SECTION IV
STRUCTURES

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SECTION IV

STRUCTURES

4-1. INTRODUCTION. This section explains procedures for removal and installation of structural components of the airplane, for the check and balance of the stabilator and rudder and for the repair of structural surfaces on all models. Information for the rigging and adjustment of control surfaces, as well as the removal and installation of their controls, may be found in Section V.

4-2. DESCRIPTION. The fuselage is composed of two basic sections. The forward section which extends from the foremost point on the nose to station 171.1, a point just aft of the rearmost side window, is a tubular structure or truss type construction with bulkheads, channels and stringers. The aft section of the fuselage which extends from station 171.1 to station 299.38 is of semi-monocoque type construction. Windows include a two piece windshield and three windows along each side. A storm window is located on the left side forward window which opens inward when the latch is released. On PA-23-250 (six place) models, the center window on the left side has been designed for use as an emergency exit. On PA-23-250 and PA-23-235 airplanes, there is a baggage door located on the right side of the fuselage at the rear of the cabin area. On PA-23-250 (six place) airplanes there are two baggage doors on the right side, one located just aft of the cabin area, and the other located on the nose section.

Each wing panel is an all metal, full cantilever, multi-spar type construction with metal ribs and stringers covered with stressed skin. Installed in each wing just aft of the center main spar are two bladder type fuel cells. Attached to each wing is the power plant, aileron, flap and main landing gear. The center full length "I" beam type main spar, on each wing, extends into the fuselage where they are joined together with high strength butt fittings, making in effect a continuous center main spar. The main spar is also attached to the side of the fuselage as are the front and rear spars.

The empennage or tail section is an all metal, full cantilever, multi-spar type construction, with ribs, covered with stressed skin. The empennage consists of a vertical stabilizer, rudder, and a two part horizontal stabilator. The vertical stabilizer, rudder and stabilator incorporate two main spars, and attach to the aft bulkhead assembly of the fuselage.

NOTE

When torquing structural assemblies, standard torque values are to be used as found in FAA Advisory Circular 43.13-1 or Torque Tables in Section II of this manual, unless otherwise stated in this section.

4-3. WING GROUP.

4-4. WING TIP.

4-5. REMOVAL OF WING TIP.

NOTE

Airplanes with pneumatic deicers, remove deicers as per instructions in Section XIV.

NOTE

Airplanes with wing tip tanks, disconnect tip cell per instructions in Section IX.

a. Remove the access plate located on the bottom of the front wing spar where the wing skin and tip skin join together. (Refer to Access and Inspection Provisions, Section II.)

b. Remove the hinge pin located inside the access opening on the bottom of the wing tip. Remove the pin through the top of the wing tip by pushing up on the bottom of the pin until the top can be grasped with pliers and pulled out.

NOTE

Some airplanes are equipped with a small plate covering the top of the pin. If the cover plate is installed, loosen the screws on either side and slide the plate into the wing tip.

c. Remove the screws attaching the wing tip to the wing.

d. Pull the wing tip far enough off to disconnect the two fuel cell vent lines and the navigation light wire at the quick disconnect fitting.

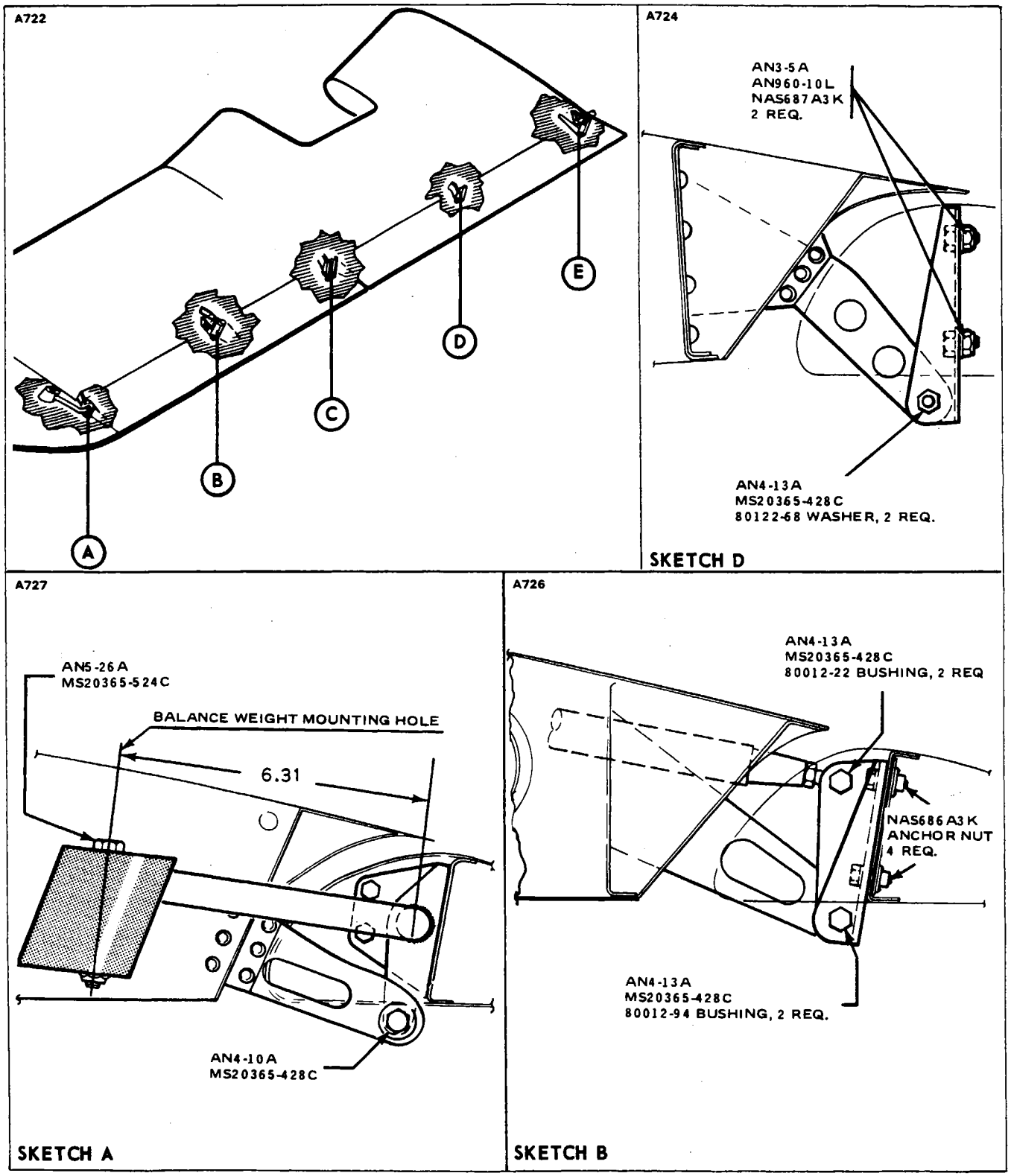

Figure 4-1. Aileron and Flap Installation

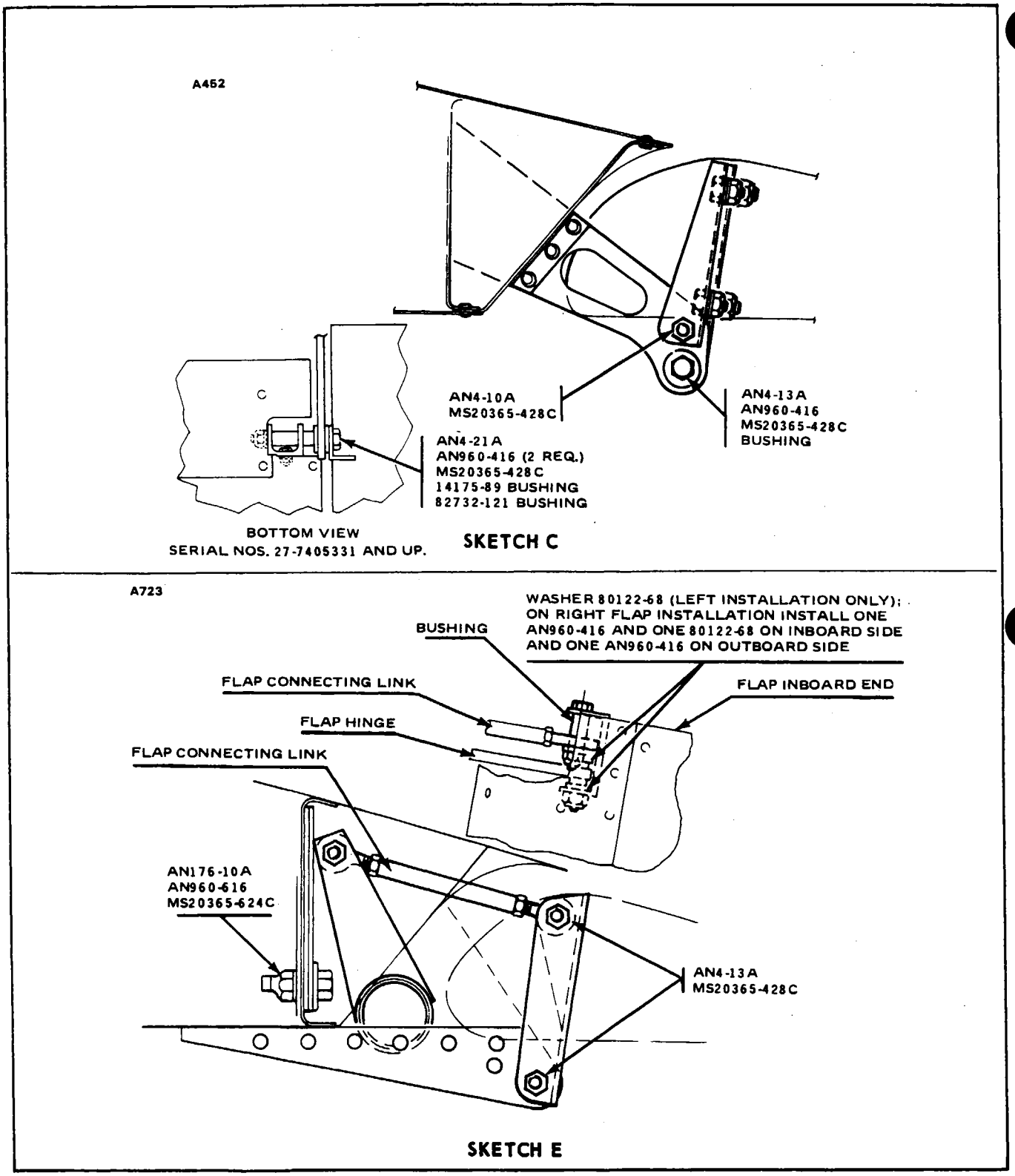

Figure 4-1. Aileron and Flap Installation (cont.)

NOTE

On airplanes with Serial Nos. 27-1 to 27-524 incl., and 27-2000 to 27-2269 incl., there are no fuel cell vent lines installed in the wing tip.

e. Remove the wing tip.

4-6. INSTALLATION OF WING TIP.

NOTE

See Section IX for instructions on installation of wing tip fuel cells if wing tip tanks are installed.

a. Hold the wing tip near the wing and connect the navigation light wire and the two fuel cell vent lines, where applicable.
b. Position the wing tip on the wing.
c. Insert a new hinge pin from the top of the wing tip.
d. Install tip attaching screws and tighten.
e. Install the access cover plate on the bottom of the wing tip.
f. Cover the top of the hinge pin, where applicable, by sliding the cover plate over top of the pin and tightening the screws on either side.

4-7. AILERON.

4-8. REMOVAL OF AILERON. (Refer to Figure 4-1.)

a. Disconnect the aileron control tube at the center aileron hinge by removing attaching nut and bolt and spacer bushings.
b. Remove the balance weight from the balance weight arm by removing attaching nut and bolt.
c. Disconnect the aileron from its hinge brackets by removing hinge nuts and bolts. Note spacer washers and their locations, if any.
d. Remove the aileron by lowering the inboard end of the aileron and swinging it under the wing so the balance weight arm can be drawn out from the wing tip.

4-9. INSTALLATION OF AILERON. (Refer to Figure 4-1.)

a. Install the aileron by first inserting the balance weight arm into the wing tip.
b. Align the hinges and install the three hinge bolts. Check each hinge attachment for need of spacer washers and secure bolts with nuts.
c. Slide the aileron balance weight on the balance weight arm and secure with bolt and nut.
d. Connect the aileron control tube to the hinge fitting at the center of the aileron with bushings, bolt and nut.

e. Check clearances of control tube, and balance weight and arm.
f. Check rigging and adjustment of aileron as described in Section V.

4-10. FLAP.

4-11. REMOVAL OF FLAP. (Refer to Figure 4-1.)
a. Remove the rear wing root fairing adjacent to flap by removing attaching screws.
b. Using the hydraulic hand pump, lower the flaps to the down position.
c. Disconnect the control tube at the inboard end of the flap by removing attaching bolt and nut.
d. Disconnect the flap from its hinge brackets by removing hinge nuts and bolts. Note spacer bushings and washers, and their locations.
e. Remove the flap from the wing.

4-12. INSTALLATION OF FLAP. (Refer to Figure 4-1.)
a. Align the hinges and install the three hinge bolts. Check alignment and install washers and nuts.
b. With the flap control rod extended to the down position connect the rod to the flap.
c. Check rigging and adjustment of flaps as described in Section V.
d. Install the rear wing root fairing with attaching screws.

4-13. WING.

4-14. REMOVAL OF WING. (Refer to Figure 4-2.)
a. Remove wing root fairings, all wing inspection plates and panels, front fuselage side access panels and the bottom fuselage access panel. (Refer to Access and Inspection Provisions, Section II.)
b. Close the fuel valve and drain the fuel from the wing to be removed. (Refer to Draining Fuel System, Section II.)
c. Remove the engine from the wing to be removed. (Refer to Engine Removal, Section VIII.)

CAUTION

To prevent damage or contamination of fuel, hydraulic and miscellaneous lines, place a protective cover over the line fittings and ends.

NOTE

To help facilitate reinstallation of control cables and fuel or hydraulic lines, before removing mark cable and line ends in some identifying manner and attach a line where applicable to cables before drawing them through the fuselage or wing.

d. Drain the brake lines and reservoir. (Refer to Draining Brake System, Section II.)

e. Remove the front and center seats.

f. Place the airplane on jacks. (Refer to Jacking, Section II.)

g. Place a cradle under the airplane, lower and remove jacks. If necessary, retract gears slightly.

h. Drain the hydraulic system. (Refer to Draining Hydraulic System, Section II.)

i. Disconnect the fuel shut-off control cable at the fuel shut-off valve. Remove the cable clamp at the rib beside the valve and at the wing butt rib.

j. Disconnect the primer, if installed, and fuel crossfeed lines under the fuel control panel.

k. Remove the interior trim panel just below the door sill on the right side and remove the lower middle section of the panel on the left side.

l. Remove the attaching screws at the floor, at the front and rear of the spar cover. Remove seat brackets from spar and remove cover.

m. Disconnect the aileron control cables at the bellcrank, which are accessible through the inspection opening on the bottom of the wing, about half way out between the engine and the end of the wing. Remove the pulley at the next inboard inspection opening and at the wing butt. Remove the cap on the rub block in the nacelle space and remove the cables from the wing.

n. Disconnect the vacuum and fuel pressure lines.

o. Disconnect the fuel lines at the wing butt, and disconnect the manifold pressure lines.

p. Disconnect the airspeed lines.

q. Disconnect the hydraulic lines and remove the CO_2 bottle. (Refer to Emergency Gear Extension System, Section VI.)

r. On PA-23-250 and PA-23-235 airplanes, remove the insulating cap from the

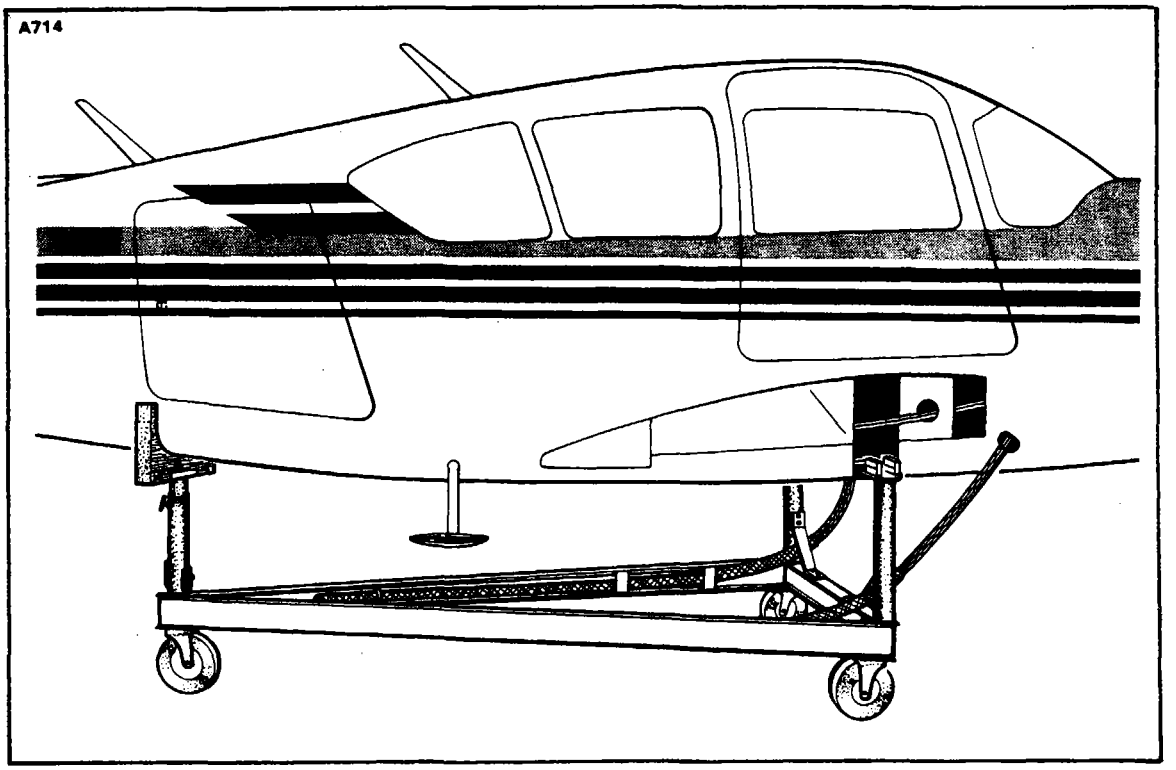

Figure 4-2. Fuselage Cradle

electric wiring terminal block in the rear section of the fuselage access opening and disconnect the wires. On PA-23-250 (Six place) airplanes, the above wires are connected by a cannon plug located just forward of the main spar.

s. All engine controls (throttle, carburetor heat or alternate air door, propeller governor and mixture) must be removed from the wing. The tachometer shaft is removed last and must be inserted first through the control tube when reassembling, due to the large nut on the shaft.

t. Remove the outside wing bolts and arrange a fuselage support cradle.

u. Place a table or some kind of support under the wing to be removed. Support other wing as necessary.

NOTE

The support for the wing should be covered with felt or similar material to prevent damage to the wing surface.

v. Remove the center bolts and the rear spar bolts. To facilitate reinstalla-

tion, note the location and amount of shim or spacer plates and washers.

w. Remove the front spar bolt.

x. Remove the wing.

4-15. INSTALLATION OF WING. (Refer to Figures 4-1 and 4-3.)

a. Ascertain that fuselage is positioned solidly on a support cradle.

b. Place the wing in position for installation, with the spar end a few inches from the side of the fuselage and set on trestles.

c. Prepare the various lines, control cables and wires for inserting into the wing or fuselage when the wing is slid into place.

d. Slide the wing into the fuselage and butt the spar ends. (Maximum distance of .031 of an inch is permissible between spar caps.)

e. Insert the tachometer shaft through the control cable guide tube, followed with the throttle, carburetor heat or alternate air, propeller governor and mixture controls.

f. Attach the main spar to the fuselage frame on the side of the fuselage. Install a bolt down through the spar and fuselage frame on the forward side and secure with washer and self-locking nut. Install a bolt and shim (P/N 17480-00) down through the spar and fuselage frame, and secure with a washer and self-locking nut.

g. Attach the rear spar to the fuselage frame fitting by inserting the bolt from the aft side. The maximum permissible gap between the rear spar and the frame fitting is .125 of an inch, before the attaching bolt is tightened. If the gap is .062 of an inch or under, draw up with bolt, washer and self-locking nut. If the gap is .062 to .125 of an inch, use a shim (P/N 80122-87) and draw up remaining gap with bolt, washer and self-locking nut.

h. Install the spar straps. Position the straps, one to the top front (a shim P/N 18283-00 may be used if needed), one to the bottom front, and one to the bottom aft. Keeping in mind the .032 of an inch maximum allowed gap between the spar caps, secure the straps with bolts, installed through the forward side, and self-locking nuts. Torque bolts from 100 to 140 inch-pounds.

i. Connect the top of the main spar at the side of the fuselage. Install the bolt from the front, a spacer block on the front, and a bushing and spacer block on the aft side. Secure with a washer and self-locking nut. Shims (.020, P/N 18380-02; .032, P/N 18380-03; or .064, P/N 18380-04) may be installed between the fuselage frame brackets and the spacer blocks, as required, to obtain a proper fit.

j. Install the plates to the top and bottom of the spar with bolts, washers and self-locking nuts. Washers are required under the heads of the two front center bolts of the upper and lower plates. Torque bolts to 160-190 inch-pounds.

k. Attach the front spar to the fuselage frame bracket with a bolt installed from the front and secured with a self-locking nut. A maximum of two washers (AN960-616) may be installed between spar fitting and frame bracket to provide a proper fit. When installing a new wing, first drill a pilot hole through the forward side of the spar using a fabricated tool, as shown in Figure 4-5, for hole alignment, and a .125 inch drill. (The tool may be fabricated from dimensions given in Figure 4-22.) Then, drill out the spar attachment hole from the aft side using a .375 inch drill.

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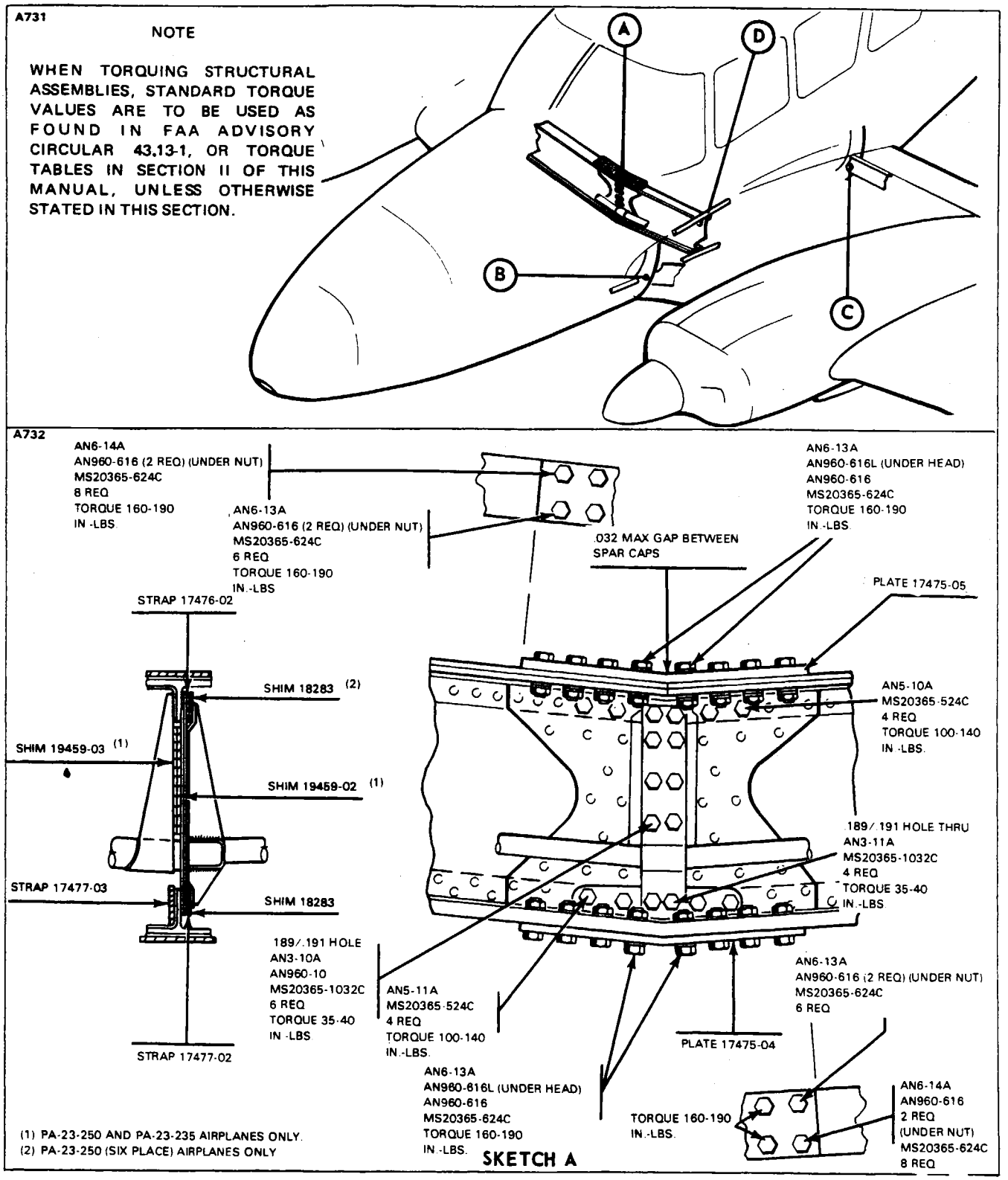


Figure 4-3. Wing Installation

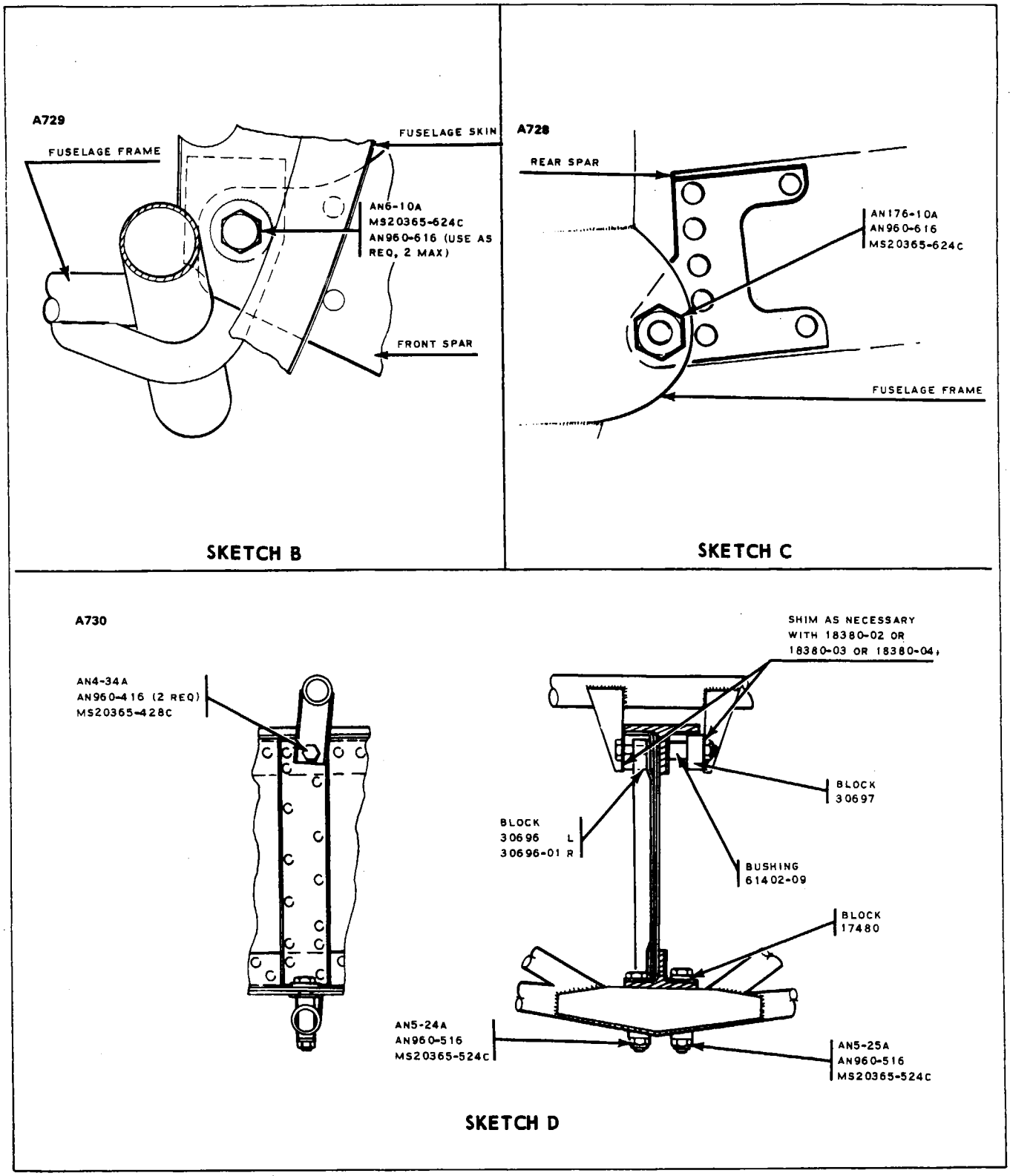


Figure 4-3. Wing Installation (cont.)

