

KIS4 Cruiser

BUILDERS MANUAL

S/N 4052

AILERON ASSEMBLY

4 PLACE AILERON ASSEMBLY

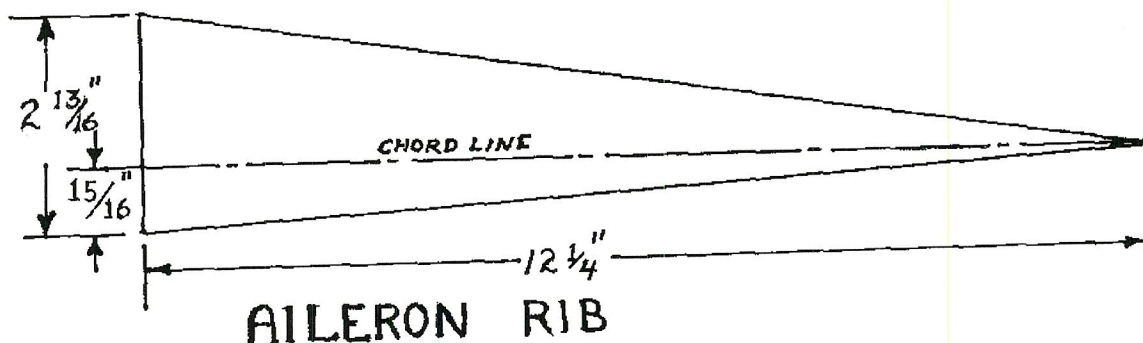
- The procedures for the four place aileron assembly are very similar to the flap assembly. One of the primary differences is fact that the hinge will be on the upper surface instead of the lower surface as was the case with the flap assembly. For this reason the ailerons will be assembled upside down.

Locate the aileron skins in the kit. There is a top and bottom skin panel each of which contain the left and right sides connected together in a single panel. The bottom skins have a slight radius at the forward edge. There is no difference for left or right skins in either set at this stage.

Clean these and all related parts, stripping off the peel ply and cleaning away any loose pieces or other debris. Lightly sand the trailing edge of all parts to the reference line left by the sharp corner in the tooling. Be careful to remove only the surplus resin and not sand through any plies of the glass. This edge will be a measurement reference point for many of the operations in this assembly.

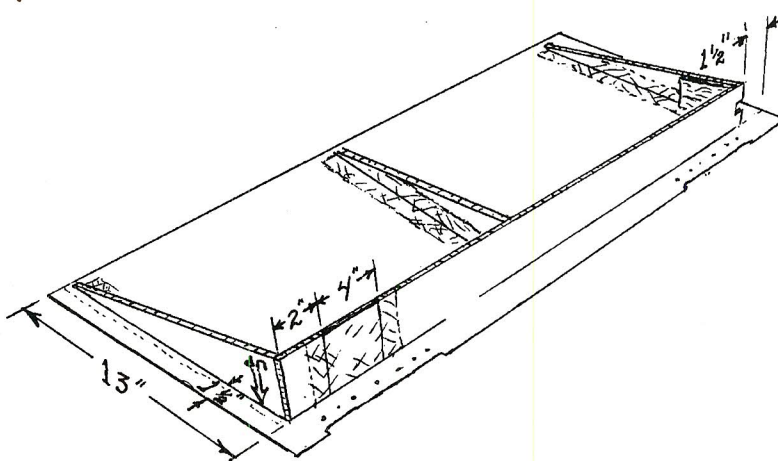
Verify that the scribed center line will leave close to the same distance from the cut edge to the sandwich panel core material on each part. If this is not true scribe a new center line and separate the left from the right by cutting at the appropriate center scribe line. Be sure that there is enough material at the ends to make each panel 42 inches long (spanwise). Trim these ends and the forward edge to set width at 14 inches

Locate the rib template and cut six pieces from the supplied prepreg honeycomb core flat panel material. These triangles are not symmetrical so note the orientation on the template text, and mark the top. Check against drawing below for proper size.



