

Adding 10 Gal. Wing Tanks

About a year before I started my Challenger build, I saw a photo of Greg Klemp's 10 gallon wing tank and knew then, this was the set of fuel tanks I wanted. However, although I had surfed onto Greg's web site a few times, I never knew he was the distributor until I met Greg at the Challenger II 20th Anniversary Fly-In at Erie, IL in 2004. Don't ask me why, but Greg has not added these wing tanks to his web site, but is the only supplier of the 10 gallon wing tanks I know of. You can carry 20 gallons of fuel for an average in-flight time of about 3 to 4 hours with about a 4 gallon reserve in case of emergency.

NOTE: The 10 gallon wing tank kits are available from Greg Klemp^{SK}, owner of "Specialty Welding, Inc." and "Klemp Aerosports" of Neshkoro, Wisconsin.

Why 10 Gallon Wing Tanks?

When I started mentioning to others how I wanted to add Greg Klemp's 10 gallon wing tanks to my Challenger, I was met with statements like, "Are you crazy? That will add a huge amount of weight to your plane, "Keep It Light"."

Well, lets take a look at what weight we are really looking at. First of all, the wing tanks "REPLACES" the fuselage fuel tank. The "empty weight" of the two 10 gallon wing tanks only adds a total of just 16 pounds over what the factory single 10 gallon, in body fuel tank will weigh. So, if "ALL" I am looking at is an additional 16 pounds, where is the "HUGE" increase in overall weight? Okay, here is what these guys were thinking. A gallon of gas weighs 6 pounds, so an additional 10 gallons of fuel will add an additional 60 pounds of weight. Add that to the kit difference of 16 lbs and you have a total increase of 76 pounds.

WOW! That is just terrible!

No! Not really. When flying locally, I will only be running 10 gallons in my plane, so I am only suffering a weight difference of just 16 pounds. However, if I want to do a cross country flight, I will be thankful for the extra 60 pounds of fuel as I will now be able to stay aloft for about 3 to 4 hours and still have a 4 gallon fuel reserve in case of bad head winds or getting off course, needing to correct and take longer to reach my destination. I will "ONLY" have to come down for refueling about once every 3-1/2 hours, unlike the person with a single 10 gallon tank who will have to refuel every 1-1/2 hours and have only a 2 gallon reserve.

To me, this is what flying in our type of plane is about. Not only for the enjoyment of flying, but to also go somewhere within reasonable distance.

YUPI I am "VERY THANKFUL" I can carry an additional 60 pounds of fuel when I want to and only at a cost of an additional 16 pounds. Think about it!

CONSTRUCTION

So, lets take a look at what it takes to add the 10 gallon fuel tanks into your wings.



MATERIALS



All materials are supplied with the wing tank kit, even the screws. All you need to supply are the tools. You will need a drill, BITS: 1/16", 1/8" standard and a 9/16" spade bit, 1-1/2" hole cutter, 1/8" NPT tap and rivet gun.



- _____ 2 Tanks
- _____ 2 Caps (Vented)
- _____ 2 Filler Necks
- _____ 8 Hold Down Clamps
- _____ 2 Cross Tubes
- _____ 8 Cross Tube Gussets
- _____ 16 SS Screws (For Filler Neck)
- _____ 5 Foot Vent Tube
- _____ 5 Foot Fuel Line
- _____ 1 Filter
- _____ 1 "T" Connector
- _____ 2, 7/16" I.D. Grommets
- _____ 1, 1/4" I.D. Grommets
- _____ 2, 1/8" NPT / 1/8 Tube Fittings (For Vent Tube)
- _____ 2 Shut-Off Valves
- _____ 1 Header Tank
- _____ 7 Hose Clamps
- _____ 5 Threaded Drain Plugs
- _____ 5, 9/16-18 Jam Nuts
- _____ 5, 9/16 Washers
- _____ 1 Aviations Gasket Sealant
- _____ 1 Header Tank Cradle
- _____ 2 Sheets Alum 18" x 40"
- _____ 2 Sheets Alum 4" x 54"
- _____ 2, 1/8 N.P.T. x 1/4" Fitting
- _____ 80 SS 42 Rivets for Sheet Metal
- _____ 30 SS 44 Rivets for Sheet Metal
- _____ 30 SS 44 for Cross Tubes
- _____ 30 SS 42 for Cross Tubes

_____ *Angle for Bottom Rail to X-BRACE support*



1. Locate the center of the raised section on top of the fuel tank where the filler neck will go



2. Drill a 1/4" pilot hole in the center of the embossment as shown.



3. Using the pilot hole as a guide, cut out the opening for the filler neck using 1 1/2" hole saw.



4. Use a square to find and mark the center of the flange (approx. 1/4" from outside edge of flange).



5. Assemble the filler cap to the Filler neck and place the filler neck with the cap install, onto the tank.



6 Align the ears perpendicular to the front of the tank and mark the flange and tank for reference.



7. Drill 8 somewhat equally spaced 1/16" holes through the flange center marks. Place the drilled flange onto the tank and align the reference marks. Use the drilled flange as a guide to drill the 1/16" holes into the tank.



