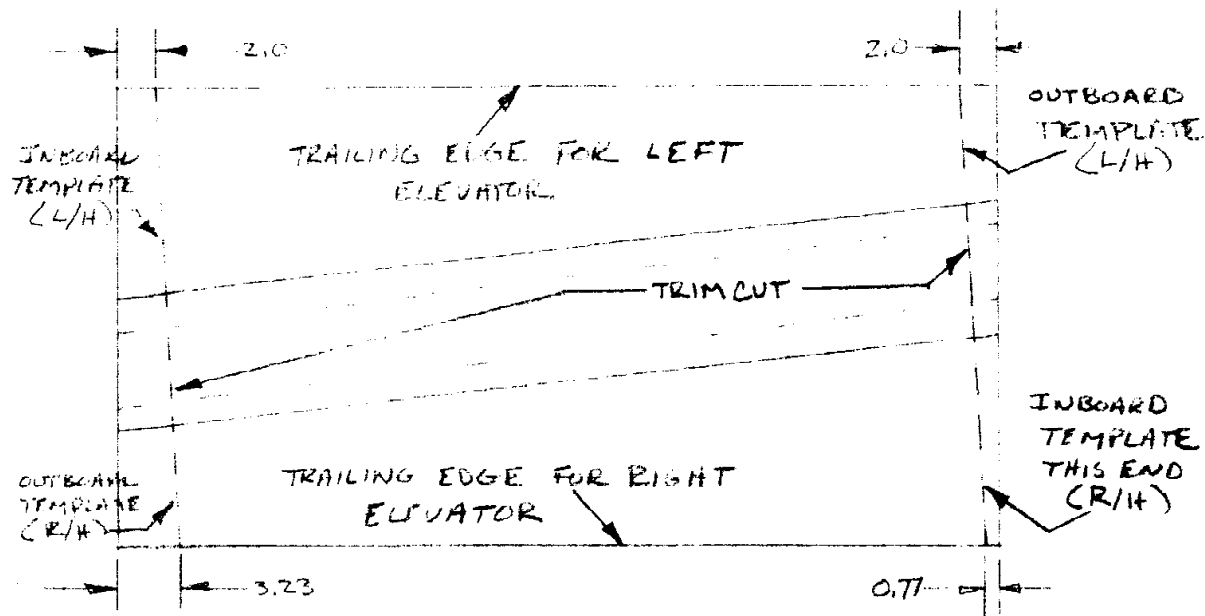


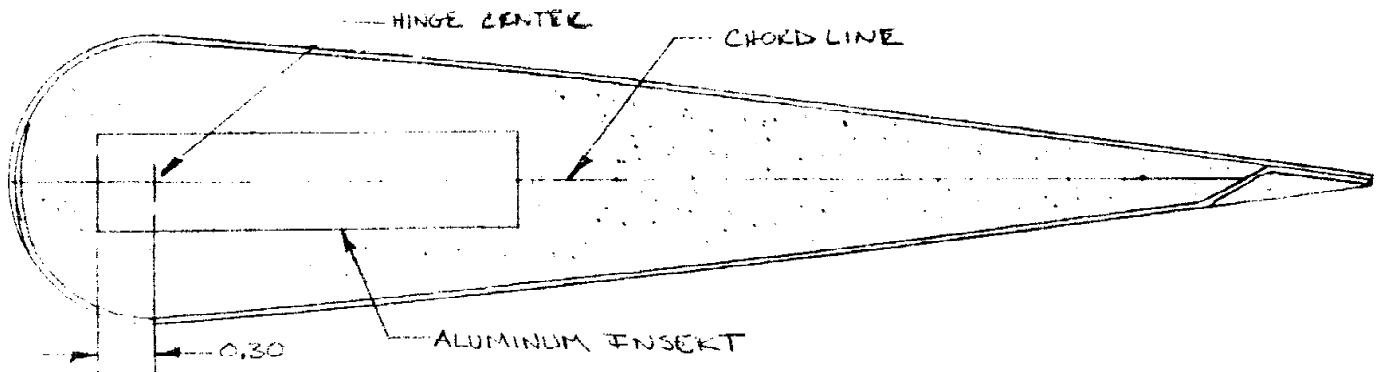
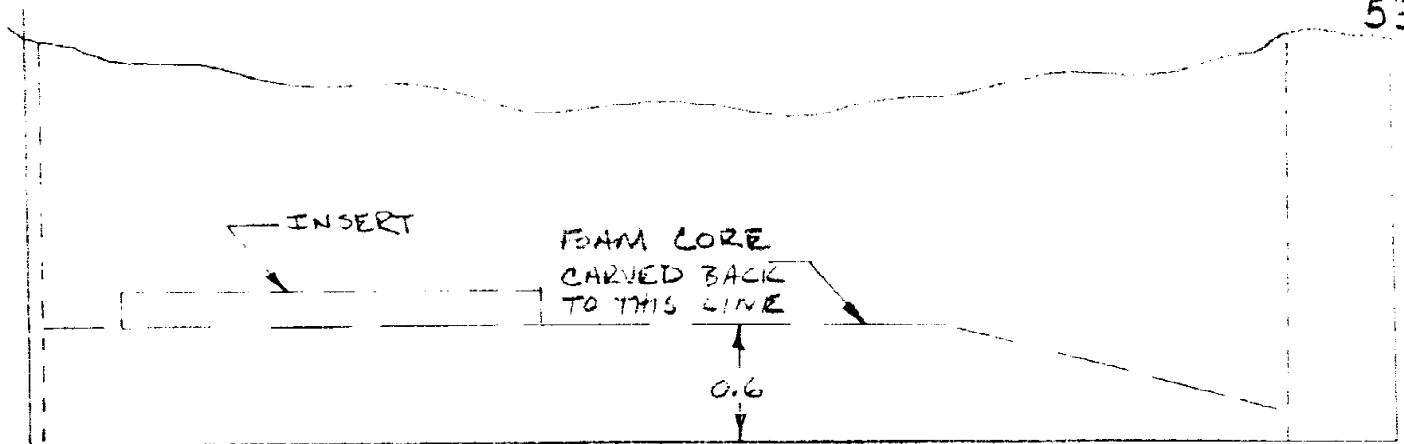
Go dig out your hotwire, two elevator templates, and the foam block left over from the stabilizer. Trim the block as shown in the sketch, mount the templates in the locations shown and cut cores.



