Skybolt News

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SERIES #4, VOL. #5

HANGAR FLYING with "MAC"

As the year of 1979 nears an end I think it only fitting to pay tribute to the many dedicated Skybolt builders who have launched their "Bolts" for the first time. Because of their tenacity, and attention to construction excellence, some of our brother builders have gone on to national recognition. At this time I must also pay tribute to the many, many "Bolt" builders who have stayed at the task and who now have projects that are nearing completion and will surely take to the skies in 1980. They ALL deserve our admiration. If your project has been gathering dust, it's a good time to make a New Years resolution to start anew and finish your "Bolt" so that you too can join this elite group. Another good way to get the juices flowing is to attend a Fly-In and watch your brother "Bolt" owners revel in the envy of the crowd.....As we renew our efforts, I will once again expound on the MAIN THEME of our custom-built objective, SAFETY, SAFETY, SAFETY.... With the foregoing statement in mind I want to pass on to you, the words of wisdom from Chuck Smith, a "Bolt" builder from Deerfield, N.H. Some of you will recall that Chuck had a mid-air fire

in his Skybolt over the eastern shores of New Hampshire. With some very fancy flying, he managed to save himself and his aircraft. The emergency landing on the beach that was chosen did however, result in severe damage to the landing gear. Never the less, all hands were safe, so the craft was dis-mantled and trucked to Chuck's farm home for rebuilding.

All of the above happened about three years ago. During months that followed Chuck was to find that the plague of fire was dogging his footsteps. As he set out to rebuild, the aircraft once again was engulfed in flames as it caught fire while welding in the gear repairs. At this point, most builders would have taken a cutting torch and finished the job, but not our "man of steel". Today, Chuck's Skybolt is once again flying but with a new name painted across the tail, "FIREBOLT".

What started this whole scenario in the first place was a leaking Fuel Return Line at a point where it is fastened to the main tank. The fitting is on the forward side of the tank, just aft of the firewall. Fuel leaking at the location easily finds it's way directly below to the exhaust stacks.

After all of this, one would have to say "What in Hell could possibly happen to our good friend that would get him even a little bit excited"? I'm sure you feel there is more to the story and you're right. It happened during taxi tests of the newly rebuilt Skybolt, er, er, Firebolt. With a friend in the front seat, panic struck once again, only this time, everything came to screeching halt before it was necessary to call the fire truck. The problem...a leaking Curtis Drain Valve in the sump of the main tank...Before any further testing was done, the aircraft was pushed back to the hangar and a line run from the sump fitting and the drain placed on the belly of the craft.

In closing the "Hangar Doors" on this session, Chuck wishes to pass on these words of advice. "When you pre-flight your Skybolt, BE SURE to also check the front cockpit area along with the rest of the plane."

AND HOW WAS YOUR YEAR ?

SAFETY BULLETIN.....AILERON HINGES

On SHEET #7 of the plans for the Skybolt we find the details of the forward portion of the Aileron Hinge at the lower righthand corner of the page. The plans has a glowing error in the specification of the rivets used to secure the rod end bearing to the ½"O.D. x .035 tube. The rivet called out in the plans (AN470A3-10) is a SOFT ALUMINUM rivet and should not be used under any circumstances. The CORRECT RIVET is an AN470AD3-10. If you have used the Soft Rivets, stop what ever you are doing and replace them with the correct rivet before you wind up as a statistic in the files of the F.A.A. If your "Bolt" is flying, ground it and make the correction before your next flight. It is easy to tell the difference between Soft and Tempered aluminum rivets. The soft "A" rivet has no identifying marks on it's head whereas the tempered "AD" rivet has a small recessed dimple on it's head that resembles a center-punch mark.

Further, before you finish the inspection, take time to write in the change on the plans themselves so that the error is permanently corrected.

NOW THAT I HAVE YOUR ATTENTION, proceed to SHEET 10 of the plans and make the same correction for the rivets called out to secure the Rod End Bearings into the ½"O.D. x .035 Aileron Push-Pull Tubes shown on the center lefthand side of the Page.