8. Drill a 9/16" hole in the rear center of the tank about 1" from the bottom edge. After drilling check to make sure there are no burrs on the inside of the tank. Feed a long piece of strong wire through the hole and

out through the filler neck opening. Slide the machined fuel outlet onto the wire so that the flange on the fitting is the last thing to enter the tank. Tip the tank upright so that the fuel outlet hole is on the bottom. Drop the fuel fitting down the wire so that the threaded end can be pulled through the drilled hole. Pull the fitting through the hole until the flange is snug against the inside wall. (A small loop or bend in the end of the wire behind the flange will help pull the fitting snug.) Remove the wire from the fuel tank.



9. Place the washer and then the nut onto the fuel outlet tube and tighten until outlet is secure. The flange is self sealing.

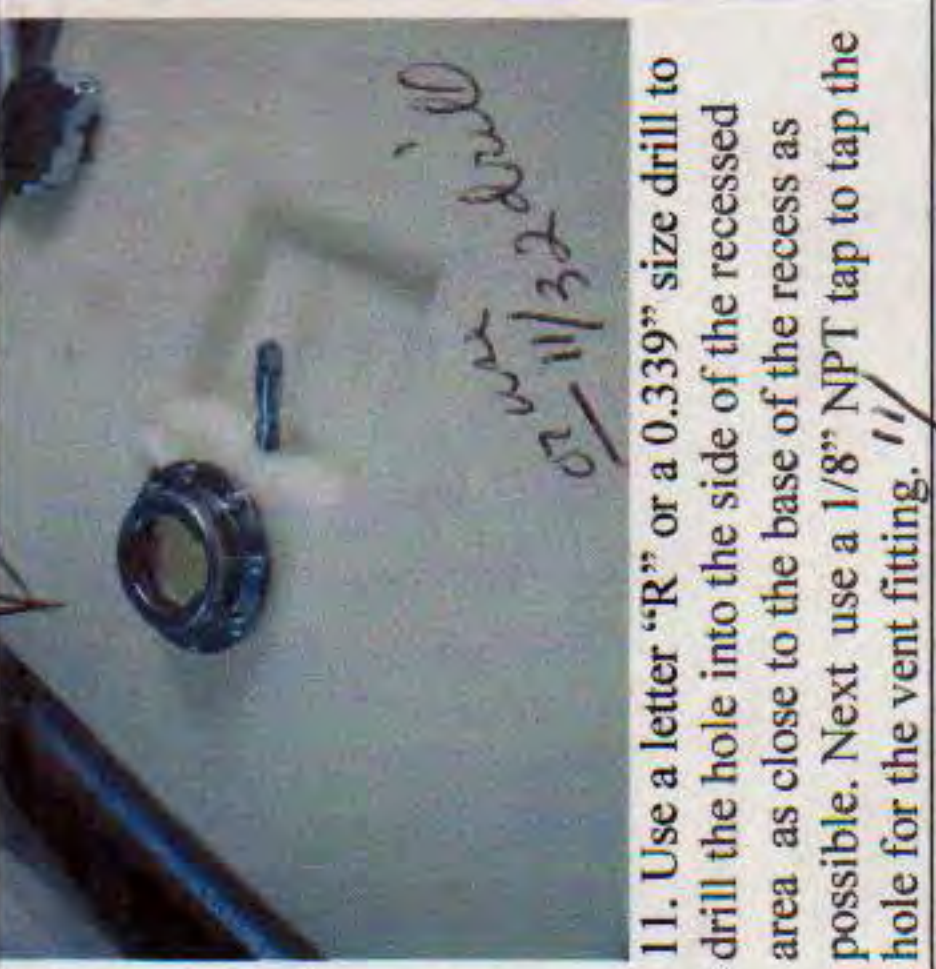


10. Enlarge the holes in the filler neck flange enough to allow the mounting screws to slide through them. **WARNING!**

DO NOT ENLARGE THE MATCHING 1/16" HOLES THAT ARE DRILLED IN THE TANK.

Apply a layer of aviation gasket sealant around the filler opening on the tank where the filler neck will be attached. Align the filler neck so that the ears of the cap are parallel to the airflow over the wing. Install the filler neck to the the tank and secure with the 8 mounting screws.

Drill and install only one fitting in ONE ~~of~~ TANK only. This vent line is strictly to vent the header tank. Hence, only one fitting in one tank



11. Use a letter "R" or a 0.339" size drill to drill the hole into the side of the recessed area as close to the base of the recess as possible. Next use a 1/8" NPT tap to tap the hole for the vent fitting.



15. Measure in, on the front and rear spars, 2 3/8" from the inboard end of the spars and mark. Measure over the width of the compression tube and place a second mark.



