Step 5: Assemble the Rudder Pedals

Position each brake actuator bracket/pivot bracket pair on the forward side of a rudder pedal (the side closest to the airplane's nose), as shown in Figure 11, with the pivot holes in the two brackets **1-5/8"** above the lower edge of the pedal. Position the two brackets **3-5/32"** apart, equidistant from the vertical centerline of the pedal, as shown. Make sure the two brackets are parallel to each other and square to the pedal. Clamp the brackets to the pedal.

Note The pedal assembly shown in Figure 11 is the **right** pedal. The left rudder pedal is a mirror-image of the right. Assembled in this manner, the brake actuator brackets of the left and right rudder pedals are positioned next to each other when the pedals are mounted to the rudder control, as shown in Figure 1.

Use the #40 pilot holes in the bracket flanges as guides to drill **#30** rivet holes through the bracket/pedal assembly.

Disassemble the rudder pedals, deburr the rivet holes and apply corrosion protection to the parts.

Note Because you'll be riveting two dissimilar metals together (steel to aluminum), it's especially important to apply adequate corrosion-protection to the contact surfaces of the parts.

Rivet the rudder pedal brackets to the rudder pedals with 1/8" AN470AD4 universal-head rivets. Place the rivet heads on the pedal sides of the assemblies.

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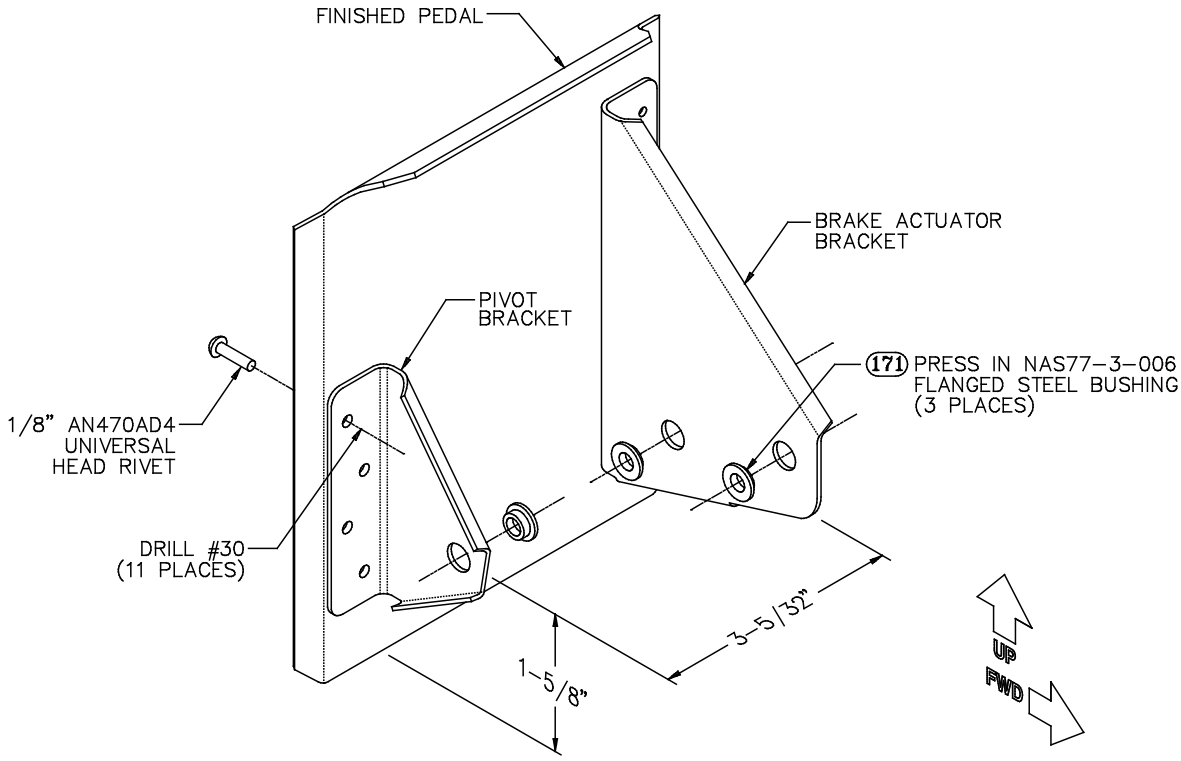

