KIS4 Cruiser

BUILDERS MANUAL

S/N 4052

FUSELAGE
SECTION 4

FUSELAGE ASSEMBLY FOURTH SECTION (OF FOUR)

SEAT BELT ATTACH POINTS

The hard points for the seat belt anchor installations should all have been inserted during the preceding fuselage assembly operations, and should be ready for the following steps. If any of the areas referred to in the following steps do not have the required high density core materials installed, and the reinforcing BID layers applied, then these should be done at this time. The anchor bolts for the rear seat shoulder straps should have been installed in the bulkhead behind the baggage area, and the straps can be assembled to these bolts at this time using the supplied 1/4 inch bolts, castellated nuts , cotter pins and washers. The front seat shoulder straps are anchored to the roof structure. It might be a good idea to put the straps in a paper or plastic bag as you complete these steps to avoid tangling or soiling them in subsequent operations.

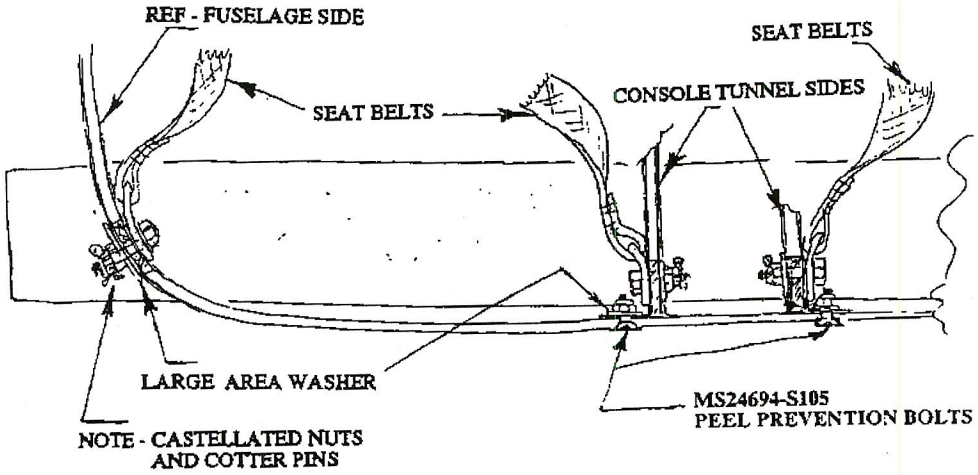


FIGURE - FRONT SEAT BELT ATTACHMENTS (REAR ARE SIMILAR)

The hard points for the front seat inner lap belt attachment are located in the rear lower corner of the control console tunnel sides. Drill a 1/4 inch hole through the center of this hard point, and another 1/4 inch hole vertically down through the fuselage bottom, inside of the control tunnel area about a half inch inboard of the wall, through the 12 layer BID reinforcement applied in an earlier step. Use a large area washer on the outside surface of the fuselage and a standard washer on the inside and bolt tightly with a 1/4 inch bolt. (this is a peel

