

SKYBOLT NEWS

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FIRST CLASS MAIL

Series #5, Vol. #3

HANGAR FLYING with "MAC"

In Series #4, Vol. #4 on Page 3, I wrote an article concerning Fuel Tank Vent Line Covers. That was a couple of years ago. After talking to one of our well known "Bolt" builders (He has built 2) at Oshkosh '81, I feel that the case history as related to me, is well worth the space in this month's issue to review the importance of this simple device in the interest of safety.

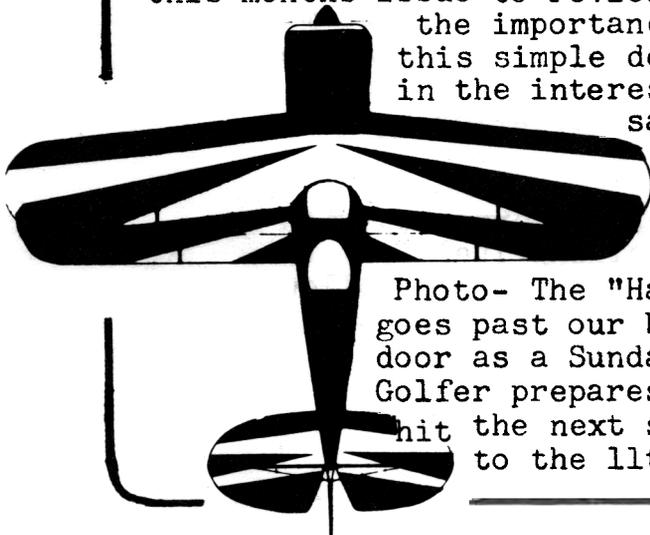


Photo- The "Hare"
goes past our back-
door as a Sunday
Golfer prepares to
hit the next shot
to the 11th hole



Our story starts out as a vacation trip for Hale Wallace and his wife in their beautiful 260 hp. "Bolt", from Rock Hill, S.C. to Block Island which is just off the coast of Rhode Island. Hale is no amateur when it comes to building fine aircraft. He spent many years in the field of RC modeling and is currently re-building a Monocoupe. His fuel system was properly designed and a selector valve co-ordinated the useage of fuel between the main tank and the wing tank that he had installed to provide a reasonable cruising range for the 260 hp. Lyc.

As the Wallace's were merrily cruising along in anticipation of a fun filled holiday, their nerves were temporarily shattered.....by the sound of 260 gagging horses that had up to now been serenely munching their oats out of a haybag us aviation types call a wing tank. In quick as a wink re-action, Hale switched to the main tank, a move that only a proficient pilot makes in such an emergency. This resulted in restoring order in the barnyard and must have had a definite calming effect on Hale and his wife who proceeded to a safe landing.

Upon examination of the fuel system it was discovered that there was still plenty of fuel in the wing tank so guess what? Ah but I see that you are way ahead of me at this point in the story. Yep, the Vent Line to the wing tank was plugged tight. Plugged so tight, that the wing tank had partially collapsed from the suction applied by the engine driven fuel pump. The culprit in the case was one that I malign every time that I get a chance, "THE LOWLY MUD DAUBBER".

Let' digress from our story for a moment and examine the consequences for the builder who has a plans type main tank installed with it's single vent line and who uses his wing tank merely as a "Gas Can" that he drains into the main tank after he has burned off a suitable amount of fuel from the main tank. This type of fuel system is merely a disaster going somewhere to happen. A plugged vent line would once again end up as a statistic in the records of the FAA and the Transportation Safety board.

Fortunately, Hale's problem was easily corrected with an air hose after draining the remaining fuel from the wing tank and blowing the tank back into shape followed by some aerobatics with a quart of Slushing Compound in the affected tank.

There is also another irony to this story. A few weeks later when Hale went to use his Paint Spray Gun, "Lo and Behold", the orifices were plugged tight. Again, the work of S.O.B'n. Mud Daubber.

Before I close the Hangar Doors, let me tell you once again, " YOU ARE NOT GEOGRAPHICALLY IMMUNE" from the possibility of the same thing happening to you. So why take a chance. Let' put VENT LINE COVERS on every open orifice on the aircraft. Last but by no means least, make note of these covers on your preflight check list. A note that says, "Remove all vent covers and check lines for freedom of obstructions".

