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ROYAL CANADIAN AIR FORCE

REPAIR & OVERHAUL INSTRUCTIONS

DAKOTA 3 & 4

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LATEST REVISED PAGES SUPERSEDE THE SAME PAGES OF PREVIOUS DATE

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Revised 7 Dec 54

LIST OF RCAF REVISIONS

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ILLUSTRATIONS

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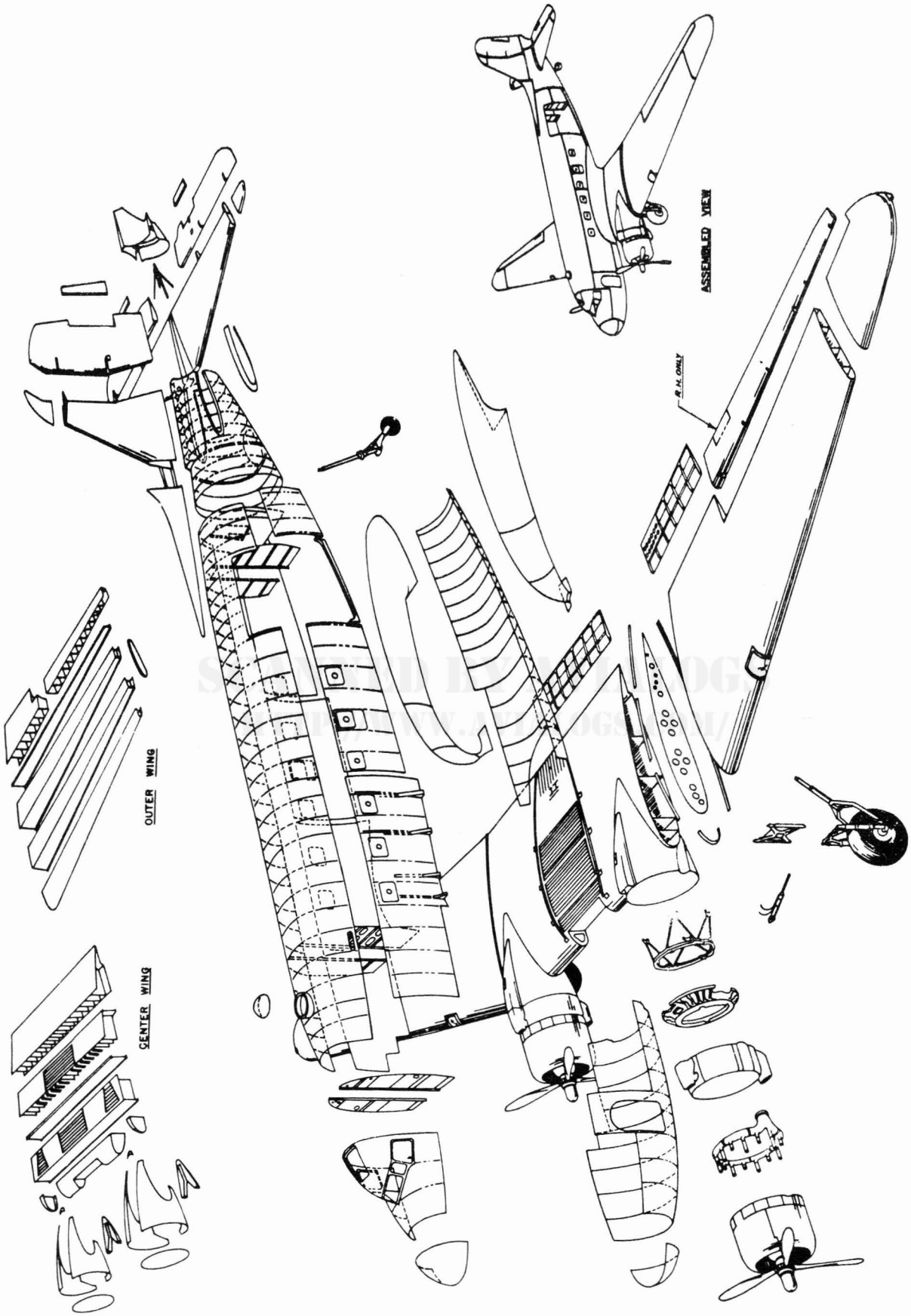
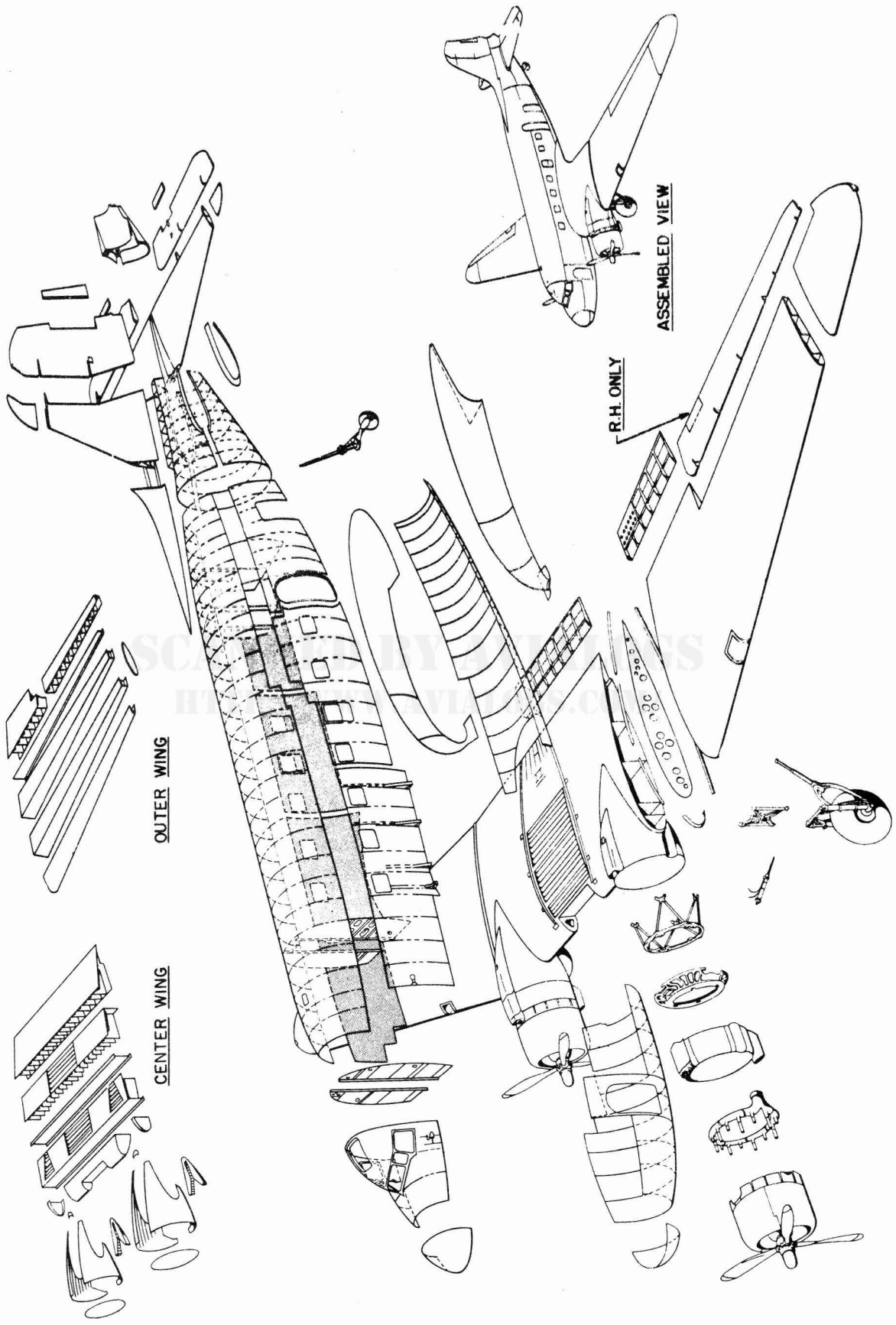
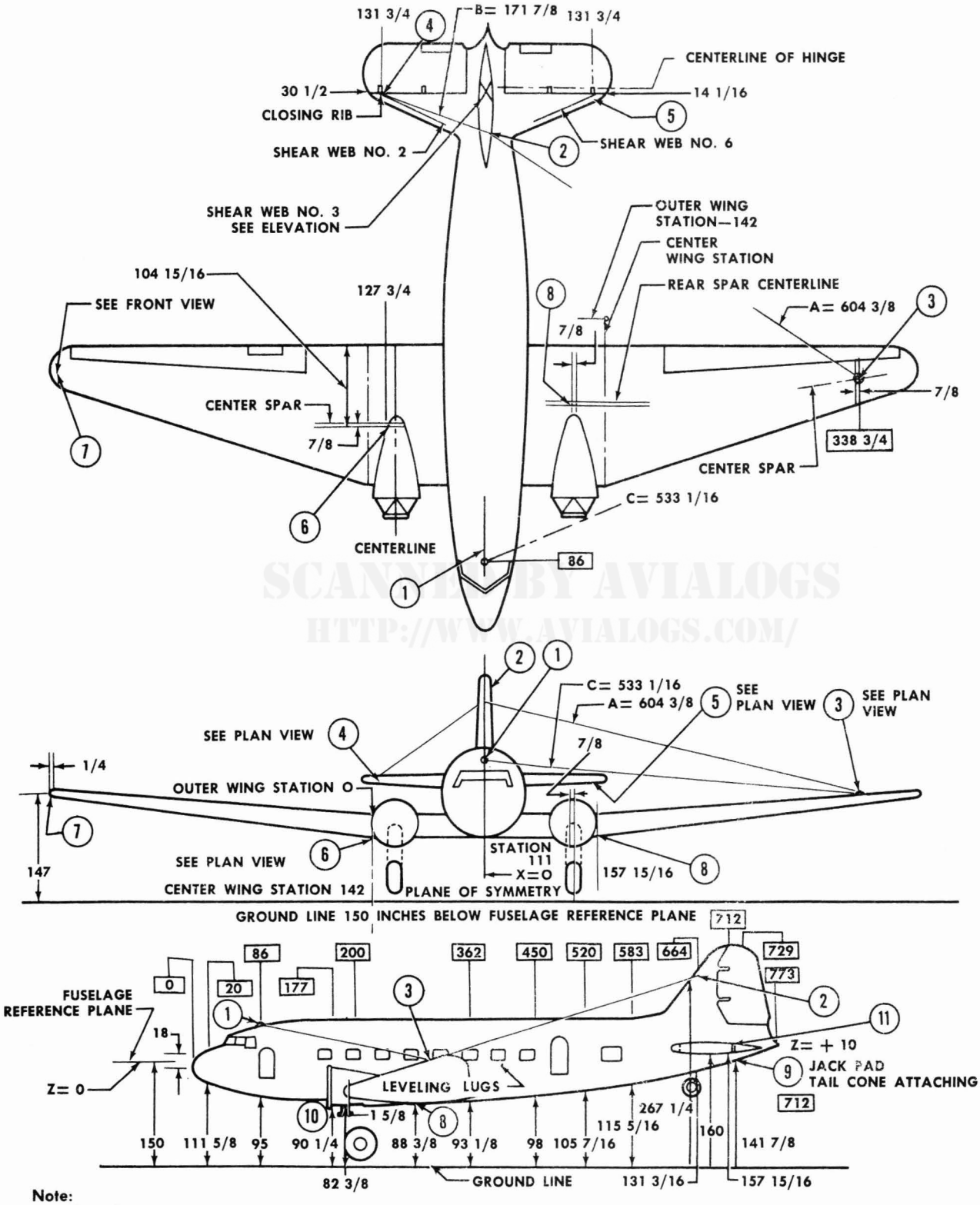


Exploded View of Airplane



Exploded View of C-117 Airplane



Note:
Boxed numbers are
fuselage stations.

15,814

(Sheet 1 of 2 Sheets) Symmetry Rigging

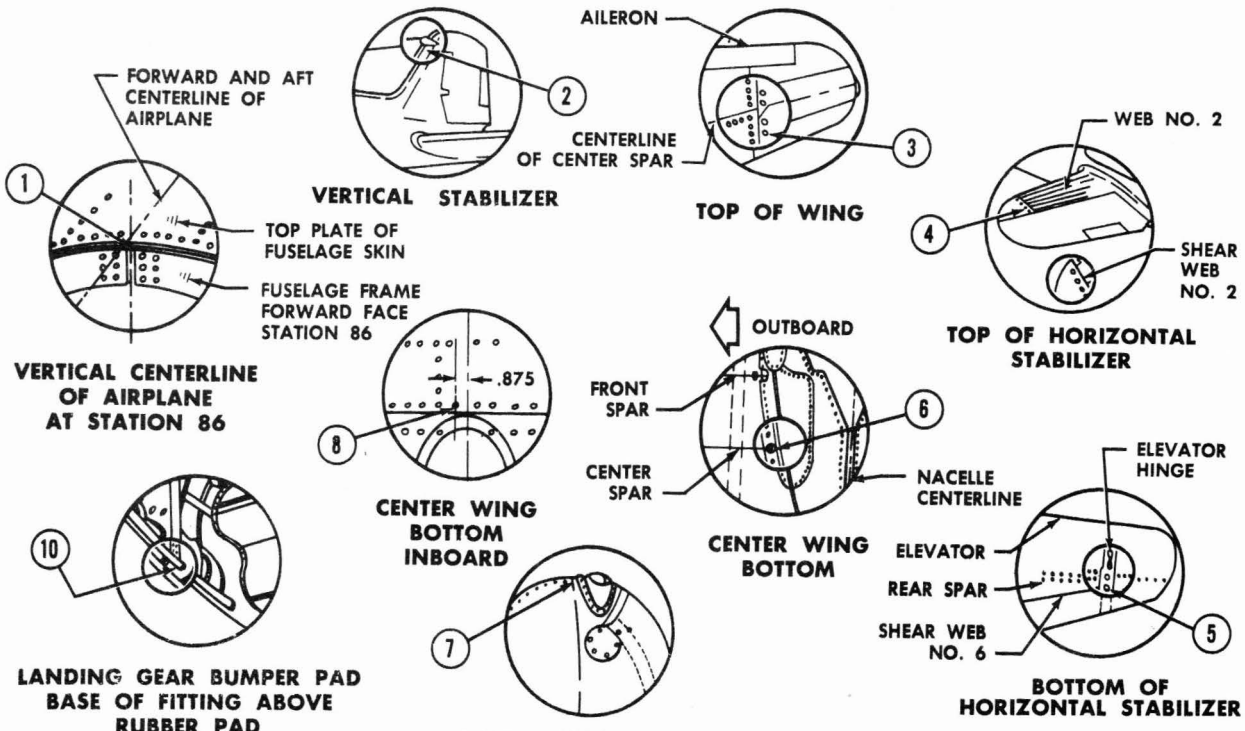


TABLE OF COORDINATES FOR INDEX POINTS

Index Point	Location	Coordinates (inches) X	Y	Z
1	Top plate of airplane skin, top forward edge of plate at aft end of escape hatch. Point on centerline of airplane at station 86. (Centerline of airplane established by center of top splice of fuselage frame at aft end of escape hatch; front face of this frame is at station 86.)	0	86.0	37 1/2
2	Vertical stabilizer: center of bolt hole, bottom side of antenna lug at stabilizer tip joint.	0	633	117
3	Top of wing tip: second screw of tip to wing attach joint, forward of diagonal corner skin trim at center spar.	478 3/8	316 5/16	9 13/16
4	Top of horizontal stabilizer; screw in shear web No. 2, and closing rib, 30 1/2-inches forward of centerline of hinge.	132 5/16	699 1/2	12
5	Bottom of horizontal stabilizer; first screw forward of rear spar, in shear web No. 6 and closing web.	132 5/16	715 13/16	7 7/8
6	Bottom of center wing; outboard flange of nacelle skin at center spar; center point on head of jack-pad bolt.	127 13/16	258 3/8	62 1/2
	Coordinates are not given for the following points since they are used only for measurements to ground line, to rig airplane in flight position, and to check leveling. They are located as follows:			
7	Wing tip extremes outboard bottom rivet, on line of center spar.			
8	Bottom of center wing, first screw inboard of centerline of nacelle, through skin and aft spar cap of rear spar.			
9	Tail cone attach point; bottom of jack pad.			
10	Center of base of fitting above landing gear rubber bumper pad, at bottom of nacelle frame at station 200 3/8.			
11	Center through 1/4-inch bearings for elevator hinge bolts, in horizontal stabilizer hinge brackets.			

Notes:
Airplane is rigged in flight position by leveling from leveling points, and from dimensions for points 2, 8, 9 and 10, given in table below. Allowable tolerance ± 1/8.

X, outboard from plane of symmetry. Y, aft of fuselage station O.

Z, above fuselage reference plane;
below fuselage reference plane.

15.815

(Sheet 2 of 2 Sheets) Symmetry Rigging

SECTION I

INTRODUCTION

1. General.

This Technical Order is the Structural Repair Instructions for the C-47, C-47A, C-47B (Navy Models R4D-1, R4D-5, R4D-6) and C-117A airplanes. It includes all necessary information for the repair of these airplanes. Personnel will read and be familiar with information contained in AN 01-40NC-1 and AN 01-40NC-2 (C-47 Models), and in AN 01-40NE-1 and AN 01-40NE-2 (C-117A Model).

2. Key to Illustrations.

To become familiar with the method of repair in the shortest time possible the following method should be used:

a. Refer to the following plating or structure diagrams:

(1) Wing plating. (See figure 1.)

(2) Wing structure. (See figure 2.)

(3) Fuselage plating. (See figures 3, 3A and 3B.)

(4) Fuselage structure. (See figures 3C and 4.)

(5) Nacelle structure and plating. (See figure 5.)

(6) Empennage structure and plating. (See figure 6.)

b. With the above diagrams as a key, locate the position and extent of the damage. Then on the plating or structure diagram find the figure number of the repair to be made. Turn to this figure and repair the damage as outlined. If a reference can't be made from the plating or structure diagrams, the repair figure can be determined from the list of illustrations. This is possible because all of the diagrams are complete in themselves.

NOTE: If a damage occurs to the control surfaces they should be rebalanced according to section V. Photographs and their respective keys are included to familiarize one with the type of structure, gage and material used.

c. Example. - If any damage occurs to the skin in the wing, turn to the plating diagram. (See figure 1.) Locate the extent and position of the damage according to station numbers and spars. On the plating diagram (figure 1) locate "Wing Skin Repair". (See figure 7.) Then, turn to figure 7 and repair the skin as noted. By knowing the exact location the rivet schedule can be determined from the table.

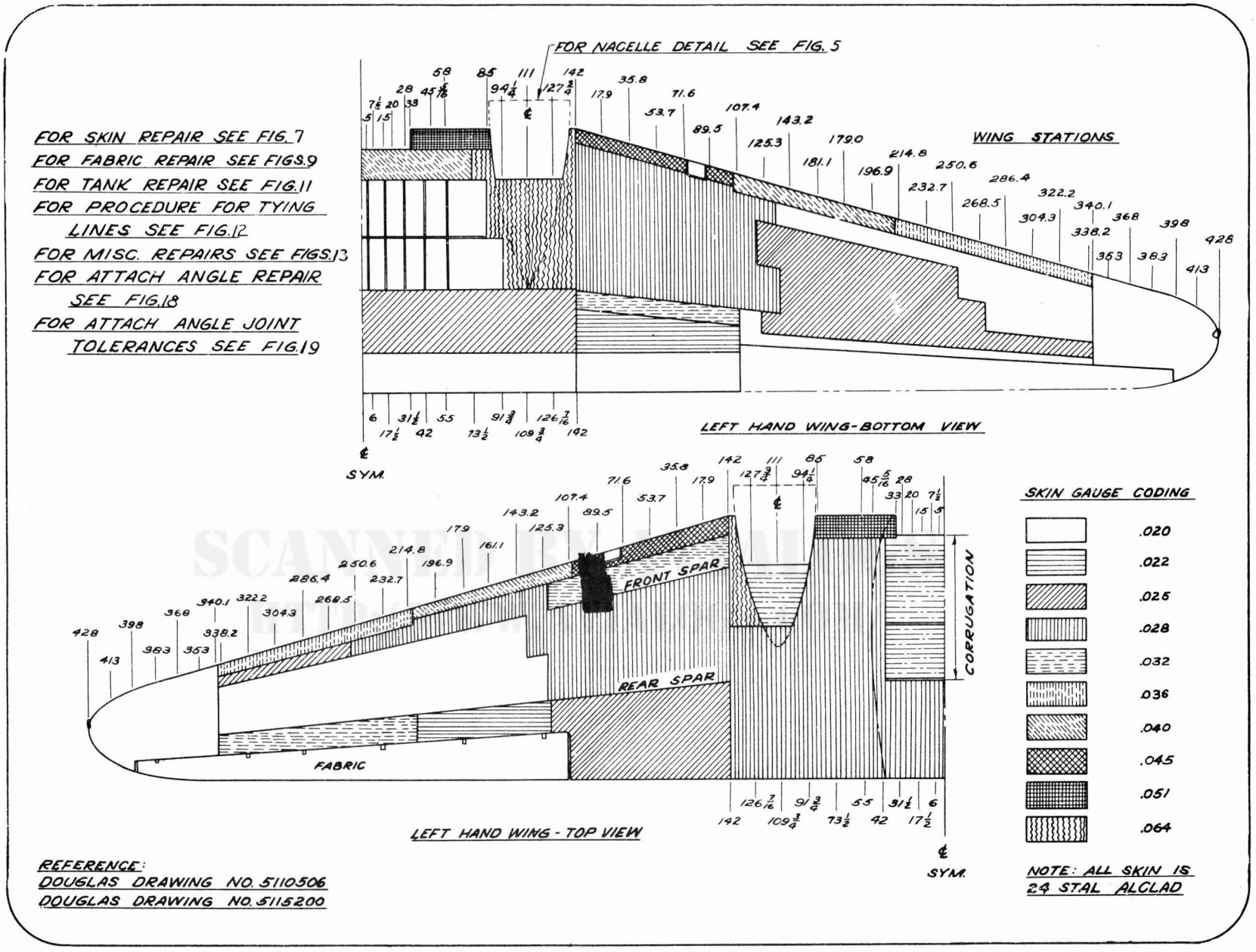


Figure 1 - Wing Plating

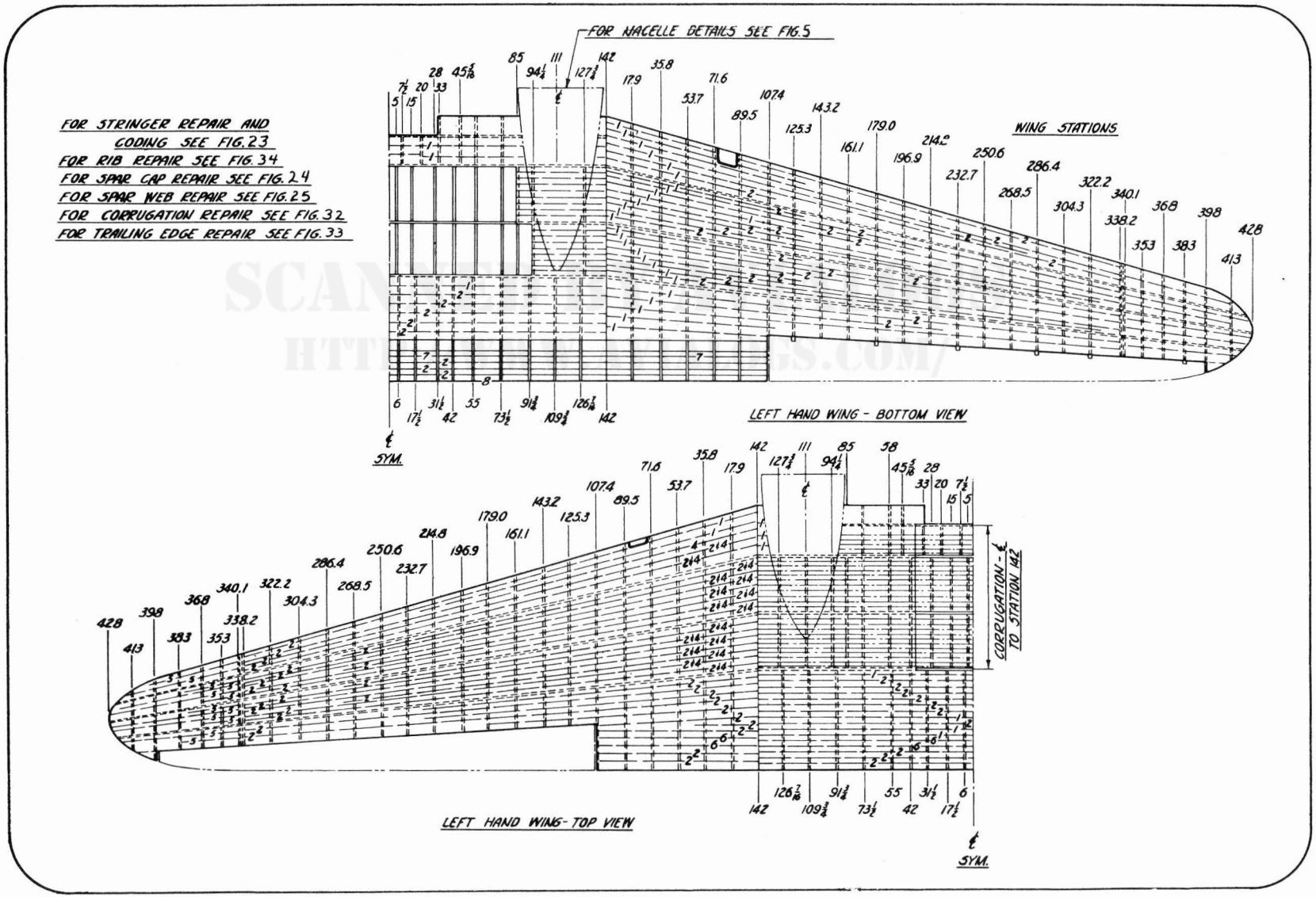


Figure 2 - Wing Structure

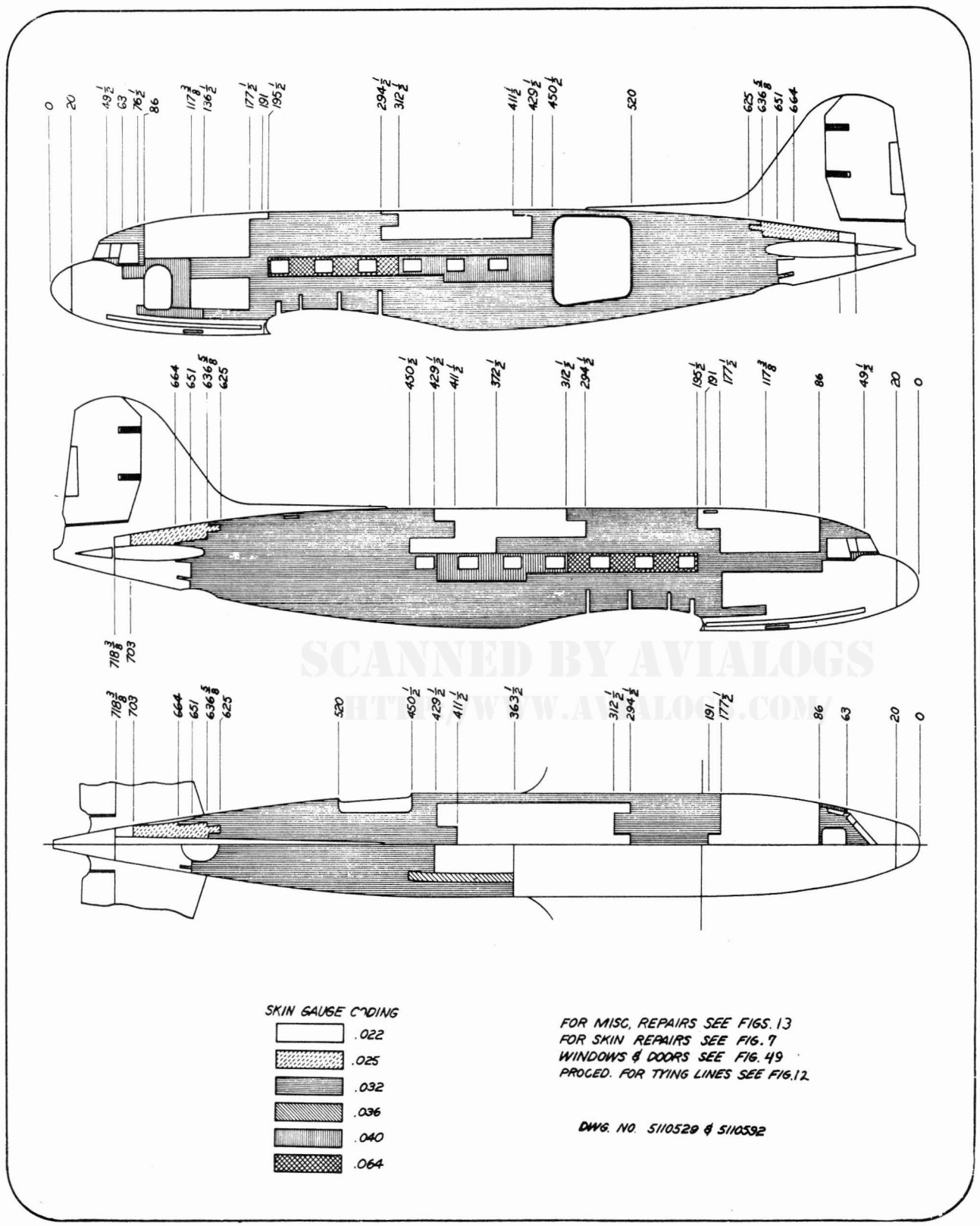


Figure 3 - Fuselage Plating (C-47 Model)

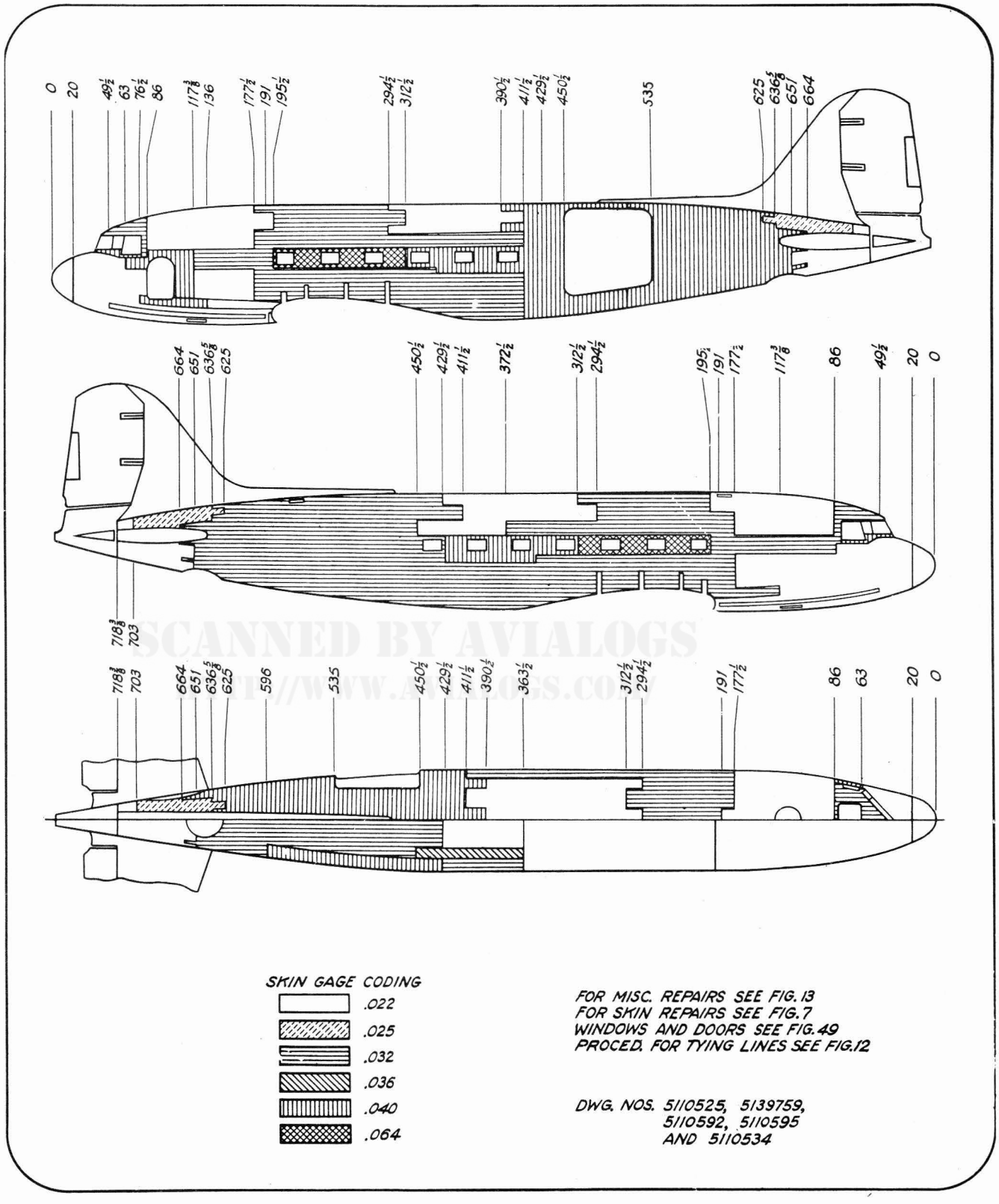


Figure 3A - Fuselage Plating (C-47A and C-47B Models)

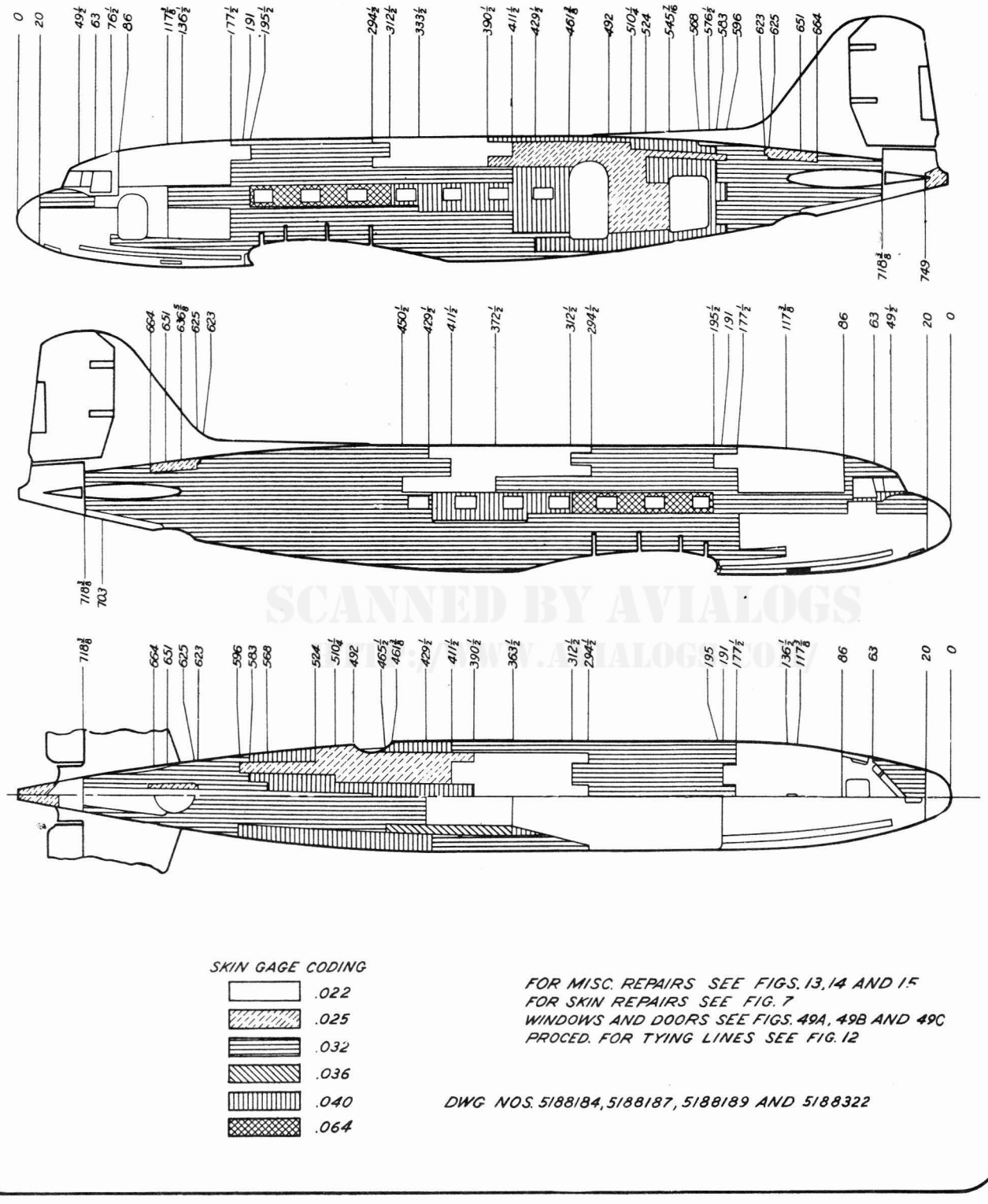
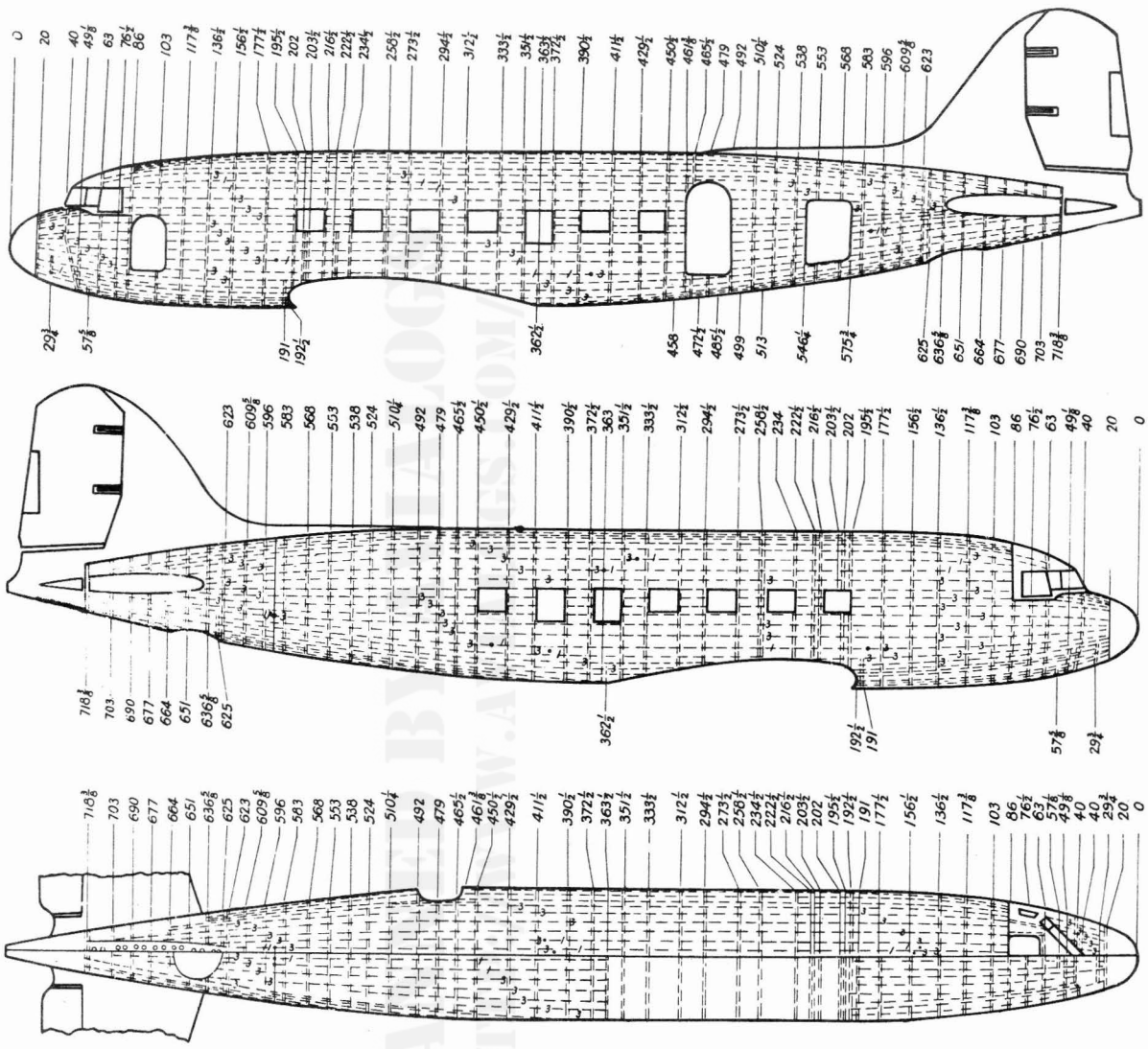


Figure 3B - Fuselage Plating (C-117A Model)

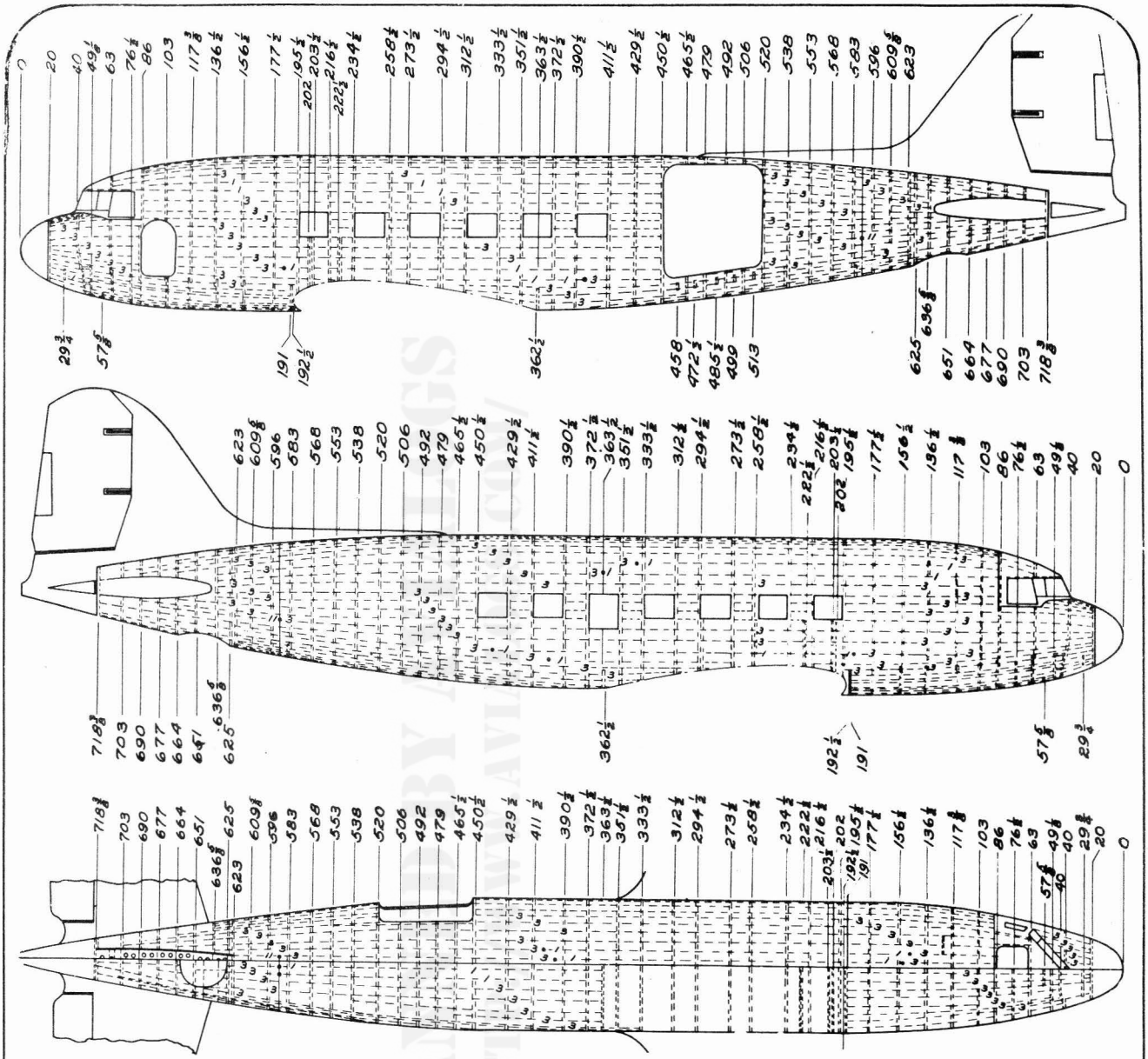


FOR STRINGER REPAIR & CODING SEE FIG. 50

REFERENCE DOUGLAS DRAWINGS

5110524, 5188167, 5118168, 5188321, 5188182

Figure 3C - Fuselage Structure (C-117A Model)



FOR FRAME REPAIR SEE FIG. 50

FOR STRINGER REPAIR & CODING SEE FIG. 23

FOR FLOOR BEAM REPAIR SEE FIG. 58

REFERENCE: DOUGLAS DRAWINGS
5110524, 5111164, 5110594, 5110591
AND 5110533

Figure 4 - Fuselage Structure

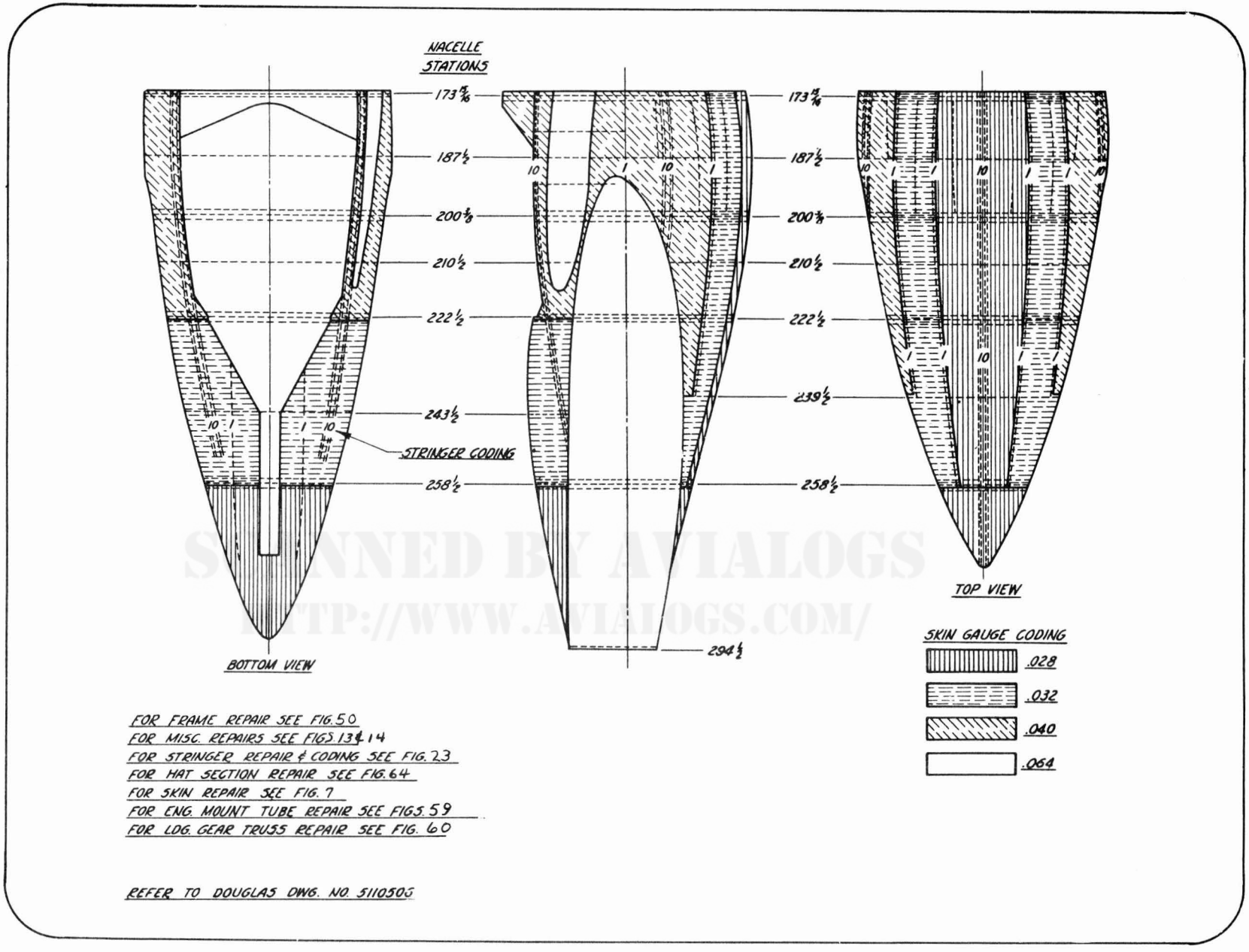


Figure 5 - Nacelle Structure and Plating

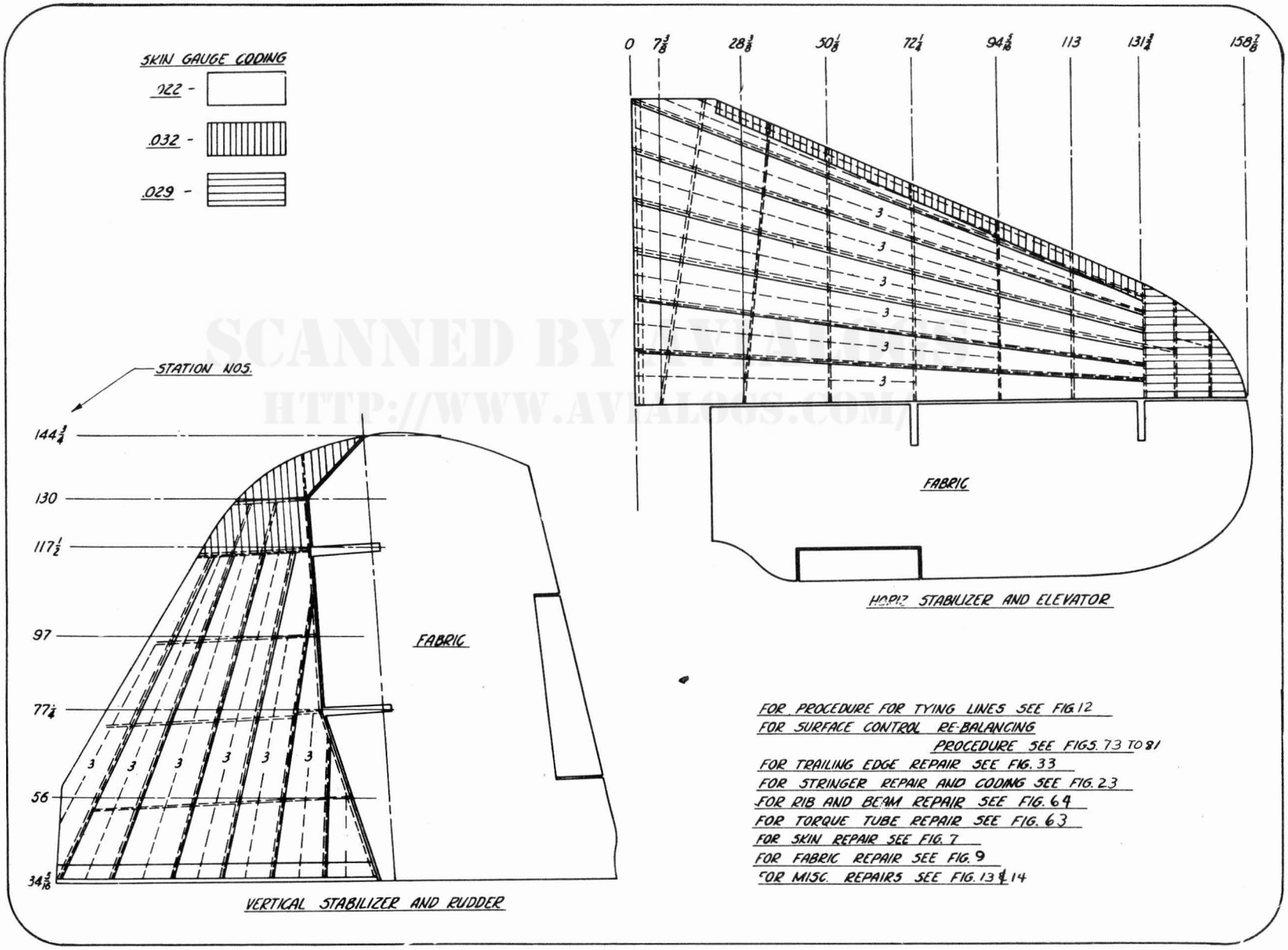
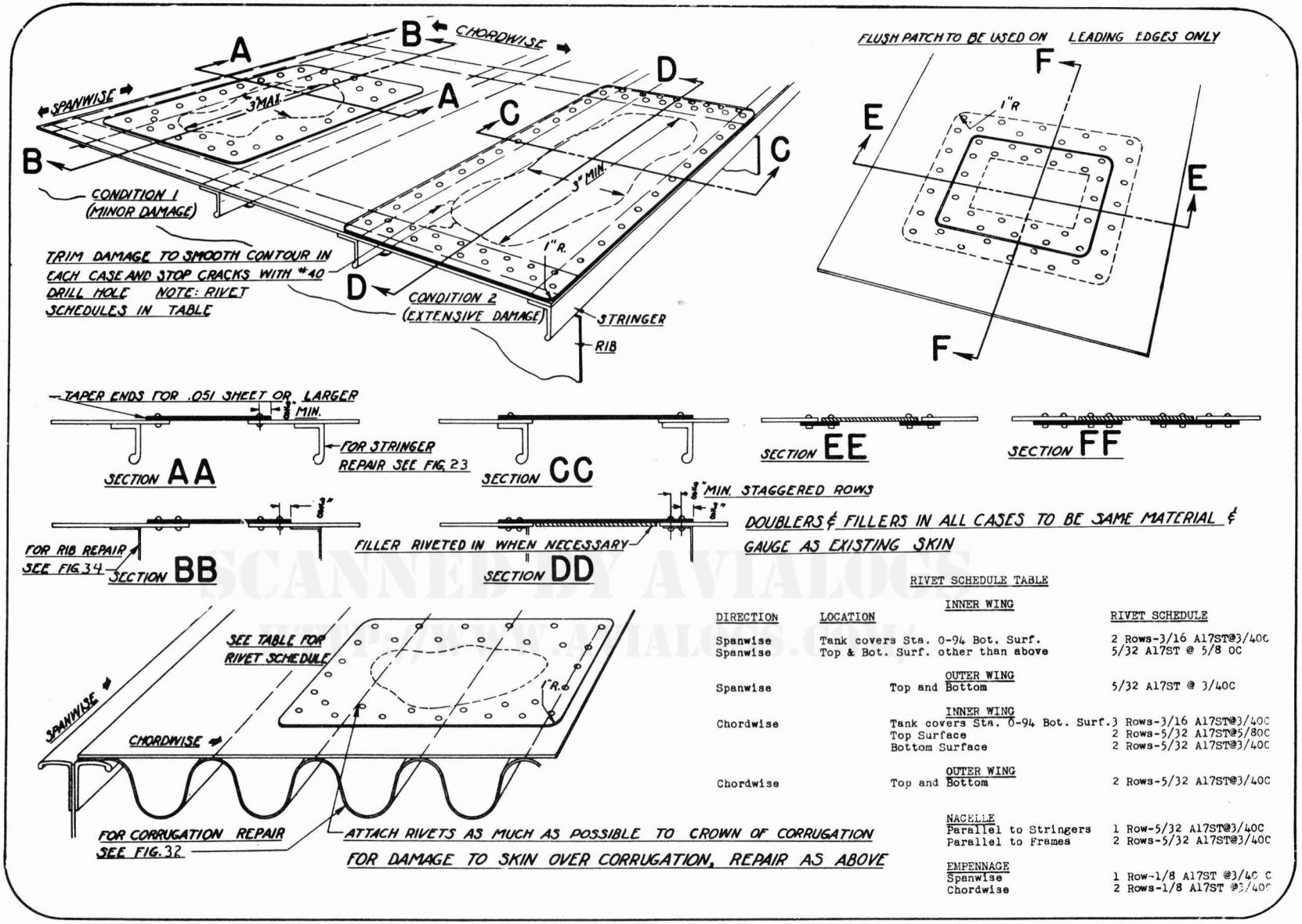


Figure 6 - Empennage Structure and Plating



RIVET SCHEDULE TABLE

DIRECTION	LOCATION	RIVET SCHEDULE
	INNER WING	
Spanwise	Tank covers Sta. 0-94 Bot. Surf.	2 Rows-3/16 A17ST@3/40C
Spanwise	Top & Bot. Surf. other than above	5/32 A17ST @ 5/8 OC
	OUTER WING	
Spanwise	Top and Bottom	5/32 A17ST @ 3/40C
	INNER WING	
Chordwise	Tank covers Sta. 0-94 Bot. Surf.	3 Rows-3/16 A17ST@3/40C
	Top Surface	2 Rows-5/32 A17ST@5/80C
	Bottom Surface	2 Rows-5/32 A17ST@3/40C
	OUTER WING	
Chordwise	Top and Bottom	2 Rows-5/32 A17ST@3/40C
	NACELLE	
	Parallel to Stringers	1 Row-5/32 A17ST@3/40C
	Parallel to Frames	2 Rows-5/32 A17ST@3/40C
	EMPENNAGE	
	Spanwise	1 Row-1/8 A17ST @3/40 C
	Chordwise	2 Rows-1/8 A17ST @3/40C

Figure 7 - Wing, Empennage and Nacelle Skin Repair

SECTION II

REPAIR OF FABRIC COVERING

1. Fabric Covered Ailerons.

a. Materials:

(1) Airplane cloth, cotton (AN-C-121).

(2) Cord - Specification No. AN-C-122 - braided cord for lacing and rib stitching (beeswaxed lightly) and cotton braided cord, special lacing, U. S. Army Specification No. 6-27.

(3) Thread - Federal Specification No. V-T-276 - cotton - left twist, type III - 804-ply.

(4) Reinforcing tape - Specification No. AN-DDD-T-91 - cotton 3/8-inch or 7/16-inch.

(5) Needles - Upholsterers needles - 10-inch No. 901, 13G, Julius Berbecker and Sons, Inc., New York and Ellis Klatcher No. 1 needles.

(6) Pinked surface tape - 2-1/4 inch tape and 4-inch tape, U. S. Army Specification No. 6-62 (Navy Aero 27-T-14 (Int)).

(7) Bank pins, No. 00 nickel plated brass.

(8) Nitrate dope, Specification No. AN-TT-D-514.

(9) Camouflage enamel, Specification No. AN-E-7.

(10) Grommets, Douglas standard part No. 1011863-2.

(11) Camouflage dope, Specification No. AN-D-8.

b. Procedure:

(1) Tie cord at the top center of the second rib on the small end of the aileron. Carry the cord over and under each rib looping the cord around the outside and through the lightening hole of each rib, as the cord is passed down the center of the aileron throughout its entire length. Return in the opposite manner.

(2) Small patches of airplane cloth 2 x 2-1/2 inches are cut and sewn around the frame at the trailing edge of the aileron at each rib station, as shown in figure 9, I; these patches serve to protect the cloth over the rivet heads and as a convenience to pin on the cover prior to sewing.

(3) Cover each hinge support with masking tape to prevent cloth from being torn. Also, place two (2) strips of one inch masking tape immediately in front of tab hinge on the top side of the aileron and one strip on the bottom.

(4) Cut two (2) patches as illustrated in figure 9, V, approximately 12 inches long and 5 inches wide. Cut two (2) smaller patches 2-1/4 x 5-3/4 inches, as shown in figure 9, V. Sew the larger patches over each end of the tab cut-out. Place narrow part of the large patch on the bottom side of the aileron so that it covers the rib well past the tab cut-out. Sew the small rectangular patch correspondingly over the edge of the same rib on the top side of the aileron.

c. Covering (Fitting). (See figure 9, VI.)

(1) Airplane cloth of sufficient width to wrap around the aileron is cut long enough to extend the full length of the aileron including the ends.

(2) Cover is placed over the frame, pulled taut, equally stressed all around and pinned.

(3) Trim cover at the top of each end to 3/8-inch seam allowance and fold bottom cover ends across the aileron ends to meet the top.

(4) Trim off all excess material allowing 3/8 inch of material all around aileron for seams.

d. Sewing. (See figure 9, IV.)

(1) Turn the edges of the material under and sew, removing the pins as you go. The baseball stitch is used on all seam sewing. A slip knot is tied in the thread every five inches to prevent total unraveling in case of thread breakage.

NOTE: Leave base of tab cut-out on right aileron pinned, as shown in figure 9, IV.

(2) Cut reinforcing tape to wrap completely around the aileron and pin at each rib station (figure 9, IV) except where the rib runs into the leading edge cut-out. At these stations extend tape 1/2 inch from the trailing edge to 1/2 inch from the metal fillets behind hinge cut-outs and pin, as illustrated in figure 9, IV.

(3) Sew tape to ribs using the conventional rib stitching of one inch spacing. (See figure 9, IV.)

NOTE: Number of stitches and length of cord per rib station is indicated in figure 9, IV. Hold aileron with leading edge down and begin rib stitching at the top outboard side of rib, one inch from the trailing edge. Tie slip knot to begin the stitching and a knot in every stitch thereafter. The rib stitching knot is the seine knot as shown in figure 9, IV. Pull knot very tight alongside the rib. End stitching 1-1/2 inches from the metal of the leading edge.

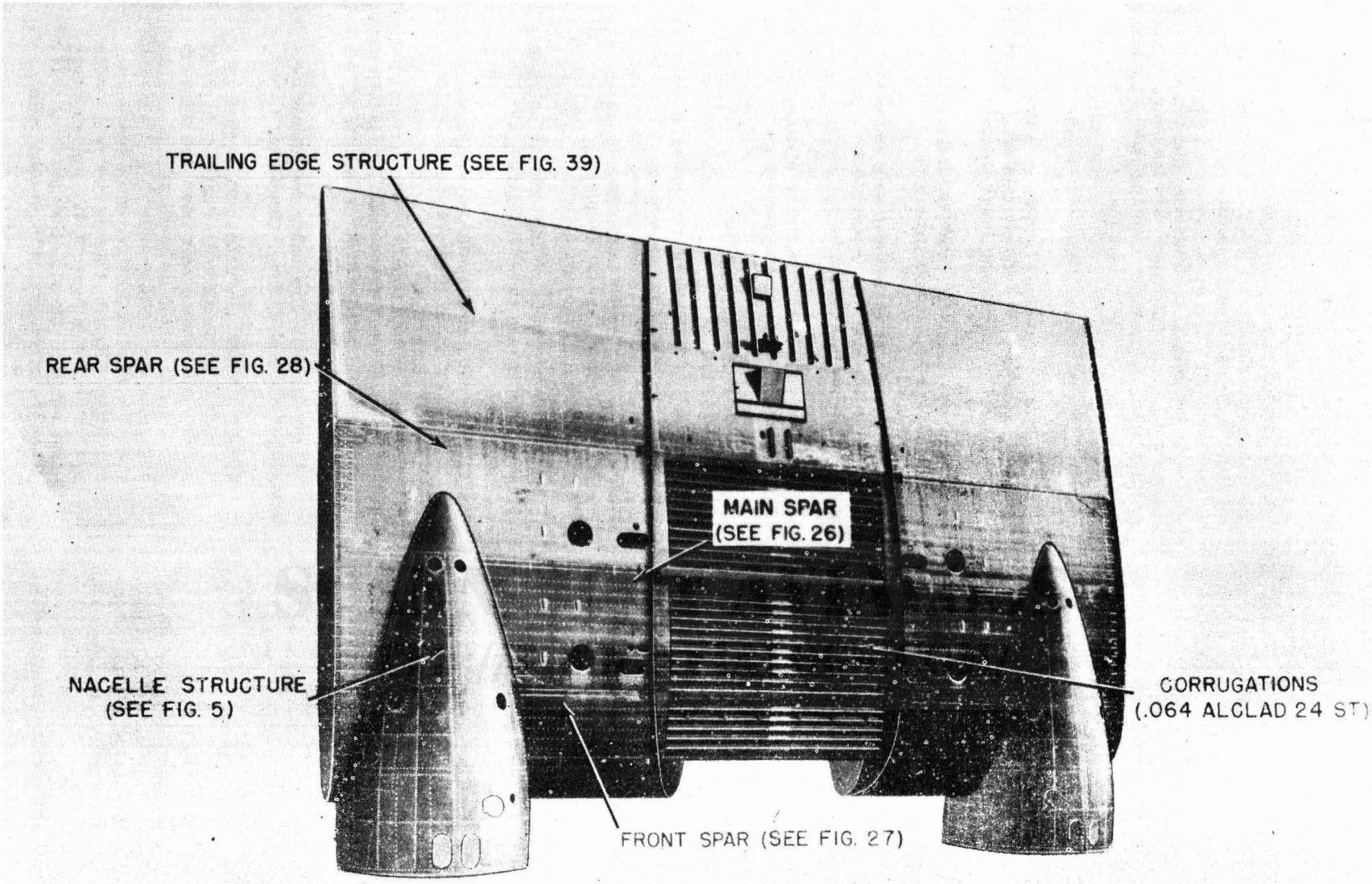


Figure 8 - Center Wing and Nacelle (C-47 and C-117A Models)

(4) Dope the aileron with one brush coat of nitrate dope.

e. Cut-outs. (See figure 9, VI.)

(1) Split each cut-out, rivet and screw where necessary a 3/8-inch .025 aluminum strip (fabric strip) across the base of the tab cut-out and around each hinge cut-out. Trim cloth from the hinge cut-outs to approximately one inch and dope back over the fabric strip to the aileron surface. (See figure 9, VI.)

(2) Mask with masking tape the exposed surfaces of hinge cut-outs. (See figure 9, II.)

f. Surface Taping. (See figure 9, II.)

(1) Apply a 2-1/4 inch pinked edge tape with nitrate dope over rib stitching at each short rib (ribs behind hinge cut-outs) running tape from the trailing edge of the aileron to the metal fillet of the leading edge.

(2) Cut and dope in place all leading edge 2-1/4 inch pinked edge tapes at each side of the hinge cut-out extending tape around the leading edge of the aileron to the edge of the metal underneath exclusive of the fillets.

(3) Apply with dope the pinked edge trapezoid shaped patches at the base of each hinge cut-out. (See figure 9, II.)

NOTE: Lay patch so that it extends just to the leading edge and does not lap over it.

(4) Lay 2-1/4 inch pinked edge spar tape between each rib except at patches. In laying the tape extend over the edge of the metal of the leading edge and dope down. (See figure 9, VI.)

NOTE: Cut spar tape so that it does not pass over rib stitching, except where there are patches. At patches extend tape over the patch to the next rib.