Figure 11: Rudder Pedal Assembly

Step 6: Mount the Rudder Pedals on the Rudder Control Weldments

As shown in Figure 11, press an NAS77-3-006 **flanged-steel bushing** [171] into each of the brake pedal bracket pivot holes with the bushing flanges toward each other. Also, press NAS77-3-006 bushings into the master cylinder mounting holes of the brake actuator brackets. Secure the bushings by applying Loctite bearing mount adhesive before pressing them in, or stake the bushings if they are loose in their holes.

Note The illustrations in this section show the pilot's rudder pedals mounted on the **left** side of the airplane. If you wish to set up the airplane for flight from the right seat (in order to have a left-hand throttle, for example), you may install the pilot's rudder pedals on the **right** side. (If you are installing the Dual Brake Option, of course, the pilot can fly from either seat.) The only other changes needed to fly primarily from the right seat would be in the placement of the instruments on the panel.

Use an AN3-35 **drilled-shank bolt** [93], two AN960-10L **thin washers** [141], an AN310-3 **castle nut** [100] and an AN380-2-2 **cotter pin** [113], as shown in Figure 12, to mount each rudder pedal to its rudder control. Position the brake actuator brackets of the left and right pedals next to each other, as shown in Figure 1.

Hint Cotter pins are specified in many places throughout the control system to secure various fasteners. While the cotter pins certainly should all be properly installed at final assembly before flying your GlaStar, you will save time and trouble at this stage if you leave them out. You will be installing and removing bolts and castle nuts numerous times as you proceed, so for now just thread the nuts on finger-tight without the cotter pins to make removal and reinstallation as easy as possible. One exception is for clevis pins that aren't held in by gravity; use cotter pins with these to keep them from falling out during the initial control system assembly procedures. Bend the ends of these cotter pins just enough to hold them in place; if not bent too far, they can be removed and replaced easily and reused multiple times.