PREPARE SPAR ASSEMBLY

Cut two spar sections 39 1/2 inches long by 3 1/8th inches wide from the 1/4 in thick prepreg honeycomb core flat panel material to make the spar assembly.



Cut two 4 inch long by 3 1/8th inch plywood sections which will be used to provide the "hard point" for the actuation clevis to be installed at a later step.

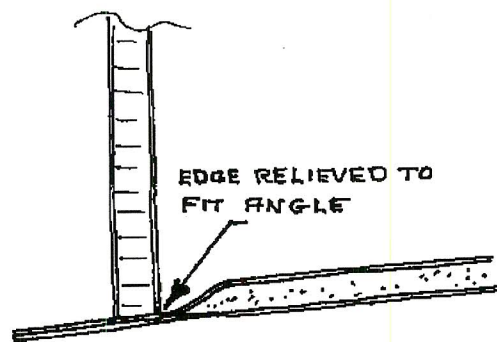
On each of the flat panel spar sections measure in from one edge 2 inches, mark with a vertical line, and locate another line 4 inches further (6 inches total). Lay the parts on a flat surface and cut away the upper skin in this 4 inch section, and clean away the core material.

Mix up a small amount of MICRO and glue the plywood into this opening, and fill in any gaps at each end. Close out the top surface of this plywood with 2 ply wet BID with a minimum 1 inch overlap at the ends. Perform this operation on a piece of plastic or waxed paper on a flat surface. Allow at least an overnight cure. Trim away any surplus glass and proceed with the aileron assembly.

INITIAL TOP HALF ASSEMBLY

Prepare a flat surface for the aileron assembly and temporarily "tack bond" the upper aileron skin outer (flat) face to the table surface. do a trial assembly as shown in the sketch. Locate the forward face of the spar assembly at 13 inches forward of the trailing edge. Trial set the ribs in place, end ribs each 1 1/4 inch from the edge of the skin (remember it is upside down - for proper rib orientation) to set the spar angle. The end of the spar with the plywood insert will become the inner end, be sure and make a left and right hand assembly.

Very lightly sand the rearward facing edges of the spar assembly. top and bottom, such that it will better fit the skin angles established by the ribs.



PREPARE FOR BONDING

Note the areas where the bonding will take place and roughen with coarse sandpaper before bonding assembly.

Tack bond the spar in place with temporary adhesive, using the ribs to assure proper angle. A small dab of a 5 minute dry MICRO placed on the edge of the honeycomb core works well. Allow "tack" joints to cure

Fillet the inside corners of the bond area along the inner face of the spar with a very small amount of dry MICRO. (remember any weight here gets doubled with the counter balance)

Tape the full length of the inner spar with 2 layers of 1 inch wide prewetted BID tape. Proceed with the following steps before this epoxy cures

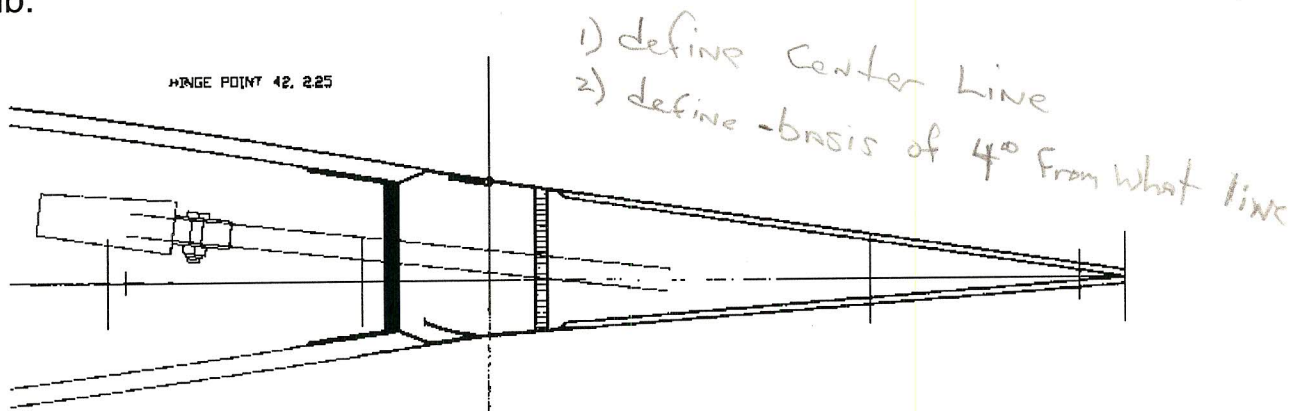
"Tack" bond the ribs in place with a small dab of 5 minute MICRO to the spar and the inner skin surface. Push into place in the wet tape on the spar back side.