19. Drill out the top and bottom rivets that hold the first inboard compression tube to the front spar and the top and bottom rivets that hold cross tube. These rivets are circled in the picture above.



12. Apply a coat of aviation gasket sealer to the vent fitting threads and screw the vent fitting into the hole. Use a 7/16" wrench to tighten until only 2 to 3 threads are showing.



16. Drill out the sleeving rivets located above the marks where the new gusset and tube will go. Lay a straight edge across the compression tubes to locate the vertical position of compression strut and mark.



20. Drill and rivet the new compression tube into place on the inboard ends of the front and rear spar. Measure to make sure the inboard side of the compression tube is 2-3/8" from the ends of the spars

13. After the filler neck, fuel line and vent tube have been installed, thoroughly vacuum out the inside of the tank. Next, fill the tank with hot soapy water and rinse out the inside of the tank. After rinsing, refill the tank with approximately 10 gallons of warm water and check for leaks. If a leak forms around the flange on the fuel outlet tube, a small amount of aviation gasket sealant may be used around the inside of the flange, but normally this is not required. After verifying that there are no leaks, empty the tank and rinse thoroughly with clean water. A hair dryer may be used to remove any moisture inside the tank or allow the tank to air dry.



17. Drill out the top and bottom two inboard rivets on the first gusset plate that attach the first inboard ~~compression tube~~ to the rear spar. These rivets are circled in the picture above.



21. Locate the position of the second compression tube by measuring over 14-1/2" from the center of the first compression tube to the inside edge of the second compression tube as shown in the next picture and mark the location. This will give the required 15"



14. Slide the compression fitting onto the vent tubing. Apply ~~aviation gasket sealer to the vent fitting threads~~. Hold the vent fitting in place with a 7/16" wrench and secure the compression fitting to the vent fitting.



18. Drill out the top and bottom rivets that hold the first inboard compression tube to the rear spar. These rivets are circled in the picture above.



on center for the fuel tank. Measure and mark the tube location on both the front and rear spars. Use a 1/8" drill to drill the holes into the spars and rivet gussets and compression tube into place using stainless steel rivets.

SET TANK INTO POSITION AFTER (SE) tube is Riveted But BEFORE 2nd Tube is to CHECK FOR FIT

To install compression tube



22. Lay the end of the first cross tube on top of the double gusset plate on the front spar. Mark and trim off the end as shown so that it will fit back into the gusset. Trim the inside corner of the tube so the center of the tube lines up with existing holes in the gusset.



23. After riveting all the tubes and gussets into place, use aluminum or stainless steel rivets to plug any unused holes in both the top and bottom of the front and rear spars left from moving the gusset plates.



24. Place the tank into position on the two inboard compression tubes as shown. Attach the tank using 4 of the large hose clamps.



25. Place the inboard wing rib 1-1/4" from the end of the front and rear spars to the side of the rib as shown and clamp securely into place.



25. Measure 17-1/2" from the center of the 1st inboard wing rib to the side of the 2nd inboard wing rib as shown and clamp securely into place on the front spar. Do the same on the rear spar.



26. Measure up the top of the inboard wing rib from the front tip to a point parallel to the center of the filler neck. Measure this distance from one end of the 18" wide aluminum sheet and place a mark in the middle of the sheet, 9" from either side.



27. Using the mark as the center, cut out a 4" hole for the filler neck to fit through. Clamp the front edge of the sheet down over the tips of the wing ribs and clamp the rear of the sheet to the wing ribs. Drill and rivet the sheet into place.



29. Install the inboard bottom rib parallel to the top rib and install the 4 "L" brackets to hold the inboard bottom rib in position as shown.



