FUSELAGE THIRD SECTION (of three)

FLAP ACTUATION TORQUE TUBE INSTALLATION

The flap actuation torque tube is a two piece assembly, and it mounts on the aft face of the wing rear spar carry through section. This rear spar should be 44 inches long (if it has been trimmed to final size). Mount one of the three torque tube mounting brackets (KS-23) at each end of the spar, located 3/8 inch below the top edge, and against the outer edge. Mount these with only the top bolt at this time such that they can align with the assembly. The bolts are #10-32 flat head counter sunk bolts (MS24694-S56), counter sink the front face of the spar such that the bolt head does not protrude above the surface (the wing rear spar surface will be bolted up tight to this surface) Using the bracket as a guide, mark and cut at least a one inch hole with a hole saw or Dremel in the fuselage side, to allow the tube to protrude through the fuselage surface and operate freely without binding. Repeat this step on the opposite side.

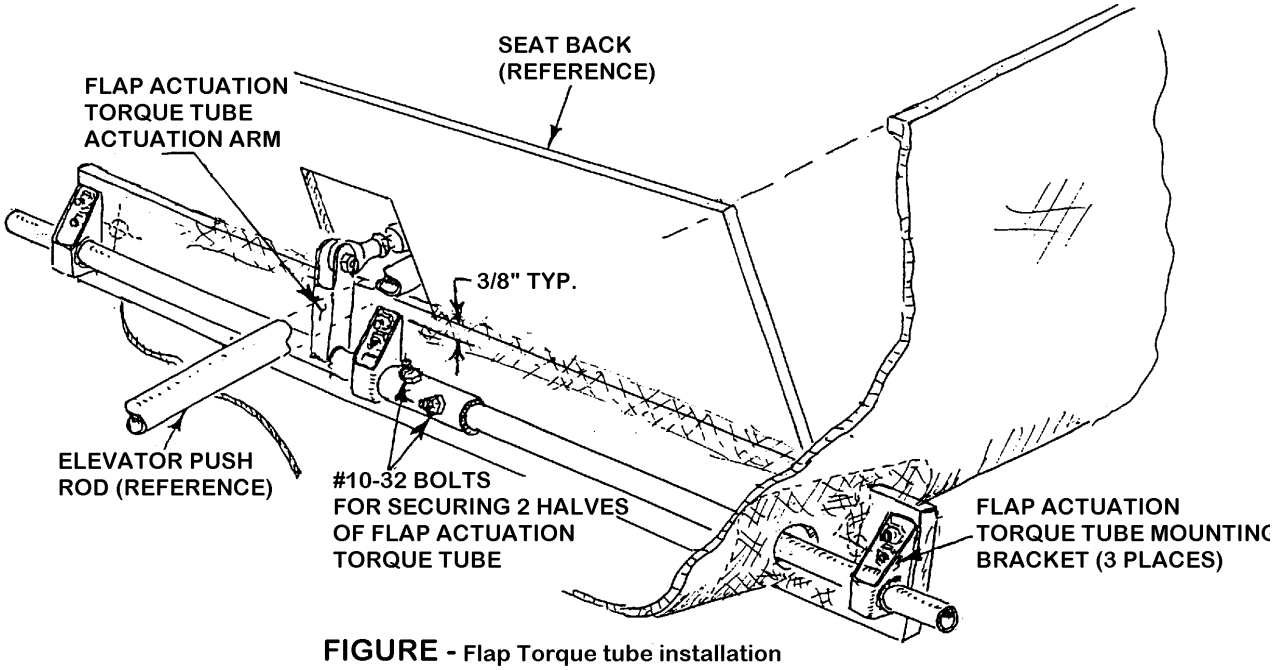


FIGURE - Flap Torque tube installation

Slip the long torque tube (with the actuation arm) through the fuselage hole on the left side, and the shorter torque tube to the right side. Slip the remaining mounting bracket on the inboard end of the long torque tube, and telescope the two torque tube halves together, to trap this bracket. Align the actuation arm on the torque tube assembly, such that it is centered with the flap actuation lever assembly in the center console. Straighten the tube assembly, and locate and drill the top mounting hole for the middle mounting bracket (this bracket location should be to the right of the airplane centerline if the assembly is proper). This center mounting bracket should be mounted with hex head #10-32 bolts since the flush surface is not required, and access will be better for a wrench than a screwdriver.

Fasten the two halves of the torque tube assembly together by drilling through the telescoped section for two #10-32 bolts. Space the bolts about one inch apart (do not trap the center mounting bracket too tightly, this section must turn freely). Drill holes and install the bolts such that the head ends will be slightly toward the spar surface when the actuation arm is vertical, to permit free rotation during flap actuation. These bolts secure the two halves and transmit the actuation torque for the right side flap section. With the torque tube assembled, pivot it several times to' clear up any interference and binding, and locate and drill for the second mounting bolt in each bearing bracket. The outer bolts are also the flat head #10-32 countersunk bolts, installed as before, and the second mounting bolt for the center bracket is another hex head #10-32.

Select the flap actuator push rod assembly (part KS-24) from the included parts, and trim the open tube end

such that the nominal length of the assembly will hold the torque tube actuation arm vertical in the flap retracted (forward) lever position. Complete this assembly by installing the AN490HT8P adapter (rivet in place) and MW-3M8/F34-14 rod end, and install in place. Cycle the assembly through the flap positions to assure free movement and no interference with structure or other control components. Temporarily remove the torque tube assembly and set it aside to avoid damage or injury from the ends protruding from the fuselage.

INSTALLATION OF FUSELAGE TOP

The top fuselage section should be installed before the fin half can be installed to finish the rudder installation. Carefully dry fit the top molded section verifying the trim line of the top half which is to be installed aligned to WL 38, which is the bottom of the joggle in the bottom fuselage molding (Remember that WL 40 should be the top trimmed edge of the fuselage bottom half, resulting in a 2 inch overlap on the bond line). Prepare the bonding surfaces (of both parts) by roughening with coarse sand paper, and cleaning away all traces of parting compounds or oily residues with lacquer thinner or acetone (observe all safety precautions in using these volatile solvents). Drill alignment holes for cleco's or other temporary fastenings such that the bond line will be continuously clamped without buckles or gaps.

CAUTION - DO NOT DRILL TROUGH THE GRAPHITE (BLACK) STRIP ALONG THE BELTLINE OF THE LOWER FUSELAGE HALF SINCE THIS IS A MAJOR STRUCTURAL ELEMENT.

Mark the ends of the bond area length on the lower fuselage molded half, for reference in applying the adhesive.

Separate the halves and mix the Hysol adhesive, or epoxy FLOX, according to the appropriate material instructions, "Butter the adhesive on the outside of the lower fuselage, and also on the inside of the upper fuselage section, in the bond areas (directly above the joggle line for the previously marked length. Replace the top molded shell, using care to keep from scraping away the adhesive in any areas. It is recommended that a helper be enlisted for this operation since it is realistically at least a two person job. If the adhesive is scraped away from any of the bond areas pry that section of the joint apart and work adhesive into the area. Replace the deco' or screws to clamp the joint together. Observe that adhesive is squeezed out in all areas and wipe away the excess before it cures. Remove the cleco's or temporary screws when the adhesive has cured to a rubbery stage and before the temporary fastenings are bonded hopelessly hard (heating the screws or clecos with a soldering gun can be an aid in removing them if the adhesive has hardened too much). Use spreader bars to maintain fuselage contour, and double check all work.

The horizontal stiffener on the seat back (which was set aside early in the seat installation) may now be installed and bonded to the seat back, and the lower fuselage shell with 2 inch wide 2 ply pre-wetted BID. Fill the joint between the ends of this stiffener and the upper fuselage shell with a dry MICRO fillet, and bond the seat back stiffener to the upper shell with 4 ply BID. Provide at least a 2-inch wide overlap on the seat back stiffener and 4-inch overlap to the fuselage upper half.

The upper sector of the STA 153 bulkhead should now be bonded to the fuselage upper half with 2 inch wide 2 ply BID bias tape, both front and back (this bulkhead was similarly bonded to the lower fuselage half at an earlier stage, and this completes the tie in). As in other similar bond operations a dry micro fillet is worked into the joint before taping.

FIN RIGHT HALF INSTALLATION

Select the right side fin half molded part from the kit, and dry fit the part to the appropriate position on the fuselage assembly. Note any areas which may require added trimming, and mark and trim as required (do not

trim the trailing edge flange, where the rudder will be installed at this time, this will be trimmed after laminating to the rudder post). Clean and prepare all areas that will be involved in the bonding operations (the joint to the fuselage and the area that will be bonded to the rudderpost). Drill temporary holes along the fuselage to fin bond line area, and install clecos or small screws to hold the fin molding in its proper location. Particularly check the relationship with the rudderpost such that neither part will displace the other, and check the fit up for bonding. Also check the fit of the other fin half at this time and trim or adjust as required to assure proper installation later. Remove the part and prepare and "butter" on the adhesive (wet FLOX can be used for this bonding operation) on both surfaces, at all bond areas, including the edge of the standing rudder post.

Be sure that adequate adhesive is applied (surplus will be squeezed out and removed later). Mount the part and install clecos or screws to close the joint adequately. If any areas buckle apart adjust the clecos or screws on each side, and add additional fastenings if required to close the entire joint line. Clamp the fin half shell and the rudder post together to assure good fit up between those components, and install a 2 inch wide, 2 ply BID tape between the forward surface of the rudder post, and the inner surface of the fin half. Clean off any adhesive that squeezes out to minimize sanding at a later time. Join the inner surface of the vertical fin to the upper surface of the horizontal stabilizer with 4 ply BID with roughly a 3-inch overlap.

Check condition of adhesive as it cures, and remove the temporary fastenings while the adhesive is still rubbery. Make sure that the adhesive has the required strength to maintain the bond, but not so hard that the fasteners cannot be removed (heating the temporary fasteners can aid in their removal).