(5) Dope in place the remaining 2-1/4 inch rib tapes extending tape completely around aileron beginning at the trailing edge. It will be necessary to trim a small "V" from the side of the tape at the leading edge, after the tape is applied, to make it fit. At the ends of the aileron extend tape halfway over the edge and fold down over the ends, laying the top tape over the bottom, at the trailing edge. "V" the tape on the leading edge to fit the aileron. (See figure 9, VI.)

(6) Apply a 2-1/4 inch tape over the trailing edge running the full length of the aileron. Lap and trim the ends letting the top half of the tape extend over the bottom.

(7) Apply a 3-3/4 inch tape over the leading edge, lapping over each end of the aileron. Trim tape off flush at each hinge cut-out as shown in figure 9, VI.

(8) Dope the end patches over that portion of the aileron ends exposing the "V" of the tape at the leading edge, as shown in figure 9, VI.

(9) Apply four (4) brush coats of nitrate dope, allowing a sufficient drying period between each coat.

(10) Brush the spot where the grommet is to be applied with another coat of dope and immediately press the grommet in place maintaining it in position with finger pressure for about 30 seconds.

NOTE: Grommets to be placed one inch from grommet center to trailing edge of aileron on the outboard side and 3/4 of an inch from grommet center to the rib. (See figure 9, III.)

g. Finish. (See figure 9, II and III.)

(1) Finish bottom surface of aileron with two (2) spray coats of gray pigmented nitrate dope and the top surface with two (2) spray coats of olive drab nitrate dope.

(2) Attach with Parker Kalon screws the hinge cut-out clips around the hinge support at the base of the cut-out on the underside of the aileron as shown on the blueprint. (See figure 9, III.)

(3) Attach metal trim tab to trailing edge of left wing as shown on blueprint.

(4) Remove the masking tape from cut-outs and paint the exposed metal with camouflage enamel.

2. Fabric Covered Control Surfaces.

The following procedure should be followed:

a. Lay strips of reinforcing tape across top of rib and cloth and attach securely under moderate tension to the forward and rear ends of the fabric.

b. The lacing must be done completely around the rib, reinforcing tape and covered fabric and must be tied with a seine knot at the top surface. The knot should then be covered with surface tape. (See figure 10.) Repeat the above procedure from the leading edge to the trailing edge. Spacing of knots should be more than one inch. For additional information refer to U. S. Army Specification No. 98-24108K (Navy Aero SR-63).

3. Bonding.

The electrical conduits and connections should be bonded in accordance with the instructions outlined in figure 71.

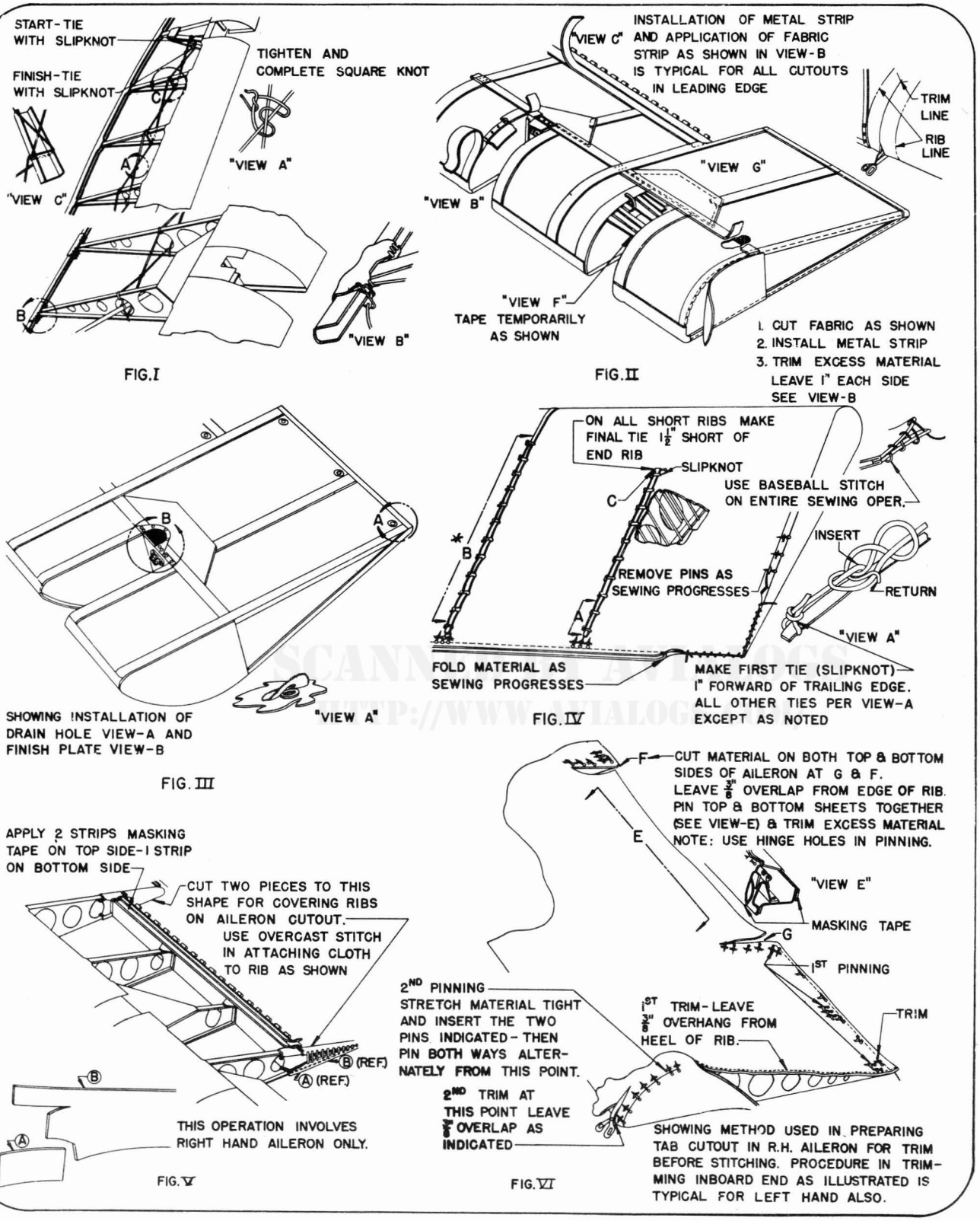


Figure 9 - Repair of Fabric Control Surface

TABLE I (SEE FIGURE 9, IV, B)

NUMBER OF STITCHES PER RIB

STATION	STITCHES	STATION	STITCHES
120.29	20	277.25	15
132	12 R.H. 23 L.H.	288.14	11
143.2	5 R.H. 22 L.H.	296.75	14
155.85	12 R.H. 22 L.H.	305.5	14
167.3	12 R.H. 21 L.H.	314.25	13
180.3	17	323.5	9
190.5	20	331.5	12
201.25	20	339	12
212	19	348.25	11
222.75	18	357.5	11
234	14	366.75	10
244.5	17	376	10
255.25	16	381.16	9
266.25	16	384.78	6

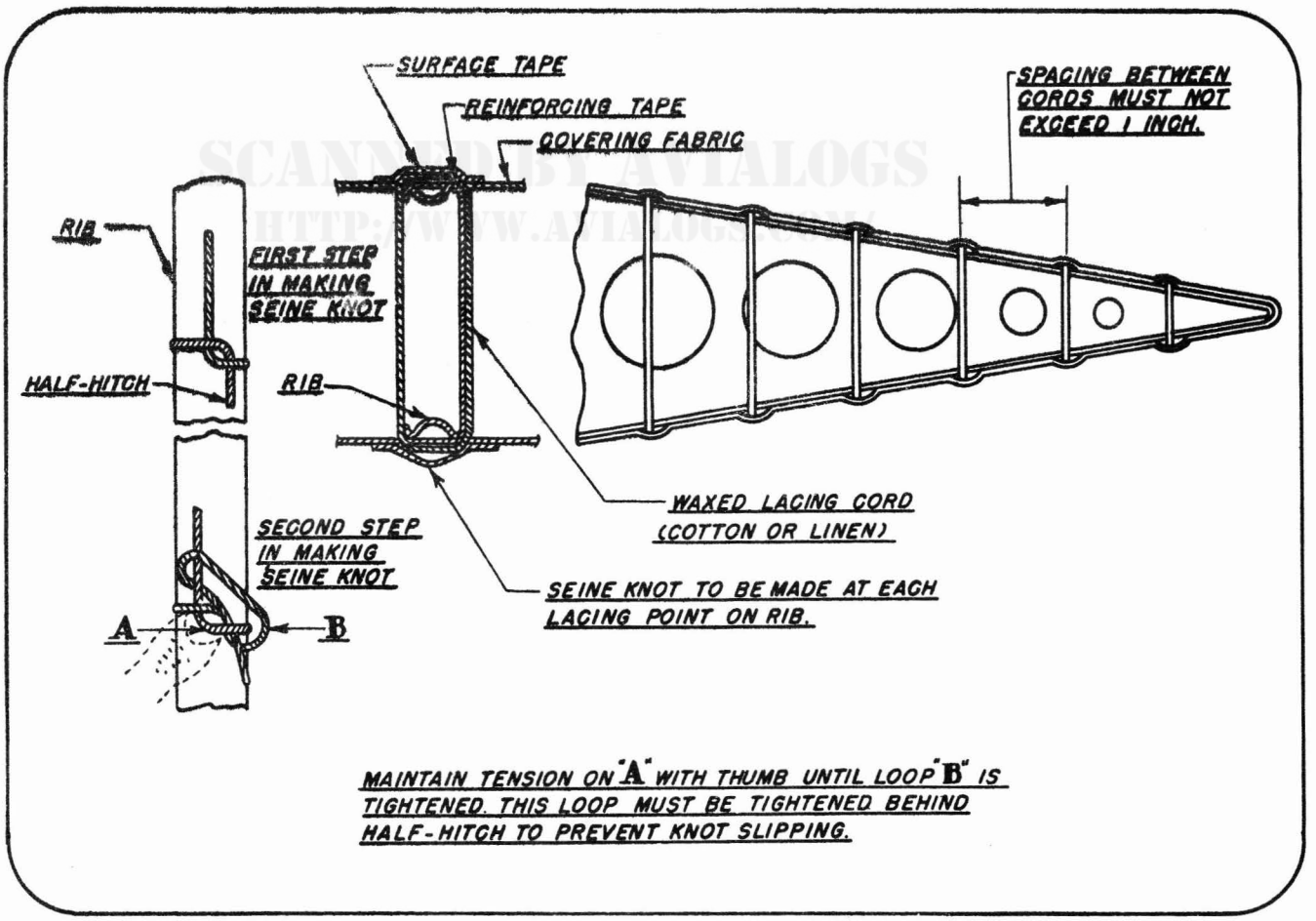


Figure 10 - Alternate Method of Repairing Fabric Control Surfaces

SECTION III

DISMANTLING, CLEANING AND INSPECTION

1. General.

a. The work outlined in this section consists of preparing the airplane for overhaul and repair. The inspections accomplished should be as complete as possible at this stage of disassembly. Major sub-assemblies which can not be inspected should be marked "Repairable" and routed to the sub-assembly groups for repair.

b. A list of special airplane tools furnished by the contractor for use in connection with the maintenance of the C-47 Model Airplanes is given in section III, paragraph 5 of AN 01-40NC-2, and for the C-117A Model Airplane in section III, paragraph 5 of AN 01-40NE-2.

2. Dismantling.

a. General. - Instructions for removing major assemblies for the C-47 Model Airplanes are given in section IV, AN 01-40NC-2, and for the C-117A Model Airplane are given in section IV, AN 01-40NE-2 (Handbooks of Erection and Maintenance Instructions) as follows:

(1) Wing	-	Paragraph 1. b.
(2) Empennage	-	Paragraph 2. b.
(3) Landing Gear	-	Paragraph 4. b.
(4) Tail Gear	-	Paragraph 4. c.
(5) Engines	-	Paragraph 6. b.
(6) Fuel Tanks	-	Paragraph 10. b.
(7) Oil Tanks	-	Paragraph 9. d.

b. Precautions.

(1) Wing Center Panel. - During or after removal of the wing center panel from the fuselage, it is desirable to have the least possible weight in the nose section of the airplane as the removal of the wing center panel leaves an unsupported area of the fuselage subject to bending under an appreciable load.

(2) Empennage. - The tab operating drum cables should be taped to prevent their unwinding before removing the rudder or elevators.

(3) Landing Gear. - As the tension in the landing gear bungee is approximately 9000 pounds, extreme care should be used when removing the landing gear. When the bungee is removed, the landing gear will drop violently unless some method of retarding is used. Do not attempt this operation with pressure in the hydraulic system. The hydraulic system pressure should always be relieved before working on the landing gear. The tire should be deflatd before removing the wheel from the axle and brake drums as rims are some times cracked from hard landings, which may cause disintegration if the wheel is removed with the tire fully inflated.

(4) Tail Wheel. - As the tail gear is extremely heavy, not less than two men should attempt to lower it after it has been disconnected from the fuselage. The tail wheel tire should be deflated before disassembling to avoid injury to personnel by cracked rims disintegrating.

(5) Engines. - When the ignition plug on the firewall is disconnected, the magnetos are not grounded. The engines should not be pulled through when this plug is out.

3. Cleaning.

a. General. - As soon as possible after cleaning, the entire airplane should be checked for corrosion. Some spots may be noted by a discoloration of the paint together with a blister effect. At the same time a general check for breaks and cracks can be made. Cracks make a pencil line effect. The following inspections should be accomplished at this stage of disassembly.

(1) Wings. - The trailing sections of the wing should be checked for corrosion around corners of the bulb angles, the rib flanges, and the skin adjacent to the angles and ribs. After 4,000 hours or six years have elapsed, the center wing section should be cleaned and refinished. The following special items should be thoroughly checked:

(a) Outer wing attaching angles both on the outer and center panels. Cracks and elongated holes. Wing attaching angles are acceptable in which the one-quarter (1/4) inch diameter nominal holes are not elongated beyond the following limits:

1. Twenty per cent of the holes in the top angle may have an elongated diameter of 0.300-inch or less provided they are scattered and the remaining holes in the top angle have an elongated diameter of 0.275-inch or less.

2. Twenty per cent of the holes in the bottom angle may have an elongated diameter of 0.300-inch or less provided they are scattered and the remaining holes in the bottom angle have an elongated diameter of 0.275-inch or less.

3. The angle material between the hole and the edge of the angle will not be cracked or deformed excessively.

(b) Outer panel nose ribs inboard of the landing light bay. Cracks and canning.

(c) Wing spars near ends. "Canning" and breaks.

(d) Wing ribs adjacent to longitudinal cut-outs. Cracked or broken.

(e) Clips attaching longitudinals to ribs. Cracked or broken. Exterior inspection for this condition can be made by pressing in on the skin covering at each longitudinal and rib connection. Damaged clips will allow an appreciable movement of the skin.

(f) Center panel ribs in trailing section adjacent to flap hinge plates. Cracks.

(g) Flap push rod rollers. Frozen or flattened.

(h) Aileron hinges and hinge ribs immediately upon entering wing structure. Cracks.

(i) Wing flap hinges on flaps. Worn spots and play.

(j) Wing and flap skin to the rear of the nacelles. Scratches, dents, and holes.

(k) Skin beneath corrosion resistant steel plates adjacent and aft of the tail pipe. Corrosion.

(l) Fuel tank compartment cover attaching angles. Cracks and elongated holes.

(m) Outer wing ribs between fore and aft spars. Cracked or broken.

(2) Empennage. - The lower ends of the vertical stabilizer tabs should be inspected for cracks along the rivet holes in the flanges. The leading edges and the lower surfaces of the horizontal stabilizer should be checked for scratches and dents.

(3) Fuselage. - The fuselage should be thoroughly inspected for dents, scratches, and wrinkled skin sheets. Dents are likely to be found in the vicinity of the propeller plane and below the cargo loading door. Structural parts should be checked for deep scratches and cracks. The lower part of the fuselage interior should be checked for corrosion.

(4) Landing Gear. - Inspect all welds for cracks. A straightedge should be used to test the upper truss for bent tubes.

(5) Tail Wheel. - Inspect spindle and fork for cracks and deep scratches. Permanent set in the spindle should be checked.

SECTION IV

REPAIR PROCEDURES

1. General.

Authorized repair depot personnel should be familiar with the following procedures to insure that all repair work is properly assembled, and the materials used have the required strength.

2. Procedure.

a. Buck Riveting Roundhead Rivets. - Buck riveting is to be used for making all repairs of the skin plate or of the airplane structure. If blind riveting is necessary, refer to figure 6. Buck riveting procedure should conform to the following instructions:

(1) The head of the rivet should be on the outside surface in the case of skin repair. The riveting of the internal structure should be governed entirely by ease of access.

(2) To insure a sufficiently strong head, the shank of the rivet that protrudes beyond the materials to be repaired should be at least one and one-half (1-1/2) times the diameter of the shank. This is only applicable to joints where the combined material to be riveted measures less than one-half (1/2) inch in depth. For a joint of one-half (1/2) inch or more, add one-sixteenth (1/16) inch for each one-half (1/2) additional inch of joint thickness.

(3) The cup on the driving set should be slightly wider and more shallow than the manufactured heads of the rivet so that the initial contact of the driving force, supplied by either a heavy hand hammer or a riveting machine, will be at the center of the head and directly in line with the rivet shank. This will keep the shank from being driven under the manufactured head, and greatly facilitate the upsetting of the shank into a flat head on the opposite end. The opposite end of the rivet should be supported against a bucking bar. This bar need be of no certain shape, but should have a flat surface to be held against the end of the rivet, and of sufficient mass to withstand the driving action and form a flat head.

b. Buck Riveting 100° Flush-Head Rivets. - The driving of 100° flush-head rivets follows the working procedure as described under buck riveting with the following exceptions:

(1) The edges of the hole drilled for a flush type rivet should be punched lightly inward. This forms a natural cup, allowing the rivet head to be set flush with the skin and not to be forced.

(2) The driving set in the case of flush rivets should be slightly convex and about two or three times the diameter of the rivet head. Care should be taken to keep the peen from slipping off the head of the rivet and marring the adjacent skin.

c. Rivet Edge, Pitch and Row Distances. - The edge distance for all rivets in alclad aluminum-alloy sheet should be at least twice the diameter of the rivet; the pitch of the rivets in a single row should be at least three times the diameter of the rivet, and where a rivet schedule calls for more than a single row, the rivets should be staggered so that those in adjacent rows do not appear in the same cross-section of the material. The distance between rows should be at least two and one-half (2-1/2) times the diameter of the rivets used.

d. Identification of Rivets. - The three types of aluminum-alloy rivets used throughout the structure are the 17ST (designation D), the A17ST (designation AD) and the 24ST (designation DD). The A17ST (AD) type is used for structure repairs. The 17ST (D) and

24ST (DD) type are used in the more highly stressed parts. The "AD" type may be identified by an indentation in the center of the manufactured head; the "DD" type by two raised lines on each side of the manufactured head; the "D" type by a raised tit in the center of the manufactured head. The physical properties of these rivets are given in section XIII.

e. Removal of Solid Rivets.

(1) When it becomes necessary to replace old rivets, great care should be employed in their removal, to insure, if possible that the rivet hole retains its original size and does not require replacement with a larger size rivet.

CAUTION: If a cold chisel is employed in the removal of old rivets, without previously taking the precaution of drilling out the rivet head, the rivet hole is very apt to become enlarged or torn. The flush-type rivet makes this caution note of great importance since there is a great possibility of tearing the material.

(2) Following is the correct procedure for the removal of solid rivets of the round head and the flush type.

(a) Removal of Round Head Rivets.

1. With a centerpunch, indent the surface so that the drill may be correctly centered.

2. With a drill of the same size or smaller as the rivet shank, drill the head to a depth that is near the level of the skin surface. Be careful not to drill skin and enlarge the rivet hole. Watch that the rivet shank does not turn with the drill, causing the skin to tear.

3. Normally the head will come off by drill but if not, carefully shear off the drilled head with a sharp chisel.

4. Drill in about 3/4 of the depth of the rivet and then drive out rivet with a punch small enough to eliminate touching the skin plate, meanwhile bracing the skin plating or fitting from the opposite side to insure that the plate, fitting, or attaching parts will not be forced or bent.

(b) Removal of Flush Head Rivets. - The previous explanation for the removal of the round-head type rivet is adequate for the removal of the flush type.

f. Elongated Rivet Holes. - If sufficient pitch, edge and row distance exists, enlarged rivet holes may be replaced with a size larger rivet, or new rivets may be driven between the damaged holes. Holes, enlarged beyond this type of repair, should be considered an open tear, and treated with a doubler or patch accordingly.

g. Heat Treatment of Material.

(1) The A17ST (AD) type rivets noted for repairs are in the hard-temper (heat-treated) condition, and are driven cold. (See section XIII.)

(2) Refer to AN 01-40NC-2 (C-47 Model Airplanes) and to AN 01-40NE-2 (C-117A Model Airplane) for the treatment that should be used for all replaced parts, repairs, and materials so that they may be similar to the original construction of the airplane.

h. Prevention of Corrosion.

(1) To prevent corrosion, it is necessary to keep the metal surfaces of the airplane dry under any of the various climatic conditions, since corrosion may be defined as the resulting chemical reaction of metal when exposed to moisture. Corrosive action is aided by the presence of high temperatures and humidity.

(2) Aluminum corrosion, detected by a white crystalline deposit, will attack exposed material regardless of thickness, though the percentage of effect upon thinner sections is correspondingly greater. Alclad sheet has a highly corrosion resistant surface, but is subject to corrosive conditions, the most important being exposure to salt moisture.

(3) Since dry aluminum will not corrode, a daily inspection of the lowest edges of all surfaces of the entire airplane should be made for moisture that has not drained away. This applies to any portion of the structural design which forms a natural container for moisture.

(4) Refer to AN 01-40NC-2 (C-47 Model Airplanes) and to AN 01-40NE-2 (C-117A Model Airplane) for the preparation of aluminum surface before coating with a moisture-proof paint.

(5) After making repairs to any portion of the airplane it should be refinished as noted in AN 01-40NC-2 (C-47 Model Airplanes) and in AN 01-40NE-2 (C-117A Model Airplane), or coated with an approved type of corrosion preventive.

i. Straightening and Working of Alclad Sheet and Stainless Steel.

(1) Alclad Sheet. Alclad aluminum alloy may be shaped with a soft faced hammer over hard wood forms. The practice of applying a torch to alclad sheet members for the purpose of straightening or forming is very dangerous as it will destroy the hard temper properties and weaken the structure. Also, the effect of a torch flame deteriorates the aluminum protective coating on alclad aluminum alloy by fusing it into the base metal and renders it more susceptible to corrosion. Protection may be obtained by the use of asbestos when such structure is subjected to heated conditions.

(a) After straightening a bent member, all of the structure adjacent to it should be inspected for loose rivets.

(2) Stainless Steel. - The straightening of stainless steel, such as is used in the construction of the nacelle firewalls, may be aided by the use of a torch if the material is not heated beyond the dark red stage. Caution must be used that adjacent aluminum structure is protected from the heat created by this procedure, as noted in paragraph i. (1), preceding.

j. Inspection.

(1) In addition to the inspection listed under section III, it is imperative to remember the following:

(a) The strength-developing components of the wing in the order of their importance are:

1. Spars.
2. Stringers and Skin.
3. Shear Webs.
4. Ribs.
5. Corrugations.

(b) The strength-developing components of the fuselage in the order of their importance are:

1. Fuselage Frames.
2. Stringers and Skin.

(c) The strength-developing components of the tail surface in the order of their importance are:

1. The Spar.
2. Skin and Ribs.

(2) No rivets should be overlooked. A rivet may be strained or its head sheared off, and not be apparent. For this reason, a feeler gage should be used when inspecting for possible loose rivets.

(3) All bolts, screws, fitting, castings, and forgings should be replaced if damaged or bent.

(4) All tension bolts should be installed with a torque wrench. The tightening torque limits are given in table 5.

SECTION V

CONTROL SURFACE REBALANCE

1. General.

To balance the control surfaces, it will be necessary to have two balance stands (figure 73), a strong cord, a scale for linear measurements and a set of weights. The following set of weights is satisfactory as any weight up to 30 pounds may be obtained to the nearest 1/1 pound. The weights are 10, 10, 5, 2, 2, 1, 1/2, 1/5, 1/5 and 1/10 pounds. The most accurate method for determining the unbalance of the control surfaces is to apply the weight to a cord fastened at the rear of the surface and suspended over the leading edge. This places the weight as far as possible from the hinge axis (figure 73), allowing the distance to be measured with the smallest percentage of error. The following is the recommended procedure for rebalancing control surfaces.

a. Rudder. - Correct balancing weight of the rudder should be 250 inch pounds tail heavy including rudder tab, the tab operating mechanism, the cables within the rudder and the rudder stock. The moments of unbalance are maximum and if exceeded, the surface should be rebalanced as follows:

(1) The control drum should be bound with friction tape or secured with some other type of lock to prevent the cables from twisting and then the tab control cables should be disconnected.

(2) The rudder, without the stock should be removed from the airplane and suspended on two balance stands. (See figure 74.) These stands should be located where there is no likelihood of encountering moving air.

(3) Coil the tab control cables within the rudder with the center of gravity of the coil of cable on the hinge line of the rudder.

(4) Secure the cord in the tab cut-out and hang it over the leading edge of the surface. Hold the surface by hand with the center line of the end rib in a horizontal position.

(5) Gradually add weight to the cord until the surface will remain balanced when released with the center line of the cord rib in a horizontal position. Note the weight on the cord.

(6) Measure the horizontal distance of the string from the hinge line and multiply this distance in inches by the weight in pounds necessary to balance the surface. This will give the moment of unbalance in inch pounds.

(7) Add 14 inch pounds to unbalance found in the preceding paragraph which will give the total moment of unbalance of the rudder and the stock attached. This figure is used in finding the number of pounds of balance weight required.

(8) If the moment of unbalance of this surface is less than 250 inch pounds maximum allowable as shown in paragraph 1. a., preceding, no corrective measures are necessary. If the moment of unbalance is larger than the maximum allowable moment, it will be necessary to add balance weights.

(9) Find the total number of inch pounds moment necessary to bring the surface into the allowable limits and add three (3) inch pounds moment to determine the amount of corrective moment necessary.

(10) Using the chart as shown in figure 75, determine the size and weight of lead necessary. In calculating the chart, the distance from the center of gravity of the lead to the hinge line was taken as 16 inches, which is the distance the center of gravity of the lead will be from the hinge line if the lead is installed as detailed above.

b. Elevator. - Correct balancing weight of the elevator should be 165 inch pounds tail heavy for each elevator including all tab mechanism, the tab, the tab control cables within the elevator and one-half of the elevator stock, or, 330 inch pounds tail heavy including both elevators, the tabs, the tab control mechanism, and the entire elevator stock. The moments of unbalance are maximum and if exceeded, the surface should be rebalanced as noted in the following paragraphs.

(1) The elevator may be balanced on the airplane if a location can be found where there is a minimum movement of air. The inside of a hangar is the most satisfactory location.

(2) Detach all of the elevator control cables from the elevator stock. It is not necessary to detach the tab control cables as they will have no effect on the balance of the entire surface.

(3) Suspend a cord over the leading edge of one of the elevators. Hold the surface by hand with the center line of the end rib in a horizontal positon.

(4) Gradually add weight to the cord until the surface will remain balanced when released with the center line of the end rib in a horizontal positon. Note the weight on the cord.

(5) It may be necessary to balance the elevators when they are removed from the airplane. This may be done on the balance stands much in the same manner as the rudder. (See figure 76.) If the elevators are balanced when removed from the airplane, a moment of nine (9) inch pounds should be added to each elevator to allow for the moment of unbalance of the elevator stock.

(6) If the moment of unbalance of this surface is less than 165 inch pounds tail heavy for each elevator or less than 330 inch pounds tail heavy for both elevators, (the allowable limits as referred to in paragraph 1. b., preceding) no corrective measures are necessary. If the moment of unbalance is larger than the maximum allowable moment it will be necessary to add balance weights.

(7) Find the total number of inch pounds moment necessary to bring the surface into the allowable limits and add three (3) inch pounds moment to determine the amount of corrective moment necessary.

(8) Using the charts in figure 77, determine the size and weight of lead necessary and install as shown on figures 76 and 80. In calculating the chart, the distance from the center of gravity of the lead to the hinge line was taken as 10.6 inches which is the distance the center of gravity of the lead will be from the hinge line if the lead is installed as shown in figure 76.

c. Aileron. - Correct balancing weight for the left hand aileron should be 130 inch pounds tail heavy as balanced on the airplane with the surface in normal flight position. The push rod should be disconnected at the aileron end of the rod and pulled forward until it does not interfere with the movement of the aileron. The right hand aileron should be 130 inch pounds tail heavy including tab and tab operating mechanism within the aileron, but not the push rods when the surface is in the normal flight position. The aileron and tab push rods are disconnected at the aileron end of the rods and then pulled forward until they do not interfere with the movement of the aileron. The moment of unbalance as noted above are maximum and if exceeded, the surfaces should be rebalanced as follows:

(1) The aileron must be balanced while suspended from the wing as the surface is too long to be suspended from two hinge stands on the floor without warping.

(a) Disconnect the aileron control rod and aileron tab control rod at the aileron end of the rod. Pull both rods forward until they no longer interfere with the surface.

(b) Attach a guide to the edge of the wing at the inboard end of the aileron cut-out on which the position of the aileron may be noted.

(c) Using a spirit level place the lower surface of the aileron in a horizontal position and mark the point on the guide where the trailing edge falls.

(d) Measure 1-1/2 inches above this point and mark this new location on the guide as the reference point. Hold the trailing edge of the aileron by hand opposite the reference point.

(e) Fasten a cord around one of the aileron hinges and wrap it around the aileron and allow it to hang over the leading edge. Gradually add weight to this cord until the surface will remain balanced with the trailing edge opposite the reference point. Note the weight on the cord.

(f) Measure the horizontal distance in inches from the cord to the center line of the hinge.

(g) Multiply the length as noted above in inches times the weight on the cord in pounds which will give the moment of unbalance of the aileron in inch pounds.

(h) If the moment of unbalance of the left-hand aileron is less than 130 inch pounds tail heavy and the right-hand aileron is less than 130 inch pounds tail heavy (the maximum allowable moments as noted in paragraph 1. c., preceding) no corrective measures are necessary. The moments for the two ailerons are different because the right-hand aileron has a tab on it. This tab is left installed when this surface is balanced which contributes to the tail-heavy condition of the surface.

(i) If the moment of unbalance is larger than the allowable maximum moment it will be necessary to add balance weights.

(j) Find the total number of inch pounds moment necessary to bring the surface into the allowable limits and add three (3) inch pounds moment to determine the amount of corrective moment necessary.

(k) Using the chart in figure 79, determine the size and weight lead necessary. In calculating this chart, the difference in the location of the center of gravity of the various size weights was taken into consideration. They are based on the forward edge of the weights always being 1/4 inch from the leading edge of the aileron.

(l) Install the weight as detailed in figure 78 with the forward edge of the weight within 1/4 inch of the leading edge of the aileron.

d. Example: For the convenience of the operating personnel, the following set of sample calculations for balancing the rudder based on arbitrary figures, set up for example only.

(1) The rudder rests with the center line of the end rib horizontal with an average weight of 15.9 pounds on the cord.

(2) The horizontal distance from the cord to the center line of the rudder axis = 17 inches.

(3) Moment of unbalance = 15.9 pounds x 17 inches = 270 inch pounds tail heavy.

(4) Moment of unbalance over allowable = 270 inch pounds 250 inch pounds = 20 inch pounds.

(5) Corrective moment necessary = 20 inch pounds +3 inch pounds = 23 inch pounds.

(6) Weight of balance lead necessary $= \frac{23}{16}$ inch pounds = 1.437 pounds of lead. (16 inches being the distance of the center of gravity of the lead from the hinge line of the rudder.)

(7) Using 1/4 inch lead sheet 1.437 x 9.74 = 13.9 sq. in. of lead. (9.74 being the number of square inches of 1/4 inch lead sheet per pounds.)

(8) Maximum length of lead for rudder = 5 inch (figure 75) therefore $\frac{13.9}{5}$ inch = 2.78 inch wide lead.

(9) Size of balance lead: 1/4 inch x 5 inch x 2.78 inch. Fasten with two rows of screws as noted in figure 80.

(10) By using the direct reading charts on figure 74 the size of the weight could have been found without the calculations in paragraphs (f) to (i), inclusive.

e. Assembly. Rigging instructions and tensions of control cables are given in the Handbook of Erection and Maintenance Instructions, AN 01-40NC-2 (C-47 Model Airplanes) and AN 01-40NE-2 (C-117A Model Airplane).

SECTION VI

REPAIR OF THE WINGS

1. Construction.

The wings are a full cantilever design. Both the left and right wings are assembled in two main sections. They consist of the inboard wing, and an outboard wing which incorporates a removable wing tip. The center wing consists of three spars, which is built up of extruded sections of aluminum alloy and webs of alclad sheet. The ribs are formed from alclad sheet and are heat-treated. The skin of the rear section (aft of the rear spar) and the lower skin of the forward section are reinforced by longitudinal extruded aluminum alloy sections. The upper surface of the forward section between spars incorporates a compression structure of corrugated 24SRT alclad sheet, corrugations running laterally. The covering of both upper and lower surfaces are of alclad sheet. The outer wing is similar in construction to the inner wing except that bulb angles and zee sections of aluminum alloy are used on the upper surface in place of the corrugated alclad sheet. (See figure 1 to figure 48.)

2. Negligible Damage.

a. Wing Skin Webs and Wing Ribs. - Smooth dents that have caused no rivets to be sheared or structure distorted and which show no trace of cracks or abrasions may be considered negligible; however, care must be taken during inspection to insure that they are not stress wrinkles caused by the failure of the structure.

b. Wing Stringers and Extrusions. - Smooth indentations and scratches that are not over 10 percent of the thickness after being rounded out and carefully inspected for cracks may be neglected.

c. Wing Spar Caps. - Smooth indentations and scratches that are not over 1/16 inch in depth after being rounded out and carefully inspected for cracks may be neglected.

d. Wing Corrugations. - Smooth indentations and scratches that are not through the alclad after being rounded out and carefully inspected for cracks may be neglected.

3. For Repair of Any Section in the Wing, Refer to:

a. Wing plating (figure 1) or wing structure (figure 2) for key to repairs.

b. If the repair doesn't appear on these diagrams, refer to the list of illustrations.

c. It is optional to use a 1-inch radius on the outside corner of all skin doublers. Whenever possible a clevis bolt should be used in the attachment of spar cap to skin. (See figure 24)

NOTE: If steel is used for a repair, it should be cadmium plated before using.

All 24SO material must be heat-treated.

SECTION VII

REPAIR OF THE FUSELAGE

1. Construction.

The fuselage is a semi-monocoque construction consisting essentially of transverse frames made of formed 24ST alclad sheet, longitudinal members of 24ST extruded bulb angles, and some special longitudinal members of 24ST alclad sheet formed as channels. The fuselage covering is 24ST alclad sheet. (See figure 48 to figure 59.)

2. Negligible Damage.

a. Fuselage Skin and Frames.

(1) Smooth dents that have caused no rivets to be sheared or structure distorted and which show no trace of cracks or abrasions may be considered negligible; however, care must be taken during inspection to insure that they are not stress wrinkles caused by the failure of the structure.

(2) Isolated holes in frames of one-half inch diameter or less, where edges show no cracks or abrasions and which are not within one inch of any other hole or structure and not in the same cross section as the stringer cut-out may be neglected.

b. Fuselage Stringers and Extrusions. - Smooth indentations and scratches that are not over 1/16 inch in depth after being rounded out and carefully inspected for cracks may be neglected.

3. For Repair of Any Section in the Fuselage, Refer to:

a. Fuselage plating (figures 3, 3A and 3B) or fuselage structure (figures 3C and 4) for key to repairs.

b. If the repair doesn't appear on these diagrams, refer to the list of illustrations.

c. It is optional to use a 1-inch radius on the outside corner of all skin doublers.

NOTE: If steel is used for a repair, it should be cadmium plated before using.

Also 24SO material must be heat-treated.

SECTION VIII

REPAIR OF THE NACELLE

1. Construction.

The engine nacelles are metal monocoque of aluminum alloy and steel. The firewalls are of corrosion resistant steel. Recesses are provided in the nacelles into which the landing gear wheels retract. (See figure 59 to figure 63.)

2. Negligible Damage.

a. Nacelle Skin and Frames.

(1) Smooth dents that have caused no rivets to be sheared or structure distorted and which show no trace of cracks or abrasions may be considered negligible; however, care must be taken during inspection to insure that they are not stress wrinkles caused by the failure of the structure.

(2) Isolated holes in frames of one-half diameter or less, where edges show no cracks or abrasions and which are not within one inch of any other hole or structure and not in the same cross section as the stringer cut-out may be neglected.

b. Nacelle Stringers and Extrusions. - Smooth indentations and scratches that are not over 1/16 inch in depth after being rounded out and carefully inspected for cracks may be neglected.

3. For Repair of Any Section in the Nacelle, Refer to:

a. Nacelle structure and plating (figure 5) for key to repairs.

b. If the repair doesn't appear on these diagrams, refer to the list of illustrations.

NOTE: If steel is used for a repair, it should be cadmium plated before using.

All 24SO material must be heat-treated.

SECTION IX

REPAIR OF THE EMPENNAGE AND CONTROL SURFACES

1. Construction of Empennage.

It is of multicellular construction employing alclad sheet and aluminum alloy extrusions. The skin is 24ST alclad. (See figure 6.)

2. Construction of Control Surfaces.

It is of aluminum alloy frame construction with 24ST alclad sheet protective covering on the leading edge. They are fabric covered. (See figure 63 to figure 70.)

3. Negligible Damage.

a. Skin and Frames.

(1) Smooth dents that have caused no rivets to be sheared of structure distorted and which show no trace of cracks or abrasions may be considered negligible; however, care must be taken during inspection to insure that they are not stress wrinkles caused by the failure of the structure.

(2) Isolated holes in frames of one-half inch diameter or less, where edges show no cracks or abrasions and which are not within one inch of any other hole or structure and not in the same cross section as the stringer cut-out may be neglected.

b. Stringers and Extrusions. - Smooth indentations and scratches that are not over 1/16 inch in depth after being rounded out and carefully inspected for cracks may be neglected.

4. For Repair of Any Section in the Empennage or Control Surfaces, Refer to:

a. Empennage structure and plating. (See figure 6 for key to repairs.)

b. If the repair doesn't appear on these diagrams refer to the list of illustrations.

NOTE: If steel is used for a repair, it should be cadmium plated before using.

.ll 24SO material must be heat-treated.

SECTION X

CONSTRUCTION OF LANDING GEAR

1. Construction of Landing Gear.

The main landing gear consists of two independent units - one mounted under each nacelle. The two units are so arranged so that they fold into the nacelles, leaving only the bottom of the wheels projecting. Each wheel is mounted between two oleo pneumatic shock absorber struts which are solidly clamped to the axle and which are connected together at their upper ends by rigid trusses. Attached to the axle at each side of the wheel is a triangular link, the upper corner is attached to a rod hinged to the oleo at the lower point of the cross bracing. The aft corner of the triangular link is attached to a yoke type brace strut which runs aft and upward, hinging between the center and rear wing spars. The upper end of the shock absorber and wheel assembly is hinged to a movable truss rotative about its upper fittings which are attached to the front wing spar. The retracting mechanism is hydraulically operated. The hydraulic retracting strut is attached to the movable truss in such a manner that when the strut is retracted it will rotate the truss forward and up into the nacelle. A mechanical lock is installed to lock the landing gear in a down position. (See figure 61.)

2. Construction of Tail Wheel.

The tail wheel is mounted in a fork (aluminum alloy casting) which connected to a spindle shaft made of heat-treated chrome molybdenum steel tubing. The spindle shaft is attached to the fuselage structure through two ball bearing fittings. An oleo pneumatic shock absorber is provided for the tail wheel. The tail wheel can swivel 360 degrees. A lock is provided to lock the wheel in the trailing position. The lock is operated from the pilot's compartment. The tail wheel is not retractable.

3. General Repair.

Small dents and cracks not over 1/32 inch in depth occurring in the web of the upper truss (figure 61) may be oxyacetylene or arc welded. For repair of the tubes in the upper truss see figure 60.

4. Rebushing.

It will be necessary to completely rebush the landing gear due to hard landings and wear caused by operation.

NOTE: If steel is used for repair, it should be cadmium plated before using.

All 24SO material must be heat-treated.

5. Reconditioning.

Reconditioning of the landing gear components may be accomplished at the points noted in figures 61A and 61B. For tolerances and specifications applicable to reconditioning, refer to pages 92C and 92D.

SECTION XI

REPAIR OF THE ENGINE MOUNT

1. Construction.

The engine mount is detachably mounted to the front face of the nacelles (at the firewalls). Rubber bushings are provided at the attachment points of the engines to the mounts. (See figure 62.)

2. Negligible Damage.

Small dents, not over 1/32 inch in depth, having smooth edges, showing no cracks or abrasions.

3. Repair to Damage.

Small cracks not over 1/32 inch in depth occurring in the web of the engine mount ring (figure 62) may be oxyacetylene or arc welded. For repair to the tubes refer to figure 59.

4. Check of Alignment.

All repairs to the engine mount should be governed by accurate means of alignment taken from the measurement of good structure or engineering drawings.

5. Pressure Testing of Repaired Engine Mounts Tubes.

a. Upon completion of repair, the structure should be pressure tested as follows:

(1) Weld all oil holes.

(2) Redrill one oil hole in the tube to be used for an air inlet while testing.

(3) Apply forty pounds per square inch air pressure, using oil hole drilled in tube for air outlet.

(4) Submerge tube in a tank of water and mark any leaks.

(5) If the leaks are apparent repair as shown in figures 59 and 60 and then repeat procedure.

CAUTION If an engine mount tube shows severe leakage, it is usually better to replace the tube.

NOTE If steel is used for a repair, it should be cadmium plated before using.

All 24SO material must be heat-treated.

6. Final Inspection and Tests.

Engine mounts will be magnafluxed and Rockwell hardness tests will be performed after repairs, prior to return to serviceable stock.

SECTION XII

MISCELLANEOUS REPAIRS

1. Windows.

Window panels should be replaced if damaged. The part numbers are given on figures 49 and 49A.

2. Cables.

Replace any 7 x 19 cable that shows more than six wires broken in any 1-inch length or any 7 x 7 cable that shows more than three wires broken in any 1-inch length. Watch particularly for breakages occurring in that length of a cable normally passing over a pulley or through a fairlead.

3. Fittings, Bolts, and Fairleads.

All fittings, bolts, screws, and fairleads should be replaced if damaged.

4. Systems Operating Units.

Any damage to the operating units of all systems requires repair according to the manufacturer's recommendations, or a replacement. A complete list of parts for the units is given in their respective sections in AN 01-40NC-2 (Model C-47 Airplanes) and AN 01-40NE-2 (Model C-117A Airplanes).

5. Hydraulic System.

a. Lines. - In cases of slight scratches in lines, they may be removed with a burnishing tool or a fine grade of emery cloth and oil. After burnishing, finish with smooth cloth and oil to leave a clear, smooth surface. Oil lines should be annealed.

b. Operating Units. - All packing in the operating valves and actuating struts should be replaced in accordance with information given in AN 01-40NC-2 (C-47 Model Airplanes) and AN 01-40NE-2 (C-117A Model Airplane) if parts are worn appreciably.

6. Firewalls, Fairings, Engine Cowling, and Fillets.

All nonstressed sheets may be repaired according to figure 14.

7. Elongated Holes.

All elongated holes may be repaired according to figures 14 and 15.

All 24SO material must be heat-treated.

8. Engine Cowling - Rework of Anti-Drag Ring Supports

1 This instruction makes provision for the rework of Anti-Rotational stops, Part 2116035 of the anti-drag ring when they fail due to unequal distribution of load.

2 This rework may be done in accordance with the following RCAF drawings which are available at Air Force Headquarters.

30747 - Rework of Anti-drag ring supports.

11826 - Support - Anti-drag ring.

SECTION XIII

REPAIR OF THE FUEL AND OIL TANKS AND LINES

1. Construction.

a. The metallic fuel tanks are constructed of 3S one-half hard aluminum alloy sheet, welded together to form the shell. The oil tanks are of the same construction and strengthened with internal baffles.

b. Refer to figure 11C for typical construction of the non-metallic fuel tanks.

2. Repair of Tanks.

a. Metallic Tanks. - Repair metallic tanks in accordance with figures 11A and 11B.

b. Non-Metallic Tanks. (See figure 11C.)

(1) Expose the fibre layer by removing the outer fabric layer a distance of three inches from all sides of the damaged areas.

(2) With a knife, scrape all the old cement from the exposed fibre, buff this surface with a medium weight sand or emery paper, then fill the hole or tear with zinc chromate paste.

(3) To repair a damaged area four inches long, cut a patch, from 1/16 inch vulcanized fibre sheet, that will extend a distance two inches from all sides of the damaged area. Cut a piece proportionately larger for damaged areas longer than four inches.

(4) Buff the under surface of the patch, soak the patch in water, then bend it to any desired curve.

(5) Apply a heavy coating of plywood glue to both of the buffed surfaces (on the tank and on the patch).

(6) Place the patch over the damaged area, then apply pressure evenly by the use of a padded wood block held down with a heavy weight or by means of a wire or rope wound around the tank and over the block several times.

(7) Allow the repair to dry for 12 hours (four hours if a hot air blower is used).

(8) When the fibre patch has dried, cut a patch from 14 ounce fabric that will extend two inches from all sides of the area from which the fabric layer was removed (i.e., (1), above).

(9) Treat the fabric patch and adjacent tank inner surface area with a coating of cellulose acetate dope, then apply the patch.

(10) Apply four coats of dope over the patch, allowing 15 minutes drying time between each application of dope.

(11) After the fourth application of dope has dried for one hour, treat the inside surface damaged area with a sloshing compound (preferably Fuller's No. T.L. 284).

(12) Temporary repairs may sometimes be accomplished by the use of a wooden plug or cork, coated with zinc chromate paste, held in place with narrow strips of 14 ounce fabric, and cemented with dope.

3. Repair of Lines.

Deep scratches or deformed lines necessitate replacement. Light scratches may be removed by the use of a burnishing tool or a fine grade of emery cloth with oil. Before installing new 1/4 inch diameter lines attach the fittings, then test them under water by subjecting them to 80-100 pounds per square inch air pressure.

4. Reinstallation of Lines. (See figure 12.)

When binding two or more lines together between supports, during line installation, adhere to the following procedure:

a. First Operation.

(1) Tie Koroseal strip temporarily to or near an outside line, leaving about six inches free.

NOTE: Use number 12100 Koroseal Strip 3/32 x 5 - 3/32 B. F. Goodrich Rubber Company.

(2) Make three turns, under tension, around all of the lines being tied, bringing the thrid turn between the two lines farthest from the start.

(3) For tying two lines only, proceed with the final operation.

b. Second Operation. - Use the free end (i.e., a., (1), above) to bind, under tension, the lacings between the lines.

c. Final Operation.

(1) Loosen the temporary tie, tie the two ends in a square knot, then trim the ends to 1/2 inch lengths.

(2) Use no finish on completed ties.

NOTE: Make a sufficient number of binding turns between lines to assure proper spacing. Application for Koroseal strips is limited to temperature under 65.6 degrees C (150 degrees F).

All 24SO material must be heat-treated.

TABLE NO. 2

DESIGN PROPERTIES
(*Values in 1000 p.s.i.)

NON-FERROUS METALS	% Elong.	Des. Tens.*	Ult. Tens.*	Y. P. Tens.*	Bearing*	Shear*	Block Comp.*	"E" (Million)
24SO - Sheet (H.T. After Form)		54	60	36	85	28	60	10.3
24SO - Tube (H.T. After Form)		60	62	40	90	37	62	10.3
24ST - Bar, to 4 Inch, Long Grain	14	60	62	40	90	37	62	10.3
24ST - Bar, 1.501 to 4 Inch Cross Gr.		55	55	38	82.5	33	55	10.3
24ST - Extruded Shapes	14	58	58	42	83	34	57	10.3
24ST - Sheet and Plate, to 1 Inch Cross Gr.	11	60	62	40	90	37	62	10.3
24ST - Sheet and Plate 1.001-1.50 Cross Gr.		60	60	40	90	36	60	10.3
24ST - Sheet and Pit. 1.501-2.00 Cross Gr.		58	58	40	87	35	58	10.3
24ST - Sheet and Pit. 2.001 3.00 Cross Gr.		56	56	40	84	33.5	56	10.3
24ST - Tube (Stretched)		62	62	42	90	37	62	10.3
24STAL - Sheet, Alclad	11	55.5	56	37	82	34	56	10
24STAL - Sheet, Alclad (H.T. After Form)		46.5	54	31	75	25	54	10
24SRT - Sheet	10	65	65	50	93	39	65	10.3
24SRTAL - Sheet, Alclad	8	62	62	46	83	35	58	10

TABLE NO. 3

ALLOWABLE SHEAR STRENGTH OF ALUMINUM ALLOY RIVETS (LBS.)

Dia. of Rivet or Pin (In.)	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8
A17ST Ad(F_{su} 25,000PSI)	83	186	331	518	745	1325	2071	2984
17ST D(F_{su} 30,000 PSI)	92	206	368	573	828	1472	2300	3313
24ST DD(F_{su} 35,000 PSI)	107	241	429	670	966	1718	2684	3865

ALLOWABLE BEARING STRENGTH OF 24ST ALCLAD ALUMINUM ALLOY SHEET (LBS.)

(F_{BR} 82,000 PSI)

Dia. of Rivet or Pin (In.)	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8
.014	71	107	143					
.016	82	123	164					
.018	92	138	184					
.020	102	153	205	256	307			
.022	113	169	225	282	338			
.025	128	192	256	320	384			
.028	143	215	287	358	430			
.032	164	245	328	409	492	656	820	984
.036	184	276	389	461	553	738	922	1107
.040	205	307	410	512	615	820	1025	1230
.045	230	345	461	576	691	922	1153	1383
.051		391	522	653	784	1045	1306	1568
.064		491	656	819	984	1312	1640	1968
.072			738	922	1107	1476	1845	2214
.081			830	1037	1245	1660	2075	2490
.091			932	1165	1399	1865	2331	2798
.102				1306	1568	2091	2613	3136
.114				1460	1753	2337	2921	3505
.128				1639	1968	2624	3280	3936
5/32					2401	3202	4002	4803
3/16					2882	3843	4804	5765

TABLE NO. 4

MINIMUM BEND RADII FOR

FORMING OF SHEET

ALUMINUM ALLOY					CORROSION-RESISTANT STEEL		
2SO 3SO	24SO 2S 1/2 H 3S 1/2 H	24ST	24SRT	GAGE	ANNEALED STAB.and UNSTAB.	1/4 HARD UNSTAB.	HARD UNSTAB.
				.005	1/32	1/32	1/16
				.010	1/32	1/32	3/32
				.015	1/32	1/32	3/32
1/32	1/32	3/32	3/32	.016			
				.018	1/32	1/32	1/8
1/32	1/32	3/32	3/32	.020			
1/32	1/32	3/32	3/32	.022	1/32	1/32	5/32
1/32	1/32	1/8	1/8	.025	1/32	1/16	5/32
				.028	1/32	1/16	5/32
1/32	1/32	1/8	1/8	.029			
1/32	1/32	1/8	1/8	.032			
				.034	1/32	1/16	5/32
1/32	1/32	5/32	5/32	.036			
				.038	1/32	1/16	3/16
1/16	1/16	5/32	5/32	.040			
				.044	1/32	1/16	3/16
1/16	1/16	3/16	3/16	.045			
				.050	1/32	3/32	3/16
1/16	1/16	3/16	3/16	.051			
				.063	1/16	3/32	7/32
1/16	3/32	3/16	1/4	.064			
1/16	1/8	7/32	9/32	.072			
				.078	3/32	1/8	1/4
3/32	1/8	5/16	7/16	.081			
3/32	5/32	3/8	15/32	.091			
				.094	1/8	5/32	5/16
				.109	5/32	3/16	3/8
				.125	3/16	7/32	
1/8	7/32	1/2	5/8	.128			
5/32	9/32	21/32	3/4	5/32			
3/16	3/8	27/32	29/32	3/16			

TABLE NO. 5

WRENCH TORQUE ON BOLTS

ITEM	NAME	REF DWG	BOLT	TORQUE (INCH LBS.)
A	Inspection Covers (C/L of Airplane)	5116643 5113541	AN5-11A	110 (±10)
B	Fuel Tank Cover Attach Angles	5110506 5114634 5116315	AN5-11A	110 (±10)
*C	Fuselage Attachment to Center Wing at Spars	5110501	AN6-22, -23, -25	175 (+100, -0)
D	Attach Upper and Lower Sides of Horizontal Stabilizer Together at C/L of Airplane	5115207	AN3-6A	40 (±5)
E	Tail Stud Attach to Main Fuselage	5142179	AN5-7A, -10A, -12A	110 (±10)
**F	Attach Angle - Inner to Outer Wing	5110501	AN4-7A, -10A	105 (+10, -0)
G	Axle Clamp Bolt	Bendix 53926	7/8 Special	2160 (±240)
†H	Engine to Ring Attach at Lord Shock Mounts	5110572	AN8-41, -47	250 (+25, -0)
I	Engine Mount Attach to Fire Wall	1116576 1116575	AN5-35	125 (±15)
	Engine Mount Tube Attach to Engine Ring; Ring Halves Attachment	5110599	S-2076907, -15, -17, -20	400 (+40, -0)

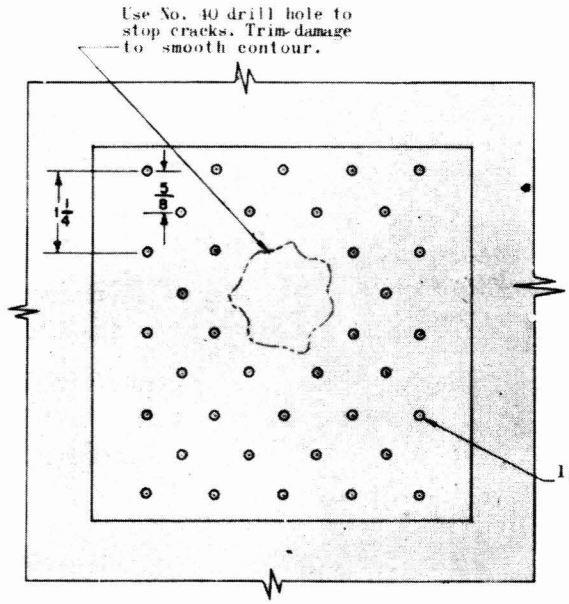
*The excessive amount of plus tolerance on item "C" enables the cotter key to be installed in the fuselage pad stud bolt to safety the castellated nut and still stay within the torque tolerance.

**The specified torque for item "F" should be applied regardless of type of finish of nuts or bolts. Stenciled instructions to the contrary on upper wing surface of some airplanes should be disregarded.

†The torque value of item "H" will have to be checked by lifting the weight of the engine from the engine mount bolts.

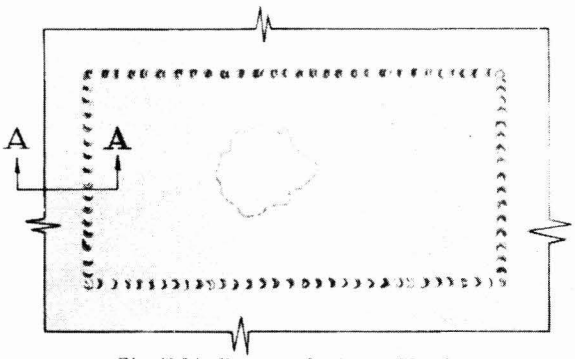
NOTE

Bolts should be absolutely clean of all grease and oil before they are torqued or tightened, as a bolt may be caused to yield at a very low torque if it is lubricated in any fashion.

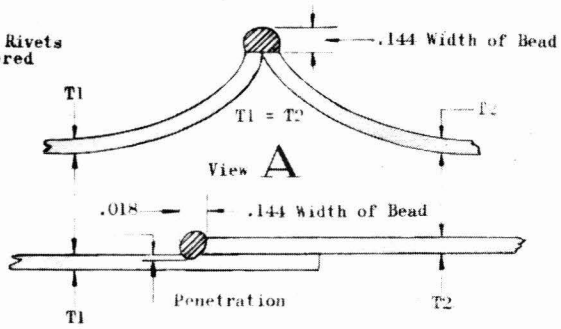


NOTE:
1. Use 2 rows 1/8 A17ST rivets for holes under two inches.
2. Use 3 rows 1/8 A17ST rivets for holes over two inches.
3. Tank joints should be sealed by zinc chromate compound Type II.

FIGURE 11A RIVET REPAIR

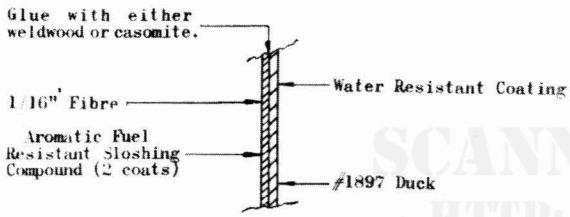


Edge Weld - Use pure aluminum weld rod.

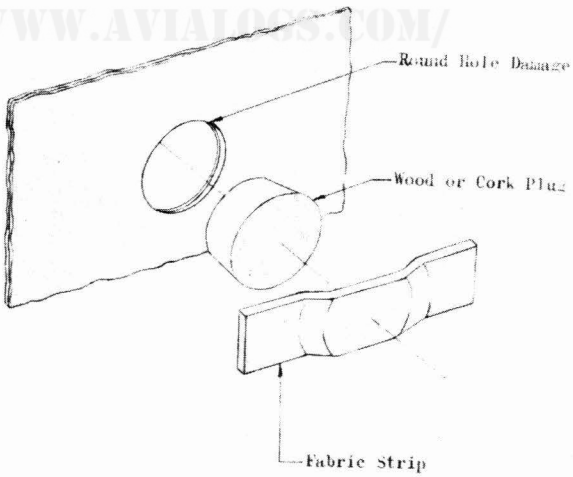


Lap Weld - Use 3/32 silicon welding rod.
T1 = T2 Gauge & Material

FIGURE 11B GAS WELD REPAIR



View B Typical Construction



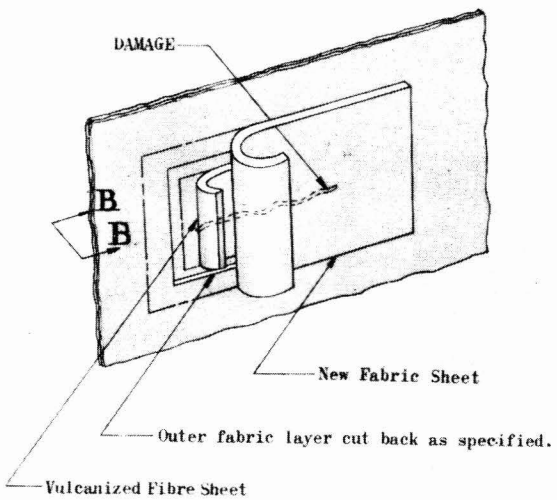


FIG. 11C REPAIR OF NON-METALLIC TANKS

Figure 11 - Fuel and Oil Tank Repair

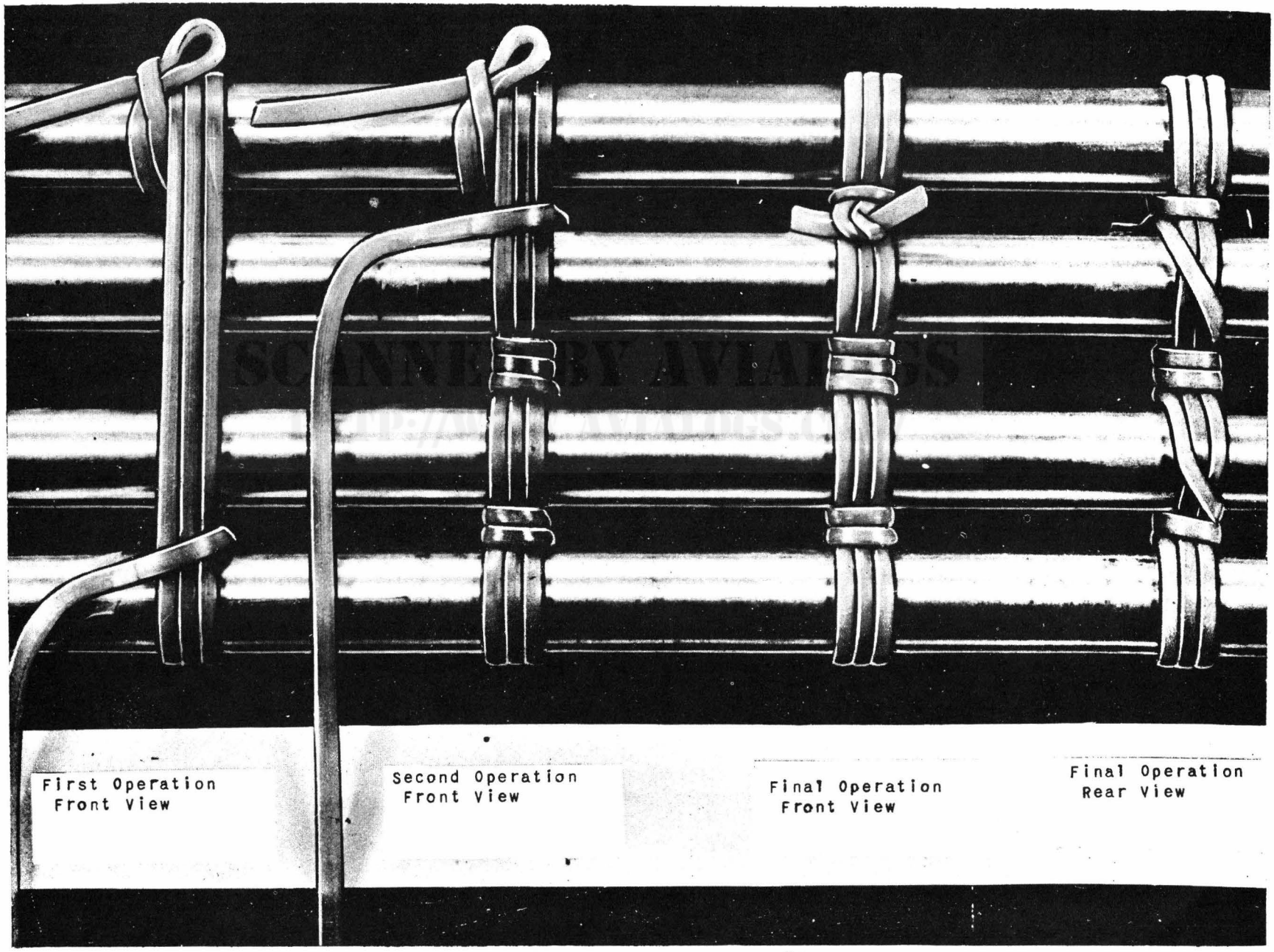


Figure 12-Procedure for Tying Lines

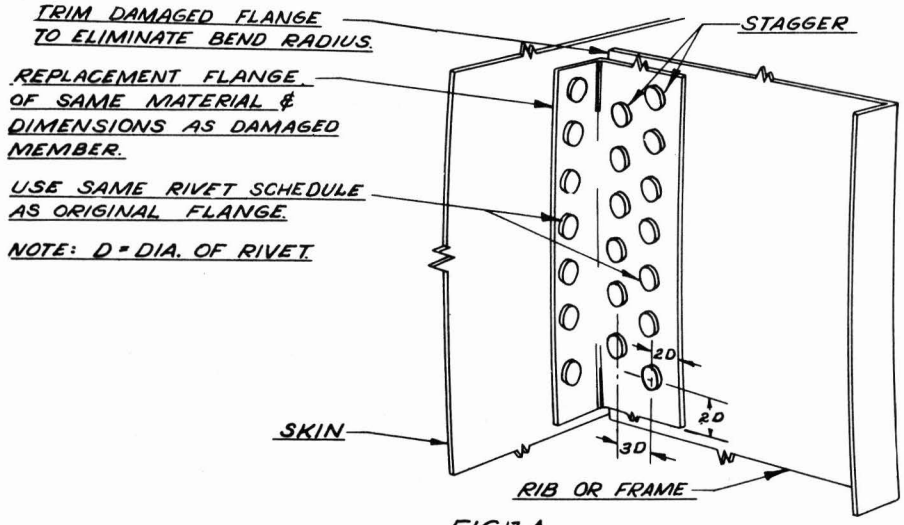
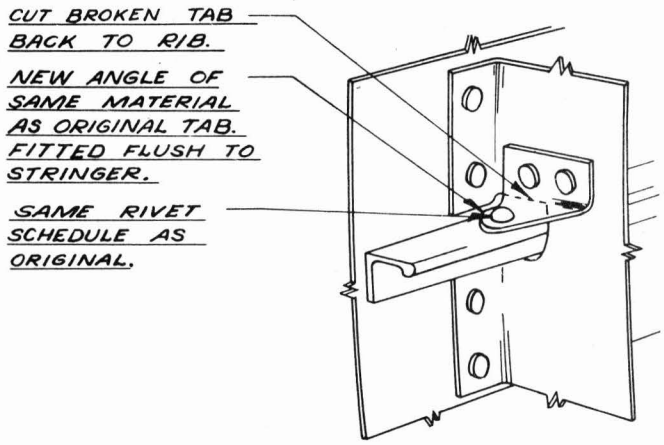


FIG.13A
REPLACEMENT OF DAMAGED FLANGE



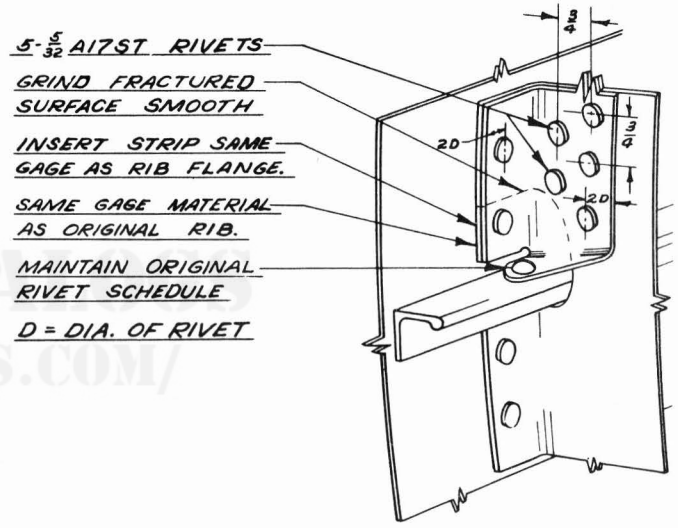


FIG.13C
REPAIRS FOR STRINGER TAB

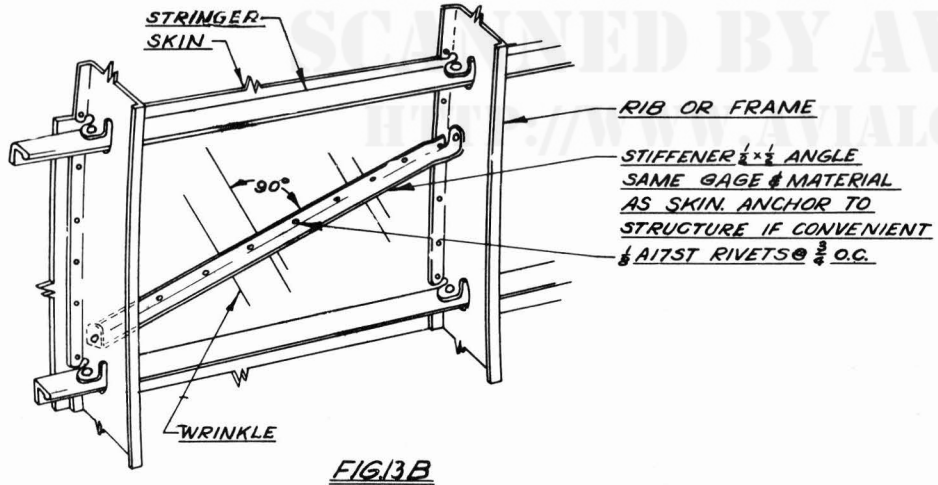
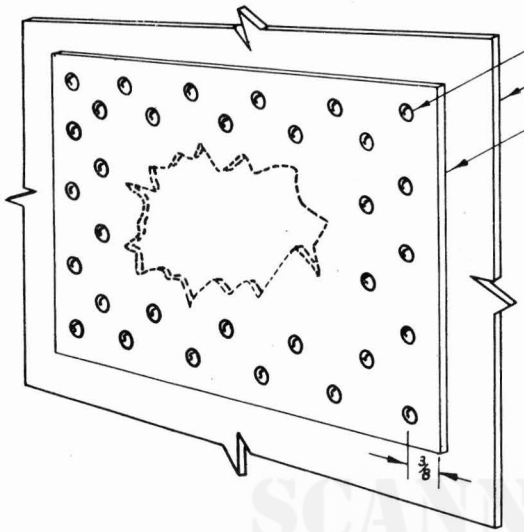


FIG.13B
REPAIR OF SKIN WRINKLES OR OIL CANS

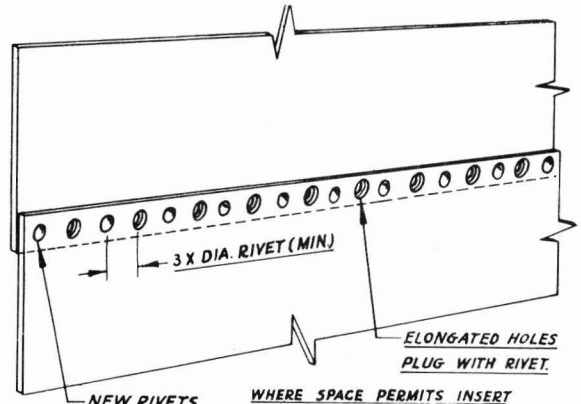
Figure 13-Miscellaneous Repairs - Flanges, Skin Wrinkles and Stringer Tabs



24 ST ALCLAD

GAGE INCH	RIVET SCHEDULE
.020	2 ROWS 1/8 A17ST @ 1 O.C.
.025	2 ROWS 1/8 A17ST @ 1 O.C.
.032	2 ROWS 1/8 A17ST @ 1 O.C.
.040	2 ROWS 5/32 A17ST @ 1 O.C.
.051	2 ROWS 5/32 A17ST @ 1 O.C.
.064	2 ROWS 3/16 A17ST @ 3/4 O.C.
.072	2 ROWS 3/16 A17ST @ 3/4 O.C.