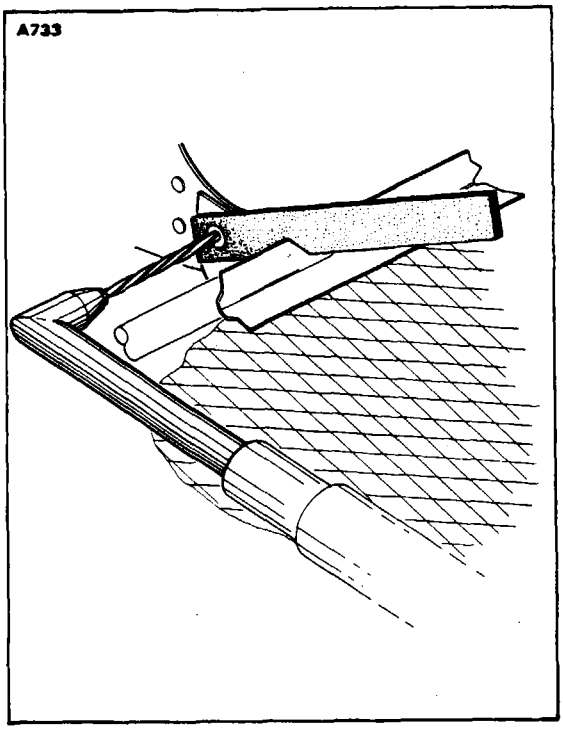


Figure 4-4. Positioning of Front Spar Aligning Tool

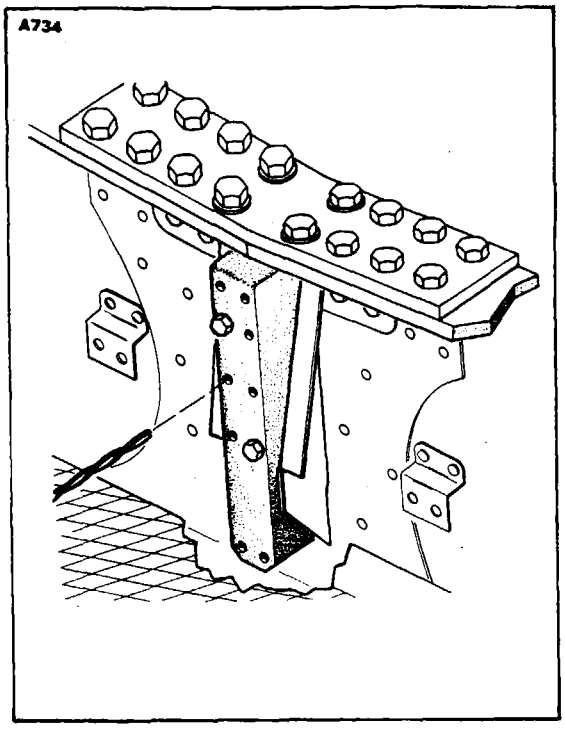


Figure 4-5. Positioning of Main Spar Aligning Tool

1. Bolt the center of butt end of the main spar. If a new wing is being installed, it will be necessary to drill holes in the spar to .189/.191 of an inch to match the fuselage frame fitting. Drill the holes in the spar with the use of a hole jig as shown in Figure 4-5, and a .189 (No. 12) inch drill. (The tool may be fabricated from dimensions given in Figure 4-21.)

NOTE

The holes must be drilled straight for proper alignment and to prevent damaging the aft fuselage frame fitting.

On PA-23-250 and PA-23-235 airplanes, insert a .187 shim plate (P/N 19459-00) against the back of the main spar and a .125 shim plate (P/N 19459-03) between the previous mentioned shim and the aft fuselage frame fitting. On PA-23-250 (six place) airplanes, insert a .313 shim plate (P/N 19303-00) between the main spar and the aft fuselage frame fitting. Install bolts from the front and secure with self-locking nuts. Torque bolts from 35 to 40 inch-pounds. Washers must be used under the nuts of the six center bolt and nut assemblies.

m. Place the wing jacks under the wings and remove the supports.

n. Connect the wires at the electrical wiring terminal block in the rear section of the fuselage access opening.

o. Connect the oil pressure lines.

p. Connect the hydraulic lines.

q. Connect the airspeed lines.

r. Connect the fuel lines at the wing butt and connect the manifold pressure lines.

s. Connect the vacuum and fuel pressure lines.

t. Replace the aileron control cables in the rub block on the wheel well. Replace the pulley at the wing butt and inspection hole, and connect the cables at the bellcrank, which is accessible through the plate on the bottom of the wing midway between the engine and the end of the wing. (Check aileron rigging and adjustment per Section V.)

u. Connect the flap control rod to the inboard end of the flap. (Check flap rigging and adjustment per Section V.)

v. Replace the spar cover.

w. Replace the interior trim panel just below the door sill on the right side and replace the lower middle section of the panel on the left side.

x. Connect the primer and fuel crossfeed lines under the fuel control box.

y. Connect the fuel shut-off control cable at the fuel shut-off valve and reclamp the cable at the rib beside the valve and at the wing butt rib.

z. Fill the hydraulic system. (Refer to Filling Hydraulic System, Section II.)

aa. Replace the front and rear seats.

ab. Fill the brake reservoir and brake system. (Refer to Servicing Brake System, Section II.)

ac. Remove the jacks and fuselage support.

ad. Fill the fuel tank. (Refer to Filling Fuel Cells, Section II.)

ae. Replace engine, engine cowling and top nacelle. (Refer to Installation of Engine, Section VIII or VIIIA.)

af. Replace the bottom fuselage access panel, the front fuselage side access panels, the wing inspection plates and panels, and the wing root fairings.

4-16. EMPENNAGE GROUP.

4-17. STABILATOR.

4-18. REMOVAL OF STABILATOR. (Refer to Figure 4-6.)

a. Disconnect the stabilator trim control rod at the horn on the center of the tab assembly by removing cotter pin, nut, washer, bushing and bolt.

b. Disconnect the stabilator halves at the attachment fittings on the inboard end of each rear spar by removing nut, washer and bolt.

c. Remove two bolts (close tolerance) with nuts and washers attaching the stabilator half to the torque tube.

d. Slide stabilator from torque tube.

NOTE

Should torque tube bearing block removal become necessary, items secured with Bearing Mount No. 72 may be separated with adequate pressing tools. Installation is accomplished by cleaning parts with Loctite Locquic Primer T and allowing 5 minutes to dry. Apply Loctite Bearing Mount No. 72 to both the inner and outer surfaces of bearing and to the torque tube. Assemble parts and wipe off excess bearing mount sealant. Allow parts to cure 60 minutes at room temperature.

4-19. INSTALLATION OF STABILATOR. (Refer to Figure 4-6.)

a. Slide the stabilator torque tube and align the two holes in the stabilator with the holes in the torque tube.

b. Secure the stabilator to the torque tube with two close tolerance bolts which have been sprayed with zinc chromite (install when still wet), washers and self-locking nuts. Torque the two bolts between 60-85 inch-pounds.

c. Connect halves of the stabilator assembly at the attachment fittings on the inboard end of each rear spar by installing the bolt, washer and self-locking nut.

d. Temporarily attach the stabilator trim control rod to the stabilator trim tab horn using bushing, washer and bolt. Add washer(s) between each horn to maintain parallel position of horns.

e. Check rigging and adjustment of the trim tab as described in Section V.

f. Secure trim control rod to horn and secure with cotter pin. Torque nut between three (3) to 35 inch-pounds on serial numbers 27-1 to 27-7554168 inclusive. Serial numbers 27-7654001 and up require a torque of 50 to 70 inch-pounds.

4-20. INSTALLATION OF NEW STABILATOR. The two mounting holes in a new stabilator are not drilled to full .312 inch diameter. The reason for this is to assure proper alignment upon installation. To fit a new stabilator to the torque tube, proceed as follows:

a. Slide the stabilator onto the stabilator torque tube.

b. Align the stabilator halves and bolt rear spar attachment fitting together with bolt, washer and nut.

c. Insert a drift pin in one of the stabilator mounting holes to assist in alignment of the stabilator during the reaming operation.

d. Using a .312 reamer, enlarge the mounting holes and install the bolt (close tolerance).

e. Remove the drift pin and repeat the reaming operation on the remaining mounting hole.

f. Install washer and nut with each attaching bolt and torque 60-85 inch-pounds.

g. Refer to paragraph 4-65 for balancing of the stabilator.

4-21. STABILATOR TRIM TAB. (Refer to Figure 4-6.)

4-22. REMOVAL OF STABILATOR TRIM TAB.

a. Disconnect the stabilator trim control rod at the horn on the center of the tab assembly by removing cotter pin, nut, washer, bushing, and bolt.

b. Remove the stabilator trim hinge pins. Straightening the hinge pin to remove it may enlarge the hinge pin holes. It is recommended that the pins be cut at their bend angle before removal and replaced with new pins upon installation.

4-23. INSTALLATION OF STABILATOR TRIM TAB.

a. Align the hinge pin holes of the trim tab with the stabilator and insert new pins. Refer to Parts Catalog for proper pin size.

b. Secure the pin by bending the end down to 90 degrees.

c. Connect the stabilator trim control rod to the tab horn with attachment hardware. On serial numbers 27-1 to 27-7554168 inclusive, torque the nut finger tight (3 to 35 in. lbs.) then install cotter pin. On serial numbers 27-7654001 and up, the bolt torque is (50 to 70 in. lbs.).

d. Check rigging of stabilator trim as described in Section V.

4-24. STABILATOR TRIM TAB FREE PLAY.

a. Place tab in neutral position (refer to Section V, Table V-I).

b. The total tab free play may not exceed 1/10 inch, measured between the outboard trailing edge of the tab and the trailing edge of the stabilator.

c. Free play in excess of 1/10 inch will require a close inspection of hinge assemblies for source of looseness.

d. Replace hinge pins if evidence of wear is present. Hinge pin diameter should be .093 to .095 of an inch.

NOTE

To withdraw hinge pins, cut pin at bend angle. Do not attempt to straighten.

e. If new hinge pins do not eliminate looseness, replace appropriate stabilator and stabilator tab hinges.

4-25. RUDDER.

4-26. REMOVAL OF RUDDER.

a. Remove the upper section of the tail cone fairing and the rudder horn access panel by removing attaching screws.

b. Remove the left or right access panel, as desired, to the cockpit area below the windshield area.

c. Relieve tension from the rudder cables by loosening one turnbuckle at the rudder pedal torque tube.

d. Disconnect the two control cables from the rudder horn by removing cotter pin, nut, washer and clevis bolt.

e. Disconnect the rudder horn from the lower rudder hinge bracket by removing cotter pin, nut, washer and clevis bolt.

f. Disconnect the rudder trim tab control rod at the tab horn by removing cotter pin, nut, washer and clevis bolt.

g. Disconnect the navigation light and rotating beacon wires at their quick disconnects located between the rudder and fin.

h. Remove the two hinge bolts with cotter pin, washer and nut and remove the rudder.

4-27. INSTALLATION OF RUDDER.

a. Align the two hinge brackets of the rudder with the hinges on the fin and install the two hinge bolts. Install washer and nut on each bolt. Tighten to allow freedom of rotation but with no end float, and safety nut with cotter pin.

b. Connect the rudder horn to the lower hinge bracket of the rudder and install clevis bolt, washer, and nut. Ascertain that the bolt slips freely through each fitting. Should it not, shims (P/N 81262-94) may be used to obtain correct alignment. Tighten nut to allow freedom of rotation and safety nut with cotter pin.

c. Connect the rudder trim tab control rod to the tab horn and secure with clevis bolt, washer, nut and cotter pin.

d. Connect the two control cables to the rudder horn with clevis bolt, washer, nut and cotter pin.

e. Connect the navigation light and rotating beacon wires at their attaching point between the rudder and fin.

f. Set rudder cable tension and alignment as given in Rigging and Adjustment of Rudder, Section VI.

NOTE

The rotating beacon is required for proper rudder mass balance. IT MUST BE INSTALLED.

g. Replace the access fairings and panels and secure.

4-28. RUDDER TRIM TAB.

4-29. REMOVAL OF RUDDER TRIM TAB.

a. Disconnect the trim tab control rod at the tab horn by removing cotter pin, nut, washer and clevis bolt.

b. Remove the rudder trim hinge pins. Straightening the hinge pin to remove it may enlarge the hinge pin holes. It is recommended that the pin be cut at its bend angle before removal and replaced with new pin upon installation.

4-30. INSTALLATION OF RUDDER TRIM TAB.

a. Align the hinge pin holes of the trim tab with the rudder and insert new pins.

b. Bend the hinge pin ends over to 90 degrees providing a safety for the pin.

c. Connect the rudder trim control rod to the tab horn with clevis bolt, washer, nut and cotter pin. The bolt should be free to rotate by hand when lubricated with general purpose oil.

4-31. VERTICAL STABILIZER (FIN).

4-32. REMOVAL OF VERTICAL STABILIZER (FIN). (Refer to Figure 4-6.)

a. Remove the tail cone fairings and access panel located on the left side of the fuselage below the leading edge of the fin by removing attaching screws.

b. Remove the fin fairing located between the fuselage and leading edge of the fin, and access plates on the right side of the fin by removing attaching screws.

c. Remove the access panel to the aft section of the fuselage located at the aft wall of the baggage compartment.

d. Remove the rudder in accordance with paragraph 4-26.

e. Block the trim cable at the trim drum with wooden blocks, or by tape, to prevent the cable from unwrapping from the drum.

f. Disconnect the trim cable at the turnbuckles within the aft section of the fuselage.

g. Remove the cotter pin cable guards from the cable pulleys within the aft section of the fuselage at station 261.0. Enter through the access opening in the left side of the fuselage.

h. Remove the rudder horn hinge fitting from the fin attachment plate by removing cap bolts; then remove trim pulleys from the fitting by removing attaching bolt, washer and nut. The trim cable is free for removal. Note, if any, the number of shims between the hinge fitting and attachment.

i. Disconnect the trim indicator wire from the forward end of the rudder trim screw.

j. Disconnect electrical wires, antenna wires and cables, and deicer line, as installed.

k. Remove the attaching bolts and screws with nuts and washers at the top of the fin spar rear attachment plate.

l. Remove the attaching bolts and screws with nuts and washers at the top of the fin spar front attachment plate.

m. Pull the fin directly up from the fuselage.

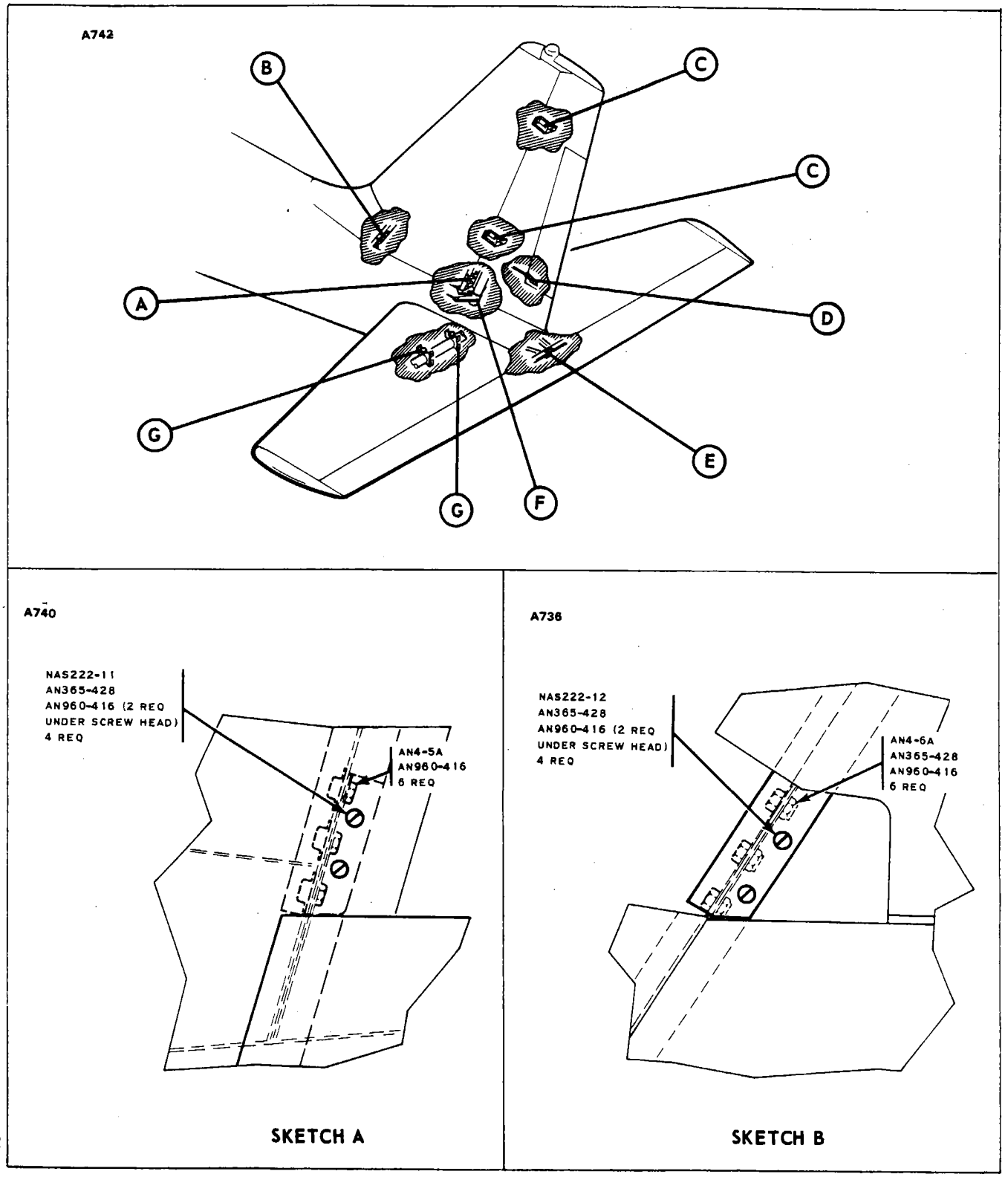


Figure 4-6. Empennage Installation

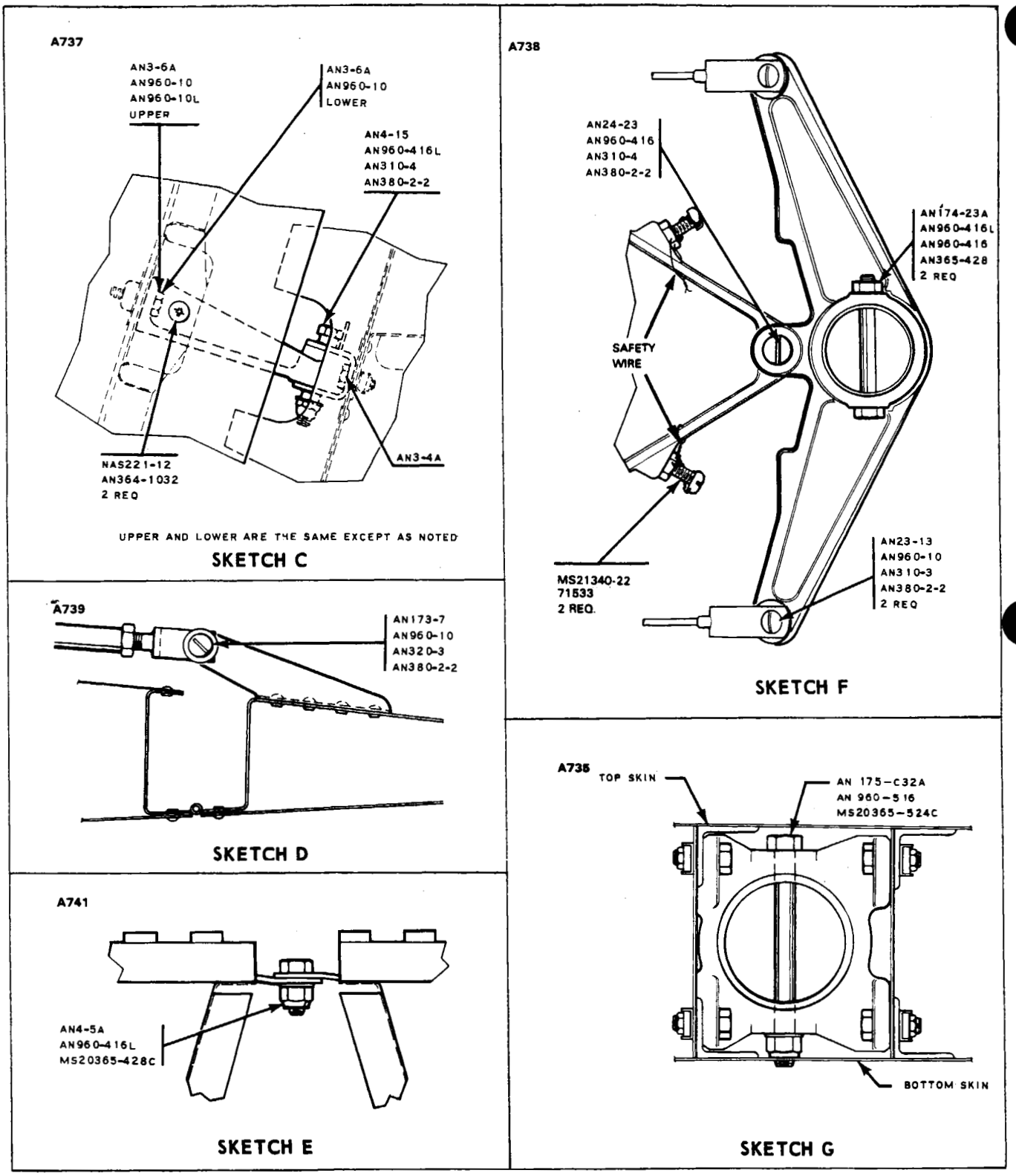


Figure 4-6. Empennage Installation (cont.)

4-33. INSTALLATION OF VERTICAL STABILIZER (FIN). (Refer to Figure 4-4.)

a. Position and align the mounting holes of the front and rear spar of the fin with the matching holes of the attachment plates on the fuselage. Ascertain that the rubber extrusion is attached to the lower skin of the fin.

b. Install and torque attaching bolts and screws with washers and nuts at the front and rear fin attachment locations. A washer is also required under the heads of each attaching screw.

c. Install the rudder trim cable pulleys, with trim cable, on the rudder horn hinge fitting and secure with bolt, washer and nut.

d. Attach the hinge fitting to the attachment plate and secure with washers and cap bolts. If previously installed, install spacer shims between the fitting and plate.

e. Route the trim cable ends forward and connect to the forward control cable.

f. Ascertain that the cable is positioned in the slot of each pulley at fuselage station 261.0, and install cotter pin cable guards.

g. Remove the blocks or tape that secure the cable at the trim mechanism.

h. Draw the trim indicator wire to the trim mechanism in the fin and connect it to the trim screw.

i. Install the rudder in accordance with paragraph 4-30.

j. Connect electrical wires, antenna wires and cables, and de-icer lines, as appropriate.

k. Set cable tensions, and rigging and adjustment of the rudder and rudder trim in accordance with instructions given in Section V. Check rudder and rudder trim operation.

l. Install access panels, plates and fairings and secure with attaching screws or fasteners.

4-34. FUSELAGE ASSEMBLY.

4-35. WINDSHIELD.

4-36. REMOVAL OF WINDSHIELD. (Refer to Figure 4-7 or 4-8.)

a. Remove the trim molding from around the inside of the windshield by removing attaching screws.

b. Remove the machine screws that secure the collar molding around the bottom of the windshield.

c. Remove the outside trim strip from between the windshield halves by holding the round nuts in the inside channel and turning out the machine screws.