Use the mother block of styrofoam to make a jig as we've done before. Sand a radius on the elevator foam core's outboard edges. Cut 1 piece of 45° BID 7.5 inches by 43 inches, three 45° BID reinforcement patches 3 1/2 by 6 1/2 inches. Two 43 inch lengths of peel ply 4 inches wide, and 42 inches of 3/4 wide peel ply. Protect the top surface areas adjacent to the leading edge and tip with tape and bond the core into the jig with some small dabs of 5 min/micro. Slurry the foam surfaces and lay up one ply BID overall with reinforcement patches over the inboard end, the outboard end, and centered 20.5 inches out from the inboard end. Peel ply strips should be layed in the trailing edge overlap area as usual and the completed skin with reinforcements is peel plied all over. Knife trim and cure 24 hours.

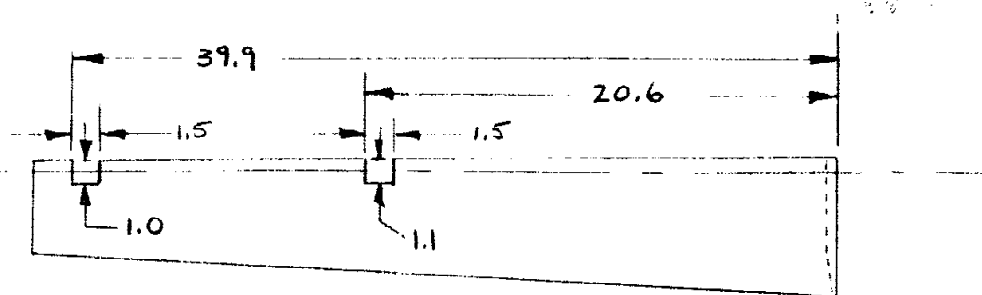
Remove the peel ply. Prep the leading edge for a 3/4 inch overlap. Prep the tip for overlap or flox corner as required. Prep the top side trailing edge overlap (lump sanded off and peel ply removed). Cut glass and peel ply as before (skip the 3/4 strips), tape off areas adjacent to the overlap, and laminate the top skins. Peel ply the top surface completely. Knife trim and cure 24 hours.

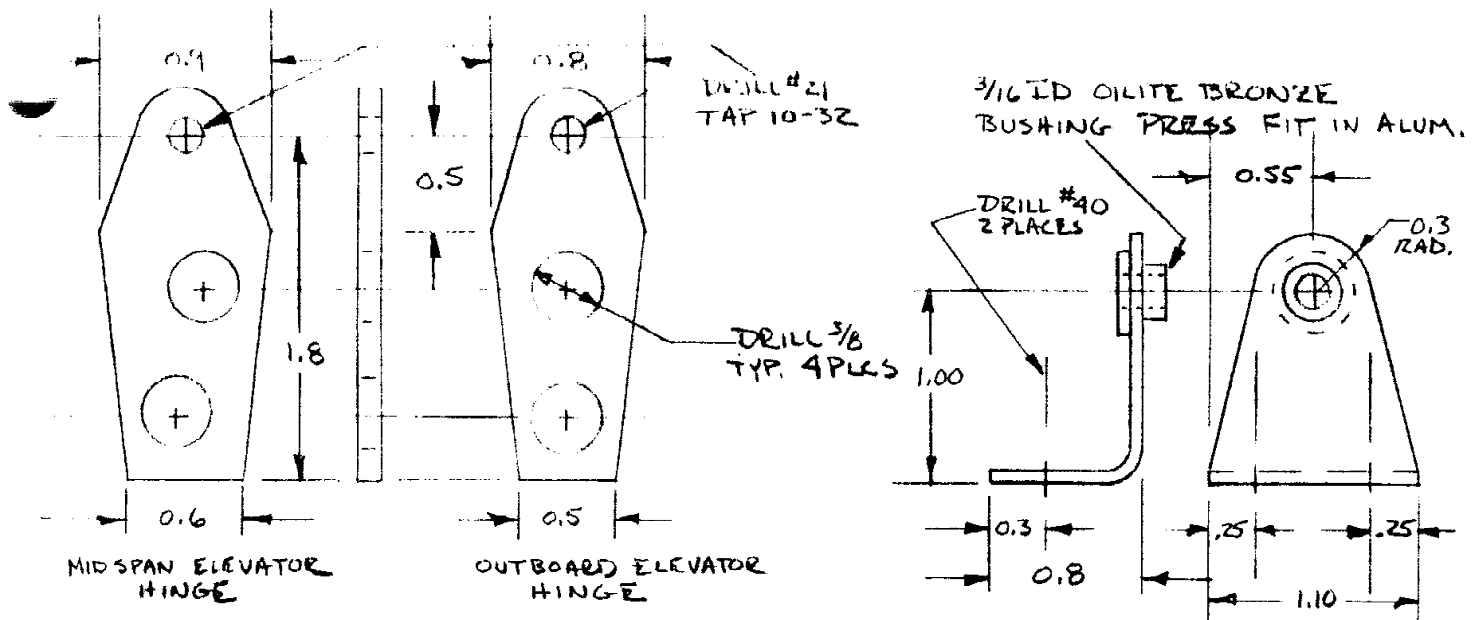
Route out the foam core from the inboard end of the elevator to a depth of 0.6 inches over the front half of the elevator and tapering to a simple flox corner at the trailing edge. Cut two 2.2 inch long pieces of 1/2 x 3/16 aluminum bar (2024-T3 or 7075-T6). Locate the aluminum inserts flush with the foam surface as shown in the sketch below. Brighten and bond in place with 5 min/micro.