Drawing shows hole out board of console tunnel

Shows under Fuselage

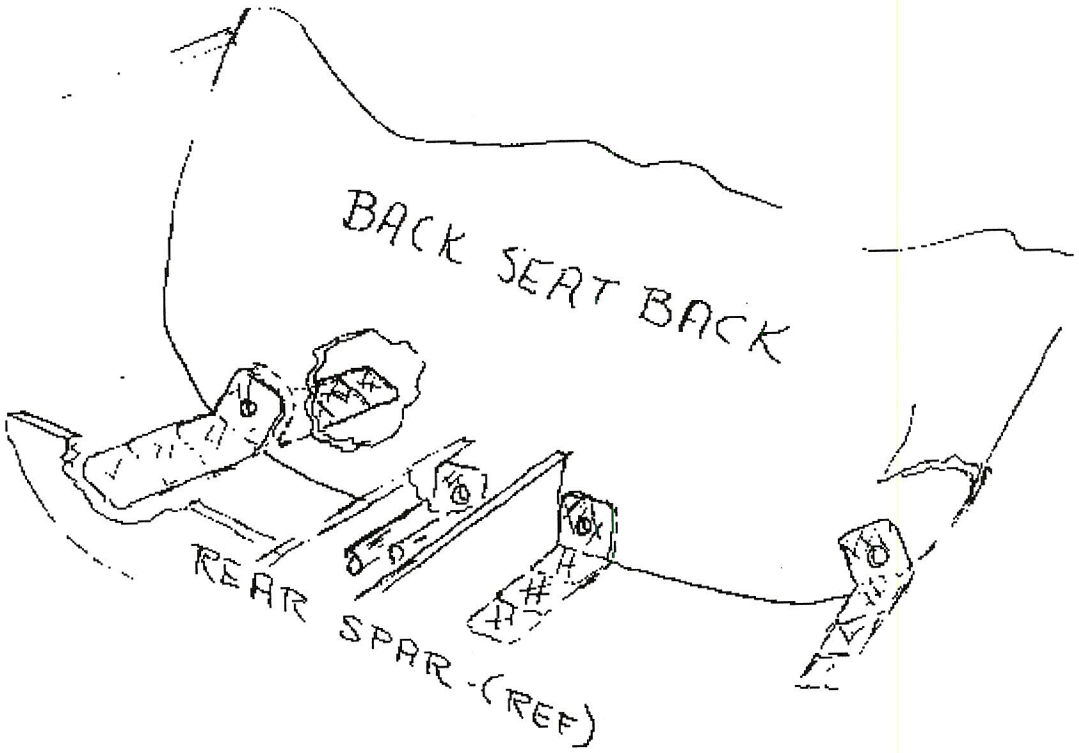
preventative against any upward forces on the belt). Bolt the appropriate belt end clevis with another 1/4 inch bolt, castellated nut and washer combination through the hard point in the tunnel side wall, and cotter key the castellated nut to prevent belt movement from loosening the nut.

The hard point for the outer lap belt section is through the fuselage wall, just ahead of the main spar. Use a large area washer on the outside of the fuselage (the wing and fairing assembly will cover this area , so there is no requirement for a flush assembly. Again use 1/4 inch bolts, and use a cotter pin and castellated nut to ensure against loosening as the belt is moved about. The enclosed figure should help clarify these instructions.

The front seat shoulder belt hard points are in the roof section just behind the door rear upper corner. Some early kits may not have the hard points installed, and the builder wil have to reinforce this area. cut a section of the inner skin roughly 1 inch wide and 2 inches longitudenly and insert a section of 1/4 inch thick plywood imbedded in a FLOX mixture. Clean and roughen an area 1 inch wide surrounding this cut out and apply a 4 layer BID 3 by 4 inches. Drill and countersink the outer surface for two #10 - 32 flat head machine screws 1 inch apart to retain a 1/8 inch aluminum strap for belt attachment. (see figure)

FIGURE ATTCH FOR FRONT SEAT SHOULDER STRAPS

The rear seat lap belt attach locations are hard points reinforced into the rear seat back lower edge where it attaches to the fuselage at four points as shown. Two inch wide pre wetted BID tape cut into 3 lengths of 4, 6, and 8 inches long for both sides (front and aft) at each location and laminated into place as shown.



FRONT SEAT BOTTOM ASSEMBLY

The front seat bottom can be tailored to individual requirements, but the enclosed instructions describe the method which has worked well on the factory airplane. The seat panels should be fabricated from the 1/4 inch pre preg panel sections included in the kit. The two front seats are seperated by the central control tunnel and each side may be customized to the individual users. The seat panels run from the main spar top at the rear, to the station 30 panel (with the control assembly) in the front. .

Make the seat bottom core section a little oversize, and fit it into place. Cut away a generous opening for the control stick to avoid restricting the movement. Dress the edges of the opening with a dry FLOX paste. Trim the edges of the panel to fit closely into place against the tunnel sides in the center, and the curved fuselage sides on the outer edges, to keep it from shifting position in use. The seat panel works very well flat, but it may be contoured for more comfort of head room if desired. It may be useful to hinge the seat panels at the rear to hold them in place but also alow access for storage or inspection.

REAR SEAT BOTTOM ASSEMBLY

The rear seat bottoms can be fabricated in a similar fashion to the front seat, as single panels on each side of the control tunnel. However the generous head room in the rear seat area will allow raising the seat panel for a one piece bench style, and could be set up for 3 seat belts for children.

