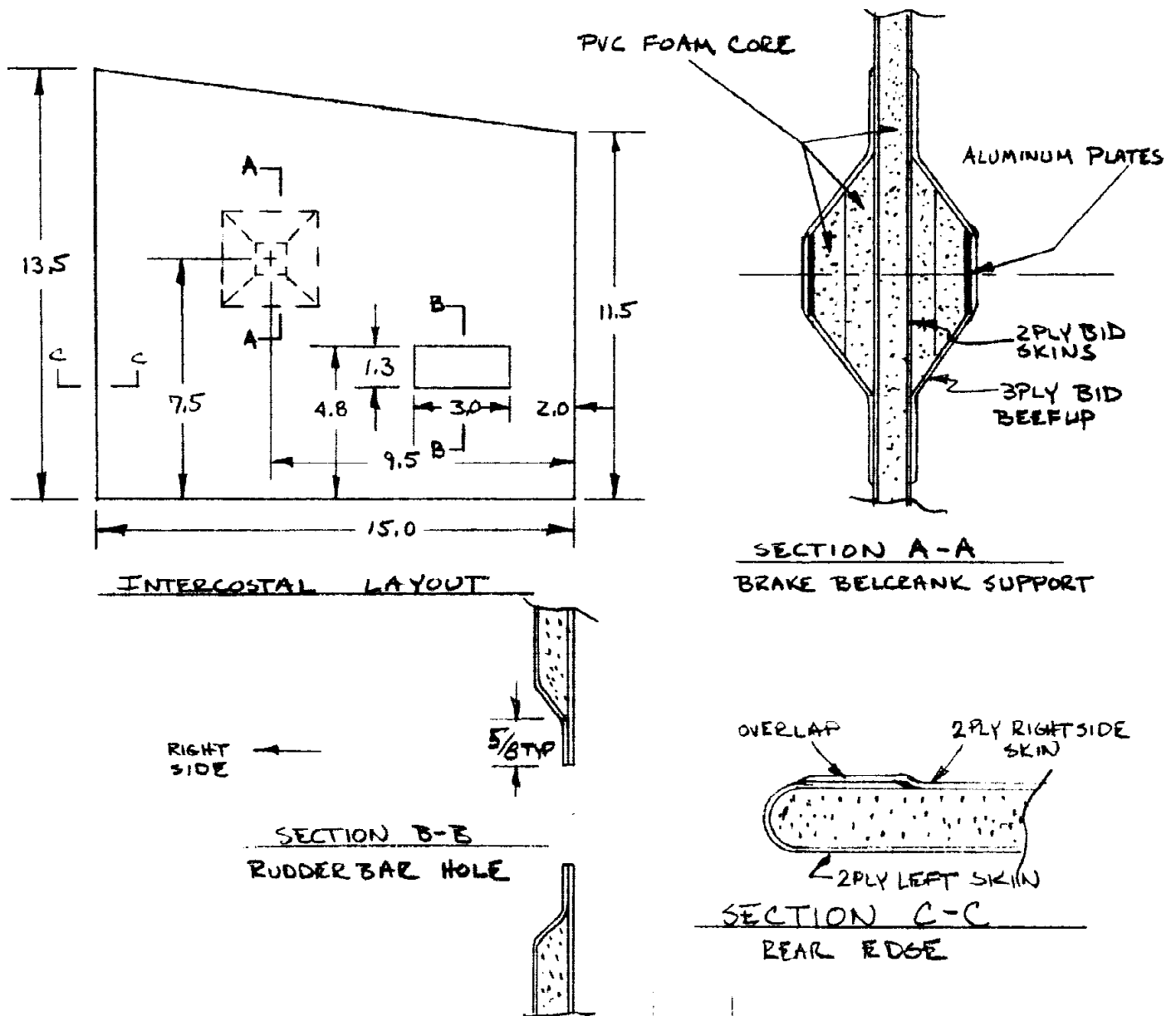


### Intercostal and Associated Systems

Along B.L.O. from the firewall to the aft end of the fuel tank is an intercostal (that's a bulkhead turned sideways) from the bottom of the airplane to the bottom of the fuel tank. This little jigger supports the fuel tank, stiffens the nose gear attachment, mounts the rudder bar, mounts the brake system, and most of the fuel system. It does more than its share of the work.