Tape both sides of the inner rib and the insides of the outer ribs and spar with about 1 inch wide, 1 ply BID tape. Trim any overhang when the epoxy cures to the rubbery stage.

PREPARE OUTBOARD END RIBS FOR COUNTER WEIGHT

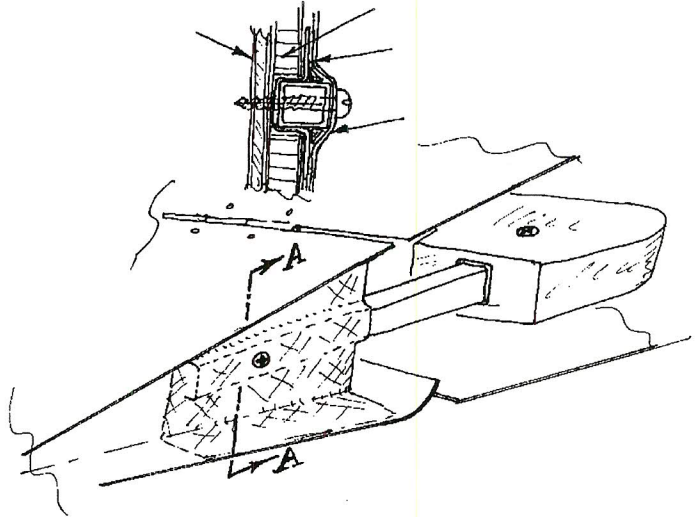
Cut 2 pieces 12 inch long from the section of the 1/2 by 1/2 inch square steel tube and clean and roughen about 3 inches of one end with coarse sand paper.

Lay the square tube in position on the outer surface of the outer rib overlapping about 2 1/2 inches along the centerline of the rib section with about 4 degrees upward since aileron travel will be more upward than downward for classic differential) and draw the outline on the rib.



If you are satisfied at this point, cut back the outer skin in the marked area, and clear away the core material in an area about 1/16 in. wider than the tube.

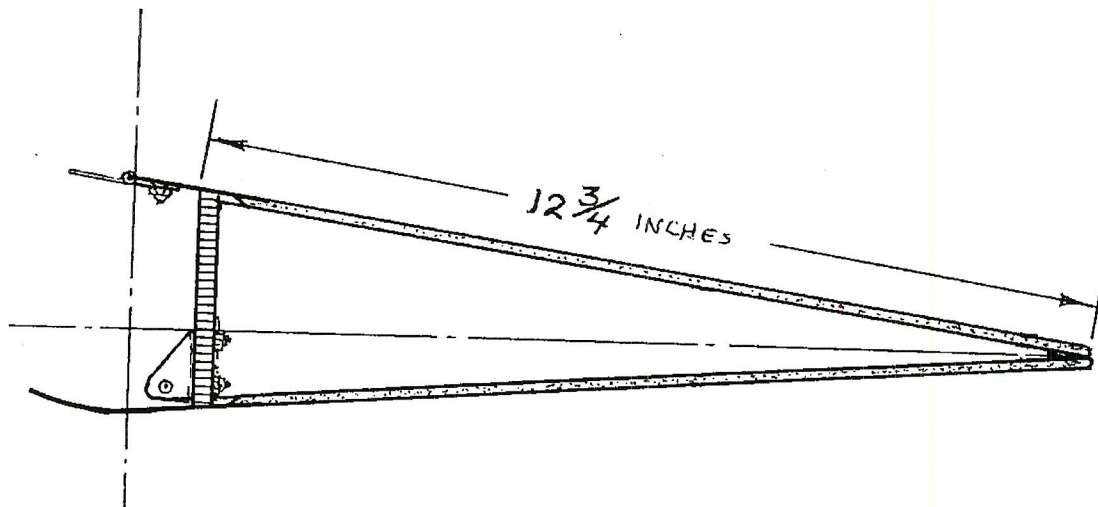
Bond a piece of 1/4 inch plywood about 3 inches long trimmed to the edges of the rib on the back side of the rib to back up this groove. Relieve the edges of these dimensions if required by the rib shape and bond in place with thick FLOX.