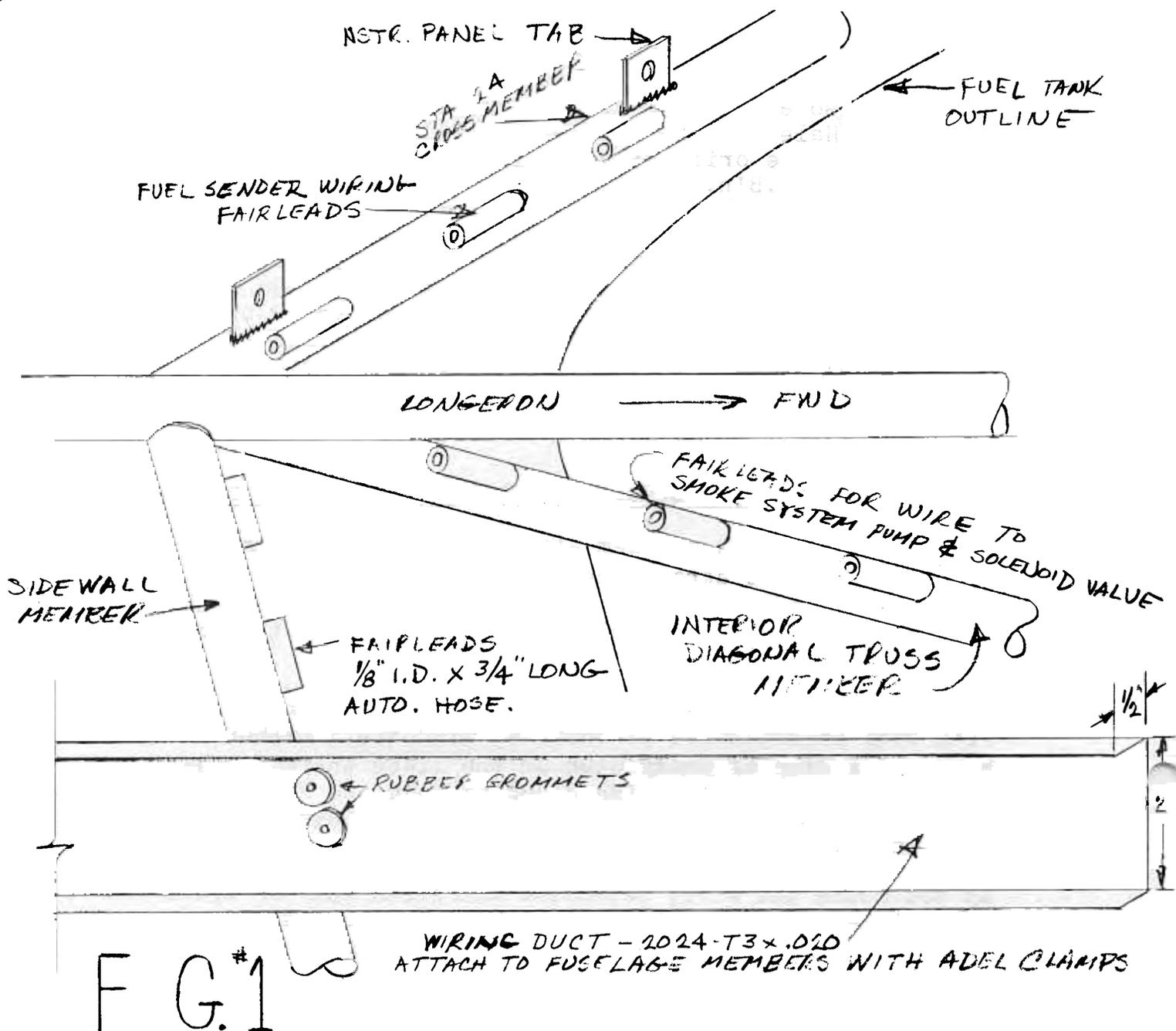
SIMPLE FAIRLEADS FOR ELEC. WIRING IN DIFFICULT SPOTS

Recently I solved a problem after much head scratching, of running a wire across the fuselage at the front instrument panel, to connect the Fuel Sender in the Main Tank. In the past, I have used plastic clips attached to various screws on the back of said panel.

In FIG. #1 you will see how I have simplified the task with some in-expensive automotive, windshield washer hose and a drop of Crazy Glue or the likes thereof. Just a drop of glue and a spring clamp to hold the Fairlead in place until the glue takes over and you have a very neat installation.

As you route the wire, determine where and how far apart the Fairleads are required. Cut the necessary Fairleads 3/4" long and slip them on the wire prior to final routing.