Cut out the front rib/spar, and the large fin rib from the pre-marked panel, and fit them to the fin half profile in the location as shown in the figure below. Prepare the Inner surface of the fin half, and the surfaces of the cut out parts, for bonding. Tack the rib/spar and rib in place with 5-minute epoxy. Recheck with other fin half, and trim these ribs if needed to avoid pushing the fin out of shape, and to provide for a good bonding fit. Bond the front rib/spar and the large rib to the inner surface of the fin with 2-inch wide two ply pre-wetted BID (a "prelam" as described elsewhere). The rib is installed parallel to a horizontal line and rests on top of the front rib/spar at the front end (see figure). Bond the rib in pace, also using 2-inch wide BID tape. Trim the right side vertical fin trailing edge at this time, using the scribe line on the molded surface. This line should extend about ¾ inch aft of he fuselage length. Temporarily mount the rudder to the edge of the fin molding (clecos or small screws through the hinges). During this temporary installation of the rudder assembly to the rudderpost (spar) the location of the rudder bell crank shall be verified. This rudder bell crank appears lopsided at first glance, but the system pivot plane is along one edge of the rudder. Ensure that the height of this bell crank will not result in any interference between the rudder cables and the elevator horn (bell crank).

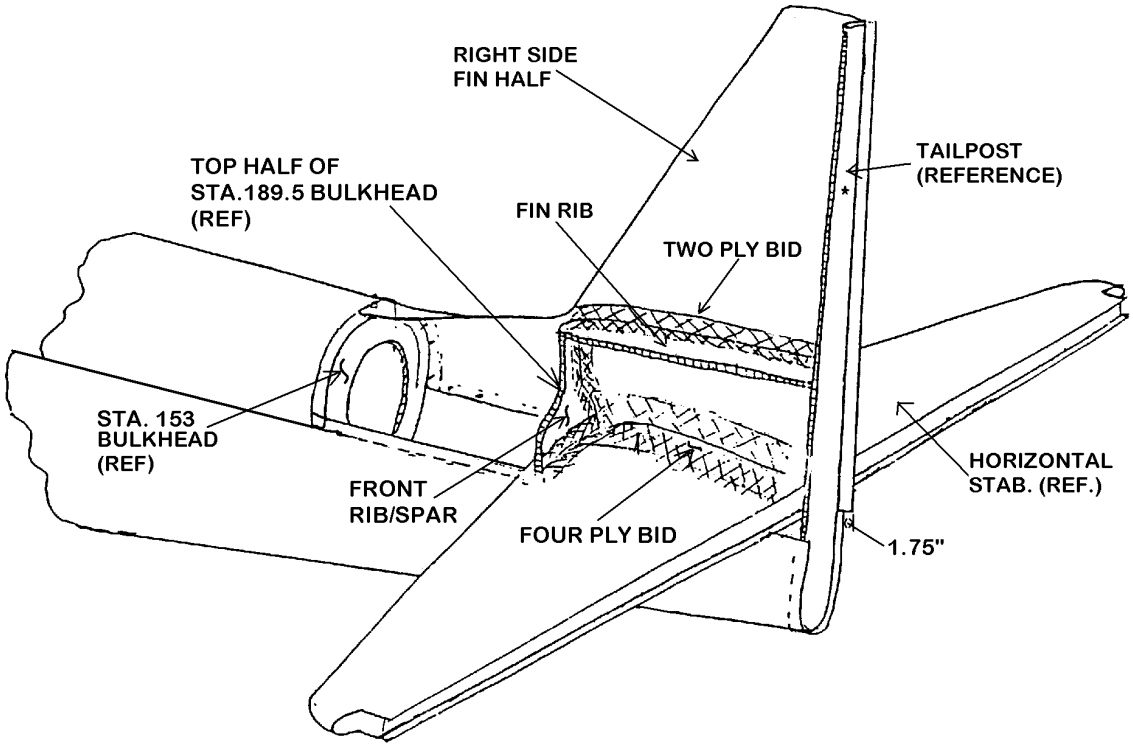


FIGURE - Fin with rib and spar installed

ROUTING RUDDER CABLES AND INSTALLING FAIRLEADS

This is probably the best time to verify the routing of the rudder cables, and install the fairleads (plastic tubing which positions and holds the cables). Because of the way that the cables will be attached to the rudder pedals, it will be necessary to cross these cables before attaching to the rudder bell crank for proper operation of the rudder, and this is the best area to accomplish this. The station 189.5 bulkhead is probably the most appropriate location for the crossing of the cables, and each cable shall be encased in it's own tube fairlead to avoid rubbing. Use a heavy wall section of the stiff nylon tubing furnished with the kit and locate and align this for a straight run of the cable to the feed through in the seat back. Drill through the bulkhead and bond the nylon tube in place with FLOX/ MICRO and locally reinforce the joint with a two-layer patch of BID. Similarly install fairleads at the station 153 bulkhead. One rudder cable will stay within the fuselage/fin housing, and connect to the end of the rudder bell crank inside the fin/rudder assembly. However, the other cable will require a "fairlead" through the right side of the fuselage wall to attach to the bellcrank end out in the airstream. Align this fairlead for a straight run, and use particular care to secure it in place. The factory-crimped ends on the cables are for the rudder bellcrank. Feed the cables through their routing, and leave the free ends up by the rudder pedals at this time.

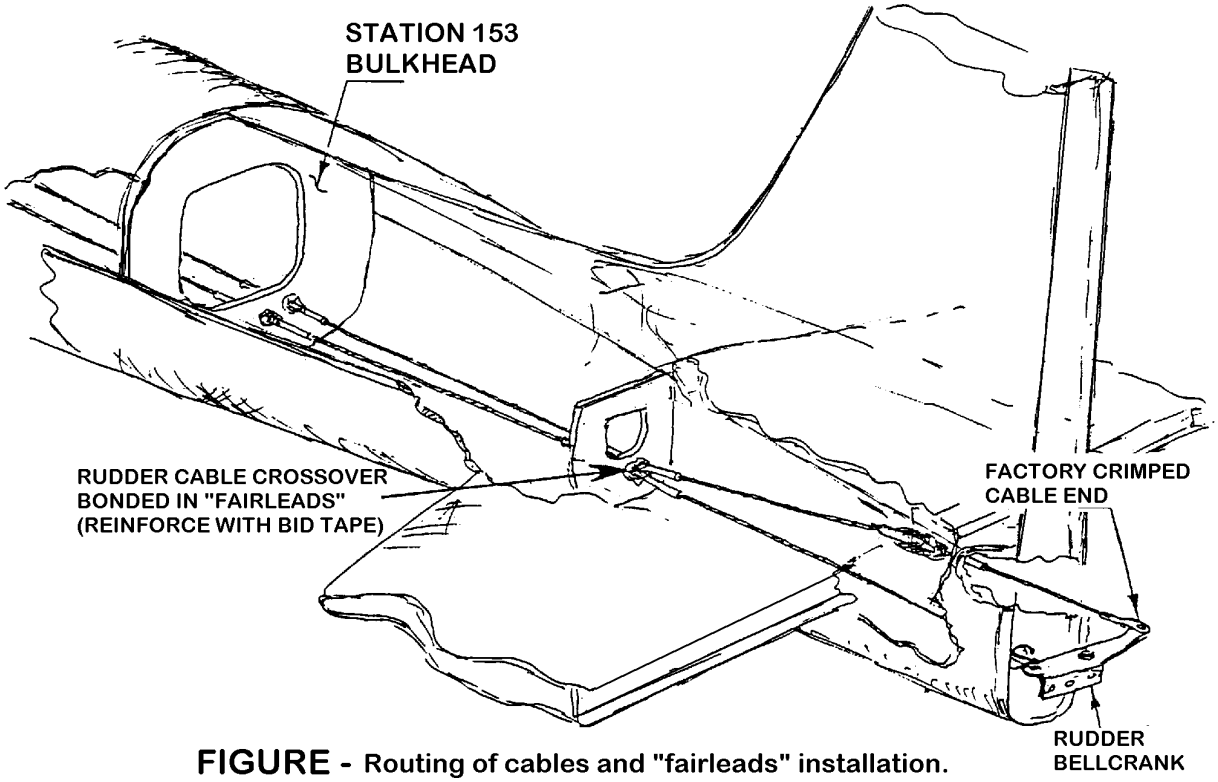


FIGURE - Routing of cables and "fairleads" installation.

Mark the location and length of the rudder hinges on the outside of the fin half. These marks will be used later to located local reinforcement for the rudder hinges. Remove the temporarily installed rudder and proceed with the fin assembly

IMPORTANT IMPORTANT IMPORTANT

The VHF communication antenna should probably be mounted inside the vertical fin at this time. This antenna is not included in the kit and can either be a commercial unit, or one of the numerous built-in units that are marketed for homebuilders. Arrangements are being made to offer a kit for this as a low cost option, so it would be a good Idea to contact Tri R Technologies before this operation is scheduled.

INSTALL LEFT FIN HALF

Dry fit the other (left side) fin half in the same manner as for the right half, with special attention to the fit-up with the ribs and tailpost. Drill the temporary holes along the fuselage to fin bond line as before, and follow the same preparation and bonding procedure, except the ribs and internal structure will require special preparation for bonding at this time as well. Remove, or crush back the honeycomb core for about a ¼-inch depth along all the panel edges that will be bonded. These recessed areas will be tilled with a thick FLOX mixture during the bonding operation. Temporarily position the fin half to transfer some of this FLOX to the mating areas. Remove the fin half, and using the transferred mixture as a guide, coat these areas with additional FLOX, as well as adding adhesive to the obvious bond zones. Reassemble and bond the fin half in place (wipe away any excess adhesive that may be squeezed out of the joints). The top of the fin is left open at this time. Paper tape is suggested on the leading edge to help hold all components in position during this bonding.

Apply four plies of BID to join both fin halves to the upper surface of the horizontal stabilizer. The best procedure to follow is to lay an initial two ply strip 6 inches wide (3 inch overlap on each side), followed by a 5 inch wide and a 4 inch wide. This will provide a tapered surface patch for easier smoothing and painting.

As in all previous inside angle joints, provide a MICRO fillet radius in the corners.

The fin vertical spar structure is primarily provided by the multi layer wet BID bonded to the back surface of the tailpost, and up the inside surfaces of the fin sides. Three layers run the entire vertical length of the tail post. Make sure that the side plies in this "U" section are laid in smooth and flat to avoid unnecessary bulk in this area where the rudder hinges will be installed. Four more plies shall be added in the hinge areas (about 1 inch past the length marks previously noted) covering the total flange within this zone, and overlapping about a half inch on to the tailpost area. Green trim the surplus material extending past the fin skins. Remove the paper tape from the leading edge, and apply two ply BID tape to bond the leading edge of the fin together. Stay within the recessed "joggle" area to avoid excessive sanding in later finishing operations.