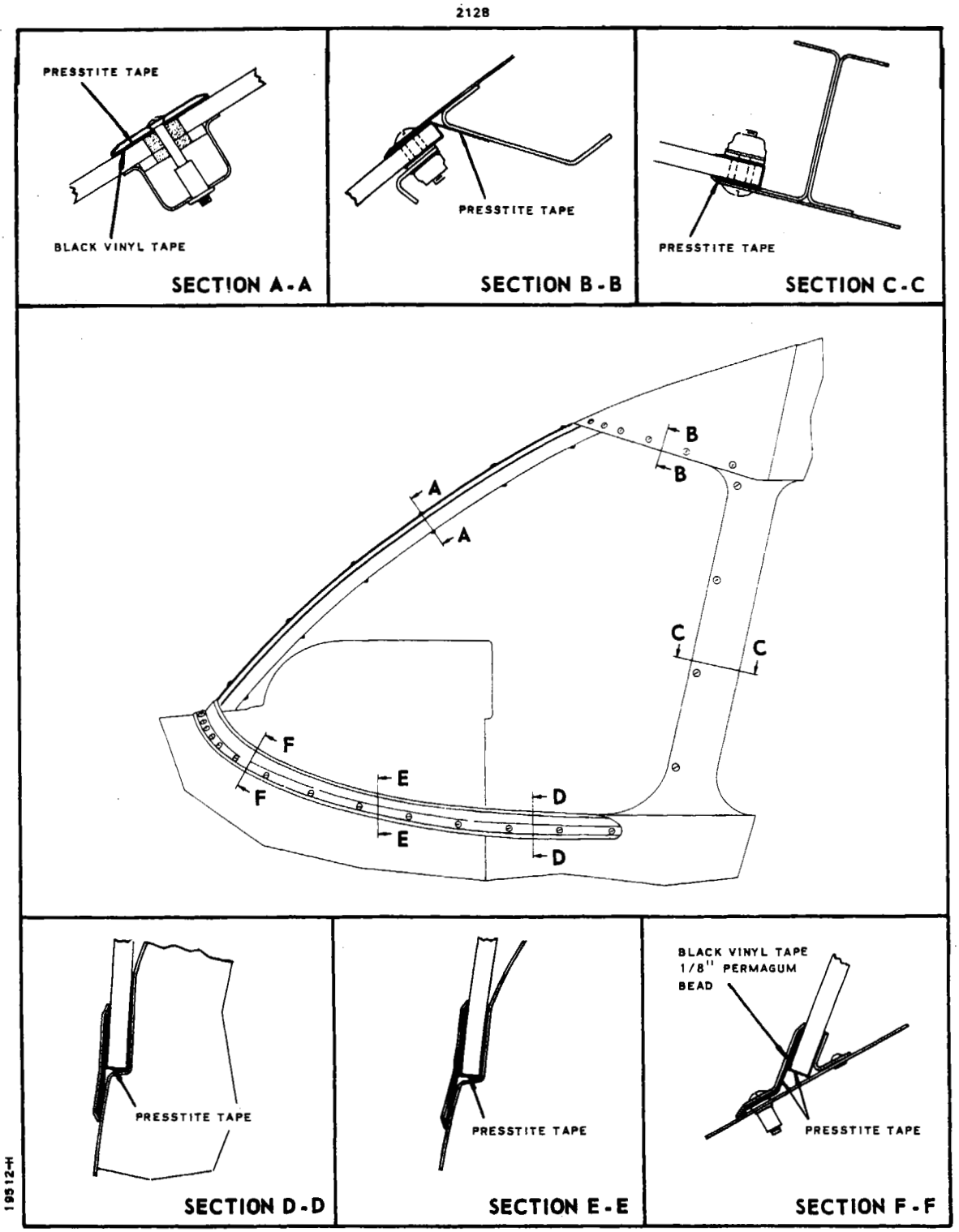


Figure 4-7. Windshield Installation. (PA-23-250 and PA-23-235.)

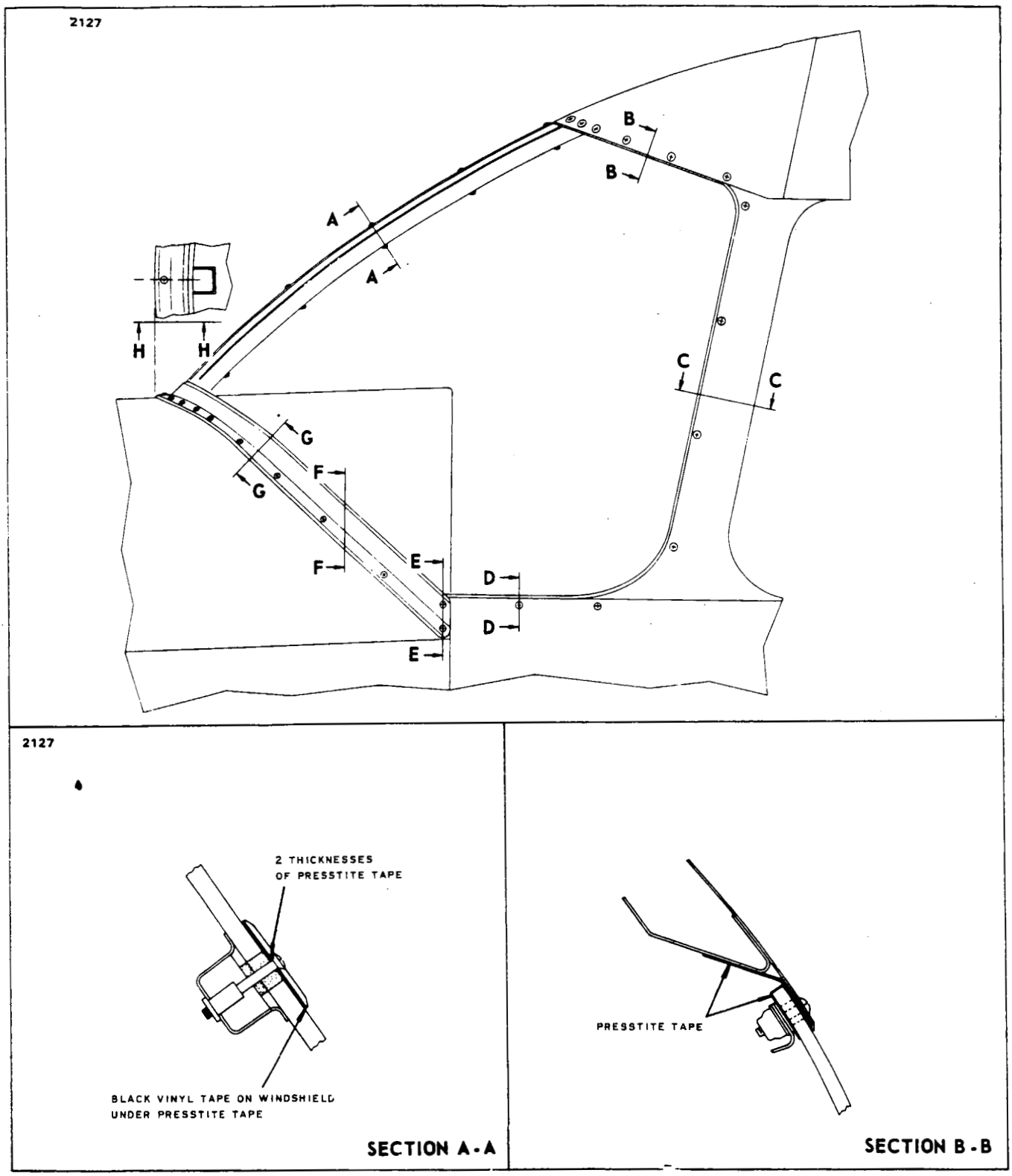


Figure 4-8. Windshield Installation (PA-23-250 - six place)

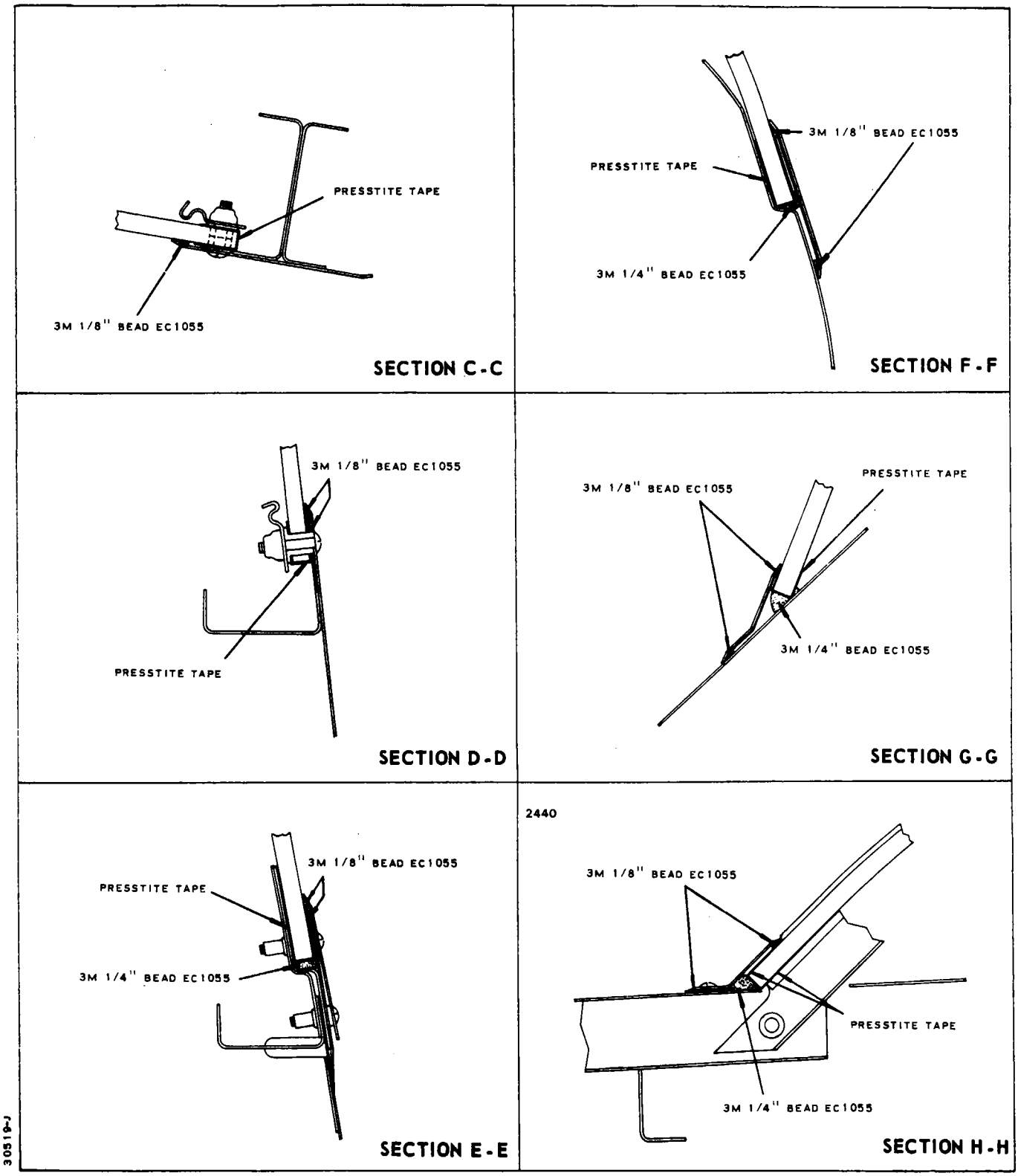


Figure 4-8. Windshield Installation (PA-23-250 - six place) (cont.)

d. Remove the retainer screws from around the top and outboard side of the windshield.

e. Push the windshield out at the bottom and work out of upper and side channels.

f. Clean old window tape from around inside of channel.

4-37. INSTALLATION OF WINDSHIELD. (Refer to Figure 4-7 or 4-8.)

a. Ascertain that new windshield is cut to match windshield removed.

b. Apply one piece of Prestite Tape Number 163 or equivalent over the edge of, and completely around, the windshield; and 3M EC1055 Bead or equivalent under the edge of the fuselage skin at the top and in the recess at the bottom of the windshield opening.

c. Slide the windshield into place being careful not to disturb the placed tape and bead material.

d. Cover the center section of the windshield with a strip of black vinyl tape and two thicknesses of Prestite tape.

e. Install center strip and secure with round nuts and screws.

f. Install inside channel and secure windshield with retainer screws and nuts around the outside of the windshield.

g. Install the collar molding around the bottom of the windshield with screws.

h. Install the trim molding around the inside of the windshield with screws.

i. Seal with sealer any areas around the windshield that may allow water to penetrate past the windshield.

j. Remove excess exposed sealer and tape.

4-38. SIDE WINDOWS.

4-39. REMOVAL OF SIDE WINDOWS. (PA-23-250, PA-23-235 and PA-23-250 (six place) Serial Nos. 27-2000 to 27-2504 incl.)

a. Remove the trim molding from around the window by removing attaching screws.

b. Remove the window retaining strips by removing attaching screws.

c. Remove the window.

d. Clean the old window sealer from the retaining strips and the fuselage skin.

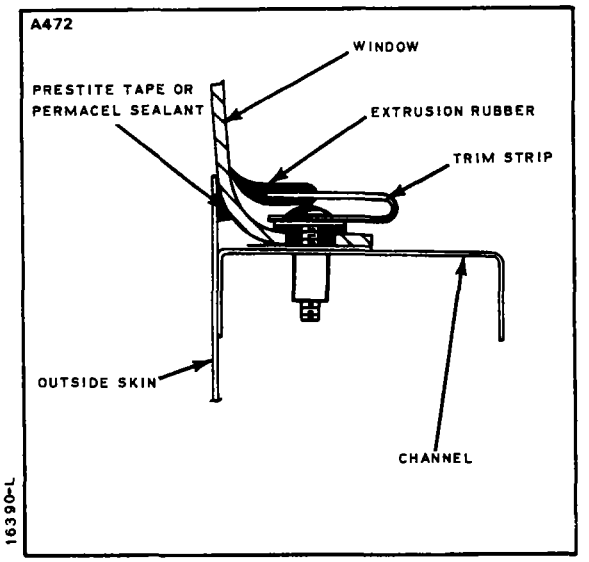


Figure 4-9. Side Window Installation (Typical)
PA-23-250, PA-23-235 and PA-23-250 (six place) Serial Nos. 27-2000 to 27-2504 incl.

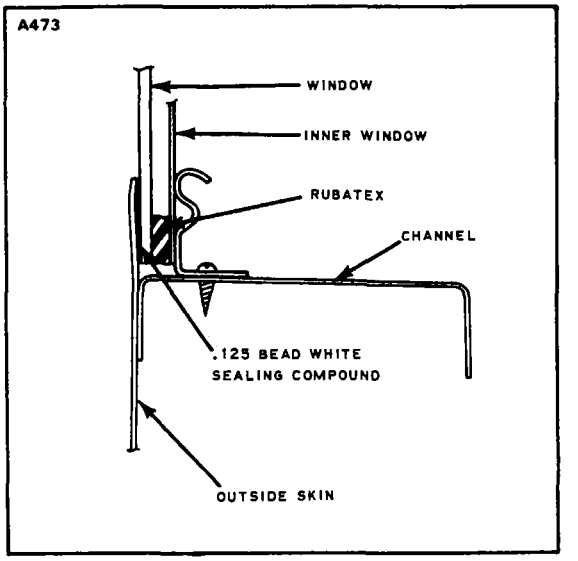


Figure 4-10. Side Window Installation (Typical)
PA-23-250 (six place)
Serial Nos. 27-2505 and up

4-40. INSTALLATION OF SIDE WINDOWS. (PA-23-250, PA-23-235 and PA-23-250 (six place) Serial Nos. 27-2000 to 27-2504 incl.)

a. Ascertain that the new window is cut to the same dimensions as the old window.

b. Apply sealer and tape to the window as follows:

1. On windows with curved edges, apply Prestite Tape No. 163 or equivalent around the window where it contacts the fuselage skin.

2. On windows with straight edges, apply Prestite Tape No. 163 or equivalent around the edge of the window and 3M Sealer No. 1126 or equivalent along the fuselage skin where it contacts the window.

c. Install the window and secure the retaining strips with screws.

d. Install the trim molding around the windows and secure with screws.

4-41. REMOVAL OF SIDE WINDOWS. PA-23-250 (six place) Serial Nos. 27-2505 and up.)

a. Remove the trim molding from around the window by removing attaching screws.

b. Remove the window retaining strips by removing attaching screws.

c. Remove the inner and outer window.

d. Remove the old window sealer from the retaining strips and the fuselage skin.

4-42. INSTALLATION OF SIDE WINDOWS. PA-23-250 (six place) Serial Nos. 27-2505 and up.)

a. Ascertain that the new windows are cut to the same dimension as the old windows.

b. Apply Prestite Tape No. 163 or equivalent over the edge of the outer window.

c. Apply 3M 1126 Sealer or equivalent along the fuselage skin where it contacts the window.

d. Install the outer window.

e. Cement the rub-tex strip around the edge of the outer window using Carbolene Neoprene Cement F-1. Air dry five minutes.

f. Install the inner window against the rub-tex strip and secure the retaining strips.

g. Position and secure retaining strips with screws.

h. Install the trim molding around the window with screws.

4-43. EMERGENCY EXIT. (PA-23-250 (six place) Serial Nos. 27-2000 and up.)

4-44. REMOVAL OF EMERGENCY EXIT ASSEMBLY. The emergency exit, located on the left side of the fuselage is sealed when installed and should only be removed in case of an emergency or for maintenance.

a. Remove the plastic placard.

b. Turn the handle and push out on the bottom of the assembly using a steady pressure. Use caution so as not to drop the assembly.

c. Clean the sealer from around the side of the window and the emergency exit opening in the side of the fuselage.

4-45. INSTALLATION OF EMERGENCY EXIT ASSEMBLY. (Refer to Figure 4-11.)

a. Place sealer, EC1055 bead .250 in. thick, or equivalent, around window assembly.

b. Cover the contacting surfaces of the window assembly with vinyl chloride copolymer film (Saran, 48 gauge, type B MIL-P-6264B.) SEE CONSUMABLE MATERIALS TABLE II-II.

c. Install the exit window by the following procedure:

1. Remove the two access plugs on bottom window panel by prying under plug with a screwdriver blade.

2. Loosen but do not remove screw in access hole.

3. Insert the top of the window assembly under the fuselage skin at the top of the exit opening. Push in on the bottom and sides of the window assembly until it is properly seated.

4. Lock window by turning release handle.

d. Check that the window assembly is flush with the surrounding fuselage skin and install the plastic placard over the release handle.

e. Trim excess polymer film from the inside and outside of the window installation.

f. Fill exterior gap between window assembly and fuselage with Permagum Sealer No. 576.1. (Presstite - Keystone Engineering Co. 3900 Chateau Ave., St. Louis, Missouri.)

4-46. REMOVAL OF EMERGENCY EXIT WINDOW.

a. Remove the trim molding around the inside of the window.

b. Remove the rivets that secure the window retainer molding and remove window.

c. Remove the old window sealer from window retainer molding and fuselage skin.

4-47. INSTALLATION OF EMERGENCY EXIT WINDOW. (Refer to Figure 4-11.)

a. Ascertain that the new window is cut to the same dimensions as the old window.

b. Apply P.R.C. Sealer 1221-B-2 (Product Research Co., Empire Ave., Burbank, Calif. 91504) over the edge of the window.

c. Place the window and retainer molding in position and secure with rivets AN426AD3-4.

d. Install trim molding around inside of window.

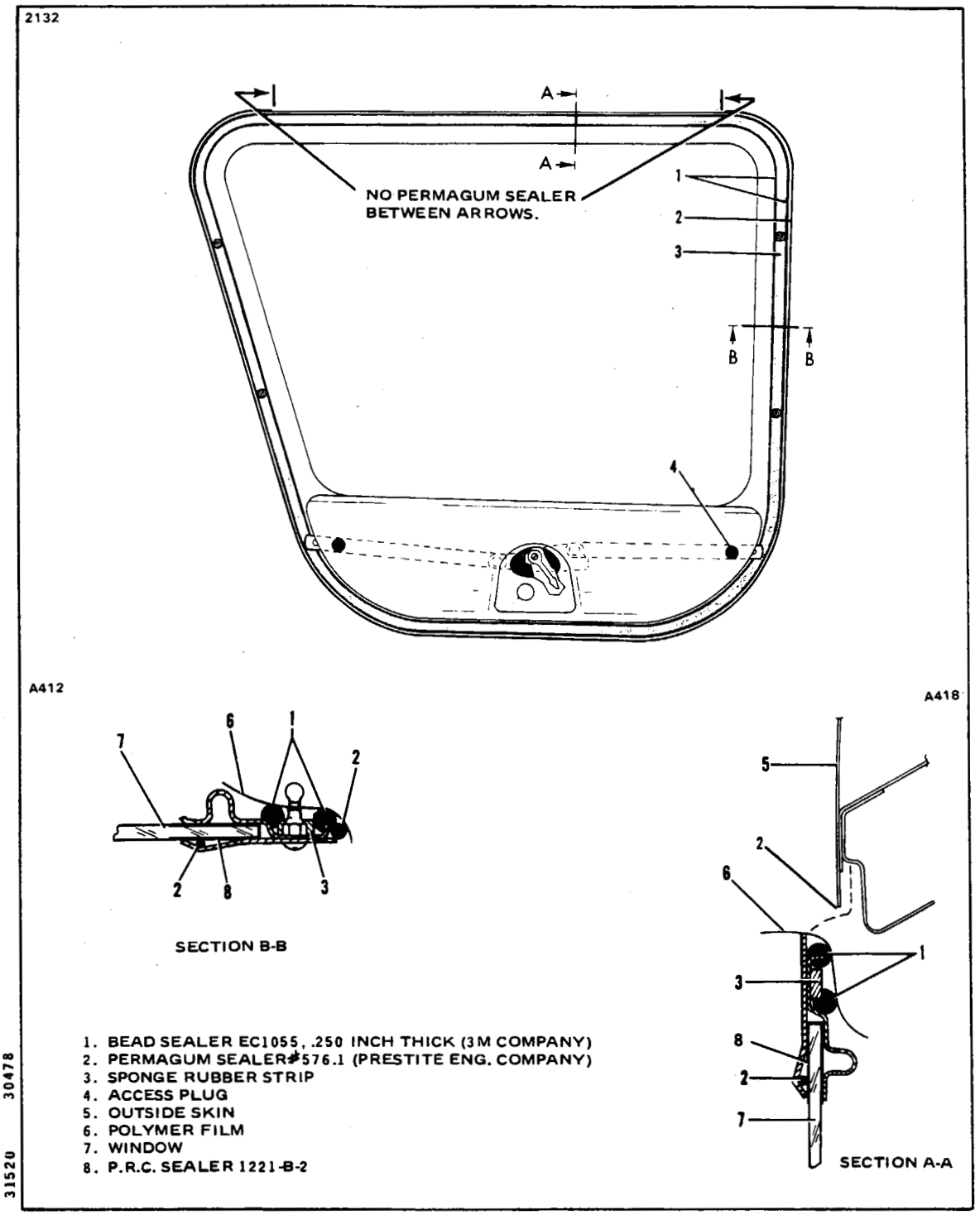


Figure 4-11. Emergency Exit Window Installation
PA-23-250 (six place)

4-48. BAGGAGE DOORS.

4-49. REMOVAL OF AFT BAGGAGE DOOR.

a. On airplanes with Serial Numbers 27-2000 and up, disconnect the baggage door holding rod from the door by removing the cotter pin and washer.

b. Remove the hinge pin that holds the door to the fuselage.

c. Remove the door.

4-50. INSTALLATION OF AFT BAGGAGE DOOR.

a. The installation of an old baggage door may be as follows:

1. Place the door in position and align the hinge halves.

2. Install the hinge pin. It is recommended that a new hinge pin be installed.

3. On airplanes with Serial Numbers 27-2000 and up, connect the baggage door holding rod with a washer and cotter pin.

b. The installation of a new baggage door may be as follows:

1. Remove the hinge half attached to the fuselage by removing the rivets securing it between the outside skin and the door frame.

2. Install a new fuselage hinge half to the baggage door hinge half using a new pin.

3. Place the door in position, inserting the fuselage hinge half between the outside skin and the door frame.

NOTE

The edges of the door may have to be trimmed to allow the door skin to fit flush with the fuselage skin.

4. Using the old rivet holes in the fuselage for a pattern, drill new holes through the top and bottom of the hinge.

5. Temporarily secure the fuselage hinge half in place and check the door for proper fit and operation.

6. Drill the remaining holes in the hinge and secure with rivets.

7. Install the trim panels to the inside of the door and weather molding.

8. Install the latch assembly and cover. (Refer to Paragraph 4-52.)

9. On PA-23-250 (six place) airplanes, install the holding arm and bracket.

4-51. REMOVAL OF AFT BAGGAGE DOOR LATCH ASSEMBLY.

a. On PA-23-250 and PA-23-235 airplanes, the door latch may be removed as follows:

1. Remove the trim panel on the inside of the door by either removing the trim screws or unsnapping it.
2. Remove the two roll pins in the center of the tube assembly.
3. Remove one of the two locking pins located in the end of the tube assembly.
4. Remove the tube assembly by pulling it from the opposite end where the locking pin was removed.
5. Remove the spring and spring retaining pin from the handle assembly.
6. Remove the lock and handle assembly.

b. On PA-23-250 (six place) airplanes, the door latch may be removed as follows:

1. Remove the plastic access cover around the latch assembly.
2. Remove the lock assembly by removing the large nut inside the latch.
3. Remove the latch mechanism by removing the attaching nuts and bolts.

4-52. INSTALLATION OF AFT BAGGAGE DOOR LATCH.

a. On PA-23-250 and PA-23-235 airplanes, the door latch may be installed as follows:

1. Insert the lock and handle assembly into the baggage door.
2. Holding the lock and handle assembly in place, install the spring and spring retaining pin to the door and the lock handle.
3. Install the tube assembly to the handle by sliding it through the bushings on either side of the door.
4. Install the locking pins on either end of the tube assembly.
5. Secure the tube assembly to the handle by means of two roll pins.
6. Install the trim panel to the inside of the baggage door by snapping it in place or using trim screws.

b. PA-23-250 (six place) airplanes, the door latch may be installed as follows:

1. Install the latch mechanism to the door and secure with attaching nuts and bolts.
2. Install the lock assembly and secure with large nut inside the latch.
3. Install the plastic trim cover with attaching screws.

4-53. REMOVAL OF FORWARD BAGGAGE DOOR. PA-23-250 (six place).

a. Remove the attaching bolts and nuts from the two hinge brackets.

b. Remove the door from the airplane.

4-54. INSTALLATION OF FORWARD BAGGAGE DOOR. PA-23-250 (six place).

a. Align the door to the hinges and install the attaching bolts and nuts through the hinges and hinge brackets.

b. Check operation of door and catch mechanism.

4-55. REMOVAL OF FORWARD BAGGAGE DOOR LATCH. PA-23-250 (six place).

a. Remove the plastic cover on the inside of the door by removing attaching screws.

b. Remove the roll pin and spring that attaches the door handle to the tube assembly.

c. Remove the door handle by removing attaching nuts and bolts.

d. Remove the lock assembly by removing the large nut on the inside of the door that holds it in place.

e. Remove the tube assembly by removing the springs and attaching pins on both ends.

f. Remove the arm assemblies from the door by removing attaching screws.

4-56. INSTALLATION OF BAGGAGE DOOR LATCH. PA-23-250 (six place).

a. Install the arm assemblies to the door with attaching screws.

b. Install the door handle with attaching bolts and nuts.

c. Holding the tube assembly in place, adjust both ends to obtain a 90 degree angle between the locking arms and the edge of the door.

d. Install the tube assembly to the locking arms with attaching pins.

e. Install the springs between the locking arm and the tube assembly.

4-57. CABIN ENTRANCE DOOR.

4-58. REMOVAL OF CABIN ENTRANCE DOOR.

a. Remove right inside windshield molding by removing attaching screws.
b. Loosen right front interior side panel to gain access to hinge pins.
c. Remove cotter pin from two hinge pins and remove hinge pins.
d. Remove door from fuselage.

