

CHAPTER 1: MOLDED PARTS, HELPFUL HINTS, HANDY NOTES

REVISIONS

From time to time, revisions to this assembly manual may be deemed necessary. When such revisions are made, you should immediately replace all outdated pages with the revised pages. Discard the out dated pages. Note that on the lower right corner of each page is a "revision date". Initial printings will have the number "0" printed and the printing date. All subsequent revisions will have the revision number followed by the date of that revision. When such revisions are made, a "table of revisions" page will also be issued. This page (or pages) should be inserted in front of the opening page (this page) of each affected chapter. A new "table of revisions" page will accompany any revision made to a chapter.

ARROWS

Most drawings will have arrows to show which direction the parts are facing, unless the drawing itself makes that very obvious. "A/C UP" refers to the direction that would be up if the part were installed in a plane sitting in the upright position. In most cases the part shown will be oriented in the same position as the part itself will be placed during that particular assembly step. However, time goes on and changes are made, so careful attention should be paid to the orientation arrows. That old cartoon of the guy agonizing over the plans for his canoe, built one end up, one end down, should not happen in real life. Especially to you.

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1. INTRODUCTION

The purpose of this chapter is to familiarize you with the parts to the kit, the tools you will be using, some techniques that may be helpful and the material that is required to build your 320FB. While you will not perform any work in this chapter other than reading and examining some of the parts that came with your kit, **PLEASE READ** this chapter completely. It will demonstrate some techniques that will save you a lot of time in the months ahead, and provide a lot of cautions and warnings that will make your plane safer and better.

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2. DRAWING LIST

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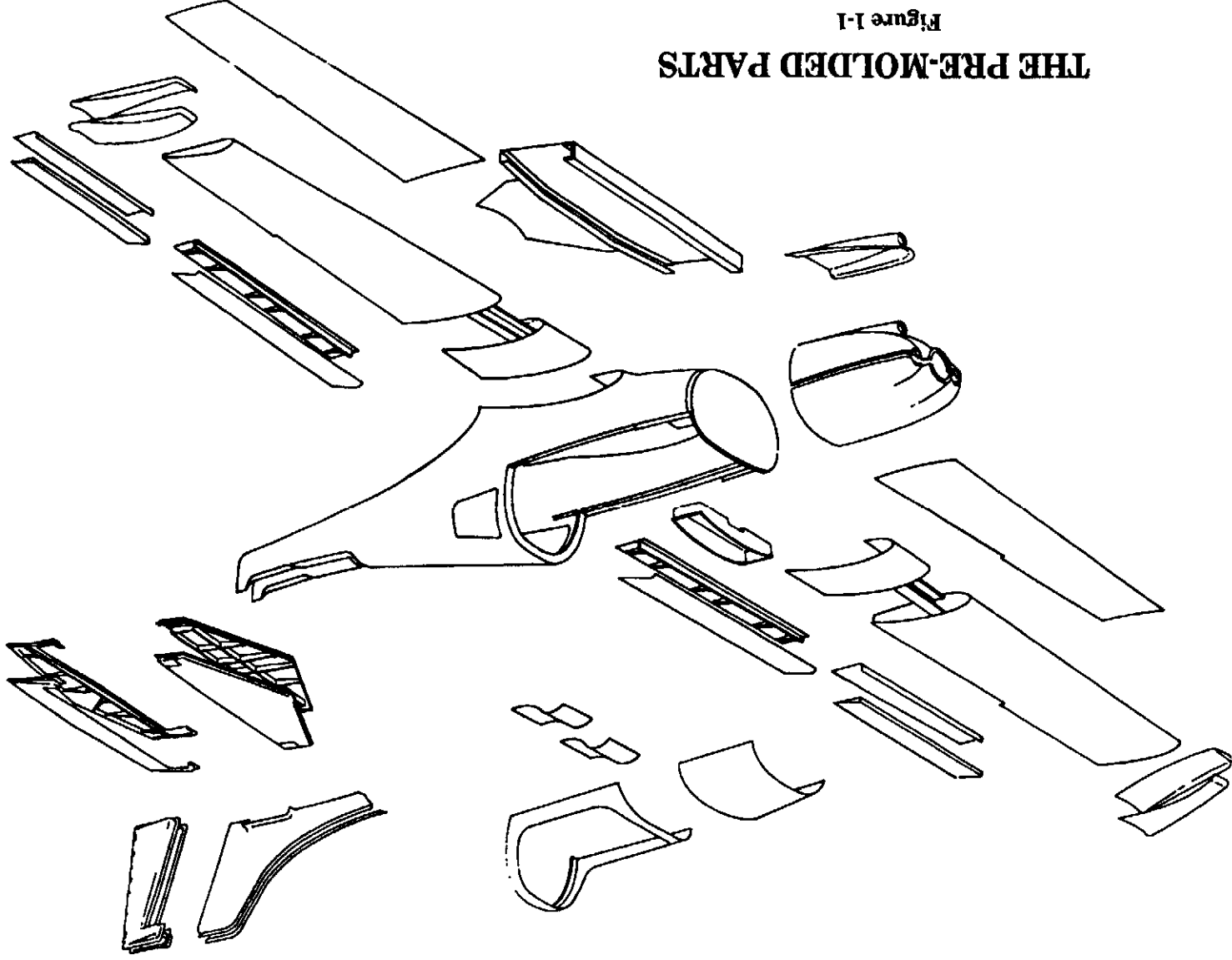
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3. EQUIPMENT REQUIRED: Special Parts, Tools & Supplies Lists

3.A. Parts:

Your kit contains several parts that are already formed for you:



THE PRE-MOLDED PARTS

Figure 1-1

3.A. Parts:

Fuselage
L.H. Bot Elevator
R.H. Top Aileron
R.H. Rudder
R.H. Top Inbd Wing
R.H. Bot Aileron
L.H. Rudder
Horiz Stab Top
L.H. Top Aileron
Fwd Deck
L.H. Top Inbd Wing
L.H. Bot Aileron
Top Cowl
Horiz Stab Bottom
R.H. Wing Tip, Top
Bottom Cowl
R.H. Top Outbd Wing and Spar
L.H. Wing Tip
Canopy Frame
R.H. Bot Outbd Wing
R.H. Vert Stab
Bot Butterfly with Fwd & Aft Ctr Spars
L.H. Top Outbd Wing and Spar
L.H. Vert Stab
L.H. Bot Outbd Wing
R.H. Wing Tip, Bot
Lower Cowl Scoop
R.H. Top Flap
L.H. Wing Tip, Bot
R.H. Top Elevator
R.H. Bot Flap
Header Fuel Tank
R.H. Bot Elevator
L.H. Top Flap
L.H. Top Elevator
L.H. Bot Flap
Nose Wheel Well

3.B. Tools

- Sheet Metal Shears
- Pencil compass or equivalent marking tool
- Utility knife or equivalent
- Saw Horses (3)
- Adhesive measurement syringes or balance scale or Epoxy Dispensing Pump
- Small weigh scale (should be capable of measurements as fine as .1 oz)
- #6x 3/8 sheet metal screws or 1/8" dia, about 1/4" material capacity clecoes and cleco pliers
- Rubber gloves or protective hand coating
- Watch or clock
- 1/8" dia drill bit
- Drill motor, with the following bits:
 - 3/32" 1/8"
 - 1/4" 5/16"
 - 3/8" 7/16"
 - 1/2" 19/32"
 - #40 #32
 - #30 #19
 - #12
- Reamer, 1 5/8", straight flute
- Pop rivet gun
- Dremel™ high speed moto tool, with tungsten carbide cutter
- Cleco pliers and clecoes
- Belt sander - table type with rotary sander
- Rotary cutter (looks like a pizza cutter but *isn't*)
- Hot glue gun
- Heat gun
- Jig saw
- Rivet squeezer
- Rubber squeegees
- 2' & 4' carpenter's levels
- Digital smart level
- C-clamps, 2", 4" and 6"
- Tubing benders
- 37° flaring tool
- Grinder
- Makita model 9030 1" belt sander (or similar)