HANGING AND RIGGING RUDDER

Install the rudder in the same location as for the temporary previous installation. The right side flange of the rudderpost channel section shall be drilled for mounting the hinges. Drill holes to match the hinges, and use countersunk head screws with the counter sink or Tinnerman washers, and elastic stop nuts on the inside. Verify the required travel, and trim any areas of interference.

Measure the cable lengths to provide the desired rudder pedal position in the neutral rudder position. Install cable thimbles and cable bushings to assure against cable wear, and crimp all cable joints with Nicopress clamps in the desired position. Using strips of metal with spaced holes, as shown in the sketches, will allow a degree of rudder pedal adjustment for pilots of various length legs, as required at some future time. Bolt the cables to one end of these strips, and attach the strip using the appropriate holes, to the tabs on the rudder pedals with bolts and bushings supplied. Rudder cable tension springs shall be installed from the front holes in these strips, forward to the fire wall with a bracket made from scrap aluminum angle bolted to the firewall (see sketch). Save the cut off cable for use with the shoulder harness later.

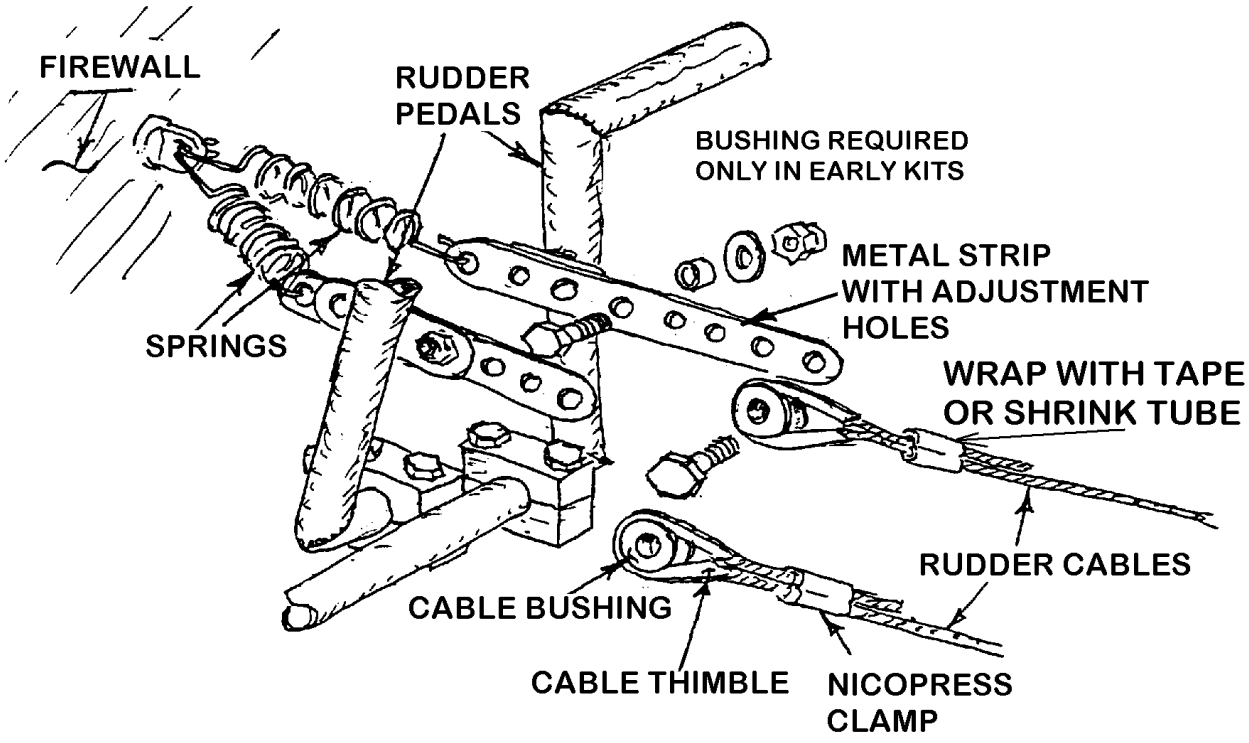


FIGURE - Rudder spring installation

CONTROL TUNNEL – BAGGAGE AREA

The area directly behind the seat back will become the baggage area, and it is particularly desirable to avoid any items carried in this area interfering with the control components that pass through this zone. The primary components of concern in this area is the elevator push-pull tube assembly, and the rudder cables which should be exiting from the seat back at the edges of the console assembly Fabricate an inverted "U" shaped "tunnel for this area which is just a bit wider than the console, to clear the cables, and just a bit higher than the push rod movement as it pivots on the idler arm. Select a section of the pre-preg panel and cut it to the shape described in the templates (or fabricate panel from ¼ foam and one ply of BID both sides). Cut two grooves along the "fold" lines on the inner surface of the panel and fold it into a "U" shape. Bond the inside corners with wet micro and tape the inside of the corners with a single 2-inch wide strip of BID. (See figure).

Make four "L" brackets out of 3-ply bid laid up as an angle strip (using an aluminum angle covered with plastic tape, as a mold will simplify this procedure). Bond these to the floor such that the will sit inside the tunnel. Install the "tunnel" over the control components, fasten it to these "L"s with self tapping screws so it can be readily removed for any required maintenance on these components.

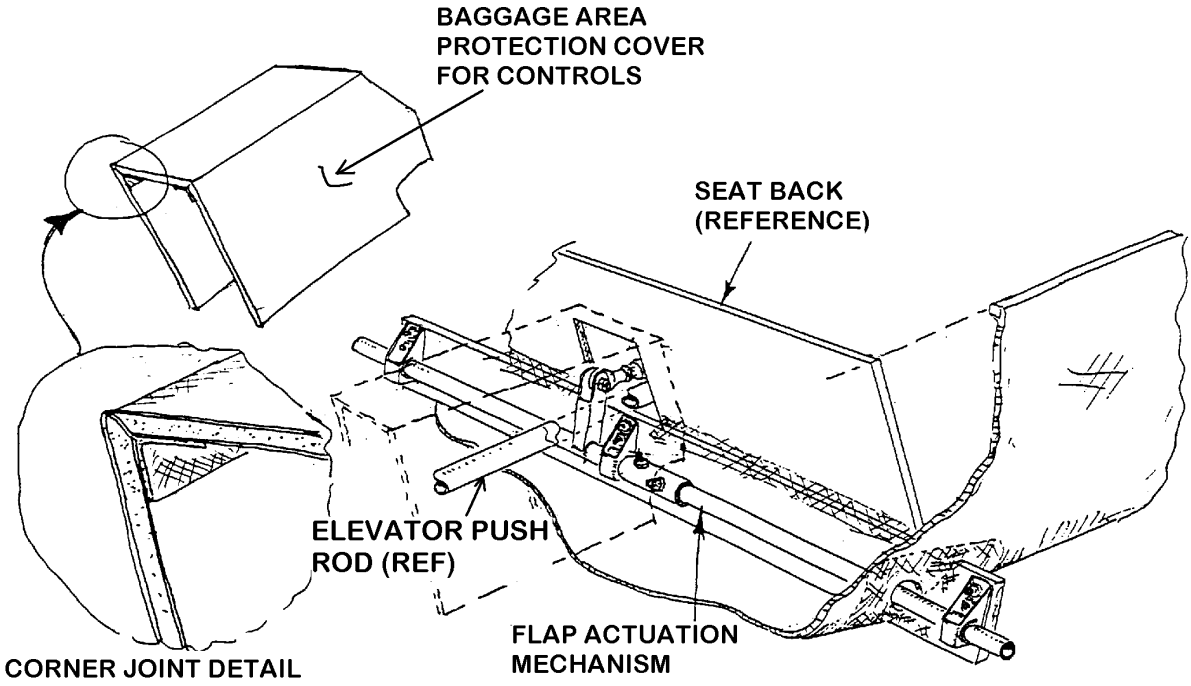


FIGURE - Protective "Tunnel" for baggage area.

BAGGAGE AREA BACK PANEL

The baggage area back panel is totally non structural, and shall be removable for maintenance access to the rear of the fuselage. It is to be fabricated from locally obtained materials and must be light weight, but sturdy enough to prevent item stowed in this area from migrating back in the fuselage.

Bond a minimum of 6 “L” tabs (such as used for the “tunnel”) around the inside perimeter of the fuselage at STA 111. These will be used to secure the back wall of the baggage compartment. Fabricate a bulkhead shaped panel from local light weight materials (such as 1/8 inch plywood or foam core poster board with a light BID layer on one surface) and mount it to these tabs with self tapping screws. A cut out in the lower section should straddle the previously installed “tunnel”. This is a non-structural component but some type of closure is required to limit the aft location and keep loose items from interfering with the controls in the aft section of the fuselage. (See figure).