4-59. INSTALLATION OF CABIN ENTRANCE.

a. Install the old door as follows:
   1. Position the door to the airplane hinge brackets.
   2. Insert the hinge pins and safety with cotter pins.
b. Install a new door as follows:
   1. Position the door to the airplane aligning the latch, locking pins, and hinges. Shims (.032, P/N 19642-02 and .064, P/N 19642-03) may be added between the door frame and hinge to provide proper alignment of the door to the airplane.
   2. Trim the edges of the door to provide a proper fit to the fuselage.
   3. If the new door being installed is not complete, install the old latch assembly to the new door frame per instructions in paragraph 4-63.
   4. Secure the door skin to the door hinges using four MS20470AD3 rivets.
   5. Position the door to the airplane and install the hinge pins. Recheck the door for proper fit and operation.
c. Install the right front interior side panel with attaching screws.
d. Install the right windshield molding with attaching screws.

4-60. ADJUSTMENT OF CABIN ENTRANCE DOOR. The only adjustment provided for the cabin entrance door is an adjustable latch plate located on the aft side of the door frame. The screws may be loosened and the latch plate moved to provide the desired fit of the door when closed.

NOTE

Improper installation of the cabin door, or use of a damaged door which does not fit properly may cause minor airflow disturbances in the stabilator control system.

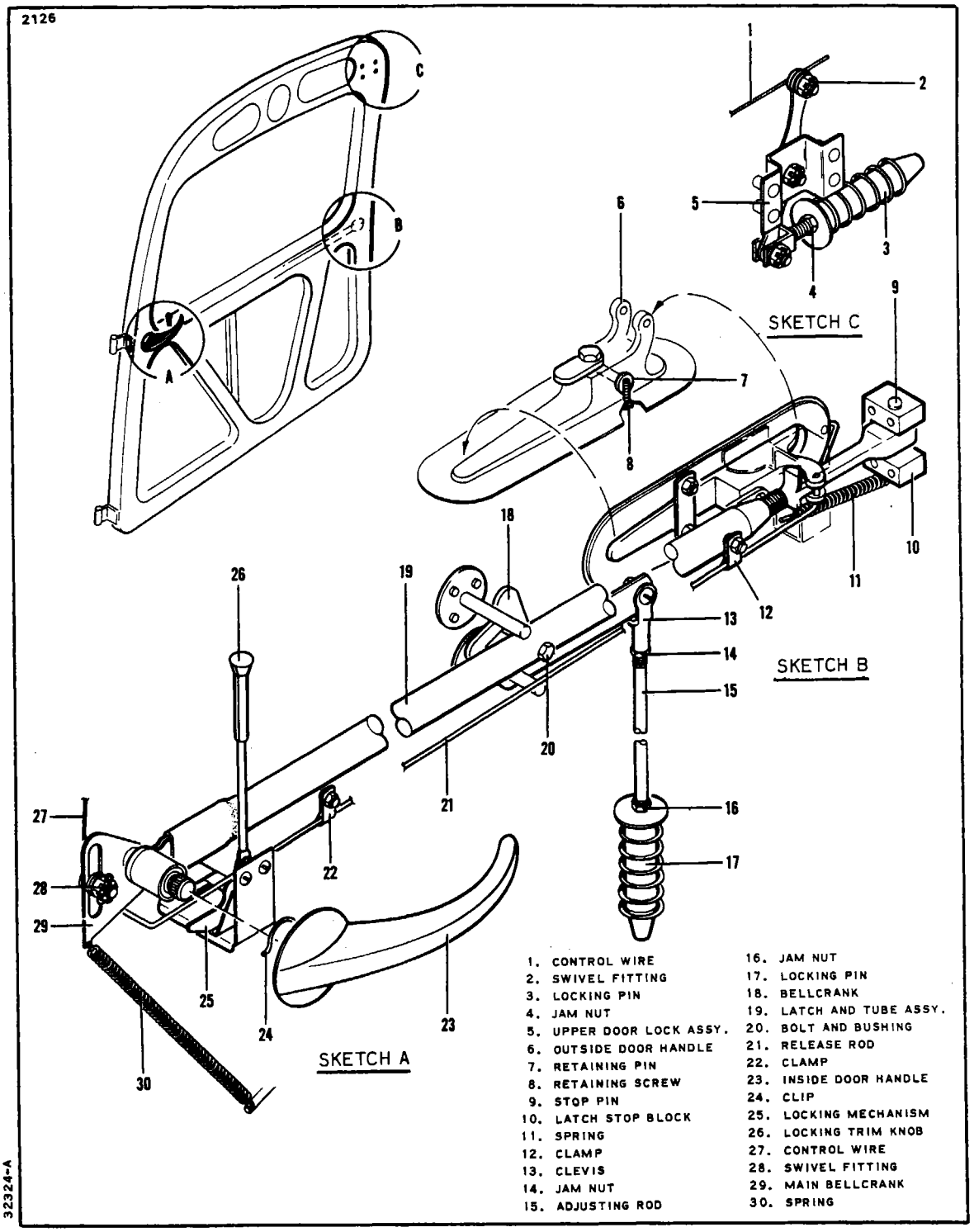


Figure 4-12. Cabin Entrance Door Latch Assembly

4-61. CABIN DOOR LATCH AND LOCK ASSEMBLY.

4-62. REMOVAL OF CABIN DOOR LATCH AND LOCK ASSEMBLY. (Refer to Figure 4-11.)

a. Remove cabin door. (Refer to paragraph 4-58.)

NOTE

It is recommended that the door be placed on a work-table covered with a clean soft material so as not to damage the door or door window.

b. Remove the locking trim knob (26).

c. Remove the window trim molding by removing attaching screws.

d. On airplanes with Serial Numbers 27-2505 and up, remove the armrest by removing attaching screws.

e. Remove the inside door handle (23) by pushing in on the trim panel around the handle and removing the clip (24) that locks the handle to the spline.

f. Remove the trim panels by unsnapping them from the door frame.

g. Remove the upper door lock assembly by the following procedure:

1. Reach up under the door frame along the forward edge and disconnect the control wire (1) from the main bellcrank by loosening the swivel fitting (2) that holds it in place.

2. Remove the attaching bolts from the door frame that secure the flexible control housing inside the door frame.

3. Remove the attaching screws or bolts that hold the upper door lock bell-crank bracket in place.

4. Remove the upper door lock assembly (5) by moving the entire unit forward withdrawing it from the aft opening in the door frame.

h. Remove the lower door lock assembly by removing the bolt from the clevis (13) end of the rod that attaches to the bellcrank (18).

i. Remove the locking mechanism (25) by removing the attaching bolts from the locking mechanism assembly and remove the assembly.

j. Remove the latch assembly as follows:

1. Remove the spring (11) attached to the door lock release rod (21) and the stop pin (9) inserted in the end of the latch.

2. Remove the stop pin (9).

3. Remove the attaching bolts from the clamps (12 and 22) that hold the door lock release rod in place.

4. Remove the door lock release rod by pulling the aft end of the rod down, removing it from the outside door handle, and withdrawing it from the door frame.

NOTE

The door lock release rod will have to be sprung slightly to remove it from the door frame.

5. Remove the aft bottom retaining screw (8) from around the outside door handle.

6. Remove the outside door handle by removing the pin (7) that holds it in place.

7. Disconnect the tube assembly (19) from the main bellcrank (18) by removing nut, washers and bolt.

8. Remove the bolt and bushing (20) from the tube assembly that actuates the bellcrank (16) for the lower lock assembly.

9. Remove the door latch stop block (10) from the door assembly by removing nuts, washers and bolts.

10. Remove the door latch and tube assembly (19).

4-63. INSTALLATION OF CABIN DOOR LATCH AND LOCK ASSEMBLY. (Refer to Figure 4-11.)

NOTE

Any new door to be installed should be compared with the old door for similarity of hole location.

a. Install the latch assembly as follows:

1. Install the tube and latch assembly (19) through the opening in the edge of the door.

2. Install the door latch stop block (10) to the door assembly with attaching bolts, washers and nuts.

3. Install the stop pin (9) through the top of the latch.

4. Temporarily install the bolt that attaches the tube to the main bellcrank.

5. Temporarily install the inside door handle (23) to the spline.

6. If the tube and latch assembly is adjusted properly, a distinct snap through action results when the main bellcrank passes center travel.

(a) If the snap through action is loose, remove the tube assembly from the bellcrank and lengthen the tube and latch assembly by rotating the tube counterclockwise.

(b) If the snap through action is tight, remove the tube assembly from the bellcrank and shorten the tube and latch assembly by rotating the tube clockwise.

NOTE

To check for proper snap through action, five to six pounds tension should be required to unlock the door. Measure the tension with a spring scale 0.5 inch from the end of the inside door handle.

7. Install the bolt, bushing (20), and nut to the tube assembly that actuates the lower lock assembly bellcrank (18).

8. Install the outside door handle (6) to the door and secure in place with a pin (7) inserted up through the door handle bracket.

9. Install a long screw (8) along the bottom of the outside door handle.

10. Insert the door lock release rod (21) inside the door frame by inserting the spring tab end first through the aft end of the door.

NOTE

The door lock release rod will have to be sprung slightly to install it inside the door frame.

11. Insert the aft end of the rod up through the hole in the outside door handle.

12. Install the clamps (12 and 22) around the door lock release rod and secure in place with attaching bolts, washers and nuts.

13. Install the spring (11) that attaches to the door lock release rod and the stop pin in the end of the latch.

b. Install the locking mechanism (25) assembly in place inside the forward end of the door frame and secure with attaching bolts, washers and nuts.

c. Install the lower lock assembly with bolt, washers and nut through the clevis (13) end of the rod attaching it to the bellcrank (18).

d. Install the upper door lock assembly as follows:

1. Install the upper door lock assembly as a complete unit. Insert the flexible control inside the door frame at the top aft opening sliding it around the edge toward the main bellcrank. Insert the rest of the assembly through the opening and move forward into place.

2. Secure the upper door lock assembly with attaching screws, bolts, washers and nuts.

3. Attach the clamps to the flexible control and secure them around the edge of the door frame with bolts, washers and nuts.

4. Connect the control wire (27) to the main bellcrank (29) using a swivel fitting (28).

e. Install the door to the airplane. (Refer to paragraph 4-59.)

f. Adjust the top and bottom locking pins (3 and 17) to allow adequate clearance between the fuselage door frame and the pins using appropriate tools.

g. Operate the door several times to insure proper fit, positive locking and free movement of all parts.

h. Remove the inside door handle and install the trim panels by snapping them in place.

i. Install the inside door handle. Secure the handle by pushing in on the trim panel around it and installing the locking clip (24).

j. On airplanes with Serial Numbers 27-2505 and up, install the armrest with attaching bolts.

k. Install the window trim molding with attaching screws.

l. Install the locking trim knob (26).

4-64. STRUCTURAL REPAIRS. Structural repair methods used may be made in accordance with the regulations set forth in FAA Advisory Circular 43.13-1A. To assist in making repairs, Figure 4-18 identifies the material and dimensions of the tubing used with the construction of the fuselage frame. Figures 4-19 and 4-20 identifies the type and thickness of skin structure used. Never make a skin replacement or patch from a material thinner than the original skin. Original material and thickness is recommended and must result in a surface which is as strong as, or stronger than, the original skin. However, flexibility must be retained so that the surrounding areas will not receive extra stress.

When making major structural repairs, other than using factory manufactured parts, it is recommended the manufacturer be contacted. No major alterations are recommended without contacting the manufacturer. Stabilator skins and ribs aft of the main spar are manufactured using a structural adhesive, which prevents skin and rib replacement in these areas. If structural adhesive has been applied between the ribs and skins, contact the manufacturer for recommended alternatives to skin or rib replacement.

4-65. CHECKING CONTROL SURFACE BALANCE. The movable control surfaces of the PA-23-250 have been balanced at time of installation at the factory and normally need not be rebalanced unless the surfaces have been repainted or repaired. Should it become necessary to check the balance of the control surfaces, the procedures given in paragraphs 4-66 and 4-67 may be used.

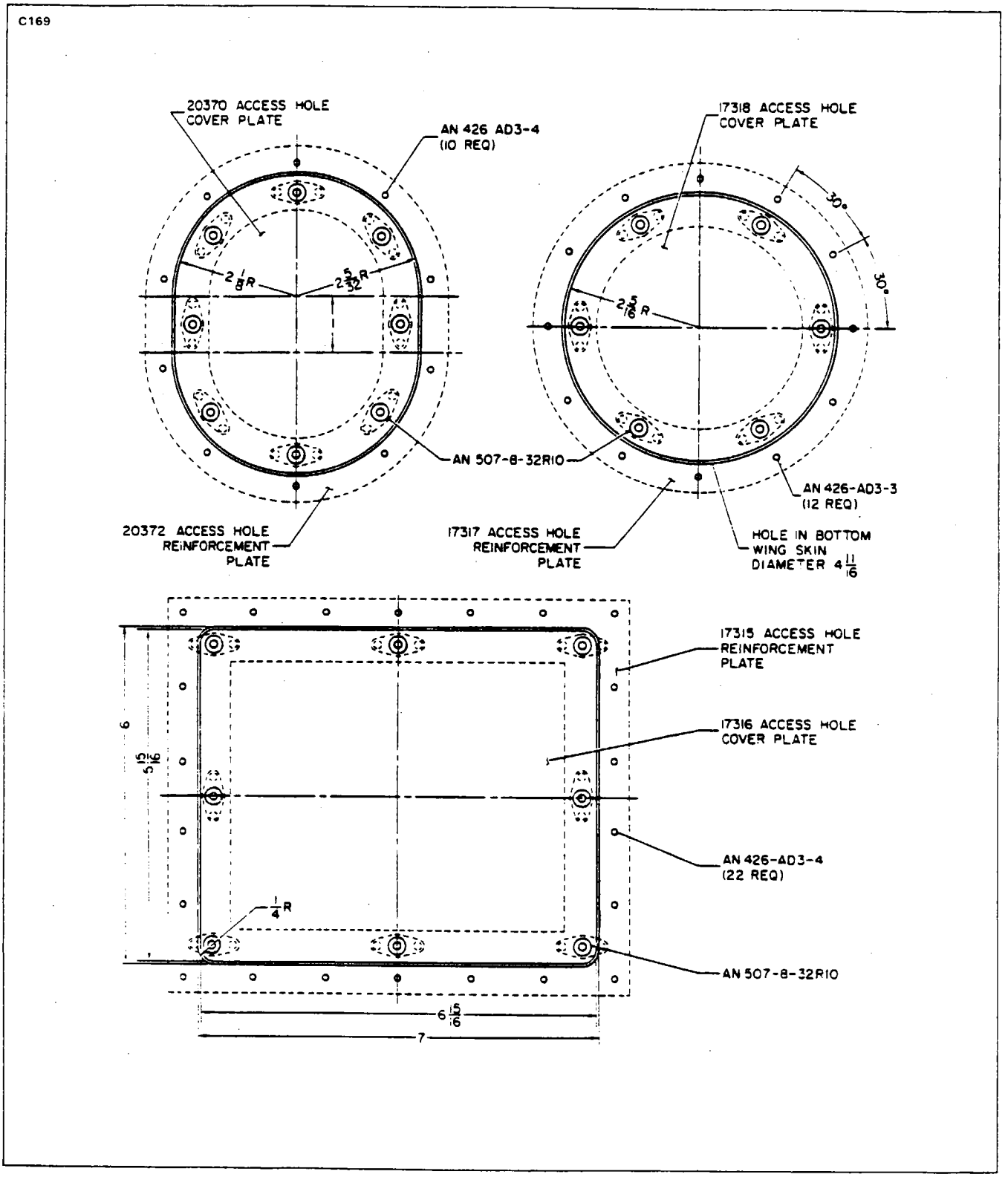


Figure 4-13. Typical Access Plates and Panels

4-66. BALANCING STABILATORS. (Refer to Figure 4-14.)

Balancing must be done whenever the balance characteristics of the stabilator have for any reason been altered, such as, repairing, repainting or replacing stabilators, installing or removing deicers, or modifying balance weight. The stabilator installation must be complete before balancing, including trim tab and paint. The stabilator control cables and bungee cable must be disconnected from the stabilator balance arm. Hold the tab in its neutral position with a small piece of tape. Due to variations in stabilators used throughout the production life span of this airplane the following instructions have been grouped into Serial Number effectivities. Check the serial number of the airplane being serviced and use the balancing instructions for that airplane.

a. Serial Numbers 27-1 to 27-7305134 inclusive:

1. Disconnect the tab actuator arm from the stabilator tab horn during balancing. The stabilator must be free to rotate.

2. Hook the test weight P/N 16854 on the stabilator rear spar attachment fittings for balancing. (Remove after balancing is completed.)

3. Add trim weight P/N 16780-3 one at a time on the trim weight attachment bolt until the stabilator balances on the neutral position (level). Refer to Paragraph 5-18 for stabilator leveling procedures.

4. If the last weight added for balancing causes overbalance, this complete weight may be used. Secure these weights and recheck the balance. Desired overbalance (leading edge heavy) is 152 inch-pounds.

5. One trim weight P/N 16780 may be used to replace two trim weights P/N 16780-3.

6. When proper balance is obtained, safety the trim weight mounting bolts, connect the control cables and bungee cable to the balance arm and connect the tab actuator arm.

b. Serial Numbers 27-7305135 to 27-7554168 inclusive, and 27-8054001 and up:

1. Disconnect the tab actuator arm at the trim mechanism end during balancing. Cradle the actuator arm just aft of the disconnected end with tape between the left and right stabilator. The stabilator must be free to rotate.

2. Hook the test weight P/N 16854 on the stabilator rear spar attachment fittings for balancing. (Remove after balancing is completed.)

3. Add trim weights P/N 16780-3 one at a time on the trim weight attachment bolt until the stabilator balances in neutral position (level). Refer 8 Paragraph 5-18 for stabilator leveling procedures.

4. If the last weight added for balancing causes overbalance, this complete weight may be used. Secure the weights and recheck the balance. Desired overbalance (leading edge heavy) is 152-158 inch-pounds.

5. One trim weight P/N 16780 may be used to replace two trim weights P/N 16780-3.

6. When proper balance is obtained, safety the trim weight bolts, connect the control and bungee cables and tab actuator arm.

c. Serial Numbers 27-7654001 to 27-7954121 inclusive:

1. Disconnect the trim tab actuator arm at the trim mechanism end during balancing. Cradle the actuator arm just below the installation location between the left and right stabilators with tape. The stabilator must be free to rotate.

2. Add trim weight P/N 49979-17 one at a time on the trim weight attachment bolt as required to balance the stabilator in neutral position (level). Refer to Paragraph 5-18 for stabilator leveling procedures.

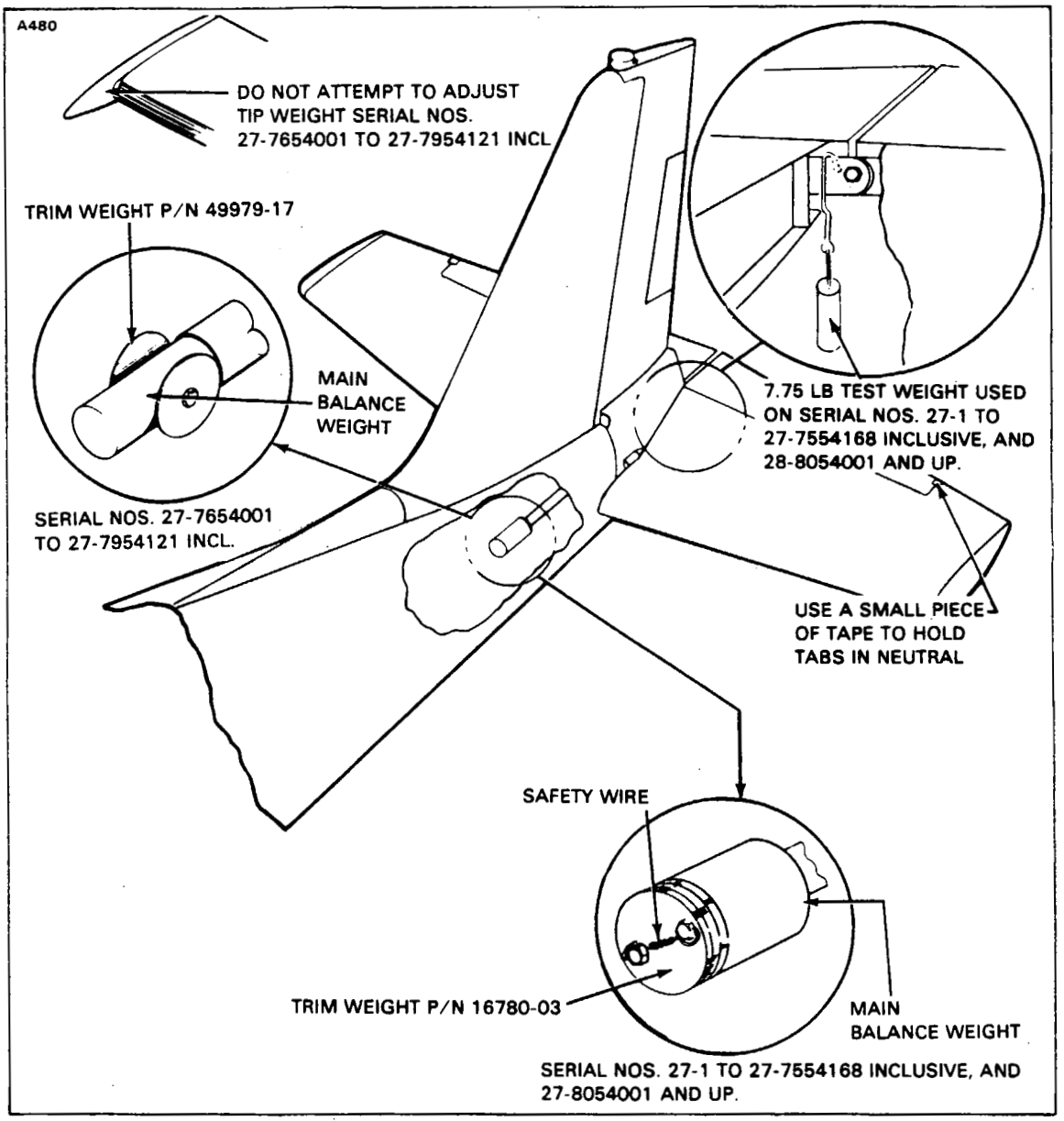


Figure 4-14. Checking Stabilator Balance

3. The maximum number of trim weights allowed is eight for stabilators without de-icer boots or ten for stabilators with de-icer boots. The trim weights must be divided equally on each side of the bolt.

4. The desired overbalance (leading edge heavy) is 2 ± 2 inch-pounds. Secure the weights and recheck balance.

5. Reconnect the control and bungee cables and trim actuator arm.

NOTE

DO NOT ATTEMPT TO ADJUST TIP WEIGHTS.

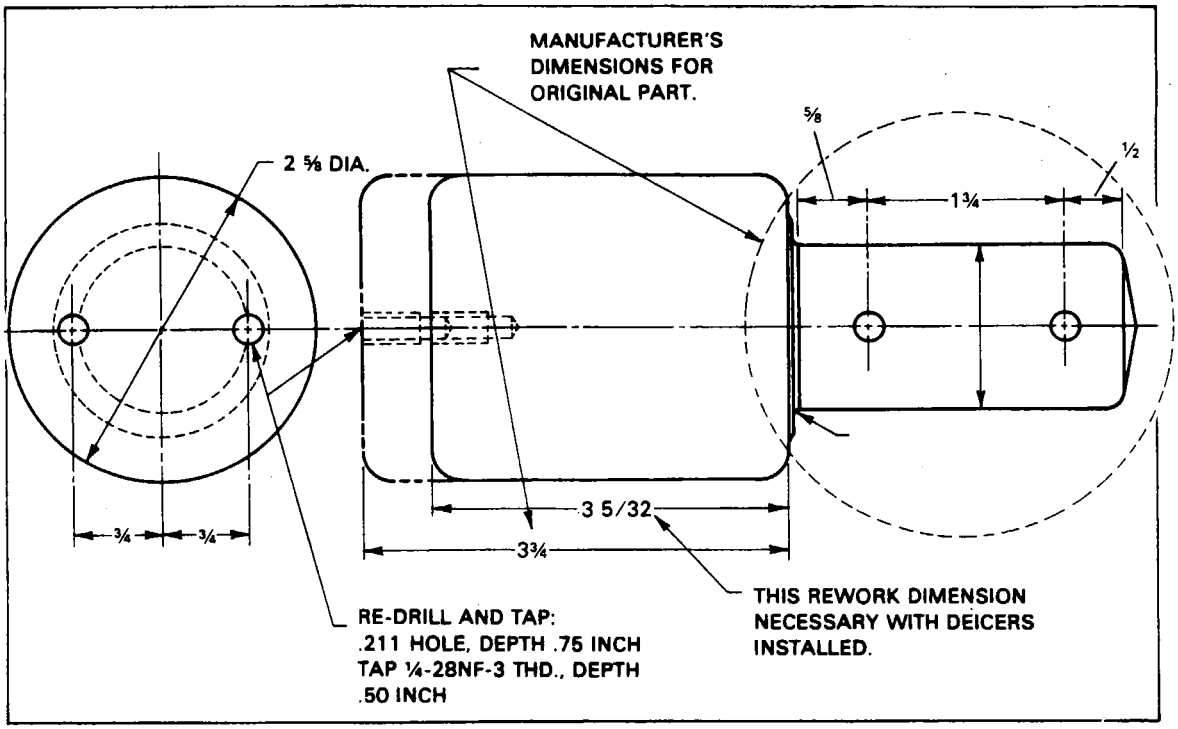


Figure 4-15. Stabilator Balance Weight - Rework

d. BALANCING STABILATORS WITH DEICER BOOTS INSTALLED. (PA-23-250 Serial Nos. 27-1 to 27-7554168 inclusive; 27-8054001 and up.) The following balancing sequence should be followed when installing deicer boots on stabilators of the above listed aircraft. Stabilator installation must be complete before balancing (including tabs and paint).

1. Disconnect stabilator control cables and bungee cable from stabilator balance arm.
2. Disconnect tab actuator arm from stabilator tab horn. Rest actuator arm in a thin wire loop below stabilator tab horn. Stabilator must be free to rotate.
3. Remove all trim weights.
4. Hook 7.75 lb. test weight on stabilator rear spar attachment fittings for balancing (Remove after balancing is completed). If stabilator overbalance with the trim weights removed, rework balance weight per paragraph 4-65 b.
5. Add trim weights one at a time on trim weight attachment bolts until stabilator balances. Refer to Paragraph 5-18 for stabilator leveling procedures.
6. If last weight added causes overbalance, this complete weight may be used. Secure these weights and recheck to assure balance.
7. Desired overbalance (leading edge heavy) is 152 inch-pounds with test weight assembly removed. Safety wire the trim weight attachment bolts and remove the test weight assembly.
8. Reconnect stabilator and tab controls.

e. REWORK - STABILATOR BALANCE WEIGHT

1. Remove balance weight from balance arm.
2. Rework balance weight as per figure 4-15.
3. Replace balance weight in balance arm.