Regarding the Elect. Fuel Sender, we also need a ground wire which will serve 2 functions. A. provide a ground for the sender B. ground the fuel tank to the airframe. In my case, I made a jumper wire to go from one fuel sender mounting screw to the center instrument panel mounting screw. Scrape or sand the paint from the tab that is welded to the fuselage crossmember at Station 24. After the jumper wire is fastened to the tab be sure to dab the jumper and the tab with zinc chromate to prevent rust and corrosion.



If you desire, two circuits can be run paralell. Use 2 pieces of hose side by side or 1 piece with a larger inside diameter. Windshield Washer Hose is only large enough for 1 #18 wire. (Mil-W-5086A, Type 2) (flexible) The hose will actually grip the wire with a fair amount of friction which keeps the wire from sagging between Fairleads.

The Wiring Duct shown above, protects the wiring harness from the pilot or passengers when there is no interior upholstery panel to serve the same function. The Duct also makes a nice protector for the Tachometer Cable and other items like a Manifold Pressure Line or let's say, the pressure side of the Engine Primer Pump. Primer Lines are indeed fragile. Matter of fact, so is any soft alum line.

ELECTRICAL SYSTEM, SIMPLIFIED

By virtue of my lazy nature and my scotch ancestry, I am constantly looking for ways to do a quality job easier and cheaper. The installation of a complete electrical system gives one plenty to think about when it comes to achieving these objectives. The drawing in FIG. #2 is my latest brainstorm.

It all started with N99MU. I have'nt been faced with the installation of an electrical system in several years until recently. In the interim, many new devices "come down the pike". I have gotten sick of the old tangled mass of wiring school. The combination of Switch and Circuit Breaker all in one unit as manufactured by Potter & Brumfield is the answer to a prayer. Prices being what they are today, this unit can save quite a bit of money when compared to separate units to do the same job. The Series #112 Potter & Brumfield Switch sells for \$15.75 ea. A quality Toggle Switch such as an AN3021-1 Single Pole Single Throw sells for \$10.80. Add to this, a Circuit Breaker at \$13.25 and the total becomes \$24.05 In contrast, we have a saving of \$8.30 by using the P & B Series #112 unit. Multiply this by at least a factor of 5 and the savings become \$41.50 If you choose an AN3022-1 (screw type mounting instead of neck mounted) the price is \$19.85 ea. and to use the Klixon PSM series circuit breaker the price for same is \$18.95ea. Now we have a price differential of \$23.15 per, times a factor of 5 equals \$115.75

The sequence of construction events used to be, 1. design a junction box for the breakers and switches 2. engage in installing a "Rats Nest" of wiring 3. Be "Dam Careful" that everthing that needs isolation is properly protected.

In FIG. #2 we see the forward or maintenance side of the rear instrument panel hanging below the instr. panel mounting tube which is fuselage Sta. 57 $\frac{1}{2}$. I make my Instr. Panel 11 $\frac{1}{4}$ " high and allow it to extend below the Crossmember 4 $\frac{1}{4}$ " as measured from the top edge of the crossmember.

The area below the crossmember is also utilized for the installation of the new Dual Westach Engine Instruments. Since these are also elec. in nature they have a common connection for the 12 volt supply source. Here again, saving money, simplifying installation. Now total up the savings on all the "crimp on" wire terminals that you have eliminated and you can see what I mean. THERE IS A BETTER WAY