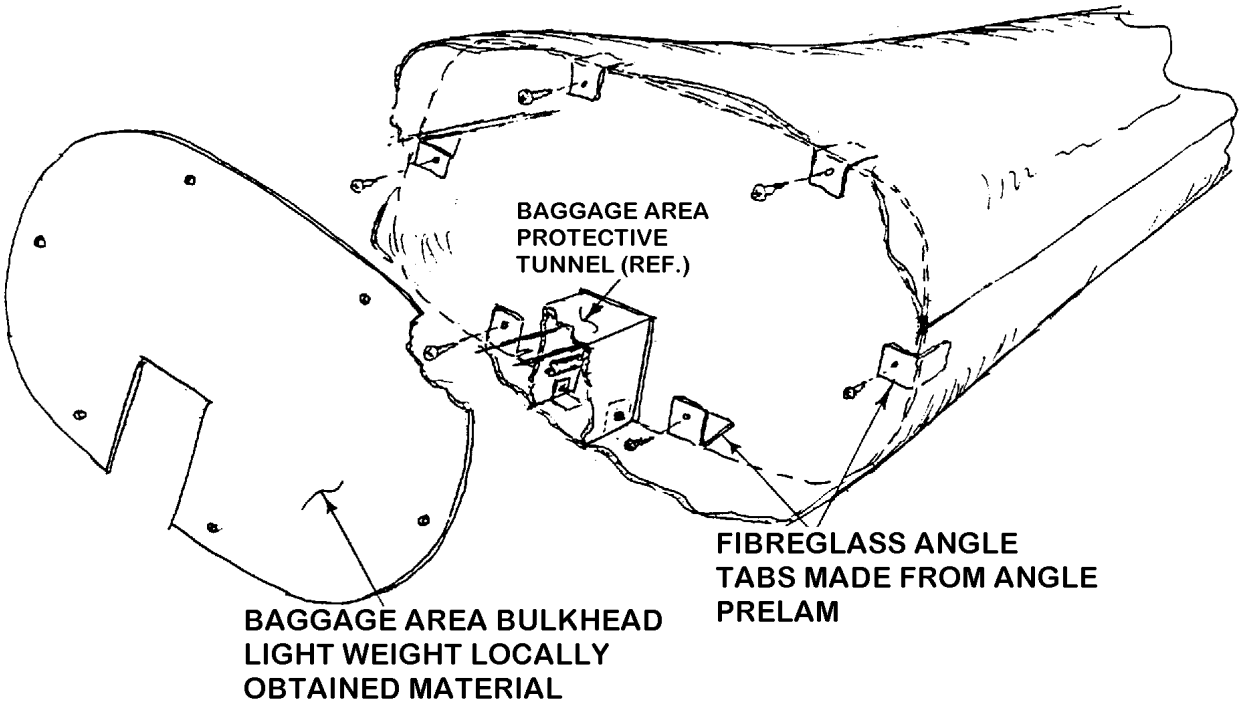


FIGURE - Baggage back bulkhead installation

MAIN GEAR INSTALLATION

The main gear shall be prepared for installation by locating and drilling for the two "roll" pins that prevent sideways movement of the main gear. The location for these pins is on the back edge of the center gear section located vertically on the section centerline and 9 ½ inches each side of the gear/aircraft centerline (LBL and RBL 9.5). Drill ¼ inch diameter for ½ inch depth parallel to aircraft centerline. (The forward edge of the gear is the straight edge.) Break (round) the edges of these holes to avoid stress concentrations. The gear legs and center sections should be dressed smooth before the roll pins are installed. Do this smoothing in a direction parallel to the length of the gear legs, being especially diligent in smoothing out any cross wise defects in the surface area, to preclude any future cracking. This operation is both for cosmetic and structural reasons. Drive the roll pins into place after these operations are complete, and test fit to the gear recess and trim off any excess length of the roll pins which might interfere with the fuselage material (the roll pins need only extend past the rear bolt centerlines for proper retention of gear position). The use of these roll pins is probably redundant, but the gear center section length will change slightly as the gear legs flex, and these pins will limit any creeping of the assembly to one side or the other.

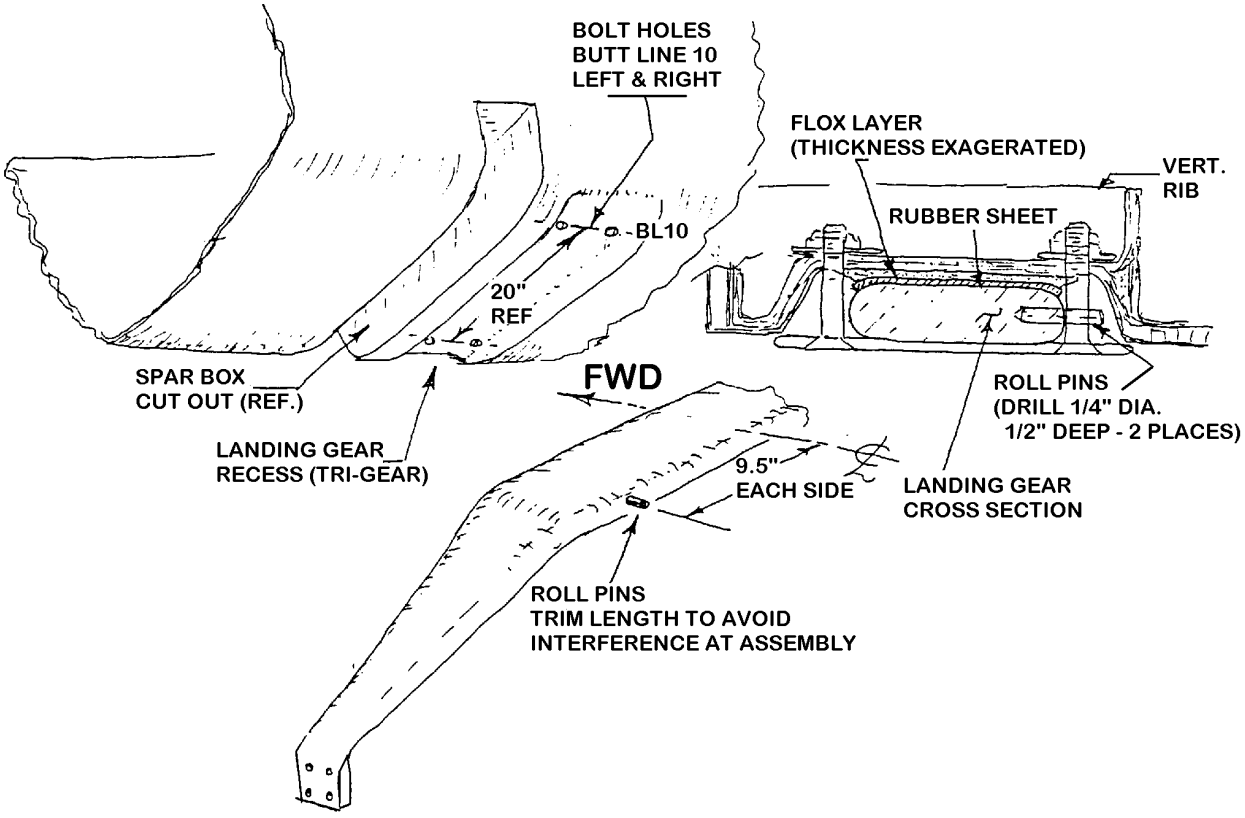


FIGURE - Main gear assembly operation

The mounting bolts will be located 10 inches either side of the aircraft centerline (RBL and LBL 10), and are 4½-inches center to center, centered in the molded recess. The center gear section should be 4 inches wide at this point., providing a little over 1/16 inch clearance between the gear and the attachment bolts. Drill a matching set of 5/16-inch holes in the steel (4130) retaining straps, and countersink to set the bolt heads flush with the surface. Using the large bearing washers provided in the kit on the inner fuselage side of the mounting holes, and MS 24694-S 178 bolts, trial assemble the gear legs to the fuselage (use minimum torque on the nuts to close up gaps but not deflect structure). Check that the assembly is square to the aircraft centerline, the legs are level on each side, and the axle centerline will be located at STA 73.5. Use thin wood

shims tacked in place with 5-minute epoxy to correct any noted misalignment.

It is recommended that a thin layer of rubber sheeting (inner tube rubber or similar) be lightly tacked to the upper mating surface of the landing gear to avoid local concentrated loading of the composite. Apply a thin layer of a thick mixture of FLOX to the rubber covered upper surface of the gear, and apply added flox on the recessed surface around any shims which may have been added to the recess area. Lightly torque the bolts holding the gear in place, and correct any positioning before the FLOX cures. Clean away surplus FLOX before it becomes fully cured. The FLOX will provide a uniform bedding for the gear, filling curvature and voids. The rubber should provide for ease in separation of the gear from the recess, as well as providing cushioning against the destructive effects of point loads into the composite. If there are too many voids in the FLOX covered areas, the process of coating the surface with FLOX can be repeated concentrating on void areas, and squeezing out surplus FLOX.

With the gear legs removed from the fuselage, locate the position for the axle assembly. Using the axle as a pattern, mark and drill the 4 holes for mounting the axle. Trim away surplus material from the ends of the gear legs for a finished appearance, and also to provide clearance for proper installation and operation of the brake mounting plate, which may also have to be drilled for the mounting bolts (drill ¼ inch). The referenced centerline of the axles should be 16½ inches below the bottom face of the gear center section. AN4-23A bolts will be used to complete this assembly.

BRAKE LINE INSTALLATION

This is probably a good time to install the brake lines from the main gear wheel assembly to the master cylinders in the rudder pedal area. Pre measure the proposed routing of the brake lines, and cut appropriate lengths of the hard nylon tubing supplied for the hydraulic lines (leave a little surplus length for possible trimming and refitting operations in the future. Plastic tie wraps can be used to secure the brake line to the rear edge of the main gear legs, although bonding them in place with a trailing edge fairing makes a classier job with less aerodynamic drag. Route over the spar and along the fuselage wall. Bond in place with little dabs of silicon adhesive, using tape to hold in place while curing.

FIRE WALL FIRE SHIELD ASSEMBLY

Trim the Fiberfax to fit the surface of the firewall area (the fiberfax is the white sheet of matted material, about 24 x 36 inch in size and about 1/8 inch thick). Use the fiberfax as a guide, and cut out the firewall stainless steel surfacing material. Try to make these materials as close to the firewall face pattern as possible. Fit the stainless in place, and seal the perimeter with a silicon rubber type sealant/adhesive. Drill holes through both materials using the engine mount bolt holes as a guide, and then install with temporary bolts and nuts.

IN ANY SUBSEQUENT INSTALLATION OF COMPONENTS WHICH PENETRATE THE FIREWALL - SEAL WITH SILICON SEALER.

NOSE GEAR ASSEMBLY

Locate the nose gear weldment, and pre drill the mounting holes per the enclosed drawing. Center the weldment on the firewall, with the lower edge of the lower mounting angle, just above the bottom firewall edge. Carefully position the assembly centered and vertical, and drill the 4 x ¼ inch diameter mounting holes as shown on the sketch. Using the large area washers on the inner surface and four AN4-10 bolts and nuts supplied, bolt the assembly in place.

If desired the wheels and wheel and brake assemblies may now be mounted, and the fuselage assembly may be supported and moved about on the gear.