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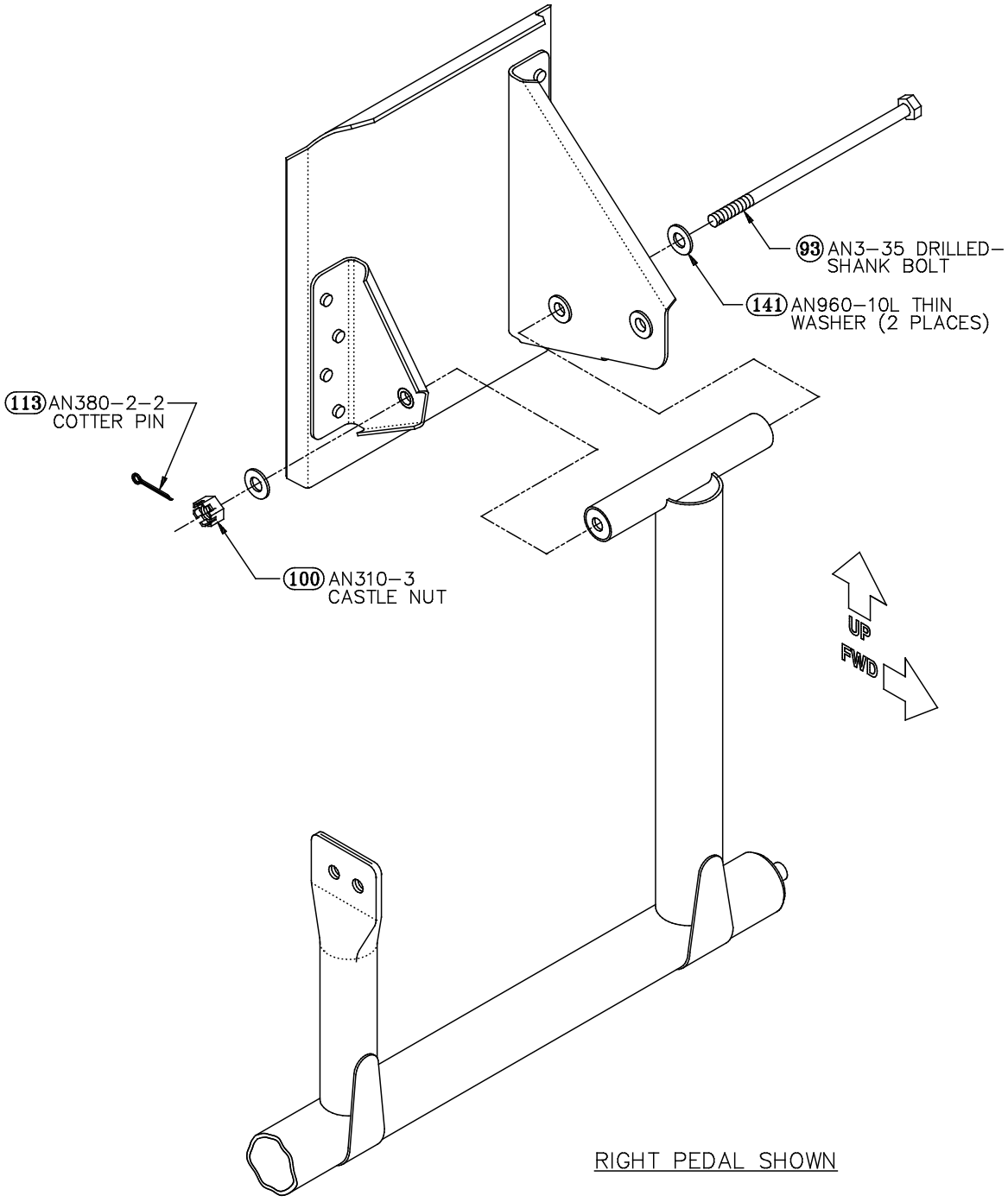

Figure 12: Mounting the Rudder Pedals

Step 7: Fabricate the Brake Master Cylinder Mounting Brackets

Use the supplied **.063" X 1" X 2-3/4" formed aluminum angle** [54] to fabricate four **master cylinder mounting brackets**, as shown in Figure 13. Be sure to make two left-hand brackets and two mirror-image, right-hand brackets. Use a bandsaw or a hacksaw to cut out the brackets, and finish the cuts with a belt sander or a file. Lay out, center punch and drill the two **#10** mounting bolt holes in the narrow flange of each bracket.

Dual Brake Option If you are installing the Dual Brake Option, use the additional material supplied with the option kit to fabricate two extra pairs of master cylinder mounting brackets. Use the same procedures described in this and the following step to mount the two additional master cylinders on the co-pilot's side.

Divide the four brackets into two pairs consisting of one left-hand and one right-hand bracket. The mounting holes for the master cylinders will be drilled in the next step, after which additional trimming of the brackets may be necessary. The brackets will be deburred and corrosion-proofed after any necessary final trimming.

