Section V

LANDING GEAR

5-1. NOSE AND MAIN LANDING GEAR.

5-2. The F-106A and F-106B airplanes are equipped with hydraulically operated retractable tricycle landing gear consisting of two main landing gear assemblies and one steerable nose landing gear assembly, as shown on figure 5-1. When airborne, the main landing gear assemblies retract inboard and up into the wheel wells in the wing and fuselage area. In the retracted position, each main landing gear assembly is housed in its respective wheel well by a hydraulically actuated fuselage door and wing-mounted fairing actuated by arms attached to the gear strut. The right and left main landing gear assemblies are interchangeable, except for the wing fairing plates, which are hand trimmed to fit each individual opening. The nose landing gear assembly retracts forward and up into the fuselage nose wheel well, and when retracted is housed in its wheel well by the nose landing gear door.

5-3. DESCRIPTION OF LANDING GEAR AND COMPONENTS.

5-4. Nose Landing Gear.

5-5. The nose landing gear assembly shown on figure 5-2 consists of a shock strut assembly, steerable dual nose wheels mounted on a single axle, a steer-damp unit, and a gear retraction mechanism. The shock strut is supported in trunnion fittings riveted to the aircraft structure in the nose wheel well. The shock strut attaches to these trunnion fittings by means of a pivot beam integral with the strut outer cylinder housing. The outer cylinder housing and integral pivot beam is a 7075-T6 aluminum alloy forging with attached steel trunnion pins. The piston assembly is made of SAE 4340 heat-treated steel and is integral with the single axle. The steering collar assembly keys to the lower end of the outer cylinder housing and turns in a set of upper and lower bushings to permit the hydraulically powered steer-damp unit operating lever and link assembly to turn the dual nose wheels. The drag brace is a 7075-T6 aluminum alloy forging; it connects at its upper end to the gear retracting mechanism and at its lower end to the fixed truss on the forward side of the strut.

5-6. Nose Landing Gear Door.

5-7. The nose landing gear door consists of a rectangular outer frame longitudinally bisected by a central beam. Four stringers parallel the central beam, two through the upper half of the door and two through the lower half of the door. The stringers are spaced equally between the door outer frame and the central beam. Eight cross frame members are perpendicular to the central beam and stringers. The cross frame members are attached to the outer frame, central beam, and stringers with clips and rivets. The entire door structure is covered by an inner and outer skin. The nose landing gear door mechanism consists of a bellcrank assembly and door link operated by a hydraulic actuating cylinder. The door mechanism has no locking action since the "door-closed" locks are integral parts of the actuating cylinder. The nose landing gear door structure and plating details are shown on figure 5-3.

5-8. Main Landing Gear.

5-9. The main landing gear components are shown on figure 5-4. Each of the two main landing gear assemblies consists of a shock strut with integral axle, an actuating cylinder, a side brace, a scissors assembly or torque arms, and two drag braces. The shock strut is supported in a trunnion mounted pivot beam attached to forged recesses in number three and four wing spars. On one end the pivot beams are hinged to the shock strut mountings and on the other end they are pinned in the recessed trunnion mountings. The shock strut outer cylinder housing is made of 7075-T6 aluminum alloy forging. The forward and aft drag braces on each main landing gear are cylindrical in shape and are pressure-welded at each end to forged end fittings. The drag braces are hollow and serve as air storage accumulators for the high-pressure pneumatic system. The drag braces are made of SAE 4340 steel. The side brace assembly of each main landing gear consists of two subassemblies. The subassemblies hinge as a knee at a fork connection. The lower assembly is a forged I-section. The upper assembly is cylindrical and incorporates an internal mechanical lock linkage. The torque arm assembly, or scissors, includes an upper arm attached to the shock strut outer cylinder housing, and a lower arm linked to the piston tube. The arms hinge at their apex. Both sections of the scissors are made of 7075-T6 aluminum alloy.

5-10. Main Landing Gear Fuselage Doors.

5-11. The main landing gear fuselage door structure consists of a zee-shaped pan forming the outer frame, a

KEY	COMPONENT	FIGURE REFERENCE
1.	Nose landing gear.	Figure 5-2
2.	Nose landing gear door structure and plating.	Figure 5-3
3.	Main landing gear.	Figure 5-4
4.	Main landing gear fuselage door structure and plating.	Figure 5-5
5.	Main landing gear wing fairing structure and plating.	Figure 5-6

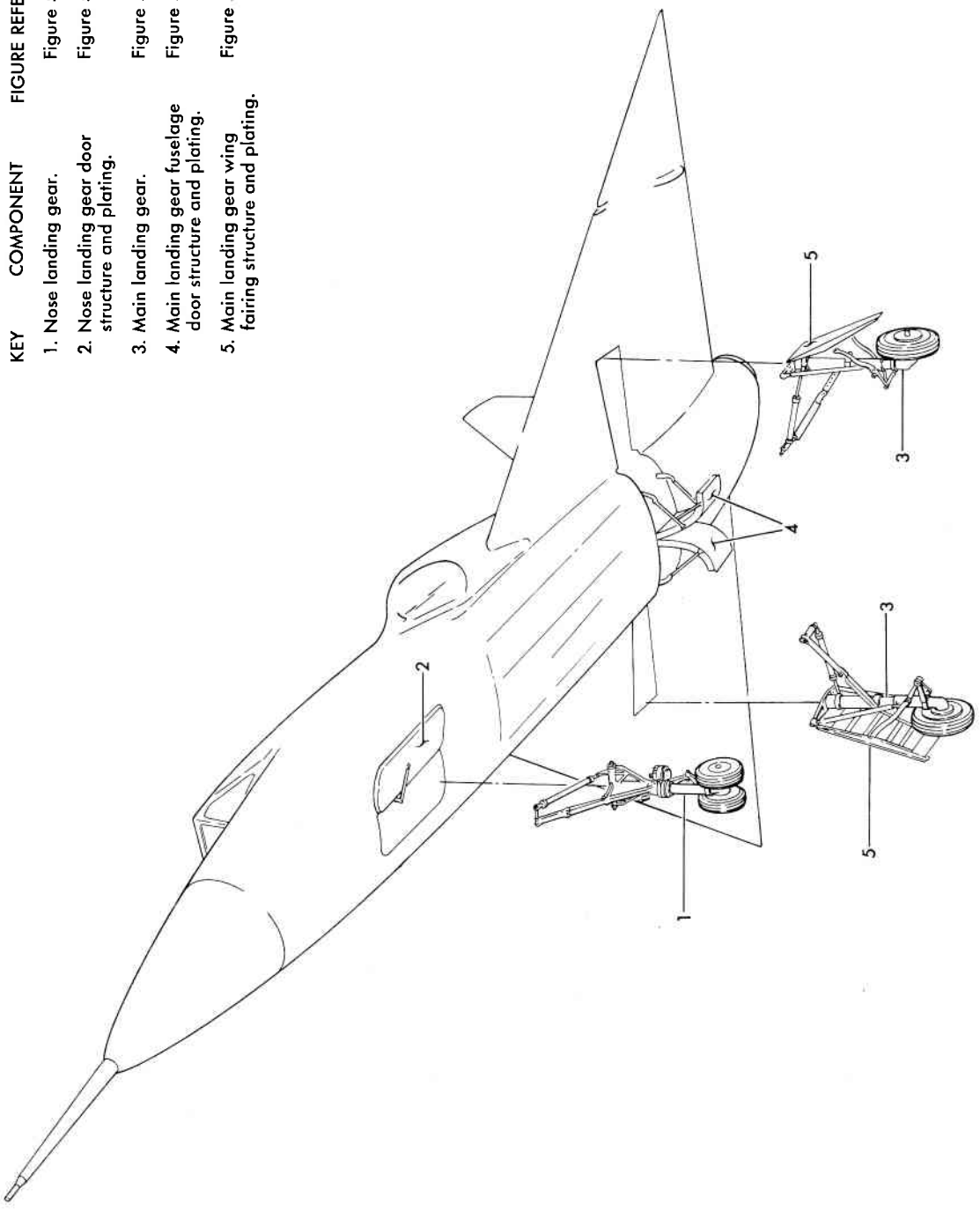

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Figure 5-1. Landing Gear Components and Figure Index

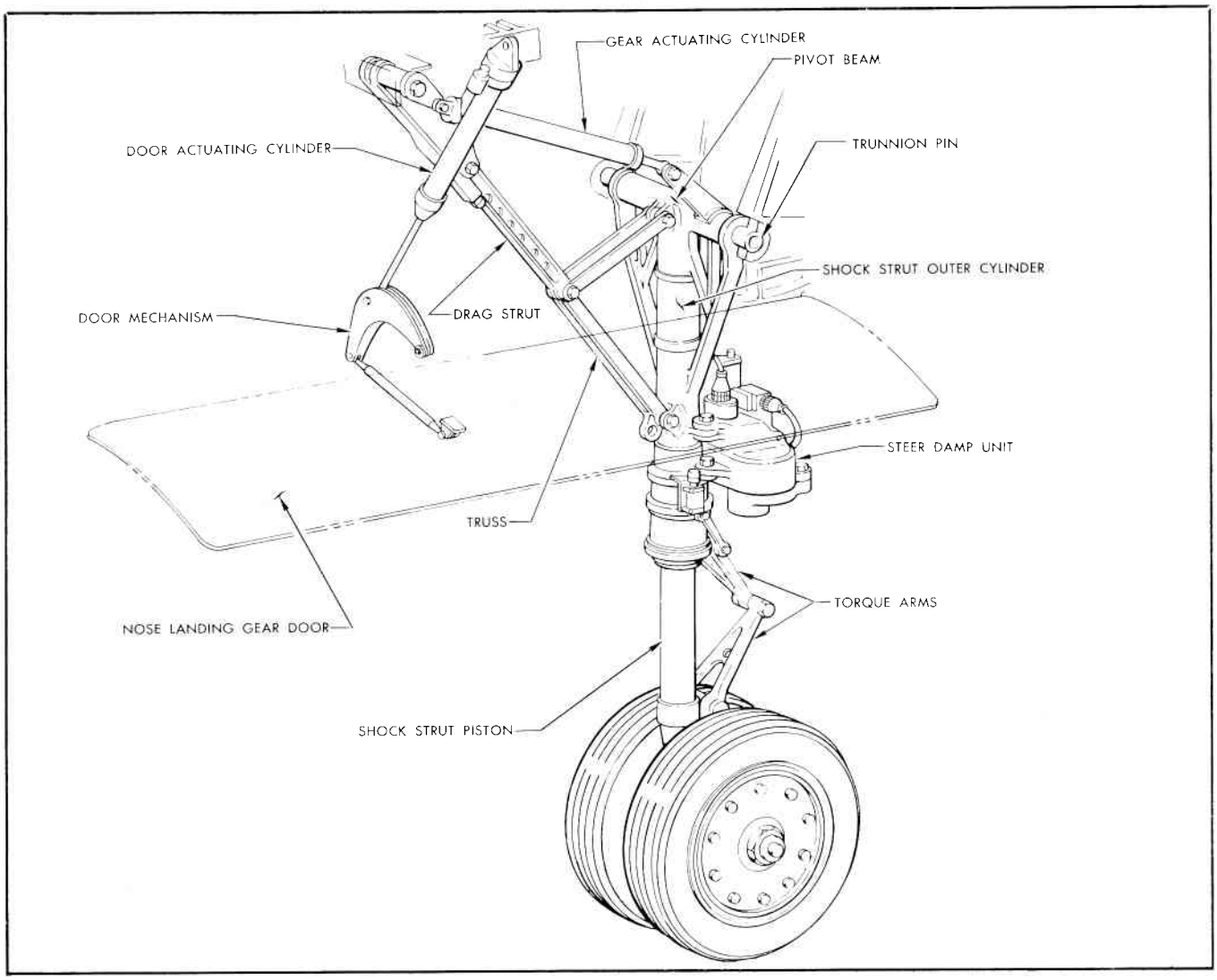


Figure 5-2. Nose Landing Gear

1. TO PREVENT STRESS CONCENTRATION, REMOVAL OF MATERIAL IN RADII IS NOT PERMITTED.
2. ON THE SURFACES INDICATED BY ARROWS AND THE SHADED SURFACES, 20% OF THE ORIGINAL THICKNESS MAY BE REMOVED OVER THE ENTIRE SURFACE FOR CLEAN UP OF CORROSION.
3. IF THE SURFACE TO BE REWORKED REQUIRES REMOVAL OF MORE THAN 20% OF THE ORIGINAL THICKNESS, CONSULT AN AEROSPACE ENGINEER.
4. IF CORROSION DAMAGE EXISTS ON BOTH SIDES OF A SURFACE, THE TOTAL REMOVAL FROM BOTH SIDES SHALL NOT EXCEED 20% OF THE ORIGINAL THICKNESS.
5. THE REWORKED AREAS MUST BE BLENDED INTO THE SURROUNDING AREAS WITH NO SHARP DISCONTINUITIES IN THE MATERIAL SURFACE.
6. TOUCH UP REWORKED AREAS IN ACCORDANCE WITH THE CORROSION PREVENTION TECHNIQUES CONTAINED IN SECTION I OF THIS T.O.

NOTE
THE SAME AREA OF THE FITTING WILL NOT BE REWORKED IF 20% OF ORIGINAL THICKNESS HAS PREVIOUSLY BEEN REMOVED.

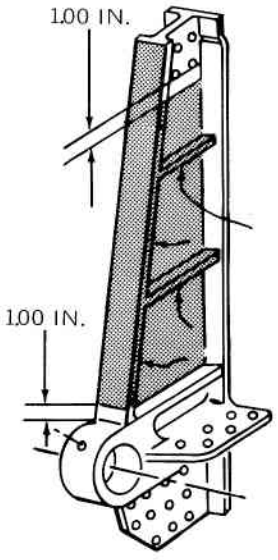


Figure 5-2A. Nose Landing Gear Trunnion Fitting Repair

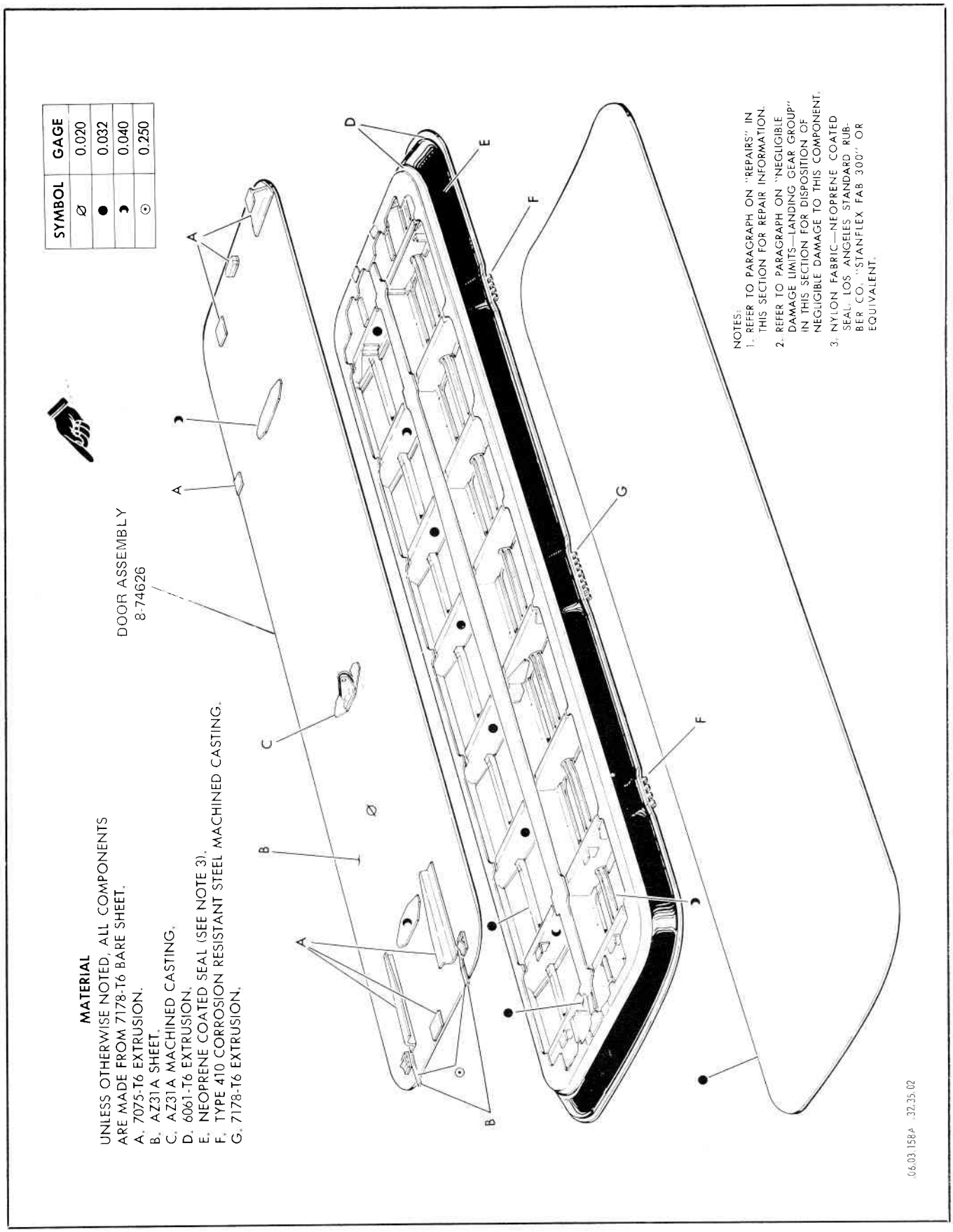


Figure 5-3. Nose Landing Gear Door Structure and Plating

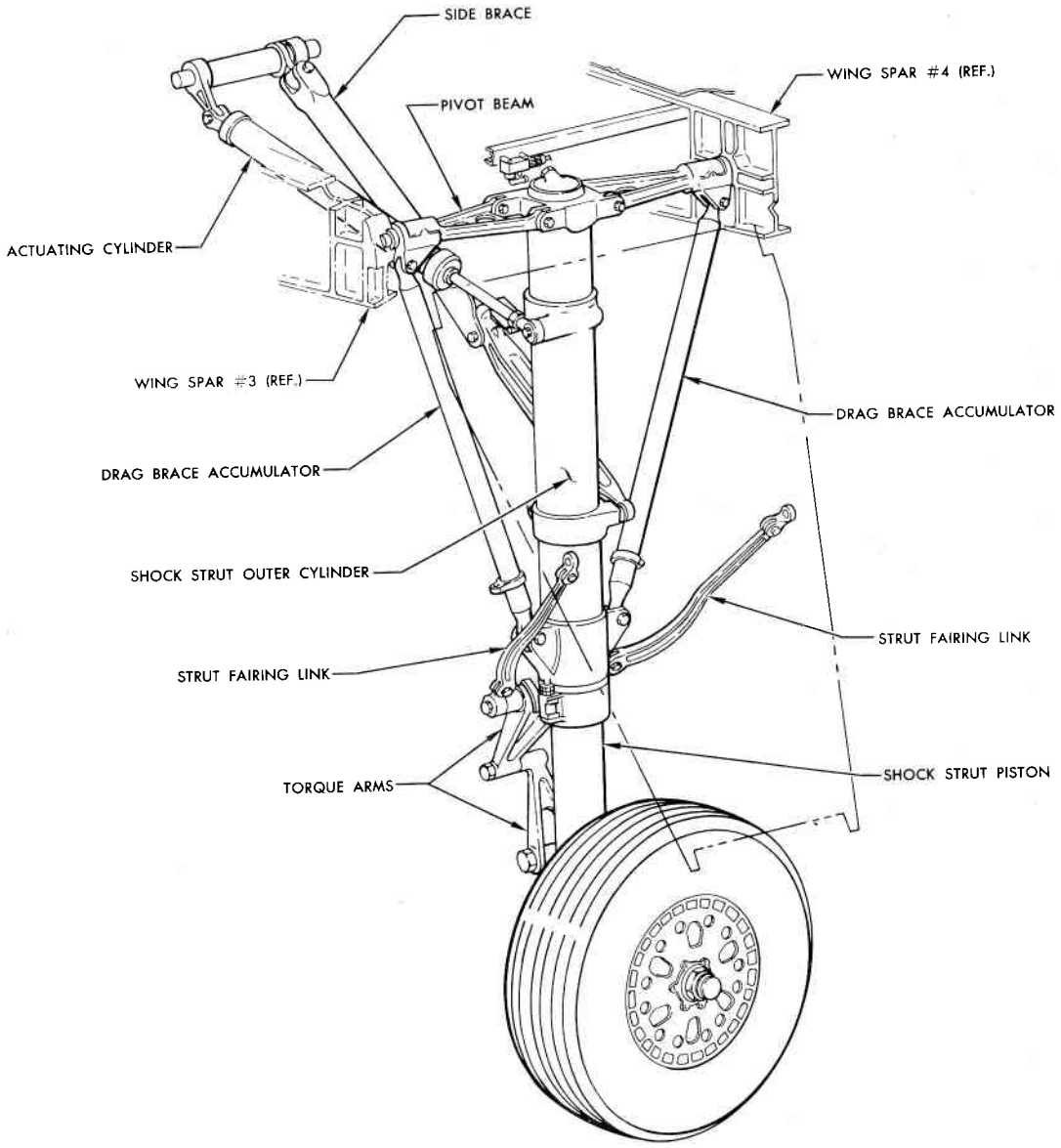


Figure 5-4. Main Landing Gear

longitudinal beam, three transverse ribs, and an inner and outer skin. As shown on figure 5-5, the outer frame is divided longitudinally by a beam formed of angles and tees. Three ribs perpendicular to the longitudinal beam are attached to the outer frame with clips and rivets. The beam and ribs reinforcing the outer frame are made of 7075-T6 clad aluminum alloy. A heavy gage outer skin made of 7075-T6 clad aluminum alloy sheet is spotwelded to the inner door structure and a lighter gage inner skin of the same material is riveted to the outer frame, beam, and ribs. The door is actuated by a hydraulic door mechanism consisting of an idler type bellcrank and an actuating cylinder. The door mechanism is spring-loaded overcenter in both the open and closed positions. The main landing gear fuselage door attaches to the fuselage with a piano-type hinge along the inboard edge of the door structure. See figures 5-9 and 5-10 for typical door repair.

5-12. Main Landing Gear Wing Fairings.

5-13. The main landing gear wing fairing structure consists of a forward and aft vertical beam, a series of horizontal stiffener ribs, an outer skin, and a partial inner skin. As shown on figure 5-6, the horizontal stiffeners are attached to the forward and aft vertical beams with clips and rivets. The beams, stiffener ribs, and the skins are made of 7075-T6 clad aluminum alloy of various gages. The outer skin is spotwelded and riveted to the beams and stiffeners, and completely covers the outer surface of the fairing structure. The inner skin is in two parts and covers the inner portion near the upper and lower extremities of the fairing. Brackets are bolted near the center of the forward and aft beams to provide the attaching points for the link assemblies fastened to the main landing gear shock struts. The top of the fairing is hinged from the wing structure at buttock line 88.70 by means of two fitting assemblies and removable pins. The fairing is locked in the up position by means of striker plates which mesh with rollers on the main landing gear fuselage door. See figure 5-11 for repair of fairing.

5-14. REPAIRS.

5-15. Negligible Damage.

5-16. Negligible damage to the landing gear components will be restricted to nicks and dents which, after being cleaned up to a regular shape, do not exceed 1/32 inch in depth and do not occur within 3/4 inch of terminal or lug holes. Any damage other than negligible damage will require engineering disposition. Table 5-I indicates the maximum allowable classifications of five types of negligible damage (damage allowed to remain "as is," after minor rework such as stop drilling cracks and fairing in nicks or scratches). The maximum allowable damage classification will be found to the right of the component name in the vertical column under the "type of damage" heading. After classification is determined, see figures 1-17 through 1-19 for the damage limits allowed for each class: I, II, or III. The limits given on figures 1-17 through 1-19 apply only for a damaged area after rework, as shown on figures 1-20 and 1-21. An aeronautical structural engineer must be consulted for damages exceeding the limits given on figures 1-17 through 1-19, and for damage to components not listed in the table.

5-17. Repair of Nose Wheel Well Curtains.

5-18. Rips, tears, and holes in the nose wheel well curtains are to be repaired as follows:

a. Roughen surface of curtain to be repaired with rough sandpaper.

b. Mix enough EPON 828 to complete repair. Follow the manufacturer's mixing instruction shown on the container.

c. Brush on one coat of mixed adhesive to repair area of curtain.

d. Apply a fiberglass cloth patch over damage. Patch should overlap damaged area by 1/2 inch on all sides.

e. Brush a coat of mixed adhesive over patch and allow adhesive to cure.

NOTE

Use a heat lamp to speed cure time.

5-19. Rivet Substitution.

5-20. All rivets used in the landing gear fairing and in the fuselage landing gear doors may be substituted by different types which have either the same or greater strength values than the original rivet, except for the following restriction: No blind rivets may be used in the nose landing gear door.

5-21. Landing Gear Alignment.

5-22. The landing gear is the nonadjustable fixed type manufactured by the Menasco Manufacturing Company. These gears are aligned by a precision fixture at time of airplane manufacture and are held in alignment by their attachment to the airplane structure. For further information concerning landing gear alignment, refer to paragraph 1-270.

5-23. Repair to Doors.

5-24. All repairs to the nose landing gear door must be the flush-type and will require the addition of a sealer to faying surfaces of the parts involved to provide airtightness. Figure 5-8 illustrates and describes a typical nose landing gear door structure and plating repair. See figures 5-5 and 5-6 for reference information regarding repairs to the main landing gear fairing and fuselage door.

5-25. Main Landing Gear Fairing Gap Repair.

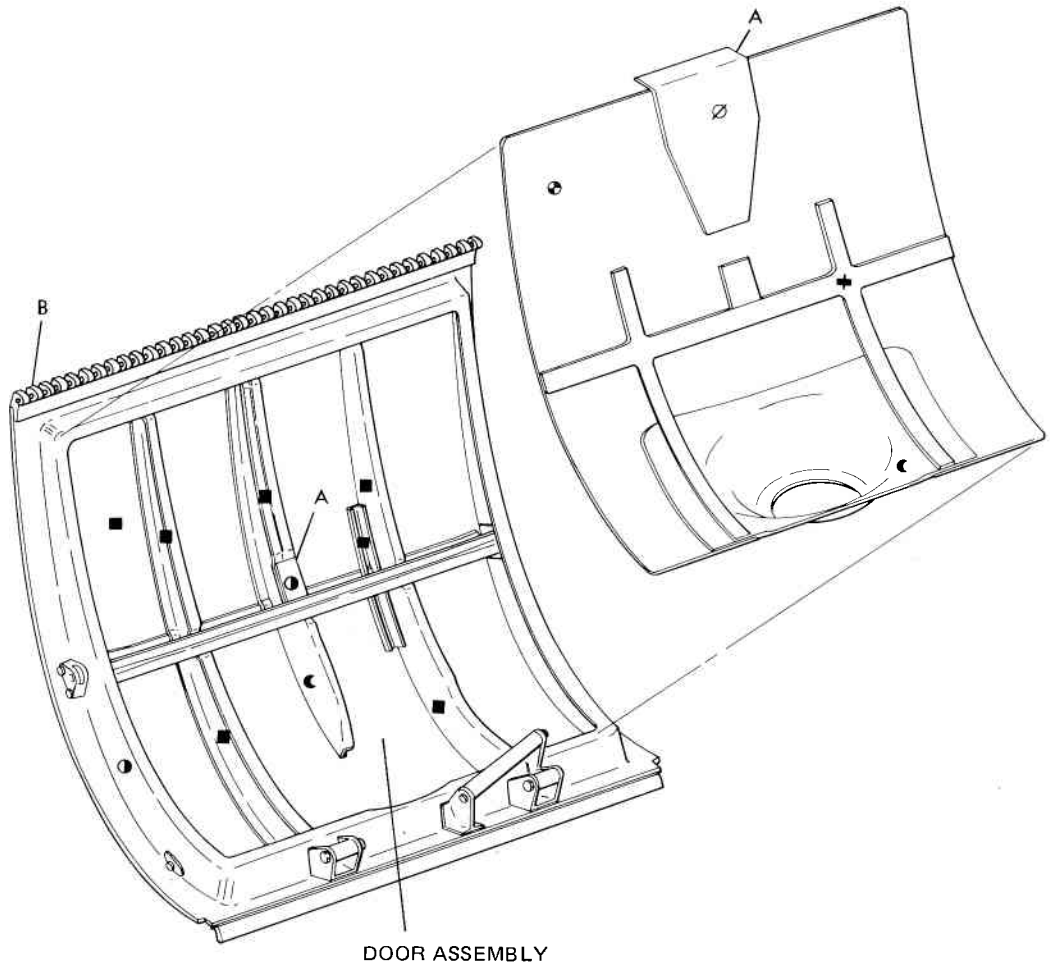
5-26. Transverse gaps greater than 0.080 inch may be reduced to within tolerance by the use of aerodynamic smoothing compound as illustrated on figure 5-7.

MATERIAL

UNLESS OTHERWISE NOTED, ALL COMPONENTS ARE MADE FROM 7075-T6 CLAD SHEET

A. Type 301 corrosion resistant steel.
B. 7178-T6 extrusion.

SYMBOL	GAGE
∅	0.020
◔	0.025
☾	0.040
■	0.050
◑	0.063
✚	0.090



DOOR ASSEMBLY
8-44545

NOTES:
1. REFER TO PARAGRAPH ON "REPAIRS" IN THIS SECTION FOR REPAIR INFORMATION.
2. REFER TO PARAGRAPH ON "NEGLIGIBLE DAMAGE LIMITS—LANDING GEAR GROUP" IN THIS SECTION FOR DISPOSITION OF NEGLIGIBLE DAMAGE TO THIS COMPONENT.

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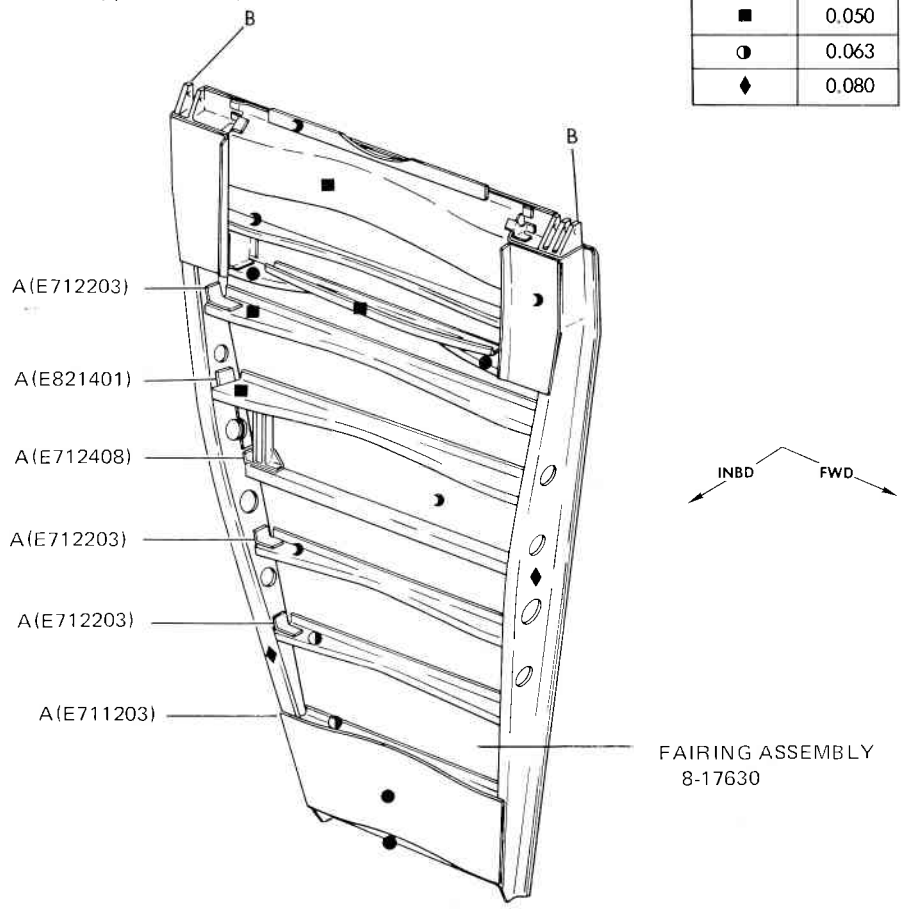
Figure 5-5. Main Landing Gear Fuselage Door Structure and Plating

MATERIAL

UNLESS OTHERWISE NOTED, ALL COMPONENTS ARE MADE FROM 7075-T6 CLAD SHEET

A. 7075-T6 extrusion with Ident No. (See Sec VIII).
B. 7075-T6 machined bar.

SYMBOL	GAGE
●	0.032
◗	0.040
■	0.050
◑	0.063
♦	0.080



NOTES:
1. REFER TO PARAGRAPH ON "REPAIRS" IN THIS SECTION FOR REPAIR INFORMATION.
2. REFER TO PARAGRAPH ON "NEGLIGIBLE DAMAGE LIMITS—LANDING GEAR GROUP" IN THIS SECTION FOR DISPOSITION OF NEGLIGIBLE DAMAGE TO THIS COMPONENT.

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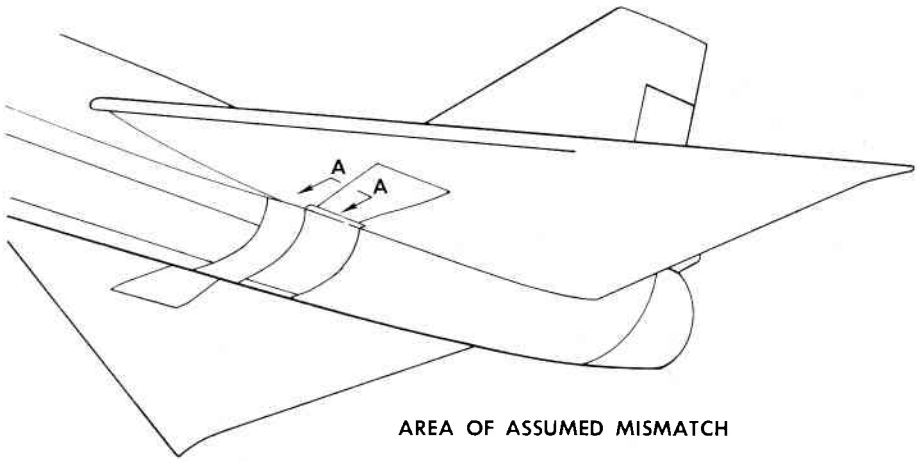
Figure 5-6. Main Landing Gear Wing Fairing Structure and Plating



AREA OF ASSUMED MISMATCH

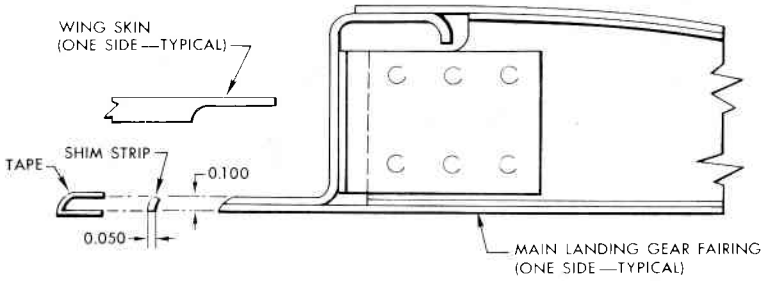
TRANSVERSE GAPS (GAPS ALONG BOTH SIDES OF MAIN LANDING GEAR FAIRING WHERE IT MATES WITH WING SKIN) IN EXCESS OF 0.080 INCH BETWEEN WING SKINS AND RETRACTED MAIN LANDING GEAR FAIRING DOOR MAY BE CORRECTED BY THE FOLLOWING PROCEDURE:

a. Clean painted mating flange of wing skin with cheese cloth dampened with aliphatic naphtha, Specification TT-N-95.
b. Fabricate a shim from a strip of metal or plastic to required length. Dimensions 0.050 inch by 0.10 inch.
c. Attach shim strip to edge of door with a pressure sensitive tape which is non-adhesive on the back side. Use Teflon tape (1.0 inch wide), Minnesota Mining and Mfg. Co., No. 529 or equivalent.
d. Retract gear and fairing to the fully closed position.

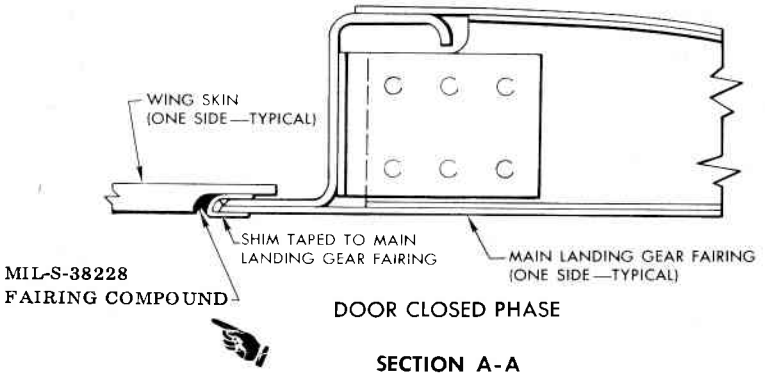
NOTE

INSPECT SHIM STRIP TO MAKE CERTAIN IT IS STILL TAPED SECURELY IN PLACE AND DOES NOT EXTEND BEYOND OUTER CONTOUR OF DOOR AND WING SKIN.

e. Mix a suitable quantity of MIL-S-38228 fairing compound.
f. Apply a fillet of mixed MIL-S-38228 to radius of door opening machined in wing skin. Apply fairing compound in a band wide enough to fill gap and thick enough to match outside contour.
g. Remove excess compound and allow compound to cure.
h. Sand smooth, open door, remove tape and shim strip, and touch up with applicable paint schedule contained in Section I.



DOOR OPEN PHASE

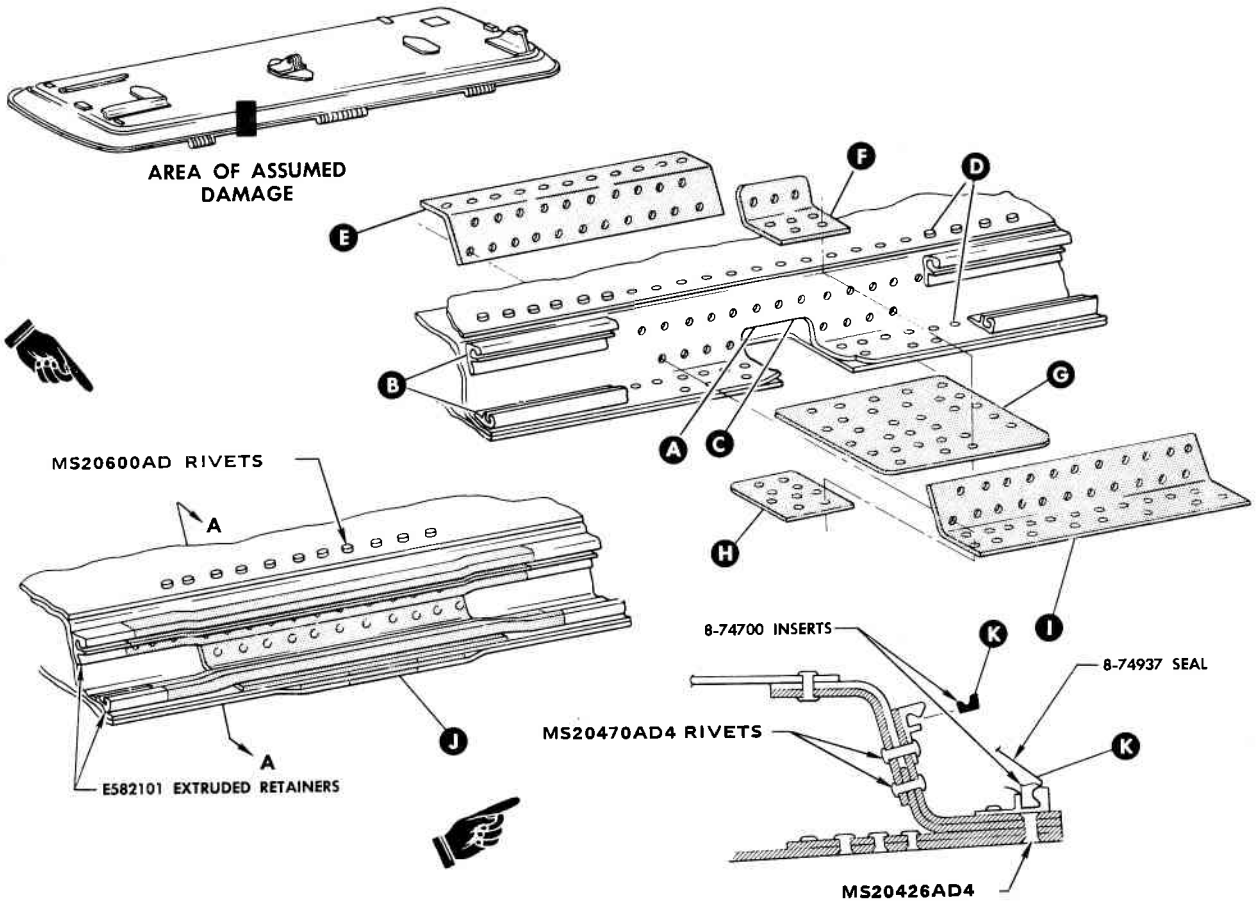


DOOR CLOSED PHASE

SECTION A-A

106 03 292B

Figure 5-7. Main Landing Gear Fairing Repair



- **A** Clean up damaged area to regular shape. Round all corners and break all sharp edges.
- **B** Remove damaged sections of E582101 extruded retainers, 8-74700 inserts and 8-74937 seal.
- **C** Cutback sufficiently to allow for installation of repair materials.
- **D** Using a No. 30 (0.128) drill, remove existing MS20600AD rivets sufficiently to peel back web for accessibility. Drill No. 30 (0.128) holes at spot welds. Countersink 100°x0.235 far side and both sides outer row.
- **E** Fabricate inside splice angle of same type material and gage as door pan. Drill No. 30 (0.128) holes to match existing rivet holes in pan.
- **F** Fabricate filler plate of same type material and gage as door pan. Drill existing holes.
- **G** Fabricate doubler from 0.020 gage type 301 ¼ hard corrosion resistant steel or suitable substitute. Drill No. 30 (0.128) holes to match existing patterns. Insert between skin and flange of pan. (Refer to Section I for minimum rivet spacing.)
- **H** Fabricate flush patch of same type material and gage as outer skin. Drill No. 30 (0.128) to match existing patterns. (Refer to Section I for minimum rivet spacing.)
- **I** Fabricate outside splice angle from 0.025 gage, type 301 ¼ hard corrosion resistant steel or suitable substitute. Drill No. 30 (0.128) holes to match existing rivet patterns.
- **J** Install inside splice angle, filler plate, flush patch, doubler, outside splice angle and section of E582101 extruded retainers with MS20600AD, MS20470AD4 and MS20426AD4 rivets as shown.
- **K** Install 8-74700 inserts and 8-74937 seal.

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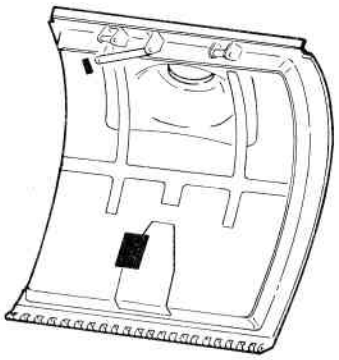
Figure 5-8. Nose Landing Gear Door Repair



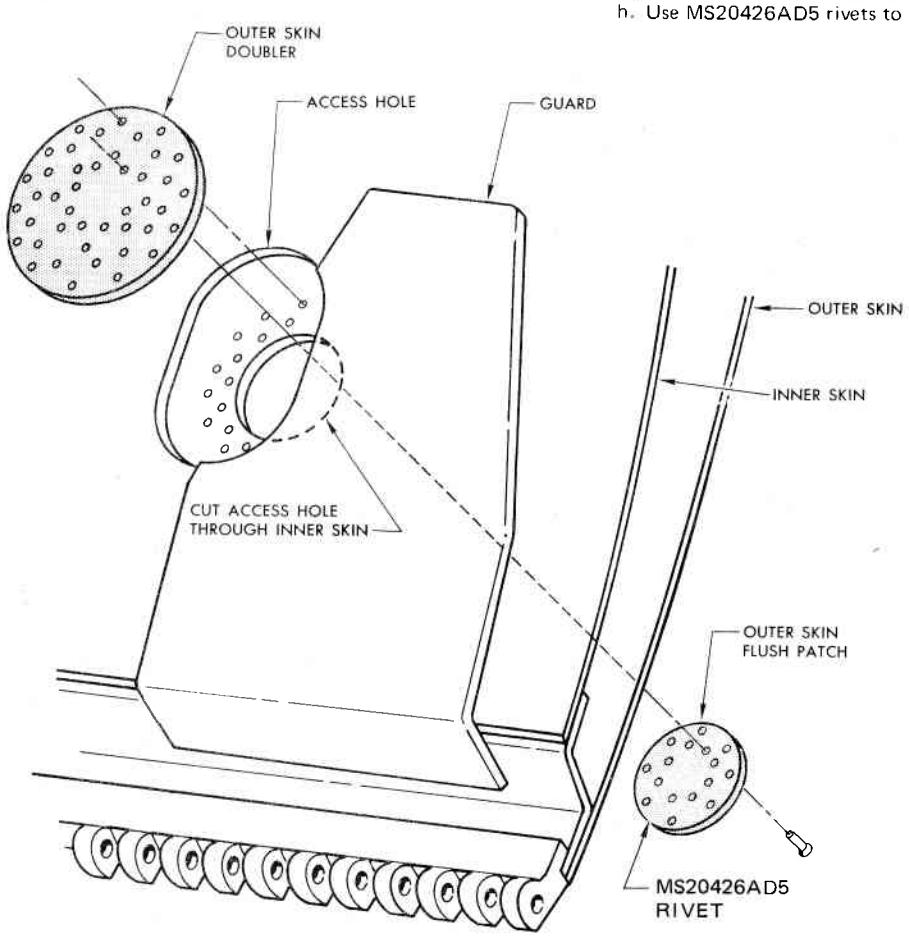
AREA OF ASSUMED DAMAGE

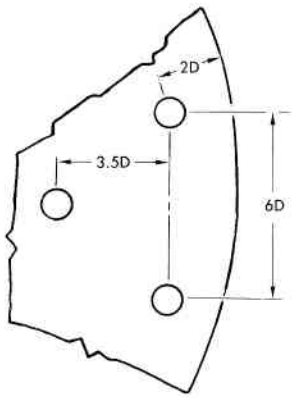
REPAIR PROCEDURE
MAIN LANDING GEAR DOOR

a. Remove main landing gear door and place on a padded work bench.
b. To determine extent of damage make a fluorescent penetrant inspection. Refer to Section I for fluorescent penetrant procedures.
c. Rout out damaged area to a regular shape.
d. Cut an access hole through inner skin. Access hole must be large enough to install a doubler to the outer (damaged) skin.
e. Fabricate doubler from 0.063" 7075-T6 bare aluminum alloy sheet.

NOTE
APPLY FINISH PROTECTION TO REPAIR MATERIALS. REFER TO T.O. 1F-106A-23 FOR APPLICABLE FINISH REQUIREMENTS.

f. Hold doubler in place and drill pilot holes through skin and doubler. Use a No. 24 (0.152) pilot drill. Refer to figure 1-32 for rivet spacing. Ream holes with a No. 20 (0.161) drill.
g. Countersink rivet holes in outer skin.
h. Use MS20426AD5 rivets to attach doubler to skin.





TYPICAL COUNTERSUNK RIVET PATTERN

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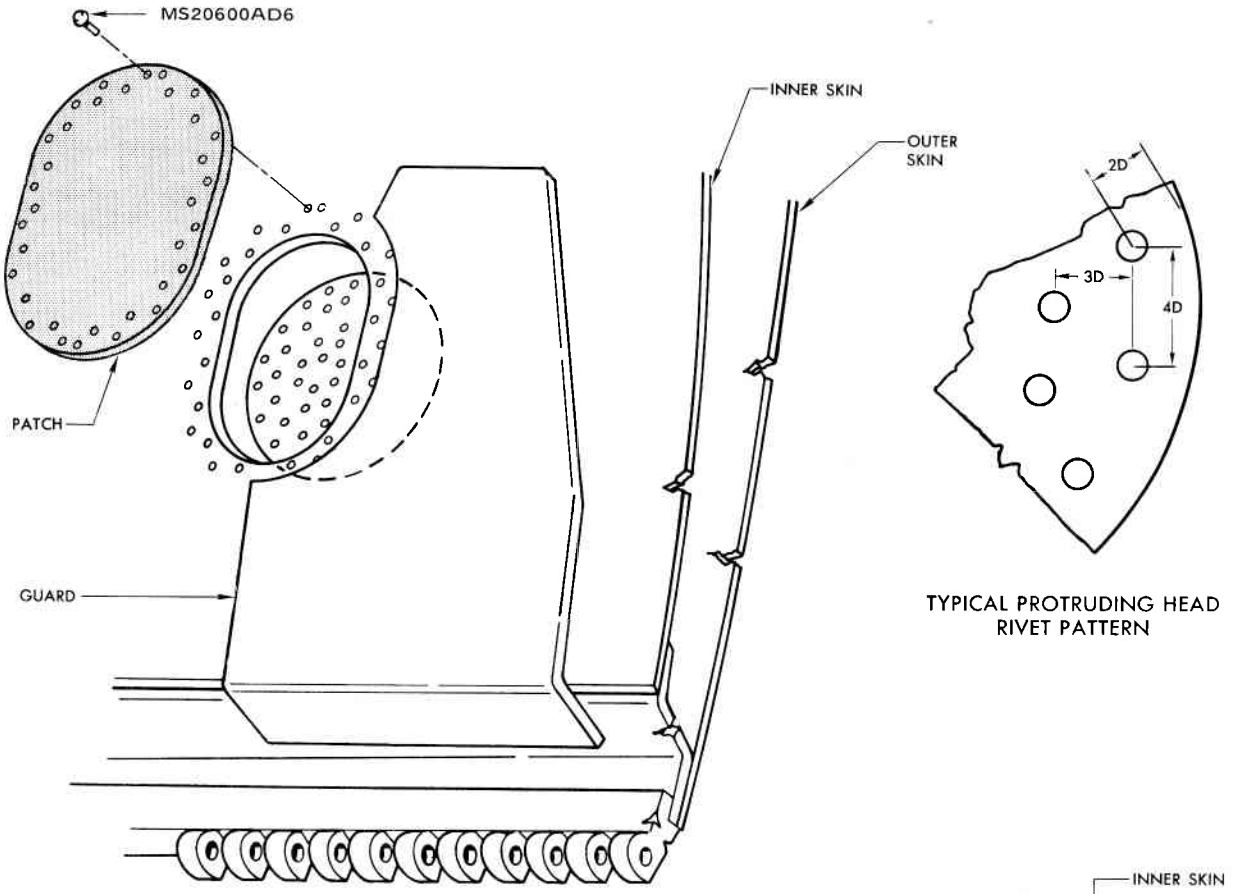
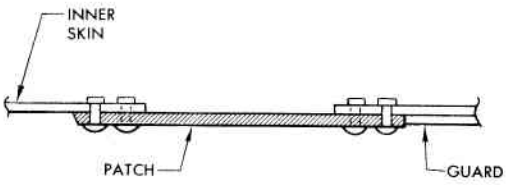
Figure 5-9. Main Landing Gear Door Repair (Sheet 1 of 2)

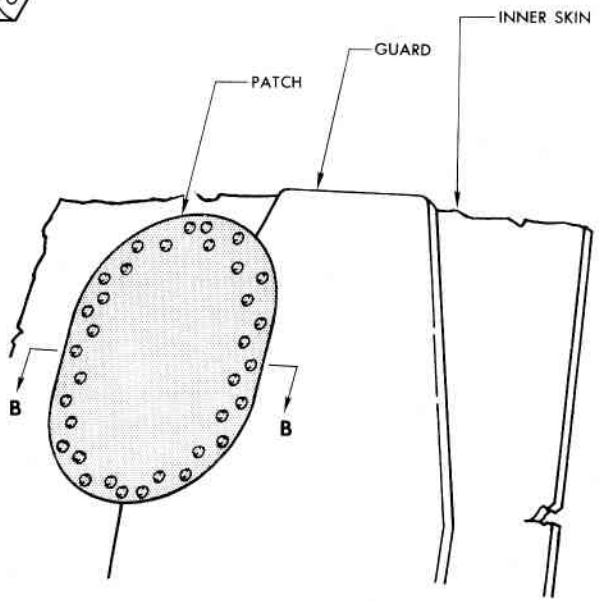


EXPLODED REPAIR

TYPICAL PROTRUDING HEAD RIVET PATTERN



SECTION B-B



ASSEMBLED REPAIR

REPAIR PROCEDURE
MAIN LANDING GEAR DOOR
(CONT)

i. Fabricate a patch from 0.032" 7075ST clad aluminum alloy.
j. Hold patch in place and drill rivet holes. Use a No. 29 (0.136") drill. Refer to Tables 1-VI and 1-VII for rivet spacing.
k. Hold patch in place with cleco fasteners and rivet to inner skin with MS20600AD6 Rivets. Install rivets in accordance with instructions contained in Section I.
l. Install door and adjust in accordance with T.O. 1F-106A-2-8-2-1.

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Figure 5-9. Main Landing Gear Door Repair (Sheet 2 of 2)

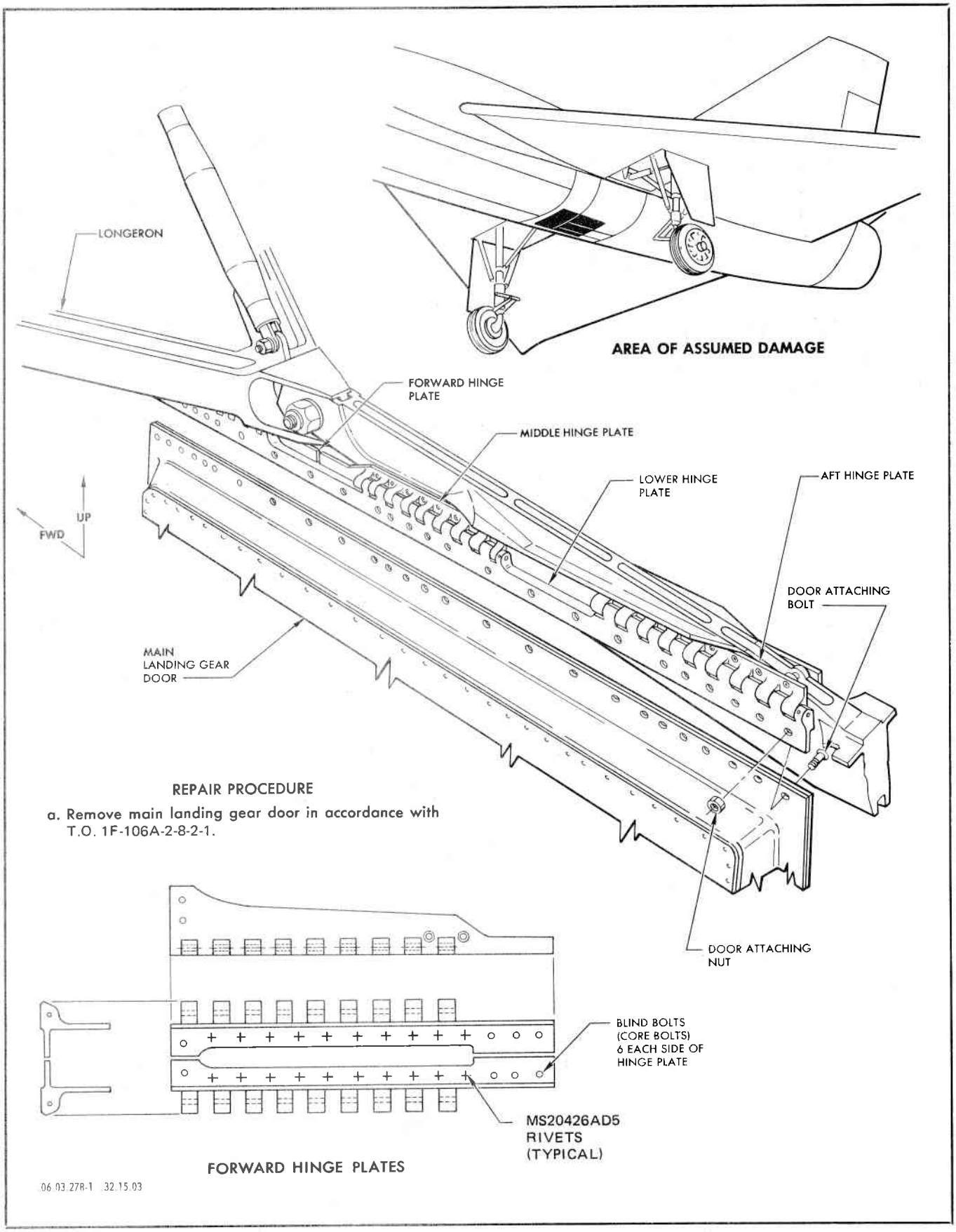


Figure 5-10. Main Landing Gear Door Attachment Repair (Sheet 1 of 2)

REPAIR PROCEDURE
(CONT)

b. Remove AN3-6 bolts (2) at forward end of damaged forward hinge plate.
c. Remove 10-32 screws (2) from lower forward end of damaged forward hinge plate.
d. Remove 10-32 screws (2) from aft end of damaged forward hinge plate.
e. Drill out MS20426AD5 rivets and 3/16 inch blind bolts (core bolts) from filler and forward hinge plate. ■
f. Remove attaching screws from aft hinge plate and remove entire door attachment assembly (forward hinge plate, aft hinge plate and lower hinge plate).
g. Remove hinge pin lock from lower hinge plate and remove forward hinge pin.
h. Replace damaged forward hinge plate and reassemble attachment assembly.
i. Installation of door attachment assembly is essentially the reverse of removal.

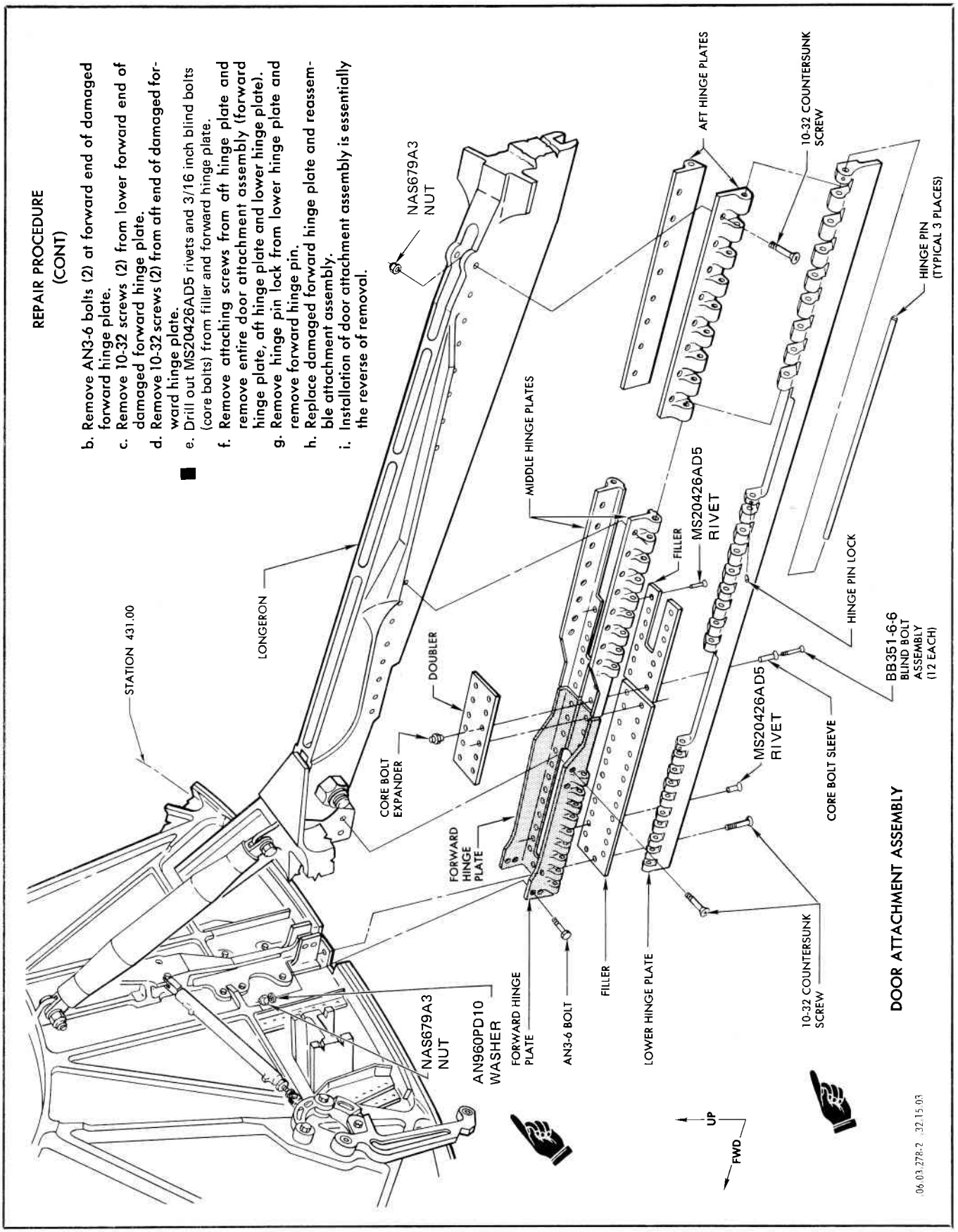
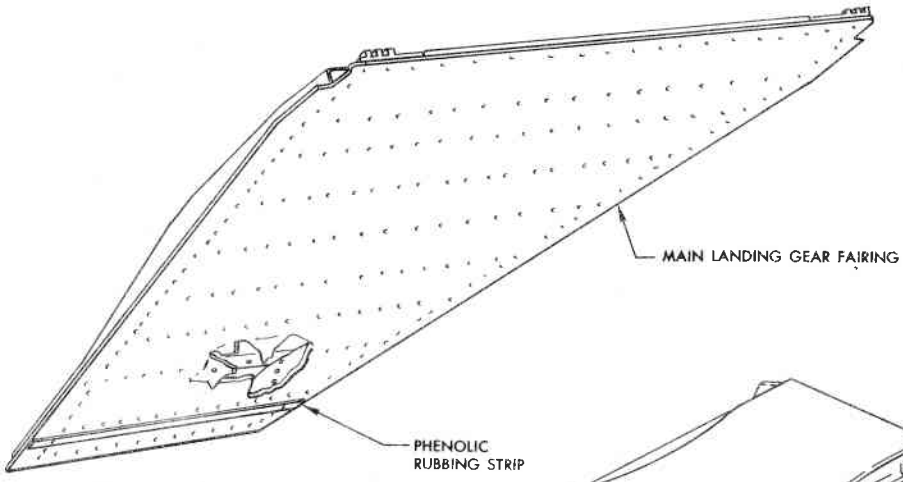
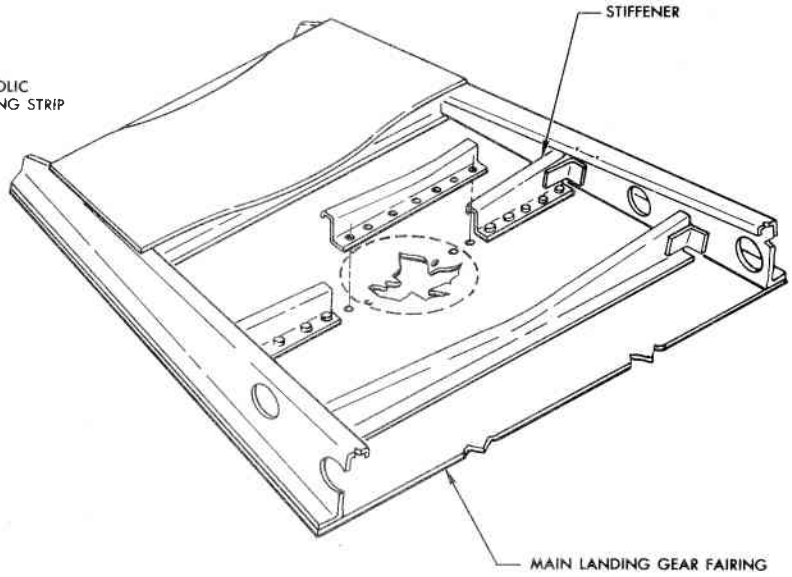
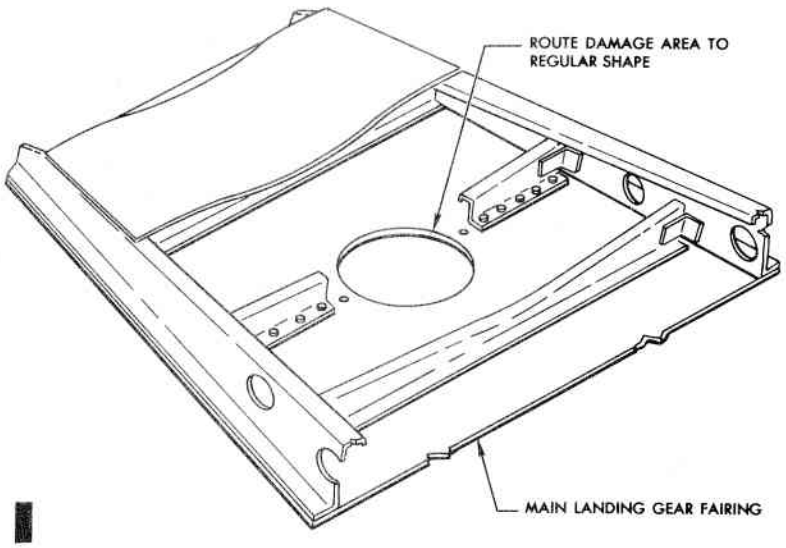


Figure 5-10. Main Landing Gear Door Attachment Repair (Sheet 2 of 2)



AREA OF ASSUMED DAMAGE





REPAIR PROCEDURE
MAIN LANDING GEAR FAIRING

a. Remove main landing gear fairing and place on a padded work bench.
b. To determine extent of damage, perform a fluorescent penetrant inspection.
c. Cut out damaged area of stiffener.
d. Rout out damaged skin to a regular shape.
e. Fabricate a doubler from 0.050" 7075-T6 bare sheet.

NOTE

APPLY FINISH PROTECTION TO REPAIR MATERIALS PER T.O. 1F-106A-23.

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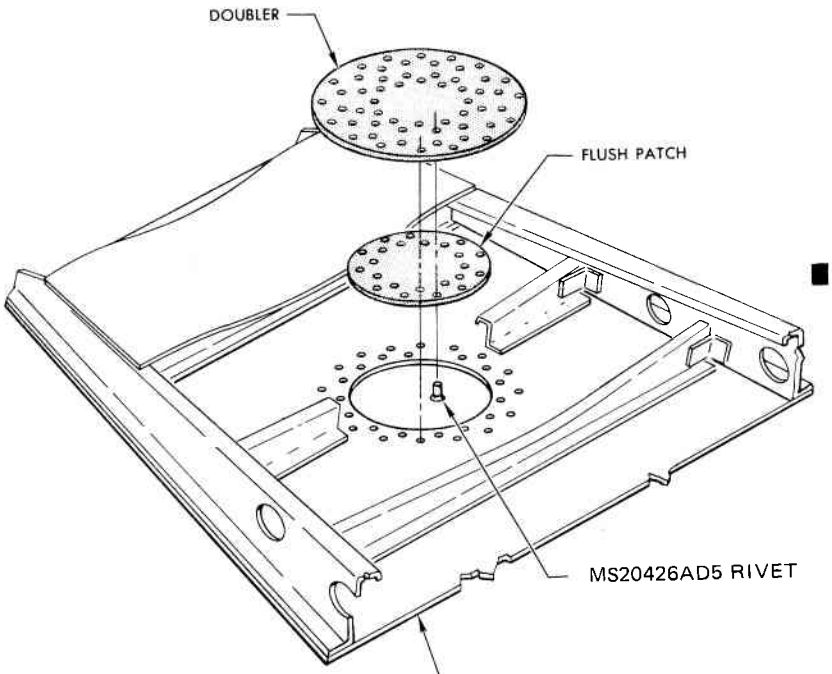
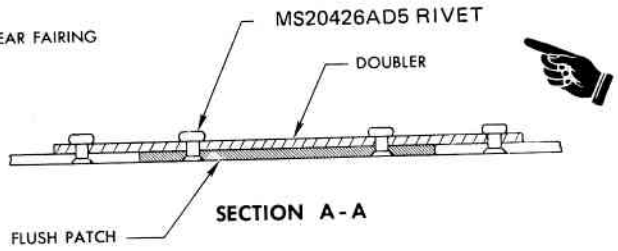
Figure 5-11. Main Landing Gear Fairing Repair (Sheet 1 of 3)



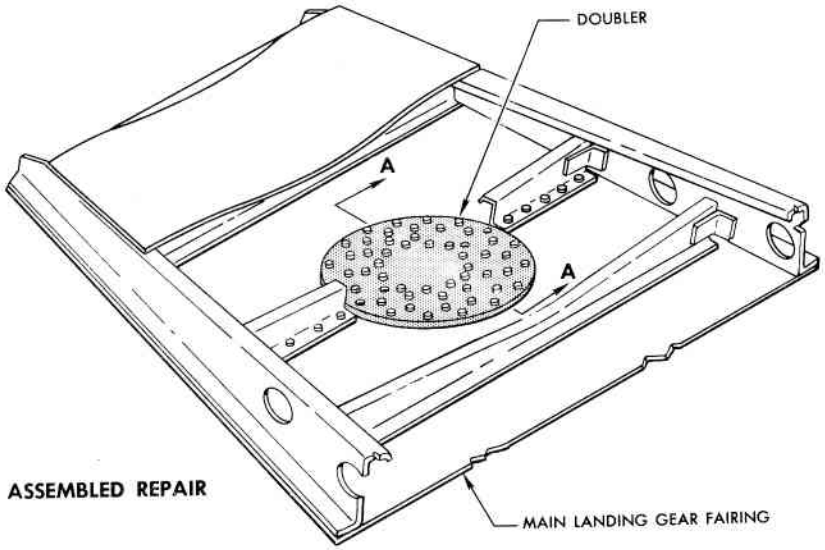
EXPLODED REPAIR

REPAIR PROCEDURE
MAIN LANDING GEAR FAIRING
(CONT)

f. Hold doubler in place and drill rivet holes. Use a No. 21 (0.0160") pilot drill. Ream with a No. 20 (0.161") drill. Refer to Section I for standard rivet spacing.
g. Countersink rivet holes in skin.
h. Use MS20426AD5 100 degree countersink rivets to fasten doubler to skin.
i. Fabricate flush patch from 0.040" 7075-T6 clad aluminum alloy sheet.
j. Use a No. 21 (0.160") drill to drill rivet holes through flush patch and doubler. Ream with a No. 20 (0.161") drill. Refer to Section I for standard rivet spacing.
k. Countersink rivet holes in patch and rivet to doubler.



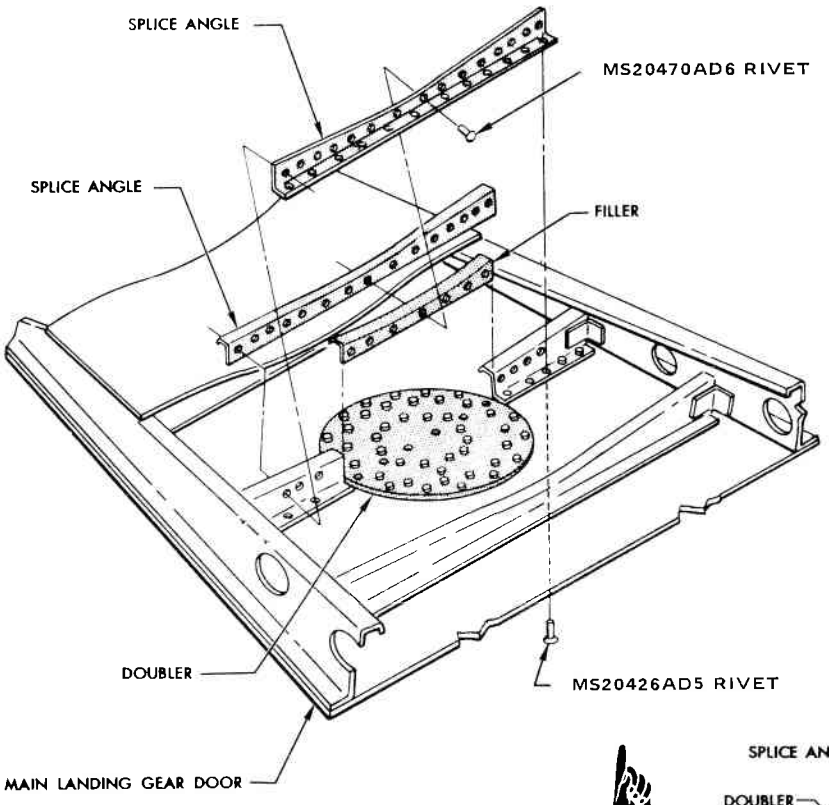
SECTION A-A



ASSEMBLED REPAIR

06.03.268-28

Figure 5-11. Main Landing Gear Fairing Repair (Sheet 2 of 3)

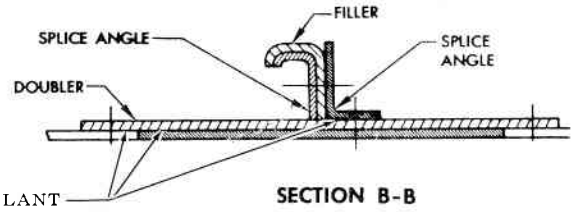


EXPLODED REPAIR

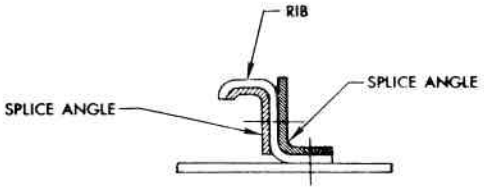
REPAIR PROCEDURE
MAIN LANDING GEAR FAIRING
(CONT)

l. Fabricate filler from 0.063" 7075-0 aluminum alloy.
m. Shape filler to conform to contour of damaged stiffener.
n. Fabricate two splice angles from 0.063" 7075-0 aluminum alloy.
o. Heat treat filler and repair angles to T6 condition.
p. Drill rivet holes for splice angles as shown.
q. Rivet repair in place. Use MS20470AD5 rivets to attach filler and splice angles; use MS20426AD5 rivets to attach skin to splice angles.

NOTE
IF PHENOLIC RUBBING STRIP SHOWN IN AREA OF ASSUMED DAMAGE VIEW IS DAMAGED, INSTALL A NEW STRIP OF THE SAME DIMENSIONS. INSTALL NEW STRIP WITH MIL-S-81733.



SECTION B-B



SECTION C-C

ASSEMBLED REPAIR

06.03.268-3A .32.27.03

Figure 5-11. Main Landing Gear Fairing Repair (Sheet 3 of 3)

TABLE 5-I

Negligible Damage Limits — Landing Gear Section

COMPONENT	TYPE AND CLASS OF DAMAGE ALLOWED AFTER REWORK					REMARKS
	Scratch	Nick	Dent	Hole	Crack	
NOSE LANDING GEAR FITTINGS						
Support Fitting	Refer to an Aeronautical Structural Engineer					
Drag Brace Fitting	Refer to an Aeronautical Structural Engineer					
NOSE LANDING GEAR DOOR STRUCTURE						
Inner Skin	II	II	III	II	II	
Outer Skin	I	I	*	*	*	
Pan	II	II	III	II	I	
Ribs	II	II	III	II	I	
Hinge Fittings	I	I	*	*	*	
MAIN LANDING GEAR FITTING						
Side Brace Fitting	Refer to an Aeronautical Structural Engineer					
MAIN LANDING GEAR DOOR STRUCTURES						
Inner Skin	II	II	III	II	II	
Outer Skin	II	II	*	*	*	
Pan	II	II	III	II	II	
Ribs	II	II	II	II	I	
Hinge Fittings	I	I Refer to an Aeronautical Structural Engineer				
MAIN LANDING GEAR FAIRING						
Inner Skin	II	II	III	II	II	
Outer Skin	II	II	*	*	*	
Channels	II	II	I	I	I	
Ribs	II	II	I	II	II	

*Component must be repaired or replaced.

5-27. Main Landing Gear Fairing Vertical Beams Repair.

5-28. The main landing gear fairing is pulled securely into wing contour when the landing gear door closes. For this reason the stiffness of the fairing vertical beams is critical. The repairs shown in Figure 5-12 can be made between BL47.50 and BL72.40 and are limited to one repair to the inner flange and one repair to the outer flange of each beam. If damage to a beam is more extensive, the beam should be replaced. After a beam repair. fairing contour should be checked; see paragraph 5-29.

5-29. Main Landing Gear Fairing Contour Check.

5-30. The contour of the main landing gear fairing must fall within specified limits. A poorly contoured fairing might not provide the necessary security when it is clamped in place by action of the gear door. Contour should be checked after a repair to a broken beam. A contour check template, Part No. 8-17630-93, may be manufactured locally if not available (see Figure 5-13). Figure 5-14 illustrates and describes the contour offset limits in graph form; fairings that do not meet these limits must be replaced.

5-31. Rebushing of Main Landing Gear Trunnion Cavity Hole.

5-32. If wing cavity hole, located in Spar Number 3 and Number 4, exceeds standard 1.9995-2.0001 diameter, rebore hole to minimum ID necessary for clean-up and install oversize bushing with 0.0015-0.0026 interference fit.

a. Recommended hole size for first rebore is 0.016 oversize.

b. Hole cavity may be rebored up to a maximum of 2.125 inches diameter where necessary to repair a defective hole. Maximum hole cavity surface roughness is 63 RMS.

WARNING

Personnel handling frozen parts must be adequately protected to prevent injury resulting from contact with parts.

c. Manufacture one piece oversize bushing similar to GD/Convair Part Number 8-16512-8 except the O.D. would graduate in size as per hole cavity diameter. Maximum bushing surface roughness is 40RMS. Thermally insert bushing by freezing the bushing with liquid nitrogen or dry ice and methylalcohol.

CAUTION

Methylalcohol shall not be used on magnesium materials due to corrosive action.

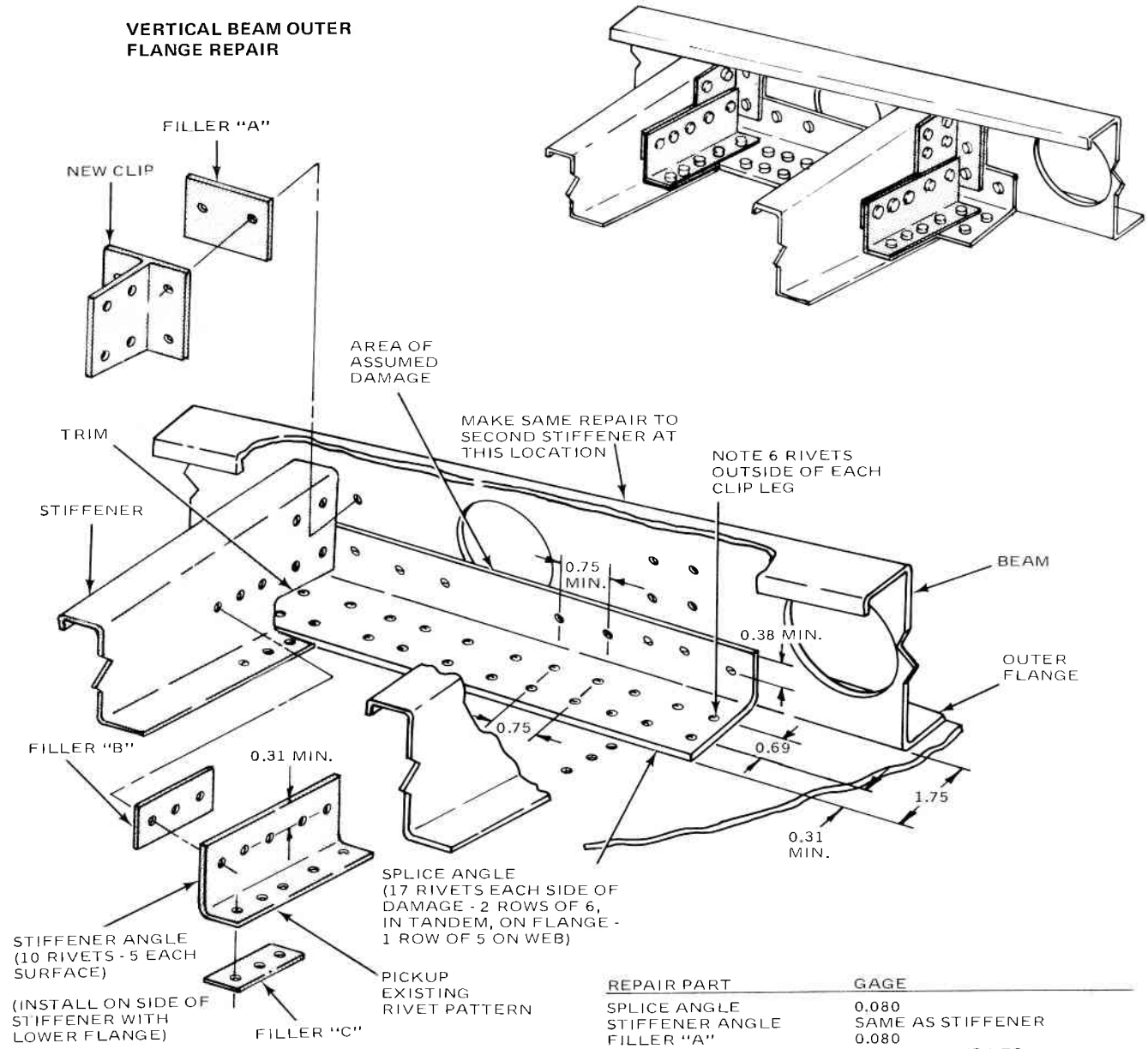
NOTE

Applicable to all F-106A/B aircraft.

5-33. Repair of Main Landing Gear Side Brace Bushing, Part Number 8-16511.

5-34. Rework/replace Main Landing Gear Side Brace Bushing as per instructions outlined in figure 5-16.

VERTICAL BEAM OUTER FLANGE REPAIR

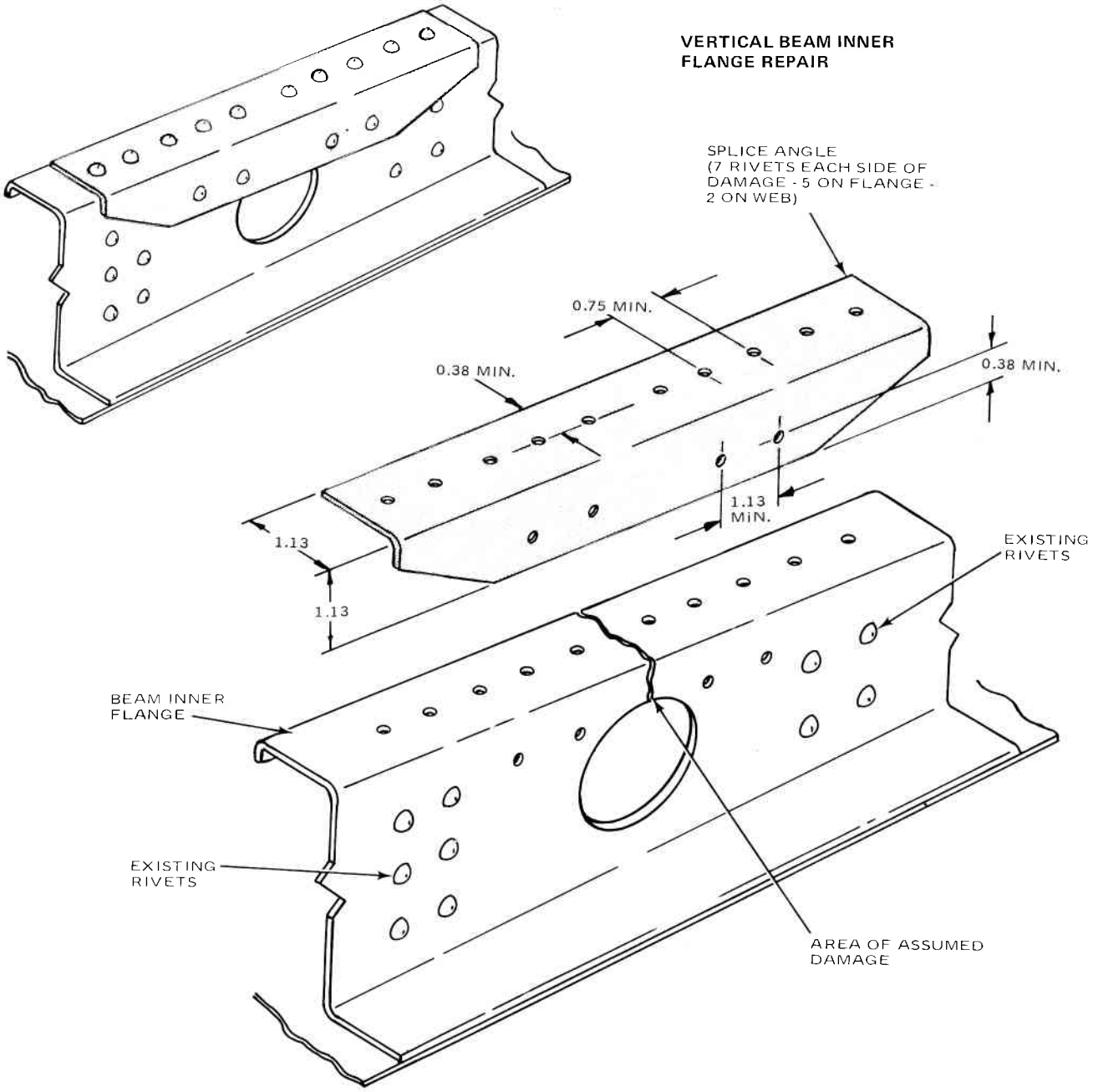


REPAIR PART	GAGE
SPLICE ANGLE	0.080
STIFFENER ANGLE	SAME AS STIFFENER
FILLER "A"	0.080
FILLER "B"	SAME AS CLIP LEG
FILLER "C"	0.080 MINUS STIFFENER GAGE

REPAIR PROCEDURE:

A. REMOVE MAIN LANDING GEAR DOOR FAIRING AND PLACE ON PADDED WORKBENCH.
B. REMOVE CLIPS FROM DAMAGED AREA USING A NO. 10 (0.193) DRILL TO REMOVE BEAM RIVETS AND A NO. 20 (0.161) DRILL FOR STIFFENER RIVETS.
C. USE NO. 20 (0.161) DRILL TO REMOVE RIVETS FROM ENDS OF STIFFENER FLANGES.
D. TRIM STIFFENERS AS NECESSARY TO ACCOMMODATE SPLICE ANGLE.
E. FABRICATE NEW CLIPS FROM 7075-T6 EXTRUSIONS. SEE FIGURE 5-6, MLG FAIRING STRUCTURE & PLATING, FOR EXTRUSION IDENTIFICATIONS. REHEAT TREAT TO W (TEMPORARILY UNSTABLE) CONDITION BEFORE FORMING.
F. FABRICATE SPLICE ANGLE, STIFFENER ANGLES, AND FILLERS FROM 7075-T6 CLAD. SEE CHART FOR GAGES. REHEAT TREAT TO W (TEMPORARILY UNSTABLE) CONDITION BEFORE FORMING ANGLES.
G. ARTIFICIALLY AGE CLIPS & ANGLES TO RETURN THEM TO T6 CONDITION.
H. POSITION SPLICE ANGLE AND DRILL NO. 10 (0.193) HOLES THROUGH BEAM WEB AND ANGLE. PICK UP EXISTING HOLES AT CLIP LOCATIONS. DRILL NO. 20 (0.161) HOLES THROUGH SKIN AND LOWER FLANGE OF ANGLE.
I. COUNTERSINK RIVET HOLES IN SKIN.
J. INSTALL SPLICE ANGLE USING MS20470DD6 AND MS20426AD5 RIVETS. DO NOT RIVET AT CLIP HOLES.
K. POSITION NEW CLIPS AND FILLERS AND DRILL USING NO. 10 (0.193) DRILL ON BEAM FACE AND NO. 20 (0.161) DRILL ON STIFFENER LEG. PICK UP ALL EXISTING CLIP HOLES.
L. RIVET CLIPS AND FILLERS IN PLACE USING MS20470DD6 AND MS20470AD5 RIVETS. DO NOT RIVET AT STIFFENER ANGLE HOLES.
M. POSITION STIFFENER ANGLES AND FILLERS AND DRILL NO. 20 (0.161) HOLES. PICK UP EXISTING HOLES IN SKIN. USE IDENTICAL PATTERN IN STIFFENER WEB.
N. RIVET STIFFENER ANGLES AND FILLERS IN PLACE USING MS20426AD5 AND MS20470AD5 RIVETS.

Figure 5-12. Main Landing Gear Fairing Vertical Beam Repair. (Sheet 1 of 3)



REPAIR PROCEDURE:

A. REMOVE MAIN LANDING GEAR FAIRING AND PLACE ON PADDED WORK BENCH.
B. FABRICATE SPLICE ANGLE FROM 0.90 GAGE 7075-T6 CLAD. REHEAT TREAT TO W (TEMPORARILY UNSTABLE) CONDITION BEFORE FORMING.
C. ARTIFICIALLY AGE TO RETURN SPLICE ANGLE TO T6 CONDITION.
D. POSITION SPLICE ANGLE OVER DAMAGE AREA AND DRILL NO. 10 (0.193) HOLES THROUGH ANGLE AND BEAM. COUNTERSINK 4 HOLES ON TRIMMED SIDE OF ANGLE.

NOTE

IF EXISTING RIVET HEADS INTERFERE WITH PLACEMENT OF REPAIR ANGLE, REMOVE 1 OR 2, AS NECESSARY, AND REPLACE WITH MS20426DD6 COUNTERSUNK RIVETS.

E. RIVET SPLICE ANGLE IN PLACE USING MS20426DD6 AND MS20470DD6 RIVETS.

Figure 5-12. Main Landing Gear Fairing Vertical Beam Repair. (Sheet 2 of 3)

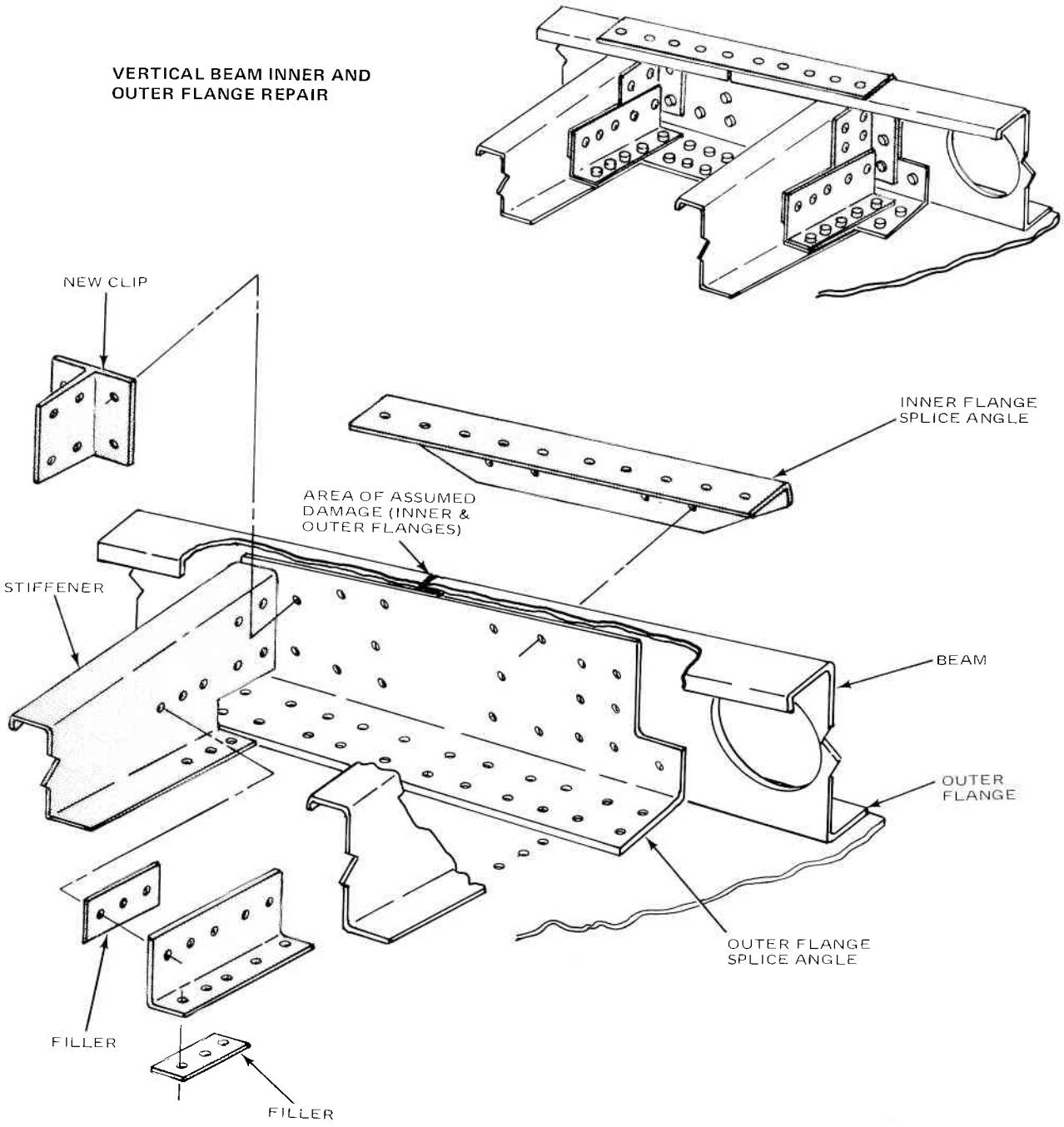
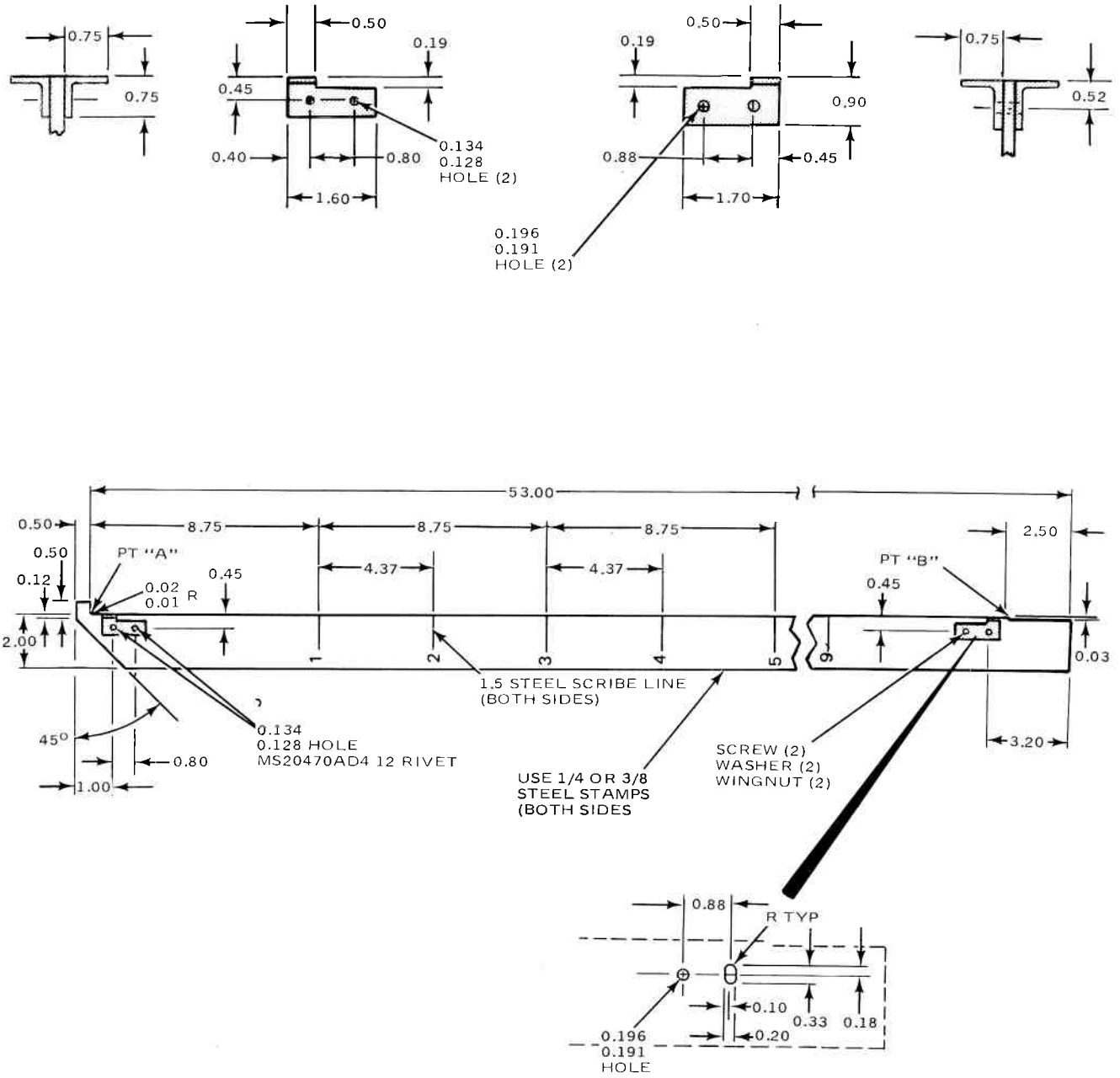


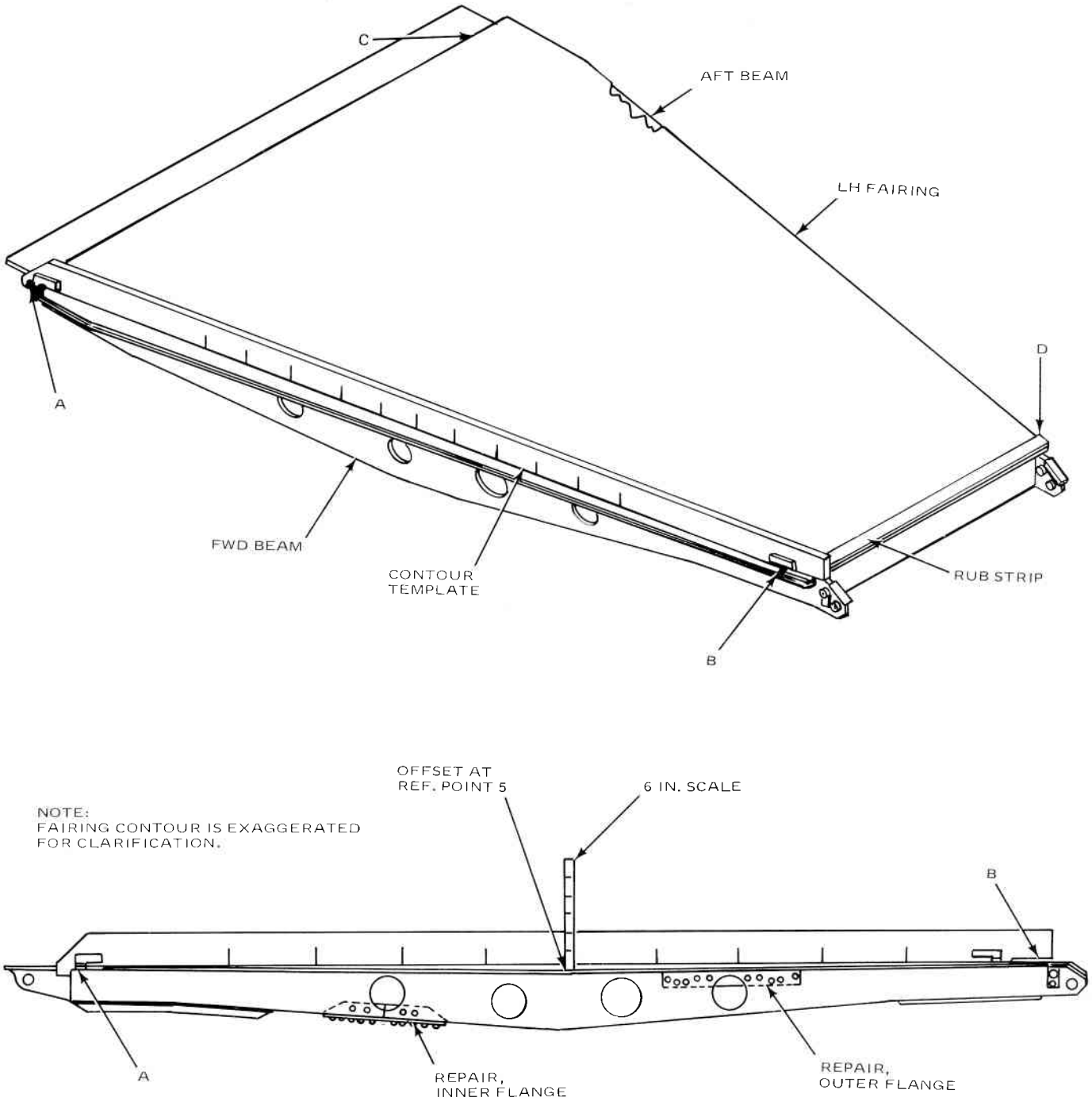
Figure 5-12. Main Landing Gear Fairing Vertical Beam Repair. (Sheet 3 of 3)



THIS CONTOUR CHECK TEMPLATE MAY BE MANUFACTURED LOCALLY.
MANUFACTURING INSTRUCTIONS:

1. MAKE FROM ALUMINUM ALLOY.
2. HARDWARE SHOWN IS SUGGESTED ONLY, USE EQUIVALENT IF NECESSARY.
3. MINIMUM THICKNESS OF TEMPLATE MATERIAL IS 0.18 IN.
4. EDGE SURFACE BETWEEN POINTS "A" AND "B" IS TO BE STRAIGHT WITHIN ± 0.01 IN. DO NOT ROUND OFF CORNERS.
5. IDENTIFY TEMPLATE WITH RUBBER STAMP OR STEEL STAMP. SIZE OF LETTERS AND NUMBERS AND LOCATION IS OPTIONAL. "MLG FAIRING CONTOUR CHECK TEMPLATE, P/N 8-17630-93."

Figure 5-13. Main Landing Gear Fairing Beams Contour Check Template



AFTER MAIN LANDING GEAR FAIRING BEAM REPAIR, CHECK FAIRING CONTOUR USING CONTOUR CHECK TEMPLATE, P/N 8-17630-93. IF ALLOWABLE OFFSETS ARE EXCEEDED, FAIRING MUST BE REPLACED.

1. POSITION CHECK TEMPLATE OVER FORWARD BEAM. HOOK LIP OF TEMPLATE OVER UPPER EDGE OF BEAM OUTER FLANGE (POINT A); THE OPPOSITE END OF TEMPLATE WILL REST ON RUB STRIP (POINT B). ADJUST STABILIZING ANGLE, IF NECESSARY, TO ASSURE FIRM, VERTICAL POSITION.
2. USING A 6-INCH STEEL MACHINIST SCALE, OR SIMILAR, MEASURE OFFSET DISTANCE BETWEEN FAIRING SURFACE AND CONTOUR TEMPLATE AT EACH NUMBERED POSITION. RECORD VALUES ON OFFSET GRAPH.
3. POSITION CONTOUR TEMPLATE OVER AFT BEAM (POINTS C AND D) AND REPEAT OFFSET CHECKS.

Figure 5-14. Main Landing Gear Fairing Contour Check

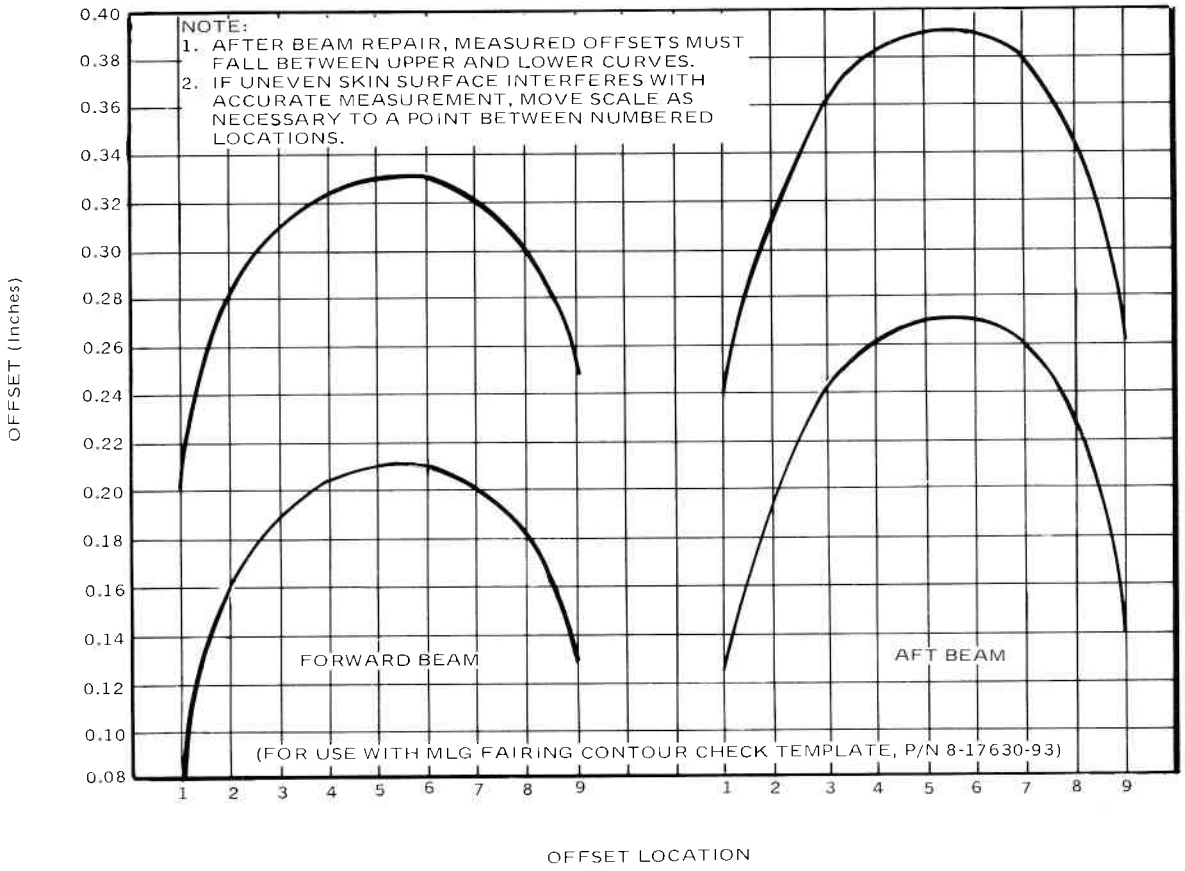
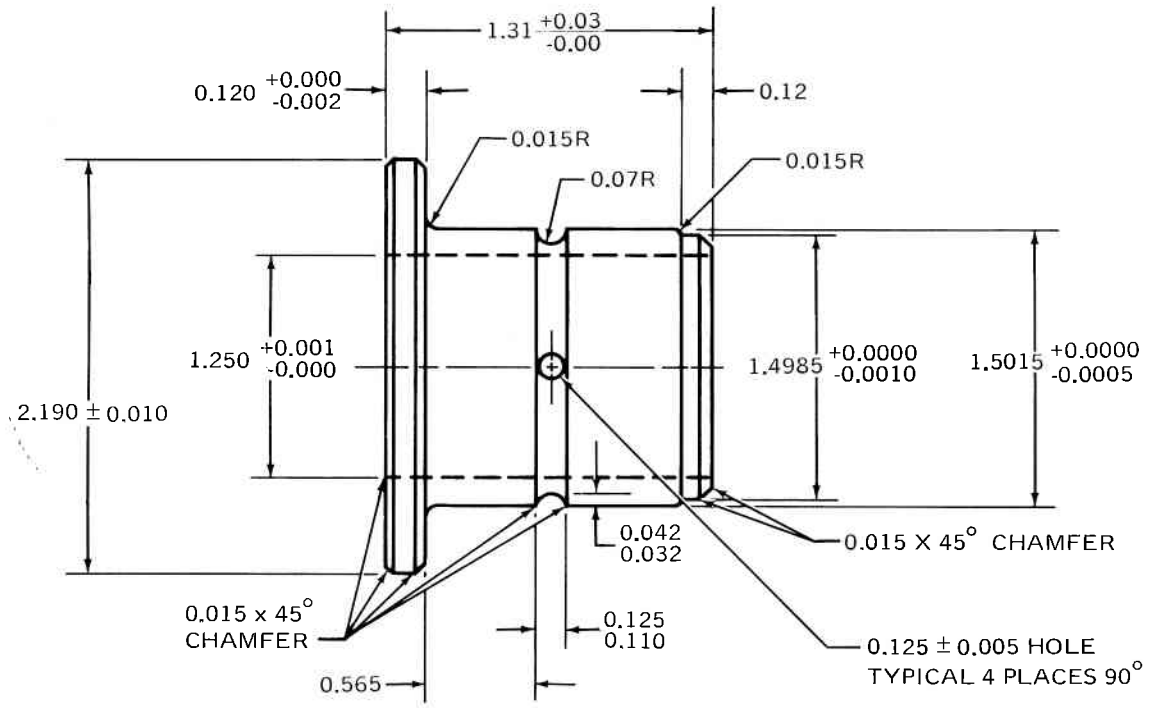


Figure 5-15. Main Landing Gear Fairing Beams Allowable Offset Graph



REF. DRWG 8-16511

BUSHING REPLACEMENT DATA

ATTACHMENT BUSHING	ORIGINAL HOLE SIZE IN ATTACHMENT FITTING	MAX. ALLOWABLE HOLE OVERSIZE	PIN, BOLT OR SHAFT DIAMETER	**INTERFERENCE FIT
LANDING GEAR SIDE BRACE	1.5000 + 0.0005 - 0.0000	1.6200 + 0.0005 - 0.0000	1.248 TO 1.249	- 0.0005 - 0.0015

NOTES:

1. MAKE BUSHING FROM SAE4130 OR SAE8630 STEEL, HEAT TREAT TO 180,000 TO 200,000 PER MIL-H-6875.

2. CADMIUM PLATE ALL BUSHING SURFACES EXCEPT THE INSIDE DIAMETER PER SPECIFICATION QQ-P-461. DIMENSIONS TO BE MET AFTER PLATING.

3. BUSHING SIDES TO BE PARALLEL AND CONCENTRIC WITHIN 0.003 INCH TOTAL INDICATOR READING.

4. BUSHING TO RECEIVE MAGNETIC INSPECTION PER MIL-I-6868. (T.O. 33B-1-1)

5. IF ORIGINAL HOLE SIZE IS WITHIN TOLERANCE, BRUSH PLATING MAY BE APPLIED TO BUSHINGS, IF AVAILABLE, TO OBTAIN PROPER INTERFERENCE FIT, PLATING IS TO BE CADMIUM.

**INTERFERENCE FIT BETWEEN OUTER DIAMETER OF BUSHING AND INNER DIAMETER OF MAIN LANDING GEAR SIDE BRACE FITTING.

Figure 5-16. Main Landing Gear Side Brace Bushing Repair

Section VI

ENGINE

6-1. ENGINE.

6-2. The aft section of the fuselage between stations 431.00 and 711.00 is designed to accommodate the engine. An engine cooling air induction system extends aft from the scroll assembly at station 431.00. The engine is enclosed by a detachable shroud and insulation blankets which provide a fireseal and air cooling space. The engine is supported in the fuselage by three support links and one thrust bearing. A nose fairing attaches to the forward face of the engine compressor. Several access doors are located in the fuselage and shroud to provide for inspection and maintenance of the engine and engine accessories. See figure 6-1 for engine components covered in this section.

6-3. Engine Cooling Shrouds.

6-4. The construction of the engine shroud consists generally of a series of circular formed frames enveloped with light gage rigidized skins which are reinforced by longitudinal longerons. Monel riveting and seam welding is used to secure the components together. The shroud slips forward over the aft portion of the engine and is held in place by means of turnbuckles attached to brackets on the engine. The engine and shroud are supported in the fuselage by three support links. The forward end of the shroud incorporates a seal around the entire forward edge which fits against the engine seal adapter to form the fireseal. Insulation blankets consisting of fiberglass batting enveloped by thin gage corrosion resistant foil are installed inside the engine shroud. The engine shroud incorporates a convergent-divergent nozzle permanently attached to the aft of the shroud except on airplanes listed on figure 6-2. Figure 6-2 shows the engine shroud.

6-5. Engine Nose Cone Fairing.

6-6. The engine nose cone fairing is connected to the center of the engine by eight bolts which pass through the extruded ring assembly at the aft end of the nose cone and into the forward face of the engine compressor. The engine nose cone fairing consists of inner and outer stressed aluminum alloy skins flush-riveted and seam-welded to an inner structure of aluminum alloy stiffeners and formers. See figure 6-3 for the material specifications and gages used in the nose cone fairing.

6-7. Engine Supports.

6-8. The engine is supported in the fuselage by two adjustable support links at the aft end of the engine, one engine thrust bearing at the forward right side, and one nonadjustable engine support link at the forward left side.

6-9. REPAIRS.

6-10. Engine Cooling Shrouds.

6-11. Damage to the engine cooling shroud, such as cracks, holes, gaps between shroud seal and firewall, or other more serious damage which is likely to create a fire hazard, will require repair or replacement of parts involved. Monel rivets shall be used in all repairs unless otherwise directed by an aeronautical engineer. Refer to T.O. 1F-106A-2-4-2-1 for removal installation procedures for engine and engine cooling shroud. See figure 6-4 for repair of shroud frames, longerons and rigidized skin. HT-1 Sealer (8030-515 2230 Local Purchase) is used as a cushioning agent and sealer when patching cracks which occur along seamwelds. See figure 6-5 for repair procedure. Gaps between the shroud seal and firewall should be closed by wedging the shroud seal against the firewall. Figure 6-6 outlines wedging procedure. Refer to Table 6-1 for negligible damage limits. Shroud insulation blanket damage such as pinholes, cracks, and tears in skin of blanket must, with few exceptions, be repaired to prevent absorption of fuel. Evaluate possible repair or replacement, observing these precautions:

a. Within an arc of 15 degrees above each side of bottom center line (blanket installed), all cracks, pinholes and tears in skin of blanket must be repaired.

b. Above lower limiting area, pinholes of under 0.032-inch diameter may be left open if not closer together than 12 inches and not more than 12 holes in each blanket.

c. The size of a repair and the number of repairs permitted are limited only by the structural integrity of the shroud blanket and good maintenance practices.

