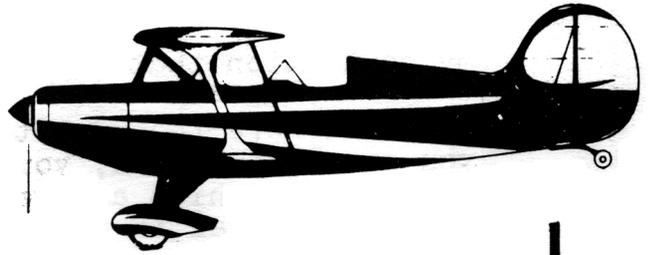


SKYBOLT NEWS

910 S. HoHoKam DR. BLDG. 107
TEMPE, ARIZ. 85281
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AUG. SEPT. 1977
(Part Two)

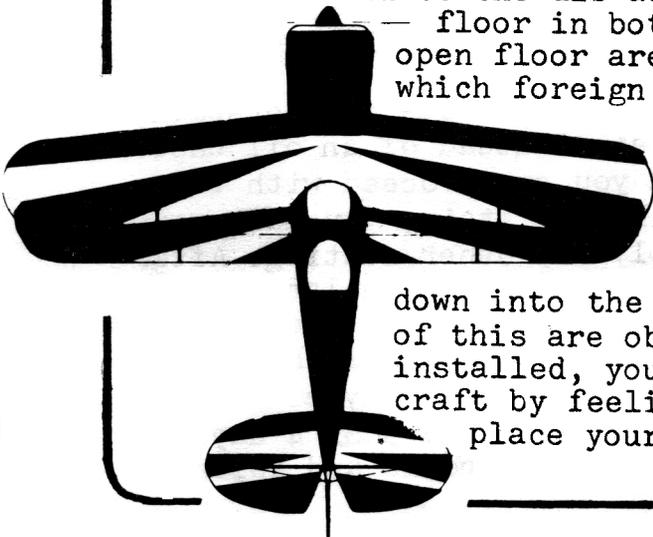
FLOORING INSTALLATIONS

Some builders have elected to go as light as possible in regards to Flooring and have installed channel shaped runners on the fuselage floor which are installed directly in back of the rudder pedals they are to service. These channels are made from .080 Alum. and measure 6" wide x length necessary with a 1" flange. Many of our early military aircraft had flooring of this type. While this type of flooring is adequate, you may wish to evaluate the dis-advantages and elect to install a full

— floor in both cockpits. The dis-advantages are open floor area around the control systems into which foreign objects might fall and jamb the con-

trols. Secondly, the entry into the cockpits of the Skybolt are so blind (you can't see where you are placing your feet) that a non-aircraft type of person can easily slip and step

down into the belly of the aircraft. The effects of this are obvious. When channel type flooring is installed, you actually enter and exit the aircraft by feeling with your feet as to where to place your feet to support your weight. It is



my contention that full flooring is the best way to build.

There is more than one type of flooring to select from. If you are so inclined, you may choose to use aluminum honeycomb panels which are very light. If you can't find the proper material in the salvage yards or surplus dealers, you can make your own by buying paper honeycomb core and sandwich it between sheets of aluminum. When compared to the cost of Mahogany aircraft plywood (the best wood to choose) honeycomb will cost a slight bit more but will be approx. 30 times stronger and 20 times stiffer. The price of $\frac{1}{4}$ " Honeycomb Core (core only) is approx. \$30 per 48" x 96" panel. Add the price of 2 sheets of required aluminum and the adhesive plus freight to that and you can see what I mean. The next best choice is Mahogany Plywood ($\frac{1}{4}$ " - 5 ply 90 degree) which costs about \$55 to \$60 per sheet plus freight and in some cases, packing charges.

FIG. 1 shows the shape of the flooring pieces. The heavy black dots on each piece represents where a mounting tab is welded to the lower structure on the airframe. How to install tabs is covered in a later subject in this issue of Skybolt News. You will notice that the Flooring is installed in 8 pieces. During final assembly of the aircraft, the Flooring is installed before the Rudder pedals and Torque Tube Ass'y.

To secure the Flooring to the tabs, we can use #8-32 x 5/8" Flat Head Machine Screws w/Flat Washers and AN364-832 Elastic Stop Nuts. The screws DO NOT have to be expensive aircraft type screws. The other method is to use Tinnerman Clip-on sheet metal nuts ("U" type NAS 446) Part # A1348-8Z-1 and #8 Flat Head Sheet Metal Screws (Self Tapping, Type "B"). This method is lighter in weight but again, is more expensive. Screws approx. .05¢ ea. and nuts approx. .15¢ ea. You'll need approx. 200 per aircraft for flooring, seat backs and baggage comp. flooring.

To obtain a super nice finish on your wood panels I suggest that you try the following. Use a wood stain if you wish or finish the panels in natural grain. If you use a wood stain, be sure to use an alcohol base stain instead of an oil base. This dries in approx. 30 min. and you can proceed with the rest of the finish. If you use oil base stain, you must wait 24 to 48 hours before you can apply any other coating. After the staining operation, we spray the panels with lacquer sanding sealer. Wait approx. 1 hour and sand with 360 Wet or Dry sandpaper (Dry) . Keep spraying and sanding until there are no shiny spots (low spots). Now apply two spray coats of epoxy varnish. When the varnish is dry, (wait 3 or 4 days) rub the surface with Dupont #7 Rubbing Compound and follow

that with a good coat of paste wax. The results of all your work will be a masterpiece or what the judges call, "An eyeball catcher".

Now for the final clincher. Install pieces of polished stainless steel plates (.016 - .020) on the floor just aft of the rudder pedals (Heel Plates). The size of the plates, approx. 4" x 8".