CUT OUT A 6 LB/FT<sup>3</sup> PVC FOAM CORE AS SHOWN BELOW.



Cut out the 3 x 1.3 inch rudder bar hole then mark the 3 x 3 inch outline of the rudder belcrank support. Sand the rear (13.5 inch) edge of the intercostal to a smooth radius as shown in Section C-C. Lay masking tape parallel to the rear edge of the intercostal on the right side, 1 inch back from the edge.

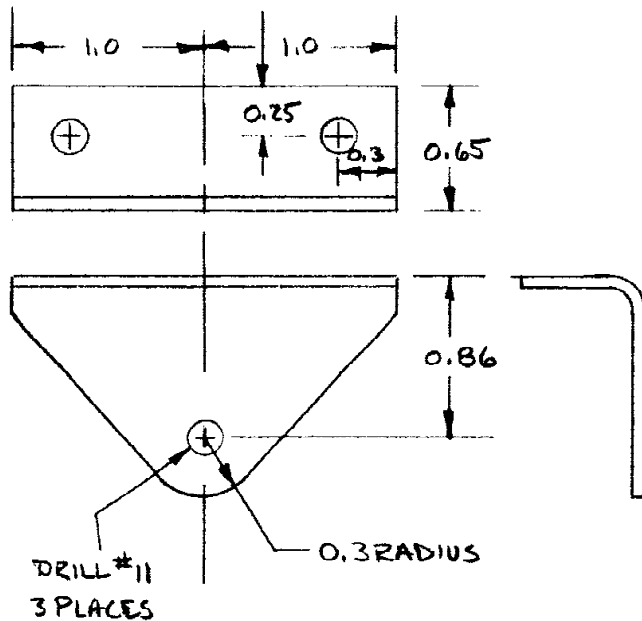
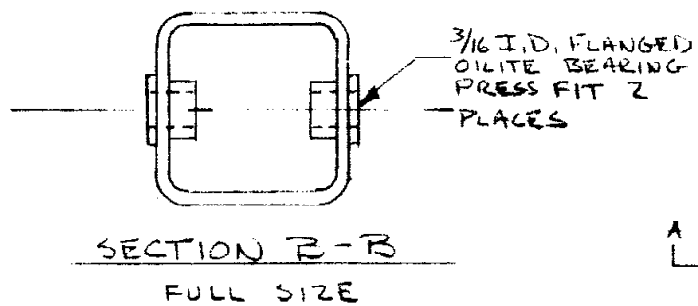
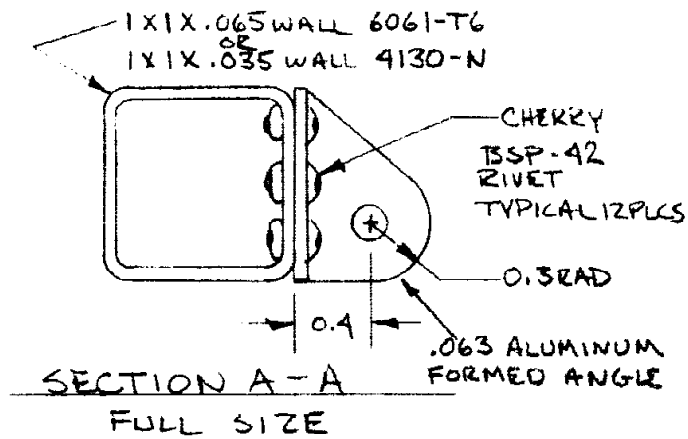
Cut 2 pieces of 45° BID 17 x 14 inches for the left side skin lay up. Cut four strips of 2 inch wide peel ply 14 inches long and one 5 inches long. Cut one 5 inch strip of 4 inch wide peel ply. If necessary, fixture the intercostal flat to your work bench with 5 min/micro dabs. Be sure to over hang the table edge with the aft edge ( 2 inch over hang). Mix epoxy, slurry the left side, the rear (radiused) corners and up to the tape underneath (right side). Lay up two plies of 45° BID over the left side and wrap underneath. Use masking tape on the end of the cloth underneath to keep the over lap area from springing away from the foam at the edge. Tape won't stick to wet cloth. Wet the bottom side (right) overlap out and then work forward on the left (top) side. Peel ply the top, bottom, and forward edges of the left side. Peel ply the overlap area underneath and the brake belcrank support area also. Knife trim the edges of the intercostal, the hole, and the tape line underneath. Remove the tape and let cure.