Blanket skins must be repaired by light pokewelding 0.002 inch to 0.004 inch thick 321 or 347 corrosion resistant foil patches over the damaged area. Patches must be large enough to allow a full overlapping spotweld pattern with a minimum of 0.25-inch edge distance all

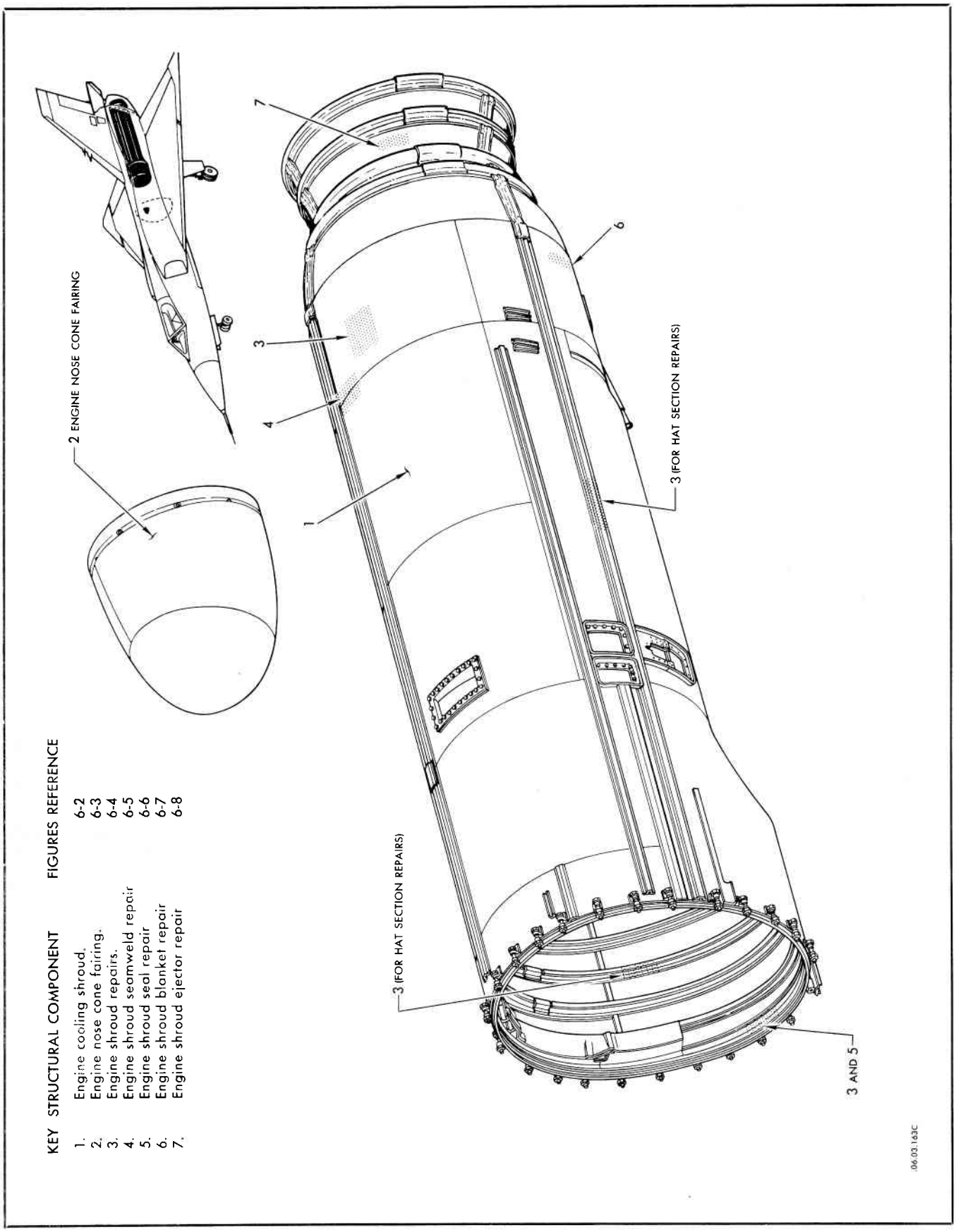


Figure 6-1. Engine Section Components and Figure Index

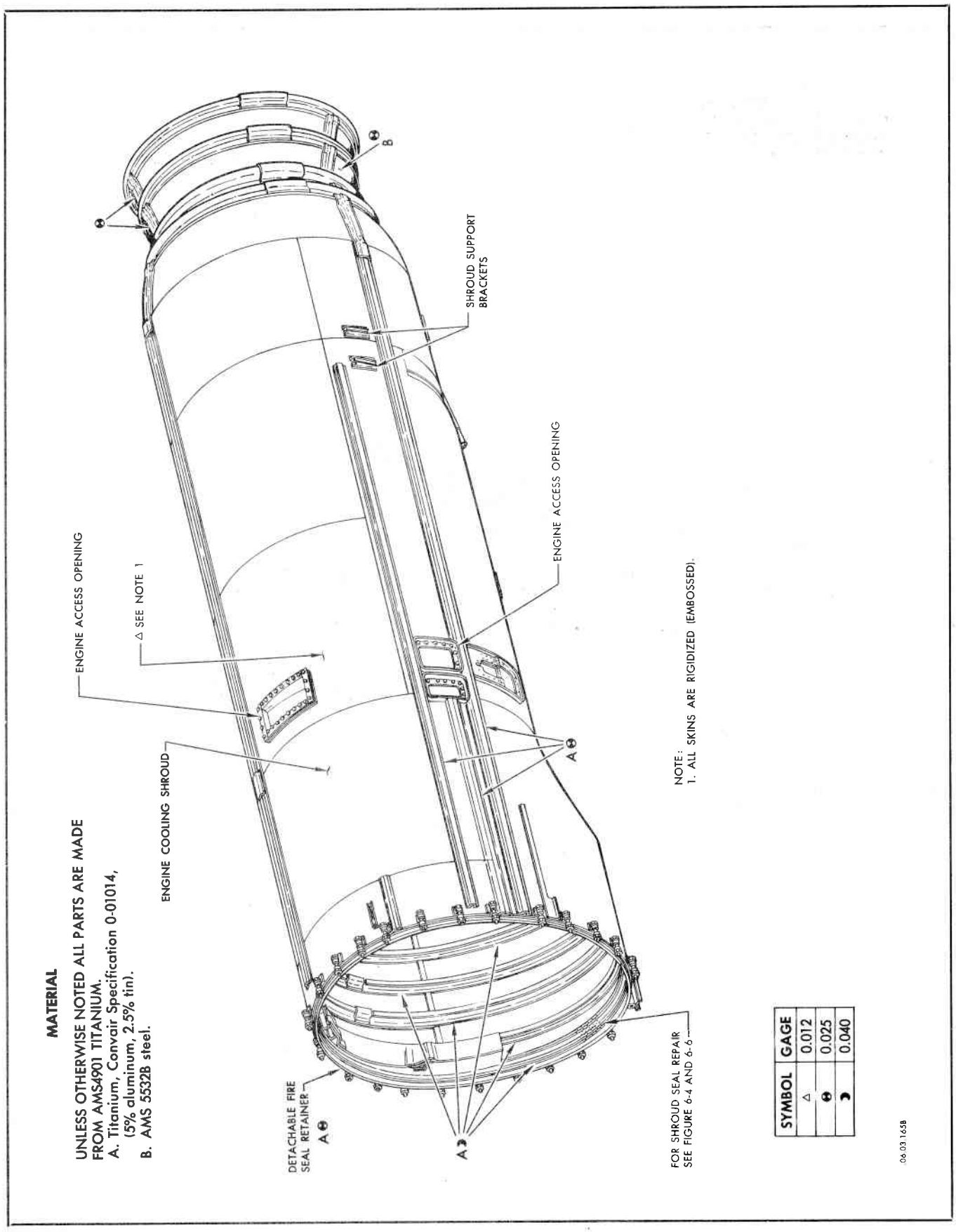
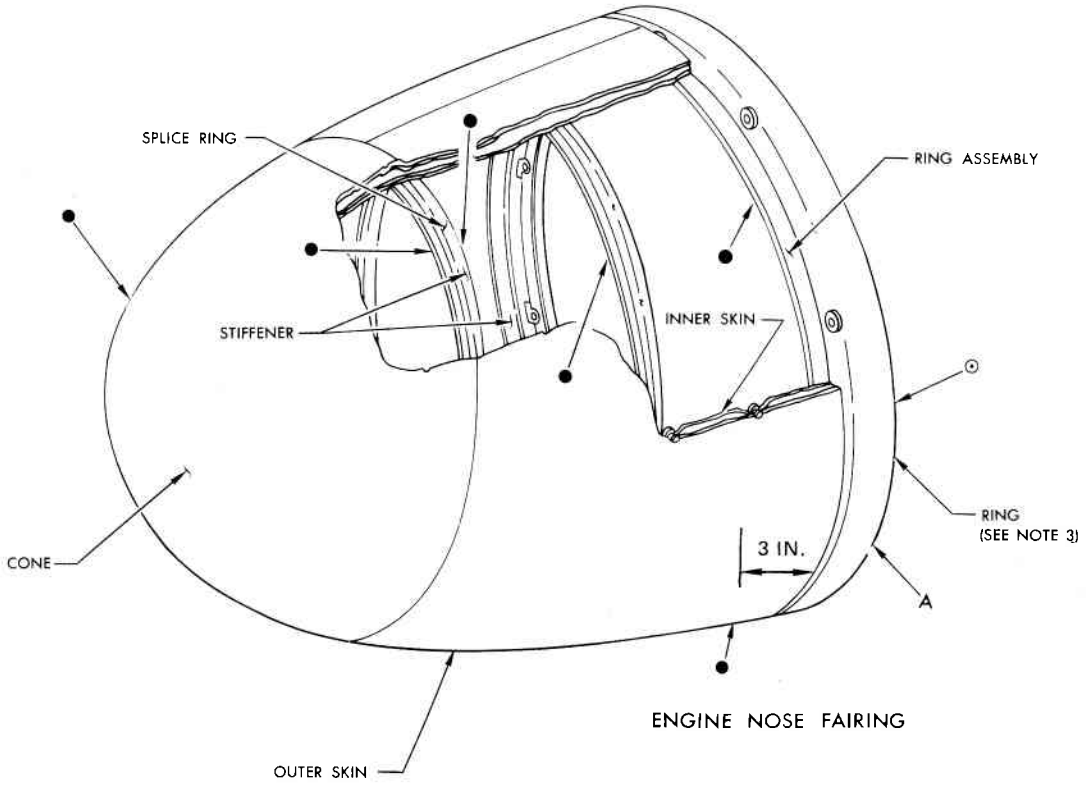


Figure 6-2. Engine Shroud

MATERIAL
UNLESS OTHERWISE NOTED, ALL COMPONENTS ARE MADE FROM 2024-T6 UNCLAD.
A. 6061-T6 extrusion.

SYMBOL	GAGE
●	.032
⊙	.625



ENGINE NOSE FAIRING

NOTES:
1. REFER TO THIS SECTION FOR ENGINE SECTION NEGLIGIBLE DAMAGE LIMITS.
2. REFER TO TYPICAL SKIN REPAIRS IN SECTION X FOR FAIRING SKIN REPAIR INFORMATION.
3. REFER TO THIS SECTION FOR ENGINE NOSE CONE FAIRING REPAIR INFORMATION.
4. O & I REPAIR (FLUSH PATCH) IS LIMITED TO 3 INCHES FORWARD OF ATTACHING POINT. REPAIR IN ACCORDANCE WITH FIGURE 10-1.

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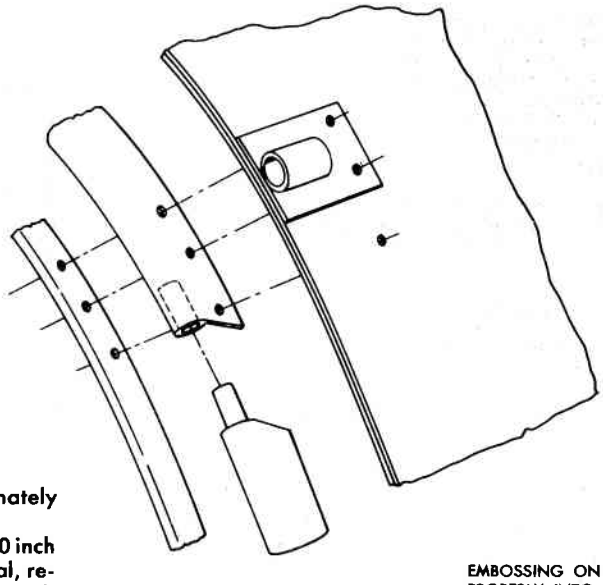
Figure 6-3. Engine Nose Cone Fairing



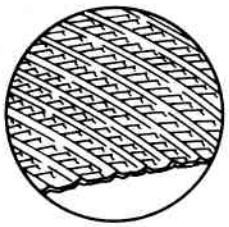
SEAL REPAIR

1. Remove stitches from cover for approximately 2-1/2 inches at ends of repair splice.
2. Cut covering material on bias leaving 1.00 inch of core material exposed. On mating seal, remove core material inside cover as illustrated.
3. Re-sew ends of material after splicing.

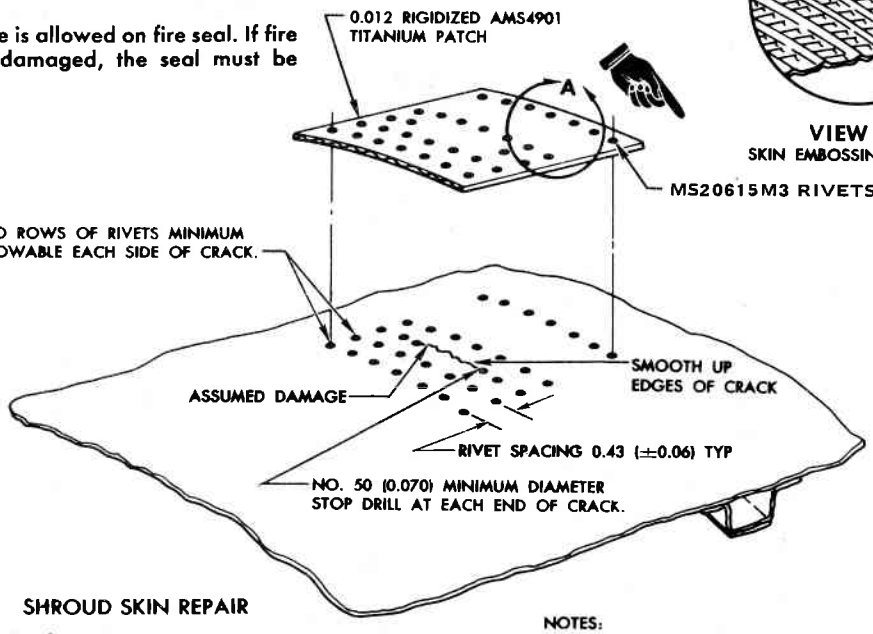
NOTE
SEAL MATERIAL IS TEFLON IMPREGNATED ASBESTOS TADPOLE SEAL WITH FULLY SINTERED INCONEL MEST CORE NO. RL285, MANUFACTURED BY RAYBESTOS MANHATTEN INC., MANHEIM, PA.

4. One repair splice is allowed on fire seal. If fire seal is further damaged, the seal must be replaced.

EMBOSSING ON PATCH SHALL NEST PROPERLY INTO EMBOSSING IN SKIN.



VIEW A
SKIN EMBOSSING DETAIL



SHROUD SKIN REPAIR

1. Stop drill ends of crack and clean up edges of crack.
2. Prepare patch of 0.012 rigidized titanium (Spec. AMS4901). Refer to Section I for formula and method for patch repair. Rivet pattern and minimum rivet edge distance to determine size of patch.
3. Install patch using MS20615M3 rivets.

NOTES:
1. TYPE 321 FLAT STAINLESS STEEL SHEET MAY BE USED AS A TEMPORARY SUBSTITUTE FOR AMS 4901 RIGIDIZED TITANIUM IN REPAIR PATCH. REFER TO PARAGRAPH ON MATERIAL SUBSTITUTIONS IN SECTION I. STAINLESS STEEL PART SHALL BE REPLACED AT NEXT DEPOT OVERHAUL.
2. IF OVERALL LENGTH OF ANY SINGLE CRACK EXCEEDS 8.0 INCHES, CONSULT AN AERONAUTICAL STRUCTURES ENGINEER FOR DISPOSITION OF DAMAGE.

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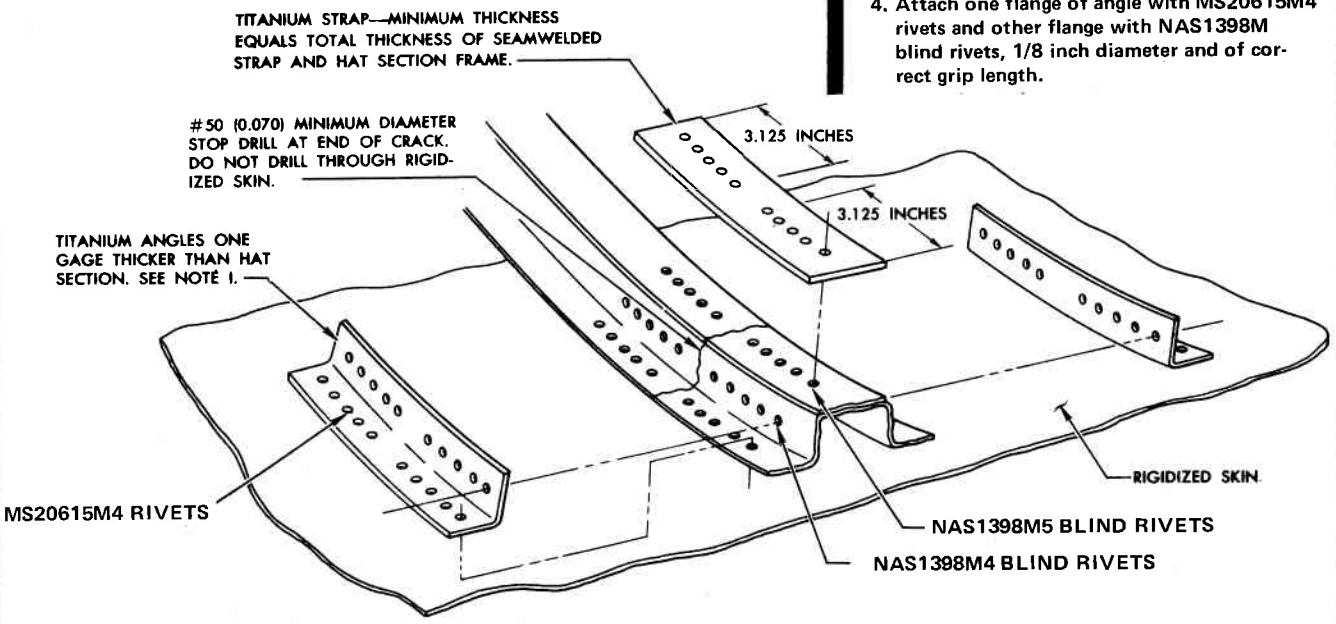
Figure 6-4. Engine Shroud Repairs (Sheet 1 of 2)

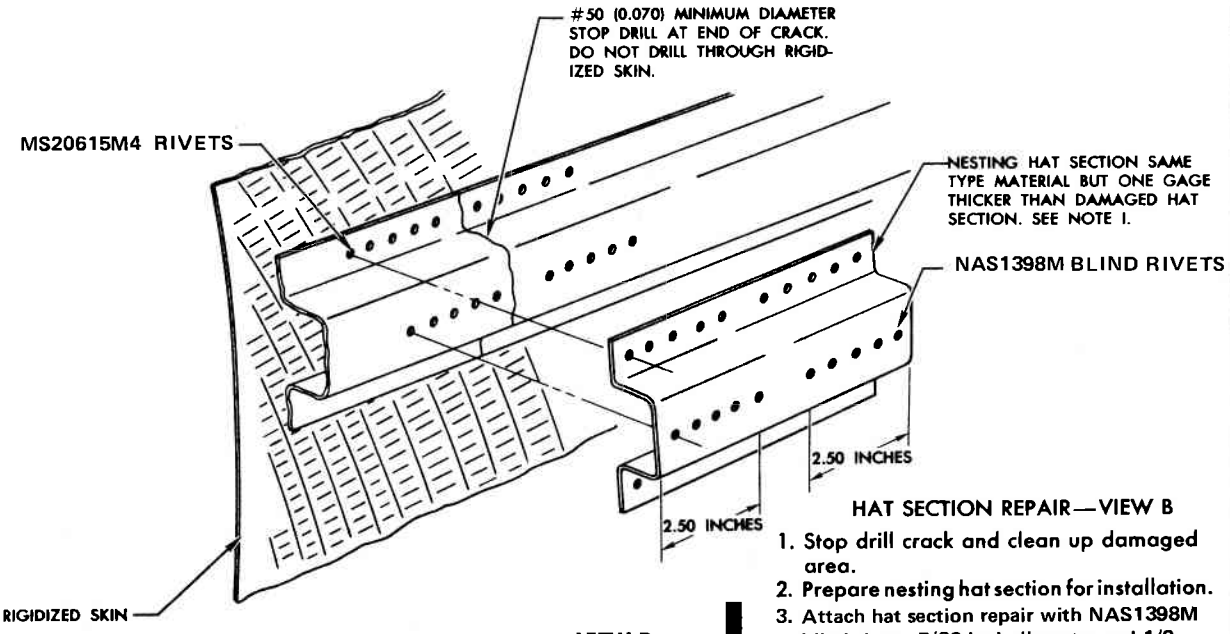
NOTES:
1. TYPE 321 STAINLESS STEEL SHEET MAY BE USED AS A TEMPORARY SUBSTITUTE FOR CONVAIR SPECIFICATION 0.01014 (5% ALUMINUM — 2.5% TIN) TITANIUM IN HAT REPAIR. STAINLESS STEEL PART SHALL BE REPLACED AT NEXT DEPOT OVERHAUL.
2. ALTERNATE SUBSTITUTE FOR DUPONT BLIND RIVETS ARE NAS 1398M AND NAS 1399M.

HAT SECTION REPAIR—VIEW A

1. Stop drill crack and clean up damaged area.
2. Prepare angles and strap for installation.
3. Attach strap with NAS1398M blind rivets, 5/32 inch diameter and of correct grip length.
4. Attach one flange of angle with MS20615M4 rivets and other flange with NAS1398M blind rivets, 1/8 inch diameter and of correct grip length.



VIEW A



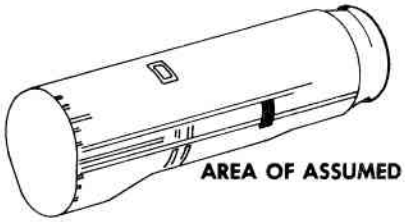
VIEW B

HAT SECTION REPAIR—VIEW B

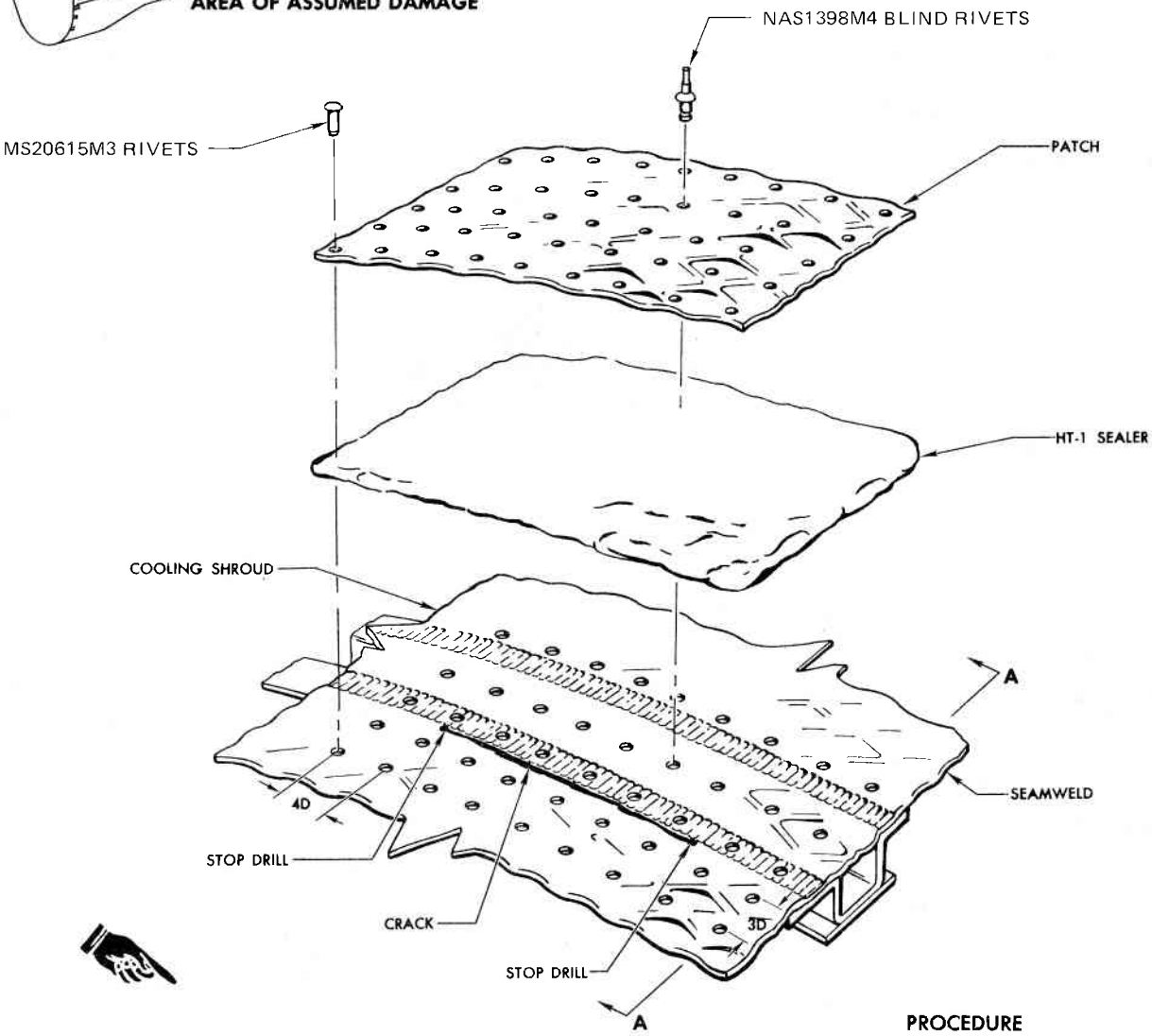
1. Stop drill crack and clean up damaged area.
2. Prepare nesting hat section for installation.
3. Attach hat section repair with NAS1398M blind rivets, 5/32 inch diameter and 1/8 inch diameter NAS1398M. Attach flanges using MS20615M4 rivets.

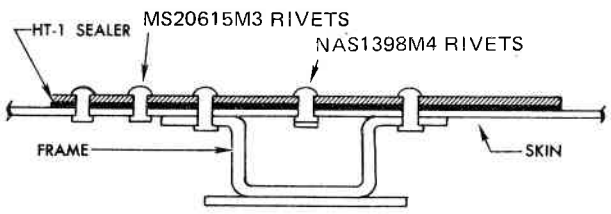
.06.03.188-2A .72.75.17

Figure 6-4. Engine Shroud Repairs (Sheet 2 of 2)



AREA OF ASSUMED DAMAGE





SECTION A-A

PROCEDURE

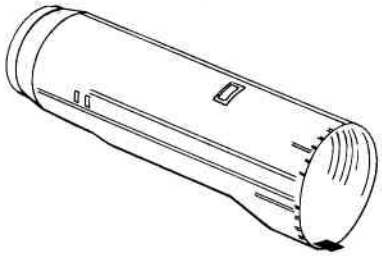
a. Stop drill ends of crack.

NOTE
THERE IS NO LIMIT ON LENGTH OF CRACK AS LONG AS GOOD REPAIR CAN BE ACCOMPLISHED.

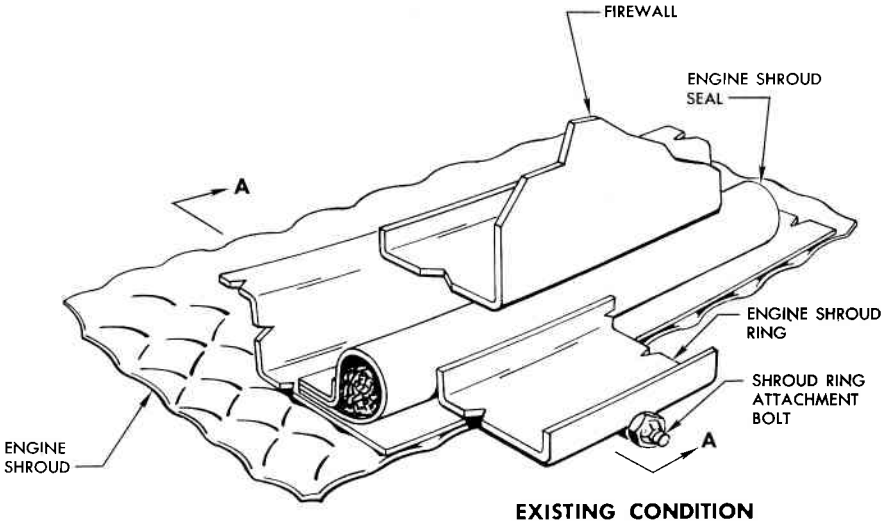
b. Fabricate a patch of 0.012 titanium (AMS4901).
c. Rivet pattern and spacing to be as shown.
d. Clean area to be patched with Methyl Ethyl Ketone Federal Stock No. 6810-290-0055.
e. Shape a layer of HT-1 sealer (FSN 8030-515-2230) and place over patch area.
f. Rivet patch to shroud with NAS1398M4 rivets in blind areas and MS20615M3 rivets in accessible areas.
g. Remove excess HT-1 from patched area.

.06.03.266 .72.75.17

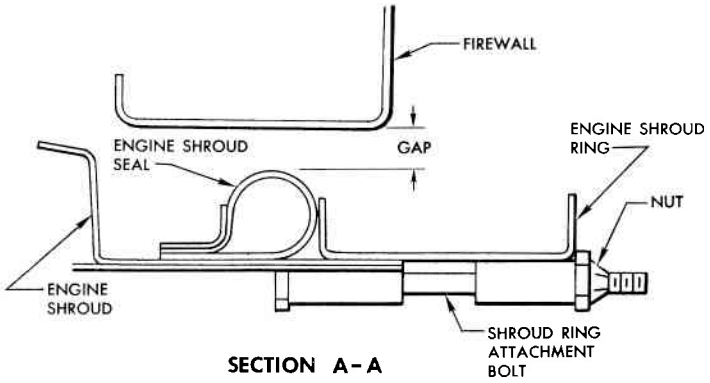
Figure 6-5. Engine Shroud Seamweld Repair



AREA OF ASSUMED GAP



EXISTING CONDITION



SECTION A-A

PROCEDURE

a. Remove shroud retainer ring retainer nuts in area where gap stops.
b. Fabricate wedges from 321 stainless steel, Federal Specifications MIL-S-6721 as shown.
c. Insert wedges between shroud ring and seal in area where gap exists.

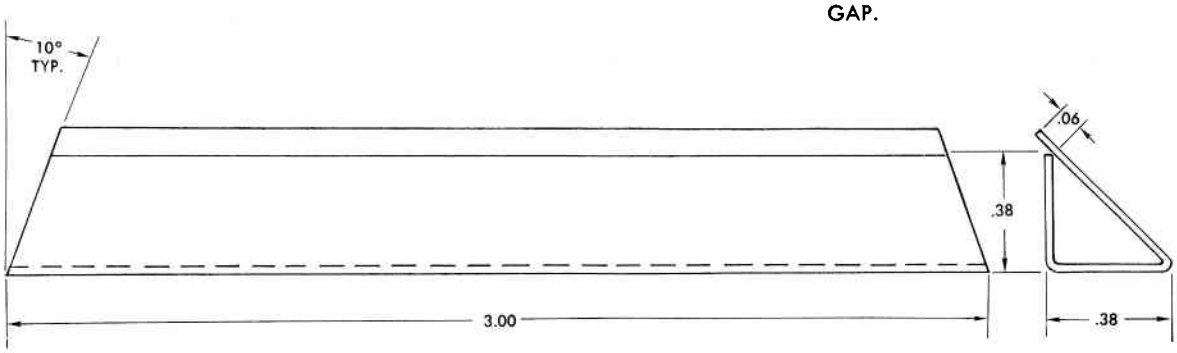
NOTE

THE NUMBER OF WEDGES USED WILL DEPEND ON THE LENGTH OF GAP TO BE CLOSED. WEDGES MUST BUTT TOGETHER TO FORM A SEAL.

d. Install retainer ring nuts and tighten enough to force seal against firewall.

CAUTION

DO NOT OVERTORQUE NUTS, SINCE THIS WILL TWIST SHROUD RING AWAY FROM WEDGES AND CAUSE ANOTHER GAP.

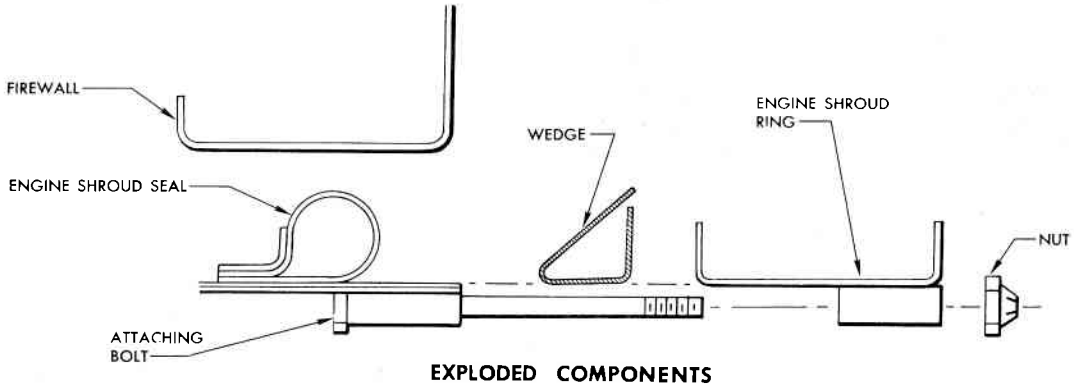


WEDGE

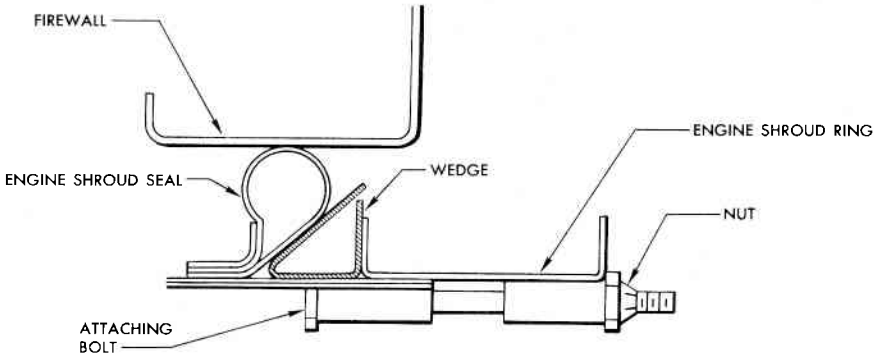
.06.03.275-1A

Figure 6-6. Engine Shroud Seal Repair (Sheet 1 of 2)

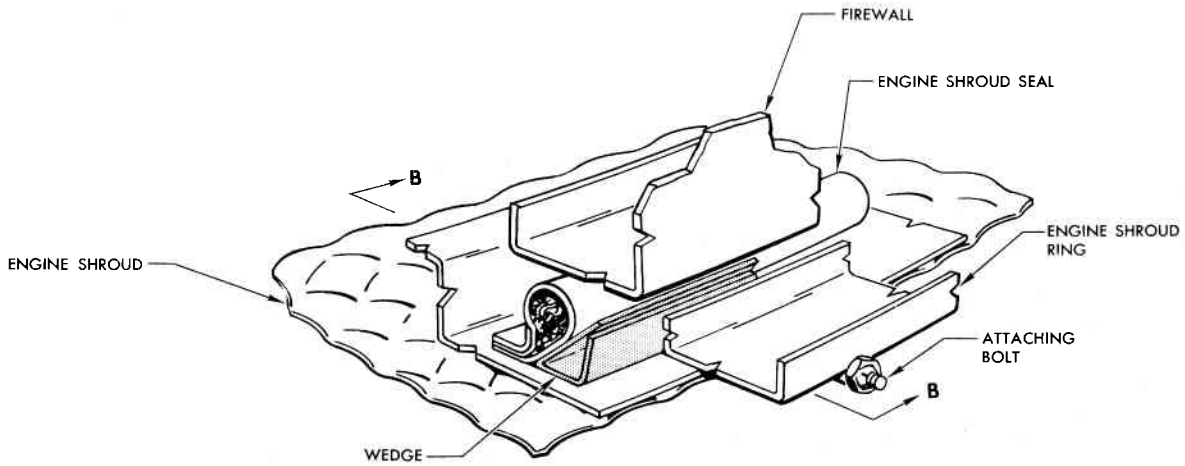
U.S. Government Printing Office 1981/771-060/2384



EXPLODED COMPONENTS



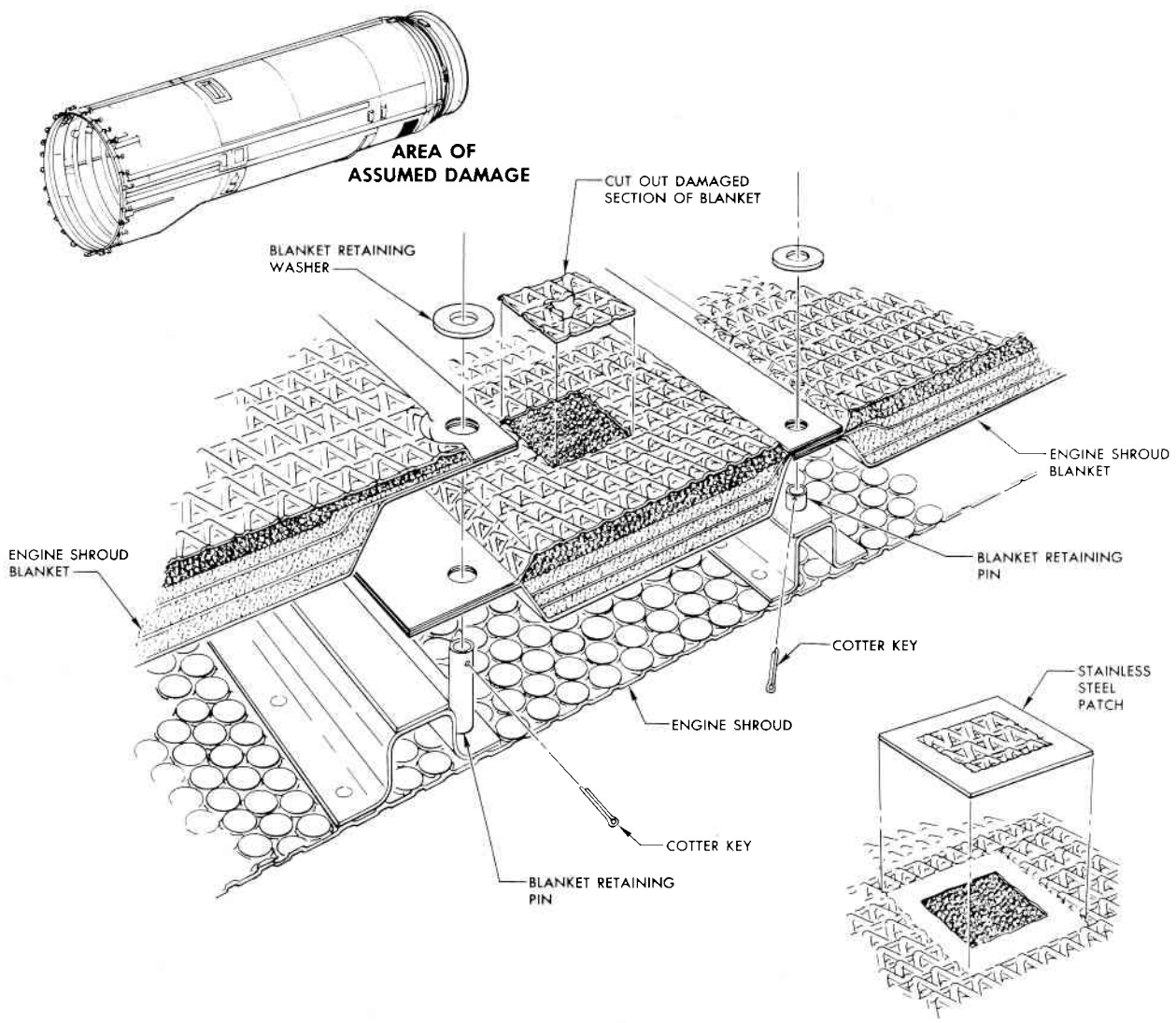
SECTION B-B



ASSEMBLED VIEW

.06.03.275-2 .72.75.17

Figure 6-6. Engine Shroud Seal Repair (Sheet 2 of 2)



REPAIR PROCEDURE

a. Remove engine from airplane. Refer to T.O. 1F-106A-2-4-2-1 for engine removal procedure.
b. Remove engine shroud from engine. Refer to T.O. 1F-106A-2-4-2-1 for removal procedure.
c. Remove cotter keys and washers holding damaged shroud blanket in place. Hold washers for reinstallation.
d. Remove damaged shroud blanket.
e. Using metal cutting hand shears, cut out damaged section of shroud blanket skin.
f. Using a pair of pliers with smooth jaws, flatten edges of cutout in shroud blanket as shown.
g. Fabricate a patch of 0.004 stainless steel foil.

NOTE

"HIT KIT" SPOTWELDER IS MANUFACTURED BY H. I. THOMPSON CO., 1733 CORDOVA STREET, LOS ANGELES 7, CALIFORNIA.

h. Place patch over cutout in shroud blanket.
i. Plug "Hit Kit" spotwelder into 110-volt ac socket and place control switch in on position. "Hit Kit" power plug is the three prong twist type and must be inserted in the same type of electrical socket.
j. Place electrode with microswitch button in one hand and smaller tube shaped electrode in opposite hand.

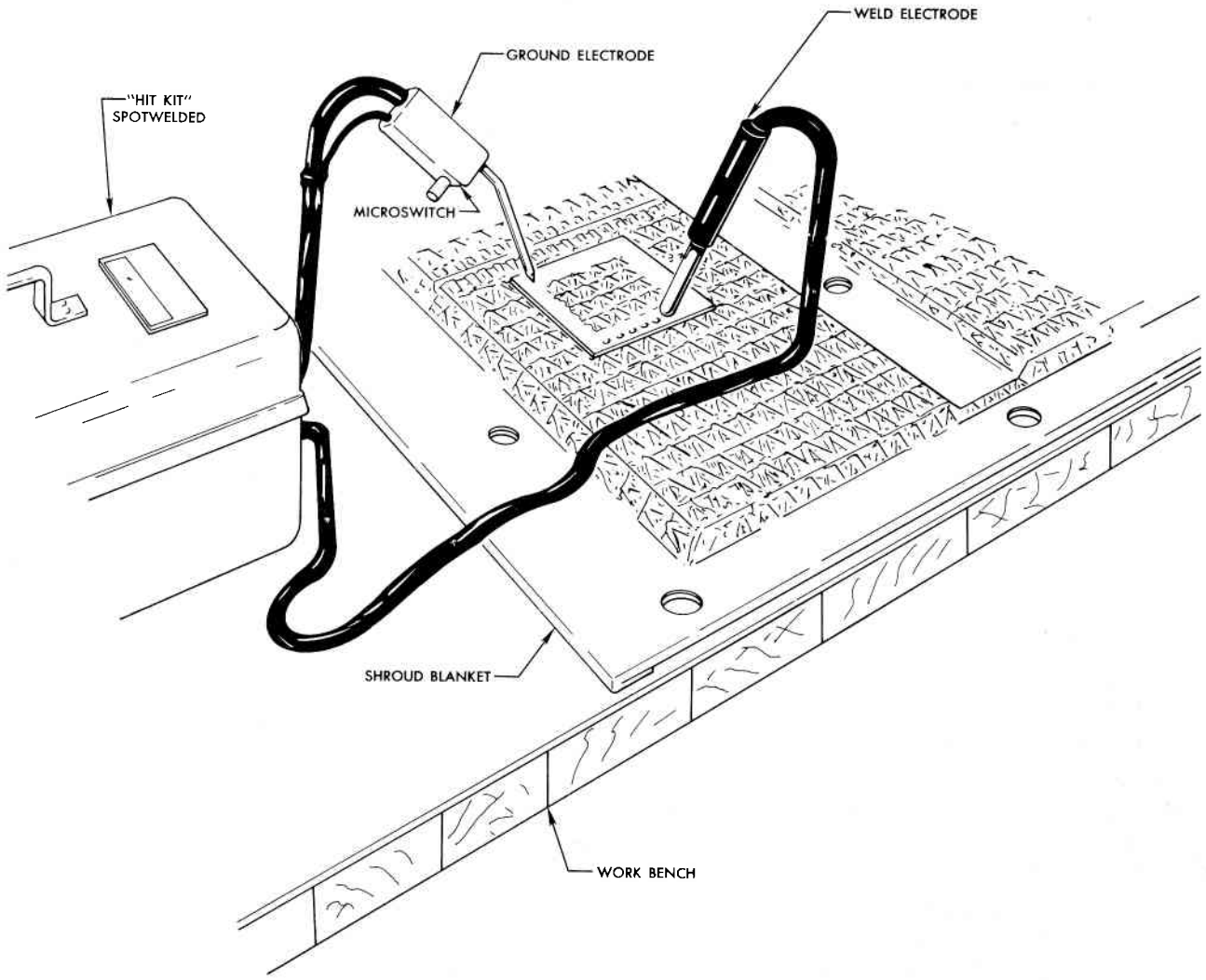
NOTE

THE SMALL UNIT IS THE WELDING ELECTRODE. THE UNIT WITH MICROSWITCH IS THE GROUND ELECTRODE.

k. Place welding electrode firmly on corner of patch with ground electrode on opposite corner of patch.
l. Depress microswitch button while holding electrodes firmly against patch.
m. Release microswitches button; move welding electrode slightly and depress microswitch again. Proceed around edge of patch, placing welds close enough together to create a liquid tight seal.
n. Reinstall blanket in engine shroud using washers removed in step c and new cotter keys to secure blanket in place.
o. Reinstall engine shroud and reinstall engine. Refer to T.O. 1F-106A-2-4-2-1 for installation procedures.

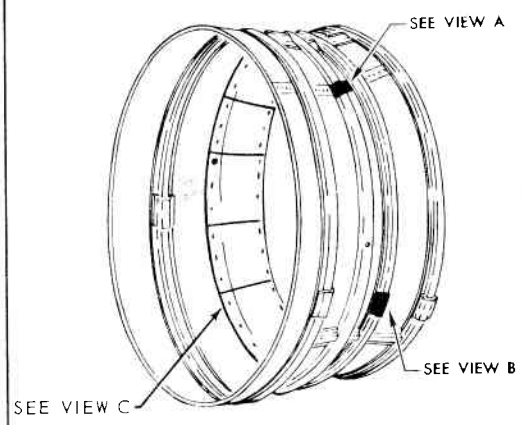
.06.03.261-1 .72.75.03

Figure 6-7. Engine Shroud Blanket Repair (Sheet 1 of 2)

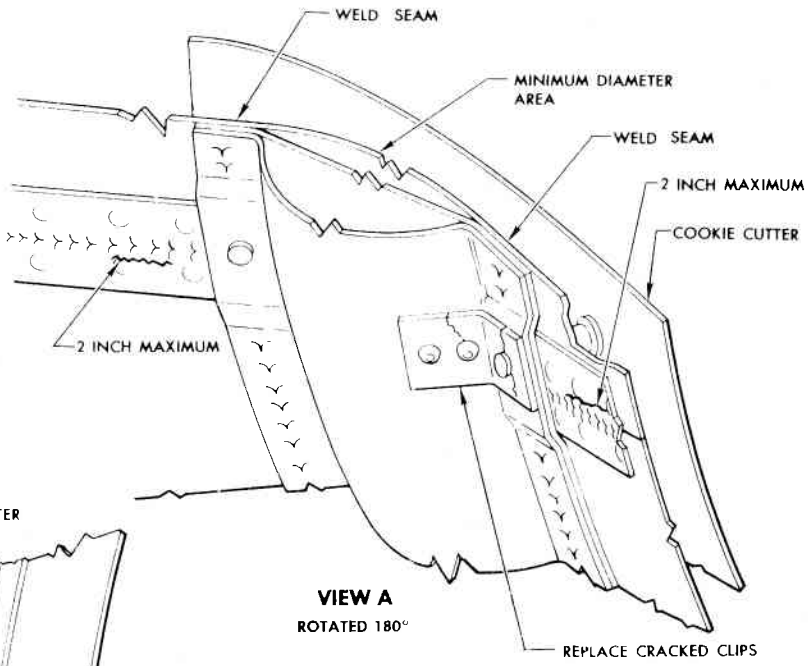


.06.03.261-2 .72.75.03

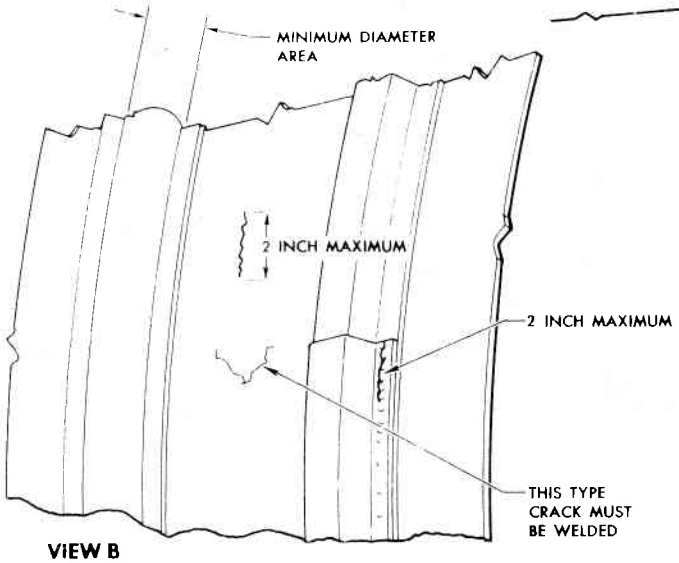
Figure 6-7. Engine Shroud Blanket Repair (Sheet 2 of 2)



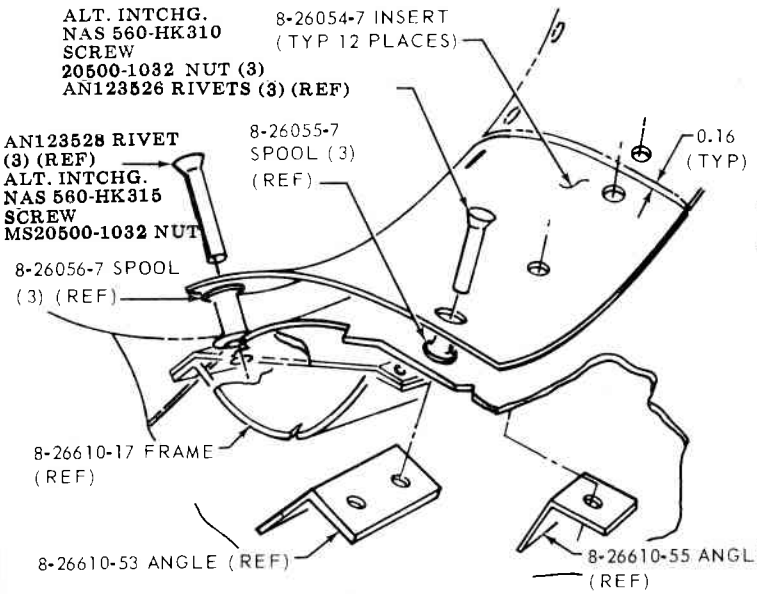
AREA OF ASSUMED DAMAGE



VIEW A
ROTATED 180°



VIEW B



VIEW C

CRACK LIMITS:

Cracks in Views A and B which do not exceed 2 inch in length must be stop drilled with a 0.090 inch drill. Cracked clips shown in View A must be replaced. Any crack which exceeds 2 inch in length or changes direction as shown in View B must be welded.

Cracks in the minimum diameter area, between weld seams under cookie cutter, (View A), may be stop drilled when they are parallel to the longitudinal axis and do not extend into weld seams. Cracks in this area, that are not parallel to the longitudinal axis or that extend into the weld seams must be welded.

NOTE

CRACKS RESULTING FROM POOR-QUALITY WELDS MAY BE REPAIRED BY REWELDING PROVIDED ALL OF POOR QUALITY WELD IS REMOVED AND ALL SURFACE CRACKS ARE REMOVED BY GRINDING. IF MORE THAN 50% OF ORIGINAL MATERIAL THICKNESS IS REMOVED DURING GRINDING, MAKE RADIUS CORNERED CUTOUT OF A LENGTH AND WIDTH WHICH IS ¼" GREATER THAN HEAT AFFECTED AREA AND MAKE A FLUSH PATCH INSERT WELD REPAIR.

WELDING PROCEDURE:

a. Perform a fluorescent penetrant inspection to determine length of crack.
b. Stop drill both ends of crack. Use a 0.090 inch drill.
c. Clean crack area with a stainless steel wire brush.
d. Use a Heliarc welding torch and N-155 welding wire that conforms with Federal Specification MIL-R-5031, Class 9 to weld crack.

INSERT REPLACEMENT:

Replace damaged inserts as per View C. To compensate for any variance that may be encountered, the 8-26054-8 inserts are supplied with 1/8 inch excess material for trim to maintain the specified gap between inserts. Trim excess material from the 8-26054-7 inserts to maintain the specified 0.16 inch gap; for any additional trim, use a suitable grindstone.

06 03 307B 72 75 03

Figure 6-8. Engine Shroud Ejector Repairs and Insert Replacement

around to make a tight repair. Torn edges or cut-outs must be repaired by wrapping patch around edge and pokewelding in place. Torn out grommets shall be repaired by wrapping patch around edge, pokewelding in place, punching new hole, and replacing grommet. If replacement grommets are not available, a plate made of 0.016-inch stainless steel may be manufactured locally and pokewelded in place. Drill or punch a hole in the replacement plate the same size as the original hole. Inside edges of the hole must be sealed completely with overlapping pokewelds around the hole. See figure 6-7 for repair of engine shroud blankets by pokewelding. See figure 6-8 for repairs to the engine shroud ejector.

NOTE

Excessively discolored blankets should be replaced.

6-12. Afterburner Liner.

6-13. Smooth Section of Afterburner Liner.

a. Cracks in the leading edge of perforated section may be continued in service provided cracks are no more than 2 inches in length and at least 4 inches from any other crack, and the number of cracks do not exceed ten and no buckling or lipping up is evident. Fluorescent penetrant inspect to located end of crack. Stop drill end of crack with size no. 9 drill. Fluorescent penetrant inspect after stop drilling to insure end of crack is drilled. Stop drilling and/or welding may be accomplished with engine installed in aircraft.

b. All welding in this area of duct must be in accordance with T.O. 2J-J75-6 with the exception of a gas backup. All fluorescent penetrant must be removed from area to be welded. To continue liner in service cracks up to four inches in length not closer together than four inches shall be welded.

6-14. Corrugated Section of Afterburner Liner.

a. One flat spot with 10 inches maximum diameter and/or 14 inches maximum axial length, with the center of the flat spot not to extend into the gas path more than 0.3 inch from the normal position. If two flat spots are present, each must not exceed two thirds of the above limits.

b. Liners which contain cracks may be continued in service provided cracks do not exceed 2 inches in length and are no closer together than 2 inches. Fluorescent penetrant inspect to locate end of crack and stop drill with size no. 21 drill. Fluorescent penetrant inspect after stop drilling to insure end of crack is drilled. Stop drilling and/or welding may be accomplished with engine installed in aircraft. To continue liner in service cracks up to three inches in length not closer together than two inches shall be welded in accordance with T.O. 2J-J75-6 with the exception of gas backup.

Note

A drill stop must be used during drilling operation to prevent over penetration of drill bit. Excessive penetration could result in damage to afterburner duct weldment.

c. Cracks in the flange progressing from the bolt holes outward are acceptable and need not be welded.

NOTE

Any condition found that exceeds the limits specified in paragraphs 6-12 through 6-14 will be repaired in accordance with T.O. 2J-J75-6 with afterburner duct (liner) removed.

6-15. Engine Nose Cone Fairing.

6-16. Damage to the nose cone fairing is critical in that the exterior of the cone is in the engine air intake airstream. Refer to paragraph 6-20 for the extent of negligible damage allowed to remain "as is" after minor rework. If the nose cone is damaged to the extent of the limits listed in paragraph 6-20, remove the nose cone, as outlined in T.O. 1F-106A-10, prior to performing repairs. All repairs to the nose cone exterior surface shall be aerodynamically smooth within the limits set forth in Section I. Blind-type rivets shall not be used when making repairs to the nose cone since this type of rivet may loosen and be drawn into the engine. See figure 10-1 for repairs applicable to the exterior of the nose cone. See figure 6-3 for material specifications and gages.

6-17. Engine Supports.

6-18. Any damage to the engine supports is critical due to the heavy loads and vibrations imposed upon them. Due to the type of construction of the engine supports, repairing is highly improbable and is not advisable. Damaged engine support components shall be replaced.

6-19. Negligible Damage Limits—Engine Section.

6-20. Table 6-I indicates the maximum allowable classifications of five types of negligible damage (damage allowed to remain "as is" after minor rework such as stop drilling cracks and fairing in nicks or scratches). The maximum allowable damage classification will be found to the right of the component name in the vertical column under the "Type of Damage" heading. After classification is determined, see figures 1-17 through 1-19 for the damage limits to be allowed for each class: I, II,

or III. The limits given on figures 1-17 through 1-19 apply only for a damaged area after rework as shown on figures 1-20 and 1-21. An aeronautical structures engineer must be consulted for damages exceeding the limits given on figures 1-17 through 1-19 and for damage to components not listed in Table 6-I.

TABLE 6-I
Negligible Damage Limits — Engine Section

COMPONENT	TYPE AND CLASS OF DAMAGE ALLOWED AFTER REWORK					REMARKS
	Scratch	Nick	Dent	Hole	Crack	
SHROUD						
Skins	II	II	III	*	*	
Longitudinal Stiffeners	II	II	III	II	I	
Angles	II	II	III	I	I	
Frames	II	II	III	I	I	
NOSE CONE FAIRING						
Skins (outer)	I	I	*	*	*	
Skins (inner)	I	I	*	*	*	
Attachment flanges	II	II	I	II	II	
Formers	II	II	I	II	II	
Stiffeners	II	II	I	II	II	

*Component must be repaired or replaced.

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Section VII

FABRIC REPAIR AND ATTACHMENT

This section not applicable to F-106A and F-106B aircraft.

Section VIII

EXTRUSION AND ROLL-FORMED CHARTS

8-1. EXTRUSIONS.

8-2. An extrusion is a die-formed structural shape that can be made to specific cross-sectional dimensions. Extrusions are formed by forcing a metal alloy in a plastic state through a stationary die by means of a hydraulic ram. The extrusion process makes possible quantity production of structural shapes in which the metal is more efficiently disposed with relation to design loads than is generally possible in standard roll-formed shapes. By the extrusion process, practical production of structural shapes with unequal thickness of flanges, tapered, bulbed, or lipped flanges, or with square or controlled radius edges is practicable. Another advantage of extrusions is often a considerable weight reduction.

8-3. Identification of Extrusions.

8-4. Extruded shapes are identified by a die or shape number, which in nearly all cases is preceded by an identifying letter, or group of letters. Identifying letters are AND , K, and E. Extrusions without an identifying letter, or with only the letter E, are contractor's numbers. The tables contain dimensional data, cross-sectional area, and type of material. Complicated or special extruded shapes are shown in individual illustrations. Tolerances not detailed, such as corner or fillet radii, shall conform to Specification, Federal Standard No. 245.

8-5. Substitution.

8-6. Substitution of formed shapes for extruded ones is not normally recommended for these airplanes; however, substitution of a structural member by bend-forming sheet metal of the same material is permissible in some instances. When substitution of an extruded shape is necessary, an extrusion of equal or slightly larger dimensions or machined from a larger extruded shape may be used. If the only substitute available is formed sheet stock, specific approval must be obtained from an aeronautical structures engineer.

8-7. Repairs.

8-8. Repairs for some extruded shapes are illustrated in Section X. The design principles of these repairs are outlined in Section I.

8-9. ROLL-FORMED SECTIONS.

8-10. Roll-formed sections differ from extruded shapes in that roll-formed sections are of uniform thickness and are formed from sheet stock. These sections have the advantage of lower cost than extrusions, but are limited in the variety of shapes possible. In specific instances, some roll-formed sections can serve the same function as an extrusion; however, this practice is not recommended without the prior approval of an aeronautical structures engineer.

8-11. Identification of Roll-Formed Sections.

8-12. Identification numbers on roll-formed sections are contractor's designations and are preceded by the letter "Y." A typical example of identifying a roll-formed section is as follows:

> EXAMPLE: Y2-B39T. The prefix "Y2" is a Convair angle of 90 degrees. The letter "B" indicates type of material as shown in table below. The number "39" indicates dimension shown in corresponding table. The letter "T" indicates that material is in hardened condition.

In the following tables, the letters A, B, D, E, F, and H have been omitted as material identification letters. Instead, material is indicated in a separate column. The condition letter "T" has also been omitted since all repair members are in the hardened condition when installed in the airplanes. The material identification letters are as follows:

"A" is 2024 clad material.
"B" is 7075 clad material.
"D" is 2024 bare material.
"E" is 7075 bare material.
"F" is 7178 bare material.
"H" is 7178 clad material.

The various shapes available in roll-formed sections are grouped in the following index. Nominal dimensions for roll-formed "Y" sections are given in the tables for each illustration. Length and width dimensions should be held to ± 0.030 inch and angular dimension to ± 1 degree.

8-13. Substitution.

8-14. With proper equipment, substitution for all "Y" sections may be fabricated in the field. As noted in

the preceding paragraph, all "Y" sections are made of 2024, 7075, or 7178 clad and bare materials. The 2024 material can usually be formed to the required dimensions when in the hard condition. The 7075 and 7178 material, being harder than 2024, must be in the SO or SW condition when being formed and must be in the fully heat treated (T6) condition when installed in the airplane.

8-15. Repairs.

8-16. Repairs for some roll-formed sections are illustrated in Section X. The design principles of these repairs are outlined in Section I.

8-17. EXTRUSION INDEX.

8-18. The following index lists the extrusions by their die number and gives the page number on which each extrusion is shown.

EXTRUSION INDEX

EXTRUSION INDEX (CONT)

EXTRUSION INDEX (CONT)

8-19. ROLL-FORMED SECTION INDEX.

8-20. The following index lists the roll-formed sections by the contractor (Convair) designated numbers and gives the figure number on which each roll-formed section is shown.

ROLL-FORMED SECTION INDEX

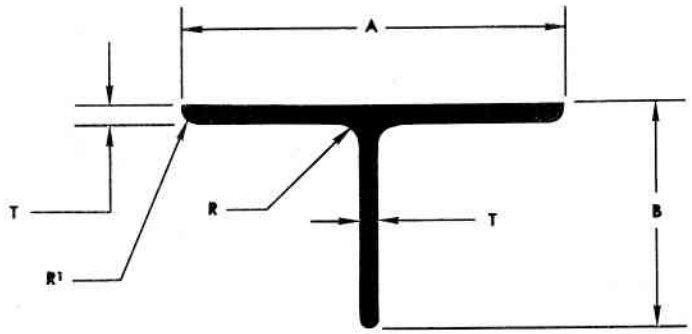
EXTRUSION INDEX (CONT)

EXTRUSION INDEX (CONT)

8-19. ROLL-FORMED SECTION INDEX.

8-20. The following index lists the roll-formed sections by the contractor (Convair) designated numbers and gives the figure number on which each roll-formed section is shown.

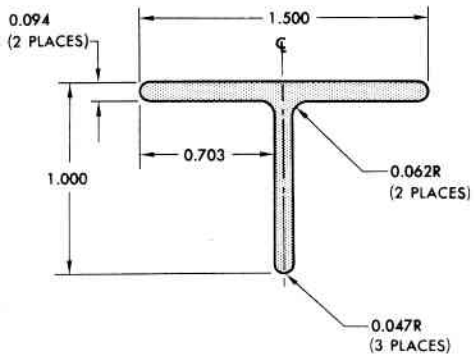
ROLL-FORMED SECTION INDEX



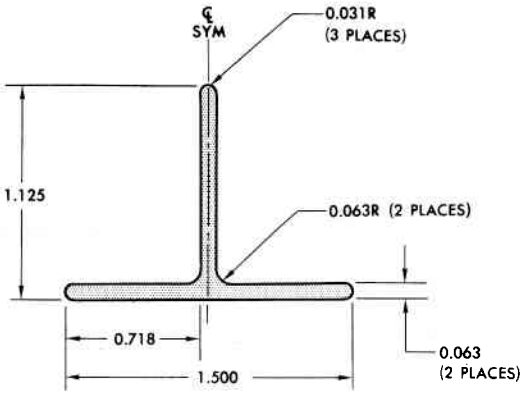
NO.	A	B	T	R	R1	AREA	2024	7075	7178
AND10136									
–1202	1.250	0.750	0.063	0.125	0.063	0.127		X	
–1303	1.375	1.000	0.078	0.125	0.078	0.183		X	
–1304	1.375	1.000	0.094	0.125	0.094	0.216		X	
–1305	1.375	1.250	0.094	0.125	0.094	0.240	X		
–1402	1.500	0.750	0.094	0.125	0.094	0.204	X	X	
–1403	1.500	1.000	0.078	0.125	0.078	0.193	X	X	X
–1405	1.500	1.250	0.078	0.125	0.078	0.212	X	X	
–1406	1.500	1.250	0.094	0.125	0.094	0.252		X	
–1407	1.500	1.250	0.125	0.125	0.125	0.326		X	
–1603	1.750	1.125	0.094	0.125	0.094	0.263		X	
–1607	1.750	1.625	0.094	0.125	0.094	0.310		X	X
–1608	1.750	1.625	0.125	0.125	0.125	0.405	X	X	
–1609	1.750	1.625	0.156	0.125	0.156	0.497	X		
–1701	1.875	1.000	0.078	0.125	0.078	0.222	X	X	X
–2001	2.000	1.000	0.078	0.125	0.078	0.231		X	
–2002	2.000	1.000	0.094	0.125	0.094	0.275	X	X	X
–2004	2.000	1.250	0.078	0.125	0.078	0.251	X	X	
–2005	2.000	1.250	0.094	0.125	0.094	0.299			X
–2006	2.000	1.250	0.125	0.125	0.125	0.389		X	
–2008	2.000	1.750	0.125	0.125	0.125	0.451		X	
–2401	2.500	1.250	0.094	0.125	0.094	0.346		X	
–2403	2.500	1.250	0.156	0.125	0.156	0.554		X	
–2405	2.500	1.625	0.125	0.125	0.125	0.498		X	
–3005	3.000	2.500	0.125	0.125	0.125	0.670			X
–3006	3.000	2.500	0.188	0.188	0.188	0.995		X	
–1404	1.500	1.000	0.094	0.125	0.094	0.228 (6061 and 7075)			
–1606	1.750	1.375	0.156	0.125	0.156	0.457 (ZK60A)			

.06.03.037-1A.58.01.00

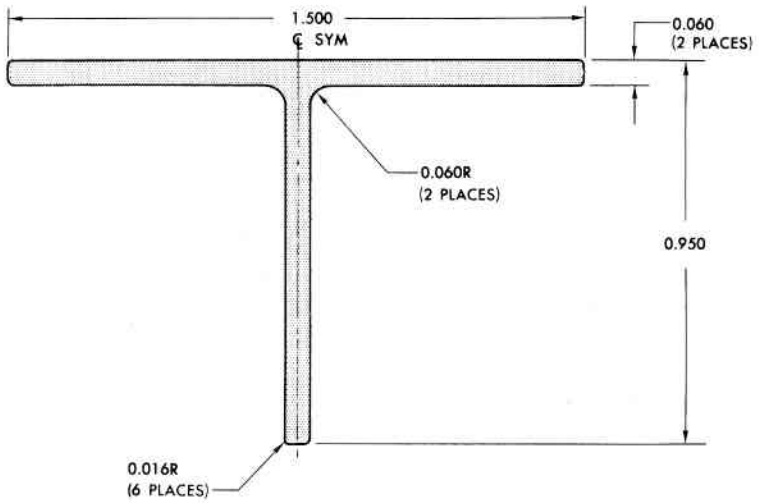
Figure 8-1. Extruded Shapes



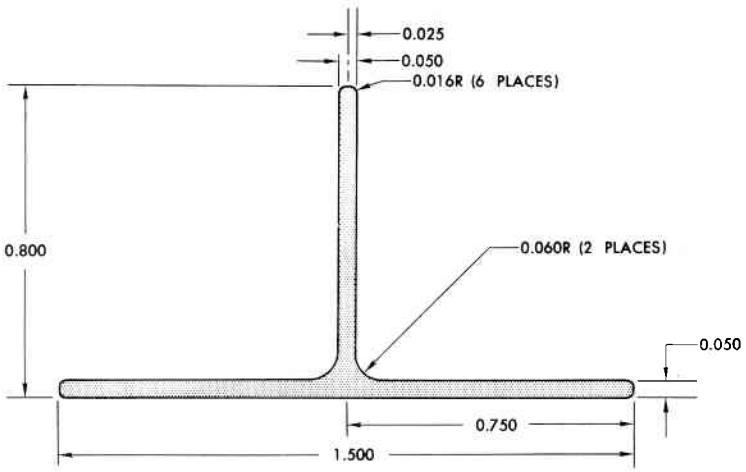
E711113 2024 AL ALLOY
AREA 0.225



E711311 7178 AL ALLOY
AREA 0.162



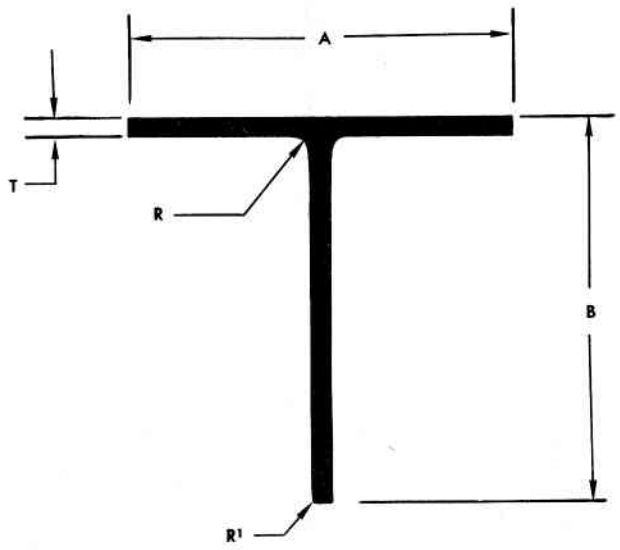
E711120 2024, 7075 AND 7178 AL ALLOY
AREA 0.143



E711122 2024 AL ALLOY
AREA 0.112

06.03.037-5 58.01.00

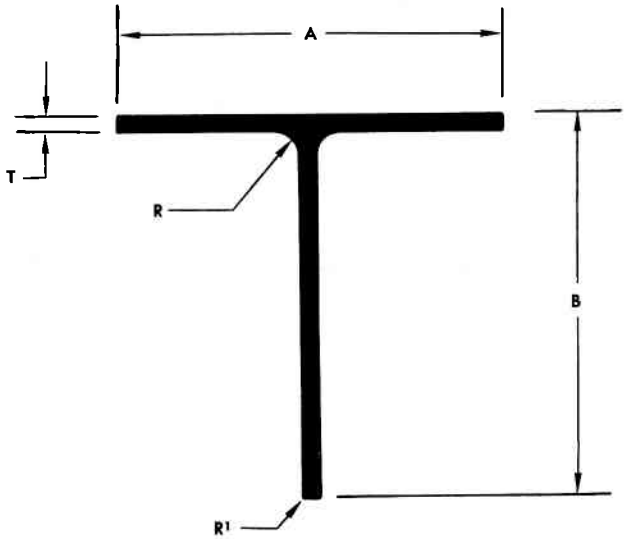
Figure 8-2. Extruded Shapes



NO.	A	B	T	R	R1	AREA	2024	7075	7178
E711306	3.500	2.120	0.100	0.125	0.016	0.560		X	
E711308	3.000	2.500	0.072	0.125	0.016	0.394		X	
E711310	3.000	2.000	0.125	0.180	0.047	0.622		X	
E711313	3.750	2.500	0.078	0.125	0.016	0.488		X	X
E711314	2.970	2.750	0.087	0.130	0.016	0.497		X	
E711315	1.800	3.250	0.080	0.900	0.016	0.401		X	
E711402	4.100	2.120	0.100	0.130	0.031	0.618			X
E711403	4.000	2.530	0.100	0.190		0.658	X		
E711406	4.000	3.420	0.130	0.190		0.963		X	
E712202	1.500	1.250	0.062	0.062	0.016	0.170	X	X	X
E712203	1.500	1.500	0.064	0.125	0.016	0.195		X	X
E712207	1.625	1.750	0.085	0.094	0.016	0.280		X	
E712211	1.500	0.750	0.051	0.125	0.016	0.117		X	
E712303	2.310	1.400	0.064	0.940		0.240		X	X
E712305	2.400	2.830	0.072	0.125	0.016	0.380		X	
E712307	2.500	1.500	0.064	0.060	0.016	0.282	X	X	
E712401	1.937	3.250	0.125	0.156		0.630	X		
E712406	1.000	3.000	0.094	0.156	0.016	0.470		X	
E712408	1.500	3.290	0.081	0.120	0.016	0.387		X	

.06.03.037- 6 .58.01.00

Figure 8-3. Extruded Shapes

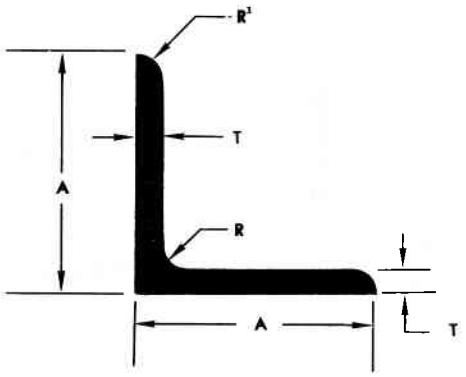


NO.	A	B	T	R	R1	AREA	2024	7075	7178
E711110	1.250	1.250	0.050	0.094	0.026	0.126		X	
E711111	1.875	1.000	0.050	0.094	0.016	0.145		X	
E711115	1.750	1.250	0.051	0.094	0.016	0.152			X
E711119	1.750	1.750	0.050	0.125	0.016	0.179		X	
E711123	1.500	0.950	0.080	0.060	0.016	0.190	X		
E711125	1.500	0.950	0.100	0.125	0.016	0.240	X		
E711126	1.400	0.750	0.100	0.060	0.016	0.206	X		
E711127	1.500	1.200	0.070	0.070	0.016	0.160	X		
E711129	1.600	1.700	0.070	0.125	0.016	0.233			
E711132	1.500	1.125	0.050	0.094	0.016	0.132	X		X
E711133	1.600	1.600	0.060	0.125	0.030	0.195		X	
E711138	1.950	1.800	0.500	0.062	0.016	0.185		X	
E711140	1.750	1.500	0.188	0.125		0.581	X		
E711201	2.180	2.000	0.070	0.090	0.016	0.291			X
E711202	2.250	2.000	0.070	0.094	0.016	0.293			X
E711203	1.600	2.090	0.070	0.094	0.016	0.255		X	
E711204	1.700	2.040	0.125	0.125	0.031	0.467			X
E711206	1.750	1.550	0.078	0.125	0.015	0.258		X	
E711209	2.250	1.750	0.062	0.062	0.016	0.248	X	X	
E711210	1.750	1.120	0.078	0.120	0.016	0.224			X
E711211	2.900	1.120	0.064	0.125	0.016	0.2655		X	
E711212	2.000	1.500	0.078	0.125	0.016	0.273		X	
E711214	2.000	2.000	0.125	0.125	0.031	0.485			X
E711216	2.000	1.000	0.063	0.063	0.016	0.186	X	X	
E711218	1.625	1.750	0.085	0.094	0.032	0.283		X	
E711219	2.000	1.000	0.090	0.125	0.026	0.269		X	
E711220	2.000	1.250	0.072	0.125	0.010	0.235		X	X
E711223	2.000	2.000	0.094	0.156	0.026	0.378		X	
E711227	1.600	1.850	0.050	0.125	0.016	0.177		X	
E711228	1.750	2.500	0.091	0.125	0.016	0.380		X	
E711230	1.250	2.000	0.080	0.125	0.016	0.260		X	
E711232	1.810	1.950	0.125	0.125	0.016	0.477		X	
E711233	1.600	2.400	0.100	0.090	0.016	0.393			X
E711234	2.000	2.000	0.080	0.125	0.016	0.320		X	
E711235	0.472	2.220	0.072	0.125	0.015	0.195	X		
E711239	2.000	1.100	0.100	0.120	0.016	0.306			X
E711301	3.250	2.500	0.070	0.190	0.016	0.403			X
E711302	3.000	1.875	0.080	0.125	0.031	0.389		X	
E711303	3.000	1.000	0.094	0.125	0.094	0.375	X		
E711305	2.375	2.625	0.080	0.125	0.016	0.400	X	X	X

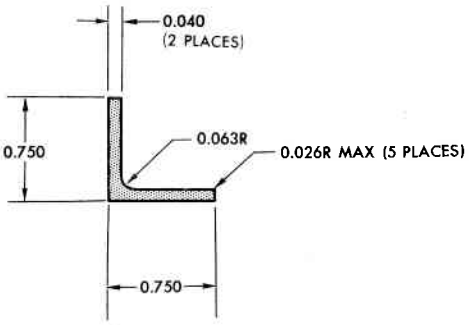
.06.03.037-2A .58.01.00

Figure 8-4. Extruded Shapes (Sheet 1 of 2)

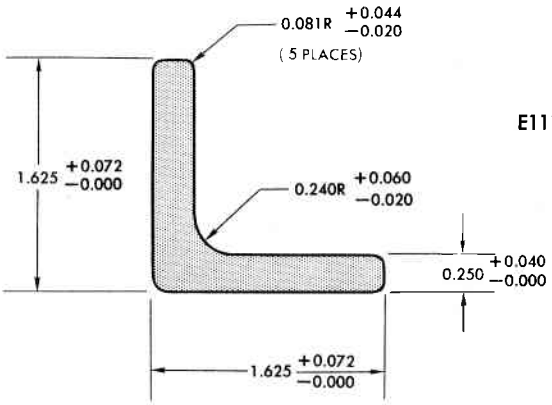
SHARP EDGES
ROUNDED 0.016



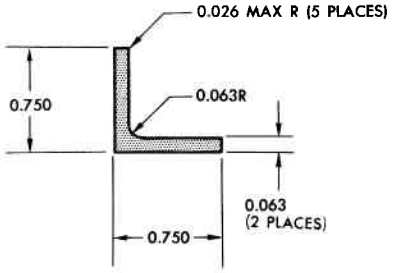
NO.	A	T	R	R_1	AREA	2024	7075	7178
AND10133								
–0601	0.750	0.063	0.094	0.063	0.091	X	X	X
–0602	0.750	0.063	0.094	0.063	0.130	X	X	
–0701	0.875	0.063	0.094	0.063	0.107		X	
–0702	0.875	0.094	0.094	0.094	0.154		X	X
–0703	0.875	0.125	0.094	0.125	0.198		X	
–1002	1.000	0.094	0.188	0.094	0.183		X	
–1003	1.000	0.125	0.188	0.125	0.235		X	
–1201	1.250	0.063	0.188	0.063	0.159	X		
–1203	1.250	0.125	0.188	0.125	0.298			X
–1401	1.500	0.063	0.188	0.063	0.191	X		
–1402	1.500	0.094	0.188	0.094	0.277	X		
–1403	1.500	0.125	0.188	0.125	0.360	X	X	X
–1404	1.500	0.188	0.188	0.188	0.521		X	
–2004	2.000	0.250	0.250	0.250	0.924		X	
–2403	2.500	0.250	0.250	0.250	1.170	X		
E111106	1.500	0.094	0.094	0.047	0.273		X	
E112302	1.000	0.062	0.062	0.031	0.121		X	



E111104 2024 AL ALLOY
AREA 0.059

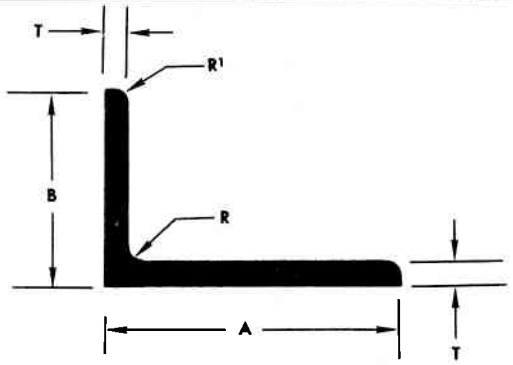


E111201 7178 AL ALLOY
AREA 0.756

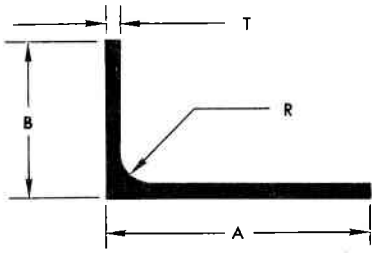


E111105 2024 AL ALLOY
AREA 0.091

Figure 8-4. Extruded Shapes (Sheet 2 of 2)

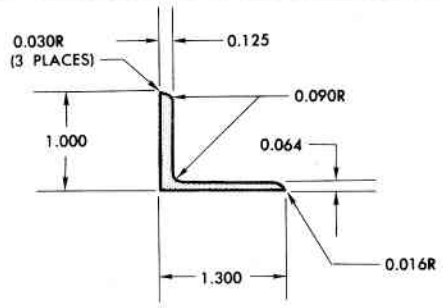


NO.	A	B	T	R	R1	AREA	2024	7075	7178
AND10134 -0602	0.750	0.625	0.063	0.063	0.063	0.082		X	
-1003	1.000	0.750	0.063	0.125	0.063	0.108		X	
-1005	1.000	0.875	0.063	0.125	0.063	0.116		X	
-1201	1.250	0.750	0.063	0.125	0.063	0.124		X	
-1202	1.250	0.750	0.094	0.125	0.094	0.179	X		
-1203	1.250	0.750	0.125	0.125	0.125	0.231	X	X	
-1204	1.250	1.000	0.063	0.125	0.063	0.139	X	X	
-1205	1.250	1.000	0.094	0.125	0.094	0.202	X	X	
-1206	1.250	1.010	0.125	0.125	0.125	0.262		X	
-1401	1.500	0.750	0.094	0.156	0.094	0.204		X	
-1402	1.500	0.750	0.125	0.156	0.125	0.264		X	
-1406	1.500	1.250	0.094	0.156	0.094	0.251		X	
-1407	1.500	1.250	0.125	0.156	0.125	0.327			X
-1601	1.750	1.000	0.125	0.156	0.125	0.327		X	
-1602	1.750	1.250	0.125	0.156	0.125	0.358	X		
-2005	2.000	1.250	0.188	0.188	0.188	0.568	X		
-2010	2.000	0.750	0.156	0.188	0.156	0.558		X	
E121108	1.000	0.750	0.063	0.063	0.031	0.106			X
E121120	0.875	0.750	0.094	0.094	0.094	0.142			X
E121121	1.500	1.250	0.072	0.090	0.070	0.198			X
E121213	2.500	1.250	0.125	0.188	0.094	0.547			X

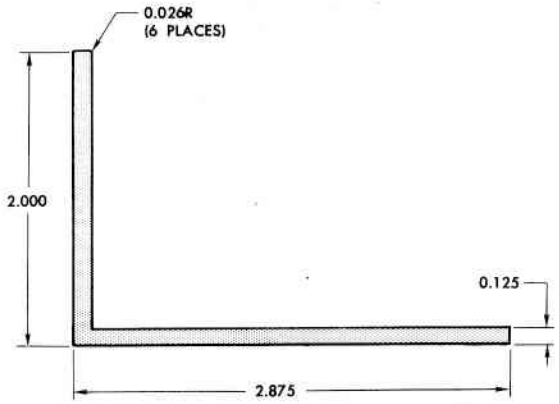


NO.	A	B	T	R	AREA	2024	7075	7178
E121103	1.200	0.880	0.090	0.090	0.189			X
E121112	1.750	0.750	0.062	0.125	0.154		X	
E121122	1.375	0.812	0.072	0.125	0.160		X	
E121124	1.350	0.700	0.080	0.090	0.158		X	
E121201	2.120	1.890	0.070	0.090	0.276		X	X
E121208	1.750	1.125	0.064	0.125	0.183		X	
E121212	2.250	1.165	0.125	0.120	0.470		X	
E121214	2.625	1.750	0.072	0.125	0.313	X		
E121306	2.750	1.200	0.080	0.125	0.3136	X		
E121307	3.000	1.250	0.125	0.125	0.517		X	
E122101	1.160	0.930	0.065	0.130	0.135			X
E122302	2.000	1.500	0.064	0.125	0.223	X		
E122305	2.625	1.750	0.072	0.125	0.3130			X
E122311	2.780	1.063	0.125	0.063	0.466	X		
E122501	3.500	1.750	0.093	0.156	0.580		X	
CORNER OR FILLET RADII NOT CALLED OUT SHALL CONFORM TO FED. STD. NO. 245								

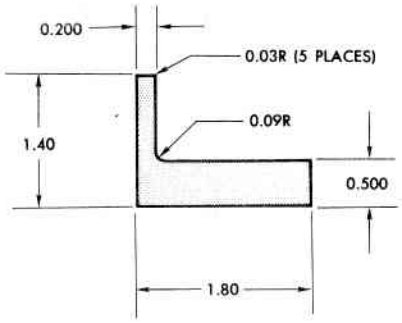
Figure 8-5. Extruded Shapes



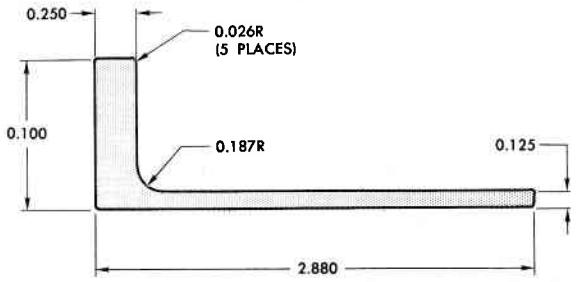
ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141101 2024 AL ALLOY.
AREA 0.200



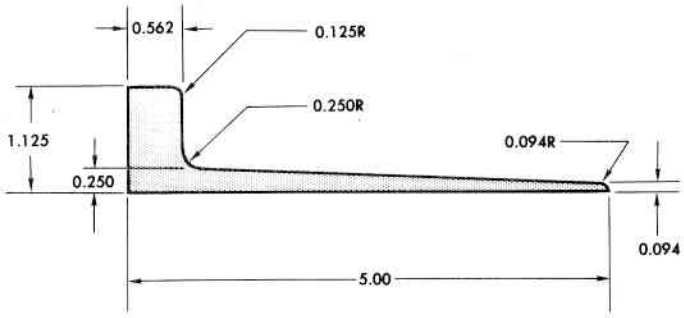
ANGLE-90°, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E121302 2024 AL ALLOY
AREA 0.594



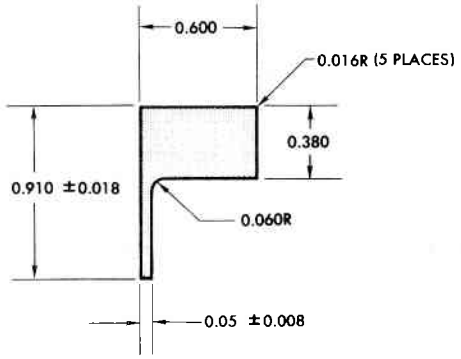
ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E121220 7178 AL ALLOY
AREA 1.08



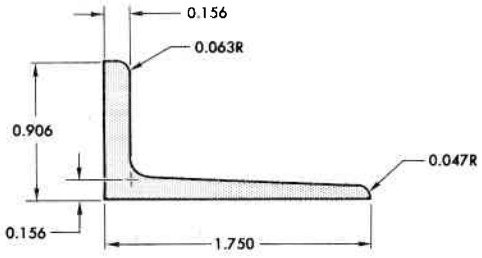
ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141305 7075 AL ALLOY
AREA 0.586



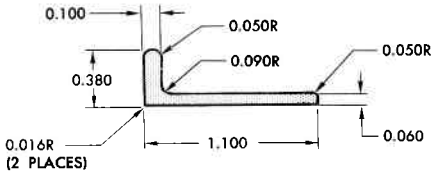
ANGLE—90°, FLANGE WIDTH UNEQUAL,
THICKNESS TAPERED
E102601 2024 AL ALLOY
AREA 1.404



ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141127 7075 AL ALLOY
AREA 0.254

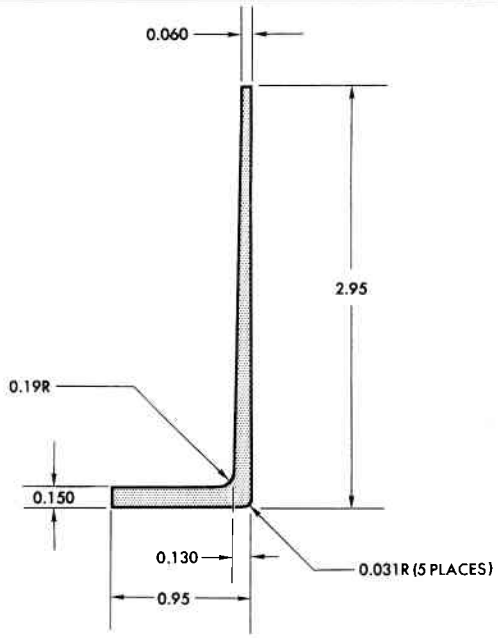


ANGLE-90°, FLANGE WIDTH UNEQUAL, THICKNESS TAPERED
E151101 7075 AL ALLOY
AREA 0.320

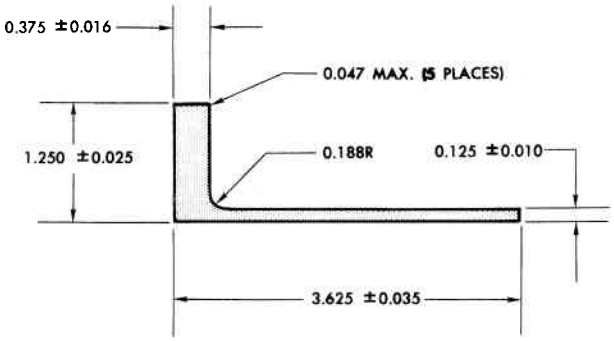


ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141104 ZK-60A MAG ALLOY
AREA 0.097

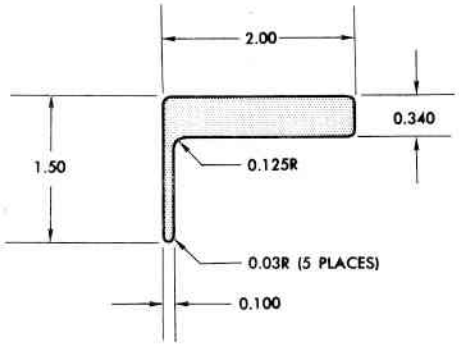
Figure 8-6. Extruded Shapes



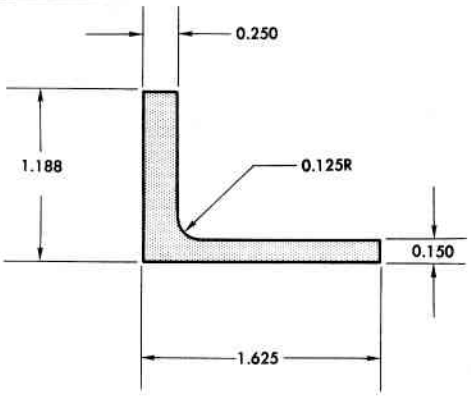
ANGLE—90°, FLANGE WIDTH UNEQUAL, THICKNESS TAPERED
E151301 7178 AL ALLOY
AREA 0.420



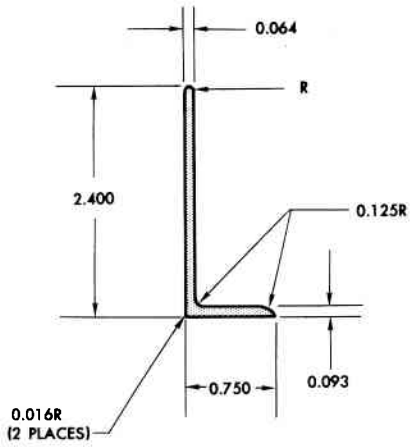
ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141304 7178 AL ALLOY
AREA 0.882



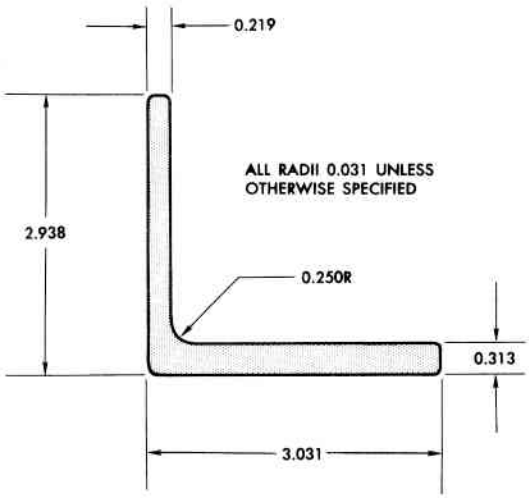
ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141220 7075 AL ALLOY
AREA 0.798



ANGLE—90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E142213 7178 AL ALLOY
AREA 0.50

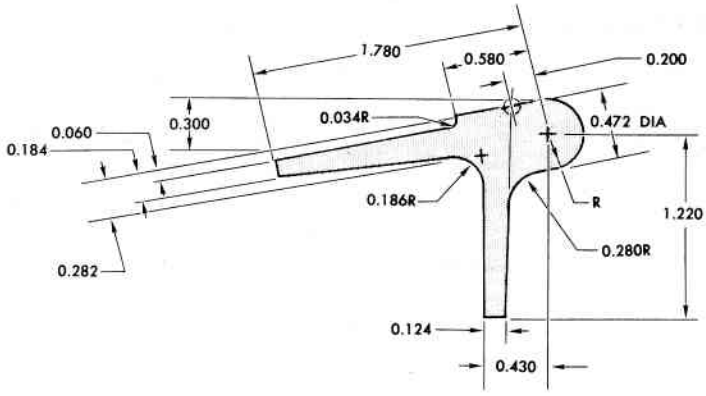


ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141206 7178 AL ALLOY
AREA 0.223

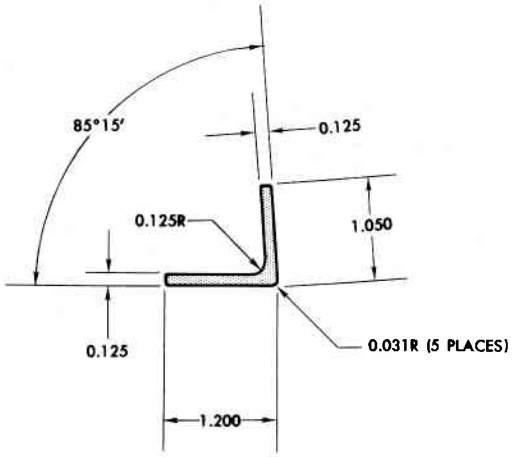


ANGLE-90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E141404 7075 AL ALLOY
AREA 1.536

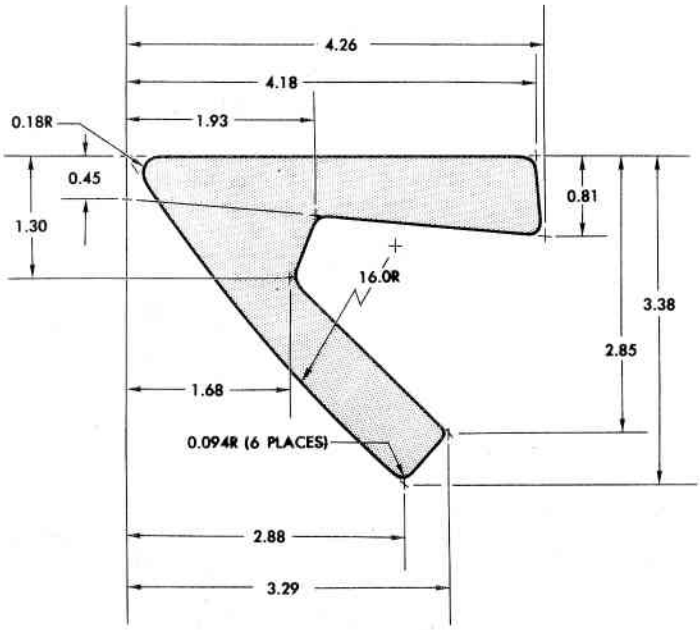
Figure 8-7. Extruded Shapes



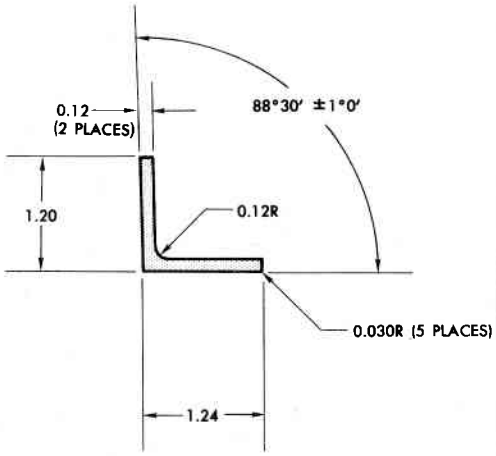
ANGLE-ACUTE, BULBED APPENDAGE
E261207 7075 AL ALLOY
AREA 0.700



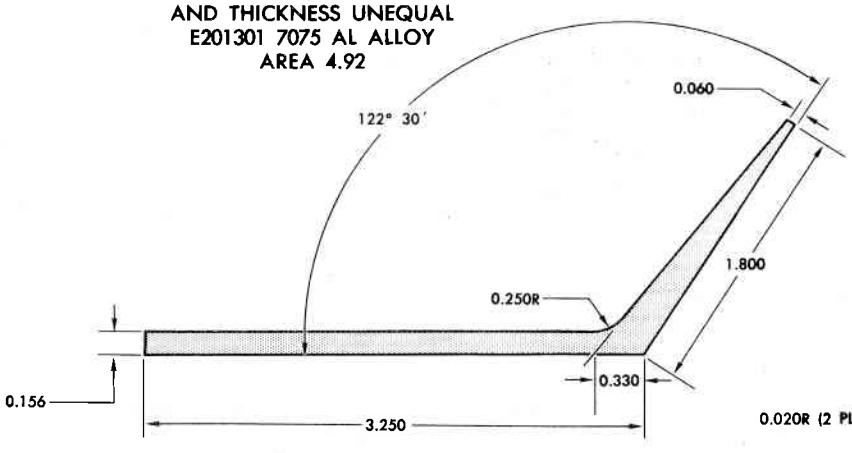
ANGLE — ACUTE, FLANGE WIDTH UNEQUAL,
THICKNESS EQUAL
E221105 7075 AL ALLOY
AREA 0.269



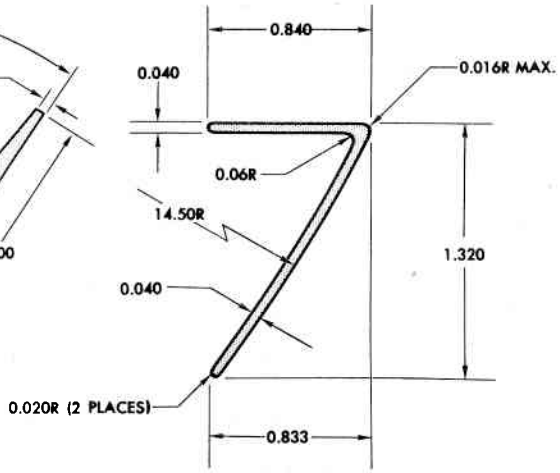
ANGLE — ACUTE, FLANGE WIDTH
AND THICKNESS UNEQUAL
E201301 7075 AL ALLOY
AREA 4.92



ANGLE — ACUTE, FLANGE WIDTH UNEQUAL,
THICKNESS EQUAL
E211105 7075 AL ALLOY
AREA 0.281



ANGLE-OBTUSE, TAPERED FLANGE
E351402 7178 AL ALLOY
AREA 0.777



ANGLE — ACUTE, MISC.
E201107 7178 AL ALLOY
AREA 0.094

Figure 8-8. Extruded Shapes

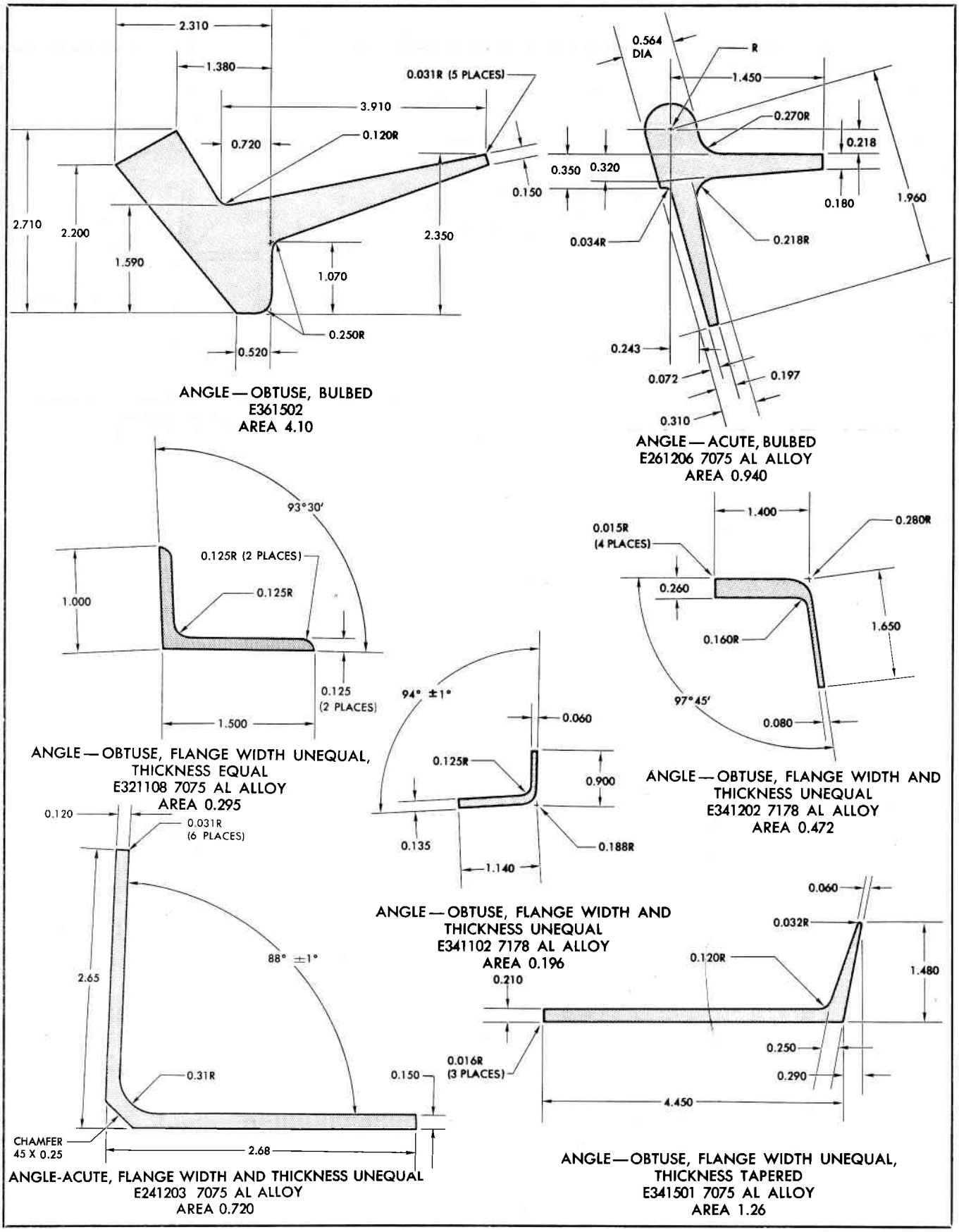


Figure 8-9. Extruded Shapes

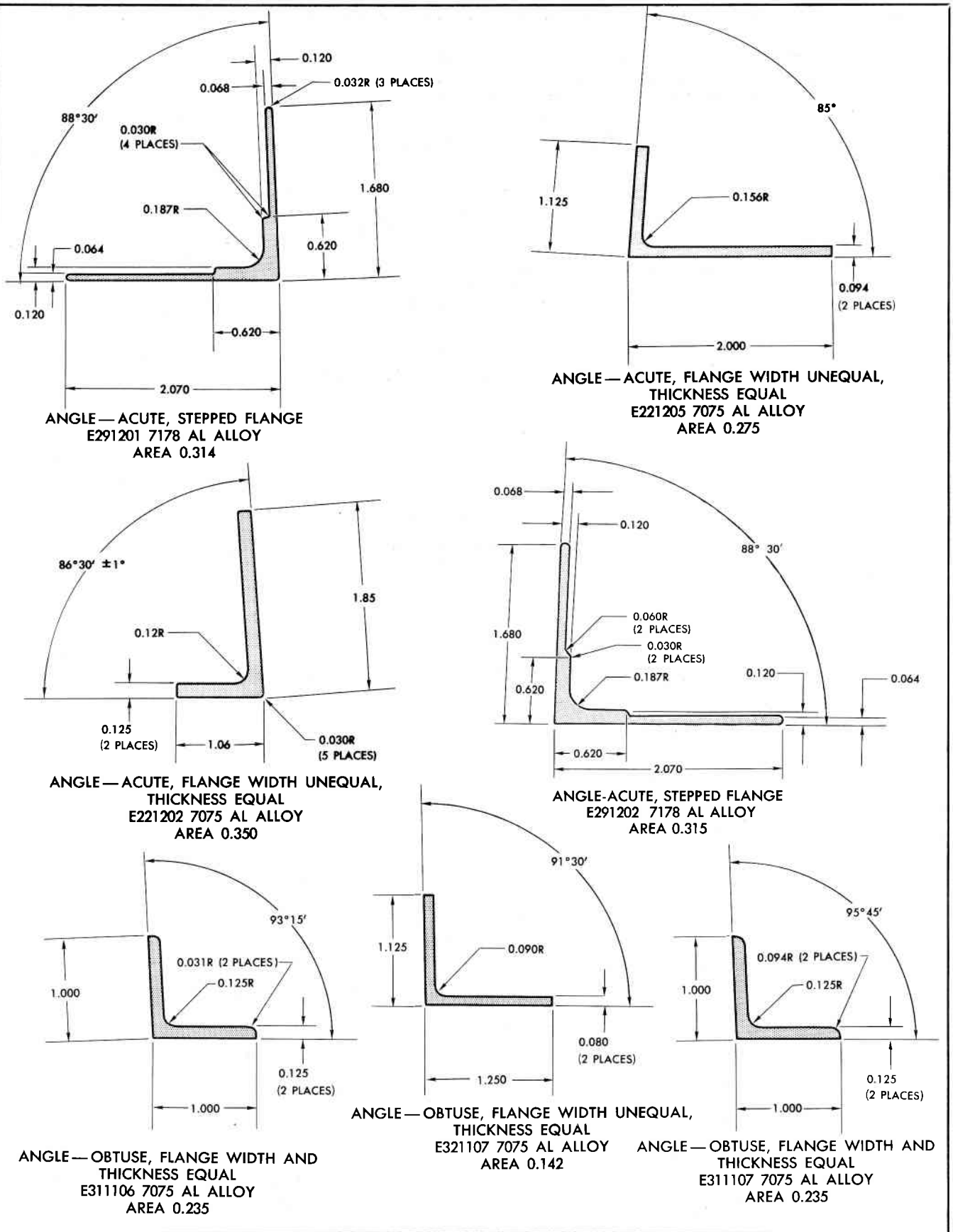


Figure 8-10. Extruded Shapes

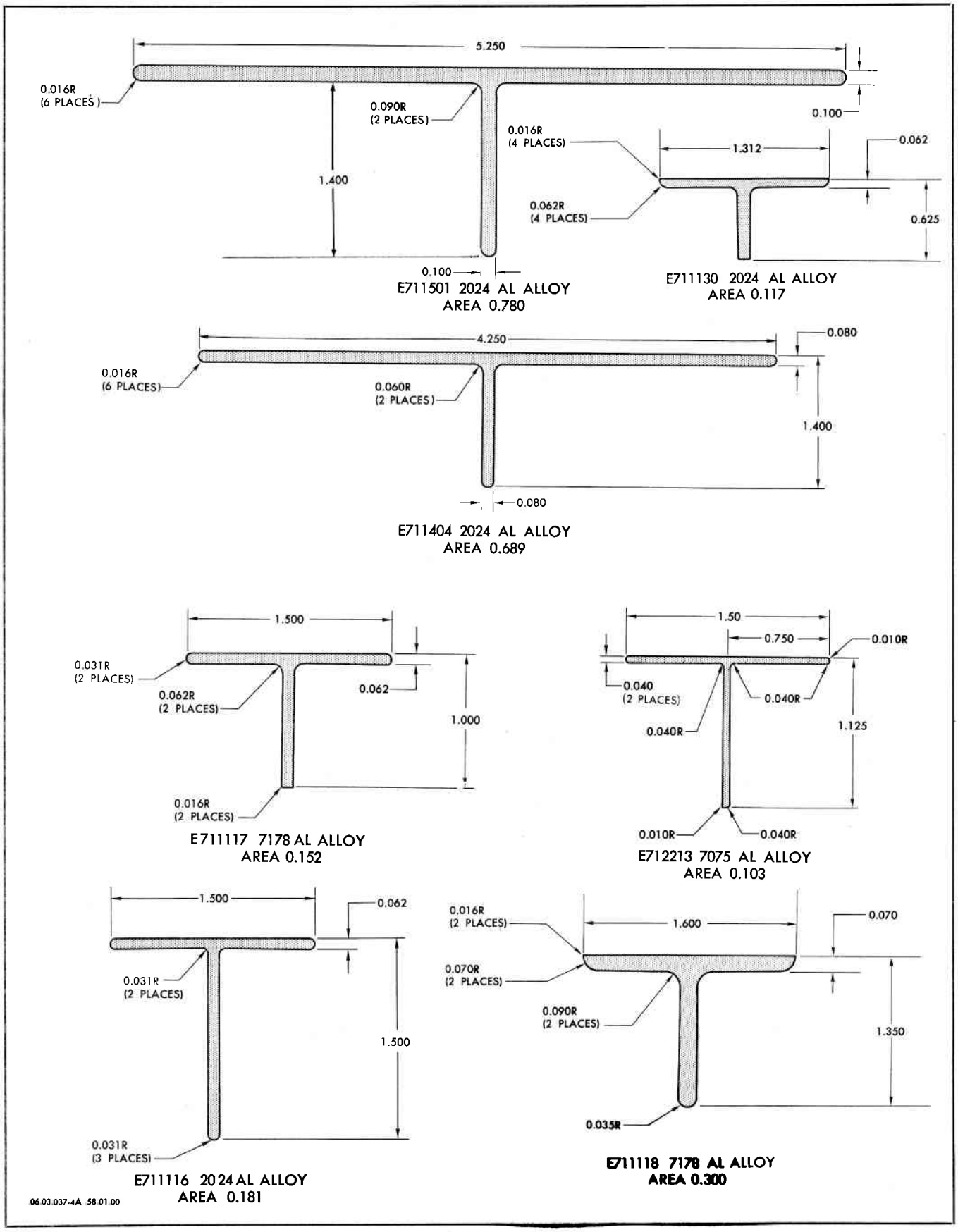


Figure 8-11. Extruded Shapes

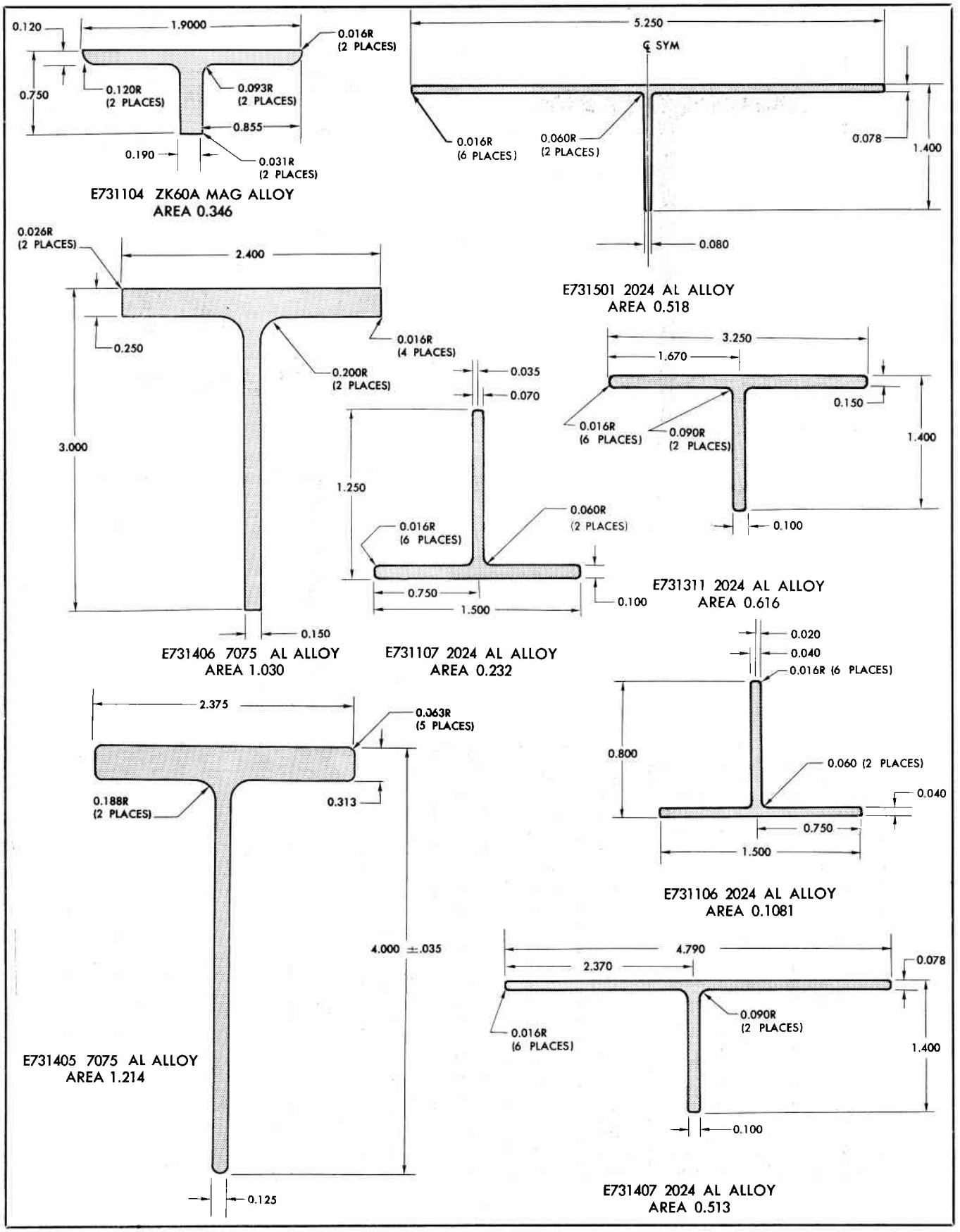
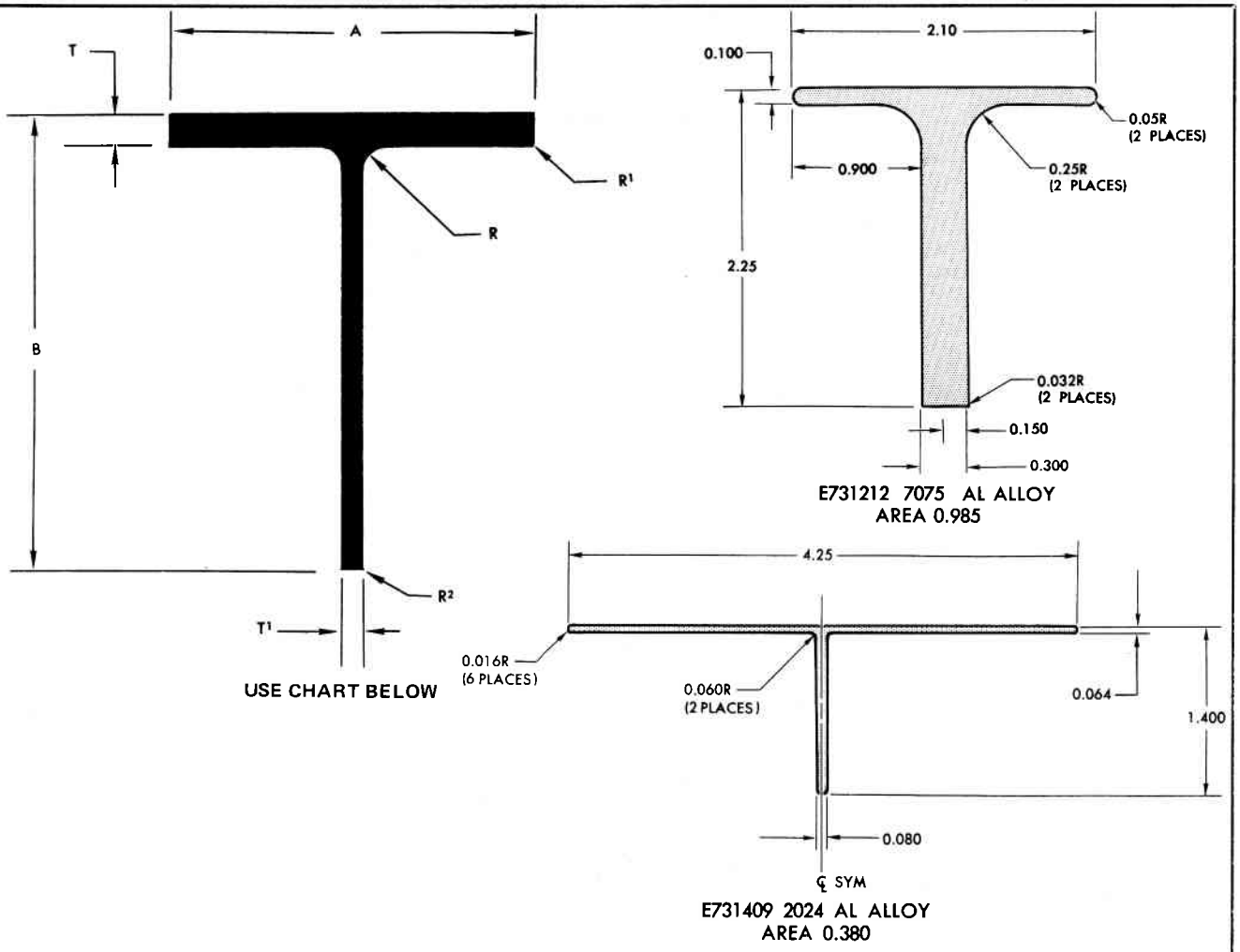
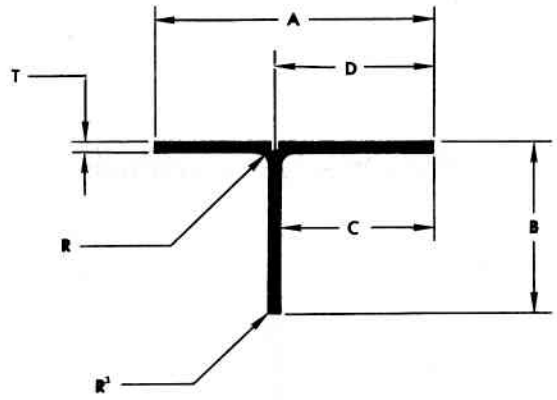


