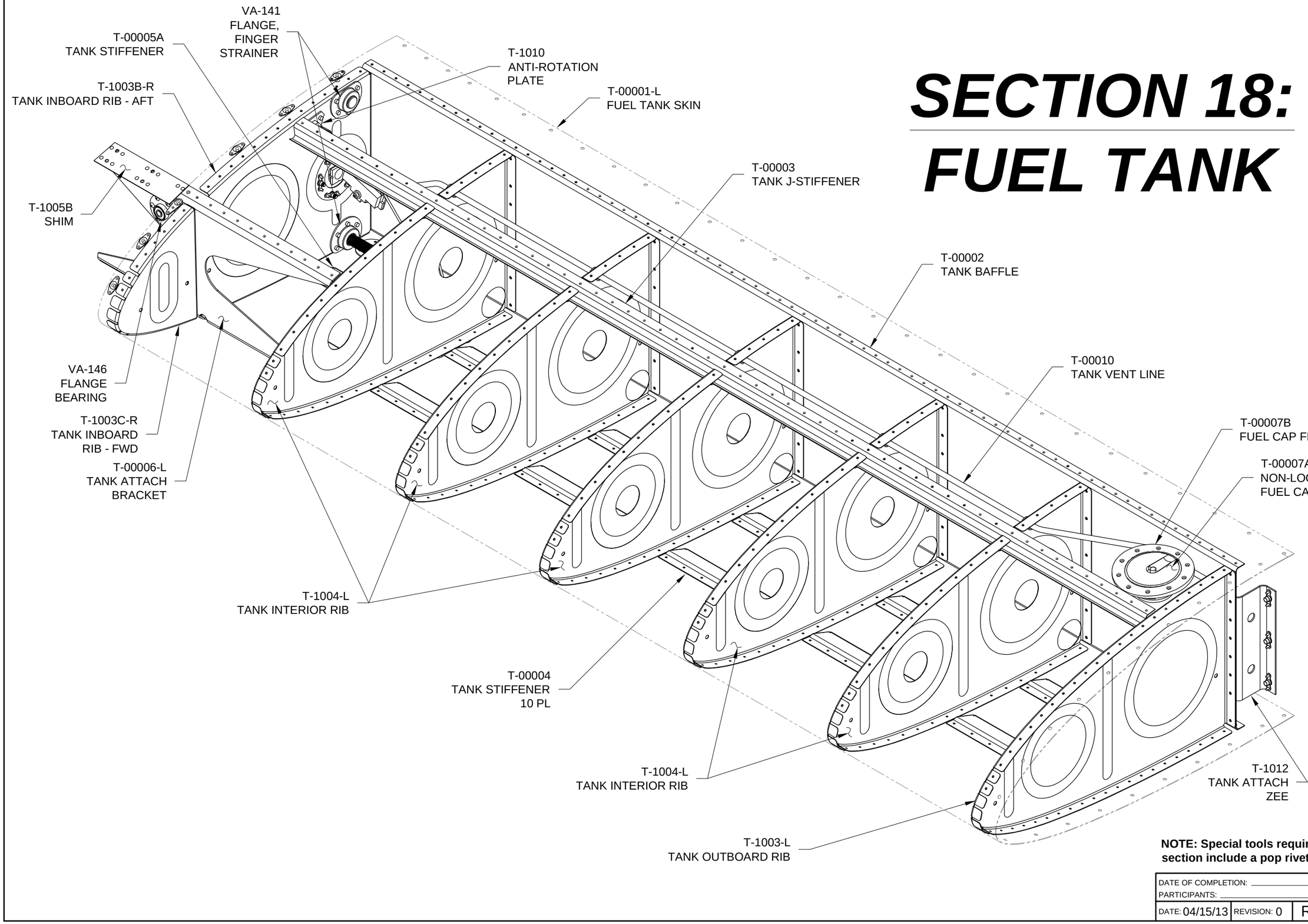
SECTION 18:
FUEL TANK



NOTE: Special tools required to complete this section include a pop rivet dimple tool.

DATE OF COMPLETION: _____
PARTICIPANTS: _____

NOTE: Except where separate instructions and/or figures exist for both left and right sides of the aircraft, only the left side parts, assemblies, or installations will be shown.

It is the builder's choice as to whether to complete all steps for the left side before repeating those steps for the right side or to complete each step for both left and right sides before moving to the next step.

Step 1: Check that flanges of all ribs used in the tank assembies are perpendicular to the rib webs. Flute the ribs as needed. See Section 5.13.

Step 2: Final-Drill #40 all .094 [2.4mm] holes and final-drill #30 all .125 [3.2mm] diameter holes ribs used in the tank assemblies.

Step 3: Use a step drill to make a 3/4 [19.05mm] hole in the T-1003B-L & -R Tank Inboard Ribs - Aft as shown in Figure 1. See Section 5.24 for more information on using step drills.

Center the VA-141 Finger Strainer Flange over the step drilled hole making sure that no part of the finger strainer flange protrudes beyond the profile of the rib.

Match-Drill #30 the finger strainer flange to the tank inboard ribs - aft.

Final-Drill #30 the .125 [3.2mm] holes in the two remaining finger strainer flanges that will attach to the lower region of the rib.

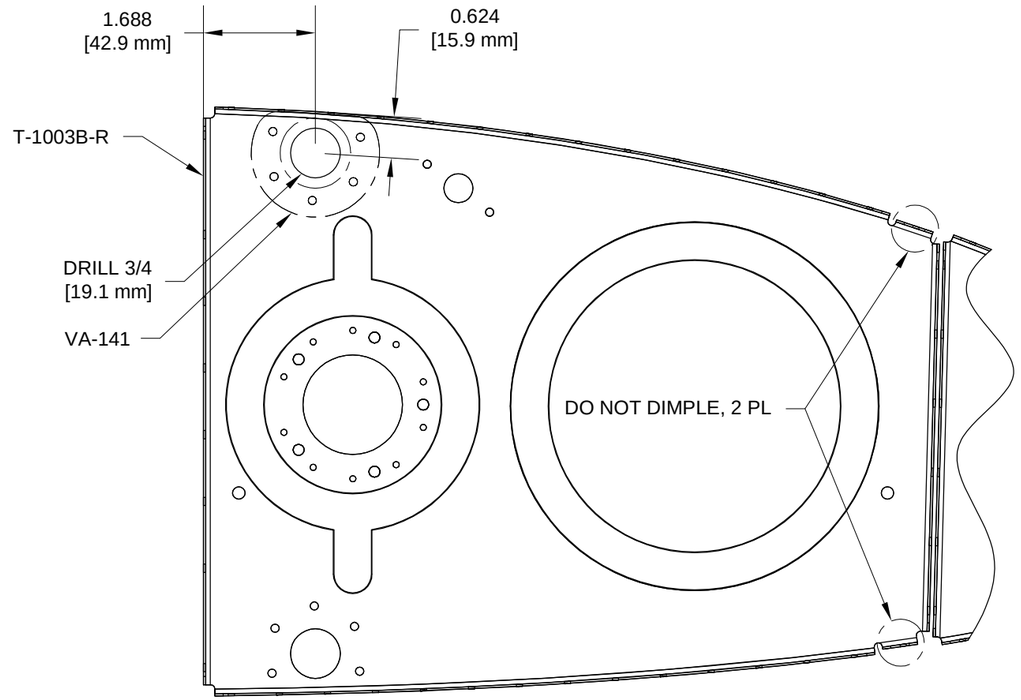


FIGURE 1: UPPER FLANGE PATTERN LOCATION

Step 4: Deburr all holes and edges of all the ribs used in the tank asemblies.

Step 5: The flanges of the T-1003 Tank Outboard Ribs, T-1003C Tank Inboard Ribs-Fwd, and T-1004 Tank Interior Ribs are notched where they form around the tight curvature of the leading edge. Despite the notching, the flanges still do not form perfectly but turn-out slightly faceted.

Buff the edges of the ribs at the nose area of all tank rib flanges on an abrasive wheel in order to minimize the tendency for them to appear faceted instead of curved.

Step 6: Dimple all the #40 holes in the flanges of all ribs used in the tank assemblies except the two small tabs on each T-1003B Tank Inboard Rib - Aft shown in Figure 1. There is limited access to the top flange aft hole in each T-1003C Tank Inboard Rib - Fwd Therefore a pop rivet dimple tool is needed.

Dimple the #40 nutplate attach holes in the T-1003B Tank Inboard Ribs - Aft using a reduced diameter female die. See Page 18-04 Figure 3 for dimple direction.

Step 7: Final-Drill 7/16 [11.1mm] the T-00005 Tank Stiffener in the two locations shown in Figure 2.

Separate the T-00005 Tank Stiffener into two T-00005A Tank Stiffeners and two T-00005B Vent Line Clips as shown in Figure 2.