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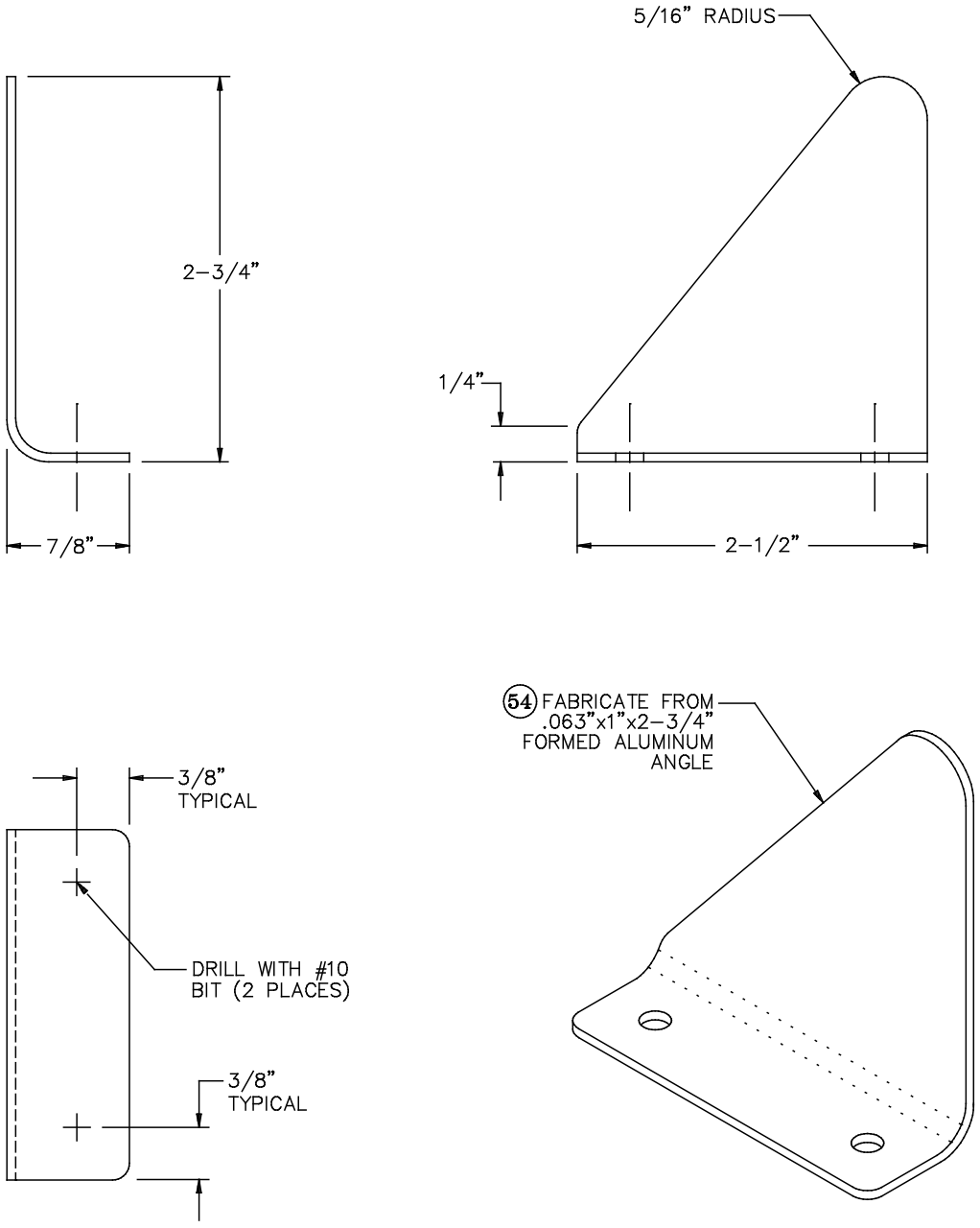


Figure 13: Master Cylinder Mounting Brackets

Step 8: Install the Brake Master Cylinders

In the neutral position, the rudder pedal pivot tubes (the small, horizontal tubes to which the rudder pedals are attached) for the left and right rudder controls are aligned, which means that the right rudder control stem (the upright tube to which the rudder pedal pivot tube is welded) must angle forward slightly and the left rudder pedal stem must angle aft slightly, as shown in Figure 14. The rudder pedals themselves, in the neutral position, are perpendicular to the waterline. Use tape, wire, clamps or any means necessary to securely support the rudder controls and the rudder pedals in the neutral positions.