FIG 14A REPAIR OF DAMAGED SHEET



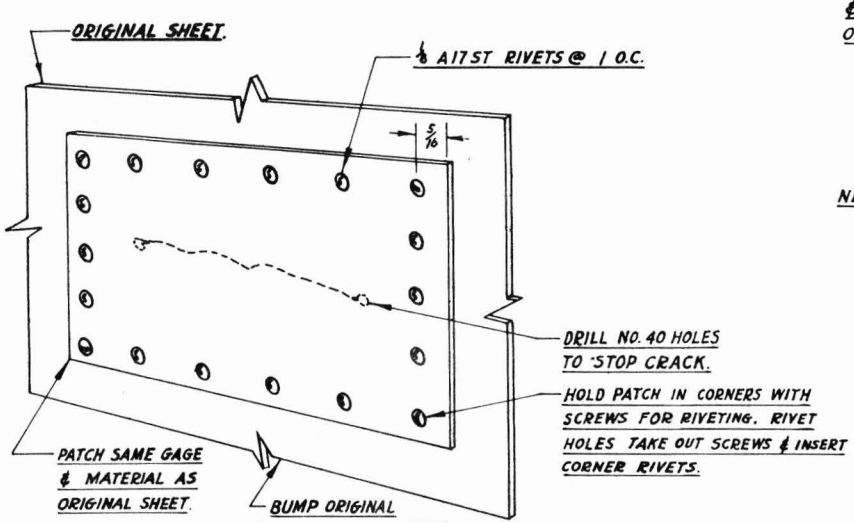


FIG 14B REPAIR OF CRACK IN SHEET

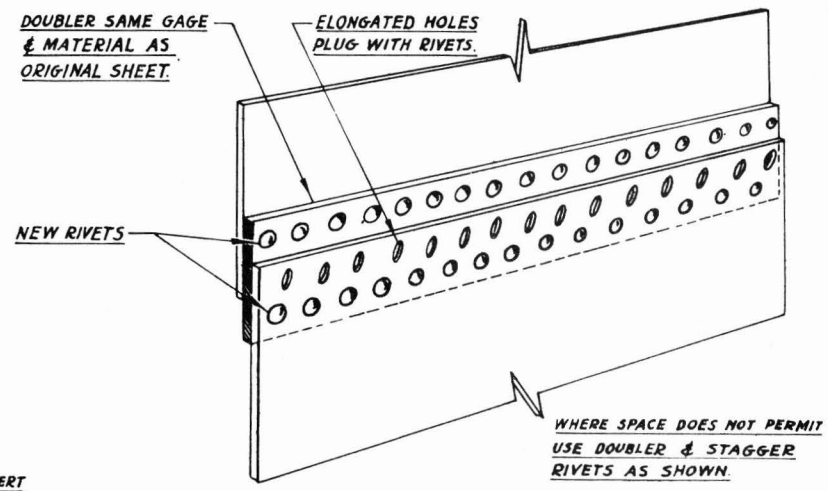


FIG 14C REINFORCEMENT FOR RIVET HOLE ELONG

Figure 14-Miscellaneous Repair of Sheet and Elongation Holes

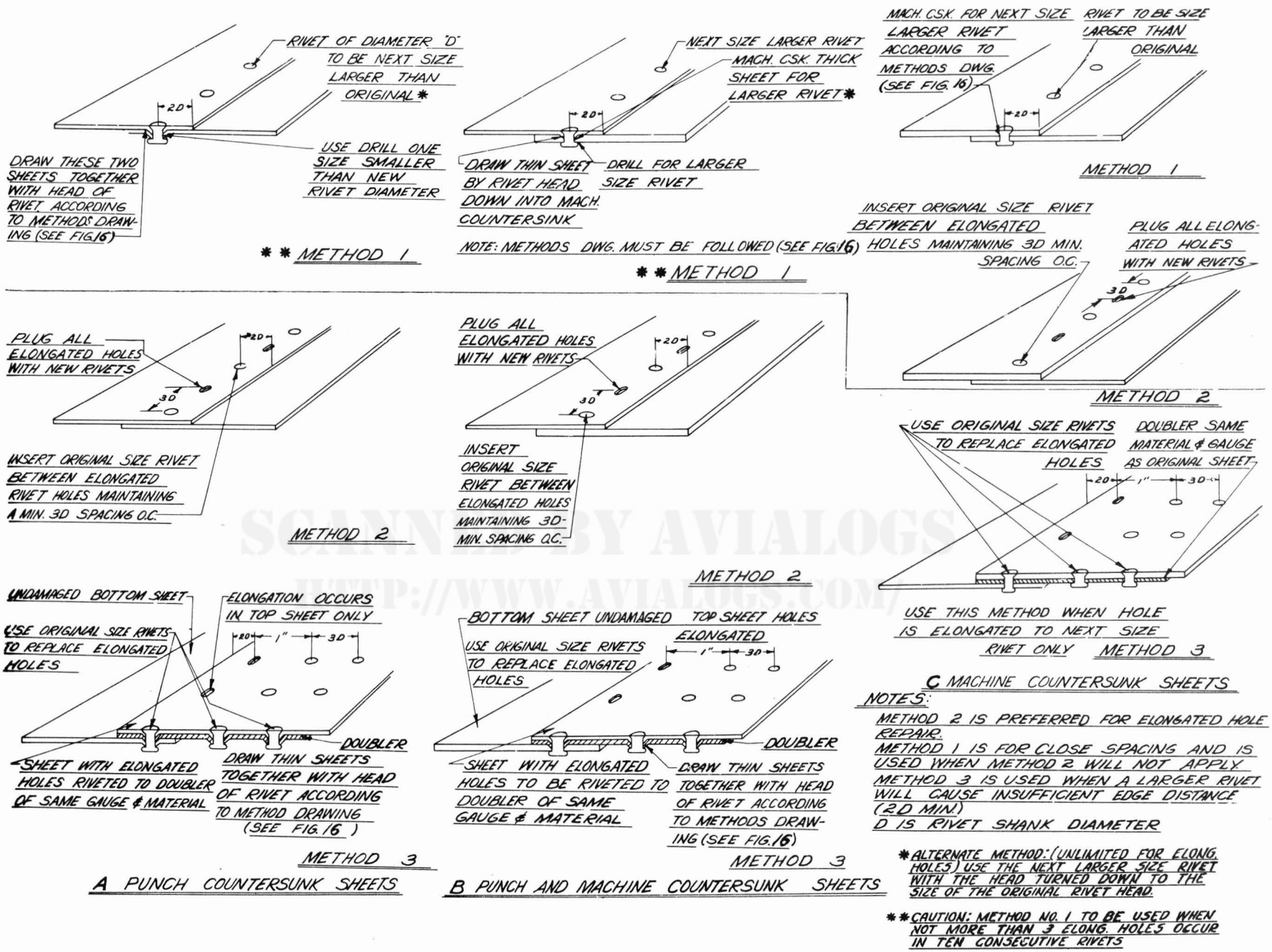
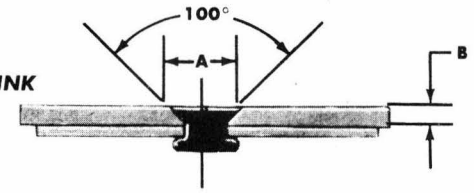


Figure 15-Repair Methods for Elongated Rivet Holes

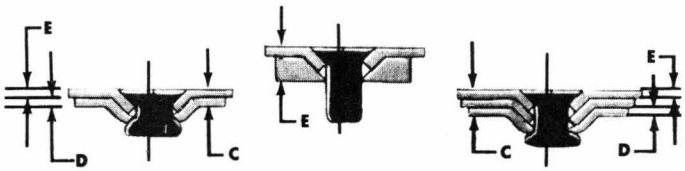
METHOD 1 — *MACHINE C'SINK*



Use this method where "B" thickness is great enough to conform with figures given in table.

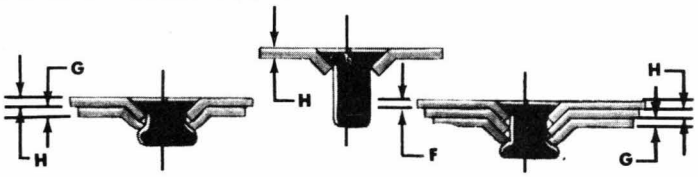
RIVET SIZE	A	B MIN.	DRILL NO.	DRILL SIZE
1/16		.032	51	.067
3/32	.191	.040	40	.098
1/8	.238	.051	30	.128
5/32	.302	.064	20	.161
3/16	.368	.072	11	.191
1/4	.493	.091	F	.257
5/16		.128	O	.316
3/8		.144	W	.386

Use "Method 2" when "C" thickness is below "B" thickness specified in "Method 1". Form C'Sink by using rivet head as a form punch.



RIVET SIZE	C MAX.	D MIN. MAX.	E MAX.	DRILL NO.	DRILL SIZE
1/16	.065	-.032	.032	51	.067
3/32	.073	.025-.036	.036	40	.098
1/8	.093	.032-.051	.051	30	.128
5/32	.101	.040-.064	.064	20	.161

METHODS 2 & 3 — *FORM C'SINK*

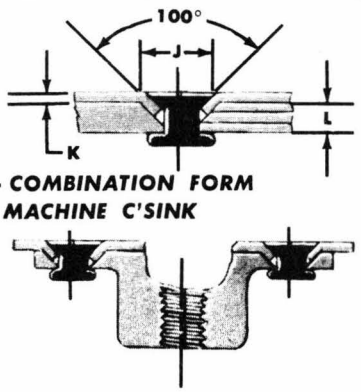


Use "Method 3" whenever skin thicknesses exceed those specified in "Method 2". Form C'Sink by punch and die.

RIVET SIZE	F MAX.	G MIN. MAX.	H MIN. MAX.	DRILL NO.	DRILL SIZE
1/16		-.032		51	.067
3/32	.064	.020-.064	.020-.064	40	.098
1/8	.081	.025-.081	.020-.081	30	.128
5/32	.081	.032-.081	.020-.081	20	.161
3/16	.081	.040-.081	.020-.081	11	.191
1/4	.093	.051-.093	.020-.093	F	.257
5/16				O	.316
3/8				W	.386

Use this method where "L" thickness is below "B" thickness as in "Method 1" and "L" thickness is great enough to conform to figures in table.

METHOD 4 — *COMBINATION FORM C'SINK AND MACHINE C'SINK*



Use 3/32 rivets for anchor nuts. Form C'Sink skin to .032; machine C'Sink skin .032 and over.

RIVET SIZE	DRILL NO. & SIZE	C'SINK DIAMETERS FOR VARIOUS "K" THICKNESSES							
		.020 & .025		.032 & .040		.051 & .064		.072 & .081	
		C'SINK DIA. J	L MIN.	C'SINK DIA. J	L MIN.	C'SINK DIA. J	L MIN.	C'SINK DIA. J	L MIN.
1/16	51-.067								
3/32	40-.098	.200	.051	.204	.051	.208	.051	.208	.051
1/8	30-.128	.250	.064	.258	.064	.265	.064	.265	.064
5/32	20-.161	.291	.093	.312	.093	.312	.093	.312	.093
3/16	11-.191	.382	.125	.386	.125	.390	.125	.390	.125
1/4	F-.257	.500	.187	.512	.187	.525	.187	.525	.187
5/16	O-.316								
3/8	W-.386								

NOTE: "L" minimum may consist of one solid part, or may be divided into several different thicknesses. "K" may consist of one thickness or more, provided any individual thickness does not exceed the maximum figures specified in table.

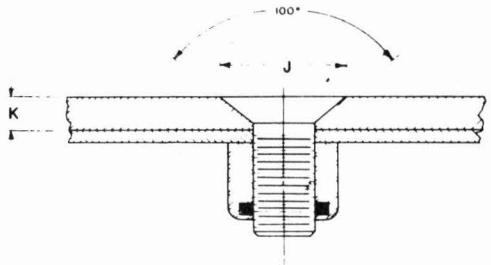
Refer to this drawing to obtain the correct method for the installation of 100° rivets

Figure 16—Methods Drawing for Rivets

MACHINE C'SINK METHOD

THIS METHOD TO BE USED ONLY WHERE "COMBINATION MACHINE C SINK AND FORM C'SINK METHOD" CANNOT BE USED AND IN SPECIAL CASES.

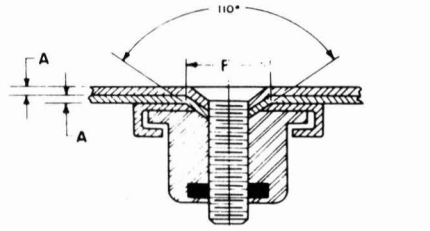
FOR SCREWS OF SIZES 4-40 AND 6-32 THIS METHOD MAY BE USED WHEREVER LIMITATIONS PERMIT.



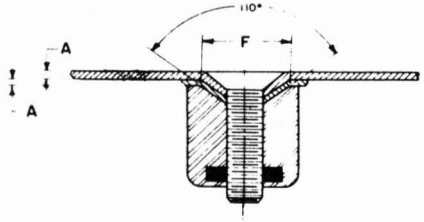
(-8)

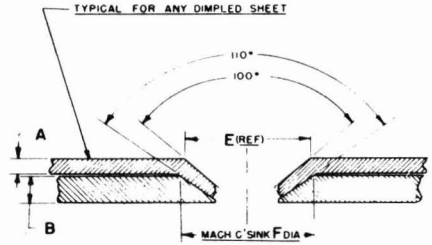
SCREW SIZE	MACH C'SINK J DIA	K MIN	DRILL SIZE	NOTES
4-40	.225	.051	33 (.113)	FOR NON-STRESSED
6-32	.273	.064	28 (.140)	JOINTS ONLY
8-32	.323	.072	19 (.166)	
10-32	.385	.091	10 (.193)	FORM C'SINK
1/4-28	.515	.114	1/4 (.250)	GIVES MUCH
5/16-24			5/16 (.312)	STRONGER JOINT
3/8-24			3/8 (.375)	

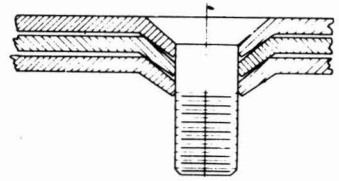
COMBINATION MACHINE C'SINK AND FORM C'SINK METHOD

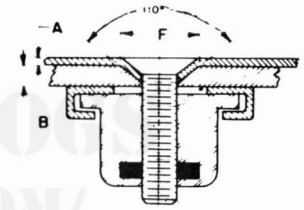


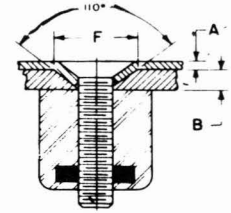
(-5)









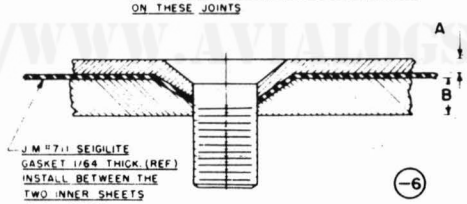


WHEN THICKNESS B IS BELOW THE MIN TABULATED THICKNESS SEE TABULATION BLOCK FOR USE OF SPACER STRIPS OR MORE DESIRABLE METHOD

(-7)

FOR GAS TIGHT JOINTS

SCREWS THREADED TO HEAD CANNOT BE USED ON THESE JOINTS



J M "7.1 SEIGILITE GASKET 1/64 THICK. (REF.) INSTALL BETWEEN THE TWO INNER SHEETS IN ALL CASES

(-6)

SCREW SIZE	A MAX	B MIN	WHEN THICKNESS B IS BELOW THE MIN TABULATED THICKNESS THE FOLLOWING APPLIES	E (REF)	PILOT HOLE SIZE FOR SHEET A	MACH C'SINK DIA F	DRILL REAM SIZE AFTER DIMPLING	NOTES
4-40	.064	.045		.225	33 (.113)	.245 .230	33 (.113)	FOR NON-STRESSED
6-32	.128	.05		.273	28 (.140)	.300 .285	28 (.140)	JOINTS ONLY
8-32	.128	.05	USE -5 METHOD	.323	28 (.140)	.355 .340	19 (.166)	
10-32	.128	.064	USE -5 METHOD	.385	19 (.166)	.390 .375	10 (.193)	
1/4-28	.128	.081	USE -5 METHOD OR SEE NOTE "5	.515	3/16 (.1875)	.540 .525	1/4 (.250)	

NOTE:

1. WHEN GAUGE OF OUTER SHEET IS .032 OR LESS AND THE TOTAL THICKNESS IS .072 OR LESS USE LOW CARBON (S A E "1120) STEEL SCREWS THREADED TO THE HEAD. USE NICKEL STEEL SCREWS FOR ALL OTHER GAUGE MATERIAL.
2. BURR BACK OF SHEET WHEN CRACKING INDICATES NECESSITY.
3. SCREWS OF SIZES 4-40 AND 6-32 ARE TO BE USED IN NON STRESSED PARTS AND JOINTS ONLY.
4. USE STEEL NUTS ONLY ON STRESSED JOINTS.
5. SEE TABULATION BLOCK — A SPACER STRIP MUST BE INSTALLED TO GIVE A MIN TOTAL THICKNESS OF .100". THIS STRIP TO BE 1/16" WIDER THAN CHANNEL OF NUT STRIP AND RIVETED BETWEEN EVERY OTHER SCREW (2 1/2" O.C. MAX.) TO "B" WITH 3/32 AD FLUSH HEAD RIVETS. GANG CHANNEL STRIPS MAY BE ATTACHED WITH SAME RIVETS AS BACKING STRIP, OTHERWISE DOUBLE FLUSH RIVETS IN STRIP.
6. WHEN SKIN THICKNESS "A" IS .025 OR LESS FOR "8 & "10 SCREWS, A PILOT HOLE SIZE OF "27 (.144) FOR "8 SCREWS AND "18 (.169) FOR "10 SCREWS MAY BE USED IF CRACKING IS ENCOUNTERED IN DIMPLING.

Figure 17—Methods Drawing for Screws

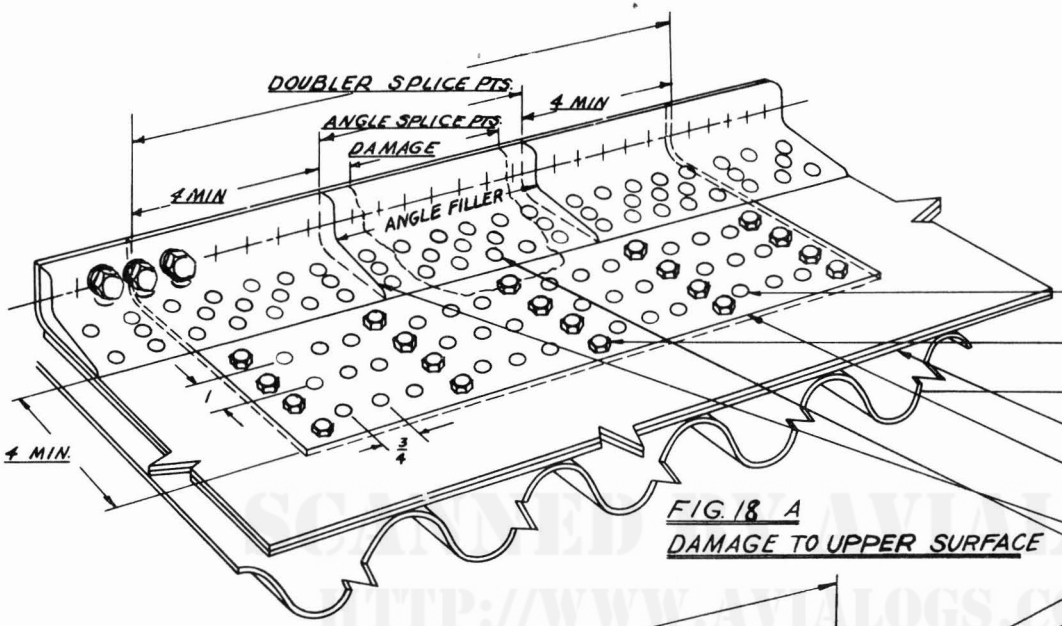


FIG. 18 A
DAMAGE TO UPPER SURFACE

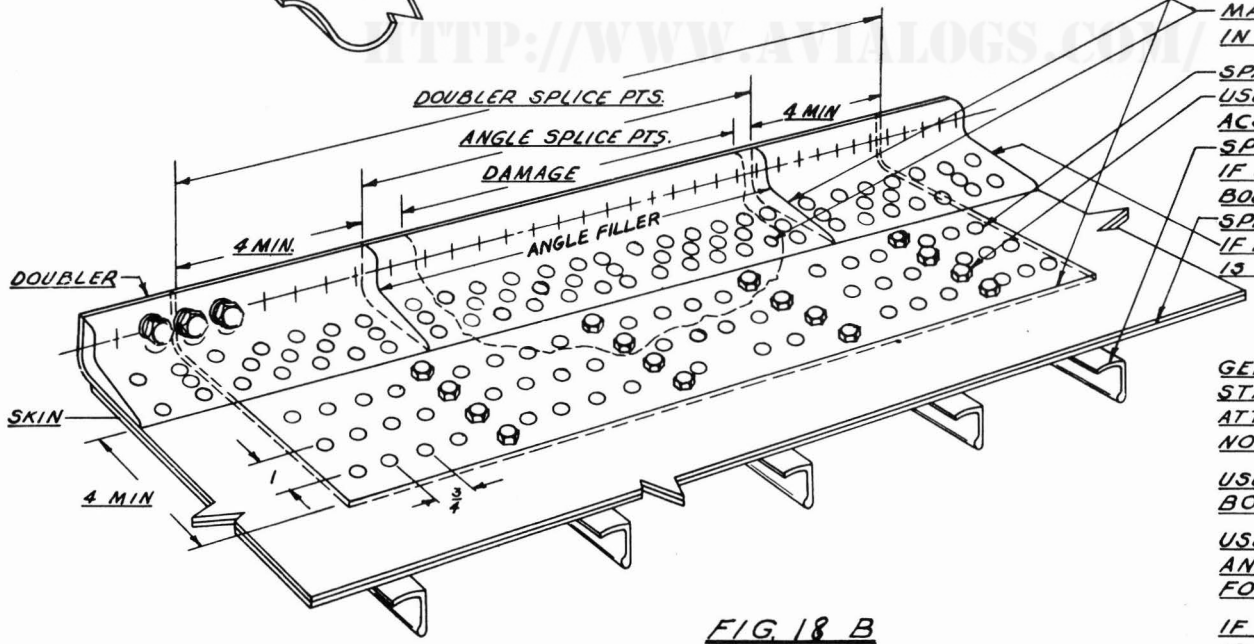


FIG. 18 B
DAMAGE TO LOWER SURFACE

NOTES:

USE 3 ROWS (9) $\frac{5}{32}$ A17ST RIVETS BETWEEN CORRUGATION PITCHES.

USE 4 AN3 BOLTS OVER EACH CORRUGATION PITCH AND AC365-1032 NUTS.

SPLICE CORRUGATION AS IN FIG. 32 IF STRINGERS ARE USED FOLLOW BOLT AND RIVET SCHEDULE IN FIG. 18 B

SPLICE SKIN AS IN FIG. 7

TRIM DOUBLER AND BEND .064 C.M. STEEL SHEET TO FIT.

TRIM DAMAGE TO SMOOTH CONTOUR MAINTAIN ORIGINAL RIVET SCHEDULE IN ANGLE FILLER.

SPACE $\frac{5}{32}$ A17ST RIVETS @ $\frac{3}{4}$ O.C. BETWEEN BOLTS

USE 4 AN3 BOLTS ON EACH STRINGER WITH AC365-1032 NUTS.

SPLICE STRINGERS AS IN FIG 23 IF CORRUGATION IS USED FOLLOW BOLT AND RIVET SCHEDULE IN FIG. 18 A.

SPLICE SKIN AS IN FIG. 7

IF MORE THAN HALF OF THE ATTACH ANGLE IS DAMAGED REPLACE THE TOTAL LENGTH

GENERAL NOTES:

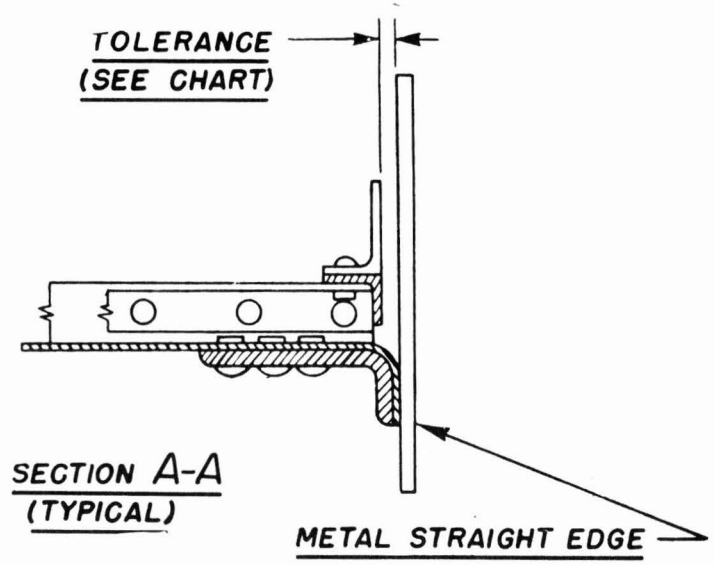
STAGGER SPLICE POINTS ON OPPOSITE ATTACH ANGLE CONNECTION SO THAT NO TWO SPLICE POINTS COINCIDE.

USE $\frac{1}{2}$ MIN EDGE DISTANCE FOR ALL BOLTS AND RIVETS.

USE $\frac{3}{4}$ MIN. O.C. CHORDWISE DISTANCE AND 1 MIN. O.C. SPANWISE DISTANCE FOR ALL BOLTS AND RIVETS.

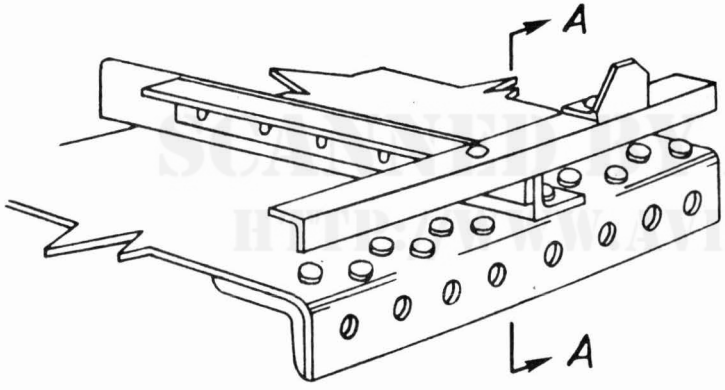
IF DOUGLAS STANDARD ATTACH ANGLE #144773 IS NOT AVAILABLE FOR FILLER, BEND .091 STEEL SHEET TO FIT.

Figure 18-Attach Angle Repairs

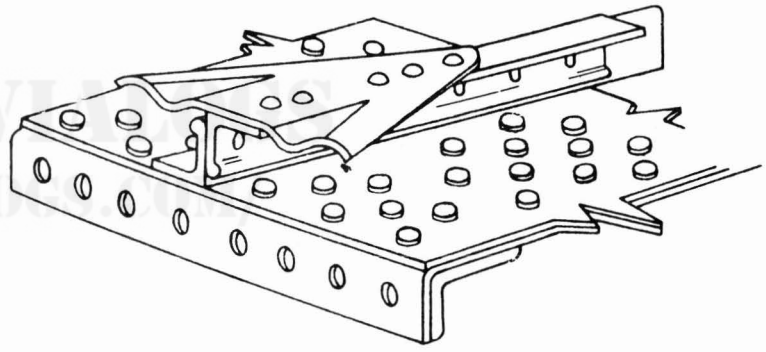


THE TANK COVER JOINTS AND THE CENTER-OUTER WING JOINTS SHOULD BE A CLOSE FIT WITHIN THE TOLERANCES LISTED BELOW. CUT STRINGERS AND WAFFEL PLATES TO FIT EXACTLY AND IF TOLERANCES ARE EXCEEDED, SHIM TO PROPER TOLERANCES WITH DURAL STRIPS. A METAL STRAIGHT EDGE AND FEELER GAUGE SHOULD BE USED TO DETERMINE THE AMOUNT OF SHIM. (SEE FIGURE 20)

POSITION	PART	TOLERANCE
INNER WING JOINTS	STRINGERS & COMPRESSION PLATE	.002 .000
OUTER WING JOINTS	STRINGERS & WAFFLE PLATES	.008 .000
TANK COVER JOINTS	STRINGERS	FLUSH TO FI



CENTER WING



OUTER WING

Figure 19—Tank Cover and Wing Joint Attachment

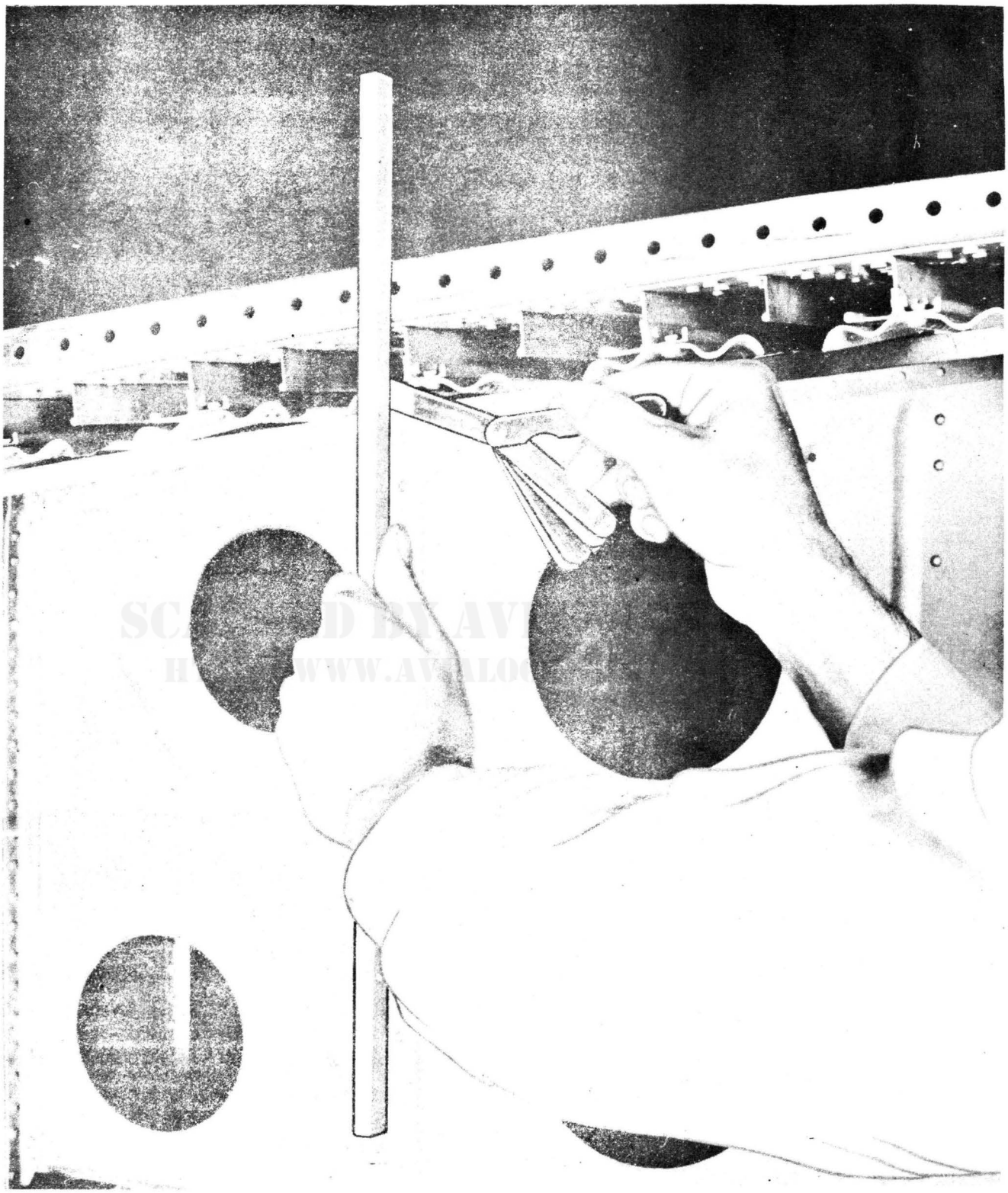


Figure 20—Wing Joint Attachment

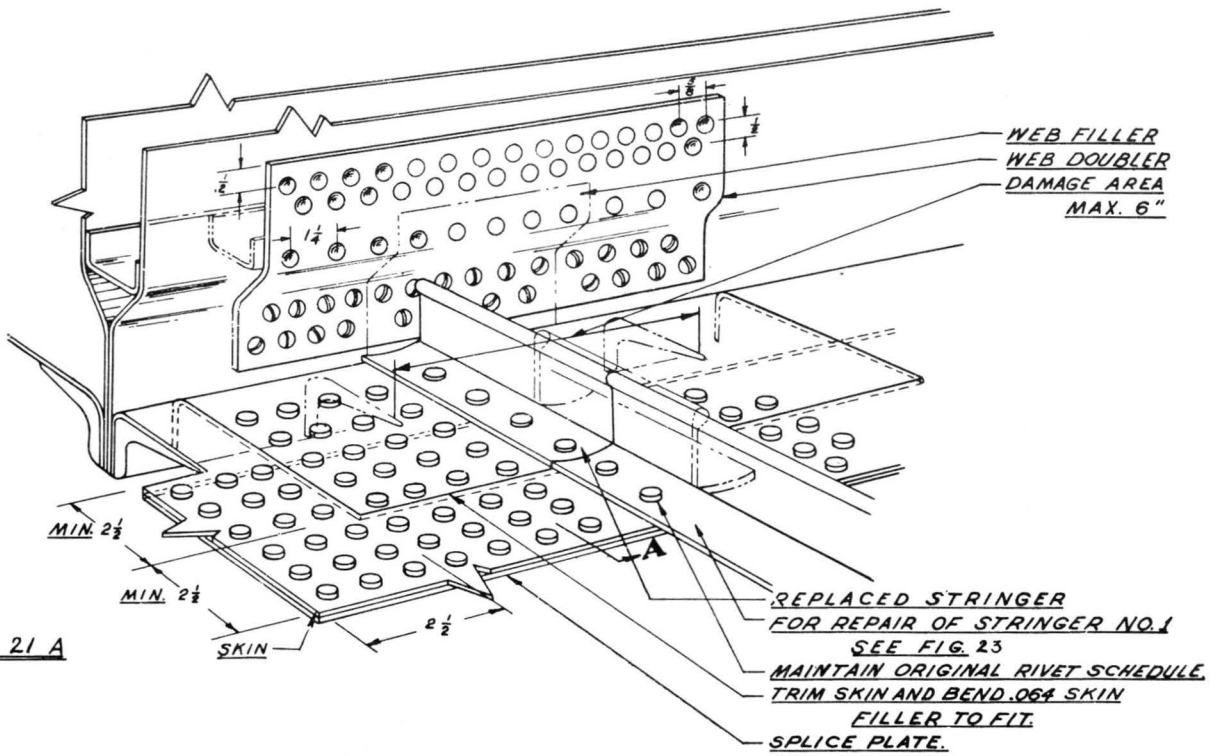
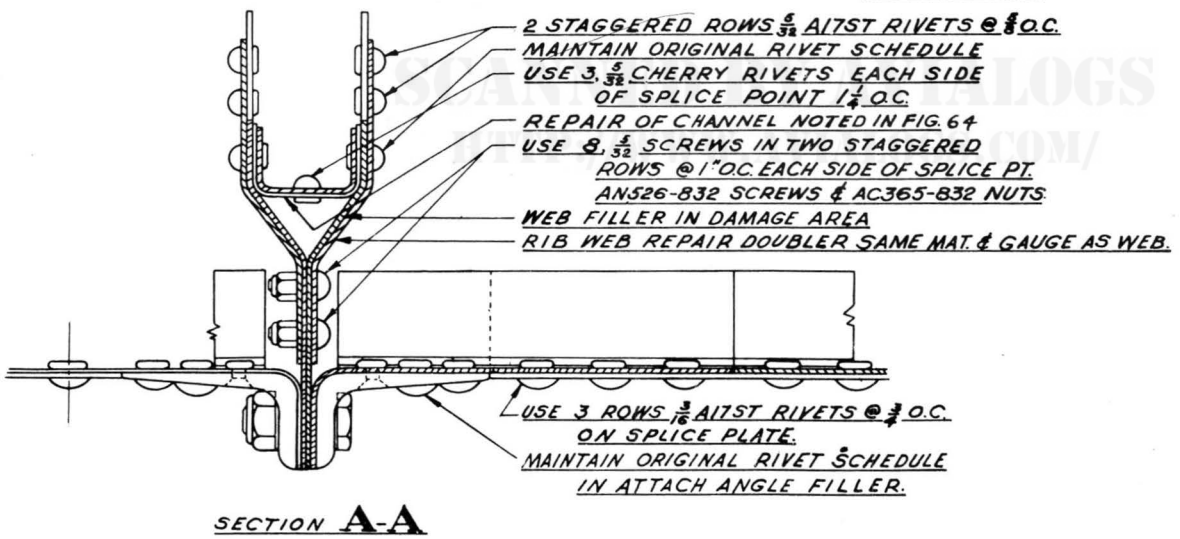


FIG. 21 A

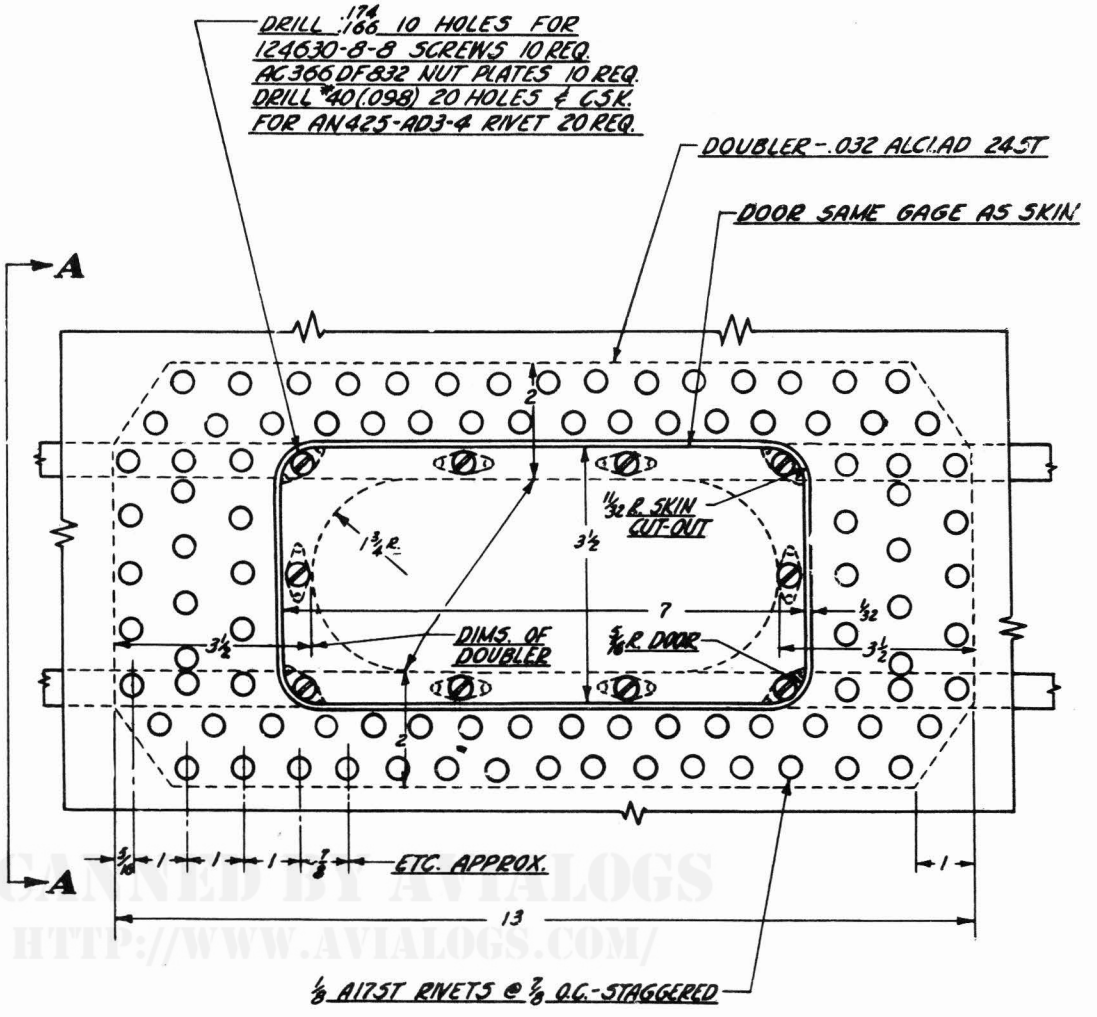


SECTION A-A

FIG. 21 B

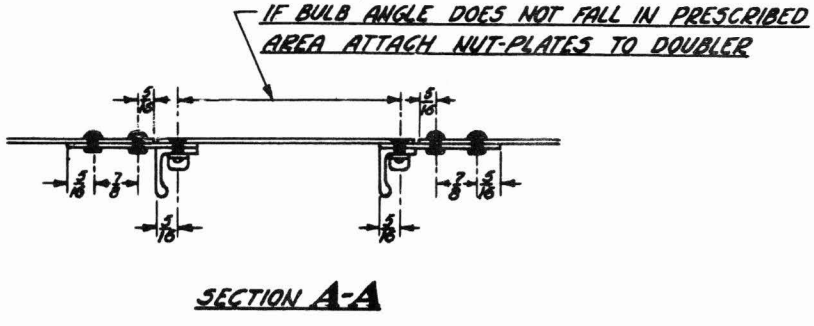
GENERAL NOTES:
THIS REPAIR SHOWN IS FOR MAXIMUM DAMAGE OF 6"
FOR DAMAGE EXCEEDING 6" USE DOUBLE SPLICE
¾" MIN. O.C. DISTANCE IN BOTH DIRECTIONS FOR ALL SKIN SPLICES.
½ MIN. EDGE DISTANCE.

Figure 21 - Tank Cover Attach Angle Repair



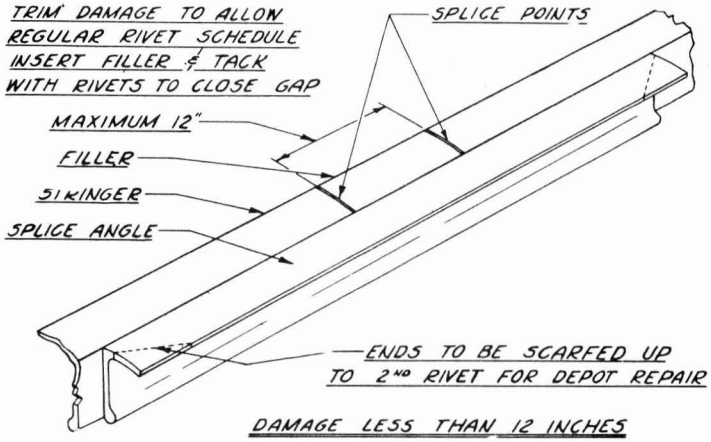
NOTE:
ACCESS DOORS SHOULD NOT BE INSTALLED IN ANY OF THE FOLLOWING AREAS:

1. WITHIN 36" OF ANOTHER INSPECTION OPENING.
2. ON THE TOP SIDE OF THE WING.
3. INSIDE THE SECOND RIB FROM THE ATTACHING ANGLES (STA. 358)
4. WITHIN 3 BAYS FOREOR AFT OF ANY SPAR.
5. IN THE LEADING EDGE SKIN.
6. ACROSS ANY SEAM OR BULKHEAD.

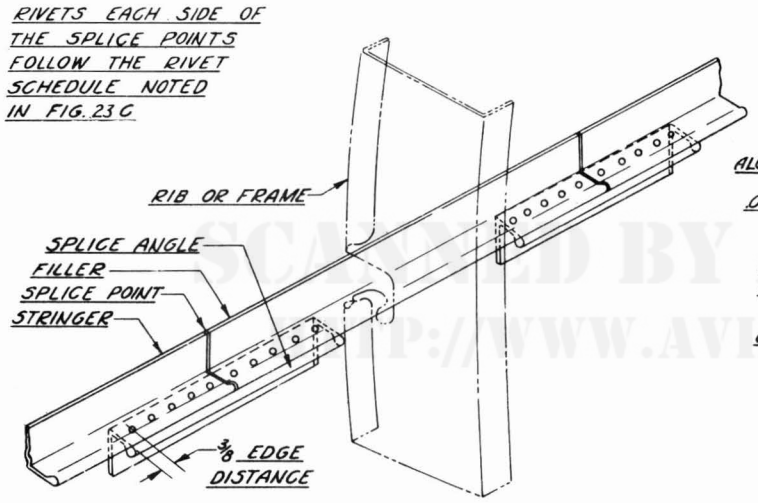


SECTION A-A

Figure 22 - Access Door Installation

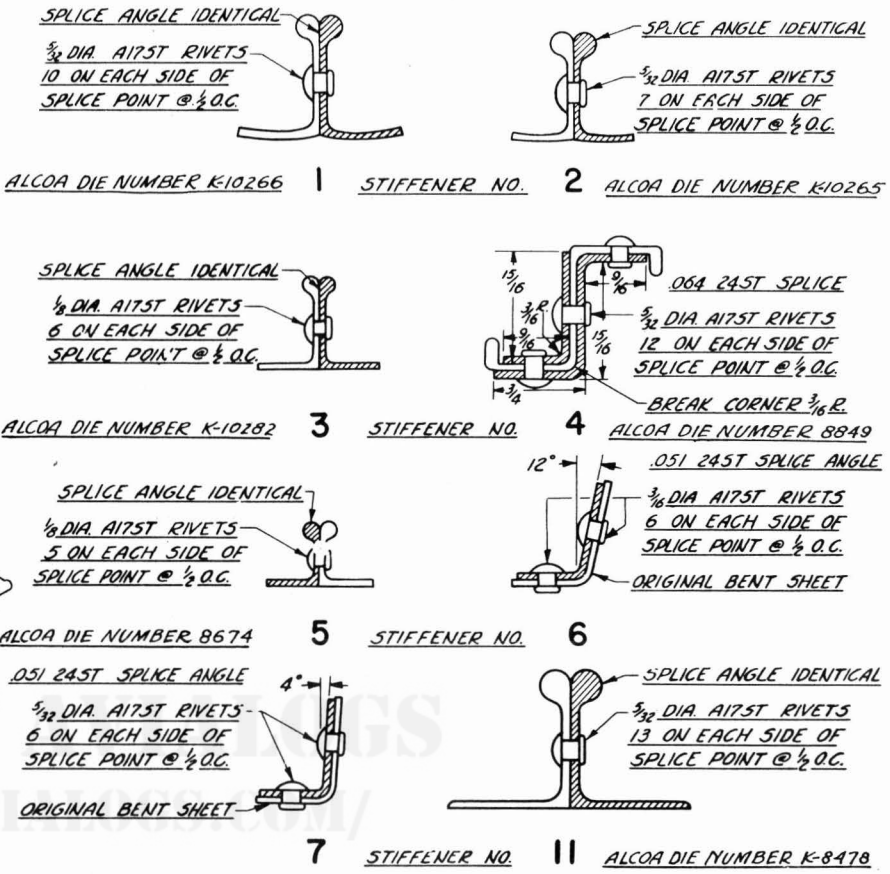


DAMAGE LESS THAN 12 INCHES
FIG. 23 A



WHEN STRINGER PASSES THROUGH RIB CUTOUT, SPLICE EACH SIDE OF RIB AS SHOWN

DAMAGE GREATER THAN 12 INCHES
FIG. 23 B



STIFFENER TYPES FIG 23 C

NOTES:

1. FOR STIFFENER NOS. AND LOCATION SEE FIGS. 2, 4, & 5
2. FOR DIMENSIONS AND MATERIAL ACCORDING TO STIFFENER NO. SEE FIG. 81
3. FOR REPAIR OF STRINGERS AT CENTER-OUTER WING JOINT SEE FIG. 19
4. IF IDENTICAL EXTRUSION IS NOT AVAILABLE ANGLE OF EQUIVALENT AREA AND MATERIAL MAY BE USED FOR REPAIR.

Figure 23—Stringer Repair

FIG. 24 A
FOR DAMAGE LESS THAN 15 INCHES

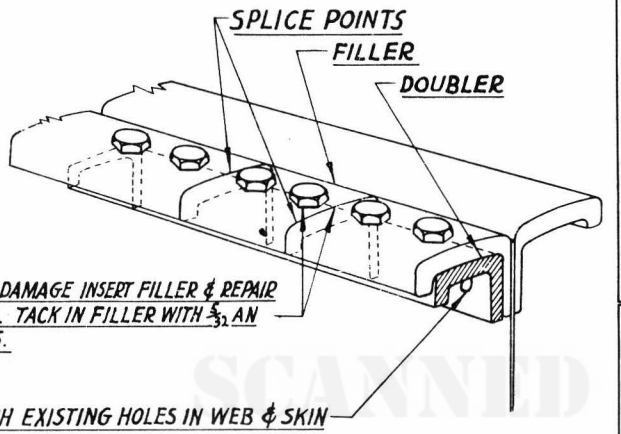
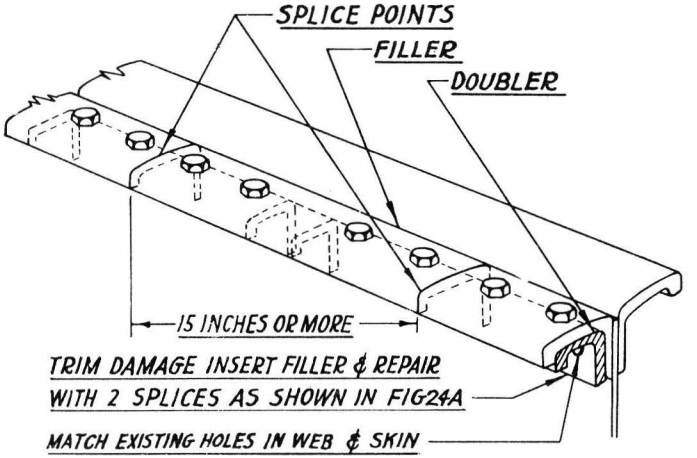


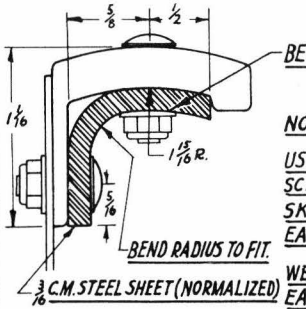
FIG. 24 B
FOR DAMAGE EXCEEDING 15 INCHES



SEE FIG C FOR CROSS SECTIONS & BOLT ARRANGEMENTS

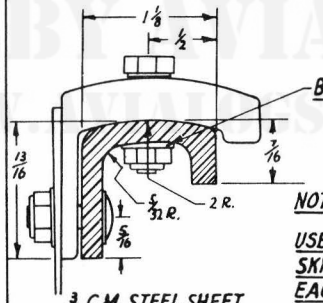
OUTER WING SPAR CAP FIG. 24C

CAP 1 STIFFENER NO. 48



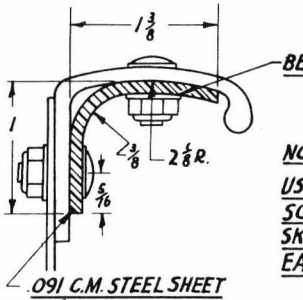
NOTE:
USE STEEL AC 525 5/32 SCREWS.
SKIN SIDE: 8 @ 5/8 O.C. EACH SIDE SPLICE PT.
WEB SIDE: 8 @ 1/2 O.C. EACH SIDE SPLICE PT.

CAP 2 STIFFENER NO. 34



NOTE:
USE STEEL AN 3 BOLTS
SKIN SIDE: 7@ 1 O.C. EACH SIDE SPLICE PT.
WEB SIDE: 7@ 3/4 O.C. EACH SIDE SPLICE PT.

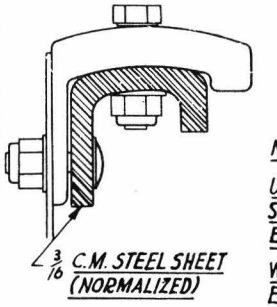
CAP 3 STIFFENER NO. 28



NOTE:
USE STEEL AC 525 5/32 SCREWS.
SKIN SIDE: 8@ 5/8 O.C. EACH SIDE SPLICE PT.
WEB SIDE: 8@ 1/2 O.C. EACH SIDE SPLICE PT.

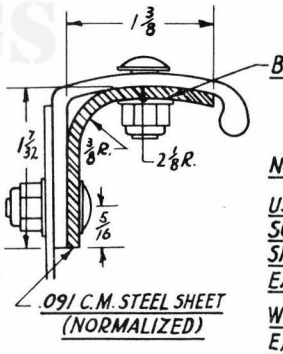
INNER WING SPAR CAP

CAP 2 STIFFENER NO. 34



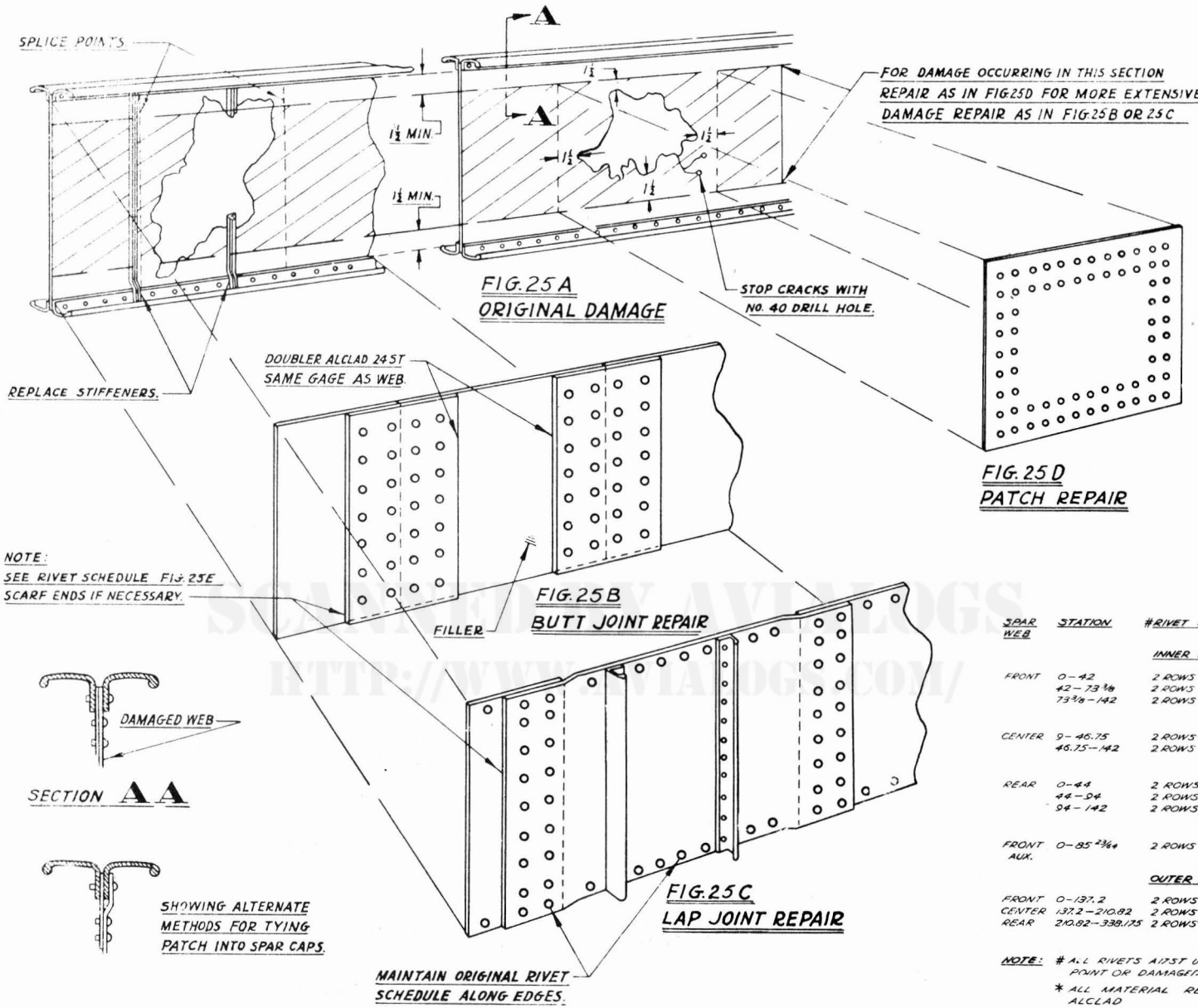
NOTE:
USE STEEL AN 3 BOLTS
SKIN SIDE: 7@ 1 O.C. EACH SIDE SPLICE PT.
WEB SIDE: 7@ 3/4 O.C. EACH SIDE SPLICE PT.

CAP 4 STIFFENER NO. 40



NOTE:
USE STEEL AC 525 5/32 SCREWS.
SKIN SIDE: 8@ 5/8 O.C. EACH SIDE SPLICE PT.
WEB SIDE: 8@ 1/2 O.C. EACH SIDE SPLICE PT.