FORWARD MOUNTED SLAVE STRUT BRACKETS...Made From 4130

In the April 1977 issue of the Skybolt News we showed how to make these brackets from 2024-T3 x .250 Alum. and discussed the problems of fabrication due to the design.

At one time in the past, we at Starfire Aviation, manu factured this part but have deleted it from our parts list due to fabrication problems and no profit. With this in mind and the many requests from readers and builders for an alternate method of construction, I have designed this part using 4130 normalized sheet

steel. The thickness is .100

To start the fabrication process I suggest that you make an Aluminum pattern using the April 1977 Skybolt News dimensions as found on Page 2 and 3. Observe the same grain orientation when scribing the pattern on the sheet steel as you would any part that requires bending. Next, check your pattern against the requirements existing on your aircraft. Be sure that the length is correct after bending.

In FIG. #1 you will find the changes necessary when building this part. Notice that on the lower aileron brackets it is simply a matter of welding bushing stock to the newly made brackets and reaming the bolt hole. The reason for the bushing is to give the AN3 bolt used to attach the Rod End Bearing, more shank bearing area for greater support.

The upper aileron bracket requires a bit more work to fabricate since we must make provisions to install a ball bearing (KP-3A). This will also require a trip to the machine shop for facing the bearing housing bushing to correct length and reaming same to provide a hole that is .0005 undersize. This will insure the proper squeezing of the bearing during a light drive fit. In the interest of additional safety, it would be wise to lightly stake the bearing housing bushing on both sides as shown in FIG. #1.

The secret to making a high quality upper aileron bracket is, to use very heavy wall (.188) 3/4"O.D. tubing for the bearing housing bushing or to use solid 4130 bar stock that has been center drilled will a letter "D" drill and reamed to .250 so that we have an accurate hole to pick up when locating the part on the Bridgeport Mill for final sizing to length and boring or reaming for the bearing fit.

CAUTION: DO NOT REAM THE BEARING HOUSING BUSHING TO FINAL SIZE PRIOR TO WELDING IN PLACE. TO DO SO WILL RESULT IN AN EGG SHAPED HOUSING AND A POOR FITTING BALL BEARING.

If you wishto, you can use Loctite or Eastman 910 adhesive to further secure the ball bearing in it's housing but I don't personally subscribe to this method. It is not necessary with a properly fitted and staked bearing.