30. Fasten the inboard wing side cover to the top and bottom inboard ribs using 1/8" stainless steel rivets.

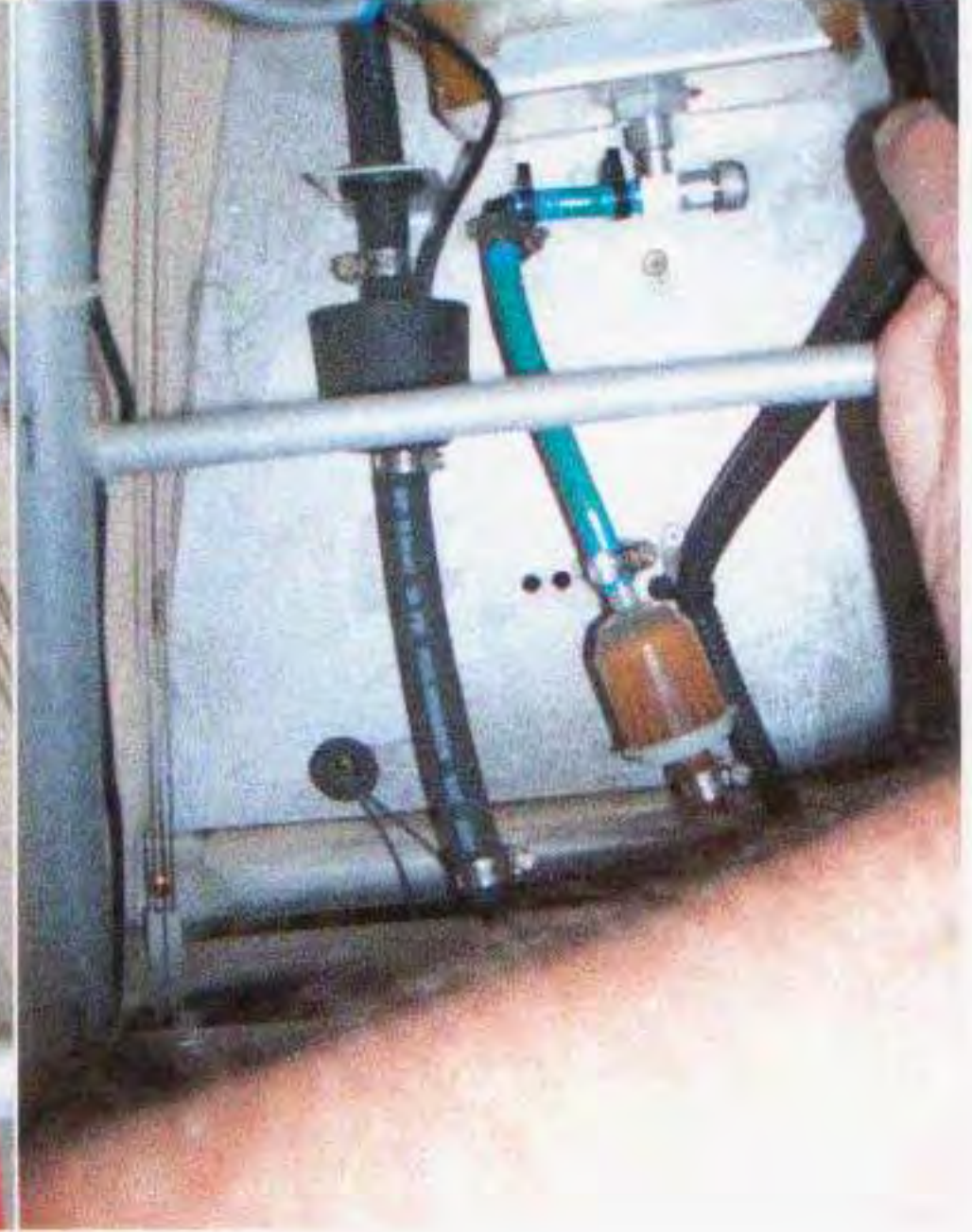
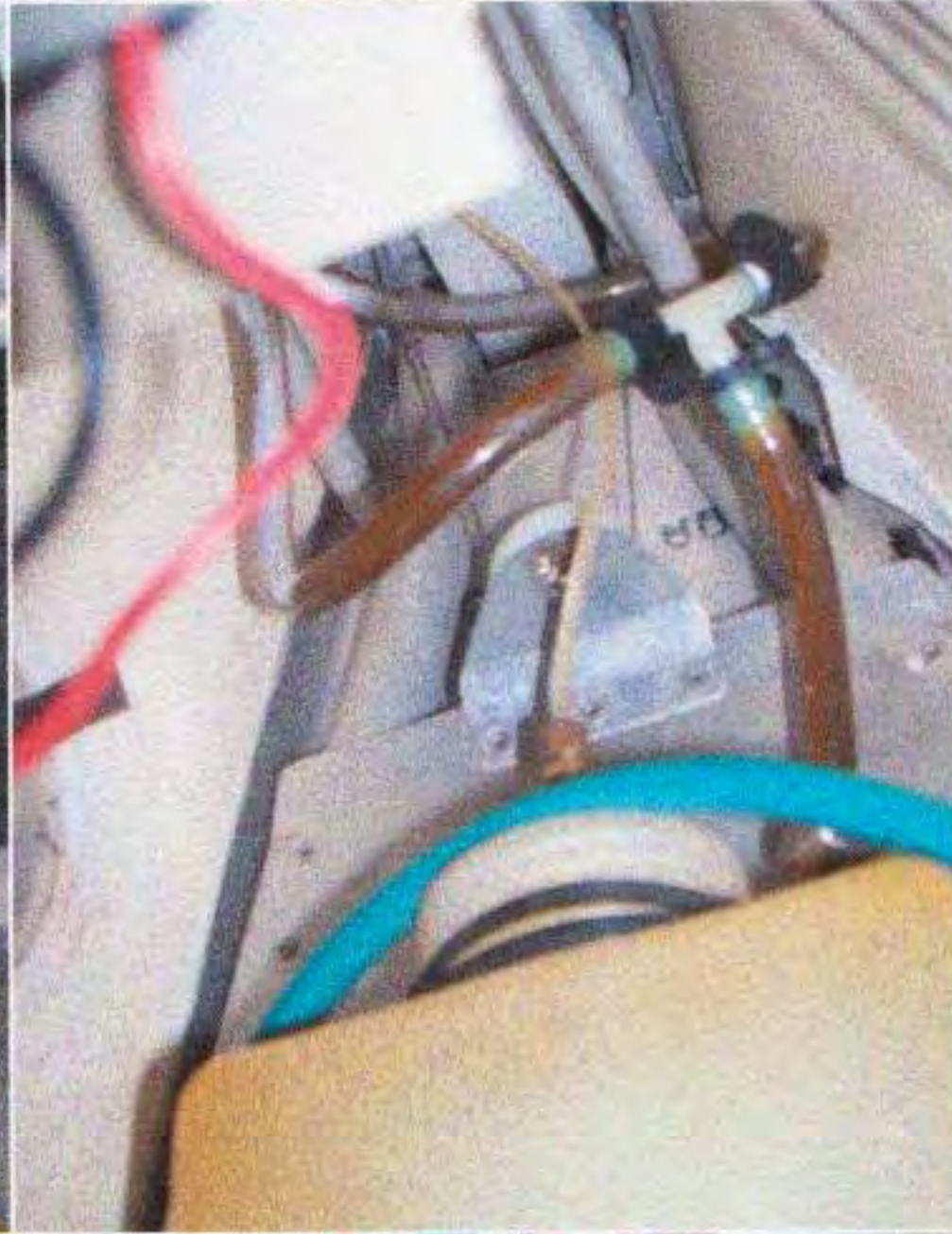