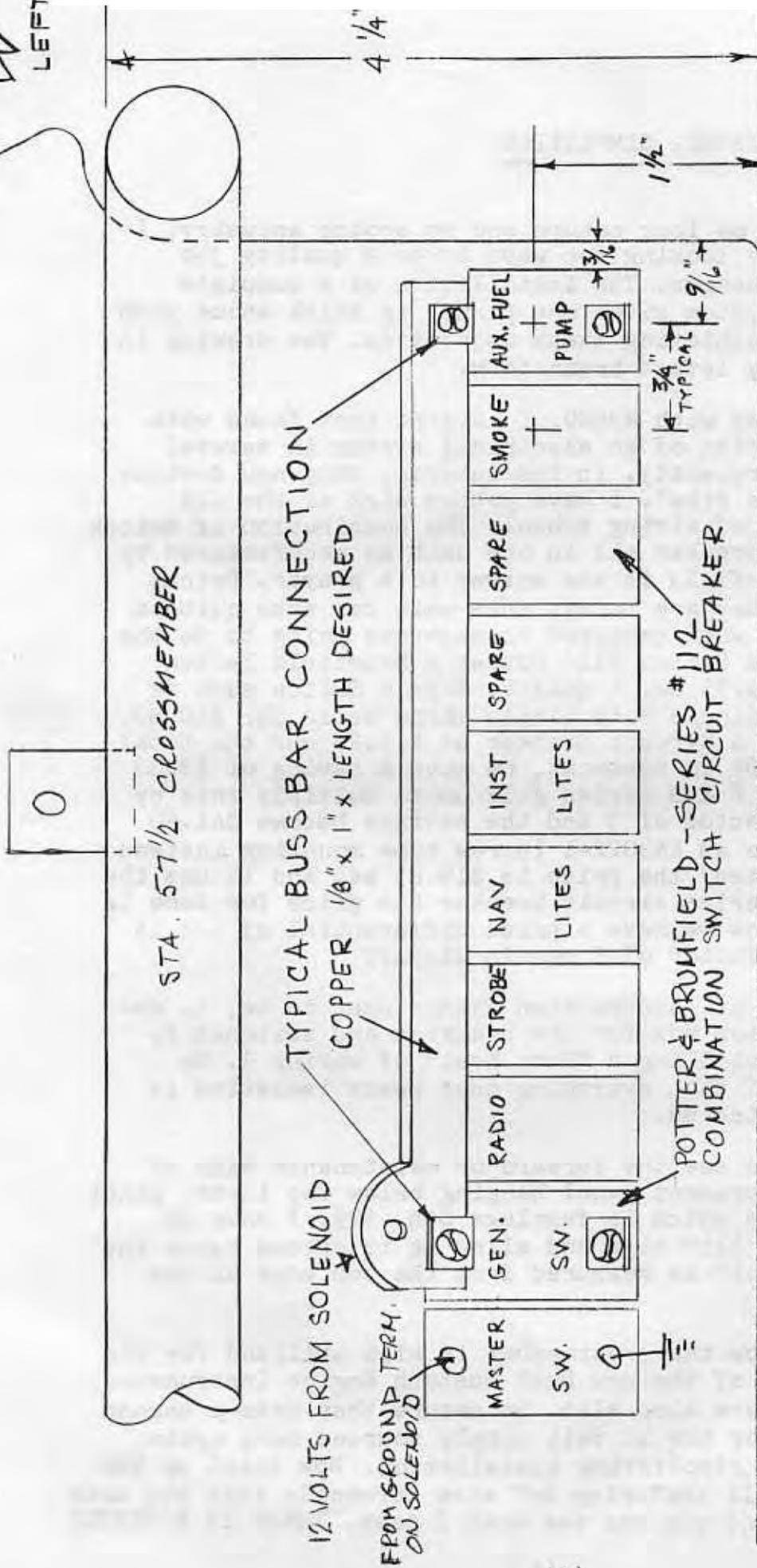


FIG. #2

NOTE: COAT ALL TERMINALS AND ENTIRE BUSS BAR WITH BALKAMP # 765-2500 "PLASTI-DIP" (AVAILABLE AT NAPA AUTO PARTS DEALERS)

OPTION: MAKE RUBBER BOOT TO COVER ENTIRE ASSEMBLY

In Photo #1 we see a good shot of the Rear Instrument Panel. The combination Switch, Circuit Breakers are in the lower left corner of the Panel. This aircraft is set up so that all controls are operated using the Left Hand so that the pilot never has to switch hands on the Control Stick.

In Photo #2 we see a shot of the Wiring Duct running along the RH. side of the airframe. The photo was taken while I was in the process of installing the wiring. The Shunt for the Ammeter is mounted in this duct at the aft end and covered with a Rubber Boot that laces with Rib Stitching Cord. When the photo was taken, the bundle of wire was being held in place with small spring clamps.

Some of you are probably wondering about the Duct that is just below the Wiring Duct. It is a combination Heating and Fresh Air Duct with the cover yet to be Pop-Riveted in place. Note the two "Eyeball Vents". The Heating Duct measures 1" x 3". The Mixer Valve is yet to be installed on the firewall but has been fabricated. You will see this in a later issue of the Skybolt News. This particular Skybolt gets a single place canopy over the rear seat and has a cockpit cover for the front hole, consequently, a Heating system is being installed.

Note in both photos, the removable Service Panel installed in the Bulkhead Panel just forward of the Rear Instrument Panel. Service access should be an objective in the design of anything. I sure wish that Detroit felt that way also.