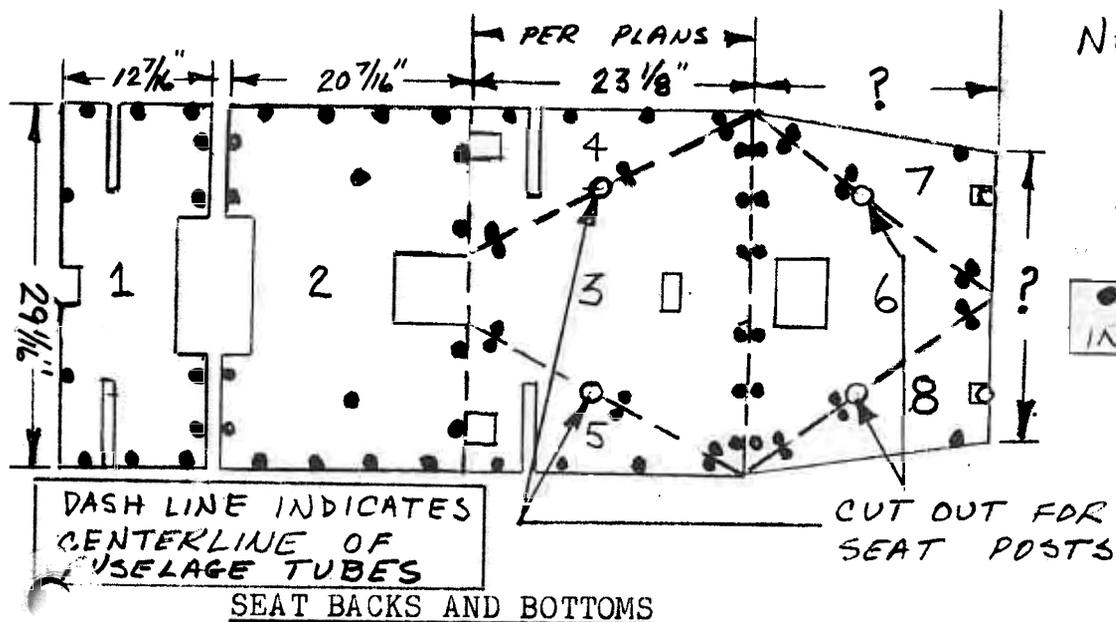


FIG. 1

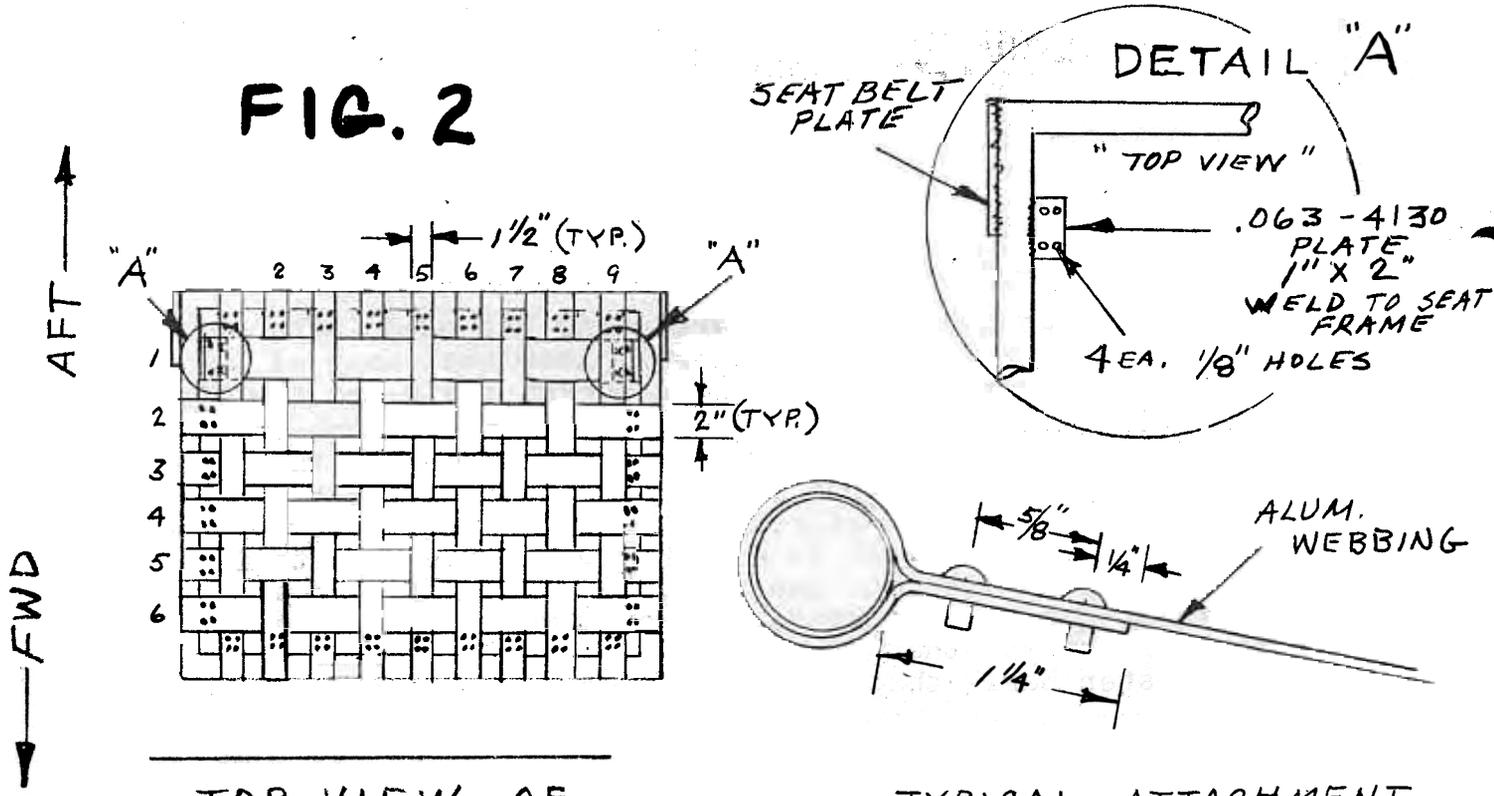
This chapter assumes that you are using the plans type seats made from 3/4" x .035-4130 tubing. I know that many of you have probably purchased fiberglass bucket seats and are planning to install them. Most of the purchasers of same probably have them for sale after they try to mount them in the Skybolt. The bucket type seats that I have seen to date, just weren't meant for a Skybolt or Starduster Too. The angle between the seat bottom and the back is all wrong. I don't mean to imply that it is impossible to use them, but you will have a major re-working job on your hands. The only molded seats that I have seen to date that are properly shaped and formed are for the Christen Eagle that was introduced at Oshkosh this year.