After curing, remove the intercostal from the work bench and remove the peel ply from the overlap area on the right side. Use your rotary file and electric drill to remove foam around the rudder bar hole as shown in Section B-B above. Prepare the exposed skin plies for bonding. Lay tape along the aft edge where the overlap ends (Section C-C). Cut 2 pieces of 45° BID 15 x 14 inches, 3 strips of 2 inch wide peel ply 14 inches long, one 5 inch strip of 2 inch and one 5 inch strip of 4 inch peel ply. Lay up the two BID right side skin plies, peel ply the top, bottom, and front edges and the belcrank support area (5 in x 5 in). Knife trim and cure.

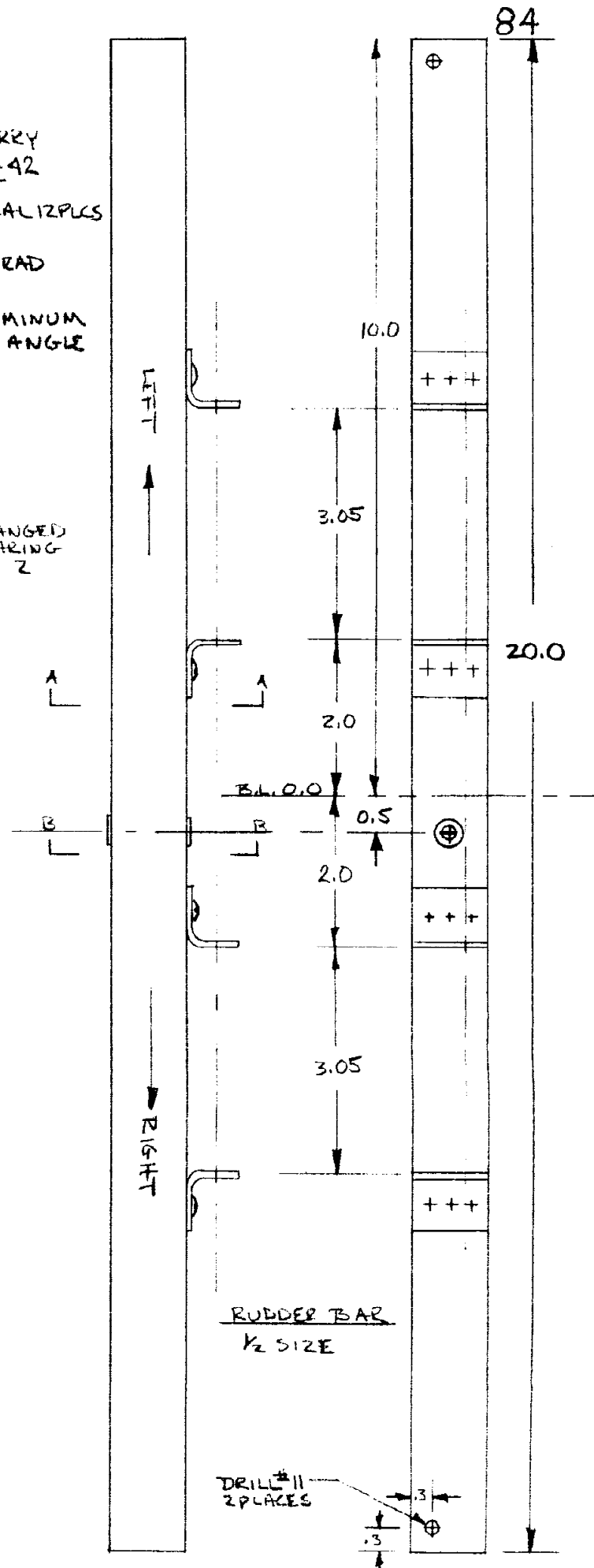
Next, cut two 1 x 1 pieces of .063 aluminum (2024-T3), two 2 1/8 x 2 1/8 pieces of 9 mm 6 lb/ft<sup>3</sup> PVC foam, and two 3 x 3 pieces of 9 mm 6 lb/ft<sup>3</sup> PVC foam. Stack one piece of each size to form the belcrank support pad. Bond the metal and two PVC foam blocks with 5 min/flox. Cure 30 minutes, then sand the two blocks into two smooth pyramids. Remove the peel ply from the belcrank support areas on the intercostal and bond the pyramids to it using 5 min/flox. Clean off any squeeze out. Go cut six pieces of 45° BID 5.5 x 5.5 inches. Lay up 3 plies 45° BID over each support block, overlapping 3/4 inch minimum onto the intercostal. Cure.