3.C. Materials & Supplies

- Hysol 9339 Structural Adhesive (supplied in kit)
- Mixing sticks - tongue depressors (supplied in kit)
- Mixing dish or cup (supplied in kit)
- #40 and #80 grit abrasive paper
- Paper toweling or cloth pieces
- Wax and silicone remover (available at auto body or paint shop)
- Methylene Chloride (MC) cleaner
- Soft aluminum pop rivets, 1/8" dia., 3/8" grip

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4. PROCEDURE

4.A. Cleaning, care and handling of parts

1. Cleaning Parts

You will find instructions calling for the usage of cleaning agents throughout this manual. We have found that Methylene Chloride (MC) cleaner is very good in its ability to remove impurities from surfaces. As with all cleaners, be sure to read and follow the safety directions. Acetone is a good cleaner but Methylene Chloride (MC) is superior. *MEK should not be used.*

2. Storage of Pre-Molded Parts

The manner in which your pre-molded parts are stored is very important. Care and thought should be exercised when laying pre-molded parts away for some future use which could be months away. Try to store these parts in a position that won't produce any distorting forces (i.e., store them supported in a position as close to actual use orientation as possible). The assembled fsfg should be rested on saw horses from the wing fillets and tail cone.

3. Honeycomb prepreg Panels

All ribs and bulkheads that are pre installed into your Fast-Build kit utilize the normally optional prepreg/honeycomb panels. All additional ribs and bulkheads can be made with either the standard foam and glass materials supplied (as standard) or if you choose, you can purchase additional prepreg panel sheets.

The prepreg honeycomb panels are available in two types: 3/8" core + 2 BID per side and 1/4" core + 1 BID per side. All BID ply schedules must remain the same when using prepreg panels (i.e., if a part calls for 6 BID on one side and 2 BID on the other side, the 2 BID honeycomb panel will require 4 additional BID on the first side). Also, all attachment BID schedules must remain the same (i.e., if plans call for a 6 BID attachment, then 6 plies (wet layout) must be used.) Typically 1-1/2" contact on each surface unless otherwise noted is sufficient.

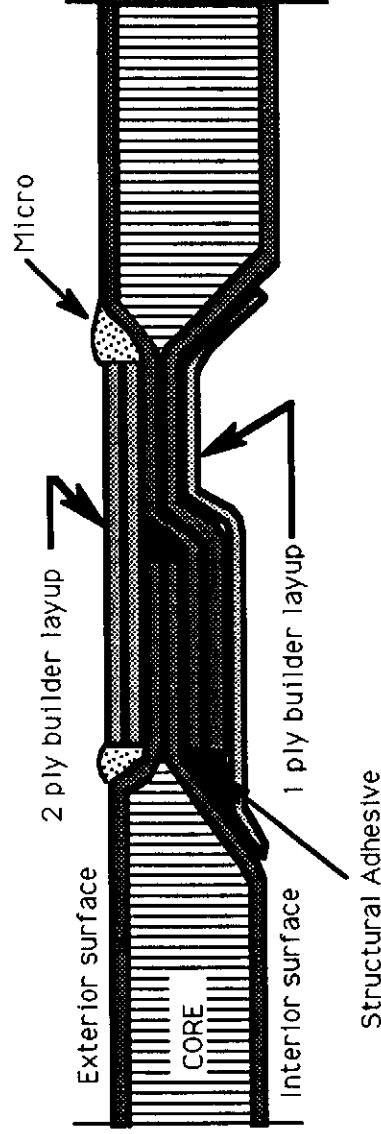
If you choose to build with these prepreg materials, the purchase of one sheet (4' x 8') of each type is generally sufficient to complete the airframe. Note that the foam and E-glass is supplied already as standard with your Fast-Build kit.

4.B. Joint Description:

Adjoining parts are attached with bonded, overlapping joints (joggles) reinforced with fiberglass strips, see Figure 1-2. Figure 1-3 shows the overlaps prior to assembly (the dimensions shown in the figures are approximate). As supplied, the part edges may have excess material. To obtain the dimensions shown the excess material must be trimmed by the builder as explained in Paragraph D-4.4-c.

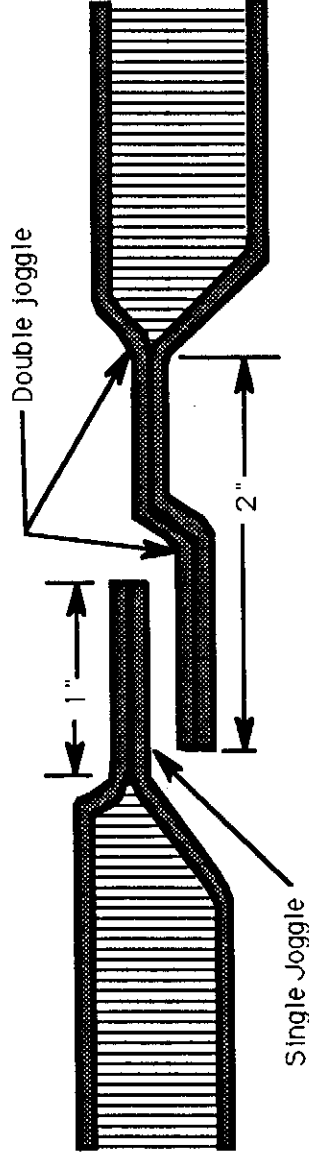
REINFORCED OVERLAPPING JOINTS

Figure 1-2



TRIMMED PARTS

Figure 1-3



Note: Before trimming, single and double joggled surfaces may look similar. To learn what each looks like, examine the front of the fuselage. The joggle that is forward of the firewall, where the bottom cowl will meet, is an example of a single joggle. The area above and behind the firewall, where the forward deck will mount, is a double joggle.