Prep the skins inside for bonding with your rotary file. Rustle up some 45° BID scraps to make two rib plies (2 1/2 x 6 triangle will do), and two smaller patches to reinforce the area over the insert. Lay up the elevator root rib and reinforcement patches. Knife trim and cure.

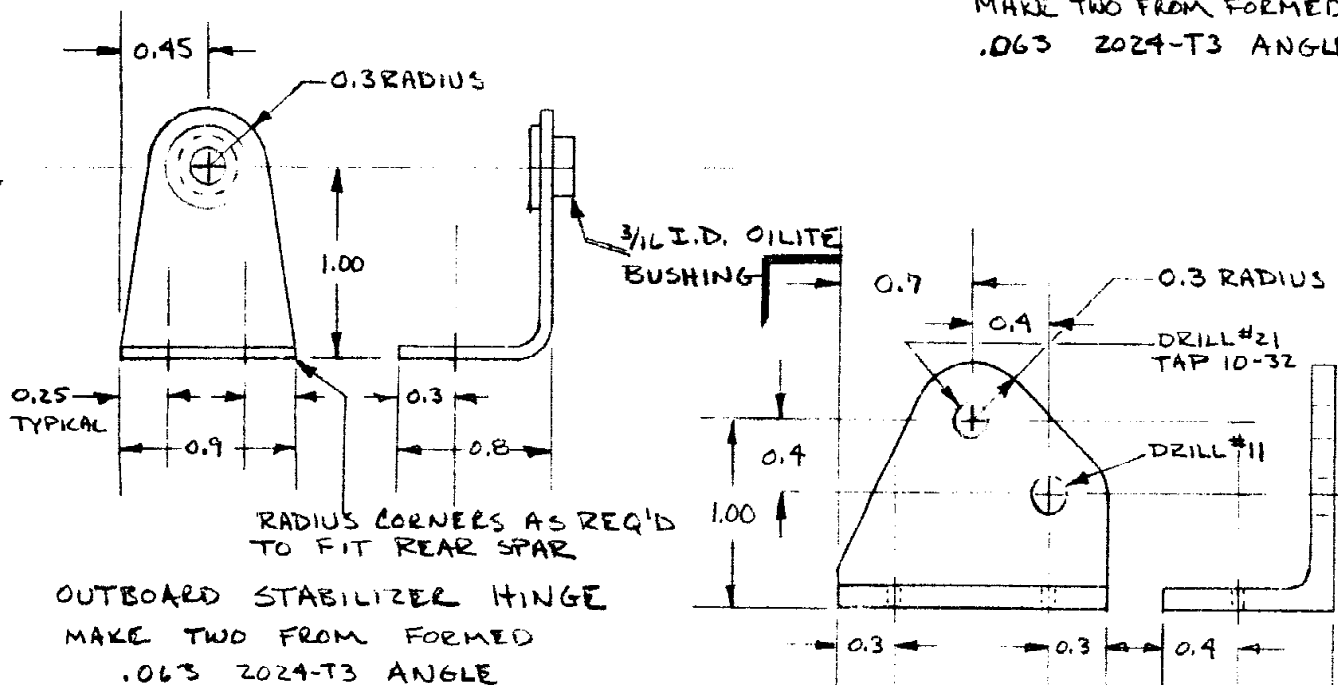
Cut plugs out of the elevator leading edge (similar to the rudder center hinge) as shown in the sketch and save. Use your rotary file to prep the edges of the cut-outs for a flox corner then lay up two plies of 45° BID around the cut-out. Knife trim and cure.