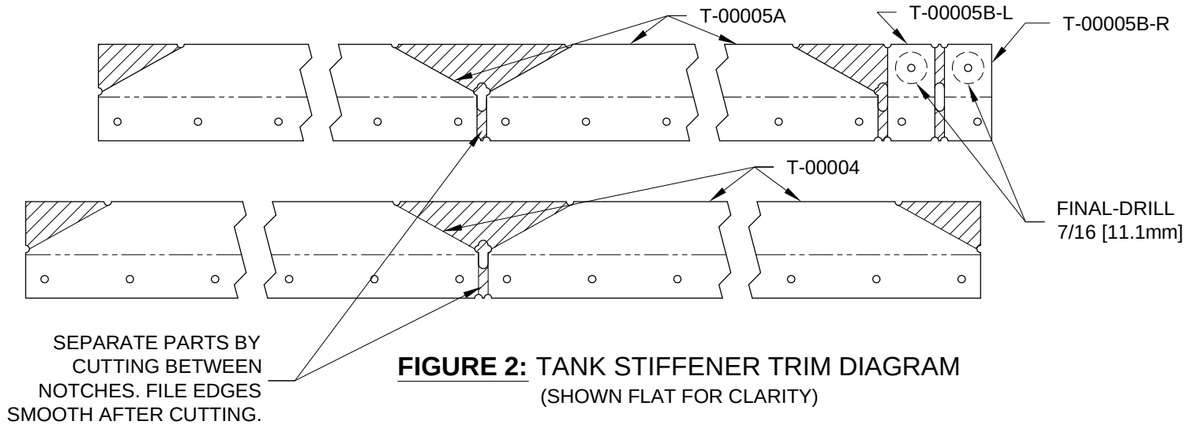


FIGURE 2: TANK STIFFENER TRIM DIAGRAM
(SHOWN FLAT FOR CLARITY)

NOTE: The inboard tank attach zee has no holes for nutplate attachment.

Step 8: Separate the T-00004 Tank Stiffeners and trim as shown in Figure 2.

Step 9: Deburr edges, scuff mating surfaces and dimple all #40 holes in the T-00004 and T-00005A Tank Stiffeners.

Step 10: Final-Drill #40 all .094 [2.4mm] holes, #30 all .125 [3.2mm] holes, and #12 all .188 [4.8mm] holes in the T-1012 Tank Attach zees.

Machine countersink all #40 holes in the tank attach zees to fit the head of an AN426AD3 rivet. See Page 18-03, Figure 1.

Step 11: Trim T-1012 Tank Attach Zees as shown in Figure 3.

Step 12: Deburr all holes and edges of all the T-1012 Tank Attach Zee Brackets.

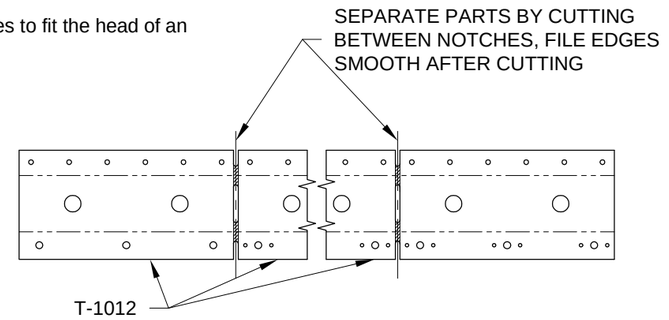


FIGURE 3:
TANK ATTACH ZEE TRIM DIAGRAM
(SHOWN FLAT FOR CLARITY)

NOTE: The inboard most tank attach zee does not have nutplates.

Step 1: Rivet nutplates to the T-1012 Tank Attach Zees as shown in Figure 1. See Section 5.16 for more information on installing nutplates.

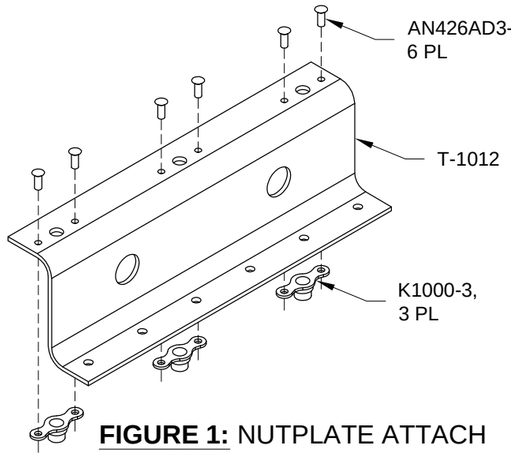


FIGURE 1: NUTPLATE ATTACH ZEE SUBASSEMBLY

Step 2: Fabricate the T-00003 Tank J-Stiffener for both left and right tank assemblies by cutting two pieces of J-channel to the length shown in Figure 2.

Draw a centerline on the flange of each J-stiffener as shown.

Drill #40 a hole in each J-stiffener as shown.

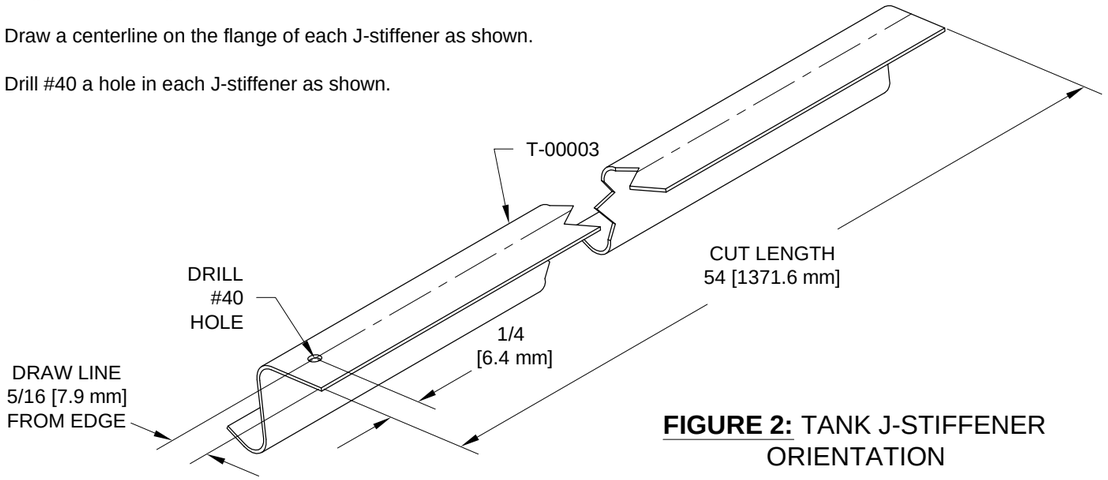


FIGURE 2: TANK J-STIFFENER ORIENTATION

Step 3: Remove the protective vinyl coating from the inside surface of the T-00001-L Tank Skin. Place the T-00001-L Fuel Tank Skin in the assembly cradle. See Page 17-04, Figure 1.

Step 4: Insert a cleco through the outboard most J-stiffener rivet hole in the T-00001-L Fuel Tank Skin and the single hole in the T-00003 Tank J-Stiffener. See Page 18-01.

Align the centerline drawn on the flange of the tank J-stiffener with the holes in the fuel tank skin, then match-drill #40 and cleco the tank J-stiffener to the skin. Work away from the clecoed hole.

Step 5: Cleco the T-00002 Tank Baffle to the T-00001-L Fuel Tank Skin. See Page 18-01. Proper orientation of the tank baffle places the flange with the "extra" hole on the bottom. See Page 18-08, Figure 1.

NOTE: Read Section 5.5 for more information on countersinking and dimpling. The tank baffle must be in place during these steps to provide a good pilot for the countersink.

To assure proper part alignment upon reassembly, leave every 10th hole on the T-00001-L Fuel Tank Skin un-countersunk. Go back and countersink these holes and install rivets after the tank has been assembled and the initial batch of sealant has cured.

Countersinks that are up to .005 too shallow are acceptable and preferable to countersinks that are too deep.

Step 6: Machine countersink the row of holes in the T-00001-L Fuel Tank Skin that attach the skin to the T-00002 Tank Baffle to fit the head of an AN426AD3 rivet.

Step 7: Remove the T-00003 Tank J-Stiffener from the T-00001-L Fuel Tank Skin.

Deburr then dimple the holes in the tank J-stiffener. It is normal for the J-stiffener to bow slightly as it is dimpled.

Step 8: Final-Drill #19 then deburr all .161 [4.1mm] diameter holes in the T-00001-L Fuel Tank Skin.

Step 9: As described in Section 5.10, form a slight bend or "crimp" in the aft edges of the T-00001-L Fuel Tank Skin.

Step 10: Remove the T-00001-L Fuel Tank Skin from the Leading Edge Assembly Cradle.

NOTE: Dimple the screw holes in the fuel tank skins using the C-frame tool and a hammer rather than forming them with a rivet squeezer. This will result in "crisper", better looking skin dimples.

Step 11: Dimple the T-00001-L Fuel Tank Skin as shown on Page 18-05, Figure 1.

Step 12: Machine countersink the T-00007B Fuel Cap Flanges as shown in Figure 2 to accept the dimples in the T-00001-L Fuel Tank Skin.