Figure 24 - Spar Cap Repair



SPAR WEB	STATION	#RIVET SCHEDULE		*MAT.
		INNER WING		
FRONT	0 – 42	2 ROWS	5/32 D @ 1" O.C.	.040
	42 – 73 3/8	2 ROWS	3/16 D @ 1" O.C.	.081
	73 3/8 – 142	2 ROWS	1/4 D @ 1" O.C.	.120
CENTER	9 – 46.75	2 ROWS	5/32 D @ 1" O.C.	.051
	46.75 – 142	2 ROWS	5/32 D @ 1" O.C.	.040
REAR	0 – 44	2 ROWS	5/32 D @ 1" O.C.	.040
	44 – 94	2 ROWS	3/16 D @ 3/4" O.C.	.081
	94 – 142	2 ROWS	5/32 D @ 1" O.C.	.051
FRONT AUX.	0 – 85 23/64	2 ROWS	5/32 D @ 1" O.C.	.040
		OUTER WING		
FRONT	0 – 137.2	2 ROWS	5/32 D @ 1" O.C.	.036
CENTER	137.2 – 210.82	2 ROWS	5/32 D @ 1" O.C.	.032
REAR	210.82 – 338.175	2 ROWS	5/32 D @ 1" O.C.	.025

NOTE: # ALL RIVETS A17ST USED EACH SIDE OF SPLICE POINT OR DAMAGED AREA.
* ALL MATERIAL REPLACEMENT 24ST AL ALCLAD

FIG. 25E

Figure 25—Spar Web

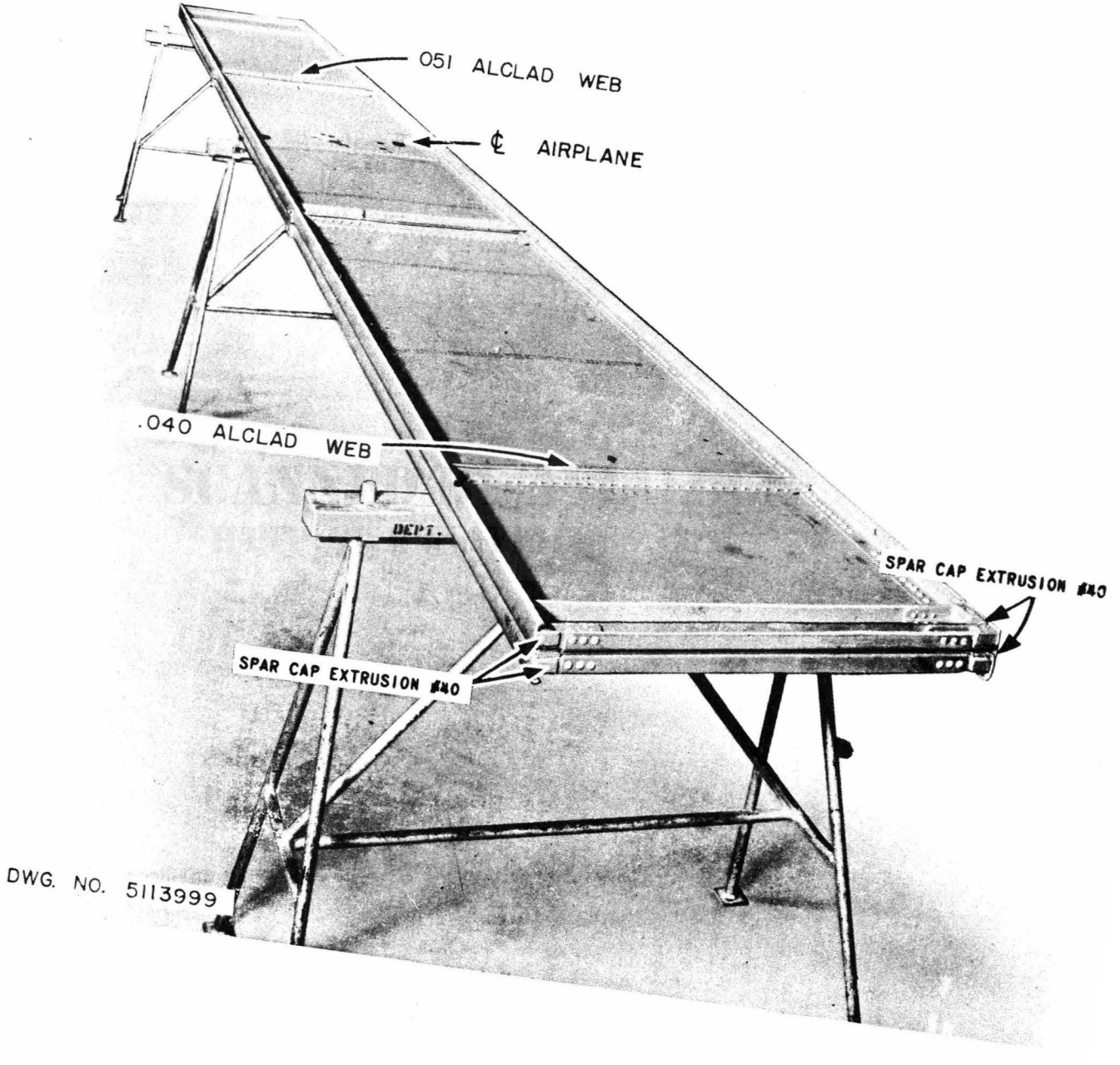


Figure 26 - Center Wing Center Spar

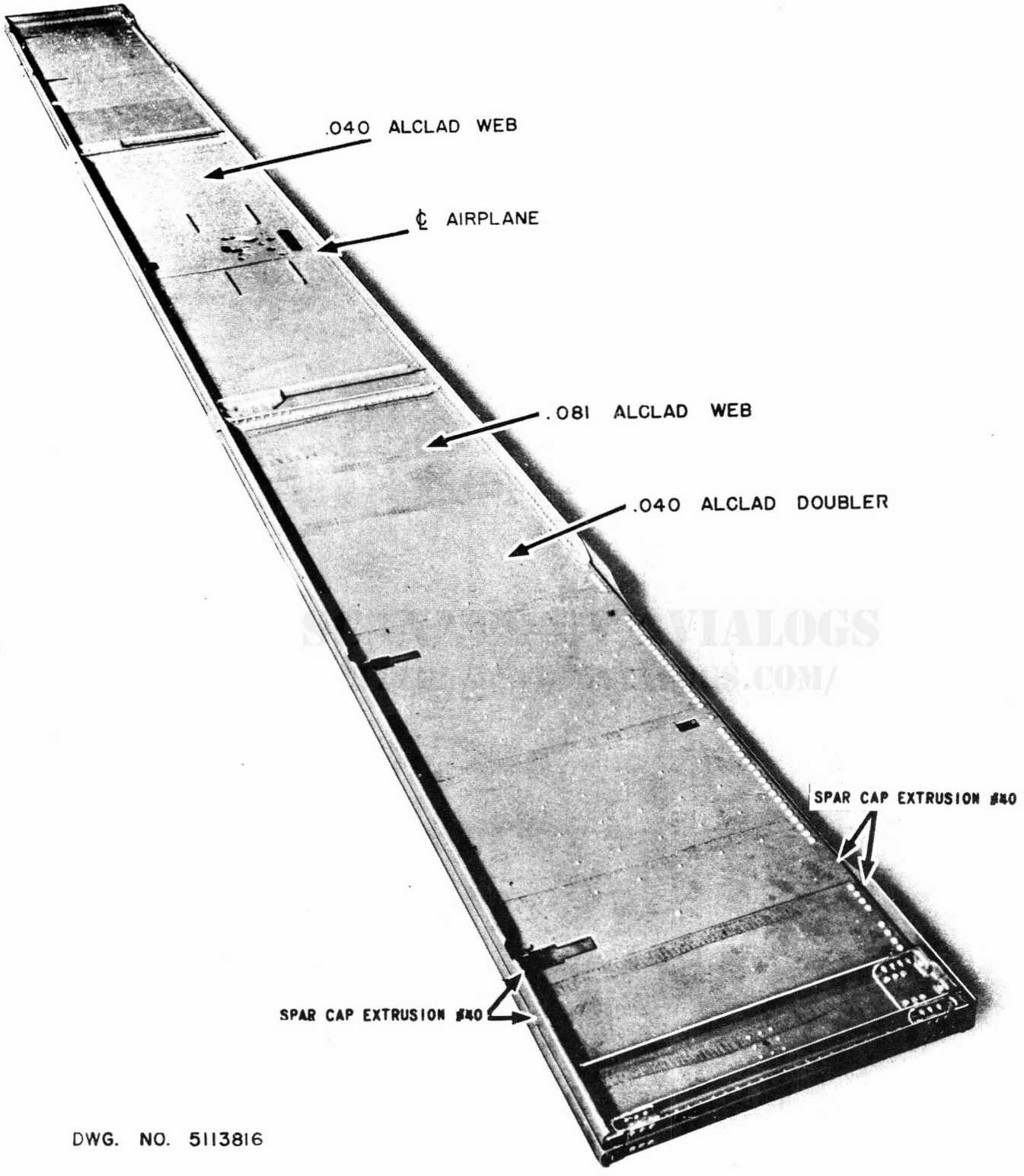


Figure 27 - Center Wing, Front Spar

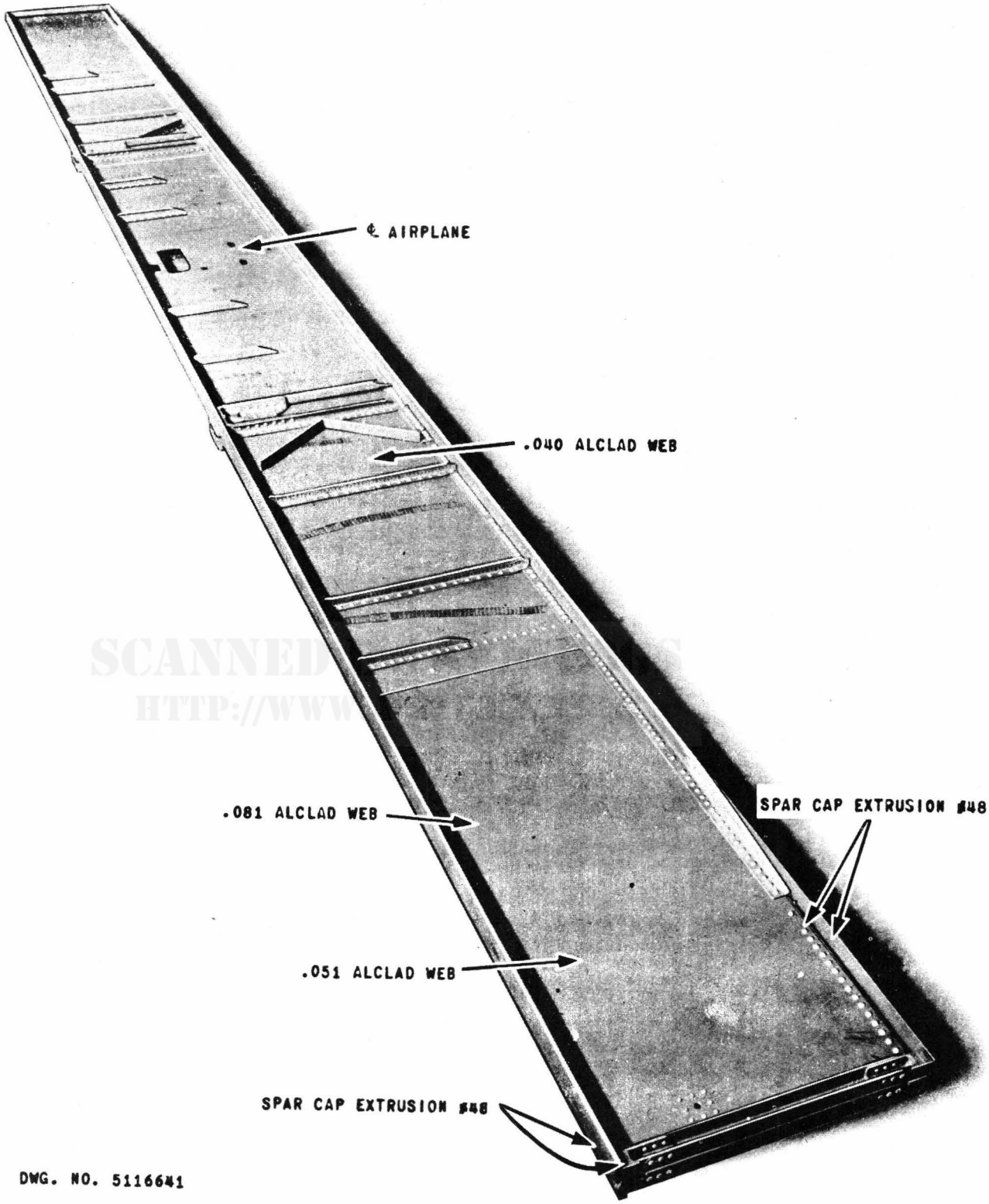


Figure 28 - Center Wing Rear Spar

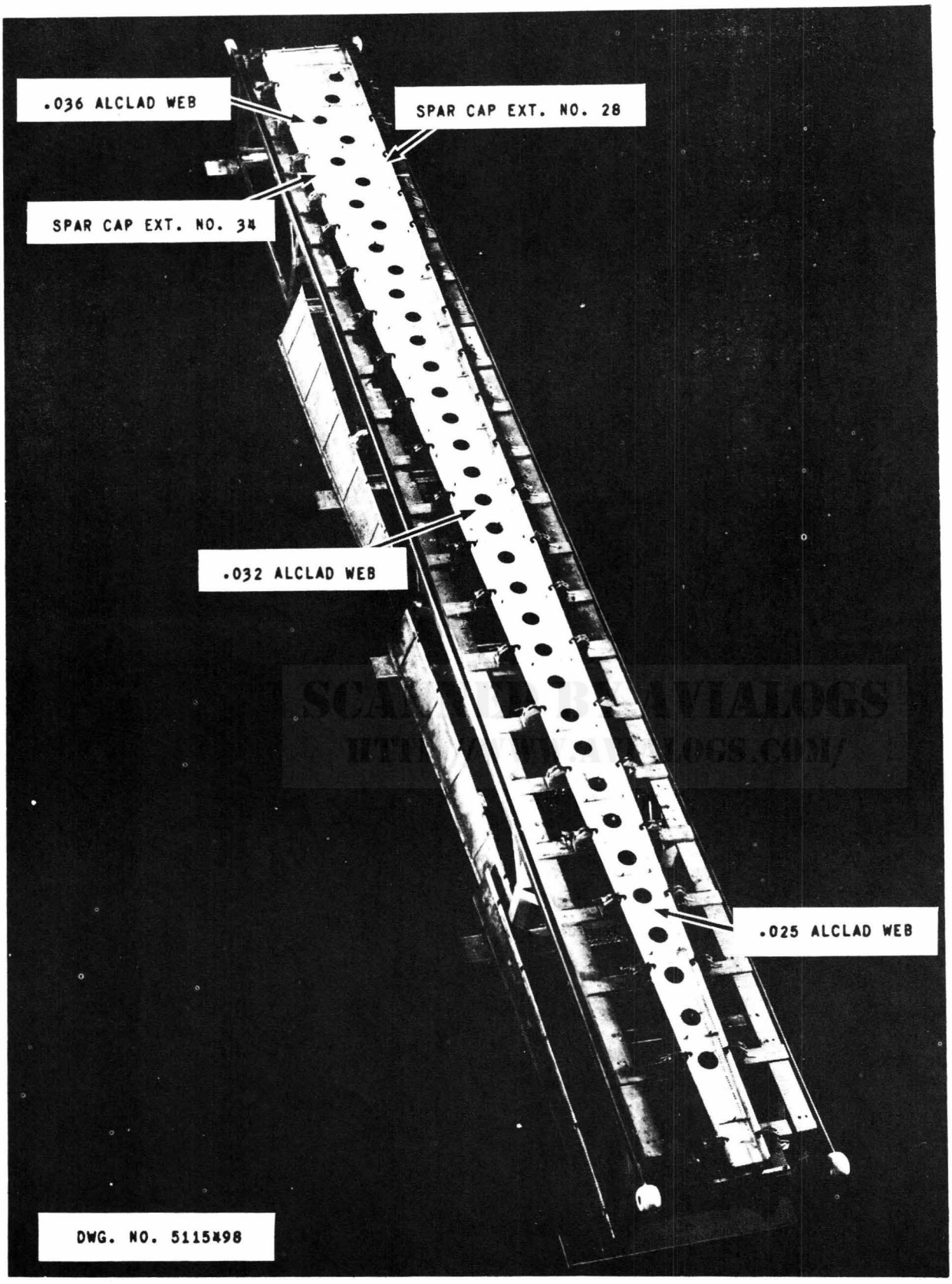


Figure 29 - Outer Wing Front Spar

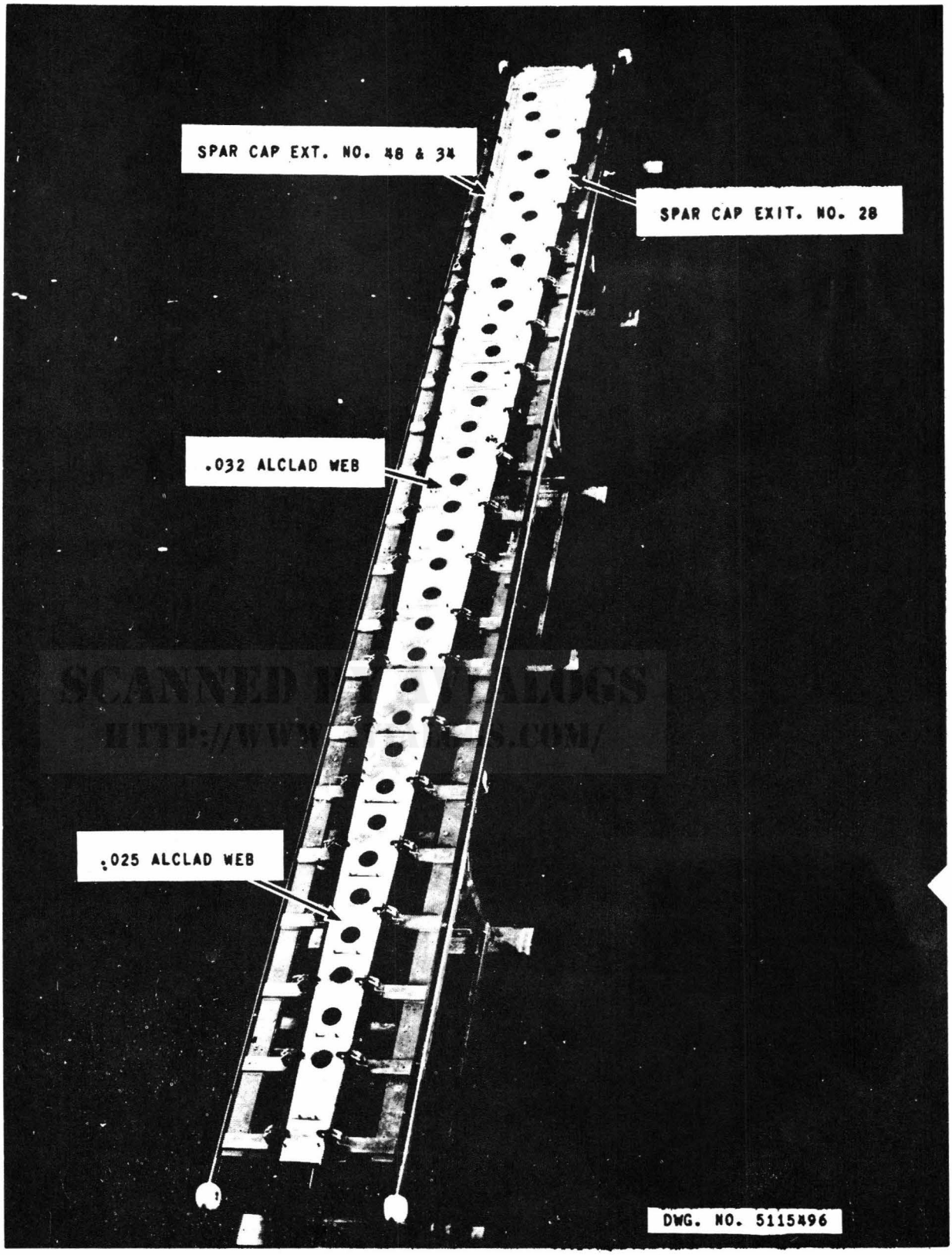


Figure 30 - Outer Wing Main Spar

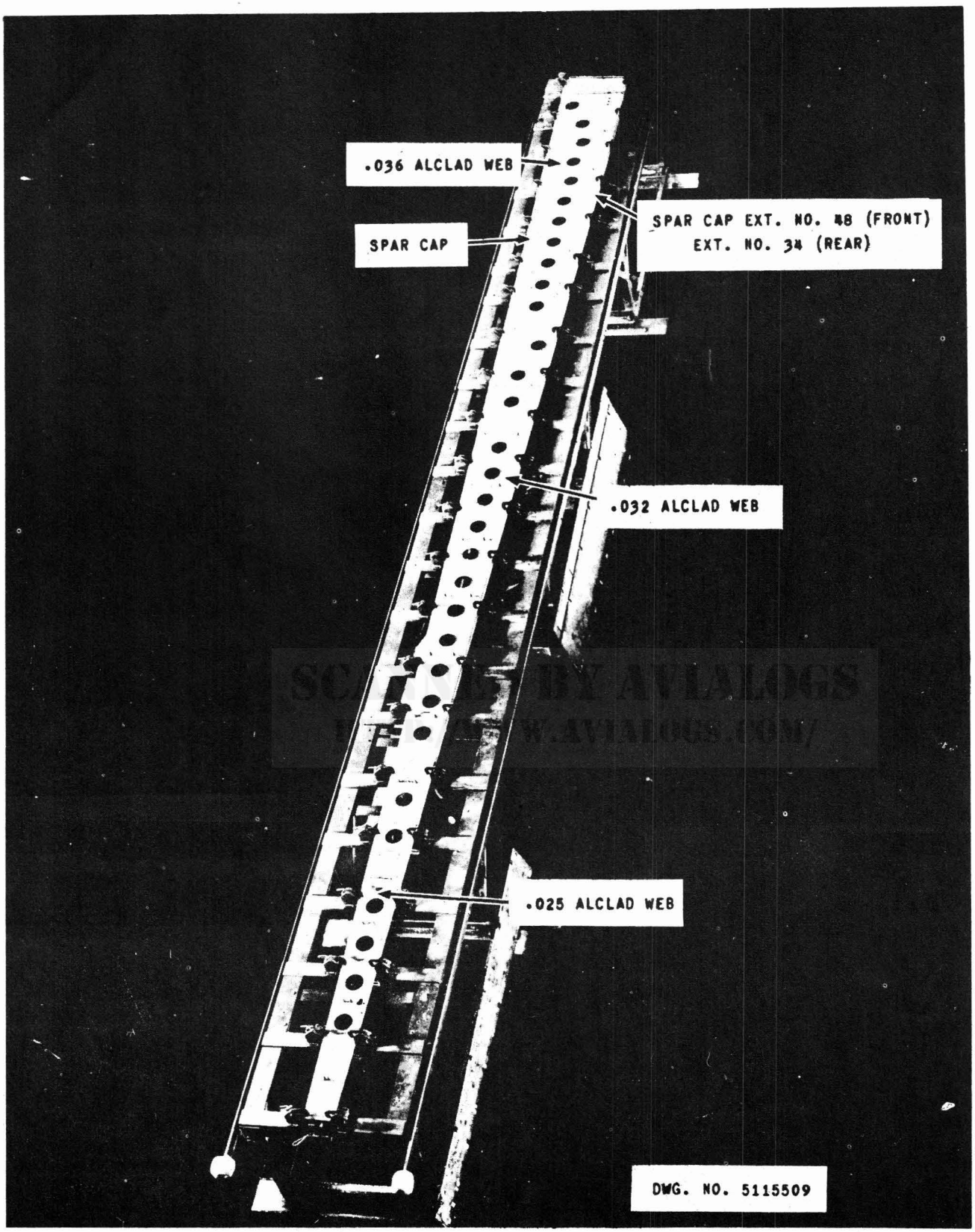


Figure 31 - Outer Wing Rear Spar

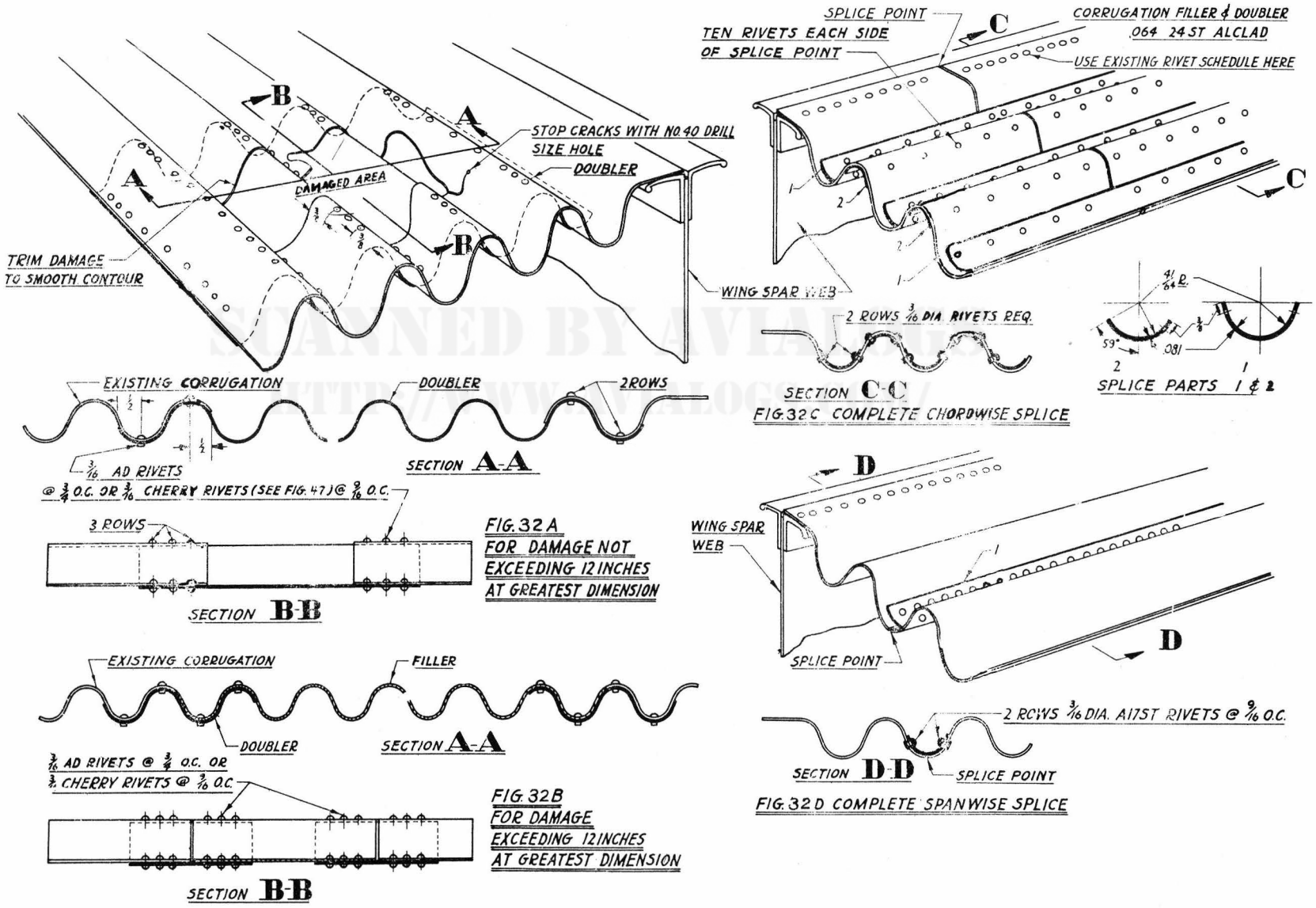


Figure 32 - Corrugation Repair & Splice

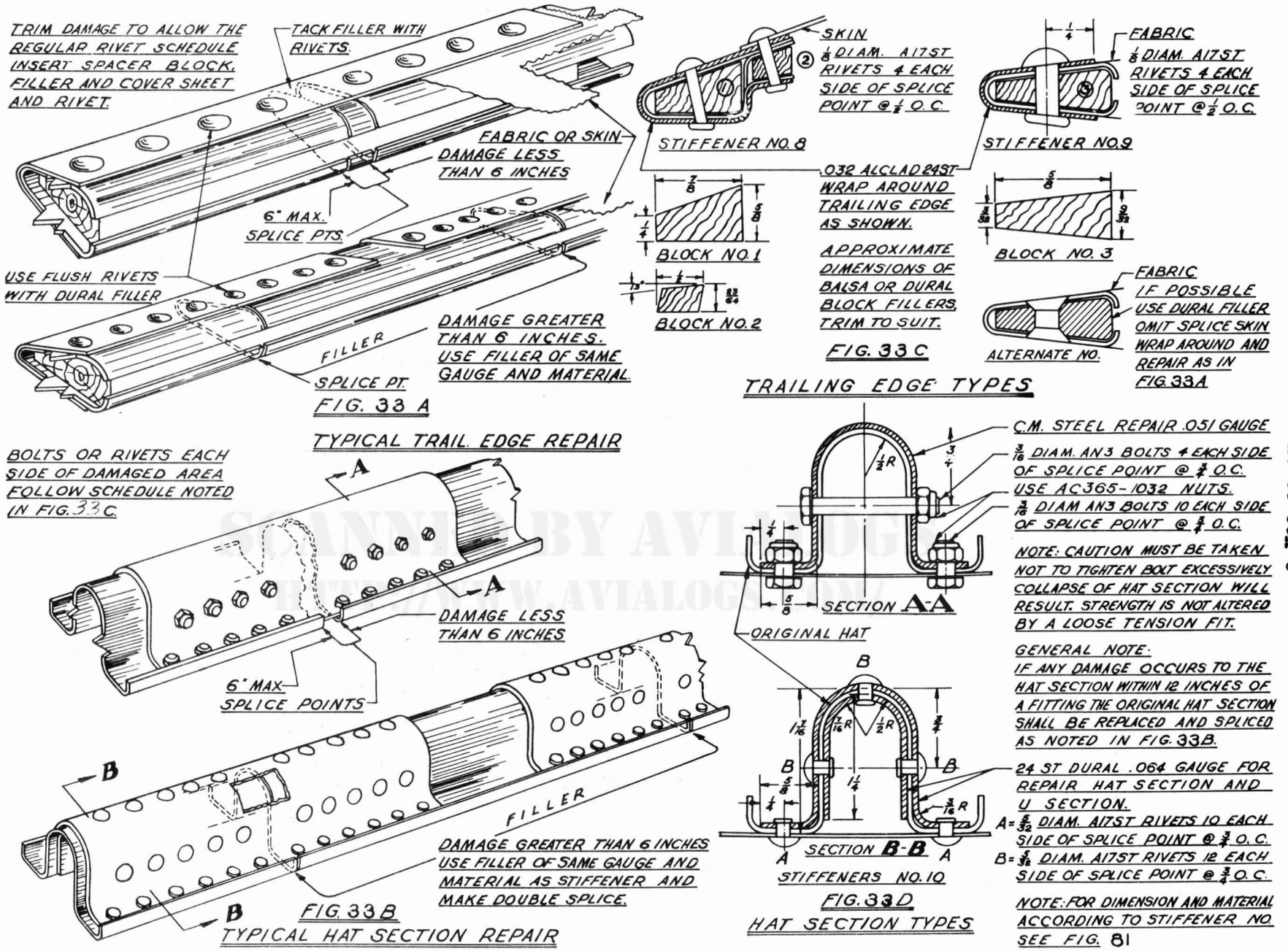


Figure 33 - Trailing Edge & Hat Section Repair

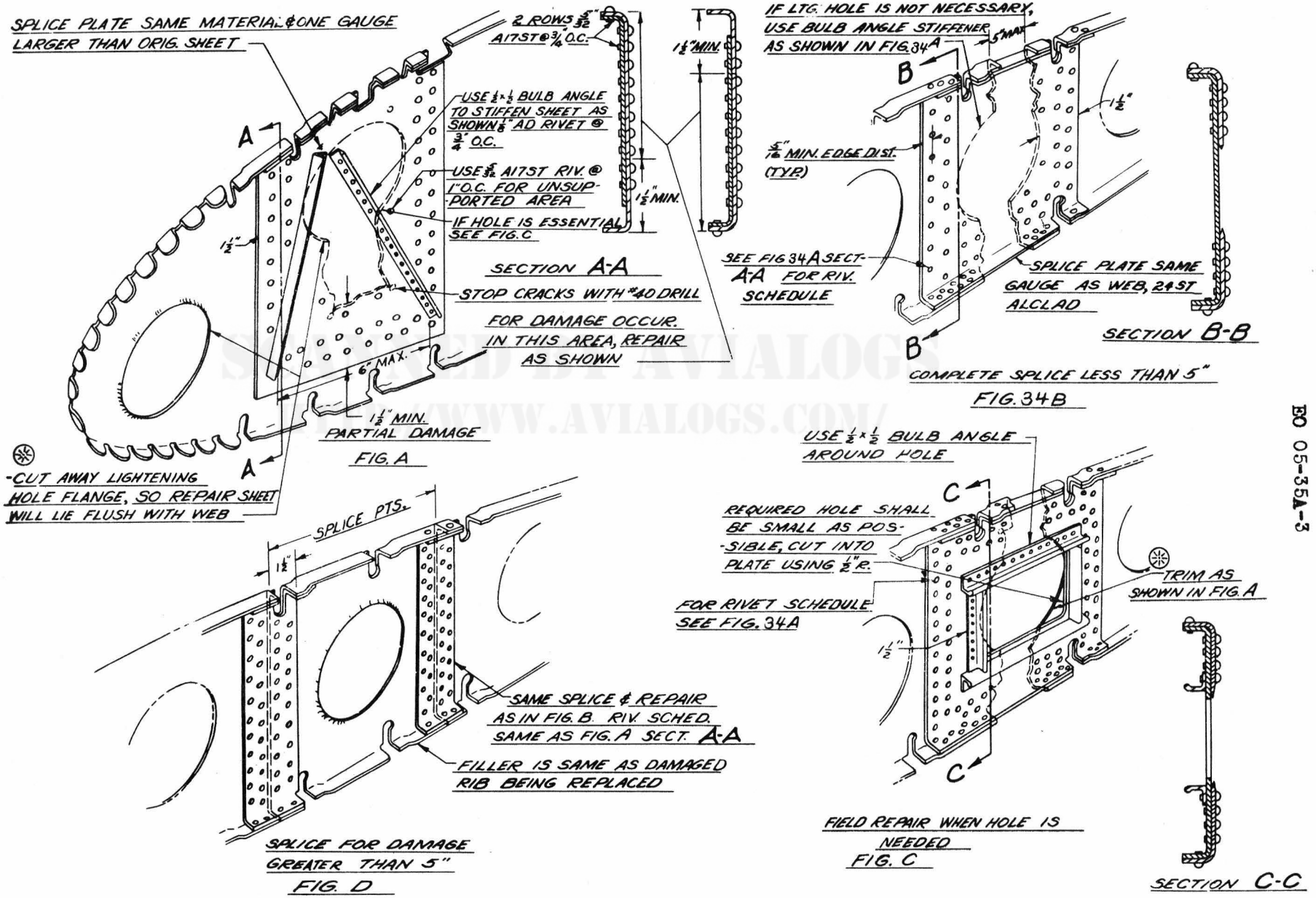


Figure 34 - Wing Rib Repair

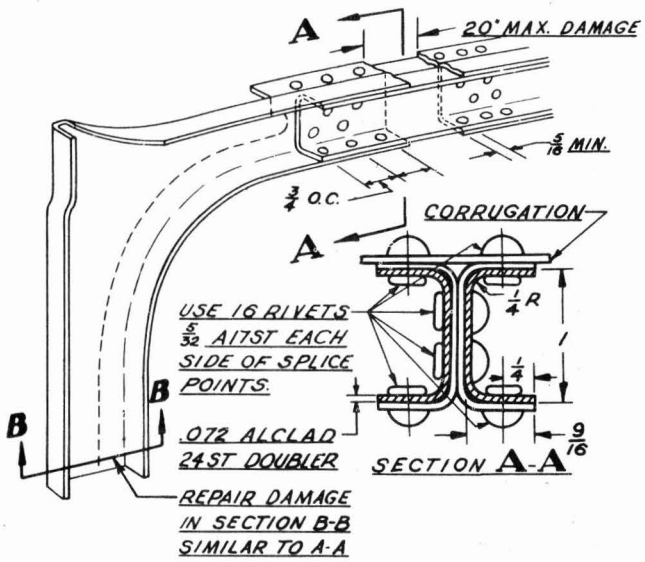


FIG. 35 D PARTIAL REPAIR TANK SUPPORT RIB

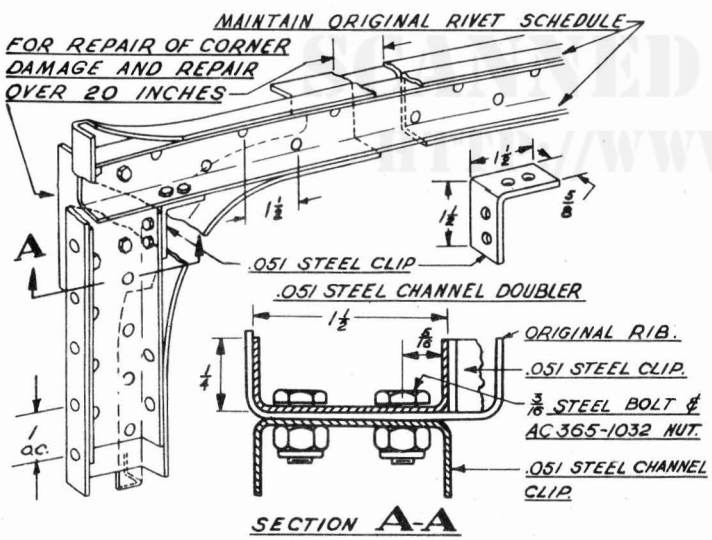


FIG. 35C TOTAL REPAIR TANK SUPPORT RIB

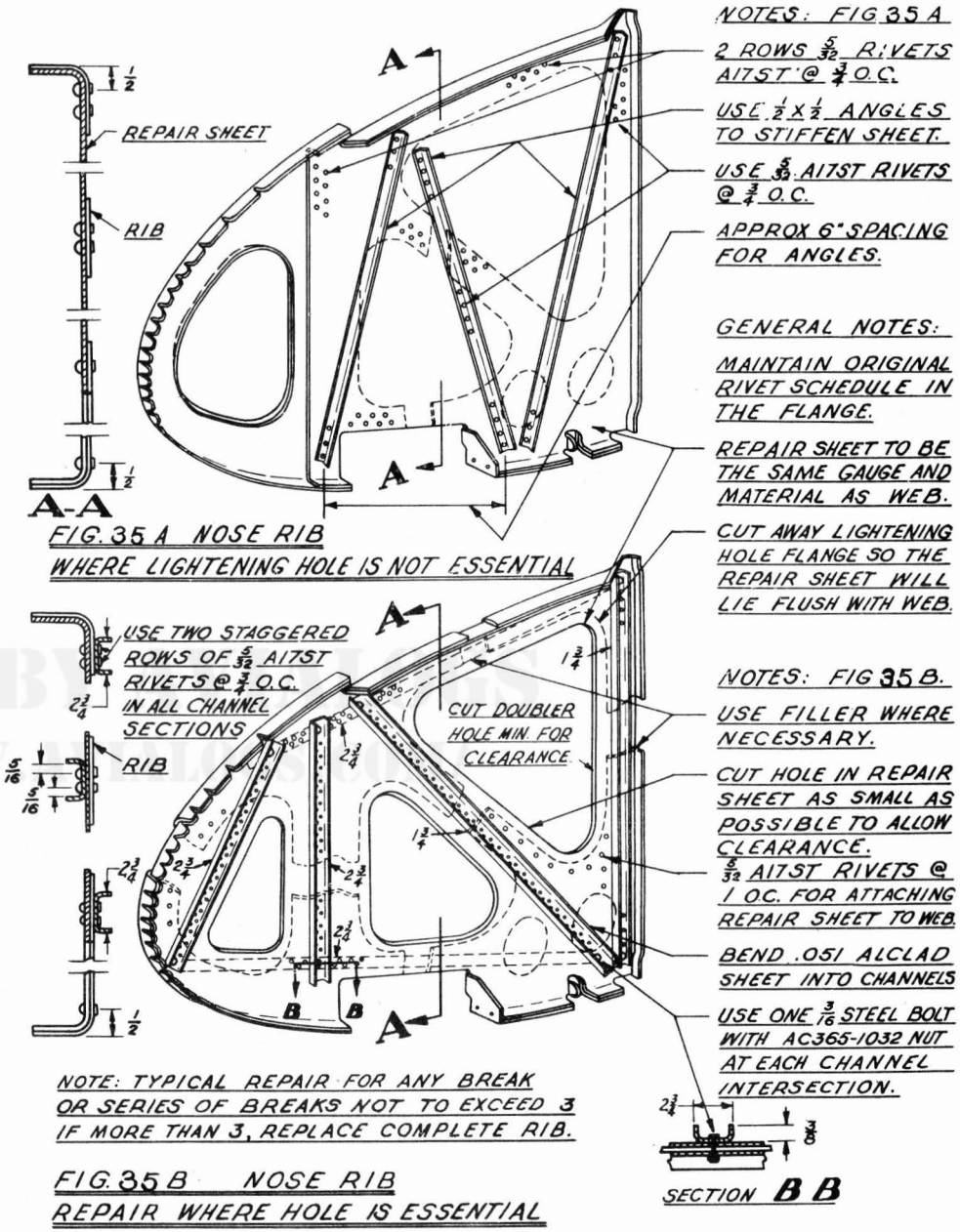


FIG. 35 A NOSE RIB WHERE LIGHTENING HOLE IS NOT ESSENTIAL

NOTE: TYPICAL REPAIR FOR ANY BREAK OR SERIES OF BREAKS NOT TO EXCEED 3 IF MORE THAN 3, REPLACE COMPLETE RIB.

FIG. 35 B NOSE RIB REPAIR WHERE HOLE IS ESSENTIAL

Figure 35 - Rib Repairs in Inner Wing

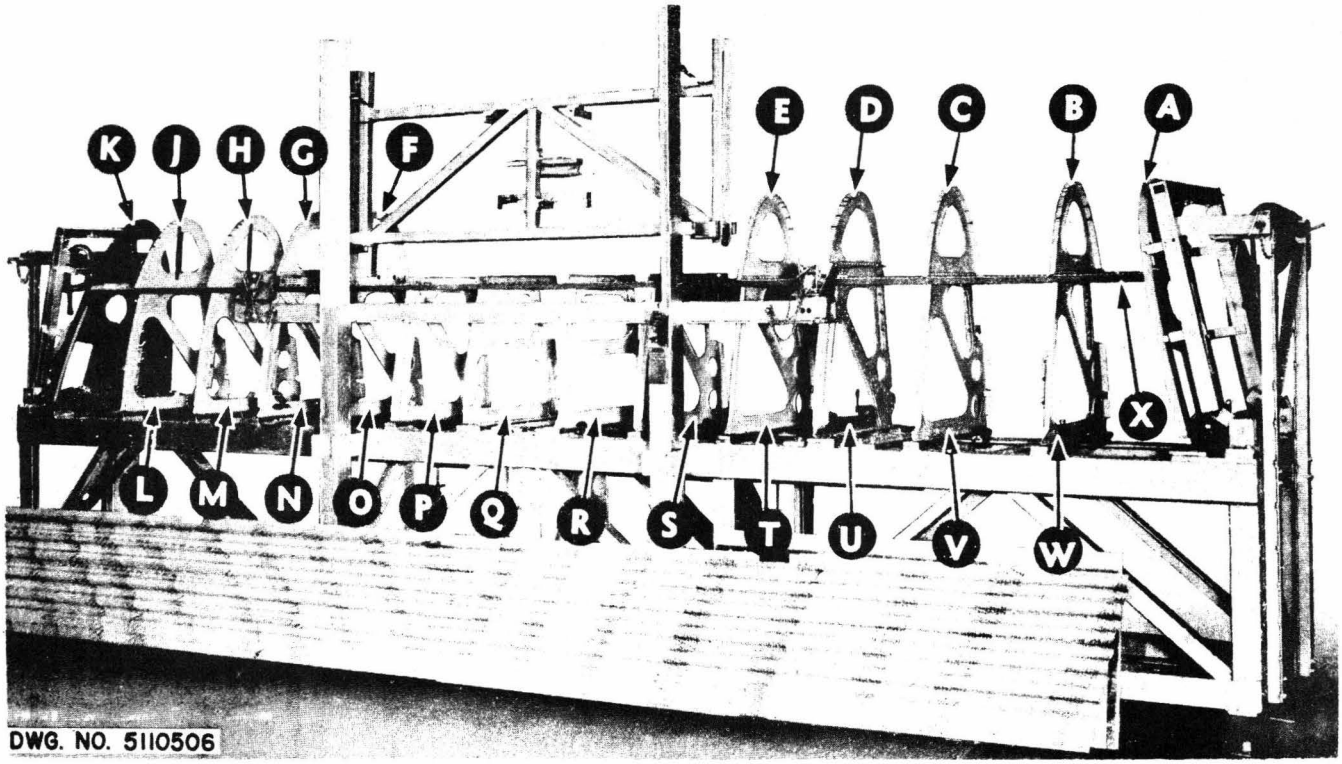


Figure 36 - Center Wing - Nose Section Frames

Key to Figure 36

REF	STATION	NAME	PART NO.	MATERIAL
A	85	Cant. Rib	5112403-1 R.H.	.064 Alclad 24SO
B	73-5/16	Rib	5113026-9 R.H.	.040 Alclad 24SO
C	58	Nose Rib	5113026-9 R.H.	.040 Alclad 24SO
D	45-5/16	Nose Rib	5113027-1 R.H.	.064 Alclad 24SO
E	33	Nose Rib	5113026-11 R.H.	.040 Alclad 24SO
F	33	Nose Rib	5113026-10 L.H.	.040 Alclad 24SO
G	45-5/16	Nose Rib	5113027- L.H.	.064 Alclad 24SO
H	58	Nose Rib	5113026-8 L.H.	.040 Alclad 24SO
J	73-1/2	Rib	5113026-8 L.H.	.040 Alclad 24SO
K	85	Cant. Rib	5112403- L.H.	.064 Alclad 24SO
L	73-1/2	Rib	5113026-8 L.H.	.040 Alclad 24SO
M	58	Rib	5113026-8 L.H.	.040 Alclad 24ST
N	45-5/16	Channel	5113027- L.H.	.064 Alclad 24SO
O	58	Rib	5113026-10 L.H	.040 Alclad 24SO
P	20	Rib	4113025- L.H.	.040 Alclad 24SO
Q	7-1/2	Rib	4113437- L H.	.040 Alclad 24SO
R	7-1/2	Rib	4113437-1 R.H.	.040 Alclad 24SO
S	20	Rib	4113025-1 R.H.	.040 Alclad 24SO
T	58	Rib	5113026-11 R.H.	.040 Alclad 24SO
U	45-5/16	Channels	5113027-1 R.H.	.064 Alclad 24SO
V	58	Rib	5113026-9 L.H.	.040 Alclad 24SO
W	73-1/2	Rib	5113026-9 R.H.	.040 Alclad 24SO
X		Angle	5110506-172	.064 Alclad 24ST

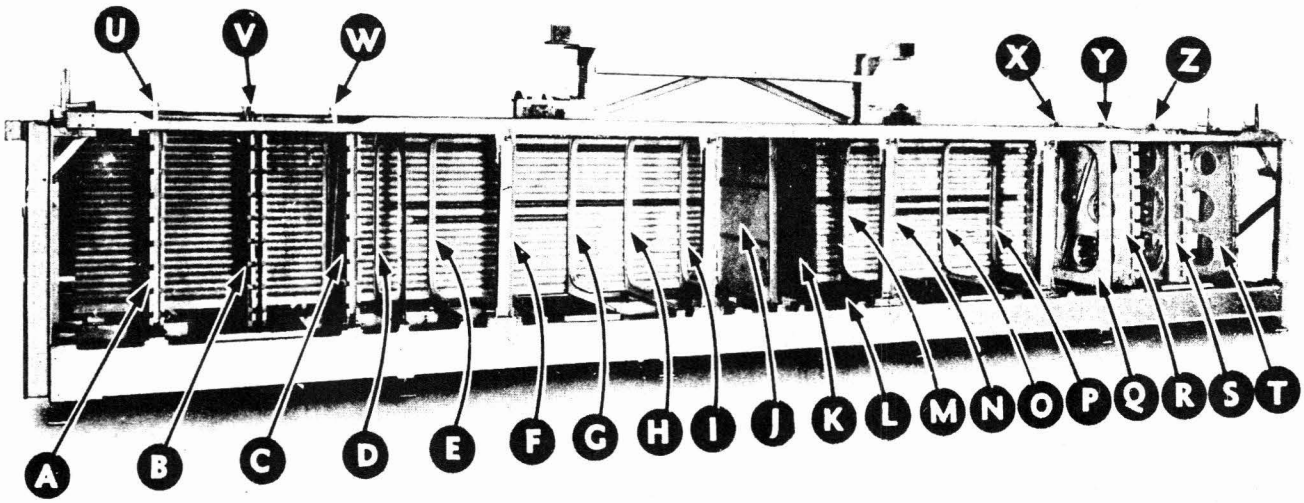


Figure 37 - Center Wing - Front Section Frames

KEY TO FIGURE 37

REF.	STATION	NAME	PART NO.	MATERIAL
A	127-3/4	Frame (Front)	5116763 L.H.	.040 Alclad 24SO
B	111	Frame (Front)	5113288 L.H.	.051 Alclad 24SO
C	94-1/4	Frame (Front)	5116763 L.H.	.040 Alclad 24SO
D	85	Frame (Front)	5118508 L.H.	.064 Alclad 24SO
E	73-1/2	Frame (Front)	5117614 L.H.	.064 Alclad 24SO
F	58	Frame (Front)	5117614 L.H.	.064 Alclad 24SO
G	42	Frame (Front)	5117614 L.H.	.064 Alclad 24SO
H	28-1/2	Frame (Front)	5117614 L.H.	.064 Alclad 24SO
I	15	Frame (Front)	5117614 L.H.	.064 Alclad 24SO
J	5	Frame (Front)	5113311 L.H.	.040 Alclad 24SO
K	5	Frame (Front)	5113311-1 R.H.	.040 Alclad 24SO
L	15	Frame (Front)	5117614-1 R.H.	.064 Alclad 24SO
M	28-1/2	Frame (Front)	5117614-1 R.H.	.064 Alclad 24SO
N	42	Frame (Front)	5117614-1 R.H.	.064 Alclad 24SO
O	58	Frame (Front)	5117614-1 R.H.	.064 Alclad 24SO
P	73-1/2	Frame (Front)	5117614-1 R.H.	.064 Alclad 24SO
Q	85	Frame (Front)	5118508-1 R.H.	.064 Alclad 24SO
R	94-1/4	Frame (Front)	5116763 R.H.	.040 Alclad 24SO
S	111	Frame (Front)	5113288 R.H.	.051 Alclad 24SO
T	127-3/4	Frame (Front)	5116763-1 R.H.	.040 Alclad 24SO
U	127-3/4	Fitting	5117828	
V	111	Fitting	2116628	
W	94-1/4	Fitting	5117828	
X	94-1/4	Fitting	5117828	
Y	111	Fitting	2116628	
Z	127-3/4	Fitting	5117828	

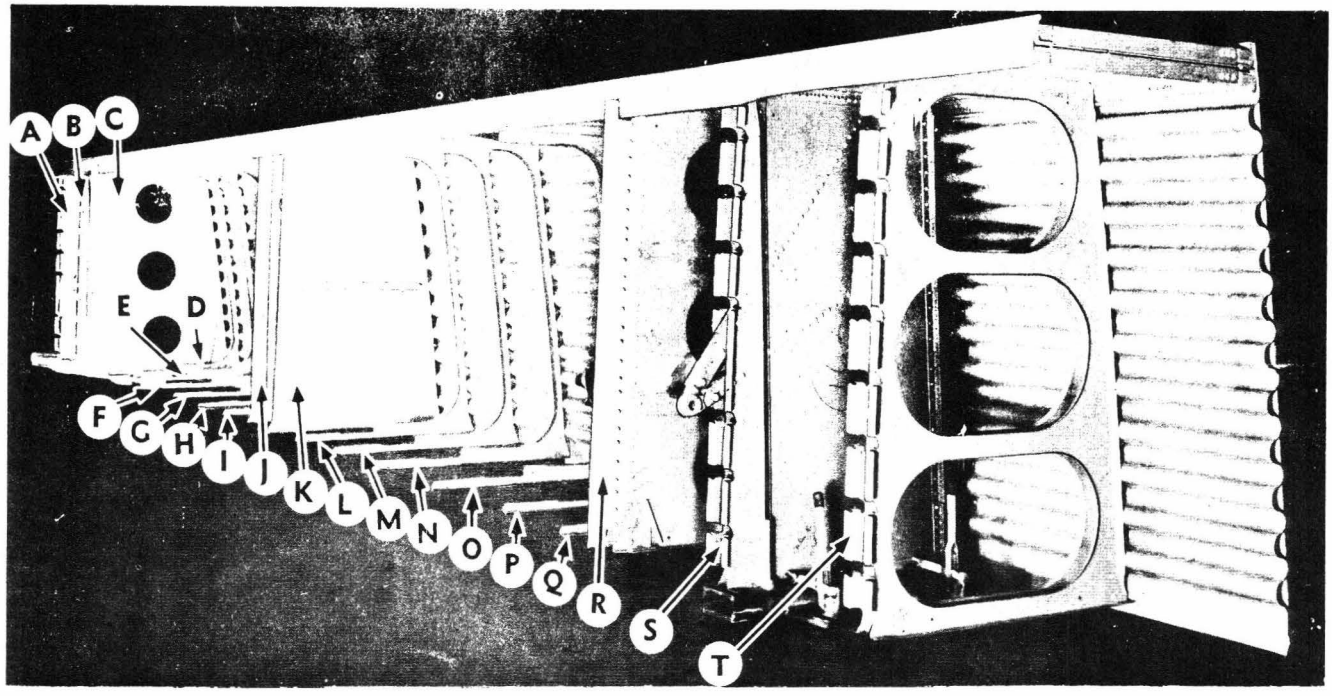


Figure 38 - Center Wing Center Section Frames

KEY TO FIGURE 38

REF.	STATION	NAME	PART NO.	MATERIAL
A	127-3/4	Frame (Rear)	5116642	.040 Alclad 24SO
B	111	Frame (Rear)	5113730	.051 Alclad 24SO
C	94 1/4	Frame (Rear)	5116640	.040 Alclad 24SO
D	85	Frame (Rear)	5117613	.064 Alclad 24SO
E	73-1/2	Frame (Rear)	5117613	.064 Alclad 24SO
F	58	Frame (Rear)	5117613	.064 Alclad 24SO
G	42	Frame (Rear)	5117613	.064 Alclad 24SO
H	28-1/2	Frame (Rear)	5117613	.064 Alclad 24SO
I	15	Frame (Rear)	5117613	.064 Alclad 24SO
J	5	Frame (Rear)	5113599	.040 Alclad 24SO
K	5	Frame (Rear)	5113599-1 R.H.	.040 Alclad 24SO
L	15	Frame (Rear)	5117613-1 R.H.	.064 Alclad 24SO
M	28-1/2	Frame (Rear)	5117613-1 R.H.	.064 Alclad 24SO
N	42	Frame (Rear)	5117613-1 R.H.	.064 Alclad 24SO
O	58	Frame (Rear)	5117613-1 R.H.	.064 Alclad 24SO
P	73-1/2	Frame (Rear)	5117613-1 R.H.	.064 Alclad 24SO
Q	85	Frame (Rear)	5117613-1 R.H.	.064 Alclad 24SO
R	94-1/4	Frame (Rear)	5116640-1 R.H.	.040 Alclad 24SO
S	111	Frame (Rear)	5113730	.051 Alclad 24SO
T	127-3/4	Frame (Rear)	5116642	.040 Alclad 24SO

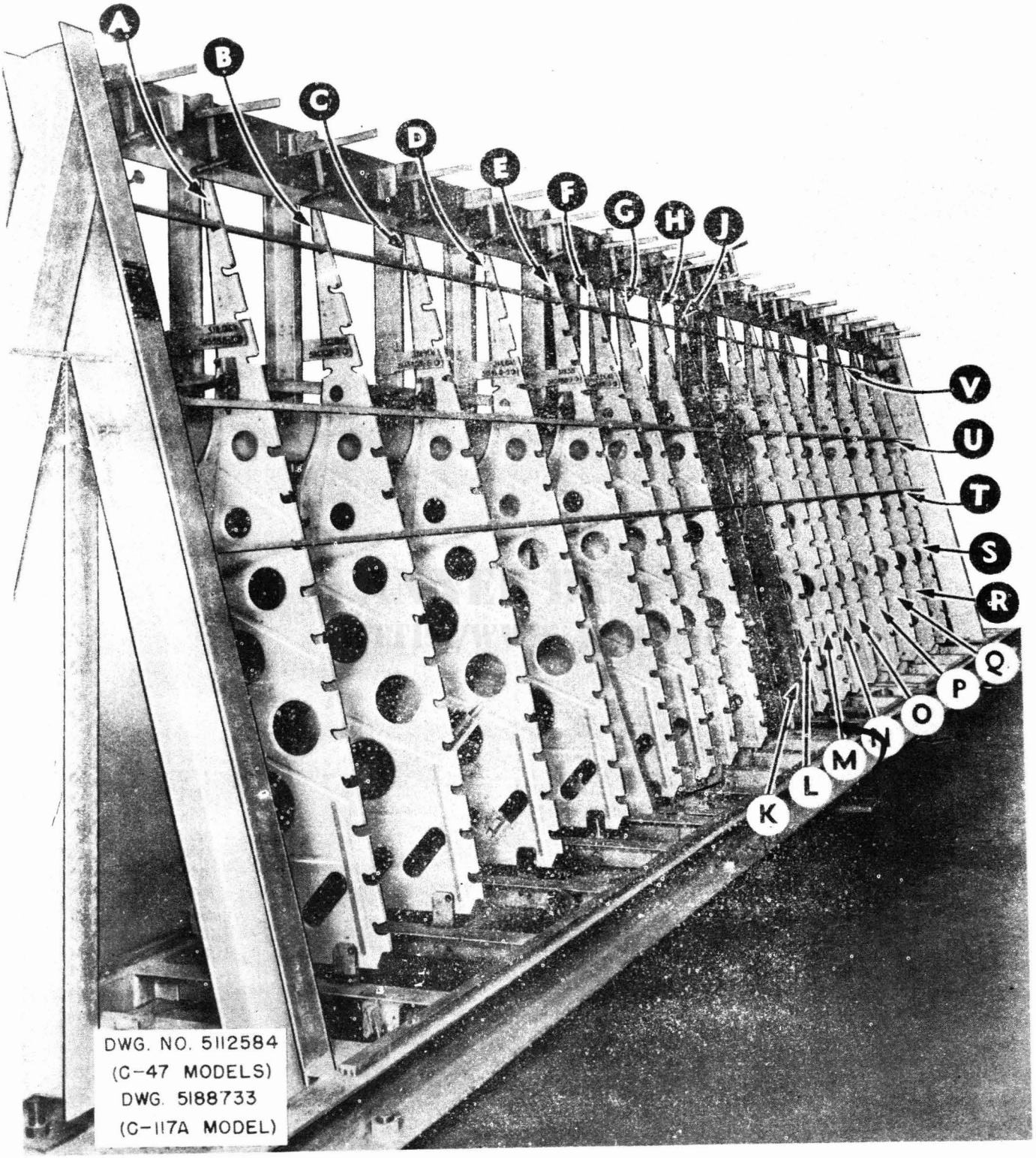


Figure 39 - Center Wing Trailing. Section Frames (C-47 and C-117A Models)

Key To Figure 39

REF	STATION	NAME	PART NO.	MATERIAL
A	126-7/16	Rib	5115988-3 R.H.	.036 Alclad 24SO
B	109-3/4	Rib	5115988-3 R.H.	.036 Alclad 24SO
C	91-3/4	Rib	5115988-5 R.H.	.036 Alclad 24SO
D	73-1/2	Rib	5115988-3 R.H.	.036 Alclad 24SO
E	55	Rib	5115988-3 R.H.	.036 Alclad 24SO
F	42	Rib	5115988-3 R.H.	.036 Alclad 24SO
G	31-1/2	Rib	5115988-3 R.H.	.036 Alclad 24SO
H	17-1/2	Rib	5115988-17 R.H.	.036 Alclad 24SO
J	6	Rib	5115986-1 R.H.	.036 Alclad 24SO
K	6	Rib	5115986 L.H.	.036 Alclad 24SO
L	17-1/2	Rib	5115988-16 L.H.	.036 Alclad 24SO
M	31-1/2	Rib	5115988-2 L.H.	.036 Alclad 24SO
N	42	Rib	5115988-2 L.H.	.036 Alclad 24SO
O	55	Rib	5115988-2 L.H.	.036 Alclad 24SO
P	73-1/2	Rib	5115988-2 L.H.	.036 Alclad 24SO
Q	91-3/4	Rib	5115988-4 L.H.	.036 Alclad 24SO
R	109-3/4	Rib	5115988-2 L.H.	.036 Alclad 24SO
S	126-7/16	Rib	5115988-2 L.H.	.036 Alclad 24ST
T		Angle	5112584-40	.028 Alclad 24ST
U		Angle	5112584-47	.028 Alclad 24SO
V		Angle	5112584-56	Ext. No. 2

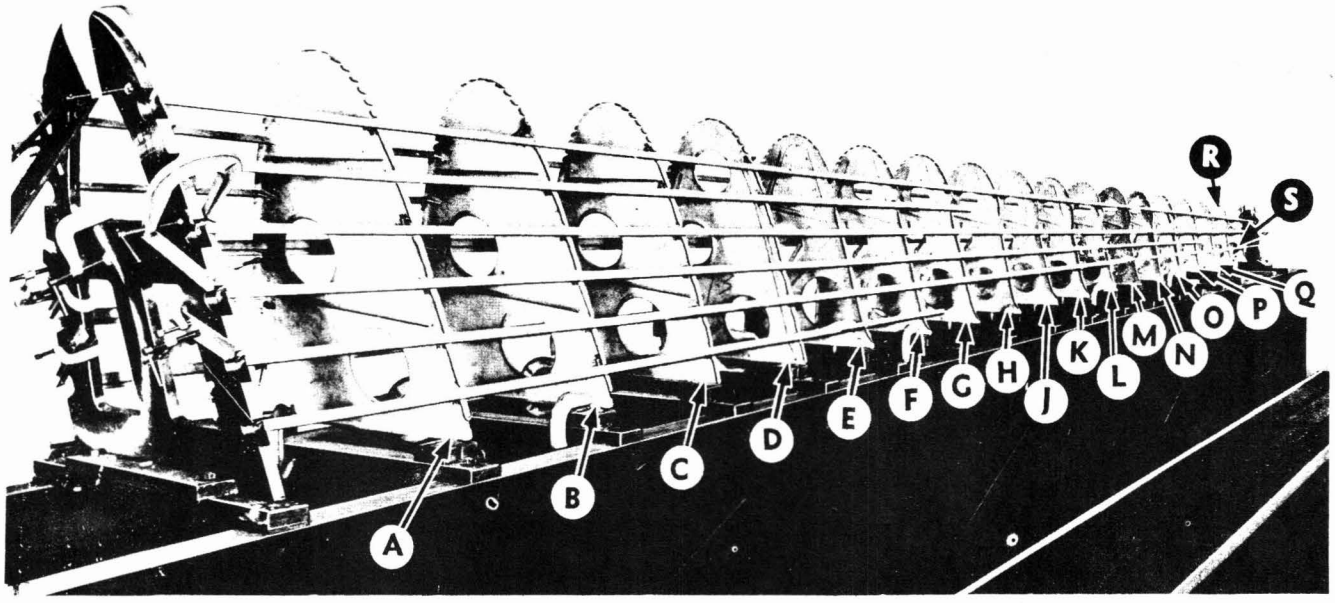


Figure 40 - Outer Wing Nose Section Frames

KEY TO FIGURE 40

REF.	STATION	NAME	PART NO.	MATERIAL
A	17.9	Nose Rib	5115490 L.H. & -1 R.H.	.032 Alclad 24SO
B	35.8	Nose Rib	5132976 L.H. & -1 R.H.	.032 Alclad 24SO
C	53.7	Nose Rib	5135123 L.H. & -1 R.H.	.032 Alclad 24ST
D	71.6	Nose Rib	5115876 L.H. & -1 R.H.	.032 Alclad 24SO
E	89.5	Nose Rib	5115486-8 L.H. & -9 R.H.	.028 Alclad 24SO
F	107.4	Nose Rib	5115486-10 L.H. & -11 R.H.	.028 Alclad 24SO
G	125.3	Nose Rib	5115486-12 L.H. & -13 R.H.	.028 Alclad 24SO
H	143.2	Nose Rib	5115486-14 L.H. & -15 R.H.	.028 Alclad 24SO
J	161.1	Nose Rib	5115486-16 L.H. & -17 R.H.	.028 Alclad 24SO
K	179	Nose Rib	5115486-18 L.H. & -19 R.H.	.028 Alclad 24SO
L	196.9	Nose Rib	5115486-20 L.H. & -21 R.H.	.028 Alclad 24SO
M	214.8	Nose Rib	5115486-22 L.H. & -23 R.H.	.028 Alclad 24SO
N	232.7	Nose Rib	5115486-24 L.H. & -25 R.H.	.028 Alclad 24SO
O	250.6	Nose Rib	5115486-26 L.H. & -27 R.H.	.028 Alclad 24SO
P	268.5	Nose Rib	5115486-28 L.H. & -29 R.H.	.028 Alclad 24SO
Q	286.4	Nose Rib	5115486-30 L.H. & -31 R.H.	.028 Alclad 24SO
R	304.3	Nose Rib	5115486-32 L.H. & -33 R.H.	.028 Alclad 24SO
S	322.2	Nose Rib	5115486-34 L.H. & -35 R.H.	.028 Alclad 24SO

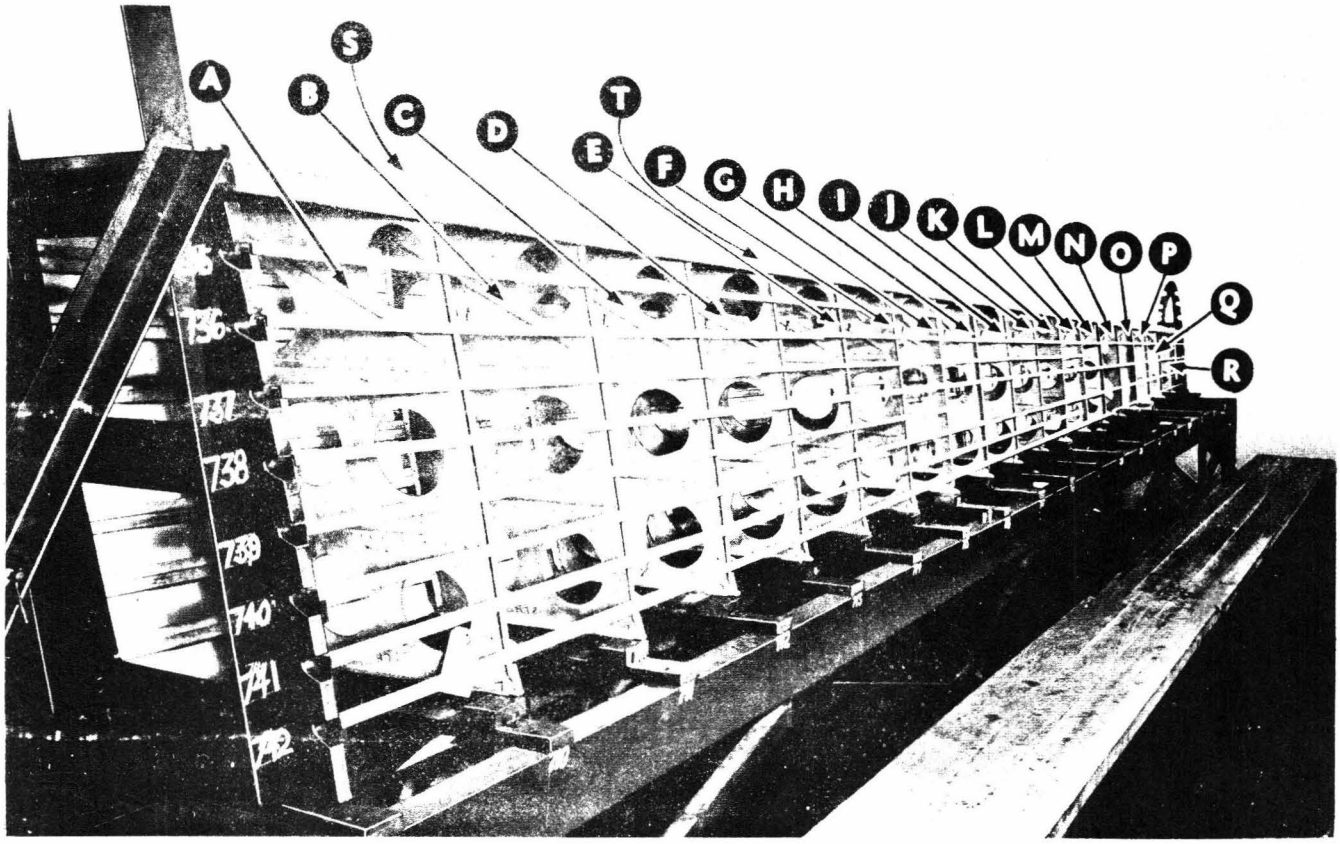


Figure 41 - Outer Wing Front Section Frames

KEY TO FIGURE 41

REF.	STATION	NAME	PART NO.	MATERIAL
A	17.9	Rib	5115497 L.H. & -1 R.H.	.022 Alclad 24SO
B	35.8	Rib	5115497-2 L.H. & -3 R.H.	.022 Alclad 24SO
C	53.7	Rib	5115497-4 L.H. & - 5 R.H.	.022 Alclad 24SO
D	71.6	Rib	5115497-6 L.H. & -7 R.H.	.022 Alclad 24SO
E	89.5	Rib	5115497-8 L.H. -9 R.H.	.022 Alclad 24SO
F	107.4	Rib	5115497-10 L.H. & -11 R.H.	.022 Alclad 24SO
G	125.3	Rib	5115497-12 L.H. & -13 R.H.	.022 Alclad 24SO
H	143.2	Rib	5115497-14 L.H. & -15 R.H.	.022 Alclad 24SO
I	161.1	Rib	5115497-16 L.H. & -17 R.H.	.022 Alclad 24SO
J	179.0	Rib	5115497-18 L.H. & -19 R.H.	.022 Alclad 24SO
K	196.9	Rib	5115497-20 L.H. & -21 R.H.	.022 Alclad 24SO
L	214.8	Rib	5115497-22 L.H. & -23 R.H.	.022 Alclad 24SO
M	232.7	Rib	5115497-24 L.H. & -25 R.H.	.022 Alclad 24SO
N	250.6	Rib	5115575 L.H. & -1 R.H.	.022 Alclad 24SO
O	268.5	Rib	5115575-2 L.H. & -3 R.H.	.022 Alclad 24SO
P	286.4	Rib	5115575-4 L.H. & -5 R.H.	.022 Alclad 24SO
Q	304.3	Rib	5115575-6 L.H. & -7 R.H.	.022 Alclad 24SO
R	322.2	Rib	5115575-8 L.H. & -9 R.H.	.022 Alclad 24SO
S		Front Spar Cap	5115498-2 L.H. & -3 R.H.	Ext. No. 34
T		Rear Spar Cap	5115498-4 L.H. & -5 R.H.	Ext. No. 34