In Photo #2 you will also notice the Battery Cable partially installed in the sidewall. The Alum Tube that it is secured to is the Crankcase Breather line running from the Oil Separator to the aft end of the airframe where it exits just forward of the Tailwheel. Many competition aerobatic machines have a similar Breather Line which is usually Rubber Hose with a weight of .38 pounds per foot. Our Alum. Tube is 6061-T4 x 1" O.D. x .028 Wall and weighs .1021 pounds per foot. This is a weight saving of .2779 p.f.

The Battery which is not visible in the photos is of a recent design and will be one of the subjects covered in the next issue of the Skybolt News. The Gates Power Pack is an un-vented Battery but expensive. However, the Distributor claims that it has a projected life of 10 years. So far it spins our 540 Lyc. with authority, Hot or Cold.

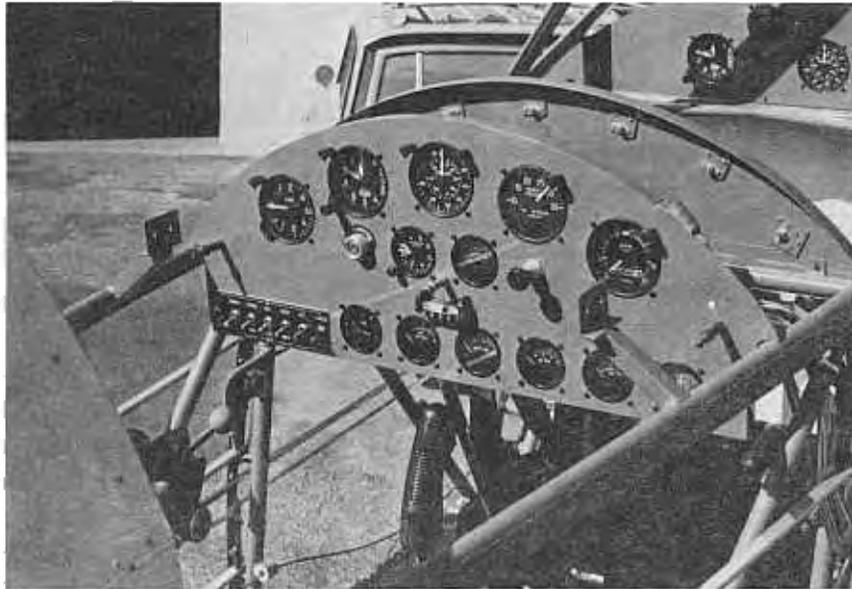


PHOTO # 1

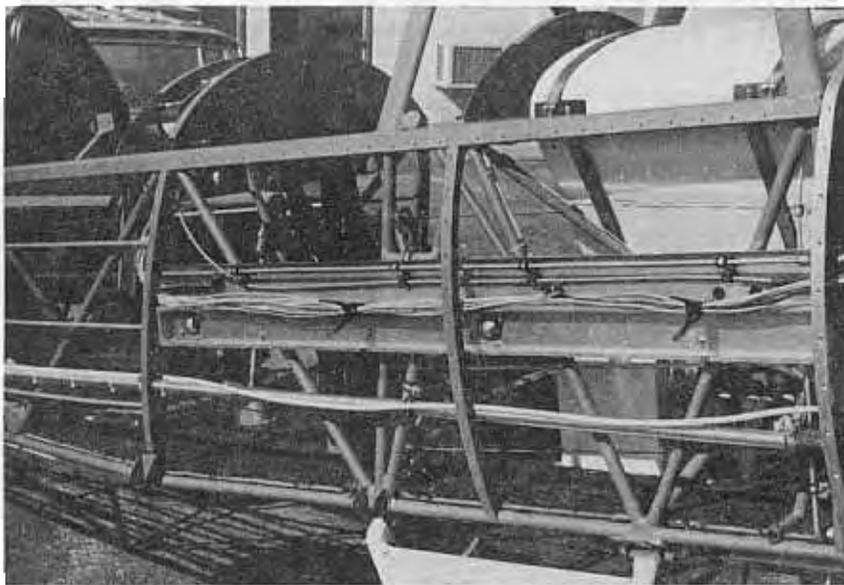


PHOTO # 2

DUAL CANOPY INSTALLATION--PART 4 (INSTALLING THE WINDSHIELD BOW)

With the Canopy Frame fabricated and the Bubble fitted to the Frame and all holes drilled, it's time to mount the Canopy on the Tracks that are installed on the air-frame. Before you slide the Canopy forward, Pad the underside of the Rear Cabane Struts with $\frac{1}{4}$ " of soft pad of a type that will not scratch the Bubble. Slide the Canopy forward until the Bubble is against the Padding on the Cabane Struts. Clamp the Tracks so that we can hold this Canopy position.