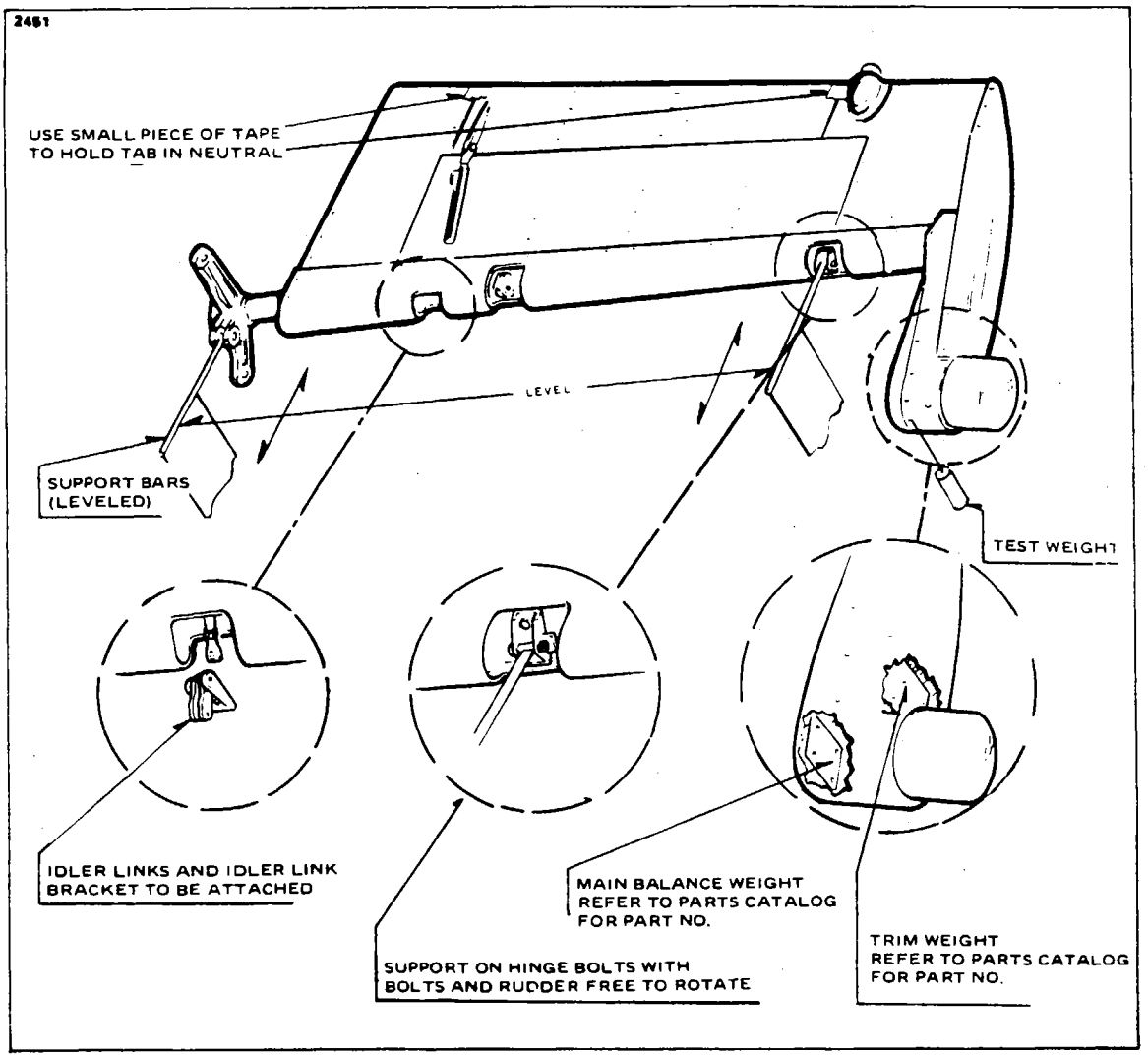


Figure 4-16. Checking Rudder Balance

4-67. BALANCING RUDDERS. (Refer to Figure 4-16.)

Rudder balancing must be accomplished with the assembly removed from the airplane and placed on a fabricated support as shown in figure 4-16, with the rudder hinge bolts in place. The support fixture must be secured to a solid workbench and the rudder allowed to rotate freely on the hinge bolts. Use small pieces of tape to hold the rudder trim tab in its neutral position.

To insure the correct balancing instructions check the data plate on the rudder assembly lower rib for the particular rudder assembly number and using the table supplied below proceed to the given method.

a. Method I.

1. The rudder must be complete before balancing, including rudder control horn, rotating beacon, navigation light, main balance weight, trim tab and tab push rod, idler link bracket and links, and painted. Rudder tip must be in position but need not be secured.

2. Level the rudder and establish a reference mark which aligns with the rudder trailing edge.

3. Loosen the beacon mounting screw and hang the test weight P/N 16857 on this screw, over the leading edge. (Remove the test weight after balancing is completed.)

4. Should the trailing edge of the rudder not align with the level reference line (test weight attached), add trim weights P/N 16845-2 one at a time directly above trim weight attachment anchor nuts until the rudder balances.

5. If the last weight added causes overbalance, this complete weight may be used. Attach these weights under the trim weight attachment screws and recheck balance. Desired underbalance (trailing edge heavy) is 45 ± 5 inch-pounds.

6. One trim weight P/N 16845-3 may be used to replace two P/N 16845-2 trim weights.

b. Method II.

1. The rudder must be complete before balancing, including rudder trim control horn, navigation light, main balance weight, trim tab, trim tab push rod, idler link bracket, idler links and paint. Rudder tip must be in position but need not be secured.

2. Level the rudder and establish a reference mark which aligns with the rudder trailing edge.

3. Loosen the tip attaching screw and hang the test weight P/N 16857 from this screw, over the leading edge. (Remove the test weight after balancing is completed.)

4. Should the trailing edge of the rudder not align with the level reference line (with test weight attached), add trim weights P/N 33451-2 one at a time directly above the trim weight attachment screws until the rudder balances (level with the reference mark).

5. If the last trim weight added for balancing causes an overbalance, the complete weight may be used. However the desired underbalance (trailing edge heavy) is 45 ± 5 inch-pounds.

6. One trim weight P/N 33451-3 may be used to replace two P/N 33451-2 trim weights.

Rudder Assy. No.	Method to Use	Test Weight P/N & WT.
16199-00 16199-14	Method I	16857 3 lbs. - 5 oz.
16199-18 16199-19 16199-20(1)	Method II	16857 3 lbs. - 5 oz.
16199-20(2) with strobe	Method III	16857-9 2 lbs. -10 oz.
16199-21 without strobe	Method IV	16857-9 2 lbs. - 10 oz.

(1) This information to be used when 16844-00 and 16844-02 balance weights are incorporated, affecting aircraft 27-7554001 to 27-7954121.

(2) This information to be used when 28592-02 balance weight is used affecting aircraft 27-8054001 and up.

c. Method III.

1. Rudder must be complete before balancing, including rudder control horn, strobe light, navigation light, main balance weight, trim tab and tab push rod, idler link bracket and links, and paint. Rudder tip must be in position but need not be secured.

2. Level the rudder and establish a reference mark which aligns with the rudder trailing edge.

3. Loosen the strobe light mounting screw and hang the test weight P/N 16857-9 on this screw, over the leading edge. (Remove test weight after balancing is completed.)

4. Should the trailing edge of the rudder not align with the level reference line (with test weight attached), add trim weights P/N 16845-2 one a a time directly above trim weight attachment anchor nuts until the rudder balances.

5. If the last weight added causes overbalance, the complete weight may be used. Attach these weights under the trim weight attachment screws and recheck balance. The desired underbalance (trailing edge heavy) is 35 ± 5 inch-pounds.

6. One trim weight P/N 16845-3 may be used to replace two P/N 16845-2 trim weights.

d. Method IV.

1. The rudder must be complete before balancing, including rudder with control horn, navigation light, main balance weight, trim tab, trim tab push rod, idler link bracket, idler links and paint. Rudder tip must be in position but need not be secured.

2. Level the rudder and establish a reference mark which aligns with the rudder trailing edge.

3. Loosen the tip attachment and screw and hang the test weight P/N 16857-9 from this screw, over the leading edge. (Remove the test weight after balancing is completed.)

4. Should the trailing edge of the rudder not align with the level reference line (with the test weight attached), add trim weights P/N 33451-2 one at a time on the main weight attachment screws until the rudder balances (level with reference mark). Replace main weight attachment nuts and recheck balance.

5. If the last trim weight added causes overbalance the complete weight may be used. However, the desired underbalance (trailing edge heavy) is 35 ± 5 inch-pounds.

6. One trim weight P/N 33451-3 may be used to replace two trim weights P/N 33451-2.

4-68. BALANCING AILERON. (Refer to Figure 4-17.)

The aileron must be complete including paint.

a. Disconnect the aileron from airplane and position on fabricated support stand, similar to stand shown in Figure 4-16 for rudder balancing.

b. Level the aileron and establish a reference mark which aligns with aileron chord line and trailing edge.

c. Place the hook end of a spring scale under the aileron trailing edge. Bring the aileron to a neutral position while pulling up on the spring scale. Note the reading on the spring scale.

d. Using the formula (Ref. figure 4-17) determine the aileron underbalance. Desired underbalance (trailing edge heavy) 4±3 inch-pounds.

e. If the aileron is too trailing edge heavy because of painting over old paint, it is necessary to strip all paint from the aileron and start over. Normally, on the ailerons, the tolerance noted in Step c will be available to permit repainting repairs, addition of static wicks, etc. However, to be certain check the balance.

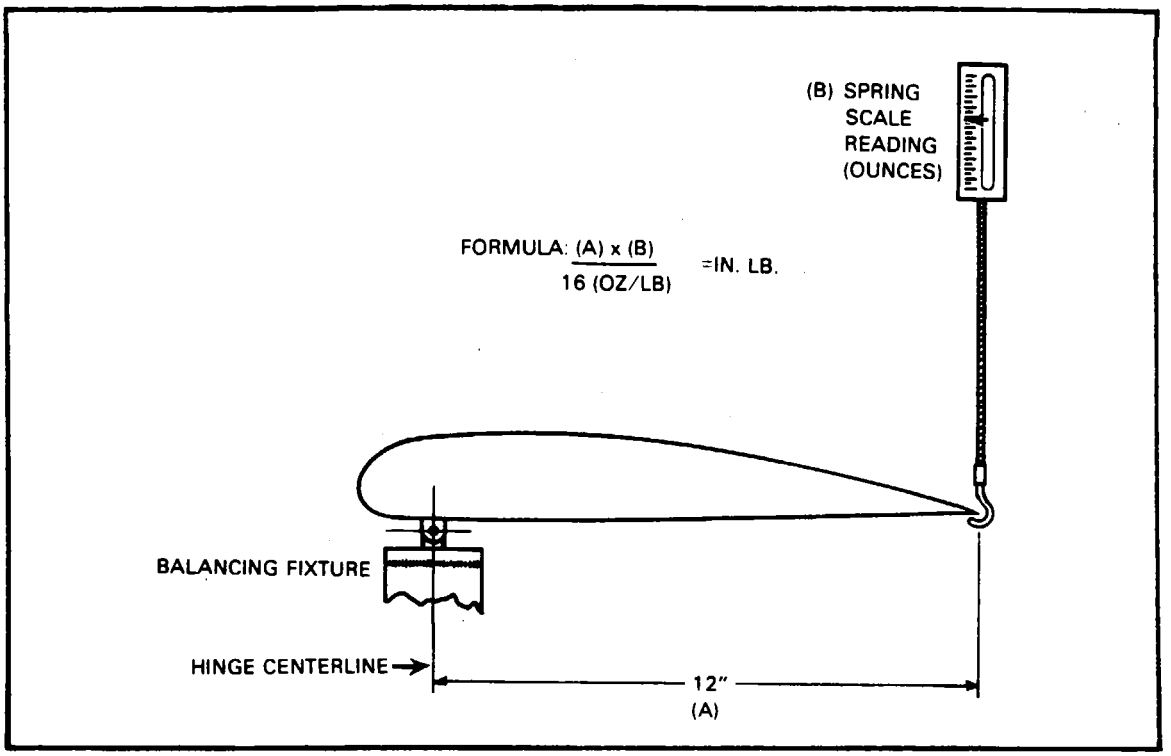


Figure 4-17. Checking Aileron Balance

4-69. FIBERGLASS REPAIRS. The repair procedure in this manual will describe the methods for the repair of fiberglass reinforced structures. Paragraph 4-68 describes Touch-up and Surface Repairs such as blisters, open seams, delaminations, cavities, small holes and minor damages that have not harmed the fiberglass cloth material. Paragraph 4-69 describes Fracture and Patch Repairs such as puncture, breaks and holes that have penetrated through the structure and damaged the fiberglass cloth. A repair kit, part number 756 729, that will furnish the necessary material for such repairs is available through Piper Aircraft dealers or distributors.

NOTE

Very carefully follow resin and catalyst mixing instructions furnished with repair kit.

4-70. FIBERGLASS TOUCH-UP AND SURFACE REPAIRS.

a. Remove wax, oil and dirt from around the damaged area with acetone, Methylethylketone or equivalent and remove paint to gel coat.

b. The damaged area may be scraped with a fine blade knife or a power drill with a burr attachment to roughen the bottom and sides of the damaged area. Feather the edge surrounding the scratch or cavity. Do not undercut the edge. (If the scratch or cavity is shallow and penetrates only the surface coat, continue to Step h.)

c. Pour a small amount of resin into a jar lid or on a piece of cardboard, just enough to fill the area being worked on. Mix an equal amount of milled fiberglass with the resin, using a putty knife or stick. Add catalyst, according to kit instructions, to the resin and mix thoroughly. A hypodermic needle may be used to inject gel into small cavities not requiring fiberglass millings mixed with the gel.

d. Work the mixture of resin, fibers and catalyst into the damaged area, using the sharp point of a putty knife or stick to press it into the bottom of the hole and to puncture any air bubbles which may be present. Fill the scratch or hole above the surrounding undamaged area about 1/16 inch.

e. Lay a piece of cellophane or wax paper over the repair to cut off air and start the cure of gel mixture.

f. Allow the gelt to cure 10 to 15 minutes until it feels rubbery to the touch. Remove the cellophane and trim flush with the surface, using a sharp razor blade or knife. Replace the cellophane and allow to cure completely for 30 minutes to an hour. The patch will shrink slightly below the structure surface as it cures. (If wax paper is used, ascertain wax is removed from surface.)

g. Rough up the bottom and edges of the hole with the electric burr attachment or rough sandpaper. Feather hole into surrounding gel coat, do not undercut.

h. Pour out a small amount of resin, add catalyst and mix thoroughly, using a cutting motion rather than stirring. Use no fibers.

i. Using the tip of a putty knife or fingertips, fill the hole to about 1/16 inch above the surrounding surface with the gel coat mixture.

j. Lay a piece of cellophane over the patch to start the curing process. Repeat Step f, trimming patch when partially cured.

k. After trimming the patch, immediately place another small amount of gel coat on one edge of the patch and cover with cellophane. Then, using a squeegee or the back of a razor blade, squeegee level with area surrounding the patch; leave the cellophane on patch for one to two hours or overnight, for complete cure.

l. After repair has cured for 24 hours, sand patch area using a sanding block with fine wet sandpaper. Finish by priming, again sanding and applying color coat.

4-71. FIBERGLASS FRACTURE AND PATCH REPAIRS.

a. Remove wax, oil and dirt from around the damaged area with acetone, Methylethylketone or equivalent.

b. Using a key hole saw, electric saber saw, or sharp knife cut away ragged edges. Cut back to sound material.

c. Remove paint three inches back from around damaged area.

d. Working inside the structure, bevel the edges to approximately a 30 degree angle and rough-sand the hole and the area around it, using 80 grit dry paper. Feather back for about two inches all around the hole. This roughens the surface for strong bond with patch.

e. Cover a piece of cardboard or metal with cellophane. Tape it to the outside of the structure, covering the hole completely. The cellophane should face toward the inside of the structure. If the repair is on a sharp contour or shaped area, a sheet of aluminum formed to a similar contour may be placed over the area. The aluminum should also be covered with cellophane.

f. Prepare a patch of fiberglass mat and cloth to cover an area two inches larger than the hole.

g. Mix a small amount of resin and catalyst, enough to be used for one step at a time, according to kit instructions.

h. Thoroughly wet mat and cloth with catalyzed resin. Daub resin on mat first, and then on cloth. Mat should be applied against structures surface with cloth on top. Both pieces may be wet out on cellophane and applied as a sandwich. Enough fiberglass cloth and mat reinforcements should be used to at least replace the amount of reinforcements removed in order to maintain the original strength. If damage occurred as a stress crack, an extra layer or two of cloth may be used to strengthen area.

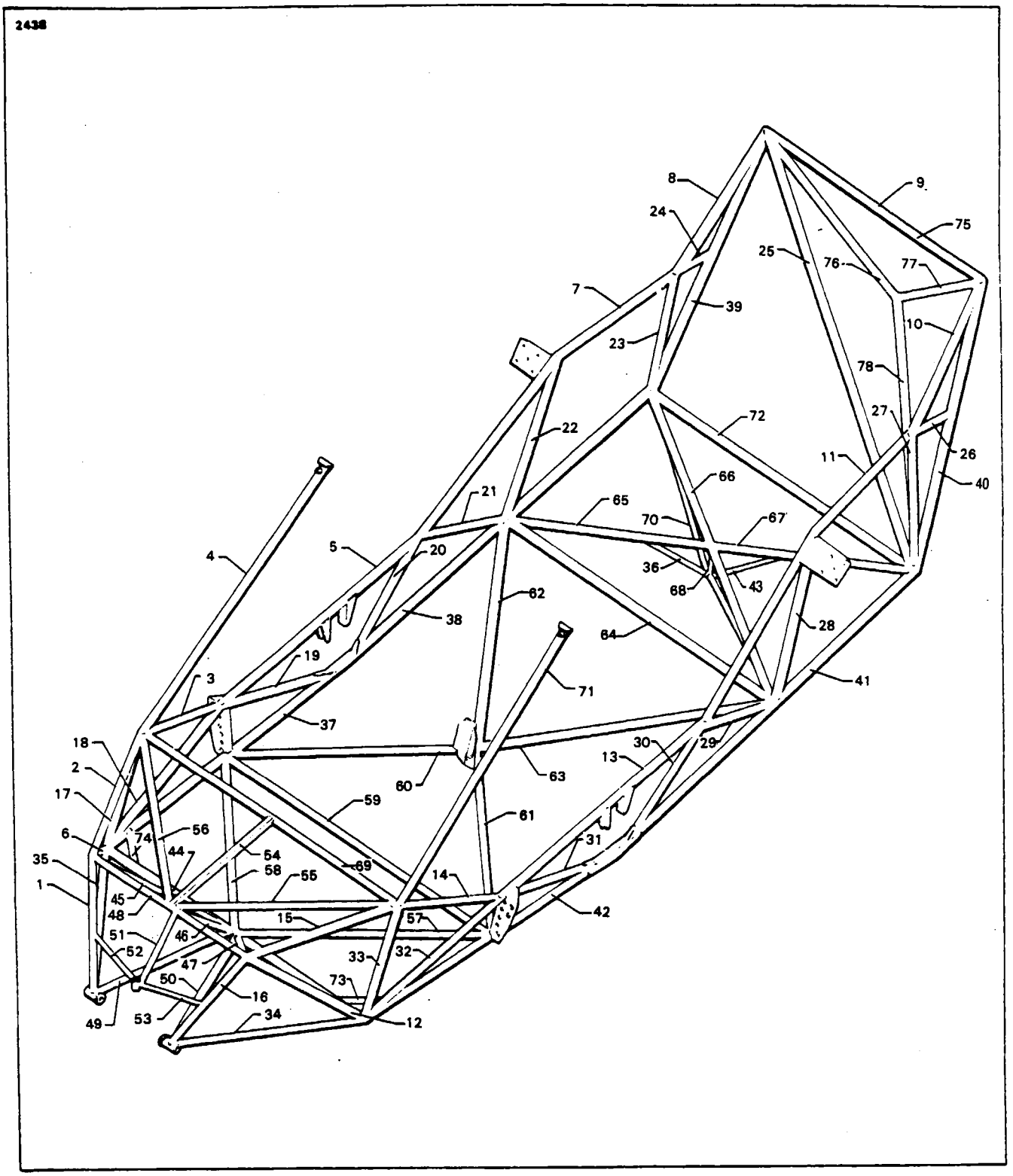
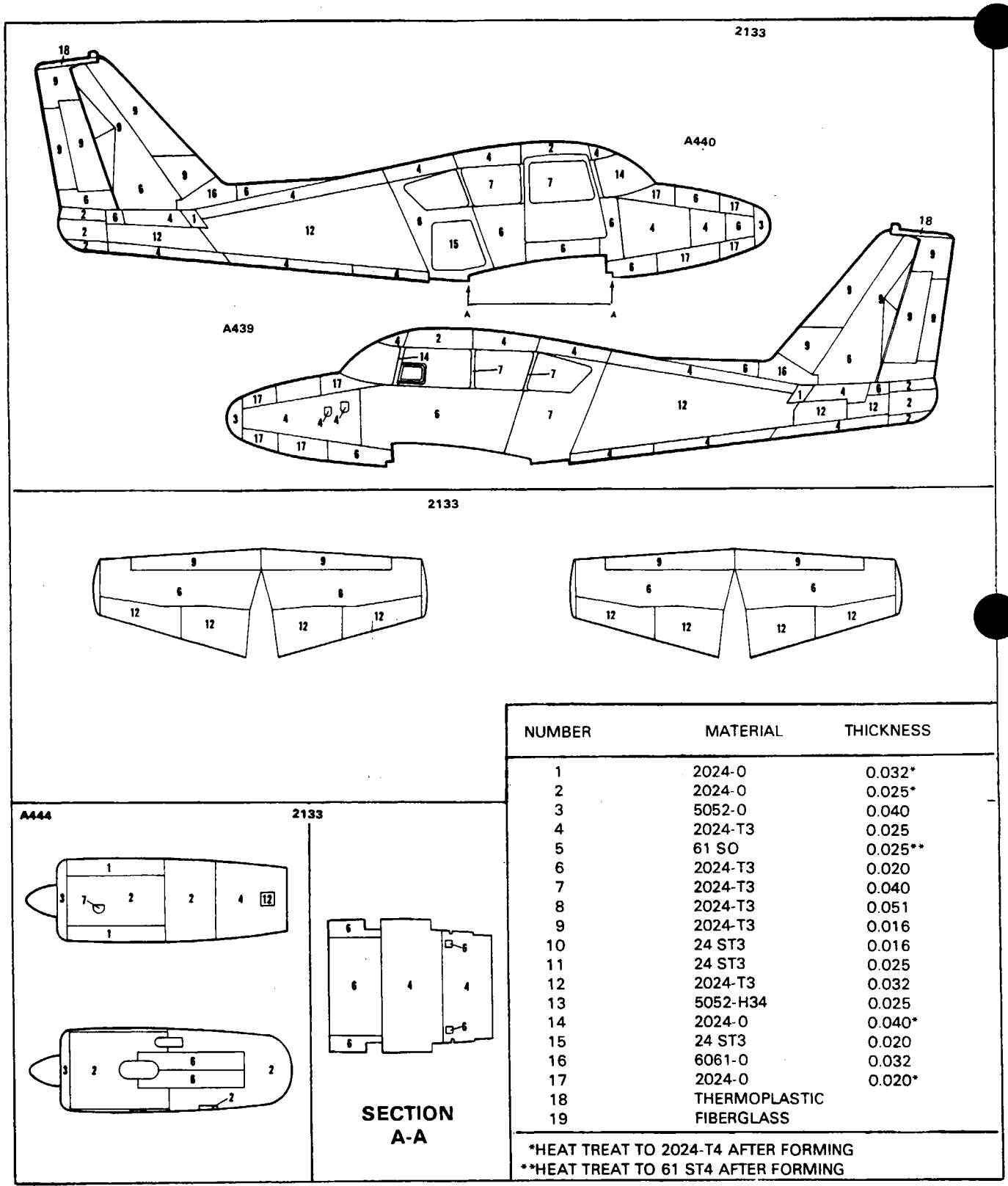


Figure 4-18. Fuselage Frame Tubing

NO.	PART NO.	MATERIAL	DIMENSIONS
1	17134-89	4130 RD STEEL TUBE	1 X .065 X 21.5
2	17134-91	4130 RD STEEL TUBE	1 X .065 X 18
3	17134-31	4130 RD STEEL TUBE	.75 X .035 X 21.25
4	17134-29	4130 RD STEEL TUBE	.875 X .035 X 36.5
5	17134-39	4130 RD STEEL TUBE	1 X .049 X 39.5
6	17134-23	4130 RD STEEL TUBE	.625 X .035 X 20.5
7	22102-19	4130 RD STEEL TUBE	.75 X .058 X 21
8	22102-17	4130 RD STEEL TUBE	1 X .049 X 22.5
9	17134-60	4130 RD STEEL TUBE	.75 X .035 X 37 (1)
10	22102-16	4130 RD STEEL TUBE	1 X .049 X 22.5
11	22102-18	4130 RD STEEL TUBE	.75 X .058 X 21
12	17134-22	4130 RD STEEL TUBE	.625 X .035 X 20.5
13	17134-38	4130 RD STEEL TUBE	1 X .049 X 39.5
14	17134-30	4130 RD STEEL TUBE	.75 X .035 X 21.25
15	17134-92	4130 RD STEEL TUBE	1 X .065 X 18
16	17134-90	4130 RD STEEL TUBE	1 X .065 X 21.5
17	17134-25	4130 RD STEEL TUBE	.625 X .035 X 18.5
18	17134-33	4130 RD STEEL TUBE	.875 X .049 X 26
19	22102-27	4130 RD STEEL TUBE	.875 X .049 X 22
20	22102-40	4130 RD STEEL TUBE	1 X .058 X 48.5
21	22102-43	4130 RD STEEL TUBE	.875 X .065 X 16.5
22	22102-25	4130 RD STEEL TUBE	1 X .058 X 27
23	22102-15	4130 RD STEEL TUBE	.75 X .058 X 24.5
24	22102-21	4130 RD STEEL TUBE	.75 X .035 X 8.5
25	17134-65	4130 RD STEEL TUBE	.75 X .035 X 65
26	22102-20	4130 RD STEEL TUBE	.75 X .035 X 8.5
27	22102-14	4130 RD STEEL TUBE	.75 X .058 X 24.5
28	22102-24	4130 RD STEEL TUBE	1 X .058 X 27
29	22102-42	4130 RD STEEL TUBE	.875 X .065 X 16.5
30	22102-41	4130 RD STEEL TUBE	1 X .058 X 48.5
31	22102-26	4130 RD STEEL TUBE	.875 X .049 X 22
32	17134-32	4130 RD STEEL TUBE	.875 X .049 X 26
33	17134-24	4130 RD STEEL TUBE	.625 X .035 X 8.5
34	17134-97	4130 RD STEEL TUBE	.75 X .049 X 24.75
35	17134-98	4130 RD STEEL TUBE	.75 X .049 X 24.75
36	22102-28	4130 RD STEEL TUBE	.375 X .028 X 8
37	17134-34	4130 RD STEEL TUBE	1 X .035 X 48
38	17134-44	4130 RD STEEL TUBE	1.125 X .049 X 62
39	22102-13	4130 RD STEEL TUBE	1.125 X .058 X 44.5
40	22102-13	4130 RD STEEL TUBE	1.125 X .058 X 44.5
41	17134-44	4130 RD STEEL TUBE	1 X .049 X 62
42	17134-34	4130 RD STEEL TUBE	1 X .035 X 48
43	22102-28	4130 RD STEEL TUBE	.375 X .028 X 8
44	17134-06	4130 RD STEEL TUBE	.75 X .035 X 42
	21121-03 (LINER TUBE)	4130 RD STEEL TUBE	.665 X .035 X 9.5
45	17134-63	4130 RD STEEL TUBE	.75 X .035 X 22.25
46	17134-64	4130 RD STEEL TUBE	.5 X .035 X 18.25
47	17134-62	4130 RD STEEL TUBE	.75 X .035 X 22.25
48	17134-56	4130 RD STEEL TUBE	.625 X .035 X 25
49	17134-04	4130 RD STEEL TUBE	.75 X .035 X 20.5
50	17134-05	4130 RD STEEL TUBE	.75 X .035 X 20.5
51	22102-44	4130 RD STEEL TUBE	.625 X .035 X 16.25
52	17134-71	1025 RD STEEL TUBE	.625 X .035 X 9
53	17134-72	1025 RD STEEL TUBE	.625 X .035 X 9
54	14089-02	1020 SQ STEEL TUBE	.687 X .025 X 14.75
55	17134-58	4130 RD STEEL TUBE	.75 X .035 X 26
56	17134-59	4130 RD STEEL TUBE	.75 X .035 X 26
57	17134-08	4130 RD STEEL TUBE	.75 X .035 X 38
58	17134-09	4130 RD STEEL TUBE	.75 X .035 X 38
59	17134-07	4130 RD STEEL TUBE	.75 X .035 X 43.5
60	17134-10	4130 RD STEEL TUBE	.75 X .035 X 30.5
	17134-82	4130 RD STEEL TUBE	.75 X .035 X 30.5
61	17134-10	4130 RD STEEL TUBE	.75 X .035 X 30.5
	17134-82	4130 RD STEEL TUBE	.75 X .035 X 30.5
62	17134-12	4130 RD STEEL TUBE	1 X .049 X 38.5
63	17134-13	4130 RD STEEL TUBE	1 X .049 X 38.5
64	17134-18	4130 RD STEEL TUBE	1 X .049 X 45
65	17134-15	4130 RD STEEL TUBE	.75 X .035 X 26
66	17134-17	4130 RD STEEL TUBE	.75 X .035 X 51.75
67	17134-16	4130 RD STEEL TUBE	.75 X .035 X 25.75
68	17134-69	4130 RD STEEL TUBE	.375 X .028 X 1.937
69	17134-57	4130 RD STEEL TUBE	.875 X .035 X 42
70	17134-14	4130 RD STEEL TUBE	.375 X .028 X 45.5
71	17134-28	4130 RD STEEL TUBE	.875 X .035 X 36.5
72	17134-99	4130 RD STEEL TUBE	.75 X .049 X 44
73	17134-66	1025 RD STEEL TUBE	.625 X .035 X 6
74	17134-67	1025 RD STEEL TUBE	.625 X .035 X 5.5
75	22102-50	4130 RD STEEL TUBE	.75 X .049 X 37.25 (2)
76	22102-47	4130 RD STEEL TUBE	.75 X .035 X 27.812 (2)
77	22102-48	4130 RD STEEL TUBE	.75 X .035 X 17.5 (2)
78	22102-49	4130 RD STEEL TUBE	.75 X .049 X 38.343 (2)

(1) ON PA-23-250, PA-23-235, PA-E23-250 AND PA-23-250 (SIX PLACE) SERIAL NOS. 27-2000 TO 27-3049 INCL. AND 27-3051 TO 27-3153 INCL.
(2) ON PA-E23-250 AND PA-23-250 (SIX PLACE) SERIAL NOS. 27-3050, 27-3154 AND UP.