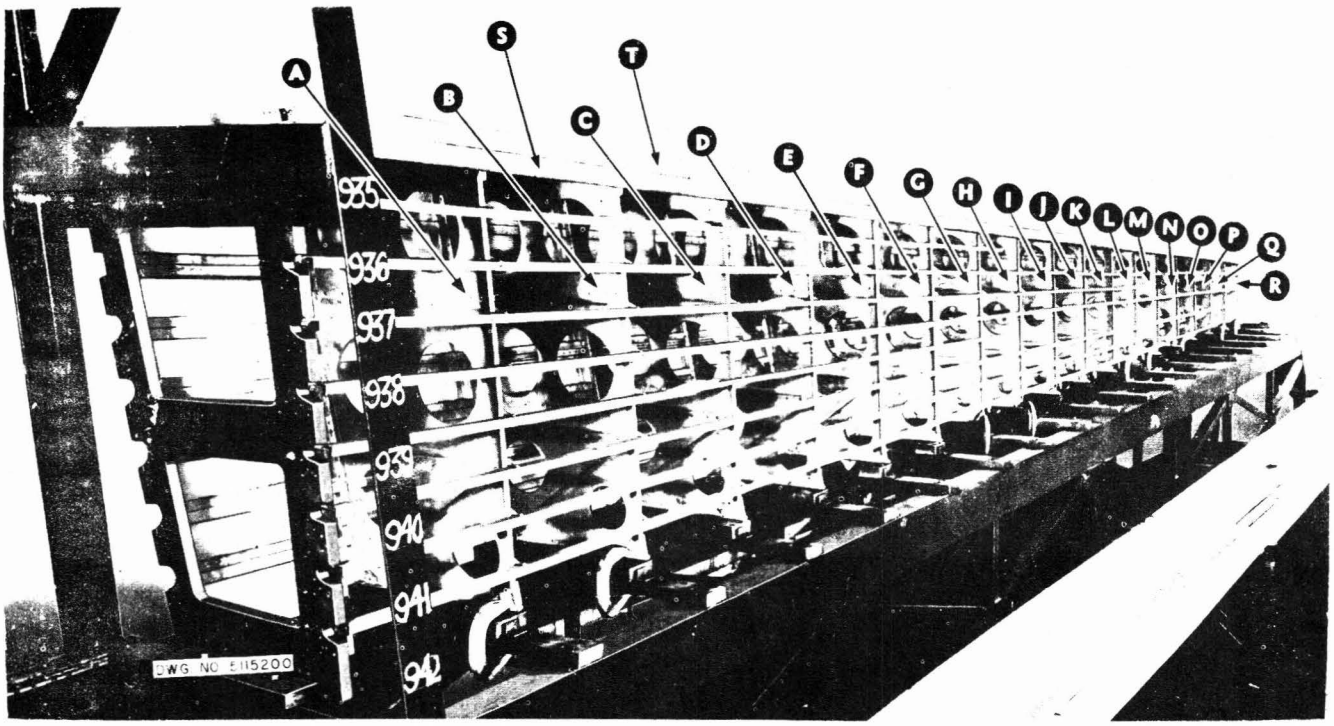


Figure 42 - Outer Wing Center Section Frames

KEY TO FIGURE 42

REF.	STATION	NAME	PART NO.	MATERIAL
A	17.9	Rib	5115489 L.H. & -1 R.H.	.022 Alclad 24SO
B	35.8	Rib	5115489-2 L.H. & -3 R.H.	.022 Alclad 24SO
C	53.7	Rib	5115489-4 L.H. & -5 R.H.	.022 Alclad 24SO
D	71.6	Rib	5115489-6 L.H. & -7 R.H.	.022 Alclad 24SO
E	89.5	Rib	5115489-8 L.H. & -9 R.H.	.022 Alclad 24SO
F	107.4	Rib	5115489-10 L.H. & -11 R.H.	.022 Alclad 24SO
G	125.3	Rib	5115489-12 L.H. & -13 R.H.	.022 Alclad 24SO
H	143.2	Rib	5115489-14 L.H. & -15 R.H.	.022 Alclad 24SO
I	161.1	Rib	5115489-16 L.H. & -17 R.H.	.022 Alclad 24SO
J	179.0	Rib	5115489-18 L.H. & -19 R.H.	.022 Alclad 24SO
K	196.9	Rib	5115489-20 L.H. & -21 R.H.	.022 Alclad 24SO
L	214.8	Rib	5115489-22 L.H. & -23 R.H.	.022 Alclad 24SO
M	232.7	Rib	5115489-24 L.H. & -25 R.H.	.022 Alclad 24SO
N	250.6	Rib	5115574 L.H. & -1 R.H.	.022 Alclad 24SO
O	268.5	Rib	5115574-2 L.H. & -3 R.H.	.022 Alclad 24SO
P	286.4	Rib	5115574-4 L.H. & -5 R.H.	.022 Alclad 24SO
Q	304.3	Rib	5115574-6 L.H. & -7 R.H.	.022 Alclad 24SO
R	322.2	Rib	5115574-8 L.H. & -9 R.H.	.022 Alclad 24SO
S		Rear Cap	5115496-4 L.H. & -5 R.H.	Ext. No. 34
T		Front Cap	5115496-2 L.H. & -3 R.H.	Ext. No. 48

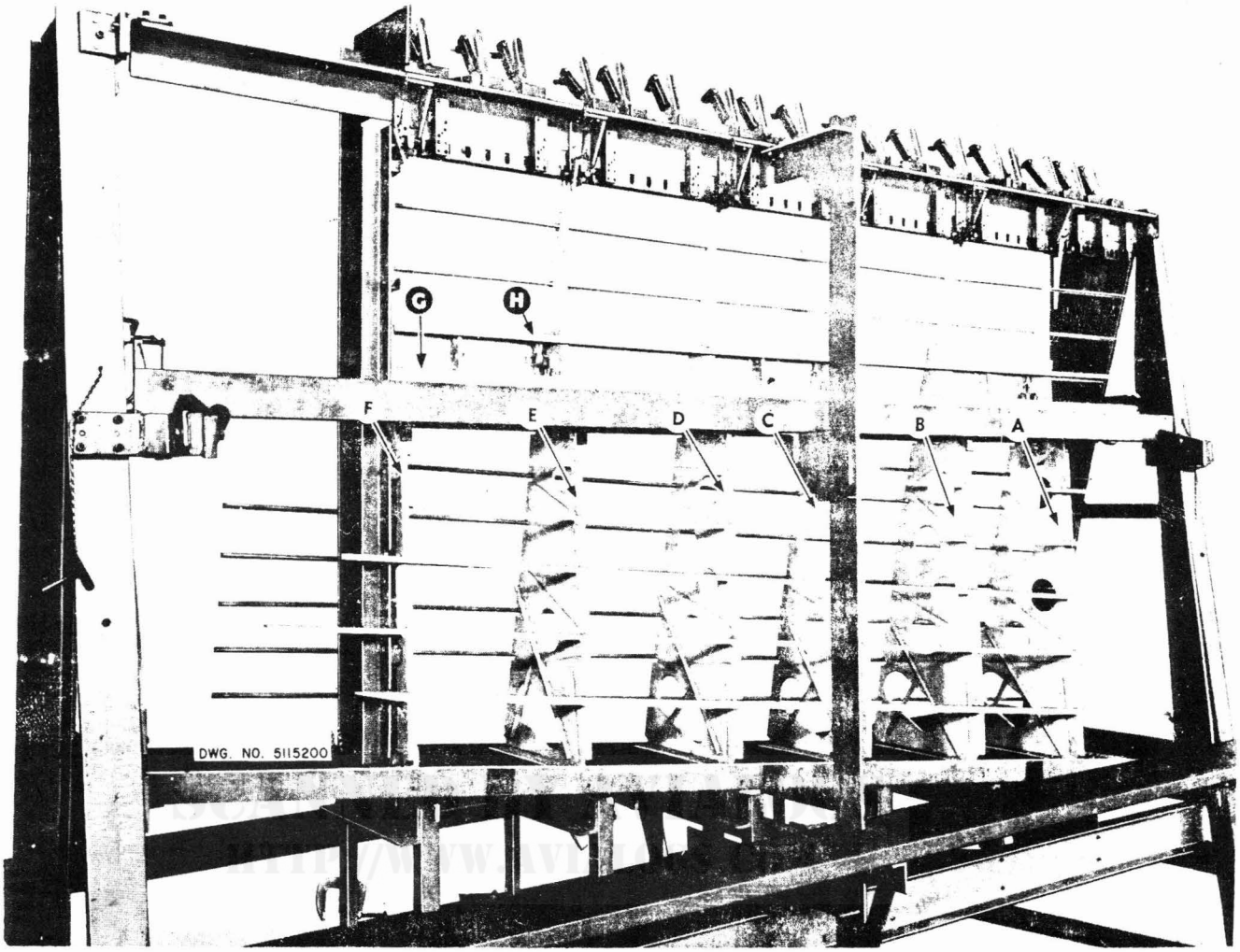


Figure 43 - Outer Wing Inboard Trailing Section

KEY TO FIGURE 43

REF.	STATION	NAME	PART NO.	MATERIAL
A	17.9	Rib	5115508-100 L.H. 5115508-101 R.H.	.028 Alclad 24SO
B	35.8	Rib	5115508-102 L.H. 5115508-103 R.H.	.028 Alclad 24SO
C	53.7	Rib	5115508-104 L.H. 5115508-105 R.H.	.028 Alclad 24SO
D	71.16	Rib	5115508-106 L.H. 5115508-107 R.H.	.028 Alclad 24SO .028 Alclad 24SO
E	89.5	Rib	5115508-108 L.H. 5115508-109 R.H.	.028 Alclad 24SO
F	107.4	Rib	5115505 L.H. 5115505-1 R.H.	.029 Alclad 24SO
G		Intercostal	5115200-128 L.H. 5115200-127 R.H.	.051 Alclad 24ST
H		Intercostal	5115200	.028 Alclad 24ST

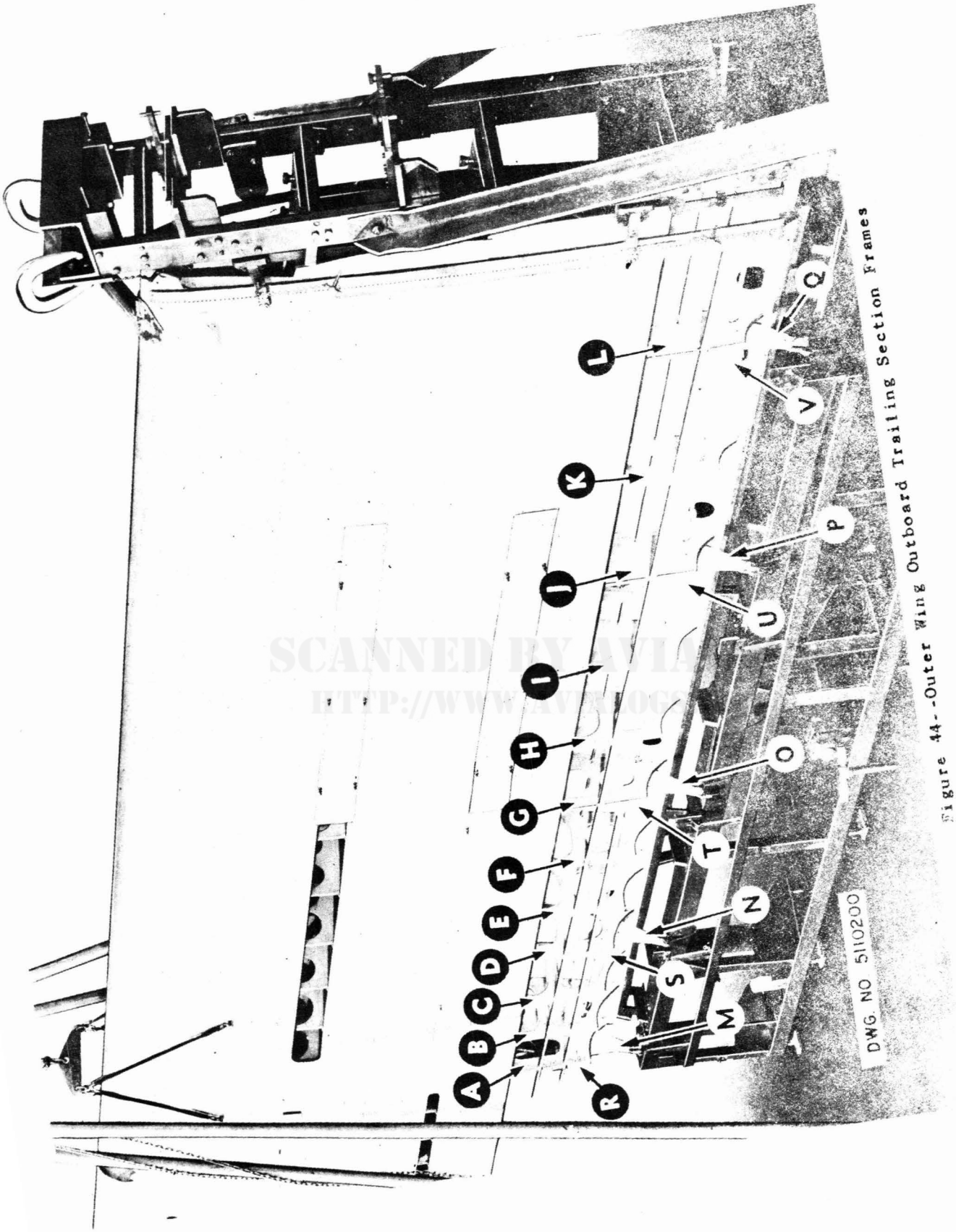


Figure 44--Outer Wing Outboard Trailing Section Frames

KEY TO FIGURE 44

REF.	STATION	NAME	PART NO.	MATERIAL
A	125.3	Rib	5115502-2 L.H. & -3 R.H.	.045 Alclad 24SO
B	143.2	Rib	5115494 L.H. & -1 R.H.	.022 Alclad 24SO
C	161.1	Rib	5115485 L.H. & -1 R.H.	.022 Alclad 24SO
D	179.0	Rib	5115510-2 L.H. & -3 R.H.	.040 Alclad 24SO
E	196.9	Rib	5115504 L.H. & -1 R.H.	.022 Alclad 24SO
F	214.8	Rib	5115491 L.H. & -1 R.H.	.022 Alclad 24SO
G	232.7	Rib	5115503-2 L.H. & -3 R.H.	.040 Alclad 24SO
H	250.6	Rib	5115507 L.H. & -1 R.H.	.022 Alclad 24SO
I	268.5	Rib	5115488 L.H. & -1 R.H.	.022 Alclad 24SO
J	286.4	Rib	5115492-2 L.H. & -3 R.H.	.045 Alclad 24SO
K	304.3	Rib	4115453 L.H. & -1 R.H.	.020 Alclad 24SO
L	322.2	Rib	5115495-2 L.H. & -3 R.H.	.040 Alclad 24SO
M	125.3	Hinge	270944 L.H. & -1 R.H.	Alum. Alloy
N	179.0	Hinge	270944 L.H. & -1 R.H.	Alum. Alloy
O	232.7	Hinge	270944 L.H. & -1 R.H.	Alum. Alloy
P	286.4	Hinge	270944 L.H. & -1 R.H.	Alum. Alloy
Q	322.2	Hinge	270944 L.H. & -1 R.H.	Alum. Alloy
R	125.3	Aux. Rib	5115502-4 L.H. & -5 R.H.	.036 Alclad 24SO
S	179.0	Aux. Rib	5115510-4 L.H. & -5 R.H.	.036 Alclad 24SO
T	232.7	Aux. Rib	5115503-4 L.H. & -5 R.H.	.036 Alclad 24SO
U	286.4	Aux. Rib	5115492-4 L.H. & -5 R.H.	.036 Alclad 24SO
V	322.2	Aux. Rib	5115495-4 L.H. & -5 R.H.	.029 Alclad 24SO

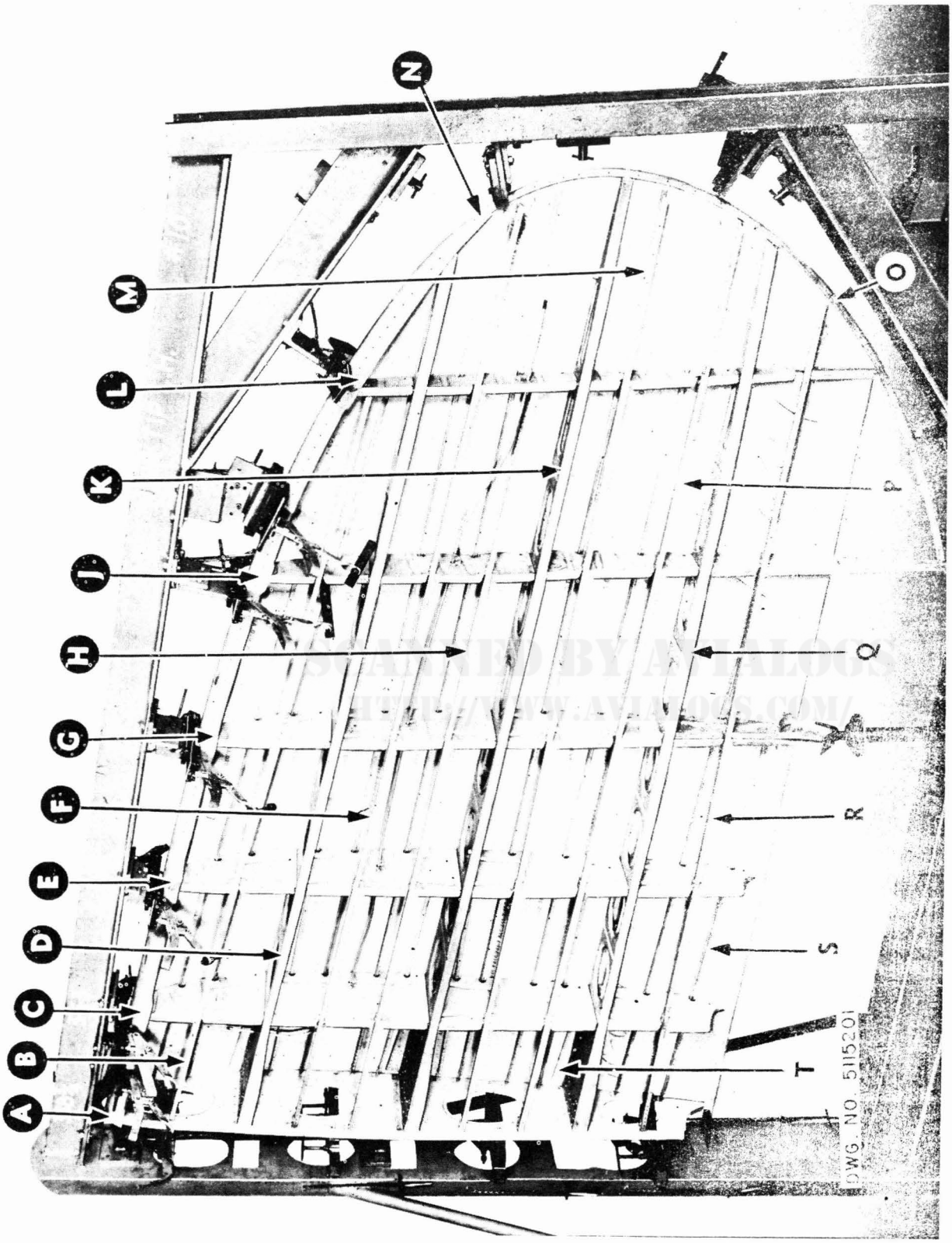


Figure 45 - Outer Wing-Tip Frames

KEY TO FIGURE 45

REF.	STATION	NAME	PART NO.	MATERIAL
A	338-3/4	Rib	511527 L.H. & -1 R.H.	.032 Alclad 24SO
B		Stringer	5115201-22 L.H. & -23 R.H.	Ext. No. 5
C	353	Rib	4114993 L.H. & -1 R.H.	.025 Alum. Alloy 24SO
D		Doubler	5115201-78	.025 Alclad 24ST
E	368	Rib	4114997 L.H. & -1 R.H.	.025 Alclad 24SO
F		Stringer	5115201-24 L.H. & -25 R.H.	Ext. No. 5
G	383	Rib	4114986 L.H. & -1 R.H.	.020 Alclad 24SO
H		Stringer	5115201-26 L.H. & -27 R.H.	Ext. No. 5
J	398	Rib	4114987 L.H. & -1 R.H.	.025 Alclad 24SO
K		Stringer	5115201-10 L.H. & -11R.H.	Ext. No. 5
L	413	Rib	2114978 L.H. & -1 R.H.	.020 Alclad 24SO
M		Stringer	5115201-28 L.H. & -29 R.H.	Ext. No. 5
N		Nose Skin	5115201-58 L.H. & -59 R.H.	.032 Alclad 24SO
O		Bow Sector	5115201-62 L.H. & -63 R.H.	Ext. No. 13
P		Stringer	5115201-30 L.H. & -31 R.H.	Ext. No. 5
Q		Stringer	5115201-32 L.H. & -33 R.H.	Ext. No. 5
R		Stringer	5115201-64 L.H. & -65 R.H.	Ext. No. 5
S		Stringer	5115201-20 L.H. & -21 R.H.	Ext. No. 5
T		Clip	1114976 L.H. & -1 R.H.	.032 Alclad 24ST

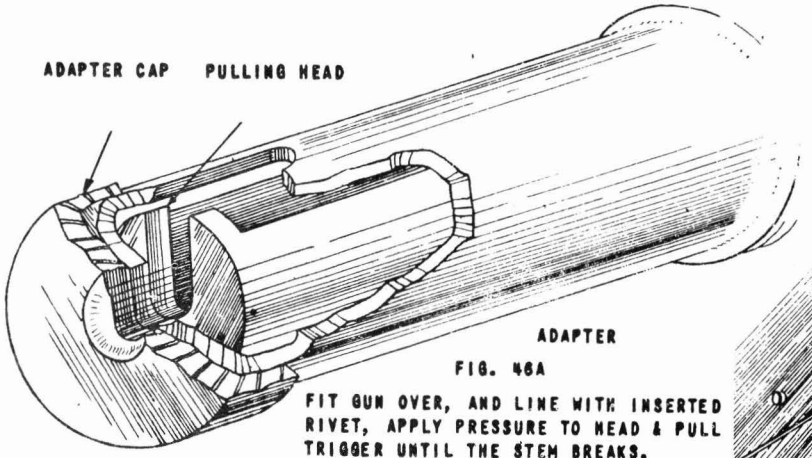


FIG. 46A

FIT GUN OVER, AND LINE WITH INSERTED RIVET, APPLY PRESSURE TO HEAD & PULL TRIGGER UNTIL THE STEM BREAKS.

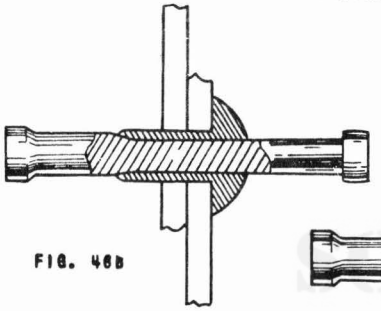


FIG. 46B

CHERRY RIVET INSERTED

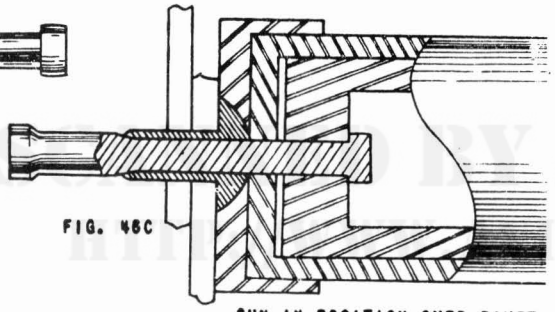


FIG. 46C

GUN IN POSITION OVER RIVET

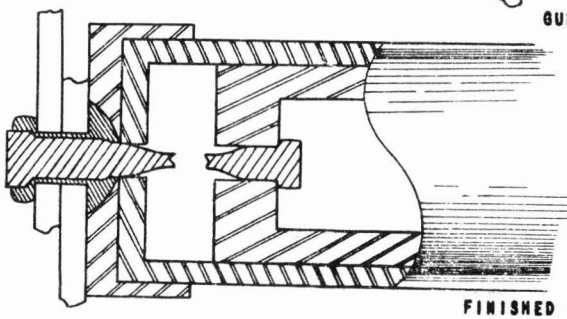
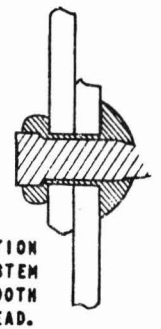


FIG. 46D RIVET INSTALLED- GUN STILL IN POSITION



FINISHED INSTALLATION
REMOVE EXCESS STEM WITH NIPPERS & SMOOTH OFF FLUSH WITH HEAD.

NOTE:

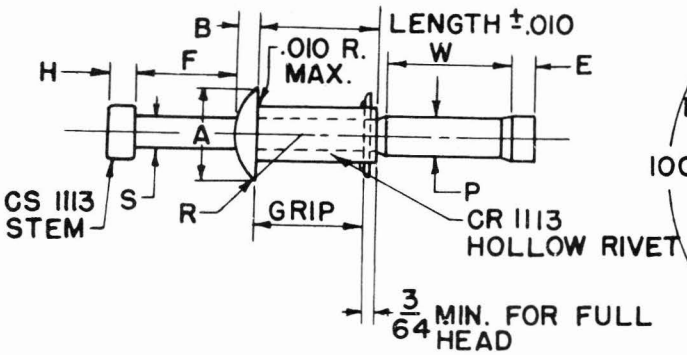
PREPARATORY TO RIVETING, DRILL ALL HOLES AT RIGHT ANGLES TO THE SHEETS, REMOVE ALL CHIPS AND DRILLING BURRS, AND USE CLAMPS OR SHEET SCREWS AT APPROXIMATELY EVERY SIXTH HOLE WHEN INSERTING SELF-BUCKING RIVETS.

CHERRY RIVET GUN IN POSITION

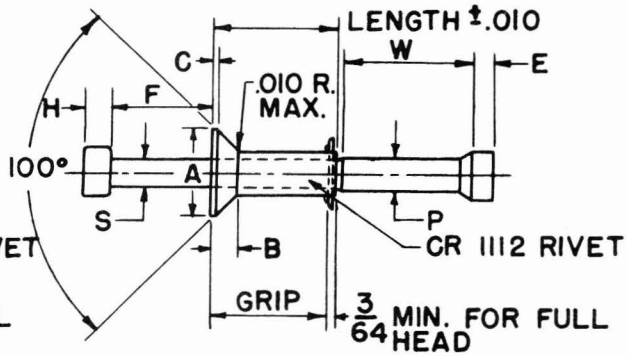
FIG. 46F

Figure 46 - Cherry Rivet Installation

LS 1127 BRAZIER HEAD ASSEM.



LS 1126 100° COUNTERSUNK HEAD ASSEM.



DIM.	1/8	.0035 .0010	5/32	.004 .001	3/16	.004 .001
A	15/64	.005	6/16	.006	25/64	.020
B	3/64	.0025	1/16	.003	5/64	.005
R	.170	.0025	.227	.003	.283	.010
E	3/64	MIN.	3/64	MIN.	1/16	MIN.
F	1/4	"	1/4	"	3/8	"
H	3/32	"	3/32	"	7/64	"
P	.102	.001	.127	.001	.152	.001
W	9/32		9/32		9/32	
S	.085	.002 .001	.109	.002 .001	.128	.002 .001

GRIP	LENGTH	DASH NUMBERS FOR LS-1127, CR-1113 & CS-1127		
1/16	1/8	4-2 (1160)	5-2 (635)	
1/8	3/16	4-4 (1045)	5-4 (590)	6-4 (370)
3/16	1/4	4-6 (985)	5-6 (550)	6-6 (350)
1/4	5/16	4-8 (920)	5-8 (520)	6-8 (330)

DIM.	1/8	.0035 .0010	5/32	.004 .001	3/16	.004 .001
A	.219	.004	.281	.004	.344	.005
B	.042	.002	.055	.002	.070	.003
C	.003	.002	.003	.002	.004	.002
E	3/64	MIN.	3/64	MIN.	1/16	MIN.
F	1/4	"	1/4	"	3/8	"
H	3/32	"	3/32	"	7/64	"
P	.102	.001	.127	.001	.152	.001
W	9/32		9/32		9/32	
S	.085	.002 .001	.109	.002 .001	.128	.002 .001

GRIP	LENGTH	DASH NUMBERS FOR LS-1126, CR-1112 & CS-1126		
1/16	1/8	4-2 (1240)	5-2 (690)	
1/8	3/16	4-4 (1130)	5-4 (640)	6-4 (410)
3/16	1/4	4-6 (1040)	5-6 (595)	6-6 (385)
1/4	5/16	4-8 (960)	5-8 (555)	6-8 (365)

NOTES:

1. **A MINIMUM OF 2 CHERRY RIVETS WILL HAVE TO BE USED FOR 1 STANDARD, OR THE NEXT SIZE LARGER.**

2. TOOL G-6 AND G-7 CHERRY RIVET GUN. CHERRY RIVET CO.
   1819 BARRANCA STREET LOS ANGELES, CALIFORNIA

EXAMPLE: IN SELECTING RIVET OF PROPER LENGTH, ALLOW MINIMUM OF 3/64 OF SHANK EXTENSION FOR UPSETTING: THUS LS-1126-4-4 AND LS-1127-4-4 ARE 1/8 IN. DIA. RIVETS X 3/16 IN. LONG FOR USE IN TOTAL STOCK THICKNESS OF FROM 5/64 IN. TO 9/64 IN.

MATERIAL: CR-1113 & CR-1112 RIVETS ARE A17ST ALUM. ALLOY A.S. SPEC. 25526
CS-1127 & CS-1126 STEMS ARE 17ST ALUM. ALLOY A.S. SPEC. 25526

FINISH: NONE. (MAY BE ANODIZED ON SPECIAL ORDER)

HEAT TREAT: DO NOT RE-HEAT TREAT LS-1127 & LS-1126

LIMITS: UNLESS OTHERWISE SPECIFIED

ANGULAR	1/2 DEGREES
FRACTIONAL	1/64
DECIMAL	.008

Figure 47 - Cherry Rivet Assembly

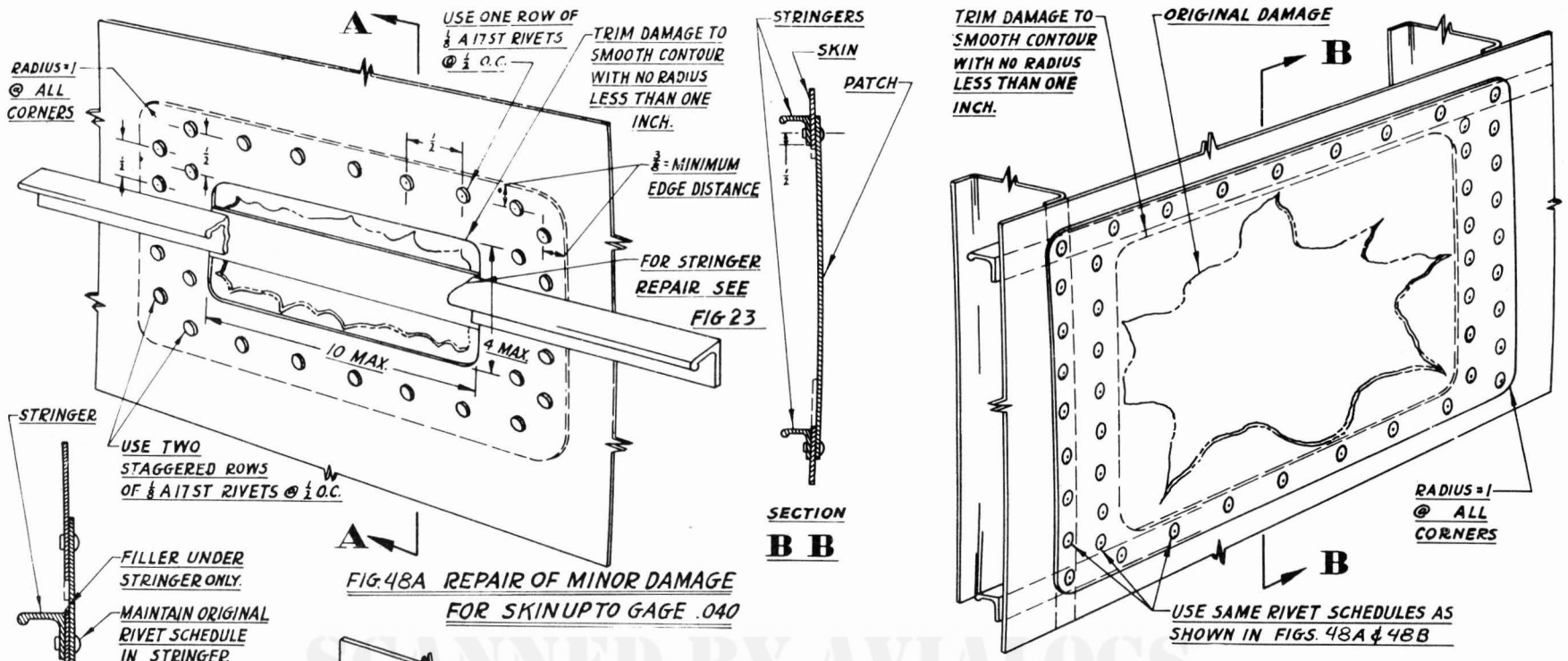
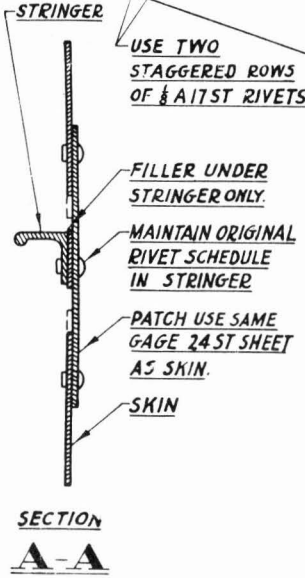


FIG. 48A REPAIR OF MINOR DAMAGE FOR SKIN UP TO GAGE .040

FIG. 48C REPAIR OF EXTENSIVE DAMAGE



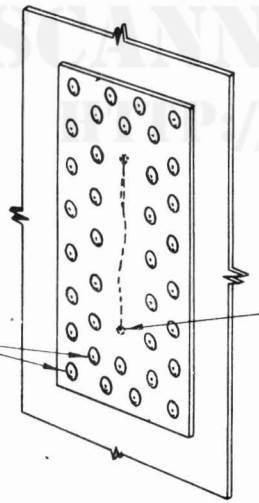


FIG. 48D PATCH FOR VERTICAL CRACK

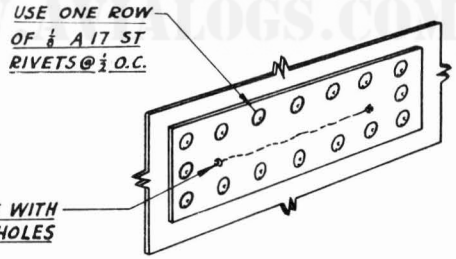


FIG. 48E PATCH FOR HORIZONTAL CRACK

FIG. 48B REPAIR OF MINOR DAMAGE FOR .064 SKIN

SPLICE SAME AS IN FIG. A EXCEPT FOR THE FOLLOWING RIVET SCHEDULE:
VERTICAL USE TWO STAGGERED ROWS OF 5/32 A17ST RIVETS @ 3/4 O.C.
HORIZONTAL USE ONE ROW OF 5/32 A17 ST RIVETS @ 3/4 O.C.

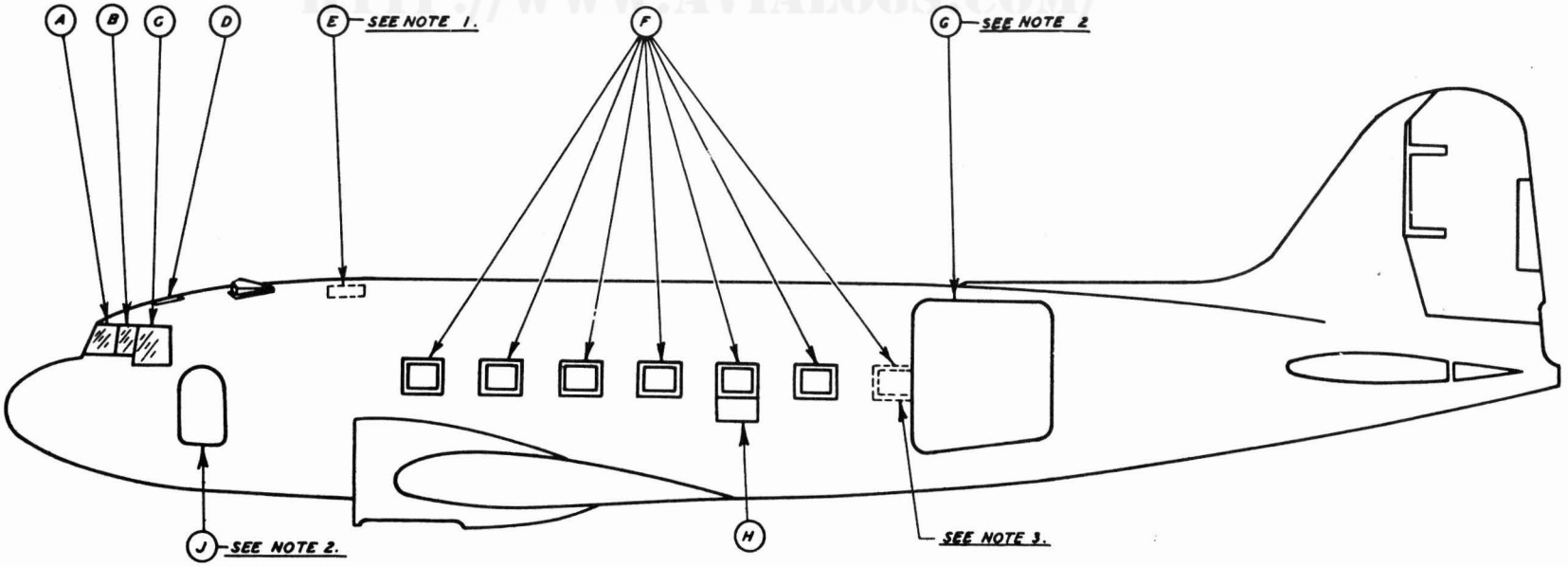
Figure 48 - Fuselage Skin Repair

REF.	PART NO.	PART NAME	REQ.
A	5117199& -1	L.H. & R.H. WINDOW ASSEM.	1
	4115409	GLASS	2
	2115401	RING	2
B	5115405 & -1	L.H. & R.H. WINDOW ASSEM.	2
C	4115404	GLASS	2
	5112869-40	SEALING STRIP	2
	5112869-41	SEALING STRIP	2
	5112869-87	SEALING STRIP	2
	5112869-88	SEALING STRIP	2
	5112869-89	SEALING STRIP	2
D	5117186	EMERGENCY HATCH	1
	5112869-50	SEALING STRIP	1
E	2114495	WINDOW PANE	1
	2114498	SEALING STRIP	1

REF.	PART NO.	PART NAME	REQ.
F	4114362	PANEL ASSEMBLY	13
	2114738	GAP	13
	2114497	SEALING STRIP	13
G	5110530	MAIN CARGO LOADING DOOR ASSEMBLY	1
H	5113191	AUXILARY EXIT ASSEMBLY	1
J	5115216	CARGO LOADING DOOR ASSEM.	1

NOTE:
1. RADIO COMPARTMENT WINDOW INSTALLED ON R.H. SIDE OF FUSELAGE ONLY.
2. MAIN CARGO LOADING DOOR AND NOSE SECTION CARGO LOADING DOOR INSTALLED ON L.H. SIDE OF FUSELAGE ONLY.
3. WINDOW INSTALLED ON R.H. SIDE OF FUSELAGE ONLY.

REFER TO DOUGLAS DWGS. 5117199, 5114063 5110530, 5112869, 5110542 & 5110523



VIEW SHOWING L.H. SIDE OF FUSELAGE

Figure 49 - Fuselage Windows And Doors

REF.	PART NO.	PART NAME	REQ.
A	5117199 & -1	L.H. & R.H. WINDOW ASSEM.	1
	4115409	GLASS	2
	2115401	RING	2
B	5115405 & -1	L.H. & R.H. WINDOW ASSEM.	2
C	4115404	GLASS	2
	5112869 - 40	SEALING STRIP	2
	5112869 - 41	SEALING STRIP	2
	5112869 - 87	SEALING STRIP	2
	5112869 - 88	SEALING STRIP	2
	5112869 - 89	SEALING STRIP	2
D	5117186	EMERGENCY HATCH	1
	5112869 - 50	SEALING STRIP	1
E	5188517	REAR LUGGAGE DOOR ASSEMBLY	1

REF.	PART NO.	PART NAME	REQ.
F	4114362	PANEL ASSEMBLY	14
	2114738	CAP	14
	2114497	SEALING STRIP	13
G	5148185	MAIN CABIN DOOR ASSEMBLY	1
H	5113191	AUXILIARY EXIT ASSEMBLY	3
J	5115216	FRONT CARGO DOOR ASSEM.	1

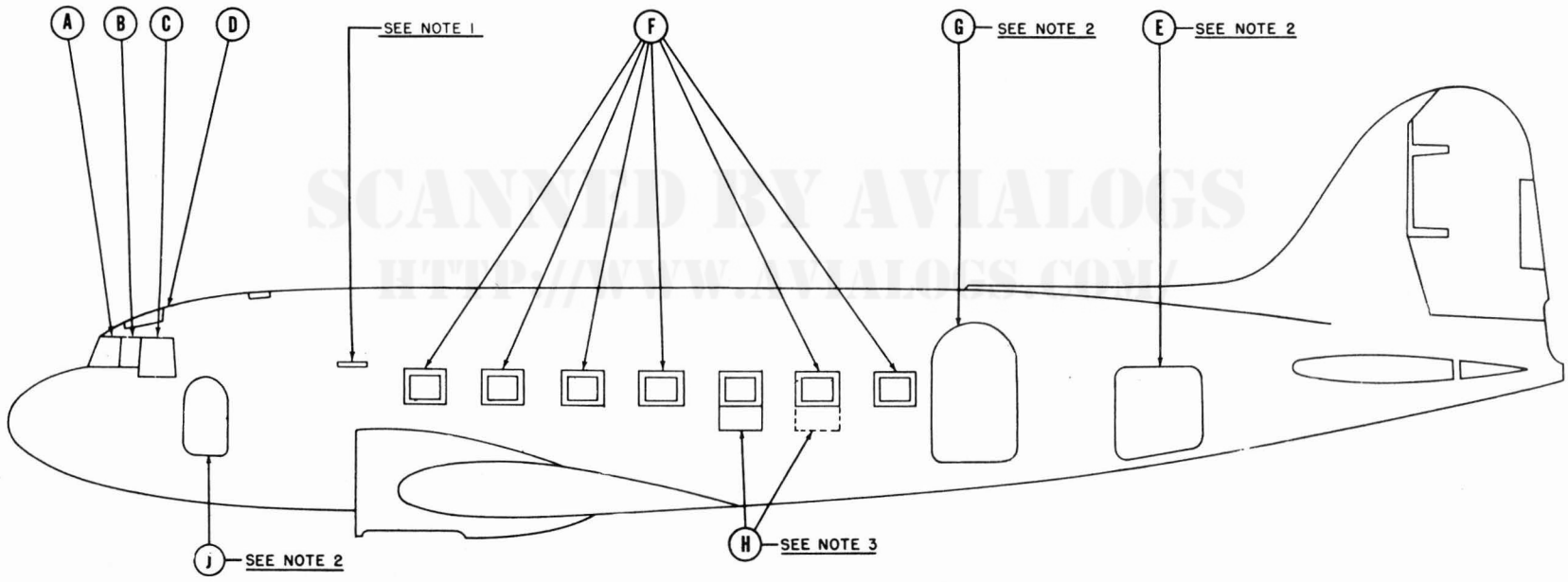
NOTE:

1. LUGGAGE COMPARTMENT WINDOW INSTALLED ON L.H. SIDE ONLY.

2. MAIN CABIN DOOR, FRONT CARGO DOOR & REAR LUGGAGE DOOR INSTALLED ON L.H. SIDE ONLY.

3. 2 AUXILIARY EXIT ASSEMBLIES REQ. ON R.H. SIDE - 1 ON L.H. SIDE.

REFER TO DOUGLAS DWGS. 5117199, 5188183, 5148767, 5112869, 5188241, & 5110523



VIEW SHOWING L.H. SIDE OF FUSELAGE

Figure 49A - Fuselage Windows and Doors (C-117A Model)

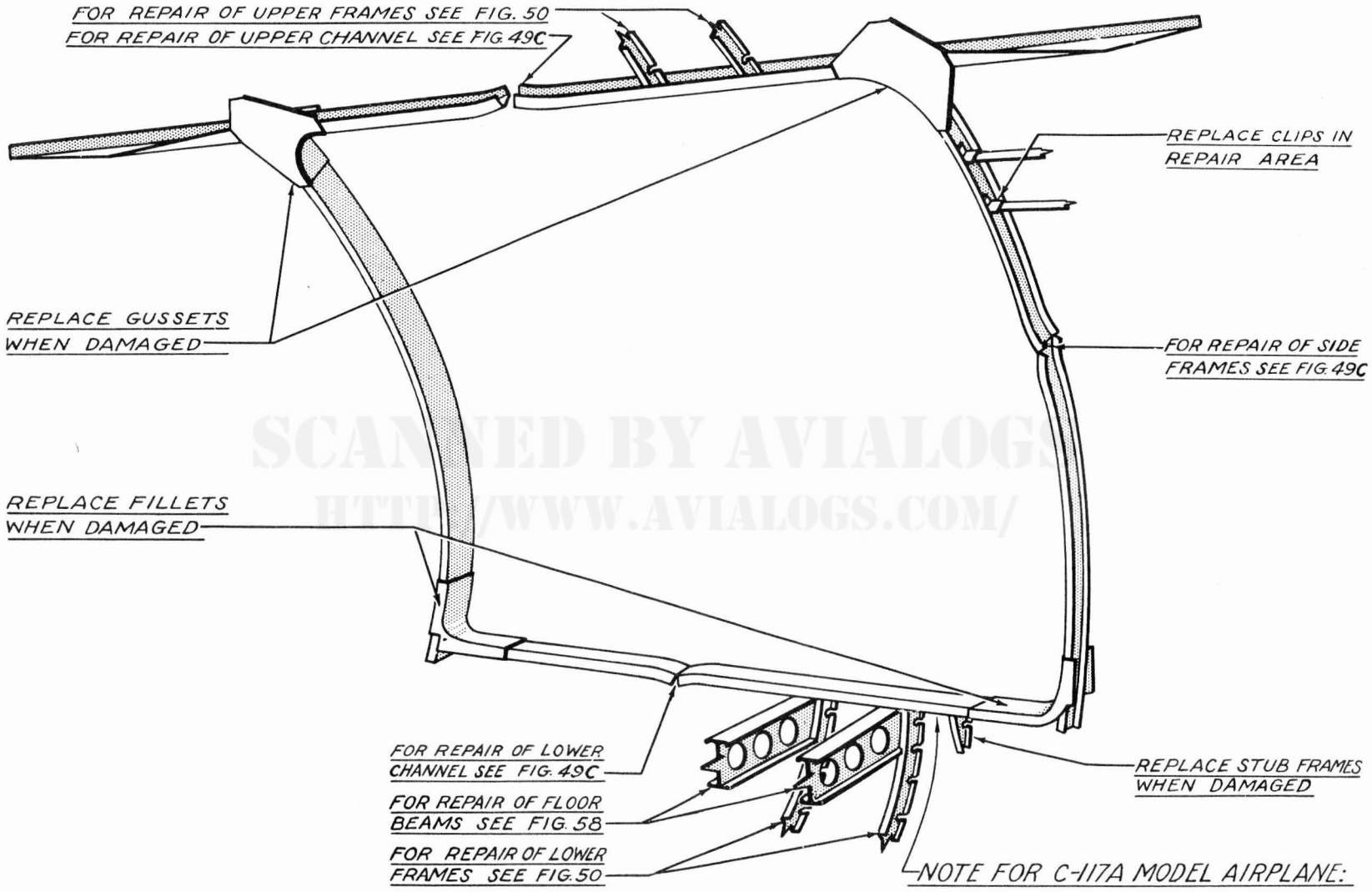


Figure 49B - Key Damage Drawing of Main Cargo Door Jamb (C-47 and C-117A Models)

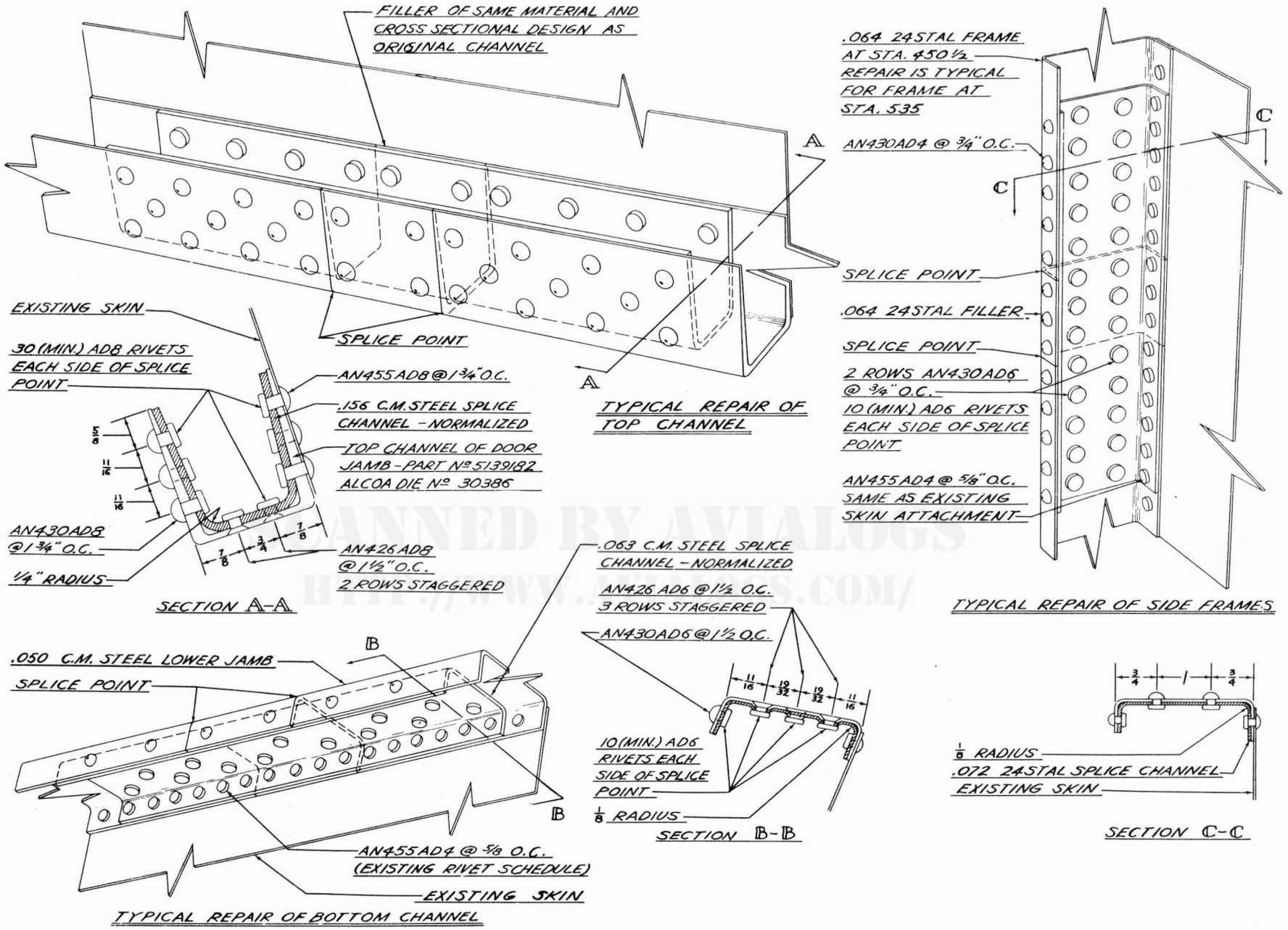


Figure 49C - Main Cargo Door Jamb Repairs

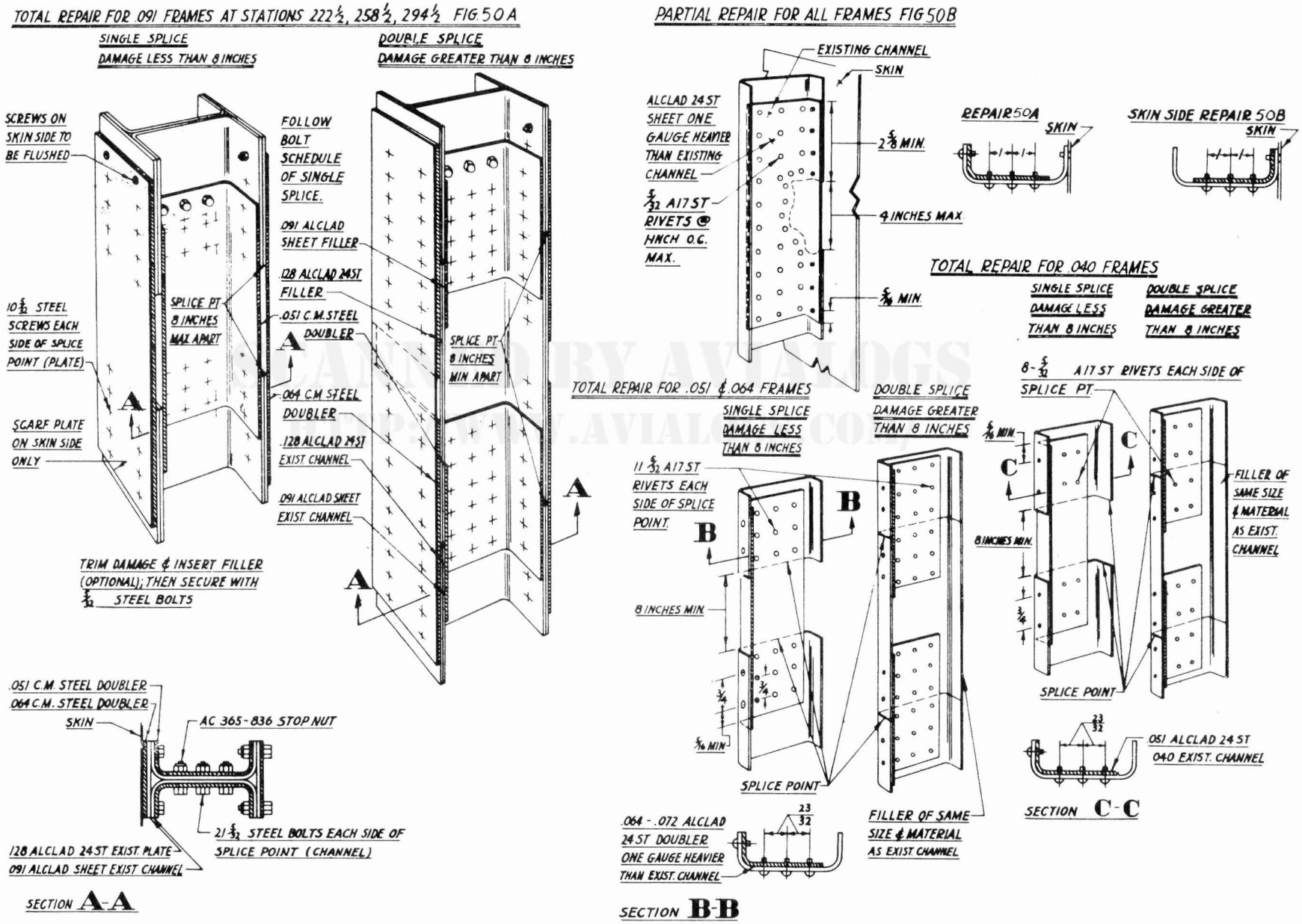


Figure 50 - Fuselage and Nacelle Frame Repairs

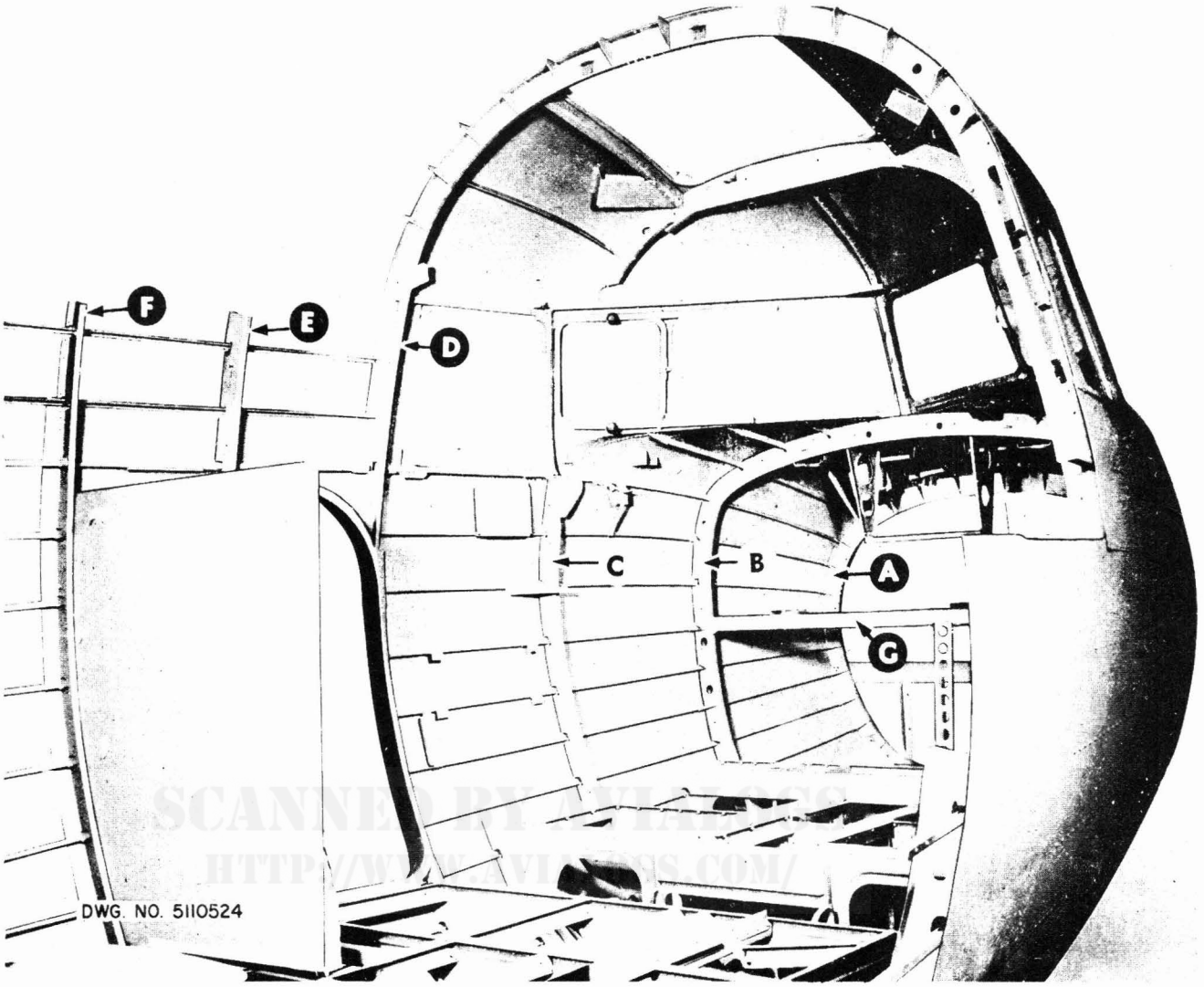


Figure 51 - Fuselage Nose Frames

KEY TO FIGURE 51

REF.	STATION	NAME	PART NO.	MATERIAL
A	20	Frame	5111485	.040 Alclad 24SO
B	40	Upper Frame	5111530	.040 Alclad 24SO
		Lower Frame	5111530	.051 Alclad 24SO
C	63	Frame	5111480-4	.051 Alclad 24SO
		Frames	5111480-2-3-40-41	.040 Alclad 24SO
D	86	Frames	5112375-2-4-14	.040 Alclad 24SO
		Frames	5112375-22-26-30	.051 Alclad 24SO
E	103	Frame	2113939	.040 Alclad 24SO
F	117-3/8	Frame	5113078	.040 Alclad 24SO
		Frame	5112374	.040 Alclad 24SO
G		Channel	5111530	.051 Alclad 24ST

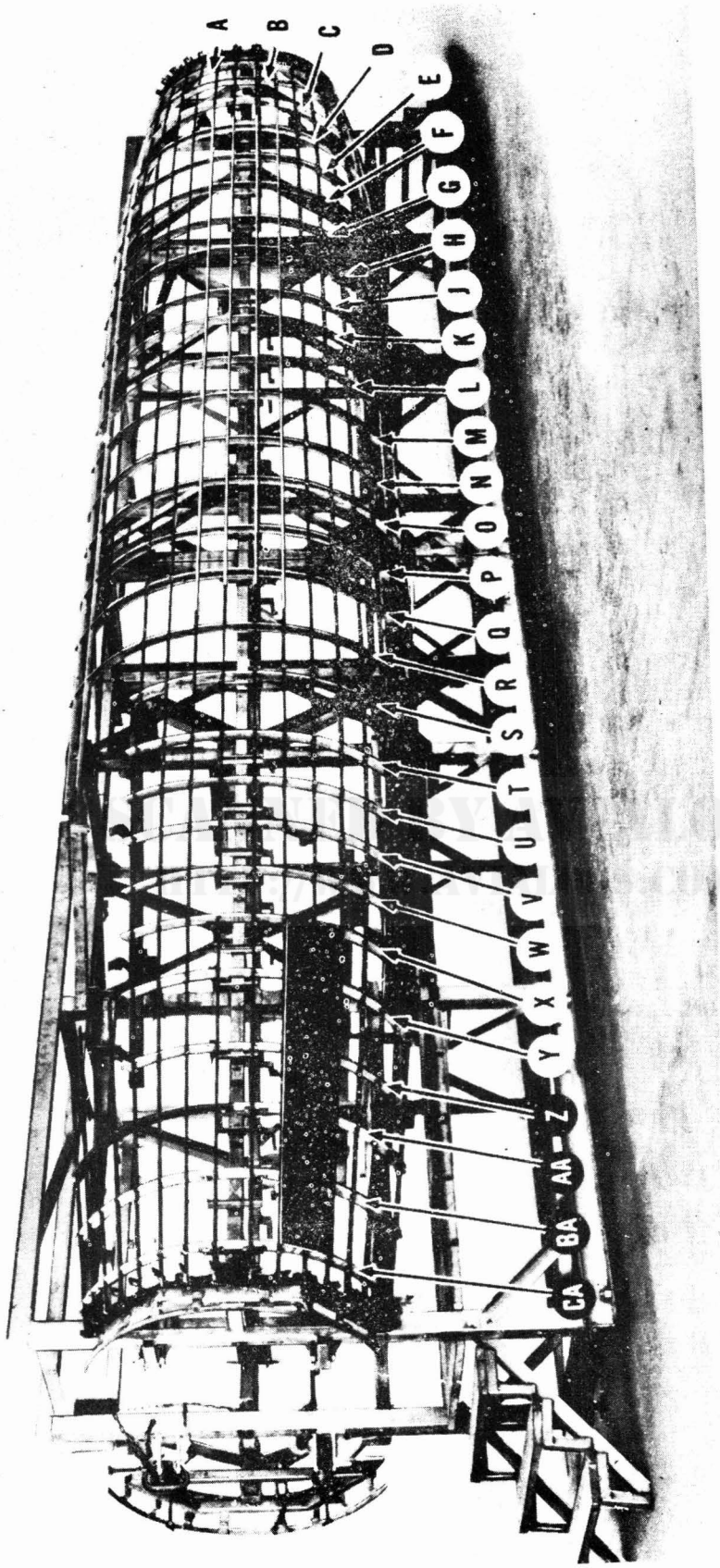


Figure 52 - Fuselage Structure

KEY TO FIGURE 52

REF.	STATION	NAME	PART NO.	MATERIAL
A	103	Frame	5112376 R.H.	.040 Alclad 24ST
		Frame	4113042 L.H.	.040 Alclad 24ST
B	117-3/8	Frame	5113079 R.H.	.040 Alclad 24ST
		Frame	5113921 L.H.	.040 Alclad 24ST
C	136-1/2	Frame	5112373 R.H.	.040 Alclad 24ST
		Frame	5112301 L.H.	.040 Alclad 24ST
D	156-1/2	Frame	5111277 R.H.	.040 Alclad 24ST
		Frame	5111278 L.H.	.040 Alclad 24ST
E	177-1/2	Frame	5111377 R.H.	.040 Alclad 24ST
		Frame	5111376 L.H.	.040 Alclad 24ST
F	195-1/2	Frame	5111394 R.H.	.040 Alclad 24ST
		Frame	5111395 L.H.	.040 Alclad 24ST
G	216-1/2	Frame	5111641 R.H.	.040 Alclad 24ST
		Frame	5111642 L.H.	.040 Alclad 24ST
H	234-1/2	Frame	5111986 R.H.	.040 Alclad 24ST
		Frame	5111985 L.H.	.040 Alclad 24ST
J	258-1/2	Frame	5111426 R.H.	.091 Alclad 24ST
		Frame	5111425 L.H.	.091 Alclad 24ST
K	273-1/2	Frame	5112031 R.H.	.064 Alclad 24ST
		Frame	5112030 L.H.	.040 Alclad 24ST
L	294-1/2	Frame	5112045 R.H.	.091 Alclad 24ST
		Frame	5112046 L.H.	.091 Alclad 24ST
M	312	Frame	5111836 R.H.	.040 Alclad 24ST
		Frame	5111835 L.H.	.040 Alclad 24ST
N	333-1/2	Frame	5111763 R.H.	.040 Alclad 24ST
		Frame	5111762 L.H.	.040 Alclad 24ST
O	351-1/2	Frame	5111735 R.H.	.040 Alclad 24ST
		Frame	5111734 L.H.	.040 Alclad 24ST
P	372-1/2	Frame	5111599 R.H.	.040 Alclad 24ST
		Frame	5111598 L.H.	.040 Alclad 24ST
Q	390-1/2	Frame	5111555 R.H.	.040 Alclad 24ST
		Frame	5111553 L.H.	.040 Alclad 24ST
R	411-1/2	Frame	5111463 R.H.	.040 Alclad 24ST
		Frame	5111464 L.H.	.040 Alclad 24ST
S	429-1/2	Frame	5111611 R.H.	.051 Alclad 24ST
		Frame	5111610 L.H.	.051 Alclad 24ST
T	450-1/2	Frame	5111907 R.H.	.051 Alclad 24ST
		Frame	5111909 L.H.	.064 Alclad 24ST
U	465-1/2	Frame	5112054 R.H.	.051 Alclad 24ST
		Frame	5112053 L.H.	.051 Alclad 24ST
V	479	Frame	5112100 R.H.	.051 Alclad 24ST
		Frame	5112099 L.H.	.051 Alclad 24ST
W	492	Frame	5112205 R.H.	.051 Alclad 24ST
		Frame	5112202 L.H.	.051 Alclad 24ST
X	506	Frame	5112126 R.H.	.051 Alclad 24ST
		Frame	5112127 L.H.	.051 Alclad 24ST
Y	520	Frame	5112270 R.H.	.051 Alclad 24ST
		Frame	5112268 L.H.	.051 Alclad 24ST
Z	538	Frame	5112391 R.H.	.040 Alclad 24ST
		Frame	5112563 L.H.	.040 Alclad 24ST
AA	553	Frame	5111224 R.H.	.040 Alclad 24ST
		Frame	5111223 L.H.	.040 Alclad 24ST
BA	568	Frame	5111284 R.H.	.040 Alclad 24ST
		Frame	5111285 L.H.	.040 Alclad 24ST
CA	583	Frame	5111365 R.H.	.040 Alclad 24ST
		Frame	5111364 L.H.	.040 Alclad 24ST

