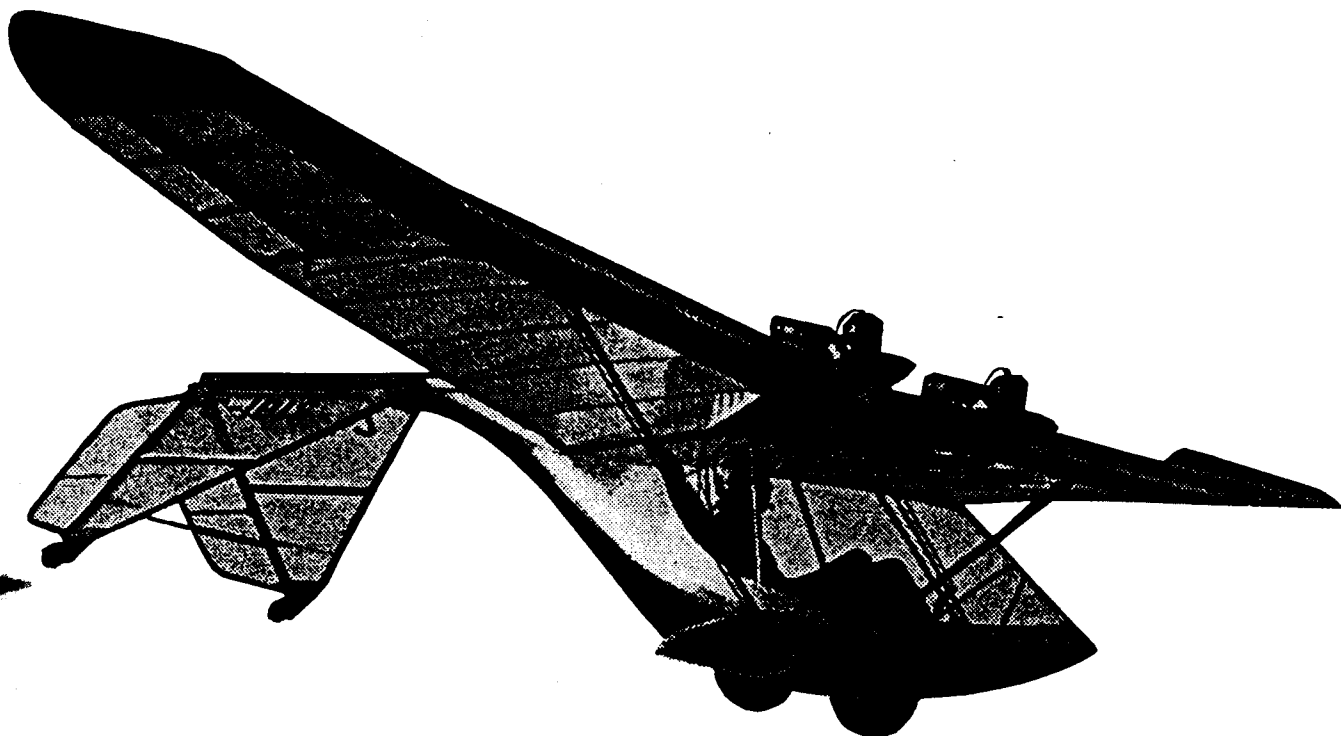


LazairTM



COCKPIT ENCLOSURE KIT

INSTALLATION MANUAL

Manual Part No. XM0058R003
Use With Kit No. YS0058-003

Section 1

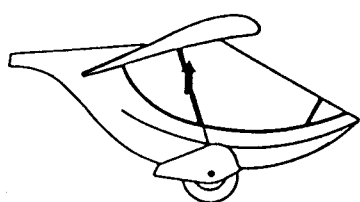
INTRODUCTION

1.1 APPLICATION

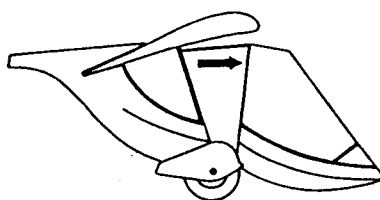
- 1.1.1 The enclosure described in this manual has been designed to fit the Lazair® Series III ultralight aircraft and its derivatives (such as the Lazair SS and the Lazair Elite). It has not been designed to fit the Lazair Series II or earlier models.
- 1.1.2 The enclosure is designed to fit on the aircraft with the nosewheel removed (ref. paragraph 1.2.1 of the Lazair Series III Assembly Manual).
- 1.1.3 A stock Series III Lazair, assembled as specified in the manual, with the enclosure installed, should be within the 254 pound maximum weight limit for an Ultralight Aircraft in the United States. However there will be very little margin. Any additional options (even paint) might be sufficient to exceed the weight limit. Therefore it is recommended that before flying the aircraft with the enclosure installed, you weigh it to ensure that it is within the allowable weight limit.

1.2 CONFIGURATION

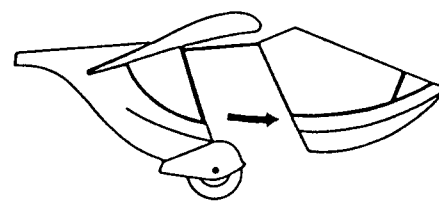
- 1.2.1 The enclosure is comprised of two main molded sections - the front section M400, and the rear section, M401. The rear section is permanently attached to the fuselage. The front section may be opened to enter or exit the cockpit, and may be easily removed completely for service.
- 1.2.2 To open the enclosure, two overhead catches are released, then the top of the front section will slide ahead approximately 15 inches. The bottom of the front section then swings ahead to the latched open position.



RELEASE



SLIDE



SWING

- 1.2.3 To close the canopy, the bottom latch is released by pressing on a pin located between the rudder pedals. The bottom will then swing closed and two knobs on the inside permit the pilot to slide the top closed. As with most land and air vehicles, the canopy should be closed with a good slam to ensure that the latches engage properly. The bottom is secured by a latch pin which is engaged automatically as the canopy is closed.

BEFORE EACH FLIGHT, ALL THREE LATCHES SHOULD BE VISUALLY CHECKED TO ENSURE THAT THEY ARE PROPERLY ENGAGED.

1.3 MATERIALS

- 1.3.1 The molded sections are made of fiberglass reinforced polyester using hand lay-up methods for maximum strength. The parts are supplied with a white gelcoat finish and may be painted any desired colour using any good quality automotive paint. If the parts are to be painted, it is recommended that the preliminary fitting be done first (up to step 2.6.7), then the parts should be lightly sanded, painted, allowed to dry completely, and installed on the aircraft.
- 1.3.2 The windshield and side windows are made of .063 inch thick Lexan® polycarbonate. This remarkable material may be easily formed without heat, it has excellent optical properties, and is extremely tough and resilient, making it an excellent material for use where impact resistance and safety are important. However, it can be scratched relatively easily, and does

not have good resistance to solvents. For this reason, never attempt to clean Lexan with volatile solvents (such as lacquer thinner) and always be careful to avoid spilling gasoline on it. If the Lexan needs cleaning, use a mild detergent and water. Attempting to clean it with a dry cloth will cause scratches. The use of volatile solvents on Lexan will destroy its clarity.

1.4 FUEL SYSTEM

1.4.1 As the fuel tank is located inside the cockpit enclosure and is relatively inaccessible, a special filler tube and fittings have been included with this kit. An additional vent line and bulkhead fitting have also been included so that the entire system may be sealed to reduce the possibility of the escape of gasses into the cockpit.

1.4.2 The fuel filler is located behind the right wing for easy filling from a portable fuel container.

1.5 OPTIONS

1.5.1 Jury Strut Kit

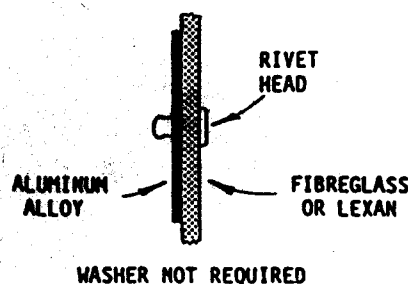
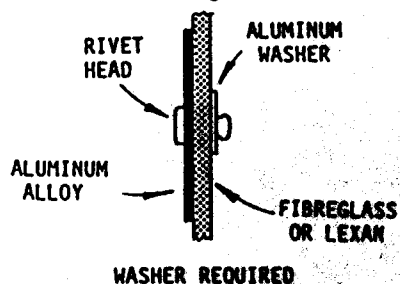
An optional Jury Strut Kit for the Series III Lazair has been available since December 1983. Because of the additional weight of the enclosure, it is strongly recommended that the jury struts be installed prior to flying the aircraft with the enclosure. (Ref. Lazair Technical Update Item 9.8). The recommended flying procedures and airspeeds in Section 3 and Appendix B of this manual have been written with the assumption that the jury struts have been installed.

1.5.2 Bottom Window

In response to requests from police departments, a heat formed Lexan window is available for the front enclosure section. With most of the fiberglass cut out and replaced by this window, the pilot can observe activity directly below the aircraft.

1.6 ASSEMBLY METHODS AND TECHNIQUES

- 1.6.1 The methods and techniques used to assemble and install the enclosure are similar to those used in the assembly of the Lazair aircraft. If you did not assemble your aircraft and you are not familiar with the techniques, it is suggested that you first review Section 1 of the Lazair Assembly Manual.
- 1.6.2 Your Lazair Assembly Manual and Parts Catalog should be kept readily available for parts identification while installing the enclosure.
- 1.6.3 As with the Lazair Aircraft Kit, two types of rivets are included in the Enclosure Kit. Stainless steel rivets (RV2044) should be used only where specifically called out in the manual. Aluminum alloy rivets (RV1043) should be used in all other locations.
- 1.6.4 Special aluminum washers are supplied in the kit for use on the rivets. These washers should be used in all locations where the rivet stem is pulled into fiberglass or Lexan.



- 1.6.5 The molded fiberglass parts are supplied in an "almost finished" condition. The edges have been trimmed and cutouts have been provided to permit installation with a minimum of disassembly of the fuselage. To reduce the possibility of damage in shipping, the slots for the wings and axles have not been completely cut out and must be completed by the builder. Where cutouts are provided, they have been made the minimum size and in most cases will have to be enlarged to fit a particular aircraft.
- 1.6.6 The Lexan for the windshield and side windows has been supplied with the curved edges cut to size. The straight edges have been left slightly oversize to permit trimming to an exact fit.

- 1.6.7 As the fiberglass used for the enclosure is quite thin, it can be cut easily with tin snips. However, to avoid cracking the gelcoat, **do not close the tinsnips completely when cutting.** Where it is necessary to cut through a section having an abrupt change in contour, a hacksaw with a fine-tooth blade should be used. Exposed edges can be finished with a file or sandpaper. Metalized vinyl trim has been provided for the trailing edge of the front section, so finishing of this edge is not required.
- 1.6.8 The Lexan can also be cut with tinsnips, but to produce a clean edge, the tinsnips should be in good condition and must be sharp. Although the Lexan is much less brittle than the fiberglass, it is also better not to close the tinsnips completely when cutting Lexan. Where necessary, the exposed edges of the Lexan should be filed or sanded after cutting.
- 1.6.9 The Lexan is supplied with a protective paper on it. It is recommended that the paper be left on to prevent scratching during installation. When you are ready to install the Lexan, remove the paper from about 2 inches around the perimeter on both sides to permit riveting, but leave the rest of the paper intact.

1.7 ENCLOSURE REMOVAL

All enclosure kits shipped since August 1984 have included the additional parts required to make the enclosure easily removeable for open cockpit flying. Although removal of the enclosure is not instant, it can be done in less than fifteen minutes. A very easy way to achieve the "best of both worlds," is to remove the side windows but leave the enclosure installed. In this configuration, the aircraft flies very well, and there is some measure of environmental protection, but you can still have that open cockpit feeling. It is not recommended that the aircraft be flown with the rear section of the enclosure installed and the front section removed as this has a considerable effect on flight characteristics.

Section 2

INSTALLATION OF ENCLOSURE AND FITTINGS

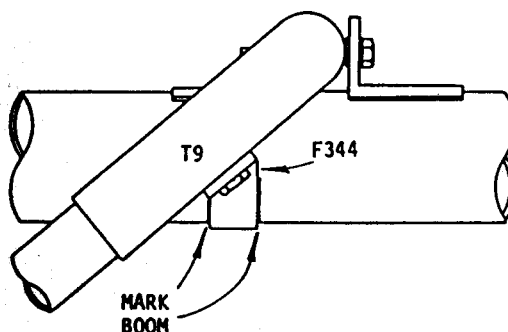
2.1 FUSELAGE DISASSEMBLY

2.1.1 ✓ Remove the wings and struts from the aircraft.

2.1.2 ✓ Remove the T329 L/R trailing arms. Retain the trailing arms and all hardware for reassembly.

2.1.3 ✓ Remove the drag cables from the fuselage and the tail. Retain the cables and all hardware for reassembly.

2.1.4 ✓ Mark the location of the F344 tail support bracket (if fitted) on the side of the boom as shown below, then drill out the rivets and remove F344. Retain F344 and hardware for reassembly. Note that the F344 was not included on serial numbers prior to A855.



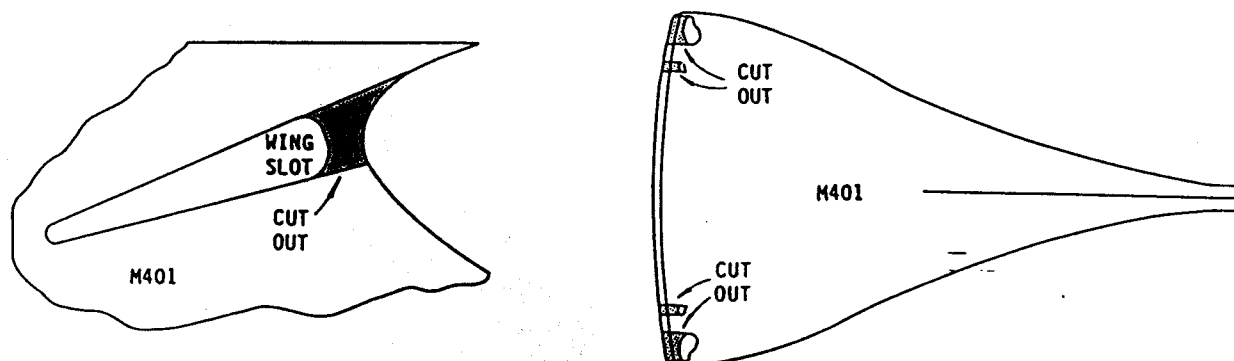
2.1.5 ✓ Remove and discard the mid gap cover. A new longer gap cover is supplied with the enclosure kit.

2.1.6 ✓ Remove and discard the rear gap cover. A rear gap cover is not required when the enclosure is installed.