Regarding the Seat Backs of both cockpits, I suggest that you use plywood paneling. In the rear seat, this will give you maximum room when using a Security type back chute. You will not be able to use any kind of a cushion in back of you. Any attempt to do so will result in your face being much too close to the instrument panel. Those of you who are building your Skybolt with the rear seat 2" further back per my plans in the Dec.'76 issue of the Skybolt News will by all means be in better shape but you still won't be able to use a cushion unless you are a very short person. During flight operations when you decide not to use a parachute, a nice 1" foam back cushion covered with expanded vinyl (genuine imitation leather)

and attached to the plywood panel with Velcro strips makes a reasonably comfortable back rest.

The seat bottoms require a little more work to install. I suggest that you use the basket weave aluminum strip method instead of the canvas sling from yesteryear. The aluminum strips are easy to install and should be installed so as to leave a slack or concave bottom. A 6" foam cushion made to fit this rounded area has proved to be quite comfortable when you are not wearing a chute. Further, depending on your height, you may be able to use a less expensive seat chute. Because a seat pack weighs more than a back pack, this could be to your advantage when flying solo aerobatics since it will move the C.G. rearward slightly. This applies of course to a Skybolt that exhibits nose heavy tendencies. In any event, be sure that you know where the C.G. is located and practice entering and leaving the aircraft with the type of chute you choose to employ.

FIG. 2



TOP VIEW OF REAR SEAT

NOTE: ALL WEBBING IS .025-2024 T3
 FORE AND AFT = 9 STRIPS (1 1/2" WIDE)
 SIDE TO SIDE = 6 " (2" WIDE)

TYPICAL ATTACHMENT OF ALUM. WEBBING TO SEAT FRAME
 USE 4 EA. 1/8" STAINLESS STEEL POP RIVETS (CHERRY N RIVETS) OR EQUIV.
 # CCP-4-4

FIG. 2 illustrates how aluminum webbing is employed in the basket weave type of seat. The spacing between the "Fore and Aft webs is approx. .275 and the spacing between the "Side to Side" webs is approx. .536 The Cherry N Pop-Rivets called out in FIG. 2 have a tensile strength of 600 lbs. and a shear strength of 450 lbs.

FLOORING TABS AND OTHERS, INSTALLED THE EASY WAY

All Flooring and Seatback Tabs are made from .040-4130 steel plate. The usual size is 3/4" x 3/4" and approx. 115 are required. This includes the Tabs needed for the Baggage Comp. floor in back of the Headrest. The Tabs used to mount the Instrument Panels and the Bulkhead Panel behind the front seat are made from .071 - 4130 and measure 5/8" x 3/4". 9 are required. The big difficulty in mounting the Tabs comes when you try to hold them accurately in place to tack-weld them. FIG.3 shows how very easy it really is. This method can also be used to hold our "Adjustable Stringer Stand-Offs" in place for welding. All you need is some small and medium sized spring clamps plus some strips of .063 or .071- 4130 approx. 1 1/2" x 36"