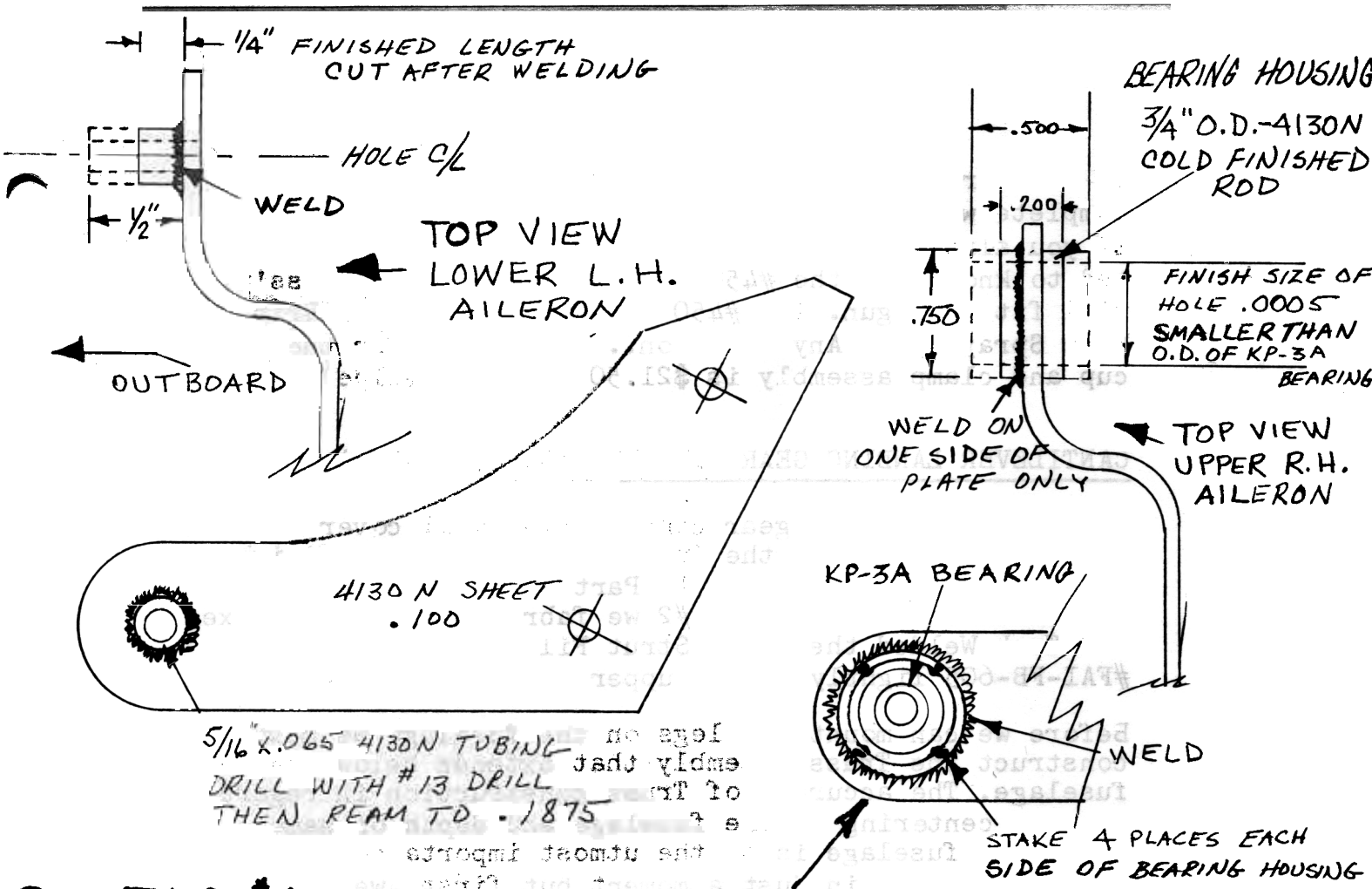


FIG. #1 **READ ARTICLE CAREFULLY BEFORE FABRICATING UPPER BRACKETS**

SHARPE PAINT SPRAYING AND AIR CONTROL EQUIPMENT

Sharpe Paint Spraying equipment is now recognized as being one of the three finest in our country....We have recently been fortunate in acquiring this fine line as a dealer...All of their Spray Guns are patented and the Model 75 series have a pressure indicator built into the handle of the gun....The Sharpe Model 20XS is the only high quality gun on the market for spraying paint strippers and removers...Likewise, the Model 20C sprays simulated vinyl and polyester body plastic.... AND NOW, the clincher...the Model 75 is available with a #2 Air Cap assembly that allows you to use this gun to spray all types of automotive and aircraft finishes while powering the gun with a 1 HP. air compressor. Air consumption is a meager 3.2 cfm at 30 psi and only 4.0 cfm at 40psi.....If you have recently priced DeVilbiss or Binks guns that are in the quality range of the Sharpe 75, you will have been quoted prices of $150 to $165. As subscribers of the Skybolt News and or customers

2B3

fit
Spraying
cup and clamp

CANTILEVER LANDING GEAR CONSTRUCTION (PART 3)

The last article in gear construction will cover mounting the legs to the fuselage and then the finish welding of the leg parts. In Part #1 we fabricated the Shock Struts. In Part #2 we fabricated the leg boxes and Tack Welded the Shock Strut Filler Bracket, Part #FAI-FB-605 lightly to the upper ends of the leg boxes.