Figure 8-12. Extruded Shapes



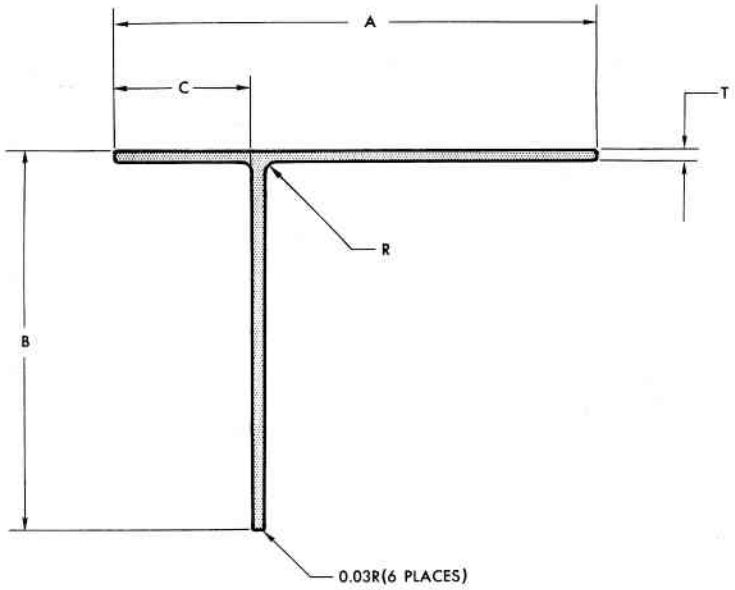
NO.	A	B	T	T1	R	R1	R2	AREA	2024	7075	7178
E711124	1.500	1.350	0.125	0.156	0.125	0.030	0.030	0.429	X		
E711401	3.950	2.000	0.078	0.070	0.094	0.016	0.016	0.412		X	
E721203	2.000	2.600	0.188	0.100	0.125	0.031	0.016	0.663			X
E731101	1.875	1.000	0.100	0.051	0.125	0.016	0.016	0.838			X
E731108	1.640	1.509	0.125	0.188	0.125	0.030	0.030	0.469	X		
E731208	2.750	1.375	0.093	0.187	0.250	0.047	0.047	0.522	X		
E731216	2.500	2.000	0.150	0.060	0.125	0.016	0.030	0.440			X
E731217	2.000	1.625	0.188	0.125	0.090	0.016	0.016	0.551		X	
E731219	2.000	1.000	0.120	0.090	0.060	0.016	0.016	0.314		X	
E731220	2.000	1.250	0.125	0.188	0.062	0.016	0.016	0.461	X		
E731222	1.830	2.256	0.550	0.070	0.120	0.010	0.010	1.153			X
E731223	1.750	2.750	0.125	0.090	0.125	0.016	0.016	0.461		X	
E731303	2.200	3.000	0.188	0.100	0.125	0.031	0.016	0.695		X	
E731308	2.250	2.850	0.156	0.125	0.130	0.031	0.031	0.680			X
E731310	3.000	1.625	0.188	0.125	0.188	0.016	0.016	0.758		X	
E731312	2.000	3.000	0.750	0.500	0.090	0.030	0.030	2.630		X	
E731402	1.830	4.500	0.200	0.090	0.125	0.031	0.016	0.755		X	X
E731403	2.000	3.750	0.188	0.125	0.125	0.047	0.047	0.827			X
E731408	4.000	3.000	0.750	0.500	0.090	0.030	0.030	4.125		X	
E731410	4.630	1.030	0.094	0.110	0.045	0.016	0.016	0.539			X
E731502	5.000	2.800	0.200	0.800	0.120	0.030	0.030	2.470		X	
E732701	2.813	6.500	0.080	0.094	0.156	0.031	0.031	0.848			X

Figure 8-13. Extruded Shapes



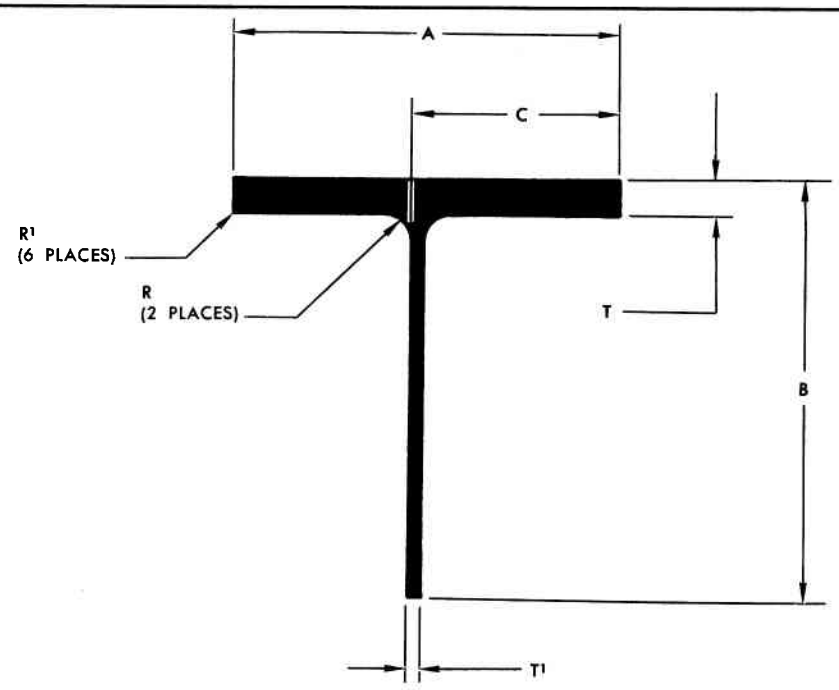
TEE—90°, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL

NO.	A	B	C	D	T	R	R¹	AREA	2024	7075	7178
E721101	1.430	0.900		0.805	0.051	0.060	0.016	0.116			X
E721102	1.750	0.800		1.000	0.051	0.090	0.016	0.125	X		
E721103	1.620	0.830	1.020		0.060	0.090	0.016	0.150		X	
E721205	1.900	1.600	1.747		0.070	0.070	0.016	0.242			X
E721206	2.670	0.950	0.980		0.080	0.090	0.016	0.218	X		
E721301	2.600	2.550	1.465		0.070	0.070	0.016	0.361		X	X
E721302	4.000	1.500	2.312		0.094	0.094	0.016	0.510			X
E721303	3.860	2.280	2.070		0.080	0.190	0.016	0.500			X
E721401	4.450	2.410	2.380		0.125	0.160	0.016	0.860		X	
E722201	2.250	1.300	1.125		0.051	0.091	0.016	0.182			X
E722601	5.625	3.938		3.750	0.250	0.188	0.031	2.343			X

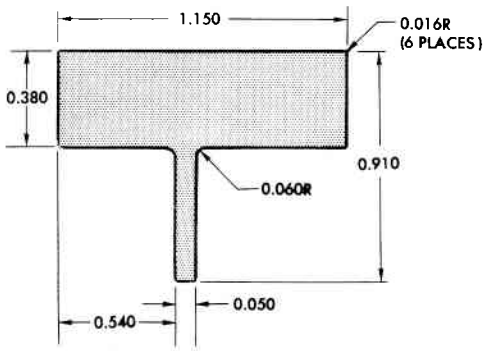


E721217 7075 AND 7178 AL ALLOY
AREA 0.271

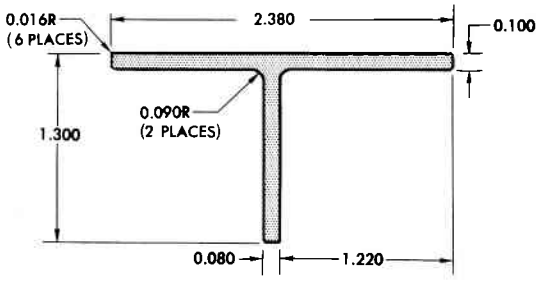
Figure 8-14. Extruded Shapes



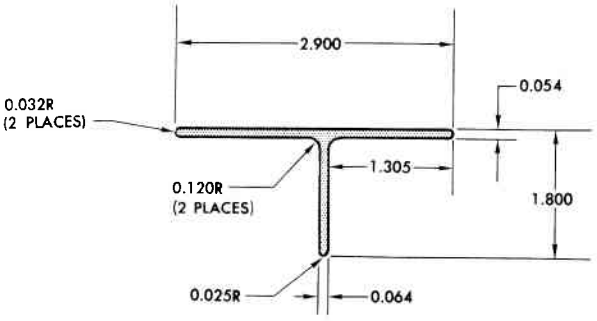
NO.	A	B	C	T	T1	R	R1	AREA	7075	7178
E741214	1.900	2.220	0.950	0.210	0.100	0.120	0.016	0.606		X
E741215	1.900	2.200	0.950	0.180	0.080	0.120	0.016	0.509		X
E741310	1.900	3.000	0.950	0.120	0.080	0.125	0.015	0.461		X
E741311	1.900	3.060	0.950	0.180	0.080	0.120	0.016	0.578		X
E741312	1.960	2.950	1.220	0.150	0.100	0.090	0.016	0.577		X
E741502	3.580	4.250	2.140	0.450	0.200	0.125	0.031	2.374	X	



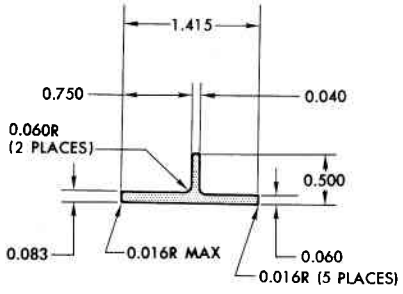
E741108 7075 AL ALLOY
AREA 0.465



E741216 2024 AL ALLOY
AREA 0.337

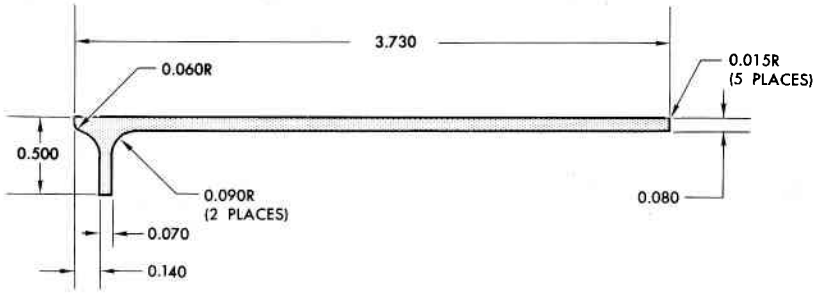


E741213 7178 AL ALLOY
AREA 0.272

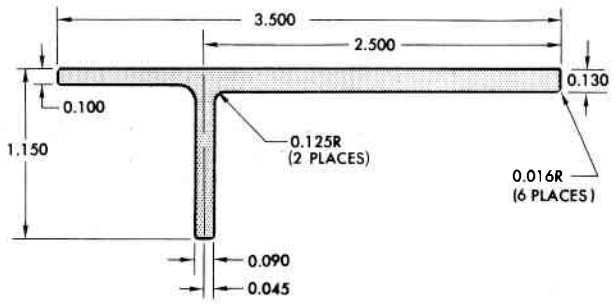


E741103 7178 AL ALLOY
AREA 0.107

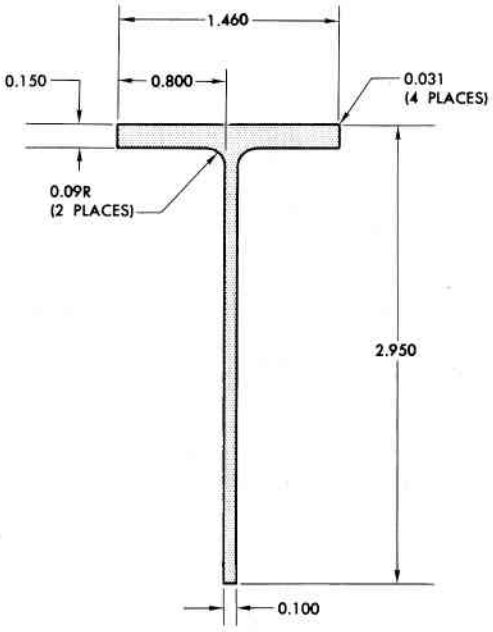
Figure 8-15. Extruded Shapes



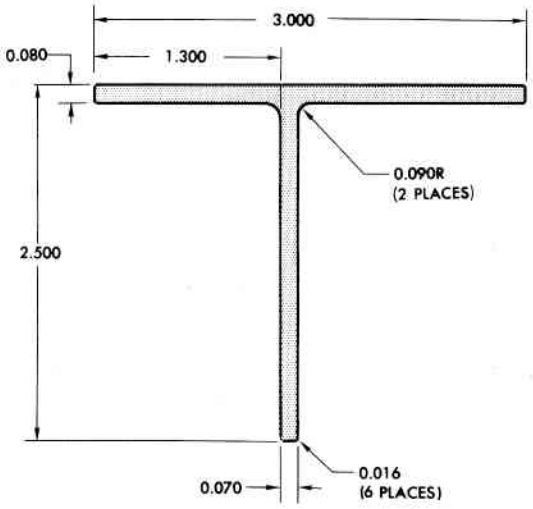
E741309 7075 AL ALLOY
AREA 0.330



E741308 2024 AL ALLOY
AREA 0.520

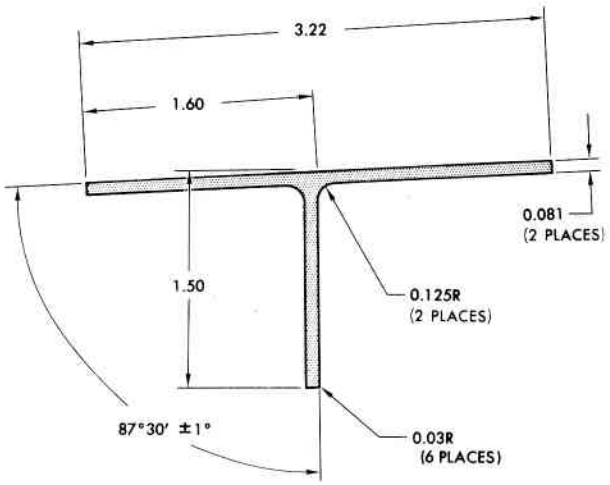


E741313 7178 AL ALLOY
AREA 0.502

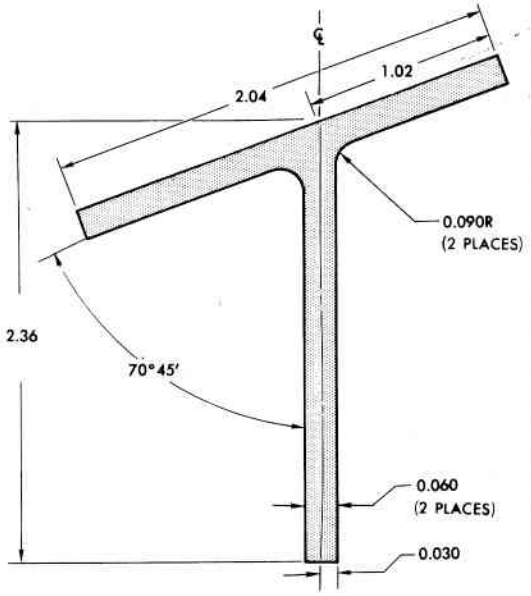


E741302 7075 AL ALLOY
AREA 0.413

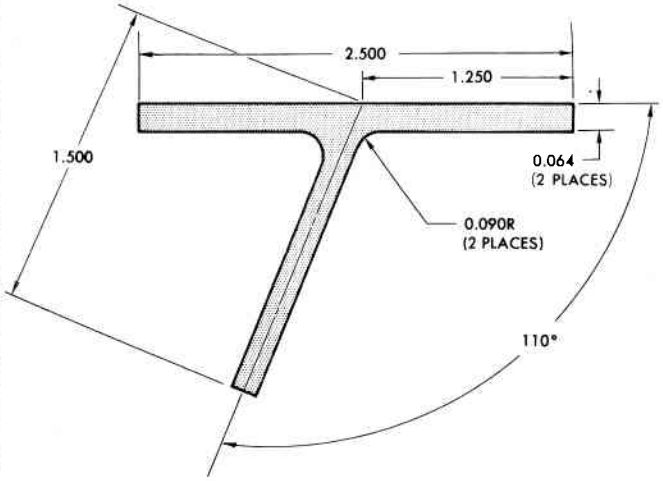
Figure 8-16. Extruded Shapes



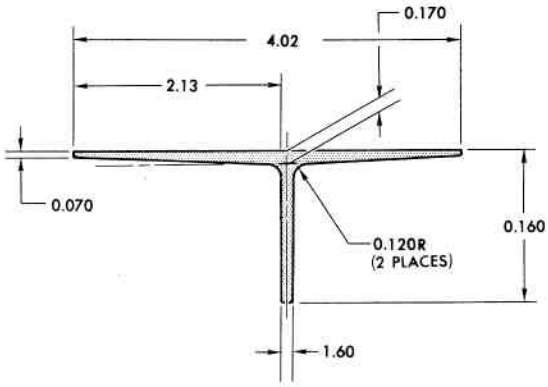
TEE — FLANGE WIDTH UNEQUAL,
THICKNESS EQUAL
E821403 7075 AL ALLOY
AREA 0.3826



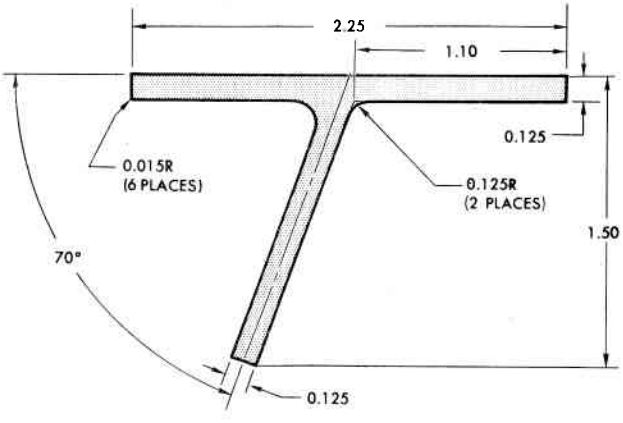
TEE — FLANGE WIDTH AND THICKNESS EQUAL
E812309 7178 AL ALLOY
AREA 0.264



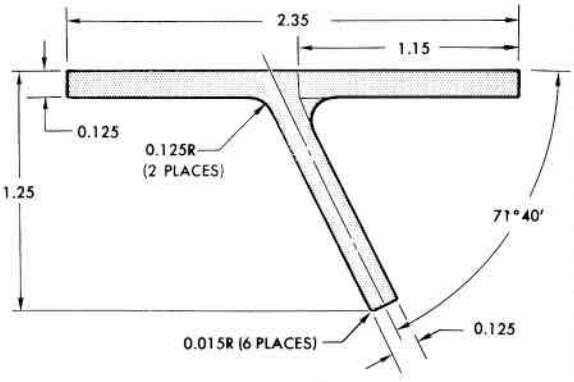
TEE — FLANGE WIDTH AND THICKNESS EQUAL,
ANGLE UNEQUAL
E812305 7075 AND 7178 AL ALLOY
AREA 0.282



TEE — FLANGE WIDTH AND THICKNESS UNEQUAL
E741406
AREA 0.716

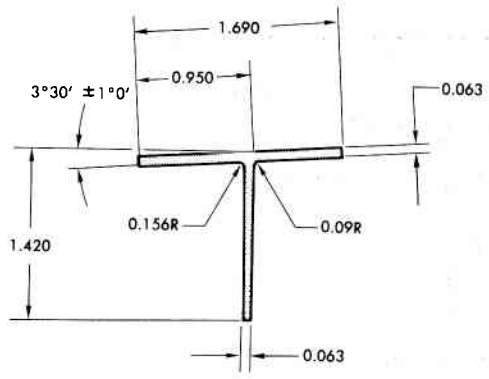


TEE — ANGLE, FLANGE WIDTH UNEQUAL,
THICKNESS EQUAL
E821207 2024 AL ALLOY
AREA 0.470

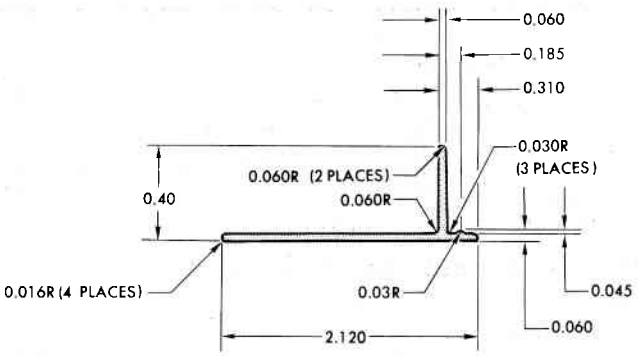


TEE — ANGLED, FLANGE WIDTH UNEQUAL,
THICKNESS EQUAL
E821208 2024 AL ALLOY
AREA 0.44

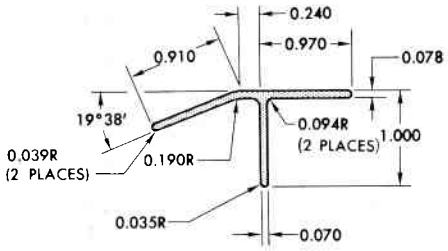
Figure 8-17. Extruded Shapes



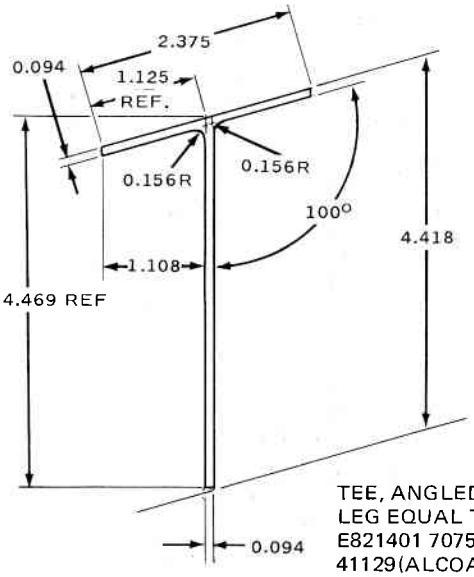
TEE — ANGLED, FLANGE WIDTH AND THICKNESS EQUAL
E811103 2024 AL ALLOY
AREA 0.21



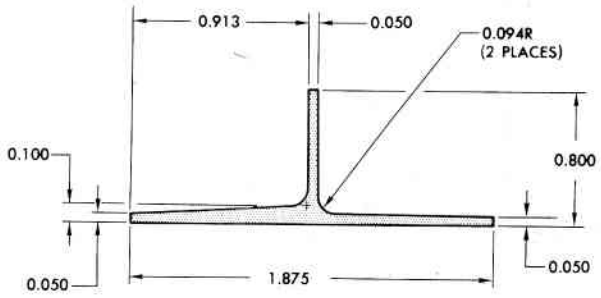
TEE — SPECIAL
E701211 2024 AL ALLOY
AREA 0.149



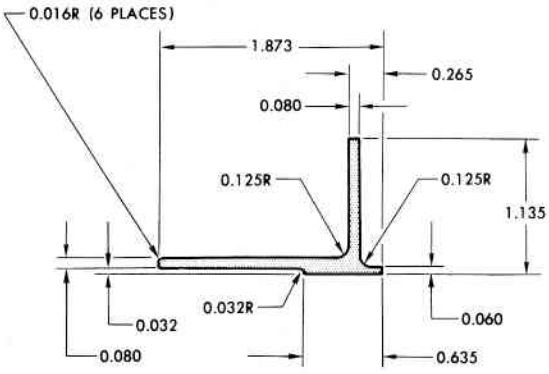
TEE — 90° MISC.
E751404 7178 AL ALLOY
AREA 2.047



TEE, ANGLED UNEQUAL LEG EQUAL THICKNESS
E821401 7075T6AL ALLOY
41129(ALCOA DIE) AREA 0.646.



TEE — TAPERED
E701105
AREA 0.157



TEE — NON UNIFORM
E701202 7178 AL ALLOY
AREA 0.252

Figure 8-18. Extruded Shapes

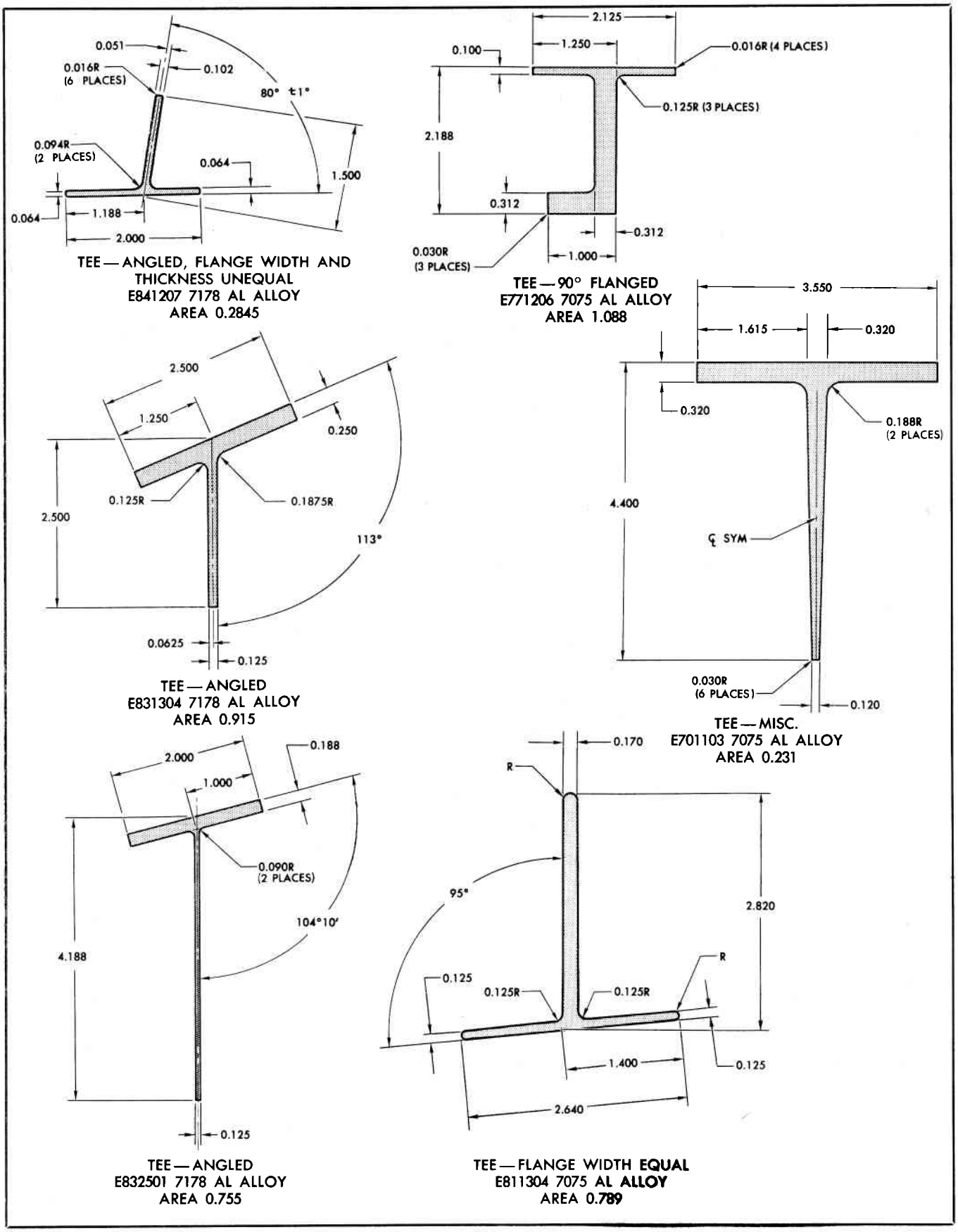


Figure 8-19. Extruded Shapes

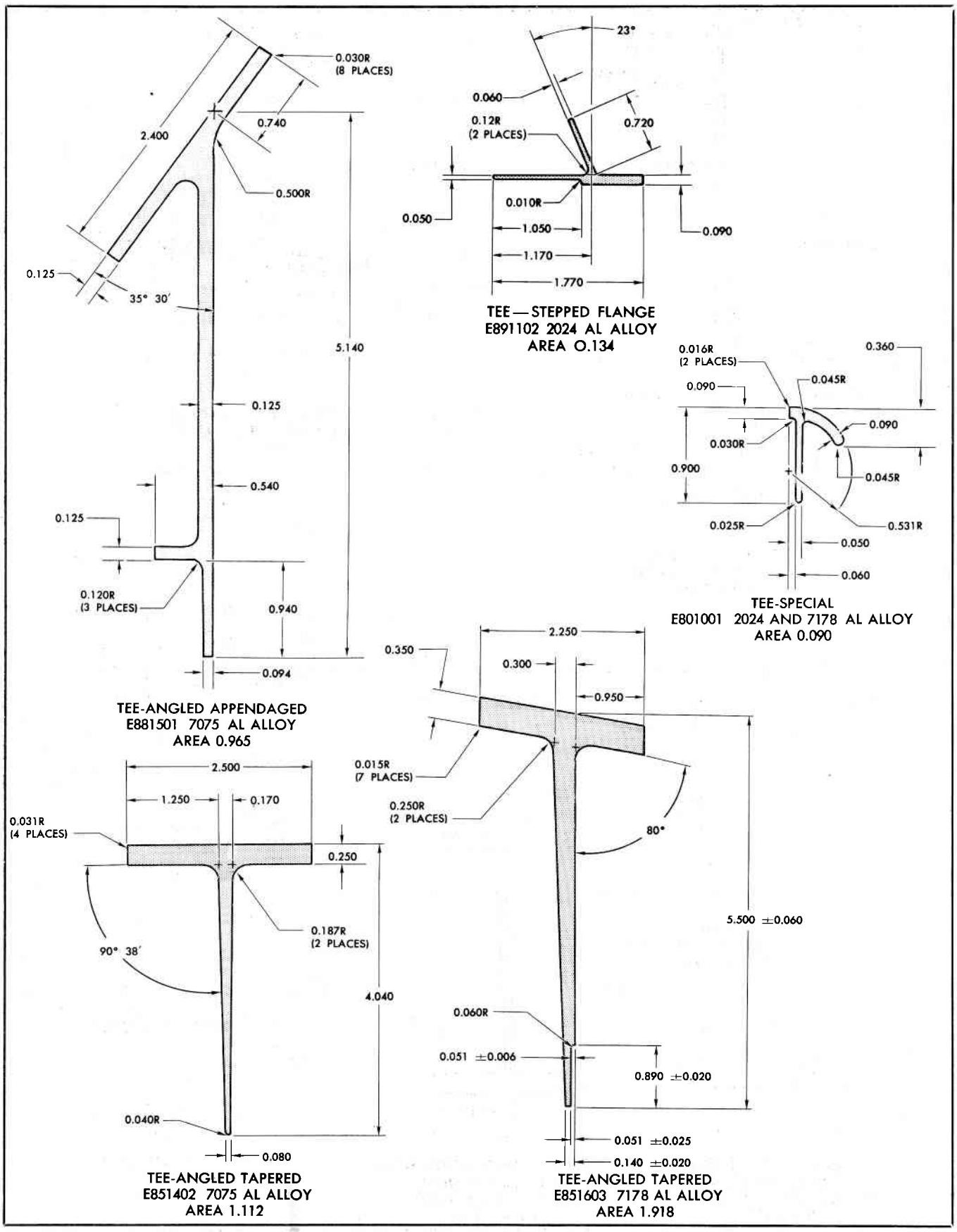


Figure 8-20. Extruded Shapes

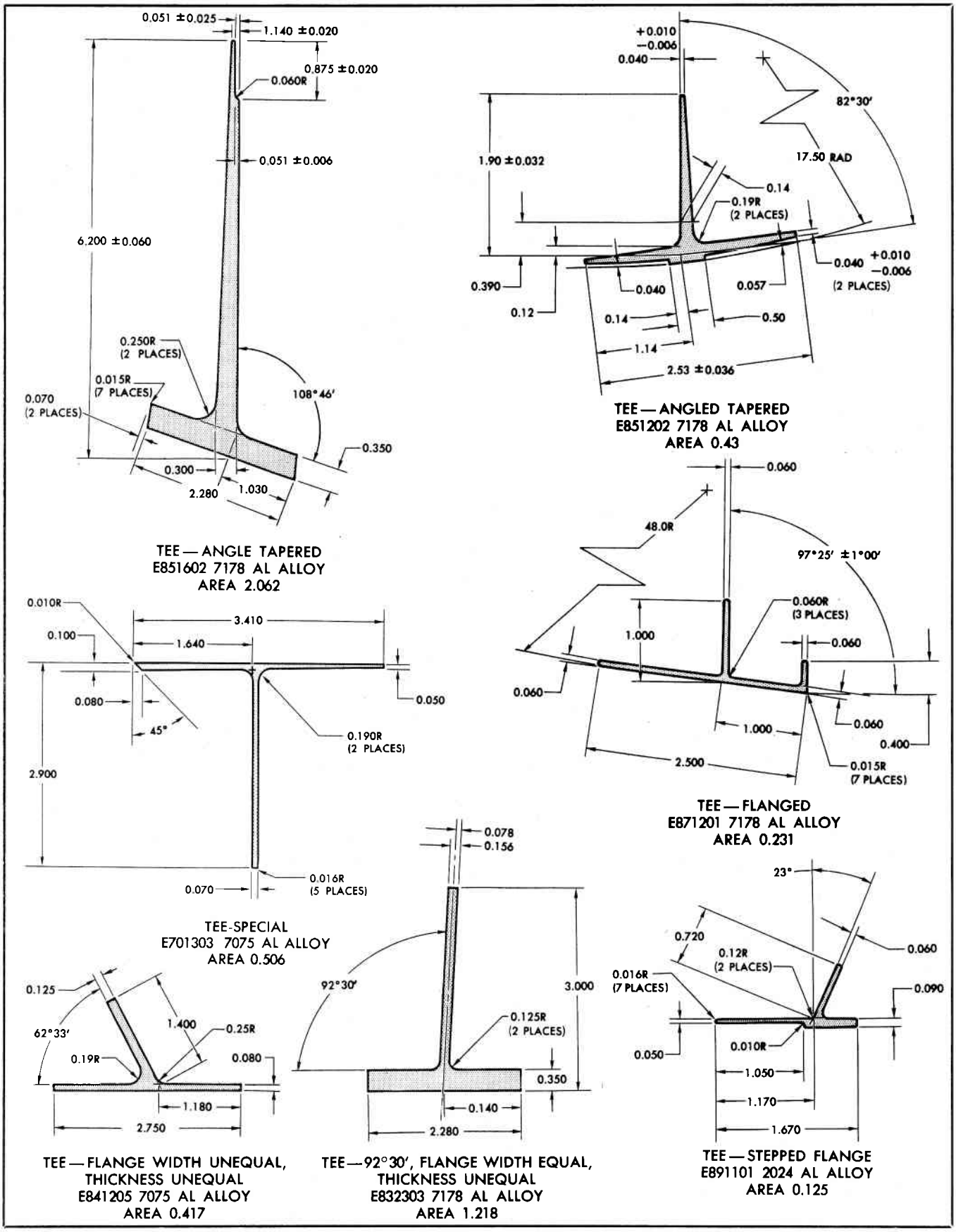
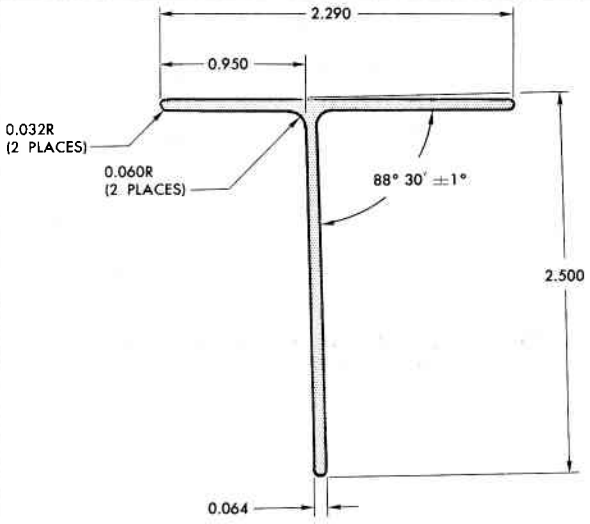
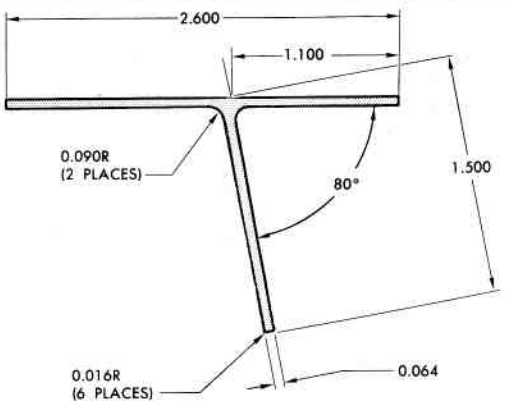


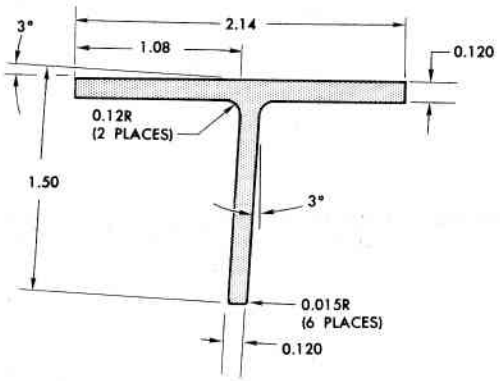
Figure 8-21. Extruded Shapes



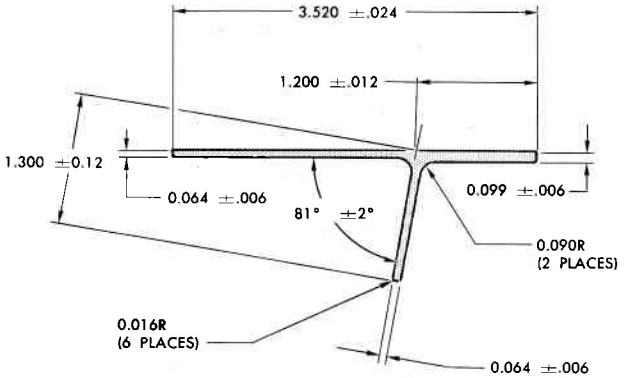
TEE-ANGLED, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E821203 7075 AL ALLOY
AREA 0.303



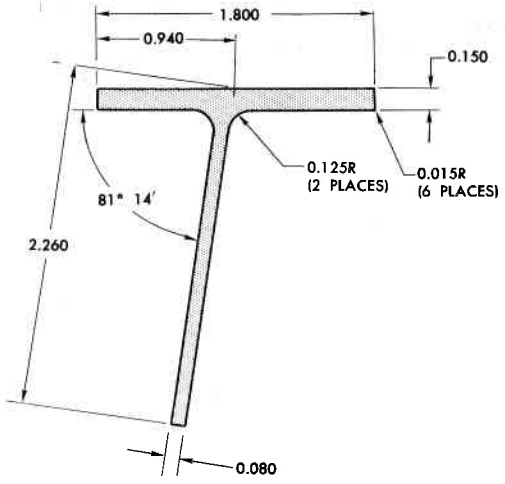
TEE-ANGLED, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E821205 7178 AL ALLOY
AREA 0.262



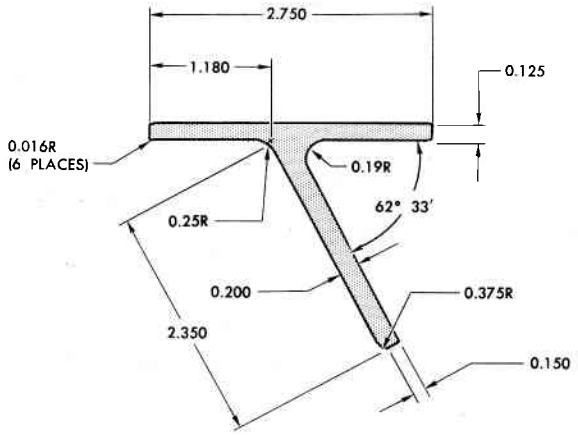
TEE-ANGLED,
FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E821206 7178 AL ALLOY
AREA 0.420



TEE-ANGLED, FLANGE WIDTH AND THICKNESS UNEQUAL
E841305 7075 AL ALLOY
AREA 0.343

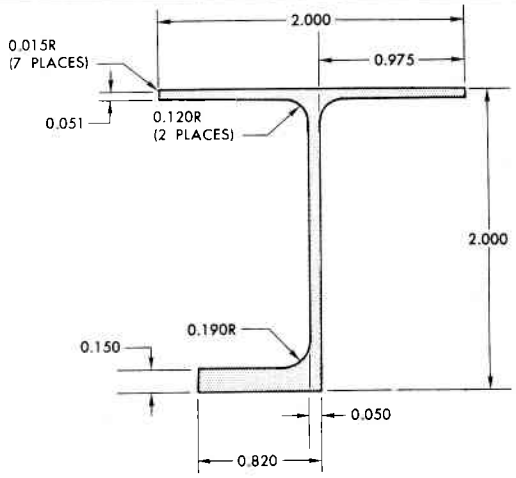


TEE-ANGLED,
FLANGE WIDTH EQUAL, THICKNESS UNEQUAL
E841203 7178 AL ALLOY
AREA 0.450

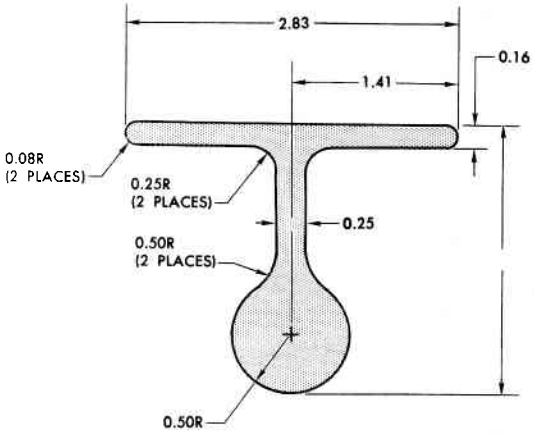


TEE-ANGLED, FLANGE WIDTH AND THICKNESS UNEQUAL
E841306 7075 AL ALLOY
AREA 0.771

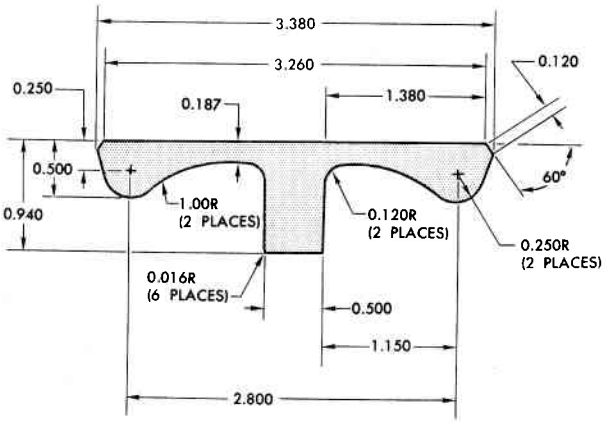
Figure 8-22. Extruded Shapes



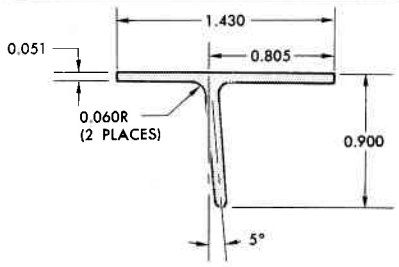
TEE—90° FLANGED
E781202 7178 AL ALLOY
AREA 0.317



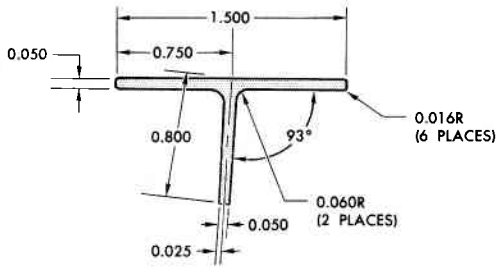
TEE - BULBED
E761301 7075 AL ALLOY
AREA 1.345



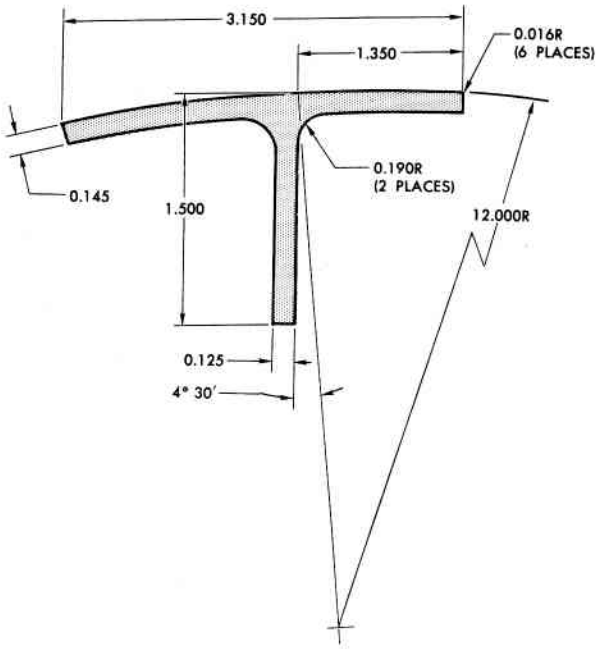
TEE - BULBED
E761302 7178 AL ALLOY
AREA 1.366



TEE-ANGLED, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E811102 7178 AL ALLOY
AREA 0.116



TEE-ANGLED, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E811104 7075 AL ALLOY
AREA 0.112



TEE-ANGLED, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E821204 2024 AL ALLOY
AREA 0.490

Figure 8-23. Extruded Shapes

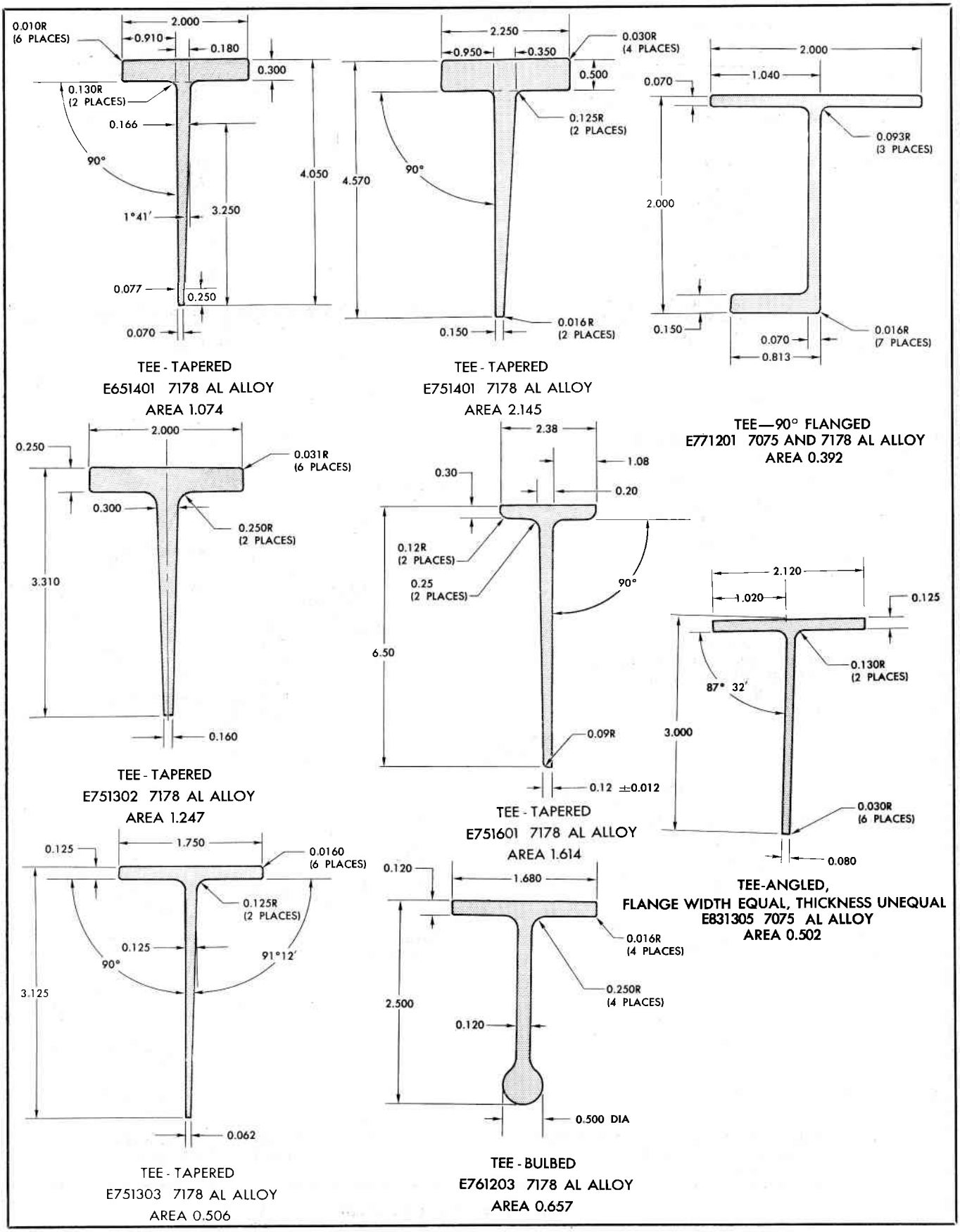
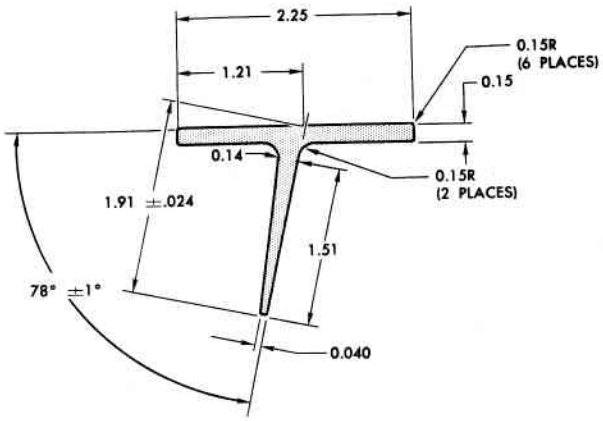
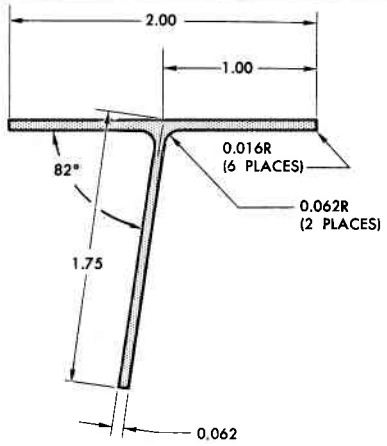


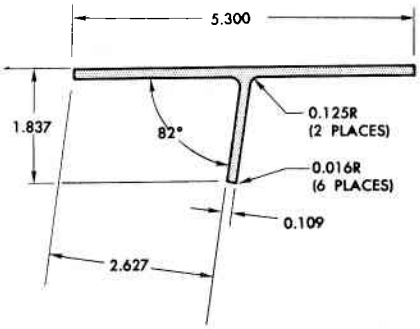
Figure 8-24. Extruded Shapes



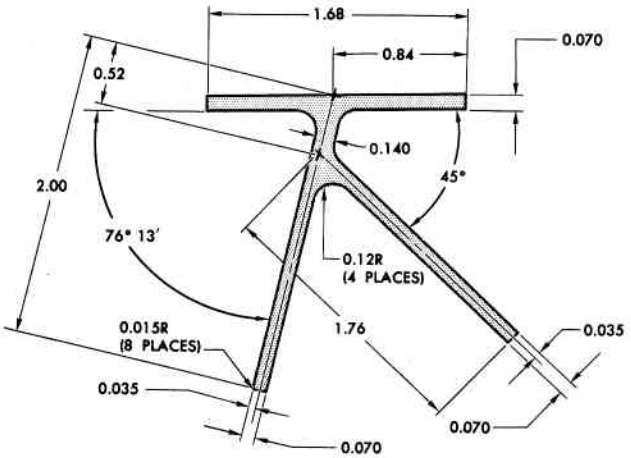
TEE-ANGLED, TAPERED
E851203 7178 AL ALLOY
AREA 0.540



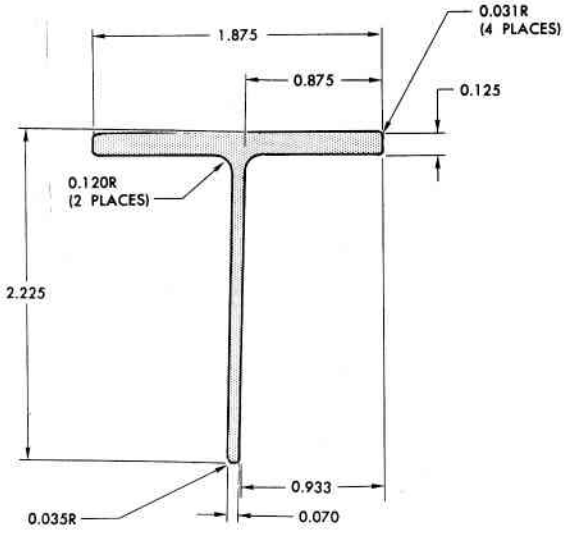
TEE-ANGLED, FLANGE WIDTH UNEQUAL, THICKNESS EQUAL
E811203 7075 AL ALLOY
AREA 0.229



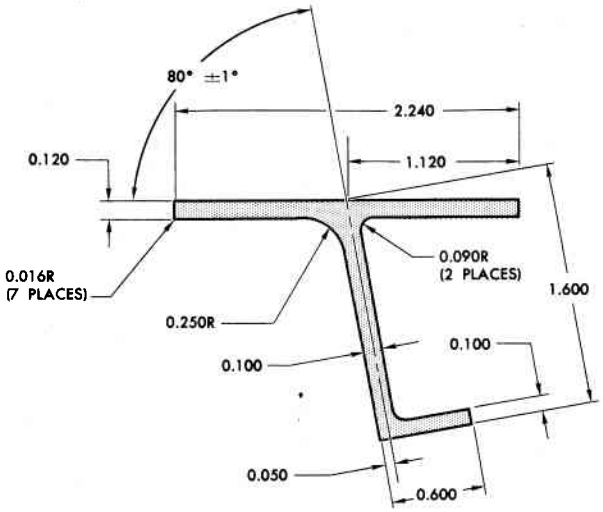
TEE-ANGLED,
FLANGE WIDTH AND THICKNESS UNEQUAL
E821501 7075 AL ALLOY
AREA 0.774



TEE-ANGLED APPENDAGED
E881202 7075 AL ALLOY
AREA 0.425

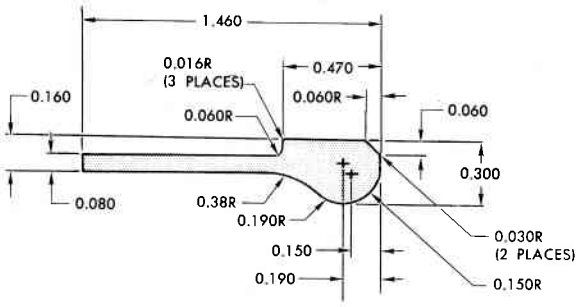


TEE-ANGLED, FLANGE WIDTH AND THICKNESS UNEQUAL
E841204 7075 AL ALLOY
AREA 0.386

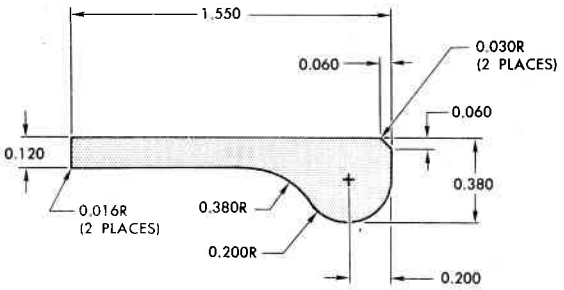


TEE-ANGLED APPENDAGED
E881201 7178 AL ALLOY
AREA 0.431

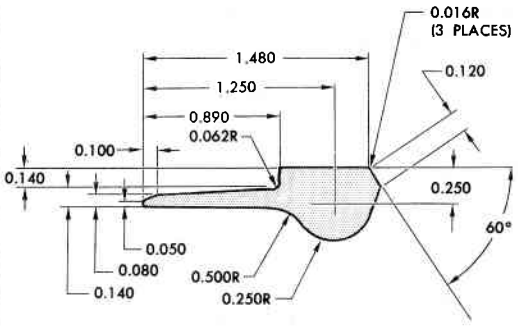
Figure 8-25. Extruded Shapes



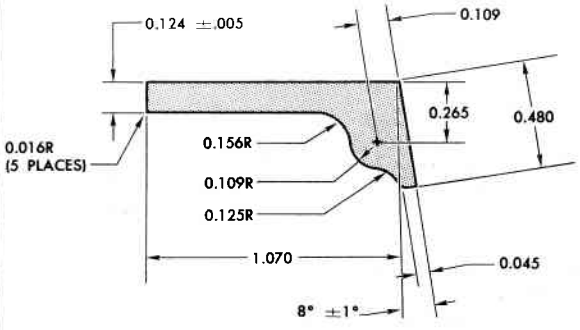
BAR-HINGE
E491133 7075 AL ALLOY
AREA 0.198



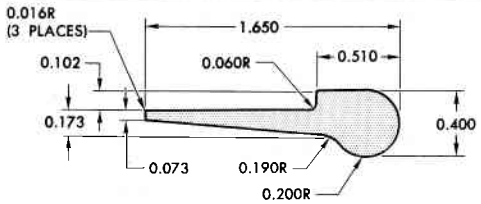
BAR-HINGE
E491132 7075 AL ALLOY
AREA 0.282



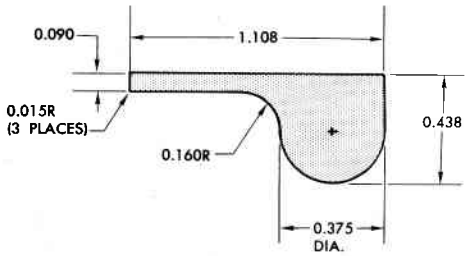
BAR—HINGE
E491131 7178 AL ALLOY
AREA 0.362



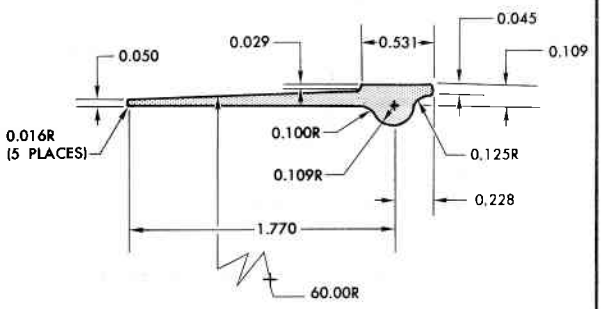
BAR—HINGE
E491125 2024 AND 7075 AL ALLOY
AREA 0.196



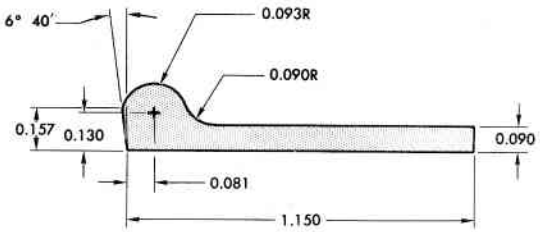
BAR—HINGE
E491130 7075 AL ALLOY
AREA 0.302



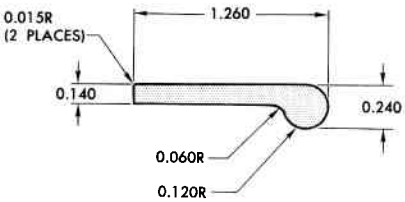
BAR—HINGE
E491127 ZK60A MAG. ALLOY
AREA 0.254



BAR—HINGE
E491124 2024 AND 7075 AL ALLOY
AREA 0.169

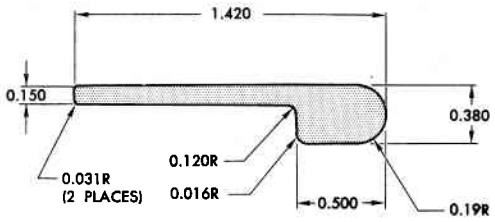


BAR—HINGE
E491115 7075 AL ALLOY
AREA 0.135

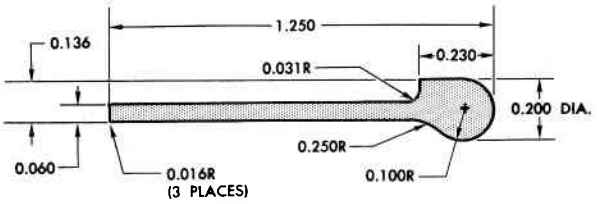


BAR—HINGE
E491128 7178 AL ALLOY
AREA 193

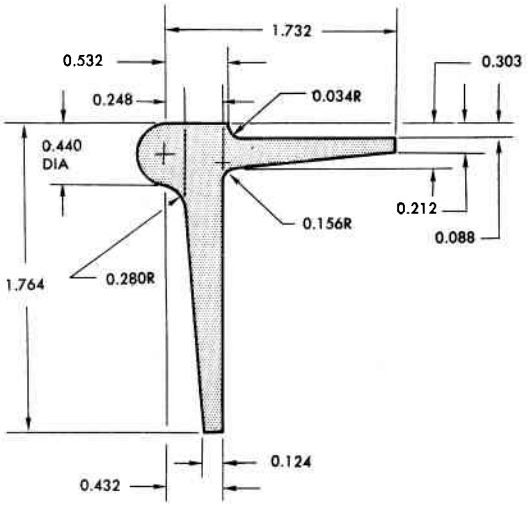
Figure 8-26. Extruded Shapes



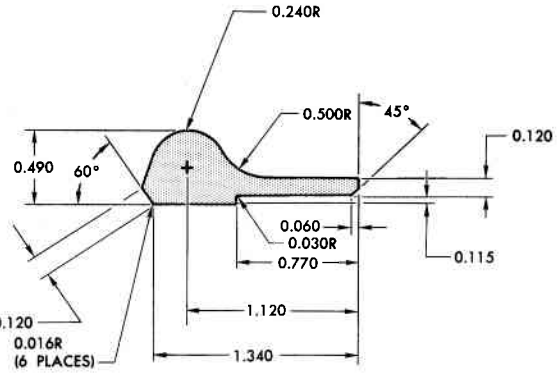
BAR—HINGE
E491129 2024 AL ALLOY
AREA 0.287



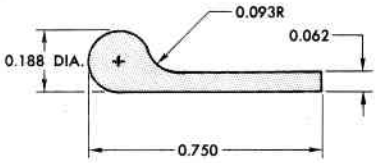
BAR—HINGE
E491119 7075 AL ALLOY
AREA 0.096



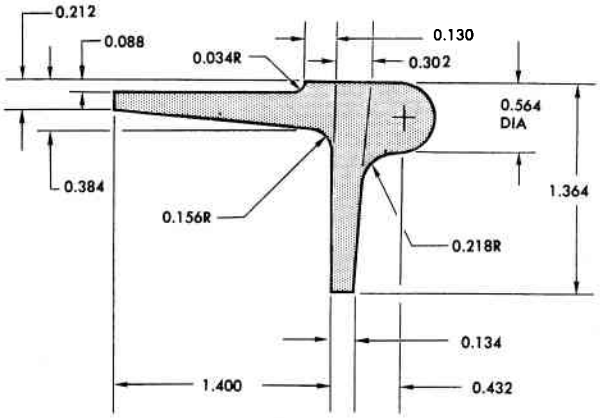
ANGLE—90°, BULBED E161203 7075 AL ALLOY AREA 0.78



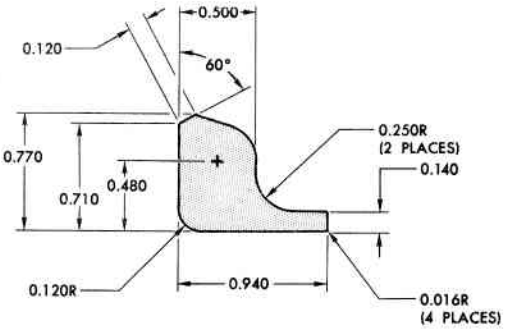
BAR—HINGE
E491116 7178 AL ALLOY
AREA 0.379



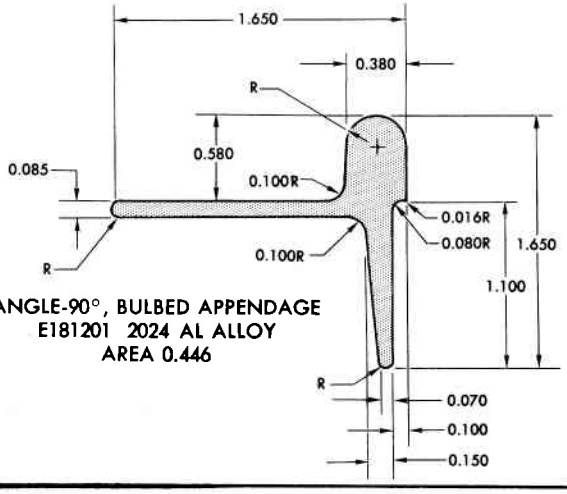
BAR—HINGE
E491002 2024 AL ALLOY
AREA 0.066



ANGLE—90°, BULBED E161202 7075 AL ALLOY AREA 0.82

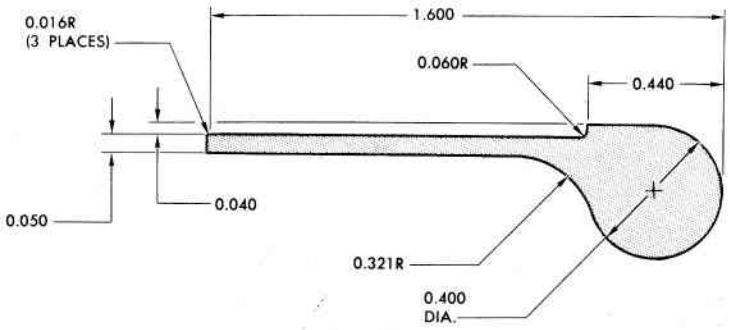


BAR—HINGE
E491003 7178 AL ALLOY
AREA 0.280

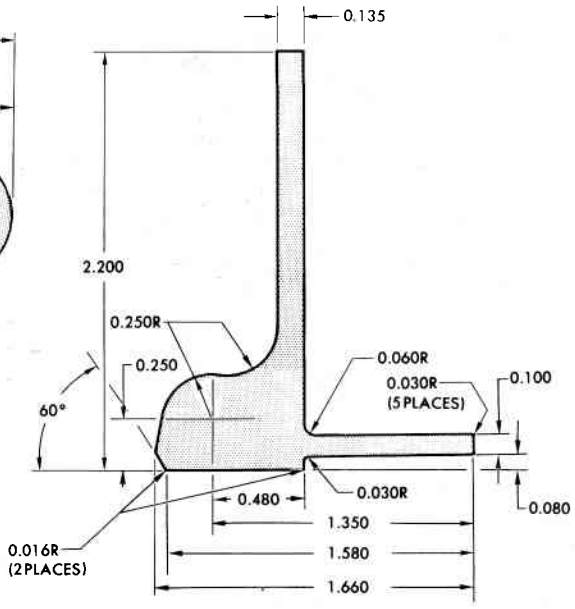


ANGLE-90°, BULBED APPENDAGE
E181201 2024 AL ALLOY
AREA 0.446

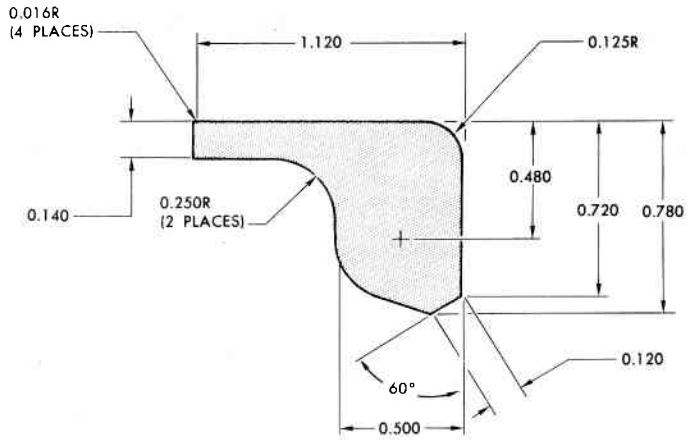
Figure 8-27. Extruded Shapes



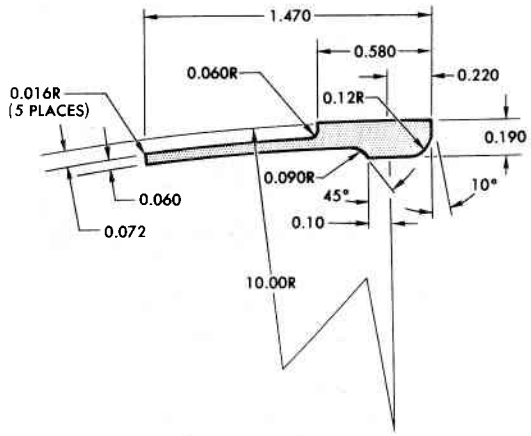
BAR—HINGE
E491136 7178 AL ALLOY
AREA 0.209



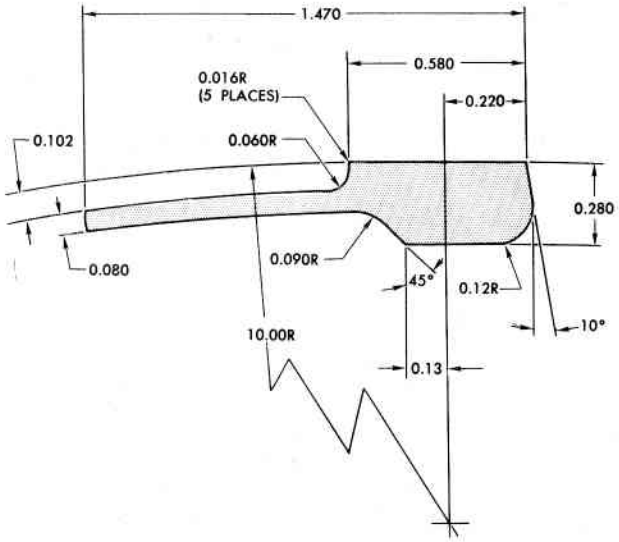
BAR—HINGE
E491203 7178 AL ALLOY
AREA 0.686



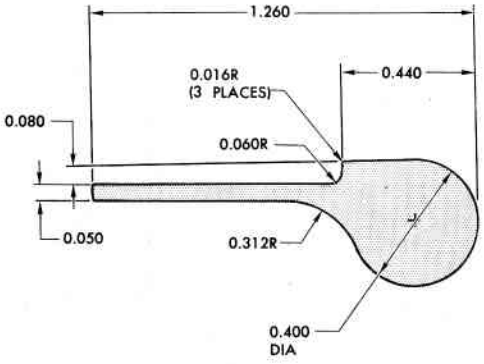
BAR—HINGE
E491138 7178 AL ALLOY
AREA 0.455



BAR—CURVED HINGE
E491106 2024 AL ALLOY
AREA 0.1473

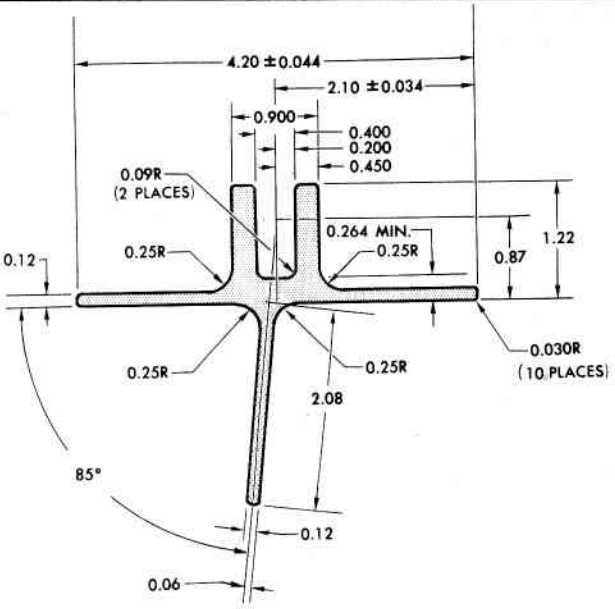


BAR-HINGE
E491134 7178 AL ALLOY
AREA 0.230

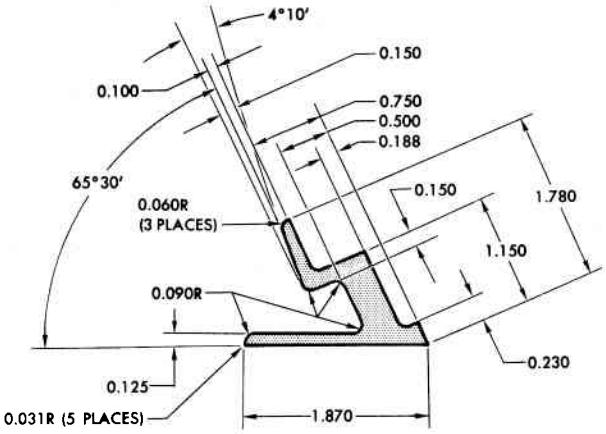


BAR-HINGE
E491135 7178 AL ALLOY
AREA 0.247

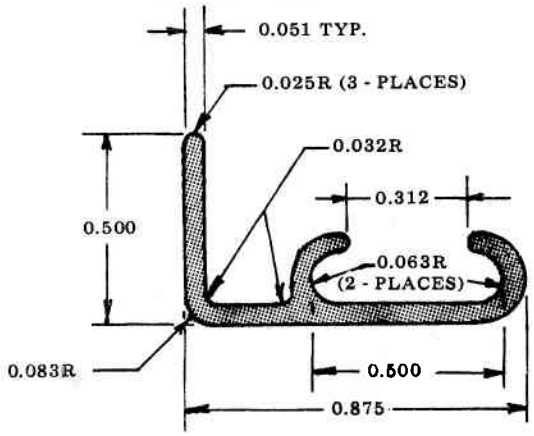
Figure 8-28. Extruded Shapes



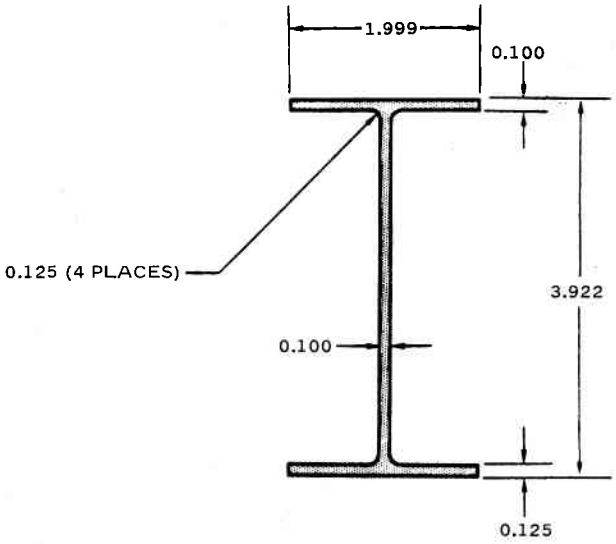
CHANNEL — FLANGED
E571402 7075 AL ALLOY
AREA 1.2058



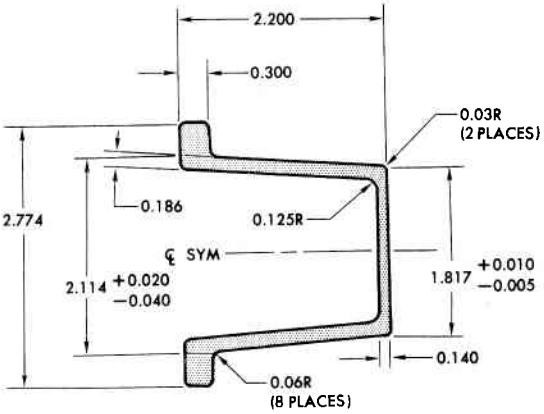
CHANNEL — NON-UNIFORM
E501202 7178 AL ALLOY
AREA 0.658



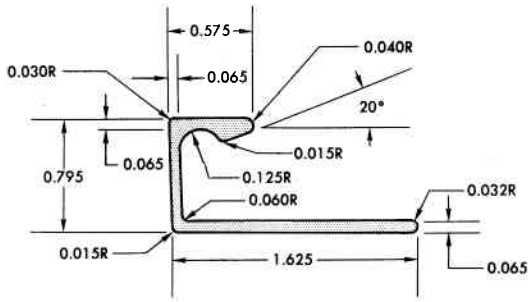
CHANNEL – RETAINER
7075-T6511 AREA 0.088
NO. 60-919 (29321)



CHANNEL - FLANGE WIDTH EQUAL,
THICKNESS UNEQUAL
E632403
AREA 0.832



CHANNEL — MISC.
E501206 7075 AL ALLOY
AREA 1.161



CHANNEL-SPECIAL
E501107 7075 AL ALLOY
AREA 0.227

Figure 8-29. Extruded Shapes

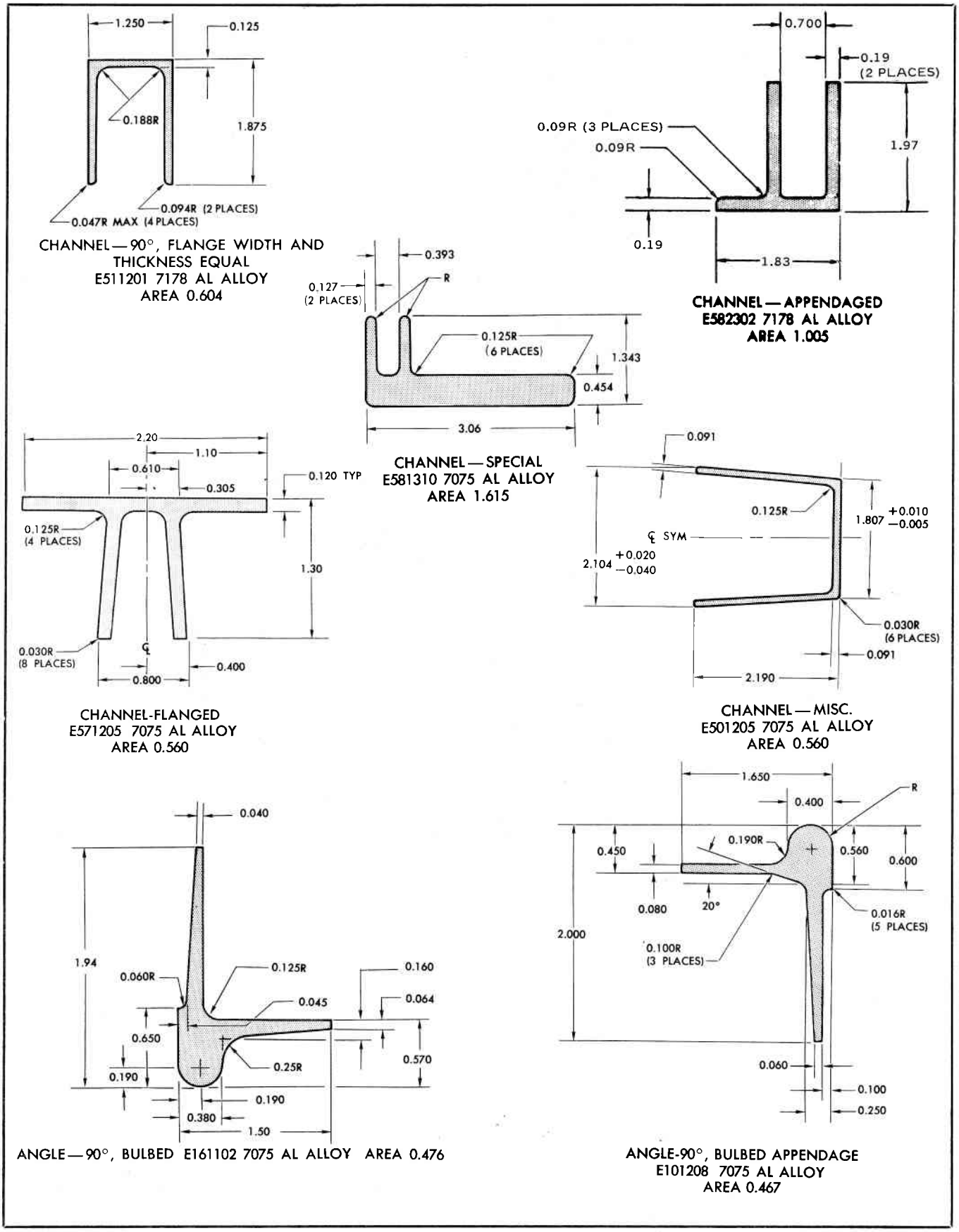
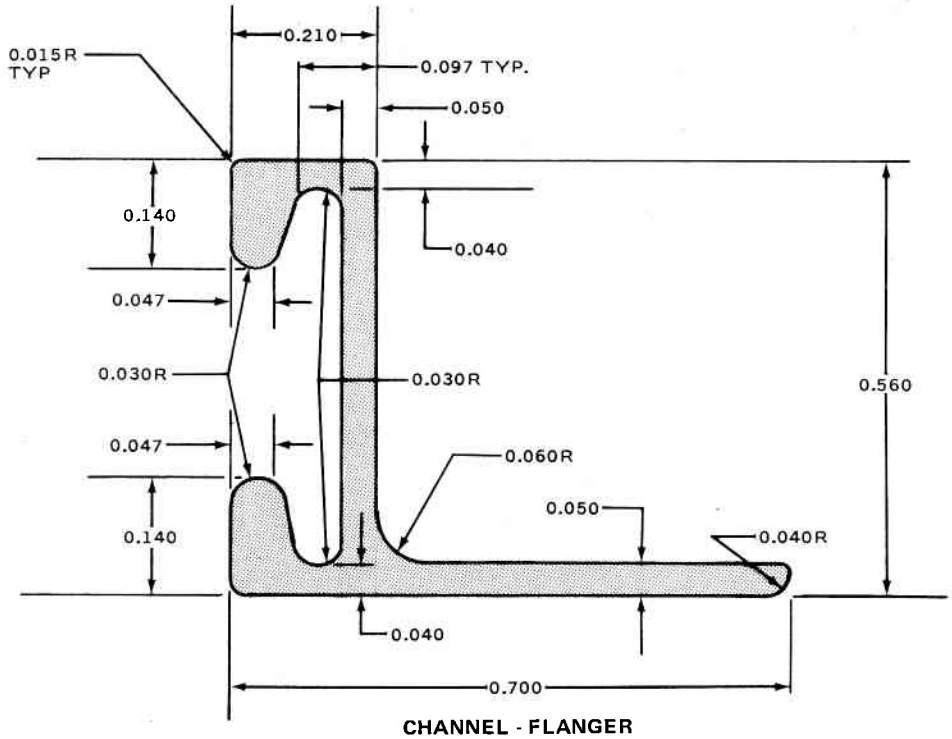
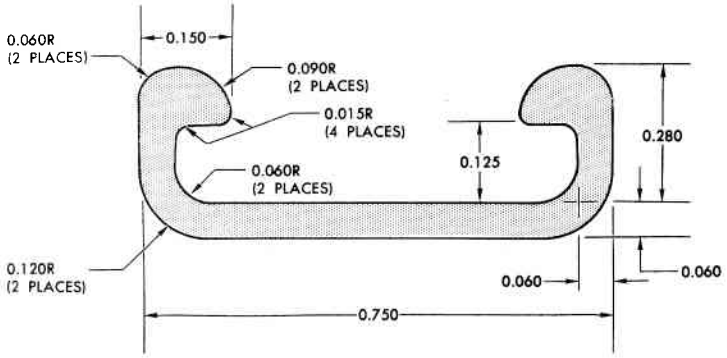


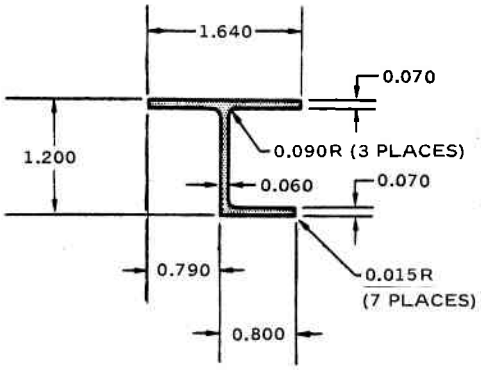
Figure 8-30. Extruded Shapes



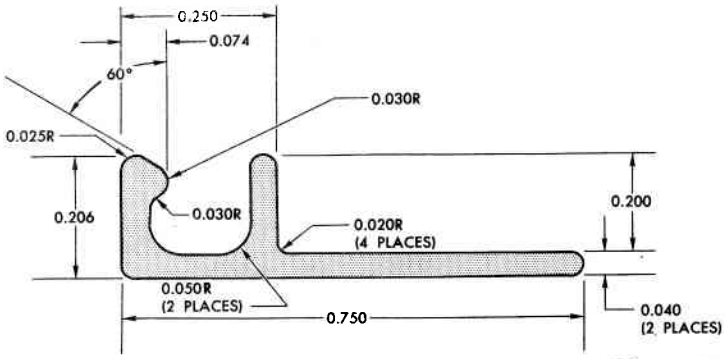
CHANNEL - FLANGER
E571002 7178 AL ALLOY
AREA 0.083



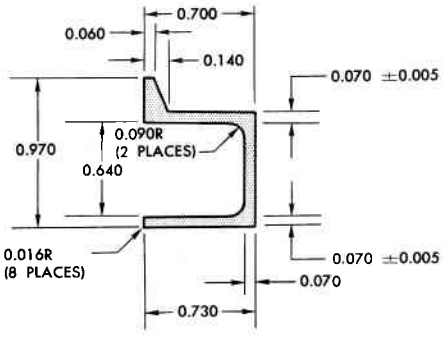
CHANNEL-BULBED
E561002 7075 AL ALLOY
AREA 0.080



CHANNEL - FLANGED
E771210 7178 AL ALLOY
AREA 0.2398

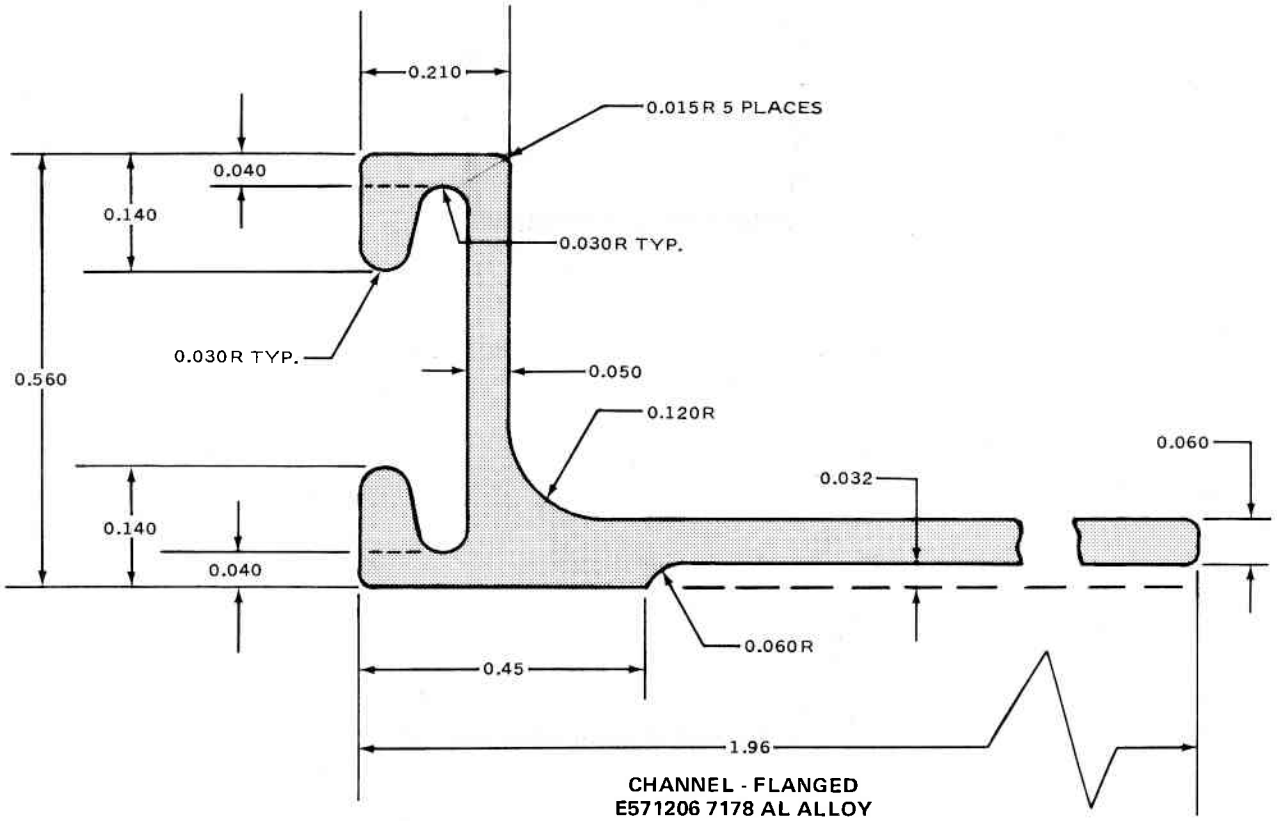


CHANNEL-APPENDAGED
E582101 6061 AL ALLOY
AREA 0.046

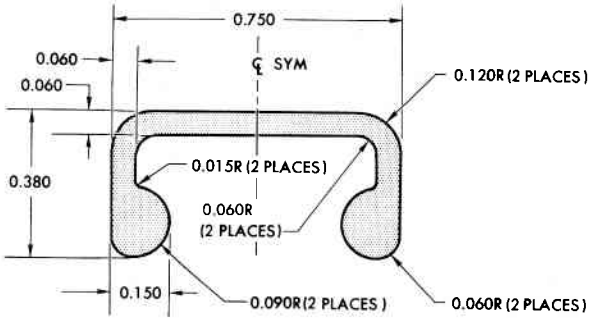


CHANNEL-90° APPENDAGED
E581102 2024 AL ALLOY
AREA 0.1671

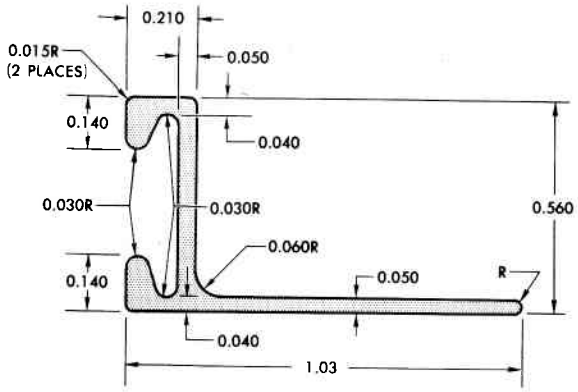
Figure 8-31. Extruded Shapes



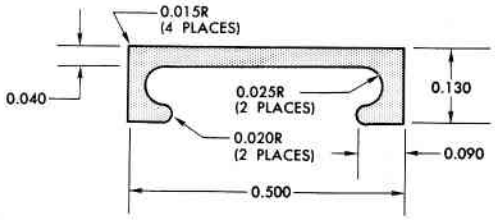
CHANNEL - FLANGED
E571206 7178 AL ALLOY
AREA 0.173



CHANNEL — BULBED
E561101 6161 AL ALLOY
AREA 0.103

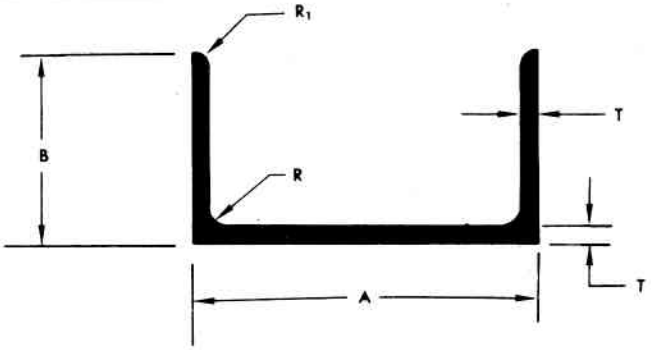


CHANNEL — FLANGED
E571104 7178 AL ALLOY
AREA 0.098



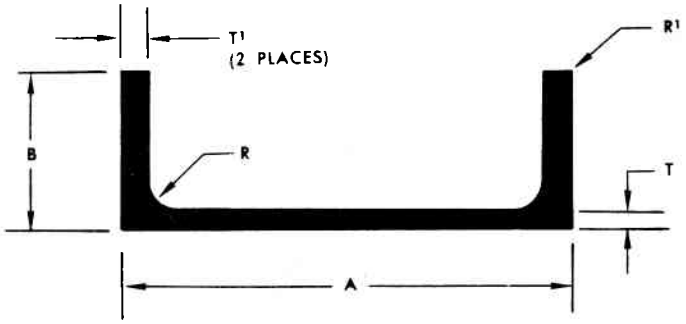
CHANNEL-FLANGED
E571001 6061 AL ALLOY
AREA 0.031

Figure 8-32. Extruded Shapes



CHANNEL—FLANGE WIDTH AND THICKNESS EQUAL

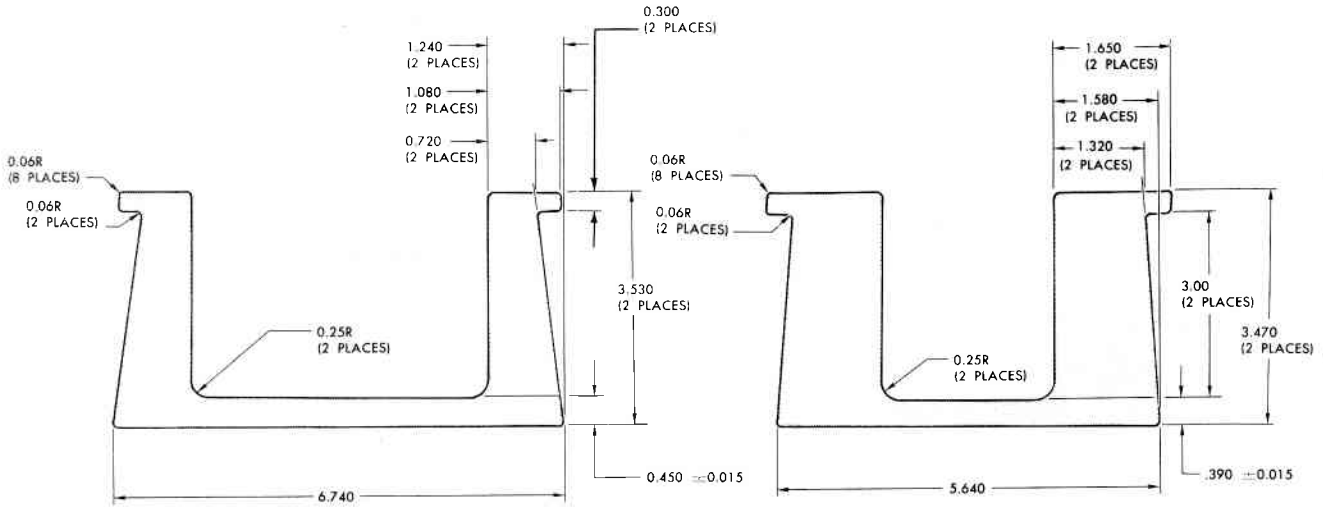
NO.	A	B	T	R	R_1	AREA	2024	7075	7178
AND10137 −1204	1.250	1.125	0.078	0.125	0.078	0.265		X	
−1604	1.750	1.000	0.094	0.125	0.094	0.338		X	
−2001	2.000	0.750	0.094	0.125	0.094	0.314		X	



CHANNEL—FLANGE WIDTH EQUAL, THICKNESS UNEQUAL

NO.	A	B	T	T1	R	R1	AREA	2024	7075	7178
E531001	0.875	0.250	0.050	0.120	0.060	0.010	0.096	X		
E531201	0.813	2.750	0.125	0.094	0.062	0.026	0.594			X
E531204	2.300	0.840	0.100	0.140	0.120	0.016	0.443			X
*HM26852	5.000	1.500	0.188	0.250	0.190	0.031	1.610			X

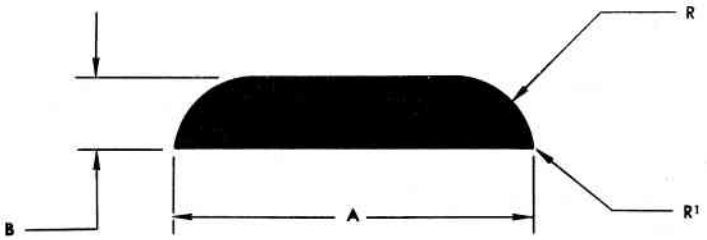
*HARVEY ALUMINUM INC., TORRANCE, CALIF.



CHANNEL—NON-UNIFORM
E501701 7075 AL ALLOY
AREA 8.8

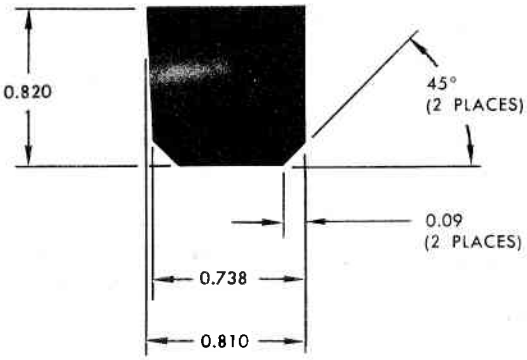
CHANNEL—NON-UNIFORM
E501601 7075 AL ALLOY
AREA 11.0

Figure 8-33. Extruded Shapes

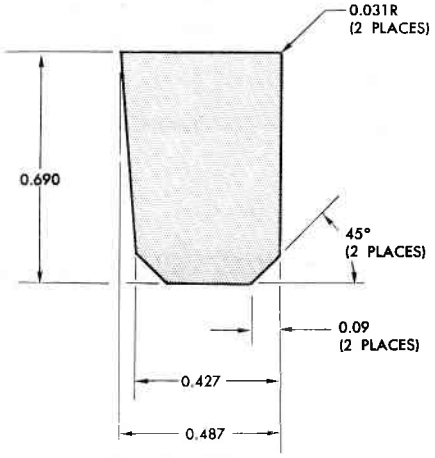


BAR—FILLER

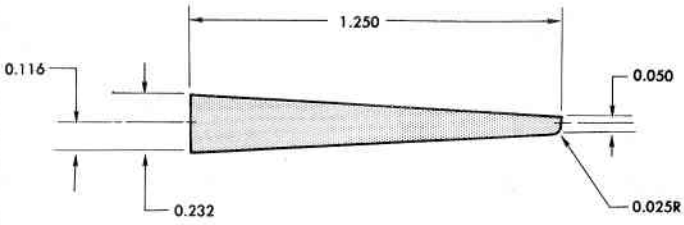
NO.	A	B	R	R¹	AREA	2024	7075
E441001	0.938	0.188	0.219	0.026	0.155		X
E441035	0.600	0.125	0.125		0.068	X	
E441036	0.780	0.160	0.160	0.016	0.1138	X	



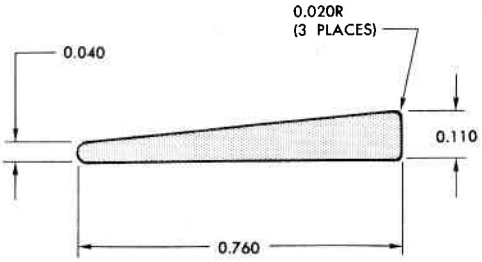
BAR—FILLER
E 441045 7075 AL ALLOY
AREA 0.635



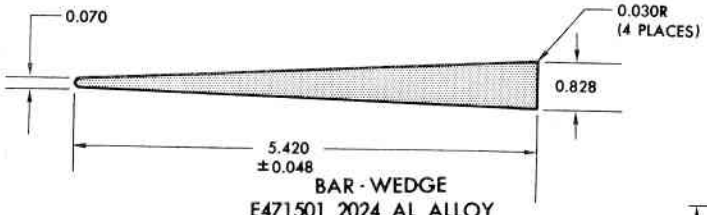
BAR-FILLER
E441046 7075 AL ALLOY
AREA 0.315



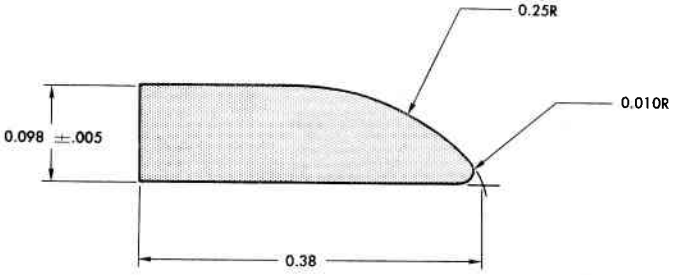
BAR-FILLER STRIP, TRAILING EDGE
E471107 7075 AL ALLOY
AREA 0.176

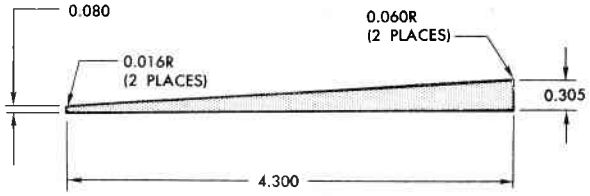


BAR-WEDGE
E 471001 7178 AL ALLOY
AREA 0.570



BAR-WEDGE
E471501 2024 AL ALLOY
AREA 2.24





BAR-WEDGE
E 471208 2024 AL ALLOY
AREA 0.830

BAR-WEDGE
E441005 3003 AL ALLOY
AREA 0.030

Figure 8-34. Extruded Shapes

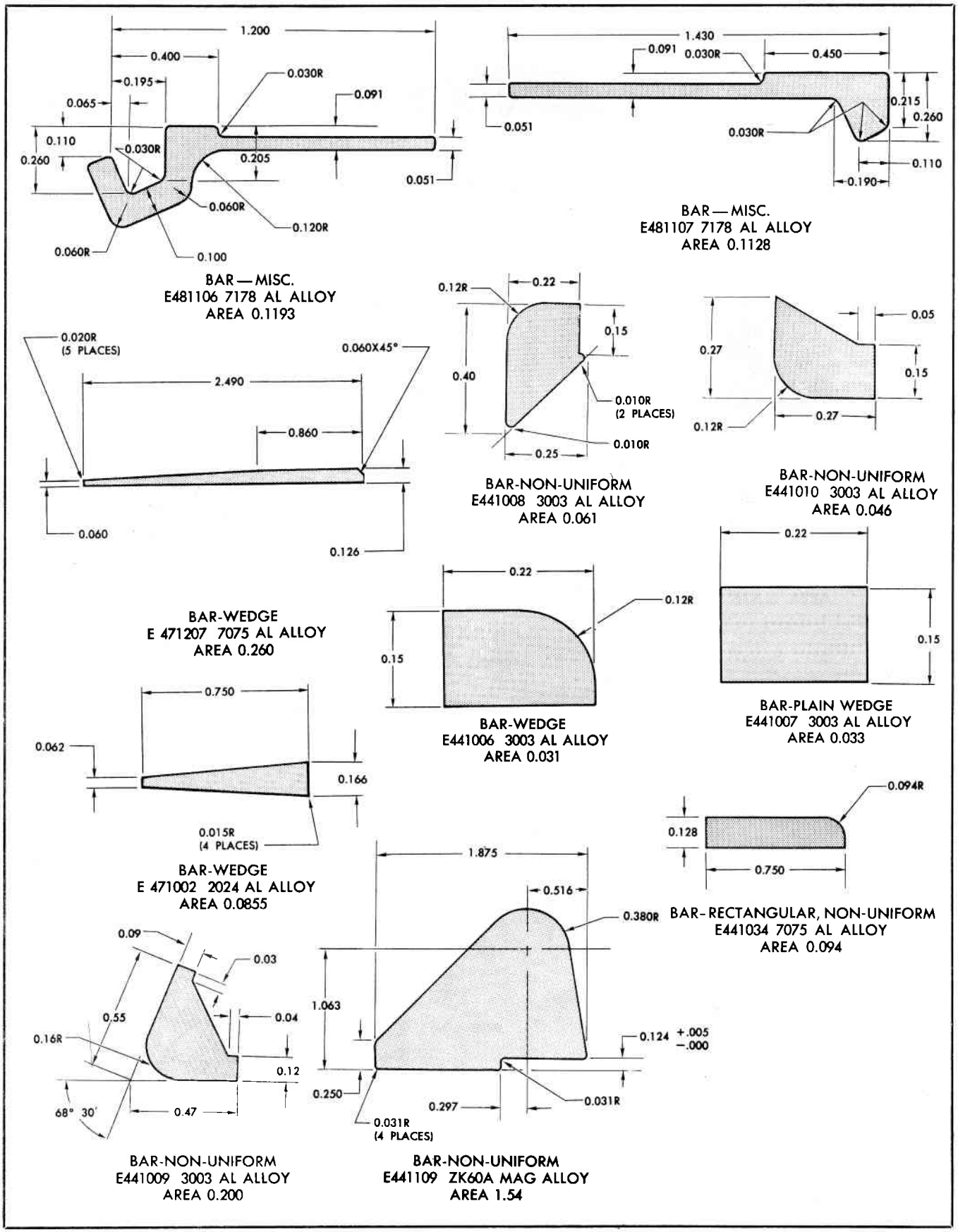


Figure 8-35. Extruded Shapes

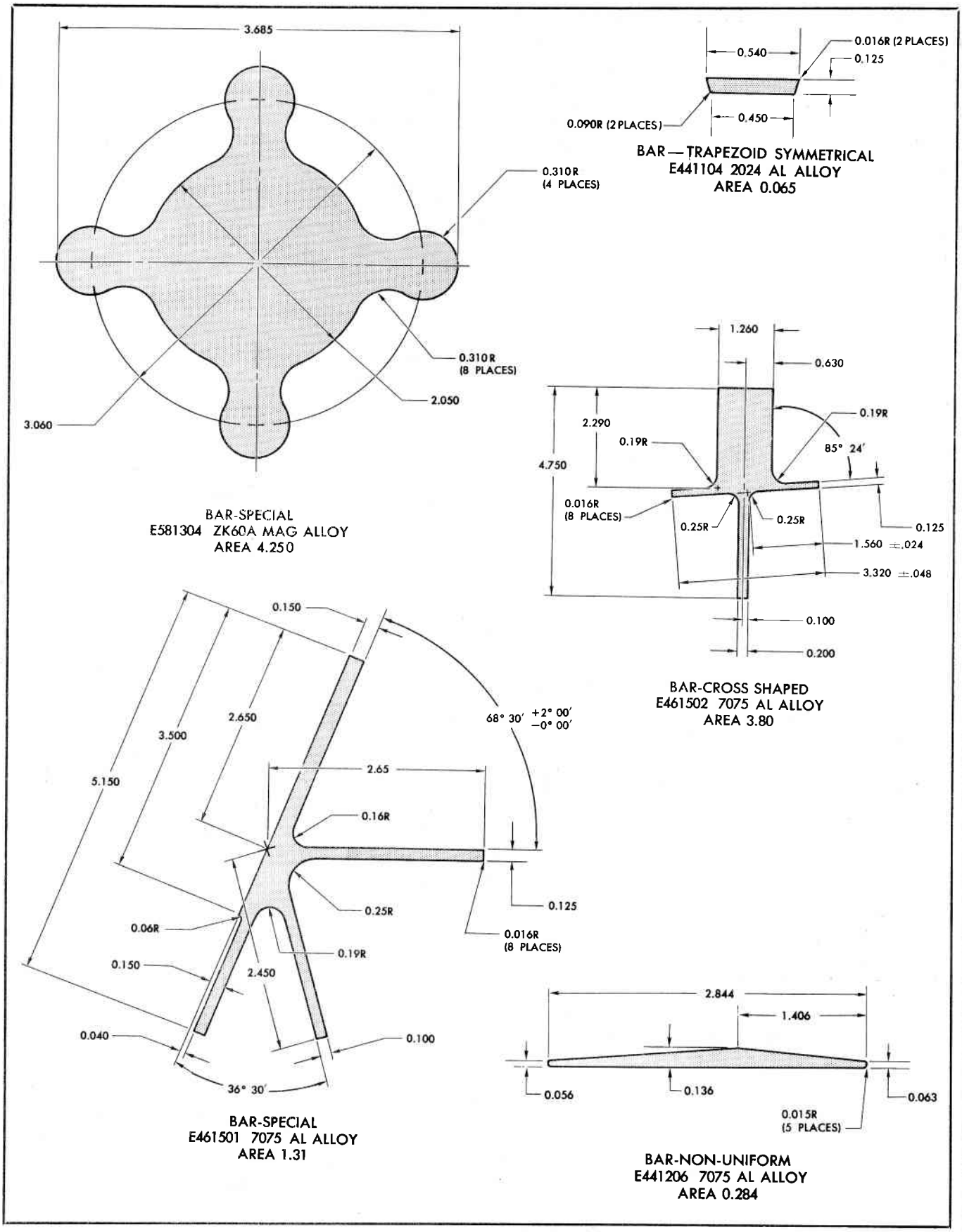
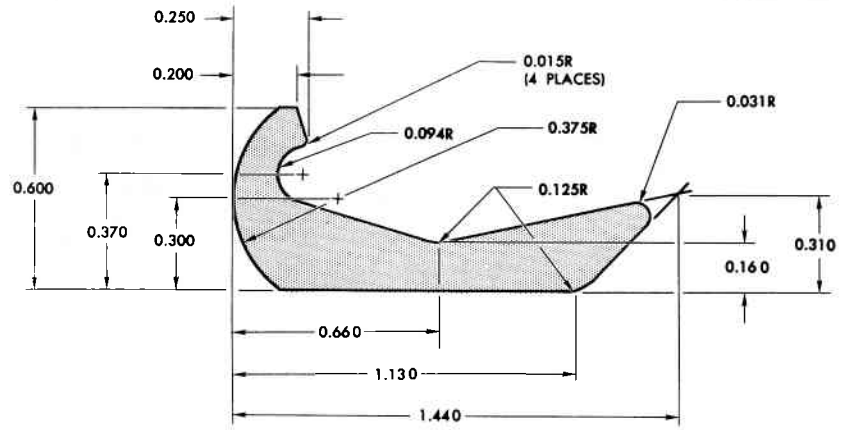
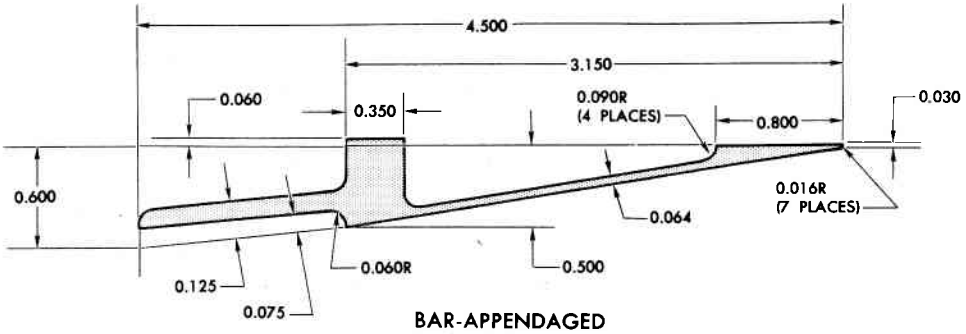


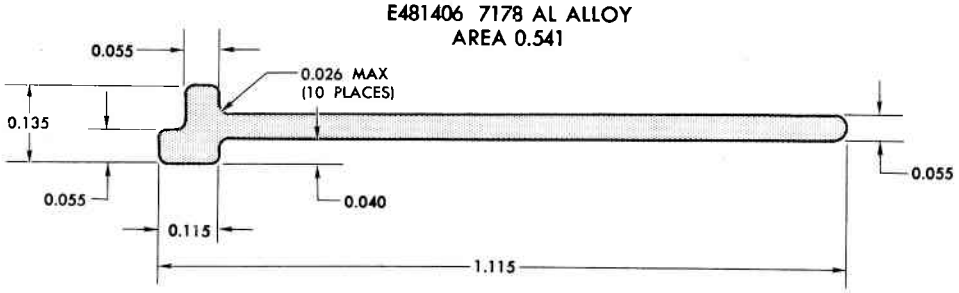
Figure 8-36. Extruded Shapes



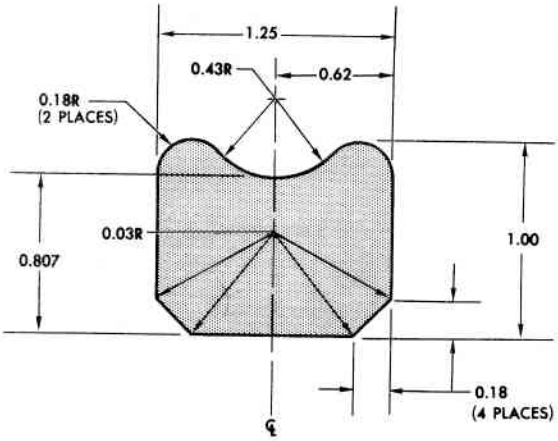
BAR-SPECIAL
E481108 7075 AL ALLOY
AREA 0.330



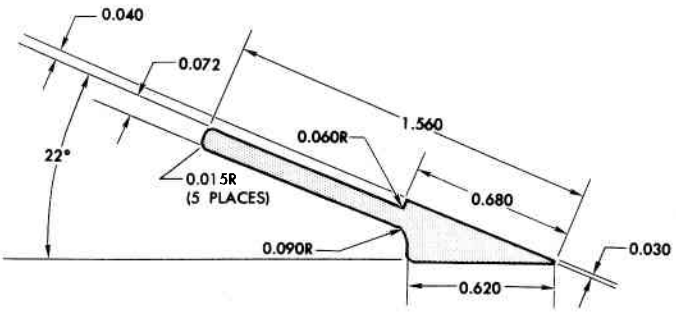
BAR-APPENDAGED
E481406 7178 AL ALLOY
AREA 0.541



BAR-APPENDAGED
E481105 2024 AL ALLOY
AREA 0.066



BAR — SPECIAL
E441118 7075 AL ALLOY
AREA 1.10



BAR-SPECIAL
E541101 7178 AL ALLOY
AREA 0.164

Figure 8-37. Extruded Shapes

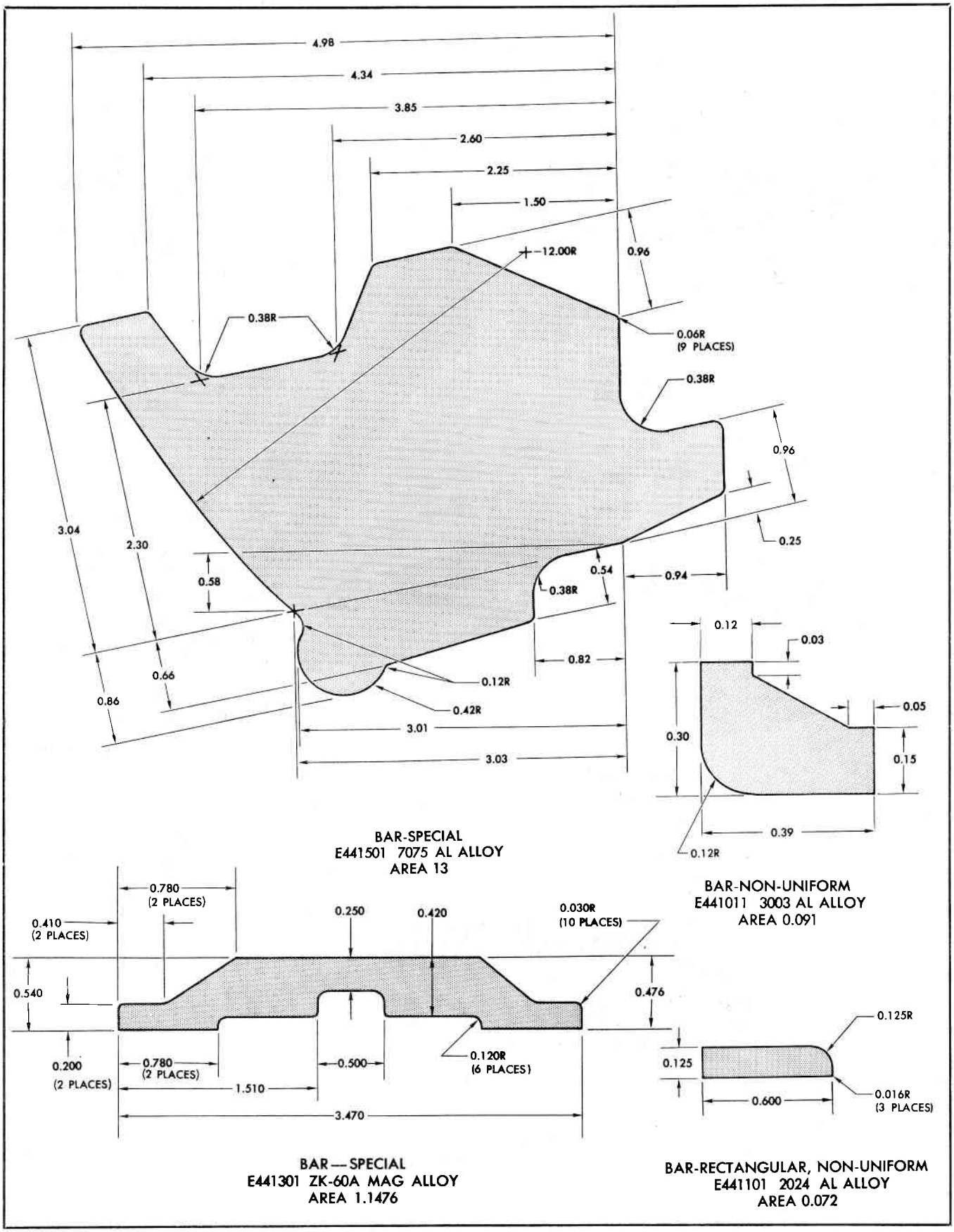
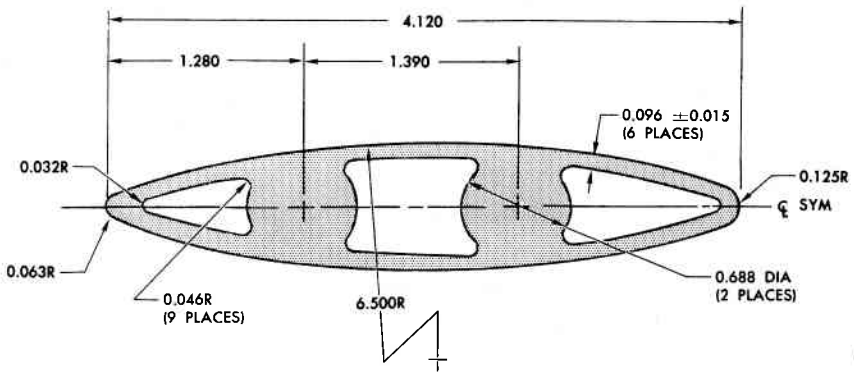
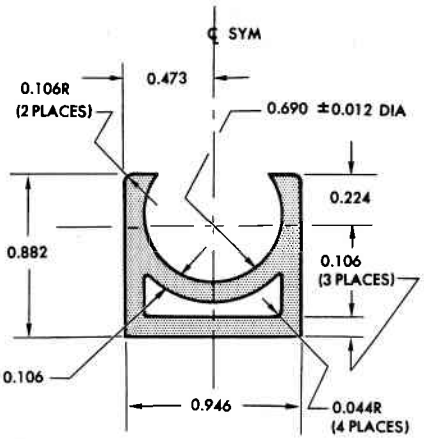