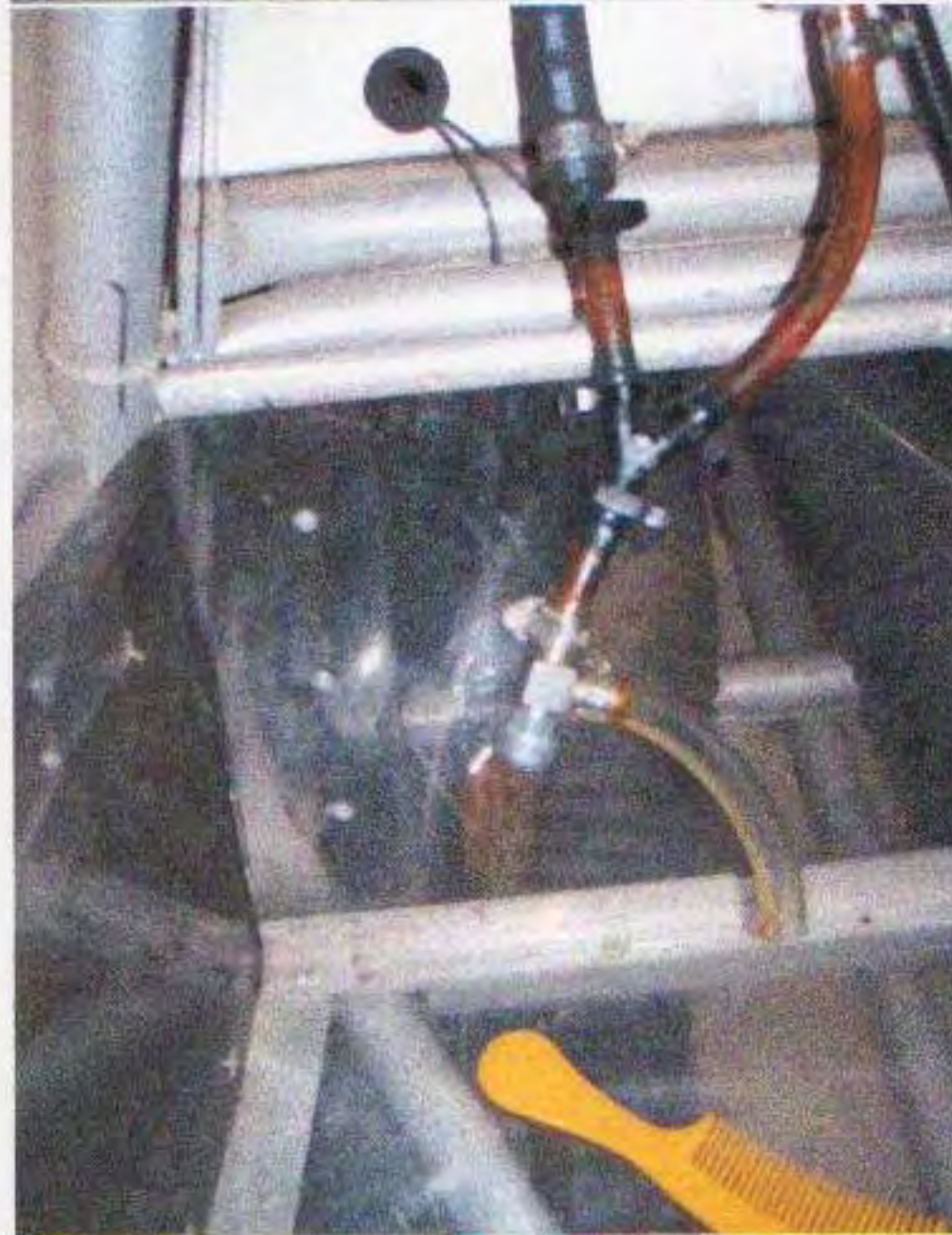
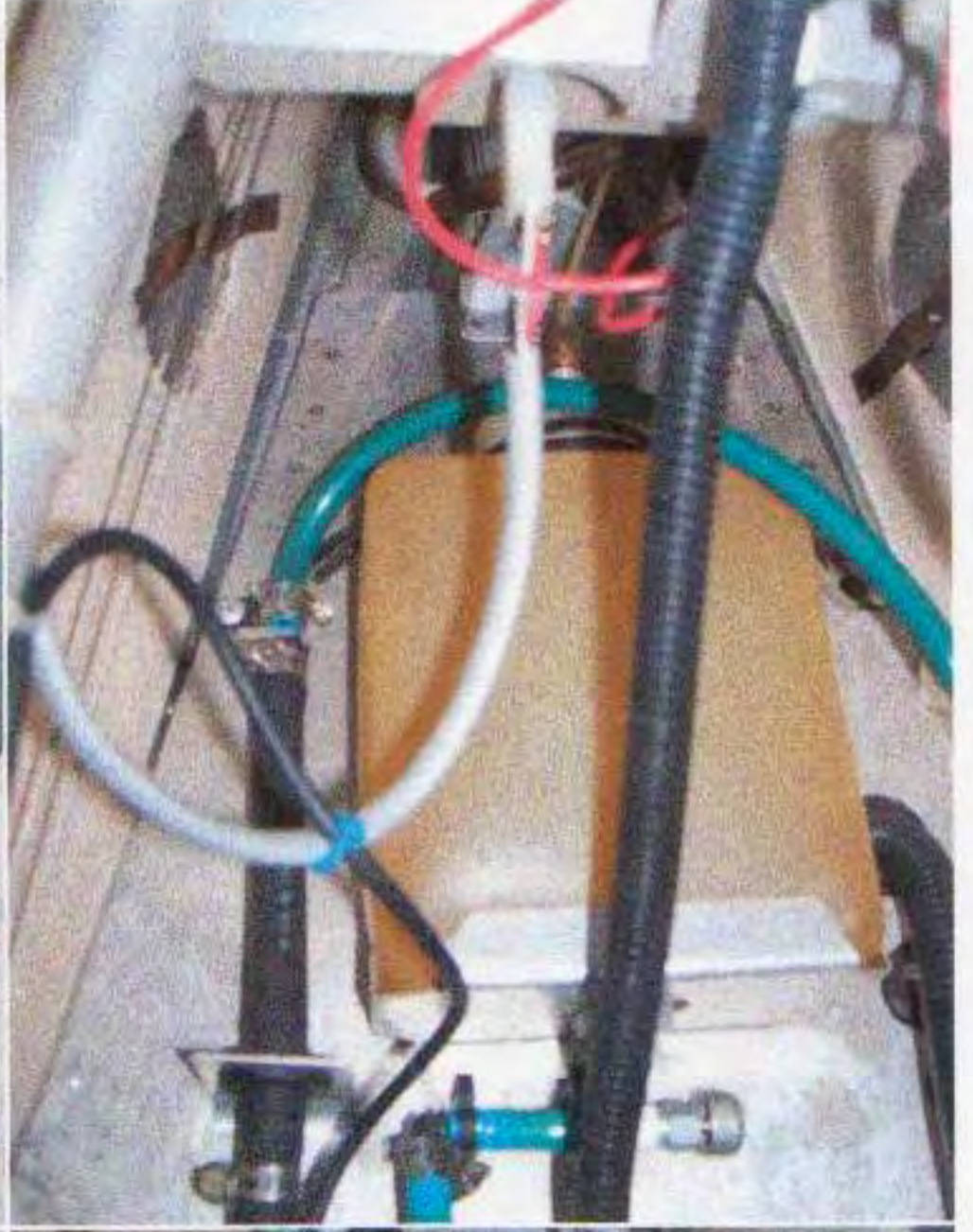