Before we can mount the legs on the fuselage we must construct the Truss Assembly that extends below the fuselage. The accuracy of Truss construction in regard to it's centering in the fuselage and depth of same below the fuselage is of the utmost importance. We will cover this in just a moment but first, we must install the Flying Wire Fitting and it's Gusset at Sta. #13 on each side of the fuselage. All parts are tack welded in place. Then, with a welding torch, we heat and form the pieces to all associated tubing members and finish by welding completely around all edges of the Flying Wire fitting and the Gusset. FIG. #2 shows the Flying Wire Fitting tack welded in place and FIG.#3 shows the Gusset tack welded in place.

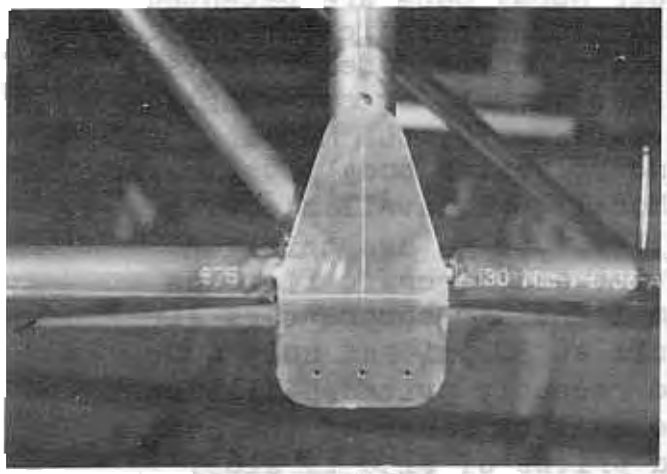


FIG.#2

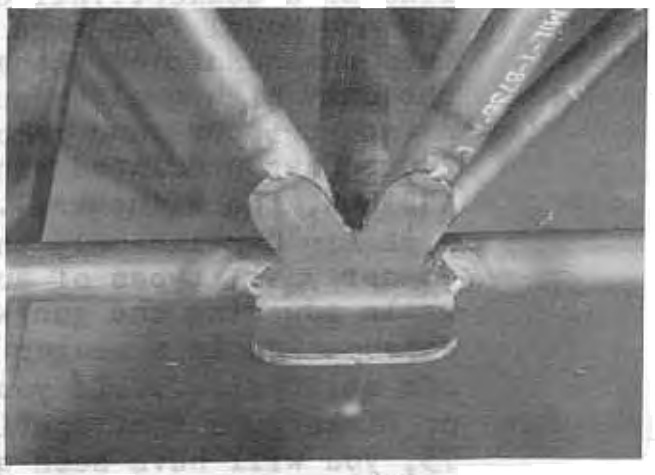


FIG #3

Now, the accuracy pre-cautions in fabrication of the Truss Assembly. Refering to Starfire Aviation,Inc. Drawing #FAI-3A, Iam assuming that you have already installed the extra tubing members required in the sidewall of the airframe. Proceeding, we now install the Cross Member at Sta. 22 in the bottom of the fuse lage. Next, we measure and mark with a Silver Pencil, Sta. #18 on the lower longerons. Our next step will be to construct an Angle Iron "T" fixture as shown in FIG. #4, clamped to the lower longerons. This will insure that the tubing truss members meet properly at Sta. #18 below the fuselage. A SCRIBE line (not visible in the photo) on the Fixture will help us to insure that the centerlines of the lower truss members meet exactly 5" below the centerlines of the lower longerons Failure to achieve accuracy in this regard will mear that the Shock Struts will not mount at the proper angle between the Shock Strut Mounting Bracket and the upper ends of the leg assemblies and can further result in excessive camber of the Wheels in the un-loaded condition of the aircraft.