CAUTION

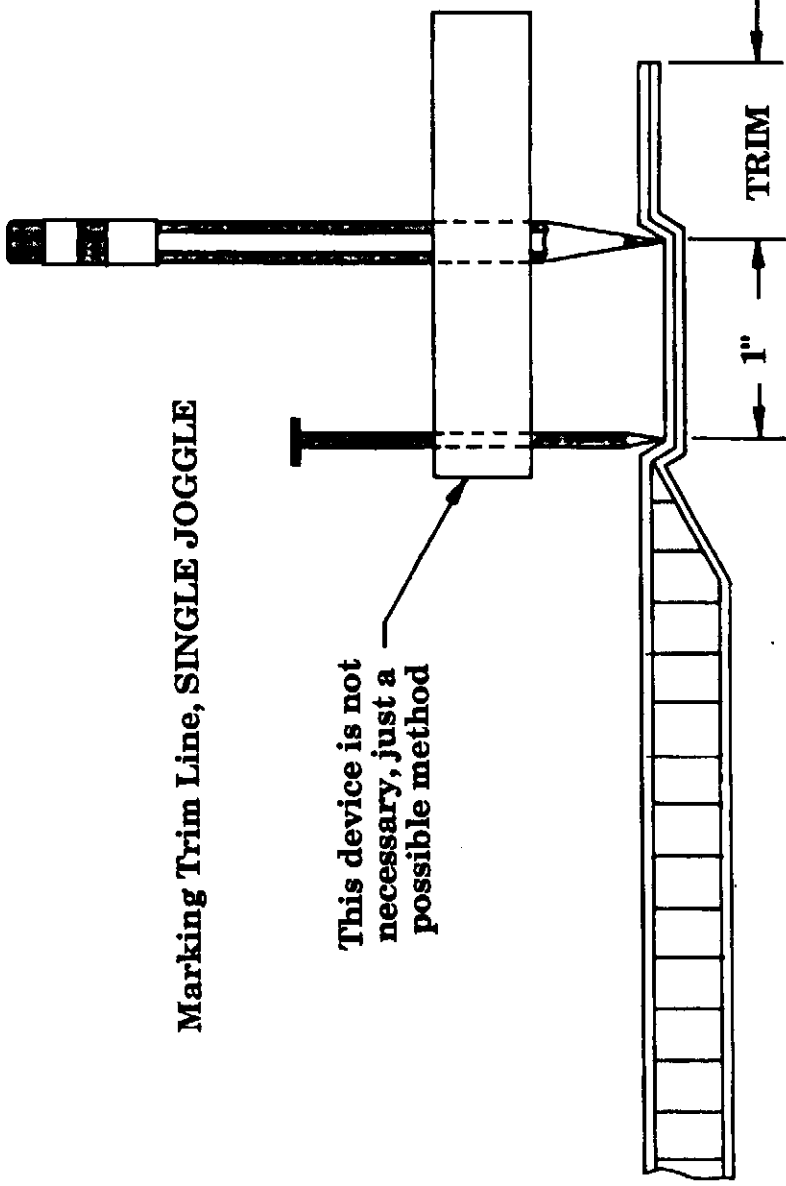
**EDGES OF PARTS MAY BE SHARP. HANDLE WITH CARE,
USE GLOVES OR FILE OFF SHARP EDGES.**

4.C. Trimming Procedure

1. Place the fuselage on a convenient working surface. Mark a line on all joggle surfaces as shown in figure 1-4a. A marking tool can be made from a piece of wood, a nail and a pencil. Make sure the nail tip is well rounded and has no sharp edges which could damage the glass fibers during use. On double joggled surfaces, mark a line as shown in figure 1-4b.

TRIMMING PROCEDURE

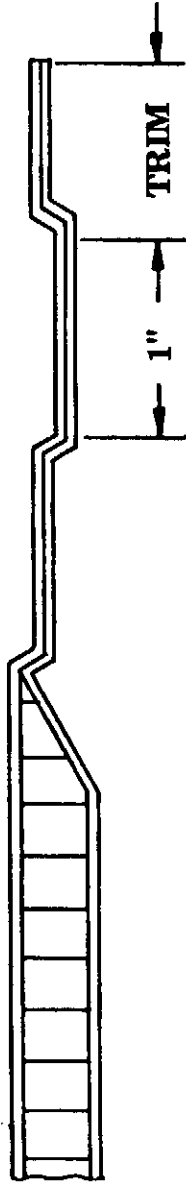
Figure 1-4



Marking Trim Line, SINGLE JOGGLE

This device is not necessary, just a possible method

Marking Trim Line, DOUBLE JOGGLE



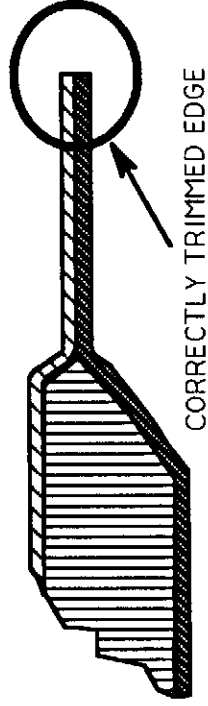
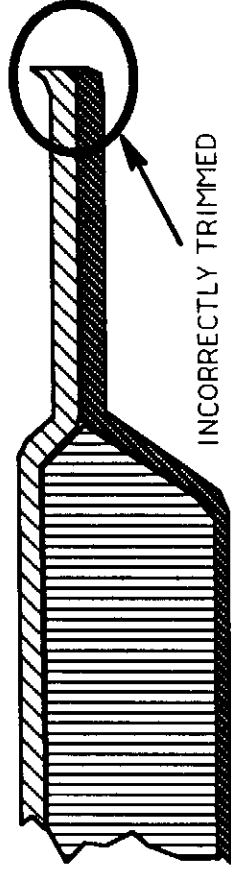
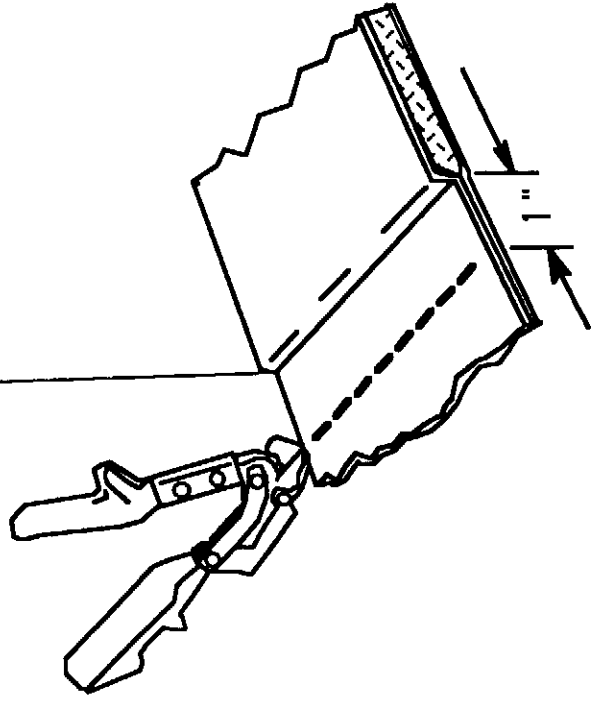
4.C. 2. Using the shears, cut along the lines. Refer to Figure 1-5 for proper appearance of the edge after trimming. If necessary, trim additional material to obtain correct edge shape. Sanding may be used for a final trimming and to smooth the edge.

3. Repeat this trimming procedure for all joggles.

SHEARING JOGGLE

Figure 1-5

This is the inner joggle edge, measure out 1" for your cut line. The double joggled parts work similarly.