31. Invert the wing and install the fuel line to the shutoff valve using the hose clamp. Drill a 9/16" hole just above the bottom rib and a 3/8" hole about 1' away from it as shown.

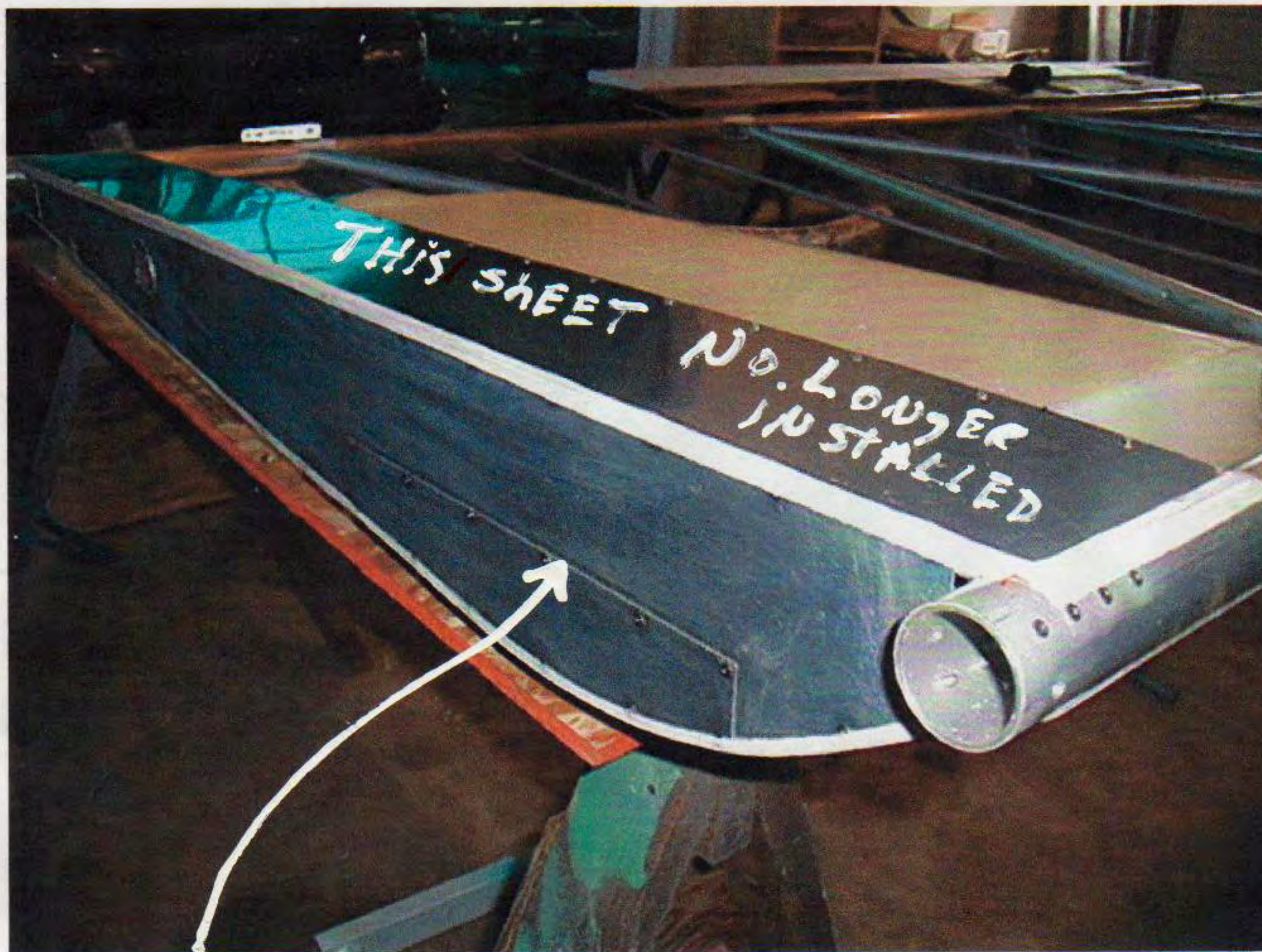


28. Use a piece of .025 x 6" wide material to make a corner gusset as shown. Drill and rivet into place. Use a sheetmetal forming tool to bend the inside edges down on both the gusset and tank cover for added strength.

Install the rubber grommet for the fuel line into the 9/16" hole. Feed the fuel line through the grommet until there is no slack between the shutoff valve and the side cover, but the line is not pulling on the valve. Install the rubber grommet for the vent tubing into the 3/8" hole. Feed the vent tubing through the grommet until there is no slack in the line. The fuel line and vent tube may be tied to the compression tube to prevent them from slapping the fabric during flight.







WE INSTALL THIS END CAP TO HELP WITH FABRIC COVERINGS. BE SURE TO SAND THOROUGHLY WITH 100 GRIT, FOR GOOD GLUE ADHESION.

TO KEEP FABRIC FROM BOWING INWARD THE BOTTOM RIB ATTACH ANGLES AS SHOWN IN PICTURE'S 38 - 39 - 48 - 49

NOTE
WINGS WITH SAIL CLOTH: DO NOT USE ANY ALUMI SHEETING. YOU MUST MAKE A REINFORCED CIRCULAR HOLE FOR THE FILLER NECK.