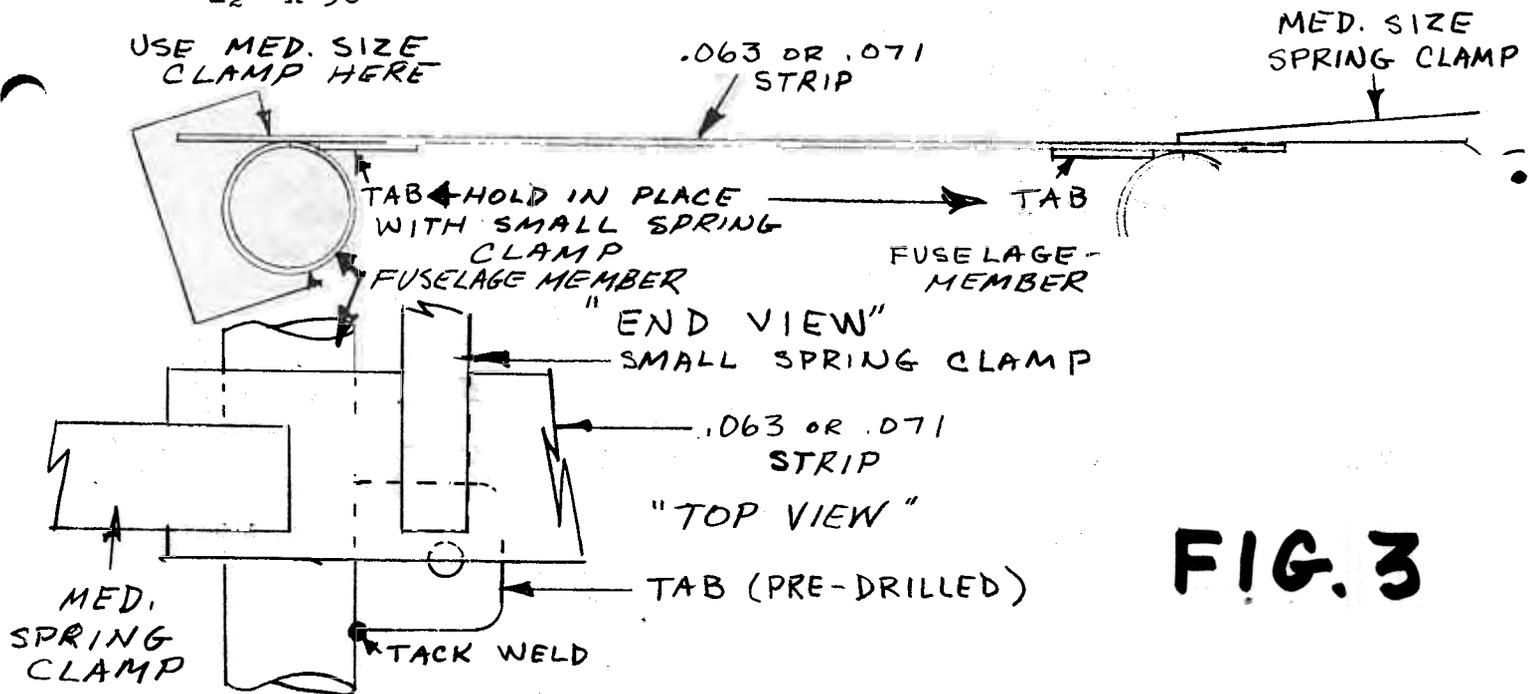


FIG. 3

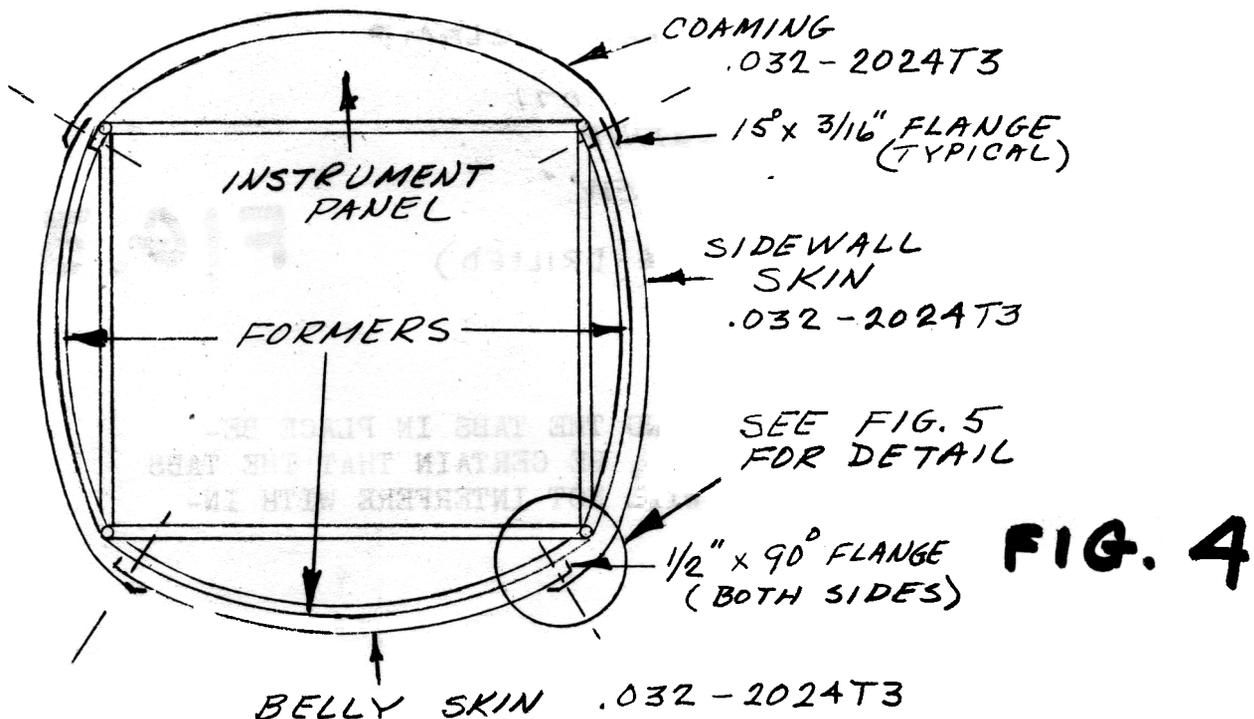
DON'T MAKE THE MISTAKE OF WELDING THE TABS IN PLACE BEFORE YOU HAVE DRILLED THEM, ALSO, BE CERTAIN THAT THE TABS ARE LOCATED PROPERLY SO THEY WILL NOT INTERFERE WITH INSTALLING OTHER COMPONENT PARTS.

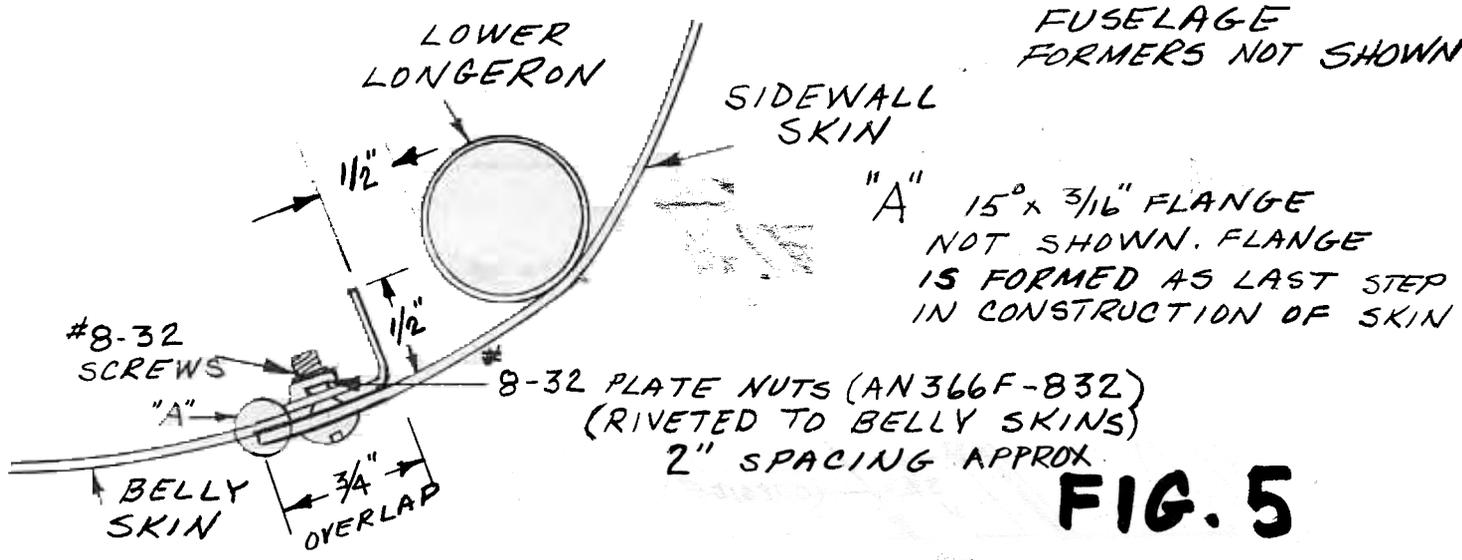
ALUMINUM SIDEWALL AND BELLY SKINS

In the June issue of Skybolt News, we discussed the construction of the Aluminum Coaming. In this issue we will carry this forward with respect to it's mating with the Sidewall Skins, plus the design of the Belly Skins. As with all good sheetmetal construction, we have to make templates of the piece we are going to build and install. A stiff paper about the same as "Manila File Folder" material is excellent.