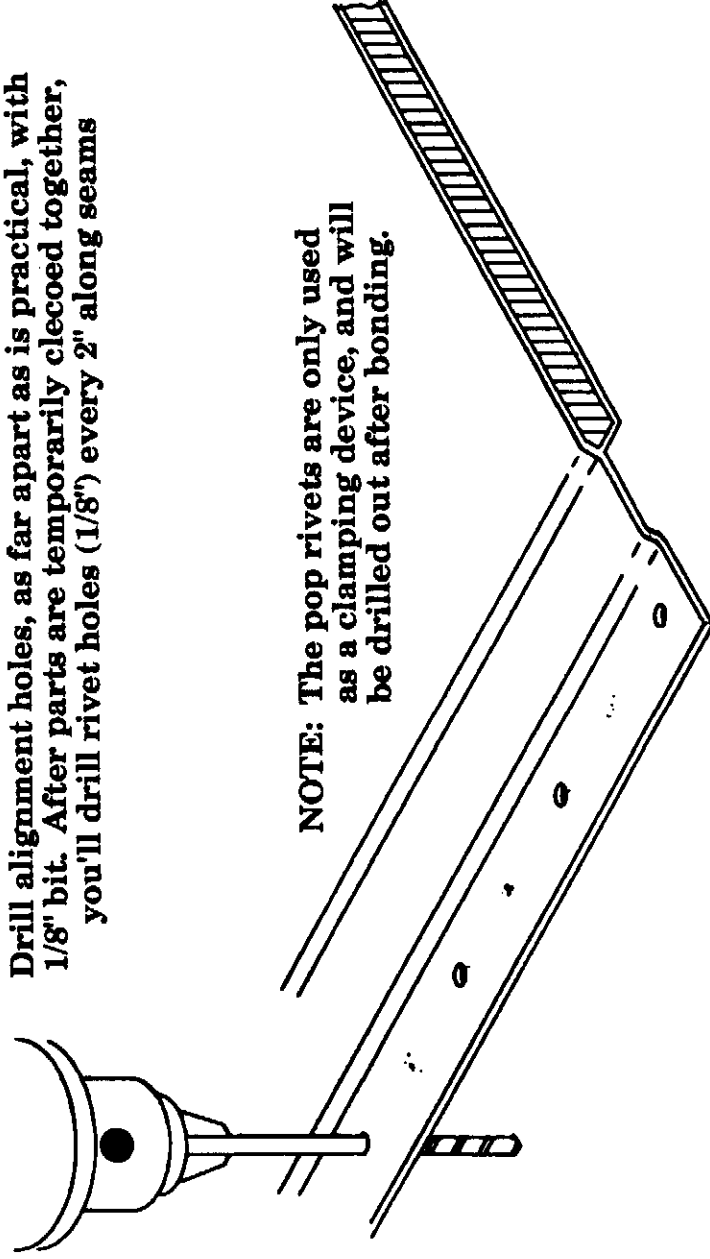
4.D. Drilling Alignment Holes

1. Equipment required
 - Electric drill
 - 1/8" Drill bit
2. Procedure
 - To obtain proper overlap alignment at assembly, holes are drilled for screws or clecoes, which are placed in these holes to hold the parts in proper alignment during cure time.
 - Using a 1/8" drill bit, drill alignment holes in the two parts to be joined (See Fig. 1-6).
 - Place screws or clecoes in the alignment holes, and drill the rivet holes every 2" in between alignment holes.

DRILLING ALIGNMENT HOLES

Figure 1-6

Drill alignment holes, as far apart as is practical, with 1/8" bit. After parts are temporarily clecoed together, you'll drill rivet holes (1/8") every 2" along seams



4.E. Removing the Protective Coating (Peelply)

Description of Parts

Molded parts are shipped with a protective coating of "peel ply" material on their inner surfaces. This material will interfere with bonding and must be removed. The peel ply usually sticks out from the edge of a part in at least one area and looks like white cloth. Where the peel ply meets and lays on the part surface it becomes transparent.

WARNING

ALL PEEL PLY MUST BE REMOVED FROM BOND AREAS TO OBTAIN GOOD BONDS. BONDING OR LAYING FIBERGLASS OVER PEEL PLY COULD RESULT IN STRUCTURAL FAILURE.

Most of the peel-ply has already been removed from your pre-molded parts, but some may remain.

Peel ply is removed by hand. It can require considerable force to pull the peel ply off in some places. As it is pulled off, it usually tears off in odd shaped pieces. Use the utility knife to pick up a new edge when necessary. **Use care not to cut into the glass of the parts.**

The white cotton strips running irregularly on the surface of the peel ply are required by the manufacturing process. These will come off with the peel ply but more pulling force will be required.

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4.F. Fastening parts together

1. When parts are to be fastened together using epoxy or structural adhesive, they must be held tightly in position until the bonding material has set. Several methods are available, but pop rivets remain the best way to be sure of a proper bond. Typically, the bonding sequence is:

The parts are prepared for bonding -

- a. peel ply is removed
- b. joggled surfaces are trimmed
- c. alignment holes are drilled
- d. sheet metal screws or clecoes*(Figure 1-7) are installed into these holes to hold the parts in alignment while holes are drilled about every 2" for pop rivets.

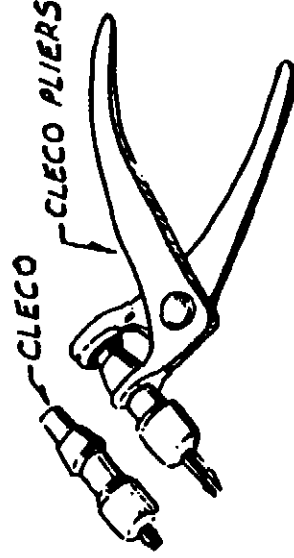
*Clecoes™ are a sheet metal fastening device used extensively in the aircraft industry (refer to Figure 1-7). A special pair of pliers (cleco tool) is used. The tip of the cleco is inserted into the alignment hole. When the pliers are released, the cleco locks itself into the holes, holding the parts tight together. Clecoes and cleco pliers are available from aircraft supply stores or catalogs (ours included). Surplus clecoes can be purchased cheaply, and only about 15 are needed for the construction of your plane.

NOTE

Either sheet metal screws or clecoes are used as fasteners. If the fastener you will use has grease, oil or other such contamination, it must be thoroughly cleaned before use to prevent contamination of surfaces which will be bonded later. Methylene Chloride may be used as a cleaning fluid.

Cleco and Cleco Pliers

Figure 1-7



Squeeze the pliers and the grippers extend and come together. Insert into the hole, press parts together, and release the cleco. The grippers will spread, holding the parts together.

4.F.1. e. The surfaces to be bonded must now be cleaned since they may have become contaminated during handling and storage. The screws or clecos are removed and the surfaces to be bonded are cleaned thoroughly with wax and silicone remover, acetone or MEC.

WARNING: FAILURE TO FOLLOW CLEANING STEPS CAN RESULT IN EVENTUAL BOND FAILURE. EVEN SURFACES WHICH APPEAR CLEAN MUST BE CLEANED SINCE NOT ALL CONTAMINANTS ARE OBVIOUS.

FOLLOW CAUTIONARY LABEL ON THE WAX AND SILICONE REMOVER CONTAINER. WAX AND SILICONE REMOVER IS FLAMMABLE AND MUST BE KEPT AWAY FROM SPARKS, HEAT AND OPEN FLAMES. HARMFUL OR FATAL IF SWALLOWED. DURING USE AND UNTIL ALL VAPORS ARE GONE: KEEP AREA WELL VENTILATED AND DO NOT SMOKE. EXTINGUISH ALL FLAMES, PILOT LIGHTS AND HEATERS. TURN OFF STOVES, ELECTRICAL TOOLS AND APPLIANCES THAT COULD ACT AS AN IGNITION SOURCE. VAPOR IS HARMFUL. AVOID BREATHING VAPORS AND USE ONLY WITH ADEQUATE VENTILATION. AVOID SKIN AND EYE CONTACT. WEAR RUBBER GLOVES OR SUITABLE PROTECTIVE SKIN BARRIER. WASH HANDS IF THEY COME IN CONTACT WITH THIS LIQUID. IF SPILLED ON CLOTHING, REMOVE AND LAUNDRER BEFORE RE-USING.

f. Dampen one cloth or piece of toweling well with the wax and silicone remover and wipe it along the bond surface of either part. Do not rub or scrub the surface as that may work the contaminants into the surface. Follow within seconds with a dry cloth or toweling piece to absorb the solvent and the contaminants it removes from the bonding surface.

g. Continue that process until that seam has been cleaned. Then replace both the wetting and drying cloths with new pieces and repeat the cleaning process for the other half. If at any time the wetting or drying cloth shows any soiling or the drying cloth becomes wet, replace it immediately with a dry one.

h. If any obvious contaminants still remain, the above process may be repeated with methylene chloride.