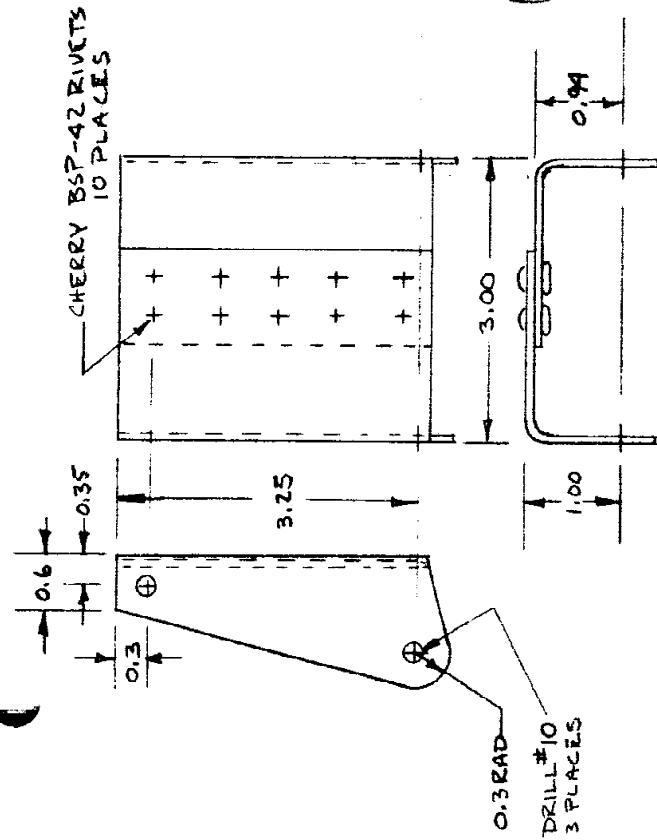
Cut a piece of 1/4 O.D. x .035 wall 2024-T3 aluminum tubing 2 1/4 inches long. Locate the center of one belcrank support block and drill through to the far support block. Increase the hole size to 1/4 diameter. Press the 2 1/4 long piece of tubing through the hole so that it sticks out on each side about 1/8 inch. If the hole is tight on the aluminum tube simply mix a bit of 5 min/flox and pack a small radius around the protruding ends. If the tube is a loose fit in the hole, plug one end of the tube with a foam scrap, work 5 min/flox down into the hole, then push the aluminum tube into position. Cure over night then drill the inside of the tube out to #11.

Go make the rudder bar, brackets, belcranks and pedals shown below.