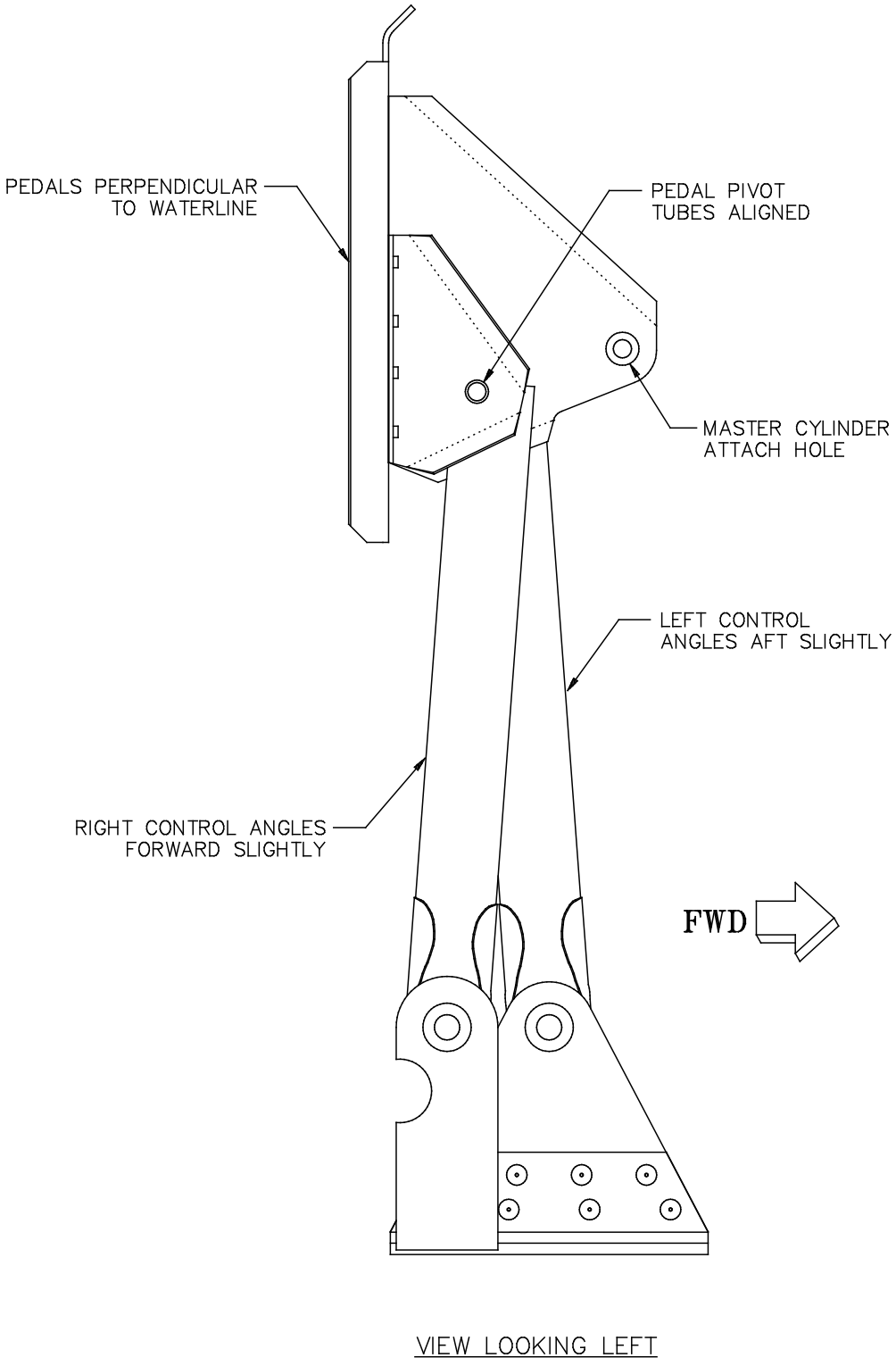