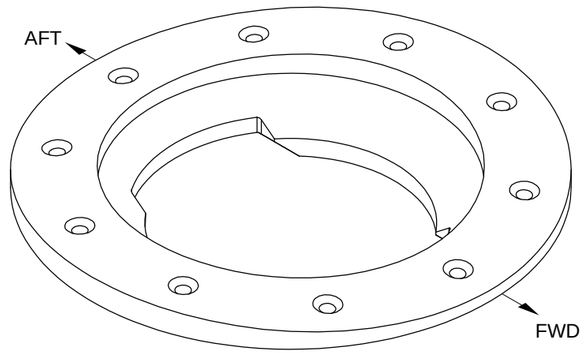


FIGURE 3: FUEL CAP FLANGE ORIENTATION

Step 1: Separate & deburr the T-1005BC Shims and trim as shown in Figure 1.

Cleco the shims to the T-00006-L Tank Attach Bracket as shown in Figure 2. Trim the inboard ends of the shims to be flush with the inboard ends of the tank attach brackets.

Remove the shims from the tank attach brackets.

Step 2: Final-Drill & deburr #40 & #19 all holes in the T-1005B and T-1005C Shims.

CAUTION: Holes dimpled for a #8 screw have a tendency to crack if not deburred carefully! First check that the hole has been drilled to final size. Thoroughly deburr the holes before dimpling.

Remember to dimple the opposite direction on the T-1005C & T-1005B shims for the right side of the aircraft.

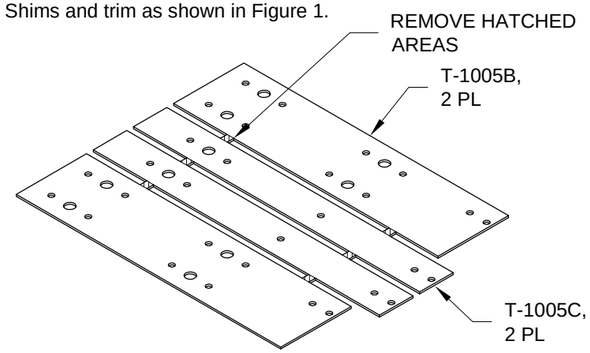


FIGURE 1: SEPARATE T-1005BC

Step 3: Dimple the two #19 holes in the T-1005B Shim which will have the K1100-08D Nutplates attached. See Figure 2. Dimple all #40 holes in the shim.

Step 4: Final-Drill #19 all .161 [4.1 mm] diameter holes in the T-00006-L & -R Tank Attach Brackets. Deburr the #19 holes. See Figure 2.

Machine countersink the #40 holes in the tank attach brackets to accept the dimples in the T-00001-L & -R Fuel Tank Skin or T-1005B and T-1005C Shims.

Step 5: Final-Drill #30 and attach the VA-146 Flange Bearing, K1000-08, nutplates, T-1005B & T-1005C Shims to the T-00006-L Tank Attach Bracket as shown in Figure 2.

NOTE: Do not prime any areas that will be in the inside of the tank.

Step 6: If desired, prime the T-1005B and T-1005C Shims, T-1012 Tank Attach Zees, and the external portion of the T-00006-L Tank Attach Brackets.

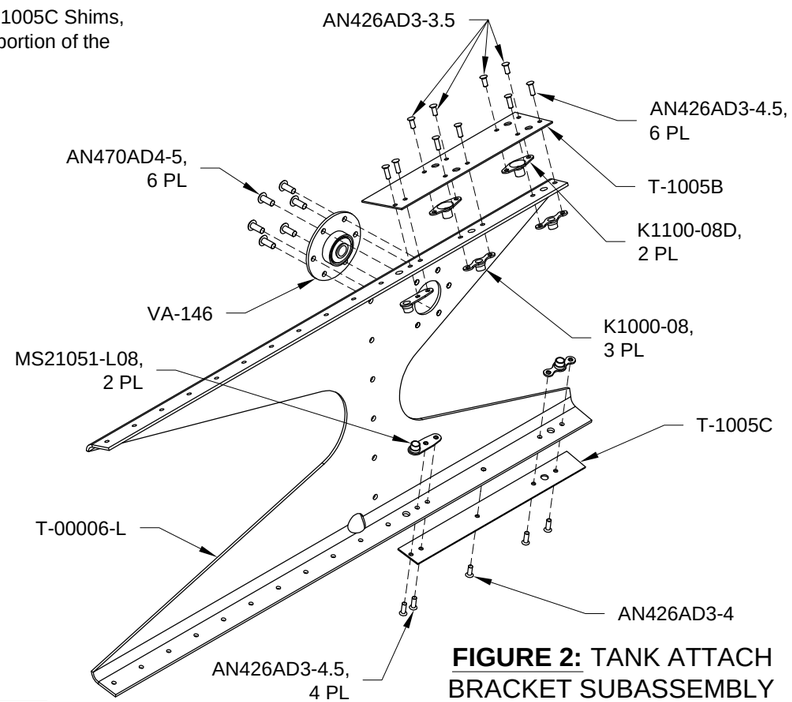


FIGURE 2: TANK ATTACH BRACKET SUBASSEMBLY

NOTE: Assembly steps from this point on require that sealant be installed between mating parts. Read section 5.16 for more information on fuel tank sealant.

The tank is riveted together just like any other structure with one very important difference: Apply sealant between the parts comprising a seam through which fuel could conceivably leak. This includes every rivet.

Step 7: The T-1003C-L & -R Tank Inboard Ribs-Fwd, T-1003B-R & -L Tank Inboard Ribs-Aft, and T-1003-L & -R Tank Outboard Ribs each have two .188 [4.8 mm] diameter holes. These holes are used to hold the ribs in proper alignment with the tool during hydropress forming of the ribs.

Install AN470AD6-5 rivets in the .188 [4.8 mm] rib holes. Use a C-Frame tool and a heavy hammer to set the rivets only enough for them to be retained in the tooling holes.

Step 8: Attach the VA-141 Fuel Flanges, T-1010 Anti-Rotation Plate and nutplates to the T-1003B-R Tank Inboard Rib - Aft as shown in Figure 3.

Clean excess sealant from inside of the hex area of the anti-rotation plate to allow for a flush fit of a bulkhead union fitting later on. See Page 18-06 Figure 1.

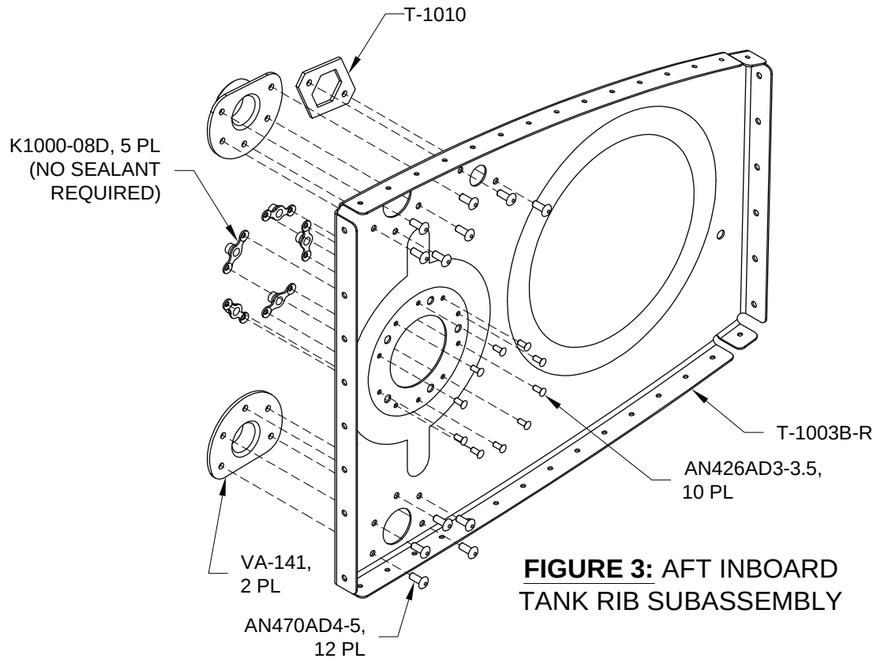


FIGURE 3: AFT INBOARD TANK RIB SUBASSEMBLY

Step 1: Final-Drill #40 the VA-112 Drain Flange.

Rivet the T-00004 Tank Stiffeners, T-00005A Tank Stiffener, and VA-112 Drain Flange to the fuel tank skin as shown in Figure 1. See Figure 2 for rivet call outs.

Step 2: Rivet the T-00007B Fuel Cap Flange and T-00005B-L Vent Line Clip to the T-00001-L Fuel Tank Skin as shown in Figure 1. See Figure 2 for rivet call-outs. Make sure the thin part of the fuel cap flange is facing the aft and fwd direction See Page 18-03 Figure 3.

Step 3: Rivet the T-1003C-R Tank Inboard Rib - Fwd, T-1004-L Tank Interior Ribs, and T-1003-L Tank Outboard Rib to the T-00001-L Tank Skin as shown in Figure 3. See Figure 1 for rivet call-outs. Keep the T-00003-L & -R Tank J-Stiffener area clean of sealant for later installation of the J-stiffener.

Begin with the tank inboard rib - forward and progress from inboard to outboard, finishing with the tank outboard rib. After the inboard and outboard ribs have been riveted form a generous fillet of sealant approximately 3/8 [9.5 mm] radius at the interior corner of the rib and along the nose area where the flange notches are located.