The Coaming we have already made, was made from 2024T3 x .032 The Sidewall Skins are made from the same material as well as the Belly Skins. FIG. 4 shows how the Skins are overlapped. Note particularly how the bottom edge of the Sidewall Skins attach to the Belly Skins. This gives the associated Skins all the rigidity they need and consequently they will withstand very heavy air loads as well as the occasional mistreatment they suffer when people hit them with their knees while entering or exiting the cockpits.

We suggest that you go to the extra trouble of installing plate nuts on the backside of the Coaming Attach Strip that is "Skip Welded" along the top longeron. It is also desirable to install Plate Nuts on the Sidewall and Belly Formers after all pilot holes have been drilled in the Skins and Formers. Last but not least, when all skins have been cut and trimmed, rolled to contour and are ready for priming, bend a 15 degree flange 3/16" wide on all overlapping edges. FIG. 5 shows more detail of the overlap of the Sidewall Skin with the Belly Skin.





MOUNTING THE BATTERY

Believe it or not, all Skybolts do not need the Battery mounted behind the rear seat. It can be mounted on the Firewall if you are installing a 180 HP Lycoming on an engine mount that is 2" shorter than the plans call out and you are using a wooden fixed pitch prop. Most other builders will have to head for the spot just aft of the rear seat.

If you are installing a 180 or 200 HP. Lycoming, the Battery to use is the Model PS6-9 GILL or equivalent. This is a 12 volt 25 amp. hr. Battery with aerobatic non-spill vent caps. If you are installing the 540 series Lycoming, the Battery to use is the Model PS6-11 GILL or the Model AC78-M EXIDE. The AC78M is a manifolded battery. The vent and drain lines connect directly to the manifold on the battery. With the AC78-M you do not need a battery box. The other batteries previously mentioned, all need a Battery Box. In any event, Vent Lines and Drain Lines are needed with all batteries except those which are sealed such as Gel Cells.

The Battery Mounting Frame is really a simple affair made from 3/4" x 1" angle formed out of .063 - 4130 steel plate. FIG. 6 shows such a frame and an AC78-M installation. The installation of one of the other model batteries would be essentially the same except that you would bolt the battery box to the frame which has already been affixed to the fuselage. All vent and drain lines should be rubber or plastic hose such as Tygon.

Gel-Cells are a fairly recent development in batteries and to my knowledge are working ok in one homebuilt that I know of. The only problem is that you need 2 in series since they are 6 volt units. They are lighter than lead-acid batteries but the cost is higher.

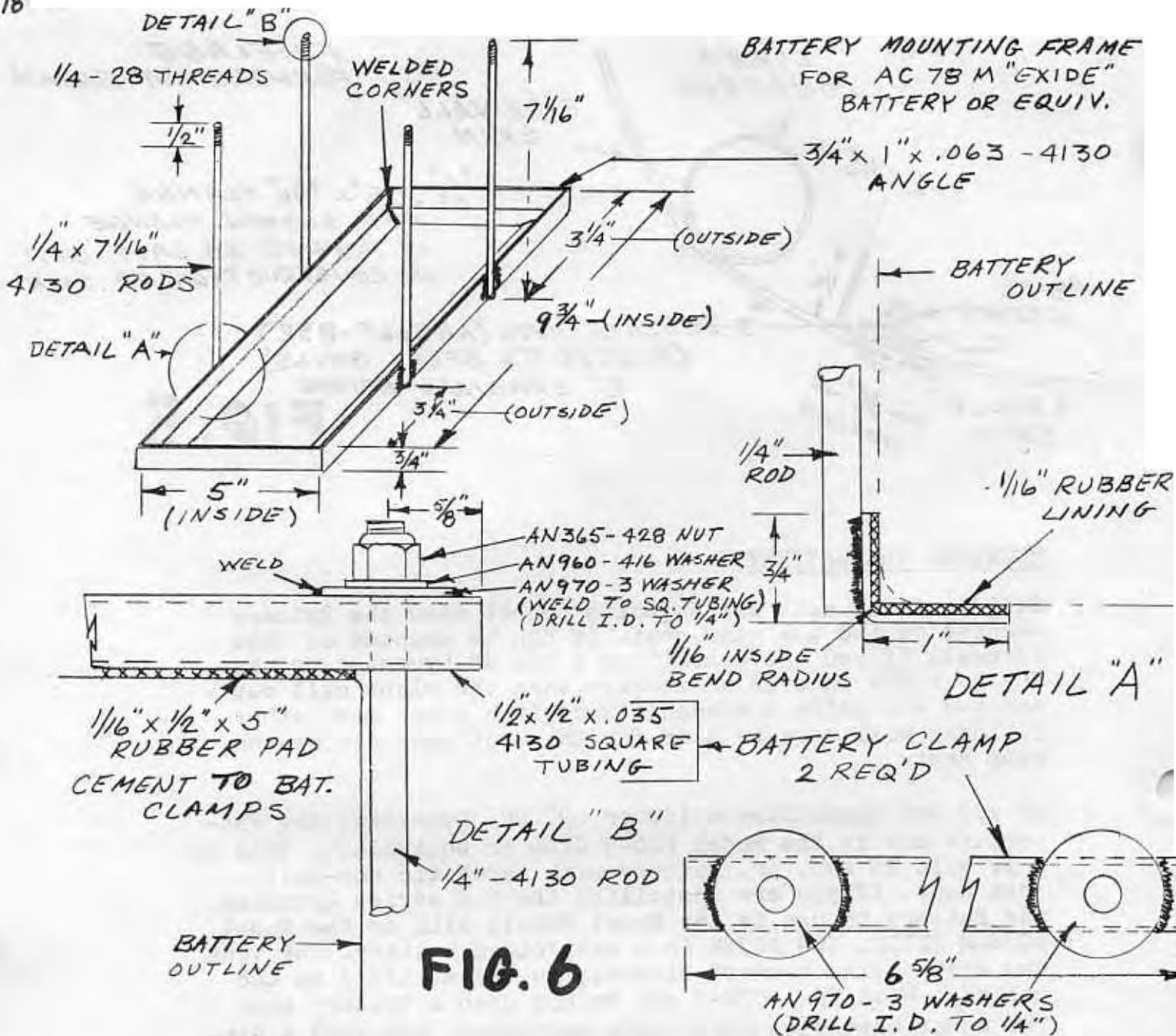
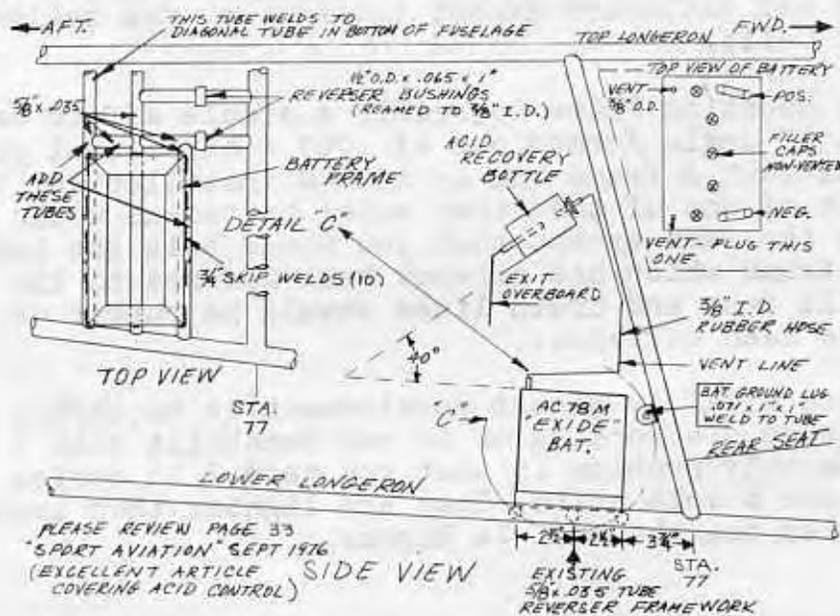