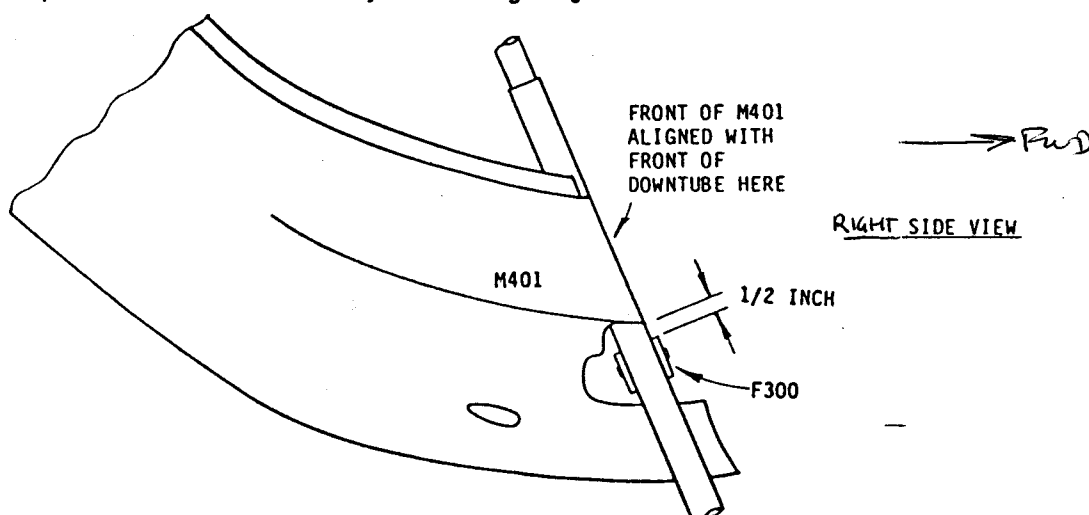
2.1.7 ✓ Remove and drain the fuel tank.

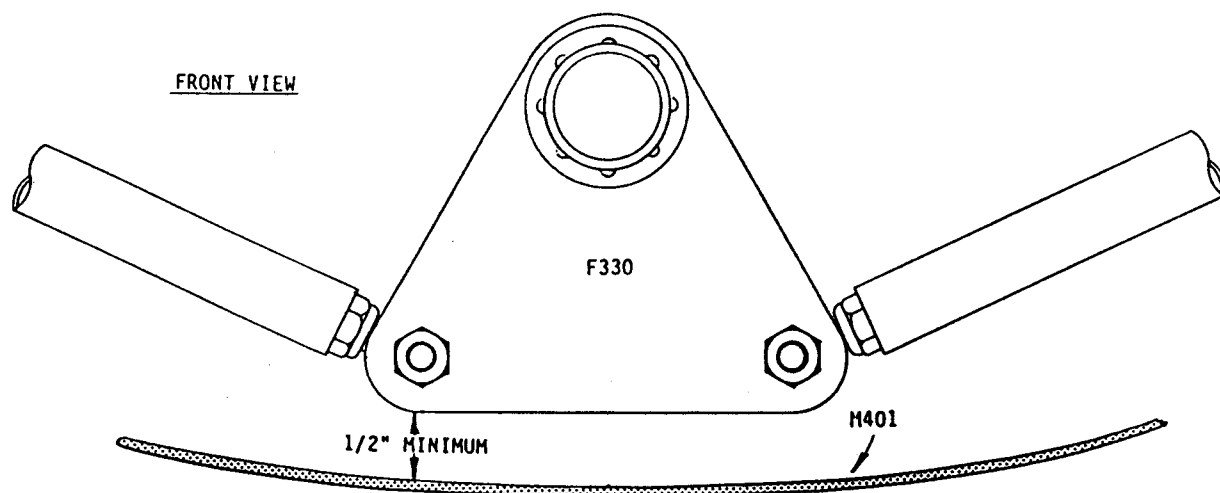
2.2 INITIAL FITTING OF REAR SECTION

- 2.2.1 ✓ Complete the cutouts in the M401 rear section for the wing and axle as shown in the figures. Use tinsnips to cut the wing slot and a hacksaw with a fine tooth blade (24 TPI) to cut the axle openings. Do not file or sand the exposed edges at this time.

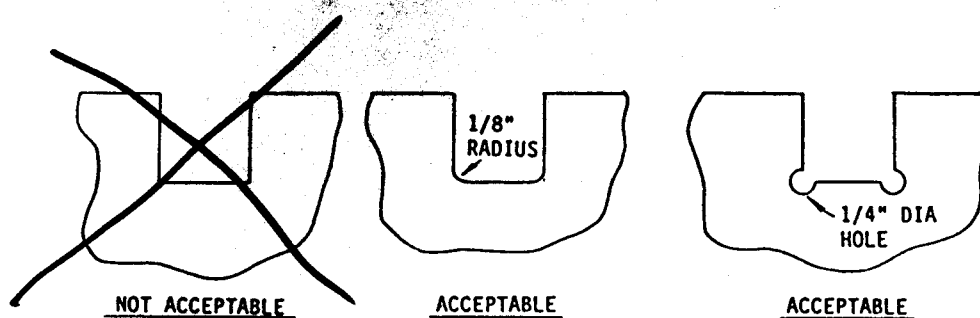


- 2.2.2 ✓ Fit the rear enclosure section M401 into position on the fuselage and temporarily tape it in place. The position is critical in two areas: as shown below, the forward edge of the vertical surface must be aligned with the forward side of the downtubes (as viewed from the side). The forward end of the waistline should be located as nearly as possible to the position shown in the figure (1/2 an inch from the top of the F300 strut attach fitting measured along the downtube), however there must be a minimum of 1/2 an inch clearance between the F330 aileron control horn and the bottom of the enclosure as shown in the second figure. If the fuselage has been properly assembled, the top edge of M401 should be parallel to the boom, and slightly above its centerline.



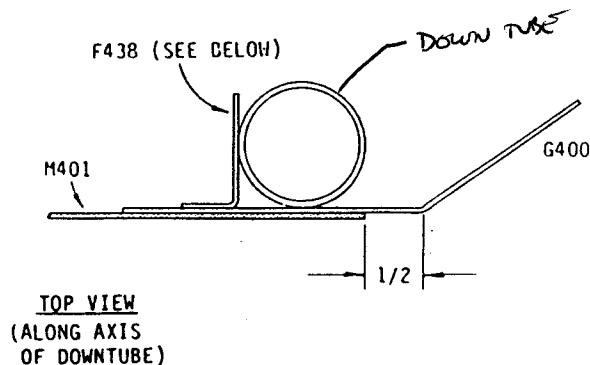
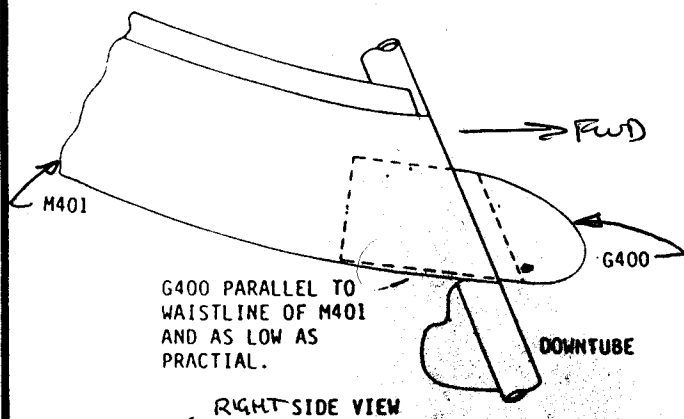


- 2.2.3 ✓ Check that there is clearance around the axle tubes so that the enclosure is not being forced out of shape by the fuselage, and be sure there is sufficient clearance to allow proper operation of the aileron pushrods. Enlarge the cutouts if necessary.
- 2.3.4 ✓ Fit the T329 trailing arms into position and ensure that there is clearance on all sides. Enlarge the cutouts if necessary.
- 2.3.5 ✓ Transfer the location of the F344 tail support bracket (Ref. paragraph 2.1.4) to M401 and make the necessary cutout. File or drill the corners of the cutout as indicated to provide stress relief. Refit the F344 and rivet it in place.



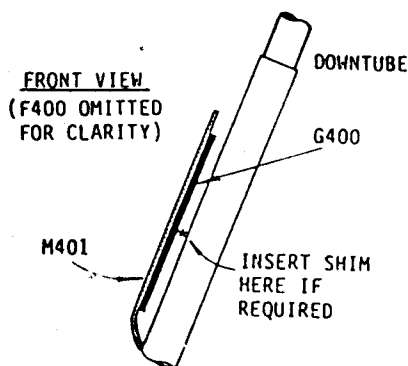
2.4 ✓ INSTALLATION OF ATTACH BRACKETS

- 2.4.1 ✓ Insert the G400 alignment tabs between M401 and the downtubes, and position them as shown in the figures. Temporarily tape the G400's to the inside of M401.



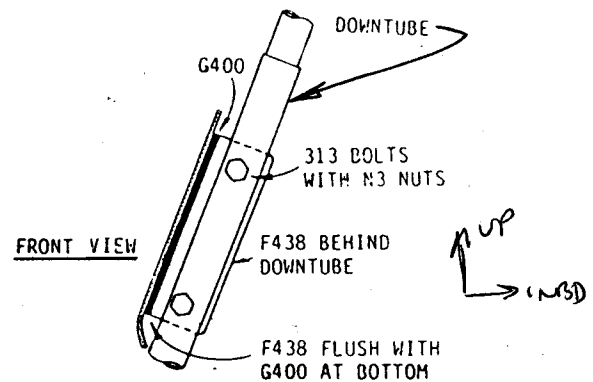
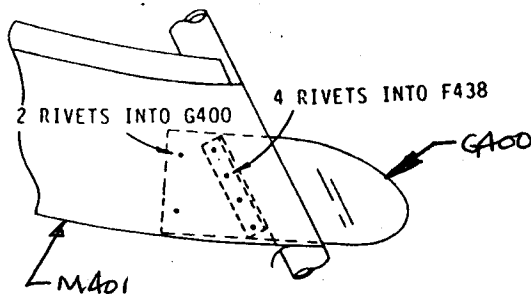
- 2.4.2 ✓ Fit the F438 attach brackets into position as shown above. Hold the brackets tightly against the downtube, and tape them to the G400's.

- 2.4.3 ✓ Temporarily fit the M400 enclosure front section into position to establish the proper width of the rear section. Temporarily insert shims between the G400's and the downtubes if necessary to spread M401 so that the G400's exert a very slight outward force on the sides of M400. The shims should be of equal thickness.



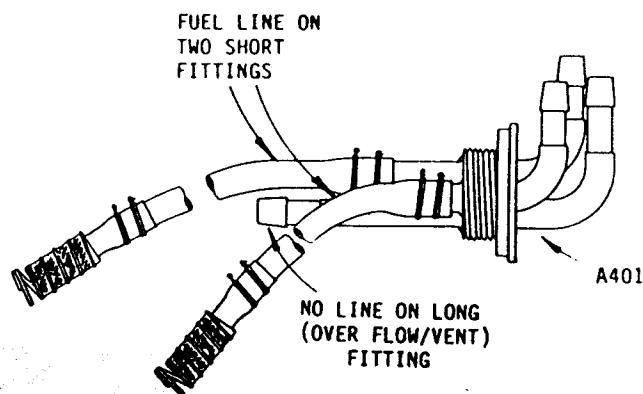
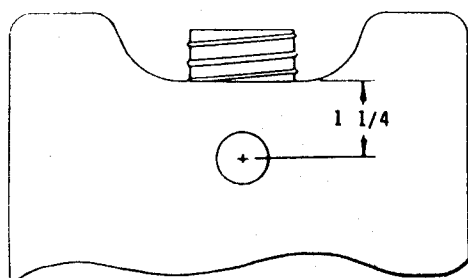
- 2.4.4 ✓ Make one final check to ensure that the cutouts provide sufficient clearance and the rear section is properly positioned. Clamp the F438 brackets to the downtubes, then drill and bolt them to the downtubes as shown. Note that it is easier to remove the enclosure for this operation, but make sure the F438's are securely clamped. Refit M401, then rivet the

- ✓ F438's to G400 (through M401) as shown. Add two more rivets through M401 and G400. If you plan on removing the enclosure frequently, the bolt holes in the F438's may be enlarged slightly to facilitate removal.

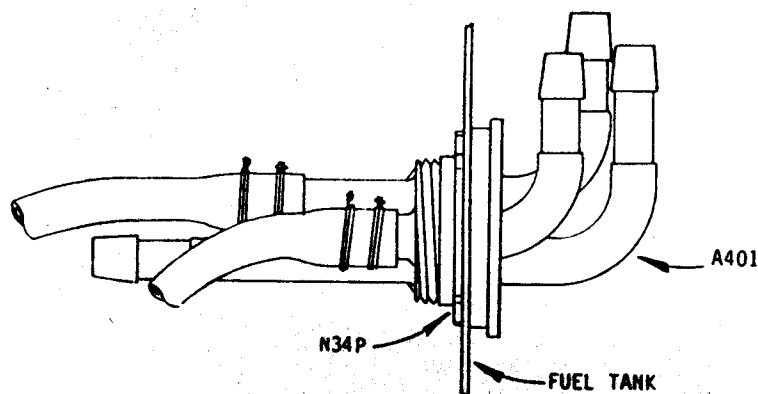


2.5 FUEL SYSTEM MODIFICATION

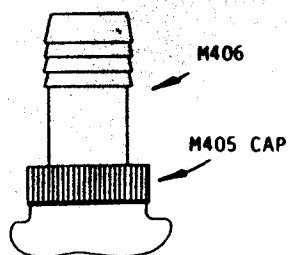
- 2.5.1 ✓ Make sure all the fuel has been drained from the fuel tank. If you are using power tools or any other source of ignition while working on the fuel tank, it should be filled with water and left over night to eliminate fuel vapor before attempting any modifications.
- 2.5.2 ✓ Cut a 1 inch diameter hole for the bulkhead fitting in the side of the fuel tank as shown. A 1 inch hole saw works best, but you can drill a series of small holes then file the edges, or use a sabre saw. Make sure the surface is flat where it will mate with the gasket. Make sure you remove all the chips from the tank. Install two fuel lines (the short ones which go inside the tank) and filters on the bulkhead fitting A401 as shown. Make sure all connections are properly safety wired (using WR25-48 supplied) and the filters can easily reach the bottom of the tank without any tight bends in the lines which could impede fuel flow. Sufficient TF5-90 fuel line is supplied in the kit to replace the short pieces inside the fuel tank.



- 2.5.3 ✓ Feed the bulkhead nut **N34P** through the mouth of the tank and hold it in place. Install the bulkhead fitting and tighten it securely. Use a screwdriver to hold the nut on the inside of the tank.

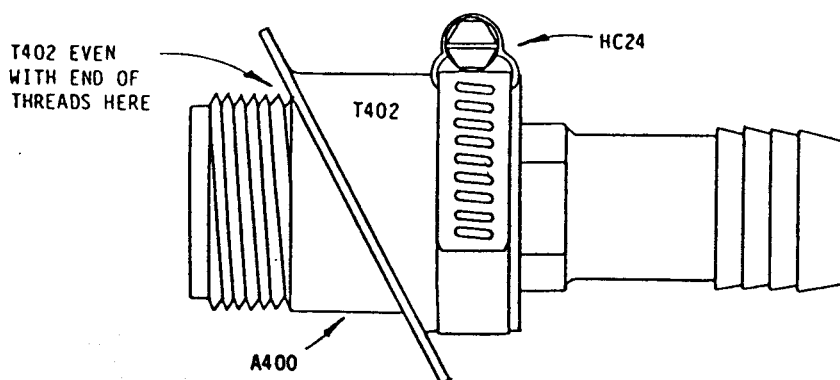


- 2.5.4 ✓ Install the tank inlet fitting **M406** on the fuel tank as shown and tighten the cap securely.