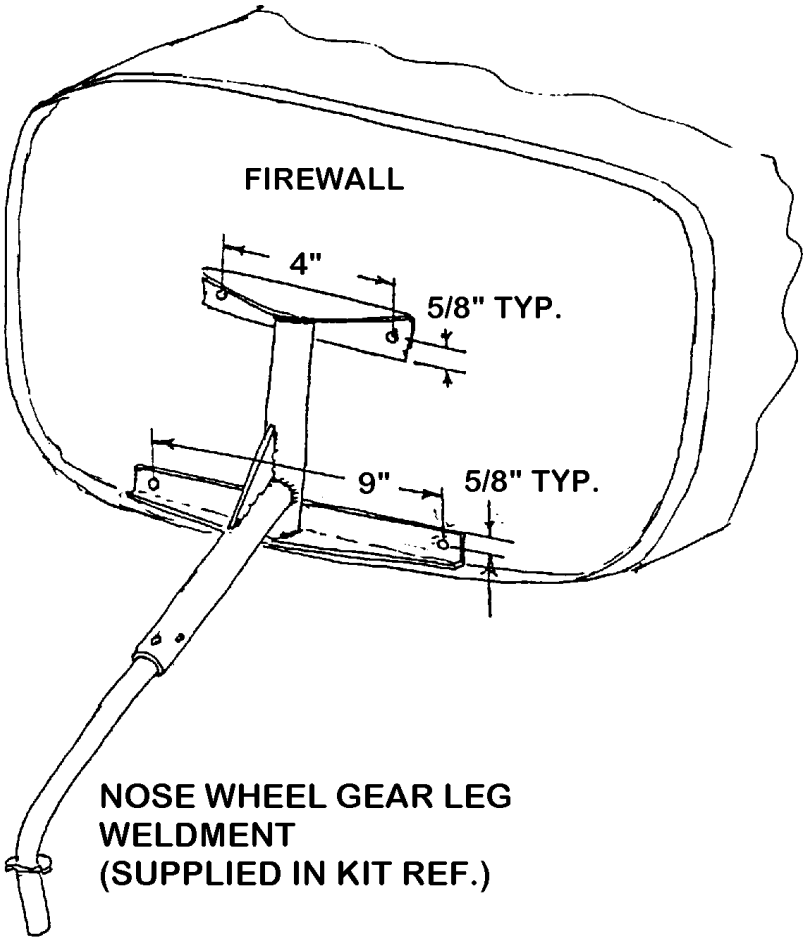


FIGURE - Nose wheel assembly mounting

DOOR INNER PANELS

Select the appropriate inner door skin and fabricate the local panel sections required for mounting the door latch mechanism components. These panels will be fabricated in place with a 4 ply BID wet lay-up. This material shall be laid up against temporary tooling surfaces as shown in sketches below, with the leading edge of the lay-up roughly 6 inches rearward of the forward door skin flange. The large panel for the handle assembly requires a semi-inflexible panel about 6 inches wide and about 5 inches high (for example 1/8 inch plywood or thin aluminum). Prepare the surface to be molded against by taping over with clear plastic tape for a smooth parting surface. This panel will be clamped directly to the surface of the lower flange, and with a 1/8 inch filler (to leave room for the window thickness) sandwiched in the upper flange. Cut out a 6-inch square of the four ply wet BID on a plastic sheet. Roll it up, wet side out in about a ¾ diameter cylinder, and unroll it against the inner surface of the clamped panel to make a "U" shaped section with the legs bonded inside the "U" section of the inner door molded part. With gloves on reach in with your fingers and remove the plastic film and pat the wet BID into place. The small corner panels are provided in a similar fashion, against a tape coated (or similar) panel. The edges of the BID should "flange" out against the sides of the molded part to provide good bonding area.

At this time the local reinforcing for the door support air strut mountings should be added to the door inner panels. Lay four ply BID in the bottom of the front window frame stiffening hat section starting near the top of the window opening and running down for about 8 inches. This BID should be wide enough wrap up the sides about ¼ inch. This will provide local stiffening in this area, and provide enough "meat" for the self-tapping screws that will be used to mount the air strut bracket.

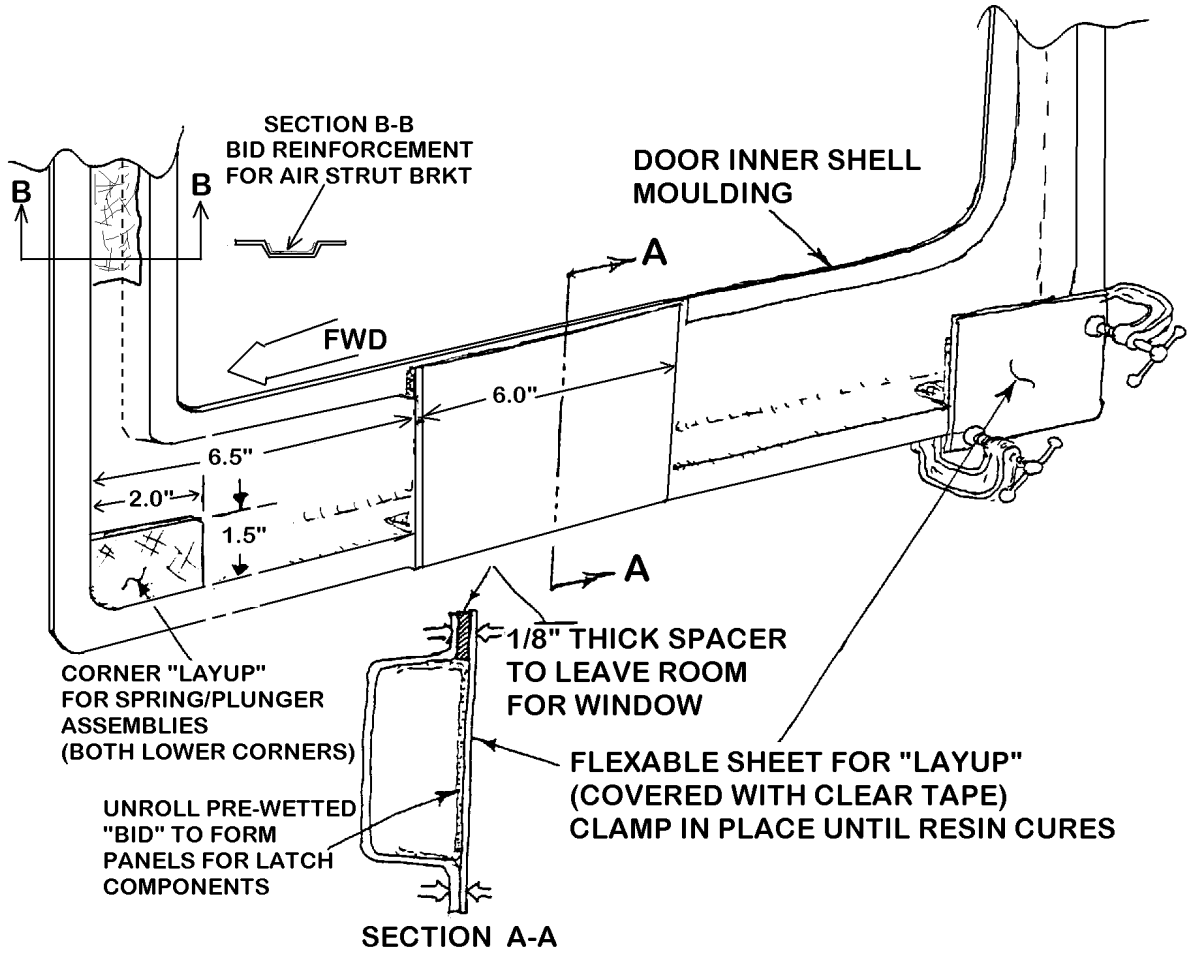


FIGURE - Local panels fabricated for mounting door latch hardware

Fabricate the door handle and latch components while these panels cure (or earlier). See the drawings for configuration and dimensions. The handles will be fabricated from the 1 x 2 box section extrusion of aluminum, and the mounting angles from the 2 x 2 x 1/16-inch thick aluminum angle supplied in the kit. The latch pins are to be made from the length of ¼ inch steel rod supplied the mounting "U" s cut from the "U" extrusion supplied. Cotter pins, nut plates, washers, springs and nuts and bolts are also supplied.