With the above pre-cautions in mind, you can proceed to weld the Truss members in place. The Outer Gussets that connect the Truss to the Cross Members can now be installed. At this point, Do Not install the Apex Gusset at the point where the Truss Tubes meet. You can however, Tack lightly, the Shock Strut Mounting Bracket, Part # FAI-MSS-481, in place

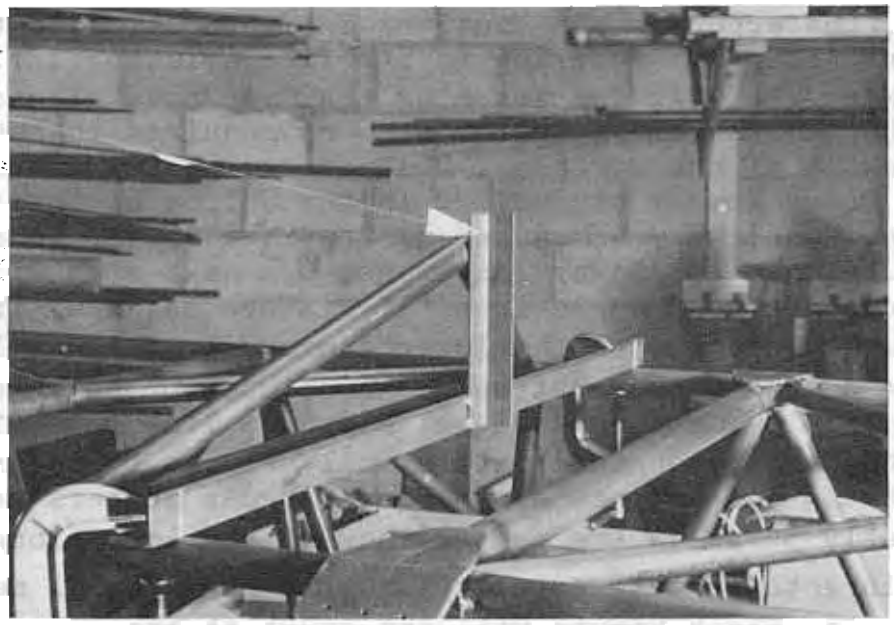
The next step in our project will be to fabricate and mount the front and rear Landing Gear Mounting Brackets. Here again, accuracy in positioning these Brackets is of great importance and can be facilitated by the construction of a Fixture. The Fixture is simple to make and consists of 2 pieces of Angle Iron with a couple of Scribe Lines and a "U" shaped slot at each end that will receive the dummy pivot shafts which are made of 5/8" O.D. Drill Rod. FIG. #5 is a simple drawing of the Angle Iron Fixture. I'm sure that you will readily appreciate the value of this simple fixture when locating the L.G. Mounts for accurate position and further, holding them in place for tacking and welding.

Also evident at this point in the article, is the fact that the fuselage is placed on it's back on saw horses and is properly leveled.