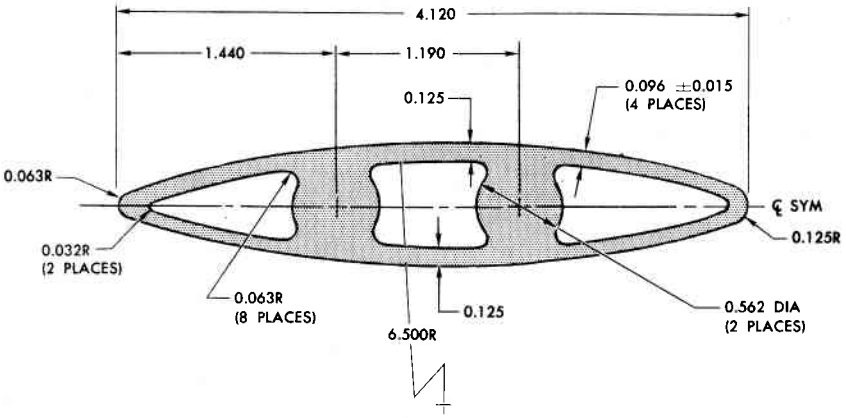
Figure 8-38. Extruded Shapes



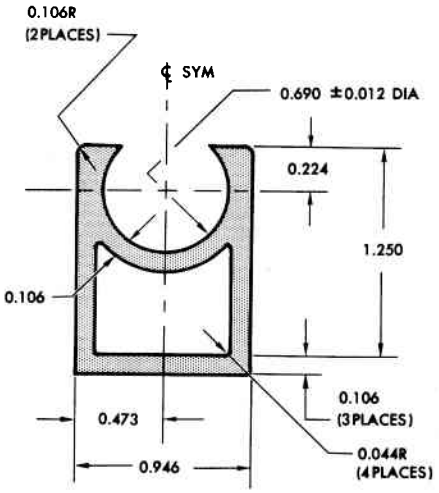
TUBE-AIRFOIL
E451402 6061 AL ALLOY
AREA 1.585



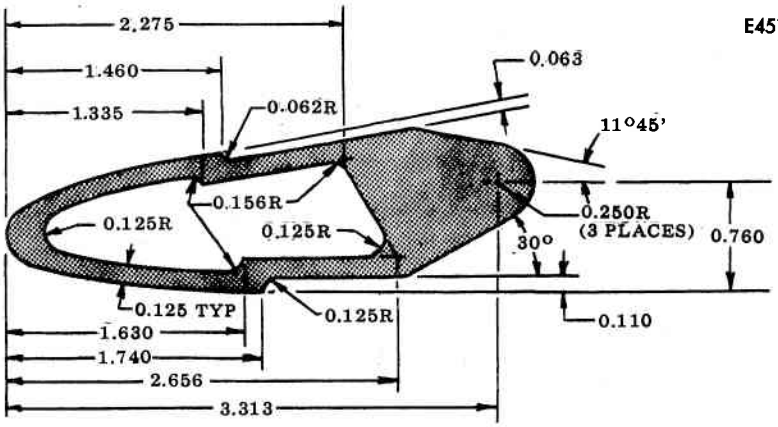
TUBE — HOLLOW
E451106 6061 AL ALLOY
AREA 0.378



TUBE-AIRFOIL
E451403 6061 AL ALLOY
AREA 1.463



TUBE — HOLLOW
E451105 6061 AL ALLOY
AREA 0.489



TUBE — AIRFOIL
7144699 6061 AL ALLOY
AREA 1.54

Figure 8-39. Extruded Tubes

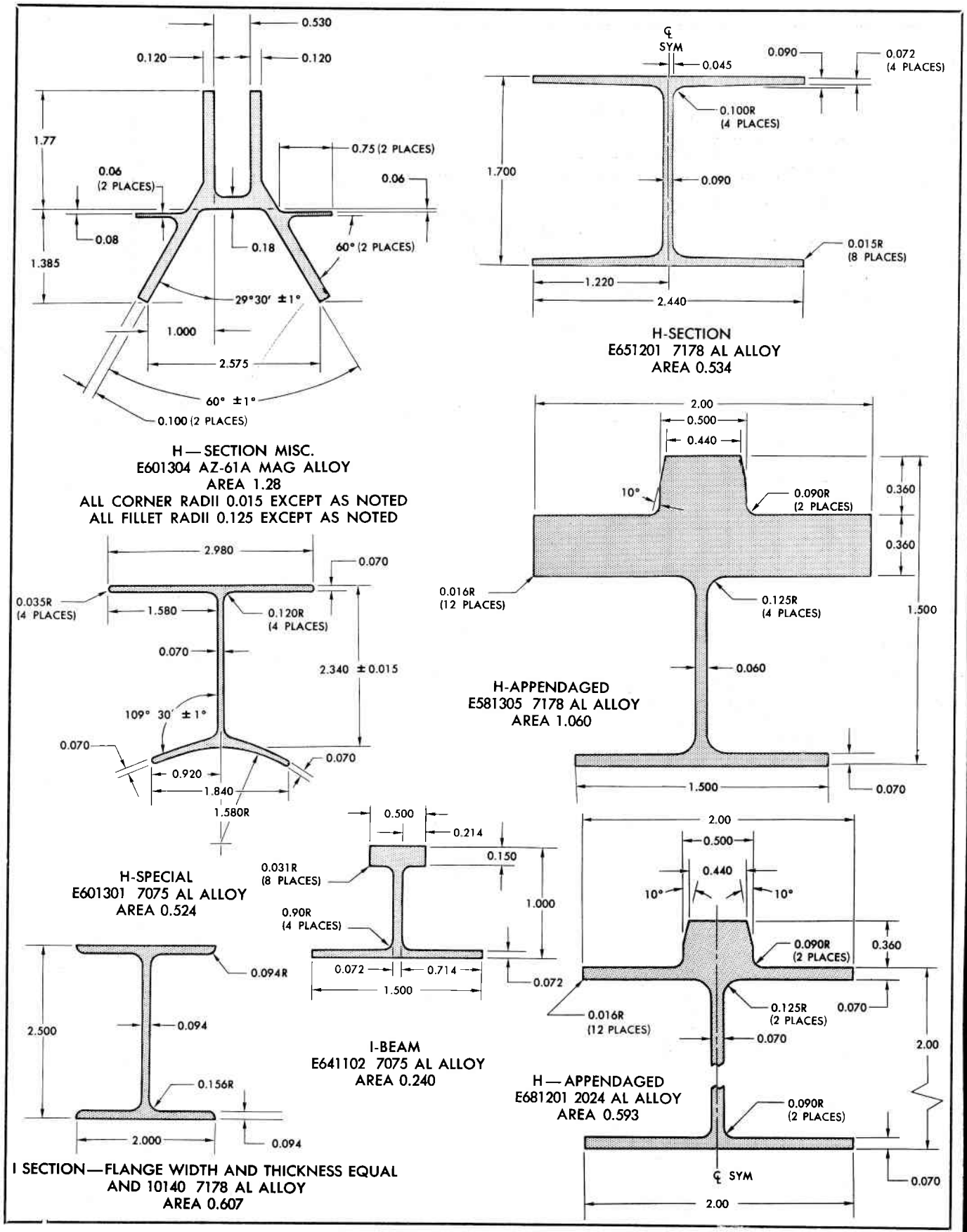


Figure 8-40. Extruded Shapes

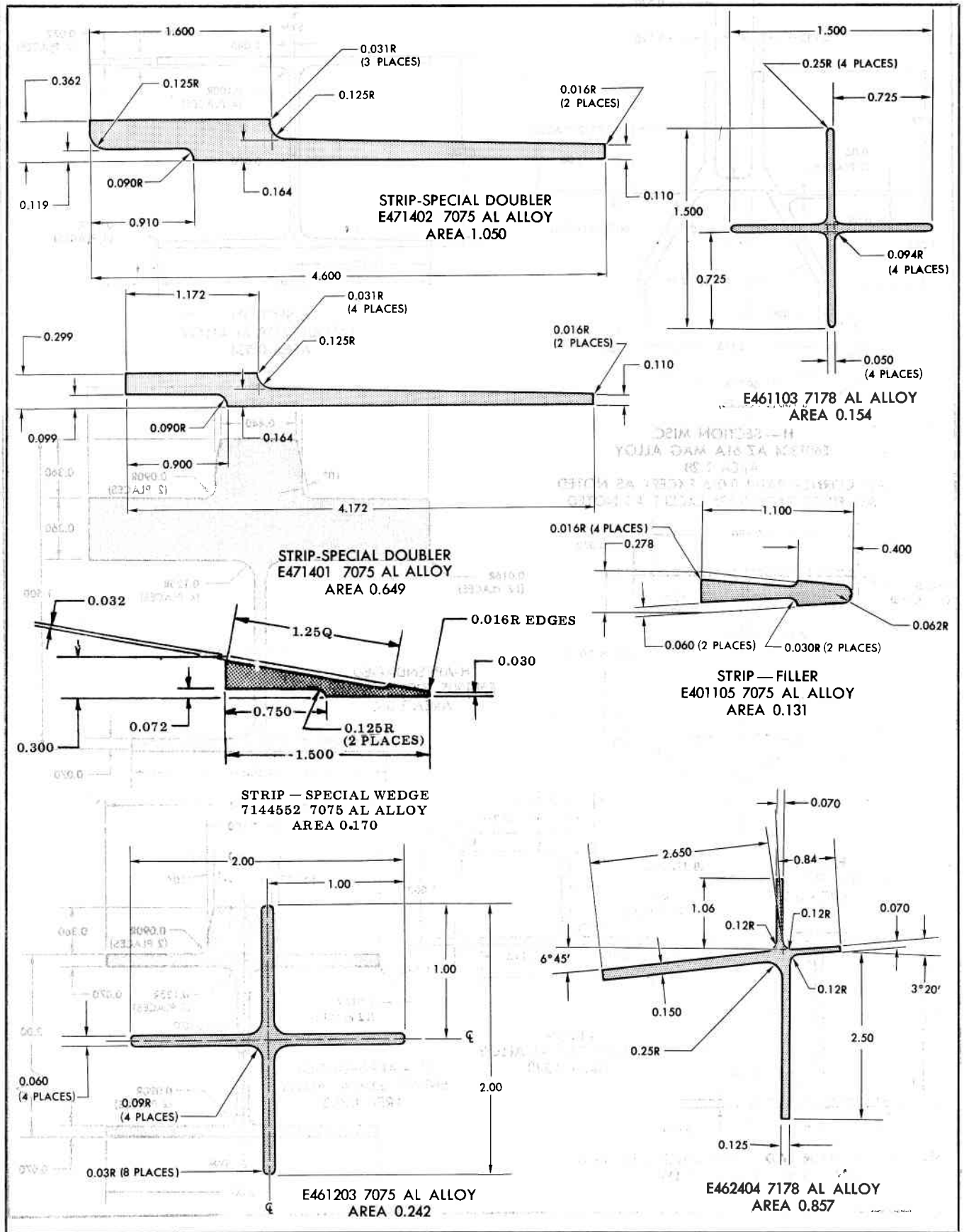


Figure 8-41. Extruded Shapes

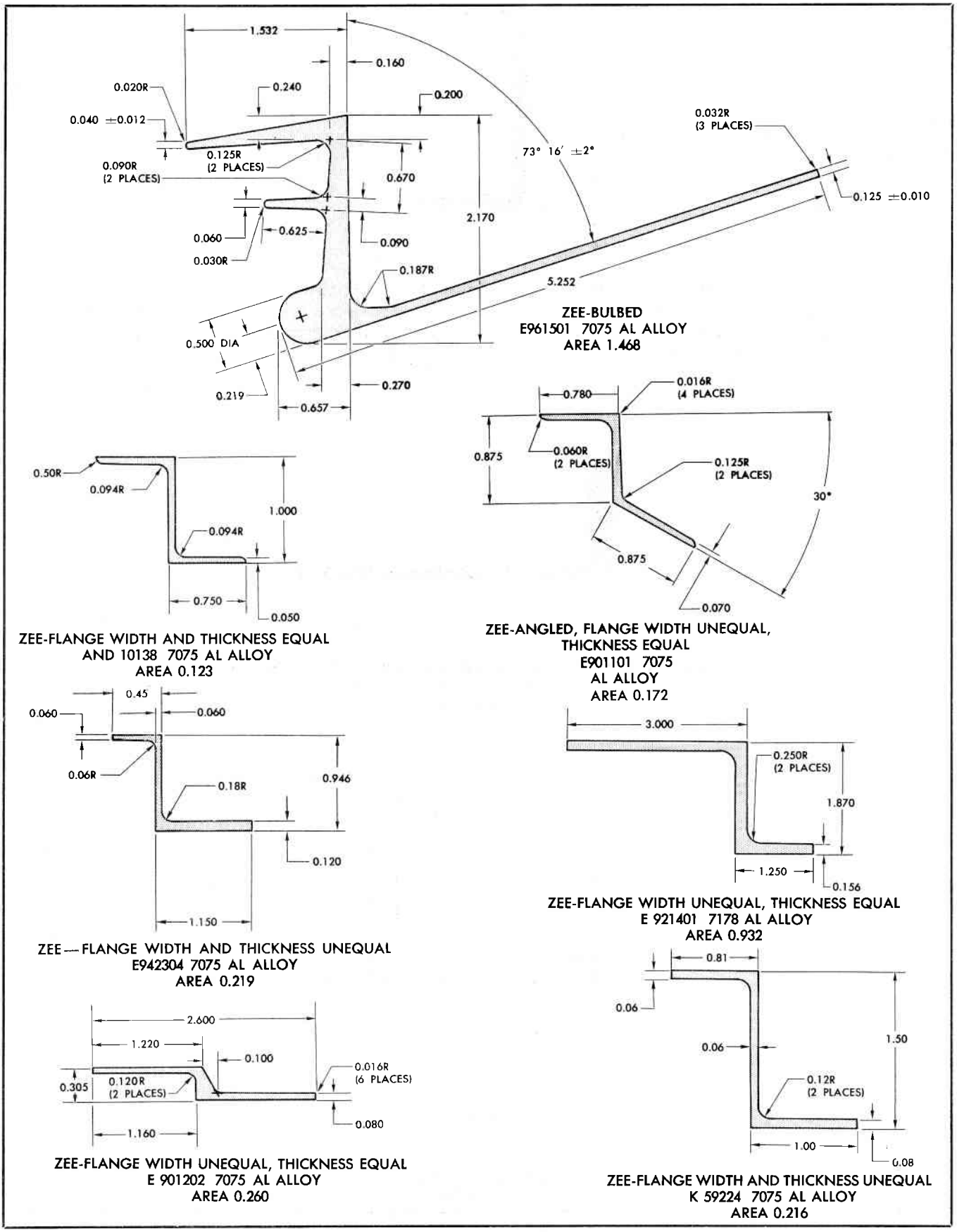
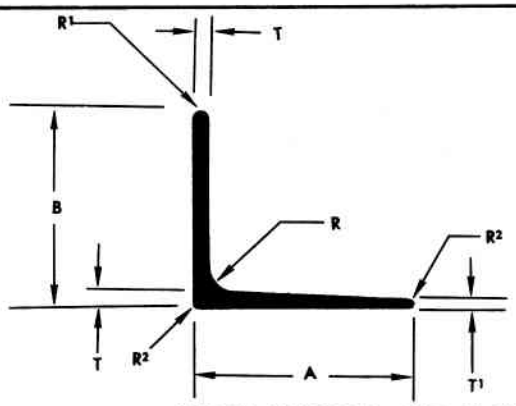
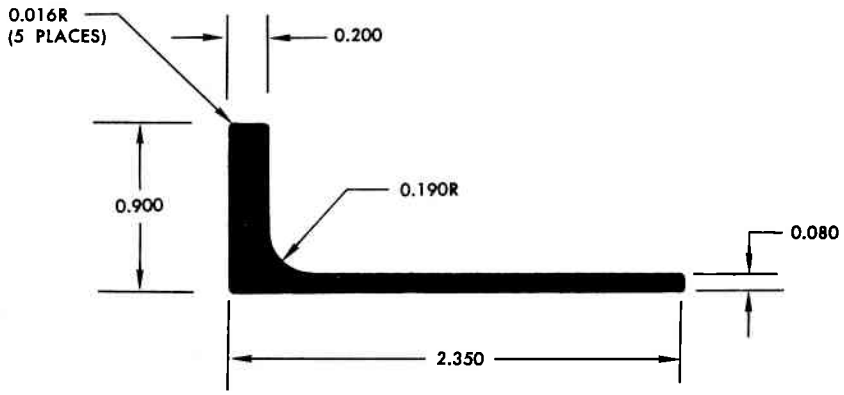


Figure 8-42. Extruded Shapes

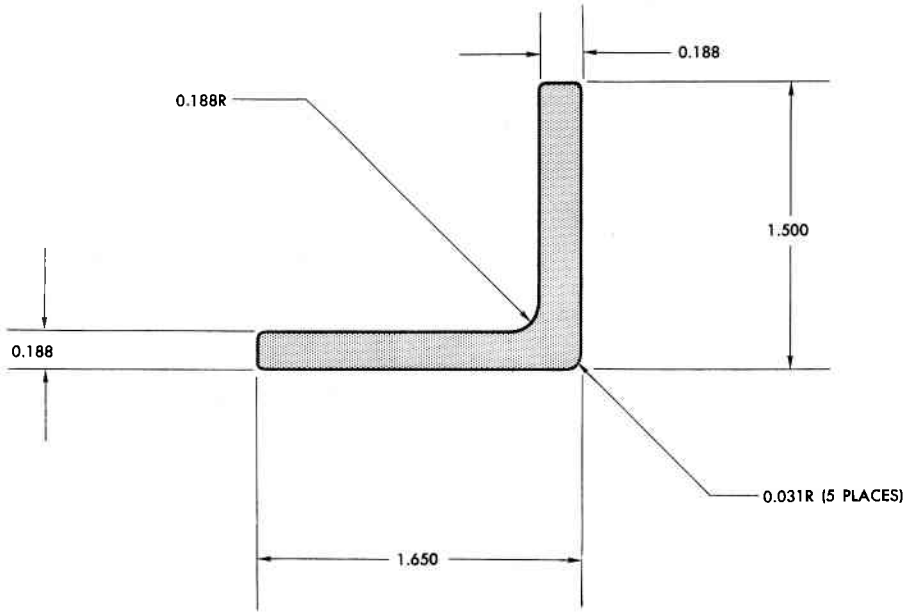


ANGLE—90° FLANGE WIDTH UNEQUAL AND FLANGE TAPERED

NO.	A	B	T	T1	R	R1	R2	AREA	7075	7178
E101104	1.125	1.000	0.060	0.030	0.125	0.030	0.015	0.110	X	
E101105	1.125	0.800	0.060	0.030	0.125	0.030	0.015	0.098	X	X

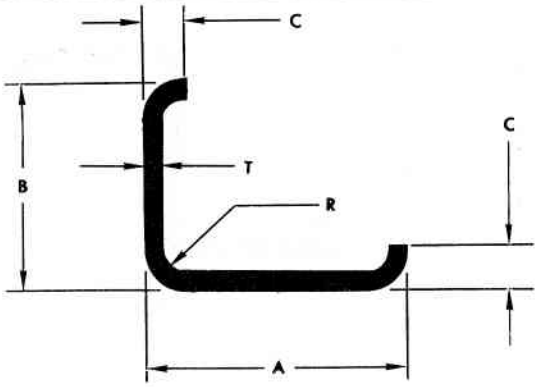


ANGLE—90°, FLANGE WIDTH AND THICKNESS UNEQUAL
E 141207 2024 AL ALLOY
AREA 0.400



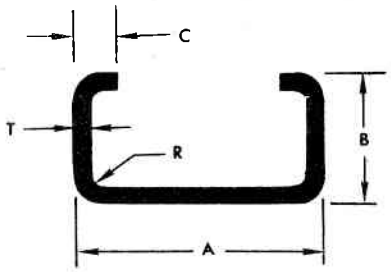
E121202 7075 AL ALLOY
AREA 0.563

Figure 8-43. Extruded Shapes



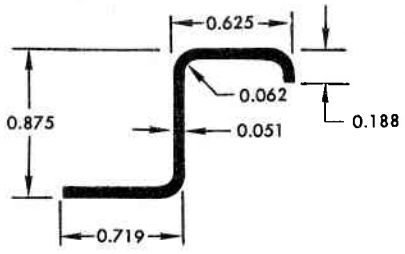
ANGLE—90°, UNEQUAL LEG, FLANGED

DASH NO.	SIZE					AREA SQ. IN.	BARE		CLAD
	A	B	C	R	T		7075	7178	7075
Y7-11	0.750	0.625	0.188	0.125	0.040	0.058	X		
-22	1.000	0.750	0.188	0.125	0.051	0.091	X		
-23	1.000	0.750	0.188	0.125	0.064	0.111	X	X	X
-30	1.000	0.875	0.188	0.125	0.051	0.097	X		
-42	1.250	1.000	0.188	0.125	0.051	0.116			X

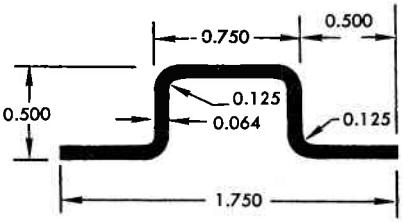


CHANNEL—UNEQUAL LEG, FLANGED

DASH NO.	SIZE					AREA SQ. IN.	BARE		CLAD
	A	B	C	R	T		7075	7178	2024
Y12-4	0.750	0.750	0.175	0.062	0.040	0.092	X		
-16	1.250	0.750	0.188	0.125	0.051	0.136		X	
-26	1.500	0.750	0.188	0.125	0.051	0.149		X	X

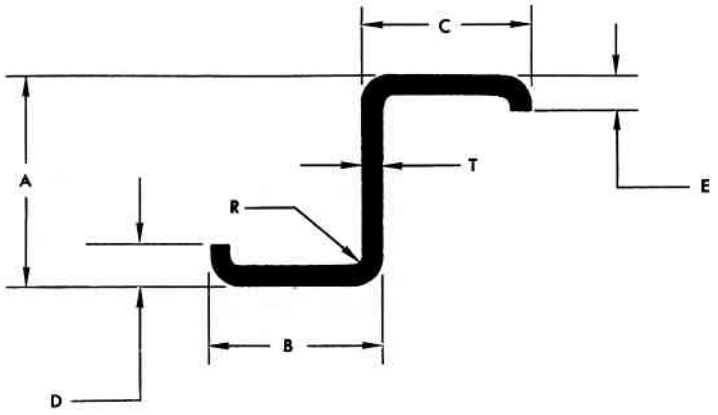


ZEE—VERTICAL, ONE LEG FLANGED
Y34-73 2024 AL ALLOY (BARE)
AREA 0.109



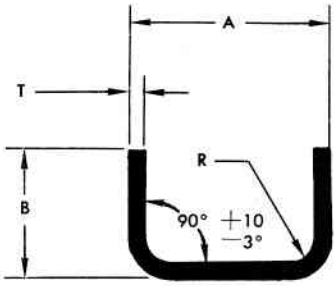
HAT—RECTANGULAR, PLAIN
Y32-10 2024 AL ALLOY (CLAD)
AREA 0.151

Figure 8-44. Standard Roll-Formed Sections



ZEE—VERTICAL, FLANGED

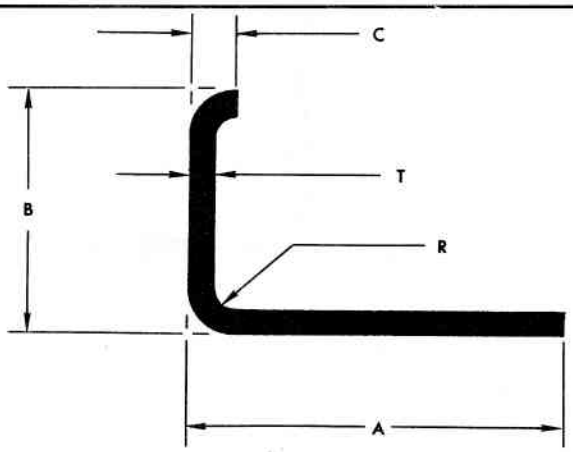
DASH NO.	SIZE							AREA SQ. IN.	BARE		
	A	B	C	D	E	R	T		2024	7075	7178
Y36–5	0.875	0.625	0.625	0.188	0.188	0.062	0.040	0.088		X	X
–17	1.000	0.688	0.688	0.188	0.188	0.062	0.032	0.080		X	
–18	1.000	0.688	0.688	0.188	0.188	0.062	0.040	0.098		X	X
–19	1.000	0.688	0.688	0.188	0.188	0.062	0.051	0.122		X	X
–21	1.000	0.688	0.688	0.188	0.188	0.062	0.064	0.149		X	X
–27	1.000	0.875	0.875	0.188	0.188	0.094	0.072	0.188			X
–29	1.125	0.812	0.812	0.219	0.219	0.094	0.064	0.167		X	
–40	1.250	0.875	0.875	0.188	0.188	0.094	0.081	0.229		X	
–41	1.250	0.875	0.875	0.219	0.219	0.094	0.072	0.211		X	
–48	1.500	0.812	0.812	0.188	0.188	0.062	0.040	0.128			X
–49	1.500	0.812	0.812	0.188	0.188	0.062	0.051	0.160			X
–50	1.500	0.812	0.812	0.219	0.219	0.094	0.064	0.198		X	
–51	1.500	0.812	0.812	0.188	0.188	0.094	0.072	0.215		X	
–52	1.500	0.812	0.812	0.250	0.250	0.125	0.091	0.270	X		



CHANNEL—EQUAL LEG, PLAIN

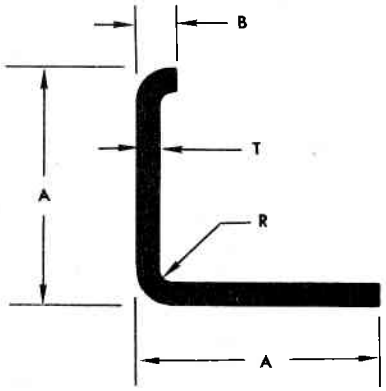
DASH NO.	SIZE				AREA SQ. IN.	BARE		CLAD	
	A	B	R	T		7075	7178	2024	7075
Y10–27	0.875	0.625	0.062	0.064	0.123				X
–38	1.000	0.300	0.062	0.032	0.047			X	
–42	1.000	0.531	0.062	0.032	0.062			X	
–44	1.000	0.625	0.062	0.040	0.084	X			
–54	1.094	0.750	0.062	0.072	0.170		X		
–58	1.250	0.750	0.062	0.051	0.131			X	
–68	1.500	0.344	0.125	0.040	0.079			X	
–69	1.500	0.750	0.062	0.040	0.114		X		
–71	1.500	0.750	0.062	0.064	0.179				X
–80	1.750	0.750	0.062	0.051	0.157		X		
–185	0.750	0.380	0.094	0.051	0.067	X			
–186	0.750	0.380	0.094	0.064	0.082	X			

Figure 8-45. Standard Roll-Formed Sections



ANGLE—UNEQUAL LEG

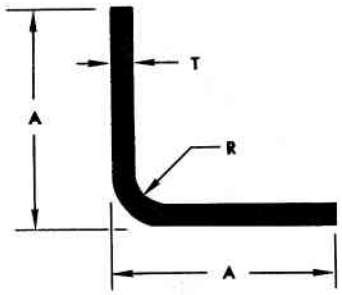
DASH NO.	SIZE					AREA SQ. IN.	BARE		CLAD
	A	B	C	R	T		7075	7178	2024
Y5–9	0.750	0.625	0.188	0.125	0.040	0.054			X
–16	0.875	0.750	0.188	0.125	0.051	0.081	X	X	
–17	0.875	0.750	0.188	0.125	0.064	0.099		X	
–21	1.000	0.750	0.188	0.125	0.040	0.069	X	X	
–22	1.000	0.750	0.188	0.125	0.051	0.087	X	X	
–24	1.000	0.750	0.219	0.125	0.072	0.121		X	
–28	1.000	0.875	0.188	0.125	0.064	0.123			X
–32	1.250	0.750	0.188	0.125	0.051	0.100			X
–33	1.250	0.750	0.188	0.125	0.064	0.123	X		
–43	1.250	1.000	0.188	0.125	0.064	0.139		X	
–45	1.250	1.000	0.219	0.125	0.081	0.175		X	
–68	1.500	0.875	0.188	0.125	0.064	0.147		X	



ANGLE—EQUAL LEG

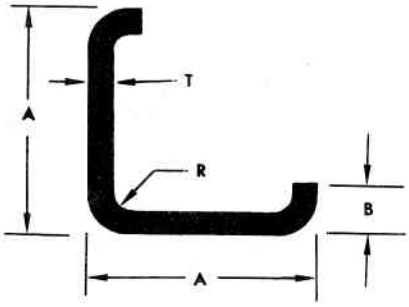
DASH NO.	SIZE				AREA SQ. IN.	BARE		CLAD
	A	B	R	T		7075	7178	7075
Y4-23	0.750	0.156	0.125	0.032	0.047		X	
-24	0.750	0.188	0.125	0.040	0.059	X	X	X
-25	0.750	0.188	0.125	0.051	0.074	X	X	X
-26	0.750	0.188	0.125	0.064	0.091		X	
-33	0.875	0.188	0.125	0.040	0.069		X	
-35	0.875	0.188	0.125	0.064	0.107		X	
-43	1.000	0.188	0.125	0.040	0.079		X	
-45	1.000	0.188	0.125	0.064	0.123	X	X	
-46	1.000	0.219	0.125	0.072	0.140		X	
-47	1.000	0.219	0.125	0.081	0.155	X		
-57	1.250	0.219	0.125	0.081	0.196		X	
-67	1.500	0.219	0.125	0.081	0.236	X		

Figure 8-46. Standard Roll-Formed Sections



ANGLE—90°, EQUAL LEG, PLAIN

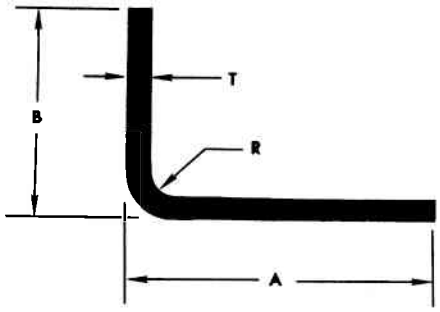
DASH NO.	SIZE			AREA SQ. IN.	BARE			CLAD	
	A	R	T		2024	7075	7178	2024	7075
Y2-2	0.625	0.094	0.051	0.059			X		X
-3	0.812	0.094	0.064	0.096			X		
-4	0.500	0.062	0.032	0.030				X	
-5	0.500	0.062	0.040	0.037			X		
-11	0.562	0.062	0.040	0.042			X		
-12	0.562	0.062	0.051	0.053			X		
-15	0.875	0.094	0.040	0.066		X			
-16	0.625	0.062	0.064	0.067		X			
-17	0.625	0.188	0.040	0.045				X	
-24	0.750	0.188	0.040	0.055				X	X
-25	0.750	0.188	0.051	0.069			X		
-26	0.750	0.188	0.064	0.086			X		
-27	0.750	0.094	0.064	0.089	X		X	X	
-28	0.750	0.094	0.072	0.099			X		
-34	0.875	0.188	0.051	0.082		X			
-35	0.875	0.188	0.064	0.102			X		
-43	1.000	0.188	0.040	0.075				X	
-46	1.000	0.094	0.072	0.135			X		
-49	1.000	0.125	0.102	0.186			X		
-69	1.500	0.094	0.102	0.289				X	
-70	1.125	0.156	0.156	0.311			X		
-90	1.000	0.094	0.064	0.120		X		X	
Y2-91	0.750	0.062	0.051	0.086		X	X		



ANGLE—90°, EQUAL LEG, FLANGED

DASH NO.	SIZE				AREA SQ. IN.	BARE		
	A	B	R	T		2024	7075	7178
Y3-16	0.625	0.156	0.125	0.032	0.041		X	X
-22	0.750	0.188	0.125	0.040	0.063		X	X
-23	0.750	0.156	0.125	0.032	0.049			X
-25	0.750	0.188	0.125	0.051	0.078		X	X
-26	0.750	0.188	0.125	0.064	0.095	X	X	X
-34	0.875	0.188	0.125	0.051	0.091		X	
-44	1.000	0.188	0.125	0.051	0.104			X

Figure 8-47. Standard Roll-Formed Sections



ANGLE—90°, UNEQUAL LEG, PLAIN

DASH NO.	SIZE				AREA SQ. IN.	BARE			CLAD	
	A	B	R	T		2024	7075	7178	2024	7075
Y6-7	0.750	0.500	0.125	0.040	0.046				X	
-8	0.750	0.625	0.094	0.051	0.065		X	X	X	X
-9	0.750	0.625	0.094	0.064	0.080			X	X	
-11	0.750	0.625	0.188	0.040	0.050				X	
-15	0.781	0.250	0.125	0.040	0.037		X			
-21	1.000	0.750	0.188	0.040	0.065		X	X		
-22	1.000	0.750	0.188	0.051	0.082			X	X	
-23	1.000	0.750	0.188	0.064	0.102				X	
-28	1.250	0.750	0.125	0.051	0.096	X				
-31	1.250	0.750	0.188	0.040	0.075		X		X	
-38	1.250	0.750	0.062	0.064	0.121				X	
-43	1.250	1.000	0.188	0.064	0.134				X	
-45	1.250	1.000	0.188	0.081	0.168				X	
-52	0.875	0.625	0.094	0.072	0.099	X				
-53	0.875	0.625	0.125	0.051	0.071		X		X	
-61	1.500	0.750	0.188	0.051	0.108				X	
-82	1.500	1.250	0.188	0.064	0.166		X			
-122	1.750	1.500	0.188	0.064	0.198				X	

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Figure 8-48. Standard Roll-Formed Sections

Section IX

DAMAGE DUE TO LANDING GEAR FAILURE

9-1. REPAIR OF DAMAGE DUE TO LANDING GEAR FAILURE.

9-2. Extensive damage to the airplane structure will result from landing gear failure. Repair of the airplane will require the replacing of structural components such as skin panels, longerons, bulkheads, beltframes, landing gears and their supporting structure. Care must be exercised when making repairs or replacements to maintain proper alignment of components and restore the airplane to as near its original configuration as possible.

NOTE

Investigation and repair of damage shall be supervised by an aeronautical structures engineer.

This section covers the following conditions of landing gear failure: nose gear up and main gears down; main gears up and nose gear down; and all gears up. Along with each condition of landing gear failure is information and illustrations pertaining to areas of probable damage, inspection and repair procedures. Refer to paragraph 1-221 for preliminary and general inspection information on the airplane exterior and substructure.

9-3. NOSE GEAR UP.

9-4. Extent of Damage.

9-5. A landing made with the nose landing gear retracted or collapsed will incur extensive damage to the following structural components: pitot-static boom; radome; forward lower longerons; lower portion of bulkheads, beltframes, skin panels and doors from the radome to approximately fuselage station 216.50; and the nose landing gear and attaching structure. The airplane wings and engine may incur damage from flying debris. The main landing gear may also incur damage due to abnormal stresses caused by the failure of the nose landing gear. See figures 9-1 through 9-3 for a survey of the damage applicable to nose landing gear failure.

9-6. Inspection of Airplane.

9-7. A thorough detailed examination of the damaged area and a visual inspection of the entire airplane is required. Remove the engine for an inspection of the compressor for damage due to flying debris. Inspect all primary structure such as longerons, bulkheads, beltframes, and nose landing gear attach point supporting structure for hidden damage or distortion. Check airframe alignment to insure against any distortion or deformation that may not be apparent in visual inspection. Check landing gear for alignment and operation. Refer to paragraph 1-268 for alignment procedures. Refer to T.O. 1F-106A-2-8-2-1 for landing gear operation procedure. Any parts suspected of being damaged shall be removed and inspected by the magnetic particle inspection or dye penetrant inspection method, whichever is applicable.

9-8. Removal of Damaged Area.

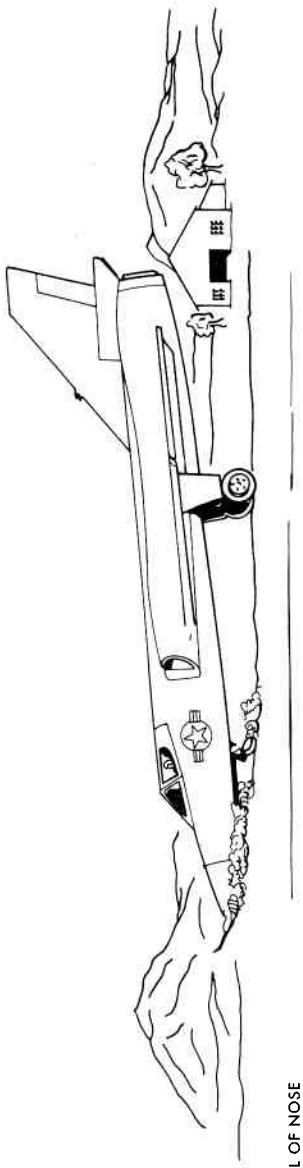
9-9. Support the airplane in such a manner as not to interfere with the repair or replacement of damaged structure; refer to paragraph 1-333 for instructions. Take care not to damage sound structure adjacent to damaged areas when making replacements. In reworking damaged structure, trim out the damaged or distorted areas and leave ample fastener edge margins in the original structure to facilitate repairs. Trimmed edges should be smooth and should allow generous radii in the corners. Large structural components to be replaced should be disassembled at some convenient point, such as manufacturing splice at fuselage station 102 or 216.50 for example, to facilitate the installation of new structure. Bolt-on components, such as the nose landing gear or the radome, should be removed to facilitate repairs.

9-10. Procurement of Parts.

9-11. Replacement parts or assemblies required for structural repair may be obtained from salvage, fabricated, or procured from spares sources. For identification of components and engineering drawing numbers see figures 1-92 and 1-93, and refer to the Illustrated Parts Breakdown, T.O. 1F-106A-4 or T.O. 1F-106B-4.

9-12. Installation of Parts.

9-13. Repairs and replacement of large structural components should be accomplished first. Installation of the



NOTES:
1. FIGURE ILLUSTRATES DAMAGE ZONE TYPICAL OF NOSE LANDING GEAR FAILURE. SEE FIGURE 9-2 AND 9-3 FOR COMPLETION OF NOSE LANDING GEAR FAILURE SURVEY.
2. REFER TO THIS SECTION FOR INSPECTION OF AIRFRAME, PROCUREMENT OF PARTS, AND REPAIR INFORMATION.
3. A DETAILED EXAMINATION OF STRUCTURE IN AREA OF LANDING GEAR ATTACH FITTINGS IS REQUIRED.
4. REPLACE COMPONENTS THAT ARE DAMAGED EXTENSIVELY.
5. EXAMINE NOSE SECTION STRUCTURE IN DETAIL FOR DAMAGE AND DISTORTION.
6. FOR SURVEY OF DAMAGE RESULTING FROM BOTH NOSE AND MAIN LANDING GEAR FAILURE, SEE FIGURES 9-1 THROUGH 9-8.

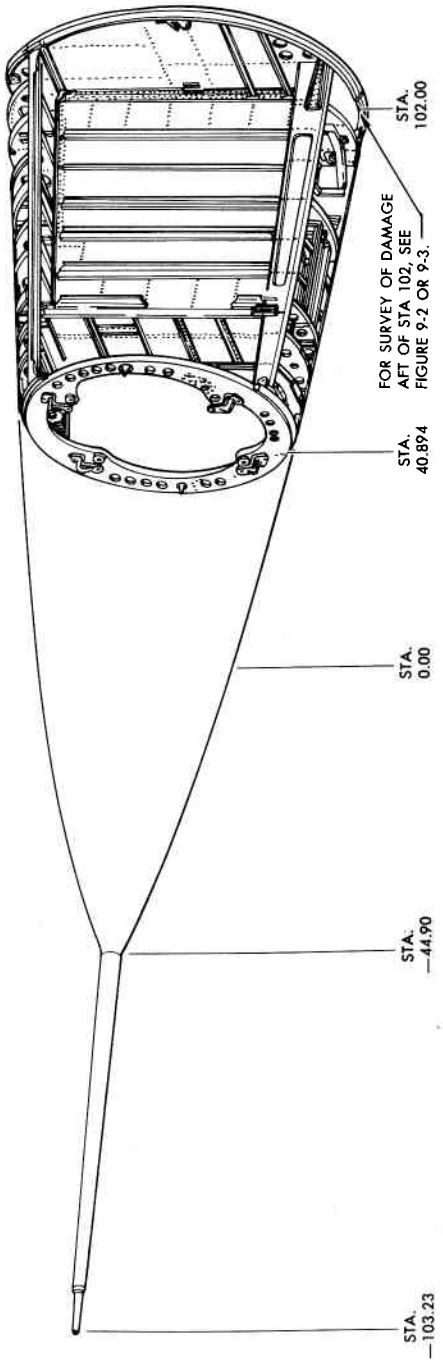


Figure 9-1. Damage Due to Landing Gear Failure — Nose Gear Up

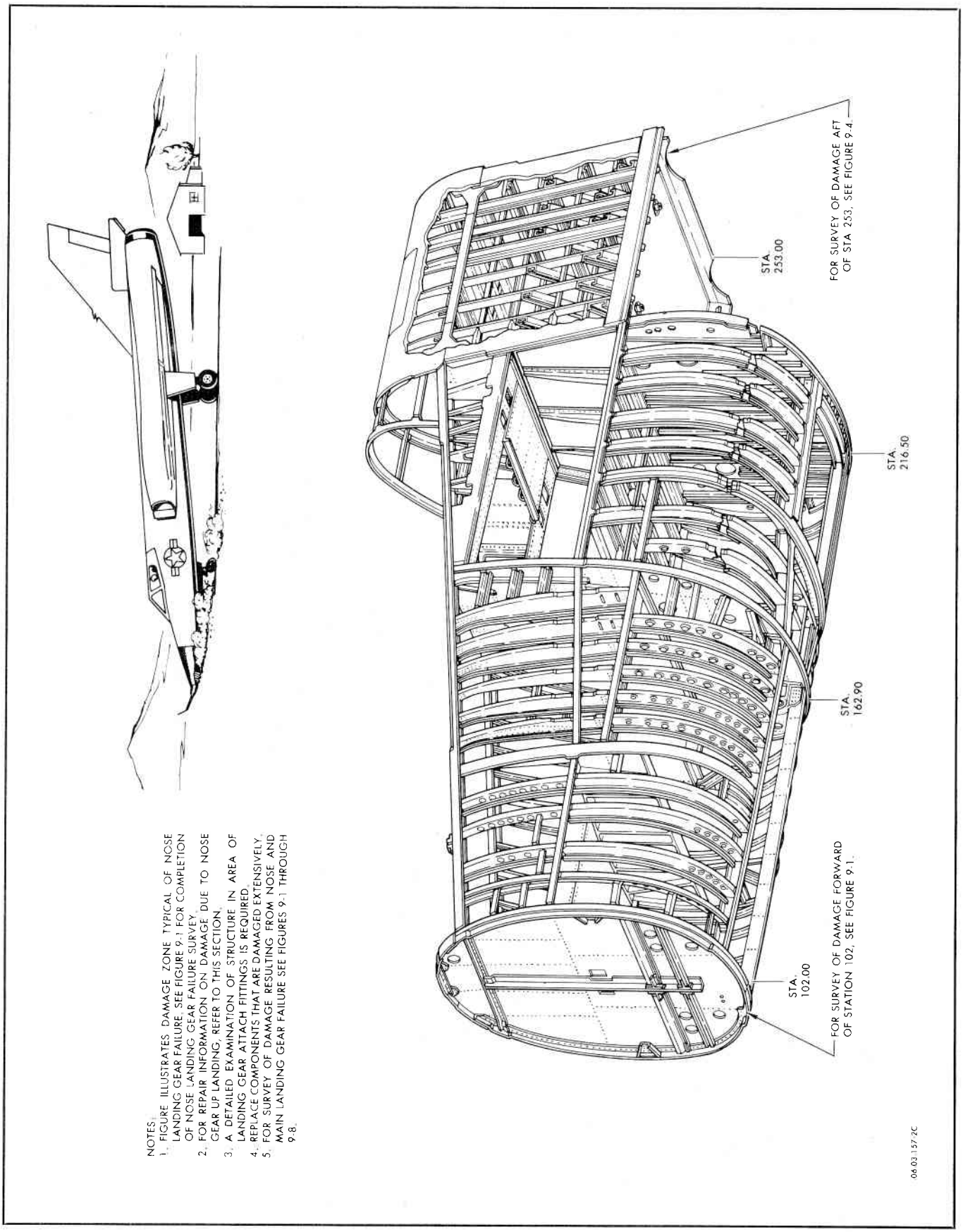
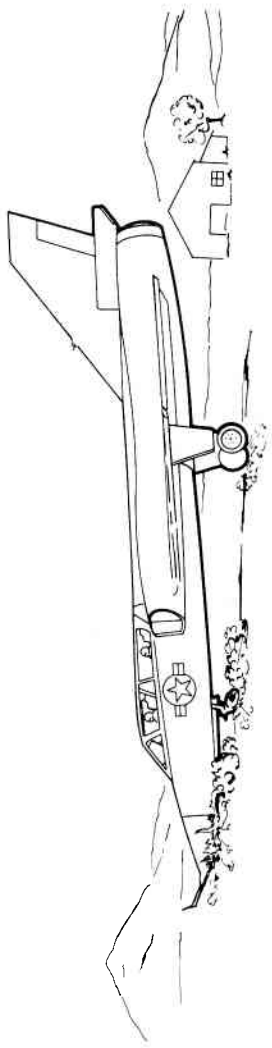
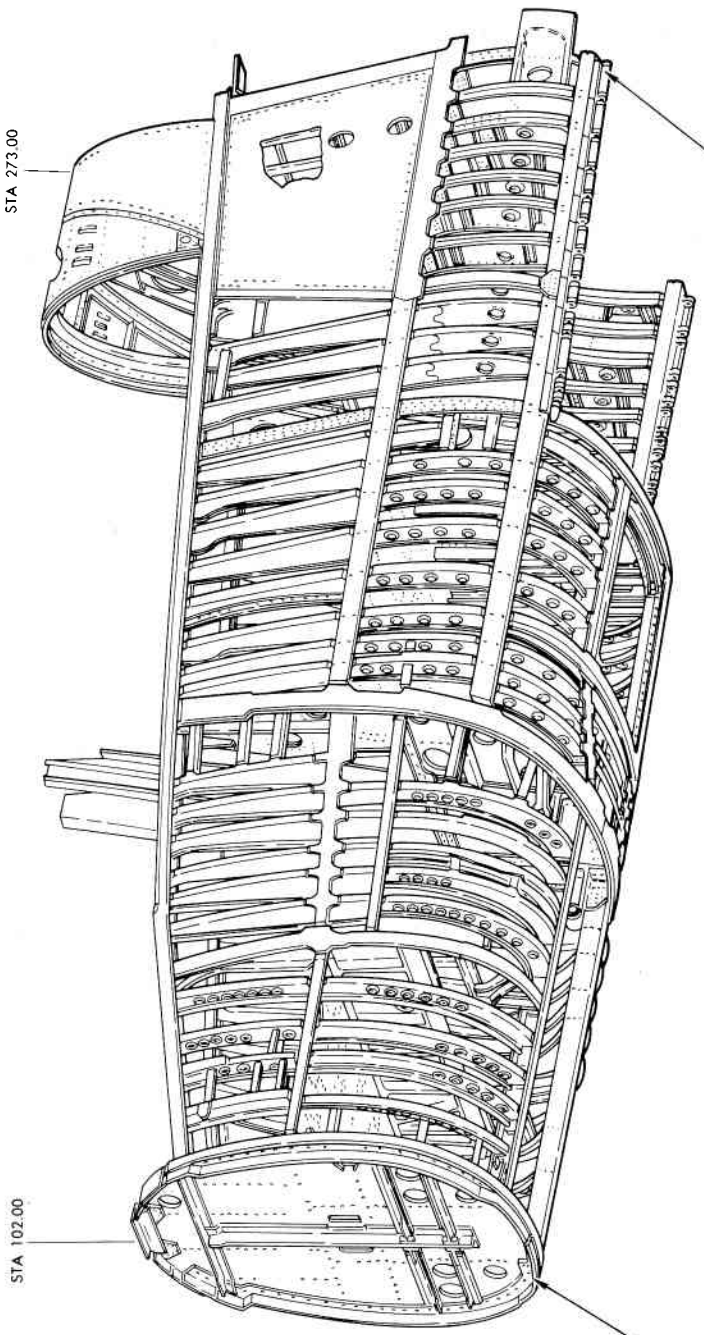


Figure 9-2. Damage Due to Landing Gear Failure — Nose Gear Up, F-106A





NOTES:
1. THIS FIGURE ILLUSTRATES THE DAMAGE ZONE TYPICAL OF NOSE LANDING GEAR FAILURE. SEE FIGURE 9-1 FOR COMPLETION OF NOSE LANDING GEAR FAILURE SURVEY.
2. FOR REPAIR INFORMATION DUE TO A NOSE GEAR UP LANDING, REFER TO THIS SECTION.
3. A DETAILED EXAMINATION OF STRUCTURE IN AREA OF LANDING GEAR ATTACH FITTINGS IS REQUIRED.
4. COMPONENTS THAT HAVE BEEN EXTENSIVELY DAMAGED MUST BE REPLACED.
5. FOR SURVEY OF DAMAGE RESULTING FROM NOSE AND MAIN LANDING GEAR FAILURE, SEE FIGURES 9-1 THROUGH 9-8.

Figure 9-3. Damage Due to Landing Gear Failure — Nose Gear Up, F-106B

large components should be done with the aid of jigs and fixtures to maintain proper alignment and to facilitate repairs. Replacement parts should be checked for any mismatch with the original structure before installation. Some replacement parts may require rework before installation can be accomplished. Refer to Sections II and IV for a complete breakdown of the wing and fuselage structure and the types of material used in their construction.

9-14. MAIN GEAR UP.

9-15. Extent of Damage.

9-16. A landing made with the main landing gear retracted or collapsed will incur extensive damage to the following airplane structural components: main landing gear and doors; aft lower longerons; lower portion of bulkheads, beltframes, skin panels and doors from approximately fuselage station 472 to station 711.40 including the lower portion of the afterburner shroud; wings and elevons; and the main landing gear attach point supporting structure. The airplane engine may incur damage from flying debris. The nose landing gear may also incur damage due to the abnormal stresses caused by the failure of the main landing gear. See figures 9-4 through 9-8 for a survey of the damage applicable to main landing gear failure.

9-17. Inspection of Airplane.

9-18. A thorough detailed examination of the damaged area and a visual inspection of the entire airplane is required. Remove the engine for an inspection of the compressor and afterburner shroud for damage. Inspect all primary structure such as longerons, bulkheads, beltframes, and main landing gear attach point supporting structure for hidden damage or distortion. Check airframe alignment to insure against any distortion or deformation that may not be apparent in visual inspection. Check landing gear for alignment and operation. Refer to paragraph 1-268 for alignment procedures. Refer to T.O. 1F-106A-2-8-2-1 for landing gear operation procedure. Any parts that are suspected of being damaged shall be removed and inspected by the magnetic particle inspection or fluorescent penetrant inspection method, whichever is applicable.

9-19. Removal of Damaged Area.

9-20. Support the airplane in such a manner as not to interfere with the repair or replacement of damaged structure; refer to paragraph 1-333 for instructions. Exercise care not to damage sound structure adjacent to damaged areas when making replacements. In reworking damaged structure, trim out the damaged or distorted areas leaving ample fastener edge margins in the original structure to facilitate repairs. Trimmed edges should be smooth and should allow generous radii in the corners. Large structural components to be replaced may be disassembled at some convenient point, such as manufacturing splice at fuselage station 472 for example, to facilitate the installation of new structure. Bolt-on components, such as the landing gear, wings, or elevons, should be removed to facilitate repairs.

9-21. Procurement of Parts.

9-22. Replacement parts or assemblies required for structural repair may be obtained from salvage, fabricated, or procured from spares sources. For identification of components and engineering drawing numbers, see figures 1-92 and 1-93 and refer to the Illustrated Parts Breakdown, T.O. 1F-106A-4 or T.O. 1F-106B-4.

9-23. Installation of Parts.

9-24. Repairs and replacement of large structural components should be accomplished first. Installation of the large components should be done with the aid of jigs and fixtures to maintain proper alignment and facilitate repairs. Replacement parts should be checked for any mismatch with the original structure before installation. Some replacement parts may require rework before installation can be accomplished. Refer to Sections II and IV for a complete breakdown of the wing and fuselage structure and the types of material used in their construction.

9-25. ALL GEAR UP.

9-26. Extent of Damage.

9-27. A landing made with all landing gear retracted or collapsed will incur extensive damage to the following airplane structural components: nose and main landing gears and their attach point supporting structure; pitot-static boom and radome; lower longerons; lower portion of bulkheads, beltframes and skin panels; doors; and the wings and elevons. Should the landing occur at a location not equipped to make major repairs, inspect critical structural components such as the fuselage lower longeron and the machined bulkheads at stations 431.00 and 472.00 for damage (see figures 9-7 and 9-8) to determine the feasibility of making temporary repairs for a "one-time" flight to a repair depot. This procedure would preclude disassembling the airplane and consequent costly shipment to repair facilities. Refer to paragraph 1-81 for aerodynamic limitations on "one-time" flights. The airplane's engine may incur damage from flying debris. See figures 9-1 through 9-8 for a complete fuselage damage survey applicable to nose and main landing gear failure.

9-28. Inspection of Airplane.

9-29. A thorough detailed examination of the damaged area and a visual inspection of the entire airplane is required. The engine will have to be removed from the airframe for its inspection and to facilitate the inspection and repair of the structure. Inspect all primary structure such as longerons, bulkheads, beltframes, and

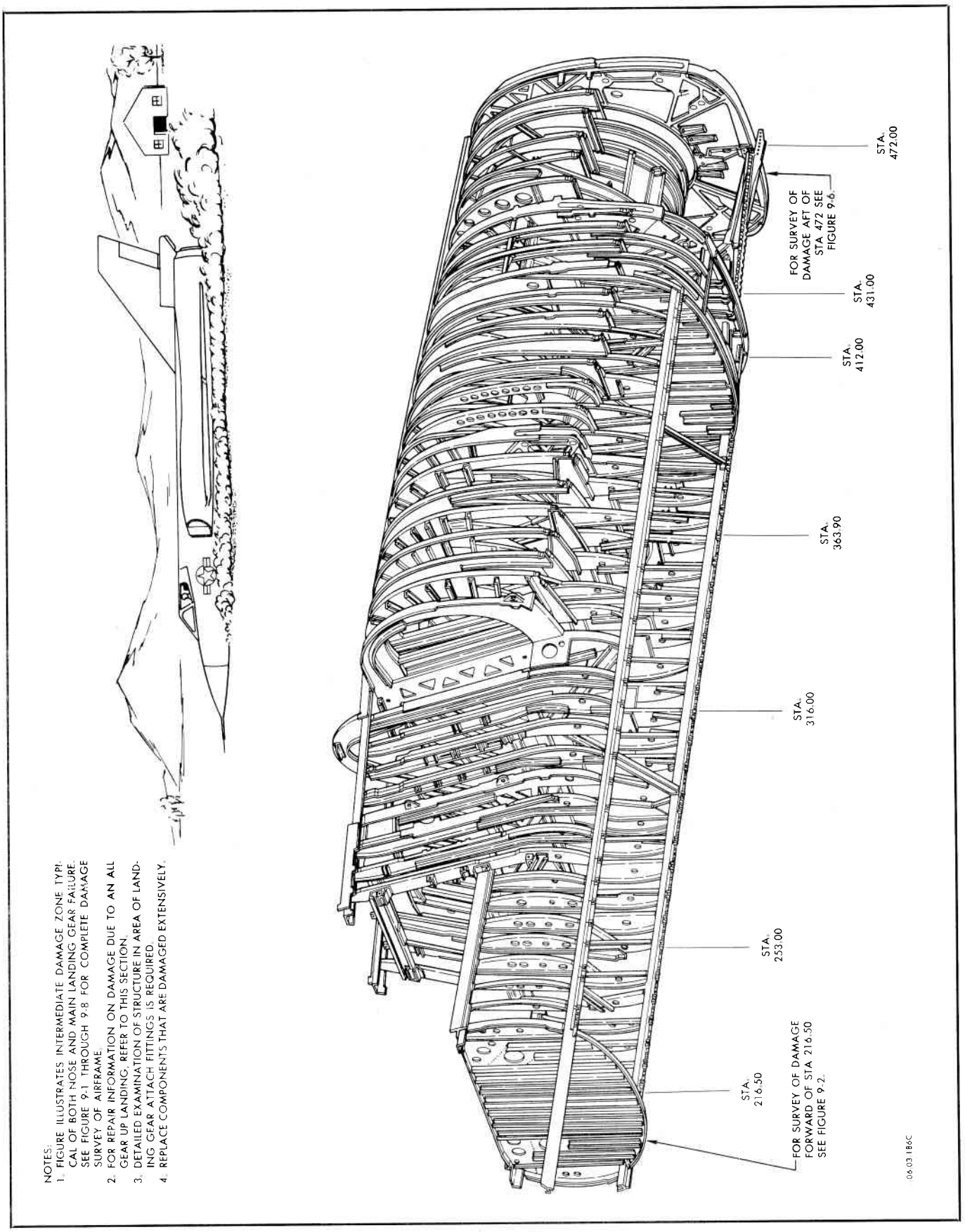


Figure 9-4. Damage Due to Landing Gear Failure — All Gear Up, F-106A

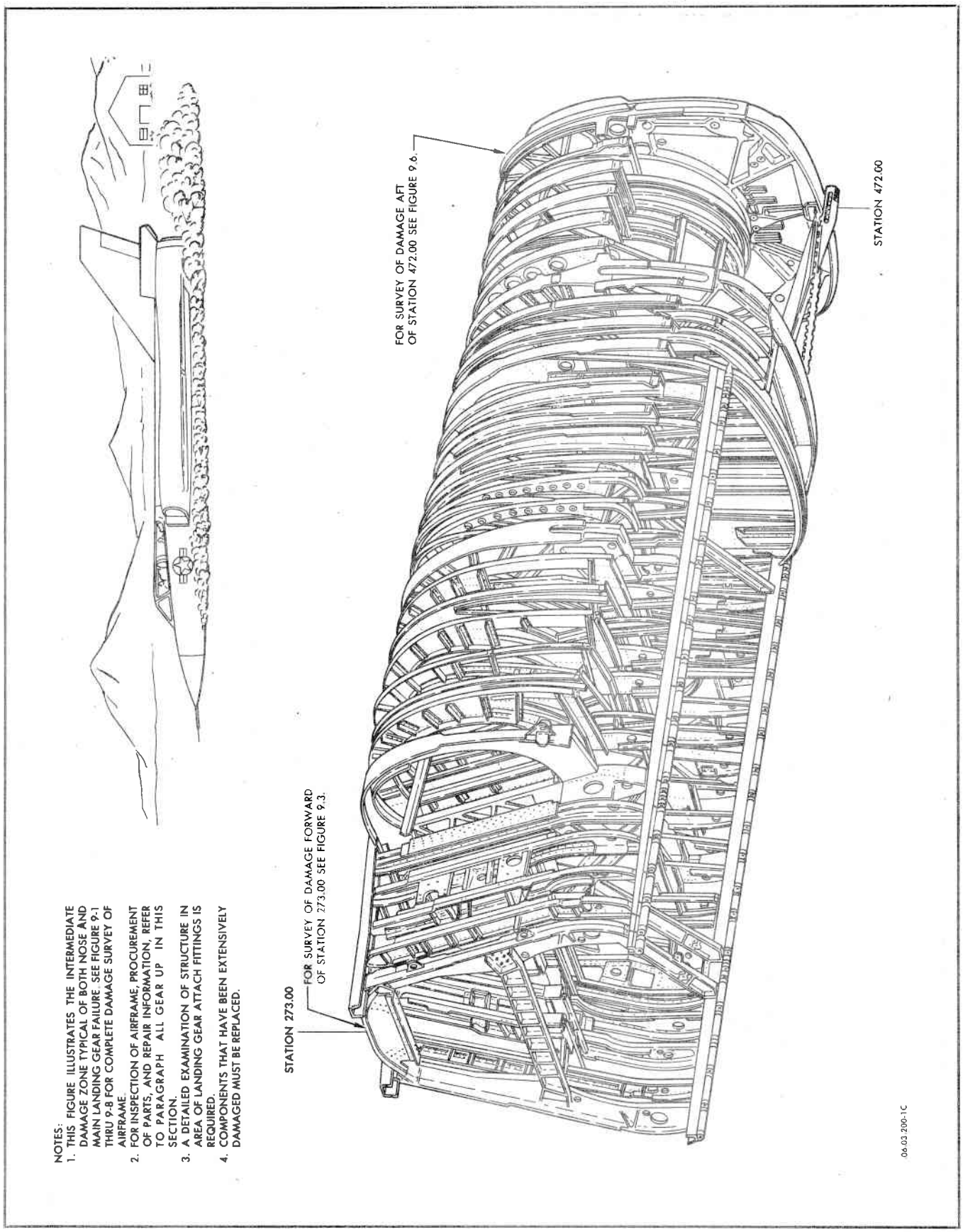


Figure 9-5. Damage Due to Landing Gear Failure — All Gear Up, F-106B

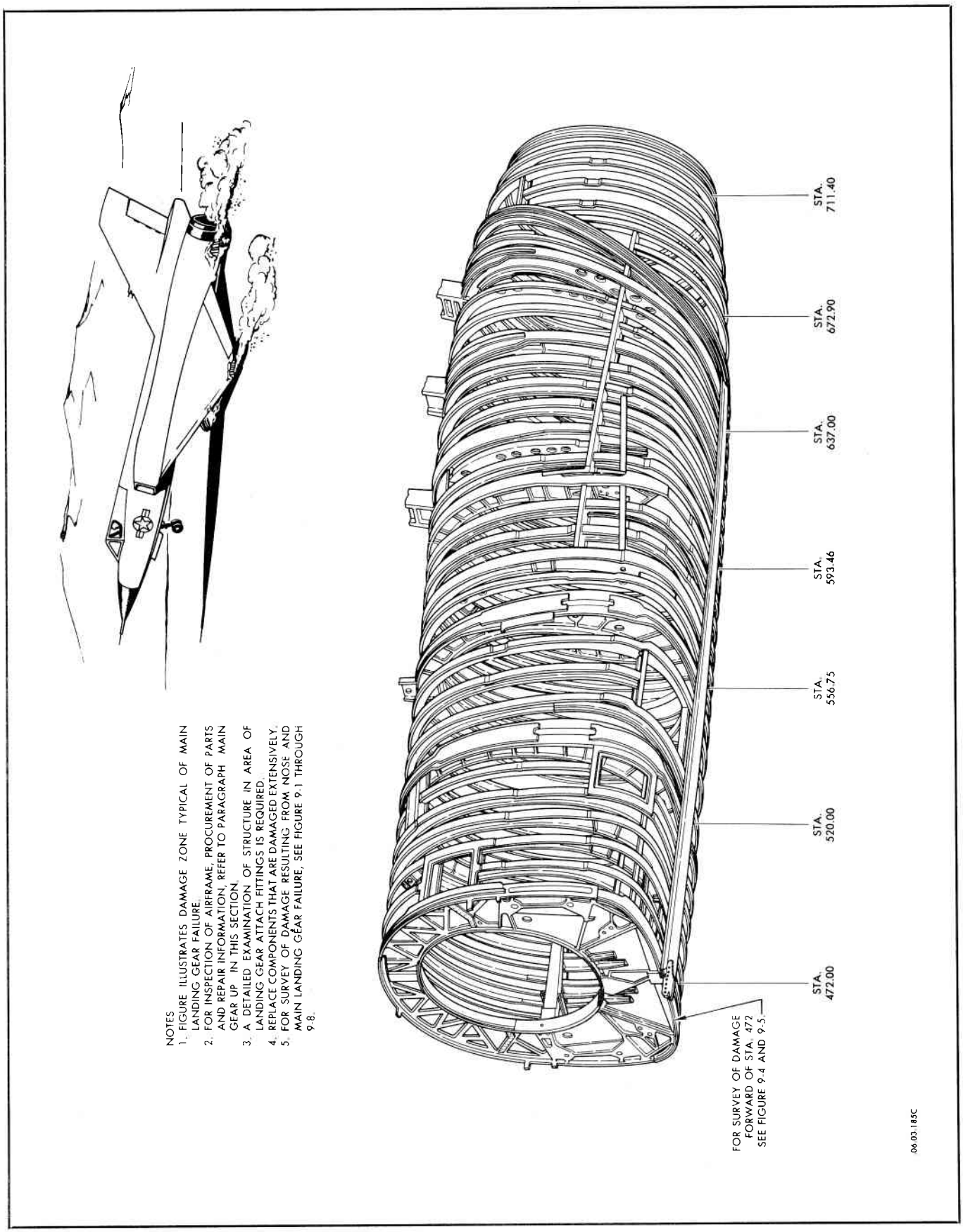
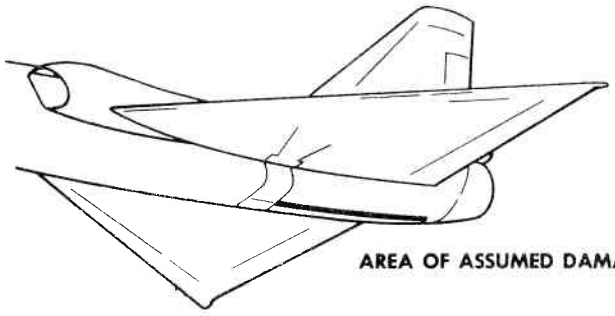
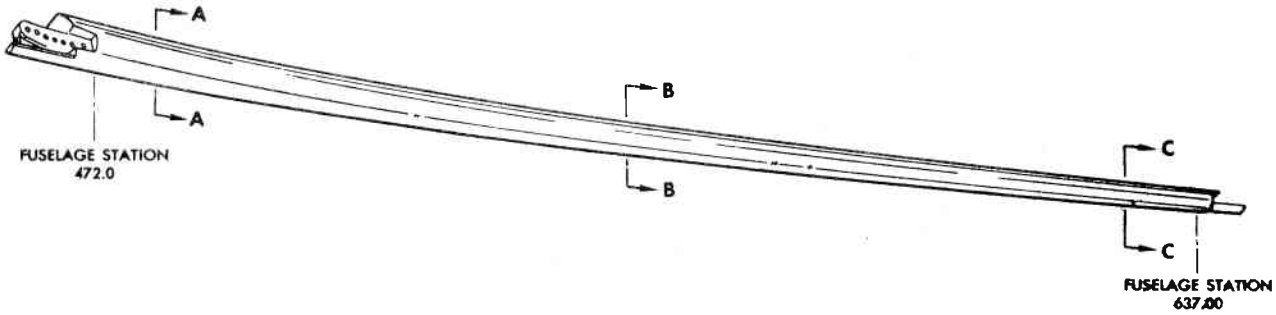
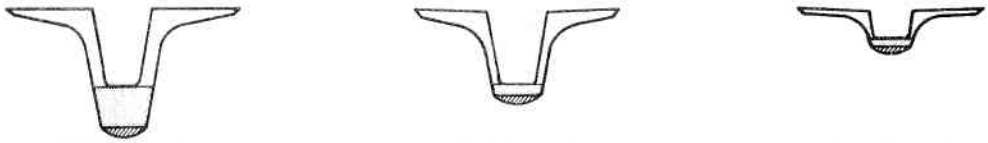


Figure 9-6. Damage Due to Landing Gear Failure — Main Gear Up



AREA OF ASSUMED DAMAGE





SECTION A-A SECTION B-B SECTION C-C

TYPICAL CROSS SECTION AREAS

DAMAGE LIMITS

MAX 10% OF LONGERON CROSS SECTION AREA MAY BE WORN AWAY BETWEEN FUSELAGE STATIONS 472.00 AND 637.00—AIRCRAFT REMAIN "IN SERVICE."

MAX OF 40% OF LONGERON CROSS SECTION WORN AWAY—AIRCRAFT MAY BE RELEASED FOR "ONE TIME FLIGHT" PROVIDED DAMAGE DOES NOT EXCEED CROSS SECTION AREA AS SHOWN.

CRACK TOLERANCES

a. REPAIR OF THE LONGERON HAS PROVEN INEFFECTIVE AND IS UNNECESSARY.

b. LONGERON WILL BE REPLACED WHEN CRACK(S) PROGRESS BETWEEN ALL THE HORIZONTAL BOLT HOLES ATTACHING TAIL HOOK TO LONGERON.

c. LONGERON WILL BE REPLACED WHEN A CRACK OR SERIES OF ABUTTED CRACKS, OTHER THAN INDICATED IN PARAGRAPH b., EXCEEDS 24 INCHES IN LENGTH.

NOTE

IF A SPARE LONGERON IS UNAVAILABLE, CONTACT THE F-106 SYSTEM SUPPORT MANAGEMENT DIVISION FOR INSTRUCTIONS CONCERNING CONTINUED USE.

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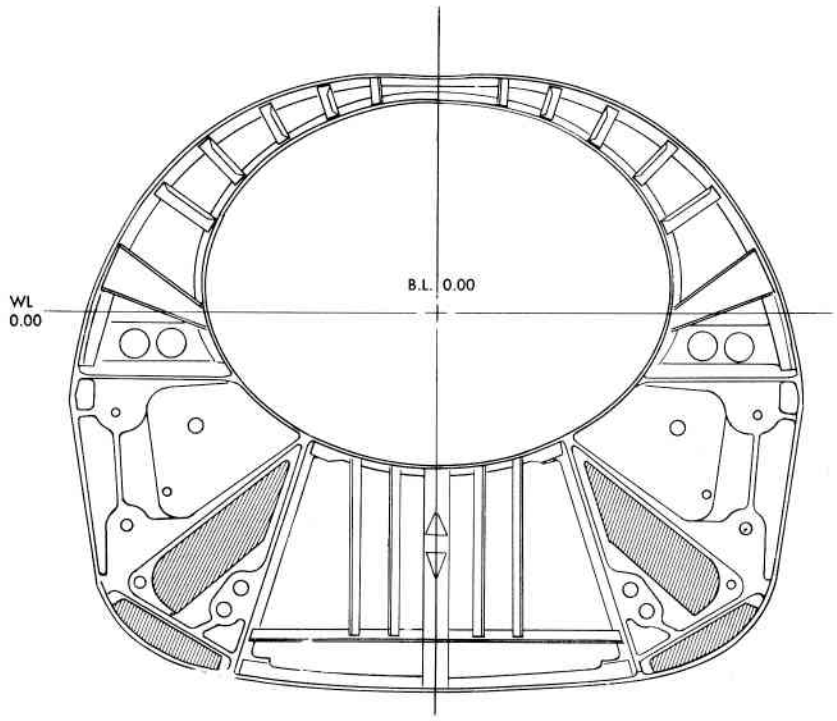
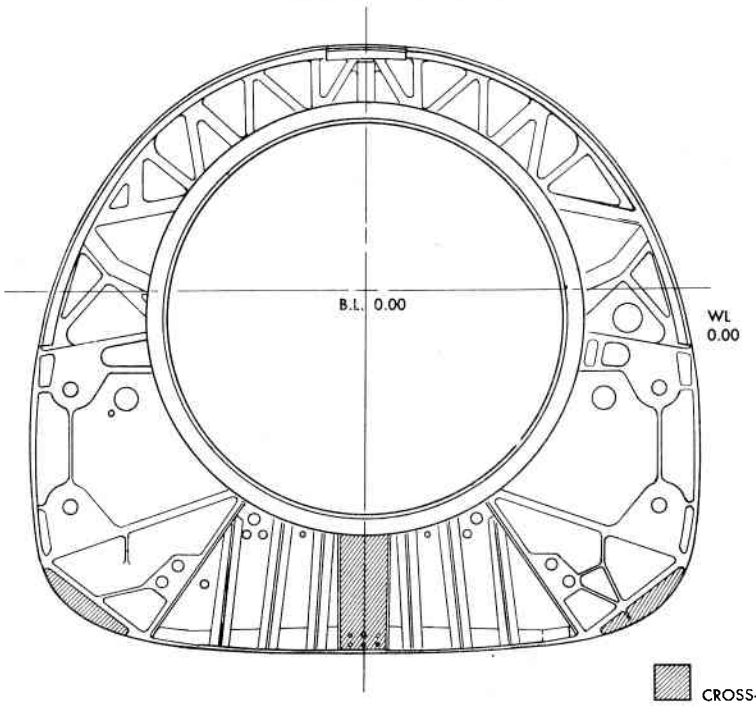
Figure 9-7. Damage Limits — Fuselage Lower Longeron



MACHINED BULKHEAD—STATION 431.00
VIEW LOOKING FORWARD



MACHINED BULKHEAD — STATION 472.00
VIEW LOOKING AFT

CROSS-LINED AREA INDICATES LIGHT METAL, NON-MACHINED AREAS WHICH MAY BE REPAIRED AS ILLUSTRATED IN SECTION X.

MACHINED AREA. WILL REQUIRE REPAIRS DESIGNED BY A STRUCTURES ENGINEER.

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Figure 9-8. Damage Limits — Machined Bulkheads, Stations 431.00 and 472.00

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landing gear attach point supporting structure for hidden damage or distortion. Check airframe alignment to insure against any distortion or deformation that may not be apparent in visual inspection. Check landing gear for alignment and operation. Refer to paragraph 1-268 for alignment procedures. Refer to T.O. 1F-106A-2-8-2-1 for landing gear operation procedure. Any parts suspected of being damaged shall be removed and inspected by the magnetic particle inspection or dye penetrant inspection method, whichever is applicable.

9-30. Removal of Damaged Area.

9-31. Support the airplane in such a manner as not to interfere with the repair or replacement of damaged structure; refer to paragraph 1-333 for instructions. Exercise care not to damage sound structure adjacent to damaged areas when making replacements. In reworking damaged structure, trim out damaged or distorted areas leaving ample fastener edge margins in the original structure to facilitate repairs. Trimmed edges should be smooth and should allow generous radii in the corners. Large structural components to be replaced may be disassembled at some convenient point, such as manufacturing splices for example, to facilitate the installation of new structure. Bolt-on components, such as the landing gear, wings, or elevons, should be removed to facilitate repairs.

9-32. Procurement of Parts.

9-33. Replacement parts or assemblies required for structural repair may be obtained from salvage, fabricated, or procured from spares sources. For identification of components and engineering drawing numbers, see figures 1-92 and 1-93 and refer to the Illustrated Parts Breakdown, T.O. 1F-106A-4 or T.O. 1F-106B-4.

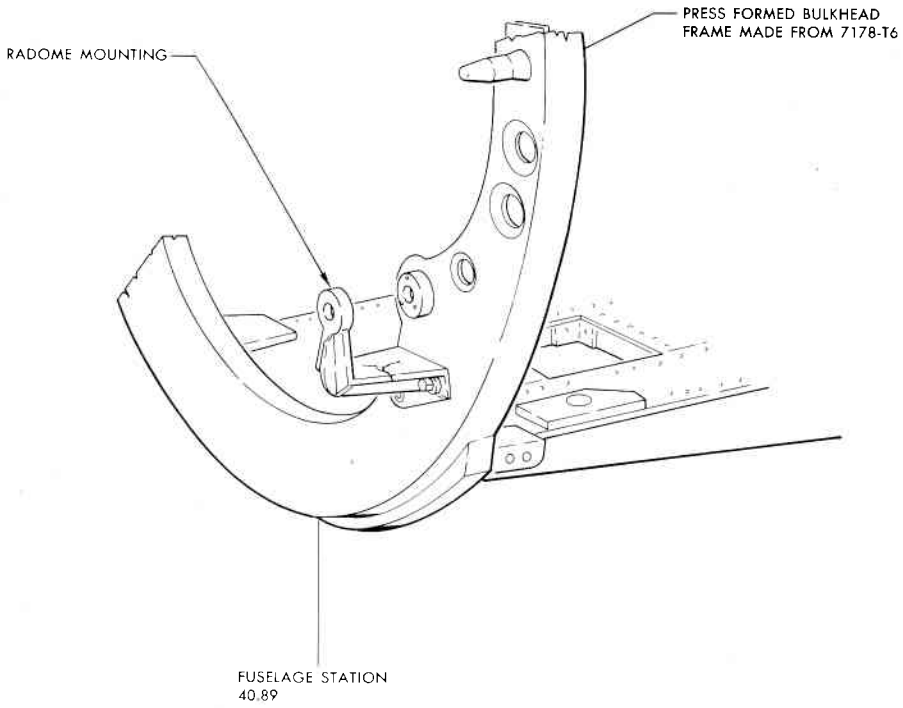
9-34. Installation of Parts.

9-35. Repairs and replacement of large structural components should be accomplished first. Installation of the large components should be done with the aid of jigs and fixtures to maintain proper alignment and facilitate repairs. Replacement parts should be checked for any mismatch with the original structure before installation. Some replacement parts may require rework before installation can be accomplished. Refer to Sections II and IV for a complete breakdown of the wing and fuselage structure and the types of material used in their construction.

9-36. SPECIFIC REPAIRS.

9-37. Figures 9-9 through 9-13 show specific repair procedures for built-up fuselage frames and bulkheads used in the F-106A and F-106B airplanes. The damage due to a landing gear failure will vary in each accident, and these illustrations are meant to be used as a guide for designing repairs within the different sections of the airplane. Refer to Section I for additional repair information.

a. Remove the fiberglas radome. Refer to T.O. 1F-106A-2-2-2-2 for radome removal procedure.
b. Open the left and right hand forward electronic compartment doors, and install an 8-96013 (1730-522-2745) door lock assembly in each door to hold the doors in an open position.
c. Remove two AN365-428 nuts, two AN960-416 washers and two AN4-10A bolts and remove the damaged radome mounting.



NOTES:
1. REFER TO SECTION IV FOR PERMISSIBLE REPAIRS TO THE FIBERGLAS RADOME.
2. REFER TO PARAGRAPH INVESTIGATION OF DAMAGE IN SECTION 1 FOR DAMAGE EVALUATION PROCEDURE.

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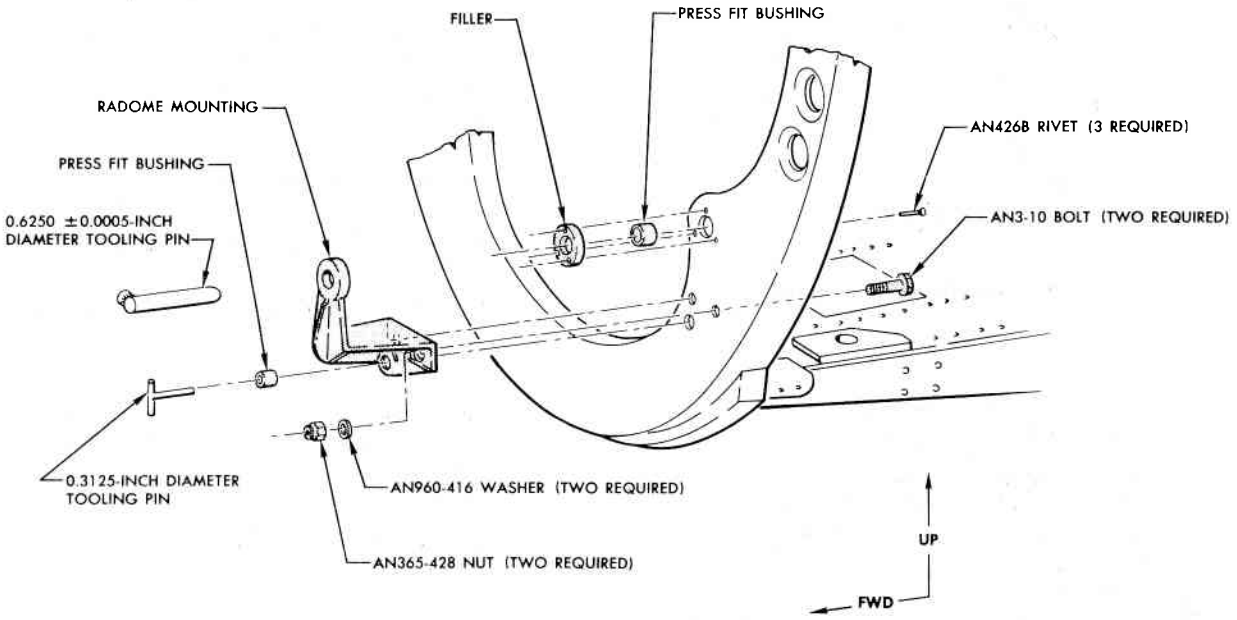
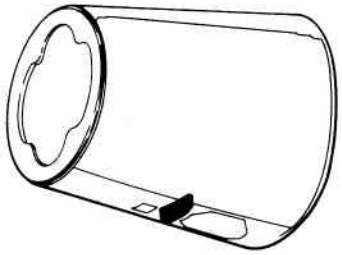
Figure 9-9. Replacement of Radome Mounting (Sheet 1 of 2)



d. Using a No. 30 (0.128) drill, remove the three AN426B rivets connecting the filler to the bulkhead frame.
e. Remove the damaged filler.
f. Remove the press fit bushing from the bulkhead if it has been damaged.
g. Install a new press fit bushing in the bulkhead if the original bushing was damaged.
h. Install a new filler. Filler may be ordered from spare stock or may be fabricated locally from 7075-T6 bar stock. Dimensions for fabricating a new filler may be obtained from a similar filler on the opposite side of the airplane.
i. Install a new radome mounting.
j. Place 0.6250 (±0.005)-inch tooling pin through the radome mounting and the fuselage bulkhead as shown.
k. Place a 0.3125 (±0.0015)-inch tooling pin through the radome mounting and the fuselage bulkhead as shown.
l. Locate and drill three No. 30 (0.128) holes in the new filler. Locate holes from existing holes in the fuselage bulkhead.
m. Secure the new filler to the fuselage bulkhead with AN426B rivets.
n. Install two new AN 4-10A bolts through the new radome mounting and the fuselage bulkhead. Install the bolts from the aft side of the bulkhead.
o. Place an AN960-416 washer over each bolt and secure with new AN365-428 nuts.
p. Tighten the nuts according to the standard torque values given on figure "Standard Bolt Torque Values" in Section 1.
q. Remove the tooling pins.
r. Reinstall the radome. Refer to T.O. 1F-106A-2-2-2-2 for radome installation procedure.

.06.03.216-2 .53.02.03

Figure 9-9. Replacement of Radome Mounting (Sheet 2 of 2)



ASSUMED AREA OF DAMAGE

REPAIR PROCEDURE

a. Support the airplane on support fixtures to allow access to the damaged area. Refer to Airplane Handling Equipment in Section I.
b. Open the lett and right hand forward electronic compartment doors and install an 8-96013 (1730-522-2745) door lock assembly in each door to hold the doors in an open position.
c. Remove the electronic equipment from the opened compartment. Refer to T.O. 1F-106A-2-27-2 for the electronic removal procedure.
d. Remove the paint and any foreign material from the outer surface of the lower panel between stations 40.89 and 102.00.

CAUTION

REFER TO PAINTING PRECAUTIONS IN AREA OF CANOPY PLEXIGLASS WINDOWS IN SECTION I IF AN AROMATIC TYPE SOLVENT IS USED TO REMOVE PAINT AND FOREIGN MATERIAL IN THIS AREA.

e. Using a No. 30 (0.128) drill, remove all rivets which attach the skin to the fuselage structure between stations 40.89 and 102.00.

NOTE

A DRILL STOP SHOULD BE USED WHEN REMOVING RIVETS FROM THE SKIN, TO PREVENT DAMAGE TO ANY UNDERLYING STRUCTURE.

f. Remove the skin and hold for comparison when fabricating a new skin.
g. Remove a sufficient number of vertical stiffener angles from the damaged frame to allow removal of damaged portion of the frame. Use a No. 30 (0.128) drill to remove rivets.

NOTE

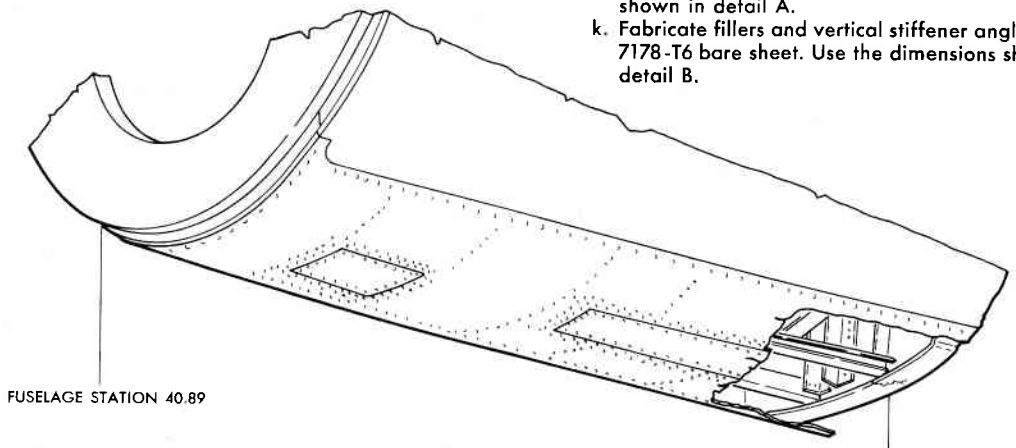
DUE TO THE PROXIMITY OF THE FRAME WORK IN THIS AREA, IT MAY BE NECESSARY TO USE A RIGHT ANGLE OR SNAKE DRILL TO REMOVE THE RIVETS ATTACHING THE VERTICAL STIFFENER ANGLES TO THE FRAME.

h. Remove the damaged portion of the frame. Use metal cutting hand shears to cut out the damaged portion of the frame. Finish cutting out the damaged area with hand files until a smooth shape is obtained.

NOTE

IF FORTY PER CENT OR MORE OF THE FRAME HAS BEEN DAMAGED, IT IS RECOMMENDED THAT THE FRAME BE REPLACED.

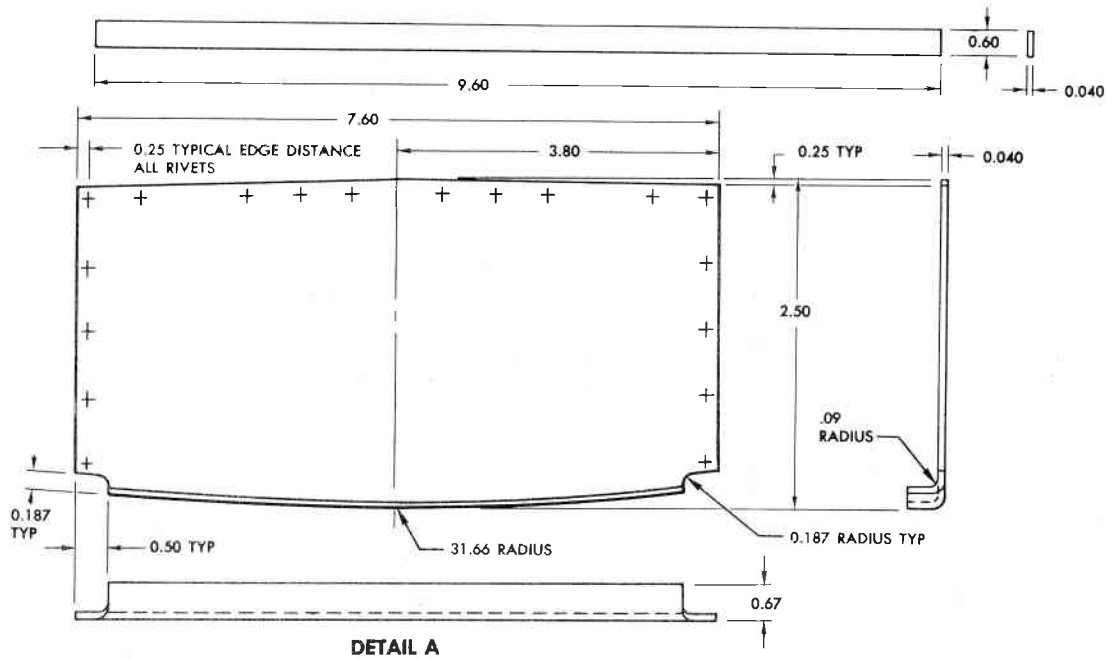
i. Fabricate a repair plate to cover the cut out area in the frame. Fabricate the repair plate from 7178-T6 bare sheet one gage thicker than the frame being repaired.
j. Predrill No. 39 (0.099) holes in the repair plate as shown in detail A.
k. Fabricate fillers and vertical stiffener angles from 7178-T6 bare sheet. Use the dimensions shown in detail B.



ENLARGED VIEW OF ASSUMED AREA OF DAMAGE

06.03.217-1A

Figure 9-10. Lower Panel Damaged Frame Repair — Fuselage Stations 40.89 to 102.00 (Sheet 1 of 5)



DETAIL A

NOTE
APPLY PROTECTIVE COATING TO ALL REPAIR PARTS PRIOR TO INSTALLATION. SEE FIGURE "PRIMER AND PAINT COATING" IN SECTION 1 FOR TYPE AND AMOUNT OF PROTECTIVE COATING TO BE APPLIED TO PARTS IN THIS AREA.

l. Secure the repair plate to the frame with clamps. Align the repair plate so that the contour of the repair plate matches the contour of the frame being repaired.

m. Using the predrilled holes in the repair plate as a guide, drill holes through the frame. Use a No. 30 (0.128) drill.

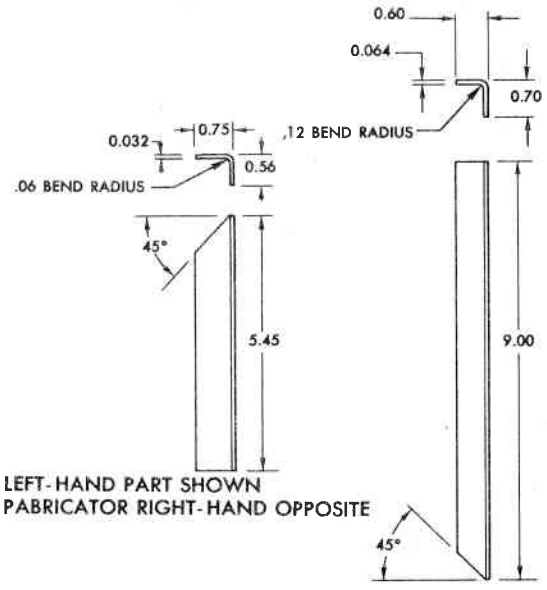
NOTE
WHEN MATING REPAIR PARTS TO THE ORIGINAL FRAME WORK, REMOVE THE REPAIR PARTS UPON COMPLETION OF DRILLING, IF NECESSARY, TO REMOVE BURRS AND DRILL CHIPS FROM BETWEEN THE FAYING SURFACES.

n. Rivet the repair plate to the frame with AN470-AD-4 rivets.

o. Secure the vertical stiffener angles and fillers in place with clamps.

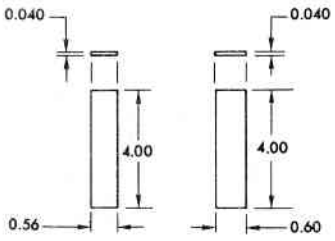
p. Using the existing holes in the upper portion of the original frame as a guide, drill holes through the fillers and angles. Use a No. 30 (0.128) drill.

q. Layout and drill holes through the lower portion of the repair angles, and repair plate. Use a No. 39 (0.099) drill. See figure "Standard Minimum Rivet Spacing" in Section 1 for rivet spacing and edge distance information.



LEFT-HAND PART SHOWN
FABRICATOR RIGHT-HAND OPPOSITE

DETAIL B



DETAIL C

NOTE:
ALL RIVETS ARE TO BE EQUALLY SPACED BETWEEN LOCATED END RIVETS. SEE FIGURE "STANDARD MINIMUM RIVET SPACING" IN SECTION 1.

.06.03.217-2 .53.02.03

Figure 9-10. Lower Panel Damaged Frame Repair — Fuselage Stations 40.89 to 102.00 (Sheet 2 of 5)

r. Ream the 0.099 holes with a No. 20 (0.161) drill.
s. Rivet the vertical stiffener angles and fillers in place with AN470AD-5 rivets.
t. Fabricate a new skin from 0.032-inch 7178-T6 bare sheet.

NOTE
LEAVE A MINIMUM OF ONE INCH ACCESS MATERIAL AROUND THE PERIMETER OF THE NEW SKIN FOR TRIM PURPOSES.

u. Cut access openings in the new skin as shown, except reduce the cutout dimensions by one inch.
v. Layout and drill holes through the contoured angle of the repair plate. See figure "Standard Minimum Rivet Spacing" in Section 1 for rivet spacing and edge distance.
w. Using a grease pencil, draw a center line on the exterior surface of the new skin.
x. Hold the new skin in place and align the center line on the new skin with the bottom center line of the airplane.
y. Using the existing holes in the fuselage frame work, drill holes through the skin. Use a No. 30 (0.128) drill.

NOTE
TO KEEP THE NEW SKIN FROM WRINKLING, COMMENCE THE DRILLING OPERATION APPROXIMATELY IN THE CENTER OF THE NEW SKIN AND PROCEED TO DRILL OUTBOARD, FORWARD AND AFT. INSERT CLECOS THROUGH THE HOLES AS THEY ARE DRILLED TO PREVENT THE SKIN FROM SLIPPING OUT OF ALIGNMENT.

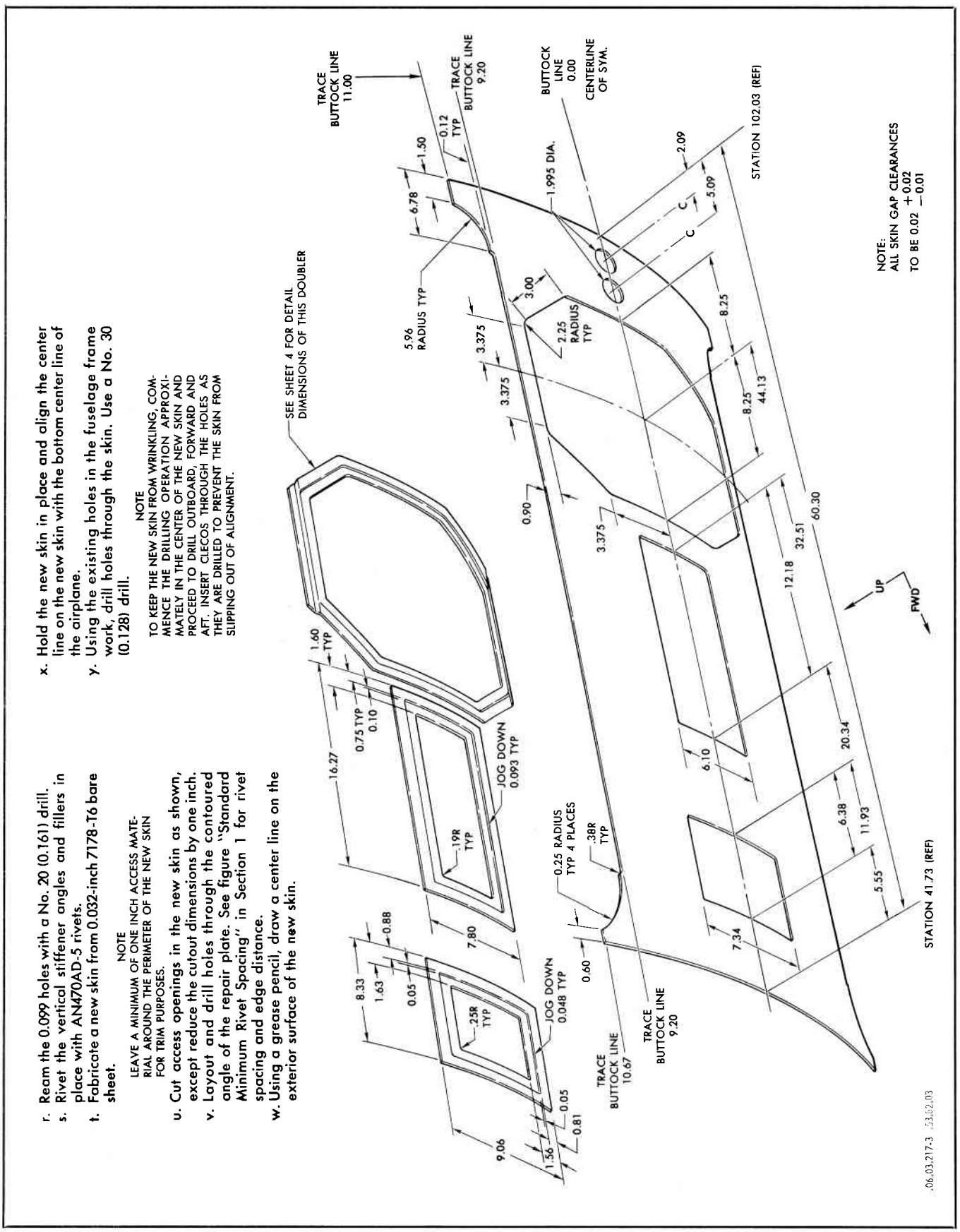
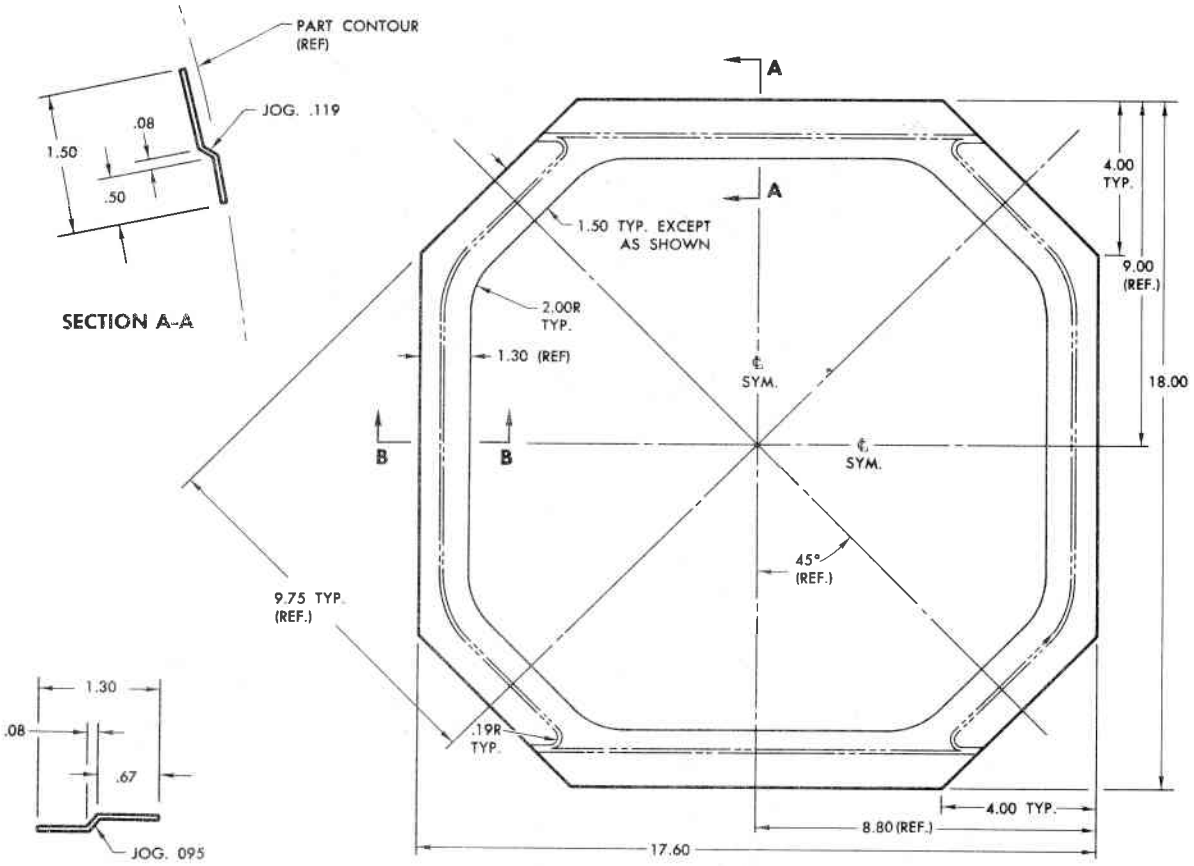


Figure 9-10. Lower Panel Damaged Frame Repair — Fuselage Stations 40.89 to 102.00 (Sheet 3 of 5)



z. Remove the skin and trim the perimeter according to the dimensions shown.
aa. All holes in the skin must be dimpled. See figure "Flush Rivet Installation" in Section 1 for dimpling information.
ab. Reinstall the skin and secure in place with AN426-AD-4 rivets.

NOTE
DO NOT INSTALL RIVETS THROUGH SKIN AND REPAIR PLATE UNTIL STEPS AC. AND AD. HAVE BEEN COMPLETED.

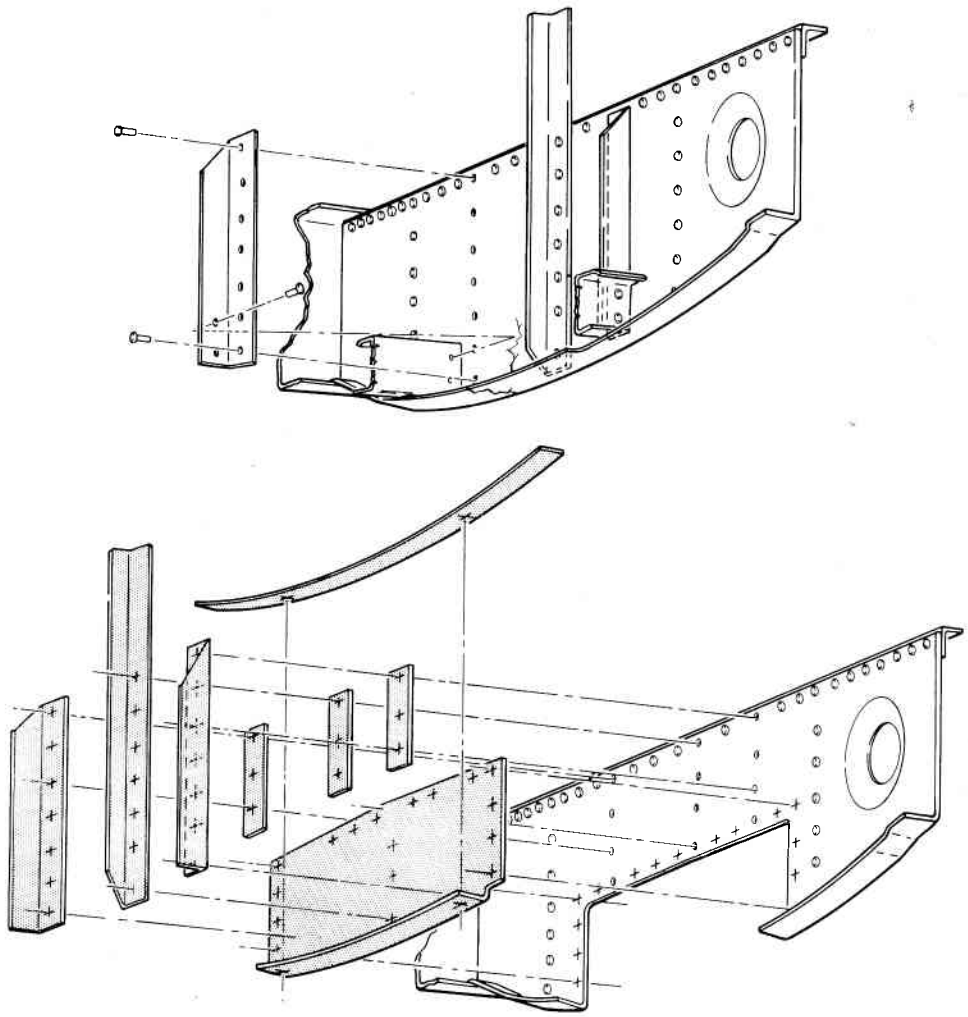
ac. Fabricate a splice from 0.040 7178-T6 bare sheet to the dimensions shown to splice the repair plate to the original frame.
ad. Place the splice on the inner surface of the repair plate flange and using the existing holes in the skin, repair plate and original frame as a guide, drill holes through the splice. Use a No. 20 (0.161) drill.
ae. Rivet the spliced area with AN426AD-5 rivets.
af. Trim the access openings to the dimensions shown.
ag. Fabricate doublers from 0.032 7178-T6 bare sheet to the dimensions shown in detail D.
ah. Layout and drill a double row of pilot holes around the access openings of the new skin. See figure "Standard Minimum Rivet Spacing" in Section 1. Use a No. 39 (0.099) drill.
ai. Clamp the doublers to the inner surface of the skin and using the predrilled holes in the skin as a guide, drill holes through the skin and doublers. Use a No. 30 (0.128) drill.
aj. Remove the doublers and dimple the skin and doublers for flush type rivets.
ak. Reinstall the doublers and secure in place with AN426AD-4 rivets.
al. Fabricate new doors for the access openings. The forward door is made from 0.080 7178-T6 bare sheet. The middle door is made from 0.125 7178-T6 bare sheet and the aft door is made from pre-impregnated fiberglas cloth.

NOTE
THE AFT FIBERGLASS DOOR CANNOT BE FABRICATED WITHOUT THE AID OF SPECIAL HEAT AND PRESSURE EQUIPMENT, THEREFORE, REPLACEMENT OF THIS COMPONENT SHOULD BE CONSIDERED.

am. Layout and drill pilot holes in the new access doors. Determine the spacing of the pilot holes from the old doors.
an. Hold the access doors in place and using the pilot holes in the doors as a guide, drill holes through the doublers. Use a No. 39 (0.099) drill.
ao. Remove the doors and ream the holes in the doublers with a No. 10 (0.1935) drill.

.06.03.217-4 .53.02.03

Figure 9-10. Lower Panel Damaged Frame Repair — Fuselage Stations 40.89 to 102.00 (Sheet 4 of 5)



FINAL ASSEMBLY SEQUENCE VIEW

ap. Install gang channels and nut plates on the inner surface of the doublers as required. Refer to the old doublers for types of gang channels and nut plates to be used and their method of attachment.

aq. Ream the holes in the access doors with a No. 10 (0.1935) drill. Machine countersink 100° all holes in the access doors on the exterior surface.

ar. Install the forward and middle doors with AN509-10R10 screws. Install the aft door with AN509-10R18 screws.

as. Fill the gaps between the access doors and the skin with aerodynamic smoothing compound, EC1293.

at. Finish the exterior surface of the repair area according to Primer and Paint Coating Procedures in Section I.

CAUTION

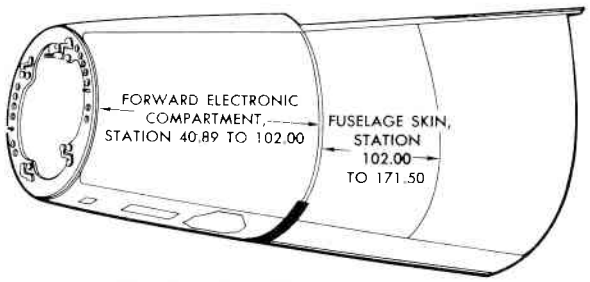
REFER TO PAINTING PRECAUTIONS IN AREA OF CANOPY PLEXIGLASS WINDOW IN SECTION I PRIOR TO TOUCHUP PAINTING.

au. Reinstall the electronic equipment which was removed in step C. Refer to T.O. 1F-106A-2-27-2 for installation procedure.

av. Remove the 8-96013 (1730-522-2745) door lock assemblies, and close and lock the forward electronic equipment doors.

06.03.217-5A

Figure 9-10. Lower Panel Damaged Frame Repair — Fuselage Stations 40.89 to 102.00 (Sheet 5 of 5)



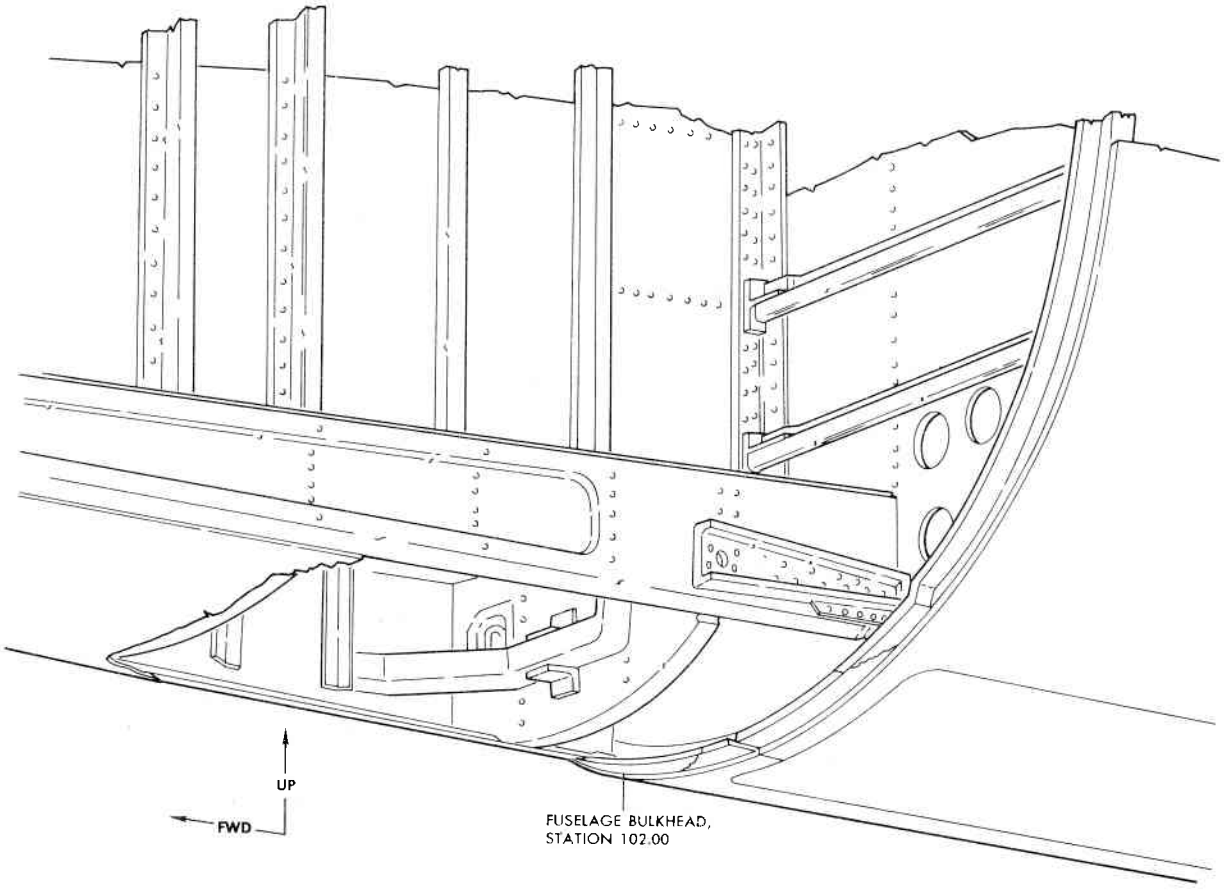
AREA OF ASSUMED DAMAGE
FUSELAGE STATION 102.00

DAMAGE REMOVAL PROCEDURE

a. Support airplane in support fixtures to allow access to damaged area. See figure Airplane Handling Equipment in Section I.
b. Open forward electronic compartment doors and install an 8-96013 (1730-522-2745) lock assembly in each door. Refer to T.O. 1F-106A-2-2-2-2 for lock assembly installation procedure.
c. Remove all electronic equipment from the opened compartment. Refer to T.O. 1F-106A-2-27-2 for electronic equipment removal procedure.
d. Remove damaged nose landing gear. Refer to T.O. 1F-106A-2-8-2-1 for nose landing gear removal procedure.

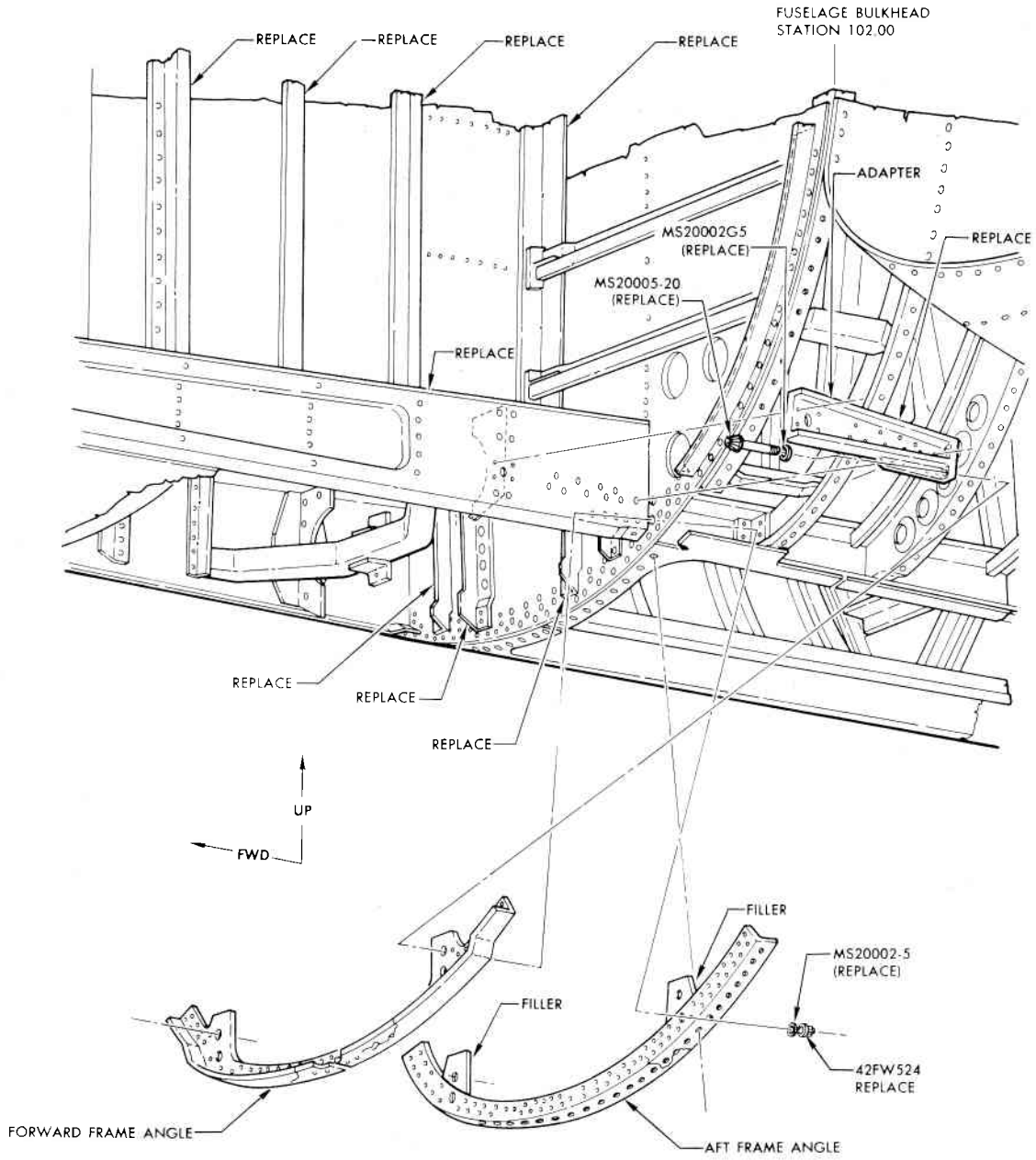
NOTE

SEE FIGURE 9-10 FOR REPAIR OF FUSELAGE FRAMES FORWARD OF STATION 102.00. SEE FIGURE 9-12 FOR REPAIR OF FUSELAGE FRAMES AFT OF STATION 102.00.



06.03.218-1B

Figure 9-11. Bulkhead Repair — Fuselage Station 102.00 (Sheet 1 of 4)



REMOVAL OF DAMAGED FUSELAGE FRAMEWORK

e. Remove electrical equipment from nose wheel well. Refer to T.O. 1F-106A-2-10-2-1 for electrical equipment removal procedure.

f. Remove paint finish from exterior surface of airplane to completely expose damaged area. Refer to T. O. 1F-106A-2-2-2-2 for approved airframe cleaning materials and procedures.

g. Remove outer skin from lower panel between stations 40.89 and 102.00. Refer to Table 1-IXLIV for drill sizes and hole diameter limits.

NOTE

REPAIR PROCEDURES FOR LOWER PANEL BETWEEN STATION 40.89 AND 102.00 ARE SHOWN ON FIGURE 9-10.

h. Remove a sufficient number of rivets from left- and right-hand skin panels between stations 102.00 and 171.50 to allow removal of damaged portion of the skins and to allow access to the internal structure.

NOTE

THE COMPONENTS MARKED "REPLACE" SHOULD BE REMOVED AND REPLACED BY NEW PARTS IF THEY HAVE BEEN DAMAGED BEYOND THE ALLOWABLE NEGLIGIBLE DAMAGE LIMITS GIVEN IN TABLE 4-1.

i. Remove a sufficient number of rivets from fuselage bulkhead frame to allow removal of damaged portion of frame.