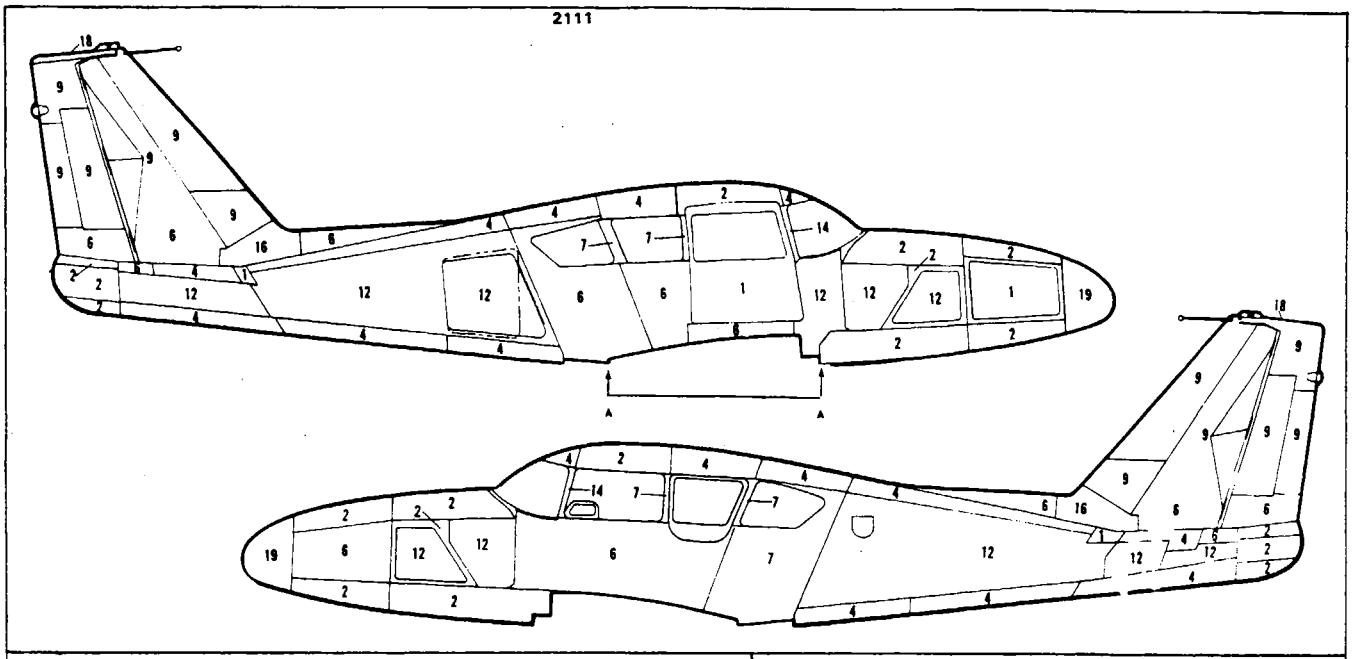
Figure 4-18. Fuselage Frame Tubing (cont.)

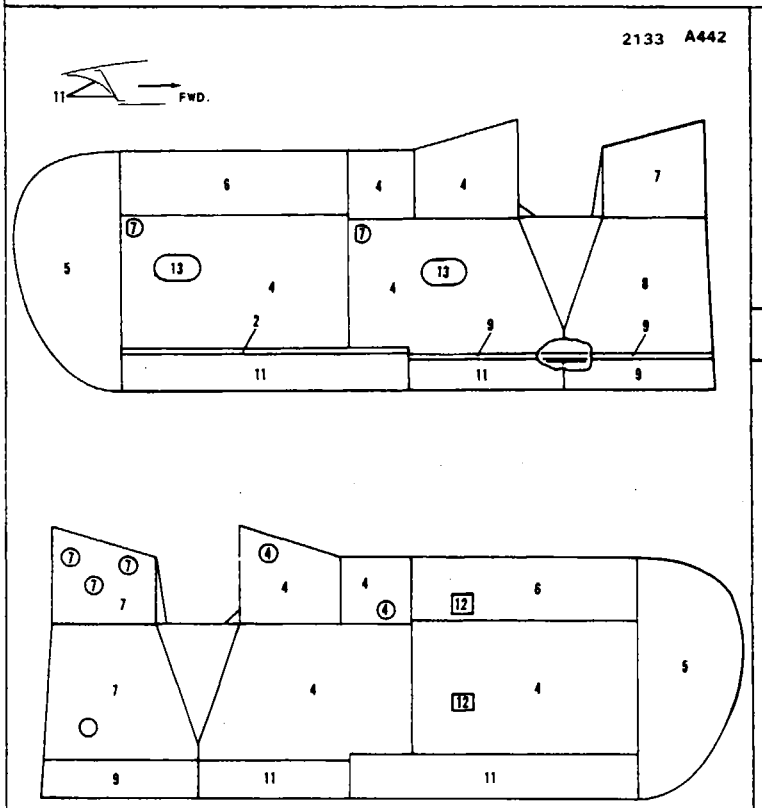


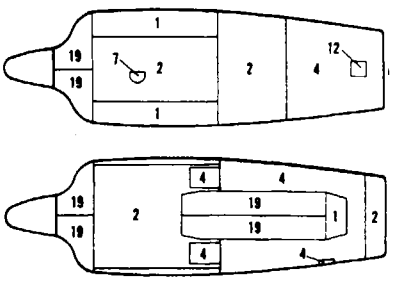
NUMBER	MATERIAL	THICKNESS
1	2024-0	0.032*
2	2024-0	0.025*
3	5052-0	0.040
4	2024-T3	0.025
5	61 SO	0.025**
6	2024-T3	0.020
7	2024-T3	0.040
8	2024-T3	0.051
9	2024-T3	0.016
10	24 ST3	0.016
11	24 ST3	0.025
12	2024-T3	0.032
13	5052-H34	0.025
14	2024-0	0.040*
15	24 ST3	0.020
16	6061-0	0.032
17	2024-0	0.020*
18	THERMOPLASTIC	
19	FIBERGLASS	

*HEAT TREAT TO 2024-T4 AFTER FORMING
**HEAT TREAT TO 61 ST4 AFTER FORMING

Figure 4-19. Skin Materials and Thicknesses







NUMBER	MATERIAL	THICKNESS
1	2024-0	0.032*
2	2024-0	0.025*
3	5052-0	0.040
4	2024-T3	0.025
5	61 SO	0.025**
6	2024-T3	0.020
7	2024-T3	0.040
8	2024-T3	0.051
9	2024-T3	0.016
10	24 ST3	0.016
11	24 ST3	0.025
12	2024-T3	0.032
13	5052-H34	0.025
14	2024-0	0.040*
15	24 ST3	0.020
16	6061-0	0.032
17	2024-0	0.020*
18	THERMOPLASTIC	
19	FIBERGLASS	

*HEAT TREAT TO 2024-T4 AFTER FORMING
**HEAT TREAT TO 61 ST4 AFTER FORMING

Figure 4-19. Skin Materials and Thicknesses (cont.)

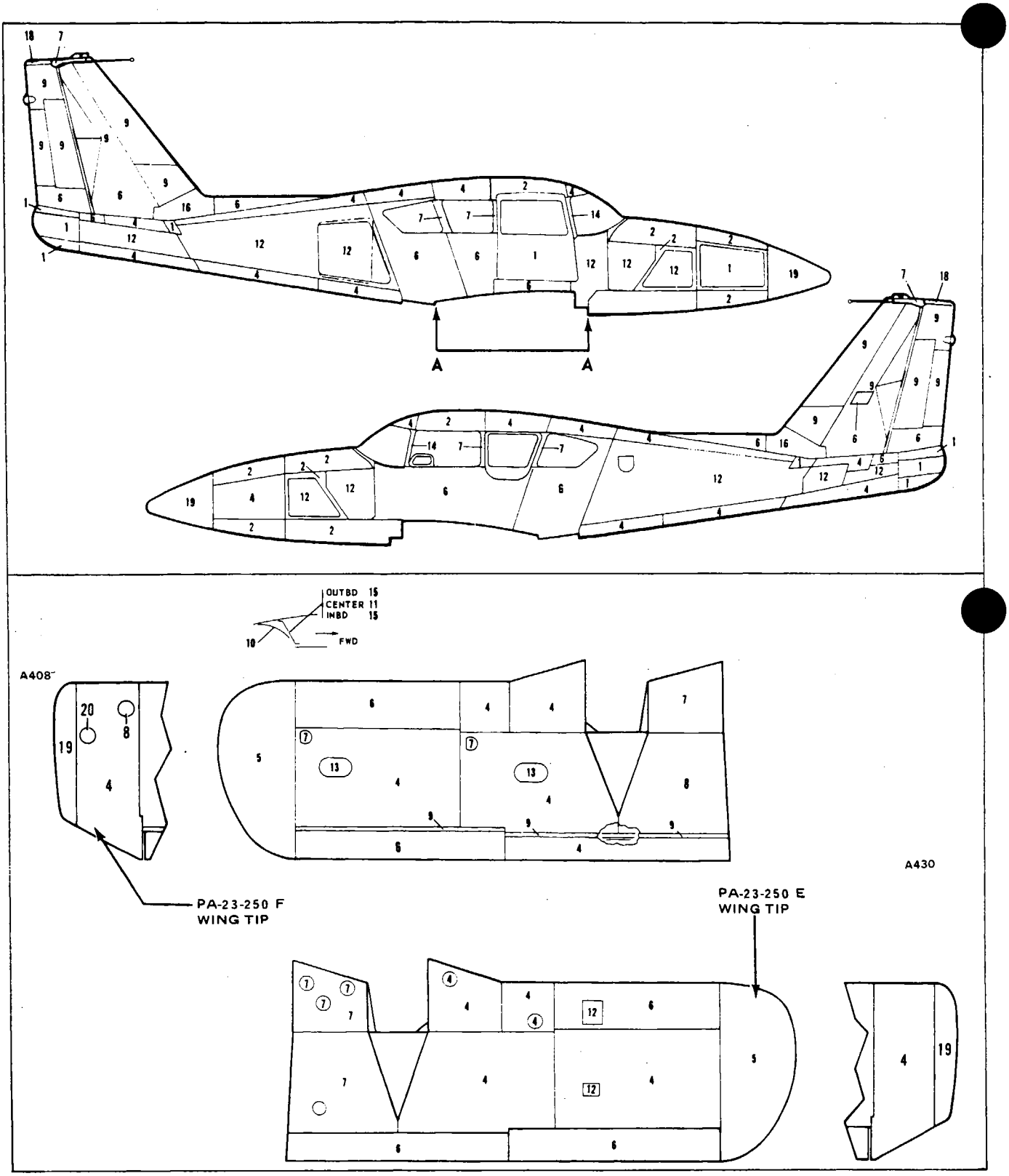
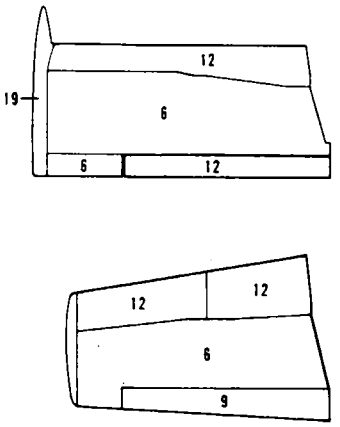


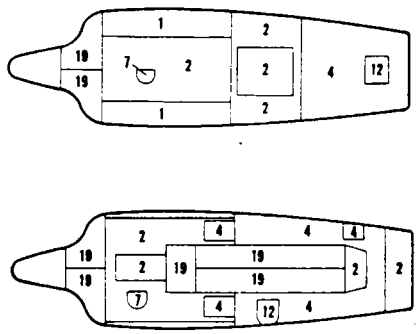
Figure 4-20. Skin Materials and Thicknesses, PA-23-250 (six place), Serial Nos. 27-4426, 27-4574 and up

A407



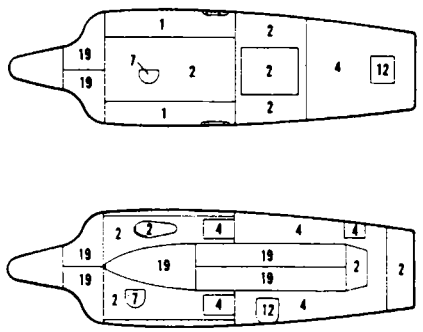
THE LEFT UPPER STABILATOR SURFACE IS SHOWN. THE LOWER AND OPPOSITE SKINS ARE OF THE SAME MATERIAL AND THICKNESS.

A41



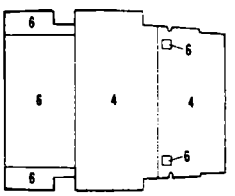
NORMAL

A431



LYCOMING TURBO.

2133

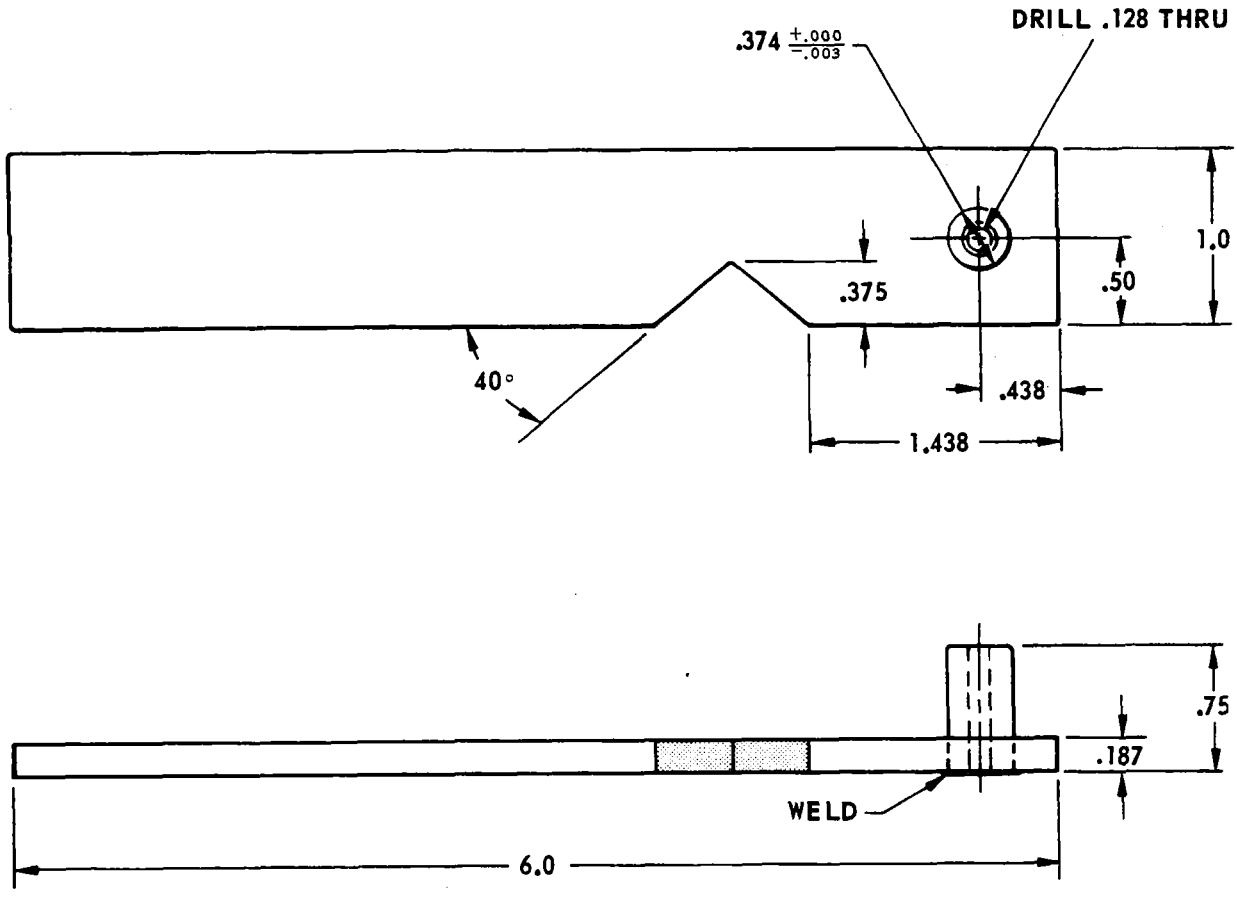


SECTION A-A

NUMBER	MATERIAL	THICKNESS
1	2024-0	0.032*
2	2024-0	0.025*
3	5052-0	0.040
4	2024-T3	0.025
5	6150	0.025**
6	2024-T3	0.020
7	2024-T3	0.040
8	2024-T3	0.051
9	2024-T3	0.016
10	24ST3	0.016
11	24ST3	0.025
12	2024-T3	0.032
13	5052-H34	0.025
14	2024-0	0.040*
15	24ST3	0.020
16	6061-0	0.032
17	2024-0	0.020*
18	THERMOPLASTIC	
19	FIBERGLASS	
20	2024-T3	.064

* HEAT TREAT TO 2024-T4 AFTER FORMING
** HEAT TREAT TO 61ST4 AFTER FORMING

Figure 4-20. Skin Materials and Thicknesses, PA-23-250 (six place), Serial Nos. 27-4426, 27-4574 and up (cont.)



MATERIAL LIST
0.187 x 1 x 6 STEEL PLATE
0.375 x 0.75 STEEL ROD

Figure 4-21. Fabricated Tool, Wing Installation

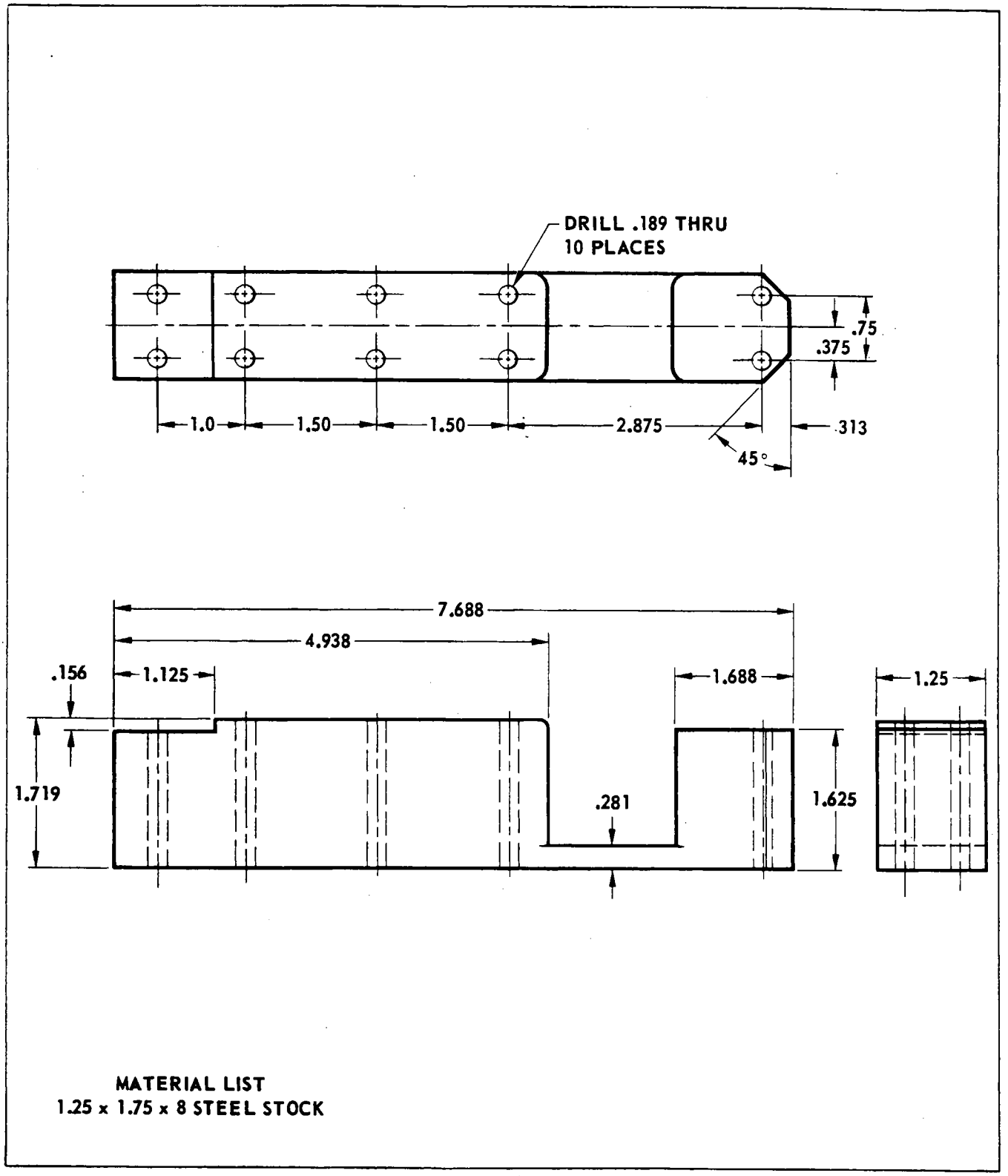


Figure 4-22. Fabricated Tool, Wing Installation

i. Lay patch over hole on inside of structure, cover with cellophane, and squeegee from center to edges to remove all air bubbles and assure adhesion around edge of hole. Air bubbles will show white in the patch and they should all be worked out to the edge. Remove excess resin before it gels on the part. Allow patch to cure completely.

j. Remove cardboard or aluminum sheet from outside of hole and rough-sand the patch and edge of hole. Feather edge of hole about two inches into undamaged area.

k. Mask area around hole with tape and paper to protect surface. Cut a piece of fiberglass mat about one inch larger than the hole and one or more pieces of fiberglass cloth two inches larger than the hole. Brush catalyzed resin over hole, lay mat over hole and wet out with catalyzed resin. Use a daubing action with brush. Then apply additional layer or layers of fiberglass cloth to build up patch to the surface of structure. Wet out each layer thoroughly with resin.

l. With a squeegee or broad knife, work out all air bubbles in the patch. Work from center to edge, pressing patch firmly against the structure. Allow patch to cure for 15 to 20 minutes.

m. As soon as the patch begins to set up, but while still rubbery, take a sharp knife and cut away extra cloth and mat. Cut on outside edge of feathering. Strip cut edges of structure. Do this before cure is complete, to save extra sanding. Allow patch to cure overnight.

n. Using dry 80 grit sandpaper on a power sander or sanding block, smooth patch and blend with surrounding surface. Should air pockets appear while sanding, puncture and fill with catalyzed resin. A hypodermic needle may be used to fill cavities. Let cure and resand.

o. Mix catalyzed resin and work into patch with fingers. Smooth carefully and work into any crevices.

p. Cover with cellophane and squeegee smooth. Allow to cure completely before removing cellophane. Let cure and resand.

q. Brush or spray a coat of catalyzed resin to seal patch. Sand patch, finish by priming, again sanding and applying color coat.

NOTE

Brush and hands may be cleaned in solvents such as acetone or Methylethylketone. If solvents are not available, a strong solution of detergent and water may be used.