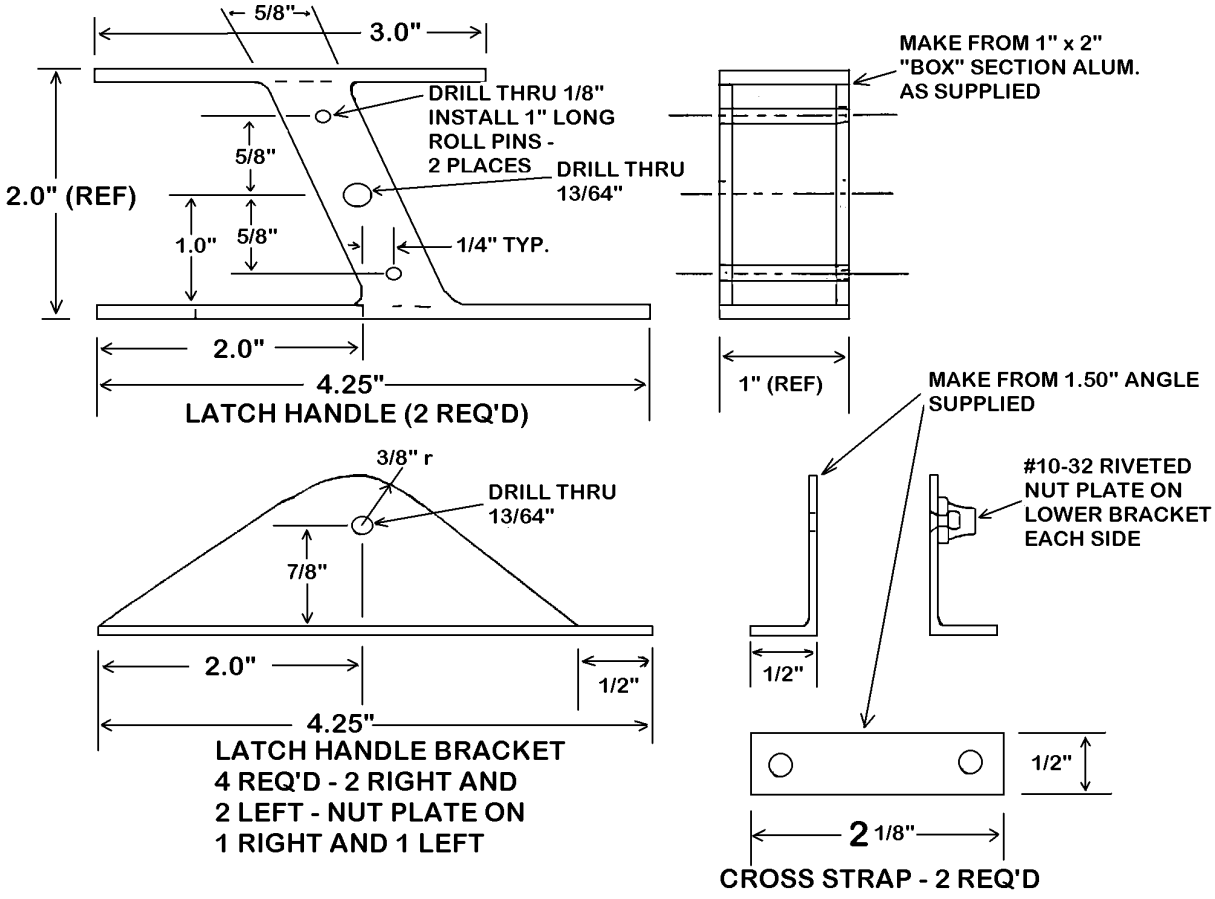
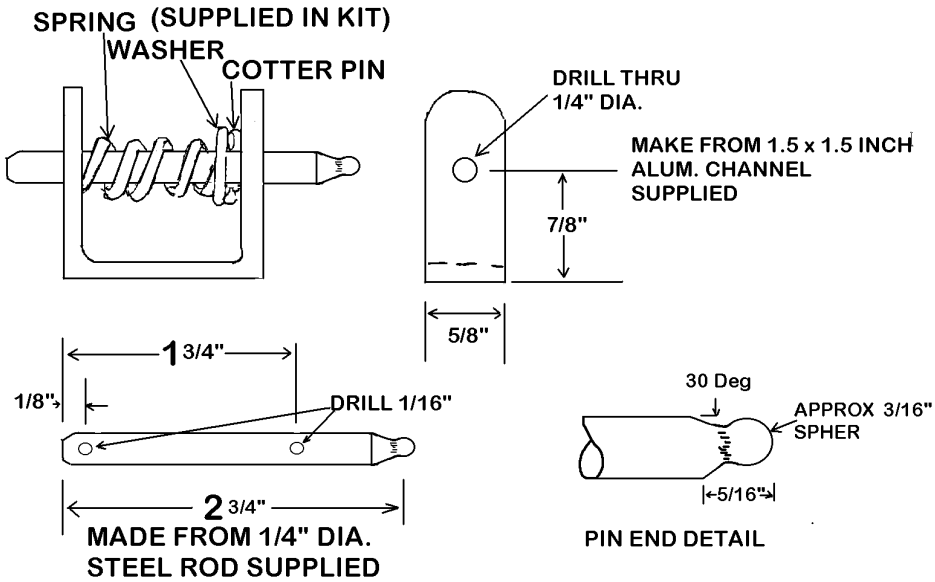


FIGURE - Door latch handle and mounting bracket components



LATCH SPRING PIN ASSEMBLY
(4 REQ'D)

FIGURE - Door latch spring and plunger assembly components

Carefully cut the opening for the handle in both the outer panel just fabricated and also the inner door skin. Position the top mounting angle behind the BID panel, and locate the position of the pivot bolt on the upper leg of the "U" section of the door inner skin molded part. Drill an access hole through this part that will permit installation and removal of the pivot bolt through this surface (large enough top ass the bolt head - this hole will be covered with upholstery material in the finished assembly).

Install the roll pins in the handle assembly, taking care to be flush with both the top and bottom surfaces as much as possible. Test assemble the handle and angles with the pivot washers installed, and mark the holes for the 4 mounting screws for the angles (these holes should be visible through the translucent BID panel - be sure that the orientation is such that the end of the handle that pivots outward is in the trailing position). Drill (5/32) and countersink the surface four places to hold the #8-32 screw heads flush. Assemble with the screws and hardware supplied, remembering to include the cross piece, which will provide the stop for the handle.

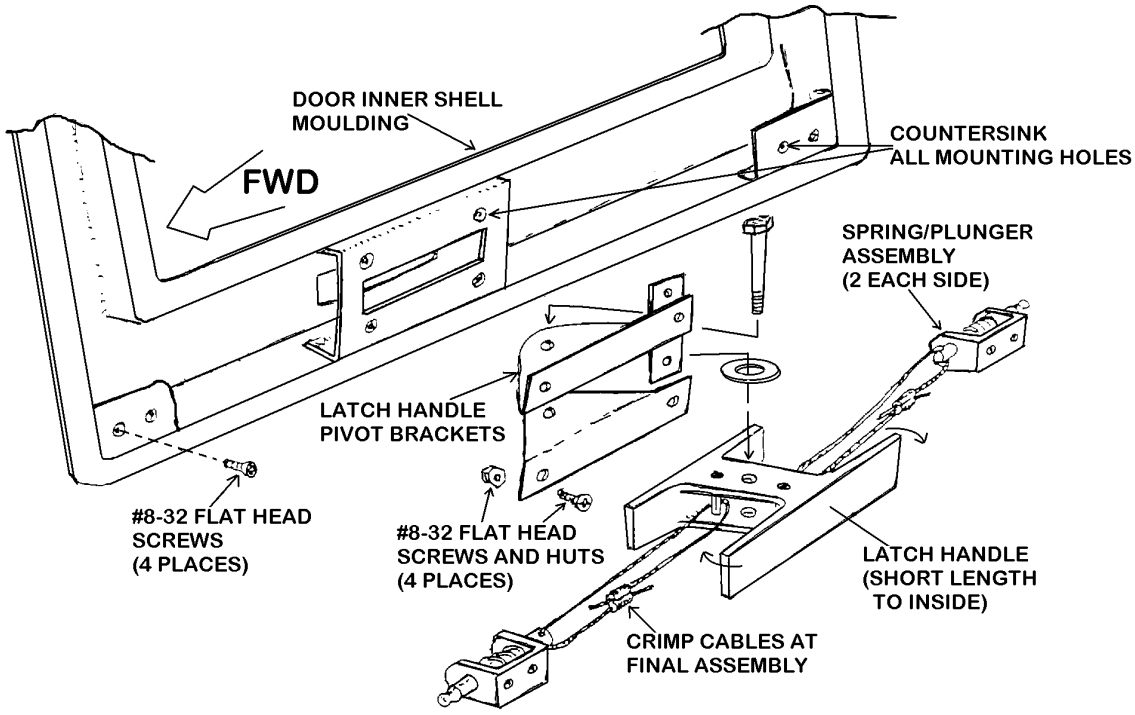


FIGURE - Door latch installation assembly view

Assemble the latch pin assemblies with the supplied spring, washer and cotter pin. Note the "ball end" configuration of the latch pin. The small ball section should pass through the hole in the "striker" plate, and the reduced diameter section will act as a detent to prevent accidental opening of the door, as happened with the first taildragger display plane. Test position the assembly, and mark the location for the latch pin hole where the latch plunger will have to protrude out through the door inner skin molding. Drill a clearance hole for this pin (about 5/16-inch diameter) through the inner door skin. Hold the assembly in position with the pin protruding through this hole and about 1/16-inch clearance between the edge of the latch pin assembly and the inner surface of the door skin molding. Drill for the first mounting screw at 1/8-inch diameter. through both the fiberglass and the aluminum. Remove the assembly and tap the hole in the aluminum for a #8-32 thread, and drill a clearance hole (about 5/32-inch diameter) and countersink the composite. Mount the

assembly with the first flat head screw, and repeat the process for the second mounting screw. Test assemble all the latch components (do not permanently install and crimp the cables at this time) and test for function and free movement of all components

Trim the window opening in the door inner panel molded parts to the scribe lines from the mold. Do not trim the outer perimeter of the part at this time. Select the proper-formed window panel, the 'A' panel is for the left side. Position the window panel over the window opening, and roughly mark the outline of the frame on the protective covering. The formed window panel is supplied oversize, an some trimming of the Plexiglas part may be advisable at this time, you must leave a minimum of ½ inch bond area around the perimeter. It is best to trim the window with a sharp fine tooth bandsaw blade. Be very careful in these operations, plexiglass is easily marred, chipped, or cracked, and windows are very expensive. Peel back this protective covering to about a quarter inch inside the window opening line, and cover the exposed plastic with masking tape. Position the window in the opening again, and again mark the opening (more precisely this time). Trim the masking tape to this line and expose the area that will be bonded to the window frame. It is advisable to apply a second layer of masking tape to this line to assist in cleaning up the edges after bonding by removing this layer of the tape while material is still wet. Roughen the exposed surface of the plastic with coarse sandpaper to prepare for bonding.

Tack the door inner panel in place over the door opening in the fuselage (it is probably better to do one side at a time to permit more accessibility for working on both the inside and outside). Adjust the position to center the window in the open area of the door opening, using the hinge areas as a guide. Tack the inner panel in position on the external surface of the fuselage (the excess material around the perimeter of the door skin should overlap the recess enough to permit this bonding, and this will hold the door in the proper shape to fit the fuselage).

Clean and roughen the area where the clear plastic window panel will be bonded. Test fit the prepared window panel in the opening, and adjust the exposed surface as required. Mix the Hysol adhesive, or epoxy FLOX, and coat both the window plastic and the window frame with the adhesive. Carefully position the window in the opening and tape into place until the adhesive cures. Squeeze out any surplus adhesive, and clean up the surplus and smooth a fillet around the edge of the joint before the adhesive cures. Removing the second layer of masking tape will help facilitate the clean up around the bond area.

Select the appropriate outer door panel, and trim the window opening to the inner scribe lines on the molded surface. Again, do not trim the outer edges. Disassemble the handle assembly from the inner door skin assembly, and position the outer skin over the inner skin. Verify the location of outer skin window opening relative to the inner skin window opening. When the position is held to satisfaction, reach through the handle opening in the inner skin, and draw the outline of the outer handle opening on the inner surface of the outer skin. Cut out this opening for the outer handle, and verify the fit between the two openings. Note the positioning of the bond areas on the inner surface of the outer skin.