06.03.218.2B

Figure 9-11. Bulkhead Repair — Fuselage Station 102.00 (Sheet 2 of 4)

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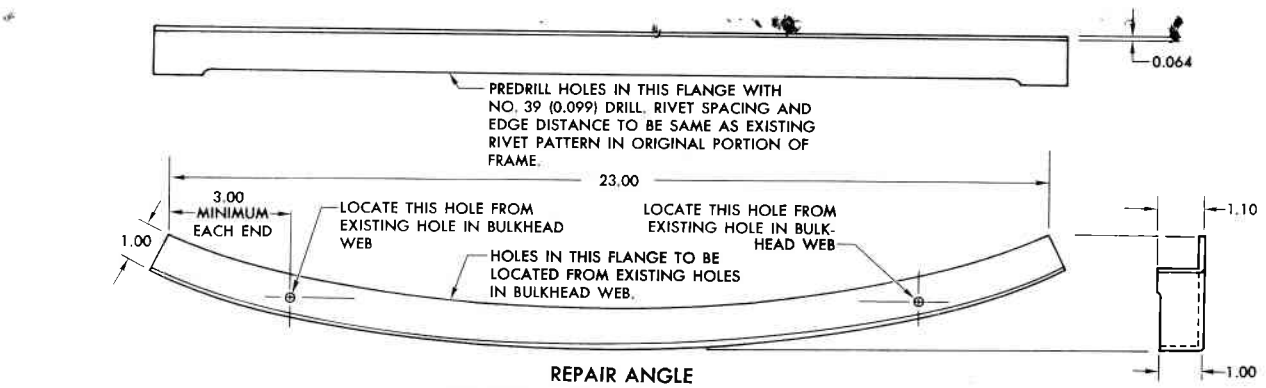
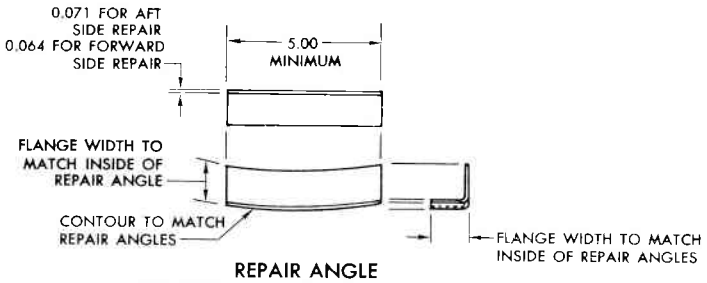
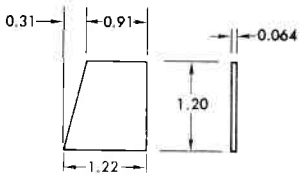


REPAIR ANGLE
FOR FORWARD SIDE OF BULKHEAD



REPAIR ANGLE
FOR FORWARD SIDE OF BULKHEAD



FILLER

i. If necessary, remove fillers from between vertical angles and bulkhead web.

k. Thoroughly remove all sealant material from repair area. Use aliphatic naphtha, Federal Specification TT-N-95A and a clean, lint-free cloth to remove sealant material.

FABRICATION OF REPAIR PARTS

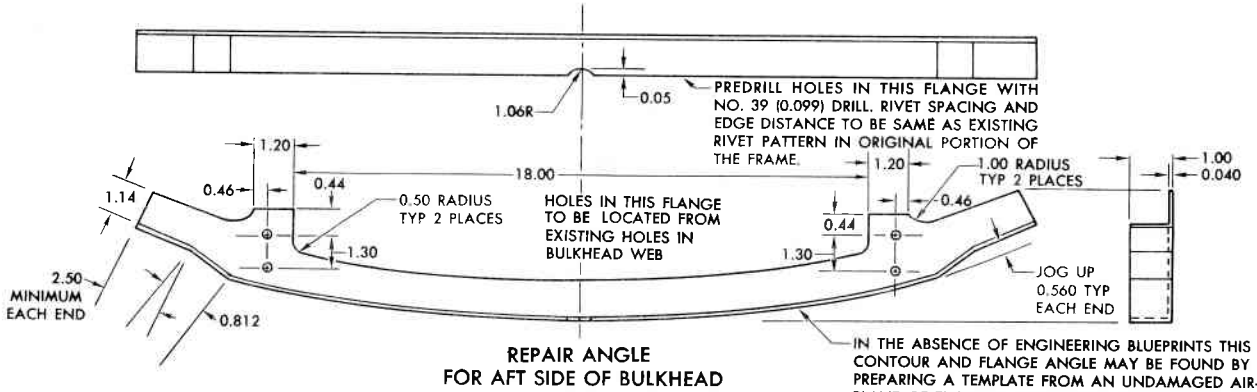
a. Fabricate a repair angle for the forward side of the bulkhead from 7178-O aluminum alloy. Heat treat to the -T6 condition per specification MIL-H-6088 after forming. Use dimensions shown on sheet 3 to form this part.

b. Fabricate a repair angle for the aft side of the bulkhead from either 7178-O or from extruded aluminum alloy No. E121209. If part is made from 7178-O, it must be heat treated to the -T6 condition per specification MIL-H-6088 after forming. Use dimensions shown on sheet 3 to form this part.

c. Fabricate skin patches as necessary from 0.040 gage, 7178-T6 aluminum alloy.

NOTE
ALL HOLES IN SKIN PATCHES MUST BE MACHINE COUNTERSUNK.

d. Apply a protective coating to all repair parts after forming. See figure "Primer and Paint Coatings" in Section 1.



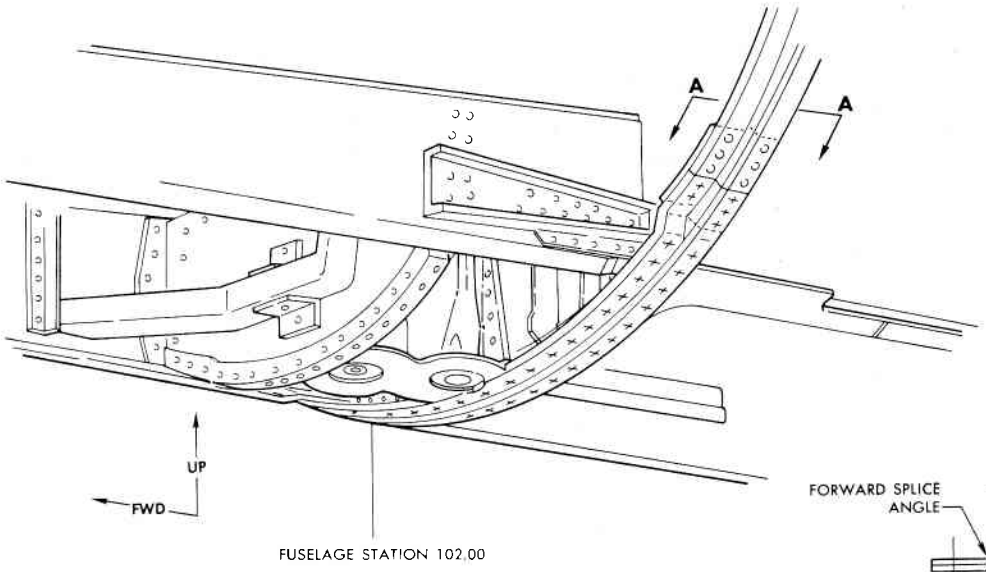
REPAIR ANGLE
FOR AFT SIDE OF BULKHEAD

IN THE ABSENCE OF ENGINEERING BLUEPRINTS THIS CONTOUR AND FLANGE ANGLE MAY BE FOUND BY PREPARING A TEMPLATE FROM AN UNDAMAGED AIRPLANE OF THE SAME MODEL AND SERIES.

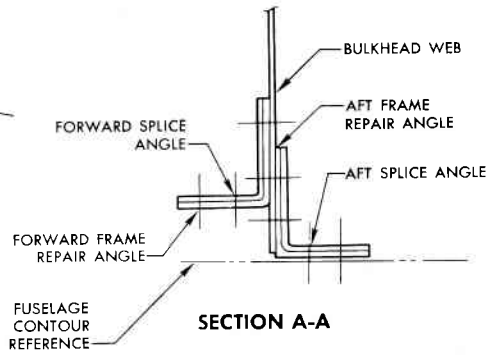
NOTE
SEE FIGURE "FLAT PATTERN LAYOUT" IN SECTION 1 FOR FLAT PATTERN LAYOUT INFORMATION, AND REFER TO TABLE "STANDARD BEND RADII FOR FLAT SHEET" IN SECTION 1 FOR BEND RADII INFORMATION.

.06.03.218-3 .53.04.03

Figure 9-11. Bulkhead Repair — Fuselage Station 102.00 (Sheet 3 of 4)



INSTALLATION VIEW



SECTION A-A

REPAIR INSTALLATION PROCEDURE

a. Install forward bulkhead repair angle and hold in place with clamps.
b. Using existing holes in bulkhead web as a guide, drill holes in repair angle.
c. Install aft bulkhead repair angle and hold in place with clamps.
d. Using holes in bulkhead web and forward repair angle as a guide, drill holes in aft repair angle.
e. Install splice angles on forward side of bulkhead and hold in place with clamps.
f. Using existing holes in bulkhead frame and repair angles as a guide, drill holes through splice angles.
g. Install splice angles on aft side of bulkhead in line with splice angles on forward side of bulkhead, and hold in place with clamps.
h. Using existing holes in bulkhead frame, repair angles and forward splice angles as a guide, drill holes through aft splice angles.
i. Remove all repair parts from bulkhead, then remove all burrs and drill chips.
j. Apply a film of MIL-S-8802 sealant to faying surfaces of repair parts.

k. Reinstall repair parts and hold in place with clecos.
l. Rivet repair angles and splice angles to bulkhead. Use Q4310 rivets.
m. Reinstall left- and right-hand adapters. Use same type and size of fasteners that were used in the original construction.
n. Install skin patches aft of station 102.00 and hold in place with clamps.
o. Using existing holes in fuselage framework as a guide, drill holes through skin patches. Countersink all holes in skin patch exterior surface 100°.

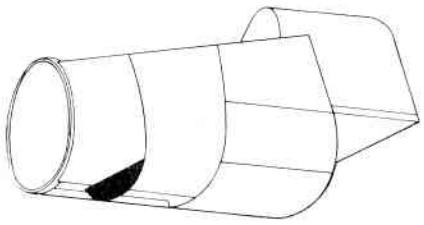
NOTE
HOLES THAT CANNOT BE LOCATED FROM THE INTERNAL STRUCTURE MAY BE DRILLED WITH THE AID OF A HOLE FINDER. SEE HOLE FINDER FIGURE IN SECTION 1.

p. Remove skin patches, then remove all burrs and drill chips.
q. Apply a film of MIL-S-8802 sealant to faying surface of repair angles and skin patches.

r. Reinstall skin patches and rivet in place. Use AN426AD-5 rivets.
s. Reinstall lower skin panel between stations 40.89 and 102.00.
t. Using predrilled holes in forward bulkhead repair angle as a guide, drill holes in lower panel. All holes in lower panel, exterior surface, must be countersunk 100°.
u. Rivet lower skin panel to bulkhead repair angle with AN426AD-4 rivets.
v. Refinish exterior surface of airplane in the damaged area according to procedures outlined on figure Primer and Paint Coatings in Section 1.
w. Reinstall electrical equipment in nose wheel well. Refer to T.O. 1F-106A-2-10-2-1 for electrical equipment installation and checkout procedure.
x. Reinstall nose landing gear. Refer to T.O. 1F-106A-2-8-2-1 for nose landing gear installation operational checkout procedures.
y. Reinstall electronic equipment in forward electronic compartment. Refer to T.O. 1F-106A-2-27-2 for electronic equipment installation and checkout procedure.
z. Remove the 8-96013 (1730-522-2745) door lock assemblies from left and right hand forward electronic compartment doors.
aa. Close and lock forward electronic compartment doors. Refer to T.O. 1F-106A-2-2-2-2 for door closing and locking procedure.

06.03.21.8-4A

Figure 9-11. Bulkhead Repair — Fuselage Station 102.00 (Sheet 4 of 4)



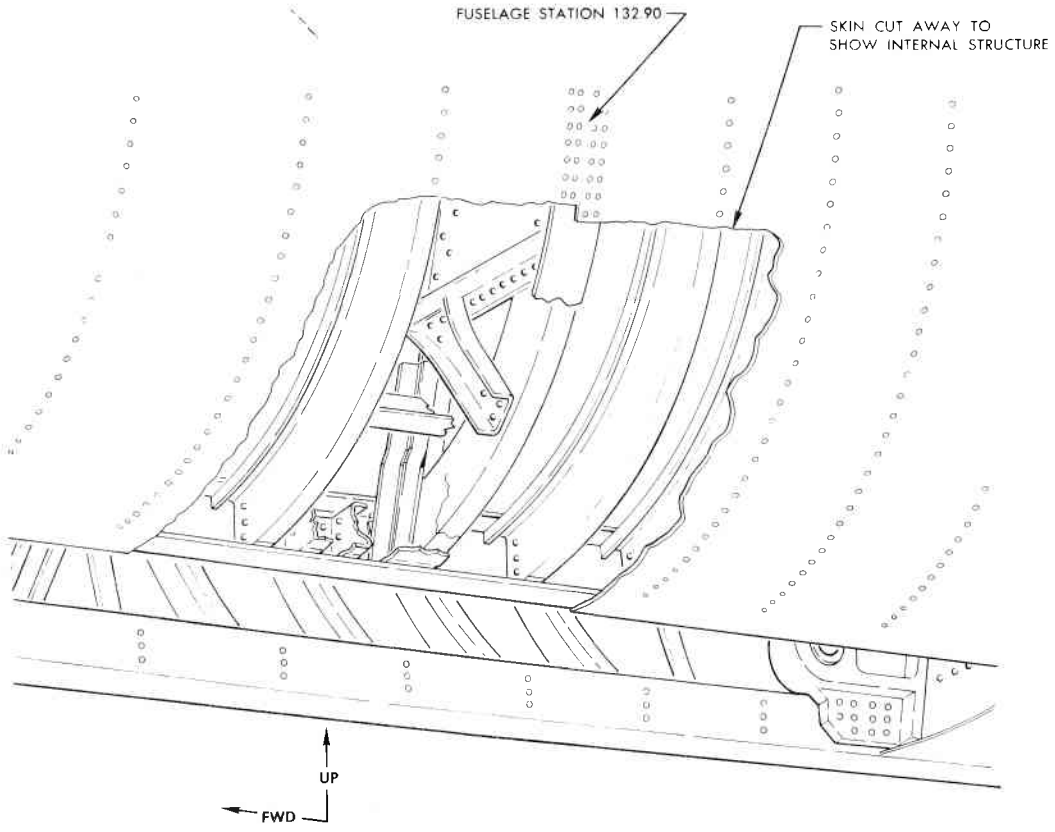
AREA OF ASSUMED DAMAGE

FRAME REPAIR PROCEDURE

a. Place airplane on support fixtures to allow access to damaged area. See figure "Airplane Handling Equipment" in Section 1.
b. Remove nose landing gear and nose landing gear door. Refer to T.O. 1F-106A-2-8-2-1 for removal procedure.
c. Remove electrical equipment from nose wheel well. Refer to T.O. 1F-106A-2-10-2-1 for removal procedure.
d. Using a No. 30 (0.128) drill, remove a sufficient number of rivets from the outer skin to allow removal of the damaged frame.

NOTE
A DRILL STOP SHOULD BE USED WHEN REMOVING RIVETS FROM THE OUTER SKIN TO PREVENT DAMAGE TO UNDERLYING STRUCTURE.

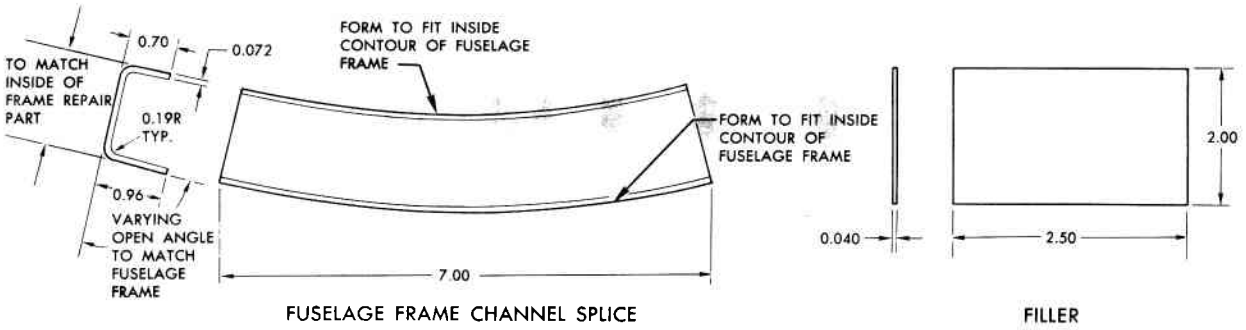
e. Using a No. 10 (0.1935) drill, remove rivets that attach clip to longeron.
f. Using a No. 10 (0.1935) drill, remove rivets that attach clip to frame and vertical stiffener channels.



VIEW LOOKING INBOARD
LEFT-HAND SIDE

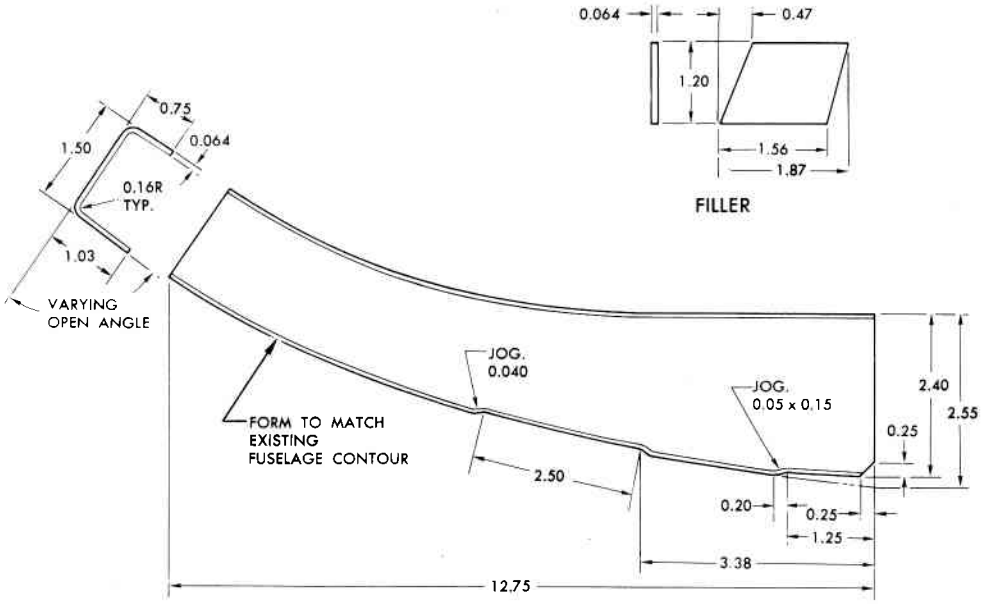
.06.03.219-1 .53.04.03

Figure 9-12. Fuselage Frame Repair—Fuselage Station 132.90 (Sheet 1 of 4)



FUSELAGE FRAME CHANNEL SPLICE

FILLER



FILLER

FUSELAGE FRAME REPAIR PART

g. Using a No. 20 (0.161) drill, remove rivets that attach the diagonal stiffener channel to the frame. See figure "Modified Hi-Speed Drill for Titanium" in Section 1 for type of drill to be used when removing steel rivets.

h. Using a No. 30 (0.128) drill, remove rivets that attach the diagonal stiffener channel to the vertical stiffener channel. See figure "Modified Hi-Speed Drill for Titanium" in Section 1 for type of drill to be used when removing steel rivets.

i. Using a No. 10 (0.1935) drill, remove rivets which attach the vertical splice channel to the vertical stiffener channel.

NOTE

REMOVE ALL OLD SEALANT FROM AROUND DAMAGED AREA. USE ALIPHATIC NAPHTHA, FEDERAL SPECIFICATION TT-N-95A TO REMOVE SEALANTS.

j. Remove diagonal stiffener and vertical splice channels.

k. Cutout damaged portion of fuselage frame.

CAUTION

PLACE A PIECE OF SCRAP METAL BETWEEN FAYING SURFACES OF FRAME AND OUTER SKIN TO PREVENT DAMAGE TO THE SKIN WHILE CUTTING OUT DAMAGED PORTION OF FUSELAGE FRAME.

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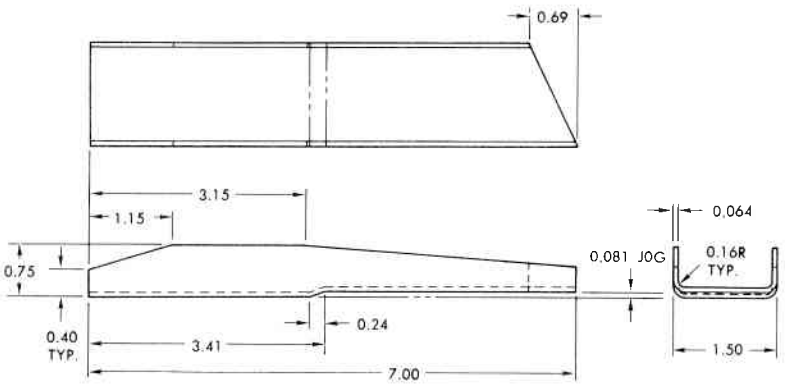
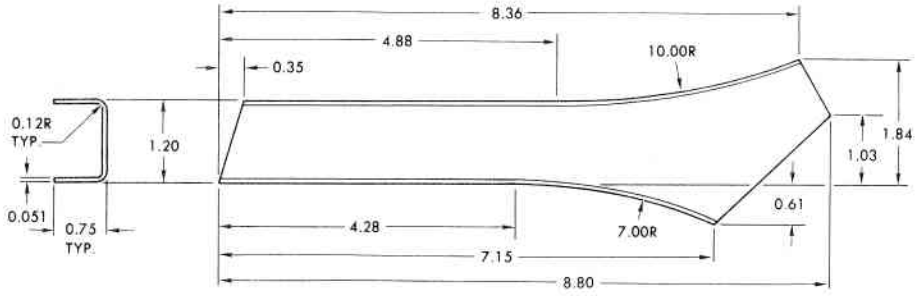
Figure 9-12. Fuselage Frame Repair — Fuselage Station 132.90 (Sheet 2 of 4)



VERTICAL SPLICE CHANNEL



DIAGONAL STIFFENER CHANNEL

i. Fabricate repair parts from 7178-0 bare sheet according to dimensions shown on sheets 2 and 3.

m. After forming, heat treat repair parts to -T6 condition per Specification MIL-H-6088.

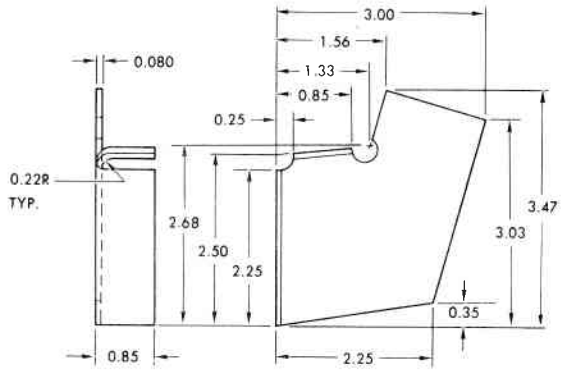
NOTE

APPLY A FILM OF MIL-S-8802 SEALANT TO FAYING SURFACES OF REPAIR PARTS PRIOR TO INSTALLATION.

n. Using existing holes in the outer skin, drill holes through new repair part. Use a No. 30 (0.128) drill.

NOTE

IF HOLES IN THE OUTER SKIN HAVE BEEN OVERSIZED DURING THE DRILLING OPERATIONS, IT IS PERMISSIBLE TO ENLARGE THE HOLE ONE RIVET SIZE.



CLIP

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Figure 9-12. Fuselage Frame Repair — Fuselage Station 132.90 (Sheet 3 of 4)

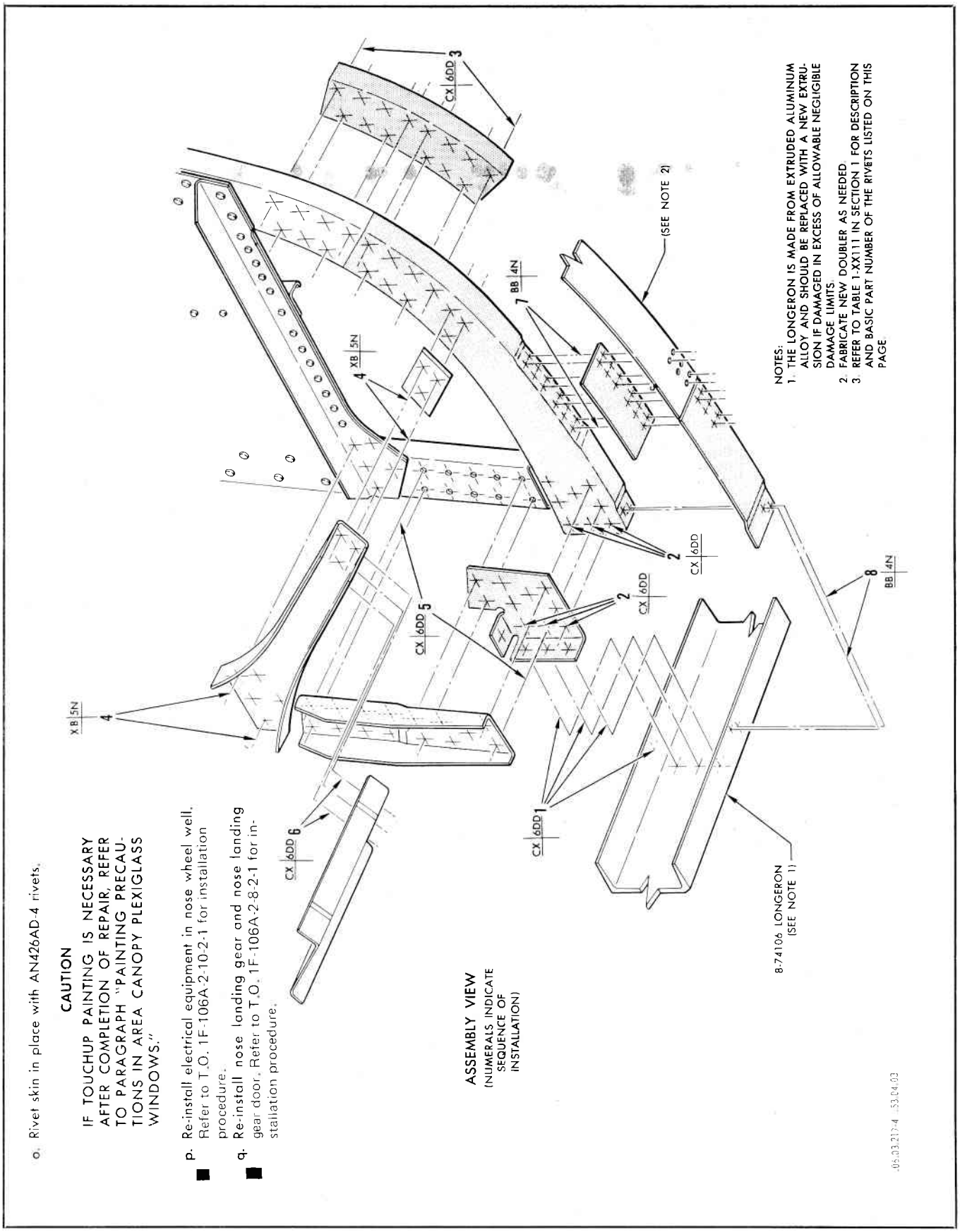
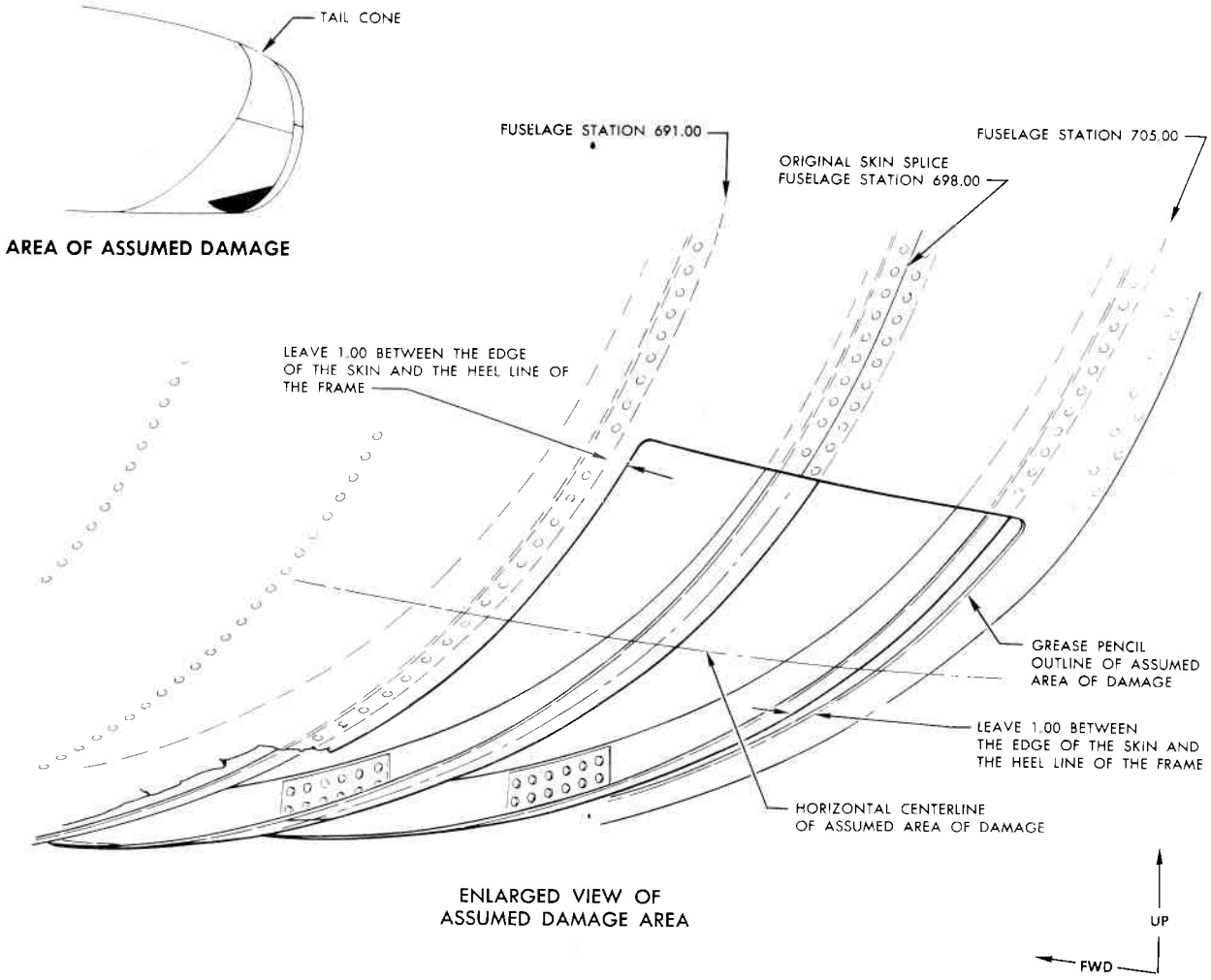


Figure 9-12. Fuselage Frame Repair — Fuselage Station 132.90 (Sheet 4 of 4)



TAIL CONE REMOVAL PROCEDURE

a. Place airplane on support fixtures to allow access to damaged area. See figure "Airplane Handling Equipment" in Section 1.

b. Remove tail cone and place on padded work bench or table. Refer to T.O. 1F-106A-2-4-2-1 for tail cone removal procedure.

DAMAGE REMOVAL PROCEDURE

a. Remove all paint and other foreign material from damaged area of tail cone, so that entire extent of damage may be detected.

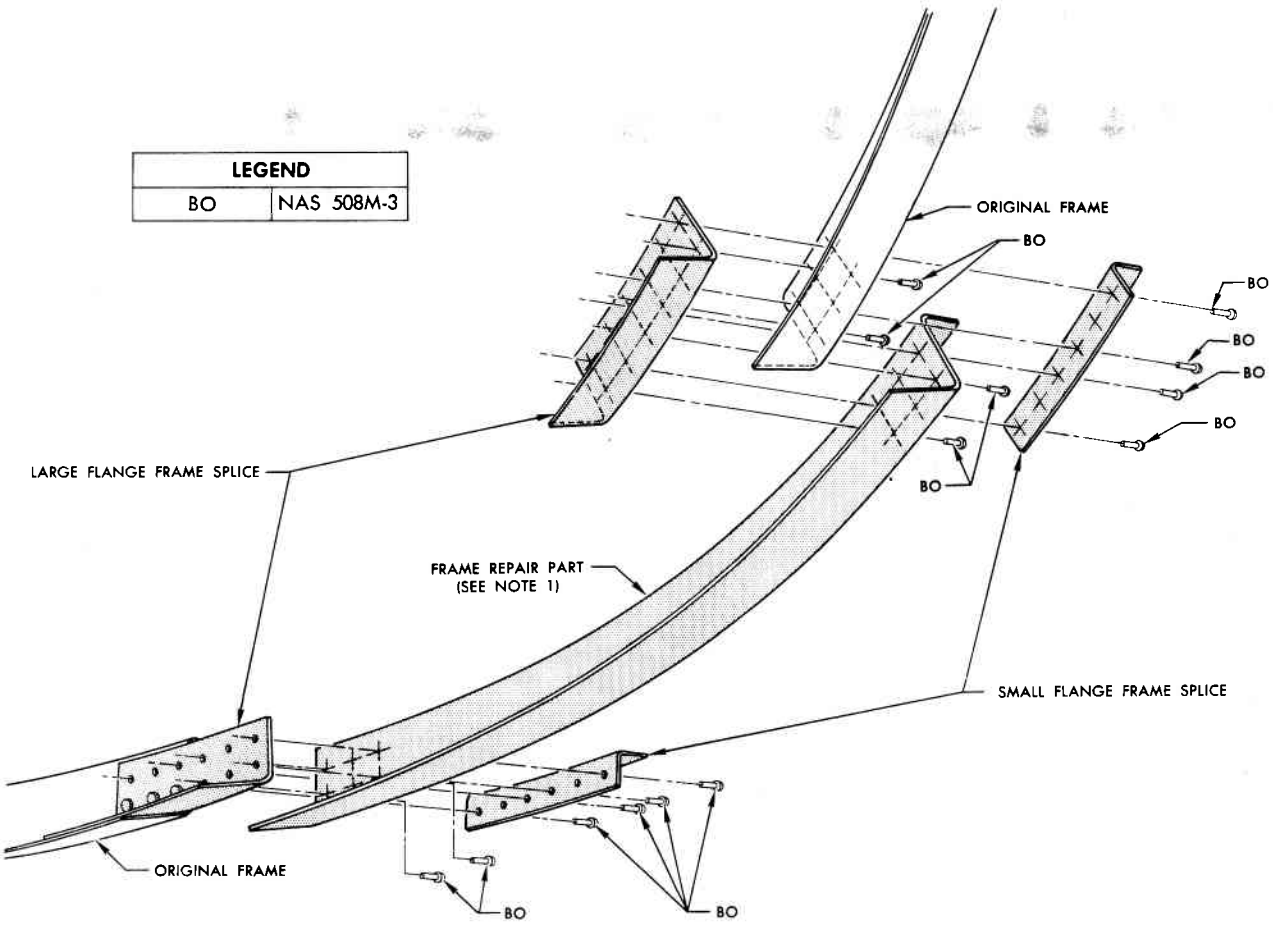
NOTE

EXTREME EDGES OF CRACKS MAY BE DETECTED WITH PENETRANTS. REFER TO PARAGRAPH "FLUORESCNET PENETRANT INSPECTION" IN SECTION 1 FOR THE DIFFERENT TYPES OF FLUORESCENT PENETRANT INSPECTION.

b. Using a straight edge and a grease pencil with "Listo Lead," outline damaged area of tail cone.

06.03.220-1 53.15.03

Figure 9-13. Damaged Tail Cone Repair (Sheet 1 of 4)



c. Using a No. 30 (0.128) drill, remove rivets from aluminum portion of tail cone skin that is within the outlined area.
d. Using a No. 39 (0.99) drill, remove rivets from titanium portion of tail cone skin that is within the outlined area.
e. Following the lines laid out in step B, cut away damaged portion of tail cone skin and frame. Metal cutting hand shears and hand files are most effective for cutting away damaged parts in the tail cone.
f. Using a No. 39 (0.099 drill, remove at least six rivets from tail cone frame and stiffener angles at each end of tail cone frame.
g. Cut away that portion of the tail cone frame stiffener angles from which rivets were removed in step F.

NOTE:
1. DIMENSIONS AND FLANGE ANGLE FOR FRAME REPAIR PART MAY BE OBTAINED FROM AN UNDAMAGED AIRPLANE OF THE SAME MODEL AND SERIES.
2. APPLY STA-BOND C-875 SEALANT TO FAYING SURFACES OF REPAIR PARTS PRIOR TO INSTALLATION.

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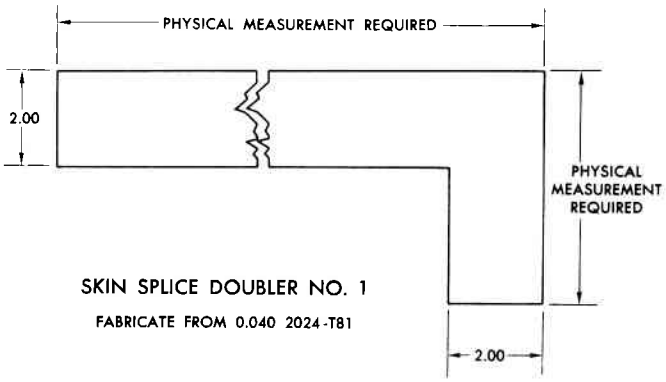
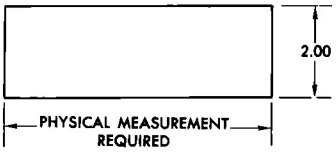
Figure 9-13. Damaged Tail Cone Repair (Sheet 2 of 4)



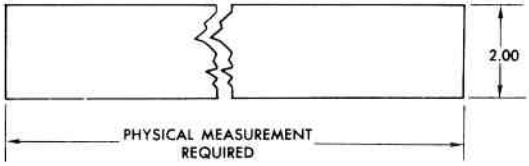
SKIN SPLICE DOUBLER NO. 1

FABRICATE FROM 0.040 2024-T81



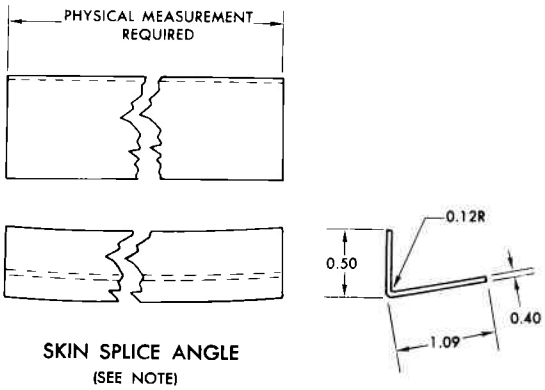
SKIN SPLICE DOUBLER NO. 2

FABRICATE FROM 0.032 AMS 4908 TITANIUM



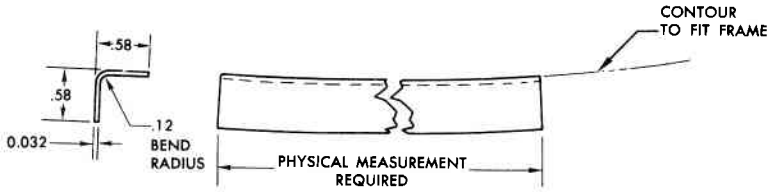
SKIN SPLICE DOUBLER NO. 3

FABRICATE FROM 0.032 AMS 4908 TITANIUM



SKIN SPLICE ANGLE

(SEE NOTE)



TAIL CONE FRAME REPAIR SPLICE

FABRICATION OF DETAIL REPAIR PARTS

a. Fabricate a tail cone frame repair part from AMS4908 titanium alloy to dimensions shown on sheet 3. The linear dimension of the repair part must be determined by a physical measurement.
b. Fabricate tail cone frame stiffener angles from AMS4908 titanium alloy, according to the dimensions shown on sheet 3. The linear dimensions of the stiffener angles must be determined by a physical measurement.
c. Fabricate skin splice doublers according to dimensions shown on sheet 3. The linear dimensions must be determined by a physical measurement.
d. Fabricate skin patches. Skin patch forward of station 698.00 is to be made from 0.032-inch 2024-T81. Skin patch aft of station 698.00 is to be made from 0.025-inch AMS4908 titianium.

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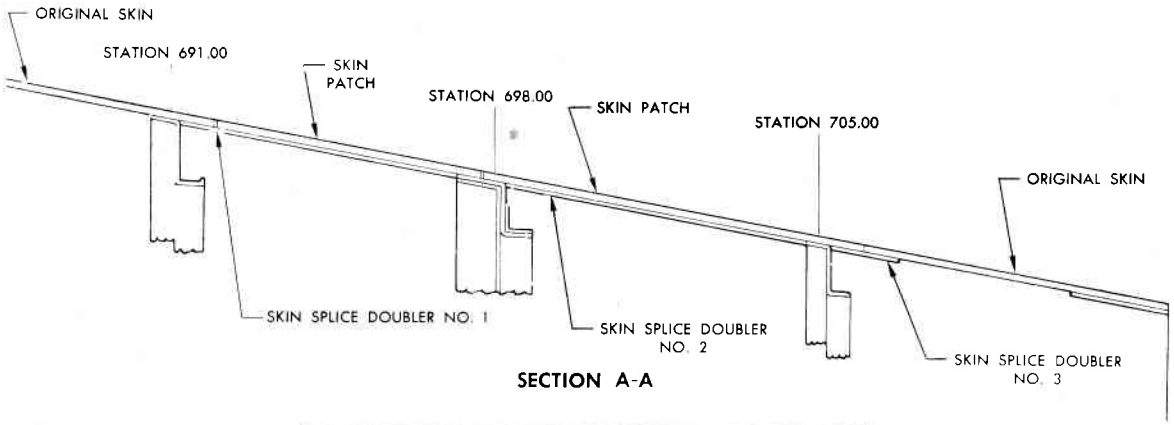
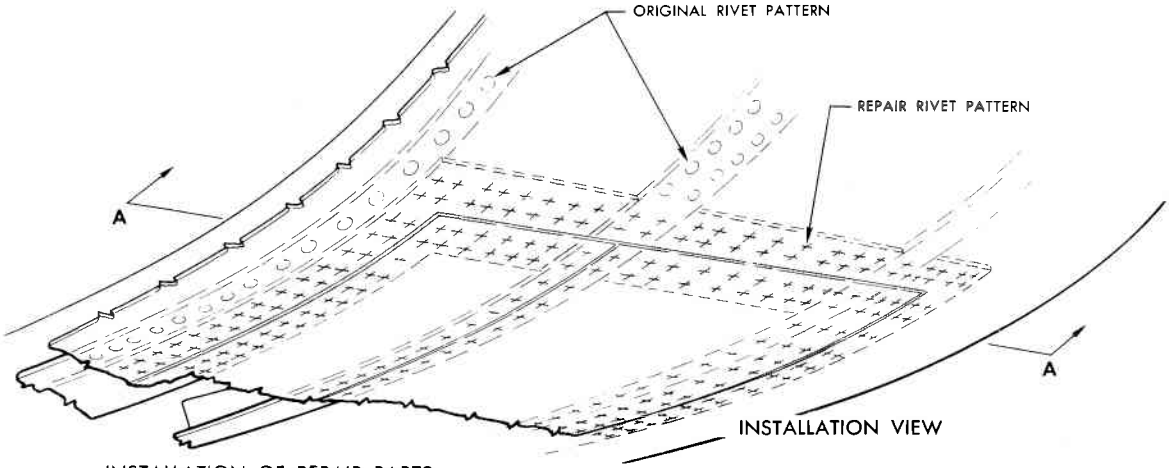
Figure 9-13. Damaged Tail Cone Repair (Sheet 3 of 4)



SECTION A-A

RIVET INSTALLATION CHART	
INTERNAL RIVETS FWD OF STA 698.00	AN470AD-4
INTERNAL RIVETS, STA 698.00 AND AFT	NAS508M-3
EXTERNAL RIVETS FWD OF STA 698.00	AN426AD-4
EXTERNAL RIVETS, STA 698.00 AND AFT	AN427M-3



INSTALLATION VIEW

INSTALLATION OF REPAIR PARTS

a. Attach wide-flanged stiffener angle to tail cone frame repair part as shown on sheet 2.
b. Insert frame repair part into tail cone and hold in place with clamps. Align repair part with original frame before drilling and riveting.
c. Install small-flanged stiffener angle and hold in place with clamps. See sheet 2 for hole size and rivet data.
d. Install skin splice doublers as shown on sheet 4.

NOTE

ALL HOLES FORWARD OF STATION 698.00 IN THE EXTERIOR SURFACE MUST BE MACHINE COUNTERSUNK 100°. ALL HOLES AFT OF STATION 698.00 IN THE EXTERIOR SURFACE MUST BE HEAT DIMPLED. REFER TO PARAGRAPH "FORMING CHARACTERISTICS OF TITANIUM" IN SECTION 1.

e. Install skin patches as shown on sheet 4.

NOTE

APPLY STA-BOND C-875 TO FAYING SURFACES OF TAIL CONE SKIN AND INTERNAL STRUCTURE PRIOR TO RIVETING.

f. Finish exterior surface of tail cone according to procedures outlined on figure "Primer and Paint Coatings" in Section 1.

TAIL CONE INSTALLATION PROCEDURE

■ a. Refer to T.O. 1F-106A-2-4-2-1 for installation procedure.

Figure 9-13. Damaged Tail Cone Repair (Sheet 4 of 4)

Section X

TYPICAL REPAIRS AND APPLICATION

10-1. TYPICAL REPAIRS.

10-2. This section covers repairs that are applicable to more than one specific component or section of the airplane structure. By application of the repair principles established in Section I, it is possible to design repairs for a large portion of the structure components of these airplanes. Damage requiring repairs exceeding those illustrated in this manual shall be designed by an authorized aeronautical structures engineer. Application of repairs that are designed by an authorized aeronautical structures engineer is authroized. In some instances, damages to structure will require a combination of two or more of the described repairs. A careful analysis of the damage will indicate which of the typical repairs may be applied.

10-3. APPLICATION OF TYPICAL REPAIRS.

10-4. Milled Skin Areas.

10-5. Conventional skin repairs are applicable to areas of milled skin where skin thickness is uniform and there are no integral ribs.

10-6. Engine Air Inlet Duct Areas.

10-7. Conventional skin repairs may be used in the repair of the engine air intake duct areas, provided damage is investigated carefully. A failure in the riveted areas of the duct could cause loosened rivets or pieces of metal to be drawn into the engine, resulting in more serious damage. Only flush-type repairs may be used on the inside of the duct. See figures 4-18A, 4-18B, 10-1 and 10-4 for typical flush repairs. Drag angle repairs may be accomplished by application of non-flush repairs in accordance with figure 10-4 when approved by an aeronautical structures engineer. In cases when it is impossible to use solid rivets, the following substitutions may be made:

SOLID	BLIND MECHANICAL LOCK
AD rivets	NAS 1399B SERIES
DD rivets	NAS 1739B SERIES
Steel screws and rivets	Blind bolt hi-shear part No. BB351

The above blind fasteners are authorized to fill the empty holes of missing rivets in the intake duct. Proper hole size and length of fasteners is of utmost importance in all blind fastener installations.

a. It is permissible to mechanically remove corrosion pits from air intake ducts. Material removed shall be ground out to form a saucer shaped depression within localized areas of one inch while maintaining three inches between pit area centers. Corrosion pits exceeding 0.025 depth limit shall be repaired as per Section IV, figure 4-18A and 4-18B. Treat and refinish all areas in accordance with T.O. 1-1-1 and T.O. 1-1-2, and this manual as applicable.

10-8. SHEET METAL SKIN AND WEB REPAIRS.

10-9. Tension-Shear Type Repair.

10-10. All skin repairs in this manual are designed to handle combination tension and shear type loads. These repairs are illustrated in principle only, and will require reference to Table 1-X. See figures 10-1 through 10-3 for applicable skin and web repair illustrations.

10-11. SHEET METAL STIFFENER REPAIRS.

10-12. Angle Repair.

10-13. Figure 10-4 shows a typical roll-formed flanged angle splice repair. Instructions for repair are given on the illustration. In all cases the splice angle must be of the same type material as the original flanged angle, but of the next heavier gage.

10-14. Channel Repair.

10-15. Figure 10-5 shows a typical roll-formed channel splice repair and figure 10-6 shows a typical channel rib repair. Refer to the instructions on the illustrations for repair procedures and the material gage to be used. In all cases the channel splice will be of the same material as the original roll-formed channel, but of the next heavier gage.

10-16. Zee Repair.

10-17. Figure 10-7 shows a typical roll-formed flanged zee splice repair. Refer to instructions on the illustration for repair procedures. An alternate repair is given when both flanges of the zee are attached to structure.

10-18. "U" Shape Repair.

10-19. Figure 10-8 shows a typical and an alternate roll-formed flanged channel splice repair. In all cases the splice angles will be fabricated from the same type of material as the original channels, but of the next higher gage.

10-20. EXTRUDED STIFFENER REPAIRS.

10-21. Extrusions and Sheet Metal Equivalents.

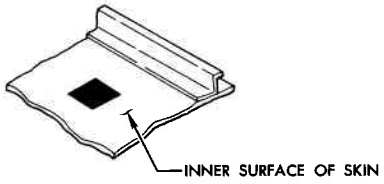
10-22. Extrusions are listed and illustrated in Section VIII. Material substitutes are listed in Table 1-I.

10-23. Extruded Tee Repair.

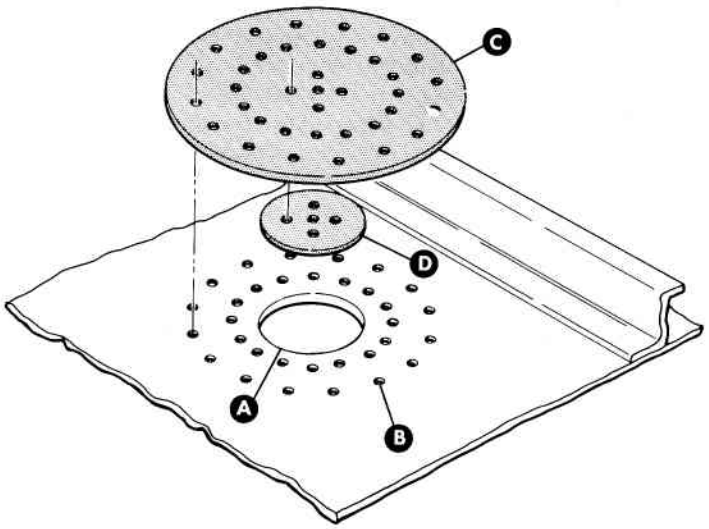
10-24. Figure 10-9 shows a typical extruded tee splice repair. Refer to the instructions on the illustration for repair procedures. In all cases, the splice angles will be of the same type material as the original extruded tee, but of the next heavier gage.

10-25. Extruded "I" Repair.

10-26. Figure 10-10 shows a typical extruded "I" splice repair. Refer to the instructions on the illustration for



AREA OF
ASSUMED DAMAGE



REPAIR
(EXPLODED VIEW)

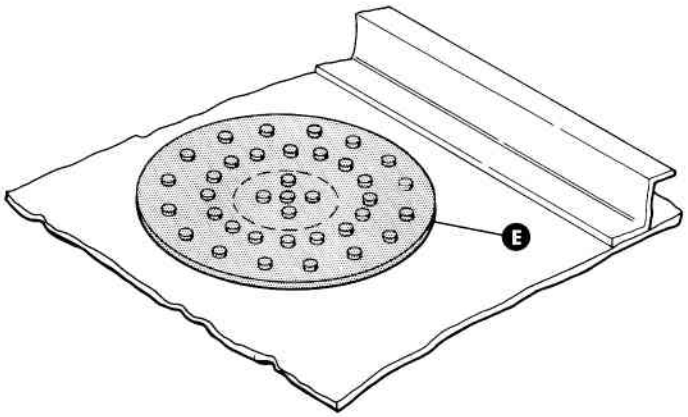
A Clean up damaged area to regular shape. Round all corners and break all sharp edges.

B Refer to illustration titled "Formula and Method for Patch Repair" in Section I for type, size, and number of rivets required. Layout and drill rivet pattern as indicated. Countersink holes 100° far side.

C Fabricate doubler of next heavier gage and same type material as skin.

D Fabricate flush plate of same gage and type material as skin.

E If required, coat patch and doubler with sealer. Refer to applicable section for airplane component being repaired for fuel-tight or pressure sealing requirements. Install as shown.



ASSEMBLED REPAIR

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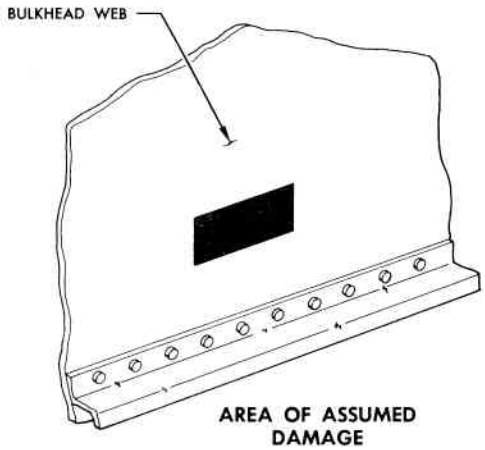
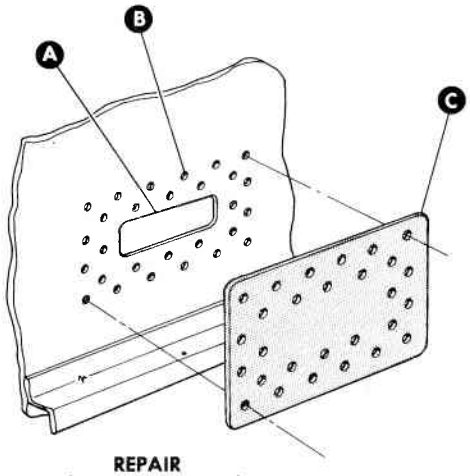
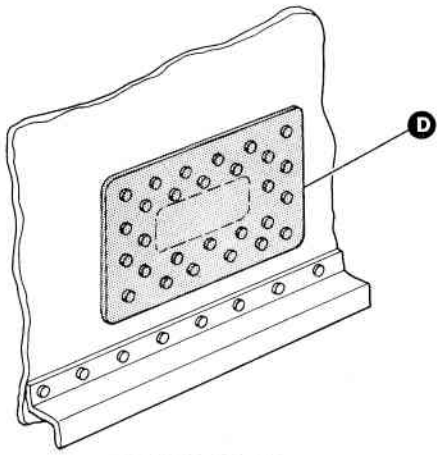
Figure 10-1. Flush Patch — Skin Repair



AREA OF ASSUMED DAMAGE



REPAIR (EXPLODED VIEW)



ASSEMBLED REPAIR

A Clean up damaged area to required shape. Round all corners and break all sharp edges.

B Refer to illustration titled "Formula and Method for Patch Repair" in Section I for type, size, and number of rivets required. Layout and drill rivet pattern as indicated.

C Fabricate doubler of next heavier gage and same type of material as web.

D If required, coat faying surface of doubler with sealer. Refer to applicable section for airplane component being repaired for fuel-tight or pressure sealing requirements. Install as shown.

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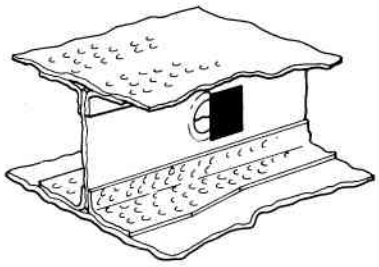
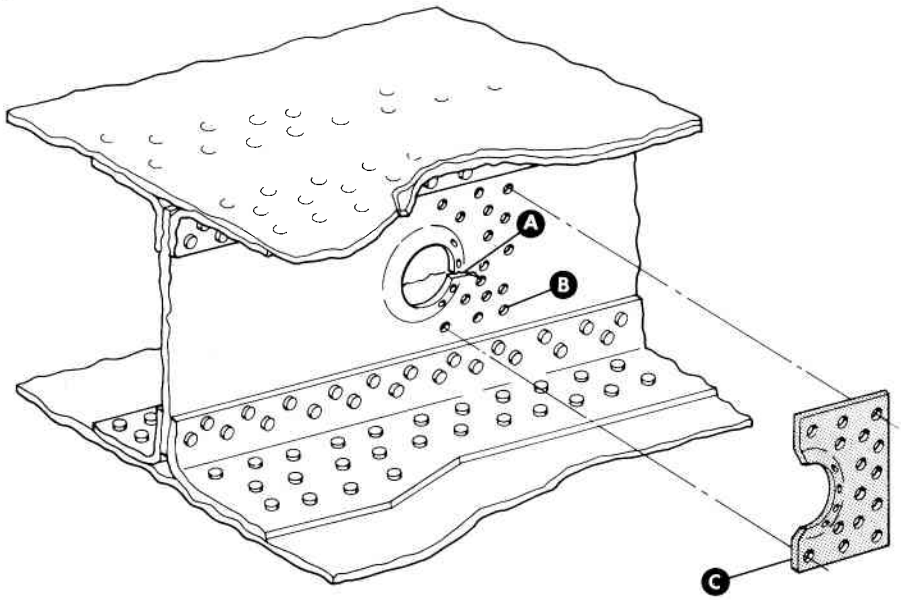
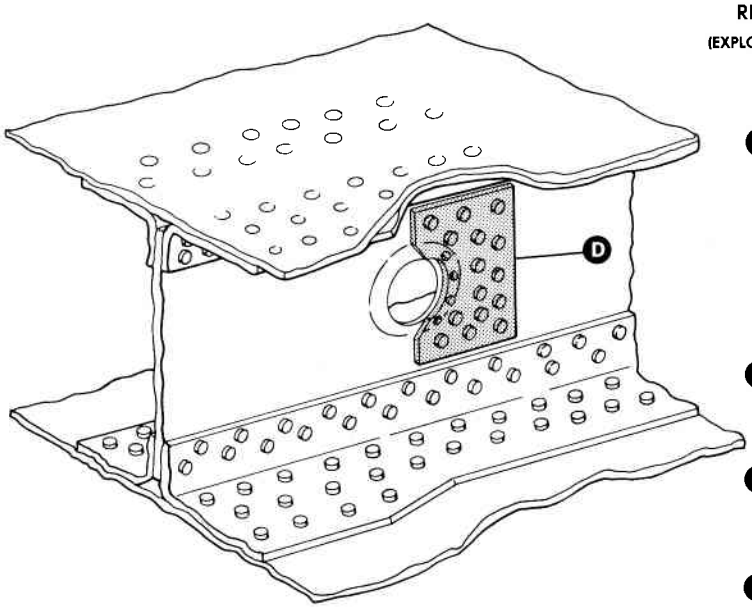
Figure 10-2. Doubler Patch — Bulkhead or Rib Web Repair



AREA OF
ASSUMED DAMAGE



REPAIR
(EXPLODED VIEW)



A Clean up damaged area to required shape. Round all corners and break all sharp edges. Hold 0.12 inch minimum radii.

NOTE
When damaged area exceeds more than 30 degrees of the hole, the repair shall be made with a circular doubler, attached around hole with 2 rows of rivets.

B Refer to illustration titled "Formula and Method for Patch Repair" in Section I for type, size, and number of rivets required. Layout and drill rivet pattern as indicated.

C Fabricate doubler of next heavier gage and same type material as web. Form to fit flange, provided 2 D rivet edge distance can be maintained, otherwise omit flange.

D Install doubler as shown.

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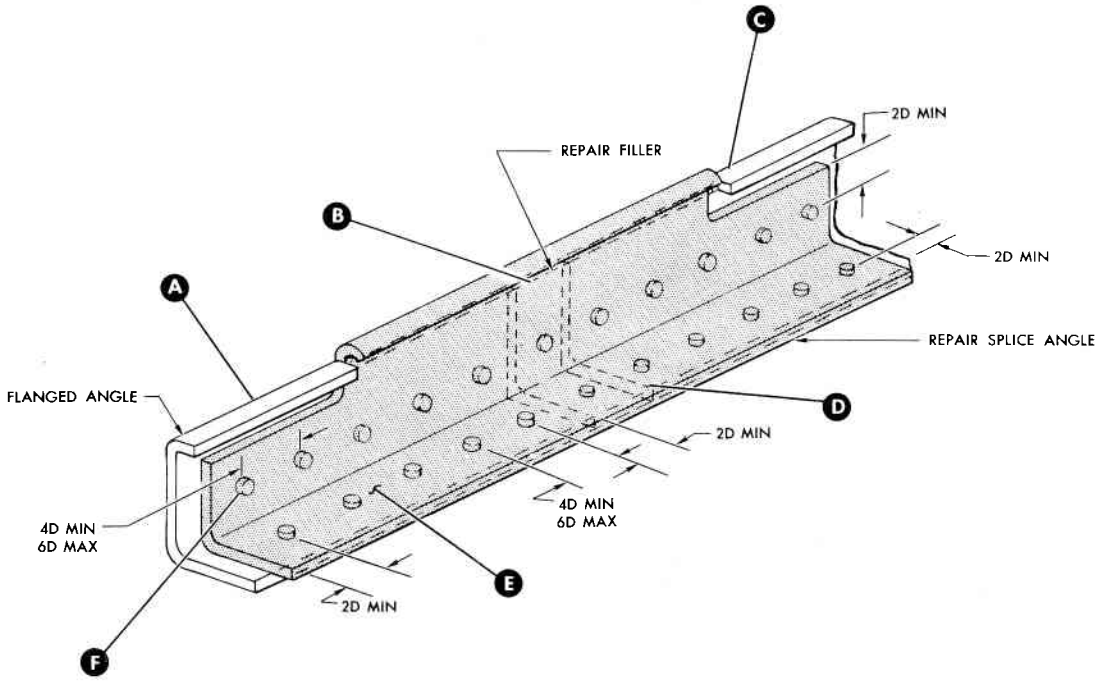
Figure 10-3. Cracked Lightening Hole Flange Repair



Ⓐ Identify flanged angle from standard roll-formed sections shown in Section VIII.

Ⓑ Clean up damaged area to regular shape. Round all corners and break all sharp edges.

Ⓒ Do not trim flange cut-out beyond absolute minimum required to avoid interference.

Ⓓ Fabricate filler of the same type material and gage as the original angle.

Ⓔ Fabricate splice angle of same type material and flange widths as original angle, but of the next heavier gage.

Ⓕ Locate rivet pattern on each side of splice as shown to provide an equal number of rivets on each side of the flange cut-out. Continue rivet pattern across filler as shown. Refer to Section I for method of determining rivet pattern.

Ⓖ Install filler and splice angles.

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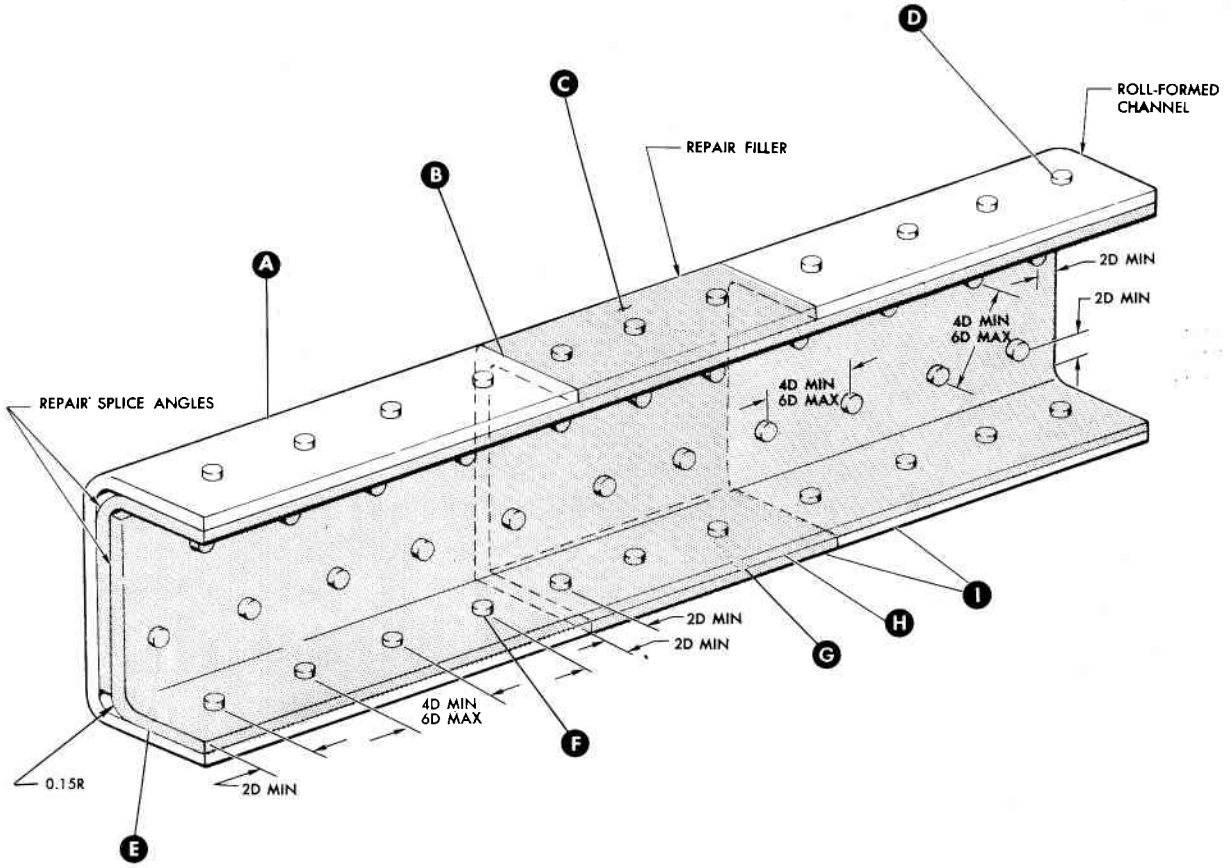
Figure 10-4. Roll-Formed Flanged Angle Splice Repair



A Identify channel from standard roll-formed sections shown in Section VIII.

B Cut out damaged area and smooth rough edges of channel.

C Fabricate filler of the same gage and material as original channel for use at former faying surface of channel and attaching structure. Filler may be omitted if channel is not attached to structure at damaged area.

D Refer to illustration "Formula and Method for Insertion Repair" in Section I for type, size, and number of rivets required. Layout rivet pattern with pencil marks on web and flanges of damaged channel.

E Fabricate splice angles of next heavier gage and same material as damaged channel. Determine length of angles by measuring 2D beyond each end of rivet pattern marked on channel.

F Clamp filler and angles into channel and drill rivet holes through channel, filler, and angles as indicated by pencil marks.

G Remove filler and angles. Clean out metal chips and remove burrs from edges of rivet holes. Refer to illustration "Primer and Paint Coatings" in Section I for applicable requirements and finish repair parts and bare edges of channel accordingly.

H If required, coat faying surfaces of repair parts with sealer. Refer to applicable airplane component section for fuel-tight or pressure sealing requirements. Install as shown:

I Install filler and angles as shown.

NOTES
1. WHEN WIDTH OF CHANNEL WEB EXCEEDS 4 RIVET DIAMETERS BETWEEN FLANGE RADII, THE RIVET PATTERN SHALL BE STAGGERED, BUT MINIMUM OF 2 RIVET DIAMETERS EDGE DISTANCE MUST BE MAINTAINED.
2. USE EQUAL NUMBER OF RIVETS ON EACH SIDE OF SPLICE AND CONTINUE RIVET PATTERN ACROSS FILLER AS SHOWN.

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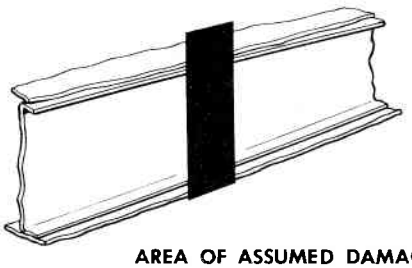
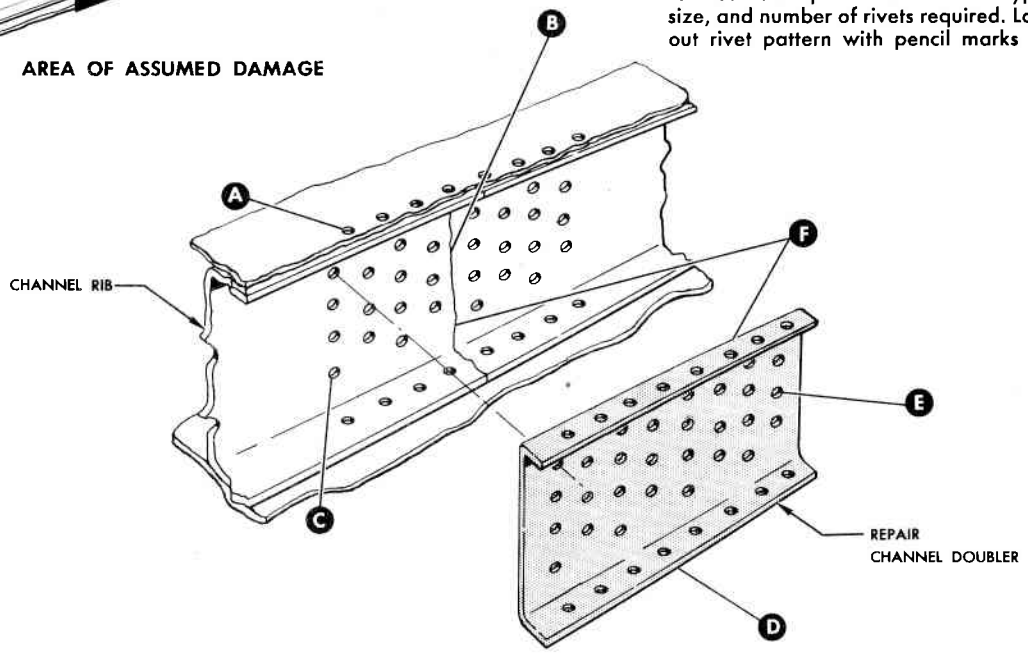
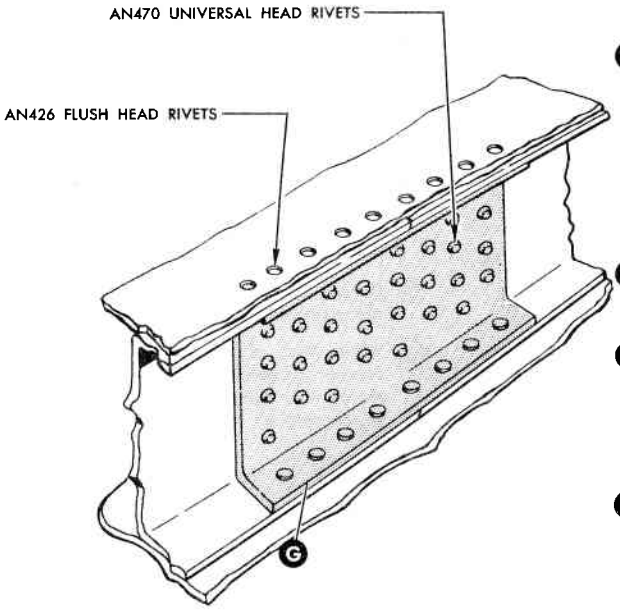
Figure 10-5. Roll-Formed Channel Splice Repair



AREA OF ASSUMED DAMAGE





A Remove existing skin rivets in both flanges.

B Smooth roughness and break sharp corners on edges of crack. Stop drill ends of partial cracks.

C Refer to illustration "Formula and Method for Insertion Repair" in Section I for type, size, and number of rivets required. Layout rivet pattern with pencil marks on web and flanges of the damaged channel.

D Fabricate channel doubler of next heavier gage and same type material as damaged channel. Determine length of doubler by measuring 2D beyond each end of rivet pattern marked on channel. Form channel doubler with material in the "O" or in the annealed condition to bend radii listed in Section I. Heat treat to final hardness after forming.

E Clamp doubler into channel and drill rivet holes through channel and doubler as indicated by pencil marks.

F Remove double, clean out metal chips and remove burrs from edges of rivet holes. Refer to illustration "Primer and Paint Coatings" in Section I for applicable requirements and finish doubler and bare edges of channel accordingly.

G If required, coat faying surface of doubler with sealer. Refer to applicable section for airplane component being repaired and for fuel-tight or pressure sealing requirements. Install as shown.

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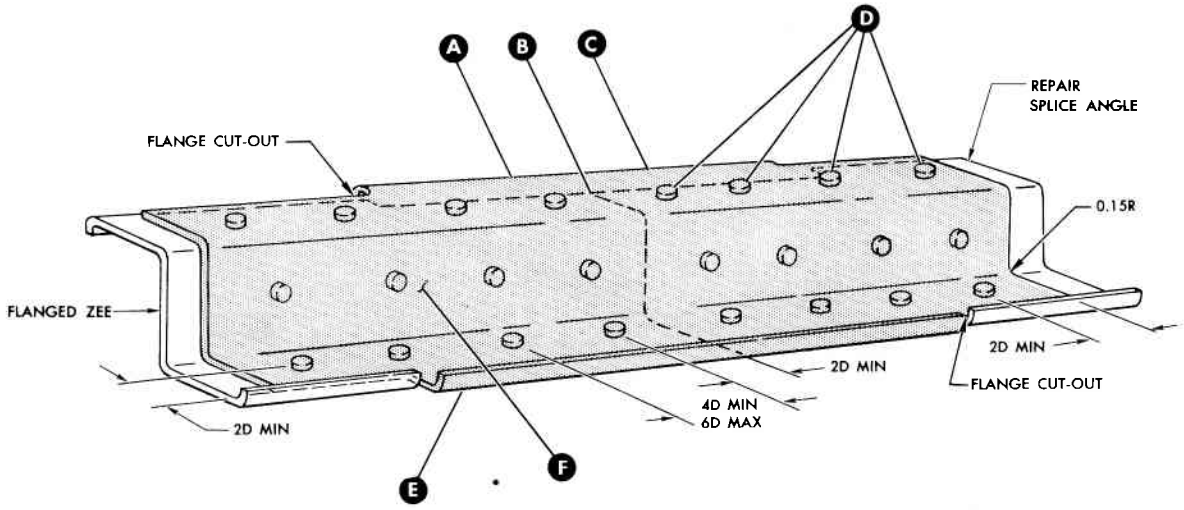
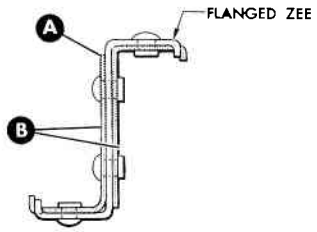
Figure 10-6. Channel Rib Repair





ALTERNATE REPAIR

A When both flanges of zee are attached cut off one flange of each splice angle and make splice repair as shown.

B Fabricate splice angles of same type material as original zee but next heavier gage. Layout rivet pattern as specified for single splice angle repair.

A Identify vertical flanged zee from standard roll-formed sections shown in Section VIII.

B Remove rough edges from butt ends.

C Fabricate splice angle of same type material and flange lengths as original zee, but next heavier gage.

D Locate rivet pattern on each side of the splice to provide an equal number of rivets on each side of the flange cut-out. Refer to Section I for standard minimum rivet spacing and method of determining rivet pattern.

E Do not trim flange cut-out beyond absolute minimum required to avoid interference.

F When web of zee exceeds 4 rivet diameters between flange radii, the rivet pattern shall be staggered, but minimum of 2 rivet diameters edge distance must be maintained.

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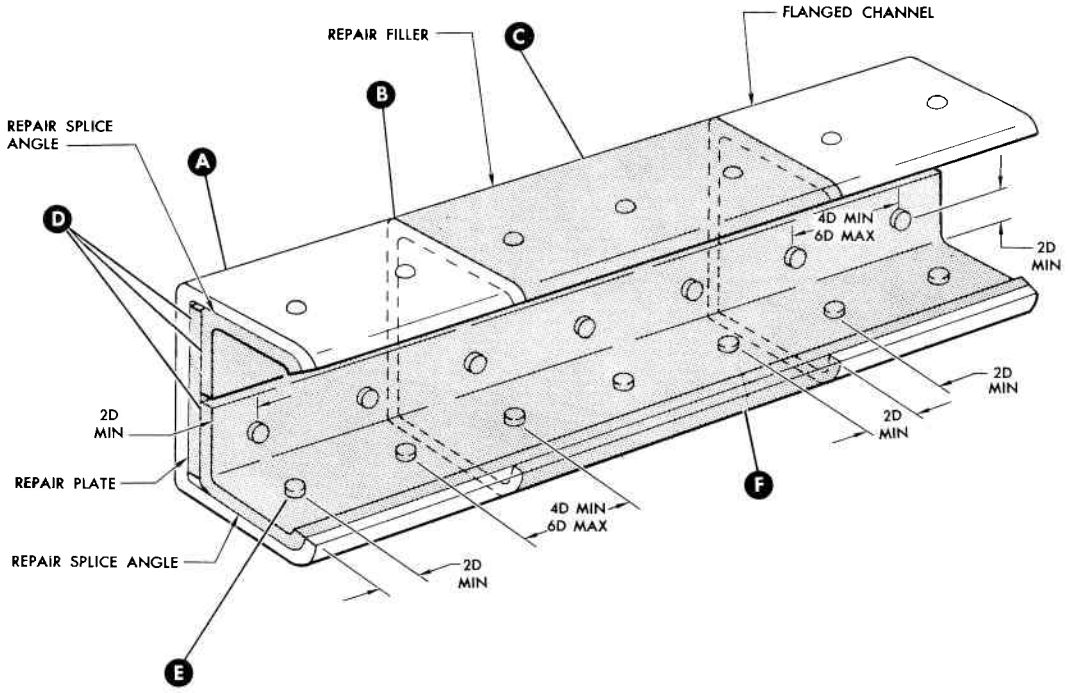
Figure 10-7. Roll-Formed Flanged Zee Splice Repair



A Identify flanged channel, from standard roll-formed sections shown in Section VIII.

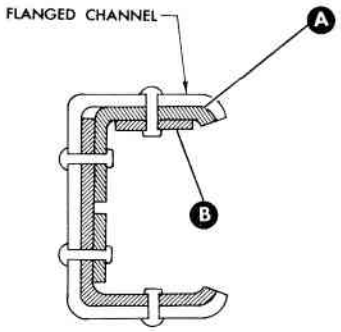
B Remove rough edges from butt ends of channel.

C Fabricate filler of same type material and gage as damaged channel.

D Fabricate splice angles and plate from same type material as original channel but next heavier gage.

E Locate and drill rivet pattern. Refer to Section I for method of determining rivet pattern.

F Install filler angles, and plate as shown.



ALTERNATE REPAIR METHOD.

A Fabricate splice angles from same type material but next heavier gage as original channel.

B Install radius block when necessary to prevent rivets from riding radius.

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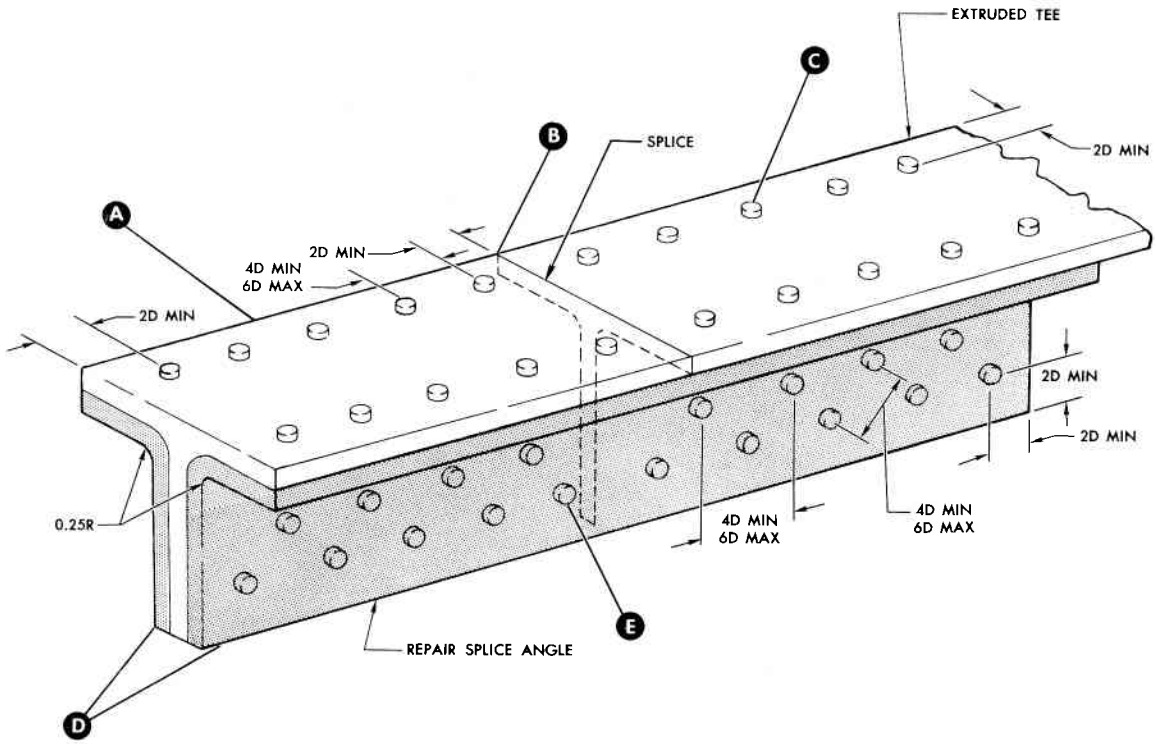
Figure 10-8. Roll-Formed Flanged Channel Splice Repair



(A) Identify extruded tee from extrusions shown in Section VIII.

(B) Remove rough edges from butt ends of tee.

(C) Refer to Section I for standard minimum rivet spacing and formula and method of determining rivet pattern.

(D) Fabricate and install roll-formed splice angles of the same type material as original tee but next heavier gage.

(E) When width of vertical leg of tee exceeds 4 rivet diameters, the rivet pattern shall be staggered, but minimum of 2 rivet diameters edge distance must be maintained.

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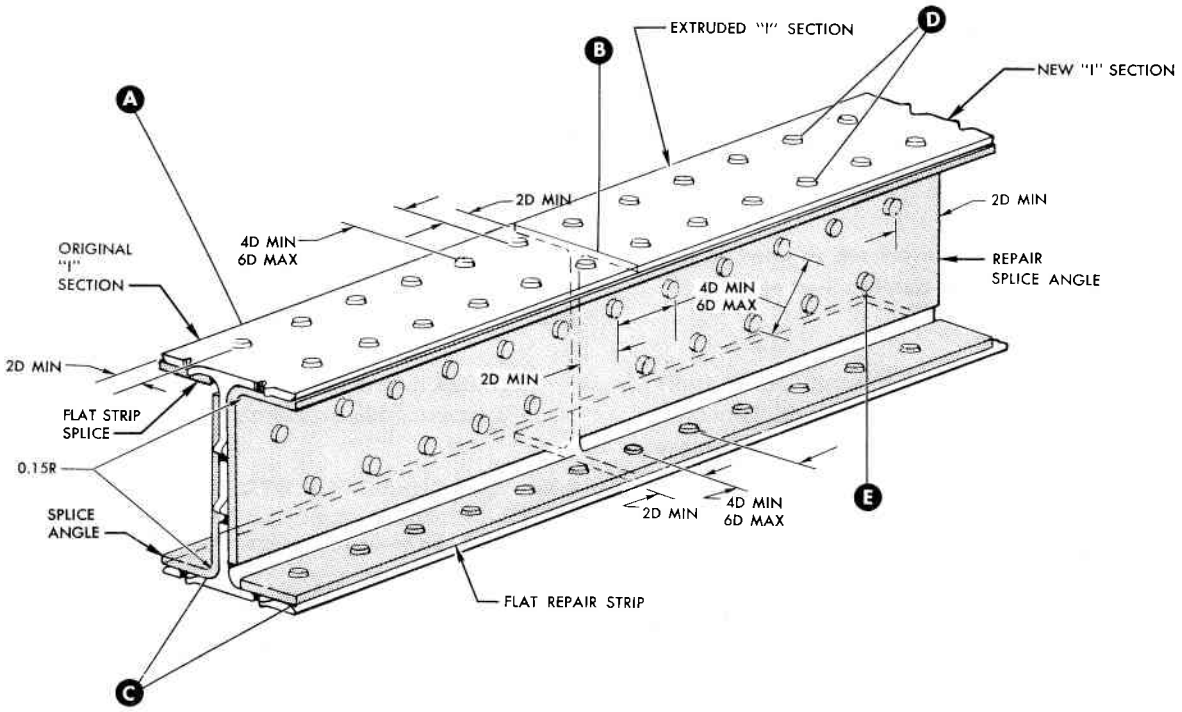
Figure 10-9. Extruded Tee Splice Repair



A Identify extruded "I" Section from extrusions shown in Section VIII.

B Remove rough edges from butt end of "I" Section.

C Fabricate and install roll-formed splice angles and flat strips of the same type material but next heavier gage.

D Use equal number of rivets on each side of splice. Refer to Section I for standard minimum rivet spacing and formula and method of repair.

E When web of "I" Section exceeds rivet diameters between flange radii, the rivet pattern shall be staggered, but minimum of 2 rivet diameters edge distance must be maintained.

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Figure 10-10. Extruded "I" Splice Repair

repair procedures. In all cases the splice angles will be of the same type material as the original "I" extrusions, but of the next heavier gage.

10-27. ALUMINUM HONEYCOMB REPAIRS.

10-28. Restoring structural strength in honeycomb panels with epoxy resins and other adhesives is an exacting process that involves specific cleaning, mixing, and handling problems. Resins and adhesives used are caustic and toxic. Personnel making repairs must be provided with the proper protective clothing and respirators. Caution must be exercised to observe the warnings displayed on the labels of adhesive containers.

NOTE

Most adhesives and accelerators are shipped in kit form under one stock number but in separate containers.

The instructions on figures 10-30 through 10-46 apply to honeycomb panels on all F-106 airplanes. However, in some instances a particular location is specified in the repair instructions. Where special tools are required, instructions for their manufacture are included. The repairs on the illustrations are arranged by number, category (dent, hole, etc.), and diameter. Before repair of any damage is attempted, the most applicable repair must be selected.

10-29. Repair Selection.

10-30. Figure 10-11 illustrates the fabrication and use of a damage locating template. This template is used to locate the center and area of the damage. However, any method, such as scribing lines across the damage area with a straight edge, may be used as long as the repair diameter can be determined.

10-31. Preparation of Damage Area.

10-32. To obtain a successful bond with adhesives, the damaged area must be properly cleaned. None of the various adhesives used in honeycomb repairs will adhere to oily or damp surfaces; even the small amount of moisture transferred from the hands when handling repair parts will seriously impair bonding strength. For this reason, clean white gloves must be worn when handling repair parts. The cleaning method illustrated in figure 10-13 is a complete step-by-step procedure. The steps required are listed in each individual repair procedure.

10-33. Repair Patch Plates and Rivet Patterns.

10-34. All patch plates used in F-106 honeycomb repairs are to be made of 0.025-inch aluminum alloy. The alloy and condition should conform to the original metal removed from the damaged area. Patch plate and rivet pattern data is shown in figure 10-12.

10-35. Repair Adhesives.

10-36. Table 10-I lists all the adhesives and accelerators required for repairs. Usually the first choice adhesive is shown. In some repairs, however, an alternate adhesive is listed. Table 10-I also gives the required cure time and temperatures. The use of heat, if so designated in the table, will decrease cure time and increase bonding strength. The manufacturer's instructions should be followed when mixing adhesives.

10-37. SPECIAL TOOLS.

10-38. Table 10-II lists special tools necessary to accomplish repairs on honeycomb structure. Also, see figures 10-11 through 10-29. Some of the tools may be fabricated locally as indicated on the table. Refer to the applicable figure number indicated in Table 10-II for information concerning fabrication and instructions for using the tools.

NOTE

It is anticipated that the required special tools will be available by March 1961.

10-39. BULKHEAD FUS. STA. 556.75 TEMPORARY REPAIR. Applicable to F-106A-57-2465 and subsequent; F-106B-57-2522 and subsequent.

a. Locate ends of crack using fluorescent penetrant per TO 33B-1-1. Crack will be located at top center line of bulkhead on either fwd or aft face.

CAUTION

Care must be taken not to drill into the No. 2 vertical stabilizer spar attached in pocket of bulkhead. Thickness of cracked web is approximately 0.230 inch.

b. Stop drill both ends of crack using 1/4 inch drill bit.

c. Use eddy current probe to inspect stop drilled area. If probe indicates crack extends beyond stop drill, use 1/4 inch router to chase out cracks.

NOTE

If crack penetrates into either radius of the attachment lug hole bosses more than 0.1 inch, contact San Antonio ALC/MMEAS, Autovon 945, ext 7541.

d. Apply one coat of MIL-C-5541 chemical coating and MIL-P-8585 zinc chromate to inside of stop drilled area and crack.

e. Fabricate 90 degree repair angle patch in accordance with Figure 10-10G.

NOTE

Prior to final assembly, trim angle to fit and smooth all edges. Treat with one coat of MIL-C-5541 and MIL-P-8585. After final assembly, apply one coat of MIL-P-8585 to entire area.

f. Install repair angle patch in accordance with Figure 10-10G.

NOTE

Treat holes with MIL-C-5541 and, prior to installation of fasteners, coat holes and fasteners with MIL-P-8585.

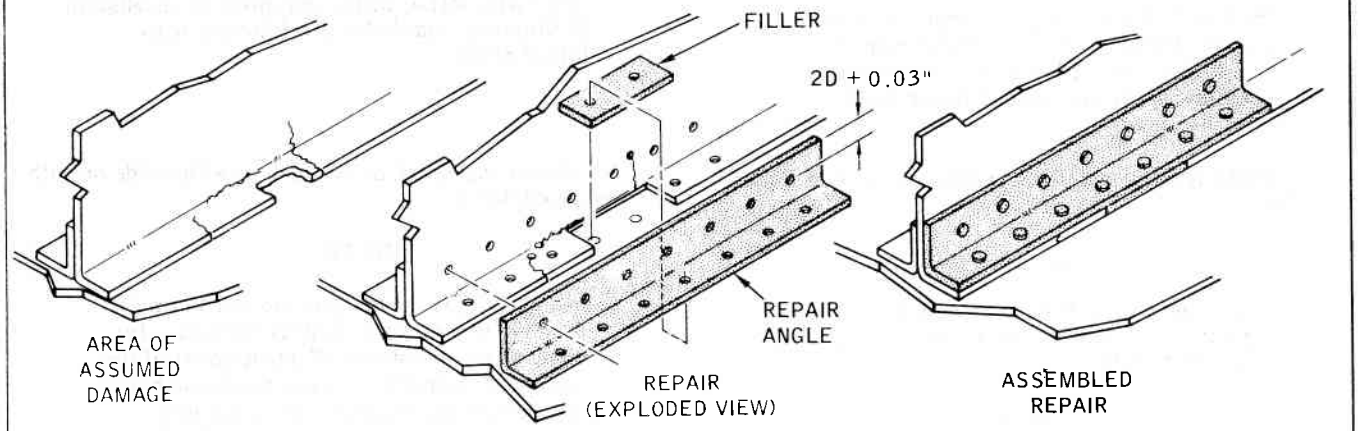
NOTE

Install bolts, Part No. AN4, with head down and with washer, Part No. AN960, under nut. Treat holes with MIL-C-5541, and, prior to installation of fasteners, coat holes and fasteners with MIL-P-8585.

g. Repair angle may be installed on either side or both sides of bulkhead.

NOTE

An entry must be made in aircraft Form 781 limiting this repair to 300 flying hours. Permanent repair consists of replacement of the bulkhead segment. Request serial number of all aircraft which receive this temporary repair be provided by message to San Antonio ALC/MMCTB.



REPAIR PROCEDURE

a. Smooth roughness and break sharp corners on edges of cracks; stop drill cracks. Trim out damaged area as required. Insert filler, in trimmed out area, of same gage material when required.

b. Fabricate repairs of same material and of next heavier gage as damaged area. Lower flange of repair to be same dimension as damaged flange. When damage extends into web leg, nested angle must extend past damage as shown in Section I, Formula and Method of Insertion Repair.

c. Locate and drill repair rivet pattern. Refer to Section I for method of determining rivet pattern.

NOTE

WHEN FLANGE IS LESS THAN ONE HALF INCH IN WIDTH, FLANGE RIVETS ARE NOT REQUIRED.

d. Refer to Section I for finish requirements of repair surfaces.

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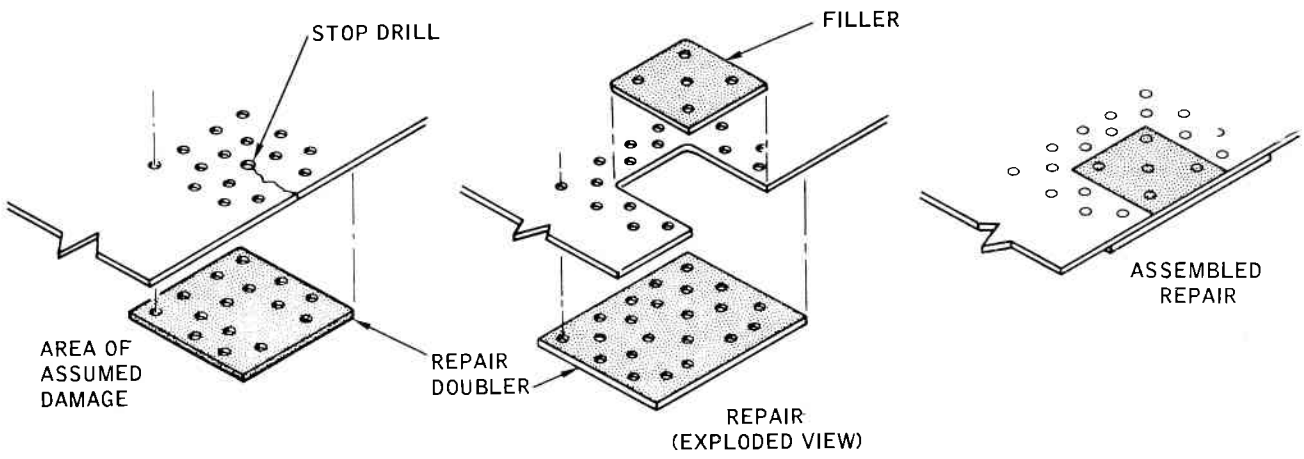
Figure 10-10A. Flange Repair



REPAIR PROCEDURE

a. Smooth roughness and break sharp corners on edges of cracks; stop drill cracks. Trim out area of damage if required. Insert filler in trimmed out area of same gage material as required.

b. Fabricate repair of same material and next heavier gage as damaged area. Repair must extend beyond damaged area same as Formula and Method of Insertion Repair in Section I.

c. Locate and drill rivet pattern. Refer to Section I for method of determining rivet pattern.

d. Install repair as shown.

e. If required, coat faying surfaces of doubler and filler with sealer. Refer to applicable section for airplane component being repaired for fuel-tight or pressure sealing requirements.

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Figure 10-10B. Flat Plate - Edge Repair

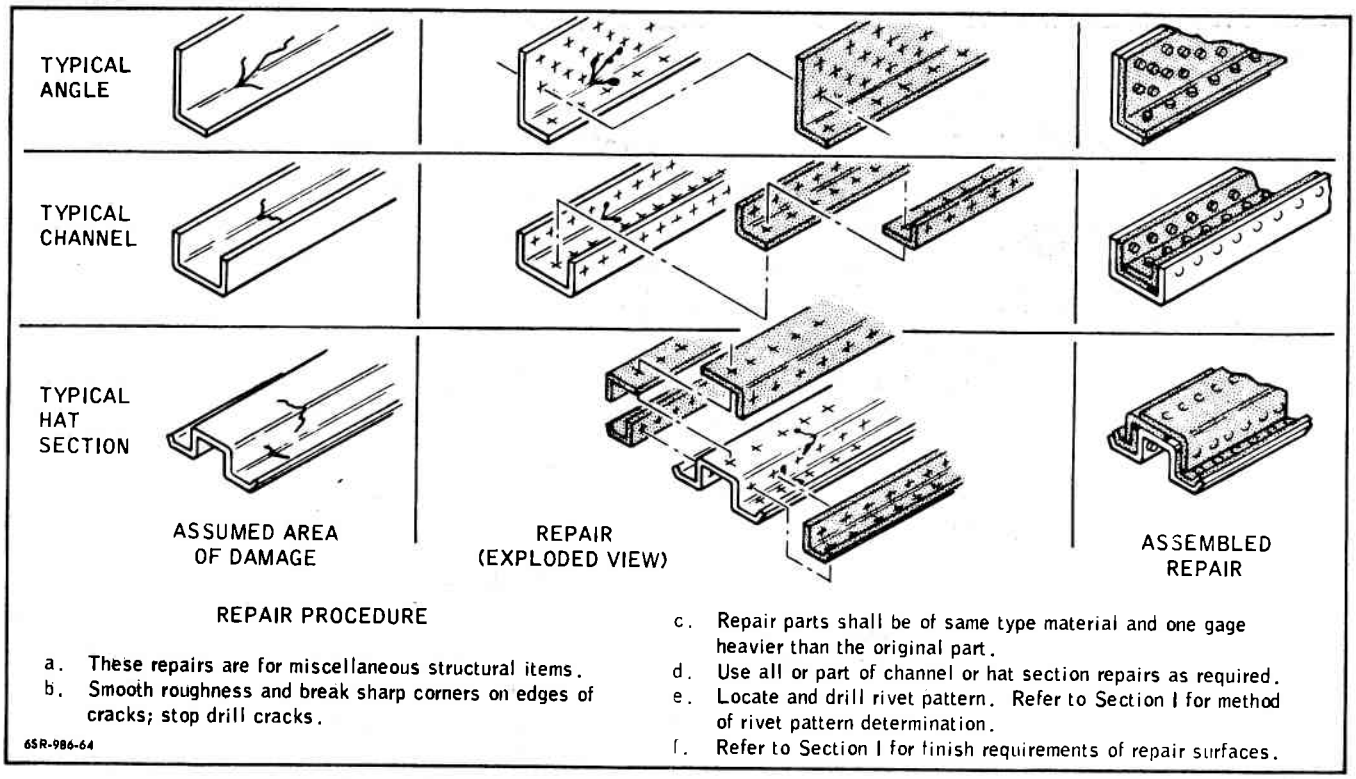
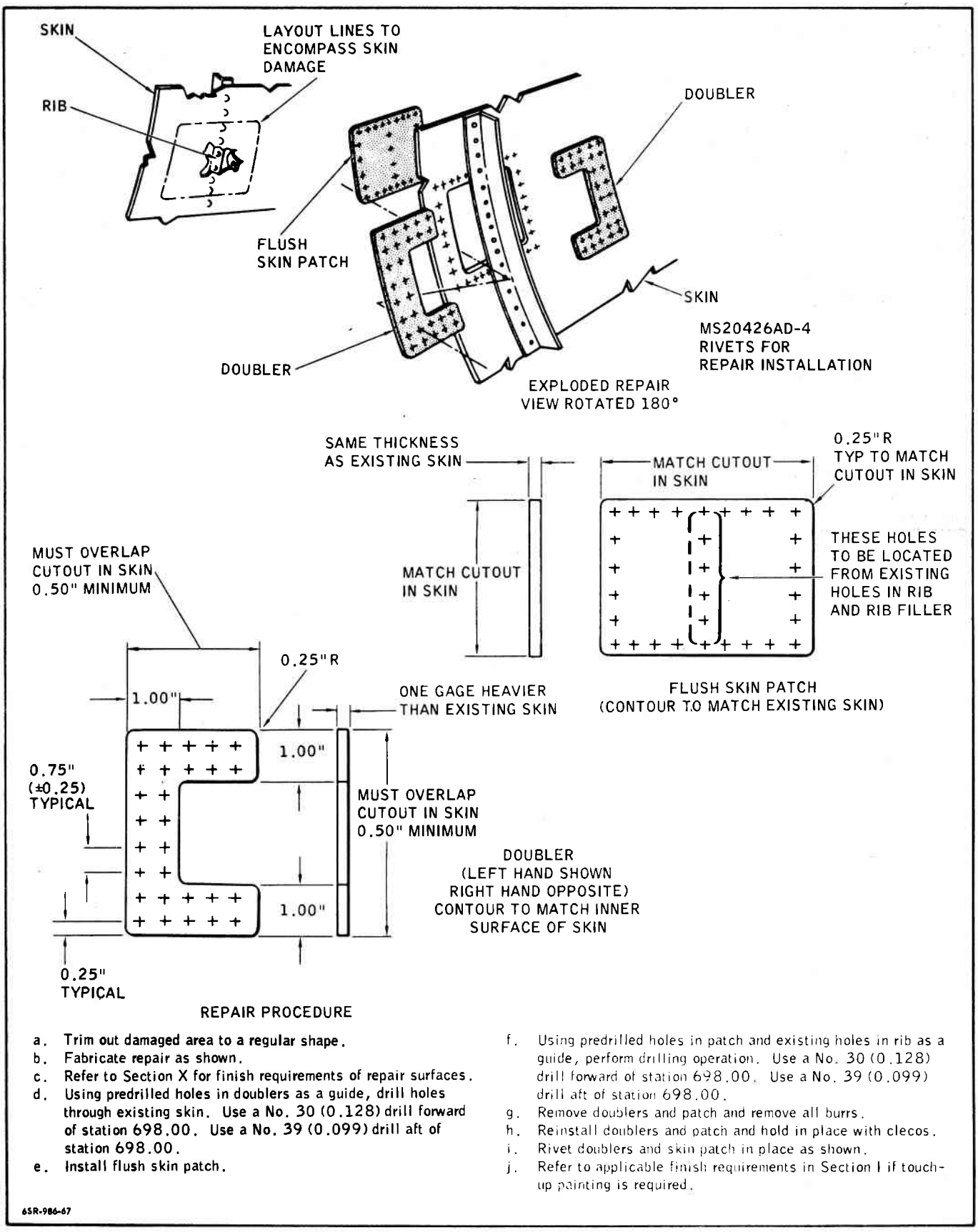


Figure 10-10C. Crack Repair of Miscellaneous Items



REPAIR PROCEDURE

a. Trim out damaged area to a regular shape.
b. Fabricate repair as shown.
c. Refer to Section X for finish requirements of repair surfaces.
d. Using predrilled holes in doublers as a guide, drill holes through existing skin. Use a No. 30 (0.128) drill forward of station 698.00. Use a No. 39 (0.099) drill aft of station 698.00.
e. Install flush skin patch.
f. Using predrilled holes in patch and existing holes in rib as a guide, perform drilling operation. Use a No. 30 (0.128) drill forward of station 698.00. Use a No. 39 (0.099) drill aft of station 698.00.
g. Remove doublers and patch and remove all burrs.
h. Reinstall doublers and patch and hold in place with clecos.
i. Rivet doublers and skin patch in place as shown.
j. Refer to applicable finish requirements in Section I if touch-up painting is required.

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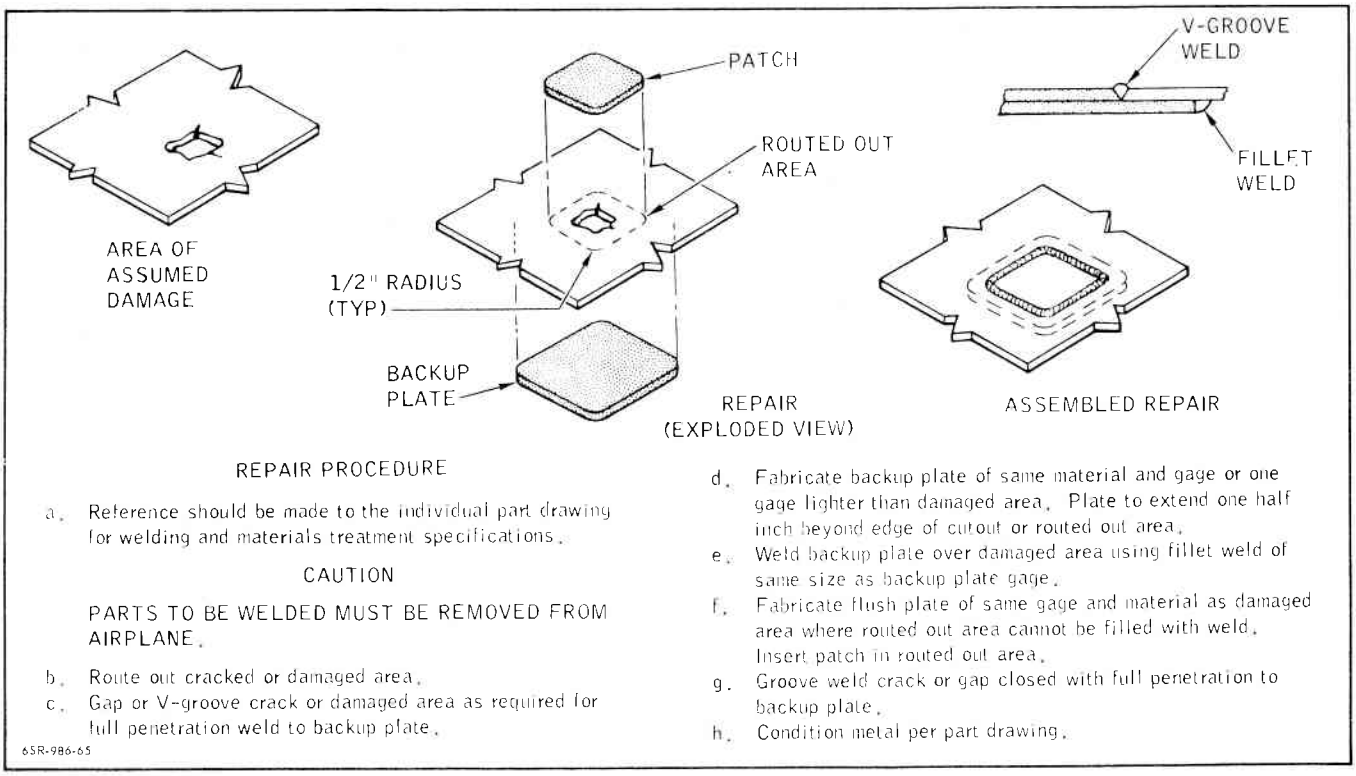
Figure 10-10D. Welded Repair for Welded Assemblies, Reinforced



REPAIR PROCEDURE

a. Reference should be made to the individual part drawing for welding and materials treatment specifications.

CAUTION

PARTS TO BE WELDED MUST BE REMOVED FROM AIRPLANE.

b. Route out cracked or damaged area.
c. Gap or V-groove crack or damaged area as required for full penetration weld to backup plate.
d. Fabricate backup plate of same material and gage or one gage lighter than damaged area. Plate to extend one half inch beyond edge of cutout or routed out area.
e. Weld backup plate over damaged area using fillet weld of same size as backup plate gage.
f. Fabricate flush plate of same gage and material as damaged area where routed out area cannot be filled with weld. Insert patch in routed out area.
g. Groove weld crack or gap closed with full penetration to backup plate.
h. Condition metal per part drawing.

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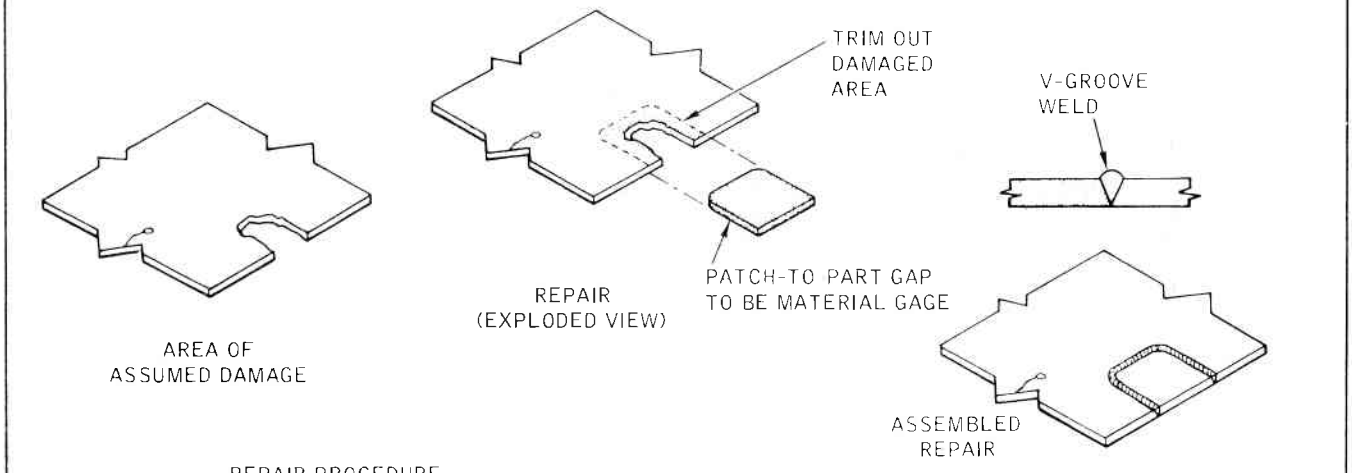
Figure 10-10E. Welded Crack Repair for Welded Assemblies



REPAIR PROCEDURE

a. Reference should be made to the individual part drawing for welding and material treatment specification.

CAUTION

PARTS TO BE WELDED MUST BE REMOVED FROM AIRPLANE.

b. Route out crack or damaged area.
c. Gap or V-groove crack or damaged area as required for full penetration weld.
d. Where required, fabricate filler patch of same material and gage as damaged area. Insert patch in damaged area.
e. Groove weld the routed out area with full penetration weld.
f. Condition metal per part drawing.

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Figure 10-10F. Dorsal Flairing Skin Repair

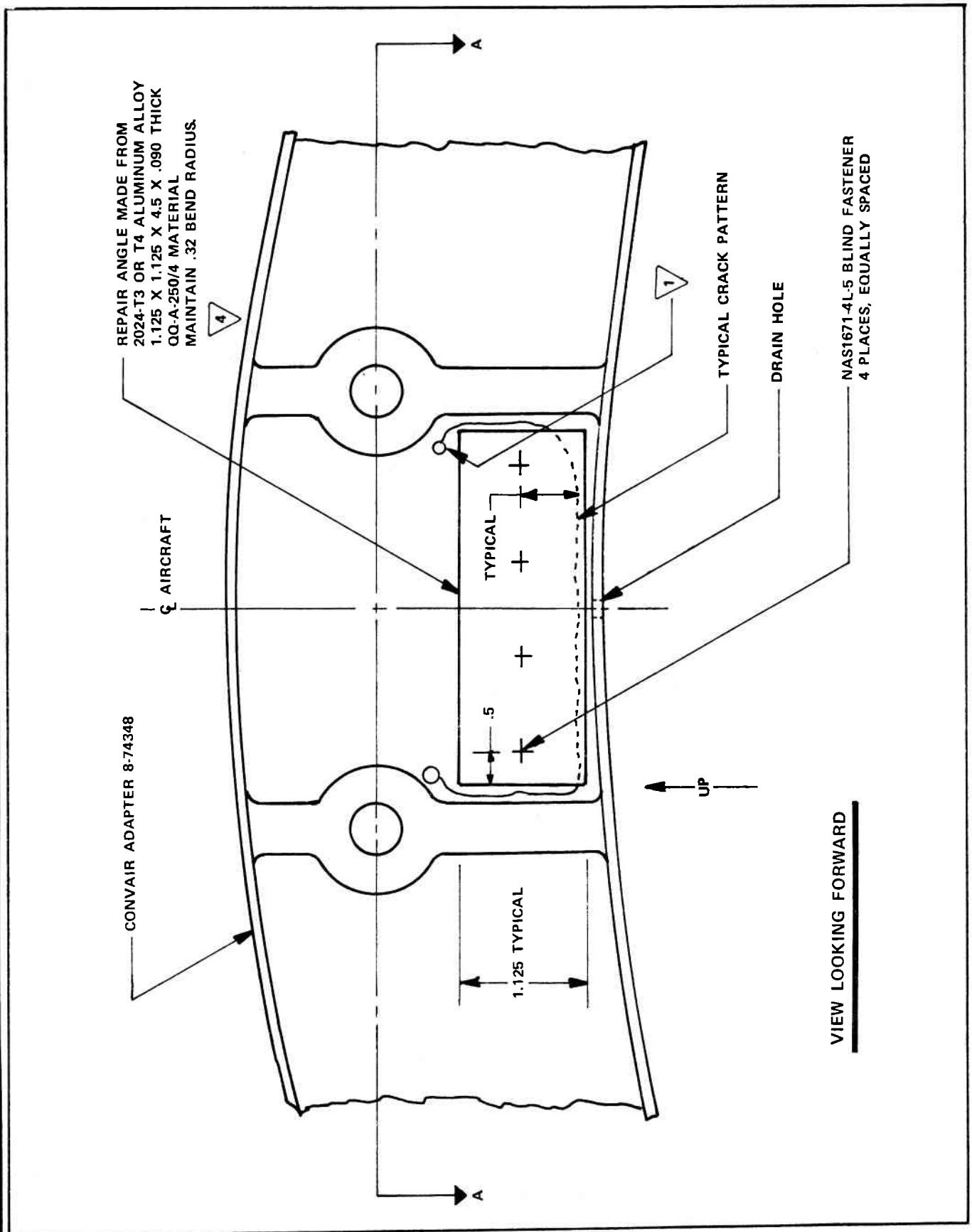


Figure 10-10G. Temporary Repair of F-106 Fuselage Sta. 556.75 Adapter, Part No. 8-74348 (Sheet 1 of 2)

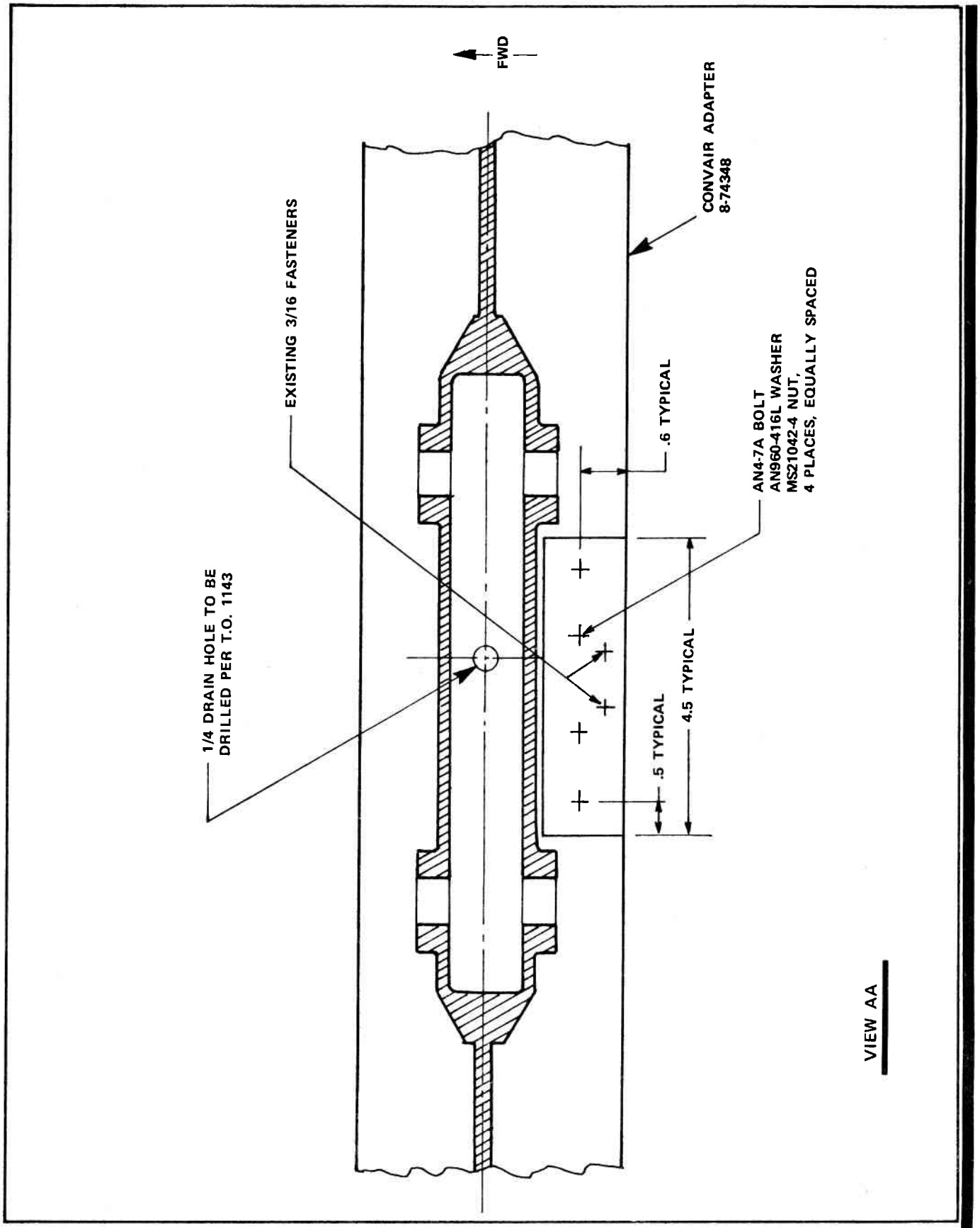
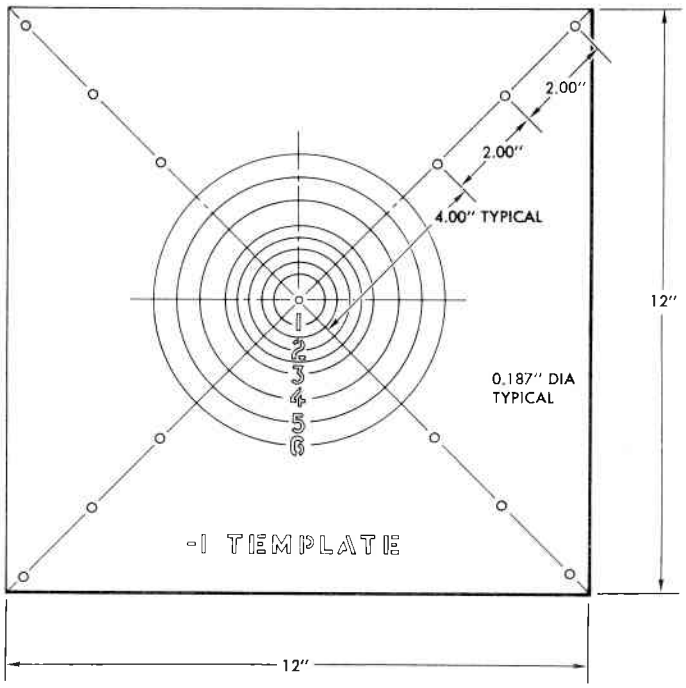
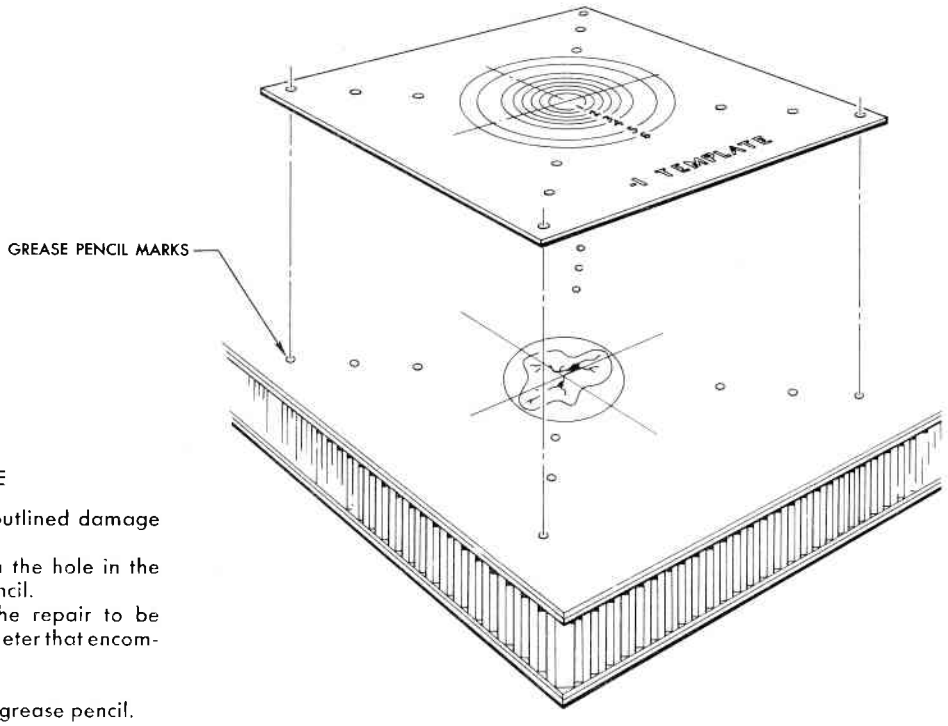


Figure 10-10G. Temporary Repair of F-106 Fuselage Sta. 556.75 Adapter, Part No. 8-74348 (Sheet 2 of 2)



NOTE:
1. MANUFACTURE TEMPLATE FROM PLEXIGLASS WITH CIRCLES AND DIAGONALS INSCRIBED ON UNDERSIDE.
2. NUMBERS INDICATE CIRCLE DIAMETER.