FIG. 6



Those of you using 180 or 200 HP. engines may also use the EXIDE AC54M Battery which installs just the same as the AC78M.

One important point that I would like to make and that is, "If you are using a Battery with Non-Spill Filler Caps", DO NOT PERFORM INVERTED FLIGHT WITH THE GENERATOR OR ALTERNATOR OPERATING. TURN IT OFF as the generating system will pressurize the battery due to the charging process. When you return to normal upright flight, the internal pressure will keep the sliding valve in the caps, closed(non-venting)consequently the battery will continue to build up internal pressure and can very easily crack the battery case when the pressure is high enough. The Battery I am referring to is the Gill PS6-9 or -11.

In the Exide AC78M or 54M the vent lines are molded to the top of the battery case. Inside, all cells are open at the top to a common manifold. When you add DISTILLED WATER in one filler opening, it circulates within to all of the other cells. Please refer to FIG.6 and the view of the top of the battery. It shows 2 vent stubs which are molded to the battery. Pay carefull attention and note that 1 of the vents is to be plugged. The other vent is hooked up to an ACID RECOVERY BOTTLE (Plastic). This method of installation will come as close as you can get to a perfect battery installation for aerobatics since you can recover the acid.

AILERON PUSH-PULL TUBES WITH AN IDLER ARM

Some builders have experienced difficulty in mounting a one piece Aileron Push-Pull Tube and have expressed a desire that we tell them how to install an Idler Arm in the Aileron Control System. The Idler arm is a very simple device and is easy to mount on the rear spar of the lower wing. You will however, need 4 more rod end bearings. 2 ea. RE4F5 and 2 ea. RE4H6. The price for the bearings alone is approx \$25

FIG. 7 shows how the Idler Arm is constructed as well as it's mounting bracket. You will notice that it is necessary to plate both sides of the rear spar with 1/4" Birch Plywood in the area in which the bracket is bolted to the spar. This is not a highly stressed area with respect to the load on the Idler Arm. AN3 Bolts will be sufficient to bolt the bracket to the spar.

You will also notice in FIG. 7 that I have left the length of the Idler Arm up to the builder to determine. This is strictly for your convenience since you may wish to make it fit your installation. The true length is 6" from the Birch Plate to the centerline of the Rod End Bearing bore.

IDLER ARM (2 REQ'D.)