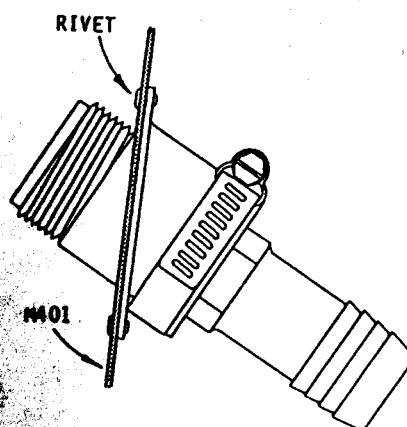


- 2.5.5 ✓ Reinstall the fuel tank in the aircraft and secure it with the rubber strap.

- 2.5.6 ✓ Slide the T402 mounting tube onto the A400 fuel filler fitting as shown, and tighten the HC20 clamp securely.

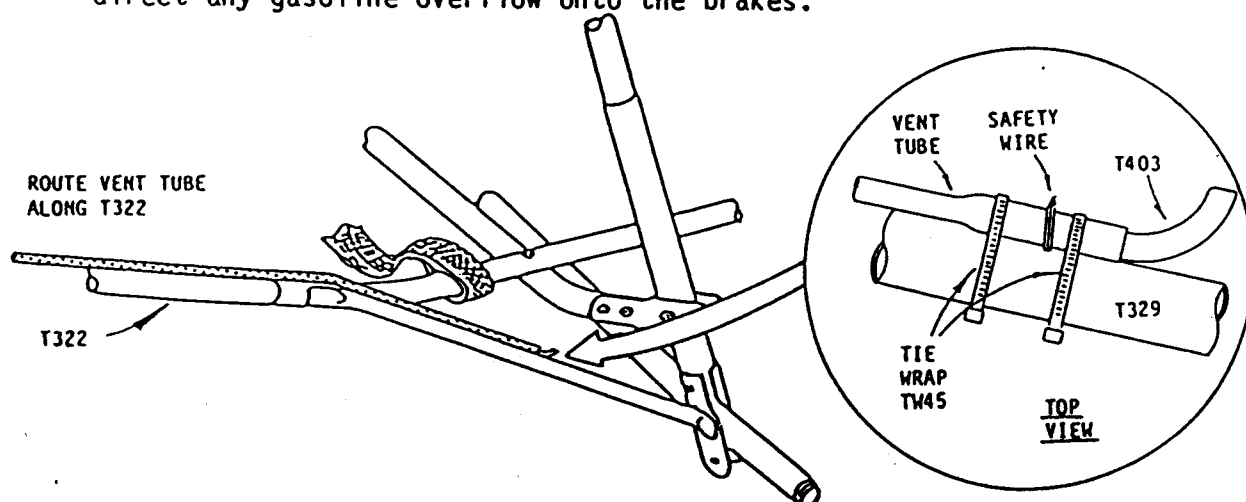


- 2.5.7 ✓ Remove the filler cap and slide the filler assembly into the hole behind the right wing cutout and check the fit. Make sure that it does not distort the fiberglass when pushed into position. Enlarge the hole if necessary. Rivet the filler assembly in place with six rivets into the flange of T402. Seal around the junction of the fuel filler assembly and the fiberglass with silicon rubber sealant (not supplied) to prevent spilled gasoline from running into the cockpit.



NOTE: The remainder of the fuel system modification instructions are included here for continuity. However, you should now proceed to subsection 2.6 (side window installation), then complete the fuel system at the appropriate time (following step 2.6.5).

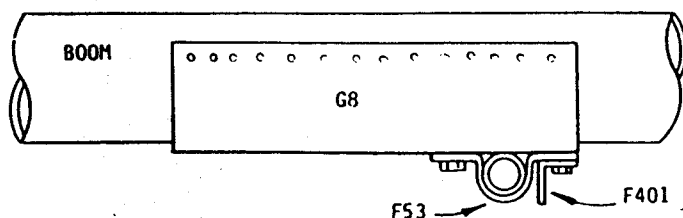
- ✓ 2.5.8 Install the large filler hose TF6-32 between the filler assembly and the fuel tank and secure with HC20 clamps. Route TF6-32 under the F404 spreader and secure it to the left T322 with a tie wrap. Make sure there are no kinks or sharp bends in TF6-32 which could impede the fuel flow.
- ✓ 2.5.9 Connect the two fuel lines from the engine to the tank and secure with safety wire. If your aircraft has the small diameter (HSS20) fuel lines from the tank to the engines, use a short piece of TF5-90 as an adapter at the fuel tank. (Ref. paragraph 8.2.2 in your Lazair Assembly Manual).
- ✓ 2.5.10 Install the overflow/vent tube as shown and secure with tie-wraps. Make sure the T403 stiffener is aimed forward and is positioned so it does not direct any gasoline overflow onto the brakes.



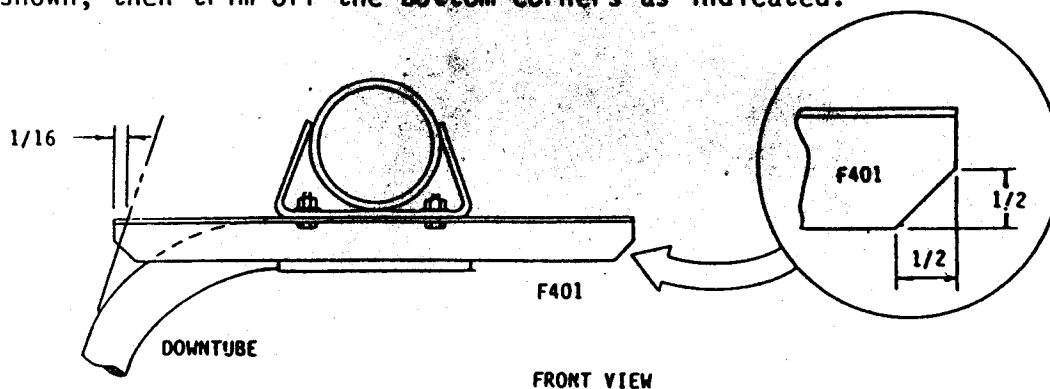
- 2.5.11 Make sure all fuel line connections are properly safety wired. Make sure all fuel lines are properly routed and secured so there are no kinks or sharp bends which could impede fuel flow.
- 2.5.12 Make sure the fuel system is completely sealed. A gross check can be made by plugging the overflow/vent line with a finger, closing the two engine feed lines by folding them, then blowing into the filler fitting. If you have put a vent hole in the small cap, or if you have the cap with the flip-up vent, it should be replaced by a new M408 cap (included in this kit). If you drilled a vent hole in the tank, it should be plugged using a sheet metal screw or other suitable means.

2.6 SIDE WINDOW INSTALLATION

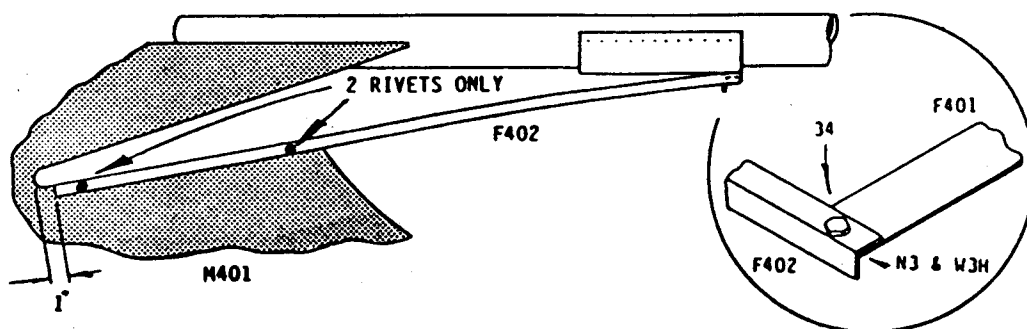
- 2.6.1 ✓ Remove the two forward bolts securing the F53 clamp to G8. Drill and bolt the track support angle F401 in position as shown. Centre F401 as nearly as possible to permit proper trimming as in Step 2.5.2. Mount F401 as far back (toward F53) as is practical.



- 2.6.2 ✓ Using a straight edge, mark the projection of the outside of the downtubes on the F401 angle. Trim the F401 1/16 inch beyond the mark on both ends as shown, then trim off the bottom corners as indicated.

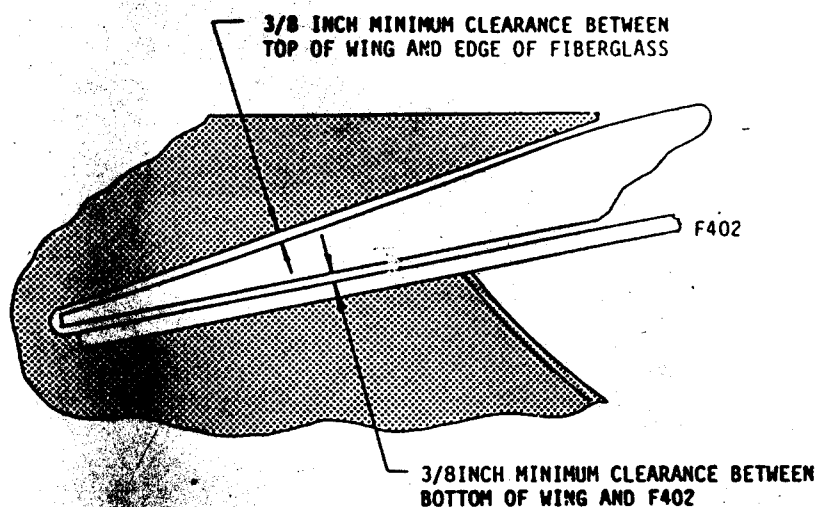


- 2.6.3 ✓ Trim the upper window angles F402 as required to fit as shown. Bolt the forward end to F401 with type 34 bolts. Fit F402 tightly over the edge of the fiberglass and secure with 2 rivets only as shown or with Cleco fasteners.

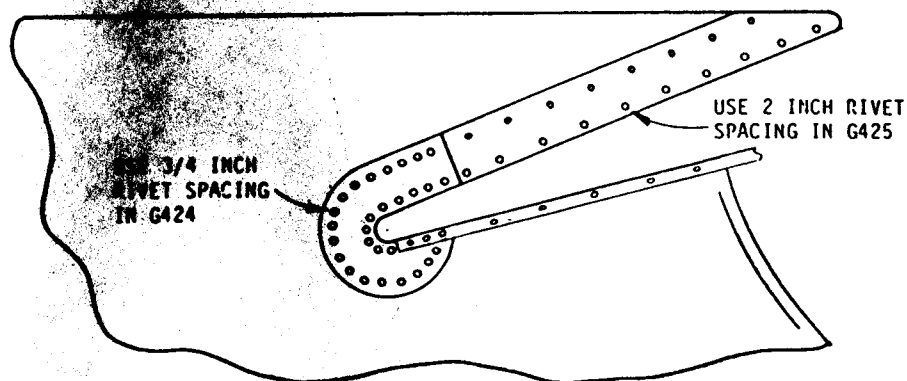


- ✓ 2.6.4 ✓ Temporarily fit the wings onto the fuselage to check the position of the cutouts. The clearance between the wing and the enclosure should be as shown. If there is insufficient clearance, remove the rivets or Clecos holding the F402's to M401 and enlarge the cutout as required. Note that to check the clearance on the top of the wing, the fiberglass should be pushed in or taped to the boom.

When you are sure the cutout is correct, rivet F402 to M401 with a 2 inch rivet spacing. Leave the rear 3 inches free of rivets so that G424 can be installed as shown in Step 2.6.5.



- ✓ 2.6.5 ✓ Rivet the G424 and G425 stiffeners in place as shown. Position G425 to allow a 3/8 inch gap as shown above and trim the front edge as required.



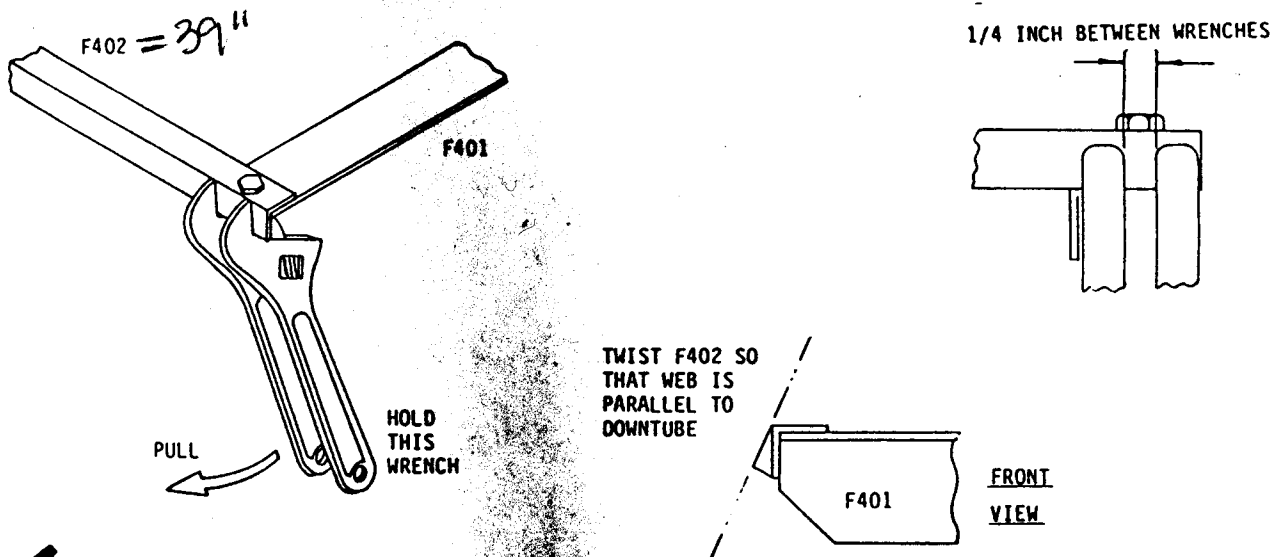
- ✓ 2.6.6 ✓ Now is a good time to go back to step 2.5.8 and complete the installation of the fuel system.

✓ 2.6.7

When you are sure that the cutouts are correct, the wings may be removed for the balance of the enclosure installation. However, the wings (or at least one wing) will have to be reinstalled to properly fit the new gap cover (step 2.14). If you wish, you can install the gap cover at this stage to avoid having to remove and reinstall the wings later. The reinstallation of one wing is also required if you choose to use the alternate method of locating the T401 windshield hoop, (in step 2.8.6), but this step cannot be done at this time.