Mark the window opening on the protective paper on the outer window surface. Peel back the protective window paper covering, and double tape this area as was done with the inner skin surface. Also trim the masking tape to expose the bonding area, and roughen with coarse sandpaper as before. Also clean and roughen the other bond areas on the inner surface of the outer skin, and the outer skin.

Re assemble the door latch assembly for the final time, securing all the bolted connections with a dab of resin or adhesive to assure that the fasteners will not work loose. When the parts are assembled, install a loop of the supplied 1/16-inch cable through the hole in the latch pin, and around the appropriate roll pin for each side. Pull a little tension on the loop (to keep the handle solidly on the stop) and mark the cables carefully for

joining. It may work best to remove the spring/plunger assembly so you can bring the cables out for the crimping process. Align the marks carefully and crimp the Nicopress cable joiner, and carefully trim and tape the cable ends protruding from the Nicopress to avoid injury or tangling of any of the components. Test fit the outer skin again, and trim any areas for correct assembly (particularly check around the handle). Clean and sand all bonding surfaces. Apply adhesive to both surfaces (particularly in the hinge area, use care in the areas around moving parts such as the door handle). Tape the outer skin in place until the adhesive cures. Local areas requiring an assured bond (such as the hinge areas) may be clamped together with a Cleco, or a small screw as a temporary clamping procedure. Remove these temporary fasteners in the same manner as for the other fuselage bond lines. When the bonded joint has cured, make alignment marks for future positioning, and remove doors, and trim to fit opening.

MOUNT DOORS

Reinforce the door hinge pads in the fuselage top molding by overlaying 4 ply BID on the inner surface. Use a tapered overlap at the edges extending from about ½ inch to an inch beyond the pads. Cut the hinge sections from the aluminum piano hinge strip included in the kit, fitting the width to the pad area on the fuselage molding. Rivet a piece of .065 aluminum to the door side of the hinge, extending the leg of the hinge to about 4 inches. Countersink both parts and grind the rivets near flush on both sides. Mount the hinges by the short sides, to the fuselage molding, temporary bolts can be used at this time. The molded recess in the fuselage top should hold the hinges in line, but check to make sure the hinge pins are aligned in both planes such that the door will not bind in operation.

With the trimmed door assembly positioned in place, swing the door end of the two hinges up to the recess in the door molding. Use a dry MICRO/FLOX mix as a liquid shim to provide alignment of the hinge surface to the surface of the door assembly. Lightly bolt the hinges to the door recess, being careful not to distort any components, nor extrude excessive MICRO/FLOX out of the joint. The pivot points of the two hinges must be in line (co-axial) or there will be binding when the door is opened. When the MICRO/FLOX cures, unbolt the hinges and peel them off the MICRO/FLOX. Clean up the mounting surfaces and re-mount with the final counter sunk bolts (#8-32 screws). Set the heads flush with the outer surface of the skin on the doors. The use of removable bolts on the door side of the hinge sets will allow a little adjustment leeway when the holes are slightly enlarged, such that the doors can be adjusted for best fit. Adding hard paper or metal shims, or sanding away the cured FLOX will also allow needed adjustment range. The hinge recesses on the fuselage top may be filled in with dry MICRO and smoothed for appearance and aerodynamics, once the door is satisfactorily positioned and proper operation verified (door removal can be accomplished at the door side of the hinge for any future maintenance).

LATCH PLATE INSTALLATION

Fabricate four angle pieces from 1 x 1½ inch 4130 steel (about .045 thick) per the sketch below. Drill the two mounting hole in each part, but leave the plunger pin hole blank at this time. Trial close the door to establish the location for the latch plate and bolt it to the inner surface of the door frame with two #8-32 flat head screws and self locking nuts. The door surface may be irregular at this location, and the previously described FLOX “shim” technique might be advisable to assure a secure mounting. Leave just enough clearance with the door hat section to assure easy opening and closing (about 1/8-inch). Close the door and mark the location where the point of the striker pin rests with the door closed securely. Drill through the angle plate at this point with a 3/16-inch. drill. Do this for both sides of the door, and open the hole if required to pass the ballpoint end of the pin. Verify proper operation of the door latching system, modifying as required. The striker plate shape should be rounded at this time to remove surplus material to avoid snagging clothes or body parts when entering or leaving.

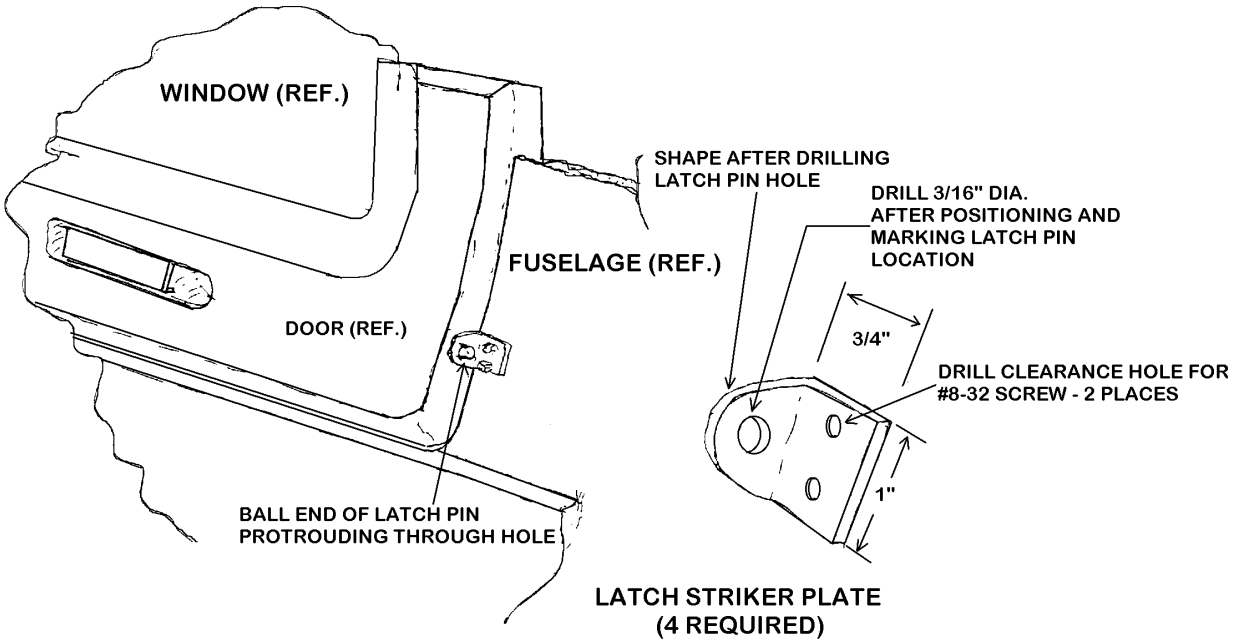


FIGURE - Door latch plate installation

AIR STRUT INSTALLATION

Locate the air struts (for holding the doors open) and brackets supplied in the kit, and mount as shown in sketch. Mock up the assembly carefully to assure that the stroke range of the air strut will not be used up without proper open positioning of the door, and that proper clearance is provided between all components during operation. It is suggested that you mark the bolt locations for the upper bracket in the fuselage door frame flange, and add about a 2 inch wide by 6 inch long 2 ply BID reinforcement to the inner surface to stiffen this mounting area. Drill and countersink for mounting with 2 #8-32 flathead screws and locknuts. The hat section of the door panel was reinforced earlier, and these brackets can be mounted directly with the self-tapping screws supplied. A little bit of FLOX “shimming” under these brackets may provide a more secure mounting.

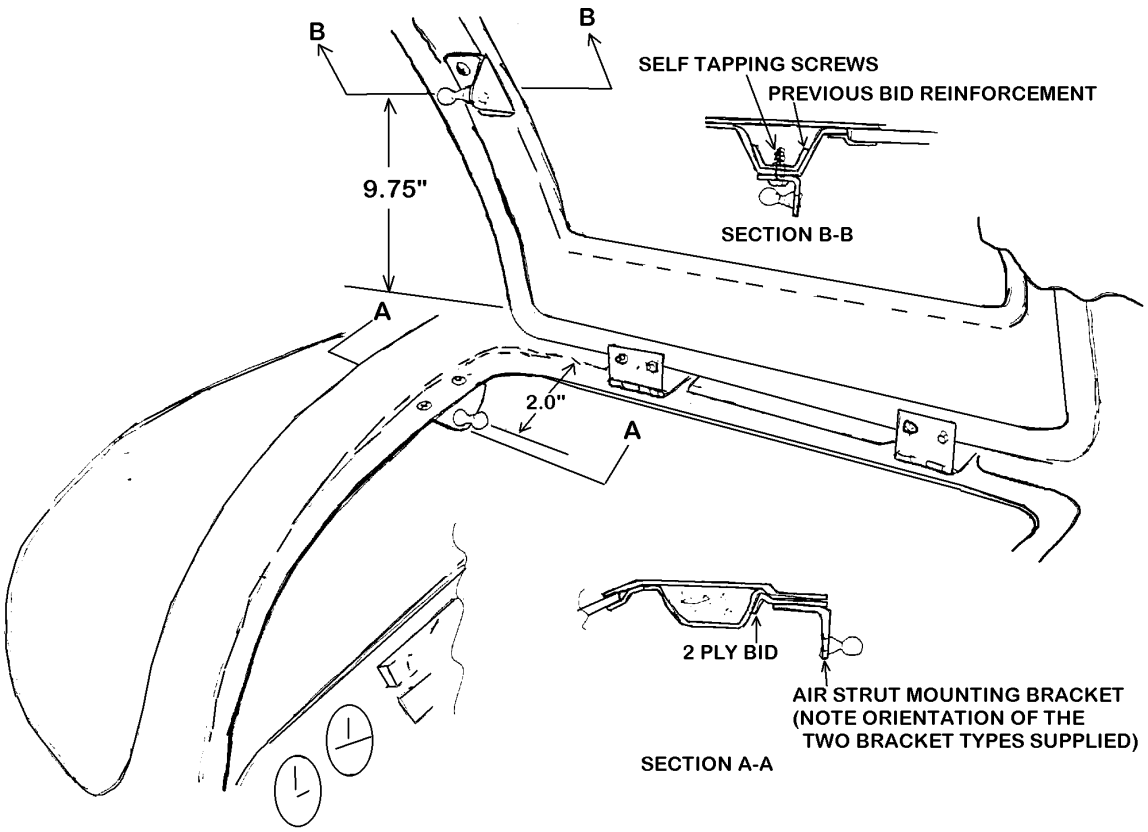


FIGURE - Air strut installation on doors

REAR WINDOWS

The rear windows are inserted in much the same fashion as for the windows in the doors. The molded window panels are oversize, so some degree of trimming will be required. Trim the fuselage opening to final size, and hold the window molding up against the inside, and mark the opening. Allow a minimum of ½ inch for bond overlap in the trimming operation. As before, peel back the protective cover, and mask with tape to the opening edge (two layers as before). Roughen the bond area with coarse sandpaper (on both the window and the fuselage) and apply the adhesive. A suggested method of clamping using wood blocks and “drywall” screws is shown in the figure below.