PROCEDURE

a. Center the template over outlined damage area.
b. Spot mark the skin through the hole in the template with a grease pencil.
c. Choose the diameter of the repair to be made (use the smallest diameter that encompasses the damage area.
d. Remove the template.
e. Mark the centerlines with a grease pencil.

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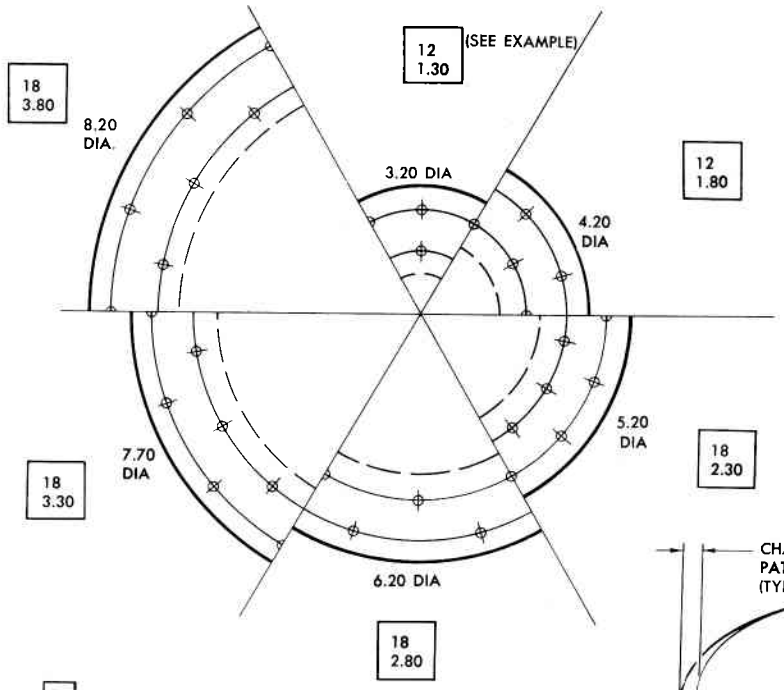
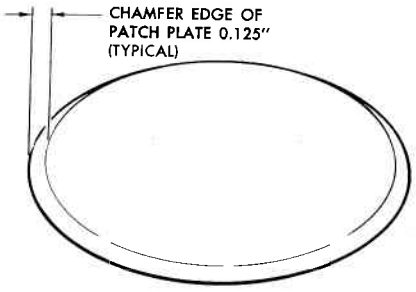
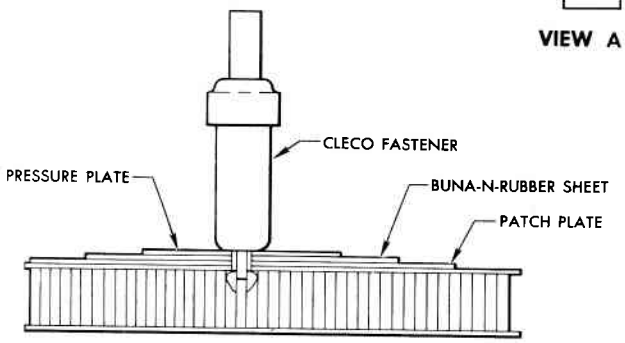
Figure 10-11. Honeycomb Repair — Damage Locating Template



VIEW A



VIEW B
(SEE NOTE 1)



VIEW C
(SEE NOTE 4)

DRILL SIZE FOR RIVETS	
RIVET	DRILL SIZE
⅛ EXPLOSIVE	NO. 29 DRILL
5/32 EXPLOSIVE	NO. 17 DRILL
⅛ CHERRY	NO. 30 DRILL
5/32 CHERRY	NO. 20 DRILL

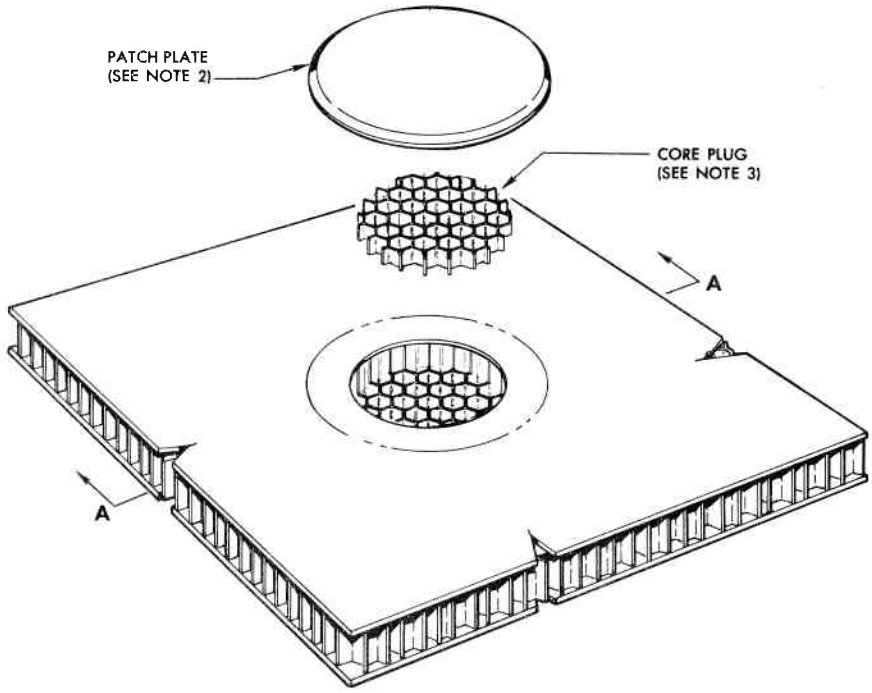
EXAMPLE 12 ← NUMBER OF RIVETS
1.30 ← RADIUS OF HOLE PATTERN

REPAIR PATCH TABLE	
DIAMETER OF DAMAGE	PATCH PLATE DIAMETER
1.000	3.200
1.500	3.700 (SEE NOTE 2)
2.000	4.200
2.500	4.700 (SEE NOTE 3)
3.000	5.200
4.000	6.200
5.000	7.200
6.000	8.200

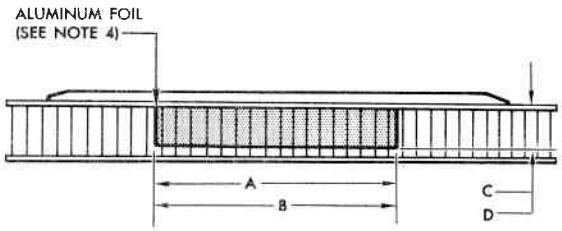
NOTES:
1. ALL PATCH PLATES USED IN HONEYCOMB REPAIRS ARE 0.025 INCH GAGE ALUMINUM ALLOY. THE TYPE AND CONDITION OF THE ALLOY SHOULD BE THE SAME AS THE METAL REMOVED FROM REPAIR AREA.
2. HOLE PATTERN SAME AS 3.200 INCH DIAMETER PATCH.
3. HOLE PATTERN SAME AS 4.200 INCH DIAMETER PATCH.
4. ALL PATCH PLATES ARE INSTALLED OVER FILM FM47 FILM. FM47 MUST HAVE 60 PSI TO 100 PSI PRESSURE WHILE HEAT IS BEING APPLIED FOR CURE. THE USE OF CLECO FASTENERS AS SHOWN IN VIEW C OR OTHER METHODS SHOWN IN THIS SECTION MAY BE USED TO APPLY THIS PRESSURE.

06.03.295-1B

Figure 10-12. Honeycomb Repairs — Patch Plates, Core Plugs, and Riveted Patterns (Sheet 1 of 2)



CORE PLUG DIMENSIONS			
REPAIR HOLE DIAMETER A	CORE PLUG DIAMETER B	REPAIR HOLE DEPTH C	CORE PLUG THICKNESS D
1.5	1.52	.250	.250
1.5	1.52	.375	.375
1.5	1.52	.500	.500
2.0	2.02	.250	.250
2.0	2.02	.375	.375
2.0	2.02	.500	.500
2.5	2.52	.250	.250
2.5	2.52	.375	.375
2.5	2.52	.500	.500
3.0	3.02	.250	.250
3.0	3.02	.375	.375
3.0	3.02	.500	.500
4.0	4.02	.250	.250
4.0	4.02	.375	.375
4.0	4.02	.500	.500
5.0	5.02	.250	.250
5.0	5.02	.375	.375
5.0	5.02	.500	.500
6.0	6.02	.250	.250
6.0	6.02	.375	.375
6.0	6.02	.500	.500
1.0	1.02	1.000	1.000
2.0	2.02	1.000	1.000
3.0	3.02	1.000	1.000
4.0	4.02	1.000	1.000
5.0	5.02	1.000	1.000
6.0	6.02	1.000	1.000



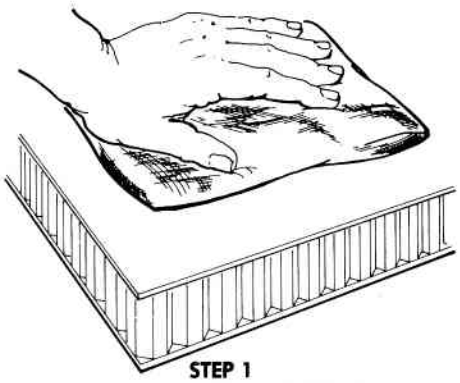
SECTION A-A

NOTE

1. THIS IS A CORE FILL OUTSIDE PATCH FOR DAMAGE ON ONE SIDE OF A HONEYCOMB STRUCTURE. APPLY PRESSURE AND HEAT PER APPLICABLE REPAIR INSTRUCTIONS.
2. SEE SHEET 1 FOR PATCH PLATE DIMENSIONS; AND RIVET PATTERN AND SIZES (IF PATCH PLATE IS RIVETED).
3. MAKE CORE PLUG FROM PERFORATED HONEYCOMB 1/8-INCH HEX CELL CORE, 0.002-INCH FOIL, SPECIFICATION MIL-C-7438B TYPE 1D. TOLERANCE FOR CORE PLUG THICKNESS (D) IS (±0.002-INCH).
4. CUT ALUMINUM FOIL FROM 0.004-INCH CLEAN STOCK MATERIAL.

.06.03.295-2

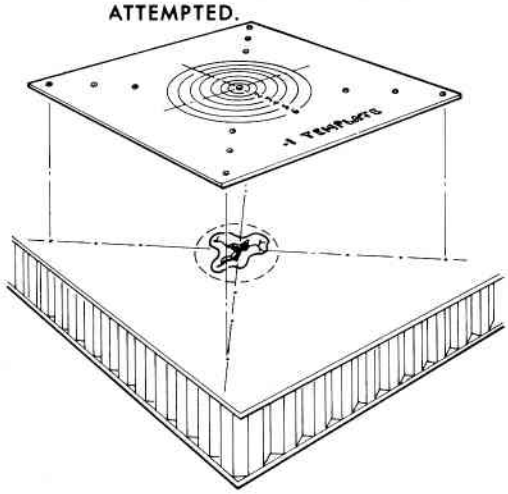
Figure 10-12. Honeycomb Repairs — Patch Plates, Core Plugs, and Rivet Patterns (Sheet 2 of 2)



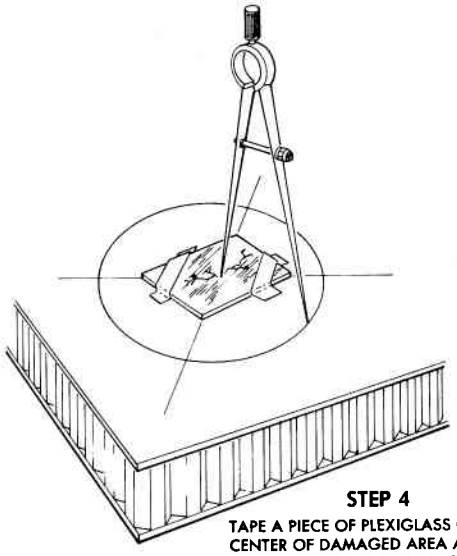
STEP 1
CLEAN THE DAMAGED AND SURROUNDING AREA WITH CHEESECLOTH SOAKED WITH METHYL ETHYL KETONE.

CAUTION
PAINT MUST BE REMOVED FROM REPAIR AREA BEFORE ANY CLEANING IS ATTEMPTED.

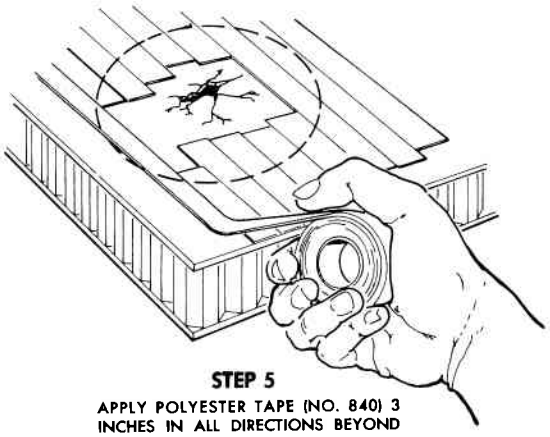
STEP 2
OUTLINE DAMAGED AREA WITH GREASE PENCIL.



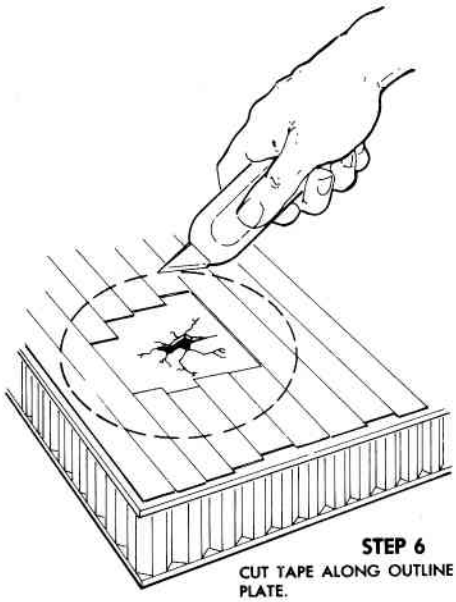
STEP 3
MARK CENTERLINES THROUGH CENTER OF DAMAGED AREA. USE TEMPLATE (SEE FIGURE 10-11).



STEP 4
TAPE A PIECE OF PLEXIGLASS OVER THE CENTER OF DAMAGED AREA AND OUTLINE PATCH PLATE AREA AS SHOWN.



STEP 5
APPLY POLYESTER TAPE (NO. 840) 3 INCHES IN ALL DIRECTIONS BEYOND PATCH PLATE OUTLINE.



STEP 6
CUT TAPE ALONG OUTLINE OF PATCH PLATE.

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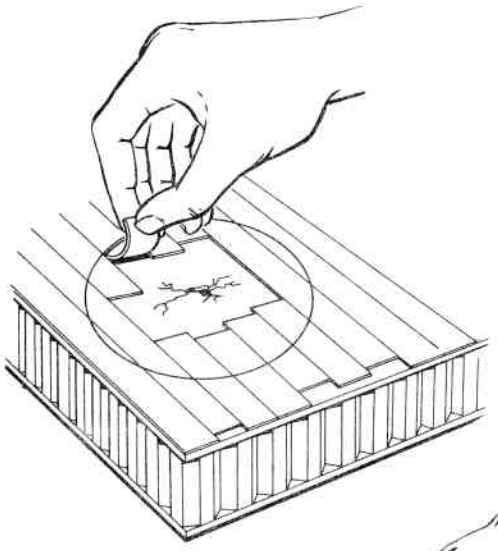
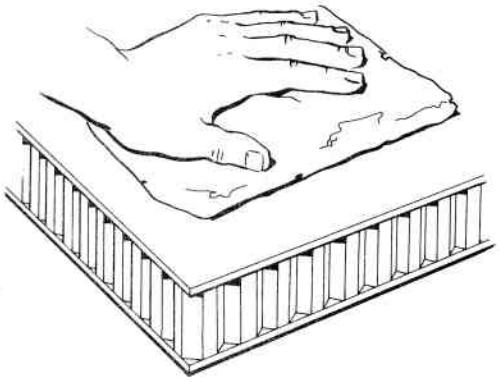
Figure 10-13. Honeycomb Repairs — Preparation and Cleaning (Sheet 1 of 2)



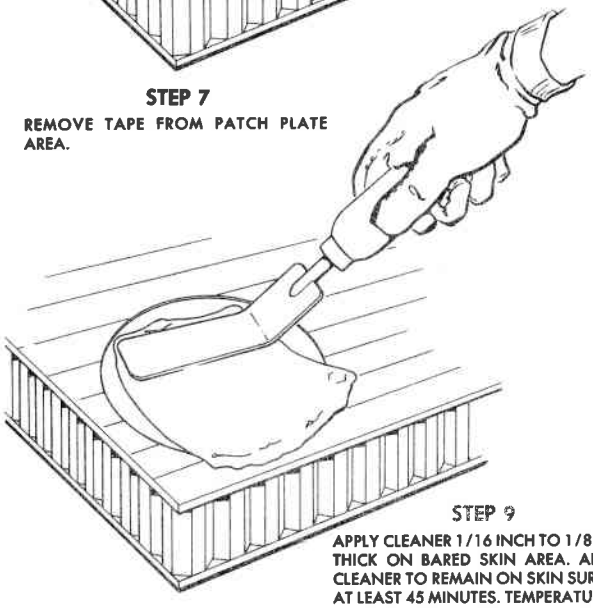
STEP 7

REMOVE TAPE FROM PATCH PLATE AREA.



STEP 8

CLEAN BARED PATCH PLATE AREA WITH METHYL ETHYL KETONE.

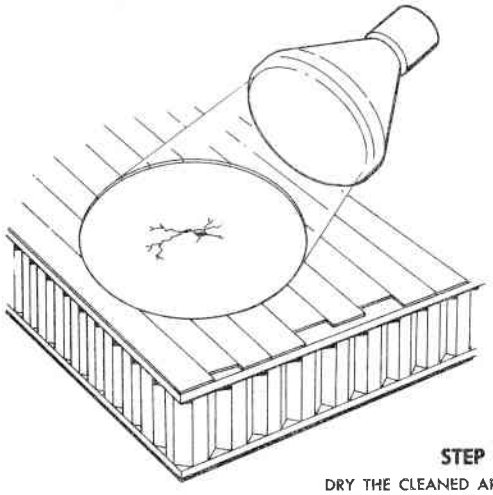


STEP 9

APPLY CLEANER 1/16 INCH TO 1/8 INCH THICK ON BARED SKIN AREA. ALLOW CLEANER TO REMAIN ON SKIN SURFACE AT LEAST 45 MINUTES. TEMPERATURE OF SKIN SHOULD BE 70°F OR ABOVE. (SEE NOTE).

STEP 10

REMOVE CLEANER. WASH BARED AREA THOROUGHLY WITH A CLEAN CHEESECLOTH SATURATED WITH CLEAR WATER.



STEP 11

DRY THE CLEANED AREA FOR 15 MINUTES WITH A HEAT LAMP.

NOTE

CLEANER IS MADE AS FOLLOWS:

1. COMBINE TEN PARTS OF SULFURIC ACID FEDERAL SPECIFICATION O-A-115(1), FOUR PARTS OF SODIUM DICHROMATE FEDERAL SPECIFICATION 0-5-595a(3), AND THIRTY PARTS OF WATER.
2. MIX ONE PART OF THE ABOVE SOLUTION WITH THREE PARTS OF BARIUM SULFATE (TECHNICAL GRADE).

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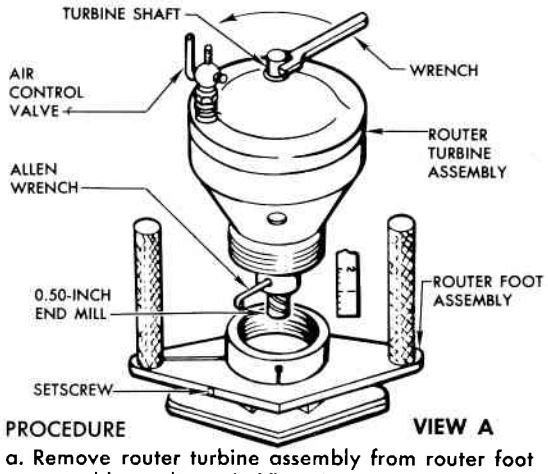
Figure 10-13. Honeycomb Repairs — Preparation and Cleaning (Sheet 2 of 2)

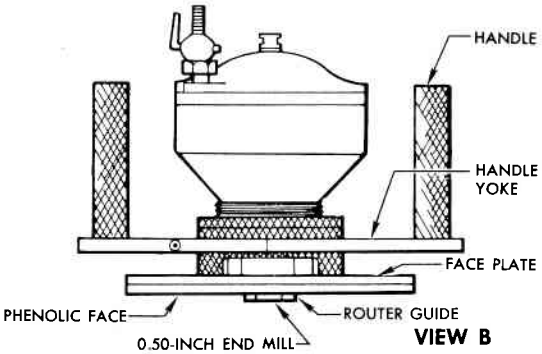


PROCEDURE VIEW A

a. Remove router turbine assembly from router foot assembly as shown in View A.
b. Install 0.50-inch end mill in router turbine assembly chuck.

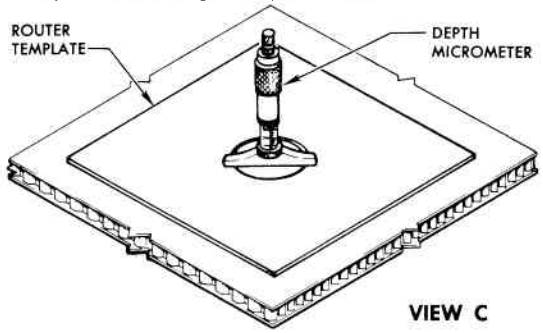
NOTE
THE END MILL MUST EXTEND 1.0 INCH BEYOND THE END OF THE CHUCK. WHEN USING THE ROUTER TURNTABLE ASSEMBLY (FIGURE 10-19) A LONGER END MILL MAY BE REQUIRED.

c. Tighten end mill by holding Allen wrench in chuck hole and turning turbine shaft counterclockwise with wrench.



VIEW B

d. Screw router turbine assembly into router foot assembly until end mill is flush with router guide. See View B.
e. Make reference mark on adjustment threads and depth scale with grease pencil. See View D.



VIEW C

f. Measure depth of tape and template in area of hole with depth micrometer as shown in View C.
g. Subtract 0.10-inch from tape and template depth measurement for depth of router guide.

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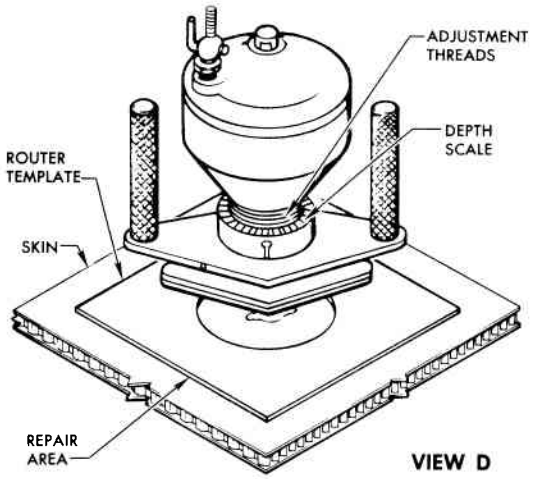
h. Increase depth of end mill one mark on depth scale for each 0.001-inch difference between depth of router template and router guide.
i. Place router on router template and rotate turbine shaft by hand for four or five revolutions.
j. Remove router from template and check depth setting.

NOTE
THE END MILL MUST BE FLUSH WITH THE SKIN. IF THE END MILL IS TOO LOW AND WILL NOT TURN WHEN THE TURBINE SHAFT IS ROTATED, OR IS SCRATCHING THE SKIN SURFACE, DECREASE THE DEPTH SETTING UNTIL THE END MILL IS FLUSH WITH THE SKIN.

k. Increase depth setting 0.002-inch and tighten setscrew.
l. Attach router assembly hose to 90- to 100-pound air source.

WARNING

AIR CONTROL VALVE ON ROUTER ASSEMBLY MUST BE IN OFF POSITION PRIOR TO ATTACHING AIR SOURCE.



VIEW D

m. Place router assembly on template with end mill over template hole.
n. Start router assembly with air control valve and make initial cut.

WARNING

SAFETY GLASSES MUST BE WORN BY PERSONNEL IN VICINITY OF REPAIR DURING ROUTER OPERATION.

NOTE
OPERATE ROUTER ASSEMBLY IN FORWARD AND AFT MOTIONS PARALLEL TO CONTOUR OF THE SKIN.

o. Remove router assembly.

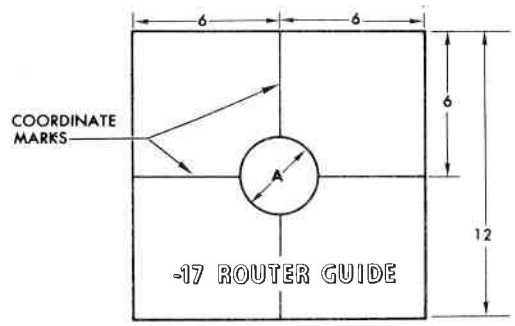
CAUTION

DO NOT LIFT ROUTER ASSEMBLY UNTIL TURBINE HAS STOPPED ROTATING.

p. Measure depth of cut with depth micrometer to determine accuracy of first setting.
q. Make series of router cuts, increasing end mill depth in increments no greater than 0.10-inch for core areas and 0.010-inch for step cuts in skin until desired routing depth is obtained.

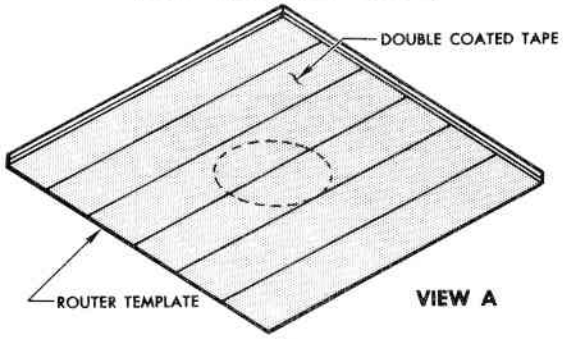
NOTE
FOR A MORE ACCURATE STEP-CUT DEPTH, ROUTE LAST 0.004-INCH OF STEP-CUT DEPTH WITH TWO 0.002-INCH CUTS.

Figure 10-14. Honeycomb Repairs — Router Assembly



ROUTER GUIDE TEMPLATE
(SEE TABLE I)

TABLE I		
OVERALL DAMAGE SIZE	TEMPLATE HOLE SIZE A	TEMPLATE DASH NUMBER
1.440	1.0	-5
1.940	1.5	-1
2.440	2.0	-9
2.940	2.5	-11
3.440	3.0	-13
4.330	4.0	-15
5.440	5.0	-17
6.440	6.0	-19



VIEW A

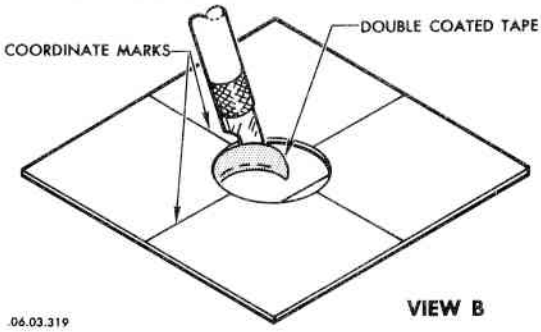
NOTE
1. FABRICATE GUIDE TEMPLATES FROM 0.125-INCH PHENOLIC, SPECIFICATION MIL-P-15035 FBM OR SIMILAR MATERIAL.
2. SCRIBE COORDINATE MARKS DEEP ENOUGH TO BE CLEARLY VISIBLE.
3. STENCIL APPLICABLE DASH NO. AND NAME ON EACH GUIDE TEMPLATE, AS SHOWN, USING 0.50-INCH BLACK LETTERS.

PROCEDURE

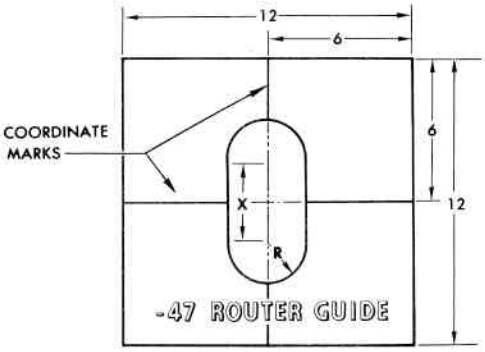
a. Tape one side of template using #400 double coated tape leaving protective backing on tape. See View A.

CAUTION

THE TAPE MUST COMPLETELY SURROUND THE TEMPLATE HOLE TO KEEP ALUMINUM CHIPS FROM GETTING BETWEEN THE TEMPLATE AND SKIN.



VIEW B



ROUTER GUIDE TEMPLATE
(SEE TABLE II)

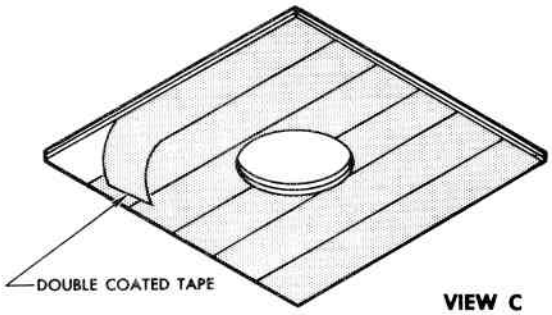
TABLE II			
OVERALL DAMAGE SIZE	TEMPLATE HOLE SIZE		TEMPLATE DASH NUMBER
	R	X	
3.0x6.25	1.720	3.250	-45
3.0x4.625	1.720	1.625	-47
2.0x5.25	1.220	3.250	-49
2.0x3.625	1.220	1.625	-51

b. Remove excess tape flush with edge of template hole using knife as shown in View B.

CAUTION

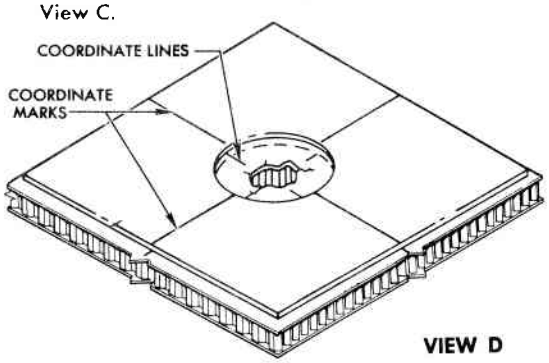
THE TEMPLATE MUST NOT BE PLACED ON THE SKIN WHILE CUTTING THE TAPE.

c. Clean area immediately surrounding the repair using Methyl-Ethyl-Ketone, Specification TT-M-261.



VIEW C

d. Remove protective backing from tape as shown in View C.



VIEW D

e. Using a grease pencil mark coordinate lines through center of the damaged area. See View D.

f. Align template coordinates with damaged area coordinates and secure template to skin.

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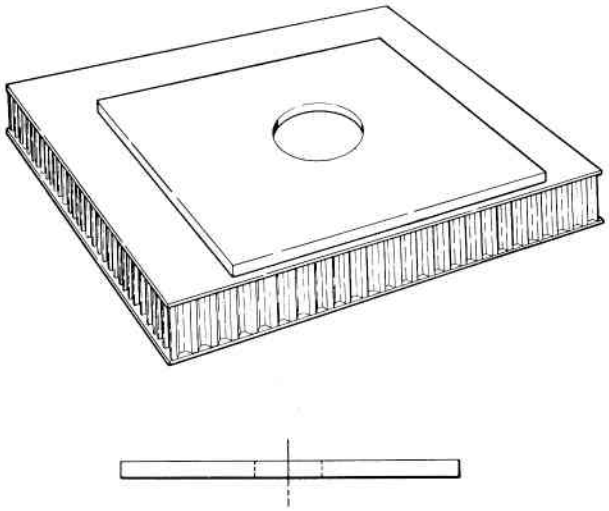
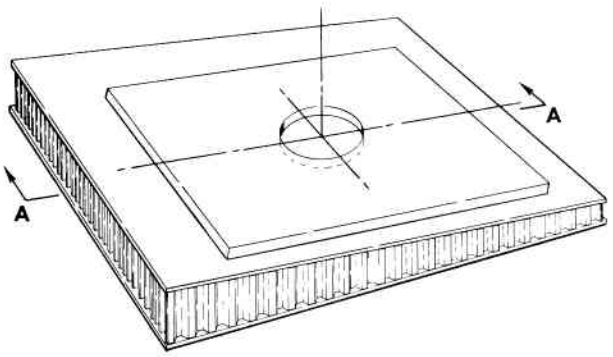
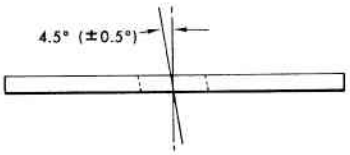
Figure 10-15. Honeycomb Repairs — Router Guide Templates



VIEW A
HOLE SAW GUIDE TEMPLATE
(SEE TABLE I)



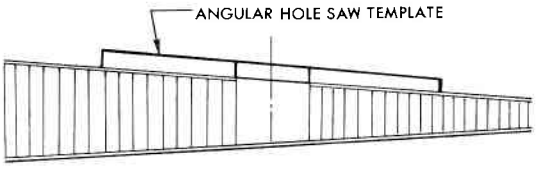


VIEW B
ANGULAR HOLE SAW GUIDE TEMPLATE
(SEE TABLE II)

TABLE I		
OVERALL DAMAGE SIZE	TEMPLATE HOLE SIZE	TEMPLATE DASH NUMBER
1.0	1.010	-21
2.0	2.010	-23
3.0	3.010	-25
4.0	4.010	-27
5.0	5.010	-29
6.0	6.010	-31

TABLE II		
OVERALL DAMAGE SIZE	TEMPLATE HOLE SIZE	TEMPLATE DASH NUMBER
1.0	1.010	-33
2.0	2.010	-35
3.0	3.010	-37
4.0	4.010	-39
5.0	5.010	-41
6.0	6.010	-43

NOTE
1. FABRICATE GUIDE TEMPLATES FROM 0.125-INCH PHENOLIC, SPECIFICATION MIL-P-15035 FBM OR SIMILAR MATERIAL. REFER TO TABLE I OR II FOR HOLE SIZES. SEE FIGURE 10-15, SHEET 1 FOR OUTSIDE DIMENSIONS.
2. DRILL HOLES IN ANGULAR GUIDE TEMPLATES AT A 4.5° (±0.5°) ANGLE AS SHOWN IN VIEW B.
3. STENCIL APPLICABLE DASH NO. (SEE TABLE I OR II) AND THE WORDS "HOLE SAW GUIDE" SIMILAR TO ILLUSTRATION SHOWN IN FIGURE 10-15 SHEET 1. USE 0.50-INCH BLACK LETTERS.



SECTION A-A

PROCEDURE

a. Accomplish steps "a" thru "d" of figure 10-15.
b. Align template so that hole encompasses entire damage area and secure template to skin. (Align angular guide template so that hole is parallel to the vertical direction ribbon as shown in Section A-A.)

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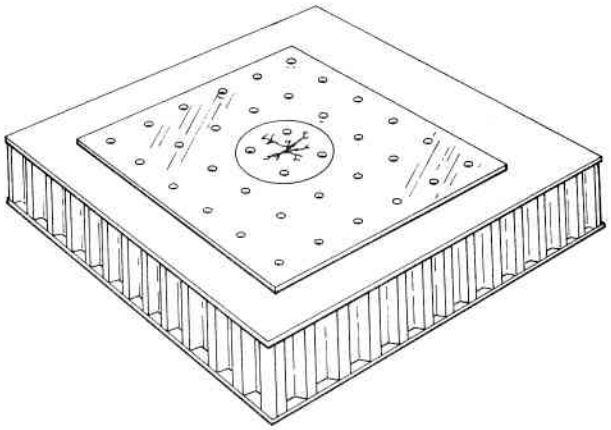
Figure 10-16. Honeycomb Repairs — Hole Saw Guide Templates



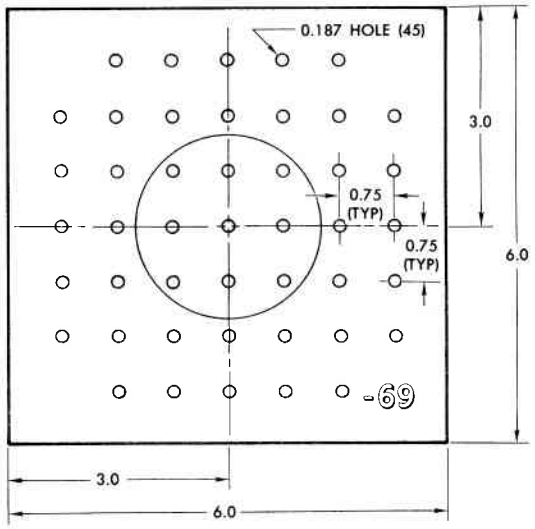
HOLE PATTERN TEMPLATE
VIEW A

NOTE

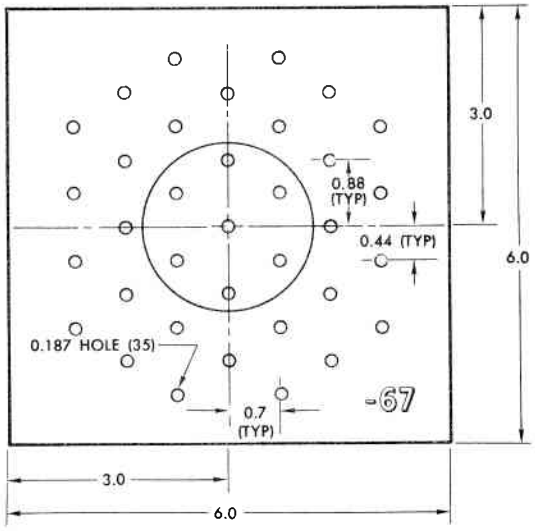
1. FABRICATE HOLE PATTERN TEMPLATES FROM 0.250-INCH CLEAR PLEXIGLASS, COMMERCIAL GRADE.
2. SCRIBE COORDINATES (CENTER-LINES) AND 2.50-INCH CIRCLE ON UNDERSIDE DEEP ENOUGH TO BE CLEARLY VISIBLE.
3. DRILL 0.187 HOLES LOCATED AS SHOWN.
4. SCRIBE OR SANDBLAST DASH NUMBER ON TOP SIDE AS SHOWN. MAKE NUMBERS APPROXIMATELY 3/8-INCH.

PROCEDURE

a. Select template that will permit the largest number of holes immediately surrounding the damaged area.
b. Center template so that circle encompasses entire damage area as shown in View A.
c. Secure template in place with #850 tape. See figure 10-15.
d. Centerpunch each hole lightly and remove template from part.



-69



-67

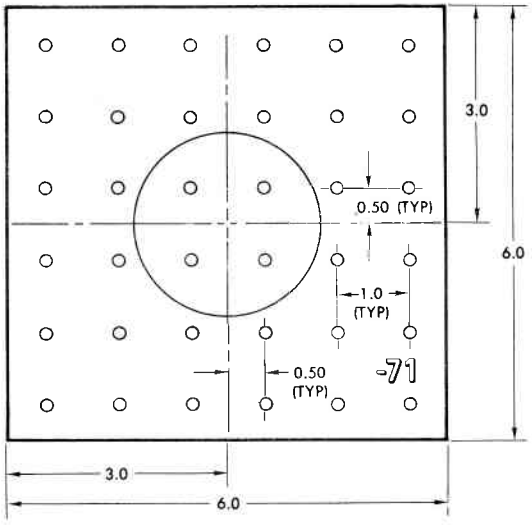


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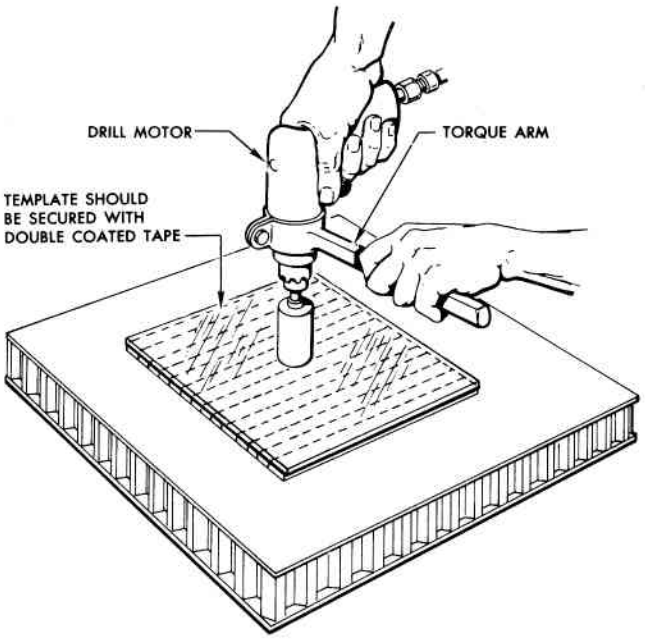
Figure 10-17. Honeycomb Repairs — Hole Pattern Templates

NOTE
THESE HOLE SAWS ARE USED IN CONJUNCTION WITH TEMPLATES -21 THRU -43. USE HOLE SAWS IN A SLOW SPEED DRILL MOTOR HAVING A ½-INCH CHUCK AND EQUIPPED WITH A TORQUE BAR.



PROCEDURE

a. Select template having hole large enough to encompass the damage area.
b. Prepare template and secure to part as described on figure 10-15.
c. Select hole saw of same diameter as template.
d. Install pilot holder in saw and install saw assembly in drill motor chuck.
e. Place saw in template at correct angle relative to part.
f. Turn on drill motor holding it firmly by torque arm.

CAUTION

BE ALERT FOR SUDDEN BINDING OR STALLING, AND DEPTH OF CUT AS SAW GOES THROUGH TOP SKIN.

g. Saw hole to the depth required by the repair instructions and remove saw and template.
h. Remove pilot holder and clean out inside of saw using punch through holder hole.

HOLE SAW DIMENSIONS					
SAW ASSY DASH NO.	SAW LENGTH	OVERALL DIAMETER	PLATE DIAMETER	WALL THICKNESS	NO. OF TEETH
-55	5.0	1.000	0.902	0.049	8
-57	5.0	2.000	1.902	0.049	12
-59	5.0	3.000	2.884	0.058	18
-61	5.0	4.000	3.870	0.065	18
-63	5.0	5.000	4.870	0.065	24
-64	5.0	6.000	5.870	0.065	24

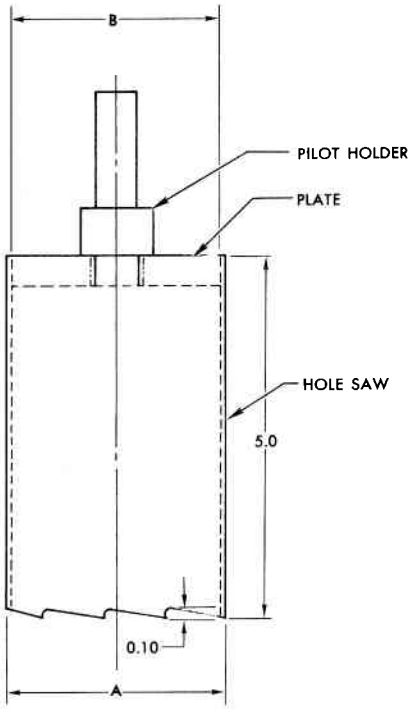


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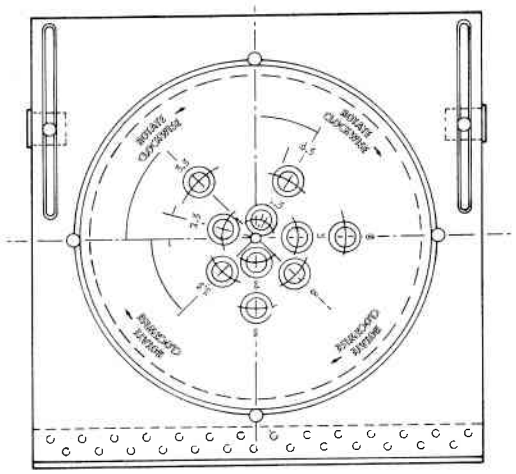
Figure 10-18. Honeycomb Repairs — Hole Saws



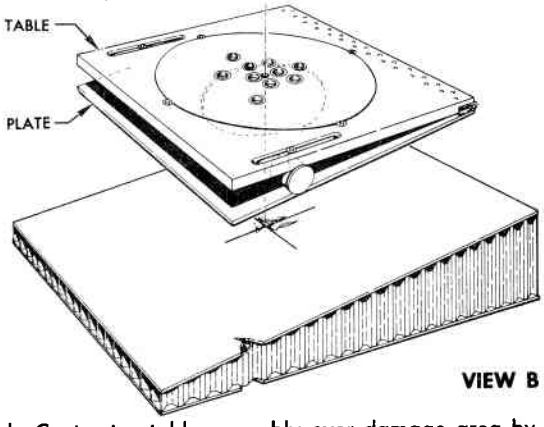
VIEW A

NOTE

THIS TURNTABLE IS USED IN CONJUNCTION WITH THE -3 ROUTER ASSEMBLY. BY USING THE TURNTABLE ASSEMBLY IT IS POSSIBLE TO MACHINE HOLES FROM 1.5 TO 6.0 INCHES DIAMETER IN INCREMENTS OF ½ INCH. THE TABLE MAY BE SET SO THAT THE HOLE IS NORMAL TO THE SURFACE OR AT AN ANGLE OF FROM 2 TO 6 DEGREES MAKING IT POSSIBLE TO MACHINE HOLES IN TAPERED PARTS PERPENDICULAR TO THE CHORD PLANE OF THE PART. SEE VIEW D.

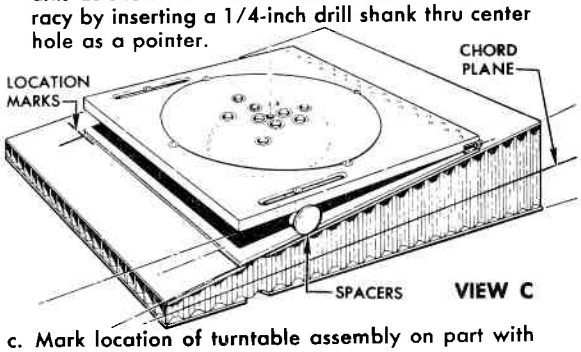
PROCEDURE

a. Establish coordinates and determine size of hole to be cut per applicable repair instructions.



VIEW B

b. Center turntable assembly over damage area by sighting thru center (1/4-inch) hole to coordinate axis as shown in View B. Check location for accuracy by inserting a 1/4-inch drill shank thru center hole as a pointer.



VIEW C

c. Mark location of turntable assembly on part with a grease pencil. See View C.

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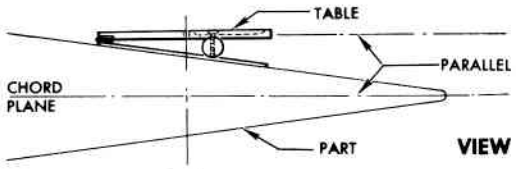
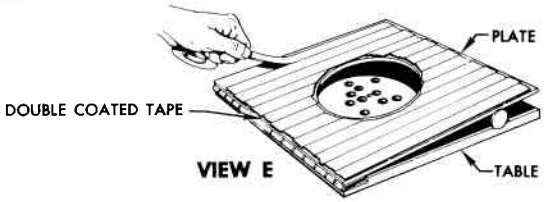
d. Adjust spacers so that the table is parallel to the chord plane of the part. See View C and D.

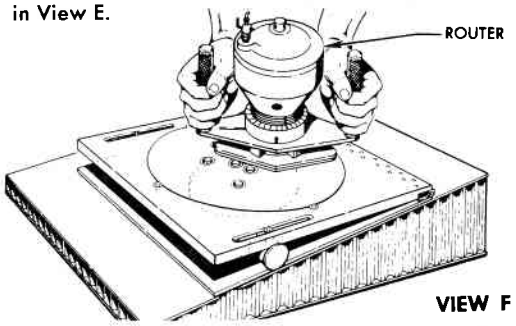


VIEW D



VIEW E

e. Remove turntable assembly and apply #400 double coated tape to underside of plate as shown in View E.



VIEW F

f. Secure turntable assembly to part using location marks established in step "c." Alo see figure 10-15.

NOTE

CHECK TO SEE THAT TURNTABLE ASSEMBLY IS FIRMLY SECURED TO PART, THAT SPACER ADJUSTMENT IS SECURE, AND THAT TABLE IS PARALLEL TO CHORD PLANE OF PART.

g. Set up router assembly as outlined in figure 10-14.
h. Place router assembly on turntable with end mill in hole having number corresponding to diameter of hole to be routed out. See Views A and F.
i. Adjust router so that end mill makes contact at nearest point on skin of part.
j. Holding router assembly firmly by handles, start hole in skin with the aid of an assistant adjusting router depth downward.
k. Cut and adjust, moving router clockwise, in a complete circle, until the desired depth is reached.

NOTE

IF ADJUSTMENT LIMIT IS REACHED BEFORE DESIRED DEPTH, SHUT OFF ROUTER AND INSTALL NEXT LENGTH END MILL. CONTINUE AS DIRECTED IN THE PRECEDING STEP.

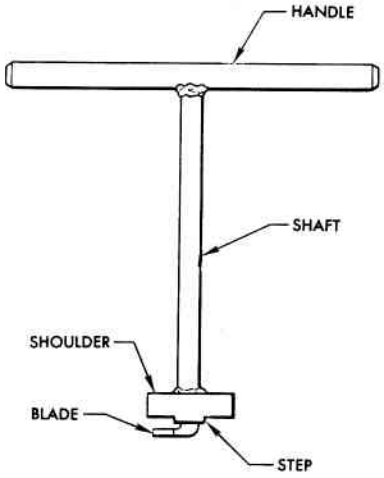
l. Remove router and turntable assembly.
m. Pry out skin and core left in center of hole being careful not to bend the skin at edge of hole.
n. If hole is to extend thru lower skin, proceed as in step "k" except stop router approximately 1/2-inch before the circle is completed.

NOTE

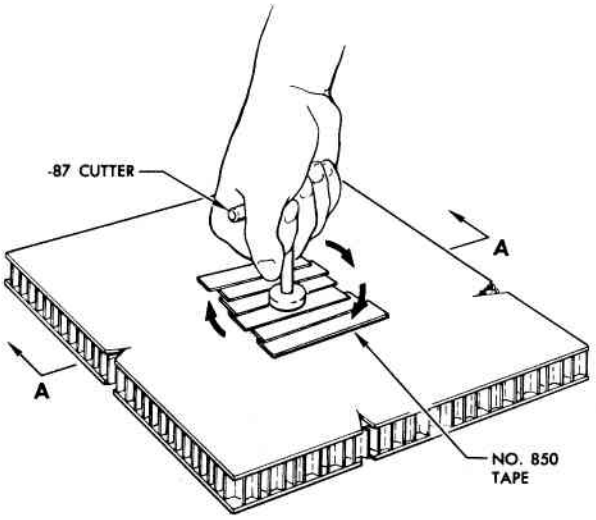
ROUTER END MILL SHOULD EXTEND APPROXIMATELY ¼ INCH THRU LOWER SKIN.

o. Turn off and remove router assembly.
p. Break off the skin disc left in the hole.
q. Repeat step "h" and finish routing out hole.
r. Remove router and turntable assemblies.

Figure 10-19. Honeycomb Repairs — Router Turntable Assembly



-87 CUTTER ASSEMBLY

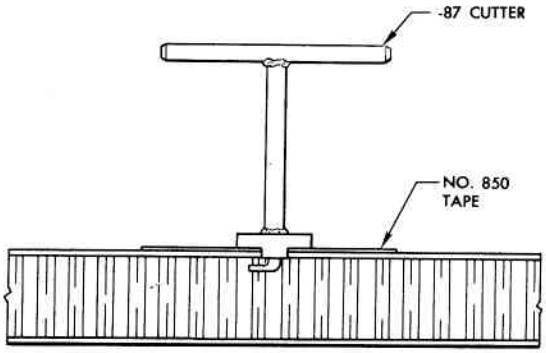


VIEW A

NOTE
THE -87 CUTTER ASSEMBLY IS A HAND OPERATED TOOL USED FOR UNDERCUTTING 0.375-INCH DIAMETER HOLES IN THE REPAIR OF HONEYCOMB STRUCTURE. SUCH UNDERCUTTING IS DONE PRIOR TO APPLICATION OF POTTING COMPOUND.

PROCEDURE

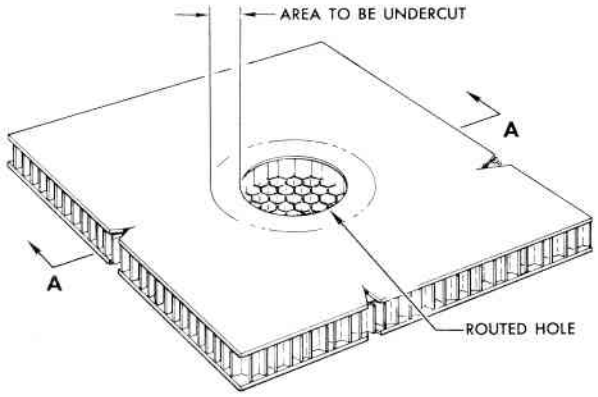
a. Apply #850 tape to area approximately one inch wide around repair hole as shown in view A.
b. Insert cutter assembly blade into 0.375-inch diameter hole and force tip of blade into core.
c. Place cutter assembly shaft in vertical position with shoulder parallel to skin.
d. Rotate handle slowly in clockwise direction and apply pressure until shoulder step moves down into 0.375-inch hole.
e. Rotate handle in clockwise direction until cutter turns freely.
f. Remove cutter assembly from hole and remove tape.



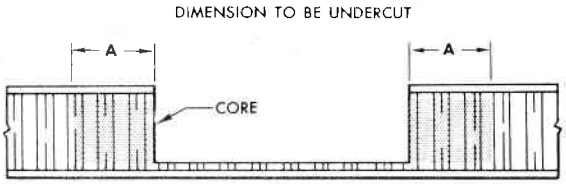
SECTION A-A

.06.03.324

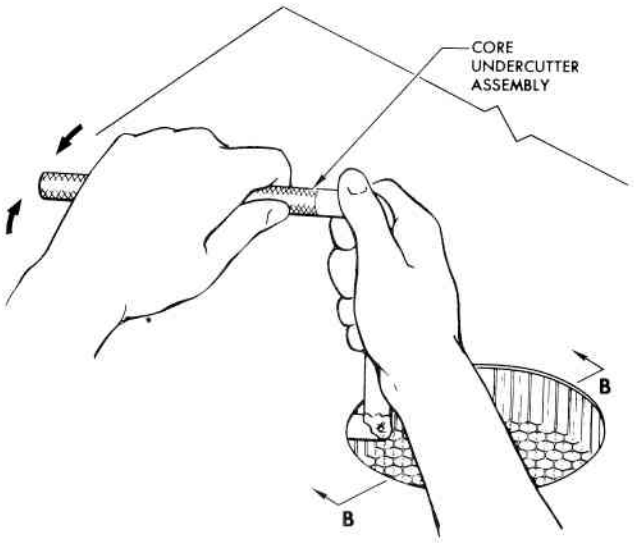
Figure 10-20. Honeycomb Repairs — Cutter Assembly



VIEW A



SECTION A-A



VIEW C

CORE UNDERCUTTING TABLE	
CORE UNDERCUTTER TOOL	CORE UNDERCUT DIMENSION A
8-01404-89	1.00-INCH
8-01404-91	1.50-INCHES
8-01404-93	.812-INCHES

NOTE

THESE TOOLS ARE USED FOR UNDERCUTTING CORE IN HONEYCOMB STRUCTURE 0.75-INCH TO 1.50-INCH. THE DEPTH AND SIZE OF THE UNDERCUT AREA WILL BE GIVEN IN THE APPLICABLE REPAIR INSTRUCTIONS.

PROCEDURE

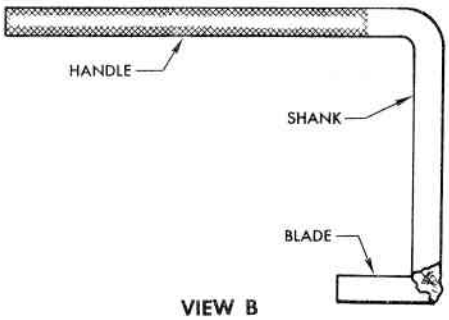
a. Determine the dimension of the area to be undercut from the repair instructions. See view A and Section A-A.
b. Select proper size tool. See core undercutting table.
c. Place core undercutting tool in routed hole.
d. Hold shank of tool in vertical position with one hand and move handle forward and aft with other hand forcing undercutter blade into core area. See View C.
e. Continue undercutting operation until all required core is cut away from around the routed hole. See Section B-B.

NOTE

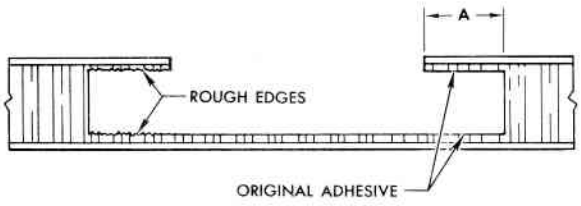
REMOVE ALL CORE IN UNDERCUT AREA UP TO THE ORIGINAL ADHESIVE. SMOOTH OFF ALL ROUGH AND JAGGED EDGES.

CAUTION

DO NOT REMOVE ORIGINAL ADHESIVE UNLESS REQUIRED BY REPAIR INSTRUCTIONS.



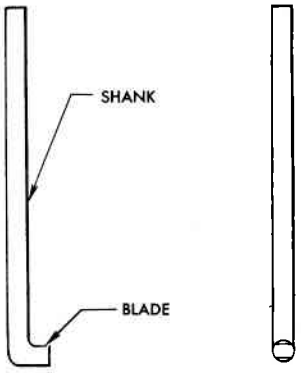
VIEW B

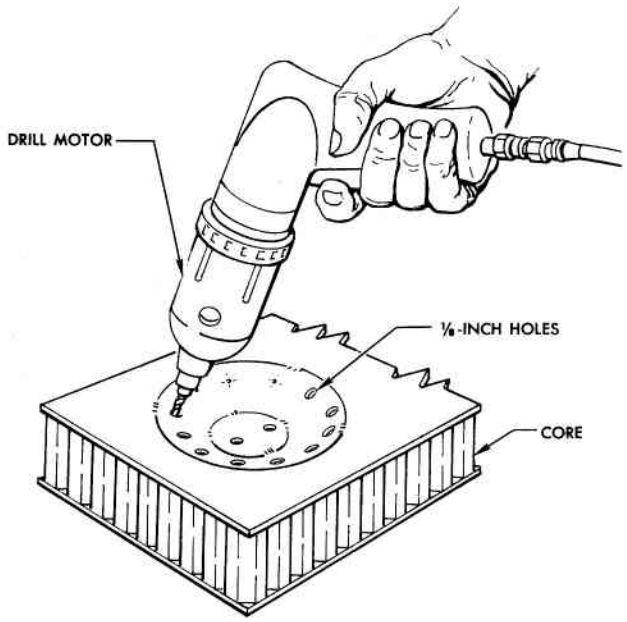


SECTION B-B

.06.03.325

Figure 10-21. Honeycomb Repairs — Hand-Operated Undercutter Assembly





NOTE

THESE TOOLS ARE USED IN CONJUNCTION WITH A ¼-INCH DRILL MOTOR. THEY ARE INSERTED IN ⅛-INCH HOLES TO UNDERCUT HONEYCOMB CORE PRIOR TO APPLICATION OF POTTING COMPOUNDS. THE -95 UNDERCUTS THE CORE TO ¼-INCH, AND THE -97 UNDERCUTS THE CORE TO ⅜-INCH.

PROCEDURE

a. Determine the size of the area to be undercut from repair instructions; select proper tool. Refer to note above.
b. Insert curved end of tool in ⅛-inch hole.
c. Raise drill motor to vertical position forcing cutter end into core.
d. Turn drill chuck by hand to free undercutter in core.
e. Turn on drill motor and undercut core by raising and lowering drill motor until tool contacts the skins.
f. Shut off drill motor and rotate chuck by hand tilting drill motor sufficiently to allow removal of the tool.

NOTE

DO NOT FORCE TOOL AGAINST SKIN.

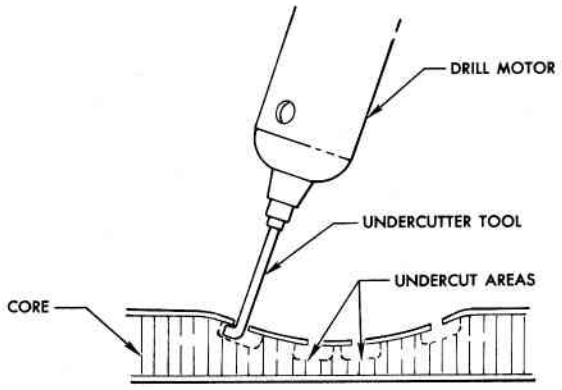


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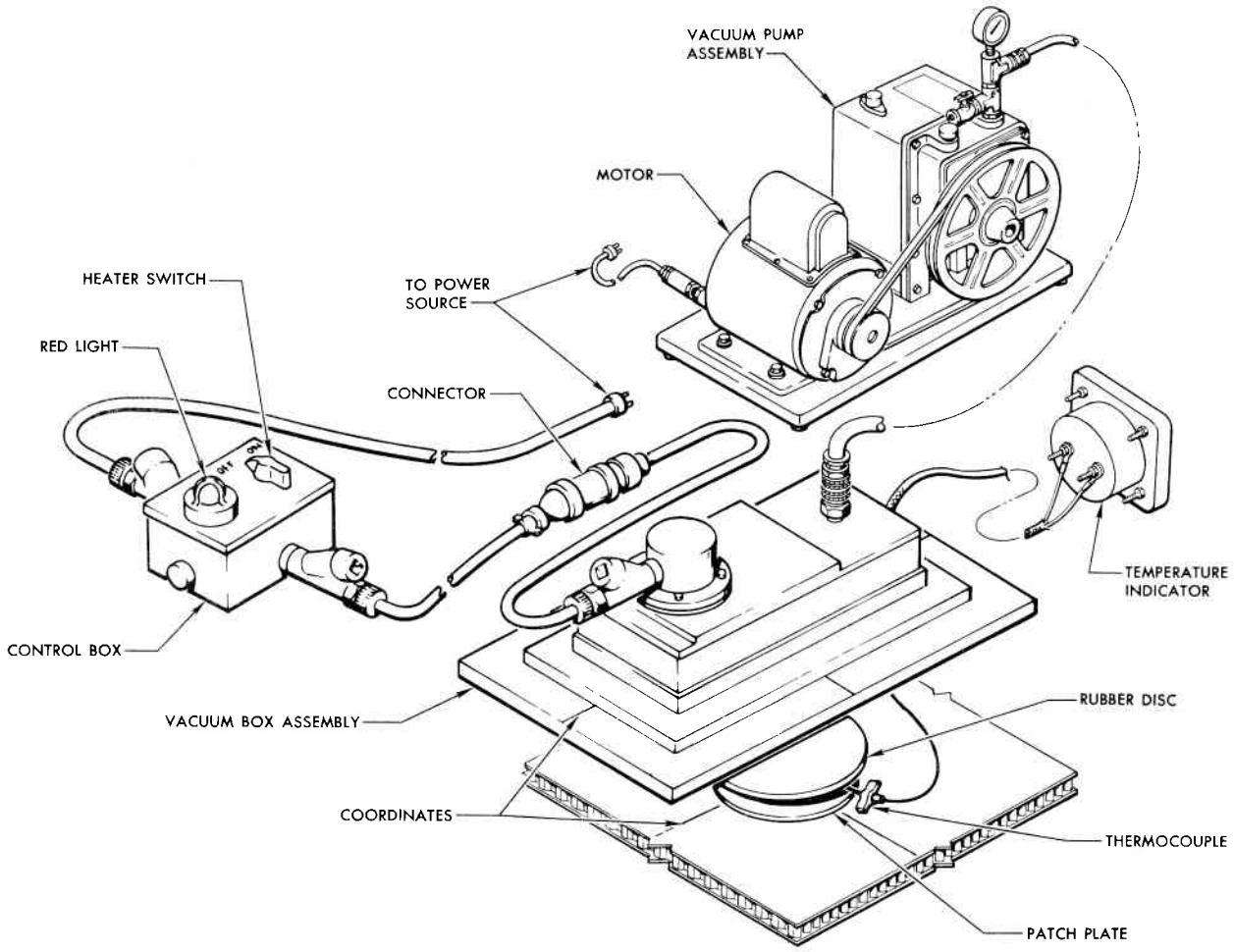
Figure 10-22. Honeycomb Repairs — Power-Operated Undercutter Assembly



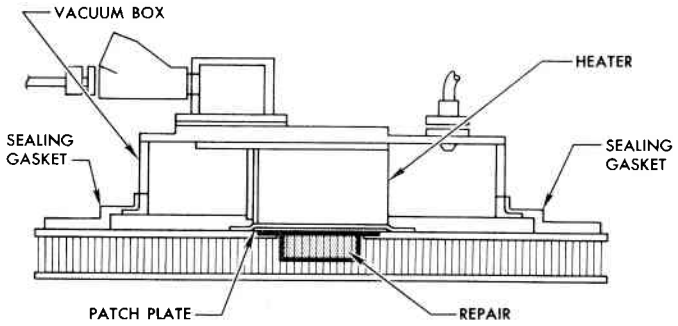
VIEW A
VACUUM BOX AND COMPONENTS

NOTE

THE -99 VACUUM BOX ASSEMBLY IS USED TO APPLY ATMOSPHERIC PRESSURE AND HEAT TO A REPAIR WHILE CURING THE ADHESIVE. IT IS USED IN CONJUNCTION WITH A VACUUM PUMP ASSEMBLY, A CONTROL BOX ASSEMBLY, AND A TEMPERATURE INDICATOR ASSEMBLY. THE CONTROL BOX ASSEMBLY CONTAINS A HEATER SWITCH, A RED LIGHT TO INDICATE WHEN THE HEATER IS IN OPERATION, A FUSE, AND AN ELECTRICAL LEAD. THE TEMPERATURE INDICATOR ASSEMBLY CONSISTS OF TWO THERMOCOUPLES AND TWO INDICATORS.

PROCEDURE

a. Place vacuum box heater switch in "OFF" position. See view A.
b. Plug vacuum box electrical lead into control box connector.
c. Plug control box electrical lead into 110-v ac power source.



VIEW B
VACUUM BOX CUTAWAY

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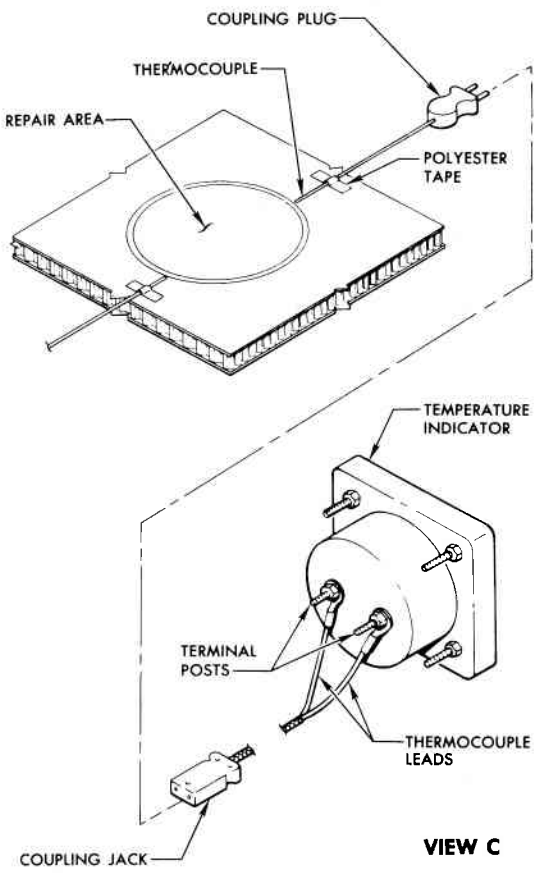
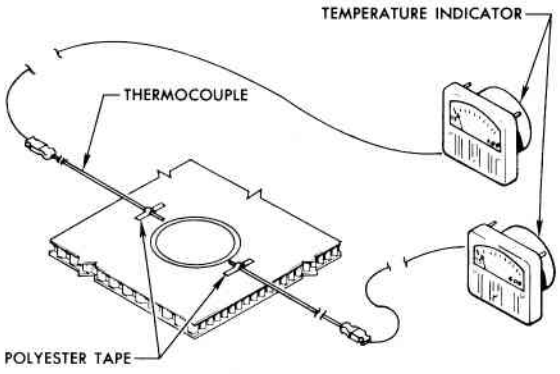
Figure 10-23. Honeycomb Repairs — Vacuum Box Assembly (Sheet 1 of 2)

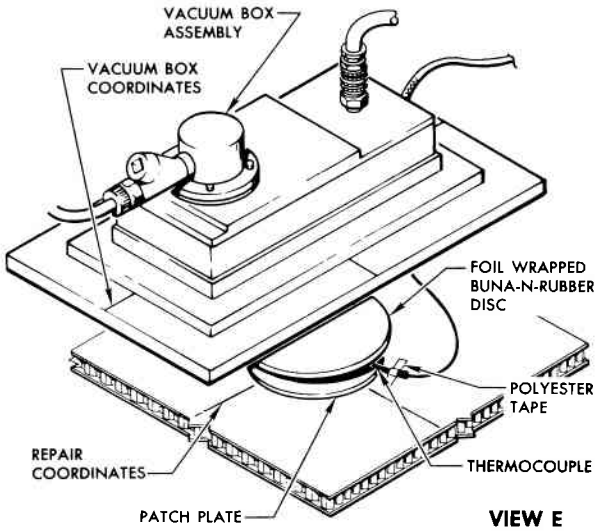


VIEW C

d. Attach thermocouple leads to terminal posts on back of temperature indicators as shown in view C.
e. Tape thermocouples down at edge of repair area using polyester tape #840. See view D.
f. Place temperature indicators in upright position for easy reading.
g. Connect coupling plug to coupling jack.



VIEW D



VIEW E

h. Center foil wrapped Buna-N-Rubber disc over repair patch plate as shown in view E.
i. Place vacuum box over rubber disc and align vacuum box coordinates with repair coordinates.
j. Attach vacuum box to vacuum pump with hose assembly.
k. Close vacuum pump valve by rotating valve handle clockwise.
l. Plug vacuum pump lead into 110-v ac power source.
m. Place vacuum pump switch in the "ON" position.
n. Allow vacuum pump gage to attain a reading of 20 to 30-inches of mercury vacuum.

NOTE
IF VACUUM GAGE DOES NOT ATTAIN A READING OF 20 INCHES OF MERCURY VACUUM, CHECK VACUUM BOX SEALING GASKET AND HOSE CONNECTIONS.

o. Place vacuum box heater switch in the "ON" position.

NOTE
WHEN HEATER SWITCH IS IN "ON" POSITION, THE RED LIGHT ILLUMINATES. WHEN THE RED LIGHT GOES OFF, HEATER TEMPERATURE HAS REACHED 350°F. THE RED LIGHT WILL GO ON AND OFF THROUGHOUT THE CURE CYCLE.

p. Start timing the cure cycle when the red light goes off the first time.
q. Cure adhesives per repair instructions monitoring temperature indicators as specified.
r. Place heater and vacuum pump switches in the "OFF" position when cure cycle is completed.
s. Turn vacuum pump handle in counterclockwise direction to allow atmospheric pressure to enter vacuum box.
t. Remove vacuum box from the repair area.

WARNING

USE ASBESTOS GLOVES WHEN HANDLING HOT VACUUM BOX.

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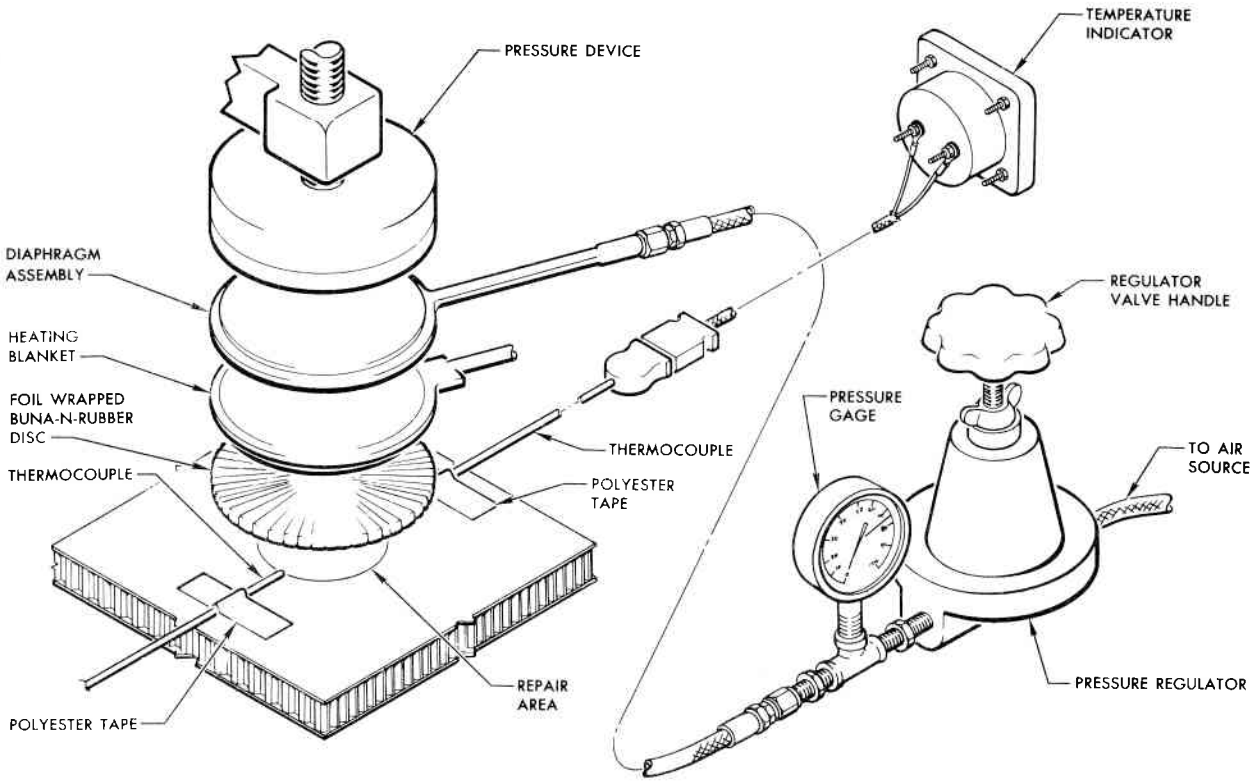
*Figure 10-23. Honeycomb Repairs — Vacuum Box **Assembly (Sheet 2 of 2)***



NOTE

DIAPHRAGM ASSEMBLIES ARE USED IN CONJUNCTION WITH CLAMP ASSEMBLIES TO PROVIDE MEASURED PRESSURE TO REPAIR AREAS. THE -839 AND THE -841 AIR DIAPHRAGM ASSEMBLIES REQUIRE A 75 TO 100 PSI AIR SOURCE WITH PRESSURE BEING REGULATED BY AN AUTOMATIC REGULATOR.

PROCEDURE

a. Select diaphragm assembly large enough to amply cover repair.
b. Connect diaphragm assembly and regulator together as shown above.
c. With repair parts, rubber, and heating blanket in place, position diaphragm on the center of the repair area.
d. Install thermocouple assembly as described on figure 10-23.
e. Close regulator valve by turning knob counterclockwise.
f. Connect 75 to 100 psi air source to regulator.
g. Turn regulator knob slowly clockwise to obtain pressure required by repair instructions.

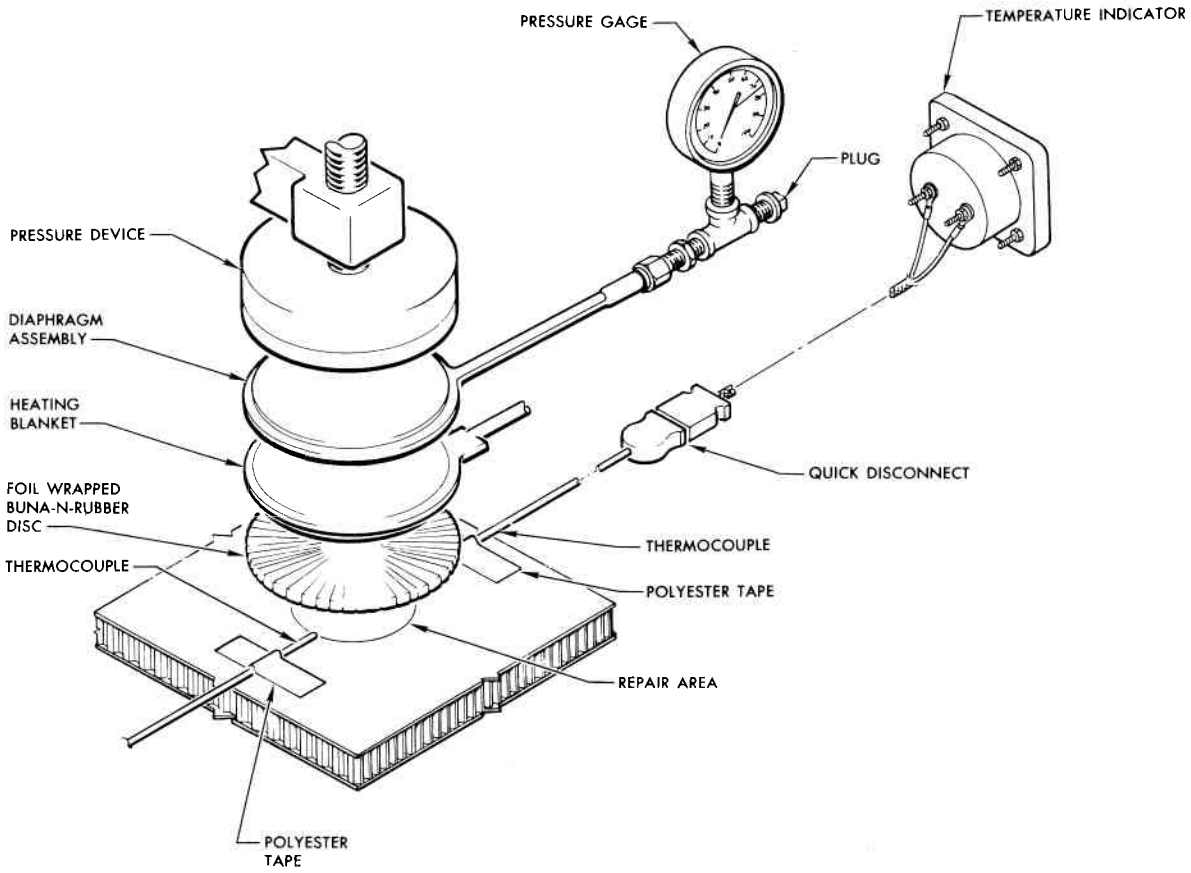
CAUTION

DO NOT EXCEED 75 PSI PRESSURE.

h. Cure adhesives per repair instructions regulating temperature and pressure indications as required.
i. Close regulator valve and disconnect air source from regulator upon completion of cure cycle.
j. Open regulator valve and bleed off diaphragm pressure.
k. Allow diaphragm assembly to cool and remove from repair area.

06.03.328

Figure 10-24. Honeycomb Repairs — Air Diaphragm Assembly



NOTES

1. DIAPHRAGM ASSEMBLIES ARE USED IN CONJUNCTION WITH CLAMP ASSEMBLIES TO PROVIDE MEASURED PRESSURE TO REPAIR AREAS. THE -843 AND THE -845 HYDRAULIC DIAPHRAGM ASSEMBLIES DO NOT FURNISH PRESSURE BUT DO REGISTER PRESSURE APPLIED BY CLAMP ADJUSTMENT.
2. PRIOR TO USE, IT IS NECESSARY TO PROPERLY FILL THE DIAPHRAGM WITH FLUID, SPECIFICATION MIL-H-8446B. TO ACCOMPLISH THIS, REMOVE PLUG AND FILL COMPLETELY FULL OF FLUID. REPLACE PLUG FINGER TIGHT. PLACE IN PLATEN PRESS WITH HEAT BLANKET AND HEAT TO 300°F. LOOSEN PLUG AND ALLOW EXCESS FLUID TO DRIP OFF UNTIL PRESSURE INDICATOR READS ZERO.

PROCEDURE

a. Select diaphragm assembly large enough to amply cover repair.
b. With repair parts, rubber, and heating blanket in place, position diaphragm on the center of the repair area.
c. Install thermocouple assembly as described on figure 10-23.
d. Position clamp on center of diaphragm and tighten finger tight.
e. Turn on the heat blanket.
f. Observe pressure gage and adjust clamp screw to maintain pressure required by repair instructions.

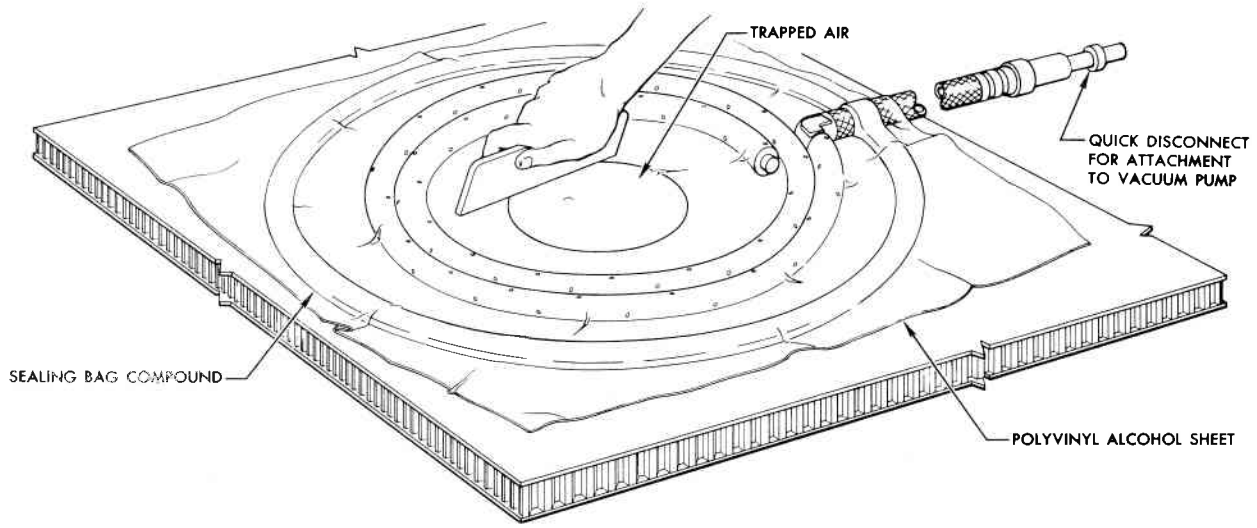
CAUTION

DO NOT EXCEED 75 PSI PRESSURE.

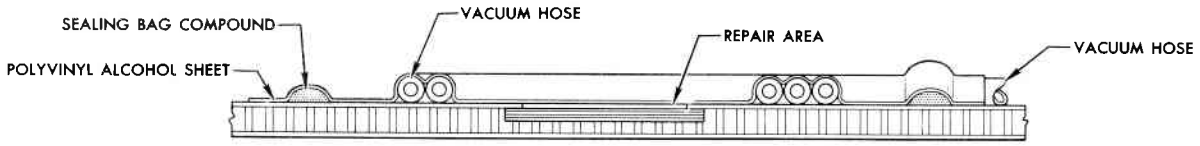
g. Cure adhesives per repair instructions regulating temperature and pressure as required.
h. Allow diaphragm assembly to cool and remove from repair area.

06.03.329

Figure 10-25. Honeycomb Repairs — Hydraulic Diaphragm Assembly



VIEW A



SECTION A-A

NOTE

THE -801 VACUUM BAG IS USED TO PROVIDE ATMOSPHERIC PRESSURE TO THE REPAIR AREA WHILE CURING ADHESIVES. THIS IS ACCOMPLISHED BY USE OF A VACUUM SOURCE TO REMOVE ATMOSPHERIC PRESSURE BETWEEN A POLYVINYL ALCOHOL SHEET AND THE REPAIR. VACUUM IS PROVIDED BY THE VACUUM PUMP USED WITH THE VACUUM BOX ASSEMBLY SHOWN IN FIGURE 10-23.

PROCEDURE

a. With repair ready for bonding per repair instructions, place a ¾-inch strip of 3985 sealing bag compound (W. P. Fuller Co., Los Angeles, Calif.) in a two-foot circle around the repair area. Pack in around the vacuum hose outlet.
b. Spread a polyvinyl alcohol sheet over the repair and press against the sealing bag compound.
c. Attach vacuum pump hose to sealing bag quick disconnect.
d. Close vacuum pump valve by rotating valve handle clockwise.
e. Plug vacuum pump lead into 110-v ac power source.
f. Place vacuum pump switch in the "ON" position.
g. Allow pump to attain a reading of 26-inches of mercury vacuum.

NOTE

IF VACUUM GAGE DOES NOT ATTAIN A READING OF 26-INCHES OF MERCURY VACUUM, CHECK SEALING AND CONNECTIONS.

.06.03.330

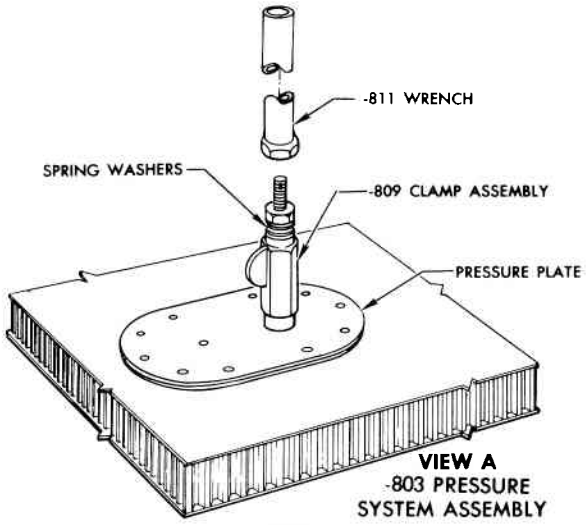
h. Remove air trapped between repair and polyvinyl alcohol sheet by smoothing sheet and forcing air to the edge as shown in view A.
i. Place heating blanket over repair area.

NOTE

SILICONE RUBBER HEATING BLANKETS MAY BE PROCURED FROM SAFEWAY HEAT ELEMENTS CO., MIDDLETOWN, CONN. TEMPERATURE OF THE BLANKET MUST BE MONITORED BY THERMOCOUPLES WITH TEMPERATURE INDICATORS AND CONTROLLED BY A MODEL 2PE136 VARIABLE TRANSFORMER (SUPERIOR ELECTRIC CO., BRISTOL, CONN.). FOR INFORMATION CONCERNING THERMOCOUPLE INSTALLATION, SEE FIGURE 10-23.

j. Place asbestos pad on heating blanket and tape in place.
k. Cure adhesives per repair instructions monitoring temperature indicators as specified.
l. Turn off heating blanket upon completion of cure cycle.
m. Turn vacuum pump handle in counterclockwise direction to allow atmospheric pressure to enter the vacuum bag.
n. After the assembly has cooled, remove the vacuum bag assembly from the repair.

Figure 10-26. Honeycomb Repairs — Vacuum Bag Assembly



VIEW A
-803 PRESSURE SYSTEM ASSEMBLY

NOTE

THE SPRING WASHERS, STACKED AS SHOWN, APPLY A LOAD OF APPROXIMATELY 70 POUNDS WHEN FULLY COMPRESSED. A LOAD OF 50-60 POUNDS PER CLAMP IS SUFFICIENT IN REPAIR WORK. THEREFORE, WASHER DEFLECTION WITH AN OBSERVABLE GAP OF APPROXIMATELY 0.015-INCH IS REQUIRED.

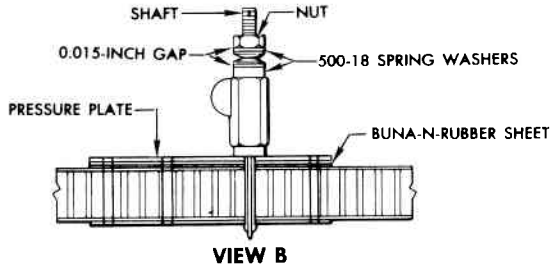
PROCEDURE

a. With repair patch, rubber sheet and pressure plate in place, drill out the 0.093 pilot holes to 0.1285-inch diameter with a No. 30 drill bit.
b. Screw the nut, on -809 clamp assembly, to top threads. Push down on shaft until nut is pushed completely down on the washers.
c. Insert the -809 clamp assembly through pressure plate hole, forcing the jaws through the rubber sheet. Push the -809 clamp assembly until it rests on the pressure plate.
d. Pull the nut until the jaws in -809 clamp engage.
e. Screw the nut down to the washers finger tight.
f. Install additional -809 clamps approximately one inch apart.
g. Tighten the nut on -809 clamps with -811 wrench until gap at edge of spring washers is approximately 0.015 inch.

CAUTION

DO NOT OVERTIGHTEN NUT AS UNDERSKIN MAY BE DAMAGED.

h. After repair bonding is accomplished and parts have cooled, screw the nut to the top of threads. Push shaft down until the nut is down on the washers.
i. Twist the clamp to break any bond attachment.
j. Remove clamps, pressure plates and rubber sheet. Proceed with repair instructions.



VIEW B
-803 PRESSURE SYSTEM ASSEMBLY

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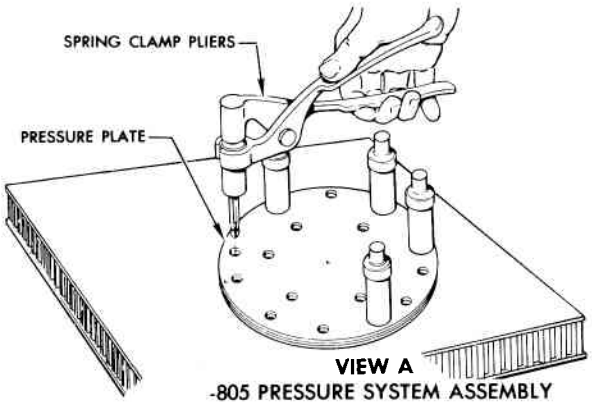


VIEW A
-805 PRESSURE SYSTEM ASSEMBLY

NOTE

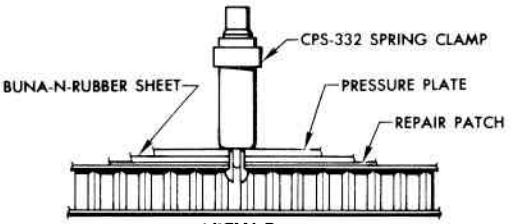
CPS-332 SPRING CLAMP HAS A SPRING LOAD OF 30 POUNDS AT 1/16-INCH EXTENSION TO 45 POUNDS AT 3/16-INCH EXTENSION. SPACE SPRING CLAMPS AT APPROXIMATELY 1-INCH APART FOR ADEQUATE PRESSURE.

PROCEDURE

a. Ascertain that repair patch, rubber sheet and pressure plate are in place.
b. Using the clamp pliers (Model 300), extend the clamp jaws and insert in pressure plate hole. Push the clamp jaws through the rubber sheet and into hole in the structure.
c. Release the pliers to engage the clamp.
d. Install spring clamps in all pressure plate holes and proceed with repair bonding instructions.
e. After repair bonding is accomplished and parts have cooled, remove all clamps, pressure plate, and rubber sheet.

NOTE

TWIST THE CLAMP TO BREAK ANY BOND ATTACHMENT.



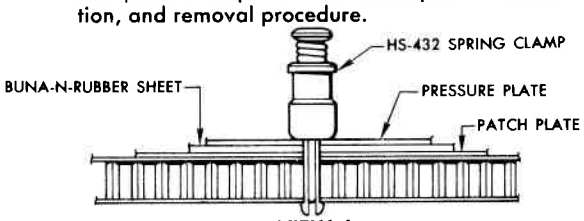
VIEW B
-805 PRESSURE SYSTEM ASSEMBLY

NOTE

HS-432 SPRING CLAMP HAS A SPRING LOAD OF 45 POUNDS AT 3/16-INCH EXTENSION TO 65 POUNDS AT 1/2-INCH EXTENSION. SPACE SPRING CLAMPS AT APPROXIMATELY 1-INCH APART.

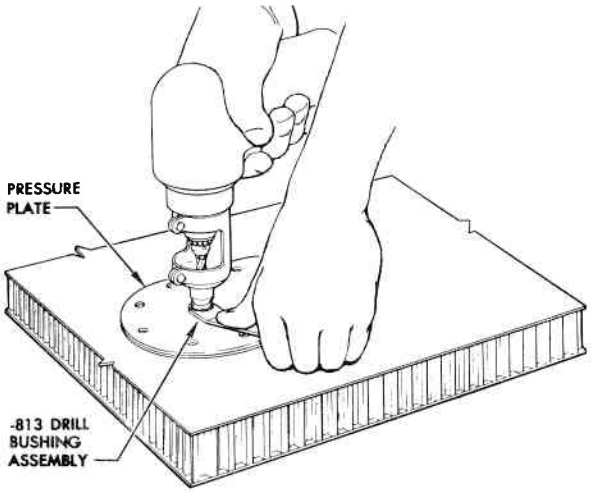
PROCEDURE

a. With repair patch, rubber sheet and pressure plate in place, drill out the 0.093 pilot holes to 0.1285-inch diameter with a No. 30 drill bit.
b. See Views A and B in -805 pressure system assembly, and perform steps "b" and subsequent in installation, and removal procedure.



VIEW A
-807 PRESSURE SYSTEM ASSEMBLY

Figure 10-27. Honeycomb Repairs — Pressure Systems



NOTES

1. THESE PLATES ARE USED WITH -813 DRILL BUSHING ASSEMBLY AND AN 0.093 DRILL TO PILOT DRILL REPAIR PARTS. THEY ARE ALSO USED WITH SPRING CLAMPS AS PRESSURE DISTRIBUTION PLATES FOR BONDING REPAIRS WHEN ASSEMBLED AS SHOWN ON FIGURE 10-27 FOR THE -803, -805, AND -807 PRESSURE SYSTEMS.
2. THE PRESSURE PLATES ARE MADE FROM 2024 ALUMINUM, SPECIFICATION QQ-A-362. AFTER FABRICATING THE PLATES, STENCIL IN ⅜ OR ½ INCH NUMERALS LOCATED APPROXIMATELY AS SHOWN TO IDENTIFY THE PLATE.
3. PRESSURE PLATES MUST HAVE ONE SIDE FLAT AS REQUIRED ON ORIGINAL SHEET MATERIAL. LIGHT SANDING TO OBTAIN A FLAT SURFACE IS ACCEPTABLE.
4. PRESSURE PLATES -315 THRU -321 ARE SIMILAR TO THOSE SHOWN. FOR DETAILED INFORMATION, SEE PRESSURE PLATE TABLE ON SHEET 2.

PROCEDURE

a. Coordinate #60 holes on the axes with repair. Coordinate axes to properly locate pattern in the structure.
b. Coordinate patch plate and pressure plate outside diameter to properly locate patch plate holes.
c. The -827 and -829 pressure plates are used with flush patches of smaller diameter. Locate the center of the patch, mark it with a grease pencil, and locate holes by sight through the center hole in the pressure plate.

NOTE

THE 0.125 INCH CENTER HOLE IN THE PRESSURE PLATE IS NOT FOR DRILLING PURPOSES.

d. If hole pattern in doubler and skin has been located and drilled, a more precise patch location is obtained by installing doubler and patch in repair location, placing template on top and securing with spring clamps. Drill the inside row of holes through patch and doubler. If holes through doubler and skin have not been drilled, template should be taped in place to prevent shifting during the drilling of holes.
e. Install patch and pressure plate assembly in conjunction with Buna-N-Rubber sheet and spring clamps. See figure 10-27 for the use of pressure plates.

NOTE

BUNA-N-RUBBER SHEET (UNCURED—1/16 INCH THICK) CAN BE OBTAINED FROM KIRKHILL RUBBER CO., 300 EAST CYPRUS STREET, BREA, CALIFORNIA. USE PRESSURE PLATE AS A TEMPLATE FOR CUTTING THE BUNA-N-RUBBER SHEET TO SIZE.

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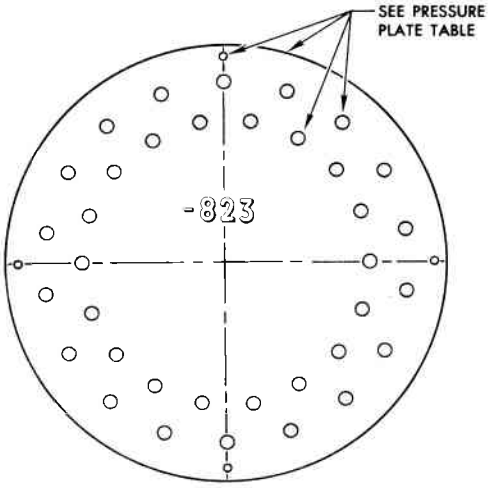
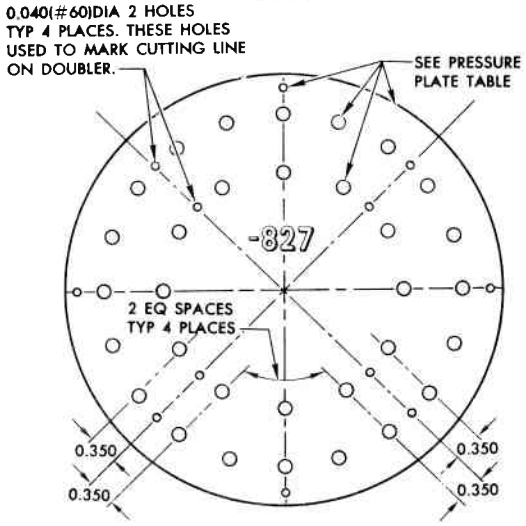




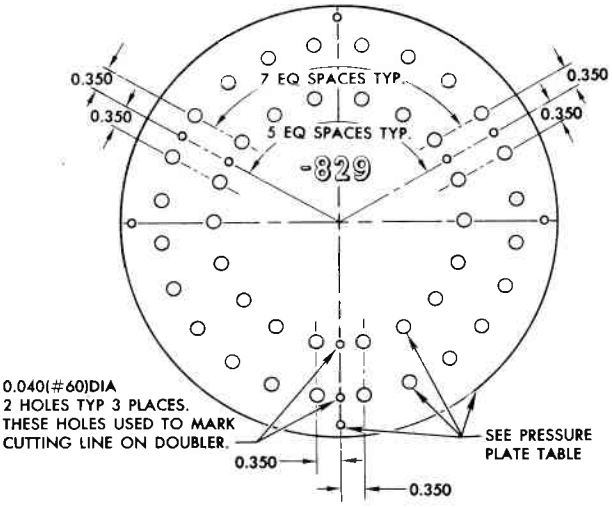
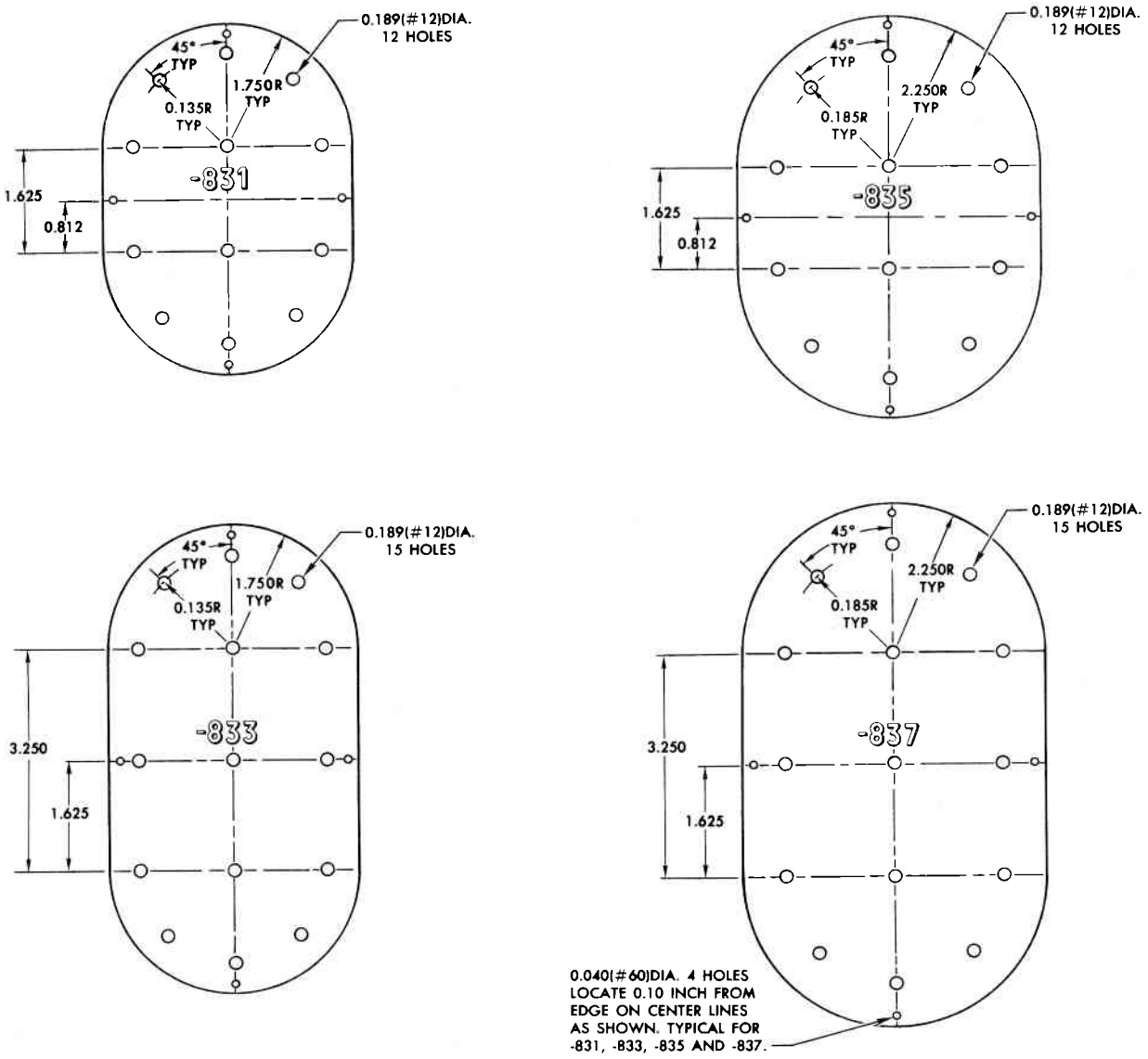


Figure 10-28. Honeycomb Repairs — Pressure Plates (Sheet 1 of 2)



PRESSURE PLATE TABLE

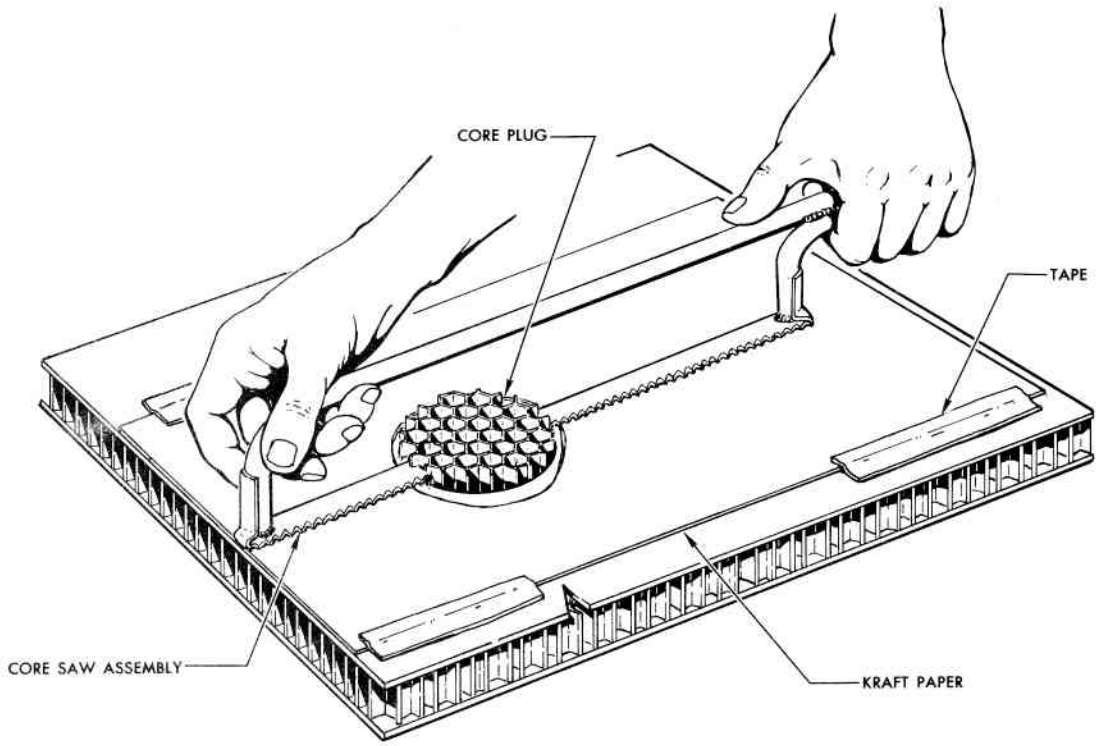
THIS TABLE GIVES DATA NOT OTHERWISE SHOWN. NUMBER OF SPACES EQUAL NUMBER OF NO. 12 HOLES REQUIRED. FOUR NO. 60 HOLES REQUIRED PER PART. LOCATE AND STAGGER AS SHOWN.

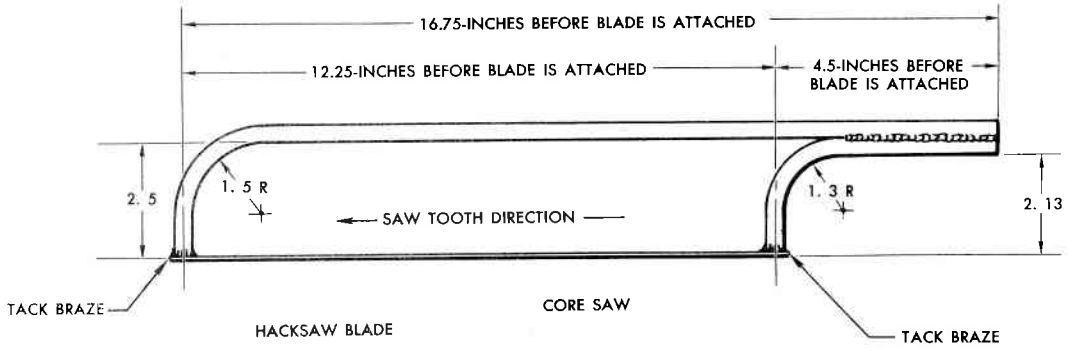
PLATE DASH NO.	PLATE OUTSIDE DIA.	0.189 (NO. 12) DIAMETER HOLES				0.040 (NO. 60) 2 HOLES DIA.	CENTER HOLE SIZE
		OUTSIDE ROW		INSIDE ROW			
		DIA.	SPACES	DIA.	SPACES		
815	3.200	2.600	12	1.600	6	3.00	.125
817	4.200	3.600	12	2.600	12	4.00	.125
819	5.200	4.600	18	3.600	18	5.00	.125
821	6.200	5.600	18	4.600	18	6.00	.125
823	7.200	6.600	18	5.600	18	7.00	.125
825	8.200	7.600	18	6.600	18	8.00	.125
827	4.500	3.750	20 HOLES	2.250	12 HOLES	4.30	.125
829	6.000	5.250	24 HOLES	3.750	18 HOLES	5.80	.125

NOTE:
PRESSURE PLATE (TEMPLATES) REFER TO SHEET 1 FOR METHOD OF FABRICATION.

06.03.332-2

Figure 10-28. Honeycomb Repairs — Pressure Plates (Sheet 2 of 2)





NOTE

THE CORE SAW IS USED FOR ROUGH CUTTING THE CORE PLUGS AND ALUMINUM TUBES NEARLY FLUSH WITH SURFACE OF SKIN WHEN PERFORMING HONEYCOMB REPAIRS WHERE HOLES HAVE BEEN ROUTED OUT. FABRICATE CORE SAW AS SHOWN USING 3/8-INCH O.D. STEEL ROD FOR CORE SAW FRAME AND HACKSAW BLADE WITH VERY FINE TEETH. BRAZE THE FRAME TOGETHER TO DIMENSION SHOWN. SPRING THE LEGS TOGETHER TO CENTER THEM OVER HOLES IN BLADE. TACK BRAZE BLADE TO FRAME AS SHOWN.

PROCEDURE

a. Apply 2 layers of #850 tape around ends of blade. and up into the frame legs. Masking tape can be used in place of #850 tape.
b. Cut a hole, the size of core plug, on the center of a piece of Kraft paper approximately 18 inches.
c. Place the Kraft paper over the core plug, and attach the paper with masking tape to the surface of skin to be repaired.

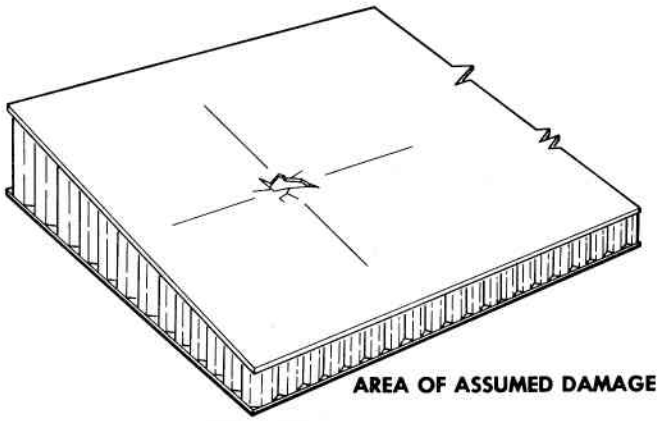
NOTE

THE #850 TAPE AND MASKING TAPE ARE USED TO PROTECT THE SURFACE SKIN FROM BEING SCRATCHED.

d. Cut off the core plug and tube as close to the skin surface as possible being careful not to scratch the skin.
e. Remove Kraft paper. Finish machining core plug with router assembly. See figure 10-14 for instructions on use of router assembly.

.06.03.333

Figure 10-29. Honeycomb Repairs — Core Saw



REPAIR NO. 1

NOTE

REPAIR NO. 1 IS FOR REPAIR OF HOLES THROUGH BOTH SIDES OF PANEL USING E3045 CORE FILLER TO FILL ROUTED HOLE. MAXIMUM ALLOWABLE HOLE DIAMETER IS 6 INCHES.

PROCEDURE

a. Determine diameter of damage area with damage locating template; see figure 10-11.
b. Select proper patch plates. See figure 10-12.
c. Prepare and clean skin surfaces. Use steps 4 through 7, figure 10-13.
d. Route out damaged area to a round, preselected size; see View A. Use -3 router assembly and -53 router turntable assembly; or hole saws and hole saw guide templates. Use these tools in accordance with instructions contained in this section.
e. Clean upper and lower patch plate bonding area on skin. Use steps 8, 9, 10, and 11, figure 10-12.

CAUTION

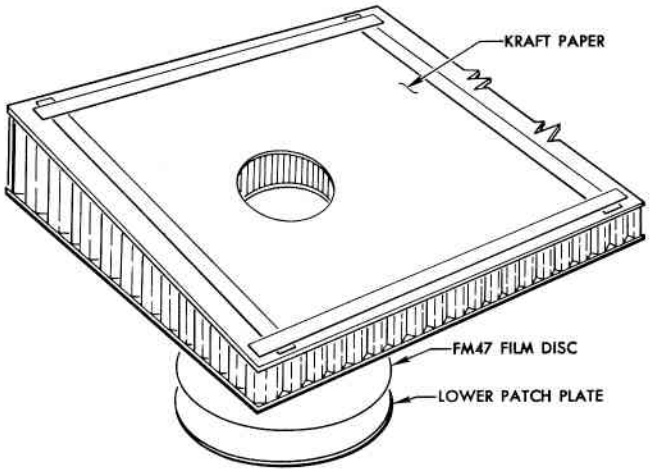
HONEYCOMB CORE MUST BE KEPT DRY AND CLEAN. ADHESIVES WILL NOT BOND TO WET SURFACES.

f. Brush thin coat of liquid primer FM47 on patch plate area. (Both upper and lower skin.)
g. Tape Kraft paper over repair area. Cut hole through paper around routed hole; see View A.
h. Cut a disc of film FM47 1/16-inch larger than lower patch plate.

CAUTION

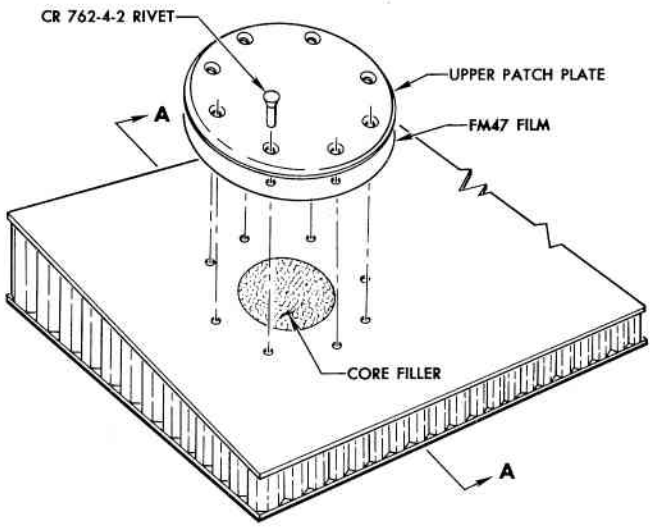
USE CLEAN WHITE GLOVES TO HANDLE FILM TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.

i. Install film disc FM47 and patch plate to lower repair area. Hold in place with tape #850; see View A.
j. Mix core filler E3045 in accordance with Table 10-1 and fill repair 1/32-inch above skin. Work in with a spatula or tongue blade until all air bubbles have been removed and core filler is solid and smooth.
k. Cure core filler. See Table 10-1. Sand down to contour of existing skin; see View B.
l. Remove Kraft paper and install upper patch plate over film disc FM47; see View B.
m. Drill rivet pattern for patch plates selected from figure 10-12.
n. Bond and cure repair parts to skin; see Section A-A. Use heat lamp, pressure plate, and -805 pressure system. See figure 10-27 and 10-28 for pressure plate and pressure system instructions. Refer to Table 10-1 for FM47 film curing instructions.
o. Install rivets in patch plates and mill rivets flush in accordance with figure 10-12. See Section A-A for cross-section of completed repair.

