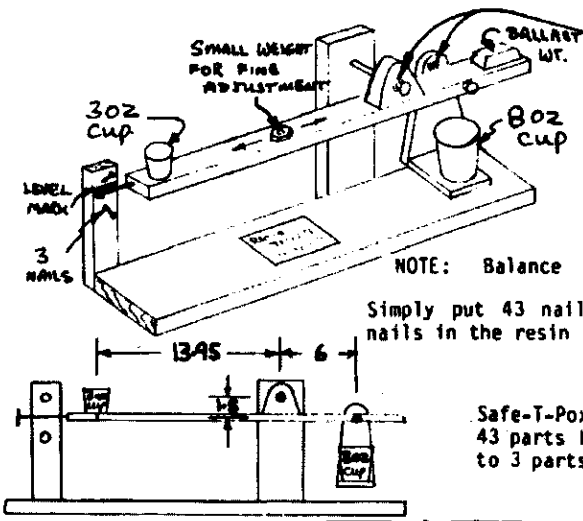
Epoxy Balance

Devices which automatically ratio the correct amount of resin and hardener and dispense it with the pull of a lever are available from Solitaire distributors for approximately $150. These save time and epoxy. You can ratio the epoxy the way we did in building N7EZ and N4EZ by building the following simple balance: (see drawings)
Cut out the 5-step instructions and glue to your balance - don't skip steps! Follow each step exactly every time you mix epoxy.

RATIO BALANCE FOR RESIN/HARDENER

1. Place both empty cups as shown. Wet the hardener cup.
2. Adjust ballast weight to level mark.
3. Fill resin cup with desired amount of resin - 1 to 6 oz.
4. Add hardener to hardener cup to balance scale on level mark.
5. Pour the hardener into the resin cup and mix.



Cut the instructions out and glue them to your balance.

Pivots - metal tube bushings in wood. Loose fit on nails. The 1/8" diameter brass tube available at hobby shops is excellent for the bushings. Must be friction-free.

NOTE: The metal tube for the pivot bushings can be cut from an empty ballpoint pen.

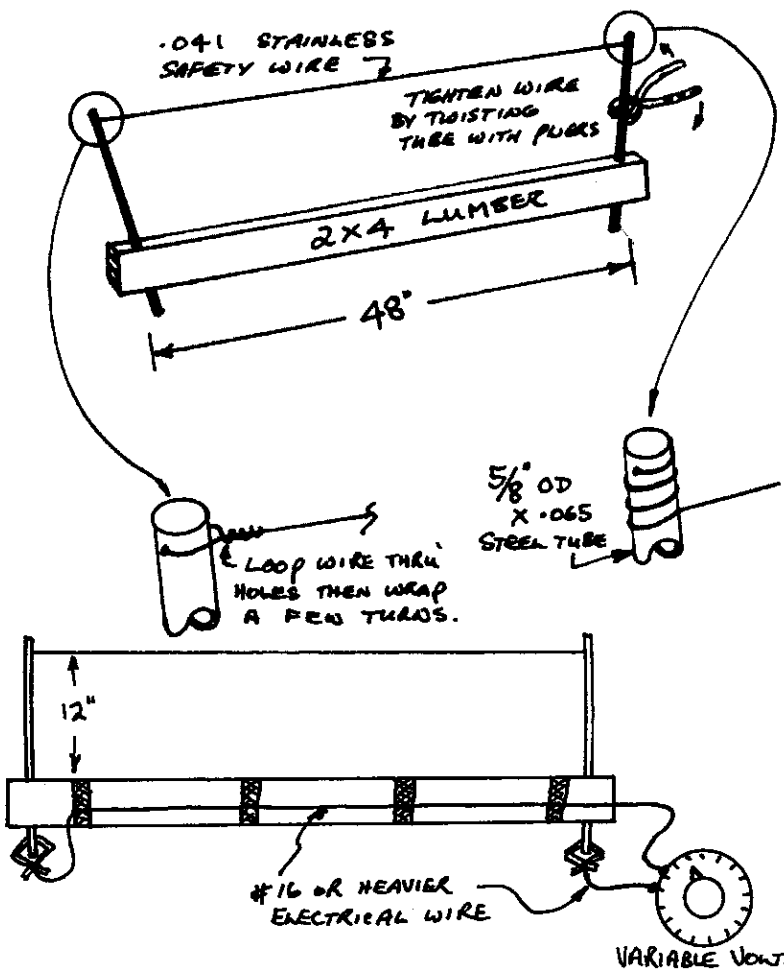
NOTE: Balance accuracy check.