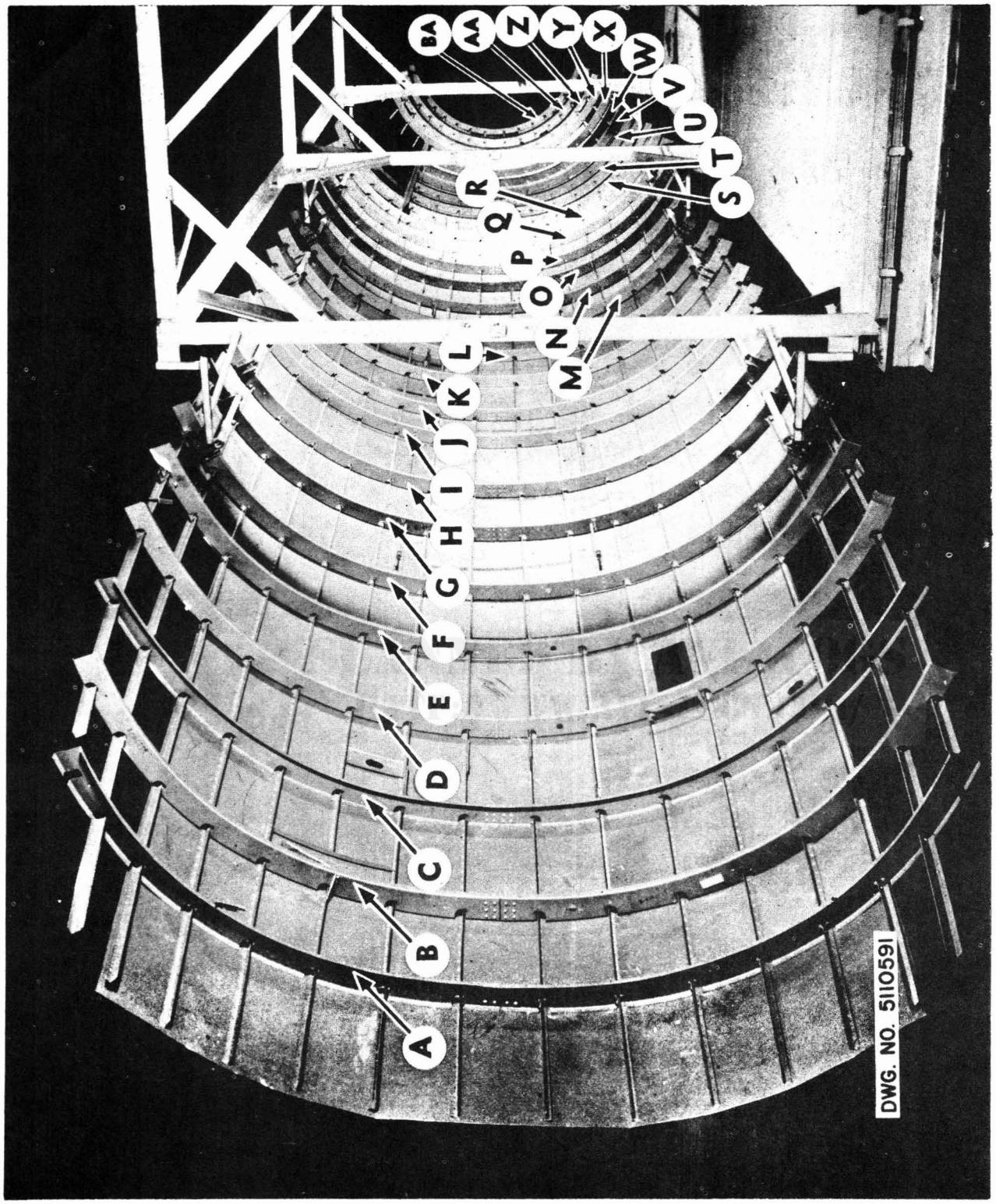


Figure 53 - Fuselage Frames Upper Section

KEY TO FIGURE 53

REF.	STATION	NAME	PART NO.	MATERIAL
A	103	Frame	5112376 R.H.	.040 Alclad 24SO
		Frame	4113042 L.H.	.040 Alclad 24SO
B	117-3/8	Frame	5113079 R.H.	.040 Alclad 24SO
		Frame	5113921 L.H.	.040 Alclad 24SO
C	136-1/2	Frame	5112373 R.H.	.040 Alclad 24SO
		Frame	5112301 L.H.	.040 Alclad 24SO
D	156-1/2	Frame	5111277 R.H.	.040 Alclad 24SO
		Frame	5111278 L.H.	.040 Alclad 24SO
E	177-1/2	Frame	5111377 R.H.	.040 Alclad 24SO
		Frame	5111376 L.H.	.040 Alclad 24SO
F	195-1/2	Frame	5111394 R.H.	.040 Alclad 24SO
		Frame	5111395 L.H.	.040 Alclad 24SO
G	216-1/2	Frame	5111641 R.H.	.040 Alclad 24SO
		Frame	5111642 L.H.	.040 Alclad 24SO
H	234-1/2	Frame	5111986 R.H.	.040 Alclad 24SO
		Frame	5111985 L.H.	.040 Alclad 24SO
I	258-1/2	Frame	5111426 R.H.	.040 Alclad 24SO
		Frame	5111425 L.H.	.040 Alclad 24SO
J	273-1/2	Frame	5112031 R.H.	.040 Alclad 24SO
		Frame	5112030 L.H.	.040 Alclad 24SO
K	294-1/2	Frame	5112045 R.H.	.040 Alclad 24SO
		Frame	5112046 L.H.	.040 Alclad 24SO
L	312-1/2	Frame	5111836 R.H.	.040 Alclad 24SO
		Frame	5111835 L.H.	.040 Alclad 24SO
M	333-1/2	Frame	5111763 R.H.	.040 Alclad 24SO
		Frame	5111762 L.H.	.040 Alclad 24SO
N	351-1/2	Frame	5111735 R.H.	.040 Alclad 24SO
		Frame	5111734 L.H.	.040 Alclad 24SO
O	372-1/2	Frame	5111599 R.H.	.040 Alclad 24SO
		Frame	5111598 L.H.	.040 Alclad 24SO
P	390-1/2	Frame	5111555 R.H.	.040 Alclad 24SO
		Frame	5111553 L.H.	.040 Alclad 24SO
Q	411-1/2	Frame	5111463 R.H.	.040 Alclad 24SO
		Frame	5111464 L.H.	.040 Alclad 24SO
R	429-1/2	Frame	5111611 R.H.	.040 Alclad 24SO
		Frame	5111610 L.H.	.051 Alclad 24SO
S	450-1/2	Frame	5111907 R.H.	.051 Alclad 24SO
		Frame	4112057 L.H.	.051 Alclad 24SO
T	465-1/2	Frame	5112054 R.H.	.051 Alclad 24SO
		Frame	4112053 L.H.	.051 Alclad 24SO
U	479	Frame	5112100 R.H.	.051 Alclad 24SO
		Frame	5112099 L.H.	.051 Alclad 24SO
V	492	Frame	5112205 R.H.	.051 Alclad 24SO
		Frame	4112202 L.H.	.051 Alclad 24SO
W	506	Frame	5112126 R.H.	.051 Alclad 24SO
		Frame	5112127 L.H.	.051 Alclad 24SO
X	520	Frame	5112270 R.H.	.051 Alclad 24SO
		Frame	5112268 L.H.	.051 Alclad 24SO
Y	538	Frame	5112391 R.H.	.040 Alclad 24SO
		Frame	5112563 L.H.	.040 Alclad 24SO
Z	553	Frame	5111224 R.H.	.040 Alclad 24SO
		Frame	5111223 L.H.	.040 Alclad 24SO
AA	568	Frame	5111284 R.H.	.040 Alclad 24SO
		Frame	5111285 L.H.	.040 Alclad 24SO
BA	583	Frame	5111365 R.H.	.040 Alclad 24SO
		Frame	5111364 L.H.	.040 Alclad 24SO

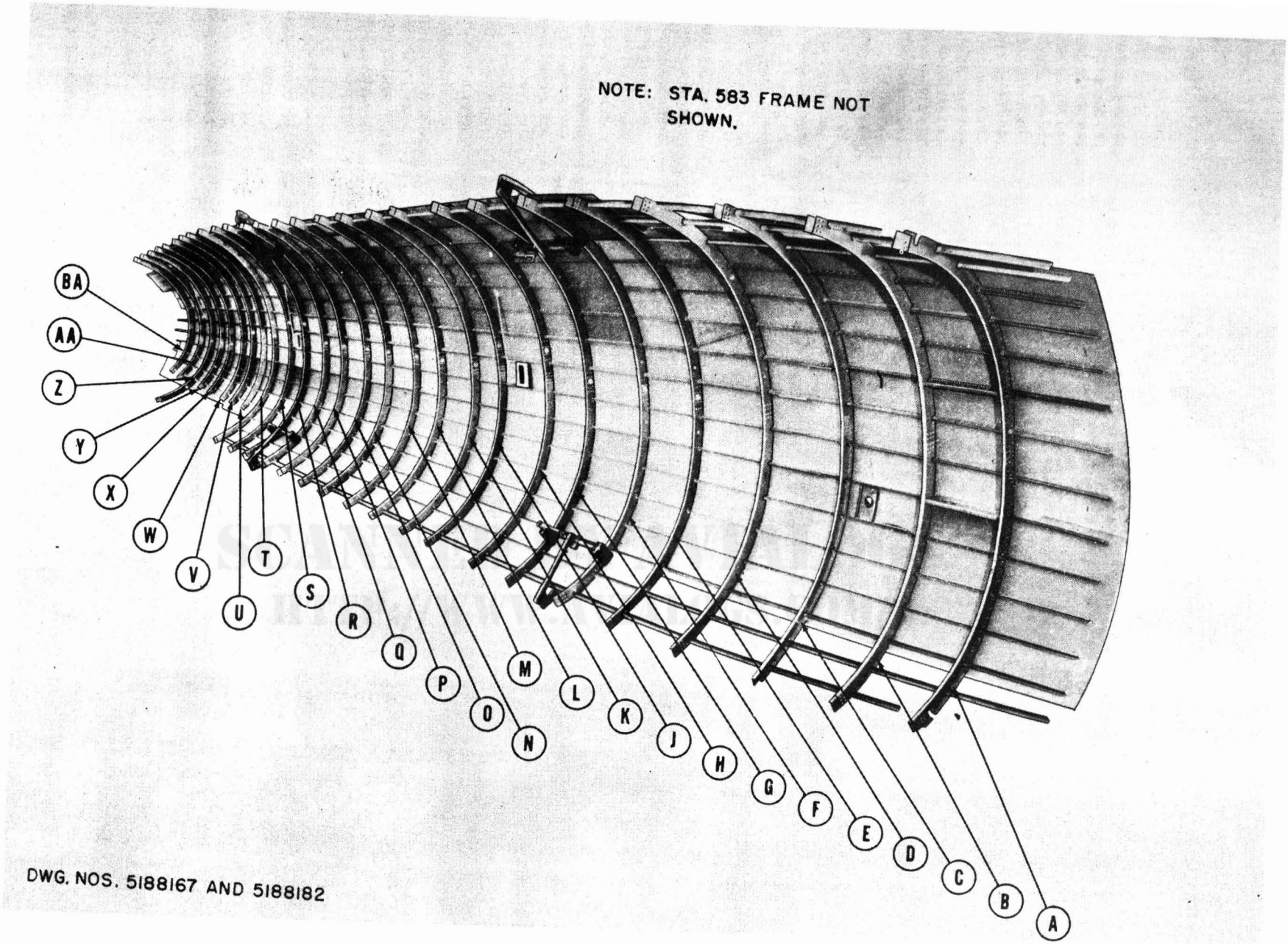


Figure 53A - Fuselage Frames Upper Section (C-117A Airplane)

KEY TO FIGURE 53A

REF.	STATION	NAME	PART NO.	MATERIAL
A	103	Frame	5112376 R.H.	.040 24ST AL
		Frame	4113042 L.H.	.040 24ST AL
B	117-3/8	Frame	5188194 R.H.	.040 24ST AL
		Frame	5188230 L.H.	.040 24ST AL
C	136-1/2	Frame	5188195 R.H.	.040 24ST AL
		Frame	5188231 L.H.	.040 24ST AL
D	156-1/2	Frame	5111277 R.H.	.040 24ST AL
		Frame	5111278 L.H.	.040 24ST AL
E	177-1/2	Frame	5111377 R.H.	.040 24ST AL
		Frame	5111376 L.H.	.040 24ST AL
F	195-1/2	Frame	5111394 R.H.	.040 24ST AL
		Frame	5111395 L.H.	.040 24ST AL
G	216-1/2	Frame	5111641 R.H.	.040 24ST AL
		Frame	5111642 L.H.	.040 24ST AL
H	234-1/2	Frame	5111986 R.H.	.040 24ST AL
		Frame	5111985 L.H.	.040 24ST AL
J	258-1/2	Frame	5111426 R.H.	.040 24ST AL
		Frame	5111425 L.H.	.040 24ST AL
K	273-1/2	Frame	5112031 R.H.	.040 24ST AL
		Frame	5112030 L.H.	.040 24ST AL
L	294-1/2	Frame	5112045 R.H.	.040 24ST AL
		Frame	5112046 L.H.	.040 24ST AL
M	312-1/2	Frame	5111836 R.H.	.040 24ST AL
		Frame	5111835 L.H.	.040 24ST AL
N	333-1/2	Frame	5111763 R.H.	.040 24ST AL
		Frame	5111762 L.H.	.040 24ST AL
O	351-1/2	Frame	5111735 R.H.	.040 24ST AL
		Frame	5111734 L.H.	.040 24ST AL
P	372-1/2	Frame	5111599 R.H.	.040 24ST AL
		Frame	5111598 L.H.	.040 24ST AL
Q	390-1/2	Frame	5188191 R.H.	.040 24ST AL
		Frame	5111553 L.H.	.040 24ST AL
R	411-1/2	Frame	5188192 R.H.	.040 24ST AL
		Frame	5139820 L.H.	.040 24ST AL
S	429-1/2	Frame	5111611 R.H.	.040 24ST AL
		Frame	5188176 L.H.	.040 24ST AL
T	450-1/2	Frame	5004450 R.H. L.H.	.040 24ST AL
U	461-1/2	Frame	5148387 L.H.	.040 24ST AL
V	465-1/2	Frame	5188716 R.H. L.H.	.040 24ST AI
W	479	Frame	5188717 R.H. L.H.	.040 24ST AI
X	492	Frame	5188718 R.H. L.H.	.040 24ST AL
Y	510-1/4	Frame	5188719 R.H. L.H.	.040 24ST AL
Z	524	Frame	5188720 R.H. L.H.	.040 24ST AL
AA	538	Frame	5160862 R.H. L.H.	.040 24ST AL
BA	553	Frame	5111224 R.H.	.040 24ST AL
		Frame	4188181 L.H.	.040 24ST AL
CA	568	Frame	5111284 R.H.	.040 24ST AL
		Frame	5188178 L.H.	.040 24ST AL
DA	583	Frame	5111365 R.H.	.040 24ST AL
		Frame	5111364 L.H.	.040 24ST AL

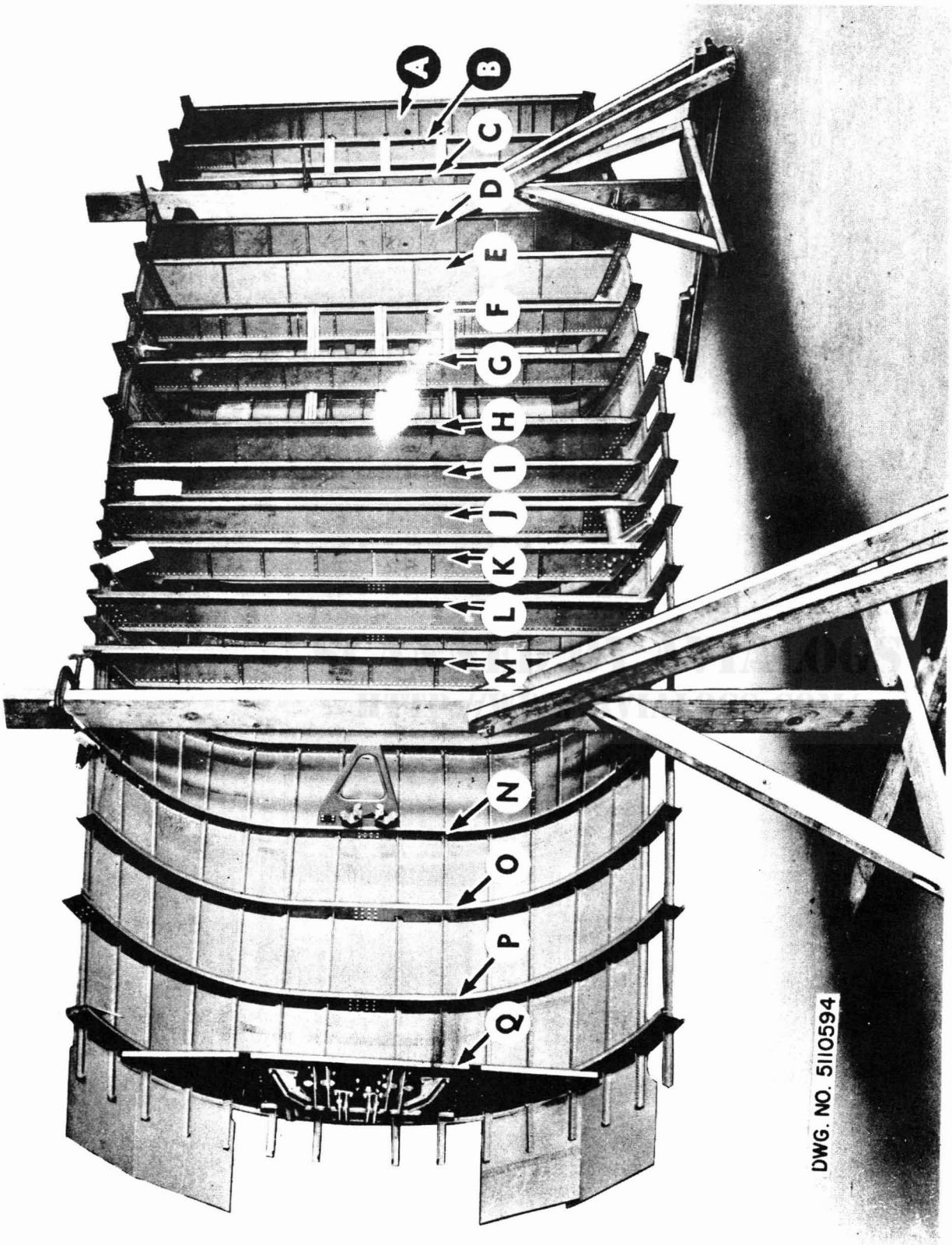


Figure 54 - Fuselage Frames Lower Section

KEY TO FIGURE 54

REF.	STATION	NAME	PART NO.	MATERIAL
A	312-1/2	Frame	5111095	.040 Alclad 24SO
		Floor Beam	5111124	Ext. No. 54
		Floor Beam Web		.032 Alclad 24ST
B	333-1/2	Frame	5111761	.040 Alclad 24SO
		Floor Beam	5110892	Ext. No. 24
		Floor Beam Web		.025 Alclad 24ST
C	351-1/2	Frame	5111122	.040 Alclad 24SO
		Floor Beam	5111125	Ext. No. 54
		Floor Beam Web		.051 Alclad 24ST
D	372-1/2	Frame	5111109	.040 Alclad 24SO
		Floor Beam	5111125	Ext. No. 54
		Floor Beam Web		.051 Alclad 24ST
E	390-1/2	Frame	5111554	.040 Alclad 24SO
		Floor Beam	5111222	Ext. No. 24
		Floor Beam Web		.025 Alclad 24ST
F	411-1/2	Frame	5111165	.040 Alclad 24SO
		Floor Beam	5114377	Ext. No. 24
		Floor Beam Web		.025 Alclad 24ST
G	429-1/2	Frame	5111167	.040 Alclad 24SO
		Floor Beam	5114247	Ext. No. 24
		Floor Beam Web		.025 Alclad 24ST
H	450-1/2	Frame	5111906	.051 Alclad 24SO
		Floor Beam	5111913	Ext. No. 54
		Floor Beam Web		.051 Alclad 24ST
I	465-1/2	Frame	5112052	.051 Alclad 24SO
		Floor Beam	5112084	Ext. Nos. 24 and 12
		Floor Beam Web		.032 Alclad 24ST
J	479	Frame	5112064	.051 Alclad 24SO
		Floor Beam	5112085	Ext. Nos. 24 and 12
		Floor Beam Web		.032 Alclad 24ST
K	492	Frame	5112204	.051 Alclad 24SO
		Floor Beam	5112086	Ext. Nos. 24 and 12
		Floor Beam Web		.032 Alclad 24ST
L	506	Frame	5112125	.051 Alclad 24SO
		Floor Beam	5112087	Ext. Nos. 24 and 12
		Floor Beam Web		.032 Alclad 24ST
M	520	Frame	5112269	.051 Alclad 24SO
		Floor Beam	5112088	Ext. Nos. 24 and 12
		Floor Beam Web		.032 Alclad 24ST
N	538	Frame	5112392	.040 Alclad 24SO
O	553	Frame	5111090	.040 Alclad 24SO
P	568	Frame	5111048	.040 Alclad 24SO
Q	583	Frame	5111363	.040 and .051 Alclad 24SO

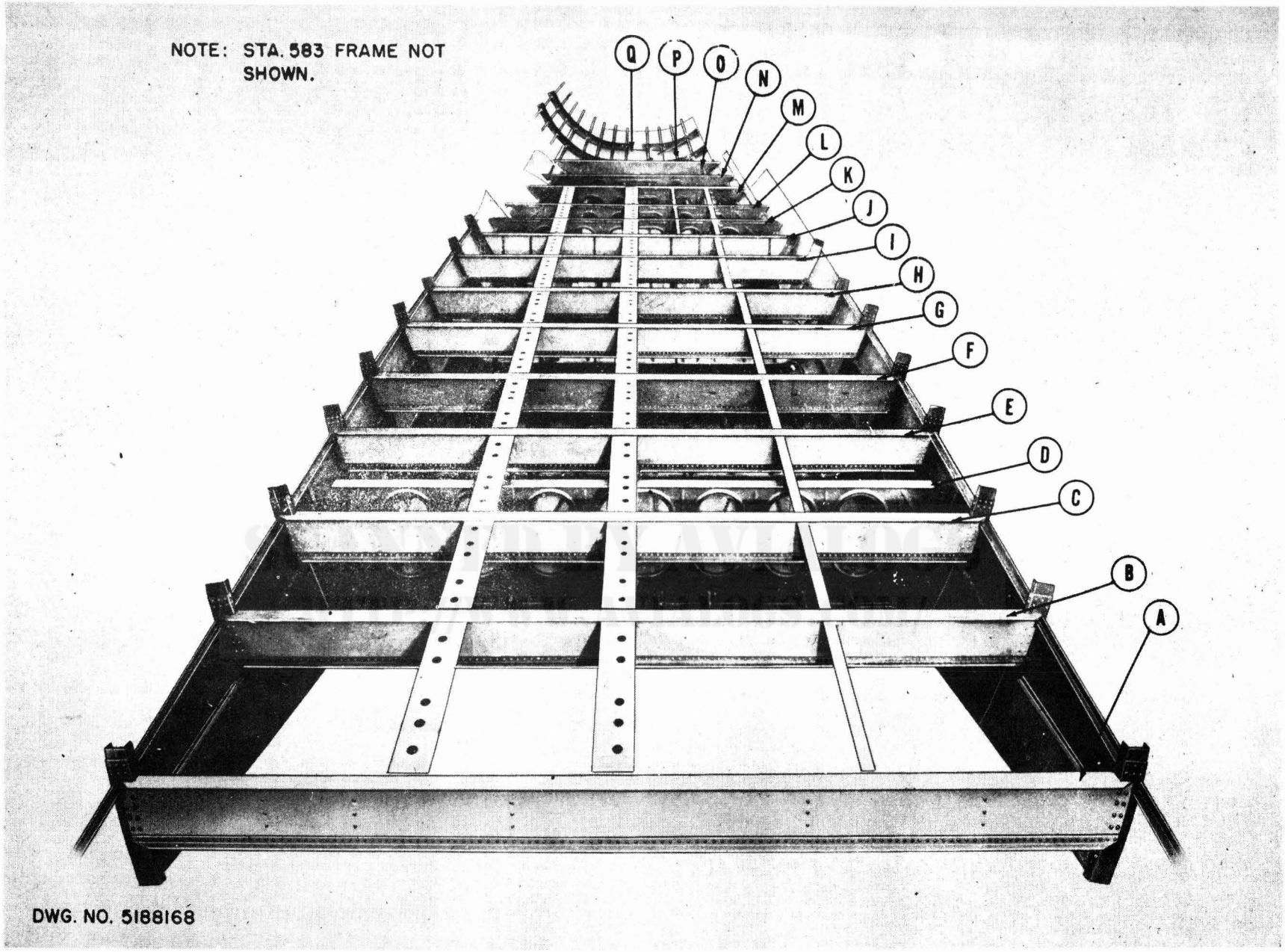


Figure 54A - Fuselage Frames, Lower Section (C-117A Model)

KEY TO FIGURE 54A

REF.	STATION	NAME	PART NO.	MATERIAL
A	312-1/2	Frame	5188169	.040 24ST AL
		Floor Beam	5012100-3	Ext. S-1003807
		Floor Beam Web		.032 24ST AL
B	333-1/2	Frame	5188166	.040 24ST AL
		Floor Beam	5012100-3	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
C	351-1/2	Frame	5188170	.040 24ST AL
		Floor Beam	5012100-3	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
D	372-1/2	Frame	5188171	.032 24ST AL
		Floor Beam	5012100-4	Ext. S-1003807
		Floor Beam Web		.032 24ST AL
E	390-1/2	Frame	5188163	.040 24ST AL
		Floor Beam	5012100-5	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
F	411-1/2	Frame	5188175	.040 24ST AL
		Floor Beam	5012100-6	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
G	429-1/2	Frame	5188162	.040 24ST AL
		Floor Beam	5012100-7	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
H	450-1/2	Frame	5004450	.040 24ST AL
		Floor Beam	5012100-8	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
I	465-1/2	Frame	5188716	.040 24ST AL
		Floor Beam	5012100-9	Ext. S-1003807
		Floor Beam Web		.025 24ST AL
J	479	Frame	5188717	.040 24ST AL
K	492	Frame	5188718	.051 24ST AL
L	510-1/4	Frame	5188719	.040 24ST AL
M	524	Frame	5188720	.040 24ST AL
N	538	Frame	5160862	.051 24ST AL
O	553	Frame	5188172	.040 24ST AL
P	568	Frame	5188174	.040 24ST AL
Q	583	Frame	5111363	.040 and .051 24ST AL

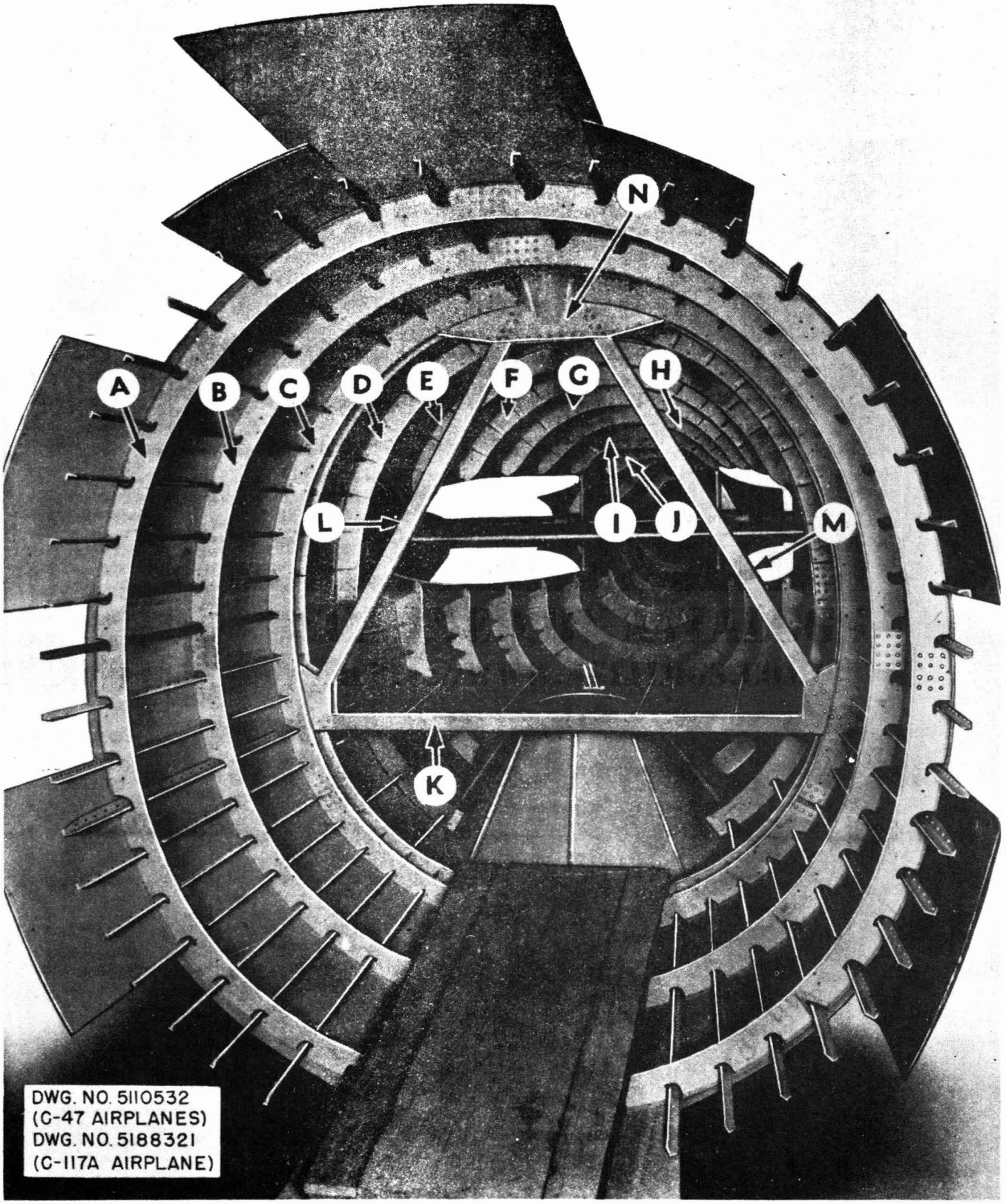


Figure 55 - Fuselage Rear Section Frames (C-47 and C-117A Models)

KEY TO FIGURE 55

REF.	STATION	NAME	PART NO.	MATERIAL
A	596	Frame	5111252	.040 24ST AL
B (C-47)	609-5/8	Frame	5111252	.040 24ST AL
B (C-117A)	609-5/8	Frame	5188398	.040 24ST AL
C	623-625	Frame	5116314	.040 24ST AL
D	636-5/8	Frame (Upper)	5116387-4 L.H. & -5 R.H.	.064 24ST AL
		Frame (Lower)	5116387-6 L.H. & -7 R.H.	.040 24ST AL
E	651	Frame (Upper)	5116364-8	.064 24ST AL
		Frame (Lower)	5116364-6 L.H. & -7 R.H.	.051 24ST AL
F	664	Frame (Upper)	5116868-8	.064 24ST AL
		Frame (Lower)	5116868-6	.051 24ST AL
G	677	Frame (Upper)	5116388-8	.064 24ST AL
		Frame (Lower)	5116388-6	.051 24ST AL
H	690	Frame (Upper)	5116145-6	.064 24ST AL
		Frame (Lower)	5116145-8	.051 24ST AL
I	703	Frame (Upper)	5118108-12	.064 24ST AL
		Frame (Lower)	5118108-10	.051 24ST AL
J (C-47)	718-3/8	Frame (Upper)	5116362-2	.051 24ST AL
		Frame (Lower)	5116362-4	.064 24ST AL
J (C-117A)	718-3/8	Frame (Upper)	5188399-2	.051 24ST AL
		Frame (Lower)	5116362-4	.064 24ST AL
K		Channel	5116314-20	.051 24ST AL
L		Channel	5116314-10 L.H.	.051 24ST AL
M		Channel	5116314-11 R.H.	.051 24ST AL
N		Fitting	5116317	

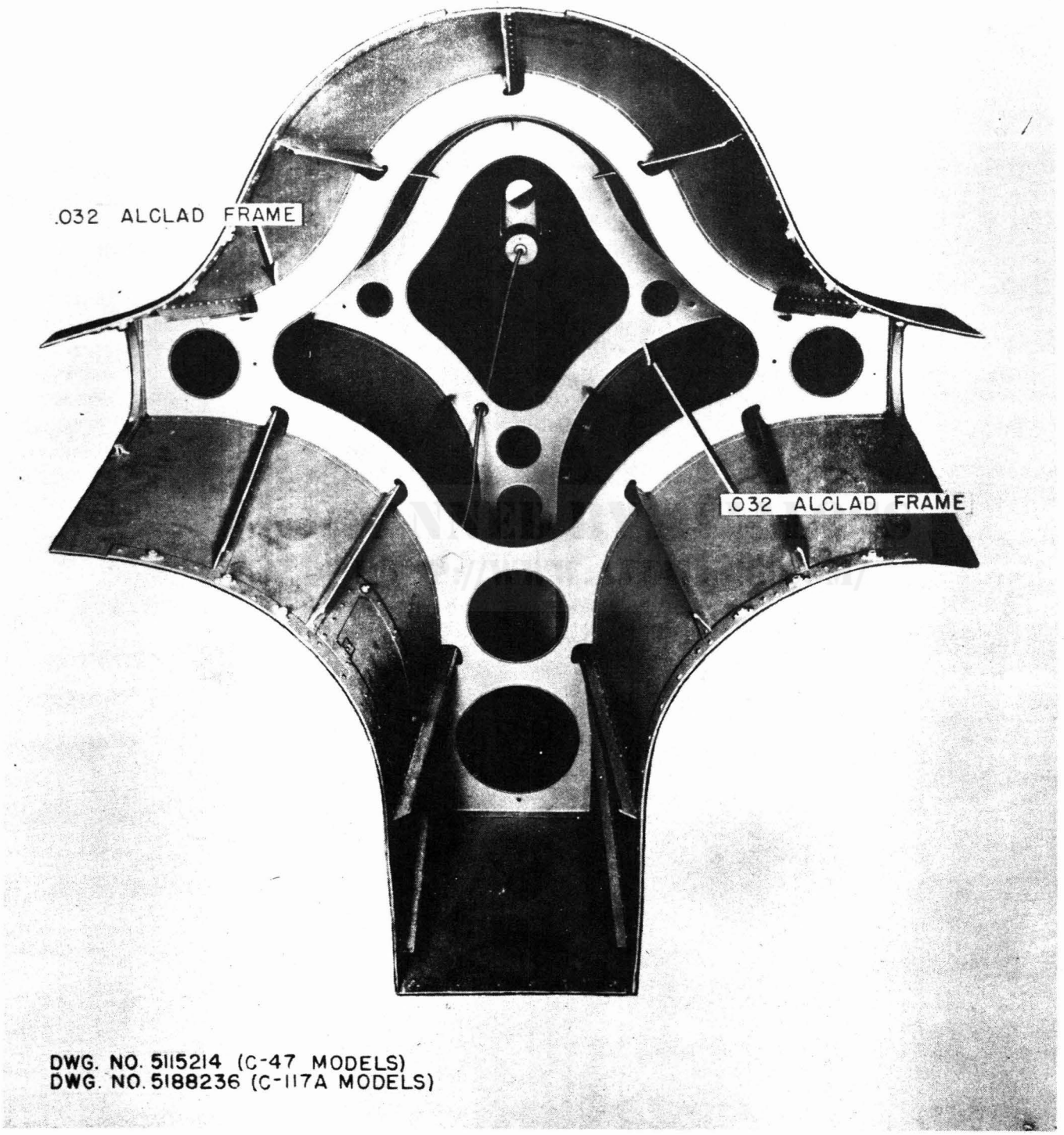


Figure 56 - Fuselage Tail Cone Frames (C-47 and C-117A Models)

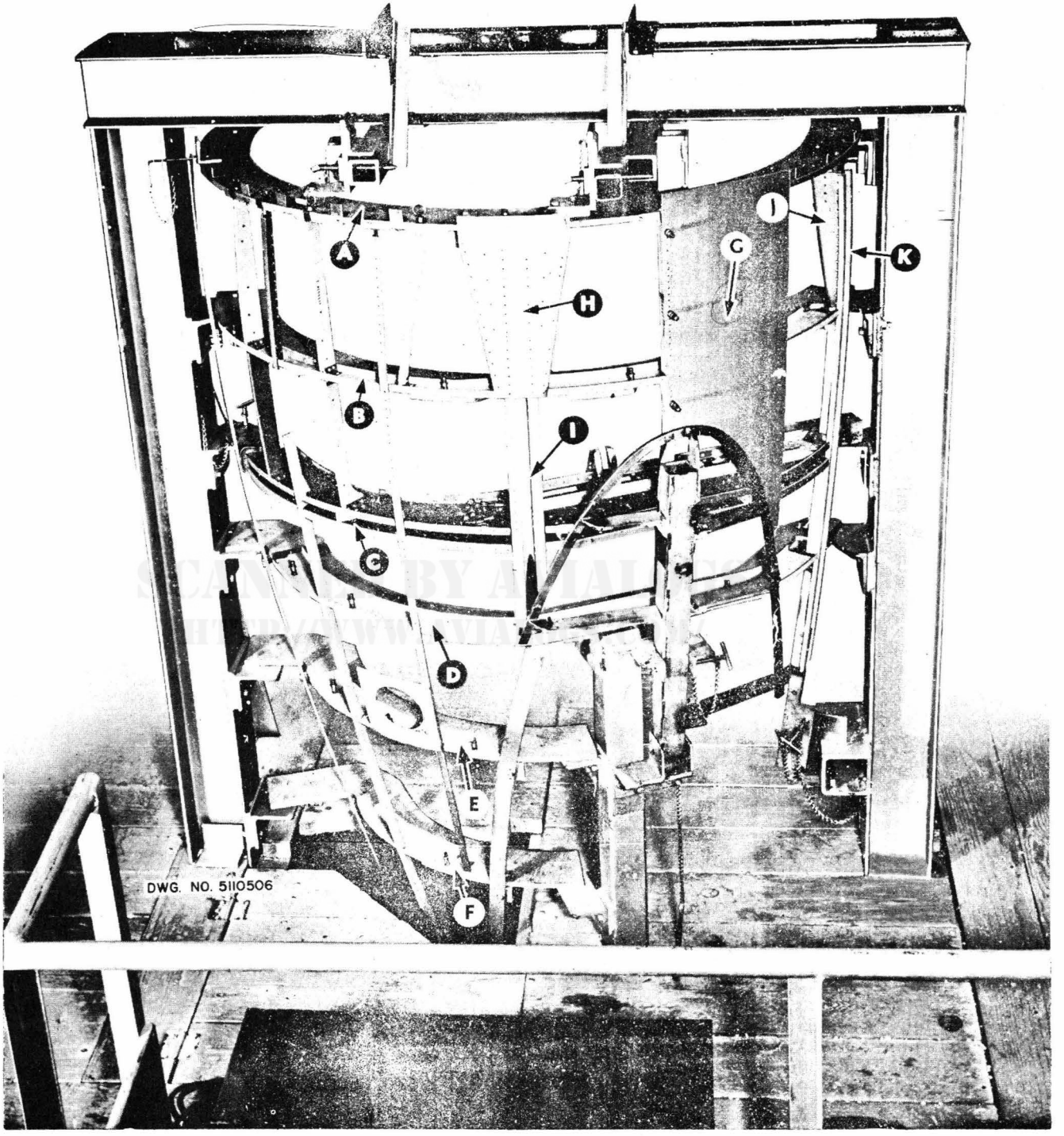


Figure 57 - Nacelle Structure

KEY TO FIGURE 57

REF.	STATION	NAME	PART NO.	MATERIAL
A	0	Firewall	5112950 L.H. & -1 R.H.	.064 Alclad 24SO
B	187-1/2	Frame	5117597 L.H. & -1 R.H.	.064 Alclad 24SO
C	200-3/8	Frame	5113947 L.H. & -1 R.H.	.045 Alclad 24SO
D	210-1/2	Frame	5116663 L.H. & -1 R.H.	.045 Alclad 24SO
E	223-1/2	Frame	4116518	.045 Alclad 24SO
F	239-1/2	Frame	4116519	.045 Alclad 24SO
G		Skin	5110506-204 L.H. & -205 R.H.	.040 Alclad 24SO
H	187-1/2	Gusset	5110506-212	.040 Alclad 24ST
I		Hat Section	5110509-94 L.H. & -95 R.H.	Ext. No. 10
J	7	Doubler	2116627	.072 Alclad 24SO
K	7	Hat Section	5110506-100 L.H. & -101 R.H.	Ext. No. 10

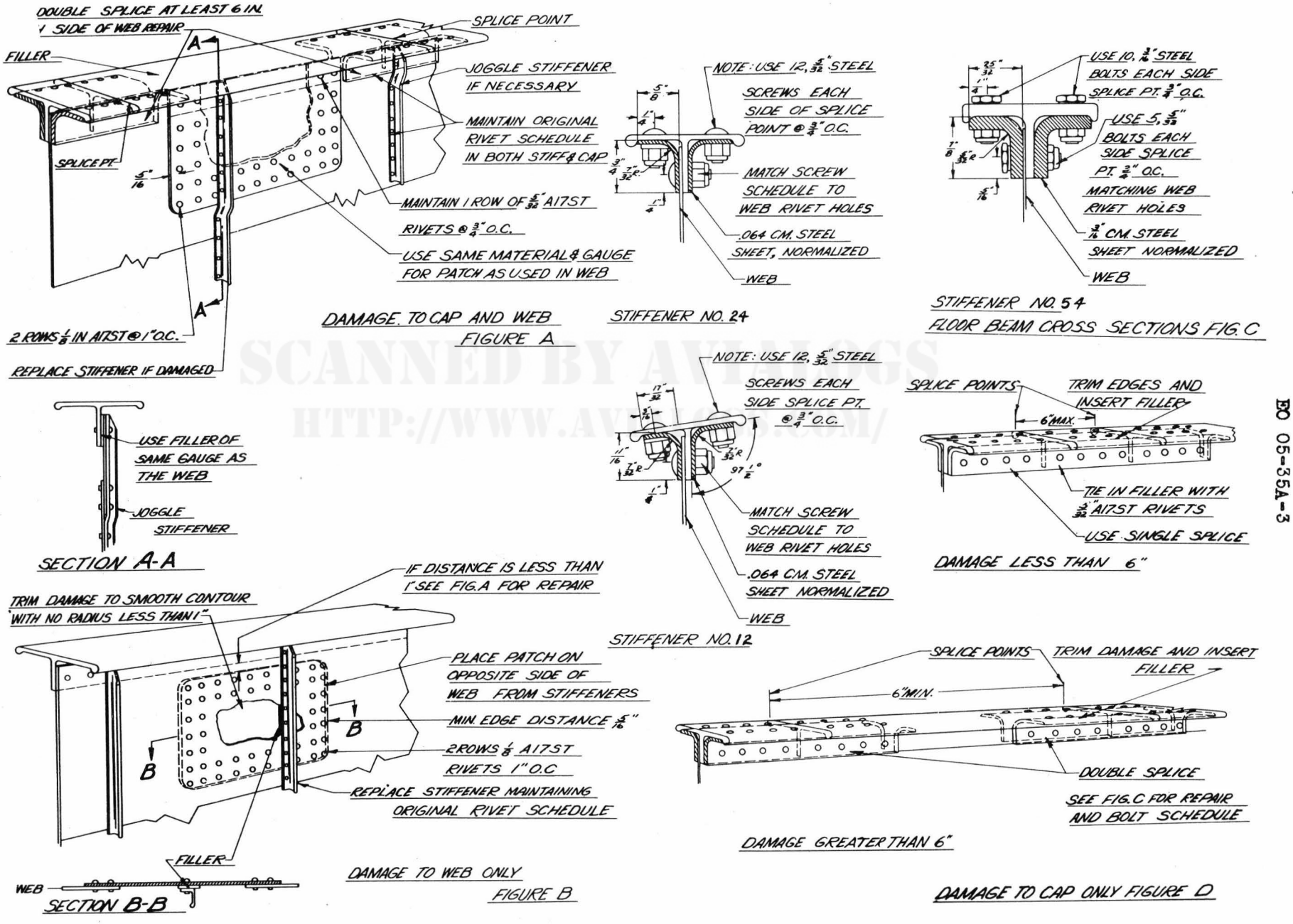
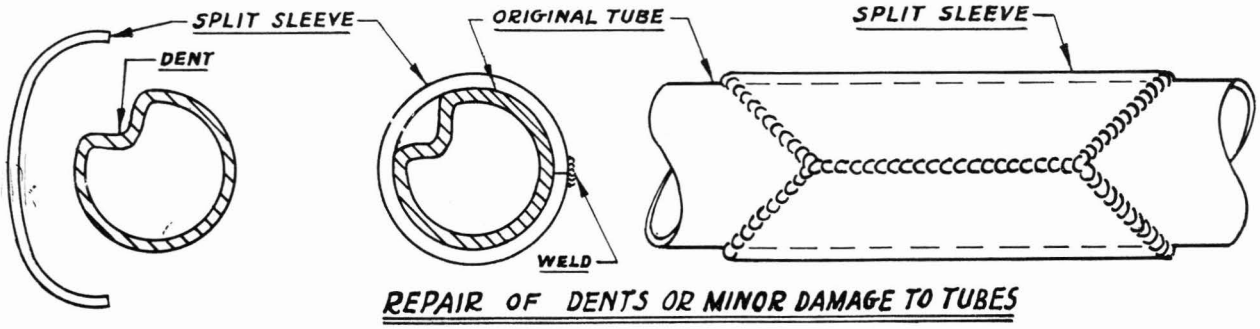
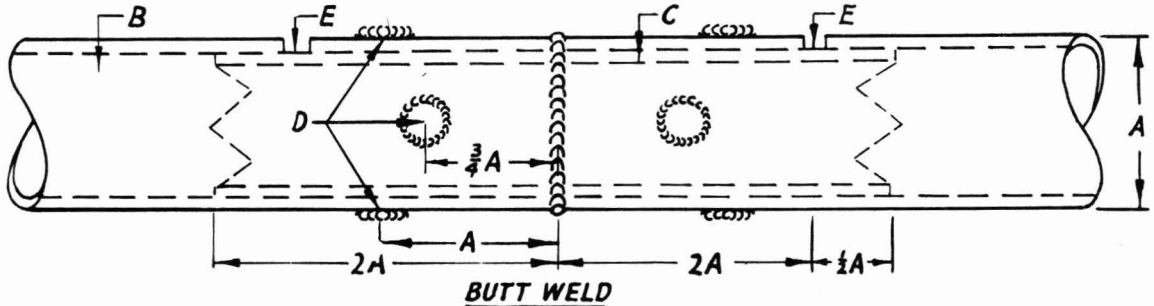


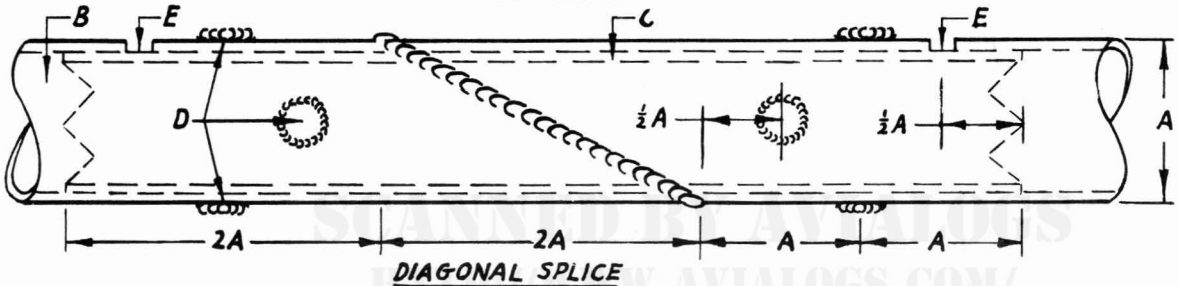
Figure 58 - Fuselage Floor Beam Repair



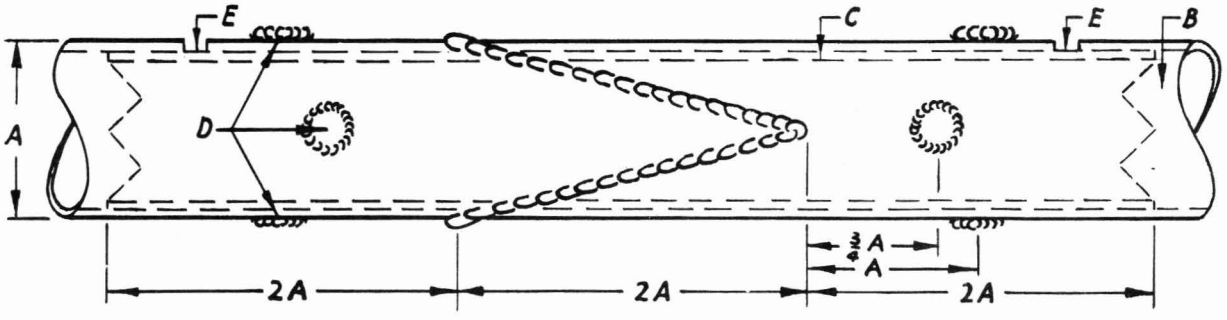
REPAIR OF DENTS OR MINOR DAMAGE TO TUBES



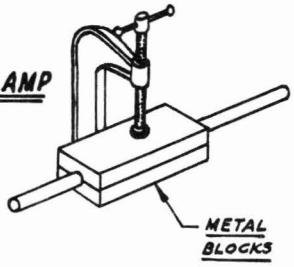
BUTT WELD



DIAGONAL SPLICE



FISH MOUTH SPLICE

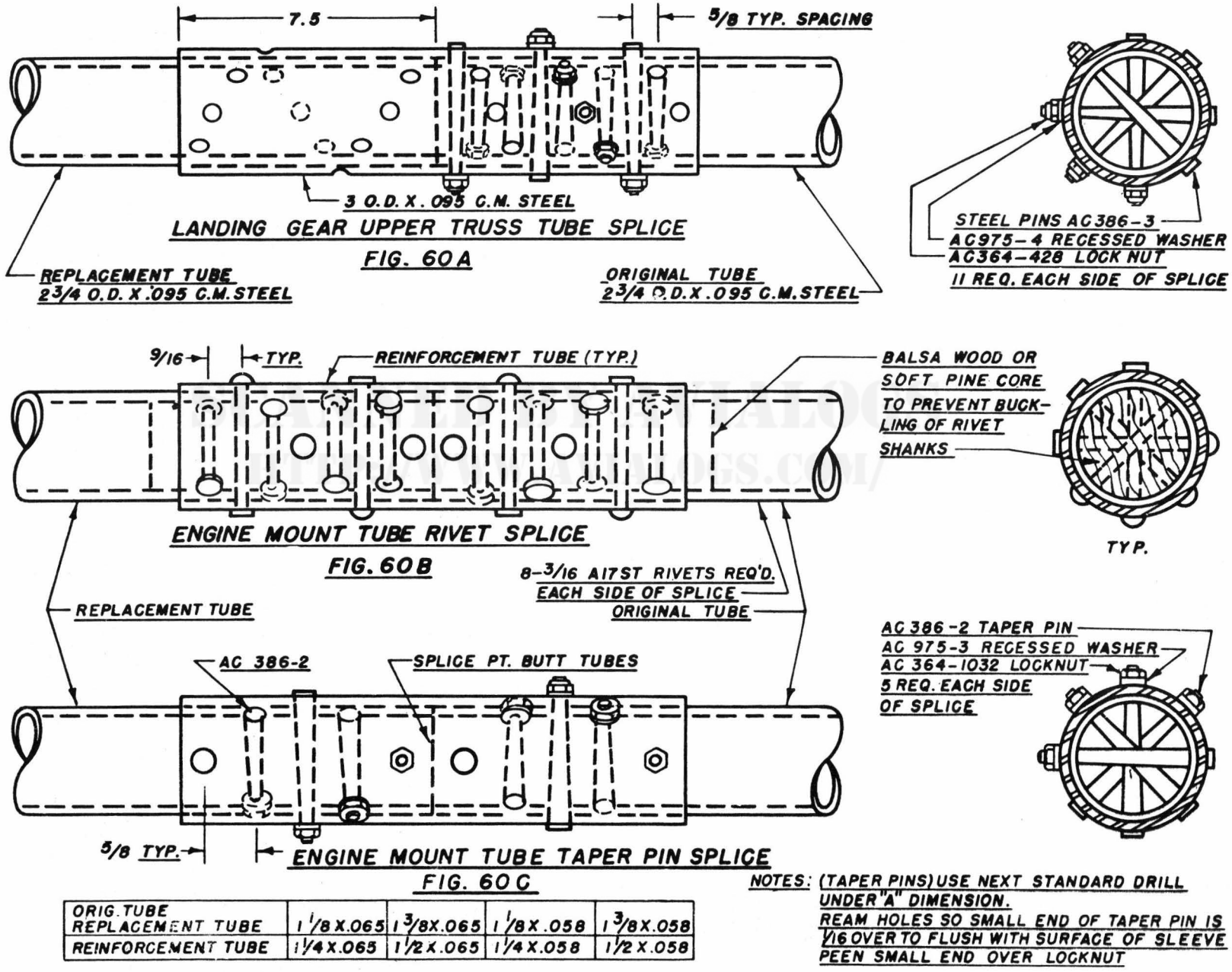


STRAIGHTENING TUBES

APPLY HEAT TO AREA OF BEND AND STRAIGHTEN AS SHOWN. AFTER STRAIGHTENING HEAT TREAT TUBE TO ORIGINAL TENSILE STRENGTH. (NORMALIZE)

A	DIA. OF ORIGINAL TUBE				
B	REPLACEMENT TUBE	1⅛ X.065	1⅛ X.065	1⅛ X.058	1⅛ X.058
C	REINFORCEMENT TUBE	1X.065	1¼ X.065	1X.058	1¼ X.058
D	DRILL ¼ MAX. HOLE IN OUTER TUBE; WELD THROUGH TO INNER TUBE				
E	DRILL ⅛ INSPECTION HOLE				

Figure 59 - Engine Mount Tube Weld Repair



ORIG. TUBE / REPLACEMENT TUBE	1 1/8 X .065	1 3/8 X .065	1 1/8 X .058	1 3/8 X .058
REINFORCEMENT TUBE	1 1/4 X .065	1 1/2 X .065	1 1/4 X .058	1 1/2 X .058

NOTES: (TAPER PINS) USE NEXT STANDARD DRILL UNDER "A" DIMENSION.
REAM HOLES SO SMALL END OF TAPER PIN IS 1/16 OVER TO FLUSH WITH SURFACE OF SLEEVE
PEEN SMALL END OVER LOCKNUT

Figure 60 - Engine Mount Tube & Landing Gear Truss Tube Repair

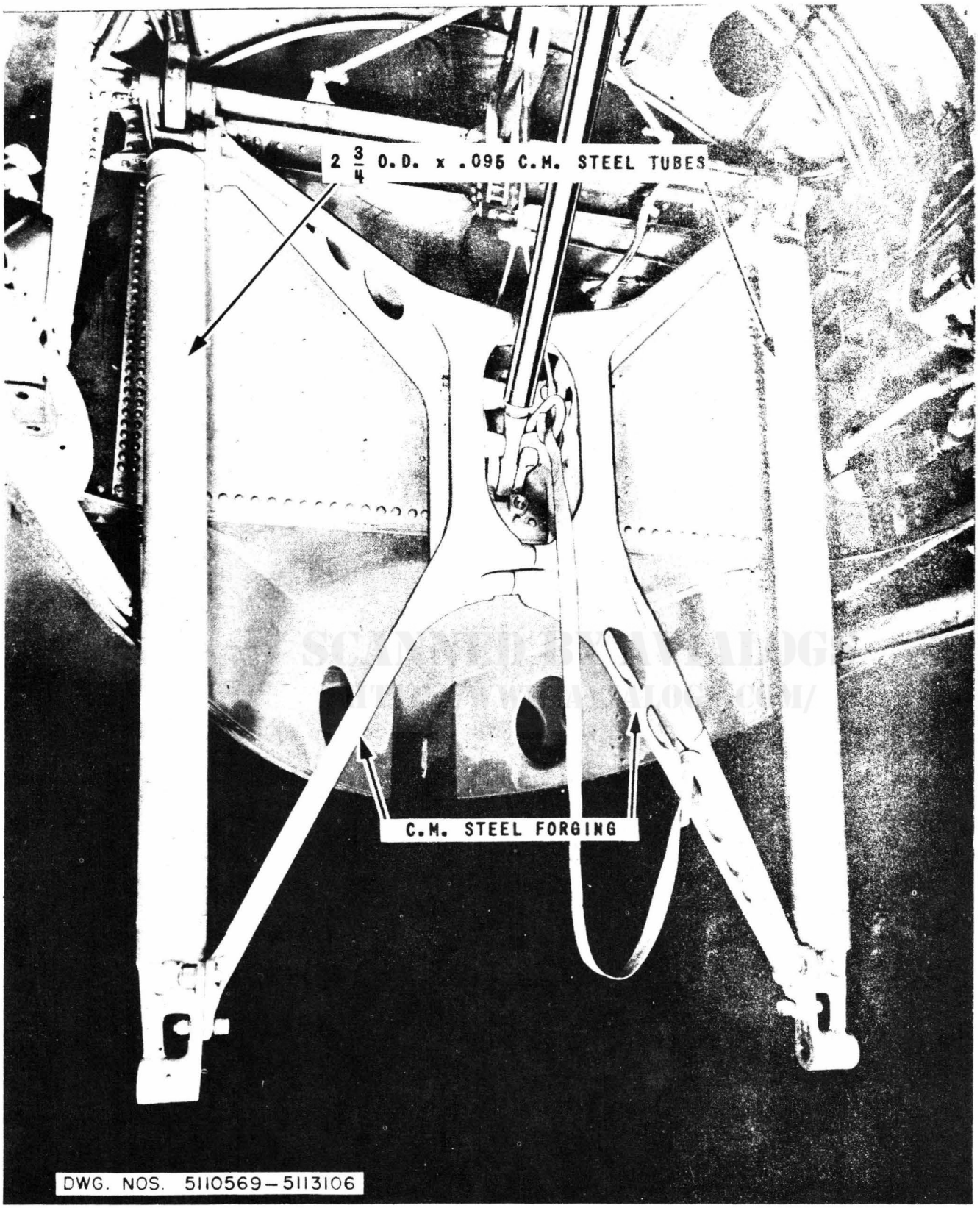


Figure 61 - Upper Landing Gear Truss

RECOMMENDED MINIMUM EDGE DISTANCES FOR LANDING GEAR

The recommended minimum edge distances and wall thicknesses given in the following tables and in the illustrations apply to the main and tail landing gears. The tolerances given are good up to the 33,000 pound maximum gross weight of these airplanes.

When the hole into which a bushing has been installed becomes worn, a new oversized bushing should be installed The new bushing should be made of the same material and be of the same hardness as the original bushing. The outside diameter of the new bushing should afford the same press fit interference as the original bushing. When a hole that does not normally incorporate a bushing becomes worn, the hole diameter should be reamed 1/8-inch oversize and a steel bushing, having a 1/16-inch wall thickness, should be pressed into the hole. The material and hardness requirements for these bushings are given in the bushing and hole diameters in order to afford the correct press fit interference between the bushing and the part. If reaming the hole oversize to accommodate a 1/16-inch thick wall bushing will reduce the edge distance below the maximum allowable value, it may still be possible to repair the part by installing a 1/32-inch thick wall bushing, using the same press fit interference requirements as given for a 1/16-inch thick wall bushing. The methods of checking the minimum allowable edge distances are given in the accompanying table.