MAKE TWO OF EACH FROM
1/8 2024-T3 ALUMINUM

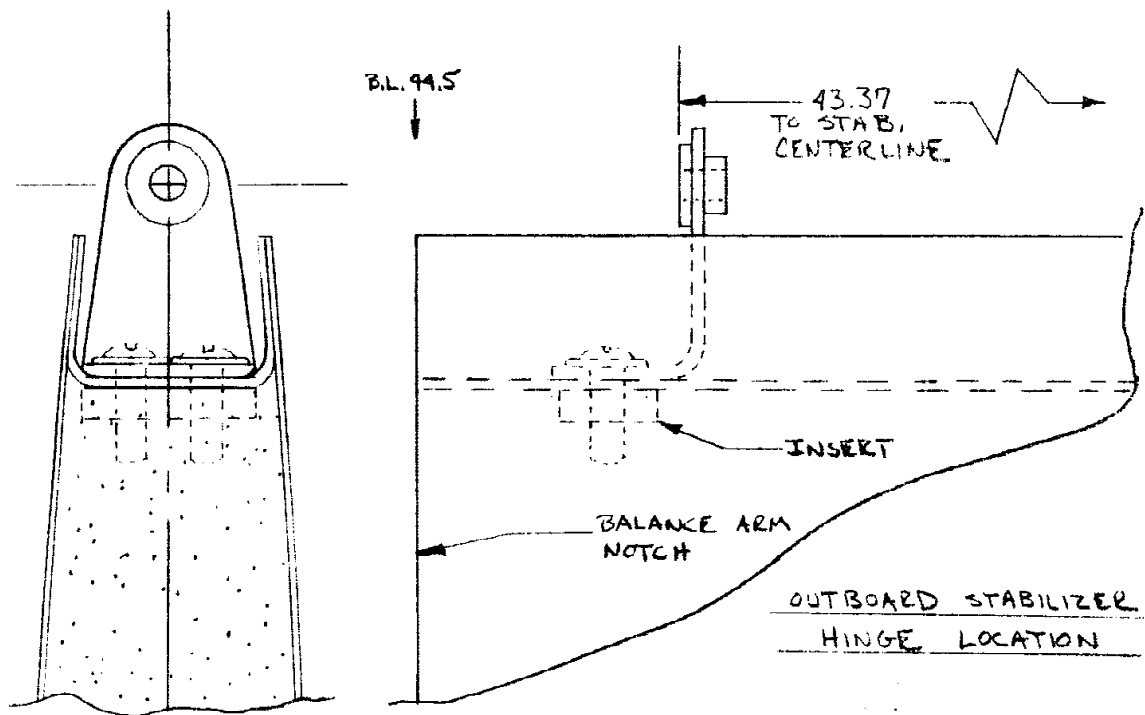
MAKE TWO FROM FORMED
.063 2024-T3 ANGLE



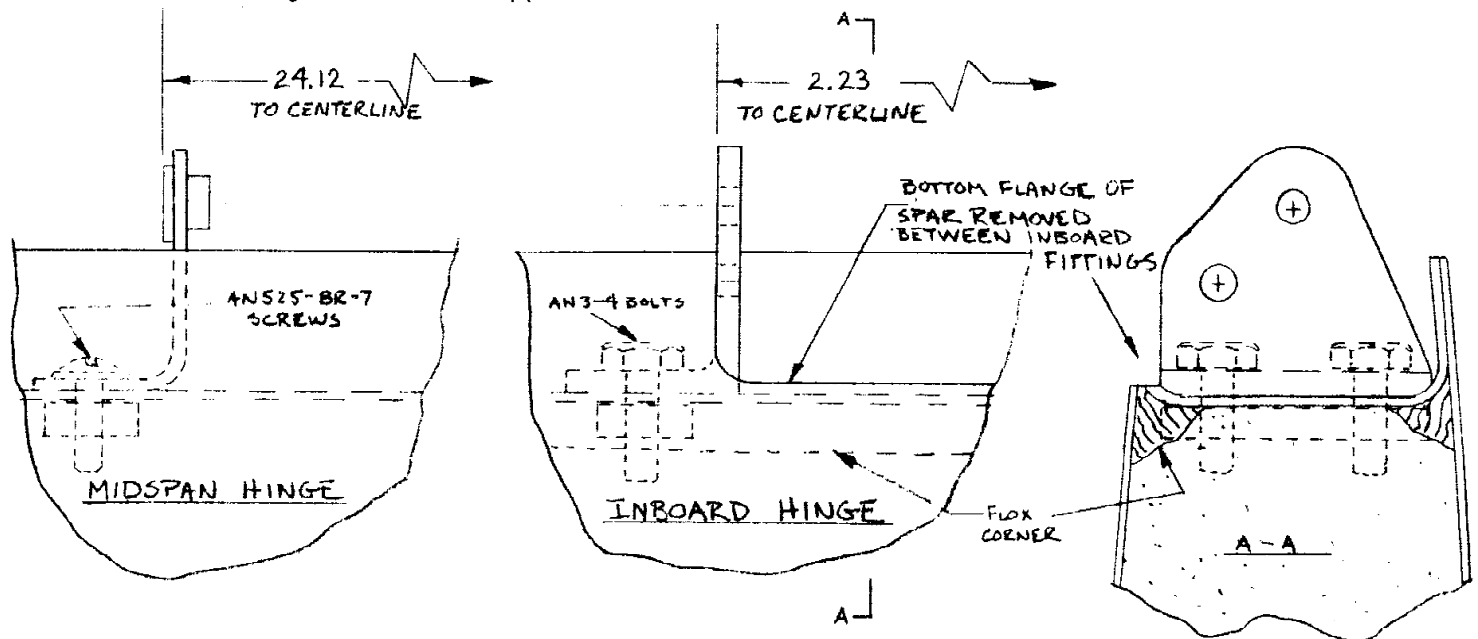
LEFT HAND PART SHOWN

MAKE ONE LEFT & ONE RIGHT HAND PART FROM
1/8 2024-T3511 OR 7075-T6511
EXTRUSION

Locate the two outboard stabilizer hinges carefully on the rear spar. Brighten the aluminum hinge's base and pull the peel ply off of the spar over the hinge insert. Bond the fitting to the spar with 5 min/flox and cure 30 minutes. Drill the pilot holes through the spar and insert and size them up to #29. Drill the fitting and spar fiberglass (not the insert) up to #21. Tap the insert 8-32. Install AN525-8R-7 screws with 5 min/flox on the threads to safety them.