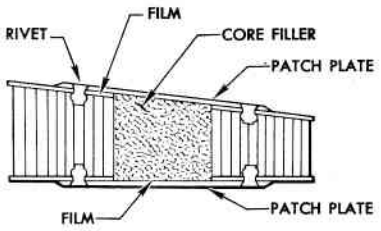


VIEW A

ROUT OUT DAMAGE. TAPE KRAFT PAPER, ADD LOWER DISC AND PATCH PLATE.



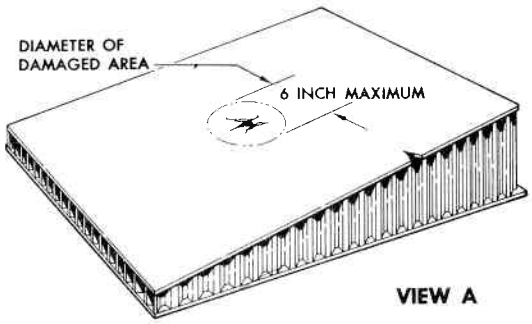
VIEW B



SECTION A-A
COMPLETED REPAIR

.06.03.296B

Figure 10-30. Honeycomb Repair No. 1 — Hole



VIEW A

REPAIR NO. 2

NOTE

REPAIR NO. 2 IS FOR REPAIR OF HOLES THROUGH BOTH SIDES OF PANEL. USE A ⅛-INCH CELL HEX CELL PERFORATED ALUMINUM HONEYCOMB CORE PLUG AND AN ALUMINUM TUBE SHEET TO FILL ROUTED HOLE. MAXIMUM ALLOWABLE HOLE DIAMETER IS 6 INCHES.

PROCEDURE

a. Determine diameter of damaged area with damage locating template; see figure 10-11.
b. Select proper patch plates. See figure 10-12.
c. Prepare and clean skin surfaces. Use steps 4 through 7 of figure 10-13.
d. Route out damaged area to a round, preselected size. Use -3 router assembly and -53 router turntable assembly; see figure 10-14 and 10-19 for operating instructions.
e. Clean upper and lower patch plate bonding area on skin. Use steps 8, 9, 10, and 11 of figure 13.

CAUTION

HONEYCOMB CORE MUST BE KEPT DRY AND CLEAN. ADHESIVES WILL NOT BOND TO WET SURFACES.

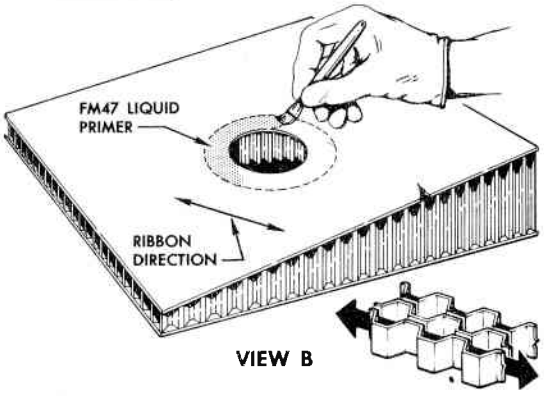
f. Brush a thin coat of FM47 liquid primer on patch plate area. (Both upper and lower skins.)
g. On skin near routed hole, mark ribbon direction.

CAUTION

USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.

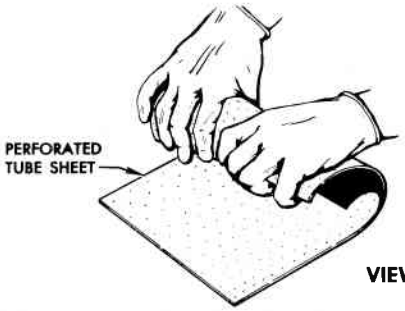
NOTE

FOR 1 INCH DIAMETER REPAIR, OMIT CORE PLUG INSTALLATION. PERFORM THE FOLLOWING REPAIR STEPS USING ONLY A TUBE SHEET OF THE CORRECT SIZE. USE E3045 CORE FILL IN PLACE OF THE CORE PLUG. REFER TO TABLE 10-1 FOR CORE FILL MIXING, APPLICATION, AND CURING INSTRUCTIONS.



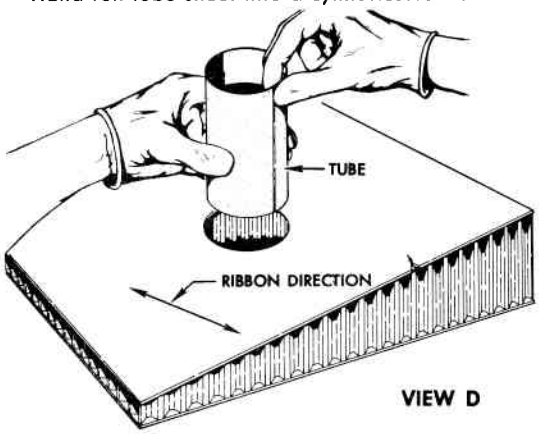
VIEW B

.06.03.334-1



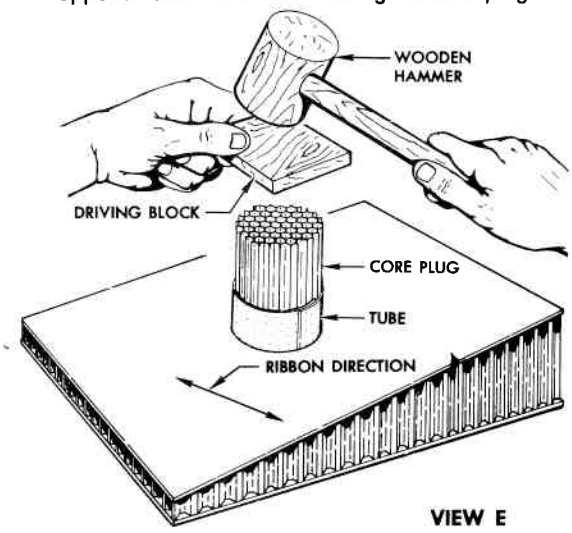
VIEW C

h. Select correct tube sheet for diameter core plug being used from the core plug and tube sheet table. Hand roll tube sheet into a cylindrical form.



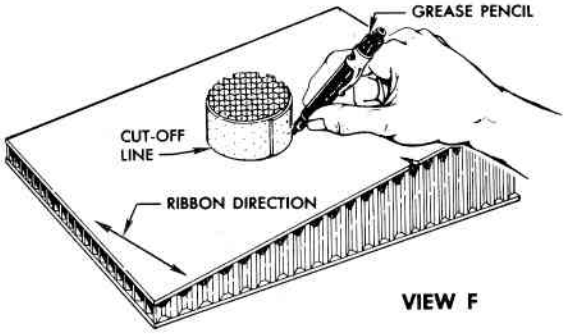
VIEW D

i. Cut tube sheet to length to obtain approximately ½-inch overlap when placed in routed hole. Correct length will be 3.14 x hole diameter +0.50-inch.
j. Push tube sheet into routed hole and slightly through the far side of skin.
k. Place proper size core plug inside tube sheet. Core plug ribbon shall run parallel to mark placed on skin in step "g."
l. With a wooden driving block and hammer, drive core plug into the tube sheet. Have an assistant hold a block or plate against tube sheet on the opposite side while also holding the core plug.



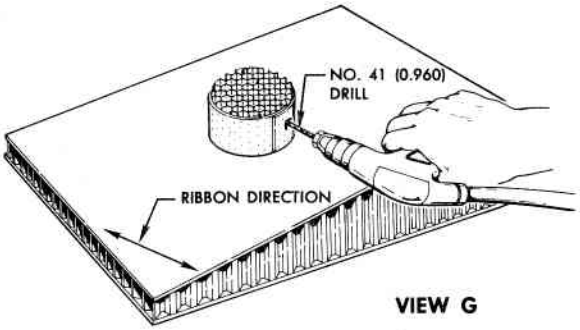
VIEW E

Figure 10-31. Honeycomb Repair No. 2 — Hole (Sheet 1 of 3)



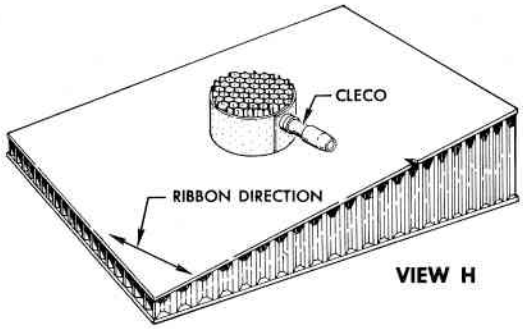
VIEW F

m. Scribe mark a cut-off line on tube sheet at skin levels. With a grease pencil, mark core and tube sheet positions.

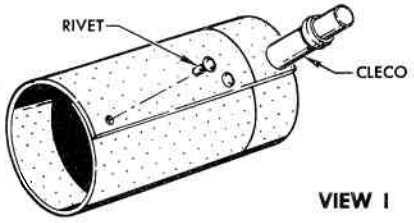


VIEW G

n. Drill a cleco hole and install cleco as shown to hold tube sheet to proper size. Use a No. 41 (0.960) drill.
o. Remove tube sheet and core plug from panel and fasten tube sheet in a cylindrical form with spring clamps.

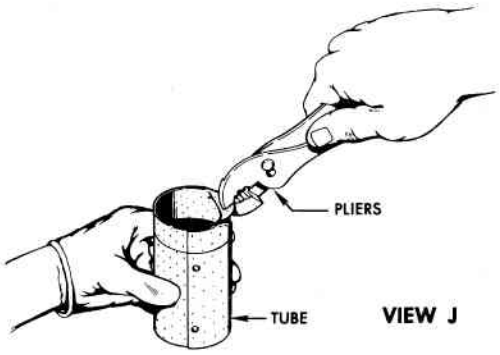


VIEW H



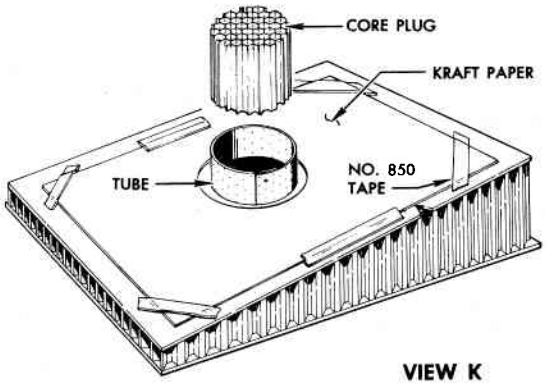
VIEW I

p. Drill at least two holes with a No. 50 (0.70) drill and install 1/16-inch diameter aluminum brazier head rivets to hold tube sheet in shape.



VIEW J

q. Bend tube sheet with pliers as shown in View J for tube sheet and core plug final installations.

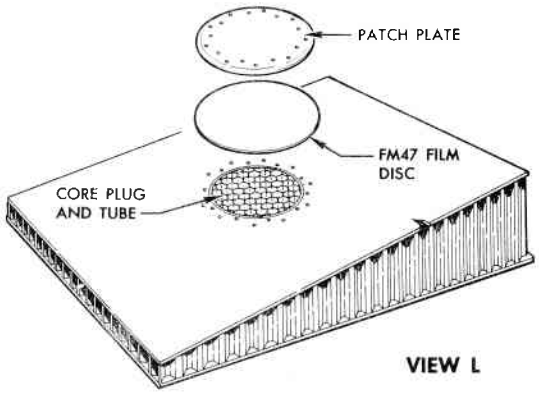


VIEW K

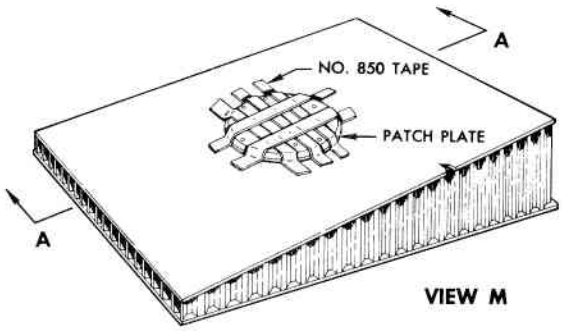
r. Tape Kraft paper over repair area. Cut hole through paper around routed hole; see View A.
s. Apply 338 adhesive to inside of routed hole. Refer to Table 10-1 for adhesive mixing instructions.
t. Place tube sheet in proper position in routed hole. With a tongue blade, work adhesive out through tube sheet perforations to fill space outside tube.
u. Apply 338 adhesive to core plug and place core plug in proper position in panel. Repeat steps "k" and "l."
v. Cure 388 adhesive with heat lamps in accordance with Table 10-1.
w. Cut away excess core and tube sheet 1/32-inch to 1/16-inch above skin levels with -861 core saw. See figure 10-29 for core saw instructions.
x. Machine core and tube sheet 0.004-inch to 0.005-inch above skins, see View L. Use -3 router assembly and a router guide template for oversized hole. See figure 10-14 for -3 router assembly instructions, and figure 10-15 for router guide template instructions.

06.03.334-2

Figure 10-31. Honeycomb Repair No. 2 — Hole (Sheet 2 of 3)

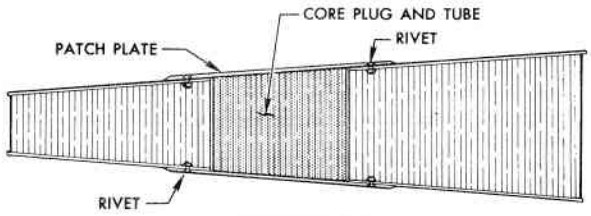


VIEW L



VIEW M

y. Remove Kraft paper. If repair area is contaminated, clean with aliphatic naphtha, Federal Specification TT-N-95, and touch-up any bare spots with FM47 liquid primer.
z. Center patch plates selected from figure 10-12 and pilot-drill rivet patterns. Drill pilot holes through patch plate and skin only.
aa. Cut disc of FM47 film 1/16-inch larger in diameter than patch plates.
ab. Center FM47 film discs on repair. Discs may be held in place with CPS-332 spring clamps.
ac. Apply 1/16-inch coat of EC1469 adhesive with a brush over areas of FM47 film discs which cover core only.
ad. Turn discs over and center EC1469 adhesive area over core. Install patch plates and hold in place with #850 tape.
ae. Bond and cure repair parts to skin. Use heat lamp, pressure plate, and -805 pressure system. See figures 10-27 and 10-28 for pressure system instructions. Refer to Table 10-1 for FM47 film and EC1469 adhesive curing instructions.
af. Drill rivet holes of correct diameter and install rivets to patch plates. Install and mill rivets flush in accordance with figure 10-12. See Section A-A for cross-section of completed repair.



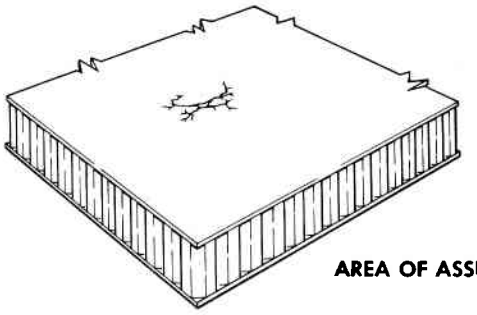
SECTION A-A

CORE PLUG AND TUBE SHEET TABLE		
DAMAGE DIAMETER	CORE PLUG USED (SEE NOTE 1)	TUBE SHEET USED (SEE NOTE 2)
1.000	NONE (USE E 3045 CORE FILLER	0.035 WALL X 1.0 DIAMETER X 5.0 WIDTH (SEE NOTE 3)
2.000	2.0 DIAMETER X 4.0 LENGTH	.012 GAGE X 5.0 WIDTH X 6.7 LENGTH
3.000	3.0 DIAMETER X 4.0 LENGTH	.012 GAGE X 5.0 WIDTH X 9.8 LENGTH
4.000	4.0 DIAMETER X 4.0 LENGTH	.012 GAGE X 5.0 WIDTH X 13.0 LENGTH
5.000	5.0 DIAMETER X 4.0 LENGTH	.012 GAGE X 5.0 WIDTH X 16.2 LENGTH
6.000	6.0 DIAMETER X 4.0 LENGTH	.012 GAGE X 5.0 WIDTH X 19.4 LENGTH

NOTES:
1. CORE PLUG MATERIAL IS PERFORATED 1/8-INCH HEX CELL, 0.002 FOIL HONEYCOMB, SPECIFICATION MIL-C-7438C.
2. TUBE SHEET MATERIAL IS 0.12 GAGE 2024-T3 PERFORATED ALUMINUM ALLOY.
3. TUBE SHEET MATERIAL FOR 1.0-INCH DIAMETER DAMAGE IS 0.035 WALL 5052 ALUMINUM ALLOY.

06.03.334-3

Figure 10-31. Honeycomb Repair No. 2 — Hole (Sheet 3 of 3)



AREA OF ASSUMED DAMAGE

REPAIR NO. 3

NOTE

REPAIR NO. 3 IS FOR REPAIR OF HOLES THROUGH ONE SIDE OF PANEL USING E3045 CORE FILLER TO FILL ROUTED HOLE. MAXIMUM ALLOWABLE CORE HOLE DIAMETER IS 6 INCHES.

PROCEDURE

a. Determine center and diameter of damage; see figure 10-11.
b. Fabricate patch plate; see figure 10-12 for details.
c. Prepare and clean damage area. Perform all steps in figure 10-13.
d. Brush liquid primer FM47 over patch plate attachment area of skin.
e. Rout out damaged area to a round; preselected size; see View A. Use -3 router assembly and proper router guide template. See figure 10-14 for -3 router assembly instructions, and figure 10-15 for router guide template instructions.
f. Blow out burrs and cutter dust with dry, clean, filtered air.
g. Center patch plate selected from figure 10-12 and drill rivet pattern.

CAUTION

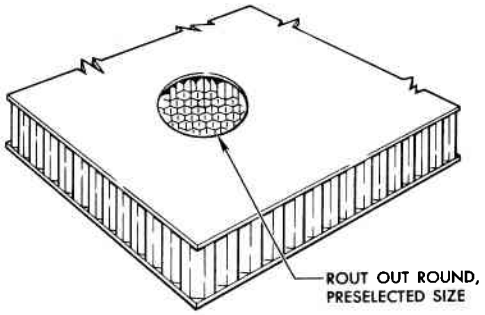
TO PREVENT EXCEEDING DESIRED RIVET HOLE DEPTH, USE A DRILL DEPTH STOP. (SEE VIEW B.) DESIRED RIVET PATTERN MAY ALSO BE DRILLED PROPERLY USING CORRECT PRESSURE PLATE AND -813 DRILL BUSHING ASSEMBLY. SEE FIGURE 10-28 FOR DRILL BUSHING AND PRESSURE PLATE INSTRUCTIONS.

h. Tape Kraft paper over repair area and cut a hole from paper to expose routed hole.
i. Mix core filler E3045 (see Table 10-1 for instructions) and fill core cavity flush at edge of skin and 1/32-inch above in center. See View C.

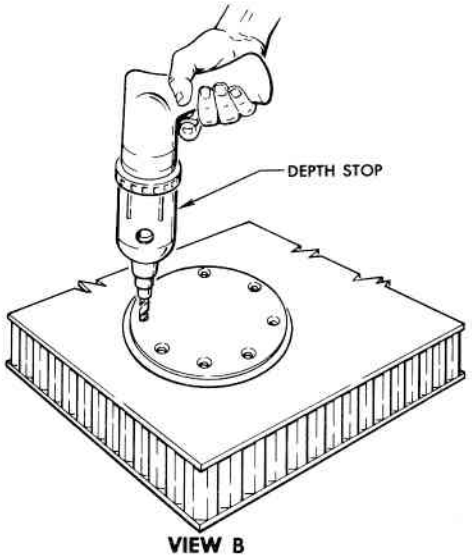
CAUTION

WEAR CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF GREASE OR MOISTURE FROM HANDS.

j. Remove Kraft paper and clean primed area with Aliphatic Naphtha, Specification TT-N-95.
k. Cut a disc from FM47 film 1/16-inch larger in diameter than patch plate and center over repair area. Place patch plate over FM47 film disc. See View C. Hold repair parts in place with #850 tape.
l. Bond and cure repair parts to skin; see Section A-A. Use heat lamp, pressure plate, and -805 pressure system. See figure 10-27 and 10-28 for pressure plate and pressure system instructions. Refer to Table 10-1 for FM47 film curing instructions.
m. Install rivets in patch plate and mill rivets flush in accordance with figure 10-12. See Section A-A for cross-section of completed repair.

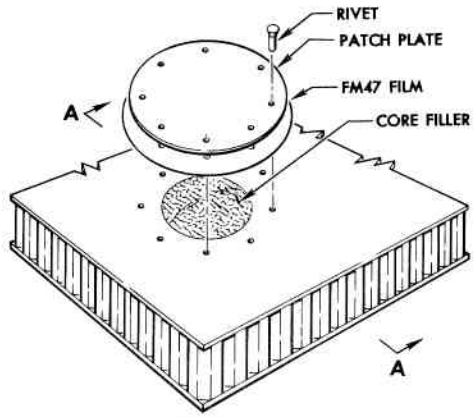


VIEW A

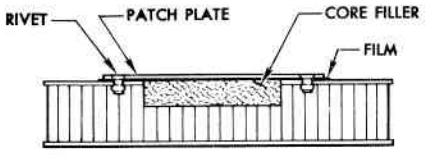


VIEW B

USE A DRILL STOP WHEN DRILLING RIVET HOLES



VIEW C



SECTION A-A

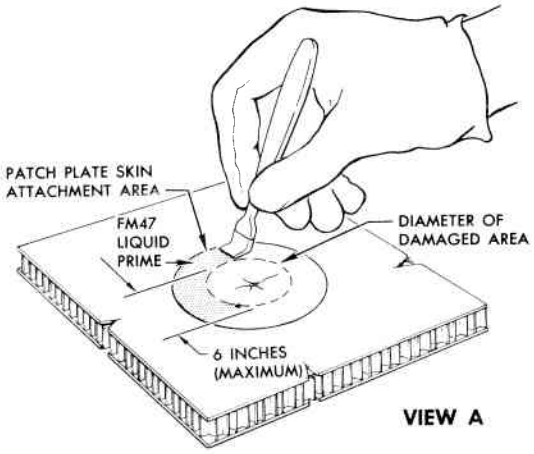
.06.03.297B

Figure 10-32. Honeycomb Repair No. 3 — Hole

REPAIR NO. 4 AND 5

NOTE

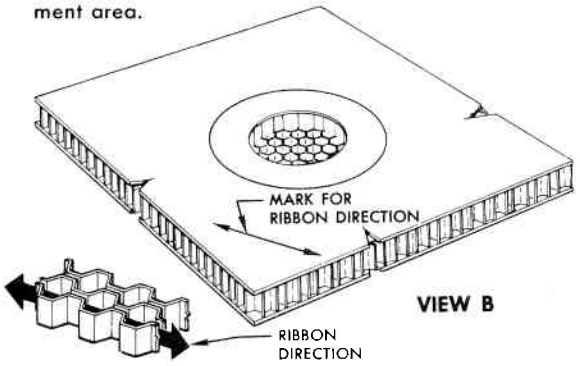
REPAIRS 4 AND 5 ARE FOR HOLES THROUGH ONE SIDE OF PANEL USING A ⅛-INCH CELL HEX-CELL CORE PLUG AND AN ALUMINUM FOIL DISC TO FILL ROUTED HOLE. MAXIMUM ALLOWABLE HOLE DIAMETER IS 6 INCHES. MAXIMUM ALLOWABLE HOLE DEPTH IS 1 INCH. FASTENERS ARE INSTALLED AFTER BONDING IN REPAIR NO. 5 TO SAFEGUARD AGAINST PEEL PROPAGATION.



VIEW A

PROCEDURE, REPAIR NO. 4

a. Determine diameter of damaged area with damage locating template; see figure 10-11.
b. Select proper patch plate and core plug. See figure 10-12.
c. Prepare and clean repair area in accordance with figure 10-13.
d. Brush FM47 liquid prime over patch plate skin attachment area.



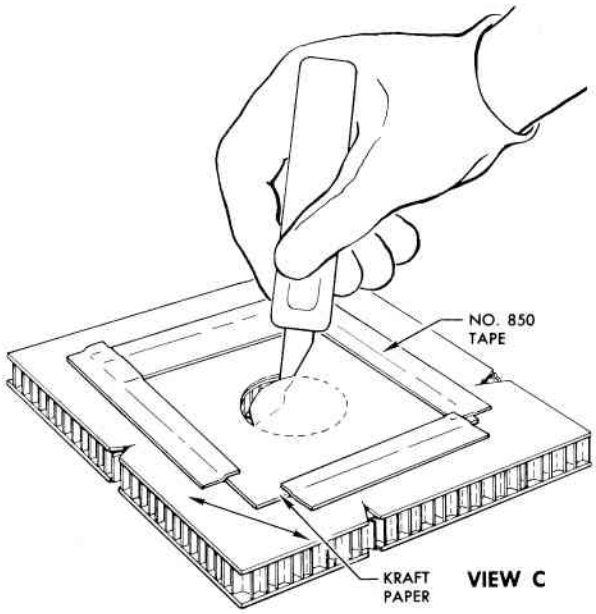
VIEW B

e. Rout out damaged area to a round, preselected size; see view A. Use -3 router assembly and proper router guide template. See figure 10-14 for -3 router assembly instructions, and figure 10-15 for router guide template instructions. Remove damaged core to match applicable dimensions in core plug table, figure 10-12 (hole depth, dimension "C," and core plug thickness, dimension "D"). Blow out burrs and cutter dust with dry, clean filtered air.
f. On skin near routed hole, mark ribbon direction.

CAUTION

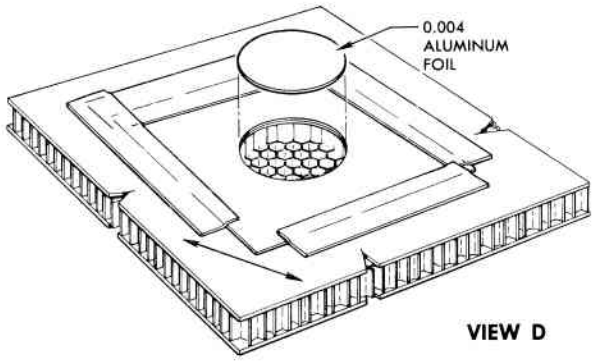
USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS

06.03.335-1



VIEW C

g. Tape Kraft paper over repair area. Cut hole through paper around routed hole;



VIEW D

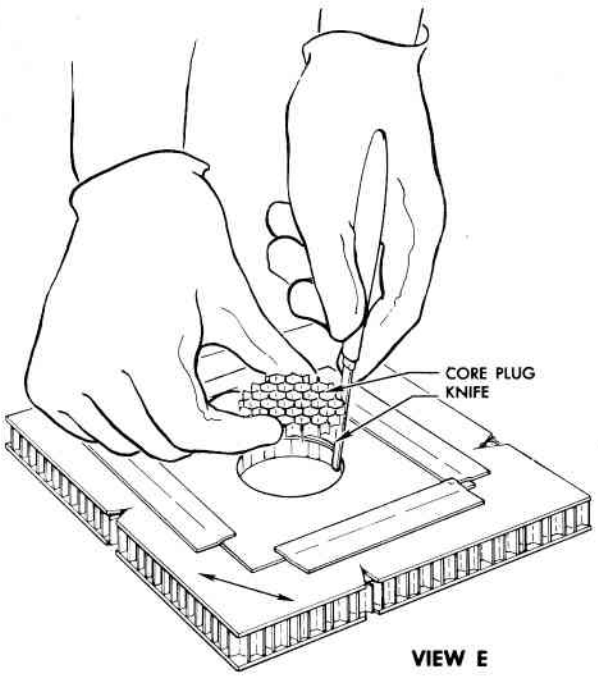
h. Cut a disc of 0.004 aluminum foil, Specification MIL-A-148C, the diameter of the routed hole.

CAUTION

IF FOIL IS SOILED, CLEAN WITH ALIPHATIC NAPHTHA, FEDERAL SPECIFICATION TT-N-95.

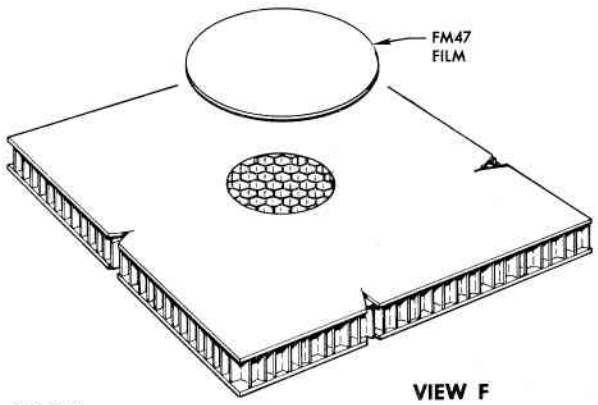
i. Hold foil disc with aliphatic naphtha cleaned needle nose pliers. Brush 338 adhesive on one side of foil disc 1/16 -inch to 1/8-inch thick.
j. Install foil disc in routed hole with adhesive coated side down. Push foil down smoothly and evenly on core.
k. Apply 338 adhesive 1/16-inch to 1/8-inch thick on top side of foil disc and to routed hole's exposed core surfaces. Work adhesive into core surfaces to fill all cavities.

Figure 10-33. Honeycomb Repair No. 4 and 5 — Hole (Sheet 1 of 3)

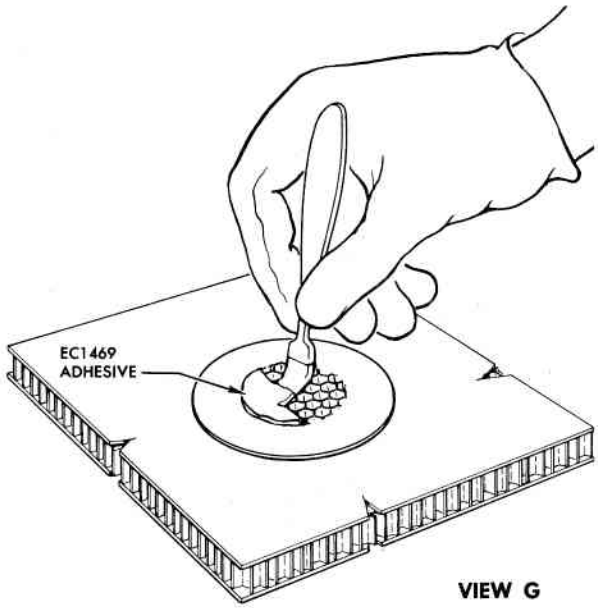


VIEW E

l. Apply 338 adhesive to outside edge of core plug selected from figure 10-12 and place in routed hole. Core plug ribbon shall run parallel to mark placed on skin in step "f." Use knife to guide core plug in position. Exercise care to prevent crushing core cells.
m. Press core plug firmly in place.
n. Cure 338 adhesive with heat lamps in accordance with Table 10-1.
o. Remove Kraft paper. If repair area is contaminated, scrape and then clean with aliphatic naphtha. Touch-up any bare spots with FM47 liquid primer.
p. Cut a disc of FM47 film 1/16-inch larger in diameter than patch plate.
q. Center FM47 disc on repair.

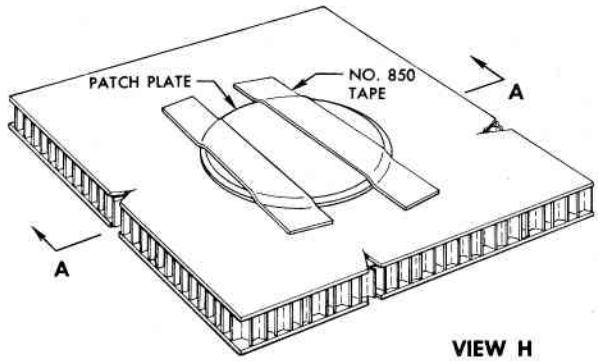


VIEW F

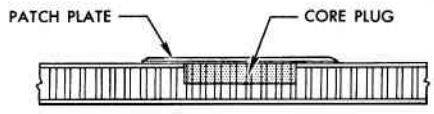


VIEW G

r. Apply 1/16-inch coat of EC1469 adhesive with a brush over the area of film disc which covers core only.
s. Turn film disc over and center EC1469 adhesive area over core. Brush patch plate bonding surface with FM47 liquid prime. Install patch plate and hold in place with #850 tape; see view H.
t. Bond and cure repair parts to skin. Use heat lamp and vacuum box assembly or air diaphragm assembly. See figure 10-23 for vacuum box assembly instructions. Refer Table 10-1 for FM47 film and EC1469 adhesive curing instructions.
u. See Section A-A for cross-section of completed repair.
v. After repair equipment is removed, inspect repaired area for voids by tapping. Voids up to 0.25 of an inch are permissible.



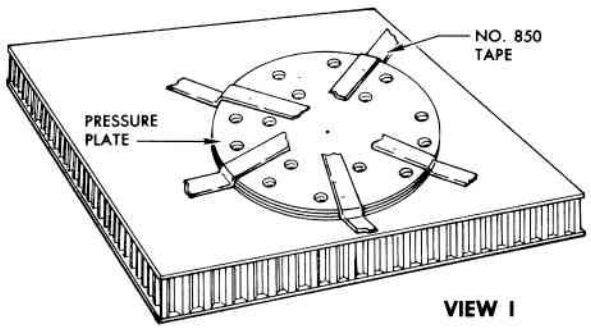
VIEW H



SECTION A-A

06.03.335-2

Figure 10-33. Honeycomb Repair No. 4 and 5 — Hole (Sheet 2 of 3)

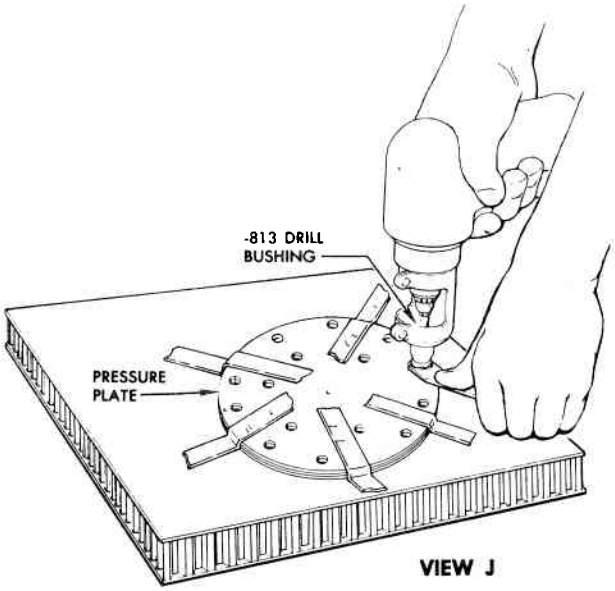


VIEW I

PROCEDURE, REPAIR NO. 5

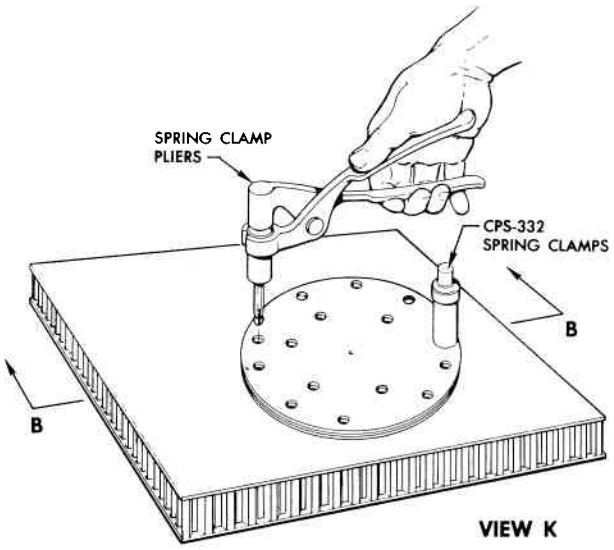
NOTE
REPAIR NO. 5 IS THE SAME AS REPAIR NO. 4 EXCEPT THAT FASTENERS ARE INSTALLED AFTER THE REPAIR IS BONDED.

a. Perform steps "a" through "t" of Repair No. 4.
b. Select a pressure plate the same size as repair patch plate; see figure 10-28.
c. Using selected pressure plate as a hole pattern template, locate and center pressure plate on repair patch plate. Tape in place with #850 tape.



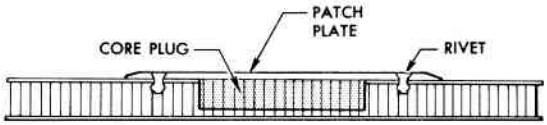
VIEW J

d. With -813 drill bushing, drill two pilot holes in opposite edges of plates as shown. Use a drill stop and drill through patch plate and skin only. See figure 10-28 for detailed instructions on the use of the -813 drill bushing with the pressure plates.



VIEW K

e. Install CPS-332 spring clamps in holes drilled in step "d."
f. Drill remaining pilot holes.
g. Drill holes of correct diameter for rivets to be installed. See figure 10-12 for patch plate and rivet patterns.
h. Remove pressure plate and clamps.
i. Countersink holes in accordance with figure 10-12.
j. Install and mill rivets flush in accordance with figure 10-12.
k. See Section B-B for cross-section of completed repair.



SECTION B-B

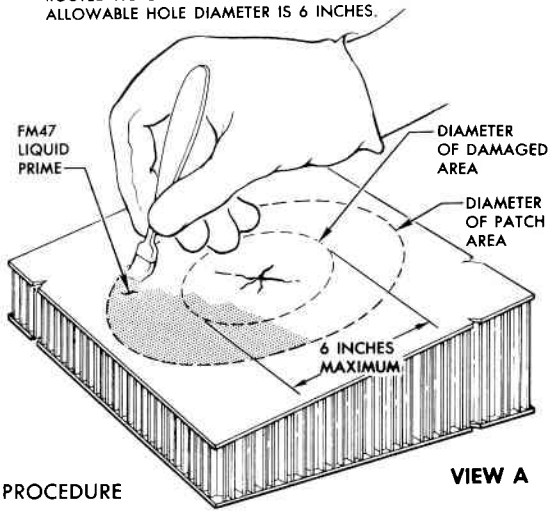
.06.03.335-3

Figure 10-33. Honeycomb Repair No. 4 and 5 — Hole (Sheet 3 of 3)

REPAIR NO. 6

NOTE

THIS PROCEDURE IS FOR REPAIR OF HOLES THROUGH ONE SIDE OF A PANEL, USE 1/8-INCH CELL HEX-CELL PERFORATED ALUMINUM HONEYCOMB CORE PLUG AND AN ALUMINUM FOIL DISC TO FILL ROUTED HOLE. THIS REPAIR IS SIMILAR TO REPAIRS 4 AND 5 EXCEPT THAT ROUTED HOLE DEPTH MAY EXCEED 1 INCH. MAXIMUM ALLOWABLE HOLE DIAMETER IS 6 INCHES.



VIEW A

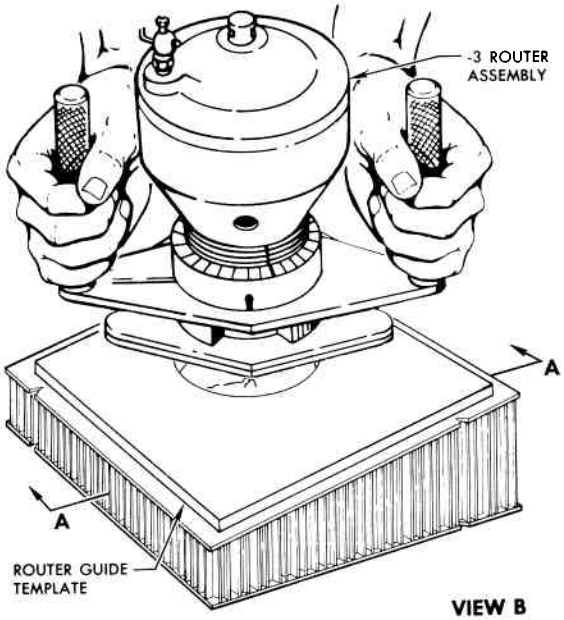
PROCEDURE

a. Determine diameter of damaged area with damage locating template; see figure 10-11.
b. Select proper patch plate and core plug; see figure 10-12.

NOTE

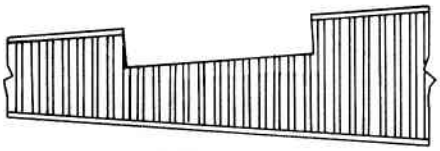
IF ROUTED HOLE DEPTH EXCEEDS 1 INCH, SELECT A CORE PLUG OF APPLICABLE DIAMETER FROM CORE PLUG AND TUBE SHEET TABLE ON FIGURE 10-31.

c. Cut core plug selected to length required to fit routed hole.
d. Prepare and clean repair area in accordance with figure 10-13.
e. Brush FM47 liquid prime over patch plate skin attachment area.



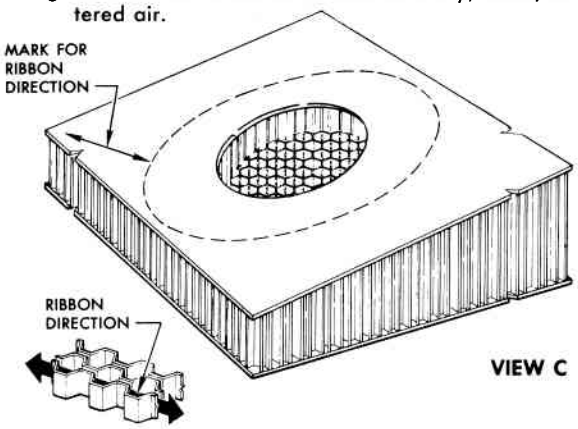
VIEW B

.06.03.336-1



SECTION A-A

f. Rout out damage to a round preselected size; see view B. Use -3 router assembly and proper router guide template. See figure 10-14 for -3 router assembly instructions, and figure 10-15 for router guide template instructions. Remove damaged core to match applicable dimensions in core plug table, figure 10-12 (hole depth, dimension "C," and core plug thickness, dimension "D").
g. Blow out burrs and cutter dust with dry, clean, filtered air.

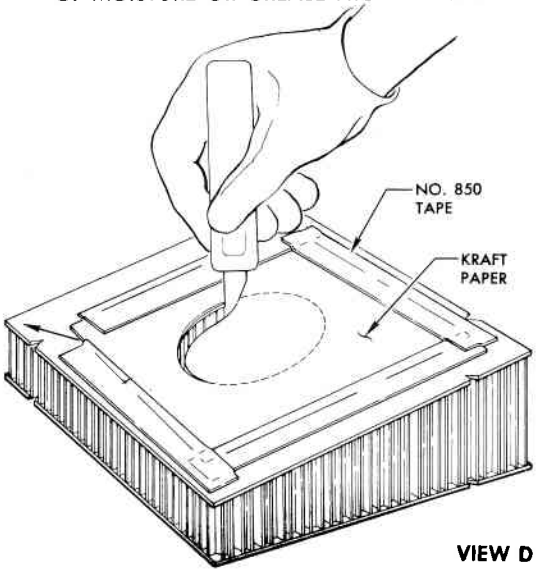


VIEW C

h. On skin near routed hole, mark ribbon direction.

CAUTION

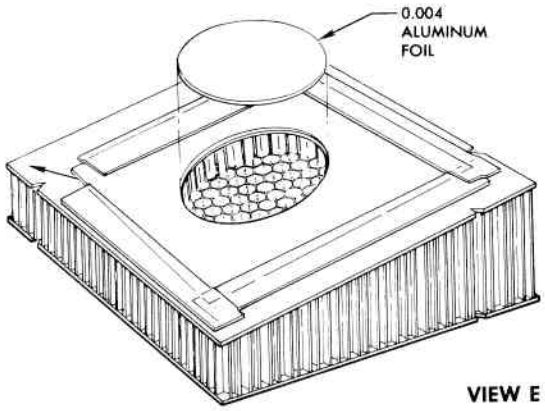
USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.



VIEW D

i. Tape Kraft paper over repair area. Cut hole through paper around routed hole.

*Figure 10-34. Honeycomb Repair No. 6 — Hole (**Sheet 1 of 3**)*



VIEW E

j. Cut a disc of 0.004 aluminum foil, Specification MIL-A-148C, the diameter of routed hole.

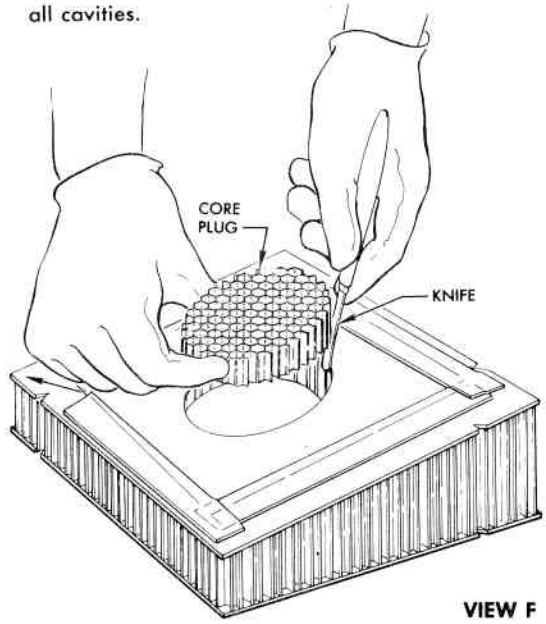
CAUTION

IF FOIL IS SOILED, CLEAN WITH ALIPHATIC NAPHTHA, FEDERAL SPECIFICATION TT-N-95.

k. Brush 338 adhesive on one side of foil disc 1/16-inch to 1/8-inch thick. Hold foil disc with aliphatic naphtha cleaned needle nose pliers.

l. Install foil disc in routed hole with adhesive coated side down. Push foil down smoothly and evenly on core.

m. Apply 338 adhesive 1/16-inch to 1/8-inch thick on top side of foil disc and to exposed core surfaces of routed hole. Work adhesive into core surfaces to fill all cavities.



VIEW F

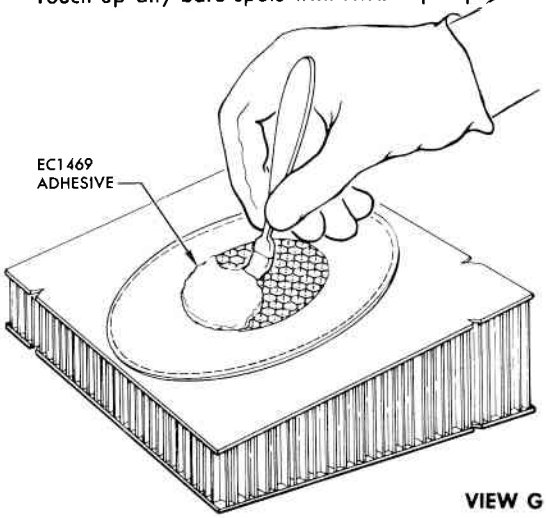
n. Using core plug selected from figure 10-12, apply 338 adhesive to outside edge of core and place in routed hole. Core plug ribbon shall run parallel to mark placed on skin in step "h." Use knife to guide core plug in position. Be careful not to crush core cells.

o. Press core plug firmly in place.

06.03.336-2

p. Cure 338 adhesive with heat lamps in accordance with Table 10-1. Cut away excess core. See figure 10-29 for core saw instructions.

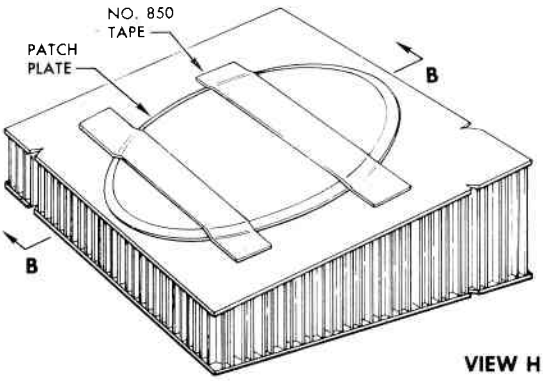
q. Remove Kraft paper. If repair area is contaminated, scrape and then clean with aliphatic naphtha. Touch-up any bare spots with FM47 liquid primer.



VIEW G

r. Cut disc of FM47 film 1/16-inch larger in diameter than patch plate.

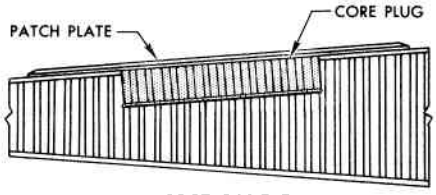
s. Center FM47 film disc on repair. Apply 1/16-inch coat of EC1469 adhesive with a brush over area of film disc which covers core only.



VIEW H

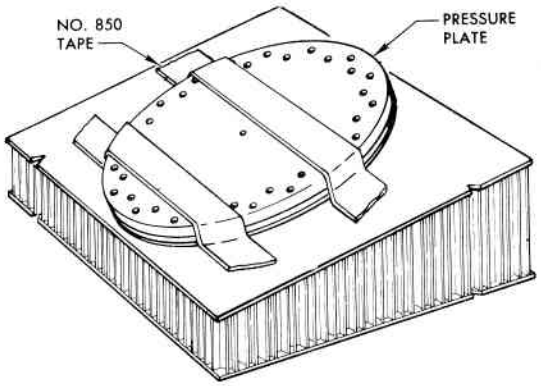
t. Turn film disc over and center EC1469 adhesive area over core. Brush patch plate bonding surface with FM47 liquid prime. Install patch plate and hold in place with #850 tape.

u. Bond and cure repair parts to skin. Refer to Table 10-1 for FM47 film and EC1469 adhesive curing instructions. Remove #850 tape after curing adhesive.



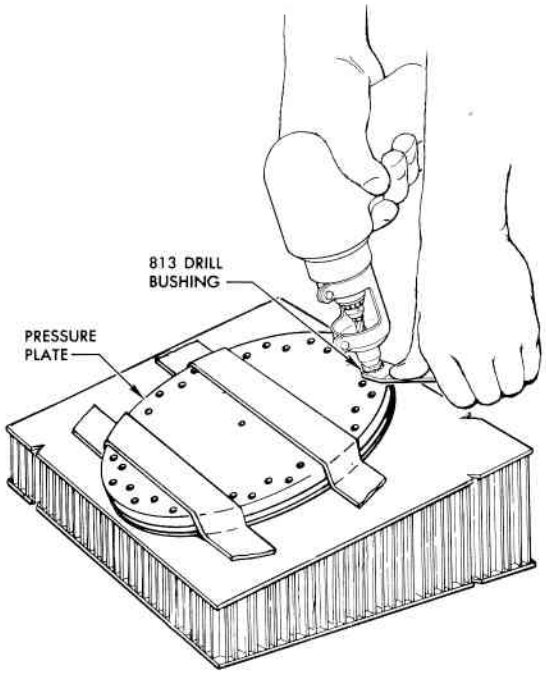
SECTION B-B

Figure 10-34. Honeycomb Repair No. 6 — Hole (Sheet 2 of 3)



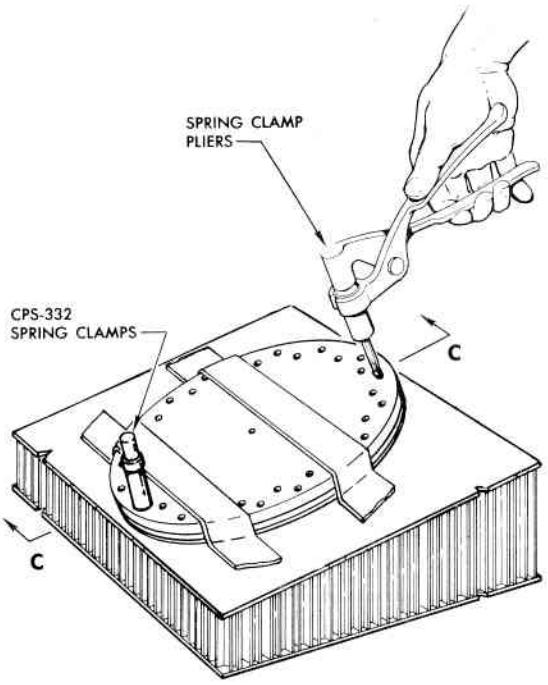
VIEW I

v. Select a pressure plate the same size as repair patch plate; see figure 10-28.
w. Using selected pressure plate as a hole pattern template, locate and center pressure plate on repair patch plate. Tape in place with #850 tape.



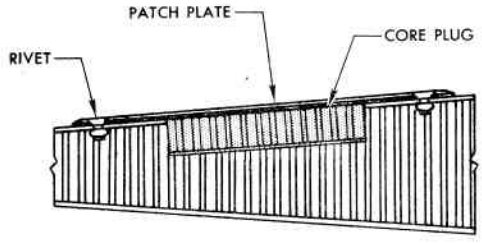
VIEW J

x. With -813 drill bushing, drill two pilot holes in opposite edges of plate as shown. Using a drill stop, drill through patch plate and skin only. See figure 10-28 for detailed instructions on the use of the -813 drill bushing with pressure plates.



VIEW K

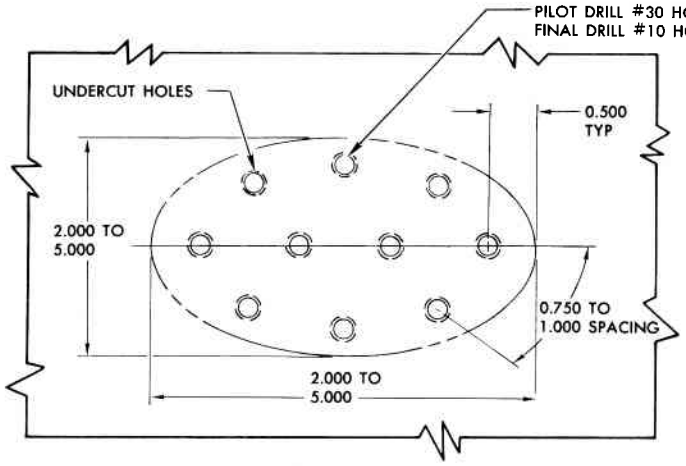
y. Install CPS-332 spring clamps in holes drilled in step "x"; drill remaining pilot holes.
z. Drill holes of correct diameter for rivets to be installed. See figure 10-12 for patch plate and rivet patterns.
aa. Remove pressure plate and clamps; countersink holes in patch plate.
ab. Install and mill rivets flush in accordance with figure 10-12.
ac. See section C-C for a cross-section of completed repair.



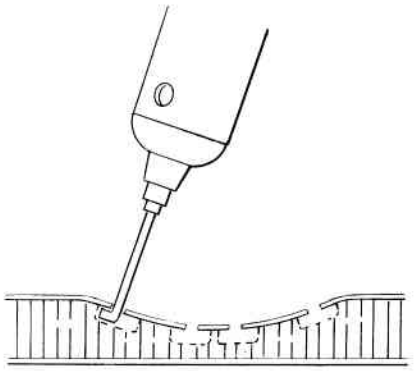
SECTION C-C

06.03.336-3

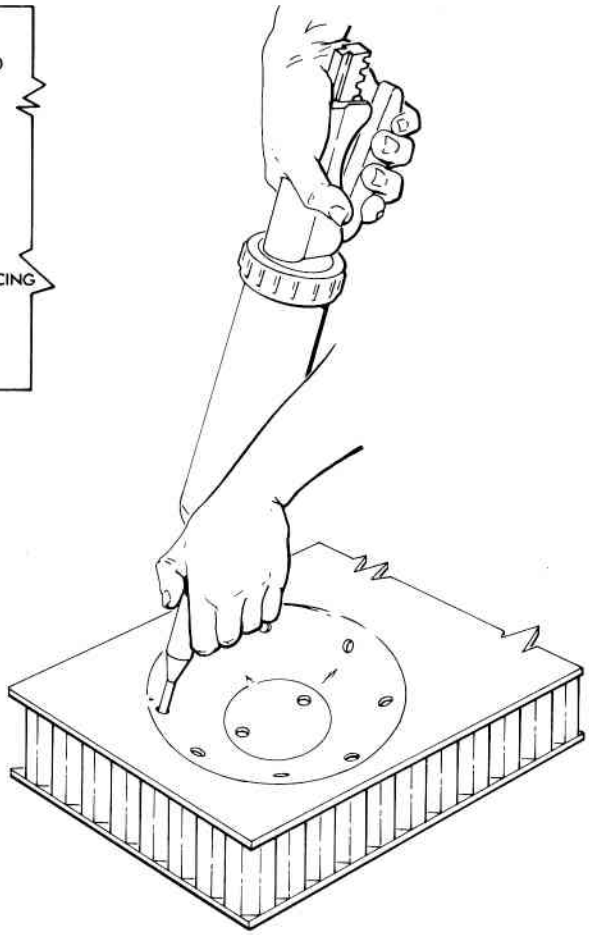
Figure 10-34. Honeycomb Repair No. 6 — Hole (Sheet 3 of 3)



VIEW A



VIEW B



VIEW C

INJECT ADHESIVE OR CORE FILL WITH SEALANT GUN

REPAIR NO. 7, 8, 9, 10 AND 11

NOTE

THESE ARE DENT OR DEPRESSION REPAIRS USED WHEN ONE SIDE OF THE PANEL IS DAMAGED. SKIN IS NOT REMOVED, DAMAGE DIAMETER SHALL NOT EXCEED 5 INCHES.

EVALUATE STRESS LOADS ON DAMAGED AREA AND TIME REQUIRED TO COMPLETE THE REPAIR BEFORE SELECTING REPAIR NUMBER. REPAIRS 7 AND 11 ARE THE STRONGEST, BUT TAKE LONGER TO PERFORM. REPAIR NO. 8 IS NOT QUITE AS STRONG AS REPAIR 7 AND 11, BUT TAKES LESS TIME TO PERFORM. REPAIRS 9 AND 10 ARE THE WEAKEST, BUT REQUIRE THE LEAST TIME TO PERFORM.

PROCEDURE, REPAIR NO. 7

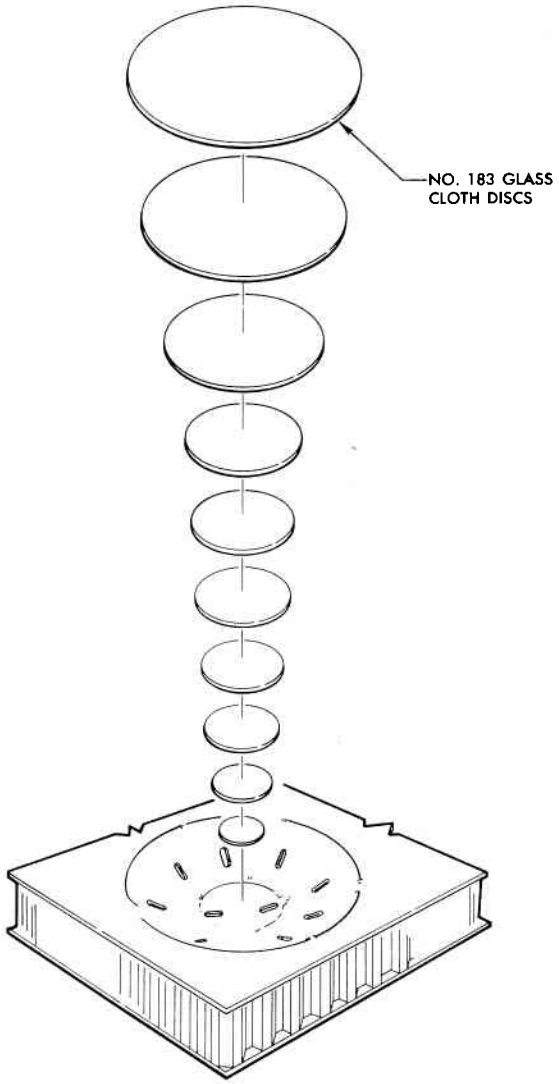
a. Prepare and clean damaged area. Use steps 1, 2 and 5 through 10 of figure 10-13.
b. Select a hole pattern template to fit damaged area from figure 10-17. Lightly centerpunch a hole pattern; see View A.
c. Drill No. 30 (0.128) pilot holes; use a drill stop to control depth.
d. Undercut holes drilled in step "c" to 0.25 inch with -95 undercutter; see View B. See figure 10-22 for instructions on the use of the -95 power-operated undercutter.
e. With a No. 10 (0.193) drill, drill out pilot holes drilled in step "c" to a 0.193 —0.200 inch diameter.
f. Smooth-up rough edges and blow out burrs and cutter dust with dry, clean, filtered air.
g. Mix Narmco 3135 adhesive in accordance with Table 10-1.
h. Use a sealant gun with a small tip and fill drilled holes with adhesive; see View C. Allow adhesive to cure before continuing repair. A heat lamp may be used to decrease curing time. See Table 10-1 for curing instructions.

NOTE

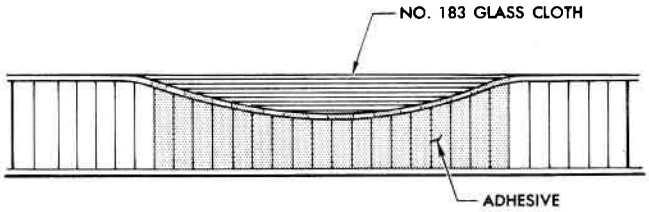
IF ANY DEPRESSIONS EXIST AT HOLE LOCATIONS AFTER COMPLETING STEP "H," REFILL AND CURE.

06.03.298-1A

Figure 10-35. Honeycomb Repair No. 7, 8, 9, 10, and 11 — Dent (Sheet 1 of 3)



VIEW D



VIEW E
(COMPLETED REPAIR NO. 7)

i. Cut discs of No. 183 glass cloth of graduated sizes so when laminated they will more than fill the depression. See View D.
j. Mix Narmco 3135 adhesive in accordance with Table 10-1. Brush a coat of the adhesive over the depression.
k. Soak each glass disc in the 3135 adhesive mixture. Install soaked discs in depression one at a time until depression is built up to 1/32-inch above existing skin.

CAUTION

AS EACH DISC IS INSTALLED, WORK OUT ANY BUBBLES WITH A TONGUE BLADE.

l. Allow repair to cure as indicated in Table 10-1 and sand down to skin contour. See View E for a cross-section of completed repair.

06.03.298-2A

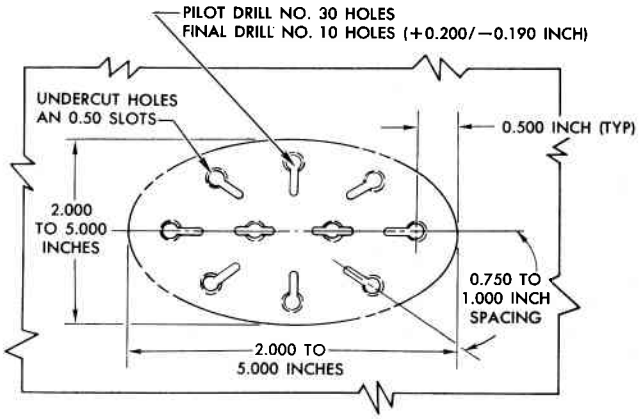
PROCEDURE, REPAIR NO. 8

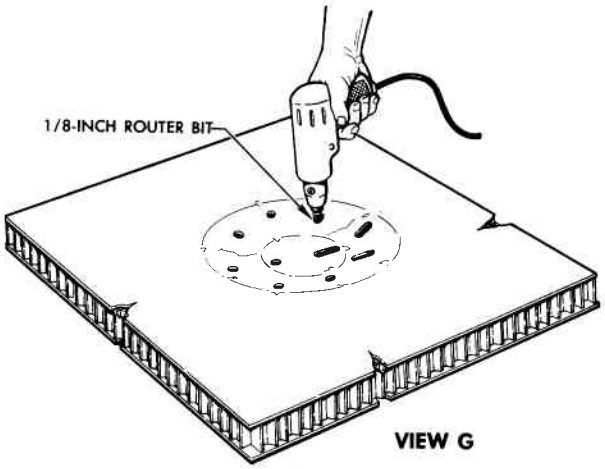
a. Perform steps "a" through "h" of Repair No. 7.
b. Mix Narmco 3135 adhesive in accordance with Table 10-1.
c. Stir Owens-Corning glass-fiber mill ends with 3135 adhesive until a paste consistency is obtained.
d. Fill depression 1/32-inch above skin levelwith paste and allow to cure.
e. Sand down to skin contour.

PROCEDURE, REPAIR NO. 9

a. Perform steps "a" through "h" of Repair No. 7.
b. Mix Narmco 3135 adhesive in accordance with Table 10-1.
c. Fill depression with the 3135 adhesive 1/32-inch above skin level; cure and sand down to skin contour.

Figure 10-35. Honeycomb Repair No. 7, 8, 9, 10, and 11 — Dent (Sheet 2 of 3)

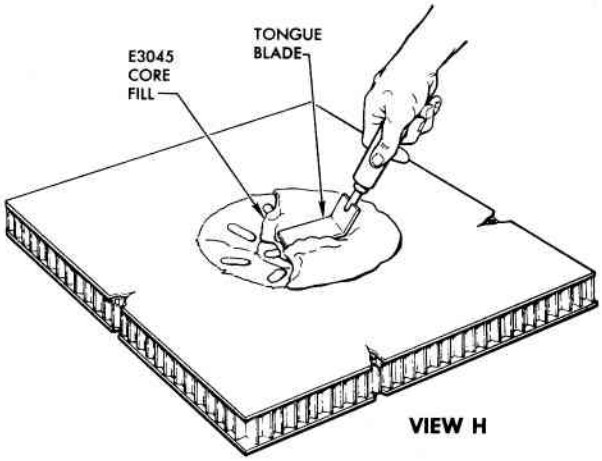




VIEW G

PROCEDURE, REPAIR NO. 10

a. Perform steps "a" through "e" of Repair No. 7; see view F.
b. With an 1/8-inch router bit, cut slots in skin 0.50 of an inch in length at drilled holes as shown in view G.
c. Smooth-up rough edges and blow out burrs and cutter dust with dry, clean, filtered air.



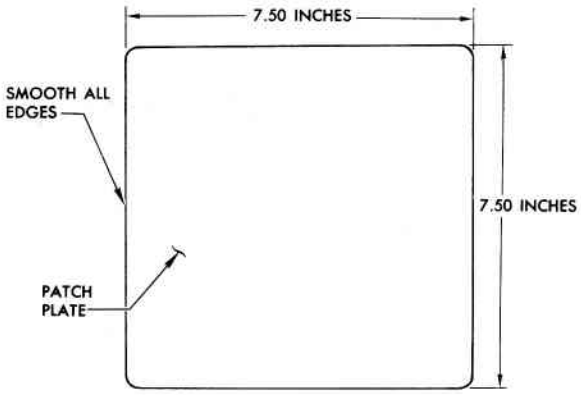
VIEW H

d. Mix E3045 core fill in accordance with Table 10-1.

06.03.298-3

e. Use a sealant gun with a small tip and fill drilled and slotted holes with core fill; see view C. With a tongue blade push and work fill until slots and holes are completely and evenly filled as shown in view H. Allow core fill to cure before continuing repair. A heat lamp may be used to decrease curing time. See Table 10-1 for curing instructions.

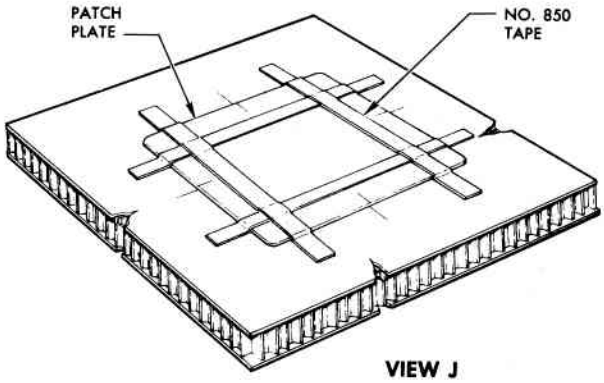
NOTE
IF ANY DEPRESSIONS EXIST AT HOLE LOCATIONS AFTER COMPLETING STEP "e," REFILL AND CURE.



VIEW I

PROCEDURE, REPAIR NO. 11

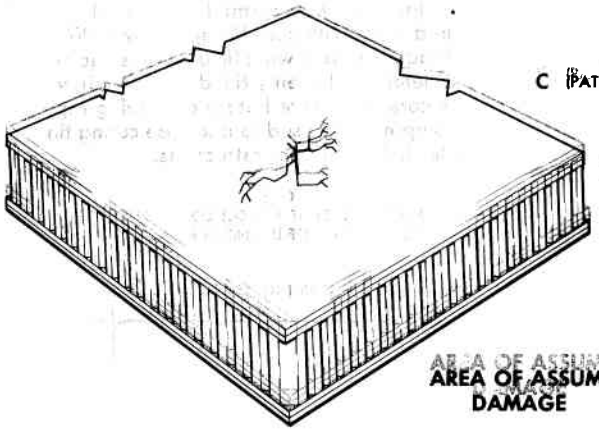
a. Prepare and clean damaged area. Use steps 1, 2, and 4 through 10 of figure 10-13. Perform steps "b" through "f" of Repair No. 10.
b. Fabricate a patch plate from 0.012 gage 2024-T3 aluminum alloy as shown in view I.



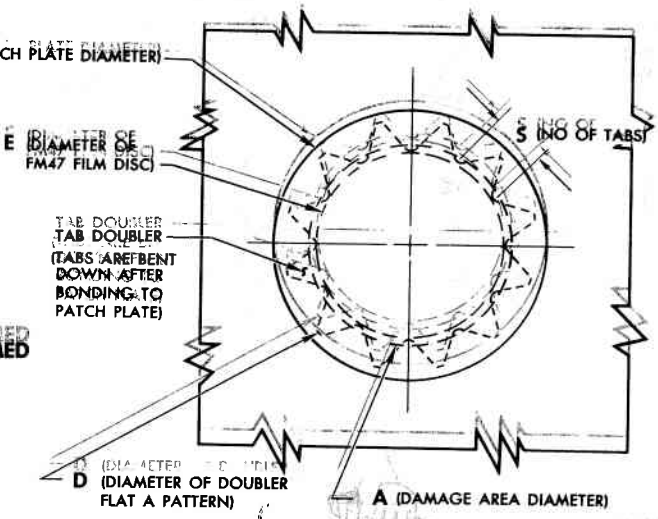
VIEW J

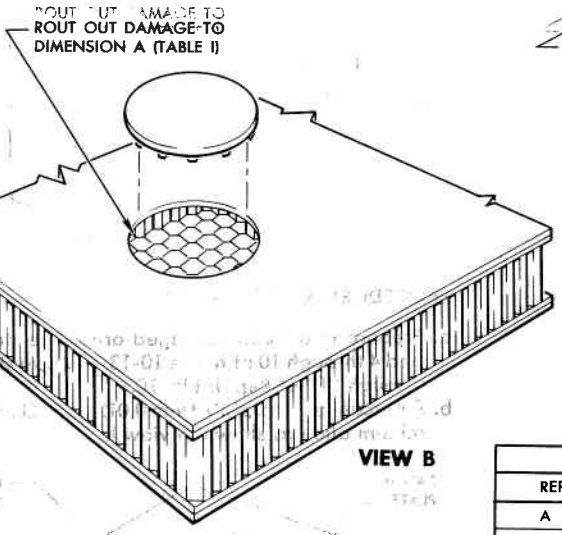
c. Apply EC1660 adhesive to one side of patch plate for bonding. Refer to Table 10-1 for adhesive application instructions.
d. Center and install patch plate on repair area with adhesive side down; see view J. Hold patch plate in place with #850 tape.
e. Bond and cure patch plate to skin. Use -801 vacuum bag assembly. See figure 10-26 for vacuum bag assembly installation and operation instructions. Refer to Table 10-1 for EC1660 adhesive curing instructions.

Figure 10-35. Honeycomb Repair No. 7, 8, 9, 10, and 11 — Dent (Sheet 3 of 3)

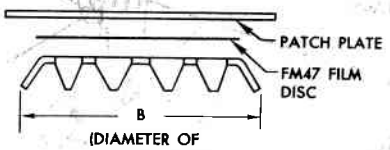


AREA OF ASSUMED DAMAGE





VIEW B



VIEW A

NOTE:
MAKE A PATCH PLATE AND TAB DOUBLER FROM 0.025 GAGE 2024-T3 ALUMINUM ALLOY.

TABLE I					
REPAIR NO. 12 AND 13, PATCH PLATE ASSEMBLY DIMENSIONS					
A	B	C	D	E	S
1.000	0.630	1.062	1.000	0.50	8
1.500	1.060	1.562	1.500	0.94	10
2.000	1.50	2.062	2.000	1.380	12

REPAIR NO. 12

NOTE

REPAIR NO. 12 IS A DENT OR CRACK REPAIR 2 INCHES IN DIAMETER MAXIMUM.
REPAIR NO. 13 IS A DENT OR CRACK REPAIR 1 INCH IN DIAMETER MAXIMUM.

PROCEDURE

a. Determine diameter of damage with damage locating template and fabricate applicable patch plate assembly. See figure 10-11 for damage locating template instructions. See View A and Table I for patch plate assembly fabrication.
b. Rout out damage area to expose honeycomb core. Use -3 router assembly and proper router guide template in accordance with figures 10-14 and 10-15. Remove adhesive scraps and cuttings from core; see View B.
c. Center patch plate assembly over hole and push prongs of doubler down into hole.

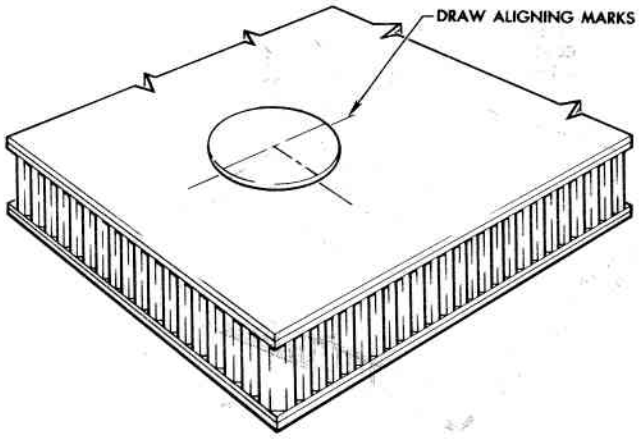
NOTE

PATCH PLATE IS LARGER THAN HOLE; PUSH DOWN UNTIL PATCH PLATE CONTACTS SKIN.

d. Mark patch plate so it can be reinstalled in the same position; see View C.

CAUTION

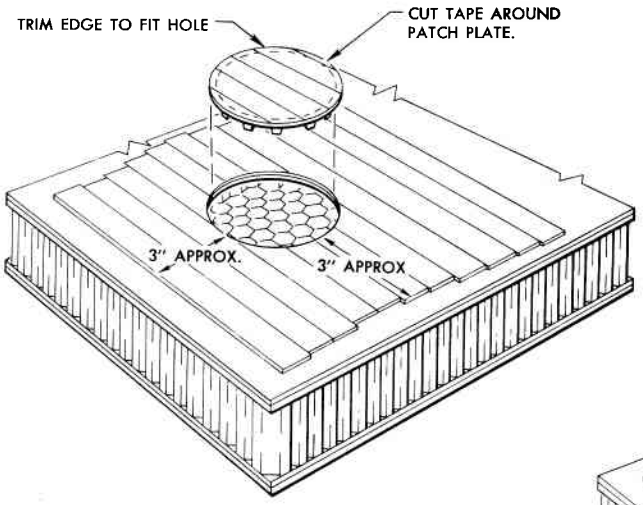
USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.



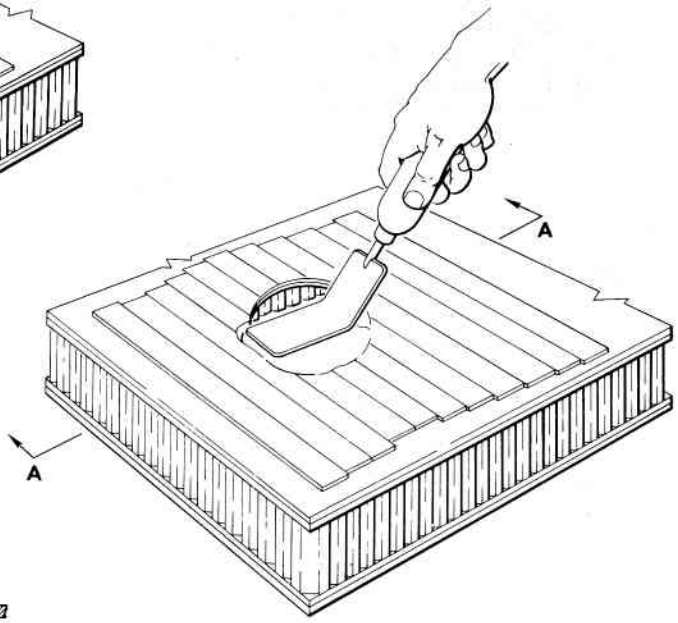
VIEW C

06.03.299-1B

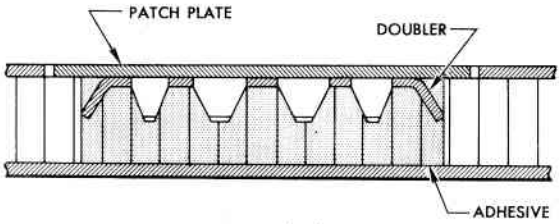
Figure 10-36. Honeycomb Repair No. 12 and 13 — Dent or Crack (Sheet 1 of 2)



VIEW D



VIEW E



SECTION A-A

e. Remove patch plate and trim until it fits hole.

NOTE
MAXIMUM ALLOWABLE GAP BETWEEN PATCH PLATE AND SKIN IS 0.010 INCH.

f. Install patch plate to align with marks made in step "d" and cover patch and surrounding skin with #850 tape to approximately 3 inches in all directions; see View D.
g. Cut tape flush with patch plate and hole edge and remove patch plate.
h. Select adhesive from Table 10-I. Mix per manufacturer's instructions.
i. Apply adhesive to hole with tongue blade or spatula; force down into core cells until holes are full; see View E. Apply adhesive to bonding surface of patch and prongs.
j. Install patch and push down until adhesive squeezes from around patch plate.
k. Allow adhesive to cure; remove tape and sand away any excess adhesive. See Section A-A for completed repair.

06.03.299-2A

REPAIR NO. 13

NOTE
REPAIR 13 IS SIMILAR TO REPAIR 12 EXCEPT THAT A PATCH PLATE IS NOT USED.

PROCEDURE

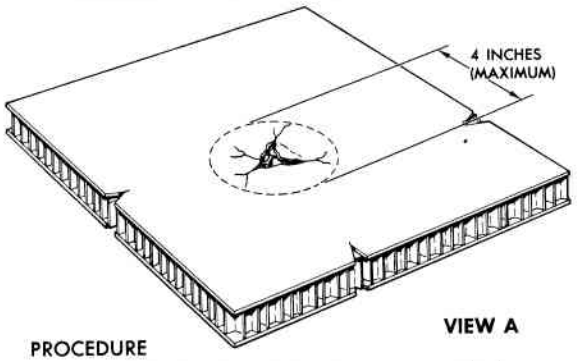
a. Rout out damaged area with a spot facer until honeycomb is exposed.
b. Straighten any damaged cores and blow out cutting dust.
c. Cover skin 3 inches in all directions around hole.
d. Mix adhesive. See Table 10-I for adhesive and mixing instruction.
e. Fill cores and hole 1/32 inch above skin and allow adhesive to cure.
f. Sand down adhesive to contour and remove tape.

Figure 10-36. Honeycomb Repair No. 12 and 13 — Dent or Crack (Sheet 2 of 2)

REPAIR NO. 14

NOTES

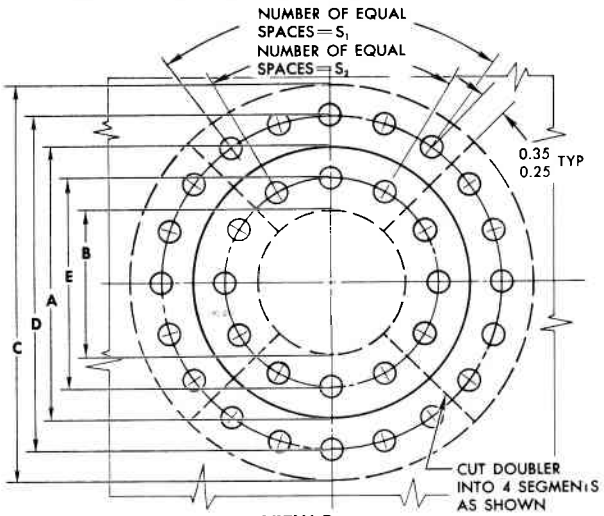
1. REPAIR NO. 14 IS FOR REPAIR OF HOLES THROUGH ONE SIDE OF THE PANEL USING A FLUSH PATCH PLATE, A DOUBLER, AND CORE FILL. ACCESS IS TO ONE SIDE OF THE PANEL ONLY. USE THIS REPAIR FOR 2-, 3-, AND 4-INCH DIAMETER HOLES.
2. MAKE PATCH PLATES AND DOUBLERS FROM 0.025 GAGE 2024-T3 ALUMINUM ALLOY.
3. MAKE FLUSH PATCH PLATES 0.030 INCH LARGER THAN DIMENSION A TO ALLOW FOR TRIM FITTING MATERIAL.



VIEW A

PROCEDURE

a. Determine diameter of damaged area with damage locating template; see figure 10-11.



VIEW B

TABLE I							
FLUSH PATCH PLATE AND DOUBLER DIMENSIONS							
DIAMETETER OF DAMAGE	A	B	C	D	E	S1	S2
2.000	2.000	1.000	3.50	2.75	1.50	3	1
3.000	3.000	1.500	4.50	3.75	2.25	4	2
4.000	4.000	2.500	5.50	4.75	3.25	5	3

b. After a diameter has been determined, select applicable flush patch plate and doubler from Table I (see view B).

c. Rout out hole to a round, preselected size of applicable A diameter; see View B. Rout hole to a depth of 9/32 (0.281) inch below underside of skin. Use -3 router assembly and applicable router guide template. See figure 10-14 for -3 router assembly instructions, and figure 10-15 for router guide template instructions.

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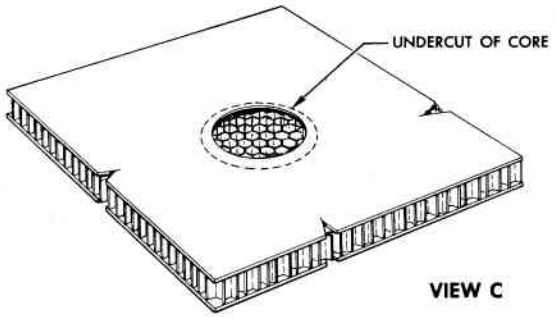


VIEW C

d. Undercut honeycomb core to doubler diameter as shown in View B. Use the -93 undercutter. See figure 10-21 for instructions on the use of the undercutter.

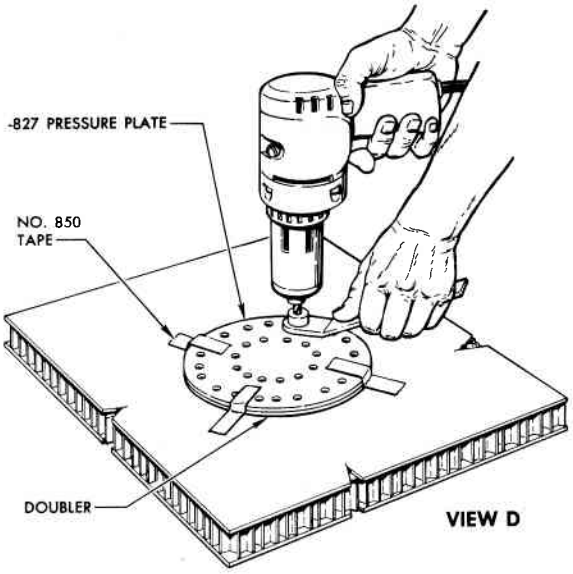
CAUTION

DO NOT SCRATCH UNDERSIDE OF SKIN WITH UNDERCUTTER.

e. Remove dust and cuttings from hole. Use an inspection mirror to check removal of cuttings and smoothness of undercut surfaces.

CAUTION

USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.



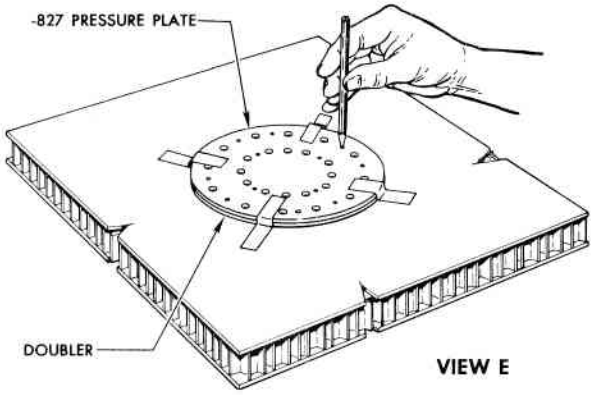
VIEW D

f. Center doubler selected in step "b" on repair.

g. With doubler centered on repair, place an -827 pressure plate in position as a template on top of doubler and secure in place with No. 850 tape; see View D. See figure 10-28 for pressure plate information.

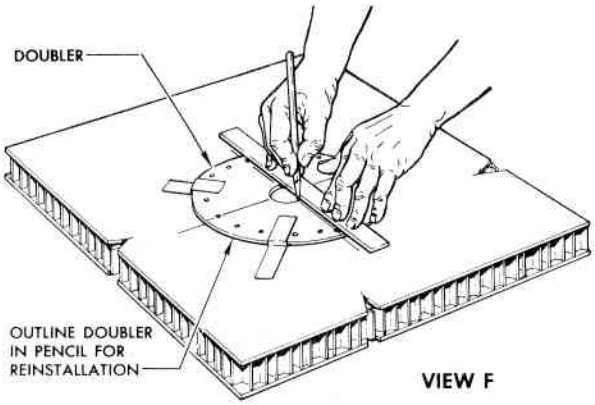
h. With an -813 drill bushing and the -827 plate, drill pilot holes for the outside row of rivet holes through doubler and skin only. See View B for applicable rivet pattern and figure 10-12 for drilling and fastener installation procedures. See figure 10-28 for detailed instructions on the use of the -813 drill bushing with pressure plates.

Figure 10-37. Honeycomb Repair No.14 — Hole (Sheet 1 of 3)



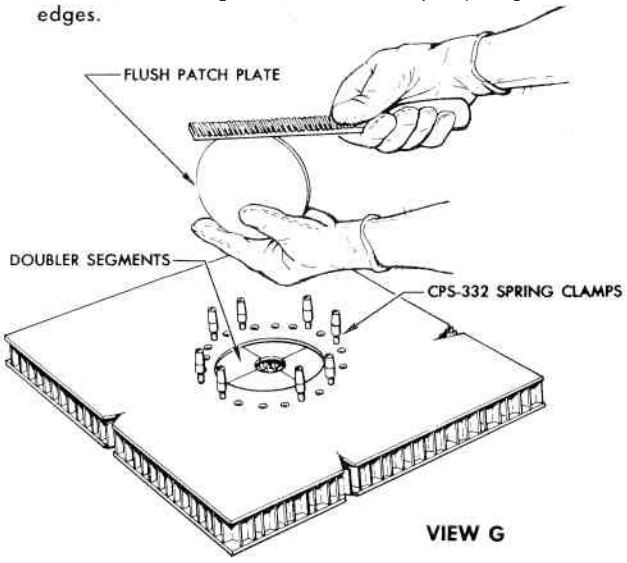
VIEW E

i. Locate and mark doubler segment cutting lines using -827 plate. Use No. 60 holes in -827 plate to locate segment cutting lines.



VIEW F

j. Remove -827 plate and mark position of doubler for reinstallation.
k. Cut doubler into segments and smooth up any rough edges.



VIEW G

l. Place doubler segments in position on repair and hold in place with CPS-332 spring clamps.

06-03.337-2

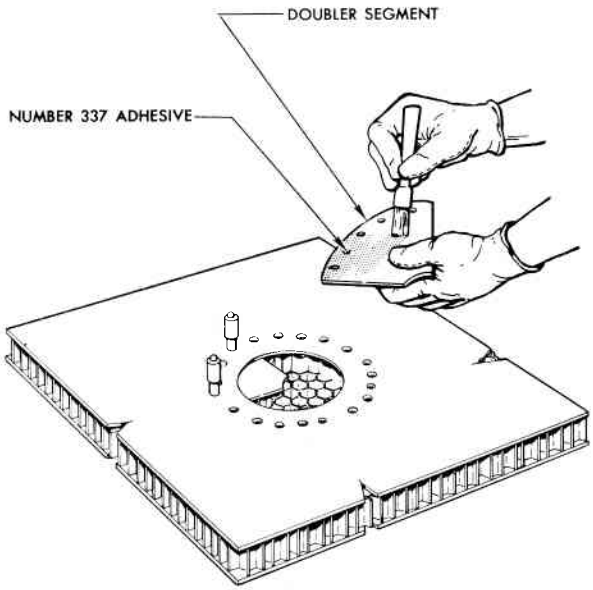
m. Install flush patch plate selected in step "b" on doubler segments and file plate to fit hole.

NOTE
MAXIMUM ALLOWABLE GAP BETWEEN PATCH PLATE AND SKIN IS 0.010 INCH.

n. Place -827 plate on repair in the same position placed in step "g" and "h." See View D.

NOTE
TO PERFORM STEP "n," REMOVE FLUSH PATCH PLATE, HOLD DOUBLER SEGMENTS IN PLACE BY HAND OR WITH NO. 850 TAPE, AND REMOVE CPS-332 SPRING CLAMPS. THEN REINSTALL FLUSH PATCH PLATE, PLACE -827 PLATE IN POSITION AND REINSTALL CPS-332 SPRING CLAMPS THROUGH -827 PLATE, SKIN, AND DOUBLER SEGMENTS.

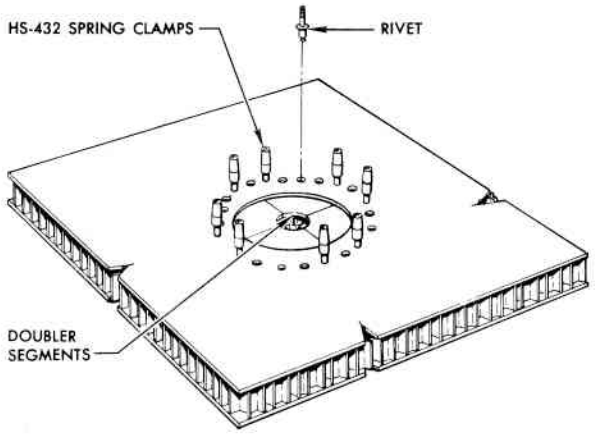
o. Pilot drill holes for inside row of rivets through flush patch plate and doubler segments; see View D. See View B for applicable rivet pattern and figure 10-12 for drilling and fastener installation procedures.
p. Drill out all pilot holes to rivet hole size selected from figure 10-12.
q. Remove -827 plate and countersink rivet holes in accordance with figure 10-12 in flush patch plate and skin only.



VIEW H

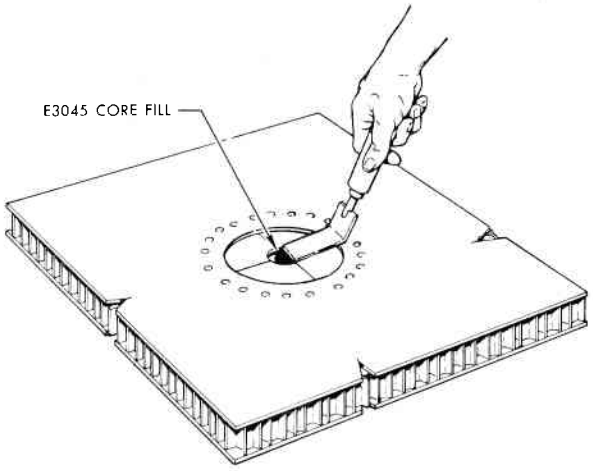
r. Remove all repair parts. Remove burrs and rough edges from repair area and parts. Clean repair parts and skin surface with Aliphatic Naphtha, Federal Specification TT-N-95. Apply a 1/32-inch layer of No. 337 adhesive to doubler segment and panel skin bonding surfaces. Refer to Table 10-1 for No. 337 adhesive mixing and application instructions.

Figure 10-37. Honeycomb Repair No. 14 — Hole (Sheet 2 of 3)



VIEW I

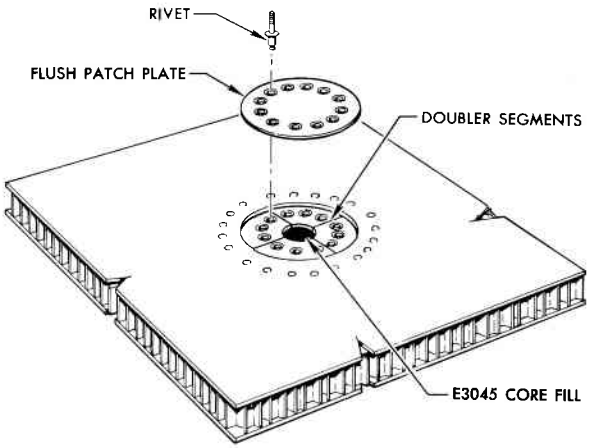
s. Reinstall doubler segments in their proper position and hold in place with HS-432 spring clamps. Rivet segments to panel skin in accordance with figure 10-12 using CR762-4-2 cherry rivets.



VIEW J

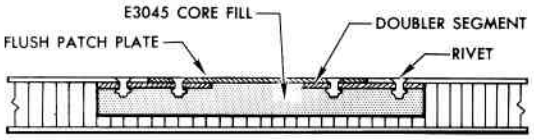
t. Mix E3045 core fill in accordance with Table 10-1.
u. Fill hole level with doubler as shown in View G with E3045 core fill. Force core fill under doubler segments; be sure cavity is filled evenly and completely.
v. Apply No. 337 adhesive to patch plate and doubler bonding surfaces.

.06.03.337-3

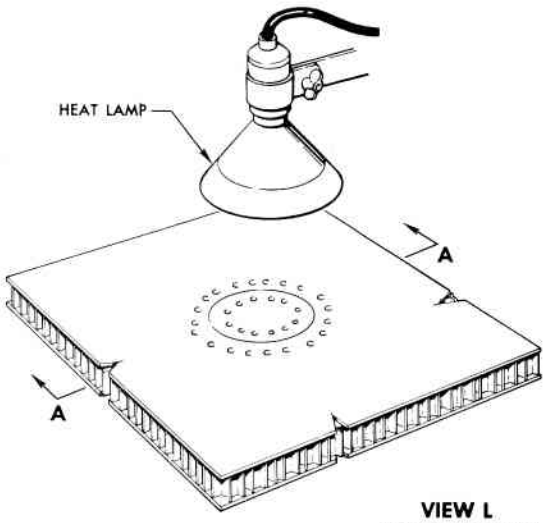


VIEW K

w. Reinstall patch plate and rivet in place. Install CR762-4-2 cherry rivets. Mill rivets flush in accordance with figure 10-12.
x. Cure No. 337 adhesive and E3045 core fill in accordance with Table 10-1.
y. See Section A-A for a cross section of completed repair.



SECTION A-A



VIEW L
(COMPLETED REPAIR)

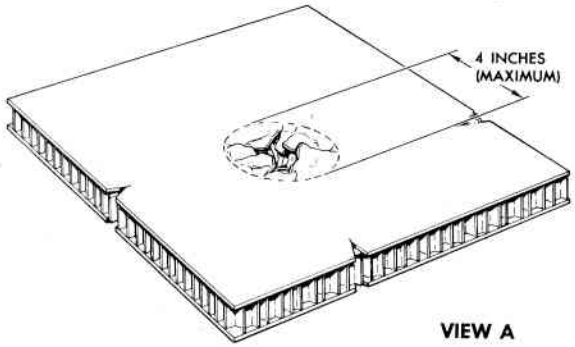
NOTE:
CURE ADHESIVE 24 TO 48 HOURS AT AMBIENT TEMPERATURE; OR 2 HOURS AT 200° USING HEAT LAMPS. DO NOT HEAT RAPIDLY.

Figure 10-37. Honeycomb Repair No. 14 — Hole (Sheet 3 of 3)

REPAIR NO. 15

NOTES

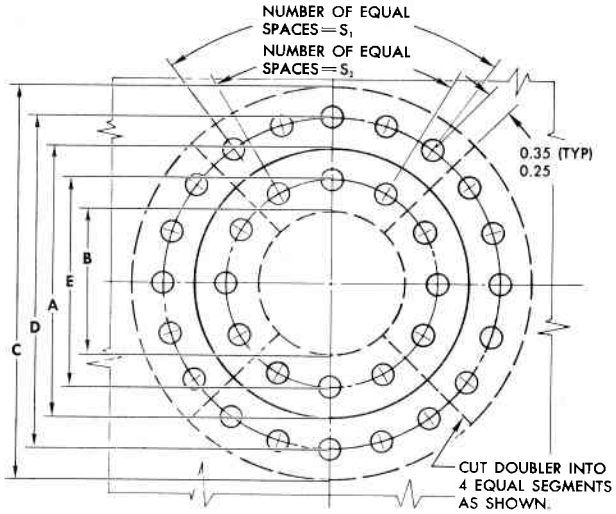
1. REPAIR NO. 15 IS FOR REPAIR OF 2-, 3-, AND 4-INCH DIAMETER HOLES THROUGH BOTH SIDES OF THE PANEL. THIS REPAIR IS SIMILAR TO REPAIR NO. 14 ON ONE SIDE USING A FLUSH PATCH PLATE, A DOUBLER, AND CORE FILL. A NON-FLUSH INSIDE PATCH PLATE IS USED TO COVER THE PANEL'S INSIDE SURFACE. ACCESS IS TO BOTH SIDES OF THE PANEL.
2. MAKE FLUSH PLATES, INSIDE SURFACE PATCH PLATES, AND DOUBLERS FROM 0.025 GAGE 2024-T3 ALUMINUM ALLOY.
3. MAKE FLUSH PATCH PLATES 0.030 INCH LARGER THAN DIMENSION A TO ALLOW FOR TRIM FITTING MATERIAL.



VIEW A

PROCEDURE

a. Determine diameter of damaged area with damage locating template; see figure 10-11.



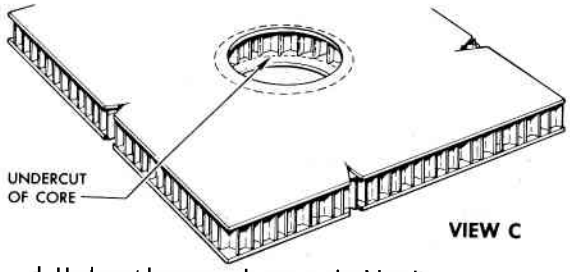
VIEW B

TABLE I FLUSH PATCH PLATE, INSIDE SURFACE PATCH PLATE, AND DOUBLER DIMENSIONS							
DIAMETER OF DAMAGE	A	B	C	D	E	S_1	S_2
2.000	2.000	1.000	3.50	2.75	1.50	3	1
3.000	3.000	1.500	4.50	3.75	2.25	4	2
4.000	4.000	2.500	5.50	4.75	3.25	5	3

b. After a diameter has been determined, select applicable flush patch plate, inside surface patch plate, and doubler from Table I (see View B).

c. Rout out hole to a round, preselected size of applicable A diameter; See View B. Use -3 router assembly and -53 router turntable assembly; see figure 10-14 and 10-19 for operating instructions.

06.03.338-1



VIEW C

d. Undercut honeycomb core to doubler diameter. Use the -93 undercutter. See figure 10-21 for instructions on the use of the undercutter.

CAUTION

DO NOT SCRATCH UNDERSIDE OF SKIN WITH UNDERCUTTER.

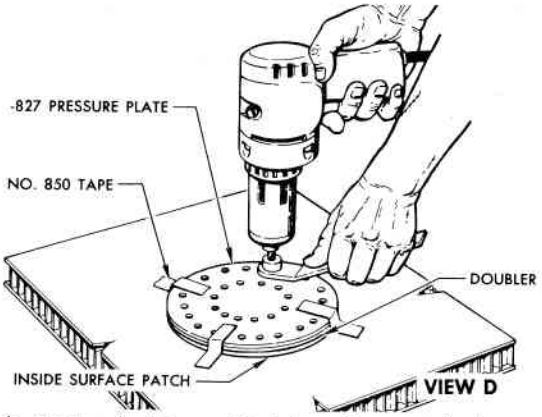
e. Remove dust and cuttings from hole. Use an inspection mirror to check removal of cuttings and smoothness of undercut surfaces.

f. Mark damaged area center lines on panel's inside skin surface with damage locating template in accordance with figure 10-11.

g. Clean and prepare panel's inside skin surface for patch plate in accordance with instructions in figure 10-13.

CAUTION

USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.



VIEW D

h. Center doubler and inside surface patch plate selected in step "b" on repair and tape in place with NO. 850 tape; see View D and Section A-A.

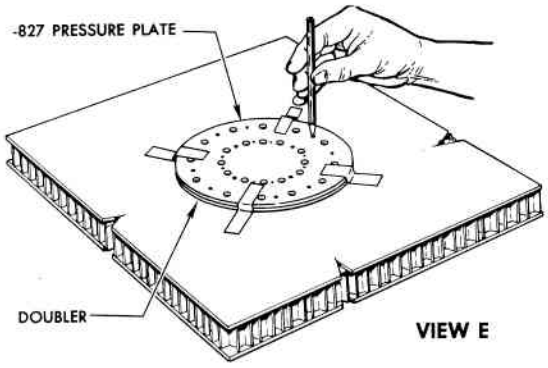
NOTE

CLEAN ALL REPAIR PARTS WITH ALIPHATIC NAPHTHA, FEDERAL SPECIFICATION TT-N-95.

i. With doubler and inside surface patch plate centered on repair, place an -827 pressure plate in position as a template on top of doubler. See figure 10-28 for pressure plate information.

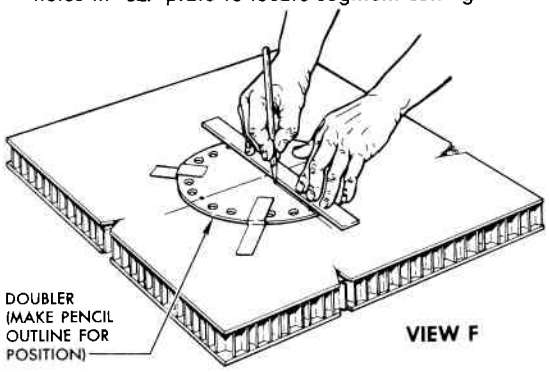
j. With an -813 drill bushing and the -827 plate, drill holes through doubler, skins, and inside surface patch plate for the outside row of rivets as shown in View D. See View B for applicable rivet pattern and figure 10-12 for drilling and fastener installation procedures. See figure 10-28 for detailed instructions on the use of the -813 drill bushing with pressure plates.

Figure 10-38. Honeycomb Repair No. 15 — Hole (Sheet 1 of 3)



VIEW E

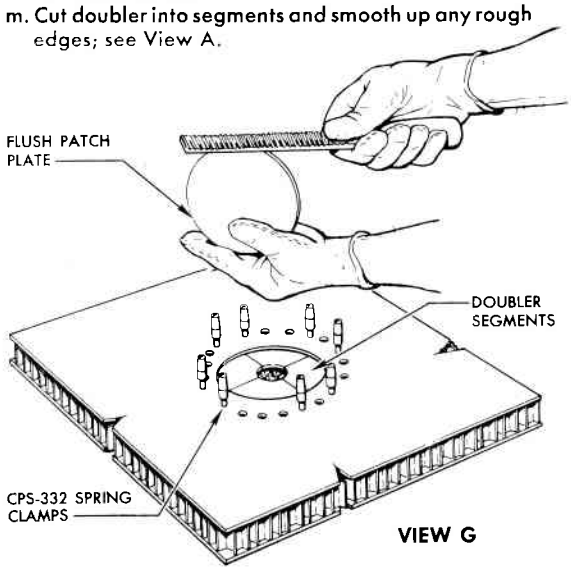
k. Locate and mark doubler segment cutting lines shown in View E and F using -827 plate. Use No. 60 holes in -827 plate to locate segment cutting lines.



VIEW F

l. Remove -827 plate and mark position of doubler for reinstallation.

m. Cut doubler into segments and smooth up any rough edges; see View A.



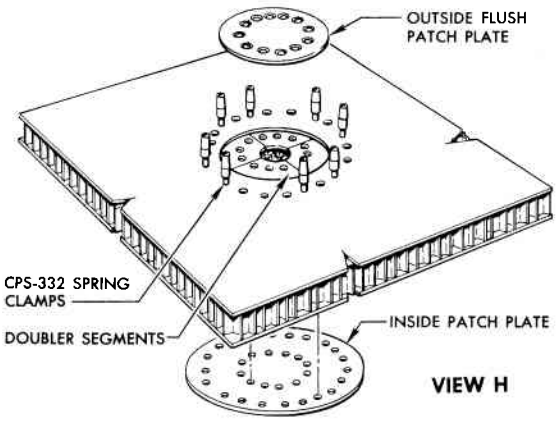
VIEW G

n. Place doubler segments in position on repair and hold in place with CPS-332 spring clamps; see View G.

o. Install flush patch plate selected in step "b" on doubler segments (file plate to fit hole).

NOTE
MAXIMUM ALLOWABLE GAP BETWEEN PATCH PLATE AND SKIN IS 0.010 INCH.

06.03.338-2



VIEW H

p. Place -827 plate on repair in the same position placed in steps "i" and "j."

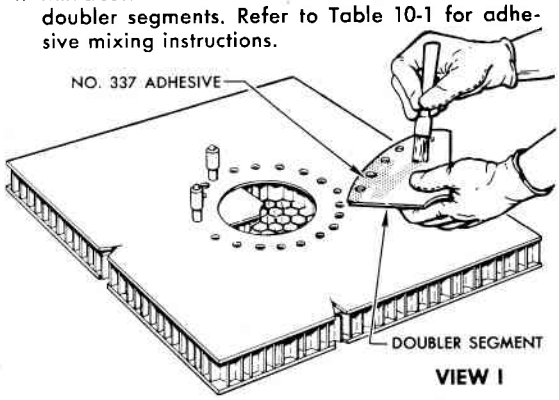
NOTE
TO PERFORM STEP "p," REMOVE FLUSH PATCH PLATE, HOLD DOUBLER SEGMENTS IN PLACE BY HAND OR WITH NO. 850 TAPE, AND REMOVE CPS-332 SPRING CLAMPS. THEN REINSTALL FLUSH PATCH PLATE, PLACE -827 PLATE IN POSITION AND REINSTALL CPS-332 SPRING CLAMPS THROUGH -827 PLATE, SKIN, AND DOUBLER SEGMENTS.

q. Pilot drill holes for inside row of rivets through flush patch plates, doubler segments, and inside surface patch plate; see View D. Drill out all pilot holes in inside surface patch plate and skin to rivet hole size selected from figure 10-12. See View B for applicable rivet pattern and figure 10-12 for drilling and fastener installation procedures.

r. Remove all repair parts. Remove burrs and rough edges from repair area and repair parts. Clean repair parts and skin surfaces with Aliphatic Naphtha, Federal Specification TT-N-95.

s. Assemble flush patch plate and -805 pressure system. See figure 10-27 for detailed instructions on the -805 pressure system.

t. Mix a sufficient amount of No. 337 adhesive to cover doubler segments. Refer to Table 10-1 for adhesive mixing instructions.



VIEW I

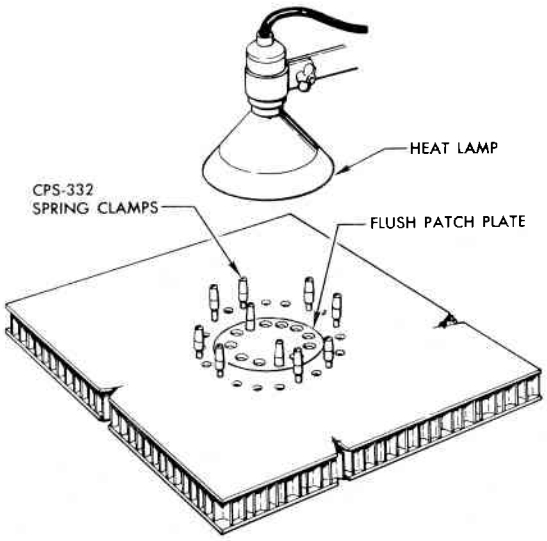
u. Apply a 1/32-inch coat of No. 337 adhesive to doubler segment and panel skin bonding surfaces.

v. Place doubler segments in position on repair one at a time and install with CPS-332 spring clamps. See View I.

w. Apply No. 337 adhesive to patch plate and doubler bonding surface.

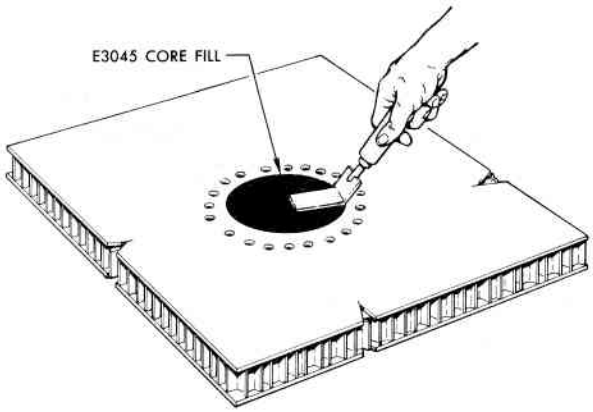
x. Install flush patch plate and -805 pressure system assembled in step "s" in position on repair and secure with CPS-332 spring clamps.

Figure 10-38. Honeycomb Repair No. 15 — Hole (Sheet 2 of 3)



VIEW J

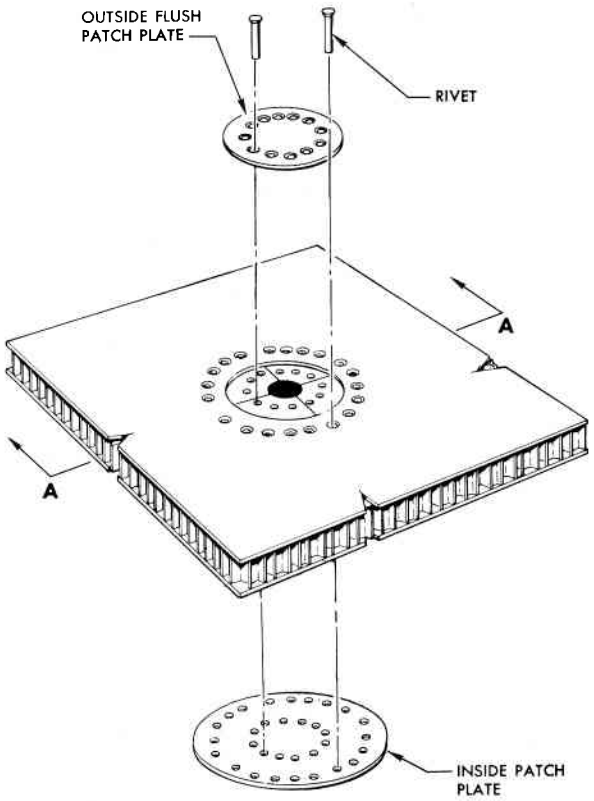
y. With a heat lamp placed approximately 8 inches above repair, partially cure adhesive for 45 minutes.
z. Remove heat lamp and CPS-332 spring clamps from outside surface repair. Drill out pilot holes to rivet hole size and countersink holes in flush patch plate and outside surface panel skin in accordance with figure 10-12.



VIEW K

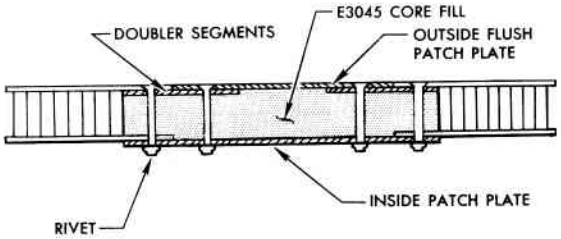
aa. Mix a sufficient amount of E3045 core fill to fill repair hole and a sufficient amount of No. 337 adhesive to bond inside surface patch plate to skin. Refer to Table 10-1 for mixing instructions.
ab. Fill hole flush with inside surface skin with E3045 core fill as shown in View K. Force core fill under inside surface skin, being sure cavity is filled evenly and completely.

ac. Apply No. 337 adhesive to inside surface patch plate bonding surfaces and rivet patch plate in place using CR762 cherry rivets. See Section A-A.
ad. Install CR726 cherry rivets in flush patch plate and panel's outside skin surface. See Section A-A.



VIEW L

ae. Cure core fill and adhesive in accordance with Table 10-1.
af. Mill rivets installed in panel's outside skin surface flush in accordance with figure 10-12. See Section A-A for a cross section of completed repair.



SECTION A-A

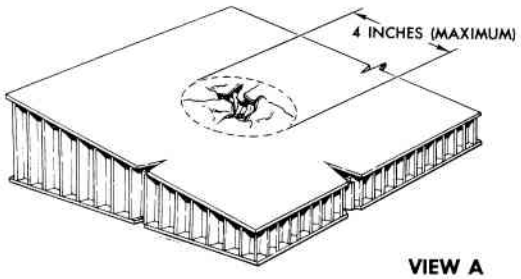
06.03.338-3

Figure 10-38. Honeycomb Repair No. 15 — Hole (Sheet 3 of 3)

REPAIR NO. 16

NOTE

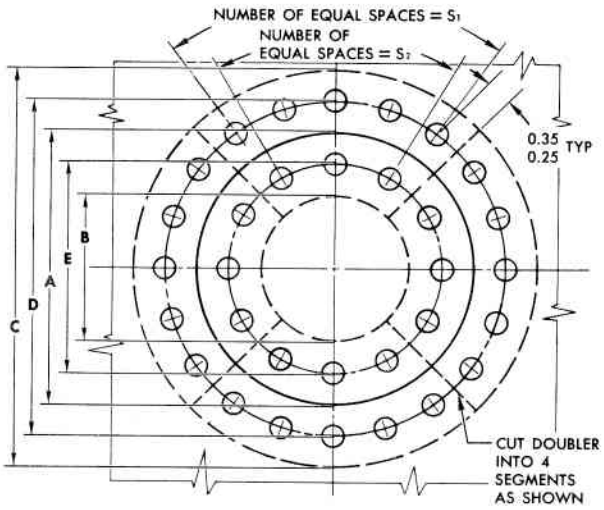
1. REPAIR NO. 16 IS SIMILAR TO REPAIR NO. 14 AND IS FOR REPAIR OF 2-, 3-, AND 4-INCH DIAMETER HOLES THROUGH BOTH SIDES OF A TAPERED PANEL. CORE FILL IS USED AS A FILLER AND FLUSH PATCH PLATES AND DOUBLERS ARE USED ON BOTH SKIN SURFACES.
2. MAKE FLUSH PATCH PLATES AND DOUBLERS FROM 0.025 GAGE 2024-T3 ALUMINUM ALLOY.
3. MAKE FLUSH PATCH PLATES 0.030 INCH LARGER THAN DIMENSION A TO ALLOW FOR TRIM FITTING MATERIAL.



VIEW A

PROCEDURE

a. Determine diameter of damaged area with damage locating templates; see figure 10-11.

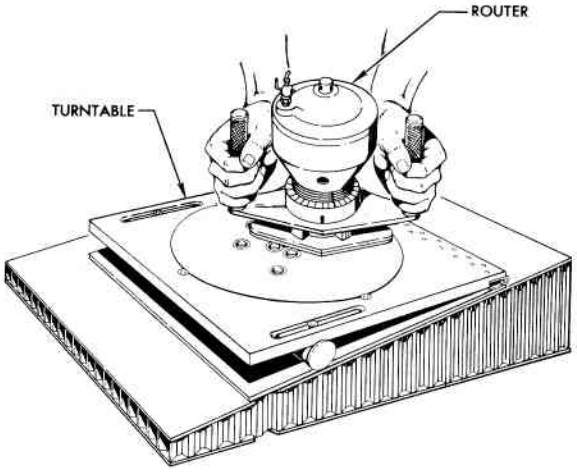


VIEW B

TABLE I							
FLUSH PATCH PLATE AND DOUBLER DIMENSIONS							
DIAMETETER OF DAMAGE	A	B	C	D	E	S_1	S_2
2.000	2.000	1.000	3.50	2.75	1.50	3	1
3.000	3.000	1.500	4.50	3.75	2.25	4	2
4.000	4.000	2.500	5.50	4.75	3.25	5	3

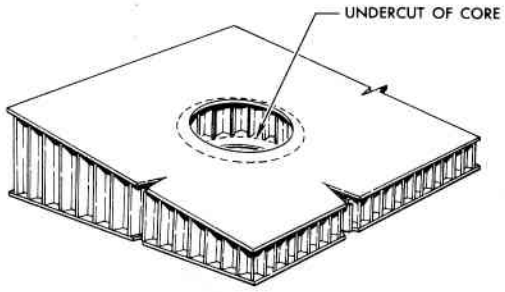
b. After a diameter has been determined, select applicable flush patch plates and doublers from Table I.

06.03.340-1



VIEW C

c. Rout out hole to a round, preselected size of applicable A diameter; see View B. Use -3 router assembly and -53 router turntable assembly; see figure 10-14 and 10-19 for operating instructions.



VIEW D

d. Undercut honeycomb core to doubler diameter as shown in View D. Use the -93 undercutter. See figure 10-21 for instructions on the use of the undercutter.