NOTE: FORWARD FACE OF FIXTURE CROSSMEMBER LOCATED ON LONGERONS AT STA. 18

NOT SHOWN IN PHOTO
SLIGHT FLAT SPOTS ON TUBES AT THIS POINT WHERE THEY REST AGAINST FIXTURE

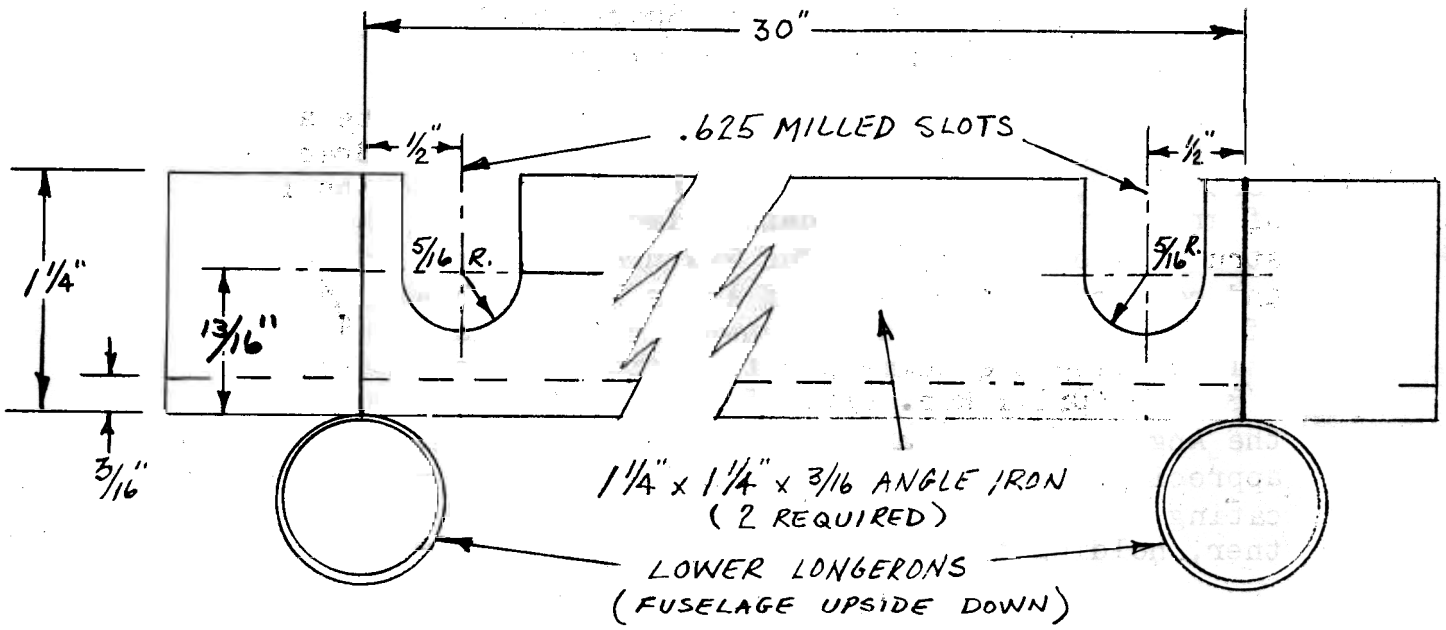
AFT



FORWARD

NOTE: FLYING WIRE FITTINGS MUST BE HEAT FORMED AND WELDED BEFORE FORWARD MEMBERS OF SHOCK STRUT TRUSS ARE INSTALLED

FIG. #4 FIXTURE: USED FOR LOCATING MEMBERS OF SHOCK STRUT TRUSS. NOTE SCRIBE LINES FOR INDEXING W/ C/L OF LONGERONS



FIXTURE: USED TO LOCATE LANDING GEAR FITTINGS.