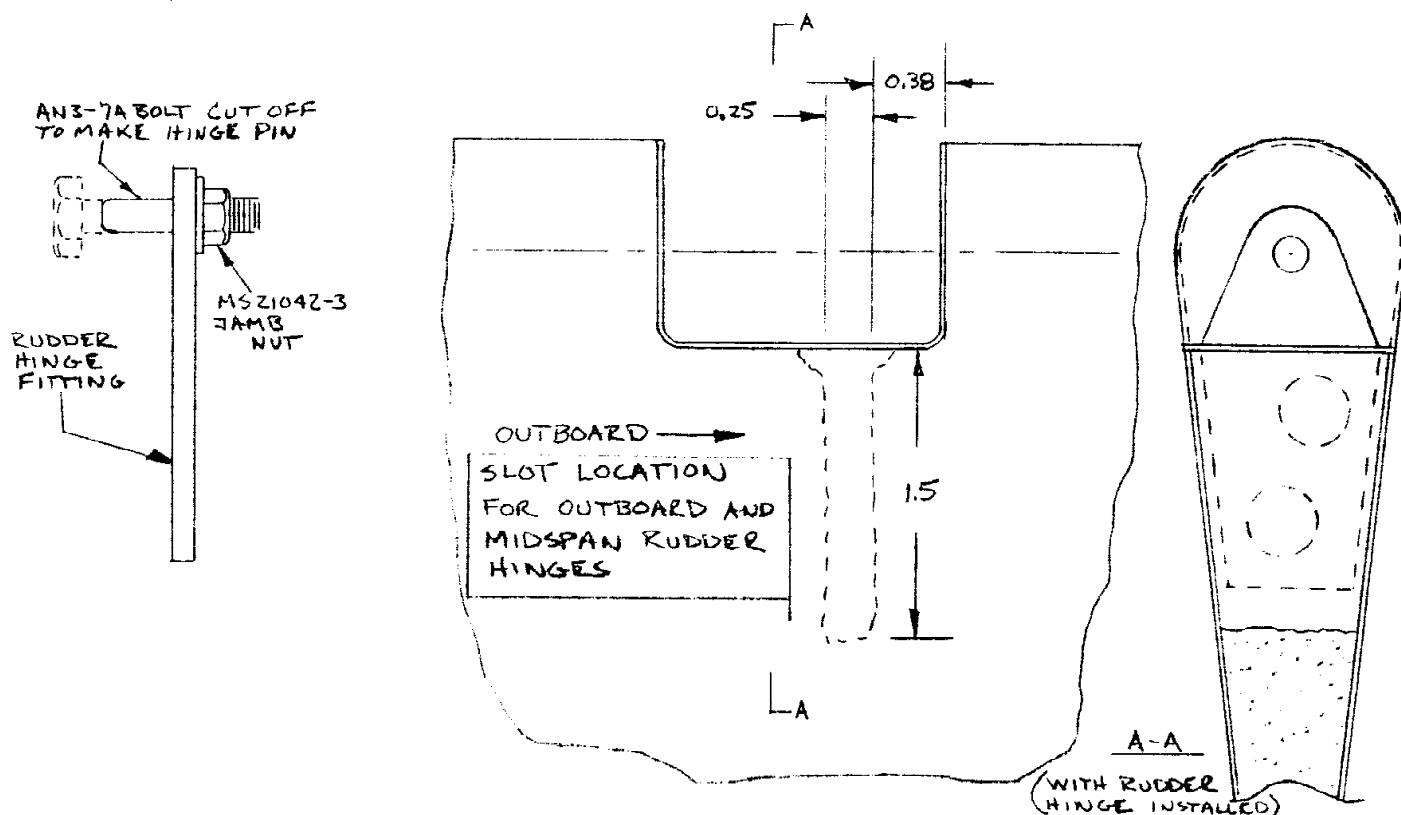


Using the tight string alignment technique (used on the flap and rudder center hinges), position, bond, drill, tap and screw the two midspan and two inboard hinge fittings to the stabilizer. The midspan and inboard fittings should be aligned and installed one at a time, not all simultaneously. The locations of the midspan and inboard fittings are shown below. Note that the spanwise dimensions on outboard and midspan fittings are from centerline (B.L.O.) to the outboard face of the dilite bushing. The midspan hinge fittings are installed using AN525-8R-7 screws (8-32) as the outboards were. The center hinge/stabilizer attach fittings are installed with two AN3-4 bolts in each side, so the tap drill size is #21 (through the fitting, glass, and insert) and shank drill #11 (through fitting and glass only). The inboard fitting mounting holes are tapped 10-32.



As shown in the sketch above, the lower flange of the rear spar is cut away between the two inboard hinge/attach fittings. The cutaway provides clearance for the stabilizer to fuselage fittings and the vertical stabilizer's rear spar.

Get the elevators out again and route out a 1/4 inch wide slot in the vertical face of each hinge cutout as shown in the sketch below. Route out foam behind the glass close out to a depth of 1.5 inches and prep the glass skin surfaces for a flox bond using a drill bit or rotary file (similar to the center rudder hinge). Gather up the four flat rudder hinges, four AN#-7A bolts, four MS21042-3 (or AN365-1032) nuts, and your hacksaw. Thread the bolts into the threaded holes in each fitting and snug them into the fittings, threads bottomed (with 15 to 20 inch-lbs torque for you detail enthusiasts). Keep the bolt tight in the fitting and tighten a locknut on the back side of each fitting. Cut the heads off of the bolts and round the cut end slightly to make a hinge pin about 3/8 inch long sticking out of each fitting. Cut the heads off of the bolts and round the cut end slightly to make a hinge pin about 3/8 inch long sticking out of each fitting.