Simply put 43 nails in the hardner cup and 100 nails in the resin cup and check for level.

Safe-T-Poxy resin to hardner ration is 100 parts to 43 parts by weight. By volume it is 7 parts resin to 3 parts hardner.

Hot Wire Cutter

You will need a hot wire cutter to carve all the foam cores for the canard, vertical stabilizer and wings. Refer to sketch.



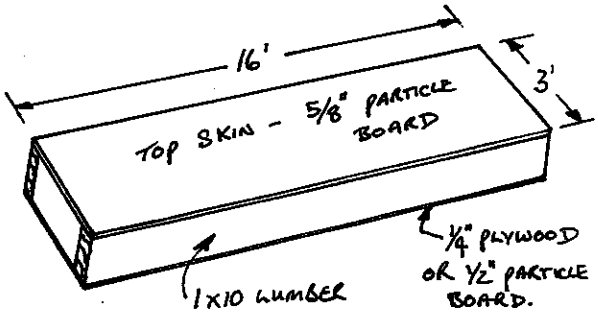
The Variable voltage control can be obtained from a Solitaire distributor or you can substitute any controllable power supply to include the 14 to 20 volt range with at least 4 amp capability. An alternative is to borrow two 12-volt battery chargers or auto batteries and lash up the following device. The "A" blocks represent either a battery or a 12-volt DC battery charger with 4-amp capability.

THE CUTTER SHOULD ONLY BE USED ON THE BLUE OR WHITE STYROFOAM. A HAZARDOUS GAS IS EMITTED IF YOU TRY TO CUT URETHANE.

Adjust the current to obtain a wire temperature which will allow the wire to cut the foam at a rate of one inch every four to six seconds when pulled with a light load (less than 1/2 lb). This can be checked with a small scrap of foam. If temperature is correct, foam will have a smooth hairy surface. A cratered surface means too much heat. If the wire is too cold, the cutter will have to be forced hard, causing the wire to lag. Lag should not exceed 1/2" over the top and bottom of the wing and not over 1/8" around the leading edge. If the wire is too hot, it will burn away too much foam, making the part too small and will result in ruts in the foam if the wire is inadvertently stopped during cutting. The wire should be tightened until the wire starts to yield. Check this by tightening the wire while plunking it listening to the sound. The pitch will increase until the wire yields.

JIG TABLE

You will need a table to jig and build the wings and canard. It should be at least 3ft by 16ft. Use a little care in making a flat, untwisted surface. The following is a sketch of the one we made and it works fine. The box design makes it stiff in torsion. Set it up with the top 35 to 39 inches above the floor. Don't get carried away with surface finish, since you are going to be gluing blocks to it with Bondo and chiseling them off several times.



MATERIALS

The materials, processes and terminology used in the construction of the Solitaire may be new to you unless you have built a moldless composite homebuilt in the last several years. This section is devoted to familiarizing you with the language, materials and techniques used in these plans. This information is basic to the construction of your airplane. You should study this section and be sure that you understand all of it before continuing.

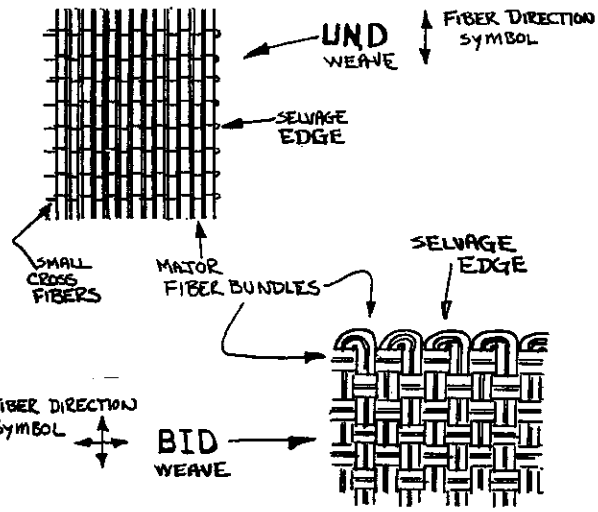
There are five basic materials that you will be working with: fiberglass cloth, epoxy, microspheres, flox and foam. Each material, its properties and uses will be discussed in detail. Basic processes using these materials will also be discussed.