Cut a 1/2 in wide strip of 1/8 in. plywood or hardboard, and bond into the bottom of the groove to shim the counter weight tube outboard by 1/8 inch for clearance to outer wing rib.

Notch the end of the spar to clear the square tube when it is installed at a later step. Be sure you make a left and right assembly, and select the proper part for subsequent steps.

PREPARE FOR THE AILERON CONTROL BRACKET



AILERON SECTION VIEW SHOWING ACTUATOR BRACKET

This is a good time to test fit the aileron with the wing assembly. Remove the assembly from the table and hold the lower skin in place (tape with masking tape if that helps) and temporarily install the tube

and weight. Place the aileron assembly into position in the wing trailing edge channel where it will be hinged. The thickness of the aileron should not be too great to allow free movement without interference with the wing structure. If the aileron is too thick, disassemble and sand away some of the height of the ribs and spar until the thickness is correct.

Position the aileron in the correct location on the wing, and note and mark the location of the actuator bracket (KS-4) which should be centered on Butt Line 119.5 (Reference the inboard edge of the aileron is BL 114) .

.This should position the actuation bracket to line up with the location of actuation push rod in the wing. Set it about 1/8 inch from the bottom edge of the spar (see figure). Drill the holes and temporarily install the bracket using the AN 525 -10 R -12 screws and the K1000 -1032A anchor nuts in the proper position for later permanent installation. Mark the rivet holes in the K1000 nuts, and disassemble. Set the screws and bracket aside, and install the anchor nuts with the flat head countersunk rivets provided (trim to proper length before setting).

Also note and mark the location of the hinges, inboard Butt Lines 116, and 146 (each 8 inches wide).

If the hole through the wing rear spar, for the aileron actuator rod, has not been drilled prior to this point, this would be a good time to accomplish this. With a 1 inch diameter hole saw. or similar tool, drill the hole through the wing's aft spar in line with the actuator bracket location (BL 119.75 center about 5/8ths above the lower wing skin inner surface - leaving at least 1/8th inch web material above the rear spar flange).

Also verify the fitting of the counter balance with the wing. A section of the wing rear spar, and possibly a portion of the outer rib flange will probably have to be trimmed away to permit assembly and operation of the counter weight inside the wing section as the aileron is actuated through it's range of travel. Cut away only that material as required for this operation.

INSTALLATION OF LOWER SKIN

Lay the lower skin in position on top of the inverted upper half assembly and carefully inspect the ribs and spars for fit. Rework any high spots noted by sanding down the offending surface. Make as many trial assemblies as is required to get a good fit.

Note areas for bonding and roughen about a 2 inch wide path in any of these areas (this includes the trailing edges of both skins).

With the lower skin carefully positioned in the "dry" assembly, it might be a good idea to drill two tiny holes, through both parts, one at each end, near the trailing edge for installing line up pins for the bonding operation.

BONDING LOWER SKIN

Push down the open edges of the honeycomb on the ribs and spar about 1/8 inch below the edges of the panel and pile a dry MICRO/FLOX mixture in a bead about 1/4 inch higher than the edges of the ribs and spar.