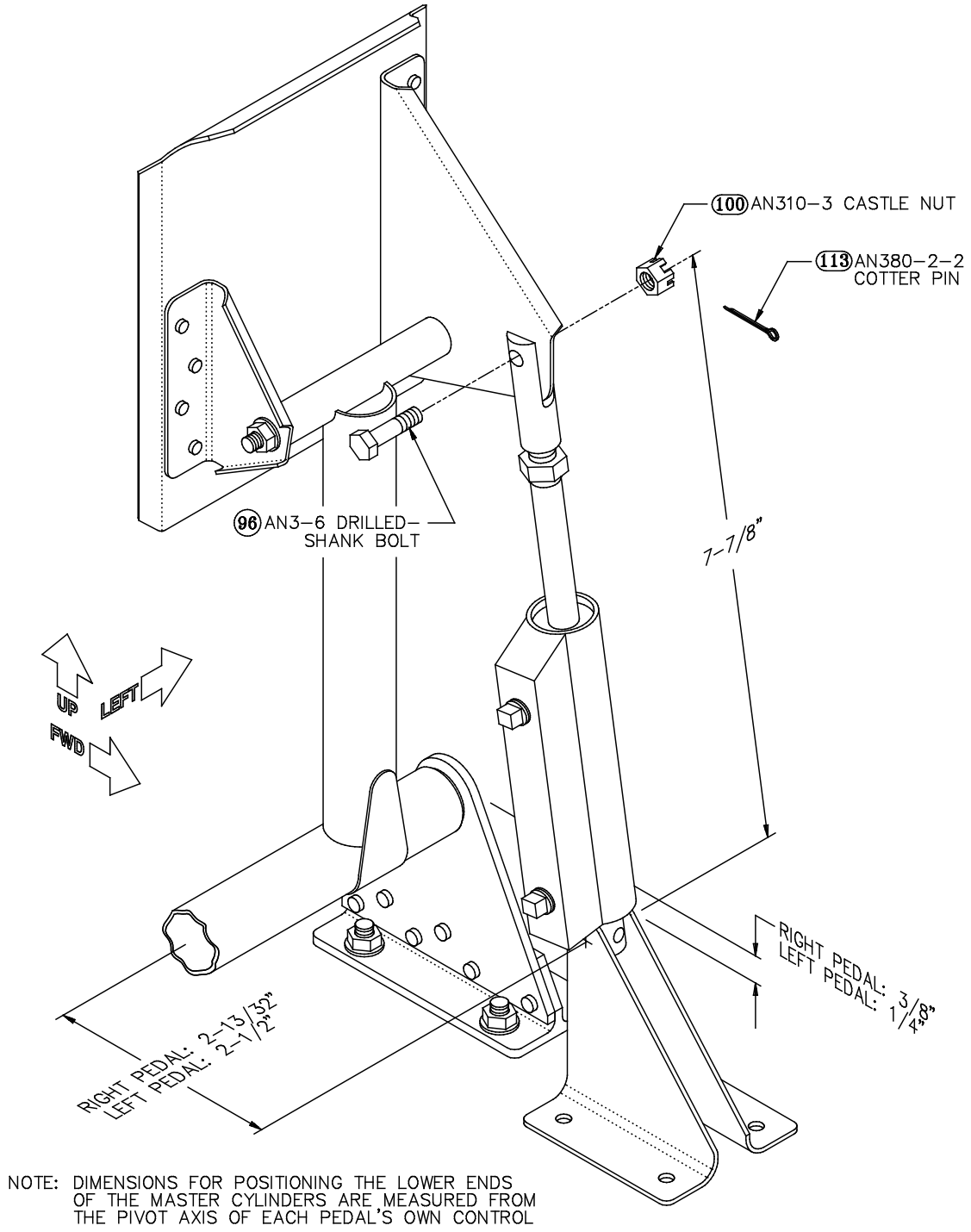