RECOMMENDED MINIMUM EDGE DISTANCES FOR MAIN LANDING GEAR

ITEM	RECOMMENDED MINIMUM EDGE DISTANCE	BUSHING NUMBER	PART OR ASSEMBLY NUMBER	BUSHING MATERIAL	HEAT TREAT	PRESS FIT INTER-FERENCE	NORMAL EDGE DISTANCE ON NEW PART
1	.187	116500-7C-018G	4116969	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.450
2	.187	116500-6C-021	4116969	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.350
3	.175	Special	4116969	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.350
4	.500	1117830	5117828	S. A. E. 4130 Steel	125,000 to 145,000	.0010-.0030	.700
5	.25	Special	5113697	S. A. E. 4130 Steel	150,000 to 180,000	.0005-.0025	.350
6	.15	1130534	5113697	Fed. QQ-B-636 Tobin Bronze	....	.0005-.0025	.300
7	.215	116500-10C-107G	2116632	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.300
8	.125	Special	5112594	S. A. E. 4130 Steel	180,000 to 200,000	.0005-.0025	.250
9	.125	Special	Bendix 53422	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.300
10	.313	Special	5116414	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.500
11	.313	Special	Bendix 53422	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.500
12	.250	Special	Bendix 65902	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.400
13	.250	Special	Bendix 53430	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.400
14	.140	1116708	2116697	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.150
15	.160	1116707	2116697	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.250
16	.150	Special	4116413	S. A. E. 4130 Steel	150,000 to 180,000	.0005-.0025	.250
17	.187	Special	4116413	S. A. E. 4130 Steel	150,000 to 180,000	.0005-.0025	.300
18	.075	1116408	4116413	Aluminum Bronze	....	.0010-.0030	.150
19	.150	1119001	5112598	Aluminum Bronze	....	.0005-.0025	.250
20	.280	Special	5116414	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.500
21	.100	Special	5141298 or 5139238 or 5113106	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.180
22	.093	116500-9C-124	4116529	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.150
23	.100	Special	4140756	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.250
24	.100	Special	5116414	S. A. E. 4130 Steel	170,000 to 190,000	.0005-.0025	.250
25	.200	131736-7C-009	4116521	S. A. E. 4130 Steel	125,000 to 145,000	.0005-.0025	.350
26	.250	Special	4112823	S. A. E. 4130 Steel	180,000 to 200,000	.0005-.0025	.350

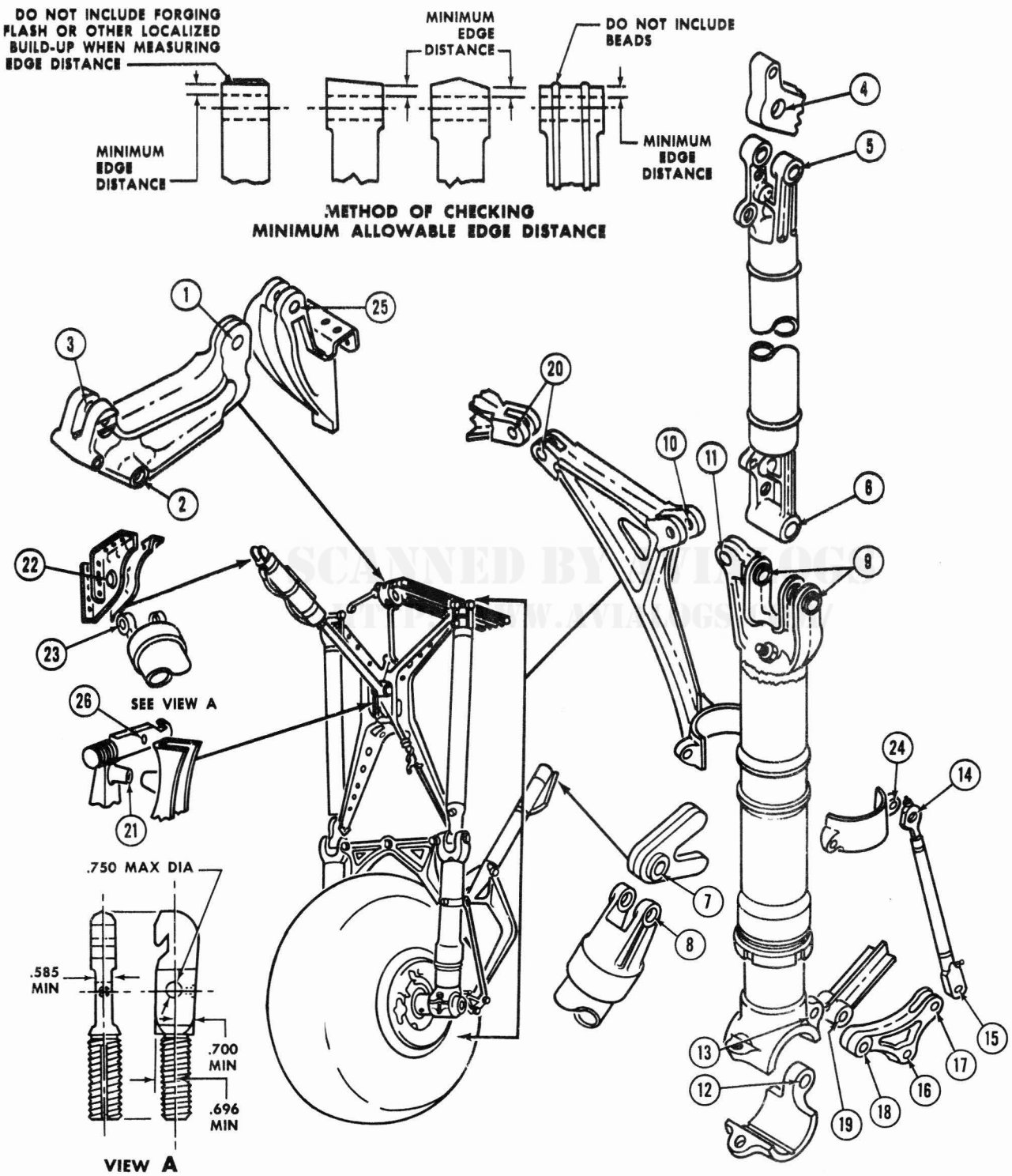
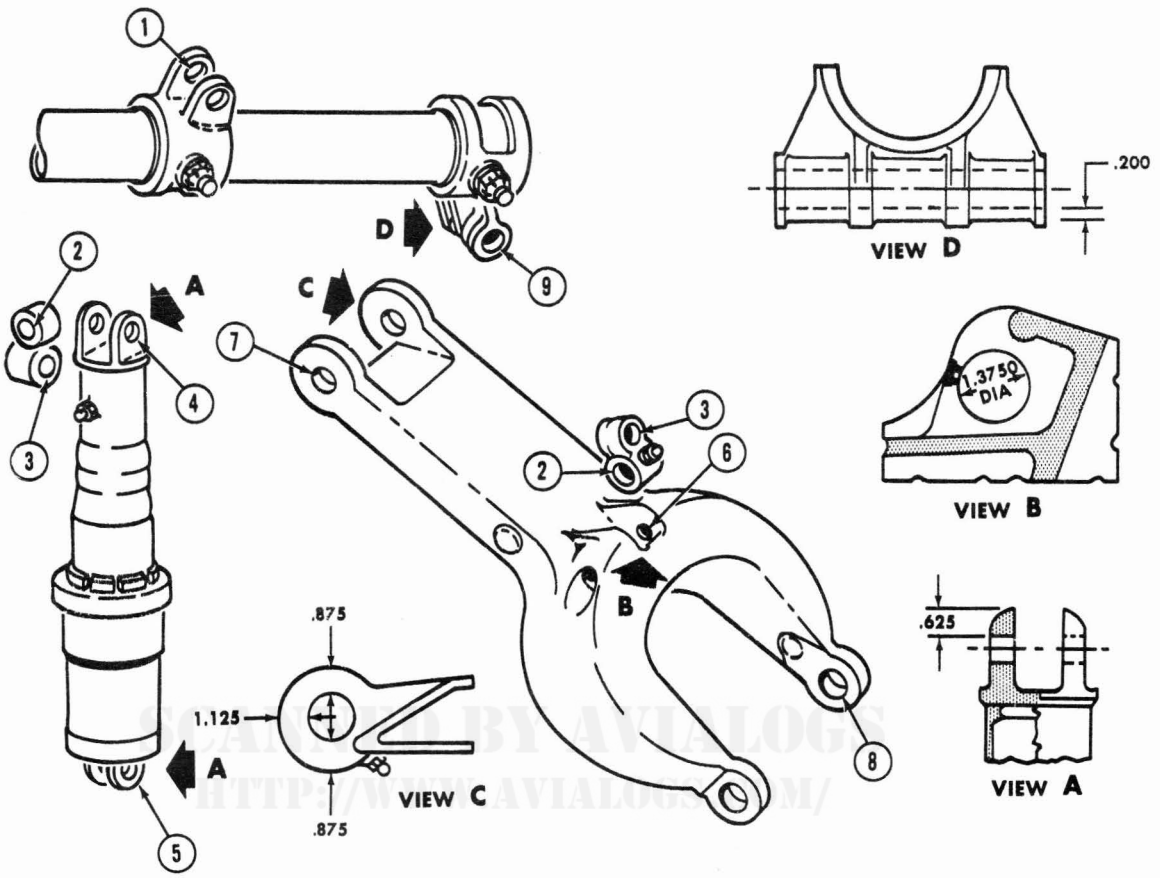


Figure 61A — Main Landing Gear



C-47 RECOMMENDED MINIMUM EDGE DISTANCE FOR TAIL LANDING GEAR

ITEM	RECOMMENDED MINIMUM EDGE DISTANCE	BUSHING NUMBER	PART OR ASSEMBLY NUMBER	BUSHING MATERIAL	HEAT-TREAT	PRESS FIT INTERFERENCE	NORMAL EDGE DISTANCE ON NEW PART
1	.340	SPECIAL	4115858	S.A.E. 4130 STEEL	150,000 TO 180,000	.0005-.0025	.500
2	.125	116500-18B -124	2115849 OR 2203993	TOBIN BRONZE	HARD	.0005-.0025	.180
3	.187	116500-16C -108	2115849 OR 2203993	S.A.E. 4130 STEEL	125,000 TO 145,000	.0005-.0025	.250
4	VIEW A	SPECIAL	3115288	S.A.E. 4130 STEEL	125,000 TO 155,000	.0005-.0025	.625
5	VIEW A	SPECIAL	4115054	S.A.E. 4130 STEEL	125,000 TO 155,000	.0005-.0025	.625
6	VIEW B	1115804	5115862	S.A.E. 4130 STEEL	125,000 TO 145,000	.0005-.0025	.450
7	VIEW C	1115805	5115862	CAST MANGAN-ESE BRONZE	—	.0005-.0025	1.125
8	.450	1116500-20C -020	5115862	S.A.E. 4130 STEEL	125,000 TO 155,000	.0005-.0025	.580
9	VIEW D	SPECIAL	4115899	S.A.E. 4130 STEEL	150,000 TO 180,000	.0005-.0025	.200

15.817

Figure 61B — Tail Landing Gear

Revised 7 Dec 54

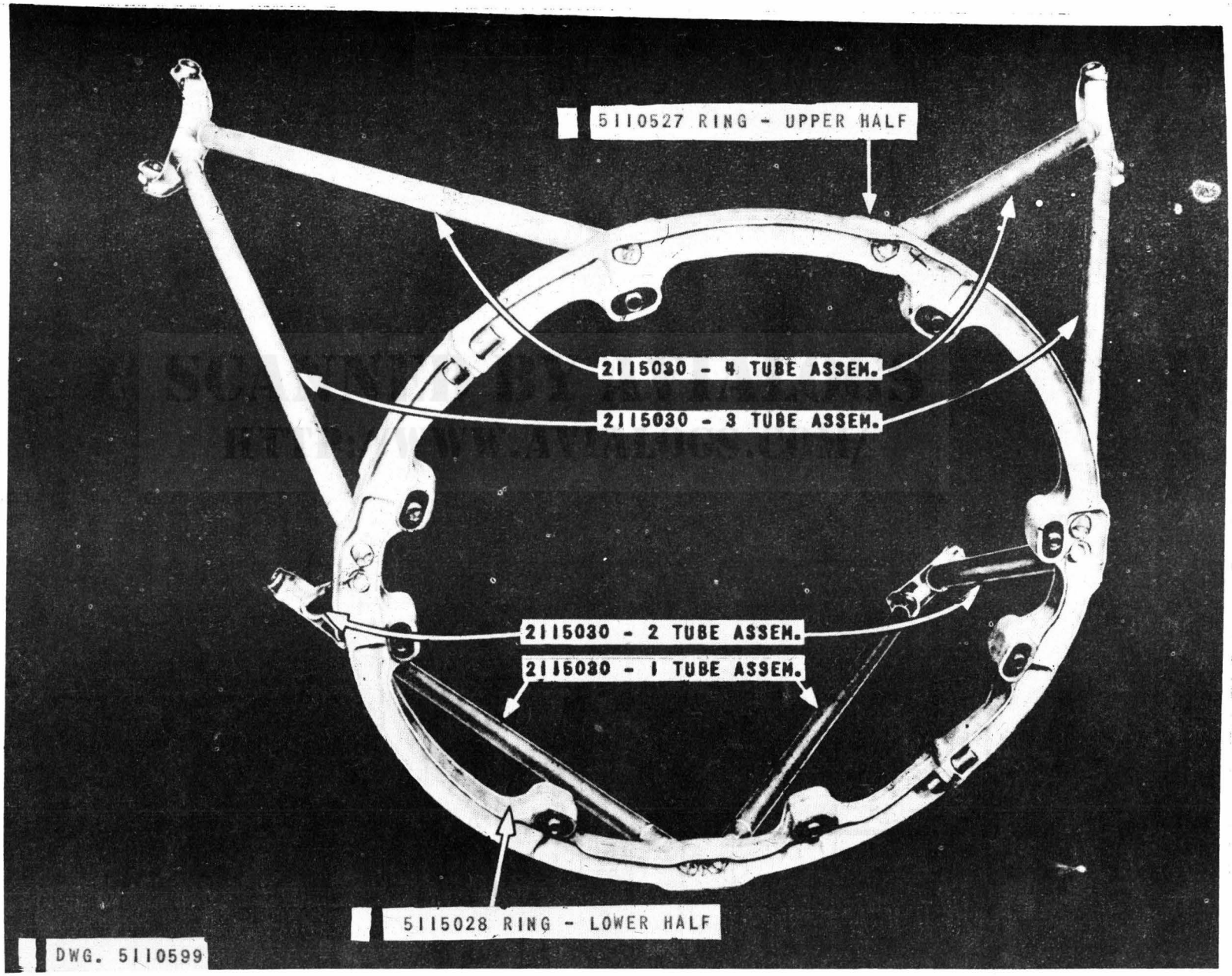
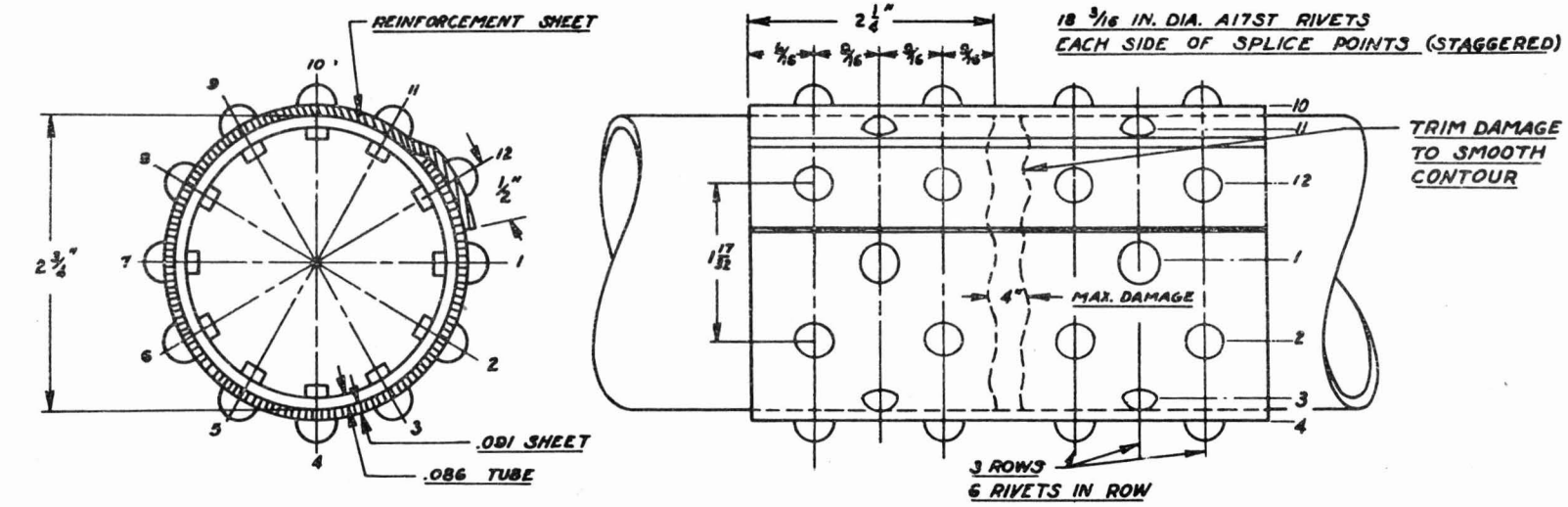
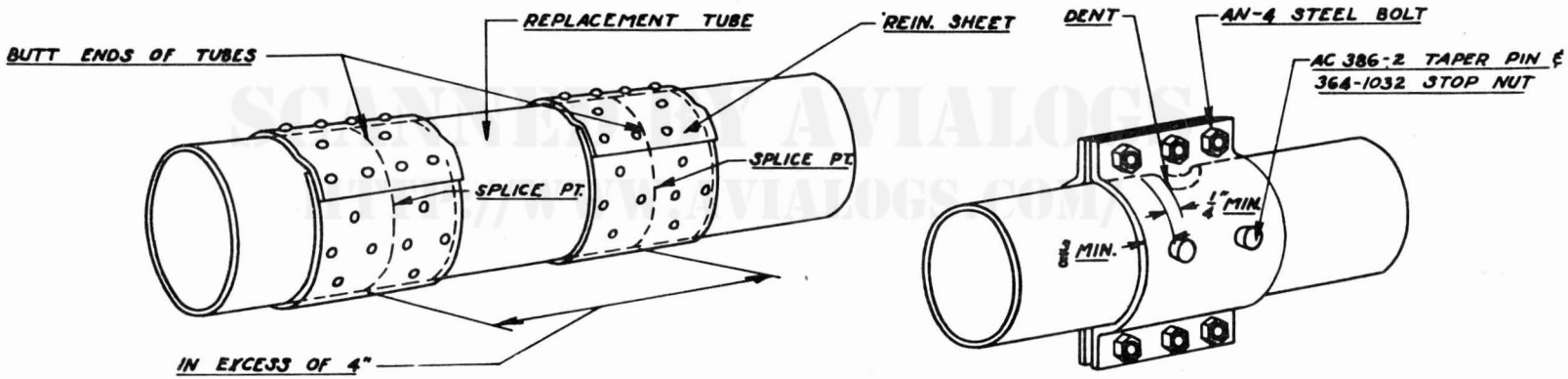


Figure 62 - Engine Mount Assembled





NOTES:
1. REINFORCEMENT CUT TO SIZE AND PRE-FORMED.
2. RIVET ROW 1 FIRST, 2 NEXT; 12 LAST.
3. MAKE ALL FILLERS & REINFORCEMENT SHEETS SAME GAUGE & MATERIAL AS ORIGINAL TUBE.

REPAIR OF DENT TO TUBE. FOR MORE EXTENSIVE DAMAGE USE COMPLETE SPLICE.

NOTE: FOR BUCKING RIVETS INSIDE TUBE USE TOOL NO. L 65-B-1149-6TX. PURCHASE FROM DOUGLAS AIRCRAFT CO.

Figure 63 - Torque Tube Repair

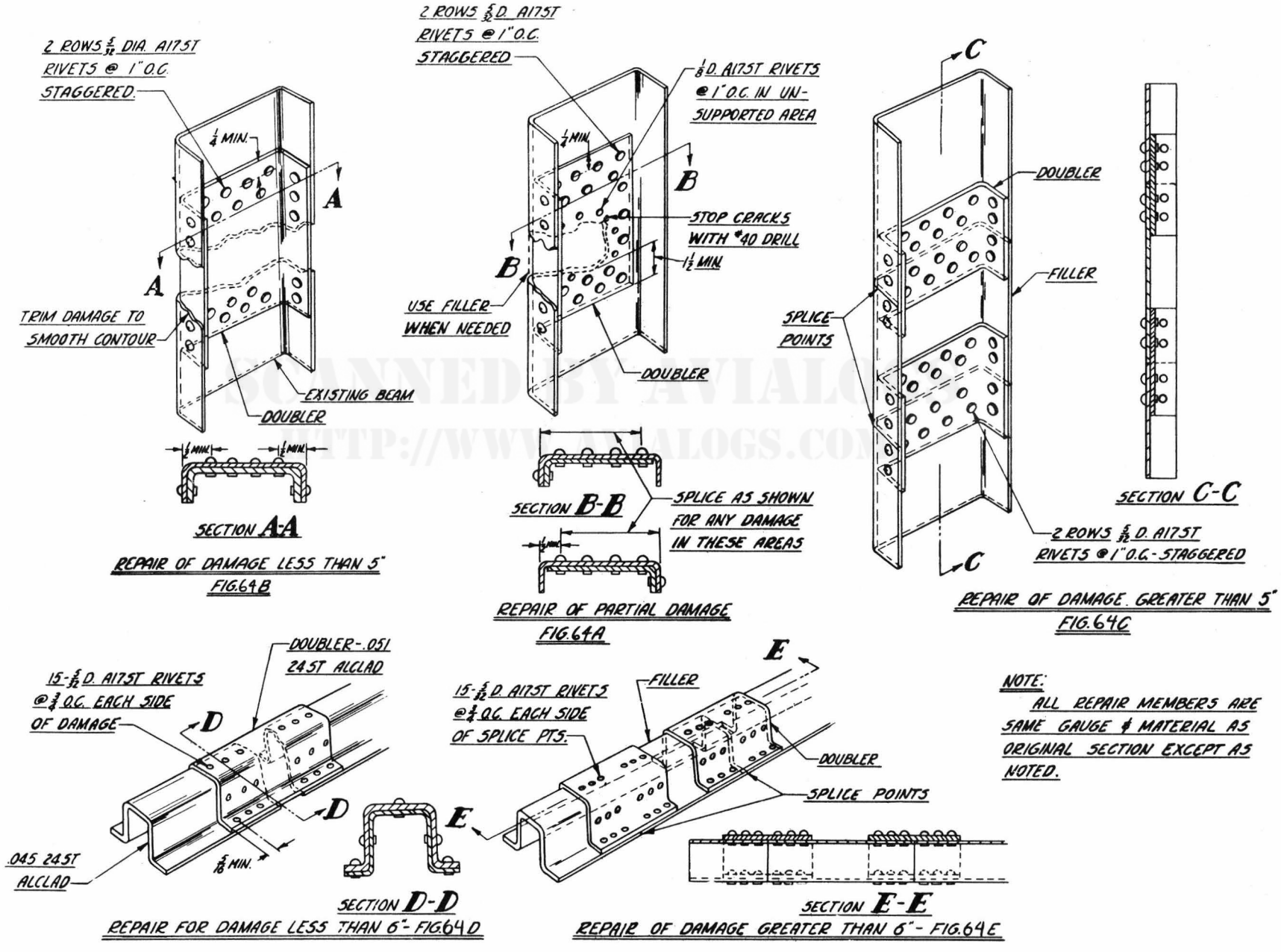


Figure 64 - Empennage & Wing Flap Rib, Beam & Hat Section Repair

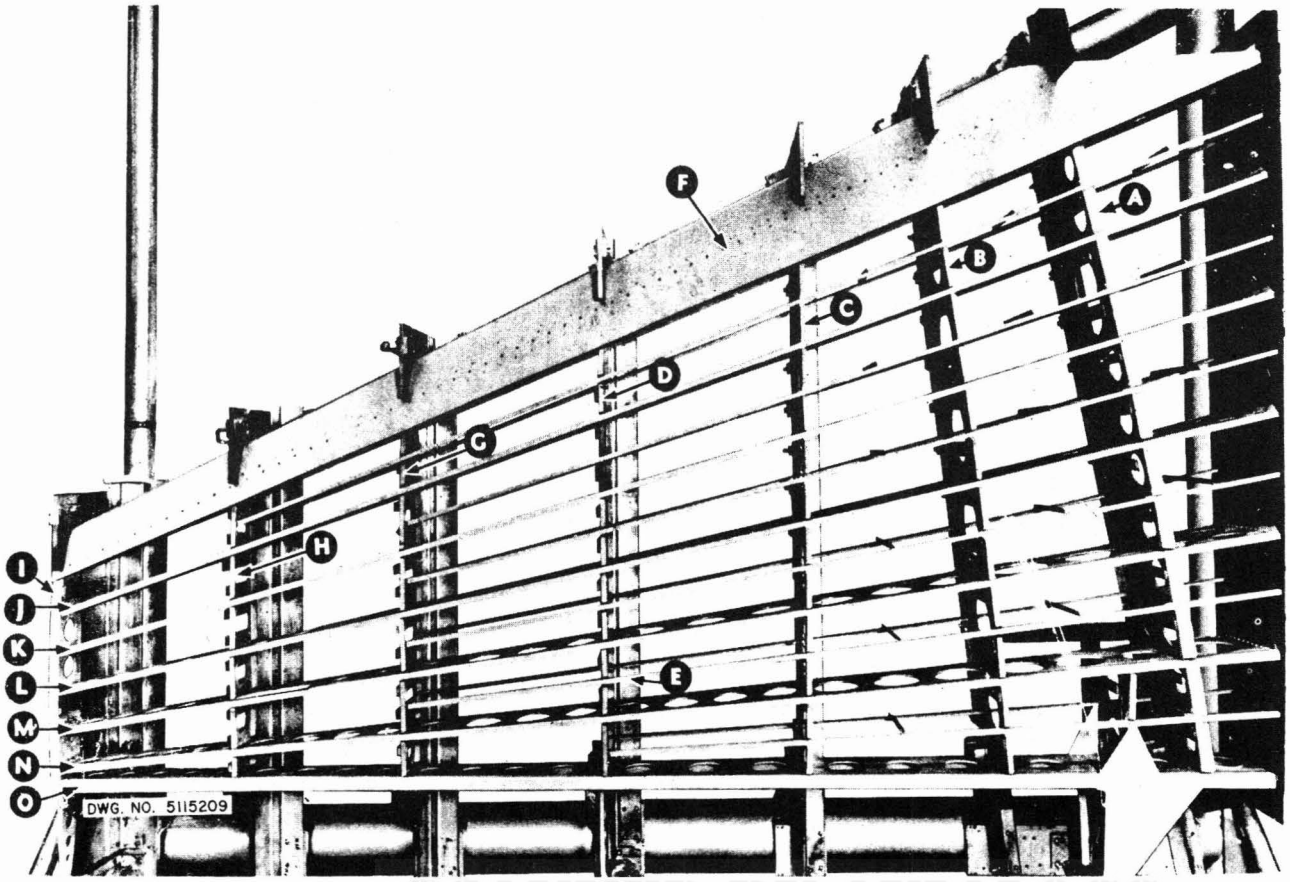


Figure 65 - Horizontal Stabilizer Assembly

KEY TO FIGURE 65

REF.	STATION	NAME	PART NO.	MATERIAL
A	7.375	Ribs	5115209	.064 Alclad 24SO
B	28-3/8	Ribs	5115209	.022 Alclad 24SO
C	50-1/8	Ribs	5115209	.022 Alclad 24SO
D	72-1/4	Ribs	5115209	.022 Alclad 24SO
E	72-1/4	Rib	5115209-57	.040 Alclad 24SO
F		Skin Nose	5115209-17	.032 Alclad 24ST
G	94-5/16	Ribs	5115209	.022 Alclad 24ST
H	113	Ribs	5115209	.022 Alclad 24SO
I	113	Rib	5115209-43	.032 Alclad 24SO
J		Shear Web	5115209-42	.022 Alclad 24ST
K		Shear Web	5115209-41	.022 Alclad 24ST
L		Shear Web	5115209-40	.022 Alclad 24ST
M		Shear Web	5115209-39	.022 Alclad 24ST
N		Shear Web	5115209-38	.022 Alclad 24ST
O		Shear Web	5115209-37	.022 Alclad 24ST

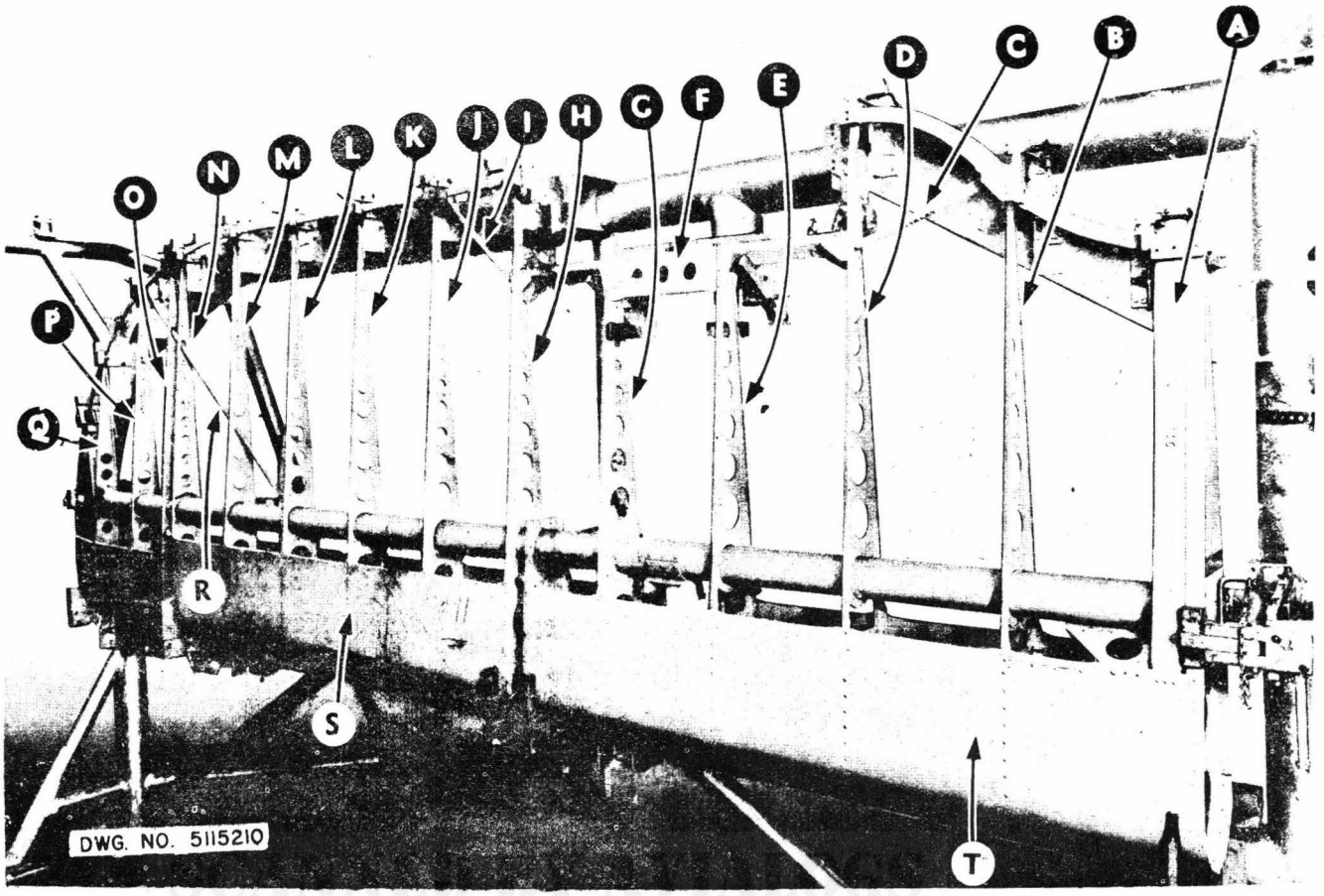


Figure 66 - Elevator Assembly

KEY TO FIGURE 66

REF.	STATION	NAME	PART NO.	MATERIAL
A	19 1/2-30	Rib	5115210-3	.051 Alclad 24SO
B	30-41	Rib	5115210-4	.020 Alclad 24SO
C		Brace	2115102	
D	41-52	Rib	5115210-5	.020 Alclad 24SO
E	52-62 1/2	Rib	5115210-6	.020 Alclad 24SO
F		Plate	5115210-110	.025 Alclad 24ST
G	62-1/2-71 7/16	Rib	5115210-7	.020 Alclad 24SO
H	71 7/16-84 1/2	Rib	5115210-9	.020 Alclad 24SO
I		Brace	1115092	
J	84 1/2-96 1/2	Rib	5115210-10	.020 Alclad 24SO
K	96 1/2-108	Rib	5115210-11	.020 Alclad 24SO
L	108-119 1/2	Rib	5115210-12	.020 Alclad 24SO
M	119 1/2-131	Rib	5115210-13	.020 Alclad 24SO
N	131-133	Rib	5115210-14	.020 Alclad 24SO
O	133-141	Rib	5115210-15	.032 Alclad 24SO
P	141-151	Rib	5115210-16	.032 Alclad 24SO
Q	151-160	Rib	5115210-17	.032 Alclad 24SO
R		Brace	2115103	
S		Nose Cover	5115210-22	.032 Alclad 24SO
T		Nose Cover	5115210-20	.025 Alclad 24ST

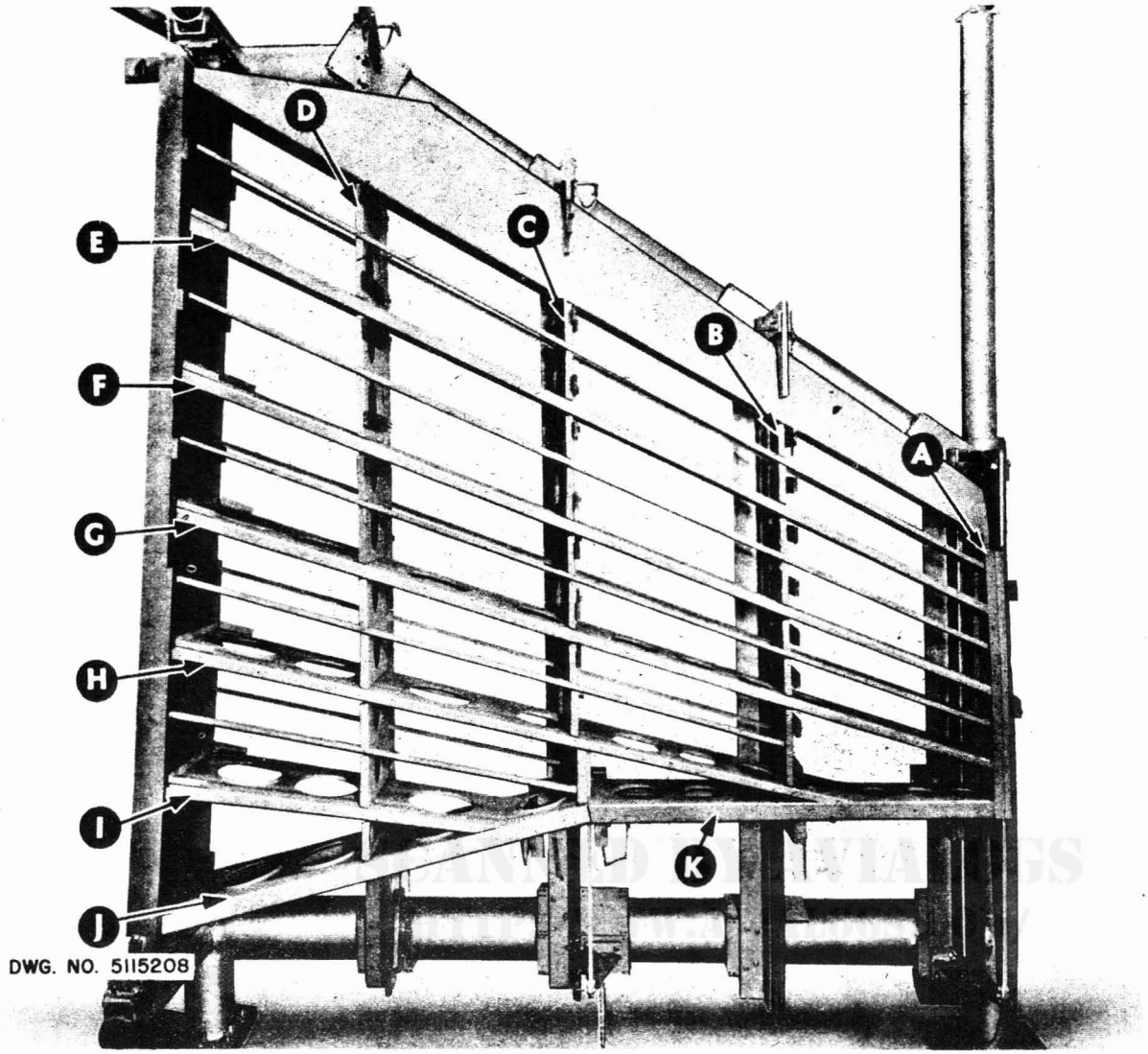


Figure 67 - Vertical Stabilizer

KEY TO FIGURE 67

REF.	STATION	NAME	PART NO.	MATERIAL
A	117-1/4	Ribs	5115208-10 5115208-11	.051 Alclad 24SO
B	97	Ribs	5115208	.022 Alclad 24SO
C	42-15/16	Ribs	5115208	.022 Alclad 24SO
D	21-11/16	Rib	5115208	.022 Alclad 24SO
E		Beam	5115208-9	.022 Alclad 24SO
F		Beam	5115208-8	.022 Alclad 24SO
G		Beam	5115208-7	.022 Alclad 24SO
H		Beam	5115208-6	.022 Alclad 24SO
I		Beam	5115208-5	.022 Alclad 24SO
J		Beam	5115208-3	.051 Alclad 24SO
K		Beam	5115208-4	.051 Alclad 24SO

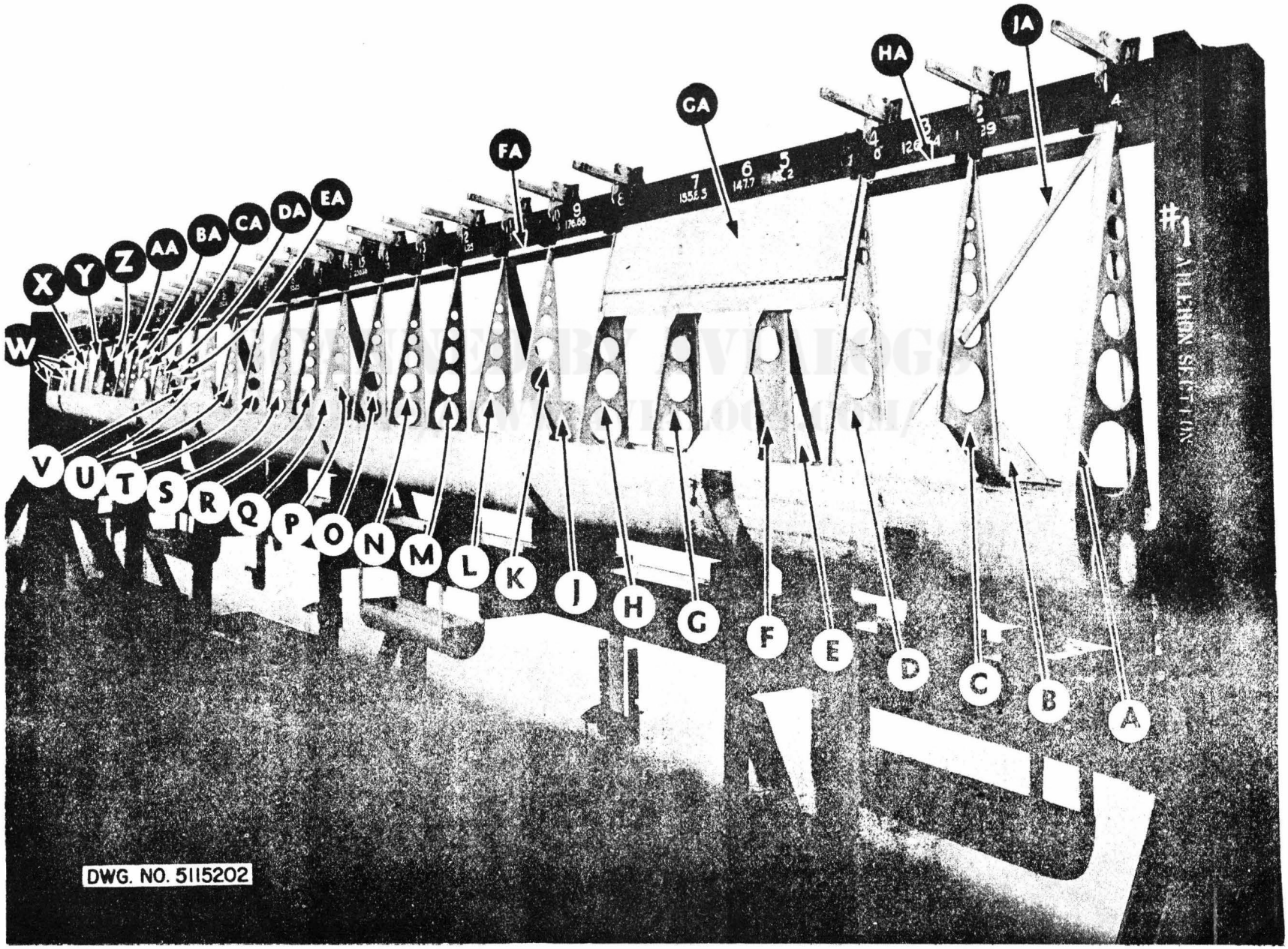


Figure 68 - Aileron Frames With Tab

KEY TO FIGURE 68

REF.	STATION	NAME	PART NO.	MATERIAL
A	107.4	Rib	5115202-110 L.H. & -111 R.H.	.020 Alclad 24SO
B		Gusset	5115202-150 L.H. & -151 R.H.	.040 Alclad 24ST
C	120.29	Rib	5115202-8 L.H. & -9 R.H.	.020 Alclad 24SO
D	132	Rib	5115202-16 L.H. & -17 R.H.	.020 Alclad 24SO
E		Gusset	5115202-202 L.H. & -203 R.H.	.040 Alclad 24ST
F	143.2 to 147.7	Rib	5115202-20 L.H. & -21 R.H.	.020 Alclad 24SO
G	155.85	Rib	5115202-24 L.H. & -25 R.H.	.020 Alclad 24SO
H	167.3	Rib	5115202-28 L.H. & -29 R.H.	.020 Alclad 24SO
J		Gusset	5115202-146 L.H. & -147 R.H.	.040 Alclad 24ST
K	180.3	Rib	5115202-36 L.H. & -37 R.H.	.020 Alclad 24SO
L	190.05	Rib	5115202-40 L.H. & -41 R.H.	.020 Alclad 24SO
M	201.25	Rib	5115202-44 L.H. & -45 R.H.	.020 Alclad 24SO
N	212	Rib	5115202-48 L.H. & -49 R.H.	.020 Alclad 24SO
O	222.75	Rib	5115202-100 L.H. & -101 R.H.	.020 Alclad 24SO
P	234	Rib	5115202-56 L.H. & -57 R.H.	.020 Alclad 24SO
Q		Gusset	5115202-146 L.H. & -147 R.H.	.040 Alclad 24ST
R	244.5	Rib	5115202-60 L.H. & -61 R.H.	.020 Alclad 24SO
S	255.25	Rib	5115202-64 L.H. & -65 R.H.	.020 Alclad 24SO
T	266.25	Rib	5115202-68 L.H. & -69 R.H.	.020 Alclad 24SO
U	277.25	Rib	5115202-108 L.H. & -109 R.H.	.020 Alclad 24SO
U	288.14	Rib	5115202-76 L.H. & -77 R.H.	.020 Alclad 24SO
V	296.75	Rib	5115202-220 L.H. & -219 R.H.	.020 Alclad 24SO
W	396.5	Rib	5115202-218 L.H. & -217 R.H.	.020 Alclad 24SO
W	384.78	Rib	5115202-198 L.H. & -199 R.H.	.020 Alclad 24SO
W	376	Rib	5115202-186 L.H. & -187 R.H.	.020 Alclad 24SO
X	366.75	Rib	5115202-158 L.H. & -159 R.H.	.020 Alclad 24ST
Y	357.5	Rib	5115202-144 L.H. & -145 R.H.	.020 Alclad 24SO
Z	348.25	Rib	5115202-96 L.H. & -97 R.H.	.020 Alclad 24SO
AA	339	Rib	5115202-154 L.H. & -155 R.H.	.020 Alclad 24SO
BA	331.5	Rib	5115202-92 L.H. & -93 R.H.	.020 Alclad 24SO
CA	323.5	Rib	5115202-138 L.H. & -139 R.H.	.020 Alclad 24SO
DA	314.25	Rib	5115202-84 L.H. & -85 R.H.	.020 Alclad 24SO
EA	305.5	Rib	5115202-80 L.H. & -81 R.H.	.020 Alclad 24SO
FA		Trailing Edge	5115202-133	Ext. No. 9
GA		Tab Assembly	5115203	.020 Alclad 24ST
HA		Trailing Edge	5115202-131	Ext. No. 9
JA		Brace Tube	5115202-184 L.H.	.035 Alloy 17ST
		Brace Tube	5115202-185 R.H.	.035 Alloy 17ST

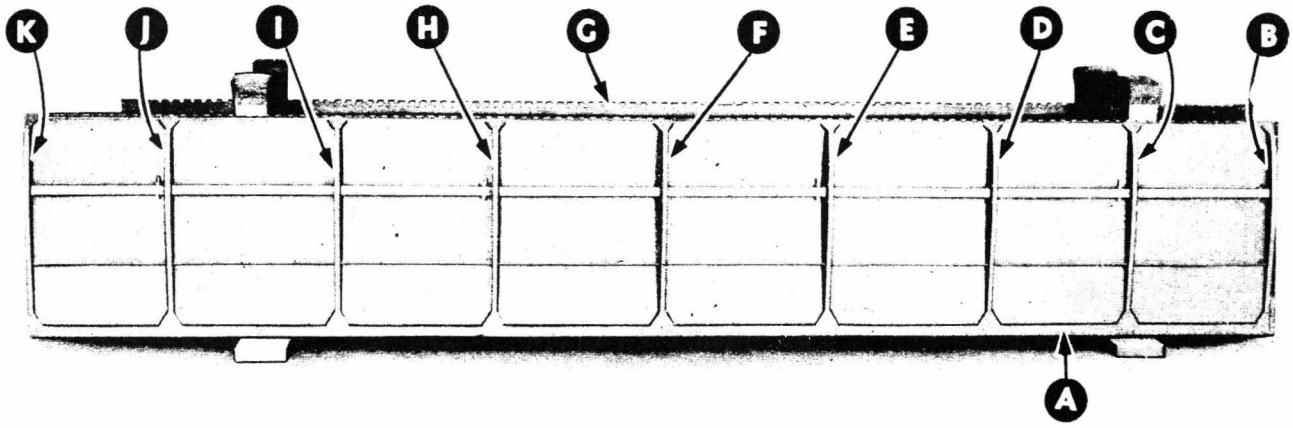
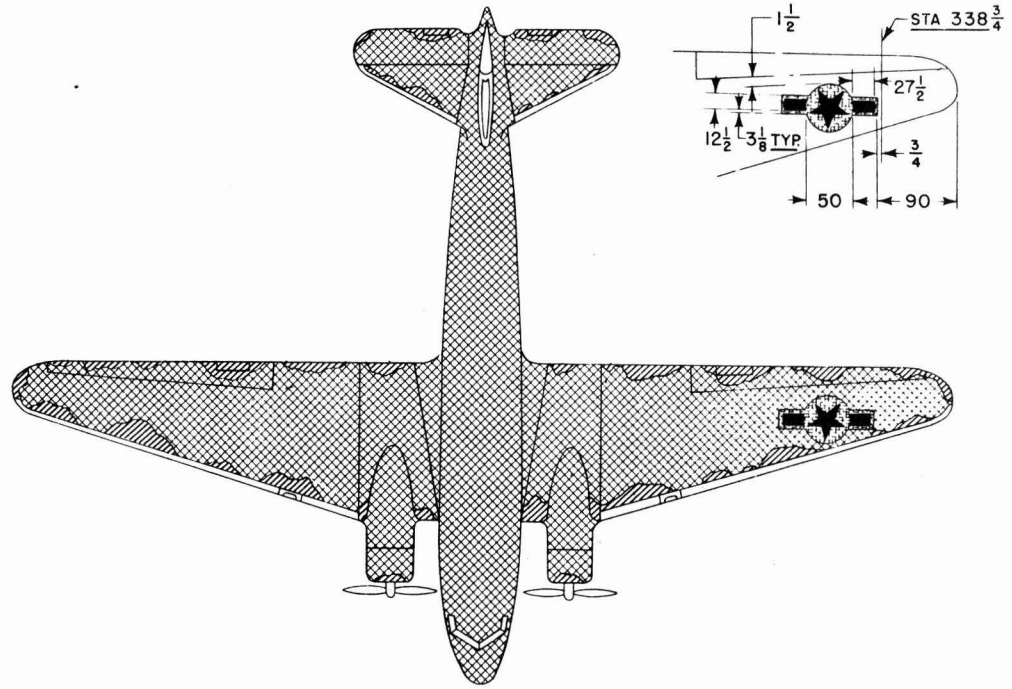
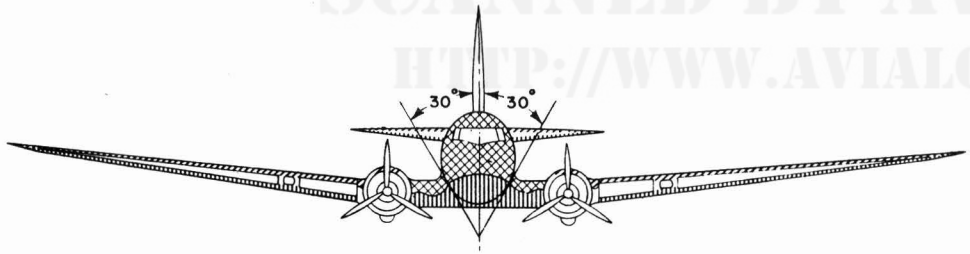


Figure 69 - Center and Outer Wing Flap

KEY TO FIGURE 69

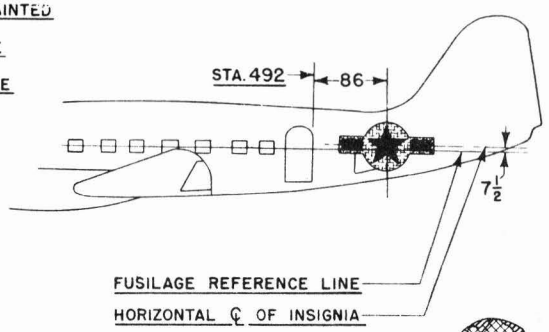
REF.	STATION	NAME	PART NO.	MATERIAL
A		Trailing Edge	2115275	.032 Alclad 24ST
B	0	Rib	3115117	.036 Alclad 24SO
C	20	Rib	3115115	.036 Alclad 24SO
D	35-3/4	Rib	3115116	.036 Alclad 24SO
E	54	Rib	3115115	.036 Alclad 24SO
F	72-1/4	Rib	3115116	.036 Alclad 24SO
G		Hinge	1000760	
H	90-5/8	Rib	3115115	.036 Alclad 24SO
I	107-1/2	Rib	3115116	.036 Alclad 24SO
J	125-1/4	Rib	3115115	.036 Alclad 24SO
K	142	Rib	3115117	.036 Alclad 24SO

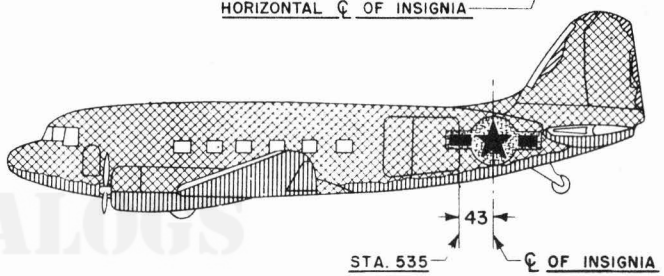




COLOR CHART

- NEUTRAL GRAY
- OLIVE DRAB
- MEDIUM GREEN
- UNPAINTED
- BLUE
- WHITE





REFER TO DOUGLAS DWG. 5115230 (C-47) 5189155 (C-117A)

NOTE:

1. LINE OF DEMARKATION BETWEEN TOP AND BOTTOM COLORS. TOP AND BOTTOM COLORS TO BLEND IN ORDER TO ELIMINATE SHARP CONTRAST.
2. OUTER PANEL INSIGNIA APPEARS ON UPPER SIDE OF L.H. WING AND LOWER SIDE OF R.H. WING ONLY. FUSILAGE INSIGNIA APPEARS ON BOTH SIDES OF AIRPLANE.
3. C-117A AIRPLANES HAVE INSIGNIA APPLIED, BUT ARE NOT CAMOUFLAGED.

Figure 70 - Camouflage Diagram (C-47 and C-117A Models)

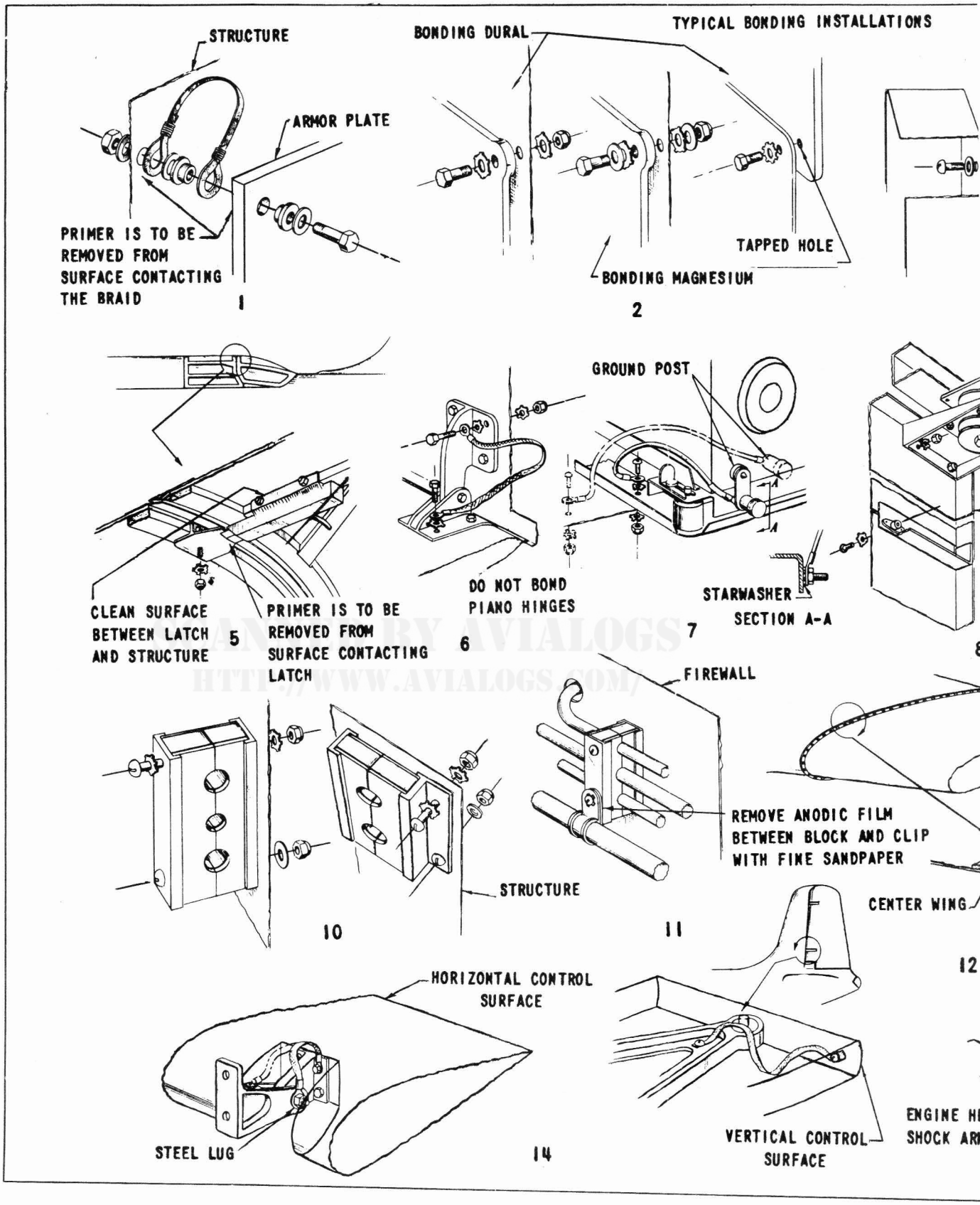
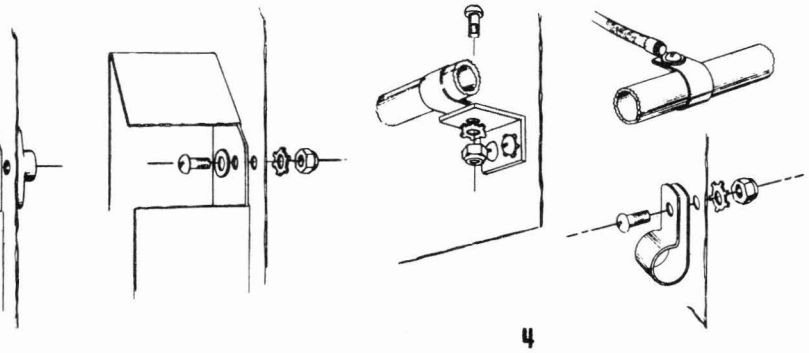


Figure 71 - Bonding Procedure

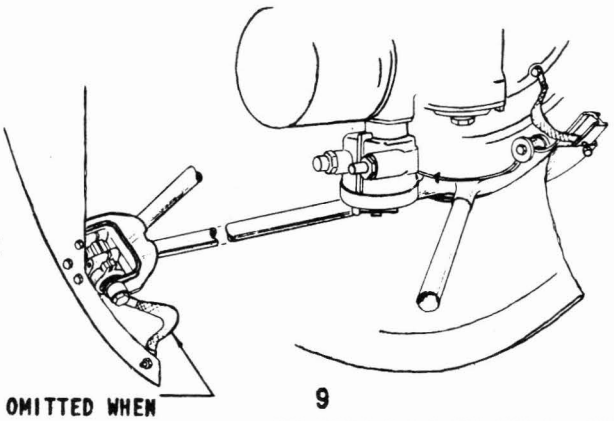


3

4

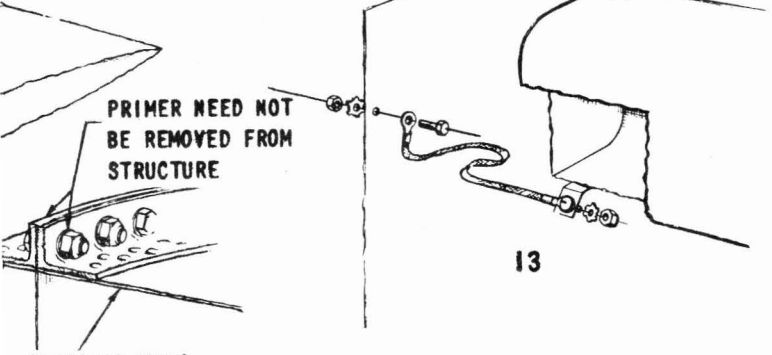
STRUCTURE

INSTRUMENT PANEL



9

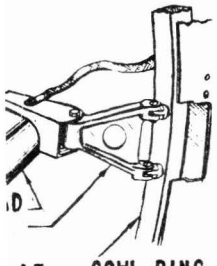
THIS BOND OMITTED WHEN ENGINE MOUNTS ARE NOT SHOCK MOUNTED BUT HAVE STEEL TO STEEL CONTACT



PRIMER NEED NOT BE REMOVED FROM STRUCTURE

13

OUTBOARD WING



15 COWL RING

NOTE:

A-WHEN SHAKEPROOF WASHERS ARE USED IT IS UNNECESSARY TO REMOVE PRIMER FROM SURFACE

B-DO NOT USE BONDING BRUSH ON MAGNESIUM OR ALUMINUM SURFACES

C-SELF TAPPING SCREWS SHOULD NOT BE USED FOR BONDING ON METAL LESS THAN 1/8 THICK

D-DRIVE SCREWS MUST NOT BE USED FOR BONDING

E-TINNED COPPER ADEL CLAMPS OR TINNED COPPER BRAIDS ARE NOT TO BE USED AGAINST ALUMINUM CONDUIT

GENERAL BONDING PROCEDURE

1. ARMOR PLATE IS TO BE BONDED TO THE STRUCTURE IN ONE (1) PLACE (BRAID SHALL BE 1/4" MINIMUM).
2. A. BONDING MAY BE ACCOMPLISHED THROUGH BOLTS AND NUTS OR BOLTS AND TAPPED HOLES OVER 1/8" DEEP.
   B. CADMIUM PLATED STEEL BOLTS ARE TO BE USED IN PREFERENCE TO ALUMINUM ALLOY BOLTS FOR BONDING WITH SHAKEPROOF WASHERS.
   WHEN BONDING MAGNESIUM WITH STAR WASHERS ARE TO BE USED BETWEEN THE TURNING PART (BOLT HEAD OR NUT) AND THE SHAKEPROOF WASHER.
   D. ALUMINUM BONDING BRAID IS PREFERRED ALTHOUGH TINNED COPPER BRAID CAN BE USED. THE ENDS OF BONDING BRAID ARE TO BE FASTENED INTO APPROPRIATE CONNECTING LUGS OR TREATED IN SUCH A WAY AS TO PREVENT FRAYING. IF IT IS NECESSARY TO SOLDER A BONDING JUMPER TO A PART, SOLDERING MUST BE DONE ACCORDING TO D.P.S. 10.903.
   E. JUMPERS MUST BE AS SHORT AS POSSIBLE, BUT THEY MUST BE SUFFICIENTLY SLACK AND FLEXIBLE TO PREVENT STRAINING OR DISTURBING THE CONTACT, OR BREAKING THE CONDUCTOR.
3. ALL ELECTRICAL JUNCTION BOXES MUST BE BONDED.
4. CONDUIT IS TO BE BONDED AT OR NEAR EACH END OF THE CONDUIT RUN. (ADDITIONAL BONDS MAY BE CALLED FOR ON ENGINEERING DRAWINGS).
5. COCKPIT ENCLOSURES ARE TO BE BONDED IN THE CLOSED POSITION ONLY.
6. HINGED PARTS ARE TO BE BONDED. DOORS ARE TO BE BONDED ACROSS ONE (1) HINGE ONLY.
7. ALL RADIO EQUIPMENT IS TO BE BONDED TO THE STRUCTURE.
8. INSTRUMENT PANELS ARE TO BE BONDED TO THE PANEL MOUNT AND THEN TO THE STRUCTURE.
9. MOTOR BLOCKS MUST BE BONDED TO THE ENGINE MOUNT AND THE ENGINE MOUNTS BONDED TO THE FIREWALL AT FOUR (4) EQUIDISTANT POINTS ACROSS THE SHOCK MOUNTS USING BONDING BRAID OF 40 AMPERE CAPACITY (3/8" BRAID OR GREATER). NO BONDING IS REQUIRED ON ENGINE MOUNTS WHICH ARE NOT SHOCK MOUNTED.
10. LONG FIXED LINES (GAS AND LIQUIDS) SHALL BE BONDED AND SUPPORTED BY GROUNDING TYPE CLAMPS AT SUITABLE POINTS WHERE THEY CROSS THE STRUCTURE.
11. METAL LINES PASSING THROUGH THE FIREWALL MUST BE BONDED TO THE FIREWALL.
12. WINGS SHALL BE BONDED ACROSS THE WING CONNECTIONS THROUGH THE USE OF TWO OR MORE THOROUGHLY CLEANED BOLTS.
13. TANKS SHALL BE BONDED IN ONE OR MORE PLACES, PREFERABLY ON LOWER CORNERS. TANKS SHALL HAVE ACCESSIBLE POINTS FOR THE CONNECTION OF BONDS.
14. ALL CONTROL SURFACES, WITH THE EXCEPTION OF TRIM TABS, SHALL BE BONDED ACROSS AT LEAST TWO HINGE BRACKETS.
15. ENGINE COWLING SHALL BE BONDED TO THE ENGINE BY THE USE OF NOT LESS THAN FOUR (4) SYMETRICALLY LOCATED BONDS. BONDS ARE TO BE MADE AS SHOWN OR BY AN APPROVED METHOD.

NOTE: WHEN IT IS NECESSARY TO BOND BOMB RACKS, THE BOND SHALL BE AS SHOWN ON THE PRODUCTION ILLUSTRATION FOR THE INSTALLATION OF THE RACK.