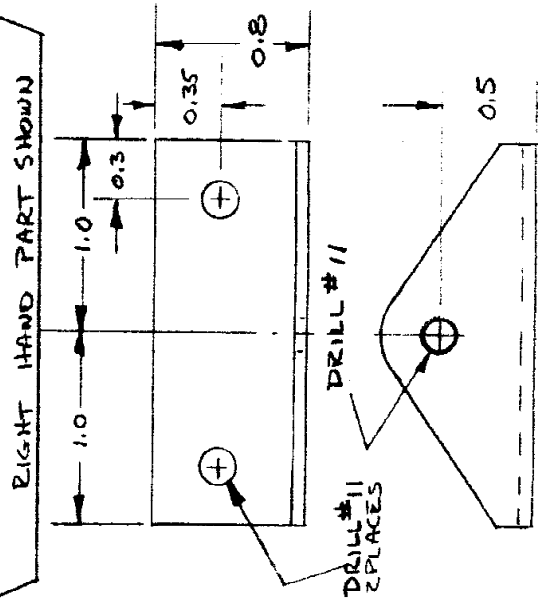


RUDDER BAR MOUNT BRACKET  
SHOWN FULL SIZE  
MAKE 2 FROM 2X2X.063  
2024-T3 ALUMINUM FORMED  
ANGLE

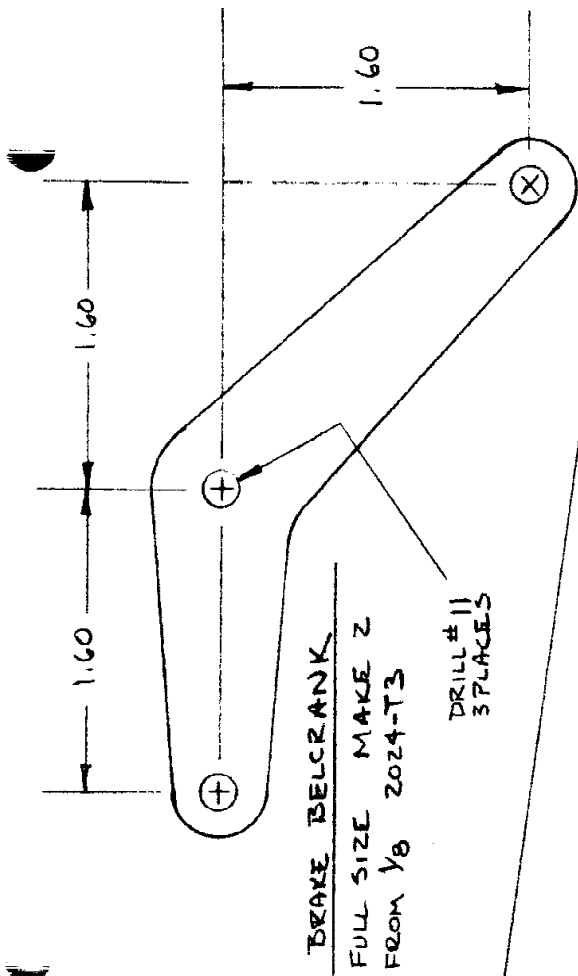




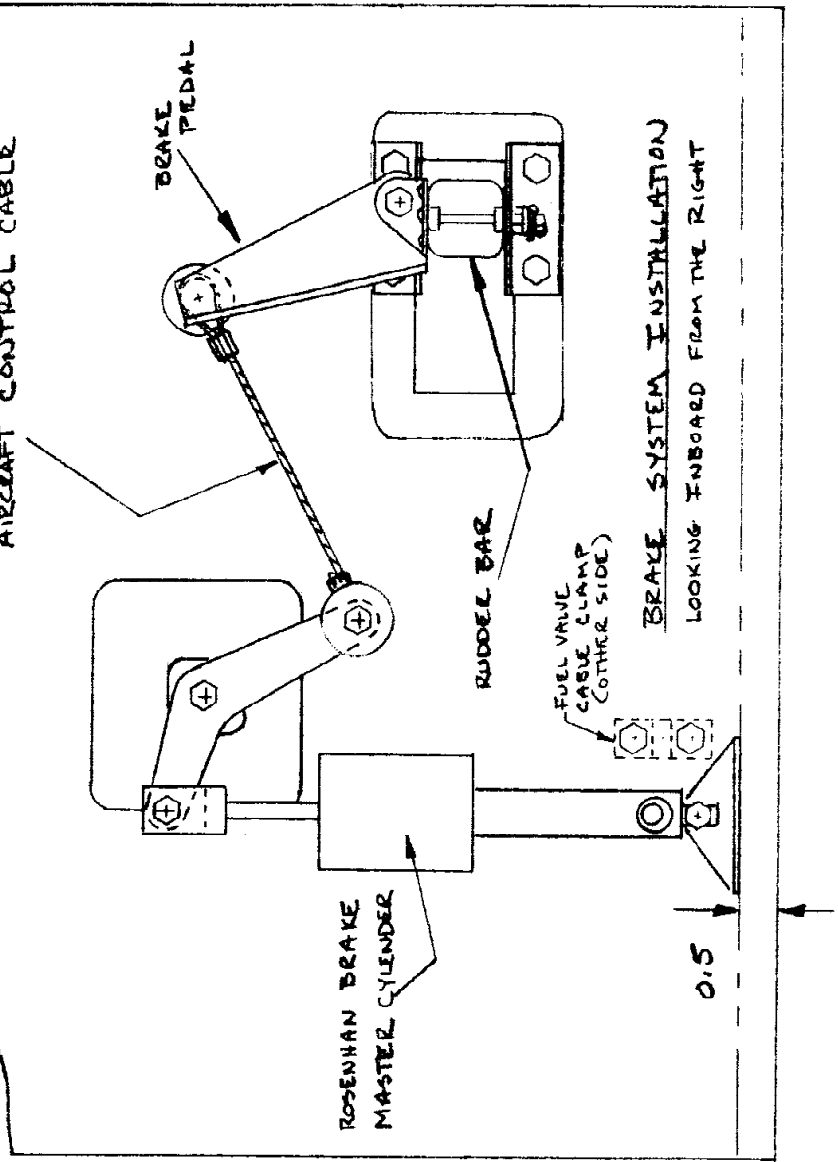
BRAKE PEDALS  
SHOWN 1/2 SIZE (MAKE 2)  
USE 2X2.063 FORMED  
2024-T3 ANGLE



MASTER CYLINDER MOUNTS  
MAKE 4 FROM 2X2 INCH .063  
FORMED ALUM INUM ANGLE



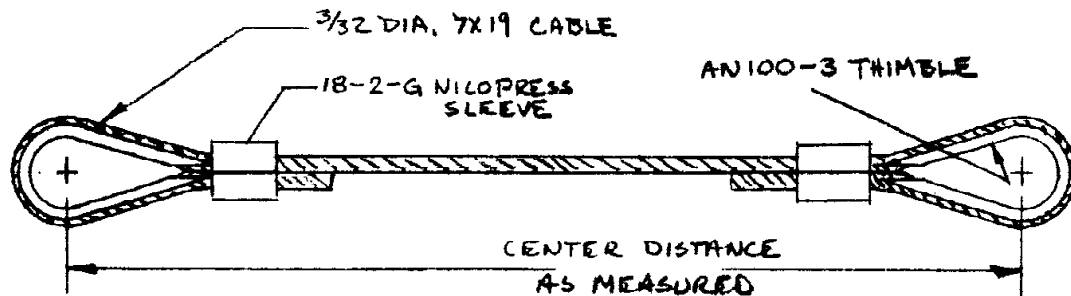
3/32 DIA 7X19 STAINLESS  
AIRCRAFT CONTROL CABLE



Locate the two rudder bar mount brackets on the right side of the intercostal as shown in the assembly sketch. The pivot for the rudder bar should be  $\frac{3}{4}$  of an inch aft of the hole's forward edge ( $2\frac{3}{4}$  aft of the front edge of the intercostal). The two brackets must have 1.12 inch gap between them to allow free motion of the bar. Drill four #11 mounting holes through the glass edges of the hole and install four AN3-4A bolts, MS21042-3 nuts, and AN960-10 washers to attach the fittings. Install the rudder bar with one AN3-16 bolt, two AN960-10 washers, one AN310-3 nut, and leave out the cotter pin (MS24665-132) until final assembly. Install the toe brake pedals (see installation sketch) using two AN-3-34 bolts, two AN960-10 washers, two AN310-3 nuts, and two more cotter pins. The bolts should be finger snug, not wrench tight.