Figure 14: Rudder Pedal Neutral Position



RIGHT PEDAL SHOWN

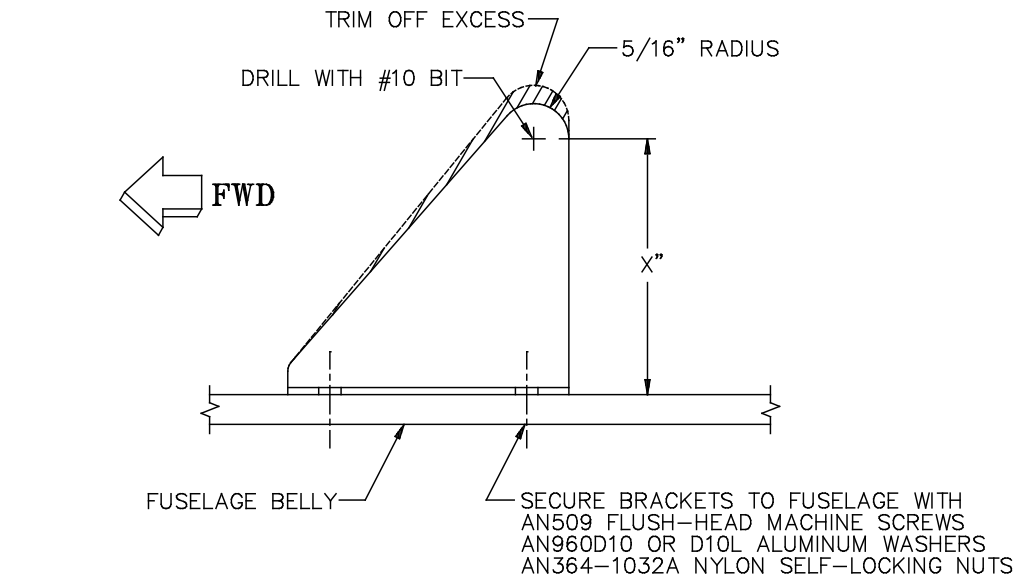
Figure 15: Master Cylinder Installation

With each **brake master cylinder** [18] in the extended (relaxed) position, thread the piston rod fork onto the piston rod until the distance between the hole in the fork and the hole at the base of the master cylinder body is **7-7/8"**, as shown in Figure 15. Lock the fork to the piston rod by tightening the jam nut against it.

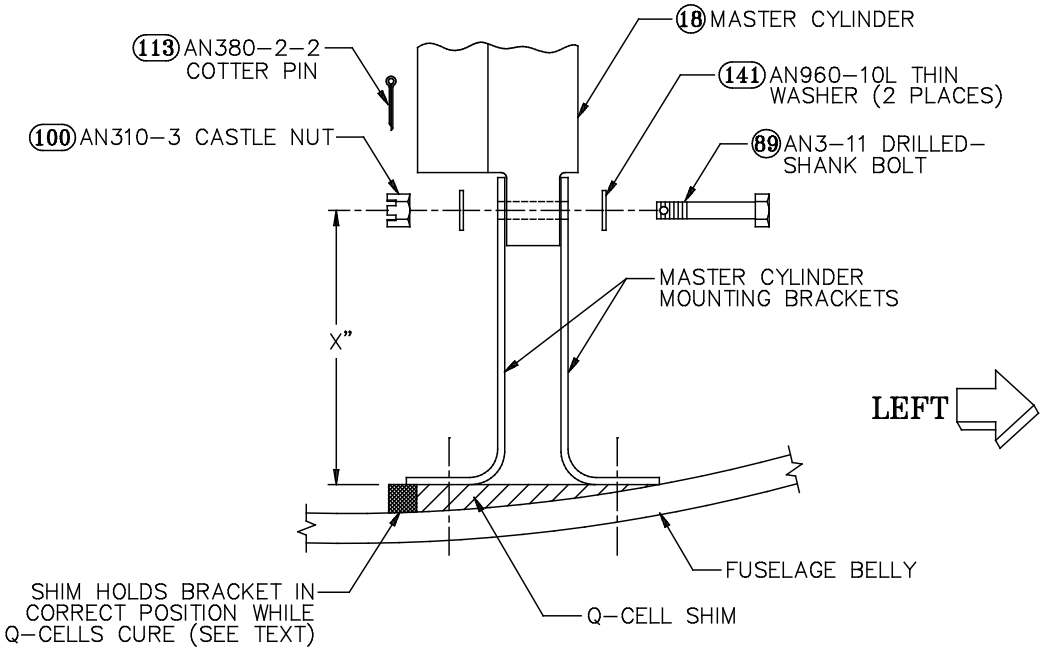
Note The master cylinders come with small, plastic plugs in the ports. To prevent the entry of contaminants, leave the plugs in until you are ready to connect the brake lines, which will be described in a later step.