Wet out the inner surfaces of the lower skin that have been prepared for bonding with some standard epoxy mix. A strip of one ply wet BID about 3/4 to 1 inch wide in this area will increase the bond strength.

Lay about a 1/4 inch triangular bead of dry FLOX where the two trailing edges will join. (Remember weight in this area is especially critical when balancing the aileron)

Lower the bottom skin carefully into place and verify squeeze out of adhesive in all the critical areas. Use some paper tape and the line

up pins, to hold the skin in position, and sort of "hinge" the skin down in position, and weight down securely in all the areas being bonded. Clean up any excess adhesive for future glassing.

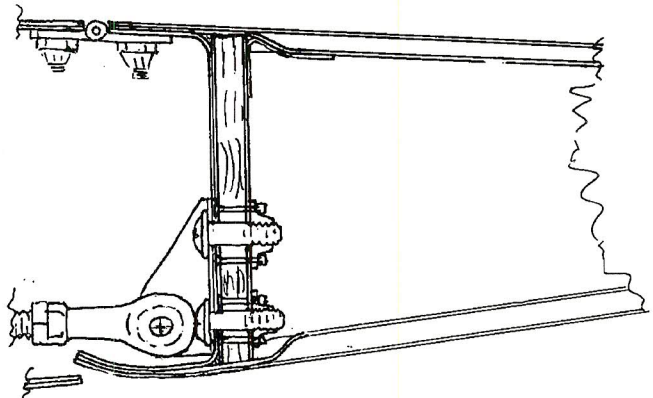
INSTALL COUNTER BALANCE TUBE

After the lower skin bond has cured bond the counter balance steel square tube in place by prefilling the cut out groove edges in the outer rib with dry MICRO and pressing one layer of prewetted bid into the groove under the tube. Size this cloth for about 3/4 to 1 inch wide either side of the tube. Trim as required so as to not overlap to the upper or lower skins. The upper surface glass cover will be accomplished in the next step.

OUTER SURFACE CLOSE OUT

Prepare the outer surfaces for final close out bonding. Roughen and clean all bond areas, remember to fillet any sharp inside corners with dry MICRO. The steel tube corners should also be filleted with dry MICRO.

Apply two ply BID to all outer surfaces of ribs and spar with a full overlap of all the overhanging edges of the aileron skins.



Locate the hinge areas and add a four layer BID prelam 3 inches wide and 10 inches long in each of the two hinge areas per aileron. Lap at least 1 inch up onto the spar surface over this length.

When the layers are cured and knife trimmed drill one or two holes through the glass covering and the steel tube and assure against any axial shifting with pop rivets or sheet metal screws.

ASSEMBLY OF AILERON COMPONENTS

Trim the glass away from the mounting holes for the aileron actuation mounting bracket (or drill out with 3/16 drill - do not damage threads in the anchor nuts). Install the actuator bracket (KS-4) with supplied hardware. .

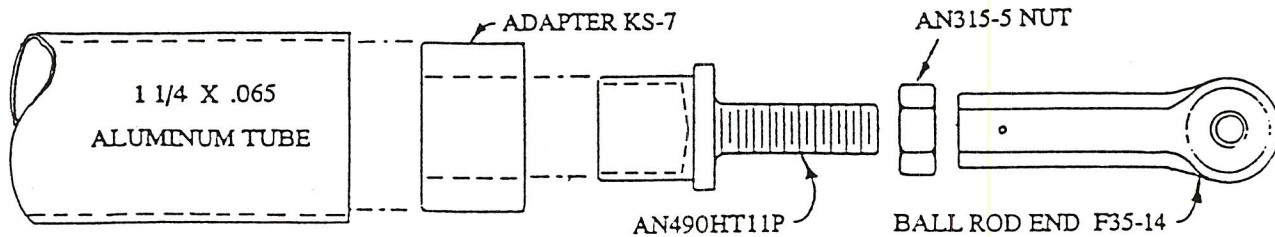
In the hinge areas trim about a 1/16 recess for the bead of the hinge. Align the aileron with the wing trailing edge in final position and drill holes and install the hinges with MS24694-S5 csnk. machine screws, A3135-017 Tinnerman washers, and either lock nuts or appropriate anchor nuts..