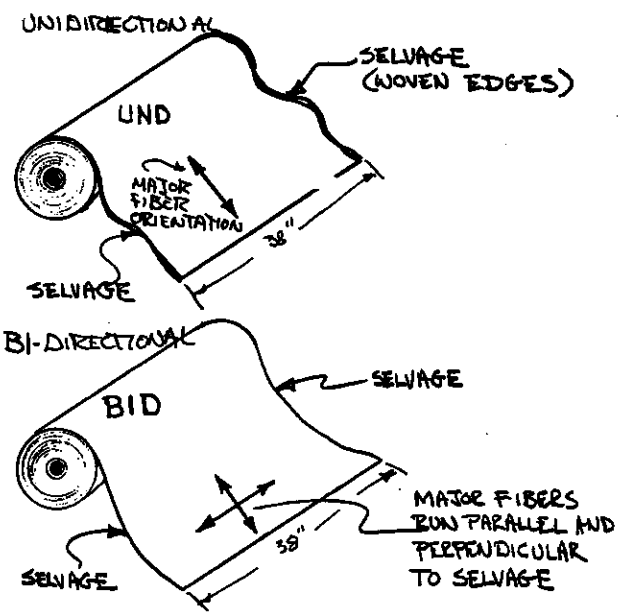
GLASS

The most basic structural material in your Solitaire is glass cloth. Glass cloth is available commercially in hundreds of different weights, weaves, strengths and working properties. The use of glass in aircraft structures, particularly structural sandwich composites, is a recent development. Very few of the commercially available glass cloth types are compatible with aircraft requirements for high strength and light weight. Even fewer are suitable for the hand layup techniques developed by RAF for the homebuilder. The glass cloth used in the Solitaire has been specifically selected for the optimum combination of workability, strength and weight.

The glass cloth in your Solitaire carries primary loads and its correct application is of vital importance. Even though doing your glass work correctly is important, this does not mean that it is difficult. Good workmanship is a must, though, to achieve the design strengths.

Two types of glass cloth are used, a bi-directional cloth (RA7725BID) and a unidirectional cloth (RA7715UND). (Use the full part number for ordering your cloth, but for simplicity, the plans will use only the BID and UND designations). BID cloth has half of the fibers woven parallel to the selvage edge of the cloth and the other half at right angles to the selvage, giving the cloth the same strength in both directions. The selvage is the woven edge of a bolt of fabric as shown in the accompanying sketch. UND cloth has 95% of the glass volume woven parallel to the selvage giving exceptional strength in that direction and very little at right angles to it.





BID is generally used as pieces which are cut at a 45° angle to the selvage and laid into contours with very little effort. BID is often applied at 45° orientation to obtain a desired torsional or shear stiffness. UND is used in areas where the primary loads are in one direction and maximum efficiency is required, such as the wing skins and spar caps. Correct orientation of fibers is extremely important.

Multiple layers of glass cloth are laminated together to form the aircraft structure. Each layer of cloth is called a ply and this term will be used throughout the plans.

Marking and cutting the plies of glass cloth is a job that you will repeat often in the construction of your Solitaire. Glass cloth should be stored, marked and cut in a clean area with clean hands and clean tools. Glass contaminated with dirt, grease, or epoxy should not be used. If your cloth roll ever gets water spilled on it, it must be discarded and not used on an aircraft structure. A clean, smooth surface is needed for marking and cutting. The area used for storing and cutting glass cloth should be separated from the aircraft assembly area because it will be exposed to foam dust, epoxy and other things which can contaminate the cloth. You will need a good sharp pair of scissors, a felt-tipped marker, a fairly straight board and a tape measure for marking and cutting. The small amount of ink from marking and numbering plies has no detrimental effect on the glass cloth.

In each step, the size, type and fiber orientation of each ply is given. Take the list to your glass