FIGURE - Seat bottom fabrication and assembly

PITCH TRIM CONTROL

Although many of our builders are opting for electrical remote trim sysytems (MAC or similar) the default pitch trim control for this aircraft is implemented using a Bowden wire cable back to a moveable tab on the elevator, and the hardware to implement this sysem is included in the kit. Remember that tab movement is the reverse of control surface movement. That is - the tab moves downward to bring the nose up, and vice versa. Route the cable under the horizontal stabilizer and into the fuselage section. It is recommended that you fabricate a "fairlead" type penetration into the fuselage section using a short length of the nylon tubing to permit the Bowden housing to slide in and out as the elevator is actuated (see figure for a rough idea of how this is accomplished). Roughly route the cable through the fuselage, up into the control console tunnel between the seats. Avoid any potential interference with the moving flight controls.

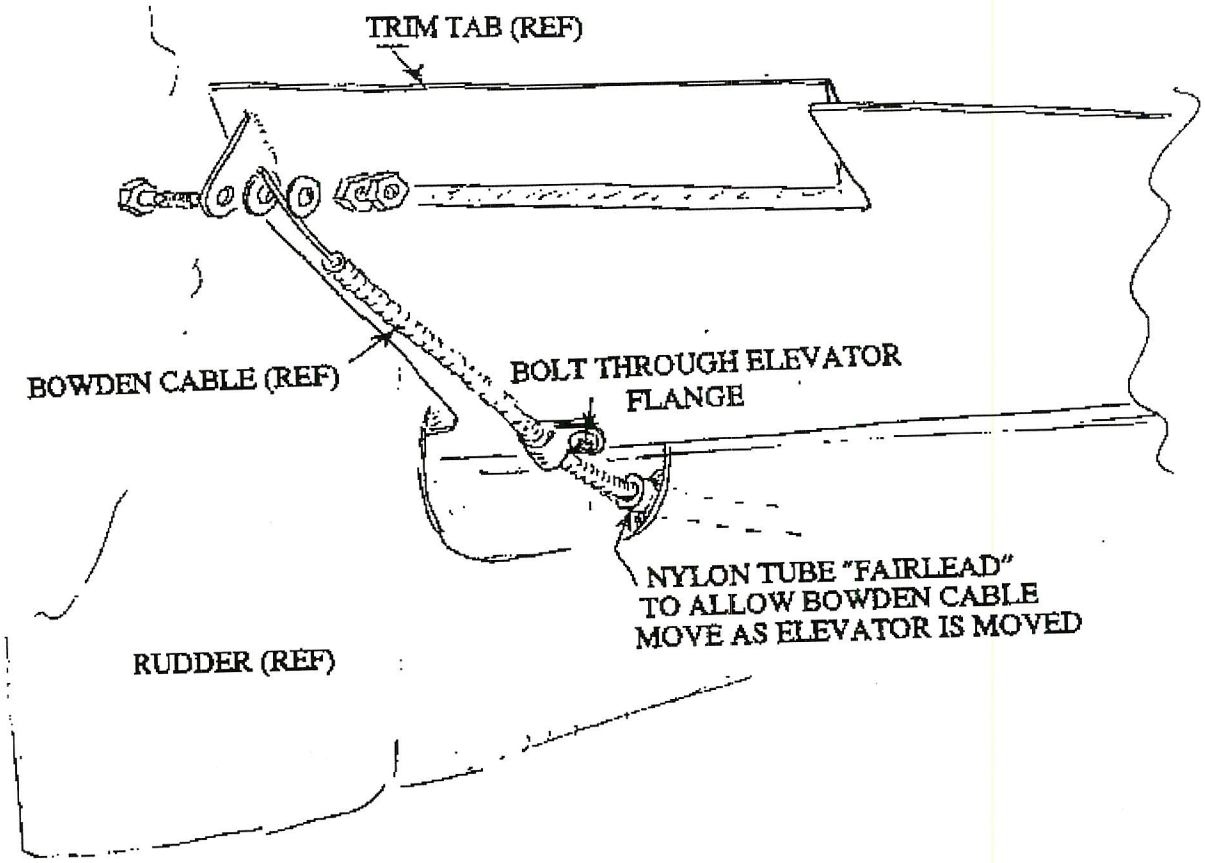


FIGURE - Trim tab end of trim system installation

FIGURE - Trim tab end of trim system installation

Attach the free end of the central wire to the trim tab control arm. Use one of the "terminal" assemblies supplied (a short #10 hex head bolt with a transverse hole drilled through about 3/16 in. from the head, packaged with two washers and two hex nuts). The transverse hole is sized for a 1/16 in. wire and must be reamed out with a 5/64 inch drill to accept the bowden wire in the kit. This will still be a close fit so the end of the wire must be deburred to fit in the hole. The bolt is passed through the hole in the control arm, then the first washer installed, the wire threaded through the hole, the second washer installed, and the first nut tightened into place with the wire positioned as desired. It is a good idea to apply a small drop of adhesive on the threads, and tighten the second "jam" nut into place.