WARNING: FOLLOW CAUTIONARY LABEL ON THE METHYLENE CHLORIDE CONTAINER. METHYLENE CHLORIDE IS A VOLATILE SOLVENT. CAUSES IRRITATION OF THE EYES, SKIN AND RESPIRATORY TRACT. PROLONGED BREATHING OF VAPOR CAN CAUSE LOSS OF CONSCIOUSNESS. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT TAKE INTERNALLY. AVOID BREATHING OF VAPORS. WHEN HANDLING WEAR CHEMICAL SPLASH GOGGLES, PROTECTIVE CLOTHING AND SOLVENT RESISTANT GLOVES. WASH THOROUGHLY AFTER HANDLING. USE ADEQUATE VENTILATION IN WORK AREA.

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4.F.1. i. After the seam is cleaned, repeat the cleaning process for the other part.

j. Using clean #80 grit abrasive paper roughen all cleaned surfaces lightly until the surface shows a fine white powder. Remove the powder with a clean cloth or clean brush.

k. The bonding material (epoxy, epoxy/flox, epoxy/micro or structural adhesive) is prepared and applied to one or both surfaces to be bonded

WARNING

THE CONTAINERS USED TO MIX THE ADHESIVE MUST NOT BE WAX COATED. THE WAX COATING COULD CONTAMINATE THE ADHESIVE AND REDUCE THE BOND STRENGTH. LIKEWISE, THE MIXING CONTAINER MUST BE FREE OF DIRT, GREASE, OIL OR OTHER SIMILAR CONTAMINANTS.

WARNING

READ THE CAUTIONARY LABEL ON THE EPOXY CANS. THIS EPOXY IS EXTREMELY IRRITATING TO THE EYES AND CAN CAUSE PERMANENT EYE DAMAGE. MAY ALSO CAUSE SKIN IRRITATION OR SENSITIZATION REACTION IN CERTAIN INDIVIDUALS. PREVENT EYE AND SKIN CONTACT WITH EPOXY MATERIALS. AVOID BREATHING VAPOR. USE ONLY IN WELL VENTILATED AREA. AVOID INHALATION OR EYE CONTACT WITH DUST FROM GRINDING OR SANDING OF CURED EPOXY. REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE RE-USE.

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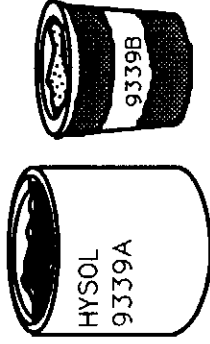
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4.F.2. If structural adhesive is to be used, prepare it as follows:

HYSOL 9339 Epoxy can be mixed in the proper weight ratio only by using a good scale. A small calculator will help, too. **IMPROPER MIXING CAN SPEED OR SLOW CURE TIME AND DECREASE ADHESIVE STRENGTH. ATTENTION TO THE MEASURING PROCESS IS IMPORTANT.**

Hysol Structural Adhesive

Figure 1-8



The mixing ratio for Hysol 9339 is 100:44.5, part A to part B. The easiest way to do this is put the mixing cup on the scale and record its empty weight. Guessing at how much epoxy you will need for the job, take about 2/3's of that amount from the Part "A" can and put it in the cup, weigh, and subtract the weight of the empty cup from the new weight, giving you the weight of just the epoxy in the cup. Multiply the weight of the epoxy in the cup by 1.445. Add the weight of the cup to this figure, and now add Part "B" until the cup weight is the same as your calculated figure. Maintaining nearest 1/10oz. is plenty close enough.

a. Example:

1. Weight of empty cup: .5 Oz
2. Weight with 2/3's (estimated) of the material you'll need, Part "A": 3.7 Oz.
3. Weight of Part "A": 3.2 Oz
4. Multiply by mix ratio 100:44.5: X 1.4
5. Total weight of Part "A" and Part "B" needed is: 4.6 Oz
6. Add the weight of the cup back in .5 Oz
7. The total weight, once you've added the proper amount of Part "B": 5.1 Oz.
8. Add Part "B" to the cup until it weighs 5.1 Oz, mix, and you're ready to go.

b. Mix the Hysol 9339 epoxy adhesive components as follows:

1. Read all the instructions and information on the epoxy cans. Temperature of the adhesive ingredients and the surrounding room temperature must be 60°F or more.

2. The 9339 adhesive has a working life of 2 hours at 77°F however, at higher temperatures or with a larger batch this working life will be considerably less. Therefore, before mixing adhesive, all necessary equipment should be ready.

3. For the same reason, it is better to mix too much adhesive than too little. If you run out and must mix a second batch, the first batch may have already begun to thicken making it difficult to compress the seam properly and possibly reducing bond strength when cured.

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Another reason for mixing more than you need - If you have a little left over, leave it in the corner of the cup with the mixing stick in it. Because cure time varies with temperature, by leaving a little in the cup and leaving the cup near the part you have epoxied, the cup can now be used as your test for curing. Wait at least 24 hours after joining parts. Then, before touching parts, try to move the stick around in the epoxy in the cup. If you can move it at all, your parts are not cured, either. Wait another 24 hours and repeat. Handling parts before cure is complete can reduce the bond strength, and should be avoided.

The epoxy cure time depends on the temperature during cure time. Because of the fire hazards involved with most heaters, it is not recommended to have a heater operating in the room that could cause a fire. However, getting the room nice and warm before applying adhesive, so the parts and air temperature is above 77°F, will help shorten cure times, but remember it will also shorten the pot life/working time of the adhesive.

4.F.2.B.3.(a) Estimate the amount of adhesive that you will need for the first seam and measure a sufficient amount of Part "A" and "B" to make that amount.

(b) Using a mixing stick, thoroughly mix the two parts for at least two minutes. Longer for larger batches. Occasionally scrape unmixed material from the sides of the cup. Uniform blue-gray color will result.

(c) Apply the structural adhesive as follows (the following assumes the seams have been cleaned and sanded as previously described. If not, do so at this time).

(1) Beginning with the seam of the first part you have chosen to start on, with a wood spatula, spread an even layer of adhesive on the overlap surface of the part. Repeat the adhesive application process on the overlap surface of the other part.

(2) Overlap the two adhesive coated surfaces and align the holes in the surfaces. Insert a screw or cleco into a hole at each end of the part, or every foot along the part if it is longer than 18". Starting at either end, insert rivets into the pre-drilled holes and form the heads (backup washers are normally not necessary).

(d) Remove the fasteners and place rivets into those holes.

(e) While the adhesive is still soft, scrape off the excess that squeezes out (Fig. 1-9). *Adhesive is much harder to remove when hardened.* Use methylene chloride on a clean cloth to remove adhesive that smears on the fiberglass surface. Clean adhesive from the clecoes if any were used.

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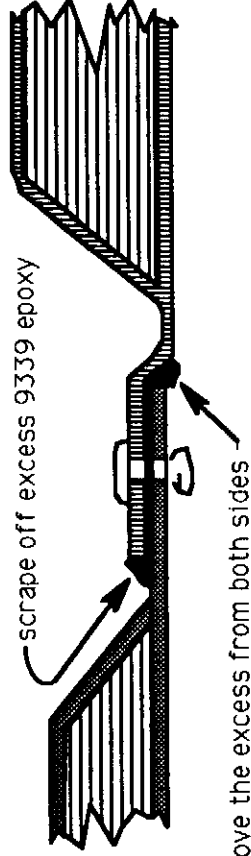
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Removing excess epoxy/adhesive

Figure 1-9



Make sure you're wearing work clothes, since the adhesive may drip on you. Also check for adhesive on hair, arms, etc., and wipe it off before it cures. A long sleeve shirt and long pants are highly recommended.