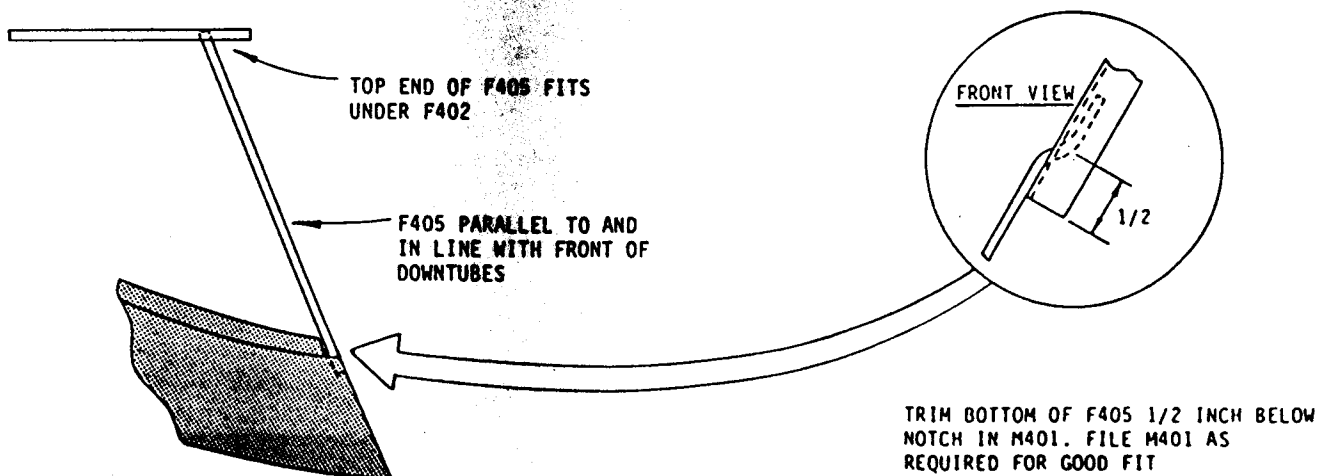
✓ 2.6.8

To align the F402 top angles with the plane of the window, they should be twisted slightly near the forward end. This is best done by using two adjustable wrenches, but two pairs of vise grips or pliers could be used.



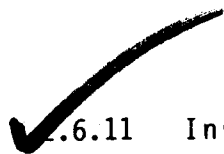
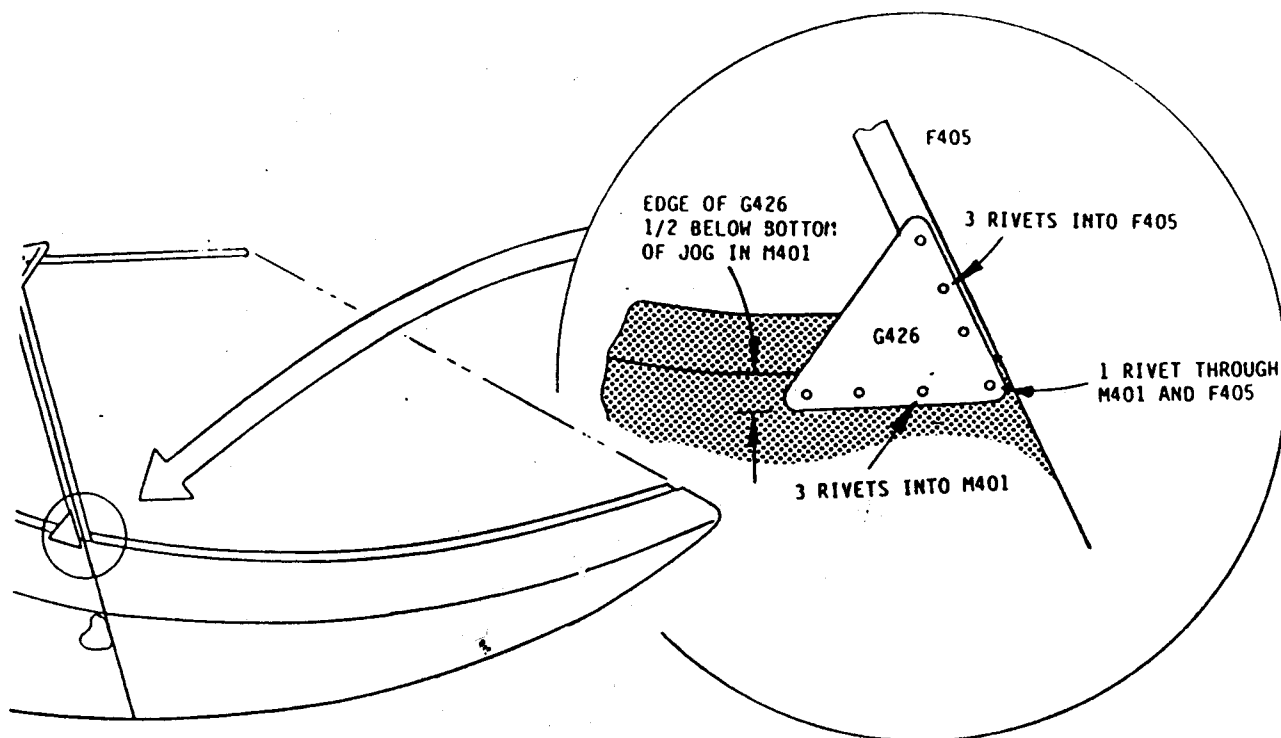
✓ 2.6.9

Cut the side window forward angles F405 as required to fit as shown. Do not rivet at this time.



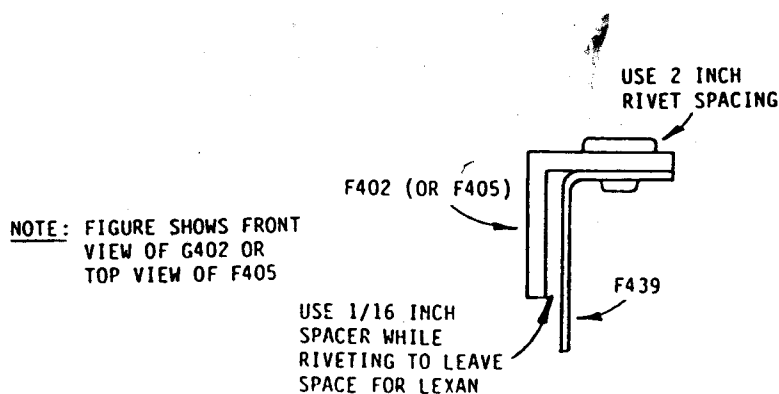


- 2.6.10 Trim a G426 gusset as required to fit as shown and round the corners. Rivet F405 in place with two rivets into F402 and 7 rivets through the gusset as indicated.

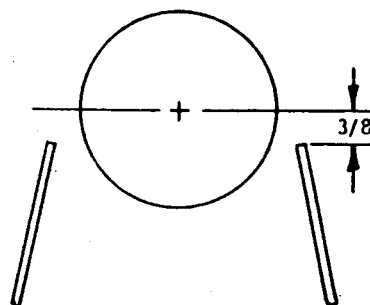


30.0" LONG

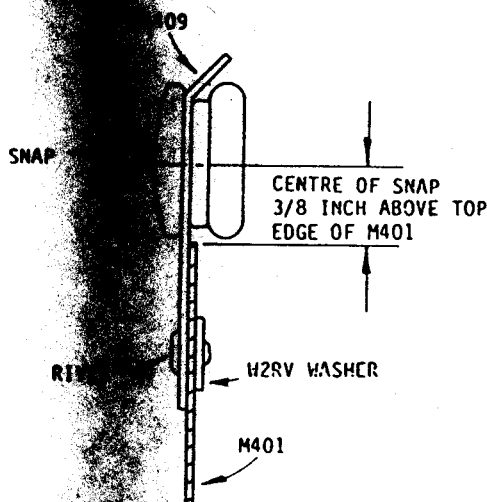
- 2.6.11 Install the F439 window guide angles in F402 and F405 as shown. Cut the F439's to length as required so the ends are about one inch from the corners of the window.



- ✓ 2.6.12 Hold the side window in place (on the outside of the angles) and mark it for trimming. Note that only the straight (top and front edges) should require trimming. Cut off the front top and front bottom corners of the window just enough to allow the window to be installed. Slide the window into place between the F402 and F439, and between F405 and F439, and check that it fits properly into the jog in M401 along the curved edge.
- ✓ 2.6.13 Using a $3/32$ inch drill, drill through the fiberglass using the holes in the female snaps as a guide. Enlarge the holes in the fiberglass to $1/8$ inch and rivet the HW6 male snaps in place.
- 2.6.14 Mark and trim the edge of M401 along the T23 boom, $3/8$ of an inch below the centerline of the boom as shown.



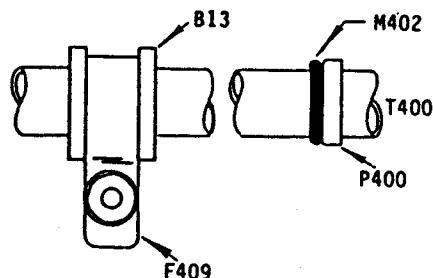
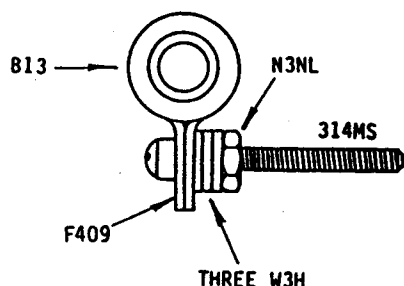
- ✓ 2.6.15 Rivet four A409 attachment bolts along the top edge of M401 as shown using a 3 inch rivet spacing.



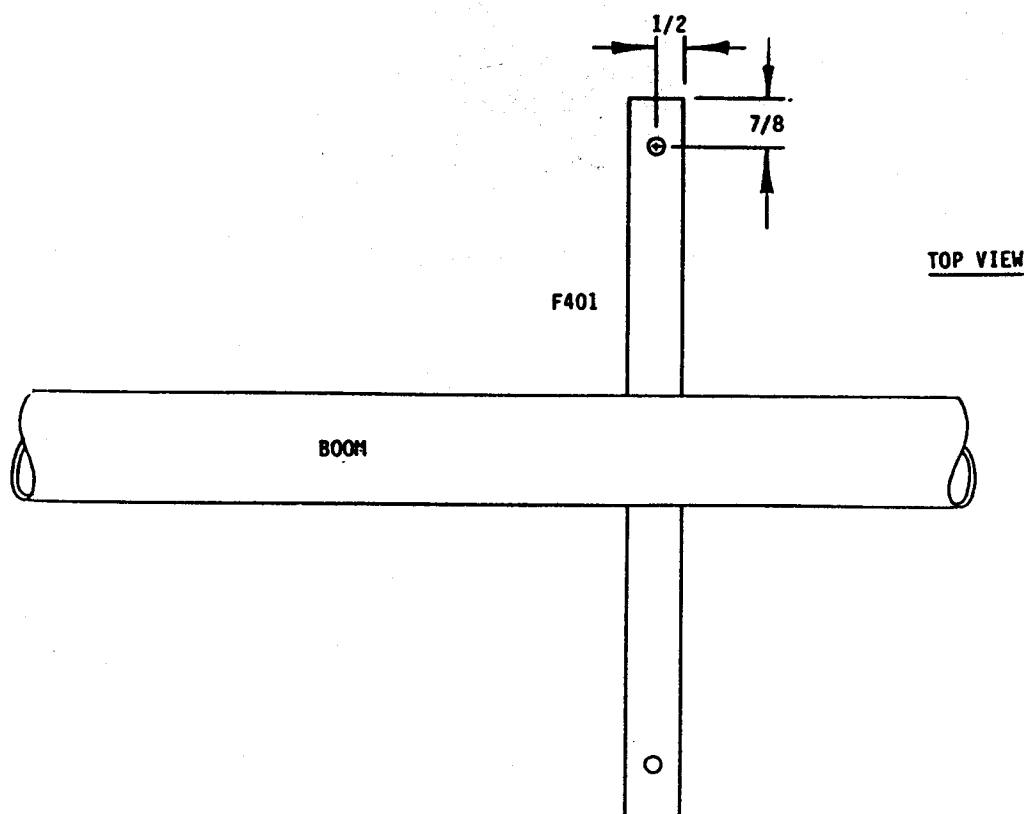
- 2.6.16 Locate and install the HW6 male snaps along the boom (as was done in step 2.6.13).

2.7 TRACK INSTALLATION

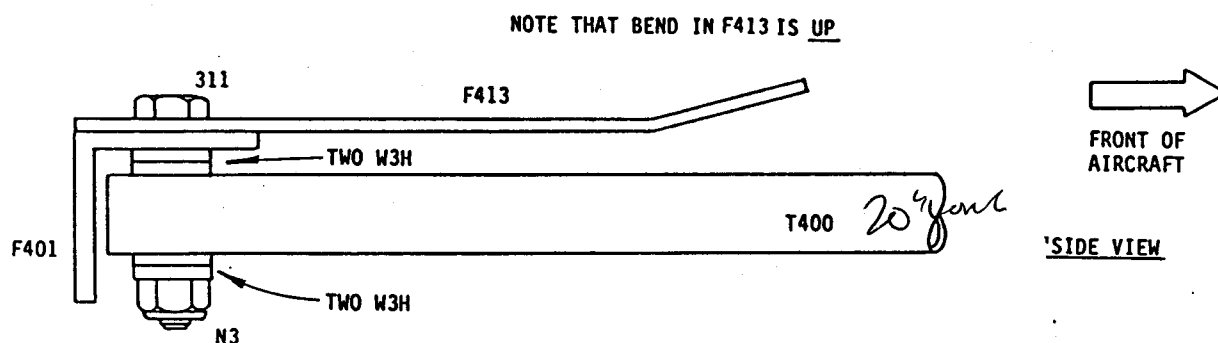
- ✓ 2.7.1 Slide a P400 stop onto each leg of the T400 track tube. Slide an M402 O-ring onto T400 next to P400. Make up two slide assemblies and slide them onto T400. Be sure to make 1 left and 1 right assembly and install them so that the bolt heads face inward.



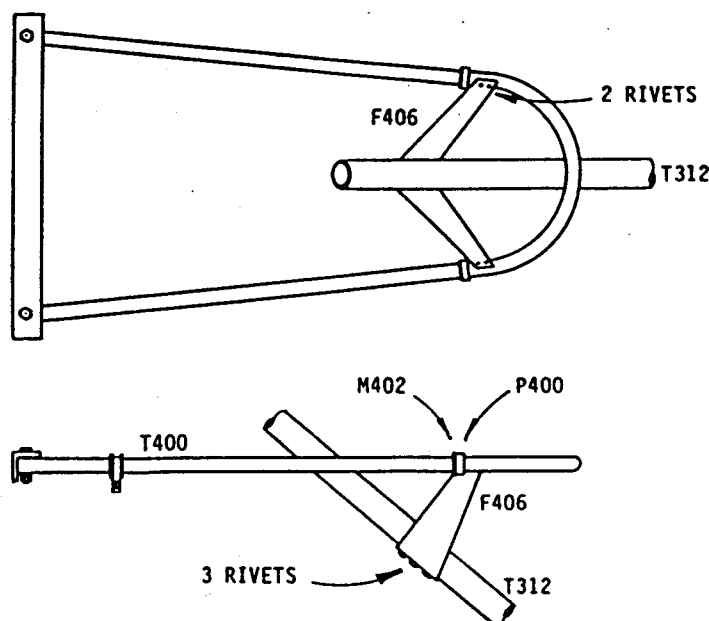
- ✓ 2.7.2 Drill a 3/16 inch hole in each end of the F401 track support angle as shown.



- 2.7.3 ✓ Bolt the T400 track in place as shown. Do not overtighten the nut and squash the tube. Note that two washers are used above and below the tube. These may be moved later to provide height adjustment if necessary. Note that the F413 latch tangs are installed at this time to avoid having to remove the bolts later, but they are not required until Step 2.11.1.