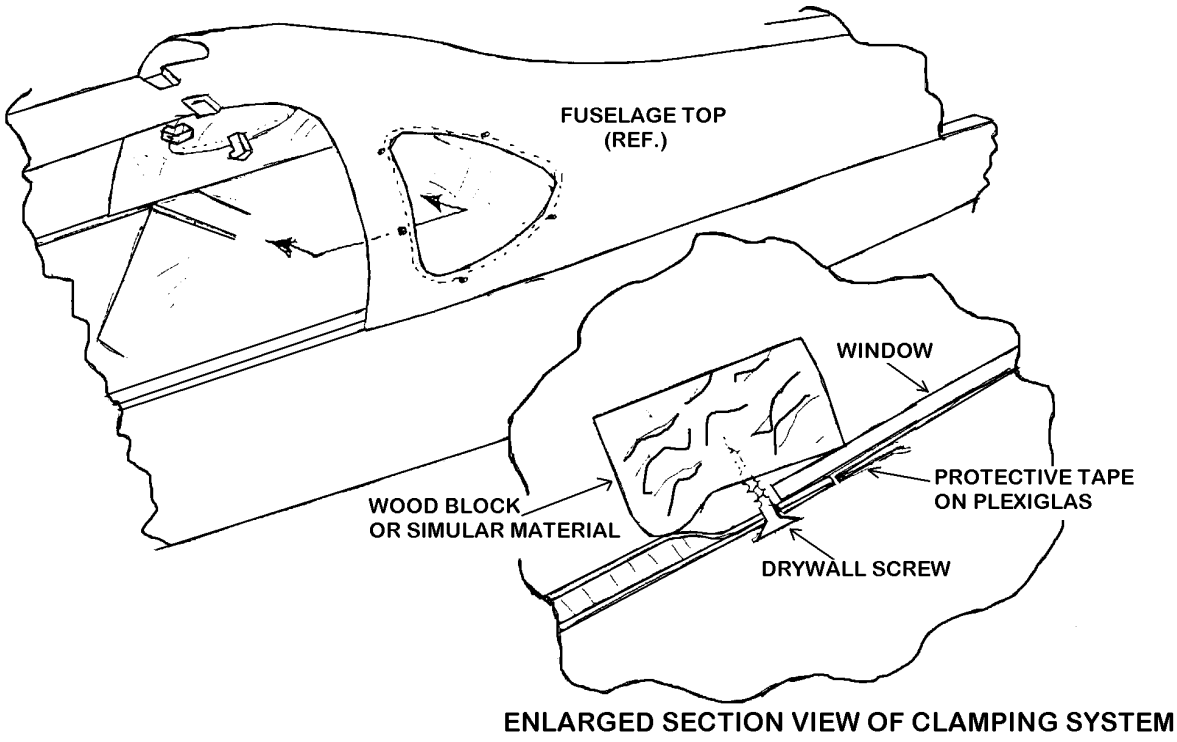


FIGURE - Clamping scheme for inserting rear windows

Drill the holes very close to the window edges (about 8 or so places are suggested, and add extra clamps in any area where a gap occurs), and tighten the wood blocks to squeeze out surplus adhesive. Wipe and clean any surplus /adhesive as soon as possible to avoid later problems. When the window adhesive cures, remove the clamps, and prepare the inner edge of the window for bonding. Use the same procedures of peeling back the protective covering, and masking. Bond the inner side of the window with a single ply pre-wetted BID tape. Be sure that this tape covers the holes that were drilled for the clamping, and fill from the outer surface with relatively dry MICRO. (It is recommended that the windshield be left out for a while longer)

INSTRUMENT PANEL

Cut the instrument panel out of the marked two ply panel, leaving a little extra material at the ends for fitting into the plane. It is probably a good idea to make the instrument cut outs before installation wherever possible so a drill press or other tooling can be more readily utilized. It will probably be desirable to thin the panel locally where the instruments are to be mounted. This can be accomplished in at least two ways. One is by cutting the areas oversize, filling the raw edges of the core with MICRO, and fastening in insert panels of aluminum as was done on the original tri-gear prototype. The other approach can be to cut away the back surface in the instrument areas and laminate two or more layers of BID, with the edges of the core filled with MICRO. An extra cost, optional molded instrument panel and dust cover is available from Tri- R Technologies, which may make it easier to provide a finished appearance for this installation, and it may be advisable to inquire before this operation is started. Review the suggested instrument panel layout shown in another section of this manual, so that a standardized layout shall be used to assure safe operation of the aircraft.

Position of the panel is somewhat of a personal preference, making sure that adequate clearance is provided

for the knees, and sufficient room is provided behind the panel for installation and servicing of the instruments. Bond the panel into position with 2 layer pre-wetted BID tape front and back. The upper area is left open at this time, and delaying windshield installation will permit better access for installing instrumentation and wiring. The center of the panel will be excessively flexible, so both the upper edge and lower edge should be stiffened. The bottom edge should have a flange added of 2 inch wide strip of the two ply panel with the edges filled with MICRO, and bonded in place with 2 ply BID. Cure a 3-inch wide strip of 3-ply BID on a smooth surface and use this as a flange for the top edge of the panel.

A stiffening panel should be made from 1-ply foam core 1-ply panel or cut from the 2-ply pre-molded panel for added stiffening. Measure the distance to the firewall for length, and make the panel about 7 inches wide. It is to be located 4½ inches to the left of centerline (see sketch below), filling the raw edges of this panel with dry MICRO is suggested to stiffen the edge. Some drilled holes along the lower edge will provide a convenient spot for some plastic tie wraps to secure wires and tubes in this area. This panel should also be used to support the radio tray.

After the instruments and wiring have been installed, it is suggested that a light, flexible, cardboard or fiberglass panel be covered with non reflective upholstery material, and retained with Velcro for the “dash” cover and instrument dust cover (or inquire about the optional cover from the factory). This panel should be sturdy enough to set an occasional small book or manual, yet lightweight and easily removed for maintenance.

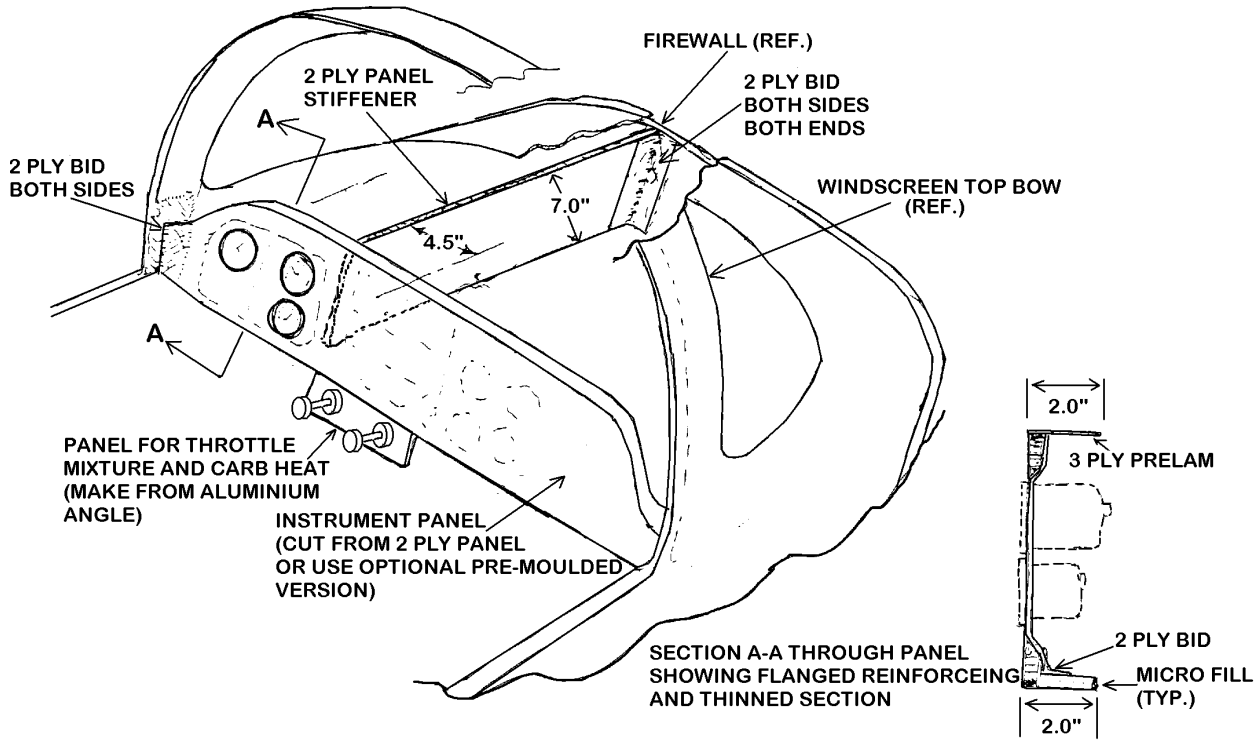


FIGURE - Installation of the instrument panel

WINDSHIELD

The windshield should be one of the last things installed on the fuselage, since it will restrict many operations in the cockpit area. Make sure that you have planned out the rest of your final assembly before bonding the plastic into place.

The windshield shall be installed using the same techniques utilized for installing the back windows. The only change recommended is the use of two ply BID for retention in this case to assure against the added loads and greater size of this panel.