Find your Brake Master Cylinders, slip an AN3-6 bolt through the mount brackets and the bottom lug on the B.M.C., run an AN310-3 nut down on each but hold the cotter pins. Bolt the short leg of each brake belcrank to the clevis on top of the B.M.C. using an AN3-8A bolt, and MS21042-3 nut.

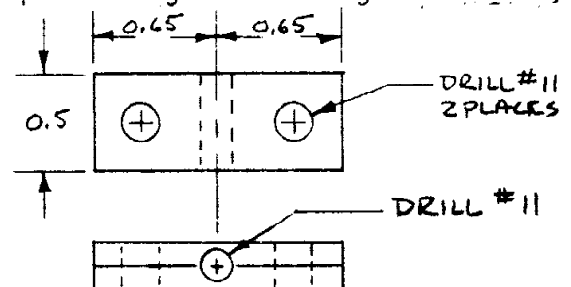
Prop the intercostal up vertically. Slip an AN3-34 bolt through the right belcrank's center hole, through the support block on the intercostal and then through the left belcrank. Run an AN310-3 nut up finger tight. Stand the B.M.C. mount brackets on top of some  $\frac{1}{2}$  inch thick foam scraps. Position the rudder bar in neutral position with the brake pedals leaning aft (toward master cylinders). Carefully measure and record the distance from the lower belcrank hole (long arm) to the top hole in the rudder pedal's inboard flange. Go make two cable assemblies as shown below which are exactly the dimensions between centers that you measured.



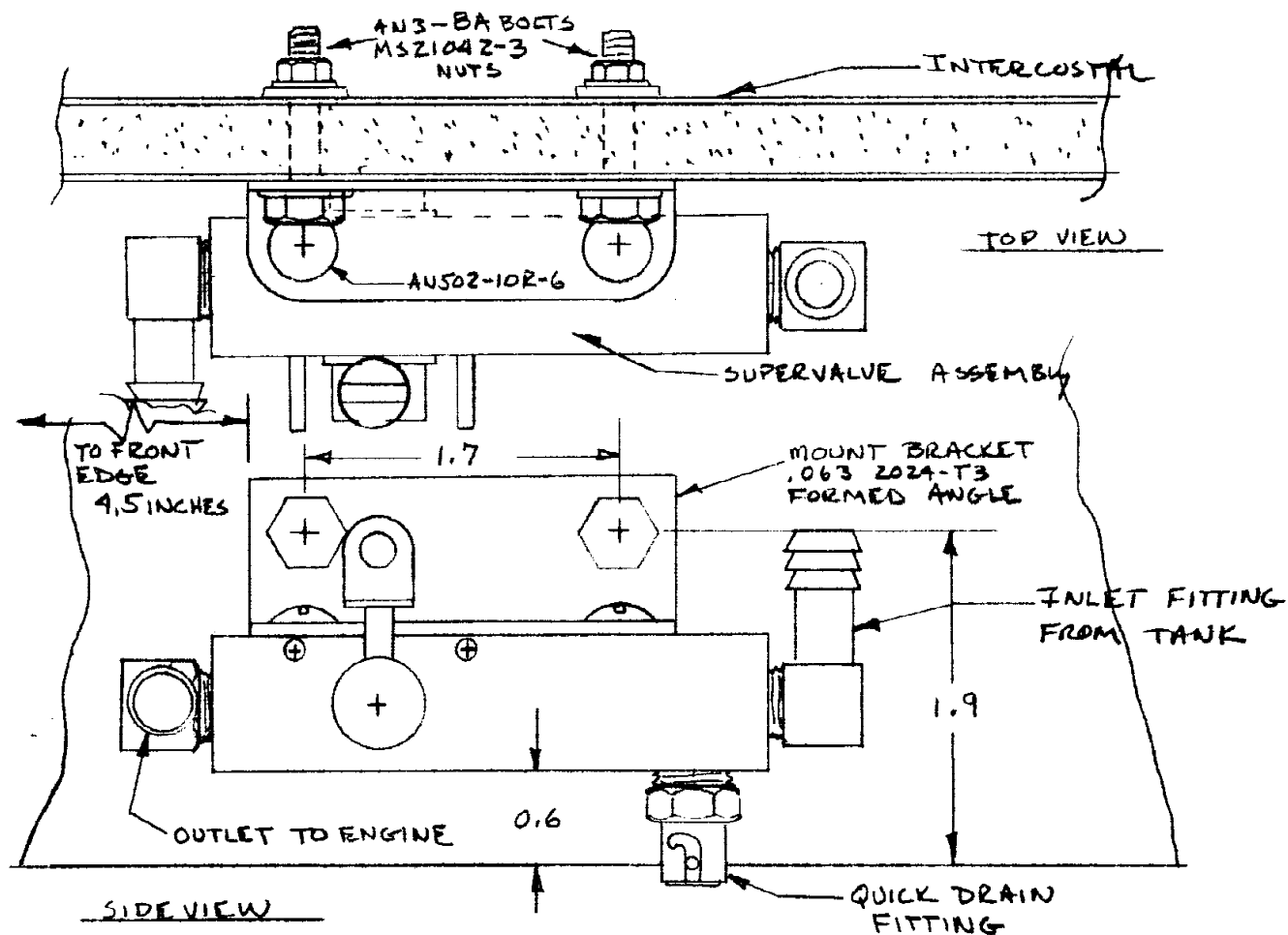
Cut four  $\frac{1}{4}$  inch long pieces of  $\frac{1}{4}$  O.D. x .035 wall 2024-T3 tubing (drill through the raw material #11 before cutting). Assemble the completed cable assemblies to the brake pedal and the belcrank with a bolt 1st (AN3-6A), wide washer 2nd (AN970-3),  $\frac{1}{4}$  inch spacer (3rd), cable assembly, then through the pedal (or belcrank) and held with an MS21042-3 nut. The big washer captures the cable assembly. Notice that the spacer and cable thimble are a loose fit and that about  $\frac{1}{8}$  inch of slack cable exists because of this. The slack is necessary to allow full rudder travel without automatically applying brakes.