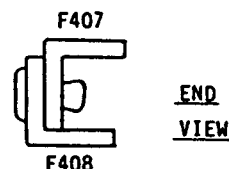
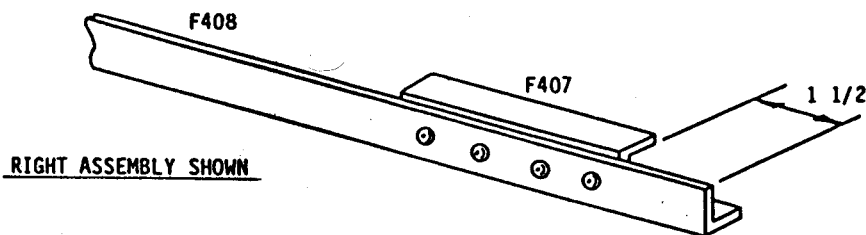
- 2.7.4 ✓ Install the F406 track support bracket as shown. Clamp it in place to ensure that the track is properly positioned, then rivet with two stainless steel rivets in each end of F406 into T400 and three stainless steel rivets into T312. Push the P400 stop and the M402 O-ring tightly against the F406 as shown in the figures.



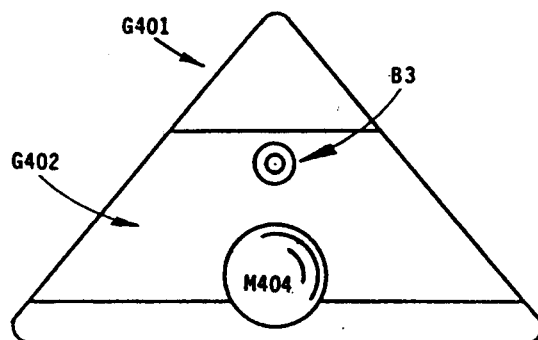
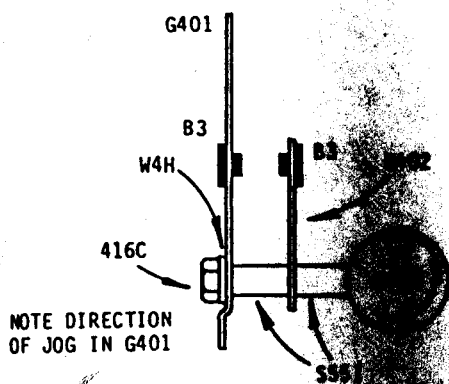
NOTE: POSITION F406 SO THAT T400
IS PARALLEL TO BOOM

2.8 ENCLOSURE FRONT SECTION INSTALLATION

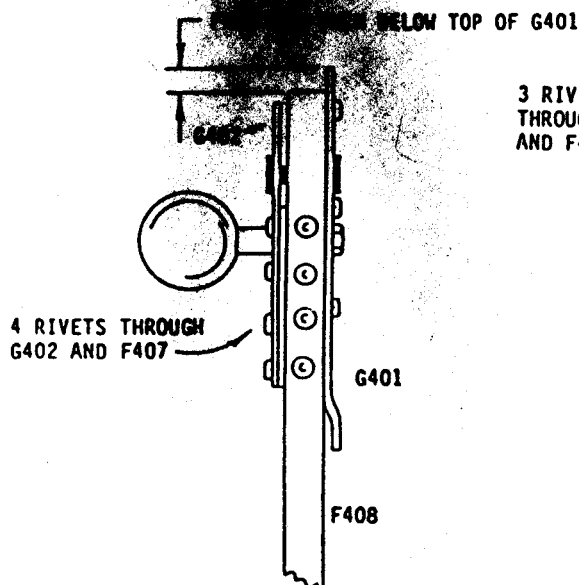
- 2.8.1 Rivet an F407 window gusset angle onto one end of each F408 windshield angle as shown. Be sure to make one left and one right assembly. = 32" LONG



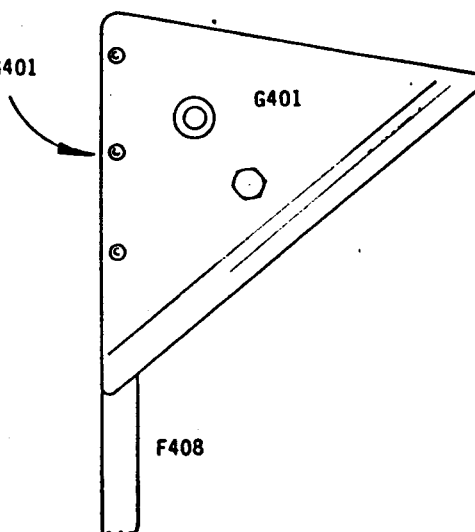
- 2.8.2 Make up the two windshield gusset assemblies as shown. Note that the left and right assemblies are identical.



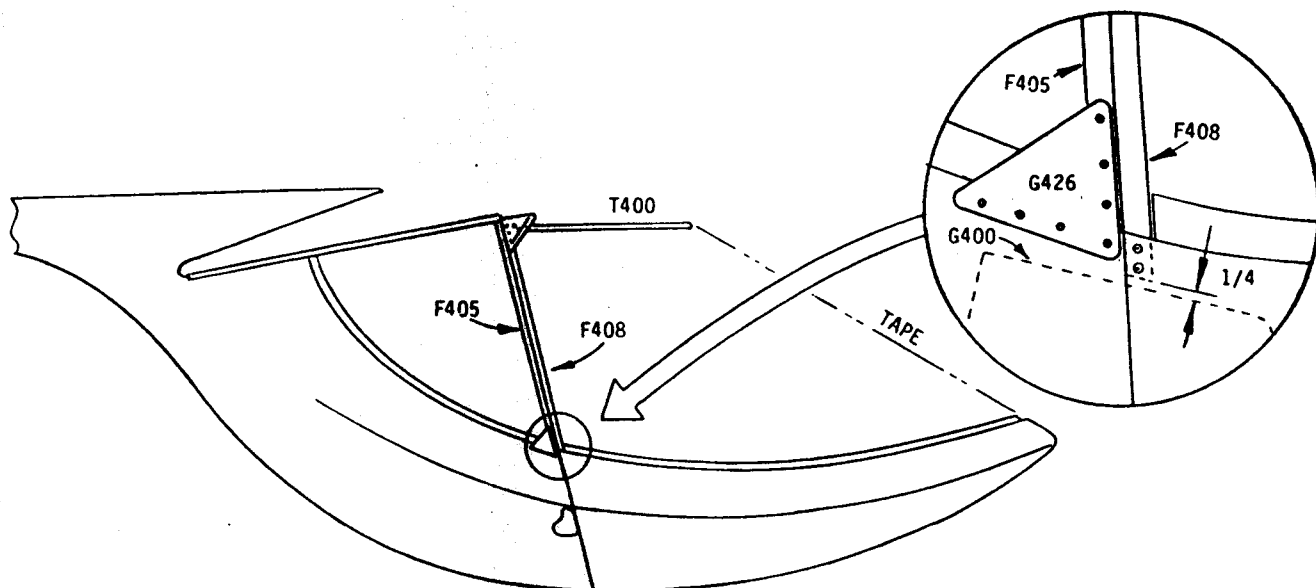
- 2.8.3 Rivet one gusset assembly onto each windshield angle assembly as shown.



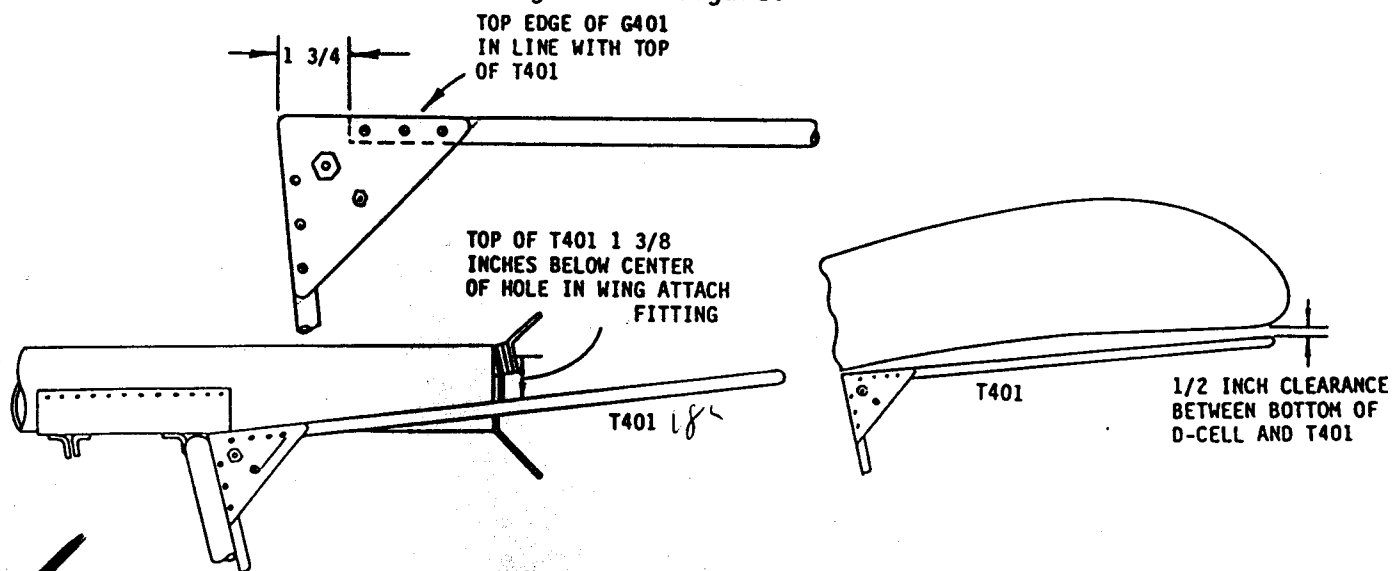
3 RIVETS THROUGH G401 AND F408



- ✓ 2.8.4 Temporarily fit the M400 front fuselage section into position. Make sure it mates properly to M401 on the sides. Support the nose with a 4 foot piece of filament tape attached to the front of the T400 track tube. Tape M400 securely to M401 on the sides to ensure that the proper alignment is maintained. Check the junction of M400 and M401 under the belly of the enclosure to set the proper height of the nose.
- ✓ 2.8.5 Fit the F408/G401 angle/gusset assemblies into position. The exposed end of the bolt in the slide assembly (step 2.6.1) should fit through the two B3 bushings in G401 and G402. Put CN3 nuts on the bolts but do not tighten or cotter pin the nuts at this time. Fit the F408 windshield angle tightly against the F405 side window angle. Trim the bottom of F408 so it will fit above the G400 alignment tab with a 1/4 inch clearance between the end of F408 and the top edge of G400. F408 should be riveted to the M400 front section with two rivets, but before riveting make sure the inside surface of the fiberglass is relatively flat where it is in contact with the F408. File the inside of the fiberglass if necessary. Note that when M400 is held to F408 by only two rivets, it can be easily damaged. Use extreme care to avoid bumping or dislodging M400 before the windshield is installed.



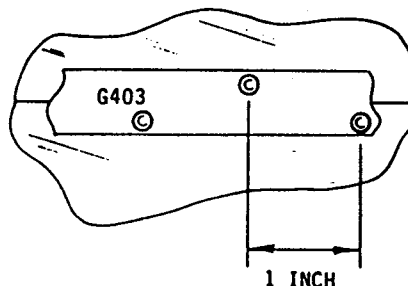
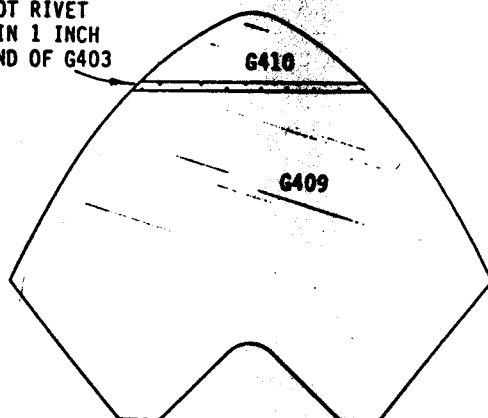
- 2.8.6 Fit the T401 windshield hoop into position as shown and rivet in place with 4 rivets through each G401. Position T401 relative to the wing attach fitting as shown. As an alternate (and more precise) method of locating T401, you can put the wings (or at least one wing) on again and position T401 as shown in the right hand figure.



2.9 WINDSHIELD INSTALLATION

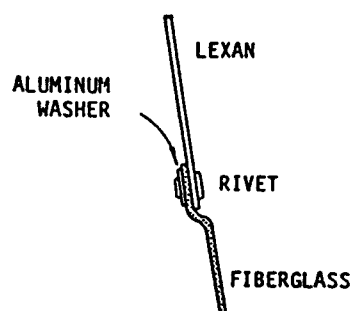
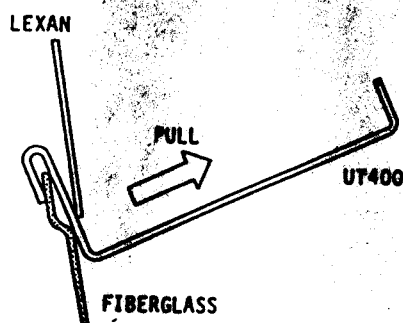
- 2.9.1 Remove a 2 inch wide strip of protective paper from both sides of the two parts of the windshield along the edges to be joined. Fit the pieces together on a flat working surface as shown below. Lay the G403 splice over the junction (making sure it is centered) and temporarily tape it in place. Drill and rivet using the rivet spacing shown, and aluminum washers on the inside. After riveting, trim the ends of G403 to the contour of the Lexan, then round the pointed ends to avoid injury when cleaning the windshield.

DO NOT RIVET
WITHIN 1 INCH
OF END OF G403

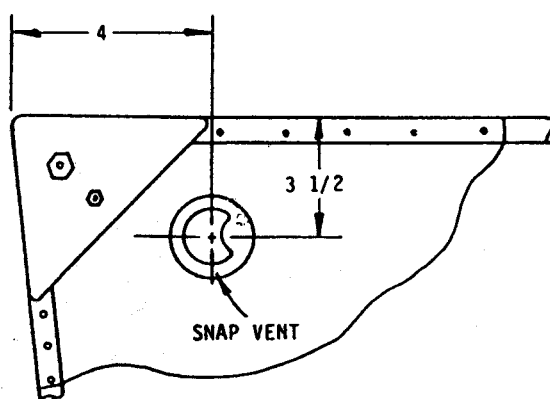


✓ 9.2

Fit the windshield into position and temporarily hold it with tape. Make sure that it fits properly into the rabbet on M400. Put one rivet into the T401 hoop (at the front) and two rivets (about 2 inches apart) into the nose of M400. With the aid of a friend, work from the nose back, pressing the Lexan into position and taping it in place. The more carefully you do this and the more frequently you tape it, the better will be the finished product. To avoid deforming M400 while pressing on the Lexan, a special tool, UT400, should be used. This tool can be hooked over the edge of the fiberglass to hold it out for taping or riveting. The tool should be moved along the top of the fiberglass, a few inches ahead of the area to be taped or riveted. The Lexan should be riveted to the fiberglass with a 2 inch rivet spacing. Although it is preferable to use aluminum washers on all the rivets, access is rather limited at this time (unless you installed a small box with a pocketfull of washers inside the enclosure prior to fitting the windshield). To overcome this problem, it is suggested that you install half the rivets without washers, using a 4 inch spacing. Then, after the complete front section has been removed from the aircraft, the remaining rivets can be installed with washers. Use a 2" rivet spacing for rivets into T401. Rivets should be installed, starting at the nose and working back, alternating sides (and riveting into M400 and T401) until you are about 1/2 inch from the trailing edge, then the trailing edge should be trimmed along F408. The top edge can be trimmed along T401 after the riveting has been completed. Note that the Lexan fits on the outside of F408, but under the jog on G401. Use a 2 inch spacing when riveting the Lexan to F408 and 3 rivets into G401.