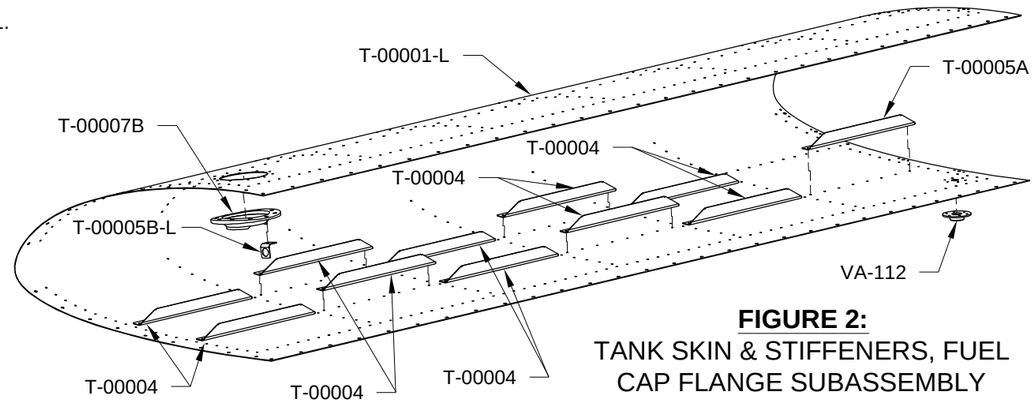


FIGURE 2:
TANK SKIN & STIFFENERS, FUEL CAP FLANGE SUBASSEMBLY

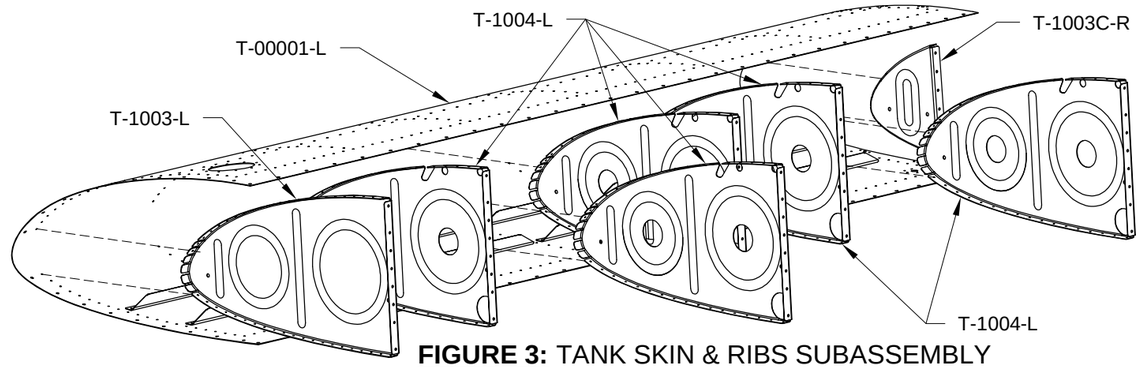
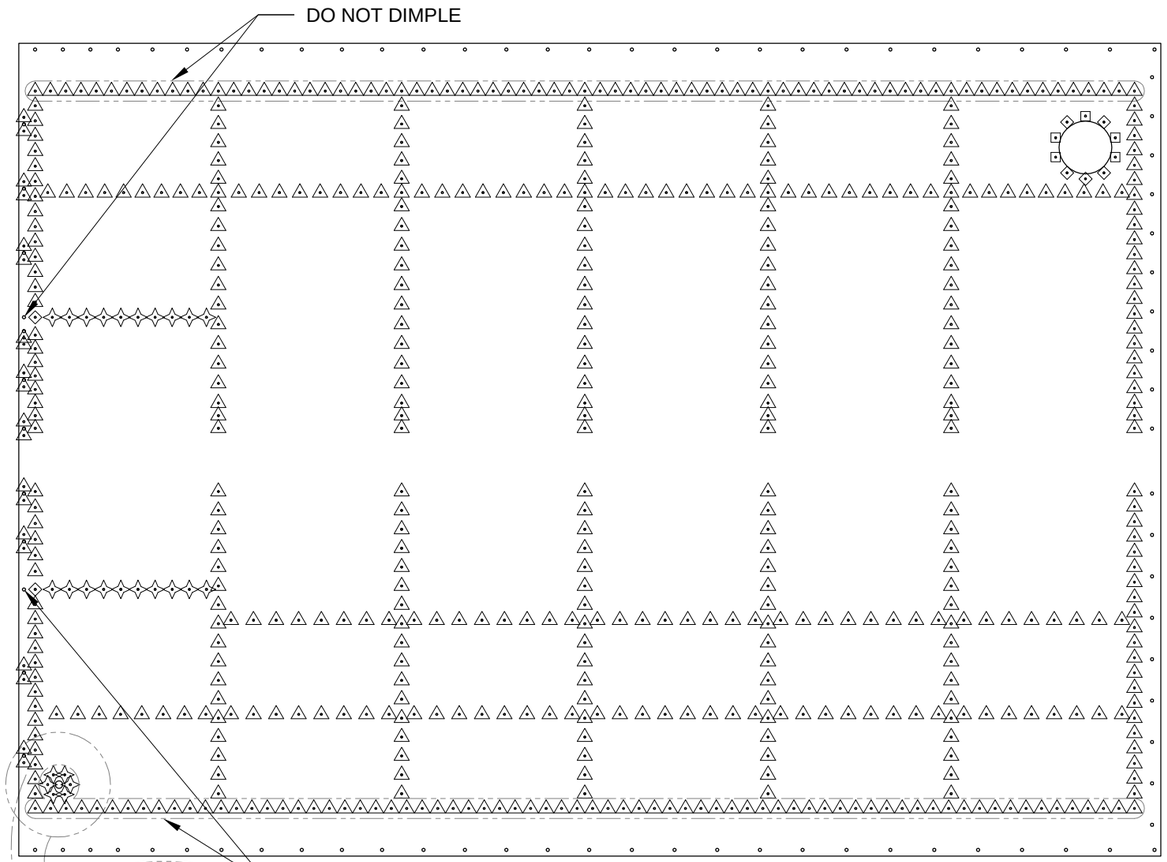


FIGURE 3: TANK SKIN & RIBS SUBASSEMBLY



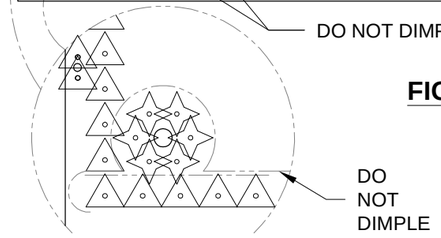


FIGURE 1: FUEL TANK SKIN RIVET DIAGRAM

Dimpling the J-stiffener causes it to bow, making it difficult to install with tank sealant in place. Have an assistant hold one end of the J-stiffener and bow it in the opposite direction. Apply sealant to the tank J-sfiffener instead of the skin. Prevent contact with the fuel tank skin while sliding it through the fuel tank ribs to minimize mess.

Step 4: Rivet the T-00003 Tank J-Stiffener to the T-00001-L Fuel Tank Skin as shown in Figure 1 & Figure 4.

NOTE: Verify that the drain back hole is not blocked with sealant.

Step 5: Rivet the T-00006-L Tank Attach Bracket Subassembly to the T-00001-L Fuel Tank Skin as shown in Figure 1 & Figure 4.

Cleco, but do not rivet the tank attach bracket to the T-1003C-R Tank Inboard Rib-Fwd.

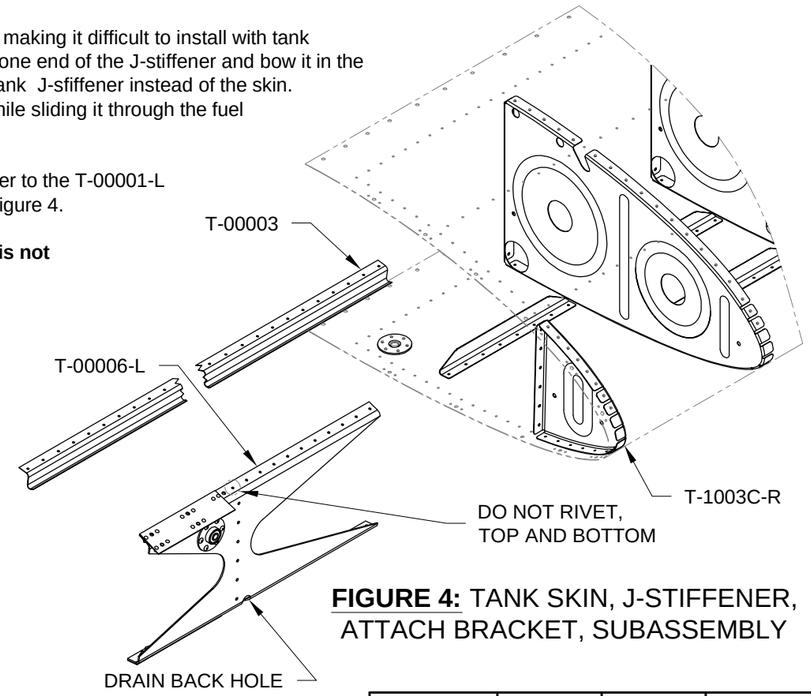


FIGURE 4: TANK SKIN, J-STIFFENER, ATTACH BRACKET, SUBASSEMBLY

Step 1: Install Snap Bushings into the holes in the T-1004-L Tank Interior Ribs and T-00005B Vent Clip as shown in Figure 1.