In Photo #3 we see the exterior view of the Windshield Bow Mounting Bracket and Stand-off. In Photo #4 we see a shot from the inside of the Canopy showing the Bracket and how the Bow welds to the base of the Bracket.

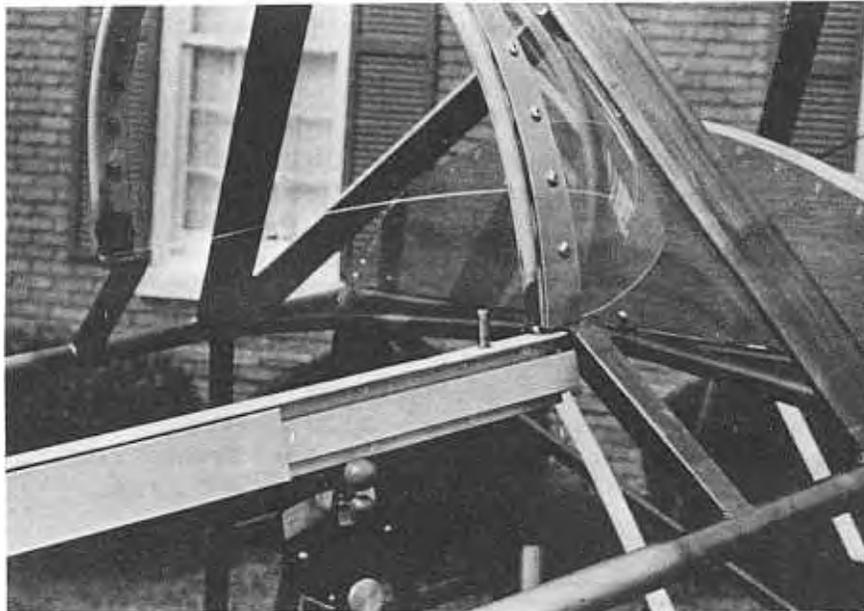


PHOTO
#3

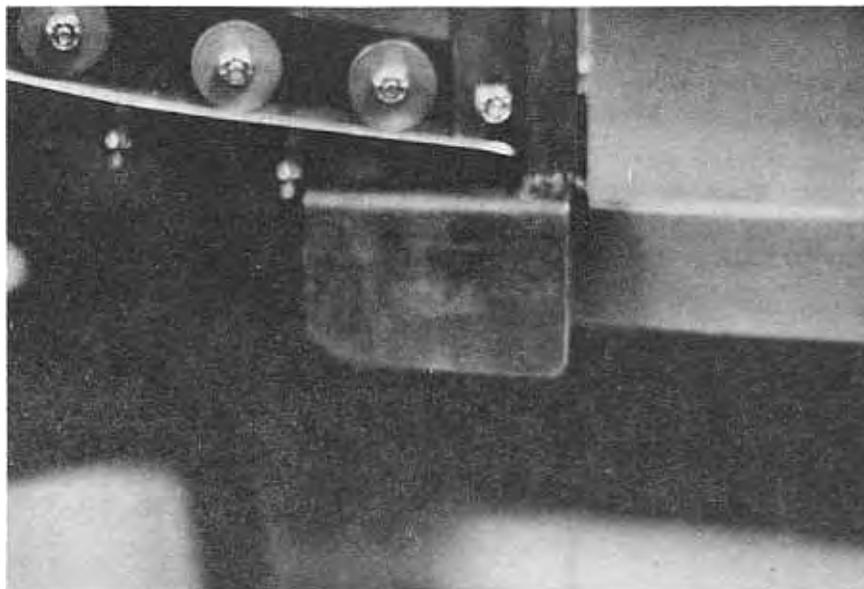


PHOTO
#4

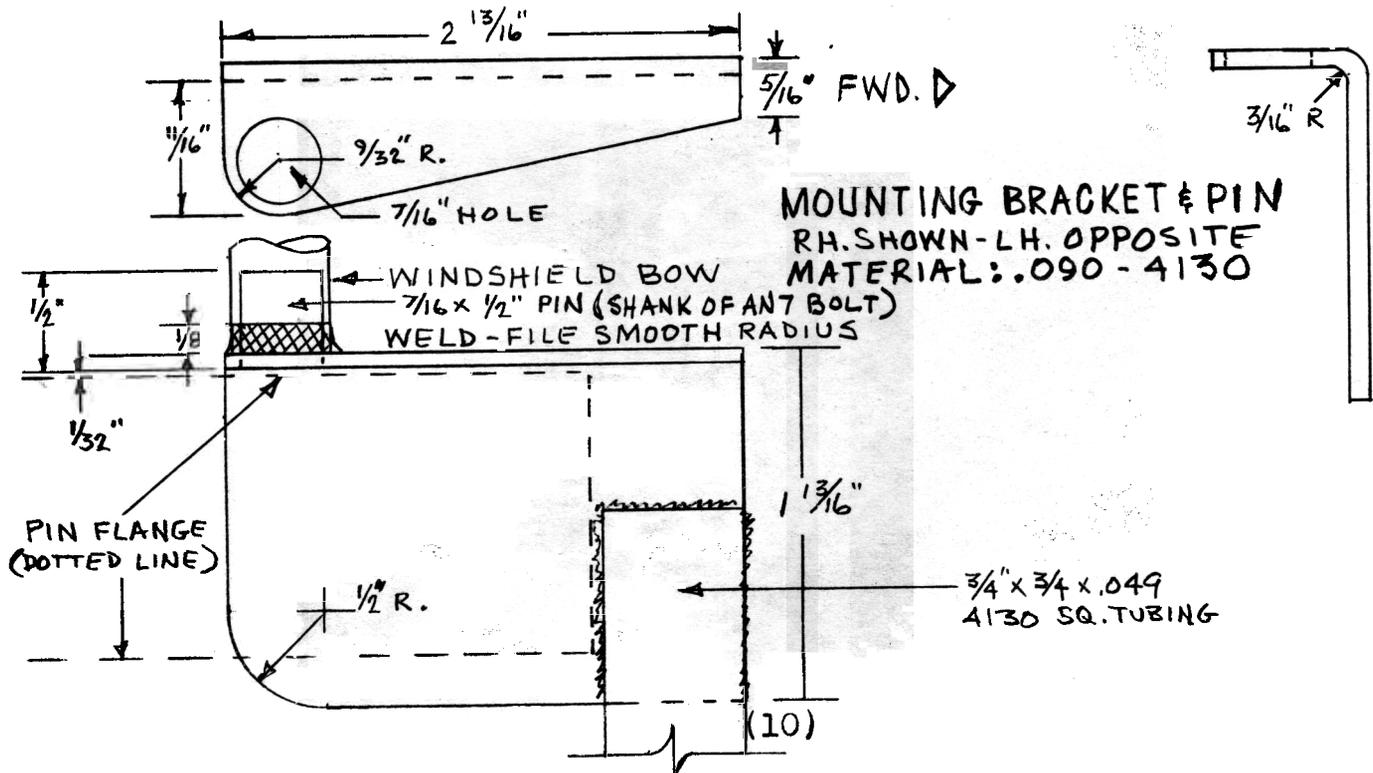
The Mounting Bracket for the Windshield Bow has a Pin in it that inserts into the bottom ends of the Bow. When weld the Bow to the pin and bracket we make one weld bead do both jobs. Bow to the Pin and Pin to the Bracket.

With the Canopy in position you can make the necessary marks on the ends of the Bow for the Pin & Bracket. The Bracket when finished should allow the Pin Flange that is riveted to Track #2 to slide under the Bow Bracket. When all measuring is done you can remove the Canopy from the Tracks and place it back on the Canopy Fixture.

Remove the Bubble (can't have it next to the welding to be done) and place the Canopr Frame back on the Tracks. Slide it forward to the Index Marks I assume that you made during the last step. Clamp the Windshield Bow and Bracket in place and proceed to Tack Weld the Stand-offs to the Bow Bracket. When everything is set to go, remove the Canopy Frame and proceed to weld the Bow Bracket and Stand-offs.

Back to the Bubble. You can now cut off the Windshield portion of the Bubble and dress the rough edges.

FIG. #3 is a drawing of the Bracket and Pin that is used to mount the Windshield Bow. Note the required clearance between the bottom edge of the bracket and the pin flange that is riveted to Track #2 . When the Canopy is in the fully closed position with the pin flange under the bow bracket we have an additional safety advantage that protects the canopy from lifting at the front regardless of air flow forces or internal canopy pressures.