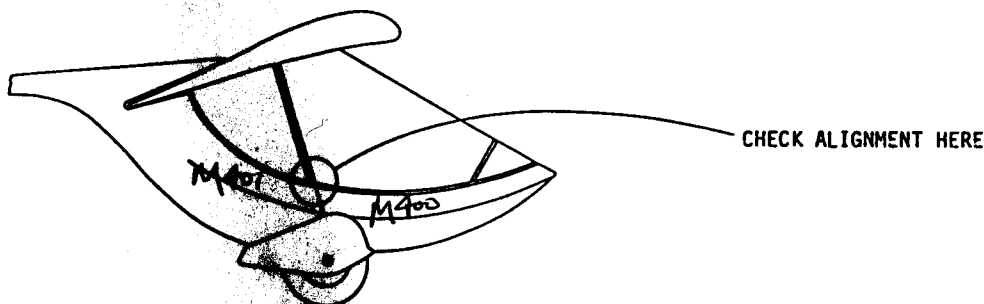
- 2.9.3 Two snap vents are included in the kit to provide cabin ventilation. If the gap at the top of the windshield and the opening around the downtubes are left open, it is unlikely that additional vents will be required. However, if you should attempt to seal these openings, it is recommended that the snap vents be installed to reduce the possibility of condensation on the inside of the windshield. Although there may be several acceptable locations for the snap vents, the location shown in the figure has been shown to work quite well.



2.10 FIT ADJUSTMENTS

2.10.1 At this stage of the assembly, the canopy will still be somewhat unwieldy because there are no latches to hold it in place. However, it is advisable to make any minor adjustments to correct the fit at this time.

2.10.2 Remove all tape holding the canopy in place. Push the canopy into the closed position and let it assume its natural shape. Check the height of the front section (at the junction of the Lexan and the fiberglass) and verify that it is properly aligned with the rear section. If this alignment is not correct, it can be adjusted by removing or installing washers between the T400 track and the F401 track support angle (see figure in Step 2.7.3). Be sure to install washers next to the nut if necessary to avoid bottoming on the threads.

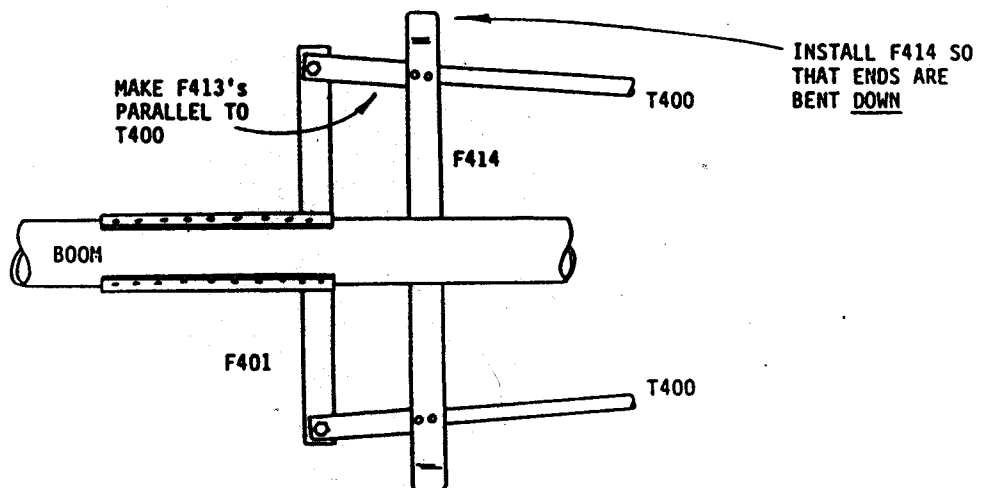


2.10.3 Check that the width of the canopy at the top corner is correct so that the windshield and the side window form a continuous plane. If necessary, add or remove washers between the F409 clamp and the N3NL nut on the slide assembly (see figure for Step 2.7.1). Tighten the CN3 nuts on the slide assembly so they exert a slight pressure on the B3 bushings, then drill a 1/16 inch hole through each bolt for the cotter pins. Do not install the cotter pins at this time, as the canopy will probably be on and off many more times, but do not forget to install the cotter pins before the first flight.

2.11 UPPER LATCH INSTALLATION

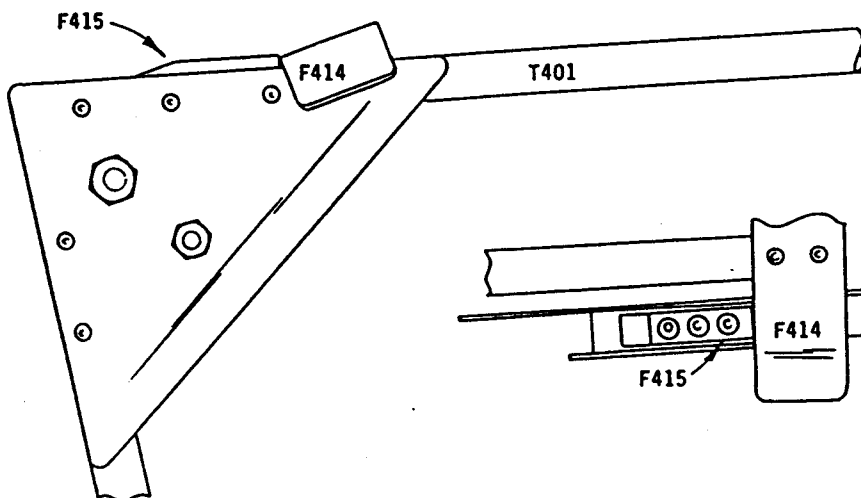
- ✓ 2.11.1 Fit the F414 latch spring under the boom and rivet it to the two F413 tangs as shown, using two stainless steel rivets into each F413. Note that the F413 tangs should be angled inward as required to avoid interference with the canopy. Make sure that F414 is centered before riveting. Do not rivet F414 to the boom.

TOP
VIEW

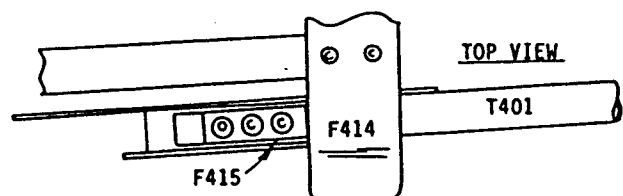


- ✓ 2.11.2 Push the canopy into the fully closed position and rivet the two F415 latch strikes to the top of T401 using 3 stainless steel rivets in each. Make sure the canopy is fully closed and make sure the F415's are held tightly against the F414 latch spring before riveting.

SIDE
VIEW



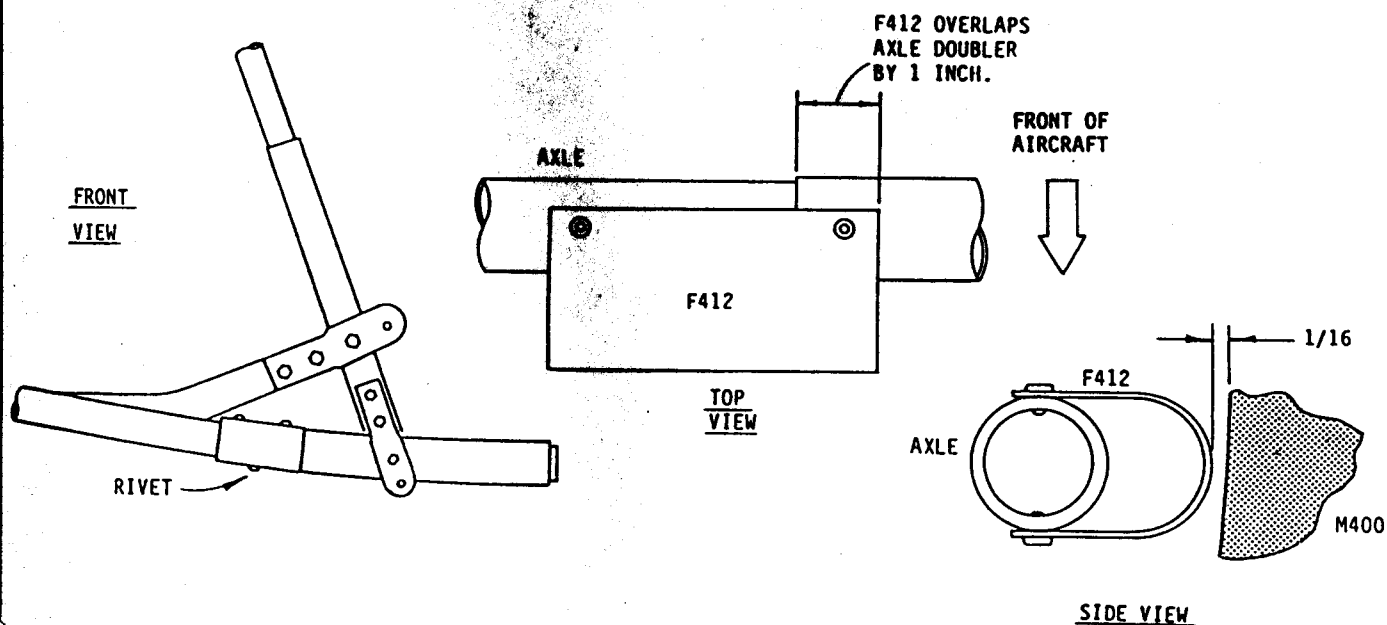
TOP VIEW



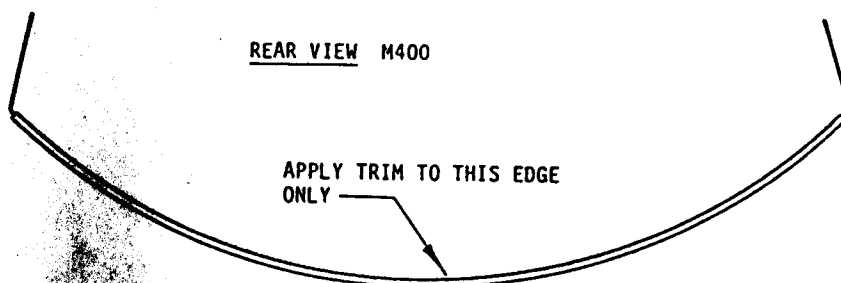
- 2.11.3 Operate the latches and open and close the canopy a few times to ensure that the latches function properly. Note that lubricating the track and the latches with Break-Free® or a good quality grease will make them work much better. If necessary, file the forward face of the F415's (where they contact F414) to obtain more clearance. Make sure that when you slam the canopy closed, both latches engage properly. Filing the sharp corner off the F414 where it slides on the F415's will make the latches easier to open. If it appears that the latches are too loose, do not attempt to correct this until after installation of the weatherstrip in Step 2.15.1. Note that at this stage in the assembly, the bottom of the canopy may make strange noises and may pop out when you slam the top closed. This will be prevented by the installation of the lower latch and the F412 bumpers.

2.12 LOWER LATCH INSTALLATION

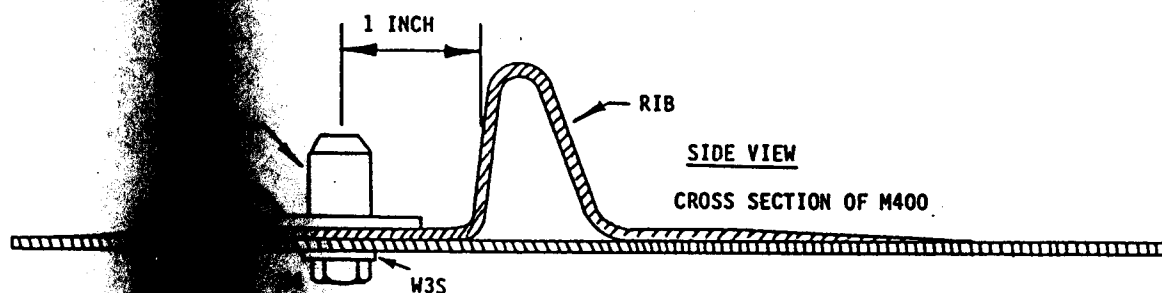
- 2.12.1 Fit the F412 bumpers over the A301 axle tube as shown. Position the bumpers so there is a clearance of 1/16 of an inch between the front of the bumper and the edge of the M400 front section when the canopy is in the closed position. Rivet the bumpers in place with 2 stainless steel rivets in the top and one in the bottom.



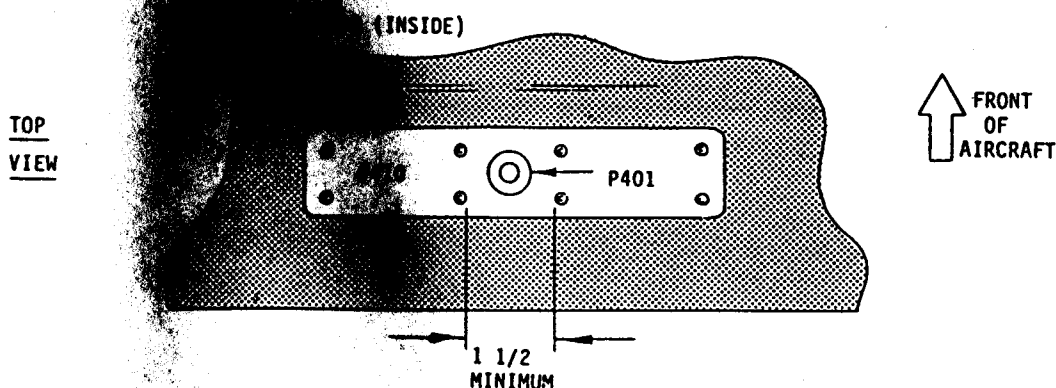
- 2.12.2 Cut a length of vinyl trim and fit it onto the trailing edge of M400 on the bottom only. Do not put trim on the vertical sides.



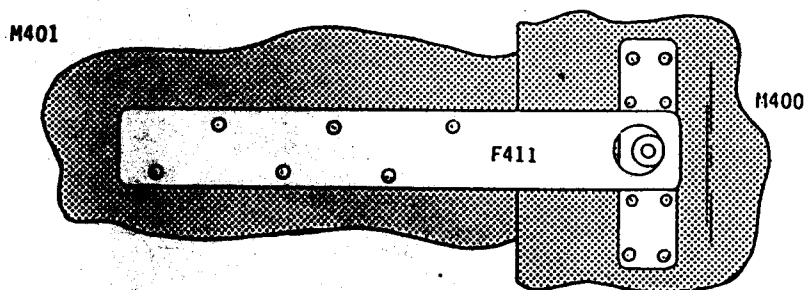
- 2.12.3 Drill a $3/8$ inch hole in the bottom of the M400 front section, on the centerline, one inch aft of the rib in M400. Bolt the F410 reinforcing plate in place using a 34 bolt and the P401 latch pin as shown. Use Loctite® 242 equivalent on the threads.



- 2.12.4 Rivet the reinforcing plate with 8 rivets as shown (with the rivet heads on the outside of the plate).