Remove the master cylinders, brake pedals, and rudder bar for storage. Cut two pieces of  $\frac{1}{2} \times \frac{3}{16}$  2024-T4 aluminum bar to make a cable housing clamp as shown below. Clamp the two aluminum pieces together and drill the two holes in the wide face. Use bolts to clamp the two pieces together through the holes, then drill the hole through the edge side.

CABLE HOUSING CLAMP



This provides you with a split cable housing clamp for the fuel shutoff valve assembly. Locate the clamp with the clamping hole centerline aimed forward and aft 1 1/2 inches above the bottom edge of the intercostal. The clamp should be positioned just forward of the master cylinder and on the left side only. Drill the two mounting holes then remove the clamp and mounting hardware (2 AN3-12A's, 2 MS21042-3's, 2 AN960-10's) for storage. Make and attach the fuel valve mount shown below. Position your Brock super-valve assembly parallel to the bottom edge of the intercostal as shown below. Drill the two #11 mounting holes through the intercostal. Check fit your installation hardware for length, then store everything for final installation later.



This completes the mounting of systems to the intercostal. When you final install all of this gear, you'll appreciate not leaving it until later.

Flip your fuselage assembly upside down to gain access to the bottom of the fuel tank and firewall bulkhead. Fit the intercostal into the corner formed by the bulkhead and tank by radiusing the top forward corner as required. Remove the peel ply from the center of the firewall nose gear support insert area and from the top and forward edges of the intercostal. Using 5 min/flox, on the edges only, bond the intercostal to the firewall and fuel tank. Check to verify that the intercostal is on centerline (B.L.O.) and doesn't lean right or left.

88  
TW

Cut four strips of 2 inch wide, 16 inch long, 0-90° BID tape. Also cut six strips of 3 inch wide, 13 inch long 45° BID. Sand any glossy cured glass within 1½ inches of the intercostal dull for structural glass to glass bonding. Lay up two plies of the 0-90° tape from tank to intercostal on both sides. Lay up three plies of 45° BID from the firewall to intercostal. These plies overlap 1½ inches onto each side of the corner and additionally about one inch onto the fuel tank bottom.

**DELETE PAGES 89 and 90.**