4.F.2.b.3. (f). Wait at least 24 hours, then test your mixing cup residue for cure. If solidly cured, then the part should be ready to start work on once more. Drill out the rivets using a 1/8" drill, and remove any loose pieces.

(g). Fill the rivet holes with a 50/50 mix of micro/flox, cleaning off any excess, let harden, and you're done with the seam. To make things a little neater, you can put a piece of tape over the back side of the seam, covering the bottom of the rivet holes, to help contain the filler mix and make a smoother neater finish, that requires less epoxy (and adding less weight, something to think about all through the construction process).

4.F.3. Epoxy

a. **Mixing epoxy.** As with the structural Adhesive, you can use a scale for measuring the proper amount of laminating resin and hardener. There are also some good measuring pumps on the market that would probably pay for themselves (about \$190.00) since you'll waste less epoxy with them, and have less chance of spills or improper mixes. We offer one in our catalog that has performed well here in our own shop for years now.

Typically, you will be using from 1 to 6 ounces at a time.

If you prefer to use a scale instead of a dispenser, you can measure the two parts as you did for the Hysol, except use 1.44 in stead of 1.445.

Another way is (*Epolite resin system used here for example purposes only. Use the appropriate ratios for your supplied system of resins.*)

- (1) Place your empty cup on the scale.
- (2) Record the weight of the empty cup.
- (3) Estimate to amount of epoxy you will need.
- (4) Add .44 oz of hardener (yellowish) to cup for each 1-1/2oz you'll need
- (5) Pour 1 oz of resin (clear) into cup for each .44 oz of hardener and mix thoroughly.

4.F.3.b. Working time can be as short as twenty minutes if it is hot, so be sure everything is in place and ready to go before you begin mixing.

c. As with the Hysol, the surfaces must be totally free of oil, grease or other contaminants, and slightly roughened. Fasten with pop rivets, let harden, remove fasteners & fill holes.

NOTE: USE CARE TO MIX YOUR RESINS AND ADHESIVES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS FOR THE PARTICULAR SYSTEM YOU ARE USING - THEY ARE ALL DIFFERENT, AND AN IMPROPER MIX RATIO COULD RESULT IN IMPROPER BONDING - OR NO BONDING AT ALL...

BE CAREFUL - PAY ATTENTION TO THE MANUFACTURERS INSTRUCTIONS!!!

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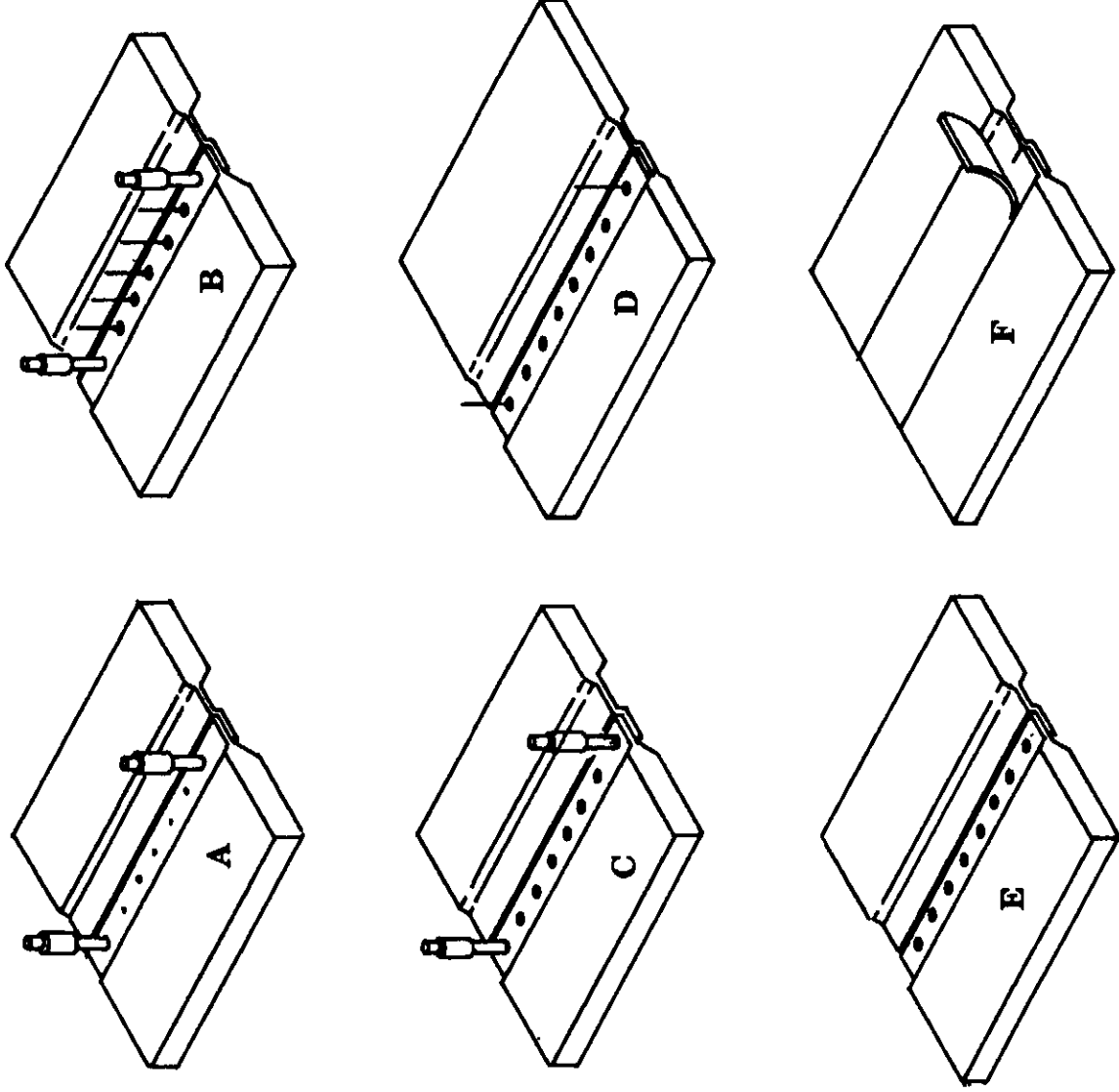
4.G. Fiberglass Strip Installation

1. Description

To stiffen joints and provide a double bond, fiber glass strips are laid over the bonded seams as shown in the sequence of drawings in figure 1-10A-F.

Joining Parts

Figure 1-10



4.G.1. a. Figure 1-10A shows the two pieces to be joined. After the adhesive has been placed along the inside of both pieces to be joined, the two clecoes were installed to hold the parts in alignment.

b. Figure 1-10B shows pop rivets set into the other holes drilled 1" apart for the length of the seam.