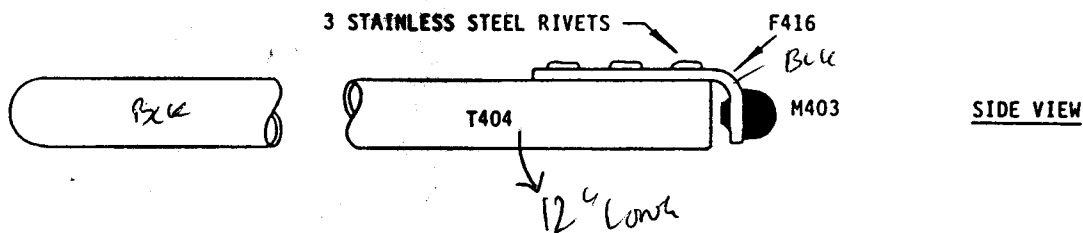
- ✓ 2.12.5 With drill in hand, climb inside and close the canopy. Make sure it is closed completely, top and bottom. Locate the F411 latch keeper as shown and drill at least two of the required rivet holes through F411 and M401. Rivet F411 in place (with the rivet heads on the outside) as shown. Note that the hole in F411 is much larger than P401. Make sure F411 is positioned as shown in the figure to hold the canopy tightly closed.



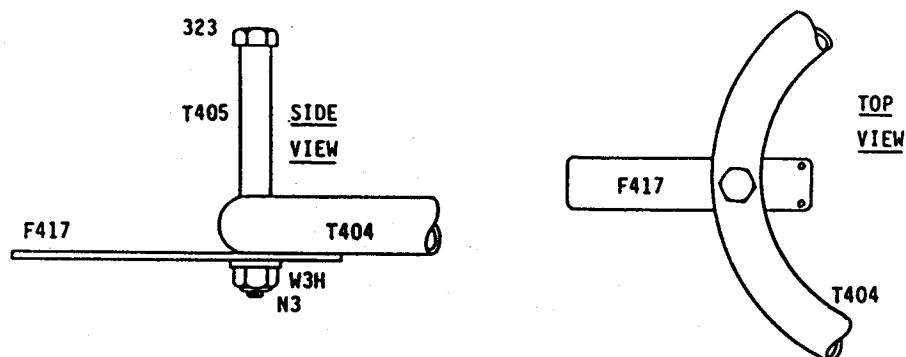
- ✓ 2.12.6 Open and close the canopy a few times and check that the lower latch engages properly. The G400 alignment tabs may be bent as required to ensure proper alignment when the bottom of the canopy is swung closed. Note that for the bottom latch to operate properly the top of the canopy must be in the full forward position when the bottom is swung closed.

2.13 FORWARD LATCH INSTALLATION

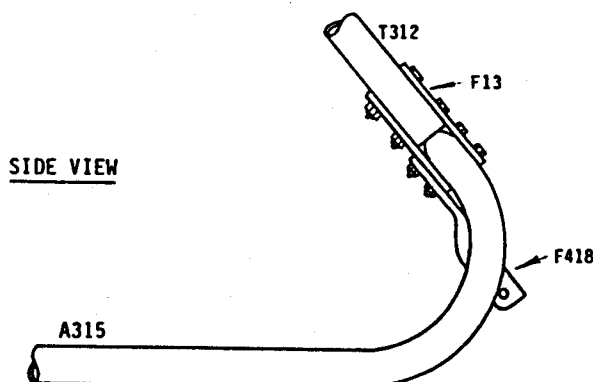
- ✓ 2.13.1 Rivet the forward latch plate F416 onto the end of the latch hoop T404 with 3 stainless steel rivets in each end as shown, and insert the M403 rubber bumpers into the holes in F416. To insert the rubber bumpers, push the stem into the hole as far as possible, then rotate the bumper in one direction only until it is properly seated.



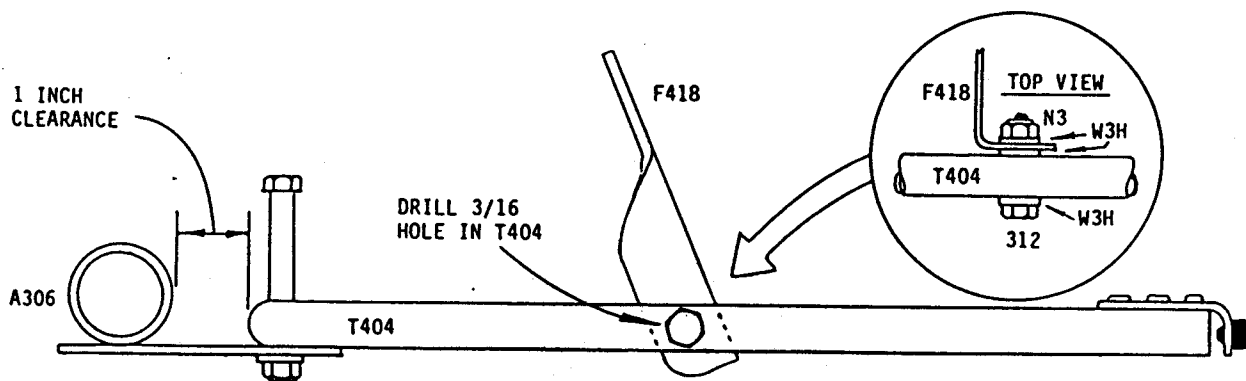
- ✓ 2.13.2 ✓ Assemble the T405 latch release pin and F417 latch stop onto the T404 hoop as shown using the predrilled hole in the middle of the hoop.



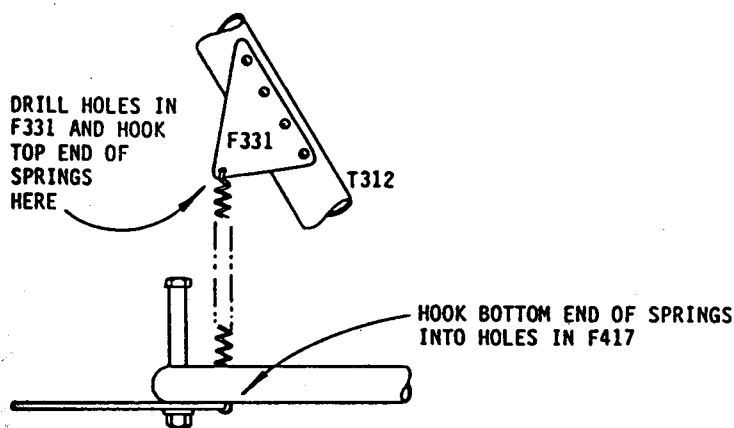
- 2.13.3 Remove the four nuts as required and bolt the F418 mounting bracket onto the fuselage using the 4 bottom bolts securing the F13 Y brackets. (Ref. paragraph 5.3.11 in your Lazair Assembly Manual).



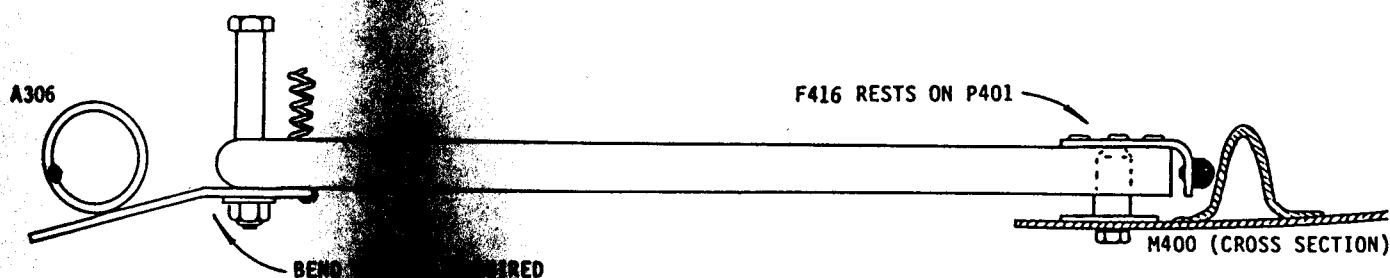
- 2.13.4 Fit the T404 latch assembly into position as shown. Allow a one inch clearance between the T404 hoop and the A306 nosewheel axle, and mark the position of the required mounting holes in T404. Drill the 3/16 inch mounting holes in T404 and bolt it in place as shown. Leave the nuts loose enough to allow T404 to pivot on the mounting bolts.



- 2.13.5 ✓ Drill two 1/16 inch holes in the bottom corners of the F331 bracket (Ref. paragraph 5.5.2 in your Lazair Assembly Manual) and install the two SP3 springs as shown.



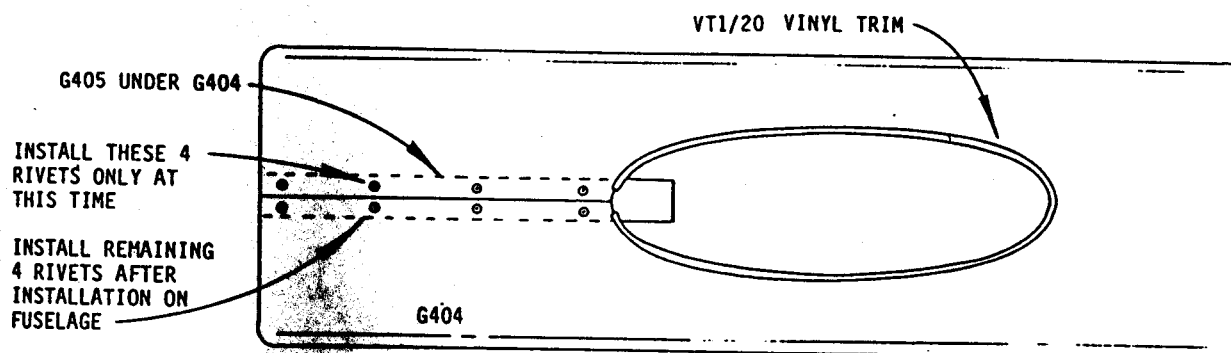
- 2.13.6 ✓ Bend the F417 stop as required to allow the F416 latch plate to contact the top of the P401 latch pin when the canopy is in the latched open position.



- 2.13.7 ✓ Climb inside the canopy and close the canopy a few times to check the operation of the forward latch. Note that you should hold both sides of the canopy with your hands before you release the latch with your foot. Adjust the bend in F417 as required for proper operation of the latch. Make sure that the latch engages properly to prevent the canopy from being opened too far as well as holding it in the open position.

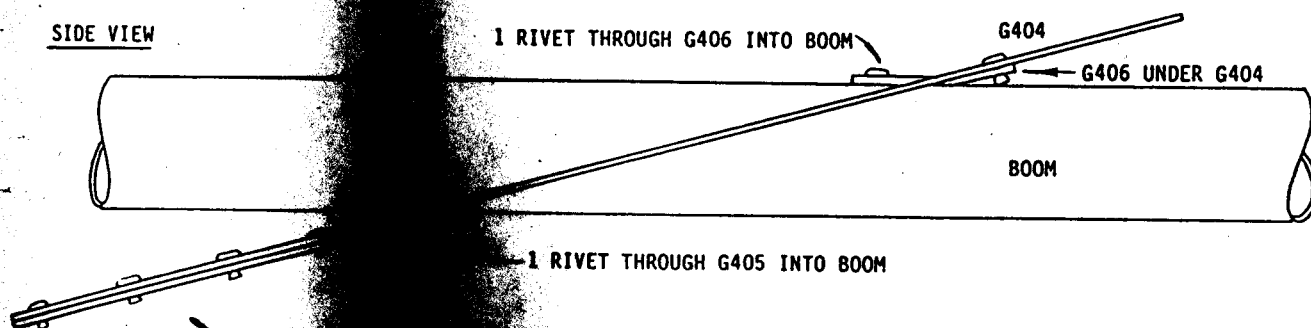
2.14 GAP COVER INSTALLATION

- 2.14.1 Cut and form a length of vinyl trim to fit the oval hole in the mid gap cover G404. Rivet the G405 gap cover splice in place as shown. Note that the 10 degree bends in G404 should be up.

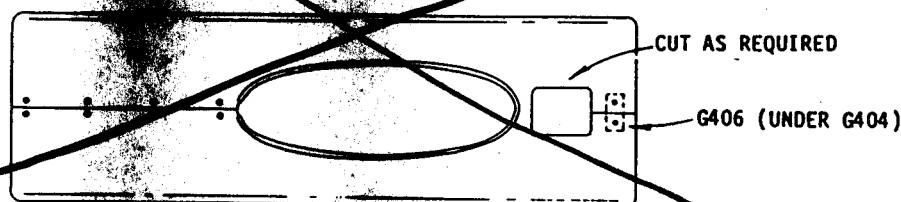


- 2.14.2 With at least one wing on the aircraft, fit the gap cover into place. Bend the forward end of G405 and rivet it to the boom with 1 rivet. Secure the forward end of the gap cover to the boom with a G406 bracket and 2 rivets.

SIDE VIEW



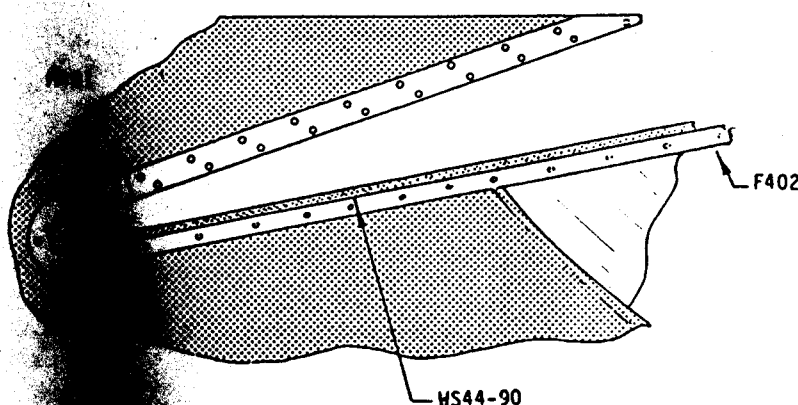
Note that on early Series III's (with the 1/4 inch ruddervator pushrods) it may be necessary to cut another opening in the gap cover for the pushrod. Use another G406 to splice the forward end of G404 after installation.



- 2.14.3 Notch the two front corners of the mid gap cover as required to provide clearance for the front gap cover attach snaps.

2.15 INSTALLATION OF WEATHER STRIP

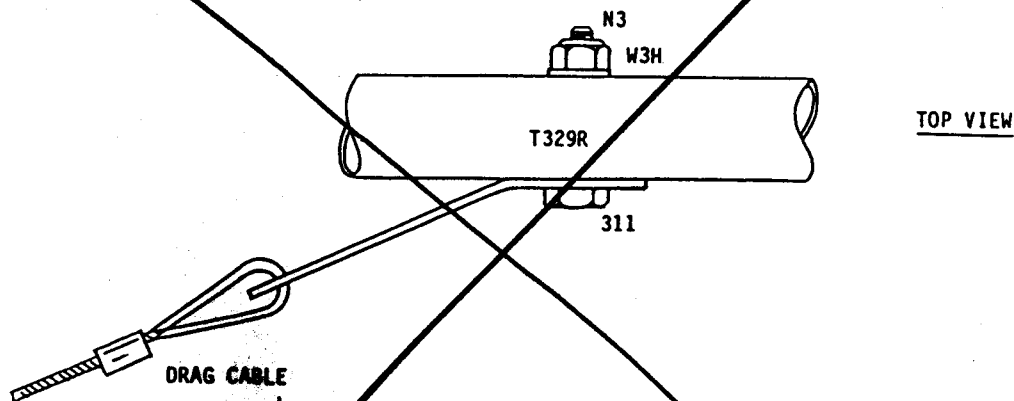
- 2.15.1 Install WS13-120 weatherstrip on the face of F408 where it mates with F405. Check the operation of the latches again and file the F415's (as in Step 2.11.3) if necessary.
- 2.15.2 Apply WS13-120 weatherstrip to the bottom of the edges of the mid gap cover where it contacts the wing.
- 2.15.3 Apply WS44-90 weatherstrip to the top of both F402's.