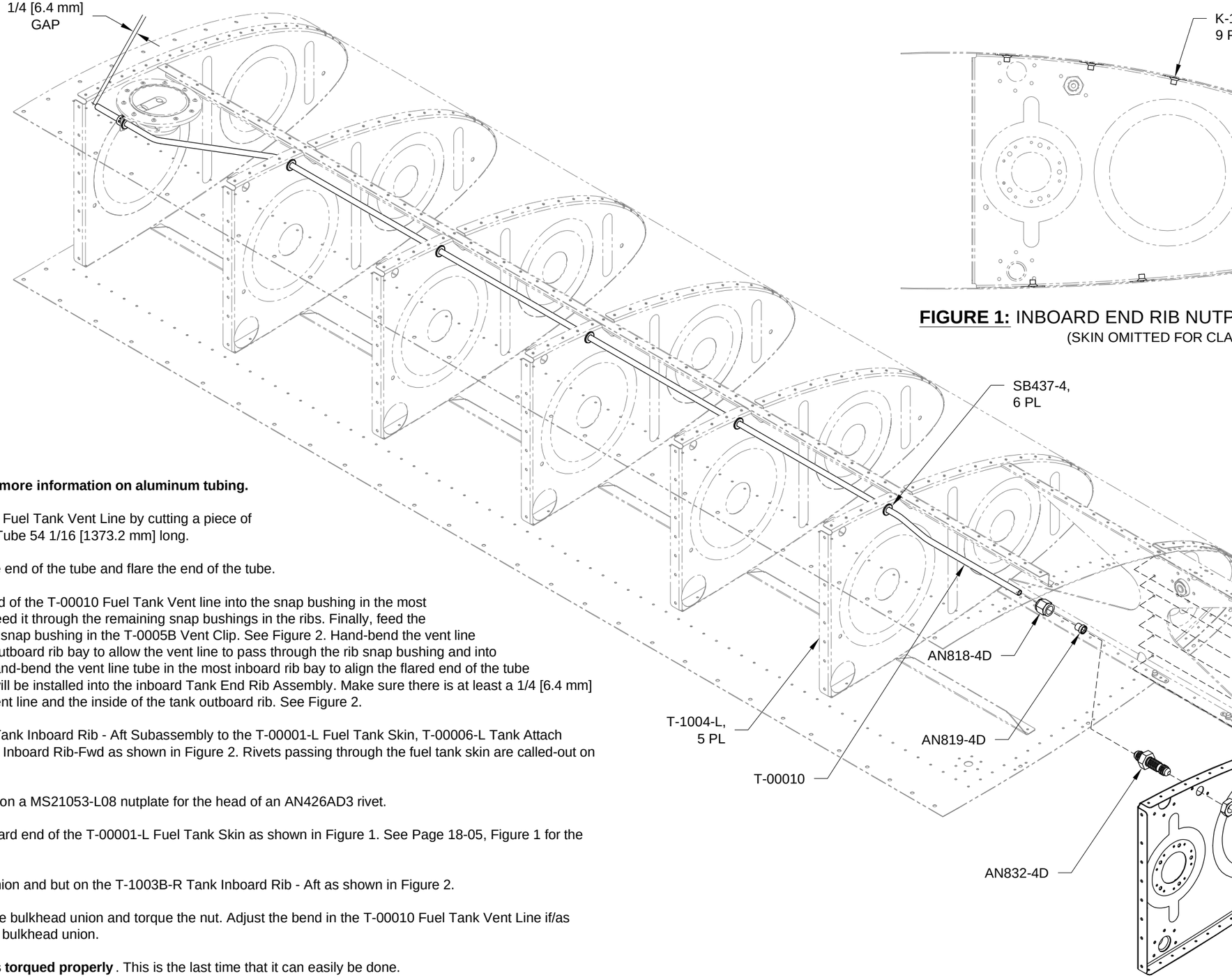


FIGURE 1: INBOARD END RIB NUTPLATE INSTALLATION
(SKIN OMITTED FOR CLARITY)

NOTE: See Section 5.14 for more information on aluminum tubing.

Step 2: Fabricate the T-00010 Fuel Tank Vent Line by cutting a piece of AT0-032X1/4 Soft Aluminum Tube 54 1/16 [1373.2 mm] long.

Place a nut and sleeve on one end of the tube and flare the end of the tube.

Step 3: Insert the un-flared end of the T-00010 Fuel Tank Vent line into the snap bushing in the most inboard tank interior rib then feed it through the remaining snap bushings in the ribs. Finally, feed the fuel tank vent line through the snap bushing in the T-0005B Vent Clip. See Figure 2. Hand-bend the vent line tube as required in the most outboard rib bay to allow the vent line to pass through the rib snap bushing and into the vent clip snap bushing. Hand-bend the vent line tube in the most inboard rib bay to align the flared end of the tube with the bulkhead fitting that will be installed into the inboard Tank End Rib Assembly. Make sure there is at least a 1/4 [6.4 mm] gap between the end of the vent line and the inside of the tank outboard rib. See Figure 2.

Step 4: Rivet the T-1003B-R Tank Inboard Rib - Aft Subassembly to the T-00001-L Fuel Tank Skin, T-00006-L Tank Attach Bracket, and T-1003C-R Tank Inboard Rib-Fwd as shown in Figure 2. Rivets passing through the fuel tank skin are called-out on Page 18-05, Figure 1.

Step 5: Dimple the rivet holes on a MS21053-L08 nutplate for the head of an AN426AD3 rivet.

Rivet the nutplates to the inboard end of the T-00001-L Fuel Tank Skin as shown in Figure 1. See Page 18-05, Figure 1 for the nutplate attach rivets.

Step 6: Install the bulkhead bnion and but on the T-1003B-R Tank Inboard Rib - Aft as shown in Figure 2.

Step 7: Thread the nut onto the bulkhead union and torque the nut. Adjust the bend in the T-00010 Fuel Tank Vent Line if/as required to align the nut to the bulkhead union.

Double-check that the nut is torqued properly. This is the last time that it can easily be done.

Double-check that the vent line is clear and has not become plugged with sealant.

FIGURE 2: TANK VENT LINE & INBOARD END RIB INSTALLATION

Step 1: Bend the IE-F385B Fuel Level Sender float wire to fit the fuel tank as shown on Page 18-10 and the Float Wire Bending Diagram supplied with the fuel level sender. Install the bent wire to the sender as shown in Figure 3. Make sure the float wire snaps into the prongs on the fuel level sender wiper arm. The left side and right side float wires are identical.

NOTE: Do not use tank sealant for this initial installation.

Step 2: Temporarily install the IE F-385B Fuel Level Sender as shown in Figure 1 & Figure 2. Bend the float wire and/or T-00010 Fuel Tank Vent Line so that the float clears the fuel tank vent line. The float and float wire should not contact either the top or bottom tank skin but leave a gap of at least 1/16 [1.6 mm] when the sender reaches its travel limits. Also verify that there is at least a 3/32 [2.4 mm] gap when the float/wire is nearest the T-1004-L rib.