Stand the stabilizer leading edge up with one half hanging over the table edge. Better drape a sandbag or a heavy, floppy, whatzit over the leading edge that's on the table to keep the whole affair from flipping on to the floor after the elevator is hung. Lay six layers of masking tape on the top and bottom of the elevator nose locally near cut-outs and at the inboard end of the elevator. This tape build-up will insure a minimum clearance between the elevator leading edge and the rear spar flanges. Trial fit the elevator hinges to the stabilizer fittings and slip the elevator into position with the tape firmly against the rear spar flanges. Have a helper check the spanwise position of the rudder and make some quick reference alignment marks.

Clear any irregularities in the stabilizer spar flanges that might keep the elevator nose from having a uniform gap of about .020 to .030 inches. Remove the elevator and fittings. Brighten the hinges for bonding, make wet flox and fill the two slots 3/4 inch full. Push the hinges into approximate position with a gentle up/down motion to clear any trapped air and fill the holes in the fittings, clean off any gross squeeze out. Reinstall the elevator, engage the hinge fittings fully, double check positioning and allow to cure at least 12 hours before disassembly. If you don't care to hold the elevator in position for that long, tape the little bugger firmly to the

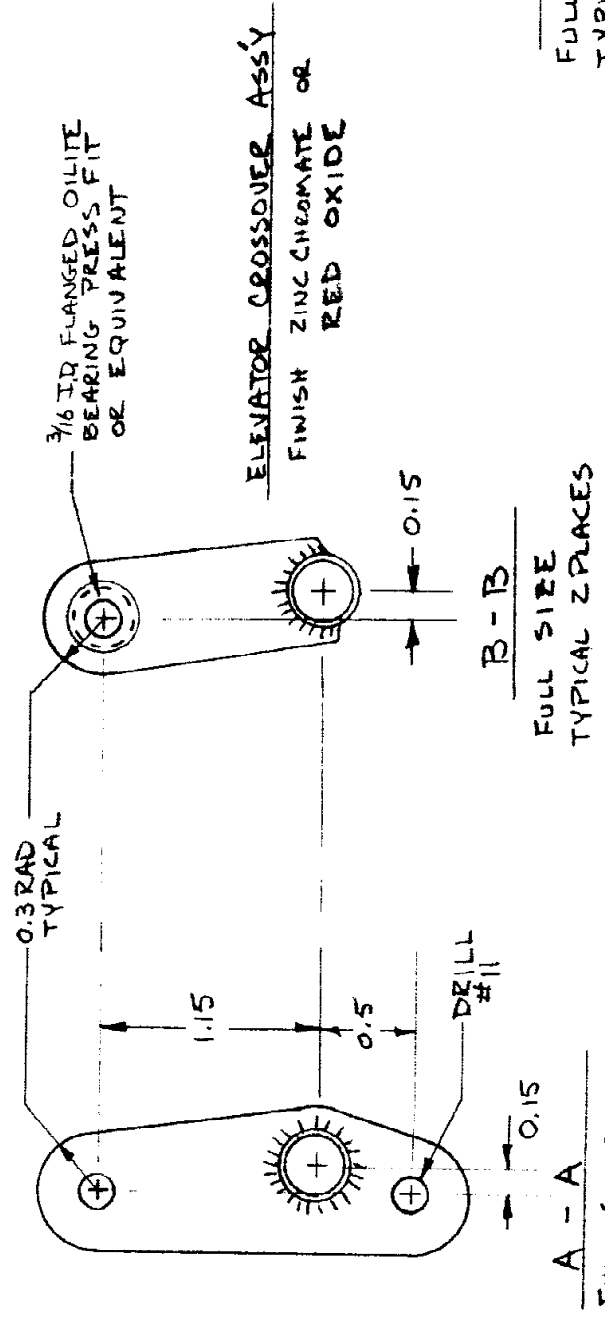
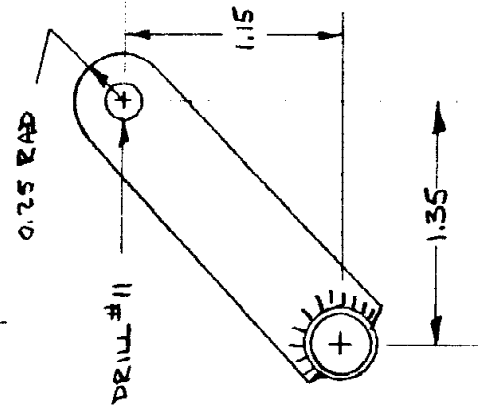
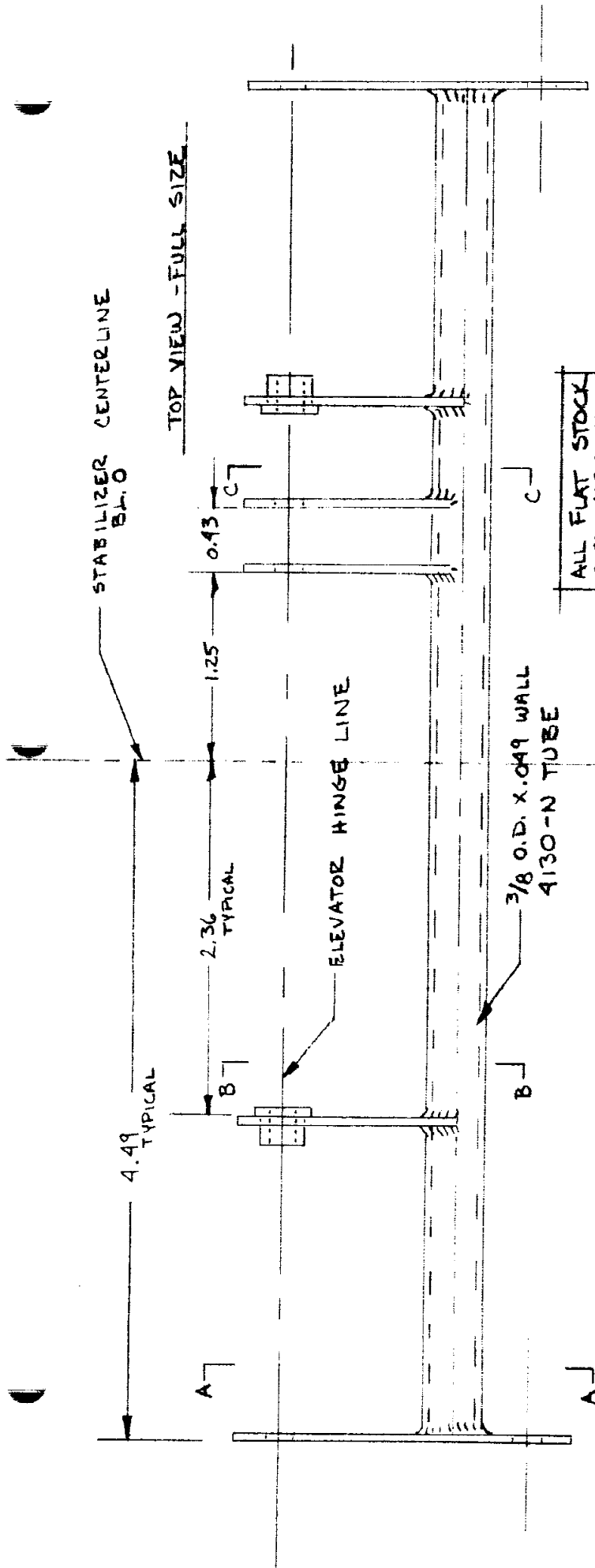
stabilizer. Do this by banding the elevator and stabilizer completely in several places so that the tape sticks to itself as well as the stabilizer. Tape will often not adhere well to cured glass surfaces. Clean off any squeeze out beyond a small radius around each fitting. You can substitute three or four foam scraps on each side bonded to the stab and elevator with a dab of 5 min/micro for the tape if you can hold still until the 5 min cures (more like 10 minutes). The elevator hinges should lay against the stabilizer hinges without a gap to insure full pin engagement and to capture the elevator so that it can't translate inboard any further than its correct position. The center crossover assembly (next will keep the elevator from moving outboard.