FIG. #5

FIG. #6

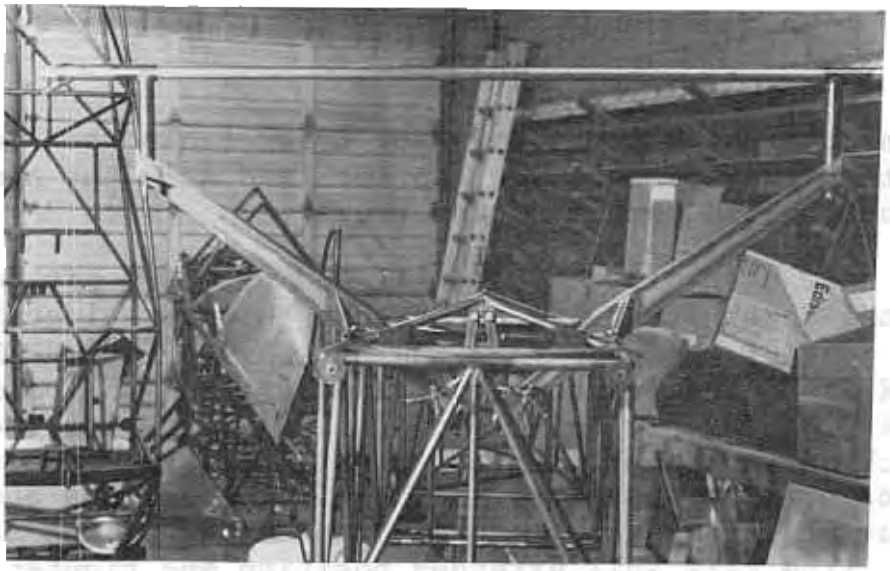


FIG. #6 above shows the legs in place on the fuselage and the Vertical Support Tubes clamped in place. A length of 1¼" O.D. x .120 wall tubing has been inserted through both axles. This is all fine and dandy but lets backup a moment to a point where only the legs are in position with no vertical support tubes in place. Now, using our Shock Strut Assemblies without the Rubber Discs and Alum Spacer Washers, install the shock strut to it's mounting bracket in the bottom of the truss using a 7/16" cheap shop bolt. Save your good aircraft bolts for final assembly. At the other end of the shock strut we install a 7/16" O.D. x .058 Bushing inside of the shock strut bushing so that we now have a 3/8" hole and will match the temporary hole in the Shock Strut Filler Bracket which is also 3/8". Using a Shop Grade 3/8" bolt, attach the shock strut to the filler bracket without a nut. The bolt acts merely as a pin. At this point, make certain that the 3/8" bolt that rides in the slot of the upper half of the shock strut assembly, is loose. The landing gear leg can now be tested for freedom of movement with respect to it's pivot pin and the smooth free sliding of the shock strut halves as they are extended and compressed. Check both gear legs in the same manner. If there is any excess friction or resistance to free movement, stop and investigate the problem and correct it. If everything regarding the free pivoting of the gear leg is OK, you can proceed to install nuts on the appropriate bolts, snug them and finish welding the lower shock strut mounting bracket and the filler brackets at the tops of the gear legs. The Filler Bracket Re-inforcement Plates can now be installed and tacked in place. Finish welding them when the gear leg is out of the airframe and more convenient to approach.

After the Shock Strut Mounting Bracket has been welded to the Truss members you can form and weld the Apex Gusset on the bottom of the truss.

The next step will be to drill and ream the aft hole in the Shock Strut Filler Bracket that is welded to the tops of the gear legs. DRILL AND REAM THE REAR HOLE ONLY. The front hole will be drilled and reamed after the leg has been re-installed along with the Shock Strut Assembly which is still bare(No rubber discs or alum. washers). Before installing the Shock strut at this point, compress the halves of the strut 3/8" from it's full extended position and tighten the nut on the 3/8" bolt that holds the halves together and rides in the slot of the upper portion of the strut assembly. This nut is tightened enough to squeeze the tubing together thereby making the upper sliding part of the shock strut act as a clamped together assembly. The position of the strut assembly as it is now clamped is the gross load position (2000 lbs.)

We can now install the Gear Leg and the Shock Struts and finish the job of drilling the front hole in the filler brackets and reaming to 7/16". The drilling and reaming is done through the hole from the aft side of the filler bracket. With the Shock Struts bolted in place, the legs should now have exactly the same angle in relation to the lateral level of the lower longerons. This check is made with a Protractor using the top face of the gear legs with of course are facing downward since the fuselage is resting on it's back.

We are now ready to to mount the Vertical Support Tube and Axle assembly to the legs. The V.S.Tubes are clamped to the ends of the leg boxes with small "C" clamps or small Vise Grip pliers. The 1½" O.D. is inserted through both axles and a level is placed on this tube to check the heigth of the Vertical Support Tubes. Slight shifting of the V.S.Tubes may be necessary to accomplish this . When Axles and Vertical Support are properly aligned, we take a plumb - bob and hang it from the front face of the axles out near their ends and check the distance from the plumb bob line to a straight edge placed across the front or "Zero" Sta. of the fuselage. The maximum difference between the right and left axles should not be more than 1/16".