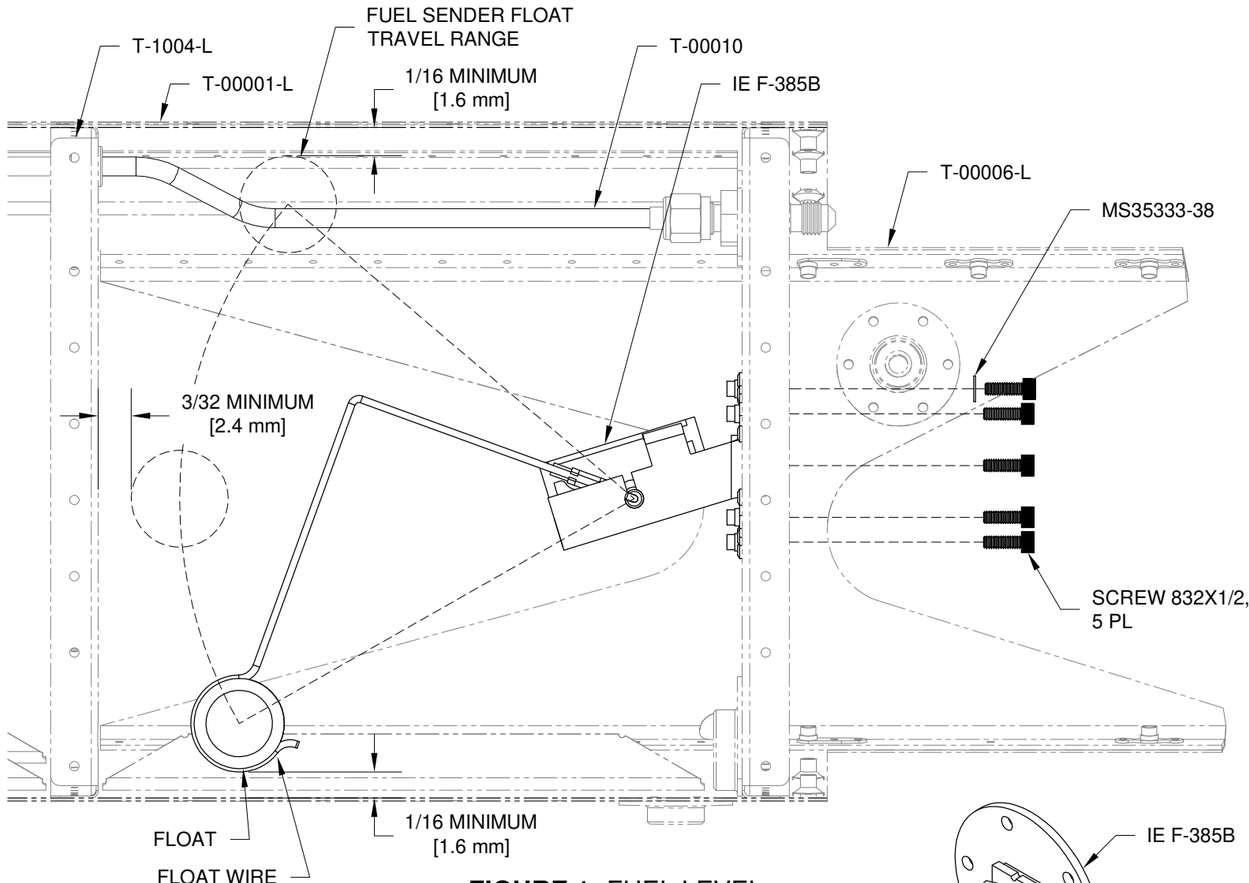


FIGURE 1: FUEL LEVEL SENDER INSTALLATION
(AFT VIEW LOOKING FORWARD)

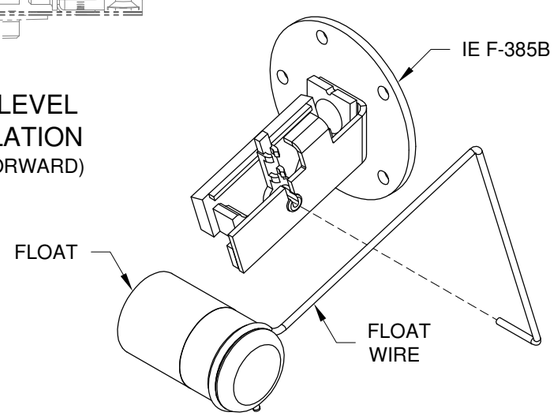


FIGURE 3: FLOAT WIRE INSTALLATION

NOTE: Step 3 can be delayed after Page 18-08 Step 3 for better bucking bar access to the inboard attach zee rivets.

Use tank sealant for this final installation.

Step 3: Final install the IE F-385B Fuel Level Sender as shown in Figure 1 & Figure 2.

Discard the gasket supplied with the fuel level sender.

Apply a 1/16 [1.6 mm] thick layer of sealant to the area of the rib where the fuel level sender will be installed.

Place the fuel level sender in its position on the rib but do not push it down into it's "bed" of sealant.

Start a screw into each hole in the fuel level sender. Note that a lock washer is installed under the head of one of the screws. This should be free of sealant as much as possible for a good electrical ground connection.

Evenly and progressively tighten the screws just enough to cause sealant to bulge evenly from underneath the perimeter of the sender plate.

When finished, there should be a minimum 1/32 [0.7mm] layer of sealant between the rib and the sender.

Leaving a thickness of sealant is important; should the sender ever need to be removed, it allows sufficient gap for a blade to be inserted between the sender and the rib to cut the bond.

Check for continuity between the ground plate on the Fuel Level Sender the T-00001 Fuel Tank Skin using a multimeter.

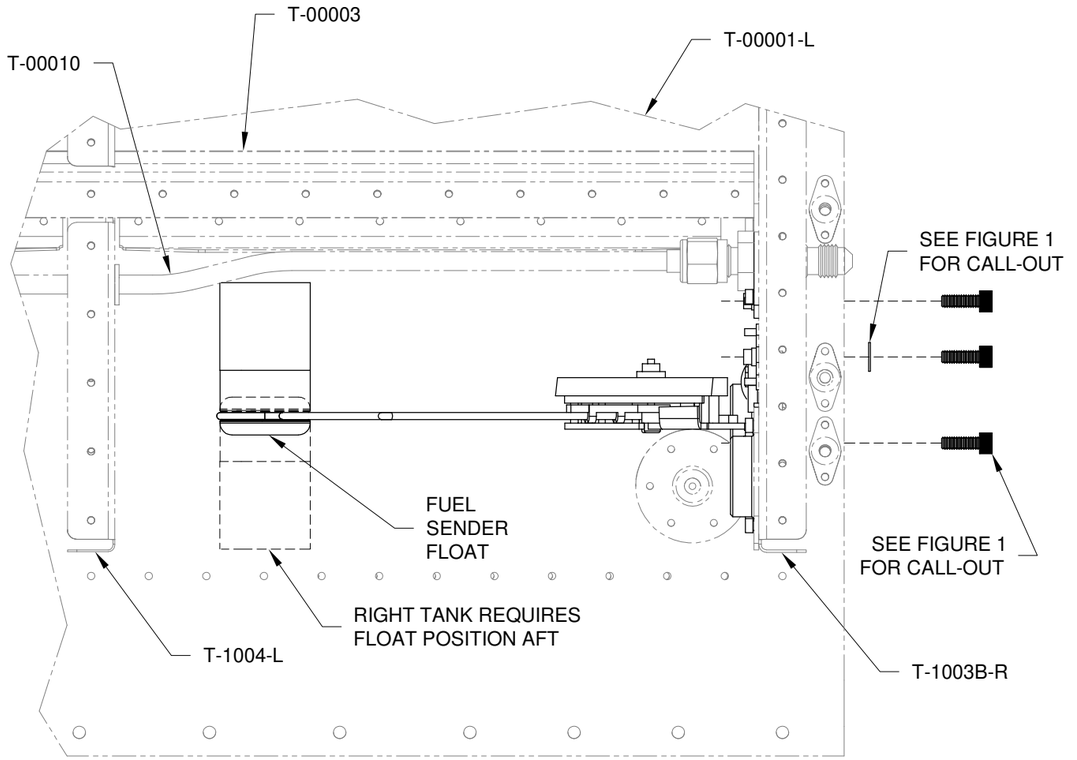


FIGURE 2: FUEL LEVEL SENDER INSTALLATION PLAN VIEW

NOTE: During the following steps, orient the Fuel Tank Assembly using the Leading Edge Assembly Cradle as best allows for the easy application of fuel tank sealant. After sitting for a minute or so, tank sealant should remain attached even if it is necessary to turn the tank upside down.

Step 1: Apply a bead of fuel tank sealant to the T-00001-L Fuel Tank Skin from the tank baffle rivet holes forward. Upon installation, the T-00002 Tank Baffle acts as a squeegee and the bead of sealant will be pushed ahead as the baffle is moved forward. Use a bead of sealant not larger than 3/16 [4.8 mm] Too much sealant will result in thickness buildup, making the tank difficult to install on the wing.

Put a bead of sealant along the inside edge of the flange on each end rib. Put a heavy glob of sealant where each corner of the baffle will meet the end ribs (this is one of the most common locations for leaks).

Put a thin smear of sealant around each of the rib flange rivet holes.

Proper orientation of the T-00002 Tank Baffle places the flange with the "extra" hole on the bottom. See Figure 1. Install the tank baffle by dropping it straight down onto the rib flanges as shown in Figure 1.

Put a cleco in every hole of the tank skin to baffle joint. After clecoing, inspect the skin to see if it is pillowed-out between the clecos. The contact surface of the tank baffle flange may require pressure to force out excess sealant. The easiest method to squeeze-out the excess is to apply a c-clamp or strong spring clamp between each set of rivets. If you are unsure, clamp the flange in a couple of spots and see if it makes a difference.