Make sure enough of the center wire is exposed from the Bowden housing to assure full adjustment of the tab. and anchor the bowden housing to the lower surface of the elevator, at the lower flange at the front edge of the elevator. Drill trough this flange and use a #8 screw with a loose nut plate up in the recess

(The nut plate need not be riveted in, the elevator flange will prevent it from turning. Use a cable clamp which will grip the housing firmly and prevent slipping fore and aft. If epoxy or other adhesive is used the secure this mounting, the bowden housing must be sealed with tape to prevent seepage from locking up the center wire. Work the elevator up and down through full travel and assure no binding of any of the free movement, and clear any potential conflicts.

Fabricate a control handle per the sketch below, from a remaining piece of 1/16 inch aluminum sheet, or procure equivalent material locally. The lower hole should be about as close to the pivot hole as will provide clearance for the sets of bolts and washers (about 3/4 in.). The upper hole for the handle, should be at least twice this value to reduce the sensitivity of this adjustment. Mock up the lever assembly and locate the appropriate point on the inner surface of the tunnel wall roughly opposite of the flap handle pivot point. Simulate operation from this pivot point, and assure that none of the components of this assembly will interfere with the other control linkages. Although the loads are light on this control, it is probably desireable to prepare a local "hard point" for the pivot bolt in the passenger side tunnel side , at the desired pivot position. Cut through the outer skin of the sandwich material, and either insert a disc of phenolic or fill the cavity with dry MICRO/FLOX. Apply a patch of 2 ply prewetted BID with at least a half inch overlap beyond the edges of the cut out. Drill a 3/16 pivot hole through the "hard point" in the selected location after the resin cures.