Drill drain/vent holes 1/8th inch dia. through each end rib in a low spot just behind the spar to assure venting of pressure with altitude change and drainage of any trapped liquids.

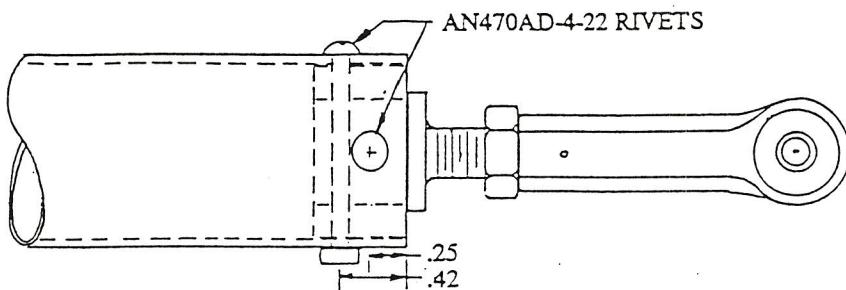
BALANCE

Either mount the aileron to the wing or another support and position the aileron weight on the 1/2 inch square tube. Locate the balance point and assure adequate aileron free travel. Drill a 3/16 hole through the weight and mounting tube and secure with a 10-32 bolt and self locking nut.

The aileron may now be final installed to the wing.



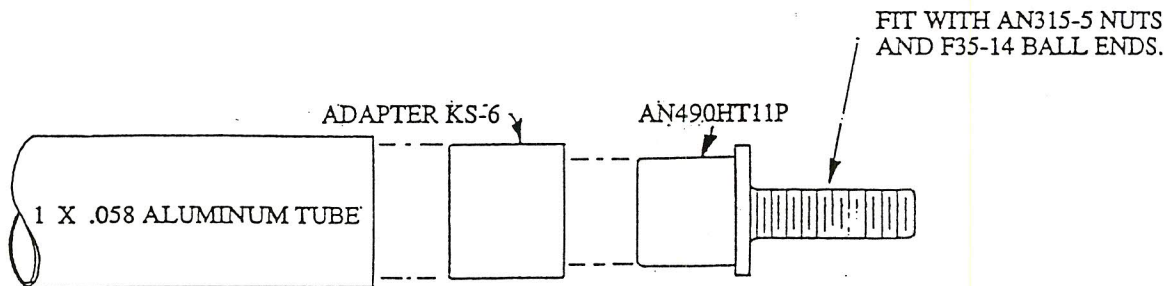
ELEVATOR TUBE



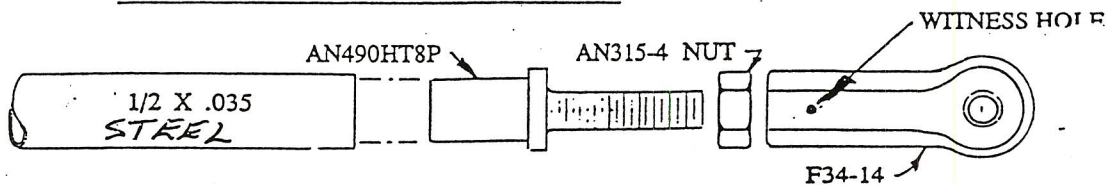
ELEVATOR TUBE ASSEMBLY

NOTES:

1. Fill all AN490 end fitting cavities with micro-flox. Allow to cure before assembly.
2. Rivet all ends as shown on elevator tube ends.



LONG AILERON TUBE



SHORT AILERON TUBE

FIGURE - Rod end assemblies for push pull tubes..