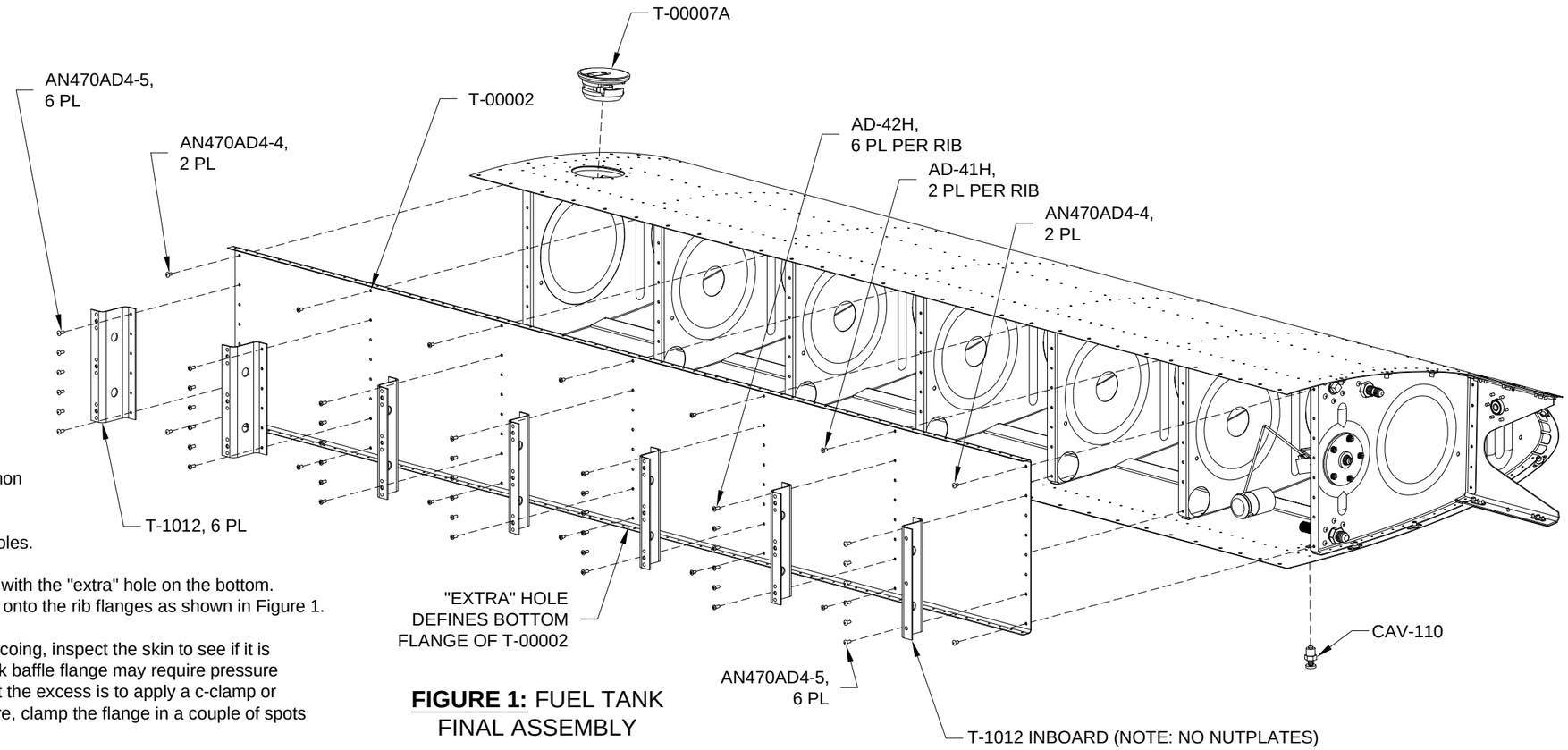


FIGURE 1: FUEL TANK FINAL ASSEMBLY

Step 2: Install the rivets attaching the T-00002 Tank Baffle to the T-1003-L, T-1003B-R and T-1004-L Fuel Tank Rib flanges as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.

Step 3: Apply a thin smear of sealant over each hole for mounting the T-1012 Tank Attach Zees. Cleco the tank attach zees in place. Check for proper tank attach zee orientation as shown in Figure 1.

Install the tank attach zee to tank baffle to rib flange rivets as shown in Figure 1. Twirl the closed-end blind rivets in sealant just before installation. The solid rivets that are installed through the end ribs need not be twirled in sealant.

Step 4: Install rivets attaching the T-00001-L Fuel Tank Skin to T-00002 Tank Baffle in all skin holes that have been countersunk. See Page 18-04, Figure 1 for rivet call-outs. After sealant has cured, machine countersink the remaining skin holes and install rivets.

Machine countersink the 5 screw holes in the T-00006-L Attach Bracket to fit a piece of aluminum that has been dimpled for a #8 flush head screw.

Step 5: Install the T-00007A Fuel Cap and CAV-110 Drain Fitting as shown in Figure 1. Seal the Drain Fitting with a fuel compatible thread sealant. (Fuse Lube, Loctite, etc...).

CAUTION: The tank sealant must be fully cured before leak testing the Fuel Tank Assembly. Use less than 1 psi. DO NOT over pressurize the Fuel Tank Assembly.

Step 1: Install the VA-261 Fuel Strainer to the T-1003B-R Tank Inboard Rib - Aft and place a balloon over the fuel strainer as shown in Figure 2. Seal the strainer with a fuel compatible thread sealant. (Fuse Lube, Loctite, etc...).

Install the AN913-3D plug fitting as shown in Figure 2.

Connect the EA HOSE H177 X 3 to the AN832-4D Bulkhead Union then connect the Fuel Air Tank Valve to the hose.

Follow the instructions provided with the Fuel Tank Test Kit to test the Fuel Tank Assembly for any leaks. Repair any leaks and re-test until no leaks are detected.

After removing the hose and air valve from the bulkhead union, it is recommended to place a balloon or similar cover over the open end of the vent line. This is to keep debris and/or nesting insects and/or honey badgers from blocking the vent line.

Step 2: Install the Fuel Tank Assembly to the Wing Spar and Leading Edge Subassembly as shown in Figure 1.

The edges of the T-00001 Fuel Tank Skin must have a zero to 1/64 [0.4 mm] gap between the adjacent wing skin edges. A larger gap may be desireable if the aircraft is to be painted, while zero gap may be desireable if the aircraft is to be left in natural aluminum. Check the fit of the fuel tank skin and file the edges as required before installing all fuel tank attach fasteners.

