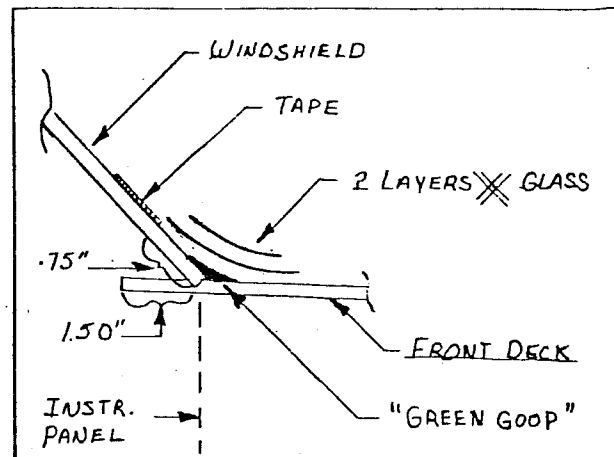
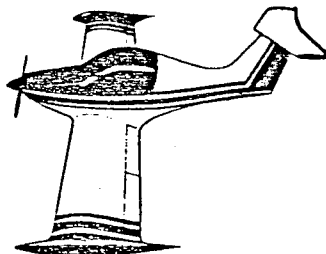
6. All areas of the windshield and fuselage to which adhesives are to be applied, should be sanded. Use masking tape to protect the windshield from scratches!!

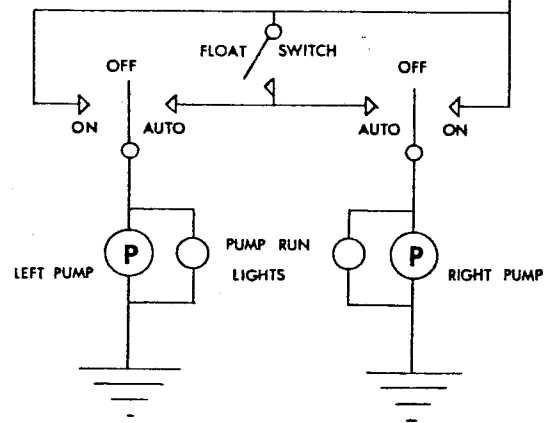
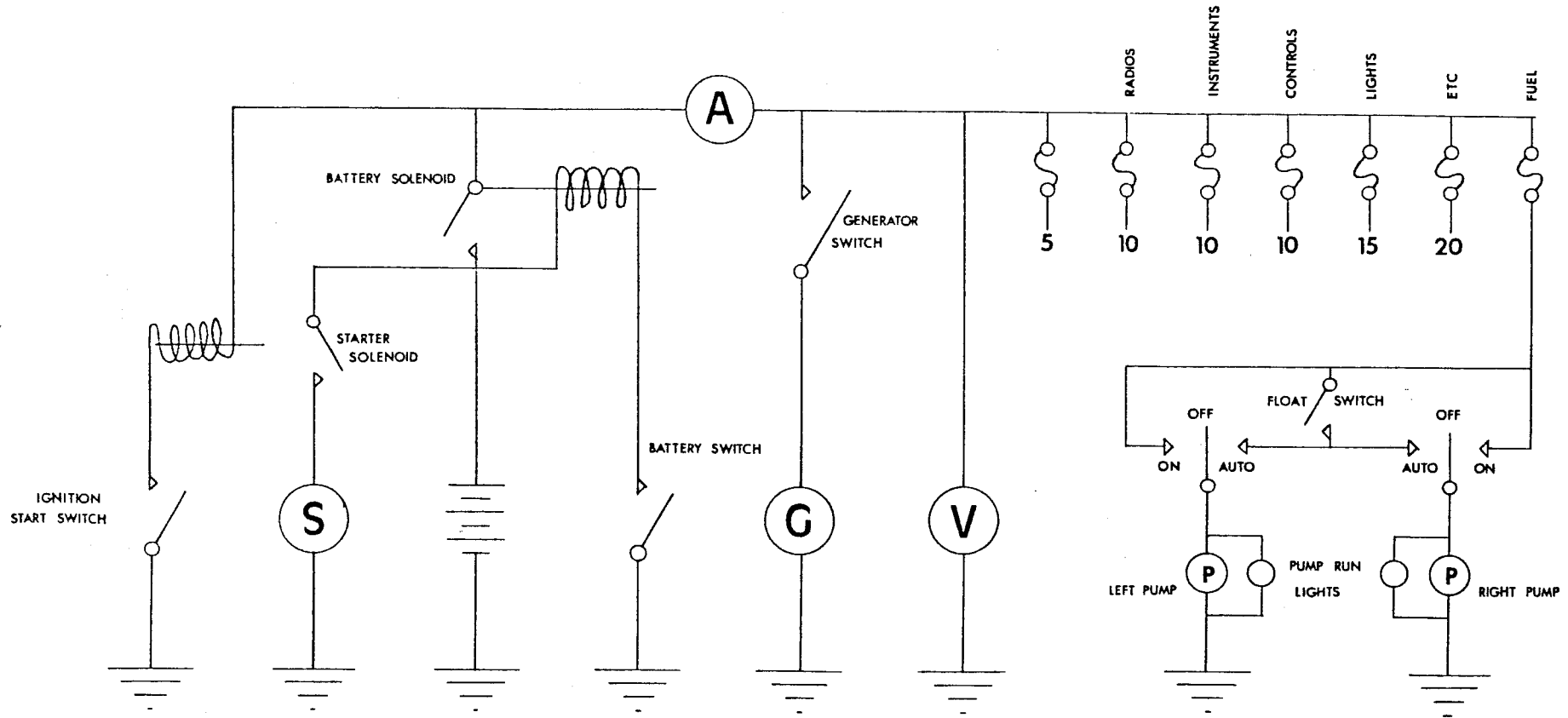
7. After satisfied with your work, using clear G. E. Silicone (comes in tube from any hardware or auto paint store) and the green-goop, glue the windshield. The canopy should be in position at this time, so that the contour is proper.

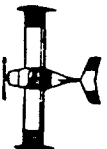
8. After the green-goop is hardened, apply two layers of glass overlapping the windshield by, 75", and the fuselage by about 1.5".

9. Final contouring is accomplished with Polli-Lite.

Beginning to look like an airplane yet?





 <p>POLLIWAGEN 8782 Hewett Place GARDEN GROVE CALIFORNIA 92644</p>	TITLE	
	Electrical Circuit	
	DRAWING NO.	REV. DATE
	E1-001	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
DECIMALS	TOLERANCES ON FRACTIONS	ANGLES
X ± .1	± 1/16"	± 1/2°
XX ± .03	± 1/32"	± 1/4°
XXX ± .010		
APPROVED BY: DATE	SCALE	SHEET NO. OF
		1 OF