Fasten the piston rod end of the left master cylinder to the brake actuator bracket of the left rudder pedal, using an AN3-6 **drilled-shank bolt** [96], an AN310-3 castle nut and an AN380-2-2 cotter pin.

Position the mounting point at the lower end of the **left** master cylinder **1/4"** below and **2-1/2"** forward of the left rudder control pivot axis, as shown in Figure 15.



SIDE VIEW



VIEW LOOKING AFT

Figure 16: Finishing the Master Cylinder Mounting Brackets

While holding the master cylinder in the position described in the last paragraph, measure the height of the lower master cylinder mounting hole above the highest point of the fuselage belly that will be contacted by the master cylinder mounting brackets, as shown in Figure 16. (The dimension is marked **"X"** in the figure.) Transfer the measurement to one of the master cylinder mounting bracket pairs, as shown, and center punch the mounting hole location onto one angle of the pair.

Note If the X measurement is greater than 2-7/16", mark the hole location 2-7/16" above the base of the bracket. Otherwise, the edge distance from the top of the bracket to the center of the hole will be too small. In this situation, the thickness of the Q-cell shim will be increased as necessary to position the end of the master cylinder at the correct height.

Hold the two angles of the bracket pair back-to-back and drill the **#10** mounting hole through both angles at the same time. Trim the upper ends of the bracket angles to a **5/16"** radius centered on the master cylinder mounting hole, as shown, and trim off excess material. Deburr and corrosion-proof the brackets. Wax the bases of the brackets so they won't stick to the Q-cell shim.

Note For the **outboard** master cylinder brackets, stagger the inboard bracket down about 1/8" relative to the outboard angle while drilling the master cylinder mounting hole. This will reduce the thickness of the Q-cell shim needed under the bracket.

Mount the lower end of the master cylinder between the master cylinder mounting brackets, using an AN3-11 **drilled-shank bolt** [89], AN960-10L thin washers, an AN310-3 castle nut and an AN380-2-2 cotter pin, as shown in Figure 16. When installing the master cylinders, point the ports for the fluid lines **inboard**.

Apply a layer of thick Q-cell mixture to the area of the fuselage belly where the master cylinder support brackets mount. Lower the brackets into the Q-cell mixture until the lower end of the master cylinder is in the position described above: 2-1/2" forward and 1/4" below the left rudder control's pivot axis. Let the Q-cell mixture cure.

Hint It will be easier to do this if you use some kind of shim (a piece of wood under the corner of the support bracket that's farthest from the shell, or a built-up hot-glue shim along one edge) to position the master cylinder the correct distance from the rudder control pivot axis. This will free you from measuring and adjusting the position of the master cylinder after the Q-cell mixture is in place. If you use hot glue for this purpose, it could remain as a permanent part of the Q-cell shim.

Repeat these procedures for the **right** master cylinder and its mounting brackets, except position the mounting point at the lower end of the **right** master cylinder **3/8"** below and **2-13/32"** forward of the **right** rudder control pivot axis.

Note In order for the rudder pedals to maintain the same angle throughout their entire stroke, the master cylinders would have to form perfect parallelograms with the pedal stems. The geometry of the rudder control system does not permit this. Using the specified dimensions for positioning the master cylinders is actually better than a pure parallelogram linkage in that, as the rudder pedal is pushed forward, the top of the pedal rotates aft slightly, making it easier to apply brake with rudder. The position of the left master cylinder relative to the left rudder control weldment is different from the position of the right cylinder relative to the right rudder control weldment because the neutral positions of the two pedals are different.

After the Q-cell shims for both master cylinder brackets have cured, use the holes in the mounting bracket flanges as guides to drill **#10** mounting holes through the fuselage shell. Countersink the outside of the fuselage for the mounting screws, and mount the brackets to the fuselage with AN509 flush-head machine screws and AN364-1032A nylon self-locking nuts. Because of the varying thicknesses of the Q-cell shims, you will need different length screws for each location (there should be an adequate assortment of different lengths left over from the fuselage assembly). Use standard procedures to choose the correct length screws, adjusting their fit with AN960D10 and AN960D10L aluminum washers as necessary.

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