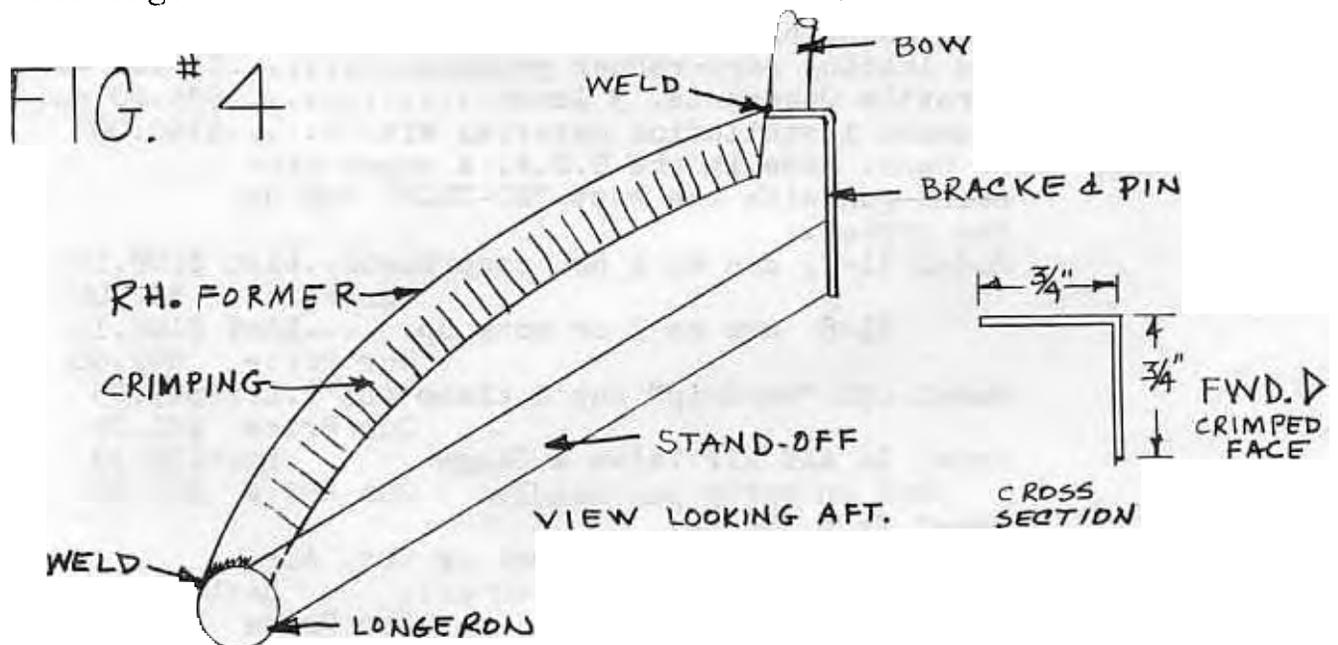
In order to install the Windshield Bow over the Pins on the Mounting Brackets it will be necessary to Ream the ends of the Bow with a 7/16" Reamer to a depth of $\frac{1}{2}$ ".

After the Windshield Bow is welded in place you will need to fabricate a Coaming Former that goes from the Top Longeron to the upper, outer edge of the Bow Bracket. The former is fabricated from 22 GA. Cold Rolled Steel Sheet. It is formed on a Sheet Metal Crimper. As the Former goes between the gears of the Crimper, one side of the Former is shrunk to produce the necessary radius.

In the next issue of the Skyboit News we will go into the Locking Mechanism of the Canopy and the Release System that is employed.

At this point in the construction of the Canopy nothing has been done to trim the bottom of the Windshield to fit the Coaming. This takes place after the Coaming has been fabricated and temporarily installed. The final trim of the bottom edge of the Windshield produces a $\frac{1}{4}$ " gap between the edge of the Windshield and the Coaming. In other words, the Windshield sits above the Coaming $\frac{1}{4}$ " all the way around the bottom edge.

FIG. #4 below is a sketch of the Coaming Former that attaches to the Bow Bracket. The underside of the Former can be used to mount two Nut Plates. One will be for the Coaming at a convenient place and the other will provide a means of securing the bottom end of the Windshield Fairing.



COMING ATTRACTIONS IN NEXT MONTHS ISSUE

1. Dual Canopy Installation (part 5) 2. Checking the Thrust Line of the engine. 3. The Gates Battery. A new lead acid battery that is sealed. 4. New Aileron Hinges for the Firebolt can be used on the Skybolt.

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PRICE F.O.B. Phoenix, AZ. \$350.00

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Sharpe Paint Guns. Made in the U.S.A. A super nice paint gun with the best "NO-DRIP" cup on the market.
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Our Price \$92.00
71-8 use on 3 or more hp.List \$108.10
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