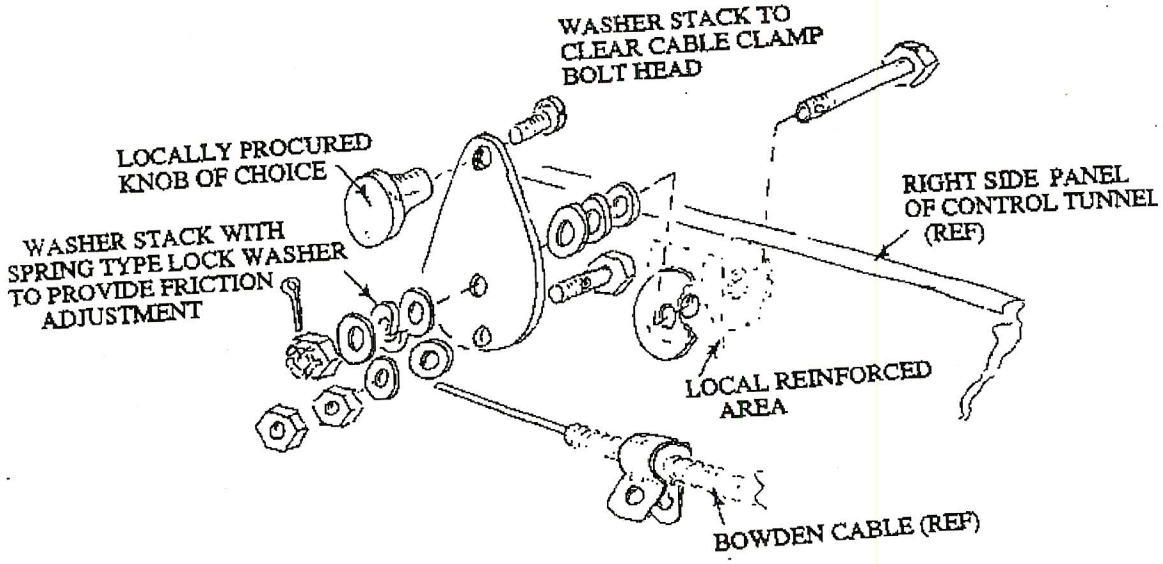


FIGURE - Trim actuationg lever - suggested assembly

Attach the free end of the Bowden center wire to the lower hole in the lever using a "terminal assembly" as before at the rear control horn. Orient the assembly such that the bolt head is toward the tunnel wall. Insert an appropriate length #10 - 32
bolt (stack the total assembly for best fit) through the pivot hole with a large area washer on each side of the sandwich panel. Add three smaller diameter washers to provide clearance for the "terminal assy." bolt head, and put on the lever. Assemble another washer, a spring lock washer, and another plain washer. Install a castellated nut and tighten to desired friction level, and install cotter pin. Anchor the Bowden housing to the tunnel inner wall with a cable clamp about 5 to 8 inches from the lever, make sure sufficient bare wire is open to permit travel of the control arm.

set the elevator at the neutral position, and set the trim tab in a neutral trail position on the elevator. Loosen the wire clamping on the lever, and set the lever in a vertical position. Re clamp on the wire, and jam nut on the "terminal assembly", and secure with a dab of epoxy or other adhesive on the threads.

Anchor the cable housing at frequent intervals (if FLOX or BID is used to anchor the cable, be sure to wrap the cable outer shell with tape to prevent the resin from seeping in and locking the cable in place).

CONTROL CONSOLE COVER

the control console cover is a molded assembly furnished with the kit. Clean up the edges and verify proper clearance for the control levers which protrude from this cover. Installation is accomplished by simply setting the cover in place, and the seat cushions will sit on the flanges holding it in place.