AILERON PUSH-PULL TUBE

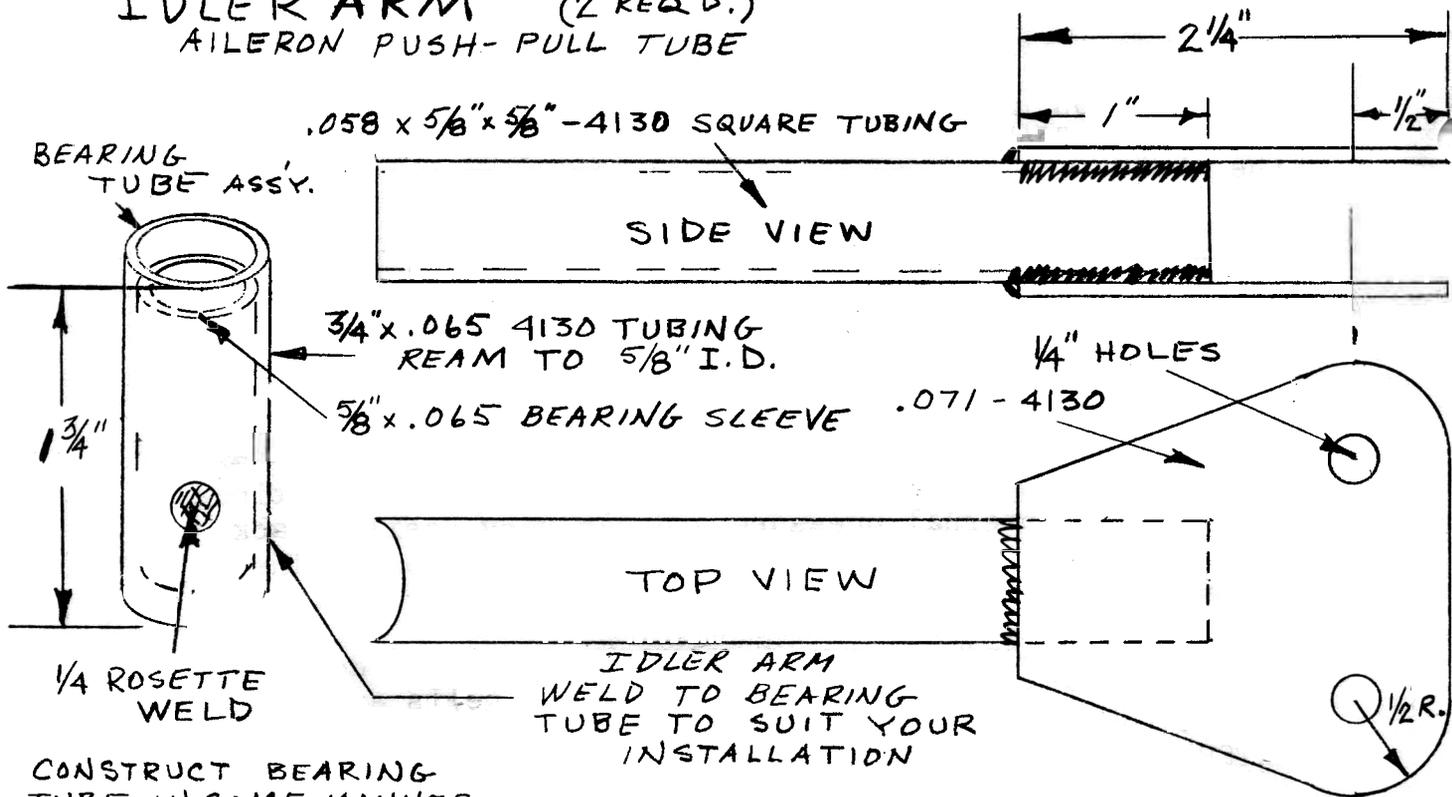
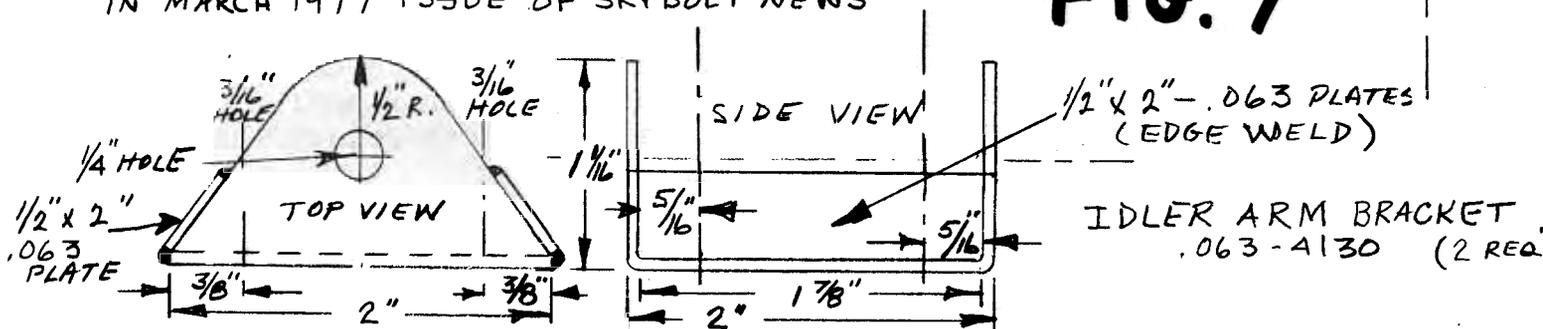


FIG. 7



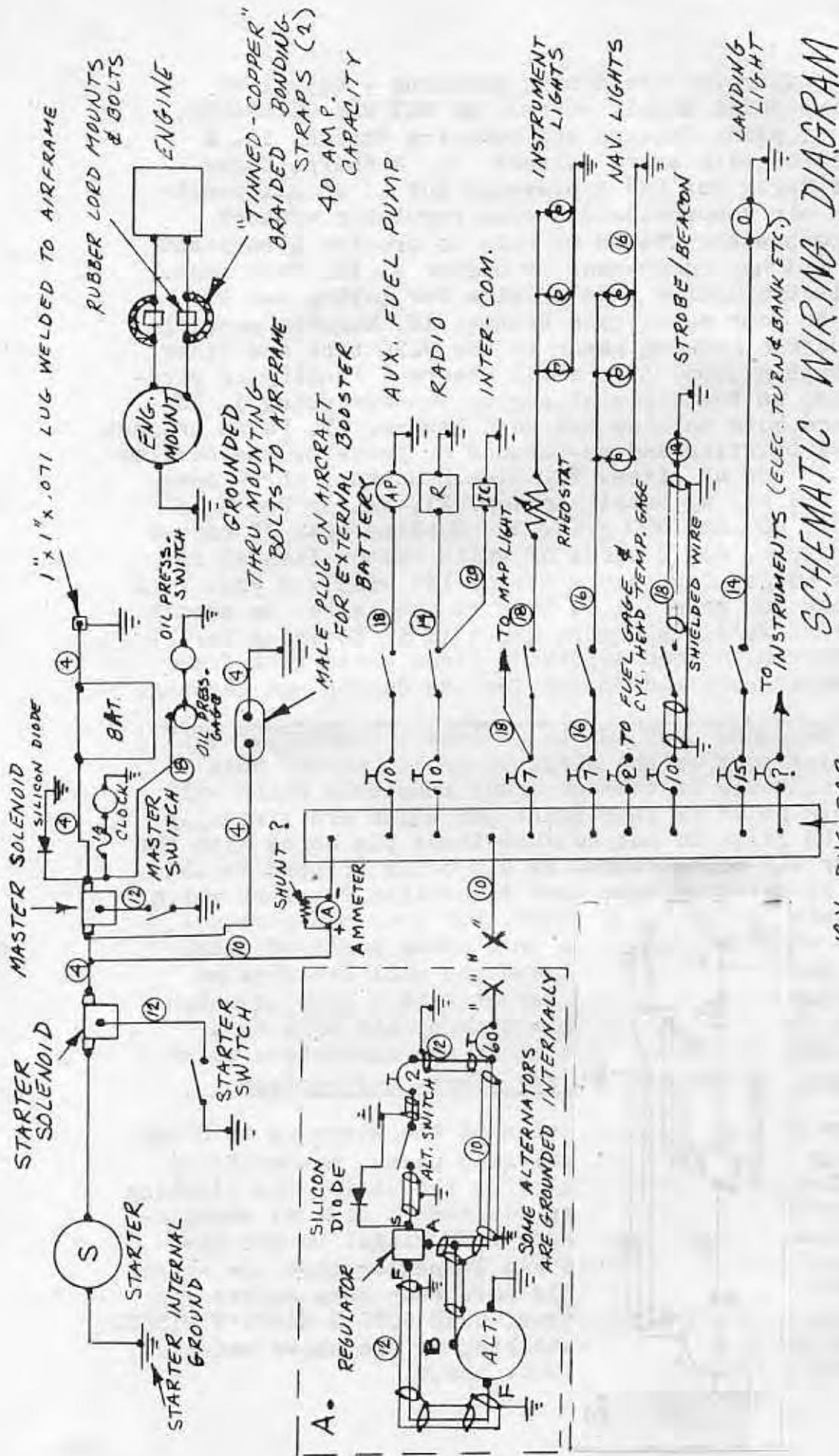
WING COVERING (PART 1)