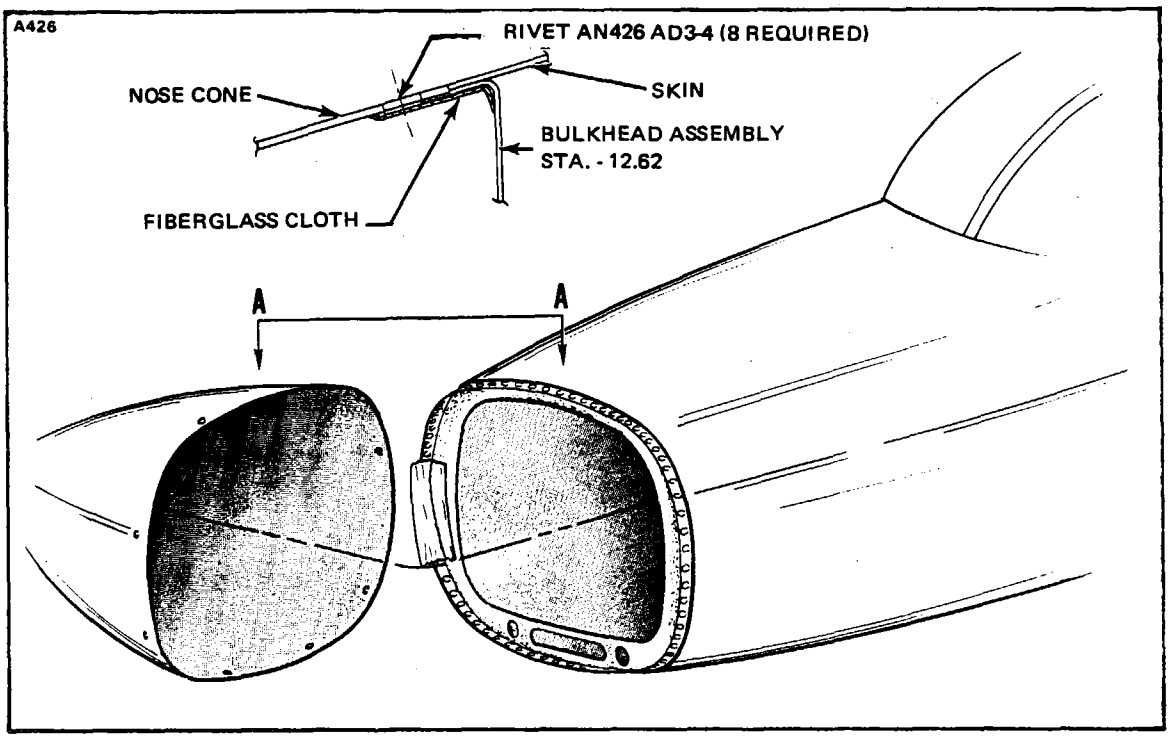


Figure 4-23. Nose Cone Installation, PA-23-250 and PA-23-235

4-72. REPLACEMENT OF DAMAGED NOSE CONE.

a. Disconnect the electrical leads to the landing light and any other equipment located in the nose cone.

b. Remove the damaged nose cone by cutting away the fiberglass attachment cloth between the inner surface of the nose cone and the flange on bulkhead at station -12.62.

c. Drill out the rivets around the mating edge of the nose cone and fuselage skin.

d. Sand off any filler material used on the other mating surfaces between the fuselage skin and nose cone.

CAUTION

Do not sand into the fuselage skin or the bulkhead.

e. Position new nose cone in place over the bulkhead flange.

f. Drill eight .098 holes in new nose cone using existing holes in bulkhead flange as template.

g. Rivet the nose cone to the flange with AN 426 AD3-4 rivets.

h. Fasten the nose cone to the fuselage with the application of fiberglass cloth layed up between the inner surface of the nose cone and flange on the bulkhead. (Refer to Figure 4-23 and instructions given on the use of fiberglass in paragraph 4-69.)

i. The outside seam between the nose cone and fuselage skin is coated with Hysol Epoxy Surface 4343 coat or equivalent and sanded smooth.

j. Finish by priming; again sanding and applying color coat.

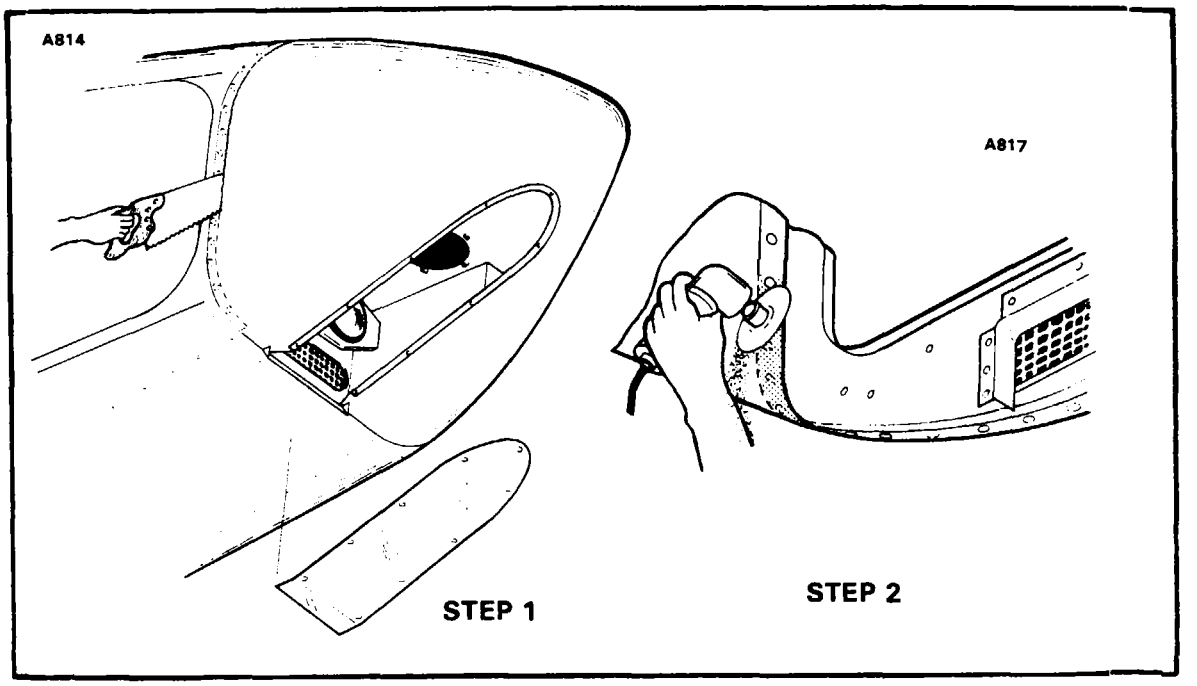


Figure 4-24. Removal of Nose Cone/Radome

4-73. REPLACEMENT/INSTALLATION OF NOSE CONE OR RADOME. PA-23-250 (six place), Serial Nos. 27-4426, 27-4574 and up. (Refer to Figures 4-24, 4-25 and 4-26.)

a. Nose Cones or Radomes damaged beyond repair should be removed as follows:

1. Remove the landing light window, any additional equipment installed in the nose cone or radome, and floorboard access panels in the nose cone.

2. Disconnect any electrical leads to the landing light and remove light assembly.

3. Should the floorboard and light supports in the radome assembly still be serviceable, disconnect them by removing the screws attaching them to the radome bulkhead and dome flanges.

4. If the floorboard and light supports are still serviceable in the standard nose cone, drill out the rivets that attach the floorboard and supports to the bulkhead, station -12.62.

5. To remove the damaged nose cone/radome cut around the dome just forward of the mounting strip(s) (Figure 4-24, Step 1)attached to bulkhead, station -12.62, and remove cone.

6. Remove the floorboard and supports from the nose cone by cutting away the fiberglass attachment cloth at the mounting strips.

b. After removing the nose cone/radome from the aircraft, back drill and remove the rivets on and around the mounting flange at station -12.62 where any fiberglass is still attached.

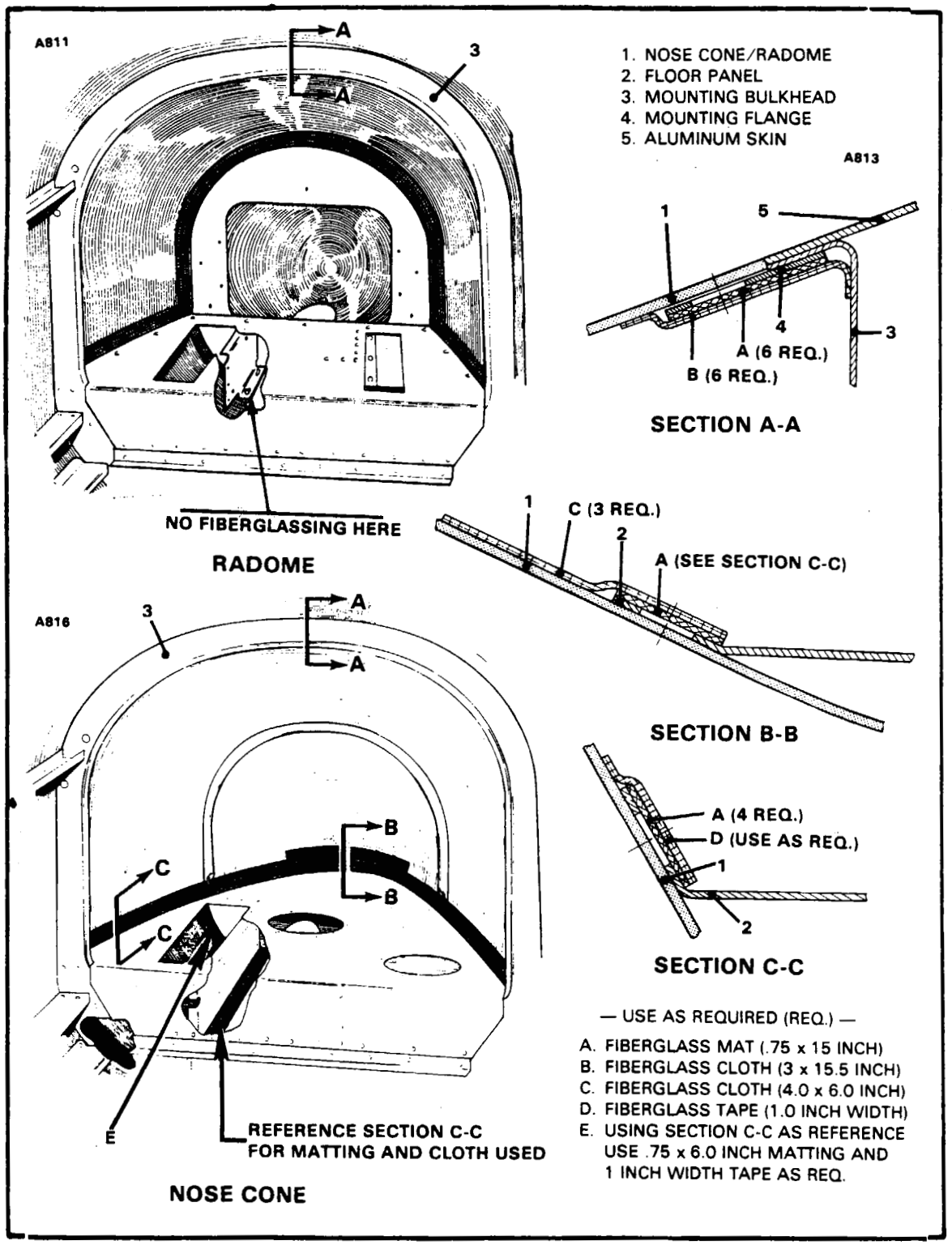


Figure 4-25. Nose Cone/Radome

c. If the bulkhead and mounting flange at station -12.62 are undamaged and not to be replaced, proceed to remove any old fiberglass and filler by grinding or sanding as shown in Step 2 of Figure 4-24. Make sure holes in mounting flange are clear, drill out if necessary.

CAUTION

When grinding off the filler and fiberglass on the mounting flange and skin, be careful not to grind into the aluminum skin of the aircraft. When getting near the skin sand by hand and only ruff up the skin surface such that the filler and body putty will stick.

NOTE

If the floorboard assemblies or bulkheads have been damaged, replacement parts may be ordered using the PA-23-250 Parts Catalog, Part Number 753 522. Piper Kit 761 026 furnishes the radome and hardware for attachment.

d. After removing the old fiberglass, filler, and body putty, position the new nose cone/radome on the mounting flange at bulkhead, station -12.62. Check to make sure the cone covers the holes in the mounting flange.

e. If the nose cone/radome floor panels haven't been removed, ascertain that the floor panels fit properly in the nose cone before proceeding. The floor panel in the nose cone configuration should fit snugly against the nose cone such that it does not deflect up or down. The floor panel in the radome configuration should fit snugly against the bulkhead in the radome in the same manner. If the floor panels on the nose cone/radome have been removed or replaced, check the fit, remove the nose cone, and install the floor panel and supports. Make sure the floor panel and support bonding flanges are clean.

NOTE

Before proceeding with any fiberglassing, wipe down the areas to be bonded with white gas or acetone. AFTER SANDING MAKE SURE DUST IS ALL BLOWN OR CLEANED OFF. When working on exterior of nose cone/radome, make sure to sand prior to applying putty to remove mold wax. (See Paragraph 4-69 for working with fiberglass.)

— WARNING —

Because of the combustibility of the substances used in this procedure, be sure to do the work in a WELL VENTILATED AREA that is FREE FROM sparks and smoking.

f. With floorboards and supports installed, reposition the nose cone/radome over the floorboard and onto the mounting flange at bulkhead, station -12.62. The nose cone/radome should fit far enough on the mounting flange that the edge of the cone completely covers the holes in the mounting flange at bulkhead, station -12.62.

CAUTION

DO NOT physically FORCE the nose cone/radome to fit flush with the aluminum nose section. Maintain at least a 3/8 inch gap and build up the cone with paste (Kit 763 904), and then body putty as shown in Figure 4-26 (of the proper mix) respectively.

g. Drill (as shown in Figure 4-26, Step 1) .098 inch holes in the nose cone to match those in the bulkhead mounting flange, twenty eight of the same for the radome (equally spaced to clear holes in flange), maintaining in the cone at least a 3/8 inch edge distance from the center of the rivet holes to the edge of the fiberglass.

h. Rivet the nose cone or radome to the mounting flange with MS20426AD3 rivets for the nose cone or MS20426AD4 rivets for the radome.

i. With the nose cone/radome riveted in position, prepare four pieces of fiberglass matting (3/4 oz., .75 x 15 inch) by placing the pieces on a piece of carboard, or other, and saturating them with prepared resin by pouring it over them as shown in Figure 4-26, Step 2. Lay and pack the matting around the mounting flange at bulkhead, station -12.62. MAKE SURE the matting is packed such that it contacts the fiberglass cone through the holes in the flange.

j. Prepare the other required matting (see Figure 4-26, Step 2) pieces and install them along their specific mating flanges.

NOTE

Make sure all mating flanges to be bonded are covered and bonded properly.

k. Prepare and apply to the specific areas the proper fiberglass cloth in the same manner as the matting shown in Figures 4-25 and 4-26.

NOTE

If the nose cone/radome does not touch the air scoop on both sides fill in from inside with fiberglass matting and later, outside with body putty as shown in Figure 4-26, Step 5.

l. Using the fiberglass paste kit (763 904) mix up the required amount (working time 15 to 30 min. depending on amount of hardener used) and lay masking tape (as shown in Figure 4-26, Steps 3 and 4) around the seam such that the paste does not spread onto the metal or fiberglass cone. Spread paste into seam with a wood (tongue depressor) or soft plastic spatula.

m. When paste is dry, sand the paste down by hand to a smooth finish.

NOTE

Before applying any body putty to smooth in nose cone/radome to nose section, sand paint off aluminum nose section down to bare metal and entire nose cone/radome.

NOTE

Do not fiberglass the light supports on the bottom of the RADOME. (See Figure 4-25.)

n. Mix some body putty and hardener; then with a wooden or plastic spatula (to keep from scratching the cone or aluminum) apply putty to the seam area, also to the sides of the lower air vent (see Figure 4-26, Step 5) if the cone doesn't contact it, and go over the putty with a wide plastic spreader to even out the putty.

o. Wait for putty to dry and sand down to acquire a smooth finish and pattern from the cone to the nose section.

NOTE

Build up cone to nose section, do not physically force cone to fit.

p. Finish by priming, sanding, and color coating. DO NOT paint over honeycomb section. When finishing radome, tape around the nose cone 18.75 inches back from the tip of the cone and paint that area with a flat black polyurethane paint only. (Refer to Figure 4-26.)

q. Reinstall/install all necessary equipment.

4-74. THERMOPLASTIC REPAIRS. The following procedure will assist in making field repairs to items made of thermoplastic which are used throughout the airplane. A list of material needed to perform these repairs is given along with suggested suppliers of the material. Common safety precautions should be observed when handling some of the materials and tools used while making these repairs.

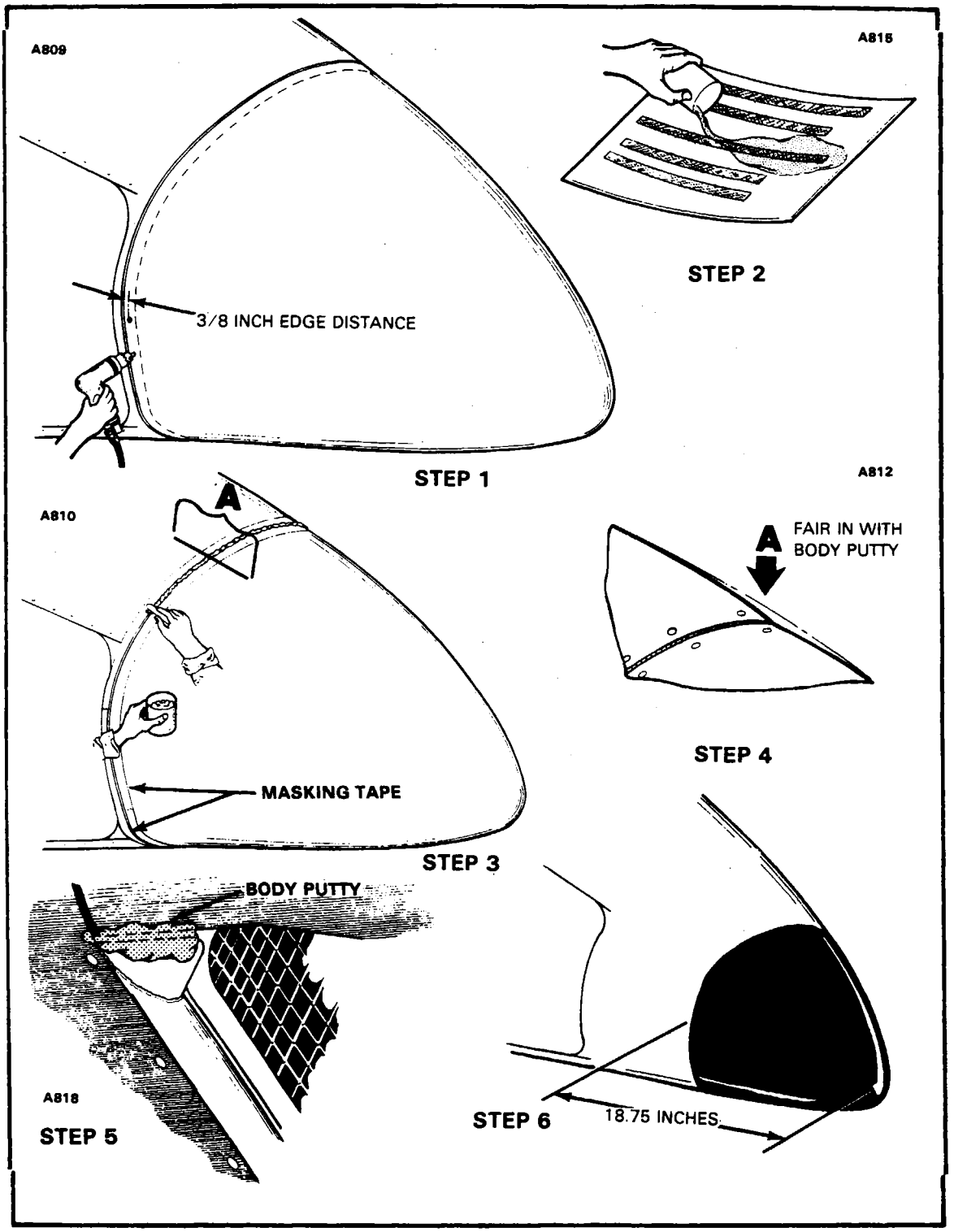


Figure 4-26. Installation of Nose Cone/Radome

TABLE IV-I. LIST OF MATERIALS (THERMOPLASTIC REPAIR)

ITEMS	DESCRIPTIONS	SUPPLIERS
Buffing and Rubbing Compounds	Automotive Type - DuPont #7 Ram Chemical #69 x 1 Mirror Glaze #1	DuPont Company Wilmington, Del. 19898 Ram Chemicals Gardena, Cal. 90248 Mirror Bright Polish Co., Inc. Irvin, Cal. 92713
Cleaners	Fantastic Spray Perchloretylene VM&P Naptha (Lighter Fluid)	Obtain From Local Suppliers
ABS-Solvent Cements	Solarite #11 Series	Solar Compounds Corp. Linden, N.J. 07036
Solvents	Methylethylketone Methylene Chloride Acetone	Obtain From Local Suppliers
Epoxy Patching Compound	Solarite #400	Solar Compounds Corp.
Hot Melt Adhesives Polyamids and Hot Melt Gun	Stick Form 1/2 in. dia. 3 in. long	Sears Roebuck & Co. or Most Hardware Stores
Hot Air Gun	Temp. Range 300° to 400° F	Local Suppliers

a. Surface Preparation:

1. Surface dirt and paint if applied must be removed from the item being repaired. Household cleaners have proven most effective in removing surface dirt.

2. Preliminary cleaning of the damaged area with perchlorethylene or VM&P Naptha will generally insure a good bond between epoxy compounds with thermoplastic.

b. Surface Scratches, Abrasion or Ground-in-Dirt: (Refer to Figure 4-27.)

1. Shallow scratches and abraded surfaces are usually repaired by following directions on containers of conventional automotive buffing and rubbing compounds.

2. If large dirt particles are embedded in thermoplastic parts, they can be removed with a hot air gun capable of supplying heat in the temperature range of 300° to 400° F. Use care not to overheat the material. Hold the nozzle of the gun about 1/4 of an inch away from the surface and apply heat with a circular motion until the area is sufficiently soft to remove the dirt particles.

3. The thermoplastic will return to its original shape upon cooling.

c. Deep Scratches, Shallow Nicks and Small Holes: (Less than 1 inch in diameter.)(Refer to Figure 4-28.)

1. Solvent cements will fit virtually any of these applications. If the area to be repaired is very small, it may be quicker to make a satisfactory cement by dissolving thermoplastic material of the same type being repaired in solvent until the desired paste-like consistency is achieved.

2. This mixture is then applied to the damaged area. Upon solvent evaporation, the hard durable solids remaining can easily be shaped to the desired contour by filing or sanding.

3. Solvent adhesives are not recommended for highly stressed areas, on thin walled parts or for patching holes greater than 1/4 inch in diameter.

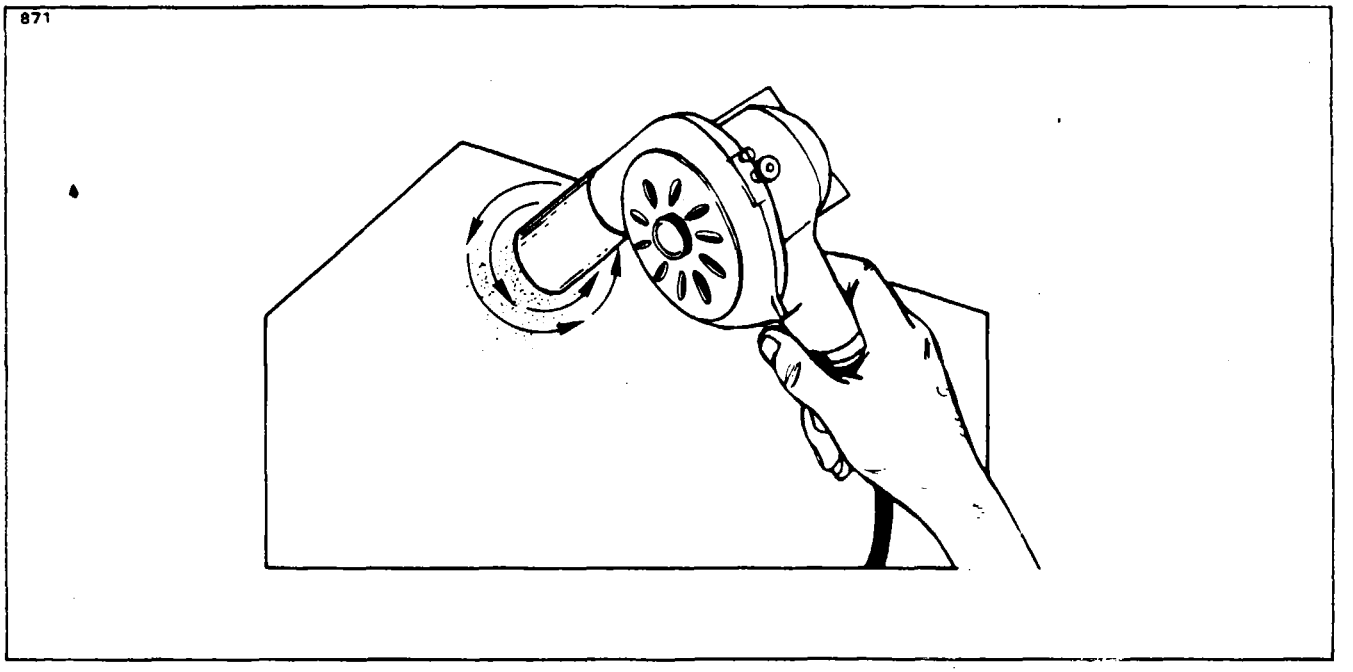


Figure 4-27. Surface Scratches, Abrasions or Ground-in-Dirt

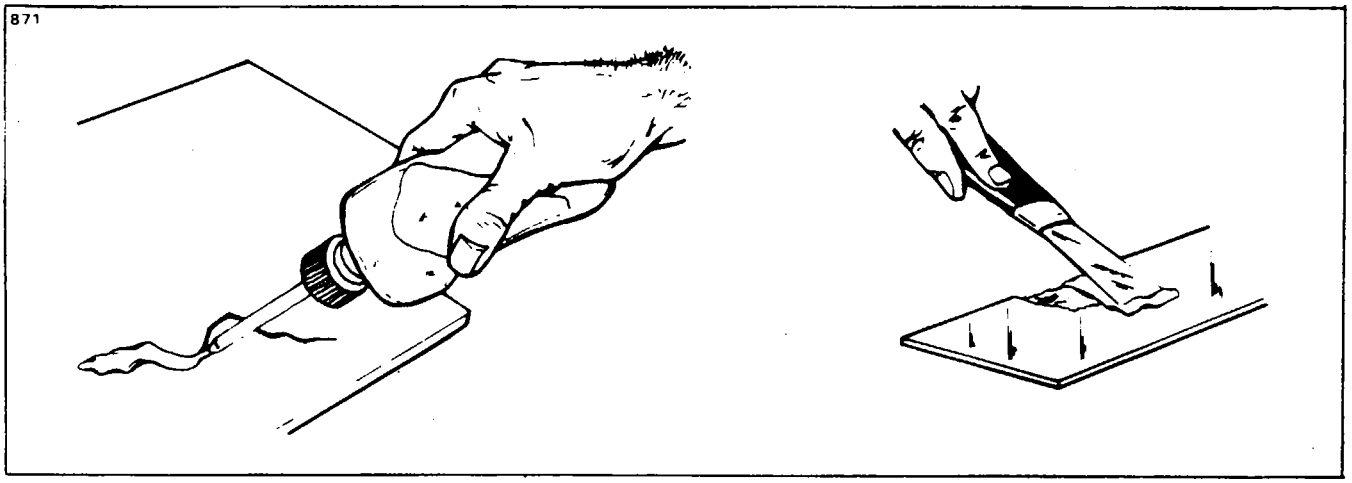


Figure 4-28. Deep Scratches, Shallow Nicks and Small Holes

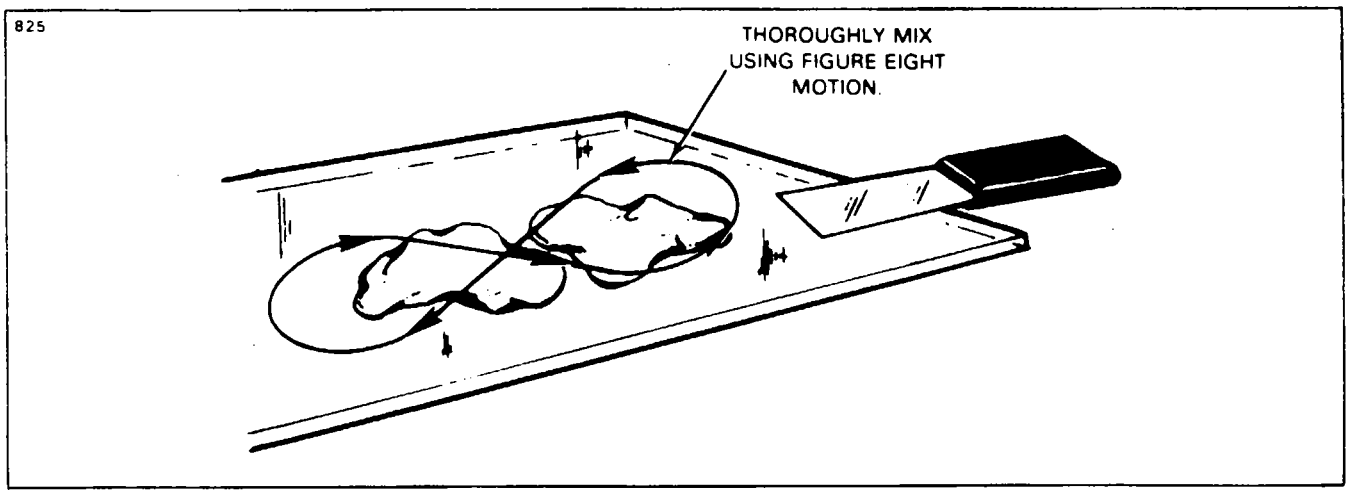


Figure 4-29. Mixing of Epoxy Patching Compound

4. For larger damages an epoxy patching compound is recommended. This type material is a two part, fast curing, easy sanding commercially available compound.