WHEEL FAIRING ASSEMBLY

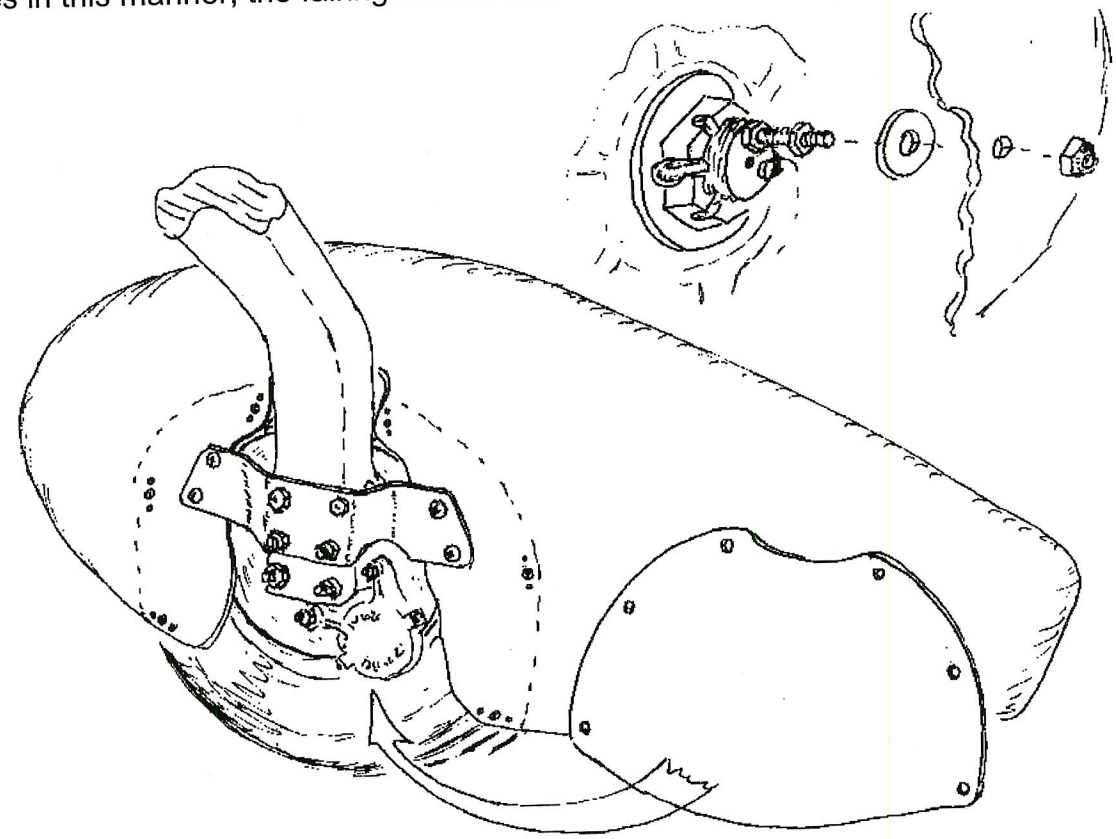
MAIN GEAR

With an aircraft of the speed potential of the KIS, the wheel fairings become a very valuable option, adding 5 to 10 mph to the cruise speed at the same fuel burn. However, a poorly installed set of fairings can quickly become a greater bother than a benefit.

Carefully trim and fit the wheel fairing to the wheel, centering it to avoid rubbing on any surface, and provide enough wheel protrusion below the fairing to suit the type of landing surface where you will be operating. There should be enough wheel sowing such that even with a flat tire and in landing attitude, the fairing will not strike the surface. Refer to the pictures and fabricate a bracket of aluminum

sheet at least .080 thick as shown to retain the inner side of the wheel fairing. use the upper two axle bolts for attachment, and drill and tap the gear leg #10-32 for two additional bolts if desired for added rigidity. secure to the fiberglass wheel fairing with two #10-32 bolts at each end. Verify location and length of bolts for clearance to the wheel and tire. Nut plates can be added to the fiberglass part for ease in assembly and disassembly

For support to the outer side of the wheel fairing, drill and tap the end of the axle above the centerline to avoid the cotter pin hole. A 1/4 inch threaded rod is suggested for this support. Use a jam nut to secure it tightly to the axle, and another nut to space out the fairing shell. Use an area washer inside the surface of the shell, and a self locking nut on the outside of the fairing. An area washer here would ad d structural support, but is probably not required. Trim excess rod for a neat looking job with minimum air drag. Supported on both sides in this manner, the fairing should almost be secure enough to stand on.



SKETCH OF WHEEL FAIRING ASSEMBLY

NOSE GEAR

The nose gear fairing is equally important, and presents a slightly different challenge. This gear must be free to swivel to permit steering on the ground, and the interface with the gear leg fairing is an extra place of concern during the installation.

The nose gear wheel fairing comes as a two piece assembly split roughly in the middle lengthwise of the section.. Position the half with the positive overlap (right side) , locating the desired placement of the wheel axle and the orientation of the fairing to the ground level. Try to keep the wheel fairing as far back as posible to minimize aerodynamic side load effects. Also note the location of the gear leg pivoting action to assure proper steering of the wheel without interference with the gear leg fairing (it might be prudent to test fit this fairing at the same time). locate one attach bolt as far forward as practical on the flat surface on the side of the "fork" (the nose wheel fork has a tab of material pointing forward for this pupose) . A shaped "shim" of Bondo or dry micro can be used to match and space the inner surface of the wheel fairing to the side of this "fork". Center the fairing longitudinal seam with the centerline of the tire during this fitting. The material of the side of the "fork " can be tapped for the attaching thread - we suggest a #10-32. the attach bolts should be located up higher on the sids of the "fork" and as far apart as permited by the "fork" width. (be sure that the bolts extending through this surface will not rub on the tire or wheel - watch both positioning and trimmed length for this). If the attachment holes are tapped as suggested rather than using self locking nut plates, remember to use Loktite or similar thread securing compound in final assembly.

SKETCH OF NOSE GEAR FARING ASSEMBLY

Temporarily attach the other half, and locate a similar set of bolts and "shims" in symmetrical locations. Double check at each step to assure that the proper alignment is being maintained, and trim away or add shimming material as required.

Make a note of the complexity of assembly and disassembly, and decide if you are going to provide a hole for tire inflation. If so, carefully locate the required hole and cut it before painting. Electrical supply houses frequently sell plated metal push in caps that could be used to close up such a hole in a finished manner.