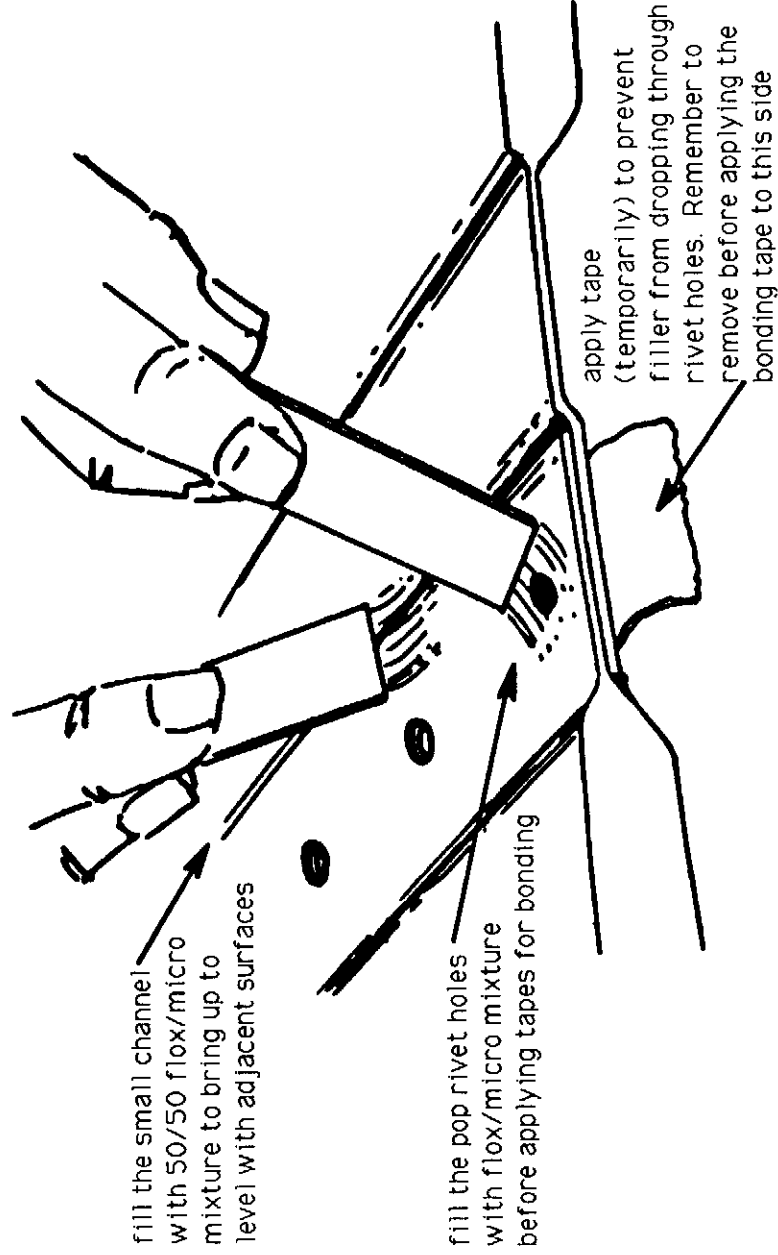
c. Figure 1-10C shows the pop rivets after being compressed

d. In figure 1-10D, the two clecoes have been removed and replaced with pop rivets awaiting compression.

e. Figure 1-10E displays the two parts, waiting patiently for the adhesive to cure.

Preparing seam for bid tape

Figure 1-11



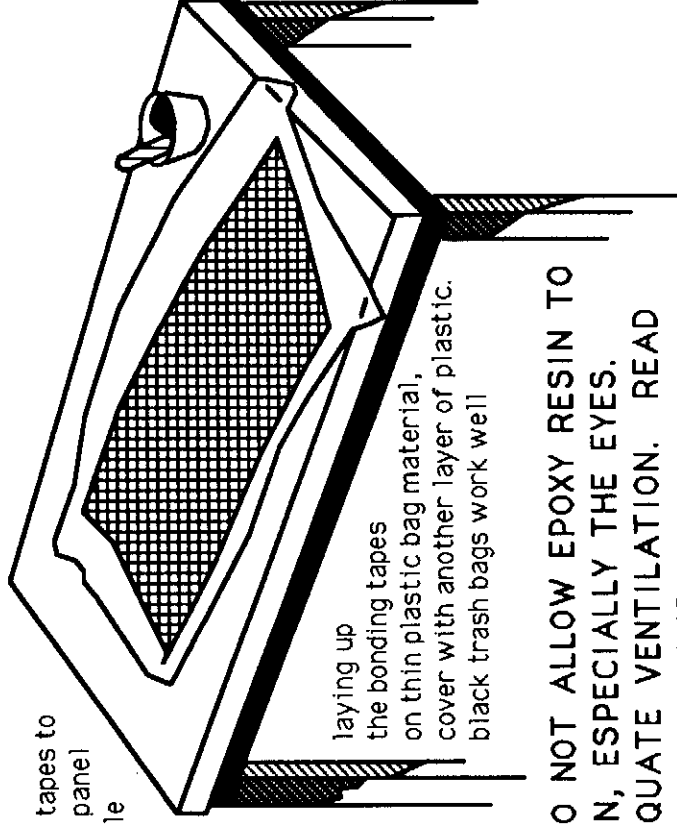
f. After the adhesive has cured, the pop rivets are drilled out, the holes filled with a 50/50 mix of flox and micro (see Figure 1-11) and, without a need to wait for that to cure, a bid strip is being laid into place over the top of the joggles.

4.G.2. Procedure

- a. First make an estimate of the total length of "BID" tapes that will be required for the particular installation.
- b. Cut two pieces of plastic slightly larger than the BID tape is to be, and set them aside.

Preparing BID strips

Figure 1-12



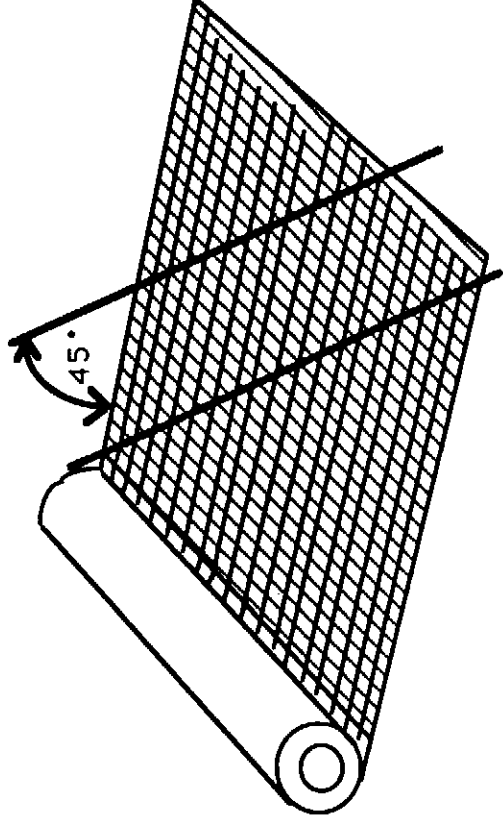
If you have a lot of tapes to make, lay up a big panel and cut out multiple strips with either a 'pizza cutter', razor blade or scissors

WARNING - DO NOT ALLOW EPOXY RESIN TO CONTACT SKIN, ESPECIALLY THE EYES. PROVIDE ADEQUATE VENTILATION. READ WARNING LABEL ON CANS.

- c. Roll out and cut enough fiber glass cloth on a smooth cutting table to provide sufficient material for the above estimation. Cut the cloth "on the bias" as shown in figure 1-13, and leave just a little additional width since the cloth may tend to stretch and become more narrow when wetting out with resin. This phenomenon can easily be kept to a minimum, producing less waste. With most BID tapes being 2 ply, be sure to cut and stack the proper amount prior to applying resin.

Cutting fiberglass on a bias

Figure 1-13



WARNING

NEVER USE A PIZZA (ROLLER BLADE) CUTTER OR BLADE TYPE CLOTH TRIMMER AGAINST THE FUSELAGE OR ANY OTHER PART. CURED GLASS FIBERS WILL BE DAMAGED BY THE CUTTING DISK OR BLADE.