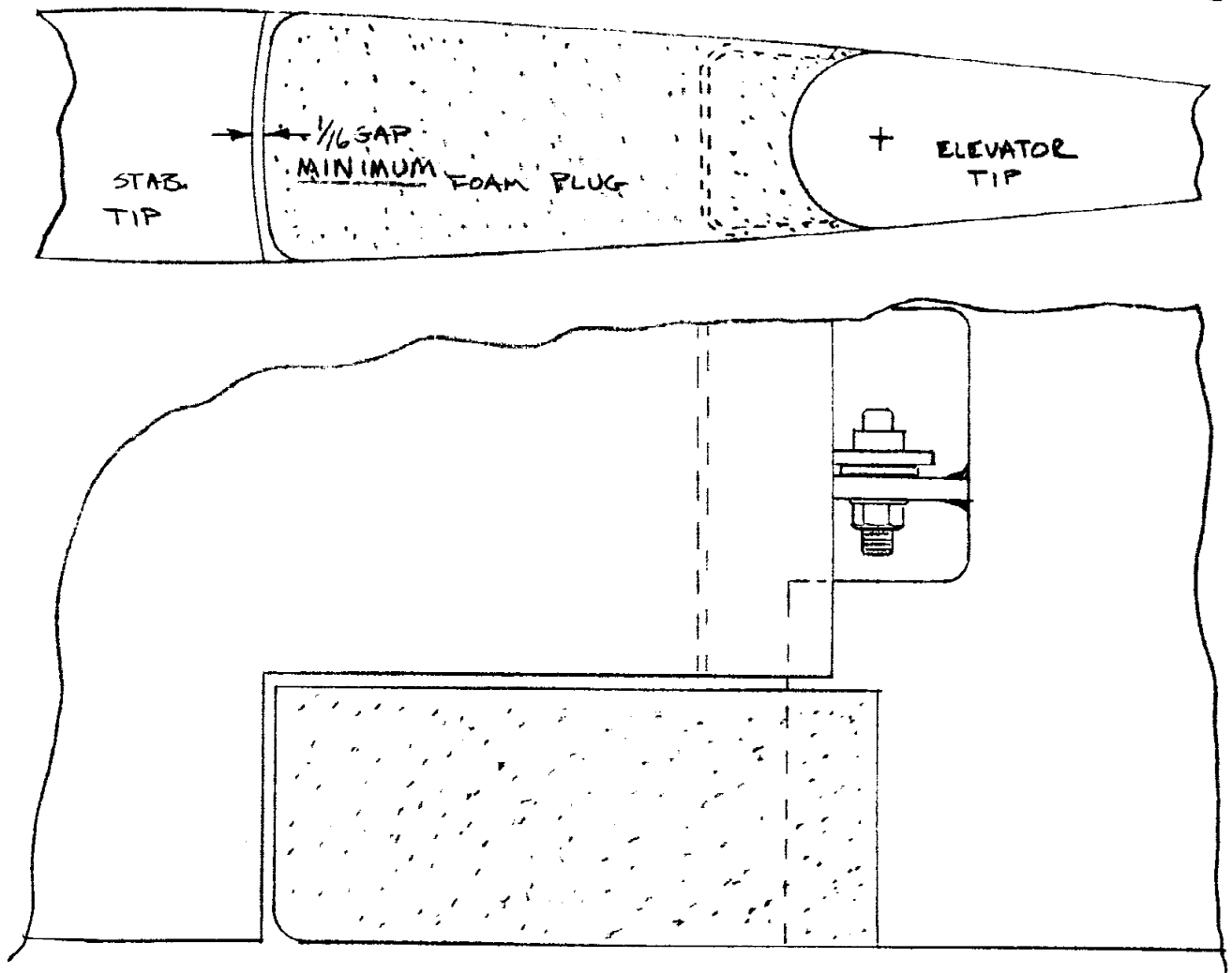
After the cure check the elevators for freedom to swing at least 30° trailing edge up and 15° trailing edge down without interference. File or sand on the spar flanges as required to clear.