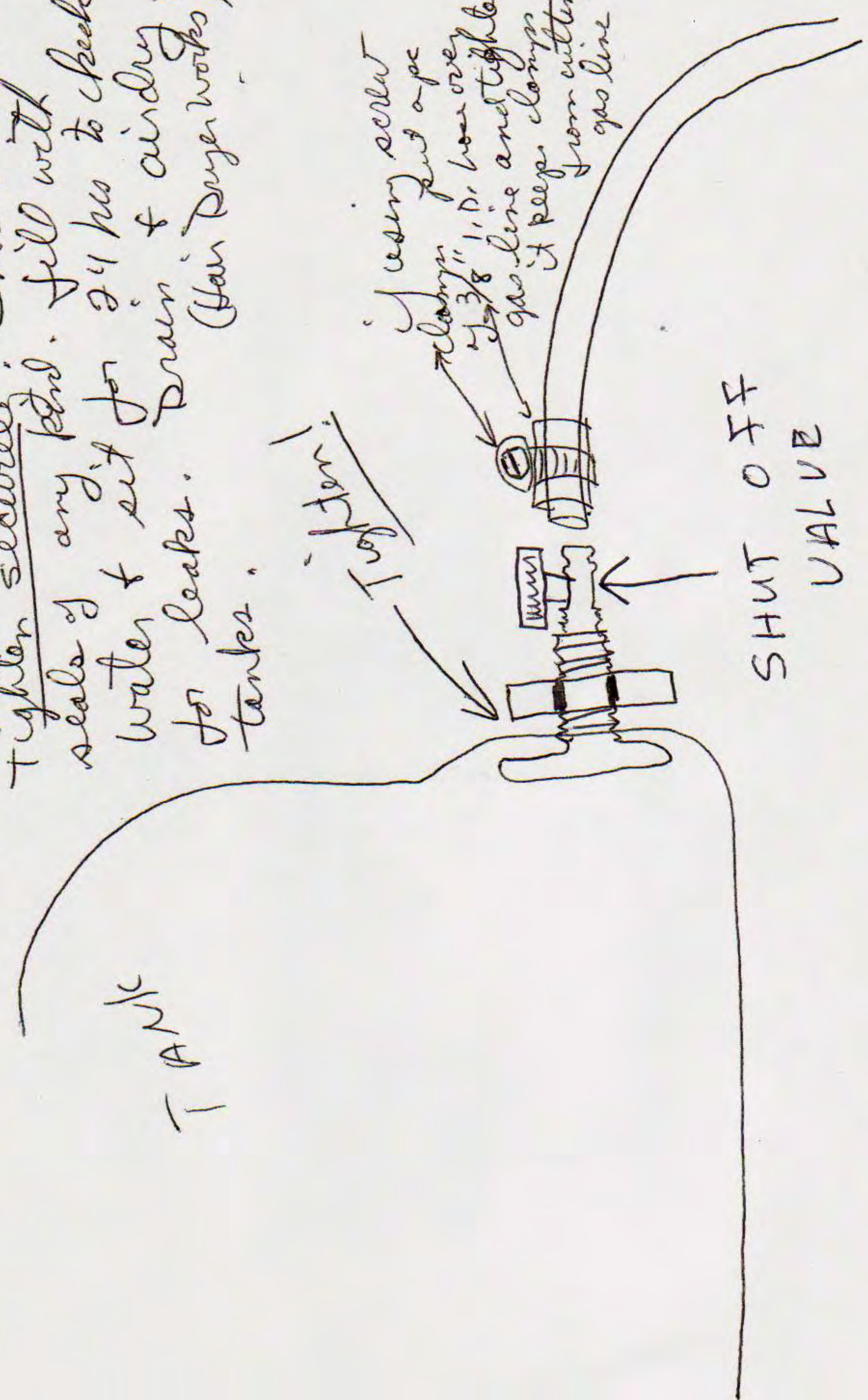
Drill hole to fit fitting, Debur hole-

Fit alum threaded flange into hole you drilled & Deburred on flat of tank

Tighten securely. Should not need seals of any kind. Fill with water & sit for 24 hrs to check for leaks. Drain & air dry (Hain Dyer works) tanks.

Tighten!

Using screw clamps put a pc of 3/8" 1.0" hose over gas line and tighten it keeps clamps from cutting gas line.



SHUT OFF VALVE

DATUM

NOSE CONE DATUM

64 1/2"

FRONT OF SPAR



4 3/4"

BACK OF FRONT SPAR

FRONT OF TANK HOLD DOWN

FRONT OF TANK

14 1/8"

CENTER OF TANK MASS

8" OF MASS

CENTER LINE OF TANK

8"

WINGS

WINGS FUEL TANK

CROSS TUBE

SUPPORT



FRONT OF SPAR TO C.O.M. OF MASS
83.375"

4 PLATES

You Must Rinse

Tank After

Installing Fittings.

You Must TIGHTEN Header

Tank Cap!