5. Adhesion can be increased by roughing the bonding surface with sandpaper and by utilizing as much surface area for the bond as possible.

6. The patching compound is mixed in equal portions on a hard flat surface using a figure eight motion. The damaged area is cleaned with perchlorethylene or VM&P Naptha prior to applying the compound. (Refer to Figure 4-29.)

7. A mechanical sander can be used after the compound is cured, providing the sander is kept in constant motion to prevent heat buildup.

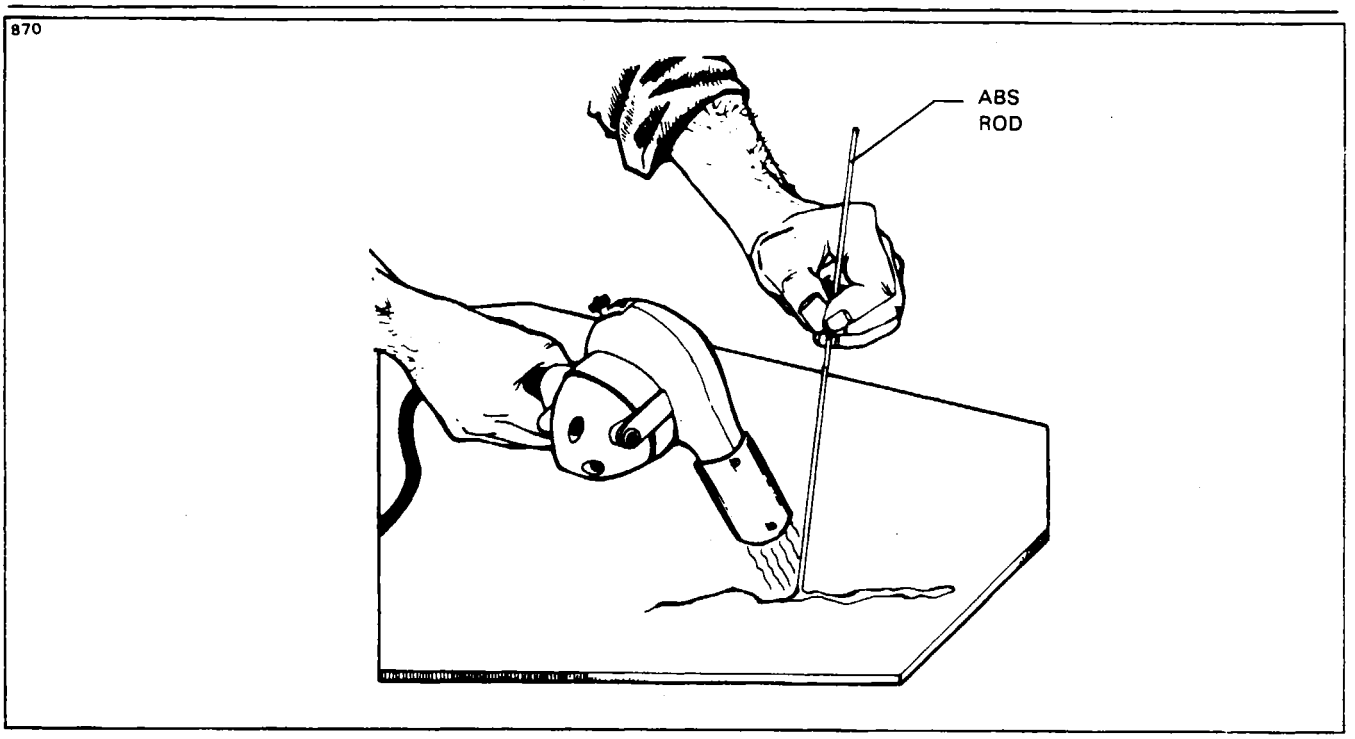


Figure 4-30. Welding Repair Method

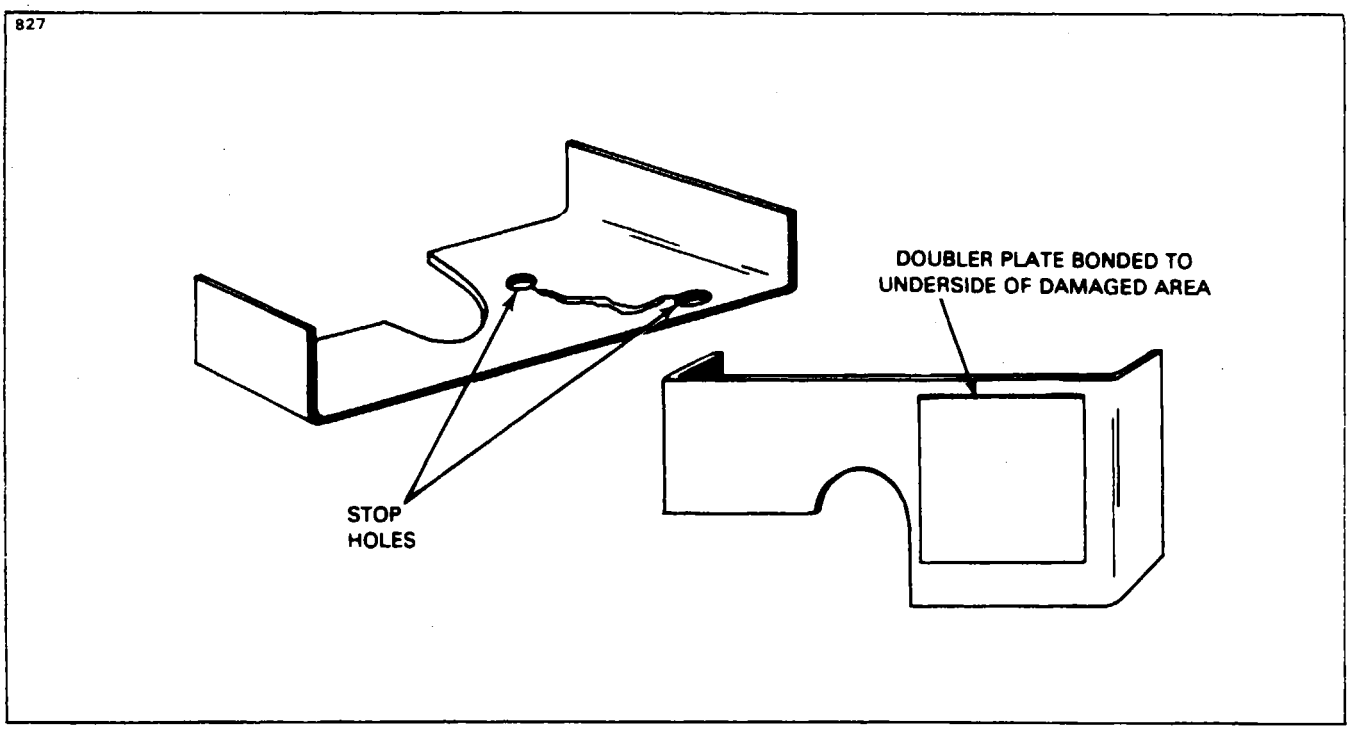


Figure 4-31. Repairing of Cracks

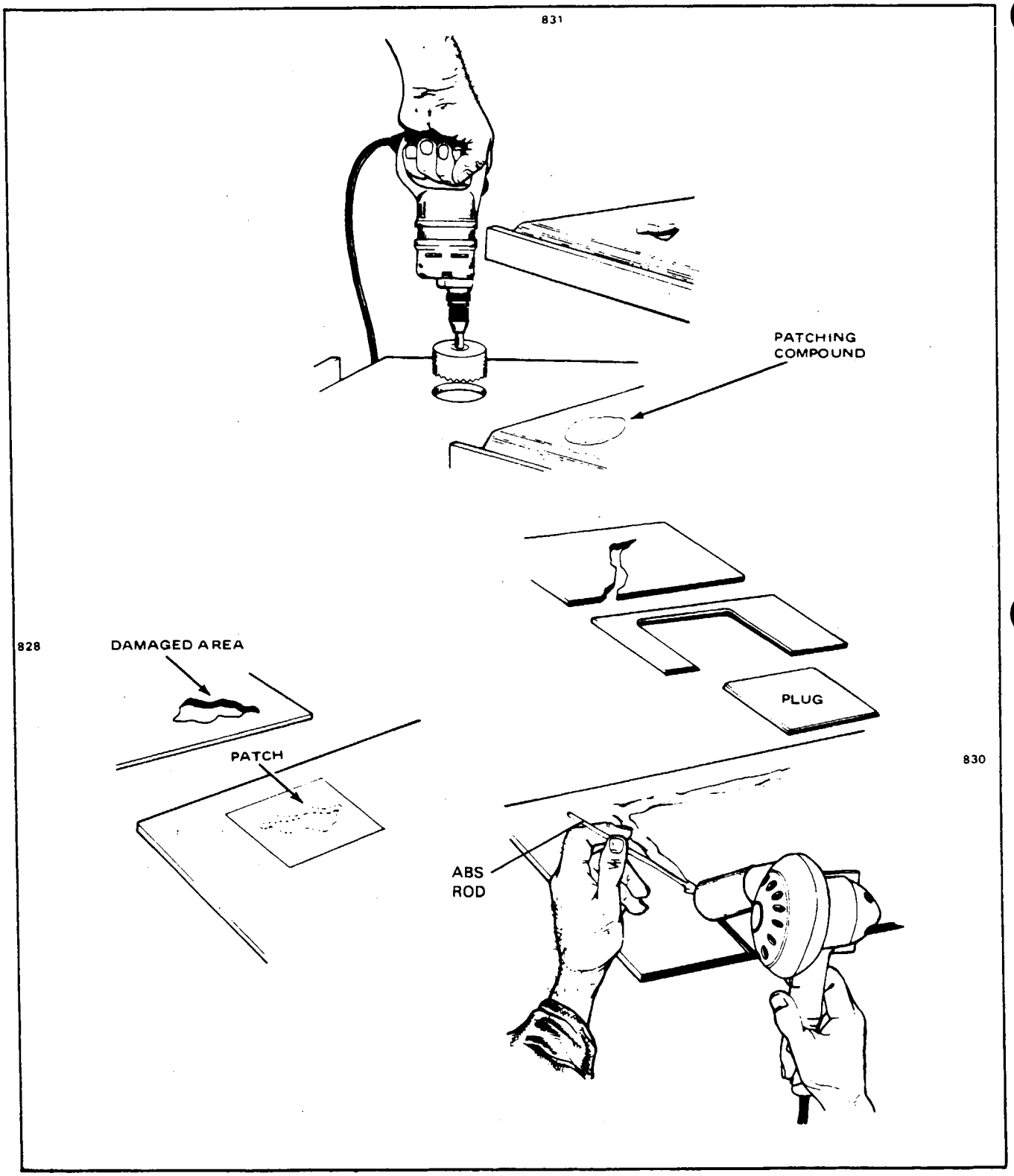


Figure 4-32. Various Repairs

8. For repairs in areas involving little or no shear stress, the hot melt adhesives, polyamids which are supplied in stick form may be used. This type of repair has a low cohesive strength factor.

9. For repairs in areas involving small holes, indentations or cracks in the material where high stress is apparent or thin walled sections are used, the welding method is suggested.

10. This welding method requires a hot air gun and ABS rods. To weld, the gun should be held to direct the flow of hot air into the fusion (repair) zone, heating the damaged area and rod simultaneously. The gun should be moved continuously in a fanning motion to prevent discoloration of the material. Pressure must be maintained on the rod to insure good adhesion. (Refer to Figure 4-30.)

11. After the repair is completed, sanding is allowed to obtain a surface of acceptable appearance.

d. Cracks: (Refer to Figure 4-31.)

1. Before repairing a crack in the thermoplastic part, first determine what caused the crack and alleviate that condition to prevent it recurring after the repair is made.

2. Drill small stop holes at each end of the crack.

3. If possible, a double plate should be bonded to the reverse side of the crack to provide extra strength to the part.

4. The crack should be "V" grooved and filled with repair material, such as solvent cement, hot melt adhesive, epoxy patching compound or hot air welded, whichever is preferred.

5. After the repair has cured, it may be sanded to match the surrounding finish.

e. Repairing Major Damage: (Larger than 1 inch in diameter.) (Refer to Figure 4-32.)

1. If possible a patch should be made of the same material and cut slightly larger than the section being repaired.

2. When appearances are important, large holes, cracks, tears, etc., should be repaired by cutting out the damaged area and replacing it with a piece of similar material.

3. When cutting away the damaged area, under cut the perimeter and maintain a smooth edge. The patch and/or plug should also have a smooth edge to insure a good fit.

4. Coat the patch with solvent adhesive and firmly attach it over the damaged area.

5. Let the patch dry for approximately one hour before any additional work is performed.

6. The hole, etc., is then filled with the repair material. A slight overfilling of the repair material is suggested to allow for sanding and finishing after the repair has cured. If patching compound is used the repair should be made in layers, not exceeding a 1/2 inch in thickness at a time, thus allowing the compound to cure and insuring a good solid buildup of successive layers is required.

f. Stress Lines: (Refer to Figure 4-33.)

1. Stress lines produce a whitened appearance in a localized area and generally emanate from the severe bending or impacting of the material.(Refer to Figure 4-34.)

2. To restore the material to its original condition and color, use a hot air gun or similar heating device and carefully apply heat to the affected area. Do not overheat the material.

g. Painting the Repair:

1. An important factor in obtaining a quality paint finish is the proper preparation of the repair and surrounding area before applying any paint.

2. It is recommended that parts be cleaned prior to painting a commercial cleaner or a solution made from one-fourth cup of detergent mixed with one gallon of water.

3. The paint used for coating thermoplastic can be either lacquers or enamels depending on which is preferred by the repair facility or customer. (SEE NOTE.)

NOTE

It is extremely important that solvent formulations be considered when selecting a paint, because not all lacquers or enamels can be used satisfactorily on thermoplastics. Some solvents used in the paints can significantly affect and degrade the plastic properties.

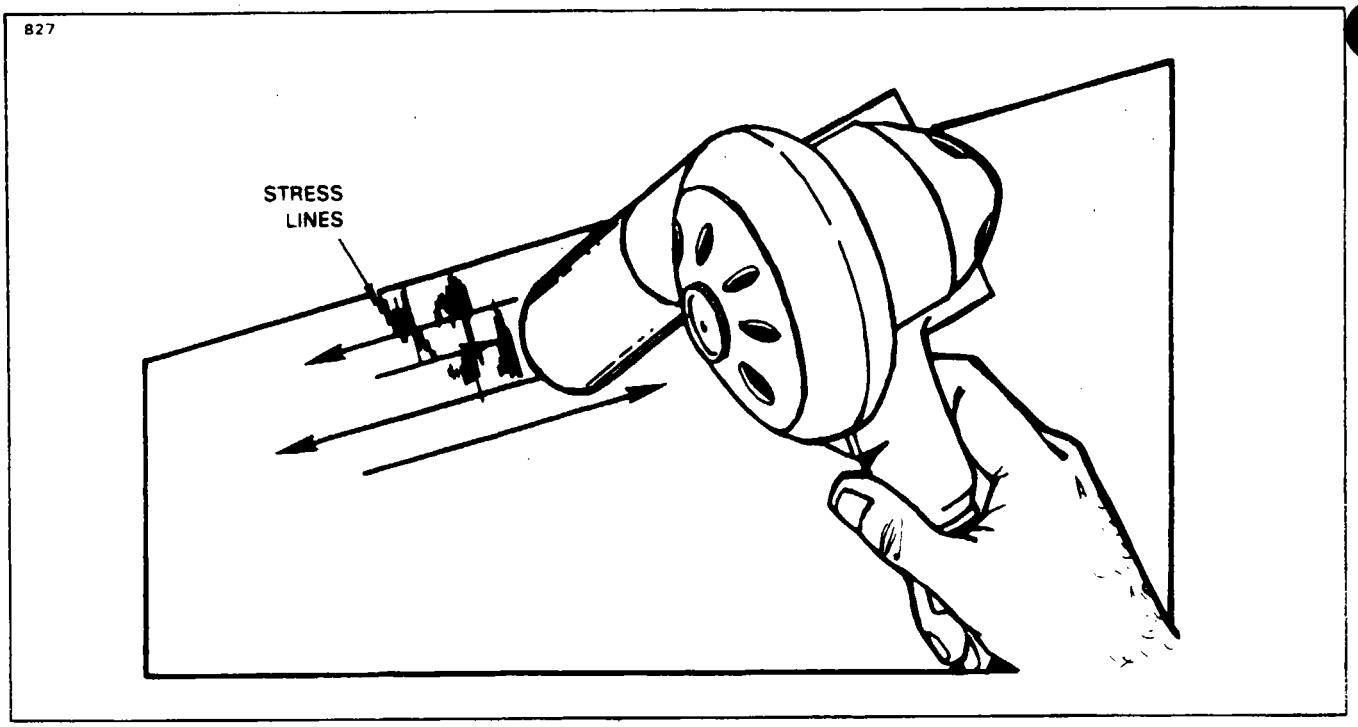


Figure 4-33. Repair of Stress Lines

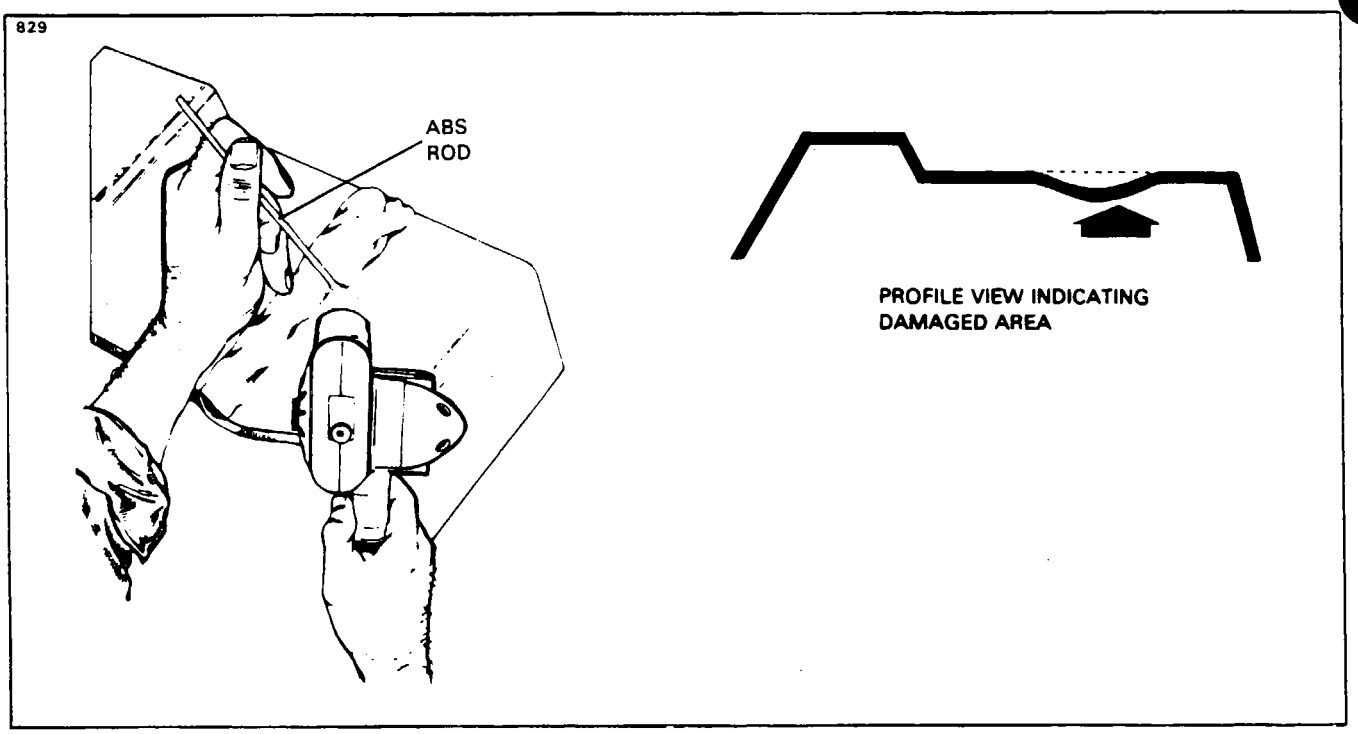


Figure 4-34. Repair of Impacted Damage

4. Another important matter to consider is that hard, brittle coatings that are usually best for abrasion resistance should not be used in areas which incur high stress, flexing or impact. Such coating may crack, thus creating a weak area.

4-75. SAFETY WALK REPAIR.

4-76. SURFACE PREPARATION.

a. Clean all surfaces with a suitable cleaning solvent to remove dirt, grease and oils. Solvents may be applied by dipping, spraying or mopping.

b. Insure that no moisture remains on the surface by wiping with a clean dry cloth.

c. Outline the area to which the liquid safety walk compound is to be applied, and mask adjacent surfaces.

NOTE

Newly painted surfaces shall be allowed to dry for 2.5 hours minimum prior to the application of the safety walk.

4-77. PRODUCT LISTING FOR LIQUID SAFETY WALK COMPOUND. (PPS-45010-1)

a. Suggested Solvents:
   Safety Solvent per MIL-S-18718
   Sherwin Williams Lacquer Thinner R7KC120
   Glidden Thinner No. 207

b. Safety Walk Material:
   Walkway Compound and Matting Nonslip (included in Piper Code No. 179 872)

4-78. APPLICATION OF LIQUID SAFETY WALK COMPOUND. Liquid safety walk compound shall be applied in an area, free of moisture for a period of 24 hours minimum after application. Do not apply when surface to be coated is below 50°F. Apply liquid safety walk compound as follows:

a. Mix and thin the liquid safety walk compound in accordance with the manufacturer's instructions on the container.

b. Coat the specified surfaces with a smooth, unbroken film of the liquid safety walk compound. A nap type roller or a stiff brush is recommended, using fore and aft strokes.

c. Allow the coating to dry for 15 minutes to one hour before recoating or touch-up; if required after application of the initial coating.

d. After recoating or touch-up, if done, allow the coating to dry for 15 minutes to one hour before removing masking.

NOTE

The coated surface shall not be walked on for six hours minimum after application of final coating.

4-79. SURFACE PREPARATION FOR PRESSURE SENSITIVE SAFETY WALK. The areas to which the pressure sensitive safety walk is to be installed must be free from all contaminates and no moisture present. If liquid safety walk is installed the area must be prepared as follows:

a. Area must be masked off to protect painted surfaces.

b. Apply suitable stripper MEK Federal Spec. TT-M-261, U.S. Rubber No. 3339 to wingwalk compound. As compound softens remove by using putty knife or other suitable tool.

c. Area must be clean and dry prior to painting.

d. Prime and paint area.

NOTE

Newly painted surfaces, shall be allowed to dry for 2.5 hours minimum prior to the application of the safety walk.

4-80. APPLICATION OF PRESSURE SENSITIVE SAFETY WALK. Wipe area with a clean dry cloth to insure that no moisture remains on surface. Do not apply when surface temperature is below 50° F. Apply pressure sensitive safety walk as follows:

a. Peel back the full width of the protective liner approximately 2 inches from the leading edge of the safety walk.

b. Apply the safety walk to the wing area, begin at the leading edge, insure proper alignment and position from wing lap.

c. Remove the remaining protective liner as the safety walk is being applied from front to back of wing area.

d. Roll firmly with a long handled cylindrical brush in both lengthwise directions. Make sure all edges adhere to the wing skin.

e. Install and rivet leading edge retainer.

4-81. SHOULDER HARNESS INERTIA REEL ADJUSTMENT.

a. Allow the harness to wind up on the reel as much as possible.

b. On the end of the reel, pry off the plastic cap over the spring, making sure the spring does not come out of the plastic cap, and set cap aside.

c. Unwind the harness completely, then measure and mark the harness 24 inches from the reel center.

d. Wind the harness onto the reel until the 24 inch mark is reached, then hold reel and place cap with spring over the reel shaft end.

e. Aligning slot in shaft with spring tank, wind spring 6 turns $\pm$ 1/2 turn and snap in the plastic cover into holes in reel end shaft.

f. Release harness and allowing it to wind up, extend the harness a few times to check reel for smooth operation.

g. With reel fully wound, hold with inertia mechanism end up and pry off plastic cap over mechanism and set reel aside.

h. Install nut in plastic cap so that stud in cap is flush with nut surface, then reposition cap over reel end and orientating properly, snap in place. Extend harness a few times to make sure action is correct.