BEFORE STARTING THE ACTUAL COVERING OF THE WINGS I AM ASSUMING THAT YOU HAVE THE FOLLOWING MATERIALS. 1. The necessary 2.7 lb. Dacron. 2. Dope, paint, thinner and retarder. 3. FLAT rib stitching cord. 4. Surface tapes either pinked or plain edge in both 2" and 4" widths. 5. Adhesive type re-inforcing tape (goes under the rib stitching). 6. 1/2" plain re-inforcing tape for use in bridging between the ribs to keep them in alignment. 7. Bias cut 2" surface tape to use on the wing tips and tail group. With this type of tape you can do a beautiful job without having to resort to notching as you will with regular surface tapes. 8. Inspection rings and inspection covers (you might as well prepare and paint the covers with the rest of the job cause you're going to have to do it sooner or later). 9. Drain grommets. 10. Cloth masking tape to cover the sharp corners here and there.

11. Masking paper for use during painting (buy it at an automotive paint supply store). DO NOT USE NEWSPAPER. 12. Plenty of paint filters and stirring sticks. 13. A good respirator with extra filters. 14. A Sharp, Binks or DeVilbiss Spray Gun and a pressure pot if at all possible. 15. An air compressor and good regulator w/water trap. The compressor should be able to provide a constant 7.5 c.f.m. (3 hp. compressor or higher). 16. Tack rags. 17. #470 Electroplating tape $\frac{1}{4}$ " wide for laying out the trim lines on your paint trim scheme. 18. Regular masking tape to tape the masking paper to the #470 tape and other secondary taping jobs. 19. Fabric Shears (Pinking or straight, depends on the style of edging you are using). 20. Dacron Thread both machine and hand sewing. 21. Paint Brushes with natural bristles and un-painted or polyethylene handles in $\frac{1}{2}$ ", 1", 3" and 4" sizes. 22. Glue Brushes (throw away type about 15¢ ea. w/ metal handles. 23. Wet or Dry sandpaper in 320, 400 and 600 grit. 24. Needles both 3" curved and 10" straight. 25. 8 yards of white cotton flannel for the leading edges. Cut into 2 strips 18" wide x 8 yds. (If possible, buy 36" material). This is the secret to smooth leading edges. We'll talk more about it in Covering Part 2 of the wings. 26. A good supply of clean white lint free rags. 27. Water Hose and Sponge for use during wet sanding.

DO NOT USE ORDINARY SHOP TOWELS OR RAGS (COMMERCIAL TYPE) for any wiping jobs on the aircraft or its parts. Most of these have silicone in them or other chemicals which will result in pin holes in your paint job which are virtually impossible to fill. Do not confuse these pin holes with the pin holes or air holes caused by air being trapped in the paint film by paint or dope that is setting too fast which usually occurs during hot weather. For your own personal experience, wipe some silicone on a scrap piece of metal and try to spray paint over it and you will see what we mean. The only product on the market that I know of which will assist you in covering this type of pin hole is a product called "SMOOTHIE". Get it at the automotive paint store and use it according to the mfrs. instructions.

At this time a thorough inspection of the wings is in order. Are there any loose nuts, un-safetied parts, un-varnished areas, missing glue blocks etc. ? Is the wiring and plumbing needed properly installed? Have you made a list of measurements and locations for the inspection rings? Do you have your log book signed off by an FAA inspector that the wings are ready for cover? This should have been done before you installed the metal leading edges. SURE HOPE I HAVEN'T MISSED ANYTHING. While you are out gathering up the above material, I'll get PART 2 ready for the Oct. issue.



SCHEMATIC WIRING DIAGRAM

- WIRING SYMBOLS**
- ④ NUMERAL INDICATES WIRE SIZE
 - ⊖ CIRCUIT BREAKER (SIZE)
 - ⊖ SWITCH (NORMALLY OPEN)
 - ⊖ GROUND
 - INDICATES ELEC. CONNECTION
 - ⊖ SHIELDED WIRE
 - ⊖ FUSE

12V. BUS BAR
1/8" x 1" x ?
COPPER

WHEN INSTALLING AN ALTERNATOR, USE "A" ABOVE
WHEN INSTALLING A D.C. GENERATOR, USE "B" ABOVE