FIG. #7

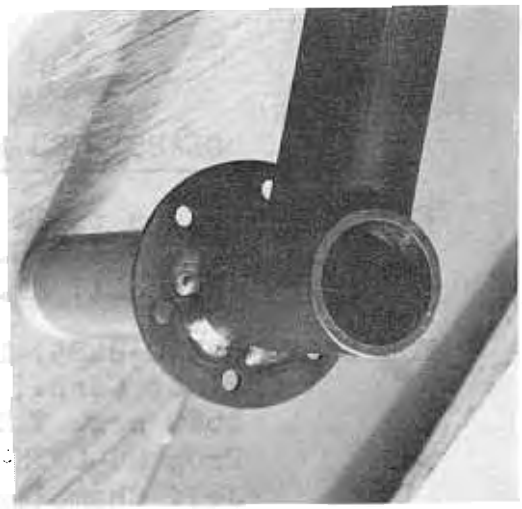


FIG. #8

What is amazing is how much adjustment you really have with relation to moving the Vertical Support Tube forward and rearward. Changing position of the "C" clamp from the front side of the leg box to the rear side or getting the travel you need by virtue of where you place the first tack weld. If the tack weld is placed at the rear of the Vertical Support Tube it will pull in that direction.

Before removing the Gear Legs for final welding, place the Brake Backing Plate in position on the Axles and tack in place.

After the legs are removed you can trim the top end of the Vertical Support Tube to conform to the slope of the gear leg. Leave the tube with top end 1/8" above the face of the gear web and tack weld a cover plug made of .090 4130 sheet. In welding the top end of the Vertical Support Tube I prefer to use one heavy bead to penetrate the tube, leg web and plug all at the same time during the welding pass.

The ends of the Front and Rear leg Webs are heated and formed around the Vertical Support Tubes as shown in FIG. #7 above. FIG. #8 shows how the Brake Backing Plate is "Skip Welded" in place on the Axle.

When installing the Pivot Tubes that secure the Landing Gear to the fuselage, liberally coat the inside of the Pivot Tube Housing and the Pivot Tube with a lithium based chassis lubricant such as used in the lubricating of the Ball Joints on your car. Every 100 hrs. or once a year should be adequate to prevent abnormal wear of the pivotal parts of the Landing Gear Assembly.

CLASSIFIED ADS & SWAPS

FOR SALE: Plans built Skybolt Main Fuel Tank $117.00 Contact M.G. Warner, 120 Arizona Drive, Russell, KY. 41169 Ph. 1-606-836-4263

FOR SALE: O-540-B4B5. 1st. Run-out w/logs. 235 hp. Float Carb., Baffles, New Starter & Alt. 1680 hrs. T.T. also Re-built 0 time Hartzell Prop HC-C2YK-4. All for $4200.00 Contact Jeff Chambliss, 1428 Lido Ct., Livermore, CA. 94550 Price also includes Engine Mount for Skybolt.

WANTED: NEW PS-5C Pressure Carb. Contact Ron Thompson, P.O. Box 160, Alice Springs, Northern Territory 5750, Australia.

FOR SALE: Continental Tiara-C 285 hp. Complete firewall forward, off of a Brave. 500 hrs. T.T. since new. 50 hrs. since all new jugs & pistons per AD. No damage. Removed for installation of P&W 450. Price includes 3 Blade Prop, Logs, Exhaust, Spinner, Mount. $6000.00 F.O.B. San Angelo,TX. 76901 Contact Johnny Williams 915-944-8558

FOR SALE: Complete set Landing Gear fittings w/bushings, by Steen. Price $65.00 Contact Joe Prisalac, Farkas Place, Pittsburg, PA. 15218 Ph. 412-271-3736

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COMING ATTRACTIONS IN VOLUME #6 : Installing the full 2 place canopy (Part 1) ....A simple approach to installing elec. circuit breakers and switches without having to build any additional panels or boxes....