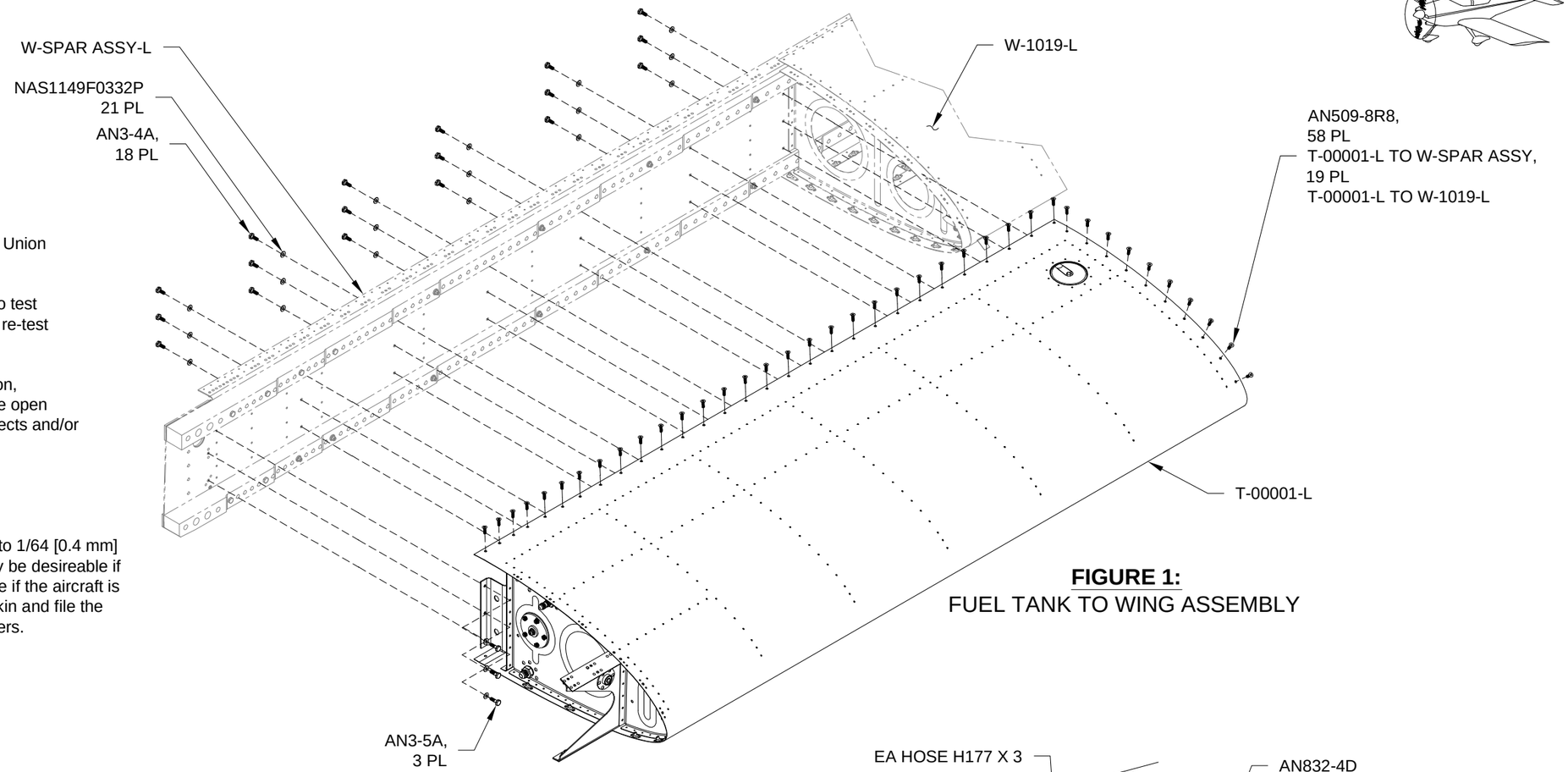


FIGURE 1:
FUEL TANK TO WING ASSEMBLY

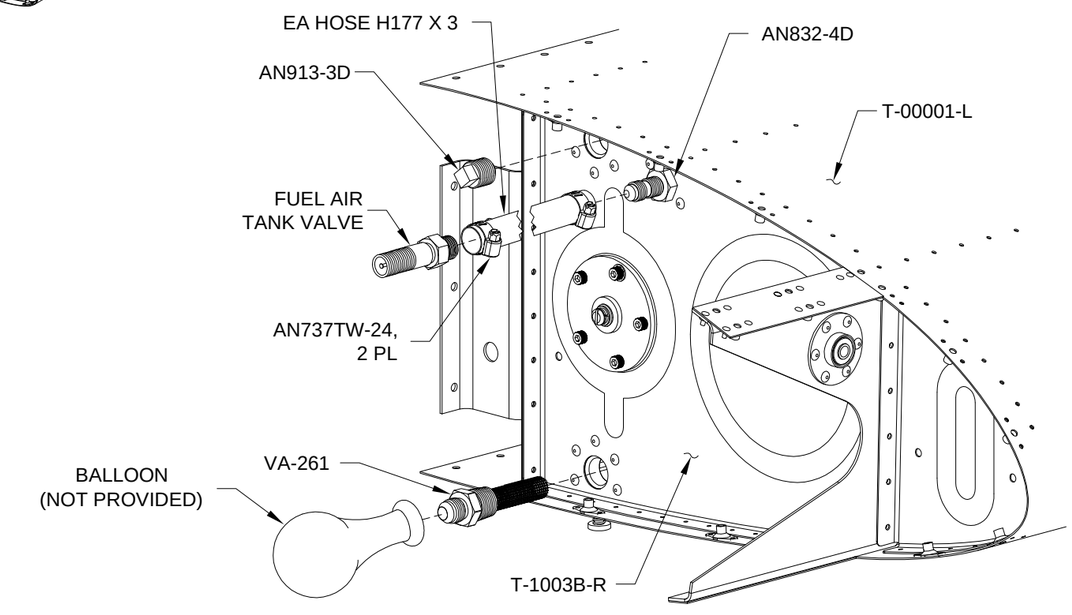


FIGURE 2: FUEL TEST ASSEMBLY VIEW

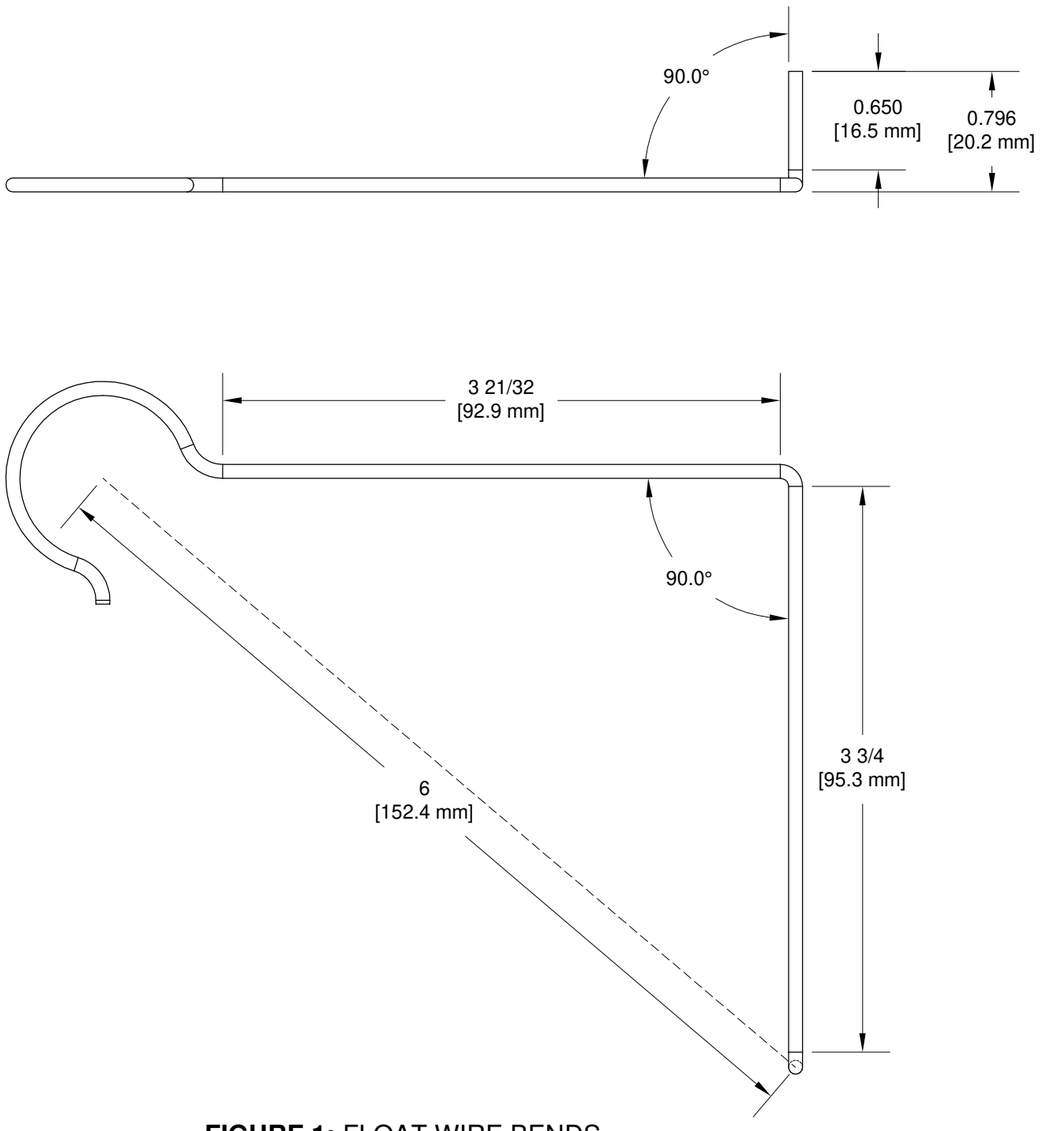


FIGURE 1: FLOAT WIRE BENDS

(NOTE: CHECK PRINTED SCALE 1:1 PER SECTION 3 BEFORE USING THE TEMPLATE!)

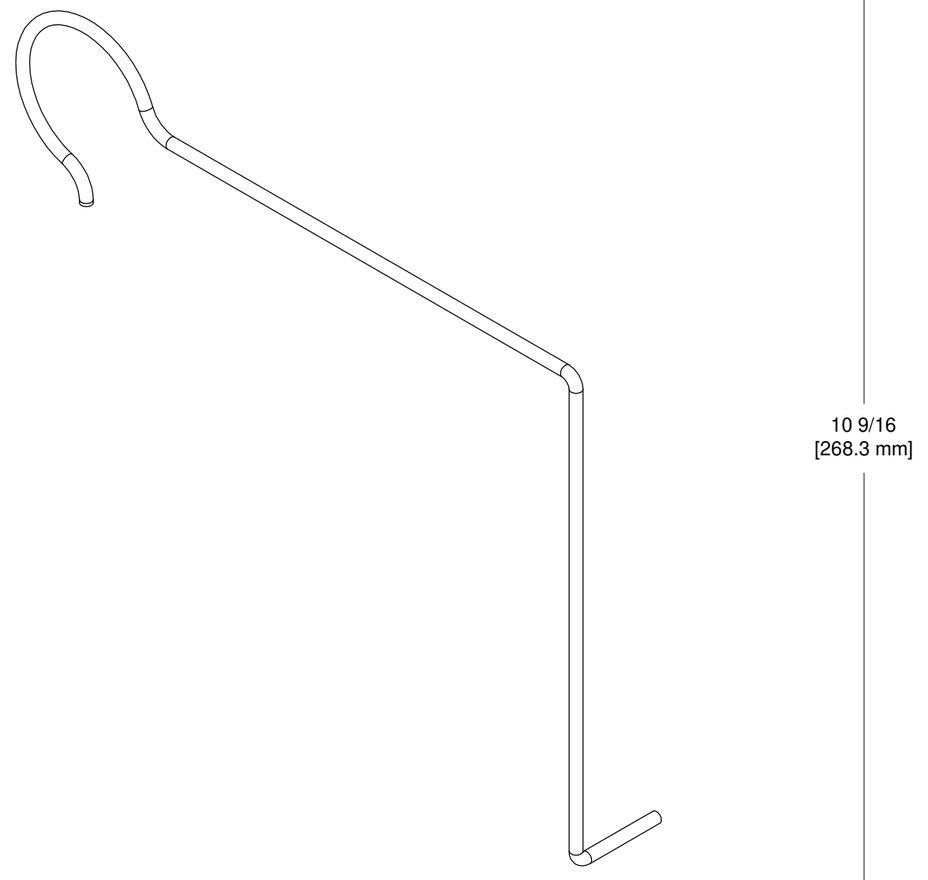


FIGURE 2: FLOAT WIRE ISOMETRIC VIEW

16
[406.4 mm]