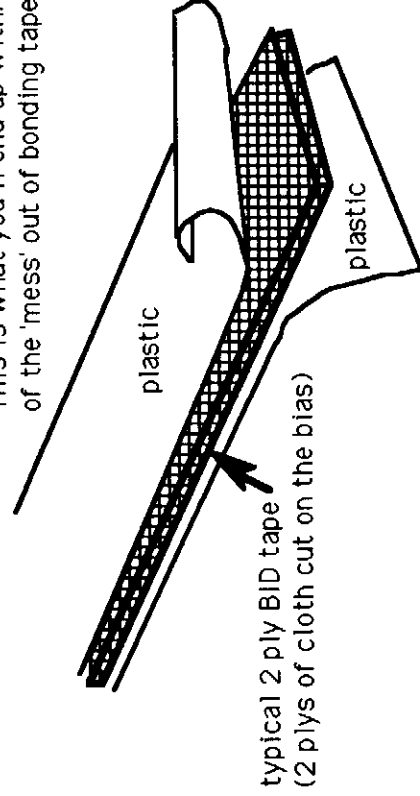
- 4.G.2. d. As you cut the BID tape, stack it on one of the pieces of plastic cut in step b.
- e. Mix the resin thoroughly (usually about 2 minutes).
- f. Apply to the cloth using a squeegee to spread it around. Start in the middle and work towards the edges. The resin will work best when kept at approximately 80°F (a box around your pumper or resin cans with a 40W light bulb inside will maintain a nice warm system, but turn it off if you will not be using the resin within the next 24 hours or less, to prevent evaporation of the esters in the system).
- g. The cloth must be uniformly wetted out, producing a uniform color. If there is any excess resin, gently squeegee (on a 45 or with the strand directions) the resin to the edges and off the BID. Squeegee out all the air bubbles by gently working them to the edges and off. Save all excess resin.
- h. When properly squeegeed out, lay the second piece of plastic over the top, and rub it down onto the BID underneath.

- 4.G.2. i. Using a felt tip marker or equivalent, mark out on the plastic the parallel BID width lines (usually 2"), and cut with either the pizza type cutter or a good pair of scissors. Using the pizza cutter usually works best, but should be performed on a hard plastic sheet (hard nylon or equivalent). See Figure 1-14.

2 BID "Sandwich"

Figure 1-14

This is what you'll end up with. It takes much of the 'mess' out of bonding tape applications.



- j. Because the cloth is sandwiched between plastic layers (figure 1-14), the strip can now be picked up and handled without stretching the fiber glass and without getting a lot of resin on your hands. Brush a light coat of mixed epoxy resin on to the cleaned seam surface.
- NOTE:** There should NOT be any tendency of the resin to "fish eye" or bead up on the surface. If it does bead up, that will indicate contaminants on the surface which will require re-cleaning. It is often additionally helpful to actually "sand" this resin into the prepreg seam surface using 80 grit sandpaper. After applying the resin to wet out the seam area, lightly sand this area, working the resin down into the prepreg. This will require only a very few actual sanding strokes (2 or 3 maximum over any given area), do not over sand for this operation.
- k. Peel one side of the plastic away from the BID and lay the BID strip down onto the prepared seam.

WARNING! Be sure that you are laying the side *WITHOUT* the plastic down onto the seam. TO ERR HERE COULD BE DISASTROUS.

LANCAIR® 320FB

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1-25

Chapter 1

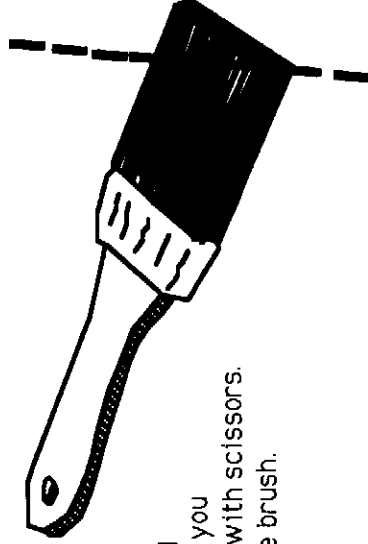
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- 4.G.2.1. Using a paper towel in your hand, firmly rub the BID down onto the seam area. The plastic should still be on the exterior surface of the BID.
- m. When the BID strip is firmly rubbed down, gently peel the top plastic piece off.
- n. Using a stipple brush with the bristles trimmed down per figure 1-15, gently work out any remaining air bubbles. These bubbles will have to be "walked" out by gently stippling on a 45° angle to the sides (or in a direction *WITH* the run of the threads in the cloth). Be gentle here since the BID tapes are quite easily pushed out of shape. If they do become pushed out of shape, gently stipple them back into proper shape and alignment within the joggle seam lines.

Stippling brush

Figure 1-15



You'll find that the stippling brushes will work better if you first cut them down a little with scissors. Cut a slight angle across the brush.

- o. Any epoxy which is left over as waste should be saved and inspected in approx. 24 hours to verify that it was in fact properly prepared and has cured satisfactorily. Note that in cooler climates, 24 hours may not produce a fully hard surface. Within 48 hours, it should certainly be hard although a true full cure will take as long as five (5) days. After three hours or so, the tape should also be removed from the inside seam.

NOTE: TAPE ON ANY PART WILL LEAVE A RESIDUE THAT MUST BE CLEANED OFF ONCE THE TAPE IS REMOVED. THIS WILL PREVENT IT FROM BEING TRANSFERRED TO OTHER SURFACES BY HANDLING, AND PREVENT THE POSSIBILITY OF ANY BID TAPES BEING LAID OVER THE RESIDUE.

Transcript of Letter to D. Weeldryer, re. Jeffco ratios
from Lancair Mail List Attachments (Jeffco-A.jpg)

Doug Weeldryer
Lancair International Inc.
2244 Airport Way
Redmond, OR 97756

Dear Doug:

Thank you for sending us the latest literature from Lancair. I am in love with the Lancair IV-P. Next time we talk on the phone I would like to know how much the Fast Build "A" kit costs on the IV-P new plane.

I will cover the mix ratios in a little more detail than discussed on the phone. The correct or optimum proportions of Jeffco 1307LV (epoxy resin) and Jeffco 3102 (epoxy hardener) is determined by plotting heat distortion temperature (H.D.T.) of various cured blends of the 2 reactants. At the optimum ratio of resin to hardener, the H.D.T. is at its maximum.

The optimum ratio of 1307LV to 3102 is as follows:

| By Weight | In Percentage |
|-------------------------------------|-----------------------------|
| 26 parts 3102 to 100 parts 1307LV | 20.6% 3102 and 79.4% 1307LV |
| By Volume | In Percentage |
| 27.4 parts 3102 to 100 parts 1307LV | 21.5% 3102 and 78.5% 1307LV |

As we discussed in our phone conversation the excess hardener, 3102 reduces H.D.T. along with the physical properties in general. Less than the optimum amount of hardener (within 10%) has no effect on the H.D.T. and physicals.

The 4:1 volume ratio recommended in Jeffco literature is about 9% lessw hardener than the optimum for 3102 with 1307LV. This 4:1 ratio by volume is on the safe side and in fact we find no loss what so ever of physicals.

To the best of my knowledge many Lance builders use Michael Engineering's metered 4 to 1 pumps. We have worked closely with Ralph Prewett of Michael Engineering to set their pumps in the optimum ratio.

Respectfully

Ed Chesakfett (?)

Handwritten note: Ratio tolerances: +/- 10% on the hardener.

Less hardener : Same characteristics, longer cure time
more hardener : softer, weaker, shorter cure time

Has been tested to 30% less hardener. Result: same characteristics, very long cure time.
(Jeffco-b.jpg)