CAUTION

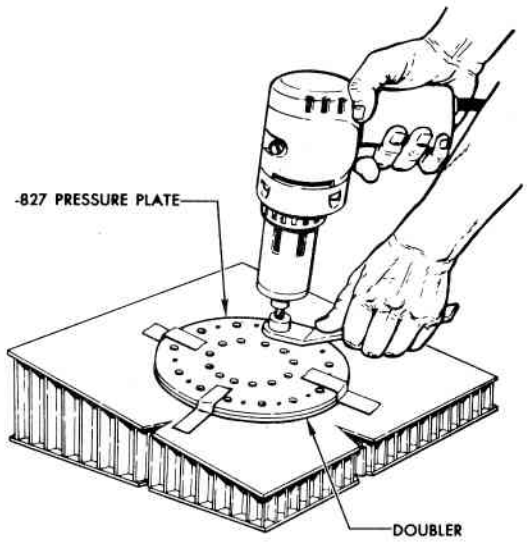
DO NOT SCRATCH UNDERSIDE OF SKIN WITH UNDERCUTTER.

e. Remove dust and cuttings from hole. Use an inspection mirror to check removal of cuttings and smoothness of undercut surfaces.

CAUTION

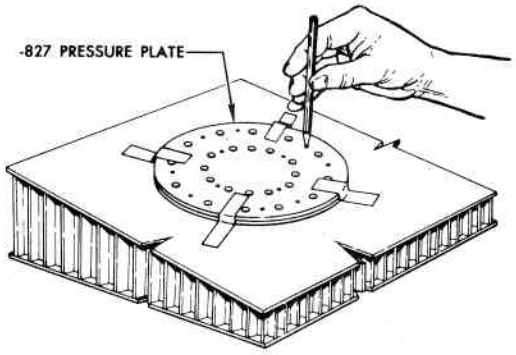
USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.

Figure 10-39. Honeycomb Repair No. 16 — Hole (Sheet 1 of 3)



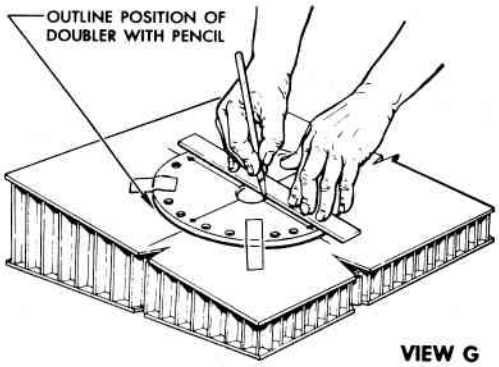
VIEW E

f. Center one of the doublers selected in step "b" on one skin surface of repair.
g. With doubler centered on repair, place an -827 pressure plate in position as a template on top of doubler and tape in place with No. 850 tape; see View E. See figure 10-28 for pressure plate information.
h. With an -813 drill bushing and the -827 plate, drill pilot holes for the outside row of rivet holes through doubler and the one skin surface only as shown in View E. See View B for applicable rivet pattern and figure 10-12 for drilling and fastener installation procedures. See figure 10-28 for detailed instructions on the use of the -813 drill bushing with pressure plates.



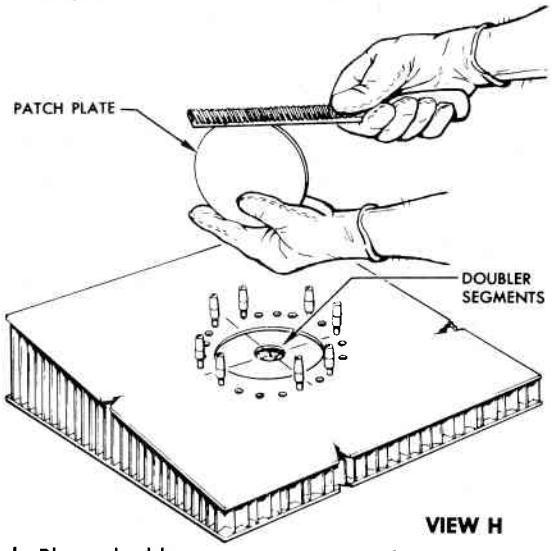
VIEW F

i. Locate and mark doubler segment cutting lines shown in View F using -827 plate. Use No. 60 holes in -827 plate to locate segment cutting lines.



VIEW G

j. Remove -827 plate and mark position of doubler for installation.
k. Cut doubler into segments and smooth up any rough edges.



VIEW H

l. Place doubler segments on repair in positions marked in step "i" and hold in place with CPS-332 spring clamps; see View H.
m. Install one of the flush patch plates selected in step "b" on doubler segments and file plate to fit hole. See View H.

NOTE
MAXIMUM ALLOWABLE GAP BETWEEN PATCH PLATE AND SKIN IS 0.010 INCH.

n. Place -827 plate on repair in the same position placed in step "g" and "h." See View E.

NOTE
TO PERFORM STEP "n," REMOVE FLUSH PATCH PLATE, HOLD DOUBLER SEGMENTS IN PLACE BY HAND OR WITH NO. 850 TAPE, AND REMOVE CPS-332 SPRING CLAMPS. THEN REINSTALL FLUSH PATCH PLATE, PLACE -827 PLATE IN POSITION, AND REINSTALL CPS-332 SPRING CLAMPS THROUGH -827 PLATE, SKIN, AND DOUBLER SEGMENTS.

o. Pilot drill holes for inside row of rivets through flush patch plate and doubler segments; see View E.
p. Drill all pilot holes to rivet hole size selected from figure 10-12.
q. Remove -827 plate and countersink rivet holes in accordance with figure 10-12 in flush patch plate and skin only.

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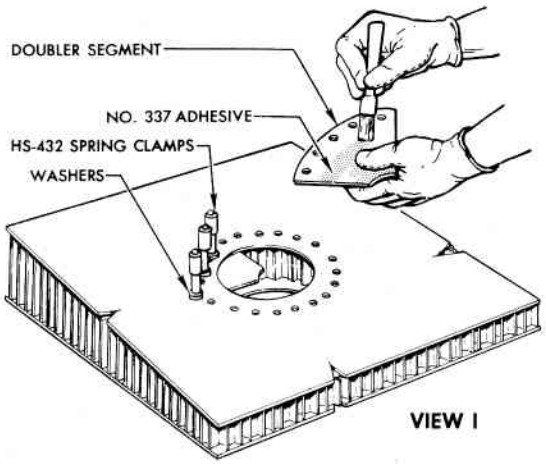
Figure 10-39. Honeycomb Repair No. 16 — Hole (Sheet 2 of 3)

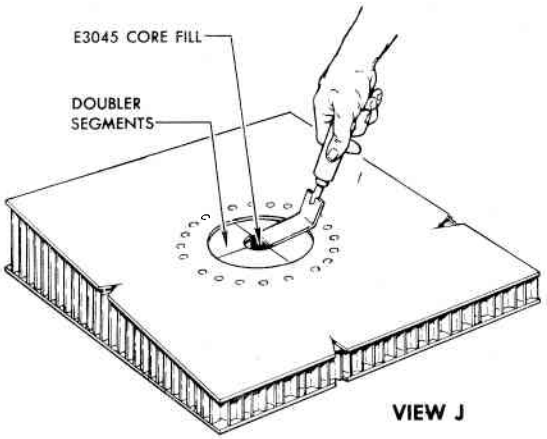


VIEW I

r. Remove all repair parts. Remove burrs and rough edges from repair area and parts. Clean repair parts and skin surface with Aliphatic Naphtha, Federal Specification TT-N-95.
s. Repeat steps "f" through "r" on the other side of panel.
t. Apply a 1/32-inch coat of No. 337 adhesive to the bonding surfaces of one set of doubler segments. Refer to Table 10-1 for adhesive mixing instructions.
u. Install adhesive coated doubler segments and a flush patch plate in position on one side of repair only. Hold parts in place with HS-432 spring clamps and rivet flush patch plate and doubler segments in place using CR762-4-2 cherry rivets.
v. Apply adhesive to the other set of doubler segment bonding surfaces and rivet in place to the other side of panel.

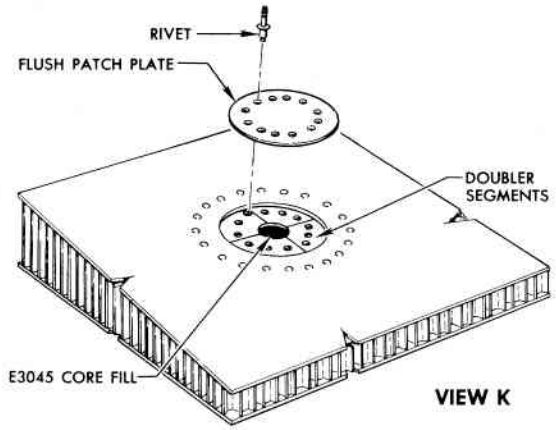
NOTE

PLACE THREE AN960-10 WASHERS ON EACH HS-432 SPRING CLAMP INSTALLED IN STEP "u." INSTALL SPRING CLAMPS IN EVERY OTHER RIVET HOLE AND PULL REPAIR PARTS TOGETHER WITH SUFFICIENT PRESSURE TO SQUEEZE OUT ANY EXCESS ADHESIVE. BE SURE TO PUSH RIVETS DOWN TIGHTLY WHEN DRIVING.



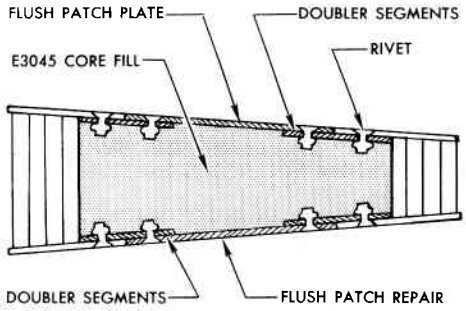
VIEW J

w. Mix E3045 core fill in accordance with Table 10-1.
x. Fill hole as shown in View K with E3045 core fill. Force core fill under doubler segments, be sure cavity is filled evenly and completely.

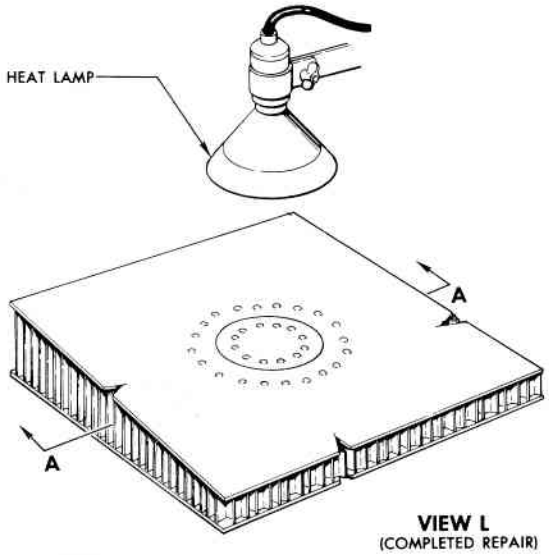


VIEW K

y. Install and rivet remaining flush patch plate to repair using CR762-4-2 cherry rivets. Mill rivets flush on both panel skin surfaces in accordance with figure 10-12.
z. Cure No. 337 adhesive and E3045 core fill in accordance with Table 10-1. See Section A-A for a cross section of a completed repair.



SECTION A-A



VIEW L
(COMPLETED REPAIR)

NOTE:
CURE ADHESIVE 24 TO 48 HOURS AT AMBIENT TEMPERATURE; OR 2 HOURS AT 200°F USING HEAT LAMPS. DO NOT HEAT RAPIDLY.

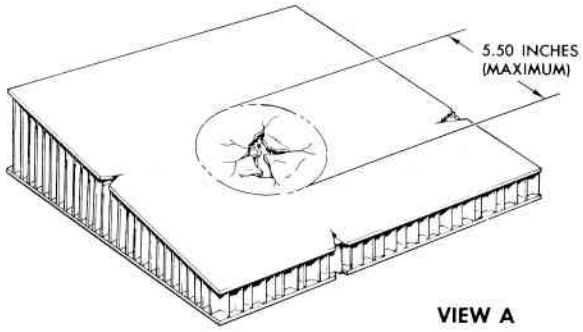
06.03.340-3

Figure 10-39. Honeycomb Repair No. 16 — Hole (Sheet 3 of 3)

REPAIR NO. 17

NOTES

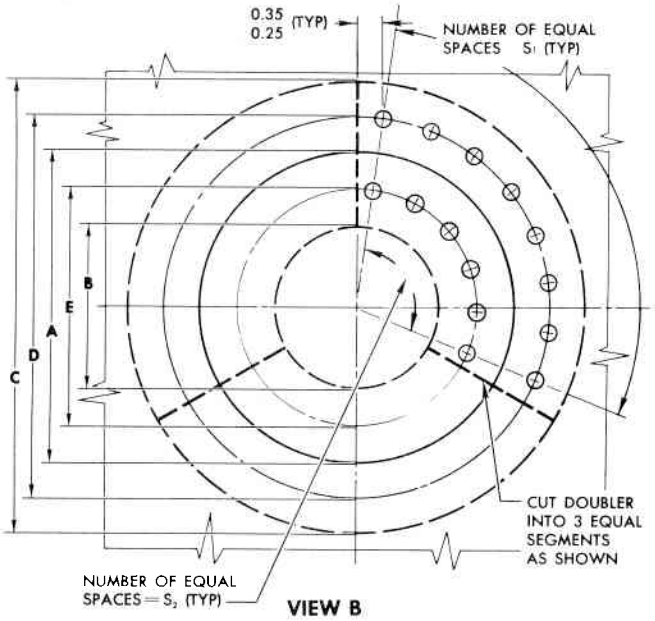
1. REPAIR NO. 17 IS ESSENTIALLY THE SAME AS REPAIR NO. 16, EXCEPT THAT IT ALLOWS REPAIR OF HOLES ON ONE SIDE OF THE HONEYCOMB PANEL UP TO 5.50 INCHES IN DIAMETER.
2. MAKE LARGE AND SMALL FLUSH PATCH PLATES AND DOUBLERS FROM 0.025 GAGE 2024-T3 ALUMINUM ALLOY.
3. MAKE LARGE AND SMALL FLUSH PATCH PLATES 0.030 INCH LARGER THAN DIMENSION A OR A1 TO ALLOW FOR TRIM FITTING MATERIAL.



VIEW A

PROCEDURE

a. Determine exact diameter of damaged area on panel skin surface which exhibits the largest damaged area. Use damage locating template in accordance with Figure 10-11.



VIEW B

TABLE I								
LARGE FLUSH PATCH PLATE AND DOUBLER DIMENSIONS								
DIAMETER OF DAMAGE	A	A1	B	C	D	E	S1	S2
3.50	3.50	2.000	2.000	5.000	4.25	2.75	6	4
4.50	4.50	3.000	3.000	6.000	5.25	3.75	7	5
5.50	5.50	4.000	4.000	7.000	6.25	4.75	9	7

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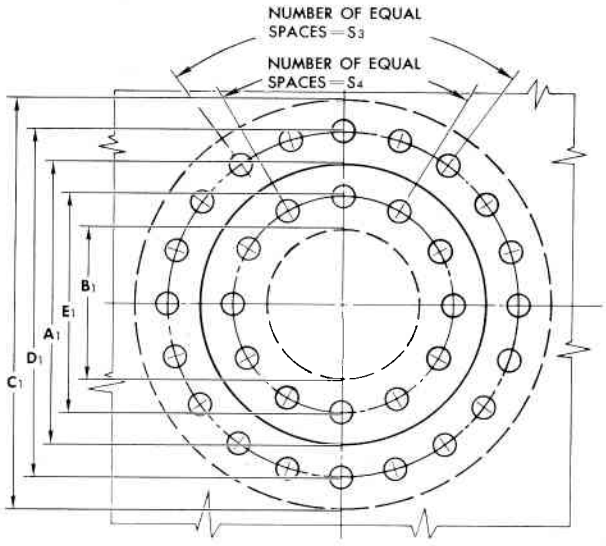
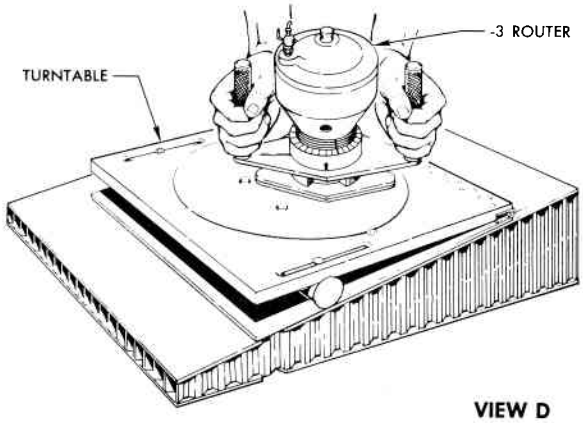


VIEW C

TABLE II							
SMALL FLUSH PATCH PLATE AND DOUBLER DIMENSIONS							
A1	B1	C1	D1	E1	S3	S4
2.000	1.000	3.50	2.75	1.50	3	1
3.000	1.500	4.50	3.75	2.25	4	2
4.000	2.500	5.50	4.75	3.25	5	3

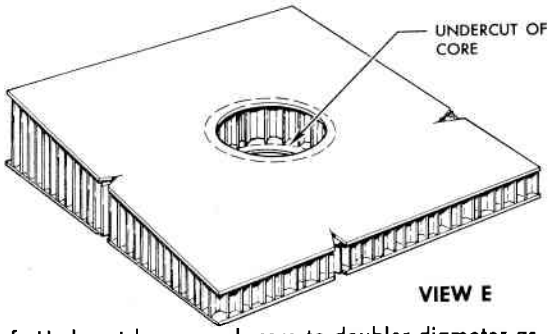
b. After a diameter has been determined, select applicable large and small flush patch plates and doublers from Table I and Table II (see views B and C).



VIEW D

c. Install -53 router turntable assembly and -3 router assembly on panel surface with the largest diameter of damage.
d. Rout a hole through both sides of the panel to a round, preselected size of applicable B diameter; see View B and D. See figure 10-14 and 10-19 for router and turntable installation and operating instructions.
e. With -3 router assembly and -53 router turntable assembly, rout out honeycomb core to adhesive on panel's opposite skin to an applicable A diameter; see View B.

Figure 10-40. Honeycomb Repair No. 17—Hole (Sheet 1 of 3)



VIEW E

f. Undercut honeycomb core to doubler diameter as shown in View E. Use the -93 undercutter. See figure 10-21 for instructions on the use of the undercutter.

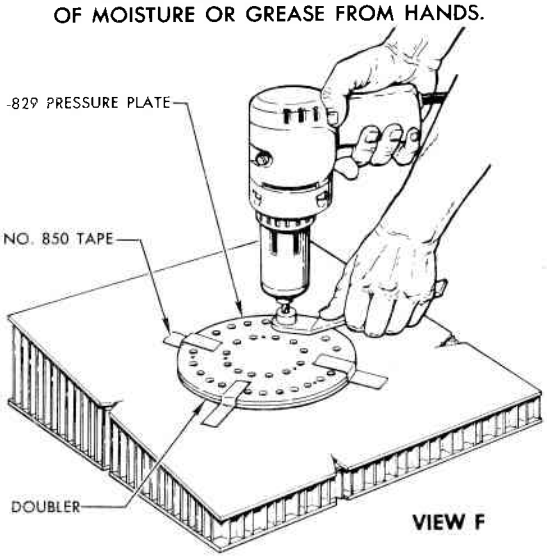
CAUTION

DO NOT SCRATCH UNDERSIDE OF SKIN WITH UNDERCUTTER.

g. Remove dust and cuttings from hole. Use an inspection mirror to check removal of cuttings and smoothness of undercut surfaces. Mark damaged area center lines on the panel's other skin surface with damage locating template in accordance with figure 10-11.

CAUTION

USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.



VIEW F

h. Center large doubler, selected in step "b," in place on skin surface of repair.

i. With large doubler centered on repair, place an -829 pressure plate in position as a template on top of doubler. Tape doubler and pressure plate in place with No. 850 tape; see view F. See figure 10-28 for pressure plate information.

j. With an -813 drill bushing and the -829 plate, drill pilot holes for the outside row of rivet holes through doubler and skin only as shown in View F. See View B for applicable rivet pattern and figure 10-12 for drilling and fastener installation procedures. See figure 10-28 for detailed instructions on the use of the -813 drill bushing with pressure plates.

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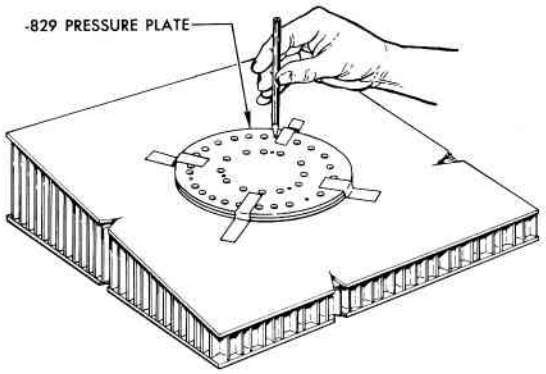
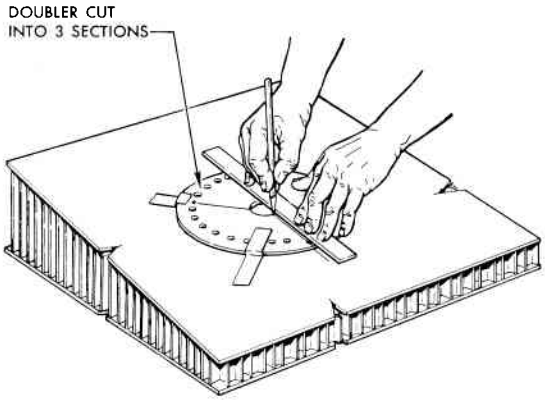


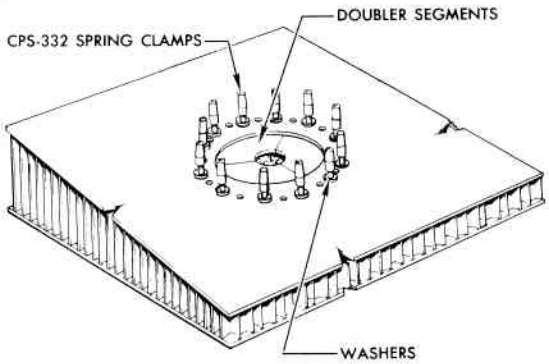
VIEW G

k. Locate and mark large doubler segment cutting lines shown in View G using -829 plate. Use No. 60 holes in -829 plate to locate segment cutting lines.



VIEW H

l. Remove -829 plate and mark position of doubler for reinstallation.

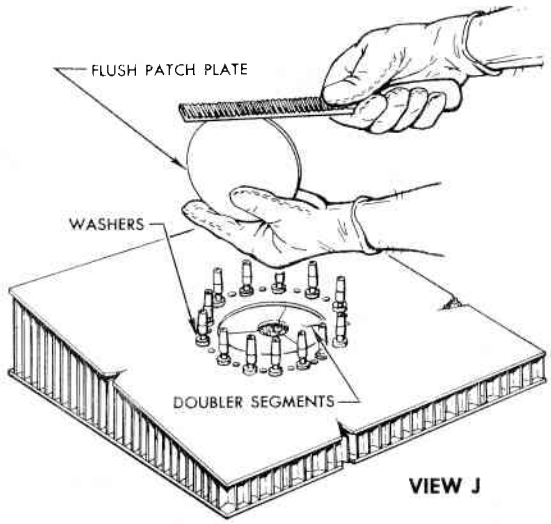


VIEW I

m. Cut large doubler into segments and smooth up any rough edges; see View B.

n. Place large doubler segments on repair in positions marked in step "l" and hold in place with CPS-332 spring clamps; see View I.

Figure 10-40. Honeycomb Repair No. 17—Hole (Sheet 2 of 3)



VIEW J

o. Install large flush patch, selected in step "b," on doubler segments and file plate to fit hole. See View J.

NOTE

MAXIMUM ALLOWABLE GAP BETWEEN PATCH PLATE AND SKIN IS 0.010 INCH.

p. Place -829 plate on repair in the same position placed in steps "i" and "j." See View F.

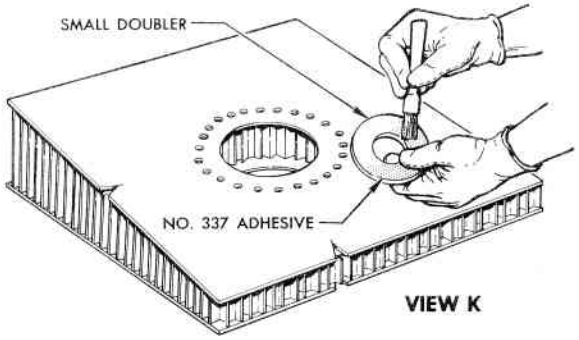
NOTE

TO PERFORM STEP "p," REMOVE FLUSH PATCH PLATE, HOLD DOUBLER SEGMENTS IN PLACE BY HAND OR WITH NO. 850 TAPE, AND REMOVE CPS-332 SPRING CLAMPS. THEN REINSTALL FLUSH PATCH PLATE, PLACE -829 PLATE IN POSITION, AND REINSTALL CPS-332 SPRING CLAMPS THROUGH -829 PLATE, SKIN, AND DOUBLER SEGMENTS.

q. Pilot drill holes for inside row of rivets through large flush patch plate and doubler segments.
r. Drill out all pilot holes to rivet hole size selected from figure 10-12.
s. Remove -829 plate and countersink rivet holes in accordance with figure 10-12 in large flush patch plate and skin only.
t. Remove repair parts. Remove burrs and rough edges from repair area and large repair parts. Clean repair parts and skin surface with Aliphatic Naphtha, Federal Specification TT-N-95.
u. With small patch plate and small doubler selected in step "b," and an -827 pressure plate, repeat steps "h" through "k" and "n" through "u" on the panel's other skin surface.

NOTE

DO NOT CUT SMALL DOUBLER INTO SEGMENTS; OMIT STEPS "l" and "m." SEE VIEW A.



VIEW K

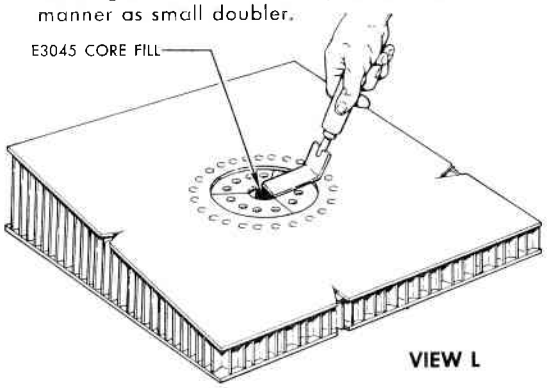
.06.03.343-3

v. Apply a 1/32-inch coat of No. 337 adhesive to the bonding surface of the small doubler. Refer to Table 10-1 for adhesive mixing instructions.
w. Install small adhesive coated doubler and flush patch plate in position. Hold parts in place with HS-432 spring clamps and rivet small flush patch plate and doubler to skin using CR762-4-2 cherry rivets.

NOTE

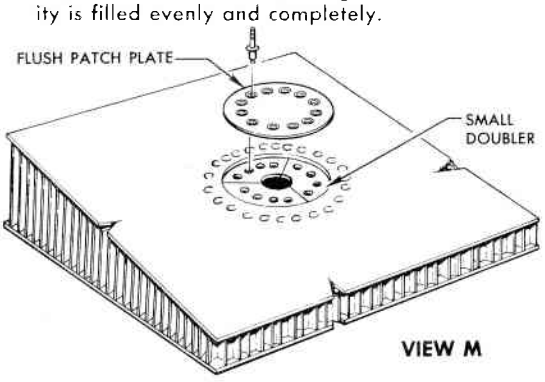
PLACE THREE AN960-10 WASHERS ON EACH HS-432 SPRING CLAMP INSTALLED IN STEP "w." INSTALL SPRING CLAMPS IN EVERY OTHER RIVET HOLE AND PULL REPAIR PARTS TOGETHER WITH SUFFICIENT PRESSURE TO SQUEEZE OUT ANY EXCESS ADHESIVE. BE SURE TO PUSH RIVETS DOWN TIGHTLY WHEN DRIVING.

x. Apply No. 337 adhesive to large doubler segment bonding surfaces and rivet to panel skin in the same manner as small doubler.



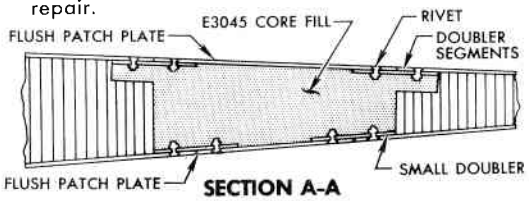
VIEW L

y. Mix E3045 core fill in accordance with Table 10-1.
z. Fill hole as shown in View L with E3045 core fill. Force core fill under doubler segments. Be sure cavity is filled evenly and completely.



VIEW M

aa. Install and rivet large flush patch plate to repair using CR762-4-2 cherry rivets.
ab. Mill rivets flush on both panel skin surfaces in accordance with figure 10-12.
ac. Cure No. 337 adhesive and E3045 core fill in accordance with Table 10-1.
ad. See Section A-A for a cross section of completed repair.

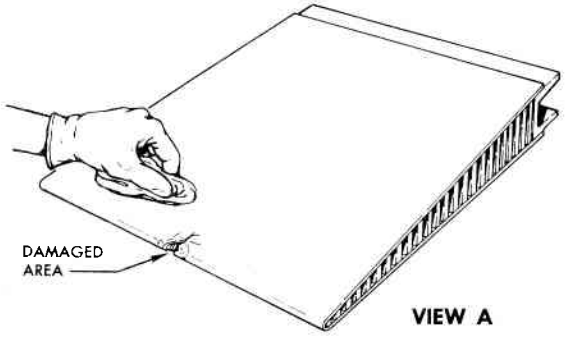


SECTION A-A

Figure 10-40. Honeycomb Repair No. 17—Hole (Sheet 3 of 3)

REPAIR NO. 18

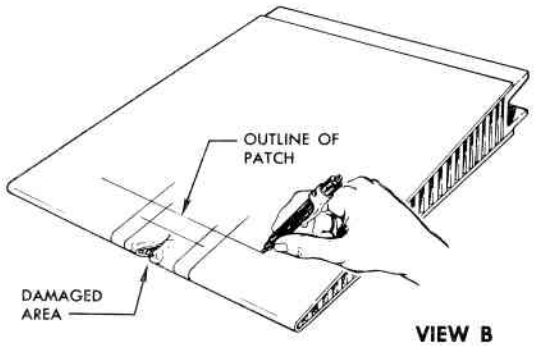
NOTE
THE MAXIMUM ALLOWABLE DIAMETER OF THIS REPAIR IS 2.00 INCHES.



VIEW A

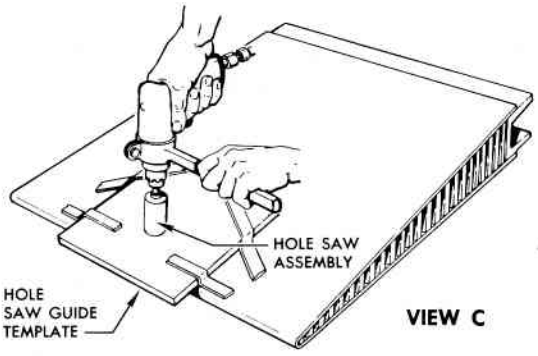
PROCEDURE

a. Clean damaged area with Methyl-Ethyl-Ketone, Specification, TT-M-261.



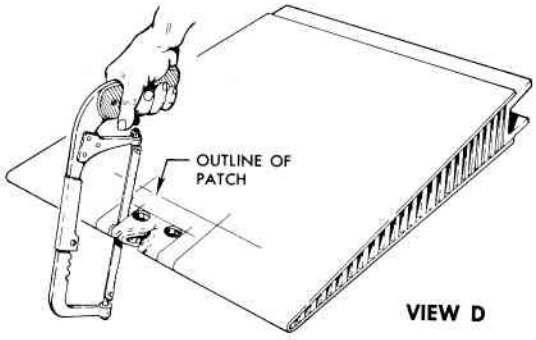
VIEW B

b. Using grease pencil, draw smallest rectangle that will enclose the damaged area as shown.
c. Draw outline of patch. Continue patch outline over trailing edge and complete on bottom side of part.



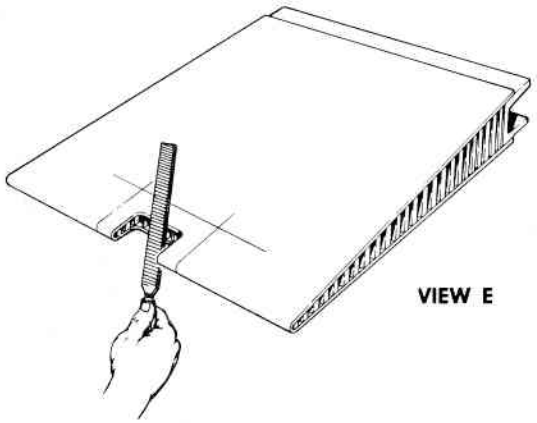
VIEW C

d. Locate -33 hole saw guide template over one corner of the damaged area outline so that hole saw will cut 0.50 corner radius. See figure 10-16.
e. With -55 hole saw assembly and slow speed drill motor, saw hole thru as shown on figure 10-18.
f. Repeat steps "d" and "e" to cut hole in other corner of damage area.



VIEW D

g. Using common hack saw, cut along lines established in step "b" from trailing edge to both corner radii and along forward line parallel to trailing edge.

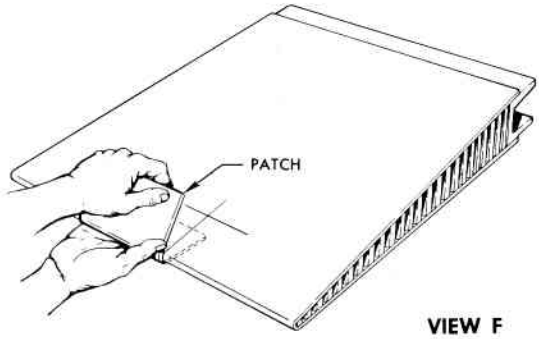


VIEW E

h. File edges of saw cuts smooth.

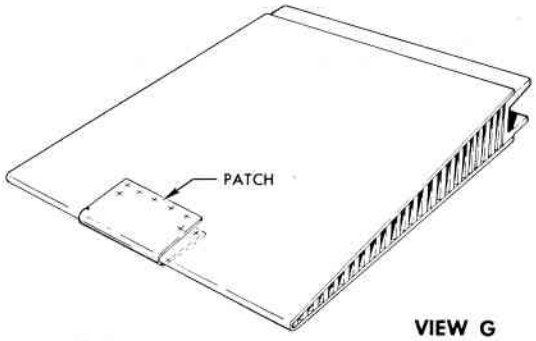
06.03.339-1

Figure 10-41. Honeycomb Repair No. 18 (Trailing Edge Damage) (Sheet 1 of 3)

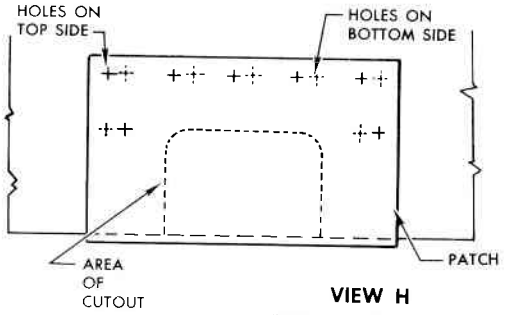


VIEW F

i. Bend 2024-T3 aluminum alloy patch (0.020 thick) to conform to contour of trailing edge.
j. Trim patch to correct dimensions.

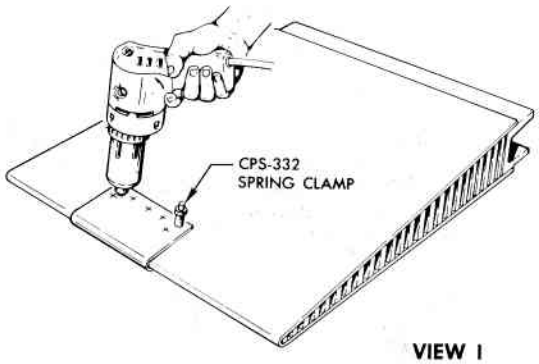


VIEW G



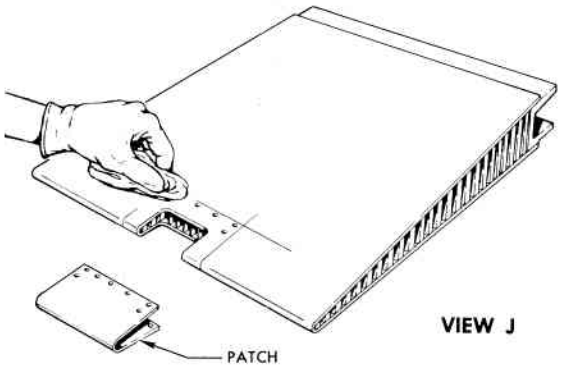
VIEW H
(VIEW LOOKING DOWN)

k. Lay out hole pattern, staggering rivets so that those on bottom side (shown in dotted lines) do not interfere with those on top side.



VIEW I

l. Holding patch firmly in place, drill two pilot holes in top side of patch in opposite corners and install CPS-332 spring clamps. Drill thru patch and skin only, using depth stop.
m. On bottom side of patch, drill two additional pilot holes in opposite corners and install CPS-332 spring clamps.
n. Drill remaining pilot holes.
o. Finish drill pilot holes with No. 30 drill for rivets.
p. Remove spring clamps and patch.
q. Blow out shavings and filings with clean, dry, filtered air.



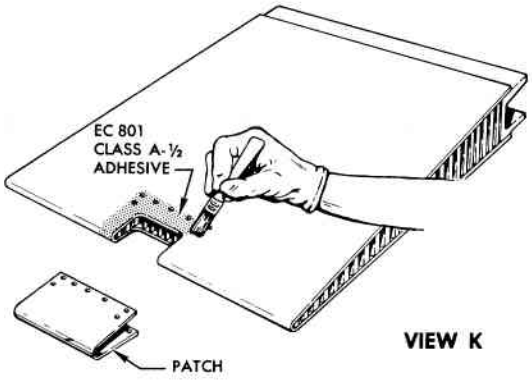
VIEW J

r. Clean surfaces to be covered by patch as outlined in figures 10-13, steps 5 thru 10.
s. Clean patch with Aliphatic Naphtha, Specification TT-N-95.

NOTE
USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.

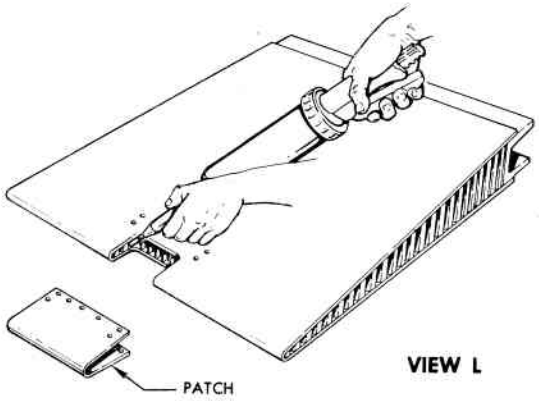
06.03.339.2

Figure 10-41. Honeycomb Repair No. 18 (Trailing Edge Damage) (Sheet 2 of 3)



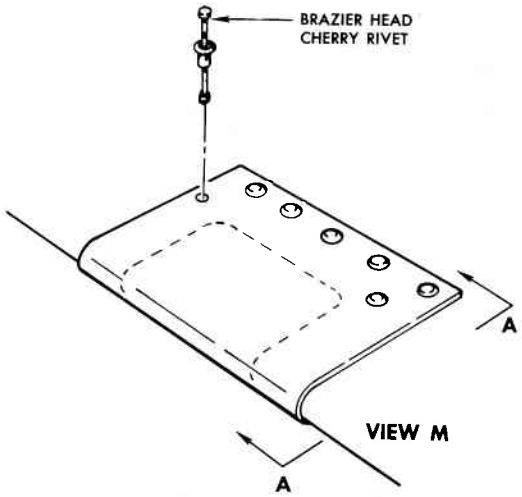
VIEW K

t. Brush coat the bond areas with EC801 Class A-1/2 adhesive. Refer to Table 10-1 for mixing instructions. Use enough adhesive to squeeze out when the parts are pressed together.
u. Fill exposed core cells with adhesive used in preceding step.



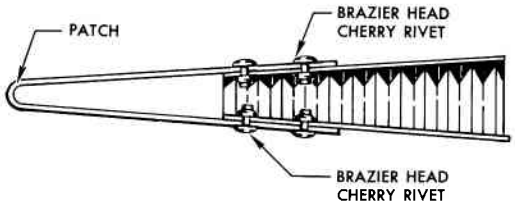
VIEW L

v. Install patch. Press firmly by hand to work out trapped air and ensure good adhesive contact.



VIEW M

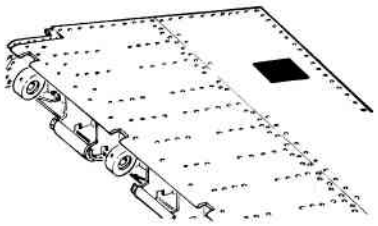
w. Install 1/8-inch brazier head cherry rivets. Exert pressure on rivet heads during pulling operation.
x. Clean surplus adhesive from repair area.



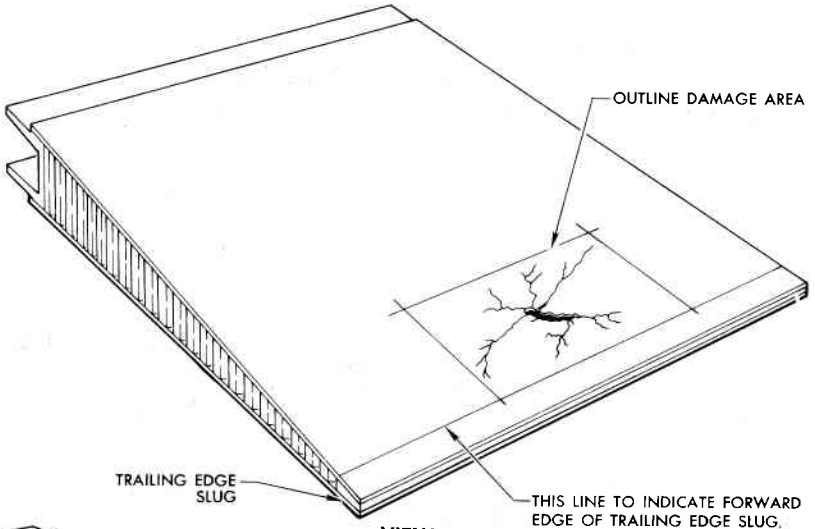
SECTION A-A

.06.03.339-3

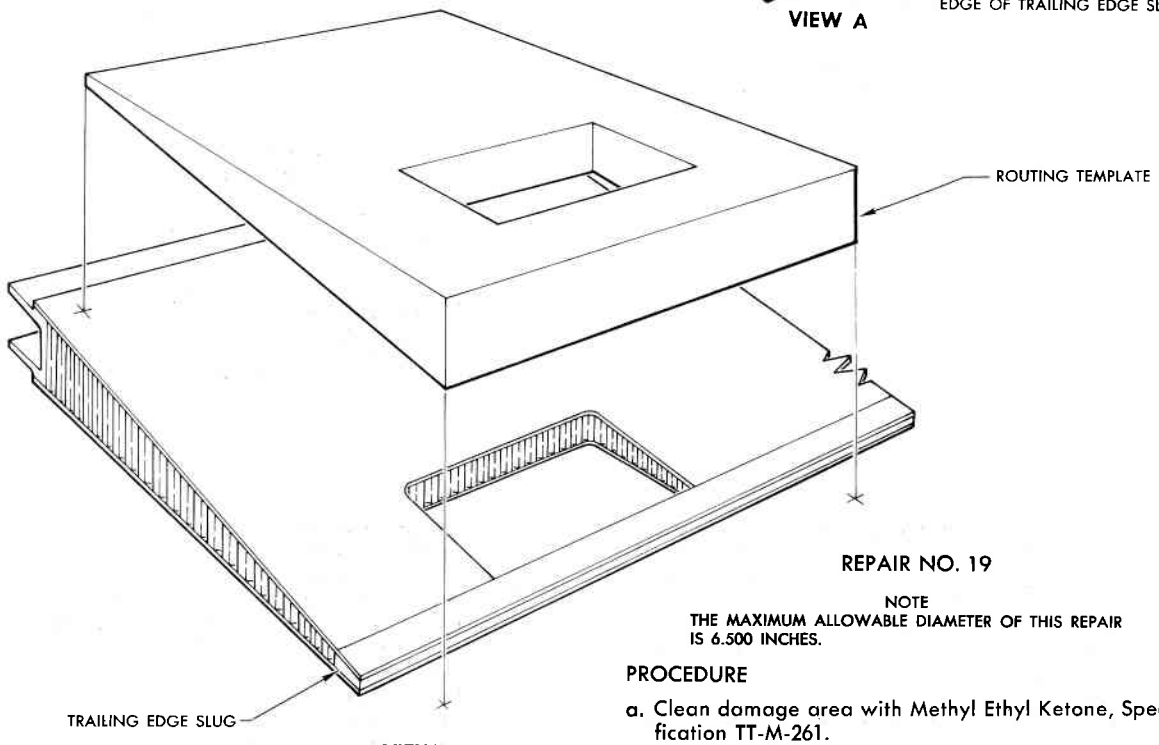
Figure 10-41. Honeycomb Repair No. 18 (Trailing Edge Damage) (Sheet 3 of 3)



AREA OF ASSUMED DAMAGE



VIEW A



VIEW B

REPAIR NO. 19

NOTE
THE MAXIMUM ALLOWABLE DIAMETER OF THIS REPAIR IS 6.500 INCHES.

PROCEDURE

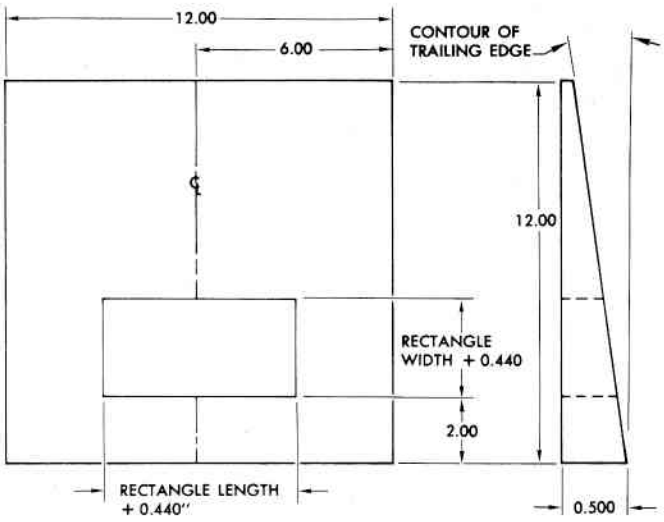
a. Clean damage area with Methyl Ethyl Ketone, Specification TT-M-261.
b. Outline damage area as shown in view A.
c. Determine existing skin gage of damage area, then find dimension L from view D and Table I.
d. Fabricate a router guide template from a piece of plywood 1/2 inch thick and 12 inches square; see views B and C.
e. Place strips of double coated scotch tape on lower surface of template to hold it in place on skin. Place cut out in template over damage area and mark outline of template.
f. Install template on reverse side of damage area and mark template outline exactly opposite outline made in step "e."

TABLE I

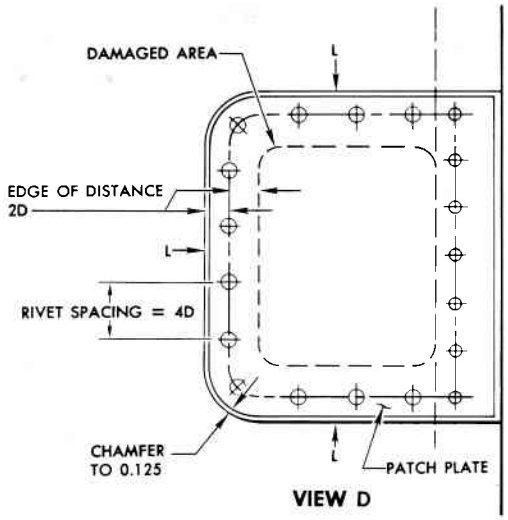
EXSTING SKIN GAGE	L DIM.
0.012 0.016 0.020	0.625
0.025	0.750
0.032	0.960
0.040	1.200
0.050	1.500

06.03.300-1 A

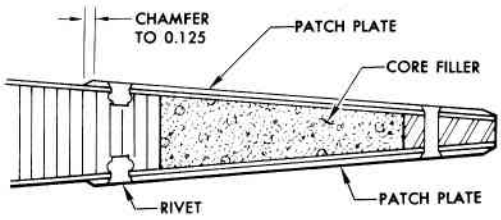
Figure 10-42. Honeycomb Repair No. 19 (Trailing Edge Damage) (Sheet 1 of 2)



VIEW C
(ROUTER GUIDE TEMPLATE)



VIEW D



VIEW E

g. Center template over upper damage area marked in step "e" and rout out damage area through existing skin. Use -3 router assembly; see figure 10-14 for operating instructions.
h. Install template on opposite side. Use coordinating marks in step "f" so template is exactly opposite area routed in step "g" and rout out area through existing skin.
i. Use a sharp knife or scroll saw and trim out damaged core. Use existing skin edges and trailing edge slug as the trim boundary; see view B.
j. Fabricate patch plates. Form, trim and chamfer as shown in view D.
k. Clean faying surfaces of patch plates and existing skin. Use steps 5 through 10, figure 10-13.
l. Mix core filler E3045 as directed by manufacturer.
m. Apply adhesive No. 337 to lower skin bond area.
n. Install lower patch plate in position and secure with tape No. 850; remove excessive adhesive.
o. Fill core cavity with core filler to 1/32 inch above skin level in center of cavity.
p. Apply adhesive No. 337 to upper patch plate and tape in place.
q. Drill rivet pattern and countersink holes. Refer to view D for rivet pattern.
r. Install P56S-134-100-8 rivets. Mill down protruding rivet heads.
s. Use a heat lamp and allow repair to cure. (See Table 10-I.) See view E for cross section of completed repair.

06.03.300-2A

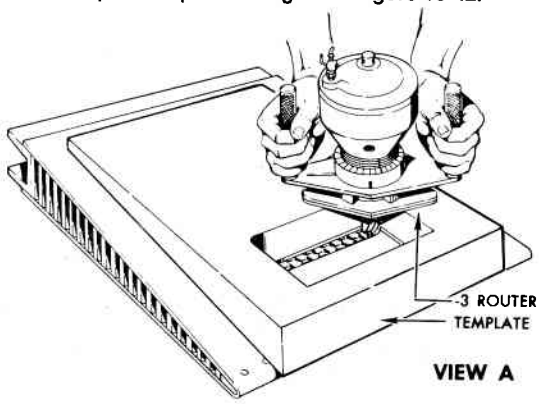
Figure 10-42. Honeycomb Repair No. 19 (Trailing Edge Damage) (Sheet 2 of 2)

REPAIR NO. 20

NOTE
THE MAXIMUM ALLOWABLE DIAMETER OF THIS REPAIR IS 6.500 INCHES.

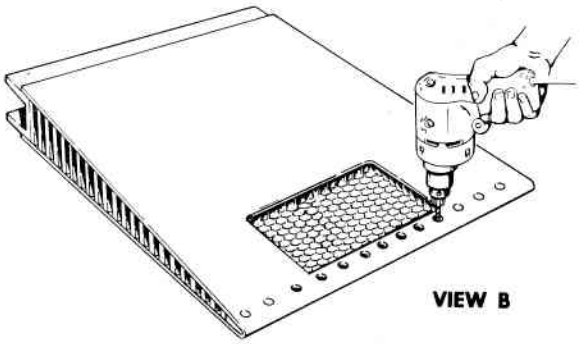
PROCEDURE

a. Accomplish steps a through e of figure 10-42.

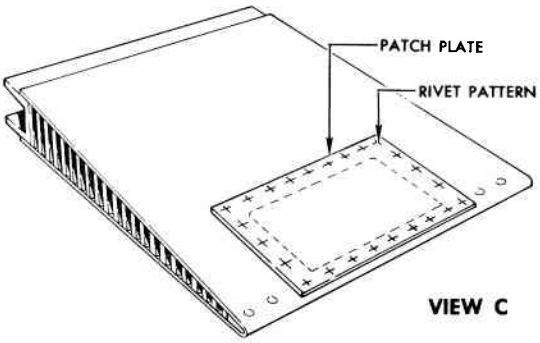


VIEW A

b. Center template over damage area and install -3 router assembly. See figure 10-14 for operating instructions.
c. Remove skin from damage area using router cuts of 0.010 inch or less. Do not remove skin over trailing edge slug.
d. Route out the damaged core to the required depth.


VIEW B

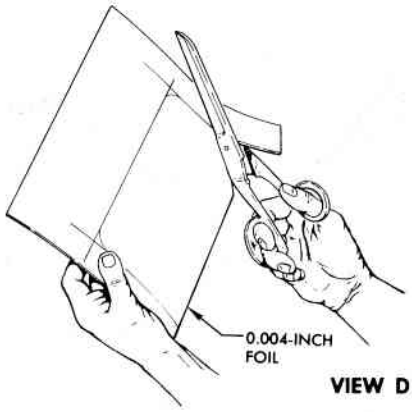
e. Drill and punch out original trailing edge rivets (if installed) in patch plate area.



VIEW C

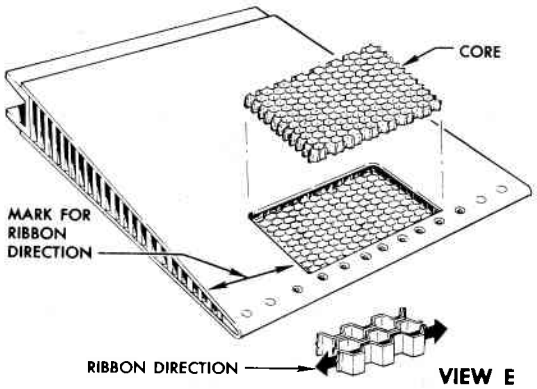
f. Fabricate 2024-T3 aluminum alloy patch plate from 0.025 material. Trim, chamfer, form, and lay out rivet pattern as shown in view C. Pick up existing rivet holes in trailing edge (if holes exist).

.06.03.341-1



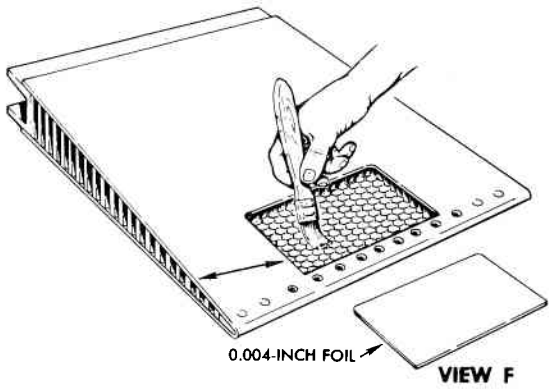
VIEW D

g. Cut out sheet of 0.004-inch foil to fit bottom of core cavity.



VIEW E

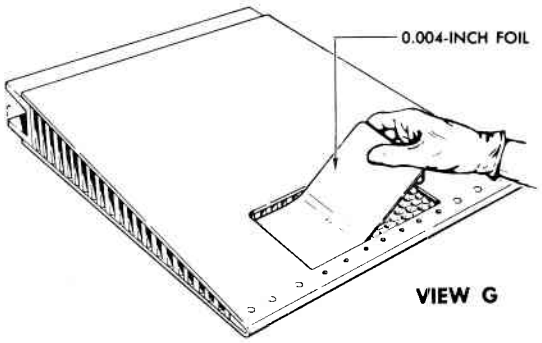
h. Cut core plug 1/32-inch oversize with ribbon direction same as core in the part.



VIEW F

i. Blow shavings out of core cavity with clean, dry, filtered air.
j. Clean faying surfaces of patch plate and existing skin as outlined in figure 10-13, steps 5 thru 10.
k. Clean core plug and foil sheet with Aliphatic Naphtha, Specification TT-N-95.
l. Brush coat one side of 0.004-inch foil 1/16 to ⅛-inch thick with No. 338 adhesive.

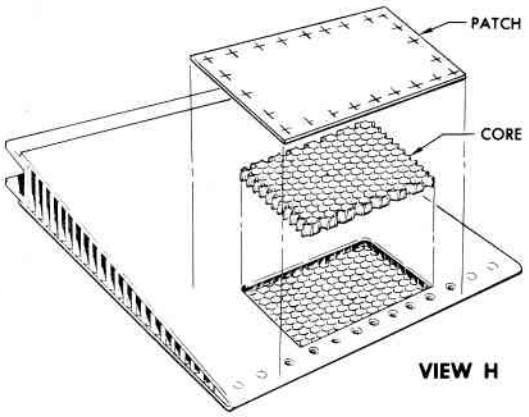
Figure 10-43. Honeycomb Repair No. 20 (Trailing Edge Damage) (Sheet 1 of 2)



VIEW G

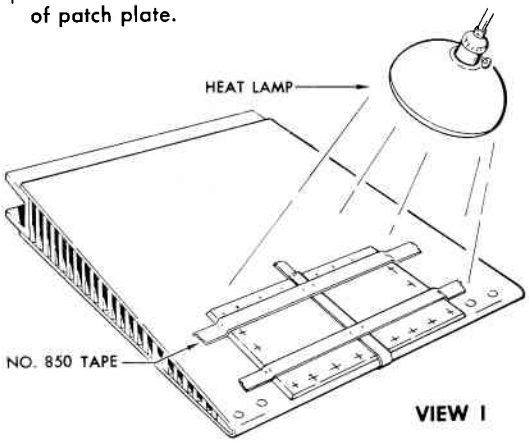
m. Push foil (adhesive side down) into core cavity.

NOTE
USE CLEAN WHITE GLOVES TO HANDLE ALL REPAIR PARTS TO PREVENT TRANSFER OF MOISTURE OR GREASE FROM HANDS.



VIEW H

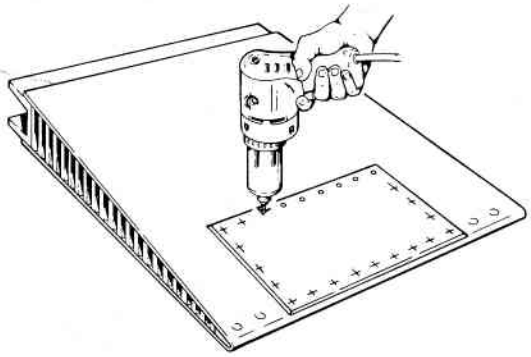
n. Coat foil and core at sides of cavity heavily with No. 338 adhesive.
o. Install core plug; push down firmly.
p. Brush a light coat of adhesive No. 337 on faying surfaces of part.
q. Brush a coat of adhesive No. 338 on faying surfaces of patch plate.



VIEW I

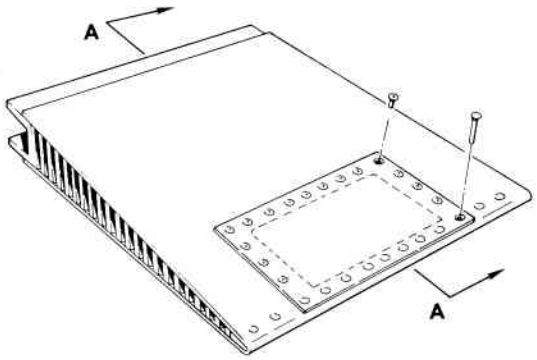
r. Install patch plate in position and secure with No. 850 tape.
s. Allow repair to cure using heat lamp. See Table 10-1.

06.03.341-2



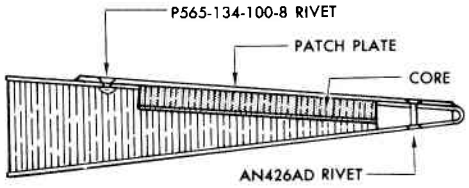
VIEW J

t. Drill holes in patch plate along trailing edge the same size as the original holes. Dimplet patch plate into old countersink. If no holes exist in trailing edge, drill No. 39 holes as shown in view B. Countersink patch plate only.
u. Drill No. 29 holes in skin area of patch plate and countersink. Drill thru patch plate and skin only using depth stop.



VIEW K

v. Install 426AD rivets in trailing edge and double flush.
w. Install P565-134-100-8 explosive rivets in skin area of patch.
x. Mill down all protruding rivet heads.
y. Clean surplus adhesive from repair area.



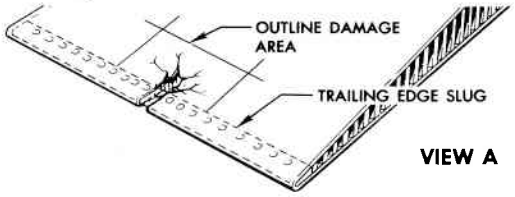
SECTION A-A

Figure 10-43. Honeycomb Repair No. 20 (Trailing Edge Damage) (Sheet 2 of 2)

REPAIRS NO. 21 AND 22

NOTE

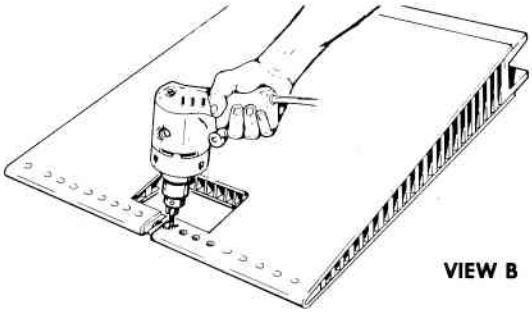
THESE REPAIRS ARE USED WHEN IT IS NECESSARY TO REPLACE A SECTION OF THE TRAILING EDGE SLUG. THEY ARE USED IN CONJUNCTION WITH HONEYCOMB TRAILING EDGE REPAIR NO. 19, DESCRIBED IN FIGURE 10-42.



VIEW A

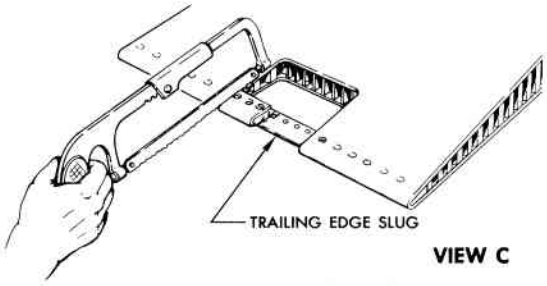
PROCEDURE

a. Accomplish steps "a" thru "i" of figure 10-42.



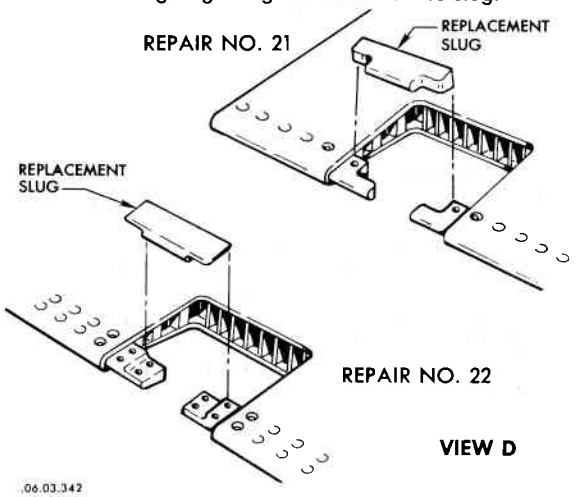
VIEW B

b. Drill and punch out original trailing edge rivets (if installed) in patch plate area.



VIEW C

c. Using common hack saw, cut remaining skin from over trailing edge slug. Do not saw into slug.



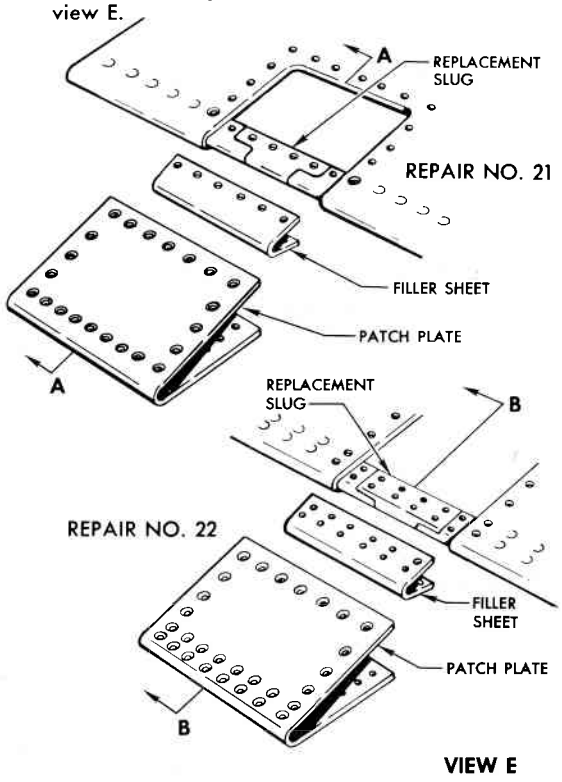
VIEW D

.06.03.342

d. Outline applicable slug repair to be made as shown in view D.

e. Using a hack saw and mill file, make appropriate cuts in trailing edge slug as shown.

f. Fabricate replacement slug from a section of a production trailing edge slug or from 2024-T3 stock. Pick up trailing edge rivet pattern as shown in view E.

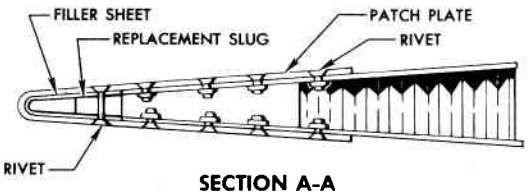


VIEW E

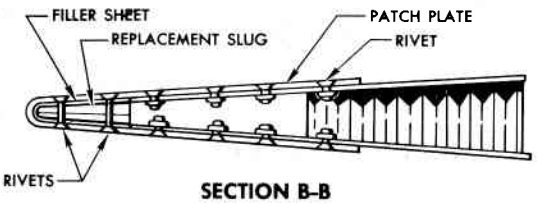
g. Fabricate filler sheet from 2024-T3 aluminum alloy the same thickness as the adjacent skin.

h. Fabricate patch plate from one piece of 2024-T3 aluminum alloy 0.025-inch thick to wrap around trailing edge as shown in view E.

i. Accomplish steps "j" thru "s" of figure 10-42.

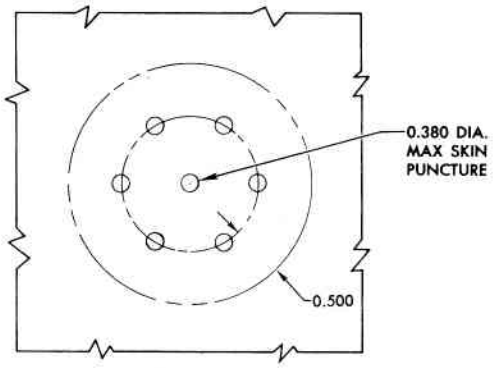


SECTION A-A

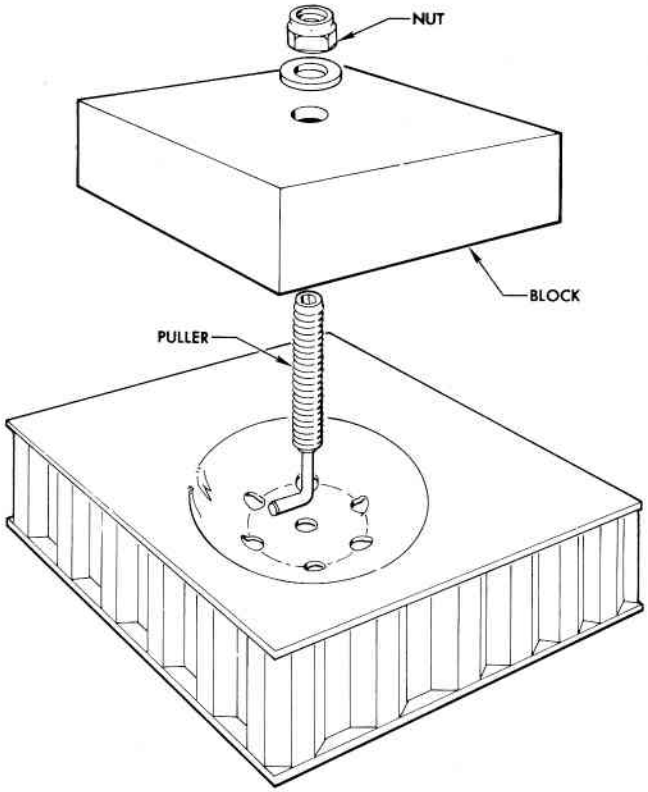


SECTION B-B

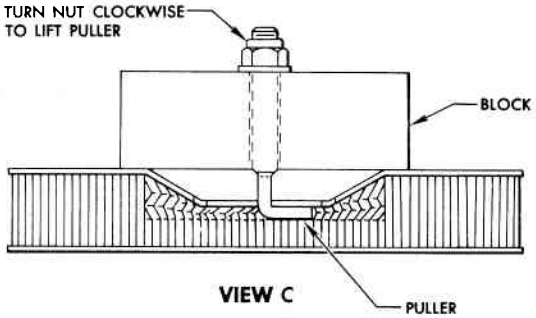
Figure 10-44. Honeycomb Repair No's. 21 and 22 (Trailing Edge Damage)



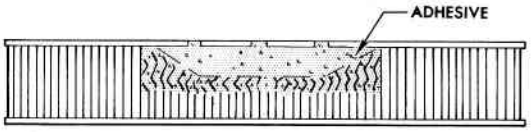
VIEW A



VIEW B



VIEW C



VIEW D

REPAIR NO. 23

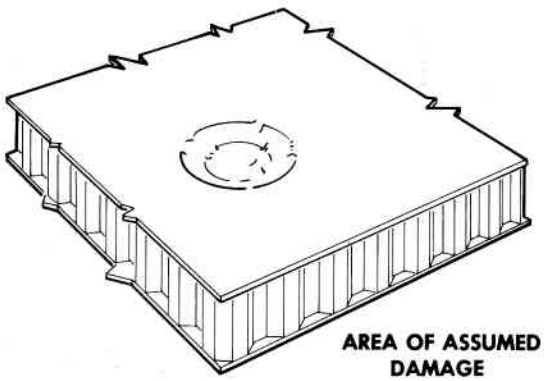
NOTE
THIS REPAIR IS USED FOR DENTS WHICH DO NOT EXCEED 2.500 INCHES IN DIAMETER.

PROCEDURE

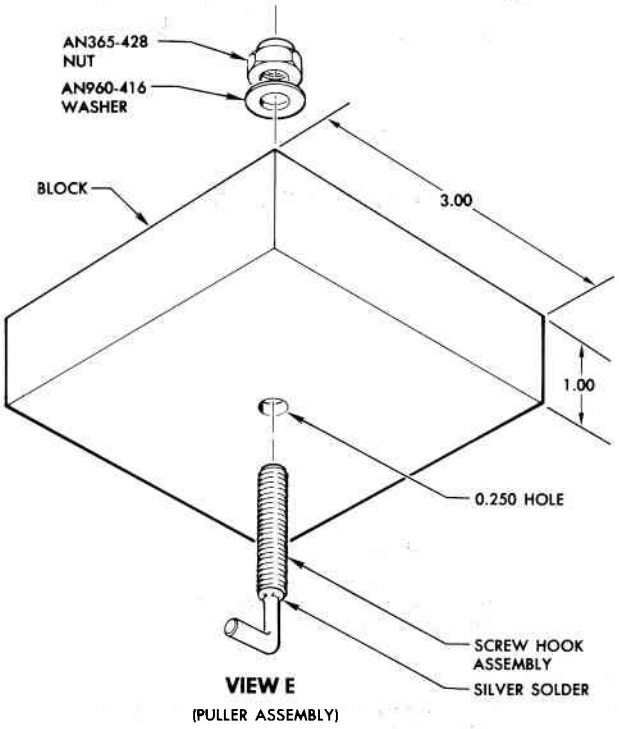
a. Prepare and clean damage area. Use steps 1, 2, 5 thru 9 and 10 of figure 10-13.
b. Lay out and centerpunch holes with proper hole pattern template as shown in view A. See figure 10-17 for illustration of -67, -69, and -71 hole pattern templates.
c. Drill holes (0.161 inch diameter) through skin only. Use a No. 20 drill and a depth stop.
d. Fabricate dent puller as shown in Views E and F.
e. Install dent puller by inserting in drilled holes; see View B.
f. Remove dent by tightening nut; see View C.
g. Select and mix proper adhesive from Table 10-1.
h. Inject adhesive in drill holes and fill depression under skin to 1/32 inch above existing skin level.
i. Allow adhesive to cure, then sand down to contour of existing skin. See View D for cross-section of completed repair.

06 03 301-1B

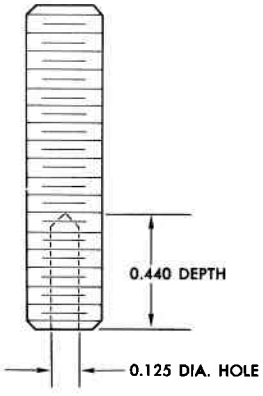
Figure 10-45. Honeycomb Repair No. 23 (Crack or Dent) (Sheet 1 of 2)

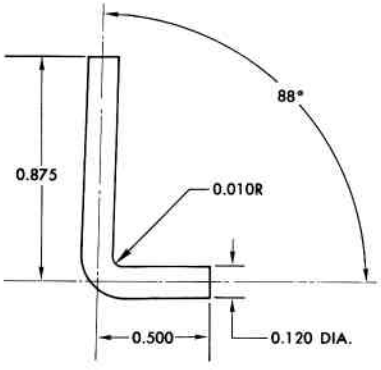


AREA OF ASSUMED DAMAGE



VIEW E
(PULLER ASSEMBLY)

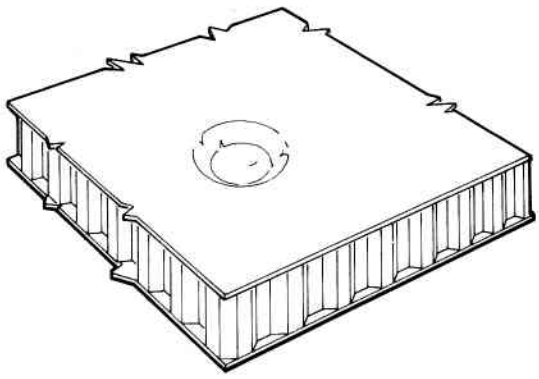




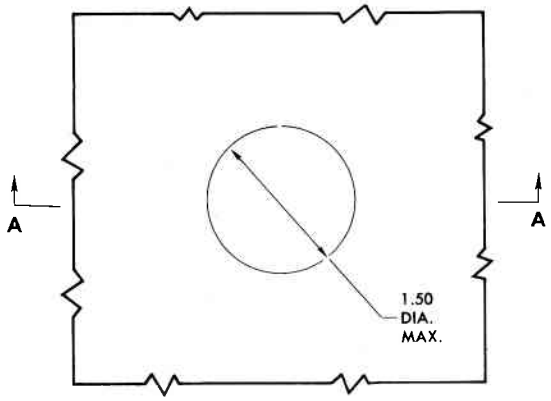
VIEW F

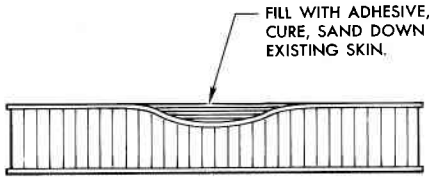
.06.03.301-2 .51.00.03

Figure 10-45. Honeycomb Repair No. 23 (Crack or Dent) (Sheet 2 of 2)



AREA OF ASSUMED DAMAGE





SECTION A-A

REPAIR NO. 24

NOTE
THIS IS A DENT REPAIR USED WHEN DAMAGE DOES NOT EXCEED 1.500 INCHES IN DIAMETER.

PROCEDURE

a. Prepare and clean damaged area. Use steps 1, 2, 5 thru 9 and 10 of figure 10-13.
b. Select adhesive and mix adhesive; mix adhesive according to manufacturers instructions.
c. Fill damage area 1/32 inch above level of existing skin.
d. Allow adhesive to cure.

NOTE
IF ADHESIVE EC1184 IS USED, ALLOW 3 HOURS CURING TIME FOR EACH 1/16 INCH OF THICKNESS.

e. Sand down to contour of existing skin.

06.03.302 A

Figure 10-46. Honeycomb Repair No. 24 (Dent)

REPAIR NO.	ADHESIVES A	NUMBER	CURING AGENT B	NUMBER	MANUFACTURER
1, 2, 3, 4, 5, and 6	FM 47 Liquid Primer	FM 47 Liquid	——	——	Bloomingdale Rubber Co. Aberdeen, Md.
1, 2, 3, 4, 5, and 6	FM 47 Film	FM 47 Film (Supported)	——	——	Bloomingdale Rubber Co. Aberdeen, Md.
3, 4, 5, 7, 8, 9, and 10	Narmco 3135	A	Narmco 3135	B	Narmco Resins and Coating Co. Costa Mesa, Calif.
2, 3, 4, 5, 6, 12, and 13	EC 1469 Compound	EC 1469	EC 1470	——	Minnesota Mining and Mfg. Co. St. Paul, Minn.
1, 2, 7, 8, 10, 14, 15, 16, 17, 19, 21, 22, 23, and 24	Core Filler	E 3045	Catalyst	E 3045	Boray Mfg. Co. 11434 S. Downey Ave. Downey, Calif.
2, 4, 5, 6, 15, and 20	338 Compound	338	Hardener 19	——	Boray Mfg. Co. 11434 S. Downey Ave. Downey, Calif.
3, 4 and 5	EC 1653 Compound	EC 1653	EC 1653A	——	Minnesota Mining and Mfg. Co. St. Paul, Minn.
3, 4, 5, 6, 7, 9, 10, 12, and 13	Narmco 3143 Compound (F.S.N. 5305-281-4648)	Narmco 3143A	Narmco 3143	Narmco 3143C	Narmco Resins and Coating Co. Costa Mesa, Calif.
6, 7, 12, 13, 23, and 24	Metalset A2	Metalset A2	01 08	——	Smooth-on Mfg. Co. 572 Communipaw Ave. Jersey City, New Jersey
3, 4 and 5	Epon 828 (F.S.N. 8040-291-0162)		Z	——	Shell Chemical Co. 10642 Downey Ave. Downey, Calif.
10, 23, and 24	EC 1184	EC 1184 A	EC 1184	B	Minnesota Mining and Mfg. Co. St. Paul, Minn.
10 and 11	EC 1660		——		Minnesota Mining and Mfg. Co. St. Paul, Minn.
18	EC 801 Compound Class A-½	EC 801	EC 1240		Minnesota Mining and Mfg. Co. St. Paul, Minn.
14, 15, 16, 17, 19, 20, 21, 22, 23, and 24	337 Compound	337	Hardener	37	Boray Mfg. Co. 11434 S. Downey Ave. Downey, Calif.

NOTES: 1. Cure cycles are optional unless otherwise directed by repair instructions. 2. Adhesive and accel

TABLE 10-I

Honeycomb Repair Adhesives and Processing

COMPONENT PARTS MIXING INSTRUCTIONS	APPLICATION INSTRUCTIONS	CURE CYCLE TIME	CURE CYCLE TEMP.	CURE CYCLE PRESS.	POT LIFE
Stir Thoroughly ee Paragraph 11-68	1. Brush or spray thin coat on surface to be primed. 2. Air dry 1 to 2 hours at ambient temperature (above 65°F).	45 Minutes	220°F to 235°F	None	——
No Mixing Required	1. Cut FM 47 film to size of area to be bonded. 2. Install in place between parts to be bonded.	30 Min. 1 Hour	300°F 275°F	60-100 Psi	——
		See Figure 10-12			
Refer to Note 2 and Paragraph 11-65	1. Apply thin coat of mixture on one faying surface with brush. 2. Press part together firmly, clamp and cure.	24 Hours	Ambient (above 65°F)	Clamp	1 Hour
		Refer to Note 1			
Refer to Note 2 and Paragraph 11-57	Fill area full plus 1/32" above surface with tongue blade. Work out any air bubbles. Cure. Sand down to contour.	Cure by raising gradually to 200°F and holding for 60 minutes.			4 Hours
Refer to Note 2 and Paragraph 11-70	Fill area full plus 132" above surface with tongue blade. Work in solid and smooth. Cure. Sand to contour.	1 Hour 20 Min.	250°F 325°F	None None	30 to 60 Min.
		Refer to Note 1			
Refer to Note 2 and Paragraph 11-63	Fill area full plus 1/32" above surface with brush or tongue blade. Work in solid. Cure. Sand to contour.	2 Hours	Ambient (above 65°F)	None	30 Min.
		Refer to Note 1			
Refer to Note 2 and Paragraph 11-54	Same as EC 1469.	2 Hours	150°F to 200°F	None	4 to 6 Hours
Refer to Note 2	For repairs 3, 4, 5, 9 and 10 apply same as EC 1469.	4 Hours	Ambient (above 65°F)	None	25 Min.
	For repairs 6 and 7 apply as per repair instructions.	1 Hour	200°F	None	
Refer to Note 2	Apply per repair instructions.	65 Min. 35 Min.	Ambient (above 65°F) Ambient (above 65°F)	—— ——	35 Min. 20 Min.
Refer to Note 2 and Paragraph 11-68	Same as EC 1469.	1 Hour	250°F to 300°F	——	1 Hour
Refer to Note 2 and Paragraph 11-42	Apply per repair instructions.	2 Hour	Ambient (above 65°F)	——	45 Min.
None	1. Apply thin coat to one side of repair patch. 2. Air dry approximately 20 minutes.	30 Min.	250°F to 300°F	3 to 15 Psi	——
A plus 12% of B by weight Mix thoroughly	Apply per repair instructions.	24 Hours 2 Hours	Ambient (above 65°F) 200°F	None None	2 Hours
2 parts A plus 1 part B by weight Mix thoroughly	Apply per repair instructions.	2 Hours 45 Min.	Ambient (above 65°F)	None None	30 Min.

erator are issued as a kit and should be mixed per manufacturer's instructions.

TABLE 10-II

Special Tools

FIGURE	NAME	PART NO.	USE AND APPLICATION
10-11	Damage Locating Template	8-01404-1 (Fabricate Locally)	To determine overall diameter of damage area and establish coordinate centerlines.
10-15	Router Guide Templates	8-01404-5 thru -19 and 8-01404-45 thru -51 (Fabricate Locally)	To guide router in order to route out damage area to a uniform shape and depth.
10-16	Hole Saw Guide Templates	8-01404-21 thru -43 (Fabricate Locally)	To locate and establish hole saw at correct angle while cutting out damage area.
10-17	Hole Pattern Templates	8-01404-67 thru -71 (Fabricate Locally)	To establish rivet hole pattern in damage area.
10-14	Router Assembly	8-01404-3	To rout out damage area to required shape and depth.
10-18	Hole Saws	8-01404-55 thru -65	To cut out damage area in a circular shape.
10-19	Router Turntable Assembly (used in conjunction with router assembly)	8-01404-53	May be used instead of templates to route out holes, in tapered parts, normal to the chord plane of the part.
10-20	Cutter Assembly	8-01404-87	Used to undercut core in the repair of 0.375-inch holes in honeycomb structure.
10-21	Hand Operated Undercutter Assembly	8-01404-89 thru -93	Used to undercut core in the repair of 0.75-inch to 1.50-inch holes in honeycomb structure.
10-22	Power Operated Undercutter Assembly	8-01404-95 and -97	Inserted in 1/8-inch holes to undercut core to 3/16-inch or 1/4-inch diameter prior to application of potting compounds.
10-23	Vacuum Box Assembly	8-01404-99	To apply pressure and heat to a repair while curing the adhesives.
10-24	Diaphragm Assembly	8-01404-839 and -841	Used in conjunction with clamp assemblies to provide measured pressure to repair while curing adhesives.
10-25	Hydraulic Diaphragm Assembly	8-01404-843 and -845	Same as diaphragm assembly.
10-26	Vacuum Bag Assembly	8-01404-801	To apply pressure to areas where other methods are impractical.
10-27	Pressure Systems	8-01404-803 thru -807	To hold patch in place and apply pressure while bonding.
10-28	Pressure Plates (used in conjunction with spring clamps and -813 drill bushing assembly)	8-01404-815 thru -837 (Fabricate Locally)	To locate rivet holes and doubler cutting lines, and to apply pressure to repair while bonding.
10-29	Core Saw	8-01404-861 (Fabricate Locally)	Used for rough cutting core plugs and tubes nearly flush with skin.

Section XI

REPAIR MATERIALS

11-1. REPAIR MATERIALS.

11-2. The following lists contain materials and attaching parts required to make the repairs discussed in this manual.

11-3. BOLTS.

11-4. The following is general practice information. Always use bolts of the original type and material for replacement. Use a nut made of the same material as the bolt. Use close tolerance bolts in shear installations. Use drilled shank bolts with castle nuts. Use undrilled shank bolts with self-locking nuts. Refer to Table 11-I for list of bolts.

TABLE 11-I

Bolts

DESIGNATION	MATERIAL	IDENTIFICATION	USE
AN3 to AN20	Steel, cadmium plated.	Raised X on head.	Ordinary Installation.
AN3C to AN20C	Corrosion resistant steel (CRES).	Raised dash mark (—) on head.	High-temperature installations.
AN3DD to AN20DD	Aluminum alloy, anodized.	Two raised radial dash marks (- -).	Use only as replacement for aluminum.
AN173 to AN186	Steel, cadmium plated close tolerance.	Raised triangle and X.	Shear installations.
MS 20004 thru MS 20024 series	High tensile strength steel.	Internal wrenching head.	Tension installations with high-strength nuts only.
NAS333 to NAS340	100° countersunk head. High tensile strength steel, cadmium plated. Close tolerance.	Number and triangle on head.	Shear installations with standard nuts. May be substituted for Huck lockbolts.
NAS 464	High tensile strength steel. Close tolerance.	Number and triangle on head.	High shear installations with standard nuts.
NAS 501	Nonmagnetic corrosion resistant steel (CRES).	Number and dash mark on head.	In area of equipment sensitive to magnetic materials or subject to high temperatures.
NAS 563 thru NAS 572	Full threaded steel, cadmium plated.	Full part number on head.	Use only as replacement for bolt of same number.
NAS 625	High tensile strength steel, higher than the MS 20004 thru MS 20024 series.	"NAS 625" on head.	Tension installations with high-strength nuts only.

11-5. NUTS.

11-6. The following is general practice information. Use a nut of the same material as the bolt. Use castle nuts with drilled shank bolts only. Use self-locking nuts with undrilled shank bolts only. Use shear nuts where bolts are in shear load only. Use high-strength nuts with all internal wrenching bolts. Aluminum nuts may be identified by weight. Corrosion resistant steel nuts may be identified with a magnet — they are nonmagnetic. Refer to Table 11-II for list of nuts.

TABLE 11-II

Nuts

DESIGNATION	TYPE	MATERIAL
AN310	Castle	Steel, aluminum, or corrosion resistant steel.
AN316	Plain	Steel or corrosion resistant steel.
AN320	Shear castle	Steel, aluminum, or corrosion resistant steel.
MS21049 OR MS21050	Countersunk plate nut, self-locking	Steel or corrosion resistant steel, countersunk.
MS21047 OR MS 21048	Plate nut, self-locking	Steel or corrosion resistant steel.
MS21044 - MS21045 OR MS21046	Self-locking	Steel or corrosion resistant steel.
MS20364	Shear self-locking	Steel, aluminum, or corrosion resistant steel.
MS20365	Self-locking	Steel, aluminum, or brass.
MS21047	Plate nut, self-locking	Steel or aluminum.
22NG41 or G-1000	Gang channel	Steel nuts, aluminum alloy channel.
EB-048 to -164	12-point wrench, self-locking	High-strength steel.

11-7. SCREWS.

11-8. Do not use low-strength steel screws in structural installations. The following screws are identified by an X on the head, indicating 125,000-145,000 psi tensile strength steel. Refer to Table 11-III for list of screws.

TABLE 11-III

Screws

DESIGNATION	HEAD TYPE
AN502	Fillister head, drilled.
MS24694	100° countersunk head.
MS27039	Brazier head.
NAS 514	100° countersunk head. Same as AN509 except for full threaded shank.

11-9. WASHERS.

11-10. Use regular or thin washers as needed. The letter "L" added to AN960 callout indicates a thin washer. Use corrosion resistant steel washers with corrosion resistant steel bolts and nuts only. Identify by being nonmagnetic. Use hard aluminum washers only for dissimilar metal insulation. Do not use aluminum washers with internal wrenching bolts except when called out on the print or as a replacement for an aluminum washer. Refer to Table 11-IV for list of washers.

TABLE 11-IV

Washers

DESIGNATION	MATERIAL	TYPE AND USE
AN960	Steel	Plain — ordinary installations.
AN960C	Corrosion resistant steel (CRES)	Plain — high-temperature installations.
AN 960D	Aluminum	Plain — insulation purposes.
MS 20002	Steel	Plain—under high-strength nuts.
MS 20002C	Steel	Countersunk. Use with countersunk face against head of internal wrenching bolts.

11-11. RIVETS.

11-12. Refer to paragraph 1-119 for usage, substitution and description of special fasteners. Refer to Table 11-V for list of standard rivets.

TABLE 11-V

Standard Rivets

DESIGNATION	MATERIAL	SHANK DIAMETERS IN $^{1}/_{32}$ INCH
MS20426B AND MS20470B	5056-F	—3 to —6
MS20426AD AND MS20470AD	2117-T3	—3 to —6
MS20426DD AND MS20470DD	2024-T31	—3 to —10

11-13. STRUCTURAL MATERIALS.

11-14. Refer to Section I for general characteristics, tempers and Table 1-I for substitutions of structural materials. Refer to Table 11-IV for list of structural materials.

TABLE 11-VI

Structural Materials

DESIGNATION	SPECIFICATION	REMARKS
	ALUMINUM ALLOY BAR STOCK	
2024-T4	QQ-A-200/3 or QQ-A-225/6	Used to machine replacements for extrusions.
6061-T6	QQ-A-200/8 or QQ-A-225/8	Used to machine replacements for extrusions.
7075-T6	QQ-A-200/11 or QQ-A-225/9	Used to machine replacements for extrusions.
7178-T6	QQ-A-200/13	Used to machine replacements for extrusions.

TABLE 11-VI

Structural Materials (Cont)

DESIGNATION	SPECIFICATION	REMARKS
ALUMINUM ALLOY SHEET STOCK		
2024-T3	Bare QQ-A-250/4 Clad QQ-A-250/5	Material has been heat treated and then given a controlled straightening operation to increase the tensile strength over 2024-T4.
2024-T4	Bare QQ-A-250/4 Clad QQ-A-250/5	Material has been heat treated without the subsequent controlled increase in tensile strength of 2024-T3.
2024-T6	Bare QQ-A-250/4 Clad QQ-A-250/5	Material has been artificially age-hardened from the 2024-T4 condition to increase its mechanical properties.
2024-T36	Clad QQ-A-250/5	Material has received controlled cold work (1%) after solution heat treatment and prior to age hardening. Exceeds normal 2024-T3 condition.
2024-T81	Bare QQ-A-250/4 Clad QQ-A-250/5	Material has been heat treated and rolled; very limited forming is possible. Should be used only for flat parts or parts having extremely simple bends.
2024-T86	Bare QQ-A-250/4 Clad QQ-A-250/5	Material has received controlled cold work (6%), after solution heat treatment and prior to age hardening. Should be used where the part is not formed or contoured.
6061-T4	Bare QQ-A-250/11	Material is used for general mechanical and lightly loaded parts. It is heat treated and has good forming characteristics. Can be aged without appreciable distortion.
6061-T6	Bare QQ-A-250/11	Material is heat treated and aged. Same characteristics as 6061-T4.
7075-T6	Bare QQ-A-250/12 Clad QQ-A-250/13	Material is a high-strength alloy suitable for all general mechanical and structural application. It is heat treated and aged.
7178-T6	Bare QQ-A-250/14 Clad QQ-A-250/15	Material is similar to 7075-T6 with increased strength properties.

TABLE 11-VI

Structural Materials (Cont)

DESIGNATION	SPECIFICATION	REMARKS
	TITANIUM	
Commercially Pure Sheet	AMS 4901	70,000 psi, annealed Min. Yield.
Commercially Pure Bar	AMS 4921	70,000 psi, annealed Min. Yield.
Alloy Sheet—8% Mn	AMS 4908	110,000 psi, annealed Min. Yield.
Alloy Sheet—5% Al and 2.5% Sn	Convair 0-01014	110,000 psi, annealed Min. Yield.
Alloy Sheet—6% Al and 4%V	Convair 0-01038	120,000 psi, annealed Min. Yield.
Alloy Bar—5% Al and 2.5%Sn	Convair 0-01015	110,000 psi, annealed Min. Yield.
Alloy Bar—6% Al and 4% V	Convair 0-01022	120,000 psi, annealed Min. Yield.
Alloy Bar—4% Al and 4% Mn	AMS 4925	130,000 psi, annealed Min. Yield.
	CORROSION RESISTANT STEEL SHEET	
Type 301, ¼ H	MIL-S-5059 Comp 301, ¼ H	Used when excellent corrosion resistance properties plus toughness and ductility are required. Not to be used where temperatures exceed 800°F.
Type 301, ½ H	MIL-S-5059 Comp 301, ½ H	Used when excellent corrosion resistance properties plus toughness and ductility are required. Not to be used where temperatures exceed 800°F.
Type 302, Annealed	MIL-S-5059 Comp 302	Used when excellent corrosion resistance properties plus toughness and ductility are required. Not to be used where temperatures exceed 800°F.
Type 321 and 347	MIL-S-6721	Used for applications requiring high heat resistance, good weldability and corrosion resistance. Used where temperatures are 800°F to 1650°F.
17-7 PH	MIL-S-25043, cond. TH1050	Used for general mechanical and structural application requiring corrosion resistance and strength up to 600°F.
Type 410	Convair 0-01047	Used for general mechanical and structural applications requiring moderate resistance to corrosion plus good physical properties. Not to be used where temperatures exceed 700°F.

TABLE 11-VI

Structural Materials (Cont)

DESIGNATION	SPECIFICATION	REMARKS
	ALLOY STEEL SHEET	
4130	AN-QQ-S-685	For general structural and mechanical parts.
	MAGNESIUM	
AZ31A	Convair, QQ-M-44, Condition H24	Material possesses a combination of good physical properties and good formability.
HK31	Convair, 0-01024 Condition H24	Primarily for components requiring weldability and good strength-to-weight ratio between 400°F and 600°F.

11-15. SODIUM HYDROXIDE.

11-16. Sodium hydroxide solution is used to determine if scratches on clad aluminum alloy sheets have penetrated through the clad layer. Mix sodium hydroxide, Specification O-S-60S, to a 10 percent solution in water.

11-17. TEMPILAQ.

11-18. Tempilaq is a temperature indicating lacquer manufactured by Tempil Corporation, 132 West 22nd Street, New York 11, N. Y. When hot dimpling is performed on aluminum and magnesium, the temperature of the area to be dimpled shall be heated to 162.7° to 176.7°C (325° to 350°F). To determine the temperature, a thin smear or daub of Tempilaq is applied adjacent to the area where the dimple is formed. When the temperature of 325°F is reached on aluminum and magnesium, the Tempilaq (orange in color) liquifies quickly, turns clear and upon cooling, solidifies, leaving a glossy or vitreous surface. Refer to paragraphs 1-174 through 1-178 for additional information on the use of Tempilaq.

11-19. SURFACE TREATMENTS.

11-20. The materials listed are for use as surface treatments on aircraft metal surfaces either alone or topcoated with enamel. Primers are intended for spray application over bare metal or chemical pretreatment coating. If used for dip application, the suitability for dipping shall be determined by the user. For further information concerning the use of surface treatments, refer to paragraph 1-181. Refer to Table 11-VII for list of surface treatment materials.

TABLE 11-VII

Surface Treatments

DESIGNATION	SPECIFICATION	APPLICATION
Paint Remover	MIL-R-25134	To remove damaged paint coating.
Chrome Pickle	MIL-M-3171 (Type 1)	Pre-paint surface treatment of magnesium alloy.
Alodine 1200	MIL-C-5541	Pre-paint surface treatment of aluminum alloy.
Wash Primer	MIL-C-8514	Primer pretreatment coating for use on clean metal surfaces of all types prior to application of paints.
Zinc Chromate Primer 32 (Yellow) 32-1 (Green)	MIL-P-8585 (Aer) or MIL-P-6808A	Primer coating for use over wash primer or on clean metal surfaces of all types and fin tip antenna.

TABLE 11-VII

Surface Treatments (Cont)

DESIGNATION	SPECIFICATION	APPLICATION
Aircraft Gray Enamel	TT-E-489 Color No. 36231	Cockpit interior protective coating over zinc chromate primer
Aliphatic Polyurethane	MIL-C-83286 Color No. 16473	Exterior protective coating over epoxy primer
Epoxy Primer	MIL-P-23377	
Aircraft Black Acrylic Lacquer Aliphatic Polyurethane	MIL-L-19538 Color No. 37038 MIL-C-83286 Lusterless	Exterior antiglare surface used in area forward of the cockpit.
Aerodynamic Smoothing Compound (Federal Stock Number 8030-684-8743	Sherwin-Williams Aluminized Putty No. DX4045.	To fill gaps less than 0.09-inch where temperature does not exceed 135°C (275°F).
Aerodynamic Smoothing Compound	MIL-S-38228 FSCM 81349 NSN 8030-00-782-1420	Refer to paragraph 11-54.
Aerodynamic Smoothing Compound (Federal Stock Number 8030-579-2527)	Stabond C-875 American Latex Product.	Refer to paragraph 11-52.
Epon Putty	EC-1751, Manufactured by Minnesota Mining and Mfg. Co., 6411 Randolph Street, Los Angeles, California.	To build up voids between two mated surfaces of different contour (IR receiver fairing installation).
Epon Putty Accelerator	EC-1752	Accelerator for EC-1751
Epon Putty	EC-1969, Manufactured by Minnesota Mining and Mfg. Co., 6411 Randolph Street, Los Angeles, California.	Alternate for EC-1751
Lacquer Primer	MIL-P-7962	Primer coating for use over wash primer, under acrylic lacquer
Lacquer, acrylic Nitrocellulose,	MIL-L-19537	Exterior protective coating over Lacquer Primer – Standard A/C Finish.

11-21. ADHESIVES.

11-22. Adhesives are used for bonding metal to metal or to various other materials such as phenolic or polyester sheet. Epoxy adhesives, listed under Specification MIL-A-8623, are permanent adhesives. Refer to Table 11-VIII for list of adhesives.

TABLE 11-VIII

Adhesives

MATERIAL	FEDERAL SPECIFICATION	FEDERAL STOCK NUMBER	REMARKS
Epon 3119	MIL-A-8623 (Aer) Type II	8030-687-3540	Refer to paragraph 11-59.
Epon VIII	MIL-A-8623 (Aer) Type II (Green)	8040-270-8136 (QT) 8040-691-1322 (PT)	Refer to paragraph 11-61.
EC-1469	MIL-A-8623 (Aer) Type II (White)	Manufactured by: Minnesota Mining and Mfg. Co., 6411 Randolph St., Los Angeles, Calif.	Refer to paragraph 11-57.
	MIL-A-25457	8040-721-901	For bonding silicon rubber to itself or to aluminum without use of heat and pressure.

11-23. Sealing Materials.

11-24. The manufacture of the F-106 airplane requires the use of many types of rubber and synthetic rubber. The type of rubber used depends upon the job it must do. For example, the electronic doors are sealed with silicone rubber. This particular material is used because of its excellent resistance to heat and cold. If an unauthorized substitute is made for this seal, failure of the electronics system could result. Most compounded natural rubber, synthetic, and especially silicone rubber, are difficult to cement. This is one of the reasons rubber parts are usually attached with rivets or screws. However, since this method of attachment is not always practical, various types of sealers and cements are provided for attaching the different types of rubber. These cements and sealers, like rubber, are provided for a specific use. Use of the wrong

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type of cement or sealer, or improper substitution of rubber seals, can cause the loss of a system or possible damage. Tables 11-IX and 11-X contain the authorized repair materials and sealing agents required to make the repairs discussed in this manual.

11-25. CABIN PRESSURIZATION SEALING MATERIALS.

11-26. For materials used in cabin pressurization sealing and their purpose and handling information, refer to Table 11-IX. Refer to paragraph 1-38 and 1-181 for sealant application procedures.

TABLE 11-IX

Cabin Pressurization Sealing Materials

MATERIAL	FEDERAL SPECIFICATION	FEDERAL STOCK NO.	REMARKS
Sealing Compound	MIL-S-8802 A 1/2 A 2 B 1/2 B 2	 8030-753-5008 8030-753-5003 8030-753-5004 8030-735-5005	Faying surface sealant. For sealing integral fuel tanks, fuel cell cavities and other areas subjected to temperature range of 65° F to 275° F.
Sealing and Coating Compound Corrosion Inhibitive Faying Surface Sealant	MIL-S-81733 TYPE II - 2 I - 2 II - 1/2 IV - 12	 8030-491-2933 8030-433-9028 8030-470-9154 8030-419-2954	In all corrosion prone areas, all faying surfaces, seams and lap joints shall be protected with sealant, Specification MIL-S-81733. Except integral fuel tank areas.
Deleted	MIL-S-8802		Suitable substitute for MIL-S-81733.
Canopy Sealer	90-006-2	8030-145-0372	Refer to Paragraphs 11-44 thru 11-45B
Canopy Sealer	RTV-106	8040-941-9984	
Canopy Sealer			
Surface Cleaner	Aliphatic Naphtha TT-N-95	6810-238-8118	Use to clean painted and unpainted surfaces.
Sealer Primer	A-4004 DC 1200	8040-653-3104 8030-870-0877	Refer to Paragraph 11-48
Parting Agent	Petrolatum VV-P-236	9150-250-0926	
Synthetic Rubber	M5570. Fairprene Sheet. 0.015" Thick. E. I. Dupont Co., Wilmington, Del.	9320-624-1700 0.031 36 X 36	Use for cabin pressure access door gasket.
Rubber Plug	Convair — 370994		To hold sealants in the voids.
Windshield Sealer	EC 1667-MMM Co. DC20-103 Dow Corning Corp. RTV-106 GE Co.	8030-850-2495 8030-951-0439 8040-941-9984	Refer to Paragraph 11-46

11-27. FUEL TANK SEALING MATERIALS.

11-28. Refer to Table 11-X for materials used in fuel tank sealing, their purpose and handling information. Repairs made in the fuel tank area, which create a new exposed metal surface, must first receive the Alodine 1200 treatment before sealants or finishes are applied. Refer to

Table 11-VII for Alodine 1200 information. Refer to paragraph 2-45 for sealant application procedure.

11-29. The materials listed in Table 11-X have been approved for fuel-tight sealing for the F-106A and F-106B airplanes.

CAUTION

Fuel tank sealants listed in Specification MIL-S-7502 are not to be used under any conditions in the fuel tank areas of the F-106A and F-106B airplanes.

TABLE 11-X

Fuel Tank Sealing Materials

MATERIAL	FEDERAL SPECIFICATION	FEDERAL STOCK NO.	REMARKS
Sealing Compound	MIL-S-8802 MIL-S-83430 (SUB) PRO SEAL 899		Refer to T.O. 1-1-3 for Mixing and Application Procedures.
Coating Corrosion Protection	MIL-S-4383 EC776		Refer to T.O. 1-1-3 for Mixing and Application Procedures.
Primer	EC 1662 (Red)	8010-973-1565	See Paragraph 11-38.
Sealer	EC 1663B (Red)		See Paragraph 11-40.
Sealer Accelerator	EC 1663A (Black)		
Cement	C319 Manufactured by Connecticut Hard Rubber Co., New Haven, Conn.		Second choice for bonding silicone rubber.
Solvent-Thinner	Methyl Isobutyl Ketone TT-M-268		Solvent or thinner for EC 776.
Dome Nut	Nutt-Shell 14630H048 Convair NU 453	4806-1650-605-8590	Replacement for access door nuts.
Solvent	Methyl Ethyl Ketone TT-M-261	6810-290-0055	Solvent for cleaning surfaces.
Solvent	Toluene TT-T-548		Solvent for cleaning surfaces.
Sealing Plug	1100 Aluminum Bar (Annealed) QQ-A-411		To plug ends of voids.

11-30. Deleted.

11-31. Deleted

WARNING

This prime contains a volatile and flammable solvent and must be kept away from sparks or flame. It also contains a toxic ingredient which can cause damage to the eyes, lungs, kidneys, and liver. Personnel who are to be exposed to this material for prolonged periods should wear chemical safety goggles, respirator, and protective clothing.

■ 11-32. Deleted.

■ 11-33. Deleted.

11-38. Primer — EC 1662.

11-39. Primer EC 1662 is a sprayable or brush type compound used to prepare metal surfaces for bonding with silicone rubber. It is used as a primer for sealer EC 1663. Before applying primer, make certain that surface to which primer is to be applied is dry and free of oil and grease. Clean surfaces with a lint-free cloth soaked with methyl ethyl ketone (6810-290-0055).

WARNING

EC 1662 is flammable and toxic material. Keep away from heat and open flame. Using personnel must wear a respirator and chemical safety goggles. Wash hands before eating or smoking.

■ 11-34. Deleted.

After spray or brush application, allow primer to dry for at least 30 minutes.

■ 11-35. Deleted

11-40. Sealer — EC 1663 B/A.

11-41. Sealer EC 1663 B/A is a two-part heat-resistant sealer applied with a brush. It has a silicone base and is the first choice sealer for bonding silicone seals to metal. Sealing surfaces must be primed with EC 1662 and allowed to dry for at least 30 minutes. Sealer should be mixed in its own container, if supplied in kit form, until it becomes one color. If not supplied in kit form, it must be mixed with 10 parts of accelerator EC 1663A (black) to 100 parts of sealer EC 1663B (red) by weight. Apply to seal with brush and allow to dry for one hour before installing seal. After seal is installed against metal surface, allow an air cure period of 24 hours.

WARNING

Accelerator EC 1663A contains ingredients that can cause skin irritation. If material comes in contact with skin, wash affected area with soap and warm water. Contaminated clothing should be laundered before reuse. If eyes are contacted by material, irrigate eyes with water and get medical attention immediately.

11-36. Structural Adhesive Prime — EC 1290.

11-37. EC 1290 is a high-temperature spray prime provided for use with "Scotch-Weld" and epoxy adhesives. It is used on fuel tank inner surfaces where the original prime has been scratched. Clean surfaces with methyl ethyl ketone (6810-290-0055). Apply prime with a siphon cup gun at 30 psi to 50 psi pressure. Cure at not less than 93.3°C (200°F) for 45 minutes.

11-42. Sealer — EC 1184.

11-43. Sealer EC 1184 is an aluminum colored compound used to aid in aerodynamic smoothing of airplane surfaces. Sealer EC 1184 can be hand-sanded and smoothly feathered into the surrounding surface, and is resistant to water, oil, gasoline, cold, heat, shock, and vibration. This material has a pot life of 45 minutes and is to be mixed per manufacturer's instructions. The cure time is two hours at ambient air temperature (above 65°F).

WARNING

This material is a flammable mixture; keep away from heat and flame. Avoid prolonged breathing of vapor; avoid prolonged or repeated contact with skin.

11-44. Canopy Sealer- Dow Corning 90-006-2.

11-45. 90-006-2. Silicone Sealant is a two-part sealer. Each of the parts comes from the manufacturer in a kit form. The sealer is used for pressure sealing around the windshield and canopy and is mixed by combining 10 parts of catalyst to 100 parts of base. The mixture is stirred with a spatula until it becomes a uniform blend. This sealer should be mixed just prior to use and only in a sufficient quantity to do the job, since its work life is only two hours. The method of application will depend upon its use. Ordinarily, it is applied over a very thin coating of petrolatum to prevent adhesion to a faying surface, or over DC 1200 primer to increase adhesion to a faying surface. RTV-106 used with primer A4004 is a suitable substitute.

11-45A. Canopy Sealer —RTV-106. *Applicable to F-106A airplanes after incorporation of TCTO 1F-106A-556.*

11-45B. RTV-106 sealer (01139) is a one part, high temperature silicone rubber sealer, red in color, and is dispensed in tube form using an attached applicator. This sealant, which has a shelf life of 12 months when stored at temperatures below 80°F (26.67°C), is used when installing an F-106A clear top canopy panel as instructed in T.O. 1F-106A-2-2-2-2. The sealer is applied to the canopy panel faying surface over a coating of A4004 primer which provides increased adhesion. A light film of petrolatum, Federal Specification VV-P-236, is applied to the canopy frame faying surface to prevent adhesion. Recommended sealant curing time before conducting a cockpit pressure leak test is a minimum of four hours at 70°F (21.1°C) temperature.

11-45C. F-106A Clear Top Canopy Bonding Cement — PS-18. *Applicable after incorporation of TCTO 1F-106A-556.*

11-45D. Cement PS-18 (77902) is a three part room temperature cement used for bonding attachments to the F-106A clear top canopy panel. The three parts of the cement consist of component A, component B, and component C.

WARNING

Do not mix components B and C directly together. Always mix components A and B together first, then add component C as directed to prevent possible danger to personnel.

Component A, when stored in the original container or a glass container, has a shelf life of six months at 45°F(7.22°C) temperature, or a shelf life of four months at 73°F (22.78°C). Component C becomes discolored when exposed to sunlight. Discoloration does not reduce the effectiveness of component C, but it should be stored in original containers or dark glass bottles to prevent discoloration. Do not mix more cement than can be used in 30 minutes, which is the average useful life under normal room temperature conditions. Since the cement will harden during polymerization, it should be mixed in a disposable container. Paper cups may be used but care should be taken to assure that the cups do not have a surface coating that might be disolved by the cement. Mix four ounces of component A and one capsule of component B together. Stir slowly, avoiding entrapment of air bubbles in the mixture. After thoroughly mixed, the mixture of components A and B has a storage life of one week at a temperature of 40°F (4.44°C) or lower. When cement is to be used, warm mixture of components A and B to room temperature, assuring that no moisture condensation enters the mixture. Add five cubic centimeters of component C to the components A and B mixture. Do not mix more cement than can be used in 30 minutes.

WARNING

Do not dispose of the cement mixing container until all remaining cement has set and the container is cool to prevent possible harmful effects to personnel.

The three part mixed cement has an average useful life of 30 minutes at 70°F (21.11°C). The use life may be extended to 90 minutes providing the mixture is kept at a temperature of 50°F (10.00°C) or lower.

11-46. Windshield Sealer — EC 1667.

11-47. Windshield sealer EC 1667 is a two-part, high-temperature, silicone-base sealer used to pressure seal the windshield faying surfaces. This sealer is supplied in kit form and should be mixed according to manufacturer's instructions. To insure proper adhesion, all surfaces must be sprayed or painted with primer EC 1662 before the sealer is applied. Cure time is approximately 24 hours at ambient temperatures. Curing time for EC 1667 sealer

may be reduced to approximately four hours when installing windshield glass panels if a locally manufactured sheet metal cover is used with the SE 0973 heater. Refer to Section V of T.O. 1F-106A-2-2-2-2 for windshield cover manufacturing details and for windshield glass panel installation procedure.

11-48. Primer — DC1200—A4004

11-49. Primer DC1200 is a surface treatment which improves the bond of 90-006-2 sealer to faying surfaces. Before applying primer, clean surfaces with a clean cloth dampened with aliphatic naphtha. Spray or brush primer directly from its container and allow it to dry for five minutes. A4004 primer is used with RTV-106 sealant.

CAUTION

Do not apply primer to 90-006-2 sealant but only to the metal surface to be bonded.

11-50. AERODYNAMIC SMOOTHING COMPOUNDS.

11-51. Aerodynamic smoothing compounds are used extensively in production and repair of F-106 airplanes to smooth-down protruding laps and seams which otherwise would cause aerodynamic drag. Several types of these compounds are used in repair procedures outlined in this manual. Because of the different size gaps they must fill and the wide heat range in which they must operate, substitutes must not be used unless approved by competent authority.

11-52. Aerodynamic Smoothing Compound — Stabond 875.

11-53. Stabond 875 is a two-part heat-resistant aerodynamic compound used to fill gaps of up to ¼ inch in laps and seams. It has the consistency of putty when mixed with Stabond "C" thinner. Since this compound requires varying amounts of thinner for different thicknesses and cure times, mixing and curing should be accomplished in accordance with the manufacturer's instructions on the container.

11-54. Aerodynamic Smoothing Compound — MIL-S-38228.

11-55. MIL-S-38228 is a two-part synthetic rubber compound in two types for filling and sealing exterior skin seams to smooth contours. Type I is for use in the temperature range of -65°F to 250°F and Type II is for use in the temperature range of -65°F to 500°F. Type I is more resistant to jet fuel than Type II. Both are available in 1/2, 2 and 4 hours application times, with cure times of 24, 48 and 72 hours respectively at room temperature. This sealant may be applied with extrusion gun or spatula. See figure 1-27 for method of application. The cured compound color is aluminum.

NOTE

Refer to T.O. 1F-106A-23 for surface preparation instructions.

11-56. ADHESIVES.

11-57. Adhesive EC 1469.

11-58. Adhesive EC 1469 is a one- or two-part epoxy resin compound with the consistency of flowable paste. It is used to re-bond separations between honeycomb and skin in the elevon and rudder trailing edges. When used as a one-part adhesive, it requires temperatures of 176.7°C (350°F) and pressure of 25 to 50 psi to effect a good cure. When used as a two-part adhesive, it will cure at

room temperature in about 60 hours. For use as a two-part adhesive, blend 4 percent EC 1470 accelerator to the desired amount of EC 1469 adhesive. Mix only the amount of material that will be used within four hours.

WARNING

Both EC 1469 and EC 1470 contain caustic and toxic components. Wear a face shield or goggles while handling or mixing and provide for adequate ventilation. Avoid contact with skin and eyes. In case of contact with eyes, flush with plenty of water for 15 minutes and get prompt medical treatment. Clean areas of skin contact with soap and water. Remove contaminated clothing at once.

Inject the mixed adhesive with a sealant gun or a large hypodermic needle.

NOTE

To facilitate ease of flow, EC 1469 may be warmed before mixing.

11-59. Epon 3119 Adhesive.

11-60. Epon 3119 is a two-part epoxy adhesive used as an alternate for Epon VIII when re-bonding separations between the honeycomb and skin in the elevon and rudder trailing edges. It is supplied in kit form; the accelerator is shipped with the adhesive but in a different container. Mixing ratios, cure times, and temperatures are shown on the containers. When small batches are mixed, as is usually the case when repairing separations, follow the recommended mixing instructions.

WARNING

Both Epon 3119 and its accelerator contain toxic and caustic compounds. Provide for adequate ventilation and protect hands and eyes while mixing.

This adhesive should be applied with either a sealant gun with a small tip or a large hypodermic needle.

11-61. Epon VIII Adhesive.

11-62. Epon VIII is a two-part epoxy adhesive used in re-bonding separations of honeycomb from skin in the elevon and rudder trailing edges. It is supplied in kit form; the accelerator is shipped with the adhesive but in a separate container. Mixing ratios, cure times, and temperatures are indicated on the container. For full bonding strength, Epon VIII requires heat cures. Mix only the amount that will be used immediately, since the pot life of this adhesive after mixing with its accelerator is one to four hours.

WARNING

Both Epon VIII and its accelerator contain toxic and caustic components. Provide for adequate ventilation; wear rubber gloves and goggles while mixing.

Because of the varying amounts of material needed to complete repairs, the manufacturer's instructions on the container should be followed. Inject adhesive in area of separation with a sealant gun with a small tip or a large hypodermic type needle.

11-63. Adhesive — 338.

11-64. Adhesive 338 is a two-part compound used as an airplane honeycomb edge sealer, or for embedding and attaching inserts and fittings in the honeycomb. This adhesive is mixed by adding hardener 19 (7 percent of adhesive by weight) and stirring well. Pot life is 30 minutes. Cure time is two to three hours at ambient air temperature (above 65°F), or 45 minutes at 200°F (93°C).

11-65. Adhesive — Narmco 3135.

11-66. Narmco 3135 is a chemical and solvent resistant two-part adhesive used to fill cracks or dents. This adhesive is mixed by adding equal parts of 3135A to 3135B, and stirring in glass fiber mill ends to the solution to obtain paste consistency. Cure time is 24 hours at ambient temperature (above 65°F), or one hour at 180°F to 200°F (82°C to 93°C).

11-67. Adhesive — Epon 828.

11-68. Epon 828 is a chemical resistant epoxy-type adhesive having a high heat distortion point. This adhesive is used to fill surface dents on the airplane. Curing agent Z is used in a 1-to-5 ratio. Cure time is one hour at 250°F to 300°F (121°C to 149°C). Pot life is one hour.

WARNING

Skin contact must be prevented. Any accidental contamination of skin areas should be thoroughly cleansed immediately.

11-69. FILLERS.

11-70. Core Filler XE 3045 is a solvent, water, and chemical resistant thermosetting polymer that is used to replace damaged honeycomb areas. This compound is mixed by adding the catalyst (7.5 percent by weight of the core filler) and stirring well. Pot life is 30 to 60 minutes when mixed with catalyst. Air cure for 24 to 48 hours or heat cure for 20 minutes at 325°F (162.8°C).

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11-71. BONDING FILM.

11-72. Bonding film FM-47 is used in conjunction with FM-47 liquid primer, to adhere patches to areas being repaired. Primer FM-47 is to be applied to a thoroughly clean surface only. Air dry for one to two hours, then apply heat at 220°F to 235°F (105°C to 113°C) for 45 minutes. Film FM-47 is cut to size and placed on the repair surface. Cure time is 30 minutes at 300°F (149°C) at 60-100 psi, or one hour at 275°F (135°C) at 60-100 psi.

11-73. AERIAL REFUELING SEALING MATERIALS.

11-74. Refer to Table 11-XI for aerial refueling sealing materials. When repairs are to be made in the aerial refueling area, refer to Section I for surface treatment of repair parts.

TABLE 11-XI

Aerial Refueling Sealing Materials

MATERIAL	FEDERAL SPECIFICATION	FEDERAL STOCK NO.	REMARKS
Sealing Compound	MIL-S-8802, Class B2		Refer to paragraph 4-17A, and to T.O 1-1-3 for mixing and application procedures. Refer to paragraph 4-52C and paragraph 4-52E.

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