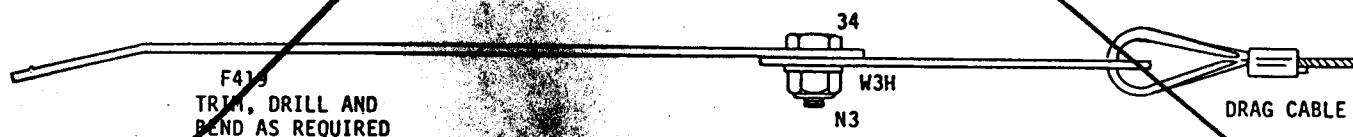
2.16 DRAG CABLE POSITION

- 2.16.1 You may, if you wish, cut two holes in the enclosure and reinstall the drag cables in their original location. However, finding the exact position to put the cables is an easy task (unless you have your own lazer gun) and the trial and error method runs the risk of converting your enclosure into a piece of scrap. To circumvent this problem, it is suggested that the forward ends of the cables be moved to the T329 trailing arms, outside the enclosure. Two cable extensions have been included for this purpose.

- 2.16.2 Temporarily hold a drag cable (or a piece of string) in position to find a mounting position on T329 L/R which will allow the cable to clear the enclosure by at least one inch. Drill through T329 and bolt the forward end of each cable as shown.



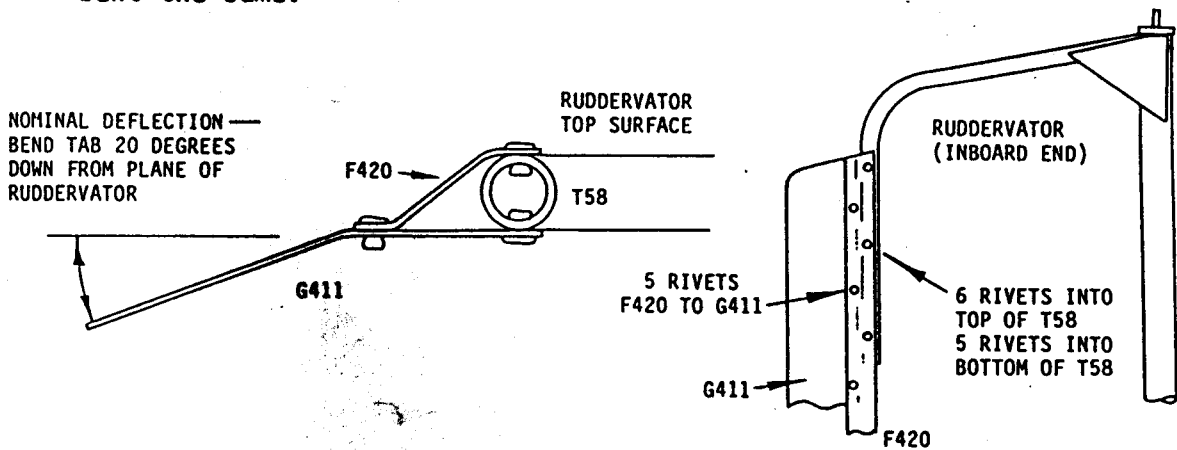
- 2.6.13 Bolt the F419 cable extensions to the other end of the cables and reinstall the cables per Section 7.3 in your Lazair Assembly Manual.



2.17 ✓ TRIM TAB INSTALLATION

- 2.17.1 ✓ Although the Lazair can be (and has been) flown with the enclosure installed and no other changes incorporated to correct for aerodynamic and center-of-gravity effects, some small amount of elevator trim will probably be required to make flying the aircraft easier and more comfortable. It is recommended that before the aircraft is test flown with the enclosure, the trim tabs be installed on the ruddervators and be set to the nominal position as specified in this manual. The optimum calibration of the trim tabs may then be determined by test flying the aircraft.

- ✓ 17.2 ✓ Rivet the ruddervator trim tabs G411 to the ruddervators as shown. Check that the angle of deflection is approximately as indicated, and bend the trim tabs if necessary to correct the angle. Make sure both trim tabs are bent the same.



- 2.17.3 By test flying the aircraft, determine whether it tends to pitch up or pitch down at what you consider to be a normal cruise speed. The trim may then be adjusted by bending the trim tabs, but they must, of course, be bent in the correct direction. If the aircraft feels nose heavy (requires back pressure on the stick to fly straight and level), the trim tabs should be bent down. Do not change the angle of the bend by more than 5 degrees at a time, and be sure to bend both sides the same.

Section 3

FLYING THE LAZAIR WITH THE ENCLOSURE INSTALLED

3.1 GENERAL

- 3.1.1 The addition of the enclosure does more than provide environmental protection and enhance the appearance of the Lazair. It also changes the flight characteristics. If you are an experienced power pilot, and especially if you have a background in sailplanes, you will probably find the flight characteristics improved. If all of your flying experience has been in the Lazair, you will probably not find the changes detrimental, but regardless of your background, you will definitely find the aircraft different.
- 3.1.2 Although some of the more subtle changes tend to be quite subjective, and you must, therefore, evaluate them yourself, you should not attempt to fly your newly adorned Lazair without some idea of what to expect. Although generalities can sometimes be misleading, you should expect your Lazair to 1. perform more like a conventional light aircraft, and 2. do almost everything at a higher airspeed than it did before you added the enclosure. Because of the increase in weight, the takeoff roll will be a bit longer and the stall speeds (with and without power) will be higher. Because of the reduced drag, top speed and cruising speed (at a given power setting) will be higher.
- 3.1.3 However, the most noticeable change will be the reduction in glide angle when you are making your landing approach. Because of the lower drag, the enclosure equipped Lazair wants to keep right on flying even though you may have decided its time to land. For this reason, short field landings will be significantly more difficult. Make sure that the first time you fly with the enclosure, you choose a landing site which will permit a long approach, will allow you to land long, and still have room for a long rollout. As your experience and confidence grow, you will be able to use a shorter field, but you must first develop your judgement so you know where you are going to land.

3.2 AIRSPEED CONSIDERATIONS

- 3.2.1 As the Lazair now behaves more like a conventional aircraft, your piloting techniques and procedures must be more like those of a conventional pilot. It is now much more necessary to "fly by the numbers".
- 3.2.2 Before you can fly by the numbers, a reliable airspeed indicator is an absolute necessity. Although the Hall Brothers wind instrument has worked remarkably well on the Lazair as an indicator of relative airspeed, it is subject to several restrictions (Ref. "Learning to Fly The Lazair", Page 6) and is not recommended for flying with the enclosure. For those pilots who will insist on using it anyway, we have attempted to provide a cross reference to the recommended airspeed indicator, but we make no guaranty of the accuracy or repeatability of these figures. *guarantee*
- 3.2.3 There are many good, reliable airspeed indicators for use on ultralights. The one we recommend (and the one on which the airspeed data is based) is the Orbit Instruments pitot type airspeed indicator. This instrument is a good quality standard aircraft ASI which has been recalibrated and rescaled for use at ultralight speeds.
- 3.2.4 The airspeeds tabulated in appendix B should provide an indication of how your aircraft will react, as well as the recommended speeds for normal operation. All speeds shown are in MPH for a standard day at sea level. These speeds are based on test flights with the factory demonstrator, trimmed for 30 mph hands off at full power, and full fuel. Actual speeds on your aircraft may differ slightly depending upon the way in which it was constructed, the way it is trimmed, and the weight and balance. Note also that changing the location of the pitot and/or static ports on the instruments can alter the instrument reading.

3.3 OTHER CONSIDERATIONS

- 3.3.1 While sideslipping can be used as an effective means of losing altitude, it should not be relied upon, and should definitely not be used until you have sufficient experience flying with the enclosure. Because of the relatively low profile area, the short coupling and the inverted V tail, the Lazair

will not react the same as a conventional aircraft in a sideslip. If you intend to use this technique, be sure to practice it at a sufficiently safe altitude until you have learned how the aircraft will react under all conditions.

3.3.2 Although there is no reason at this time to believe that the aircraft with the enclosure installed will not perform acceptably on floats, no testing has as yet been done in this configuration. Since both the weight and the frontal area have been increased, and it has been shown that the enclosure has a significant effect on flight characteristics, the use of floats on the Lazair with the cockpit enclosure is not recommended at this time. When the flight test program with floats has been completed, information on flight characteristics and recommendations will be available from your authorized Ultraflight dealer or from the factory.

3.3.3 { At the time of writing, testing of devices to increase drag and/or decrease lift to provide additional glide slope control was in progress. Information regarding the effectiveness and availability of these devices will be published when available.

3.3.4 Note that due to the shape of the enclosure, tools (or anything else left inside the enclosure) will slide down to the lowest point, under the F330 aileron control horn (shown in the figure at the top of Page 8). To prevent possible interference with the aileron control system, this area must be kept clear. Be sure that no tools are left inside the enclosure.

CHECK THE AREA UNDER F330 BEFORE EVERY FLIGHT

A similar problem could occur if you fail to fasten your seat belt and it should fall into the area under F330.

MAKE SURE YOUR SEAT BELT IS FASTENED BEFORE EVERY FLIGHT

Airspeeds, Series III Lazair™ with Cockpit Enclosure

All figures based on a 490 lb. Gross Weight

250
35
165
450

	AIRSPEED, MPH	
	Orbit (Note 1,3)	Hall (Note 1,2,3)
Stall Speed (Power off, stick full back, "mush")	34	27
Stall Speed (Power at idle)	30	25
Stall Speed (Full power)	20	19
Maximum Speed (Full power, level flight)	61	43
Never Exceed Speed (see Note 4)	62	44
Best Rate of Climb Speed	30	25
Best Glide Speed	36	29
Recommended Minimum Approach Speed (Power at idle)	35	28
Recommended Minimum Approach Speed (Power off)	40	32
Recommended Touchdown Speed (Power at idle)	25	23
Recommended Touchdown Speed (Power off)	30	25
Recommended Single Engine Speed	35	28

- Notes:
1. Orbit Instruments, pitot type indicator, mounted inside nose of enclosure with short pitot tube extending 3 inches ahead of nose of enclosure.
 2. Hall Brothers wind indicator, mounted entirely outside enclosure with pitot opening 2 inches above and 2 inches ahead of nose of enclosure.
 3. Figures subject to conditions in paragraph 3.2.2 and 3.2.4.
 4. Figures valid only with optional jury strut kit installed.

Airspeeds, Series III Lazair™ with Cockpit Enclosure

All figures based on a 490 lb. Gross Weight

	AIRSPEED, MPH	
	Orbit (Note 1,3)	Hall (Note 1,2,3)
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- Notes:
1. Orbit instruments, pitot type indicator, mounted inside nose of enclosure with short pitot tube extending 3 inches ahead of nose of enclosure.
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 4. Figures valid only with optional jury strut kit installed.

PARTS LIST FULL ENCLOSURE KIT

<u>Part No.</u>	<u>Quantity</u>	<u>Description</u>
A400	1	Assembly, Fuel Filler
A401	1	Assembly, Bulkhead Fitting
A409	4	Assembly, Attach Strip
A410L	1	Window, Side
A410R	1	Window, Side
B3	4	Bushing
B13	2	Bushing
CN3	2	Nut, Castle, 3/16
CP23	2	Pin, Cotter
F401	1	Angle, Track Support
F402 <i>39" upper</i>	2	Angle, Side Window, Upper
F405 <i>30" lower</i>	2	Angle, Side Window, Forward
F406	1	Bracket, Track Support
F407	2	Angle, Window Gusset
F408 <i>32" long upper</i>	2	Angle, Windshield
F409	2	Clamp, Windshield Slide
F410	1	Plate, Reinforcing
F411	1	Keeper, Lower Latch
F412	2	Bumper, Enclosure
F413	2	Tang, Canopy Latch
F414	1	Spring, Canopy Latch
F415	2	Strike, Canopy Latch
F416	1	Plate, Forward Latch
F417	1	Stop, Forward Latch
F418	1	Bracket, Latch Mount
F419	2	Tab, Cable Extension
F420	2	Z Bracket, Trim Tab Mtg.

<u>Part No.</u>	<u>Quantity</u>	<u>Description</u>
F438	2	Bracket, Enclosure Mt.
F439 — 30" NO PAINT	4	Angle, Window Guide
G400L	1	Tab, Alignment, Left
G400R	1	Tab, Alignment, Right
G401	2	Gusset, Window, Outside
G402	2	Gusset, Window, Inside
G403	1	Splice, Windshield
G404 SPICE	1	Cover, Mid Gap
G405	1	Splice, Mid Gap Cover
G406	2	Bracket, Gap Cover Mount
G409	1	Windshield, Large
G410	1	Windshield, Small
G411	2	Tab, Ruddervator Trim
G424	1	Stiffener, Enclosure Rear
G425	2	Stiffener, Enclosure Top
G426	2	Gusset, Side Window
HC20	2	Clamp, Hose
HW6	24	Snap, Male
TF6-32	1	Hose, Fuel Filler
TF5-90	1	Line, Fuel Overflow/vent
M400	1	Enclosure, Front Section
M401	1	Enclosure, Rear Section
M402	2	O-ring, 11/16
M403	2	Bumper, Rubber
M404	1	Knob, 1 3/8
M405	1	Cap, Fuel Tank, Large
M406	1	Fitting, Fuel Tank Inlet
M408	1	Cap, Fuel Tank, Small
N3	16	Nut, 3/16
N3NL	2	Nut, Non-Locking
N34P	1	Nut, Bulkhead Fitting

<u>Part No.</u>	<u>Quantity</u>	<u>Description</u>
P400 20⁴ long	2	Stop, Canopy Slide
P401	1	Pin, Lower Latch
RV1043	500	Rivet, Aluminum Alloy
RV2044	50	Rivet, Stainless Steel
S551	4	Spacer
SP3	2	Spring
SV2	2	Snapvent
WR25-48	1	Wire, Safety
T400 20 ⁴ long	1	Track, Windshield
T401 18 ⁴ long	1	Hoop, Windshield
T402	1	Tube, Fuel Filler Mount
T403	1	Stiffener, Vent Tube
T404 12 ⁹ long	1	Hoop, Forward Latch
T405	1	Sleeve, Release Pin
TW45	8	Tie-wrap
UT400	1	Tool, Windshield Installation
VT1/4	1	Trim, Metalized Vinyl
W3H	30	Washer, 3/16 inch
W4H	2	Washer, 1/4 inch
W2RV	150	Washer, Rivet Backup
WS13-120	1	Weather Strip, 1/8 x 3/8
WS44-90	1	Weather Strip, 1/2 x 1/2
W3S	1	Washer, 3/16 large
34	5	Bolt, 1/2 x 3/16
311	2	Bolt, 1 1/8 x 3/16
312	4	Bolt, 1 1/4 x 3/16
316	4	Bolt, 1 3/4 x 3/16
323	1	Bolt, 2 3/8 x 3/16
314MS	2	Screw, 1 1/2 x 3/16
416C	2	Bolt, 1 3/4 x 1/4
84016	1	Manual, Cockpit Enclosure Instl'n.