Fixture the elevators in neutral with proper spanwise position. Use a couple of foam blocks and 5 min/micro for the job. Carefully measure the exact distance between the root ribs of the two elevators over the aluminum inserts. The distance should be close to 9.1 inches but customize the dimension to your own parts. Also, measure the distance from the elevator ribs inboard to the faces of the inboard hinge fittings (should be 2.32 inches). The crossover assembly drawing which is shown on page is dimensioned so that a home-builders elevator and stabilizer can be fit to it even if the elevators come 1/16 inch too far inboard and the hinge fittings are both 1/16 inch too far outboard. A perfect set of parts will require 2 AN960-10 washers and 2 .063 2024-T3 aluminum shims (0.7 wide and 2.1 inches long). The shims and washers will be provided with vendor supplied (read: Store Bought) parts. If you do your own welding you can customize the dimensions to fit your needs. Build or buy the assembly so we can install it.

Bolt through the two inboard hinge bearings into the stabilizer fittings with AN3-6A bolts. Space the cross-over assembly as required with washers. Mark the reference chordline on the inboard rib of each elevator and assemble the elevators to the stabilizer and crossover assembly. Mark the outline of the two forward crossover to elevator mounting bolt holes on the elevator rib. These marks should be very close to the hinge line center (center of the elevator leading edge radius also). Carefully locate and drill the marked hole up to #21 (start small and get the hole center established, then enlarge it). Drill through the glass rib only with #11 and then tap the insert 10-32. Reassemble elevators, stab, and crossover. Bolt the crossover tube assembly to the elevator leading edges with AN3H-4A bolts (drilled heads for safety wire) and one AN960-10L (thin) washer. Since the leading edge bolts are on the elevator hinge line you can still shift the rear attach hole by rotating the elevator. Set the rear holes basically centered on the chordline with small adjustments to make both elevator trailing edges line up together. Drill and tap 10-32. Install AN3H-4A bolts in the rear holes also. On final installation the two bolts are tightened and then the heads are safety wired to each other.

Leave the elevators installed and lock them in neutral position with a clamp on the inboard hinge. Carve a foam scrap to fit the leading edge of the elevator tip (roughly 1/2 inch radius) and the balance arm cut-out. Bond the foam block to the leading edge of the elevator with 5 min/micro. Carve the foam down faired with the stabilizer tip (slightly below contour to allow for the glass buildup and finish). You should have a minimum gap of 1/16 inch between the foam plug and the stabilizer cut-out.





Remove the elevators from the stabilizer. Cut two 15.5 inch long and two 11.5 inch long strips of 0° UNI 1.2 inches wide. Also, cut two pieces of 45° BID 5 inches by 8 inches. Sand any glossy cured glass on the elevator tips dull for bonding. Lay up one ply of BID over each balance arm's top, bottom and outboard (tip) surfaces overlapping onto the elevator skins about 3 inches aft of the hinge line. Work the BID around the corners of the balance arm nose as best you can by scissor cutting the corners and cussing a lot. Trap any troublesome areas in the BID at the nose under the UNI plies to follow. Lay the longest UNI ply from about 4 inches aft of the hinge line (maybe 0.2 from the trailing edge) over the top side, around the nose of the balance arm, and back along the bottom surface to almost the trailing edge. The shorter UNI ply does the same trick but only extends 2 inches aft of the hinge line. Peel ply the new lay up where it overlaps the elevator skins to help smooth the little step created. The flat inboard face of the balance arm will be laminated later. Knife trim and cure 12 hours. After curing, route out the foam from the leading edge of the balance arm back 1.2 inches and outboard enough to bury a 1 x 1.3 x 1.3 block of lead flush with the inboard surface. Bond the lead in place with 5 min/flox.

Go mix dry micro and over fill the trailing edges of the elevators. Cure over night and sand the micro flush with the surface contour. Check the elevator balance and drill away the lead block as required to get the elevator to hang slightly trailing edge up (about 3/4 inch above neutral at the inboard trailing edge). This provides enough over balance to allow for neutral balance after paint.

60

Lay up a two ply BID closeout on the bare balance arm face (inboard) with flox corners to the elevator nose and balance arm skin plies.

Go find the plugs saved from the rudder hinge cut-outs. Cut the leading edge glass away and slot to provide assembly and operational clearance of the hinge hardware (review the rudder center hinge method). Remove all foam core from the plugs and install with 5 min/micro.

Final fit check the rudder balance arm into the notch in the stabilizer. You need to have at least .030 minimum clearance. Close out the stabilizer with one ply of 45° BID and small flox corners to the skins and rear spar. Knife trim and cure.

The forward stabilizer to fuselage attachment requires glass bonding over the center 8 inches of leading edge so don't paint the stabilizer until the final mating with the fuselage has been accomplished.