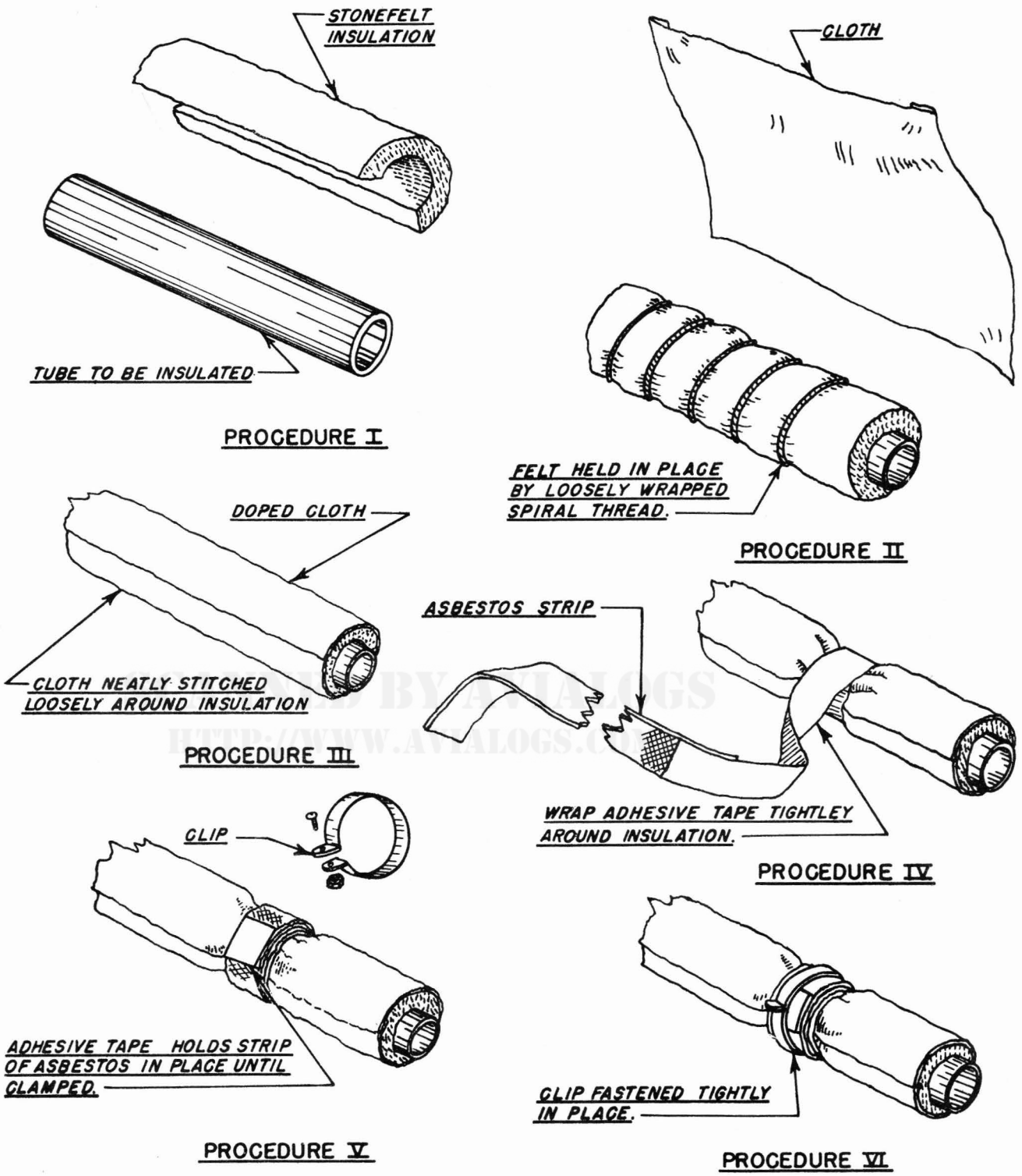


Figure 72 - Warm Air Duct Insulation

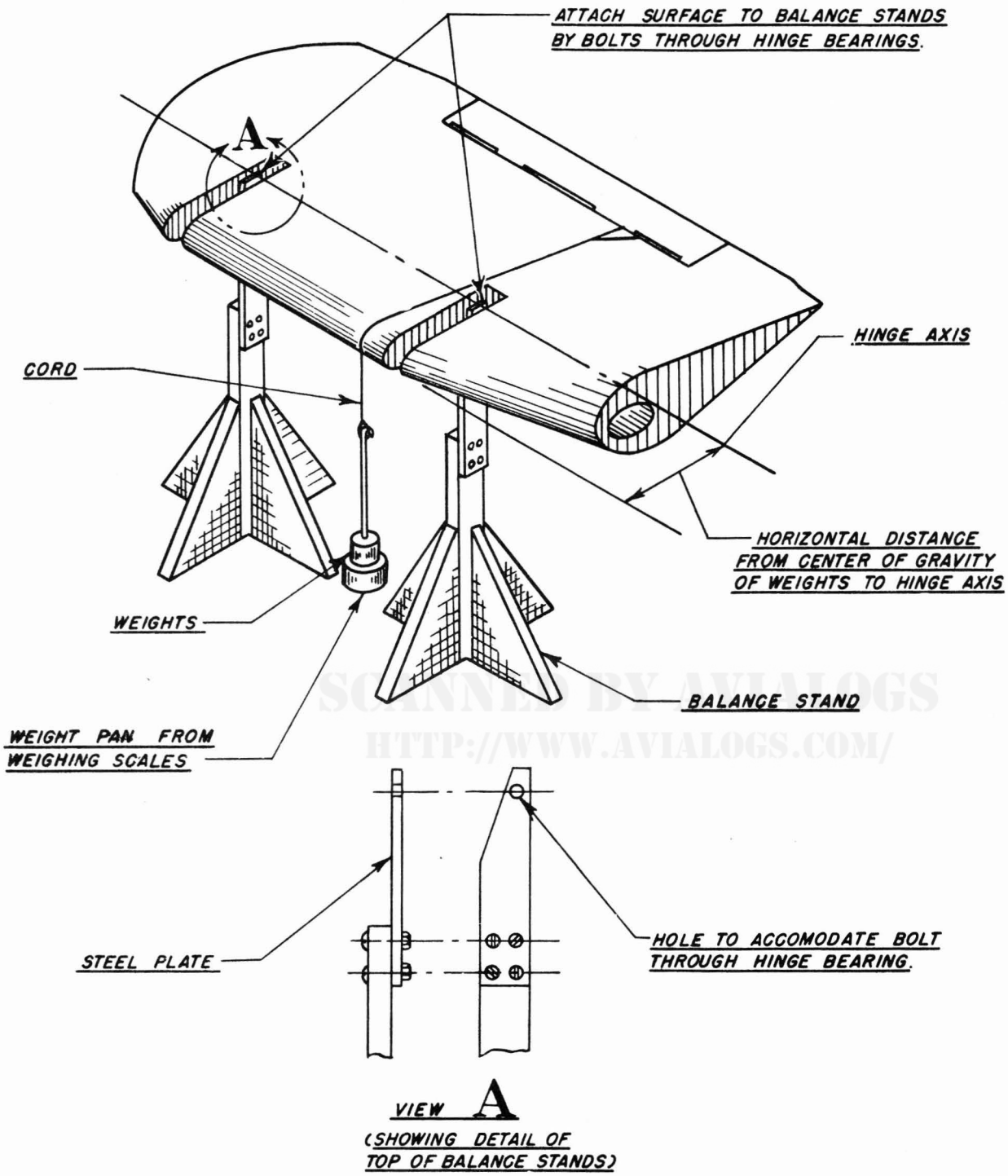
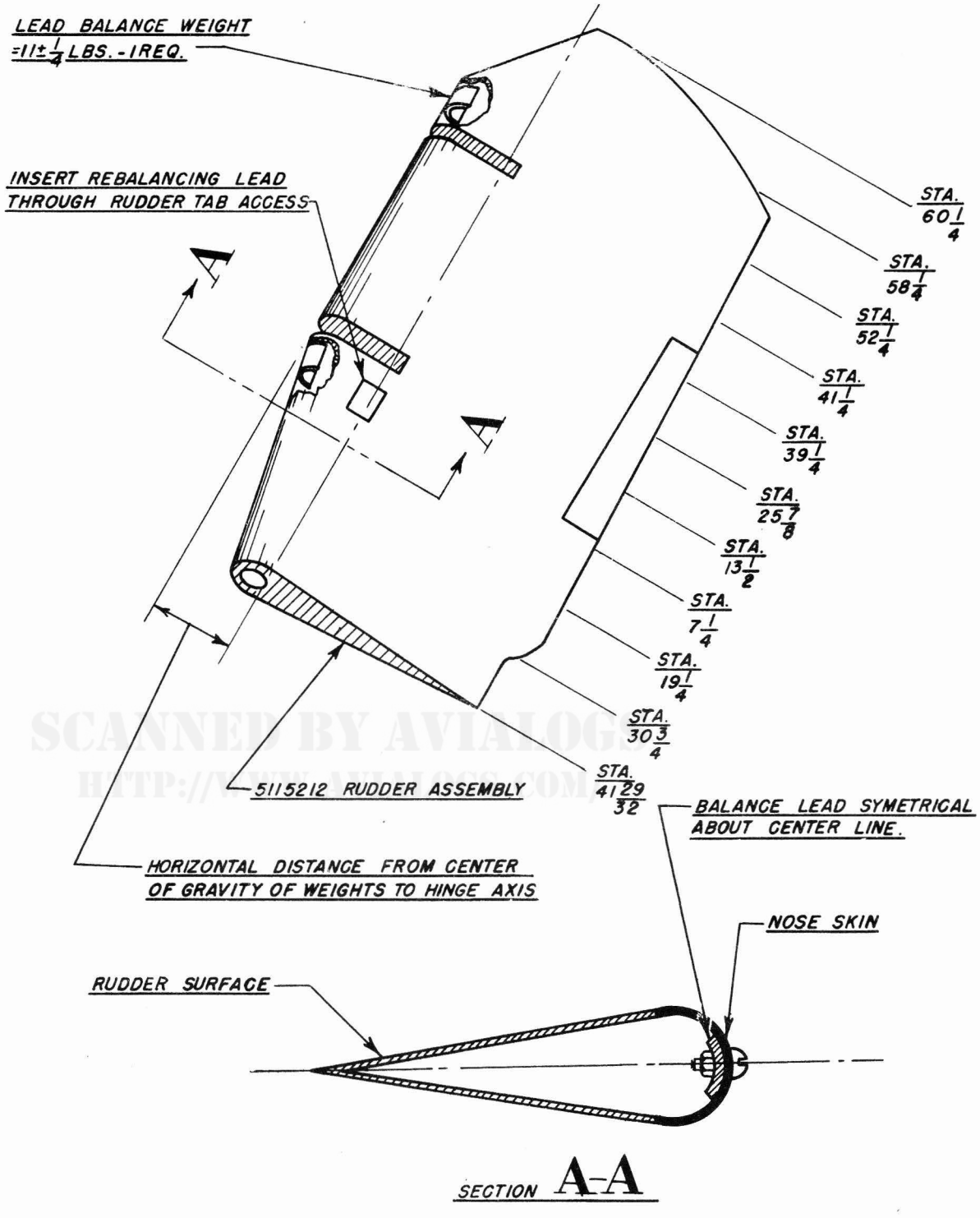


Figure 73 - Surface Control Balance Stand



NOTE:
FOR COMPUTATION OF RUDDER REBALANCE WEIGHT REFER TO FIG. 75

Figure 74 - Rudder Rebalance Procedure

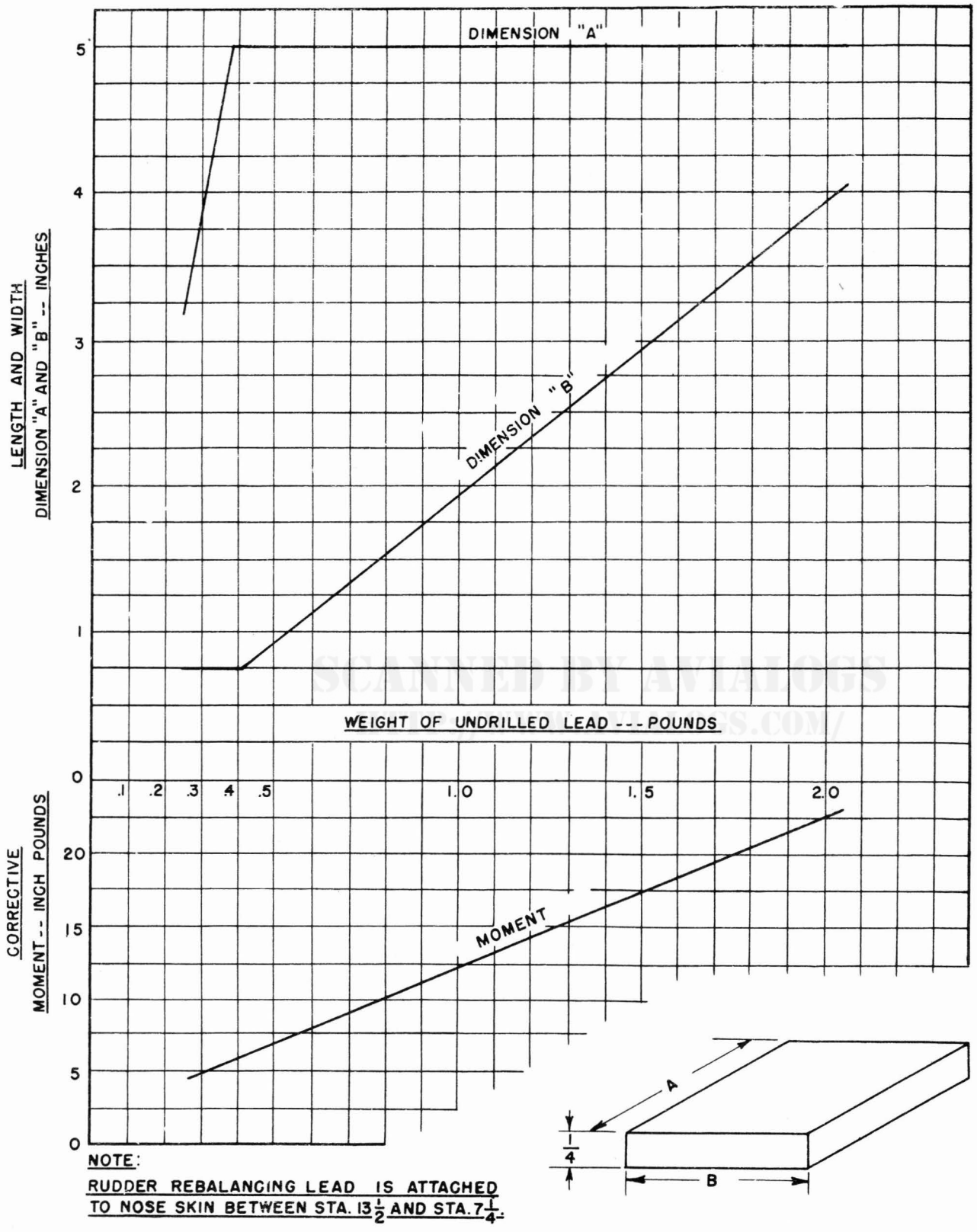
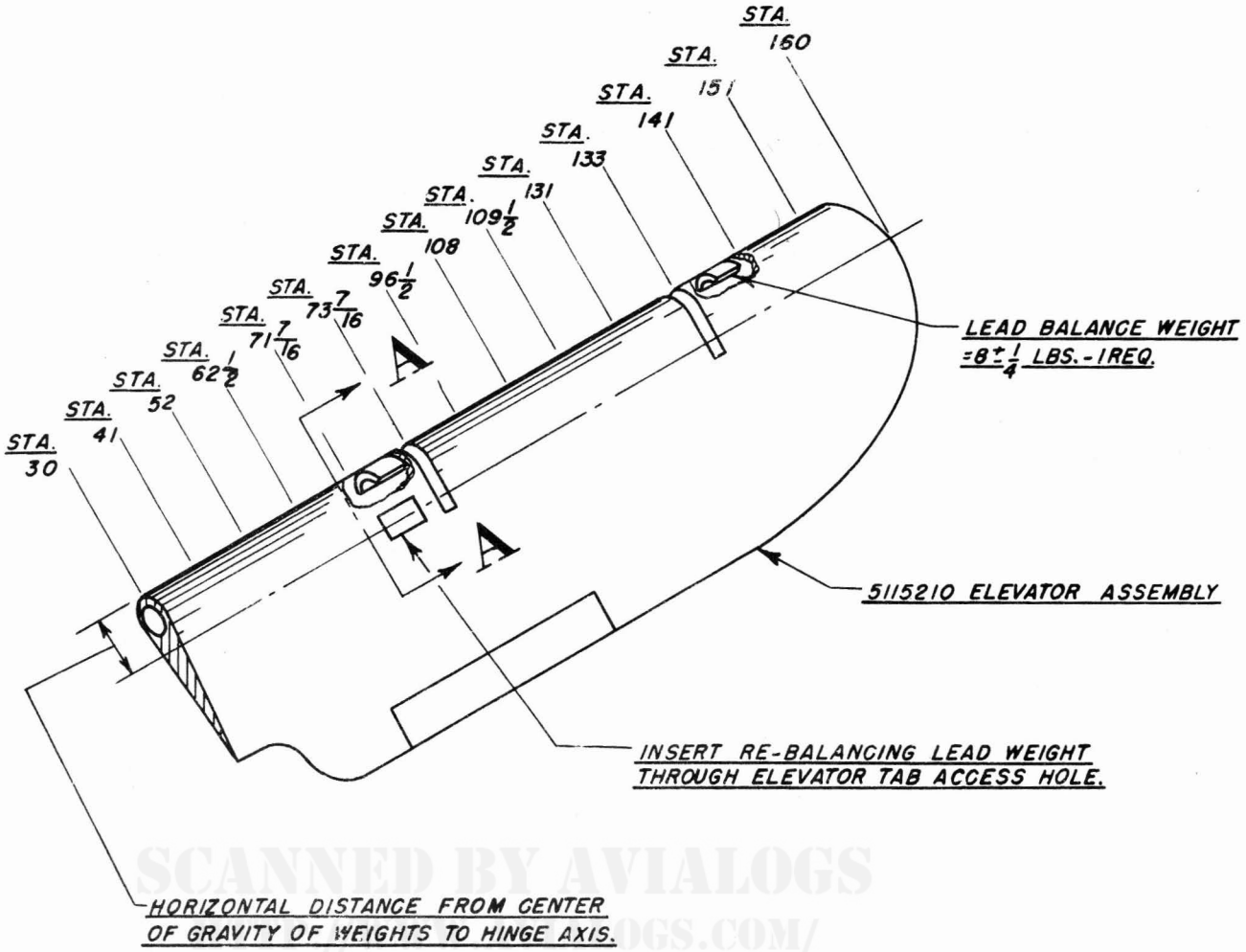
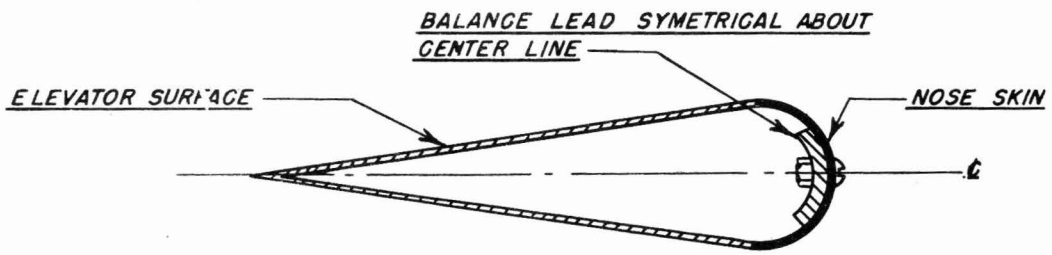


Figure 75 - Rudder Rebalance Computation Chart





SECTION A-A

NOTE:
FOR COMPUTATION OF ELEVATOR RE-BALANCE WEIGHT REFER TO FIC. 77 .

Figure 76 - Elevator Rebalance Procedure

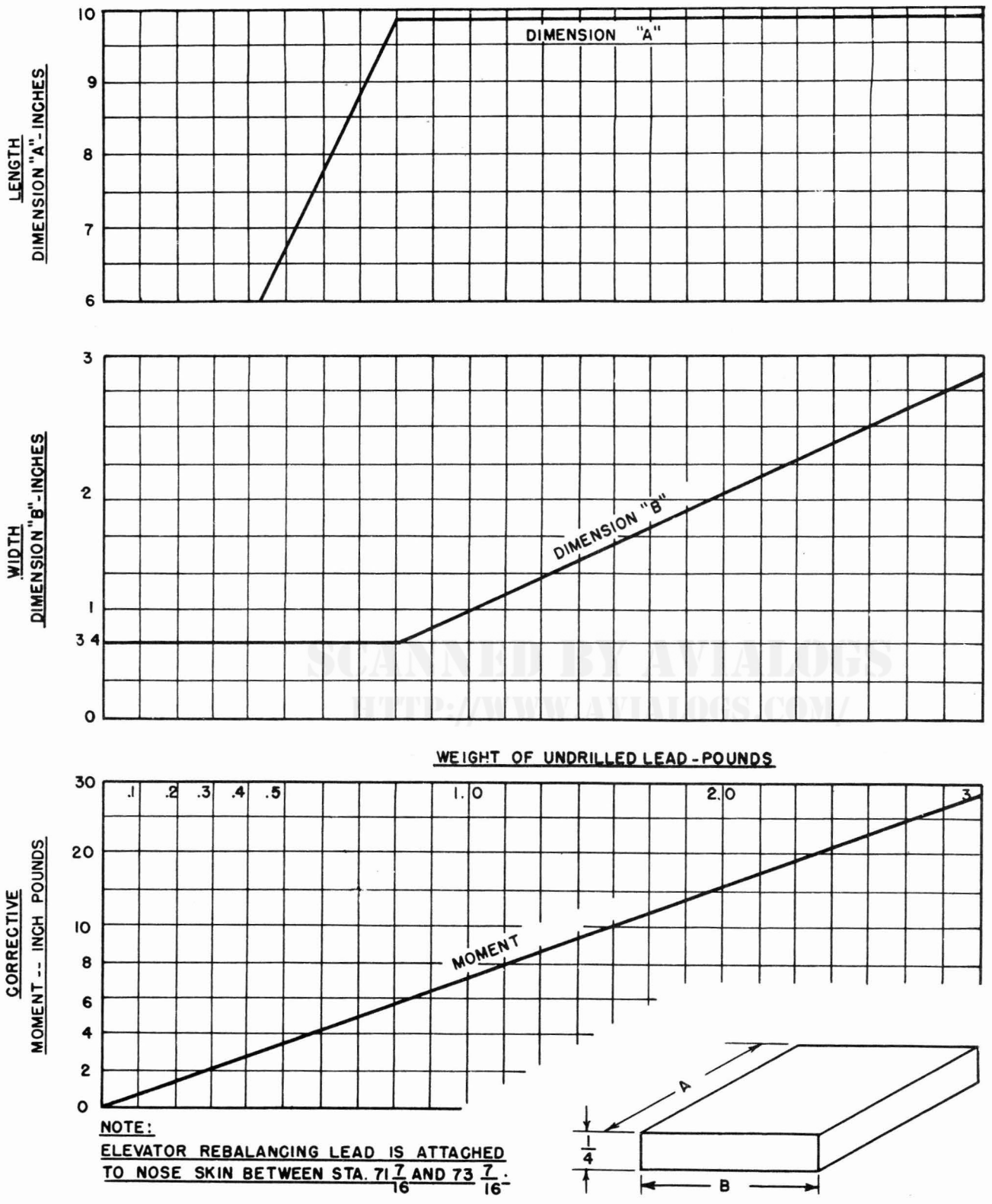


Figure 77 - Elevator Rebalance Computation Chart

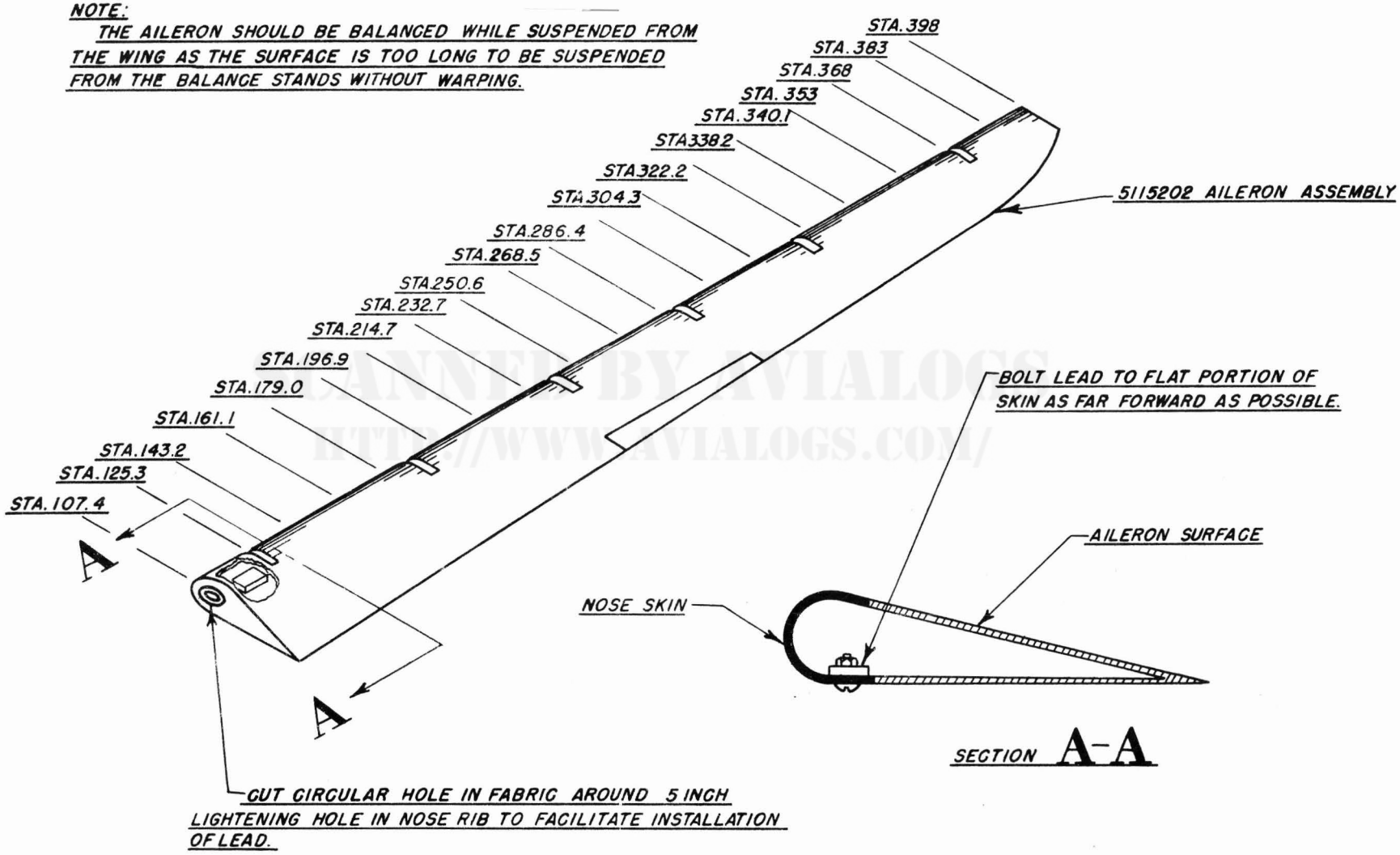


Figure 78 - Aileron Rebalance Procedure

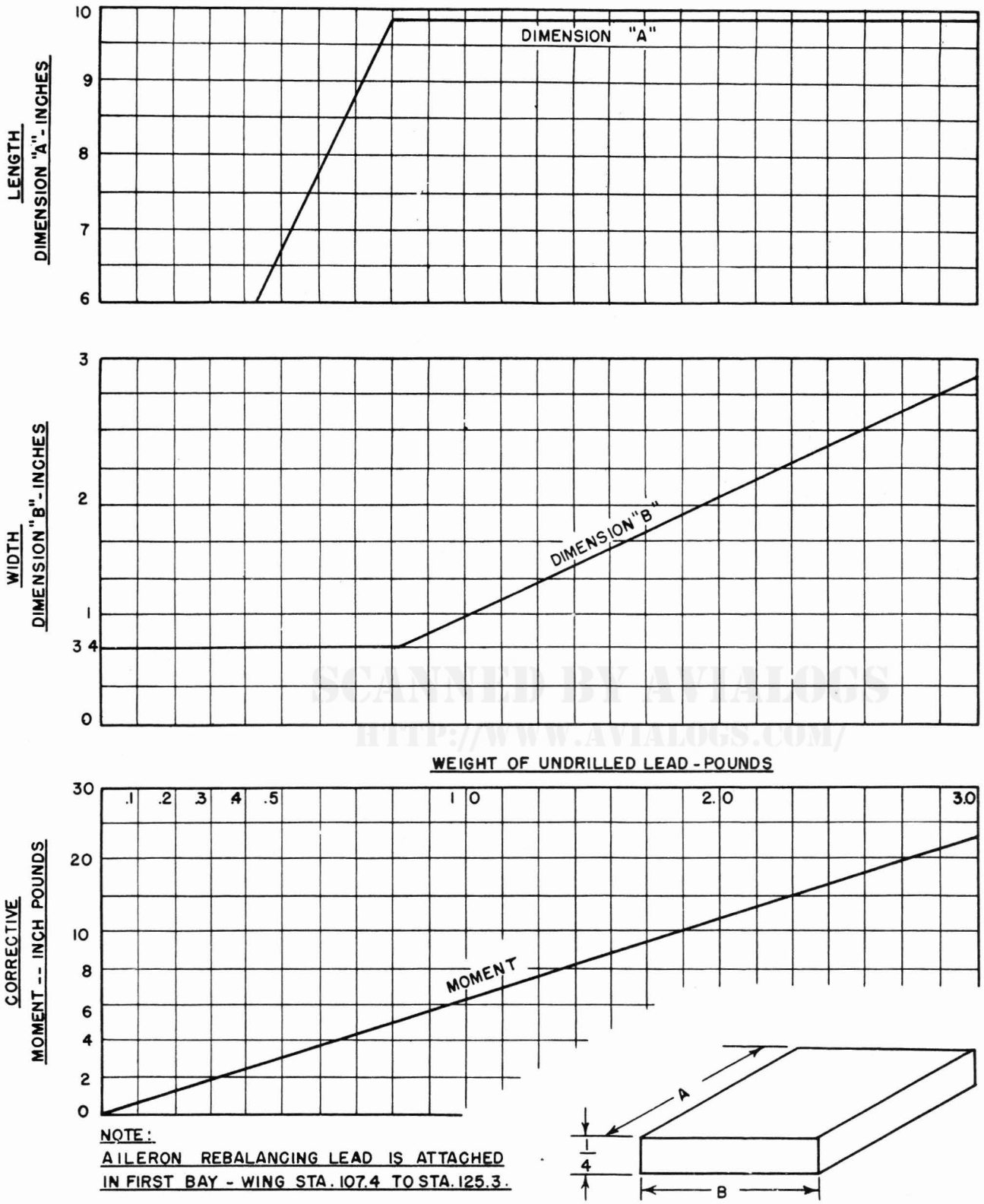


Figure 79 - Aileron Rebalance Computation Chart

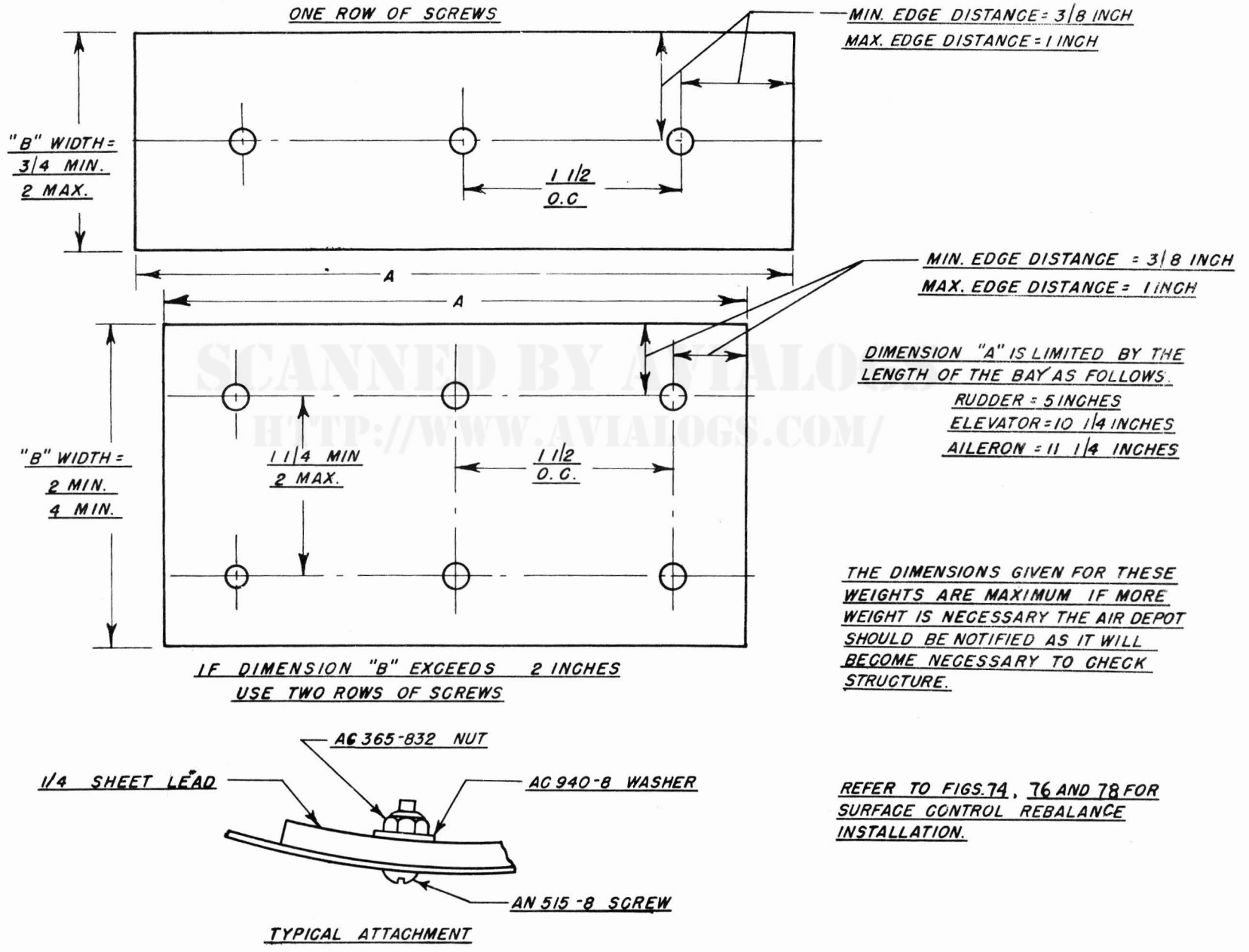
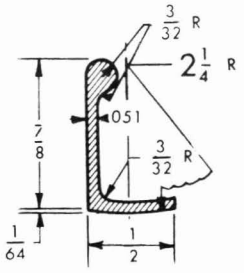
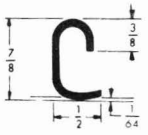


Figure 80 - Surface Control Balance Weight Detail



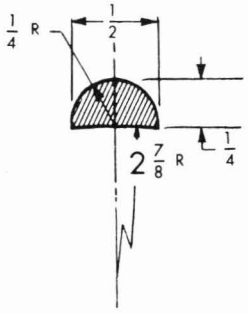


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .1096 Sq. In.

S-130892 ALCOA DIE NUMBER K-10265

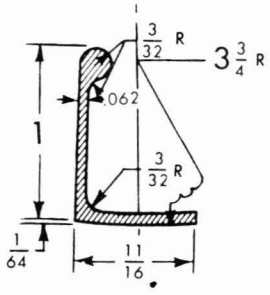
AREA .091 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-130909 ALCOA DIE NUMBER D-919

AREA .098 SQ. IN. MATERIAL 24S

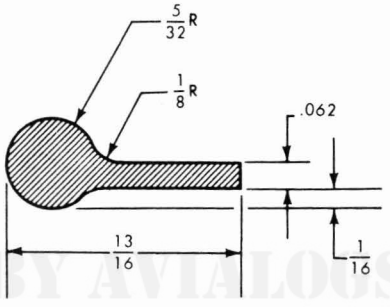


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1475 Sq. In.

S-130893 ALCOA DIE NUMBER K-10266

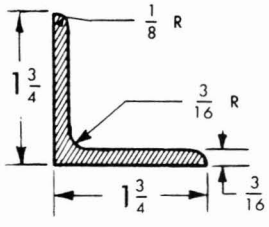
AREA .122 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-130910 ALCOA DIE NUMBER 6207

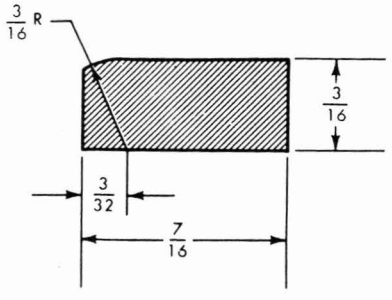
AREA .110 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-130907 ALCOA DIE NUMBER K-77-U

AREA .620 SQ. IN. MATERIAL 24S

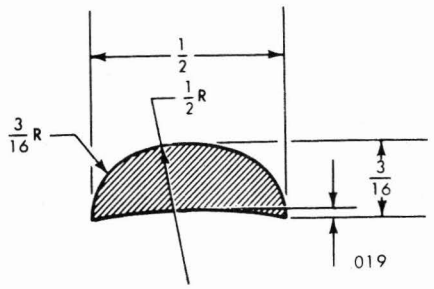


NO ALTERNATE THIS THIS EXTRUSION

S-130918 ALCOA DIE NUMBER 1169

AREA 087 SQ. IN. MATERIAL 24S

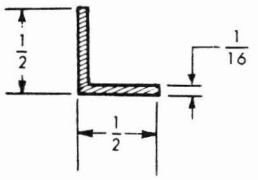
Figure 81 (Sheet 1 of 21) — Extrusion Charts

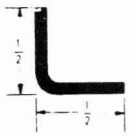


NO ALTERNATE FOR THIS EXTRUSION

S-130919 ALCOA DIE NUMBER 74-C

AREA .071 SQ. IN. MATERIAL 24S



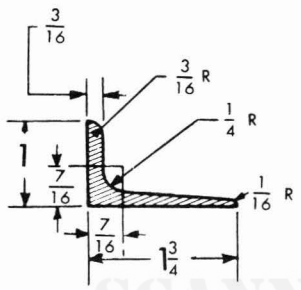


ALTERNATE

Material 24SO
H.T. to 24ST
Area .072 Sq. In.
Min. Radii 1/8
Area .0618 Sq. In.

S-132965 ALCOA DIE NUMBER K-1312

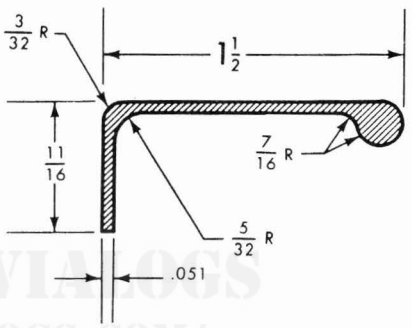
AREA .059 SQ. IN. MATERIAL 24S

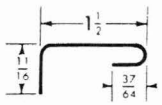


NO ALTERNATE FOR THIS EXTRUSION

S-130985 ALCOA DIE NUMBER D-7868

AREA .395 SQ. IN. MATERIAL 24S



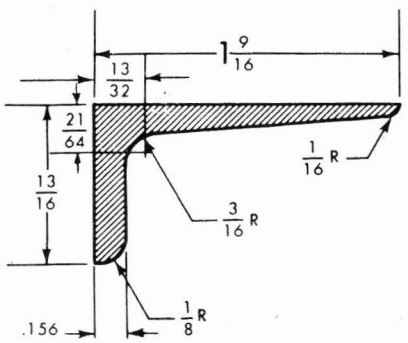


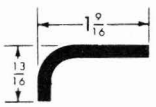
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .1735 Sq. In.

S-134903 ALCOA DIE NUMBER 8476

AREA .144 SQ. IN. MATERIAL 24S



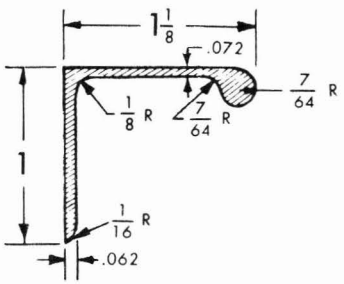


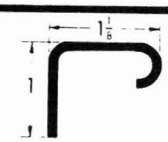
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .188
Min. Radii 3/8
Area .370 Sq. In.

S-131004 ALCOA DIE NUMBER 14867

AREA .280 SQ. IN. MATERIAL 24S





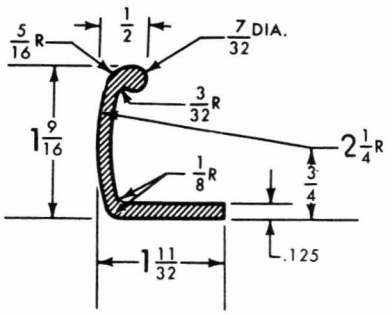
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .091
Min. Radii 5/32
Area .212 Sq. In.

S-135311 ALCOA DIE NUMBER K-8478

AREA .168 SQ. IN. MATERIAL 24S

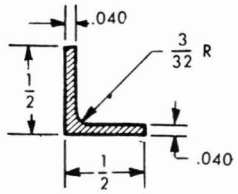
Figure 81 (Sheet 2 of 21) — Extrusion Charts

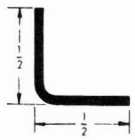


NO ALTERNATE FOR THIS EXTRUSION

S-135407 ALCOA DIE NUMBER 8672

AREA .378 SQ. IN. MATERIAL 24S



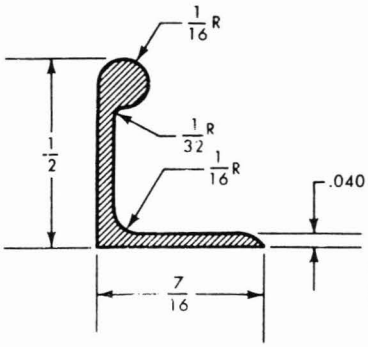


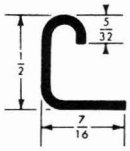
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .051
Min. Radii 1/16
Area .0464 Sq. In.

S-136555 ALCOA DIE NUMBER K-8848

AREA .03925 SQ. IN. MATERIAL 24S



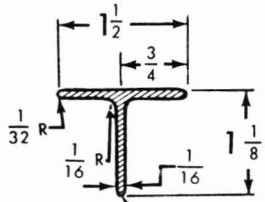


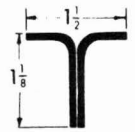
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .051
Min. Radii 1/16
Area .053 Sq. In.

S-135989 ALCOA DIE NUMBER 8674

AREA .044 SQ. IN. MATERIAL 24S



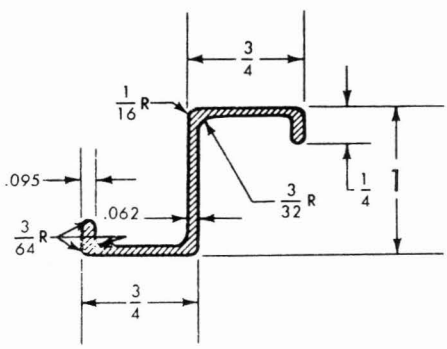


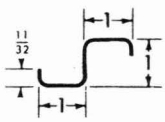
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .2047 Sq. In.

S-137058 ALCOA DIE NUMBER 2499

AREA .160 SQ. IN. MATERIAL 24S



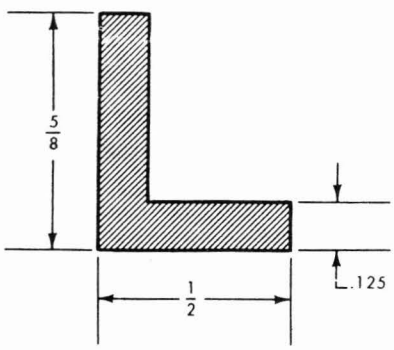


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .223 Sq. In.

S-136493 ALCOA DIE NUMBER 8849

AREA .184 SQ. IN. MATERIAL 24S

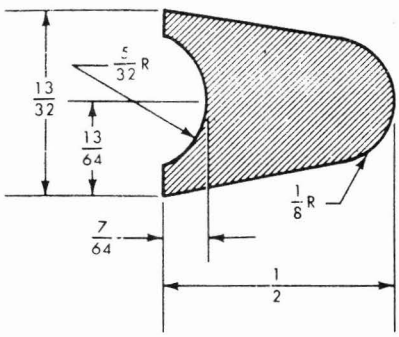


NO ALTERNATE FOR THIS EXTRUSION

S-137073 ALCOA DIE NUMBER 8881

AREA .125 SQ. IN. MATERIAL 24S

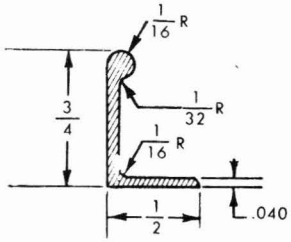
Figure 81 (Sheet 3 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-137932 ALCOA DIE NUMBER 9032

AREA .122 SQ. IN. MATERIAL 24S

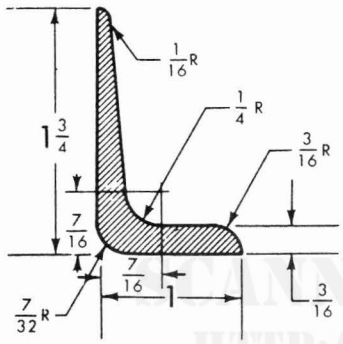


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .051
Min. Radii 1/16
Area .0689 Sq. In.

S-164577 ALCOA DIE NUMBER 10282

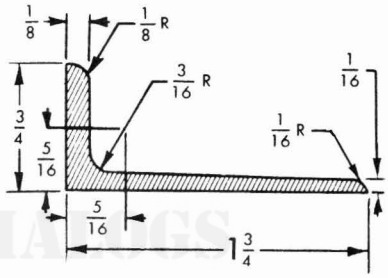
AREA .057 SQ. IN. MATERIAL 24S

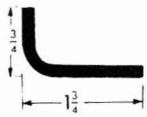


NO ALTERNATE FOR THIS EXTRUSION

S-144773 ALCOA DIE NUMBER 9667

AREA .396 SQ. IN. MATERIAL 24S



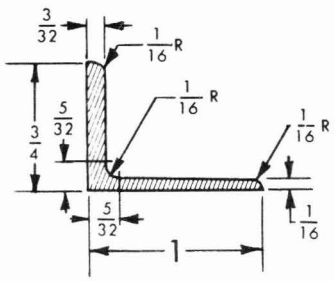


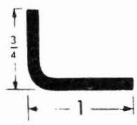
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .188
Min. Radii 3/8
Area .3965 Sq. In.

S-165186 ALCOA DIE NUMBER 10480

AREA .250 SQ. IN. MATERIAL 24S



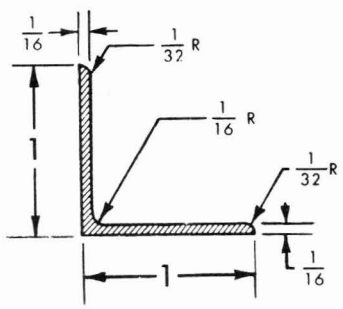


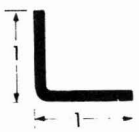
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .156
Min. Radii 9/32
Area .2242 Sq. In.

S-151776 ALCOA DIE NUMBER K-7621

AREA .140 SQ. IN. MATERIAL 24S





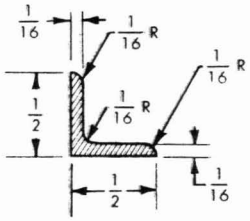
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .134 Sq. In.

S-167881 ALCOA DIE NUMBER 78-J

AREA .121 SQ. IN. MATERIAL 24S

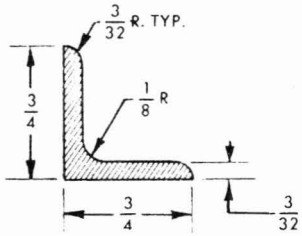
Figure 81 (Sheet 4 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-167882 ALCOA DIE NUMBER 78-P OR 10133-0401

AREA .059 SQ. IN. MATERIAL 24S

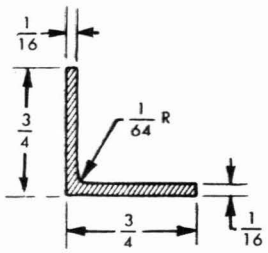


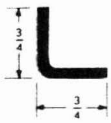
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .102
Min. Radii 3/16
Area .132 Sq. In.

S-167889 ALCOA DIE NUMBER 78-C

AREA .130 SQ. IN. MATERIAL 24S



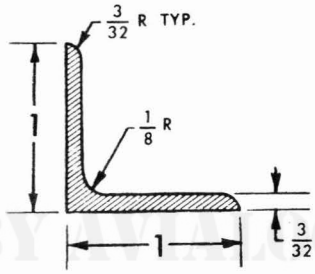


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .0978 Sq. In.

S-167883 ALCOA DIE NUMBER 472

AREA .090 SQ. IN. MATERIAL 24S

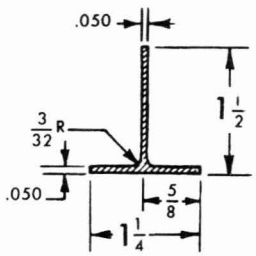


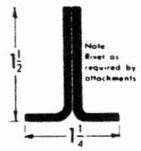
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .102
Min. Radii 3/16
Area .183 Sq. In.

S-167890 ALCOA DIE NUMBER 78-F

AREA .180 SQ. IN. MATERIAL 24S



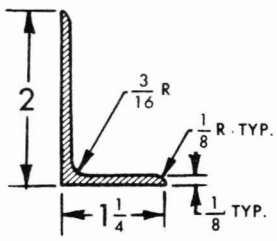


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .051
Min. Radii 1/16
Area .2076 Sq. In.

S-167887 ALCOA DIE NUMBER 3094

AREA .141 SQ. IN. MATERIAL 24S



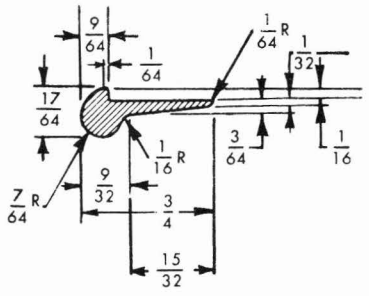
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .156
Min. Radii 9/32
Area .458 Sq. In.

S-167892 ALCOA DIE NUMBER 734-P

AREA .390 SQ. IN. MATERIAL 24S

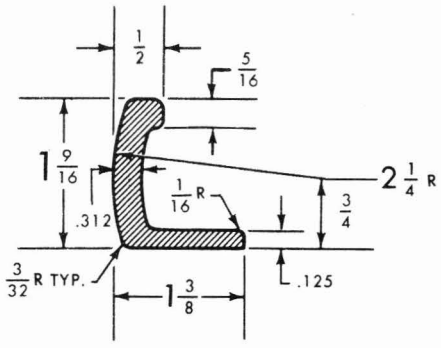
Figure 81 (Sheet 5 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-168854 ALCOA DIE NUMBER K-14618

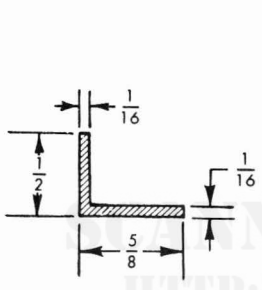
AREA .060 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-170855 ALCOA DIE NUMBER 10085

AREA .638 SQ. IN. MATERIAL 24S

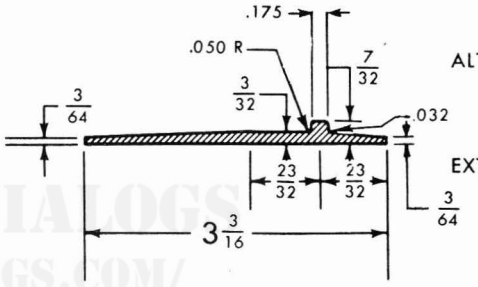


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .0708 Sq. In.

S-169096 ALCOA DIE NUMBER K-5456

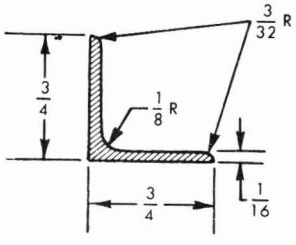
AREA .067 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-174491 ALCOA DIE NUMBER 9067

AREA .274 SQ. IN. MATERIAL 24S

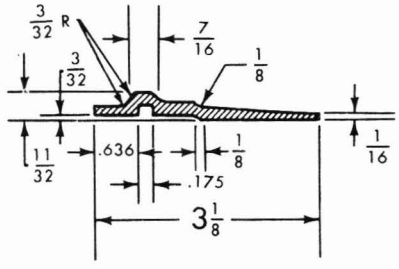


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .0978 Sq. In.

S-169097 ALCOA DIE NUMBER K-78-K

AREA .090 SQ. IN. MATERIAL 24S

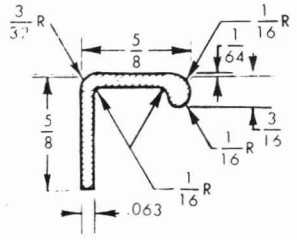


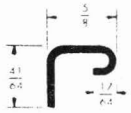
NO ALTERNATE FOR THIS EXTRUSION

S-174492 ALCOA DIE NUMBER 9068

AREA .380 SQ. IN. MATERIAL 24S

Figure 81 (Sheet 6 of 21) — Extrusion Charts



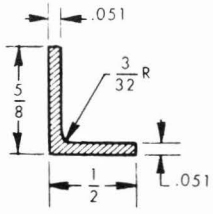


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1 8
Area .1082 Sq. In.

S-179064 ALCOA DIE NUMBER 12673

AREA .090 SQ. IN. MATERIAL 24S

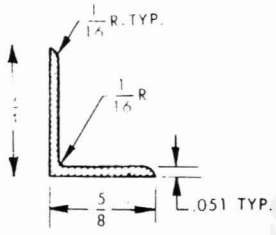


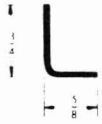
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3 32
Area .0644 Sq. In.

S-1000142 ALCOA DIE NUMBER K-10660

AREA .057 SQ. IN. MATERIAL 24S



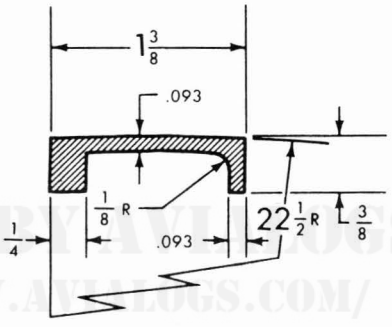


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3 32
Area .0805 Sq. In.

S-179364 ALCOA DIE NUMBER 12883

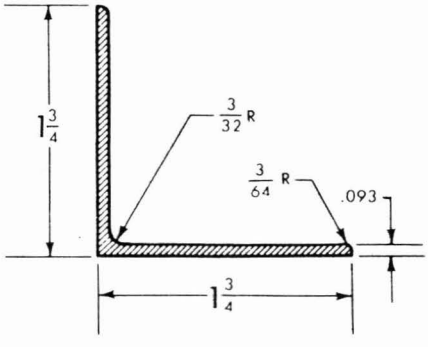
AREA .067 SQ. IN. MATERIAL 24S

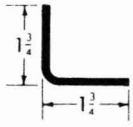


NO ALTERNATE FOR THIS EXTRUSION

S-1001730 ALCOA DIE NUMBER 11446

AREA .219 SQ. IN. MATERIAL 24S



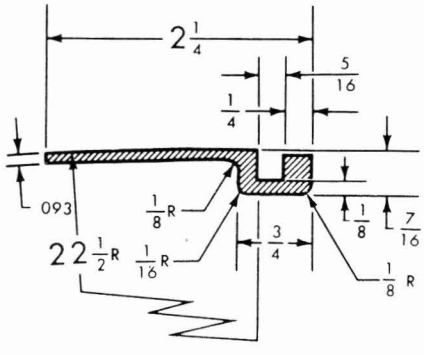


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .102
Min. Radii 3/16
Area .335 Sq. In.

S-180947 ALCOA DIE NUMBER 78L

AREA .320 SQ. IN. MATERIAL 24S

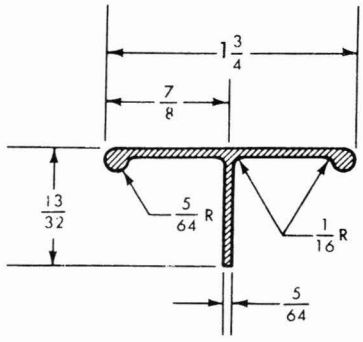


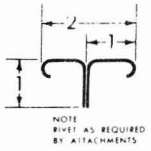
NO ALTERNATE FOR THIS EXTRUSION

S-1001731 ALCOA DIE NUMBER 11447

AREA .354 SQ. IN. MATERIAL 24S

Figure 81 (Sheet 7 of 21) — Extrusion Charts



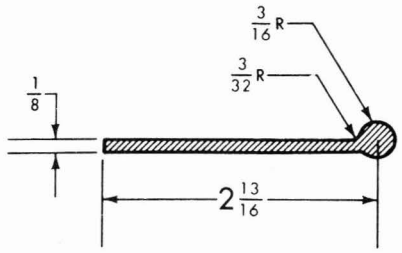


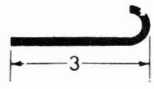
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .081
Min. Radii 1/8
Area .347 Sq. In.

S-1003807 ALCOA DIE NUMBER 11224

AREA .213 SQ. IN. MATERIAL 24S



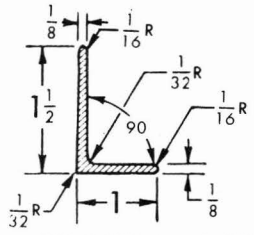


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .156
Min. Radii 9/32
Area .571 Sq. In.

S-1008660 ALCOA DIE NUMBER 11693

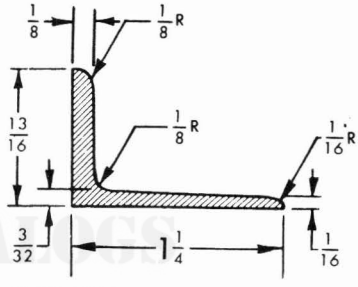
AREA .444 SQ. IN. MATERIAL 24S

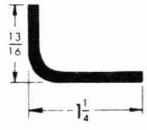


NO ALTERNATE FOR THIS EXTRUSION

S-1007015 ALCOA DIE NUMBER K-985

AREA .296 SQ. IN. MATERIAL 24S



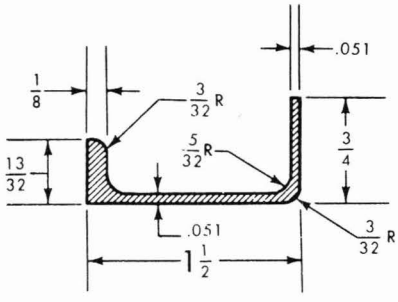


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .188
Min. Radii 3/8
Area .3142 Sq. In.

S-1016616 ALCOA DIE NUMBER K-12696

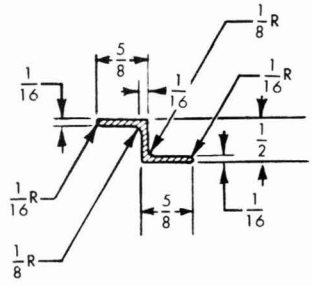
AREA .189 SQ. IN. MATERIAL 24S

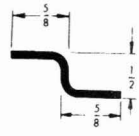


NO ALTERNATE FOR THIS EXTRUSION

S-1008504 ALCOA DIE NUMBER 11692

AREA .163 SQ. IN. MATERIAL 24S





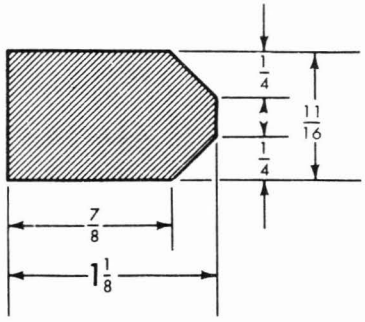
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .081
Min. Radii 1 8
Area .117 Sq. In.

S-1018327 ALCOA DIE NUMBER K-12862

AREA .107 SQ. IN. MATERIAL 24S

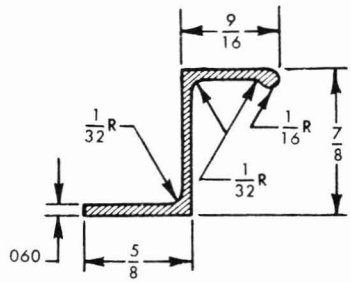
Figure 81 (Sheet 8 of 21) — Extrusion Charts

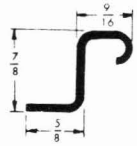


NO ALTERNATE FOR THIS EXTRUSION

S-1019274 ALCOA DIE NUMBER 14817

AREA .711 SQ. IN. MATERIAL 24S



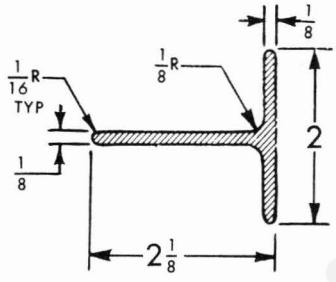


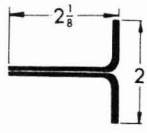
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1505 Sq. In.

S-1022235 ALCOA DIE NUMBER K-13412

AREA .123 SQ. IN. MATERIAL 24S



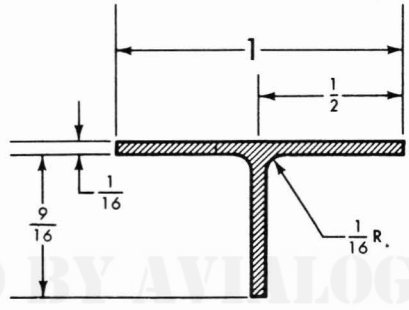


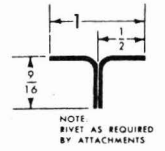
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .125
Min. Radii 7/32
Area .679 Sq. In.

S-1020195 ALCOA DIE NUMBER K-14662

AREA .502 SQ. IN. MATERIAL 24S



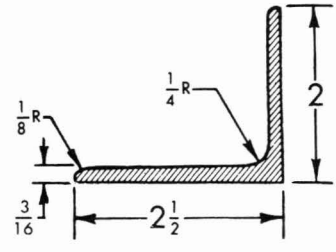


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .120 Sq. In.

S-1023480 ALCOA DIE NUMBER 2647

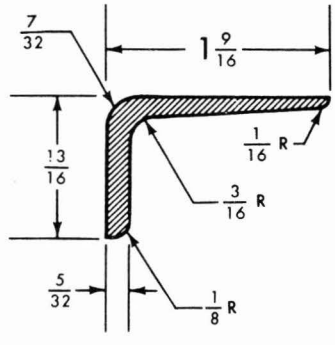
AREA .094 SQ. IN. MATERIAL 24S

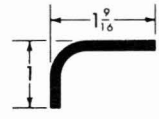


NO ALTERNATE FOR THIS EXTRUSION

S-1020679 ALCOA DIE NUMBER 734-U

AREA .82 SQ. IN. MATERIAL 24S





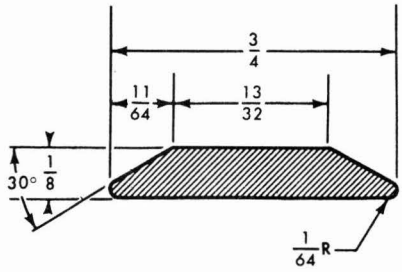
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .188
Min. Radii 3/8
Area .406 Sq. In.

S-1024008 ALCOA DIE NUMBER 14866

AREA .270 SQ. IN. MATERIAL 24S

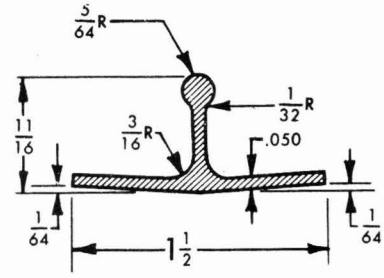
Figure 81 (Sheet 9 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-1024024 ALCOA DIE NUMBER 14683

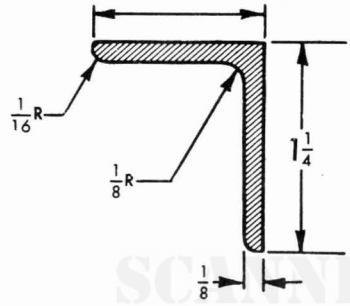
AREA .076 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1028381 ALCOA DIE NUMBER K-13666

AREA .134 SQ. IN. MATERIAL 24S

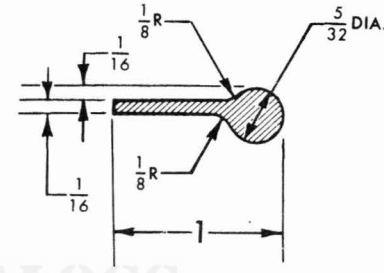


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .156
Min. Radii 9/32
Area .3025 Sq. In.

S-1025503 ALCOA DIE NUMBER K-734-HH

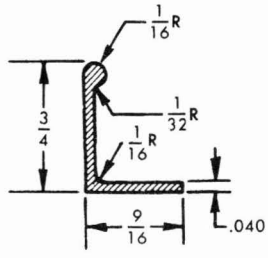
AREA .267 SQ. IN. MATERIAL 24S

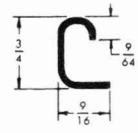


NO ALTERNATE FOR THIS EXTRUSION

S-1029111 ALCOA DIE NUMBER K-13647

AREA .128 SQ. IN. MATERIAL 24S



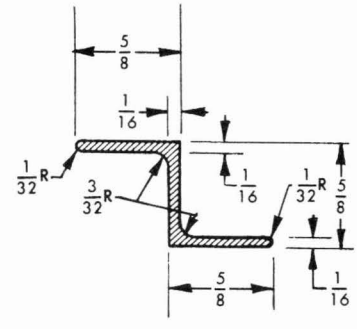


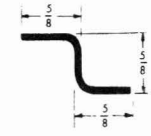
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .051
Min. Radii 1/16
Area .0721 Sq. In.

S-1027673 ALCOA DIE NUMBER K-13608

AREA .060 SQ. IN. MATERIAL 24S





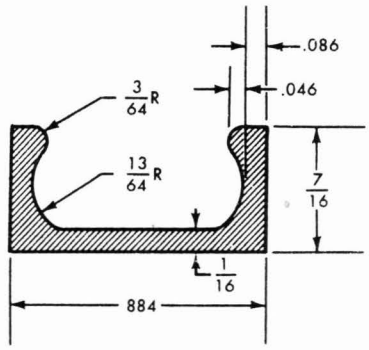
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1147 Sq. In.

S-1030509 ALCOA DIE NUMBER K-13821

AREA .113 SQ. IN. MATERIAL 24S

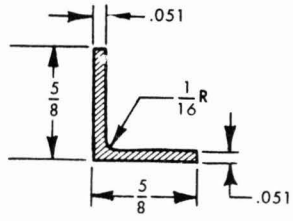
Figure 81 (Sheet 10 of 21) — Extrusion Charts

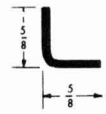


NO ALTERNATE FOR THIS EXTRUSION

S-1033420 ALCOA DIE NUMBER 14097

AREA .151 SQ. IN. MATERIAL 24S



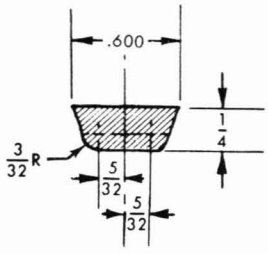


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .072 Sq. In.

S-1045544 ALCOA DIE NUMBER K-15607

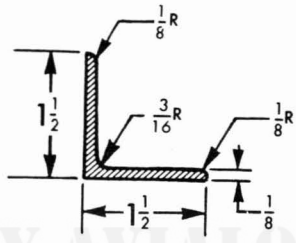
AREA .062 SQ. IN. MATERIAL 24S

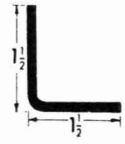


NO ALTERNATE FOR THIS EXTRUSION

S-1039966 ALCOA DIE NUMBER K-14661

AREA .130 SQ. IN. MATERIAL 24S



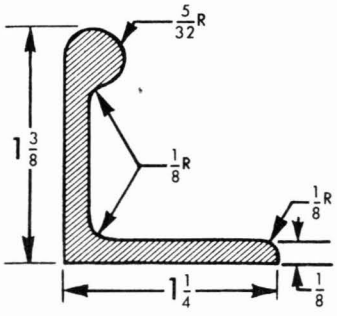


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .156
Min. Radii 9/32
Area .4195 Sq. In.

S-1046482 ALCOA DIE NUMBER K-77-R

AREA .36 SQ. IN. MATERIAL 24S

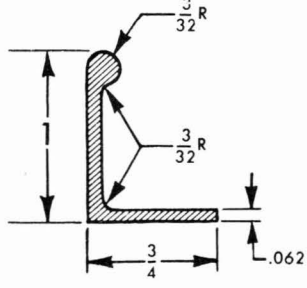


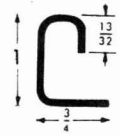
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .156
Min. Radii 9/32
Area .4686 Sq. In.

S-1045540 ALCOA DIE NUMBER K-15418

AREA .358 SQ. IN. MATERIAL 24S





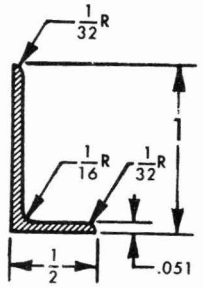
ALTERNATE

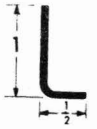
Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .153 Sq. In.

S-1047299 ALCOA DIE NUMBER K-15644

AREA .127 SQ. IN. MATERIAL 24S

Figure 81 (Sheet 11 of 21) — Extrusion Charts



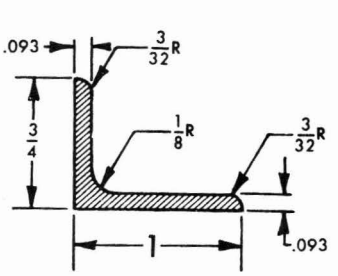


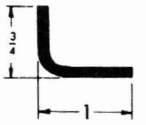
ALTERNATE

Material 24SO
H.T. to 24S
Gage .064
Min. Radii 3/32
Area .0881 Sq. In.

S-1059614 ALCOA DIE NUMBER L-23792

AREA .074 SQ. IN. MATERIAL 24S



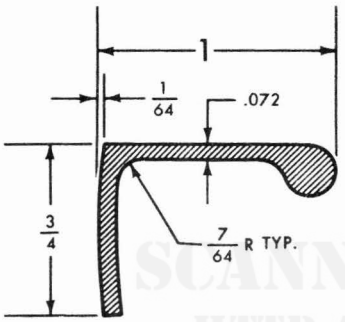


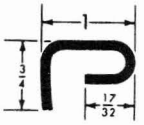
ALTERNATE

Material 24SO
H.T. to 24S
Gage .102
Min. Radii 3/16
Area .1567 Sq. In.

S-1059659 ALCOA DIE NUMBER L-24183

AREA .154 SQ. IN. MATERIAL 24S



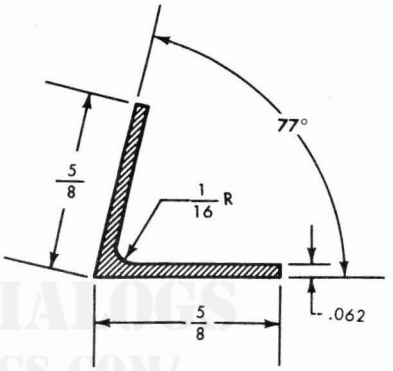


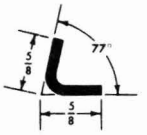
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .081
Min. Radii 1/8
Area .0746 Sq. In.

S-1059652 ALCOA DIE NUMBER L-24127

AREA .1493 SQ. IN. MATERIAL 24S



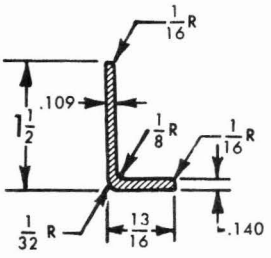


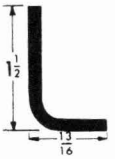
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1794 Sq. In.

S-1059668 ALCOA DIE NUMBER L-24289

AREA .073 SQ. IN. MATERIAL 24S



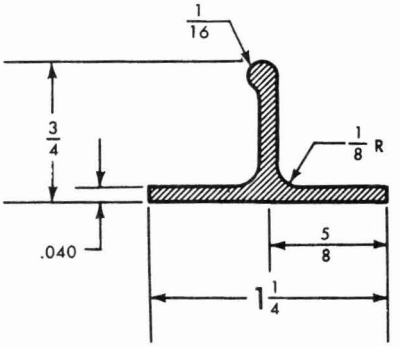


ALTERNATE

Gage .156
Material 24SO
H.T. to 24ST
Min. Radii 9/32
Area .3105 Sq. In.

S-1059653 ALCOA DIE NUMBER L-24182

AREA .262 SQ. IN. MATERIAL 24S

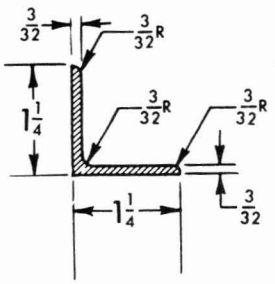


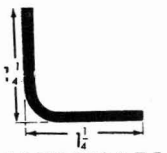
NO ALTERNATE FOR THIS EXTRUSION

S-1073341 ALCOA DIE NUMBER L-23852

AREA .094 SQ. IN. MATERIAL 24S

Figure 81 (Sheet 12 of 21) — Extrusion Charts



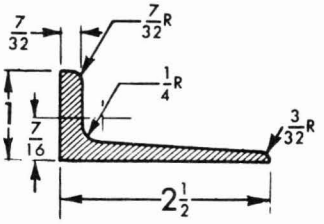


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .102
Min. Radii 3/16
Area .2334 Sq. In.

S-1073342 ALCOA DIE NUMBER 78-Y

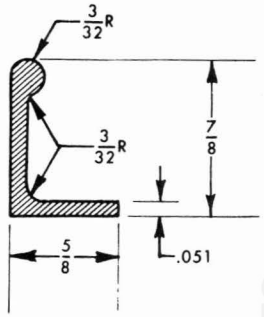
AREA .230 SQ. IN. MATERIAL 24S

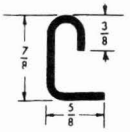


NO ALTERNATE FOR THIS EXTRUSION

S-1081131 ALCOA DIE NUMBER K-22434

AREA .548 SQ. IN. MATERIAL 24S



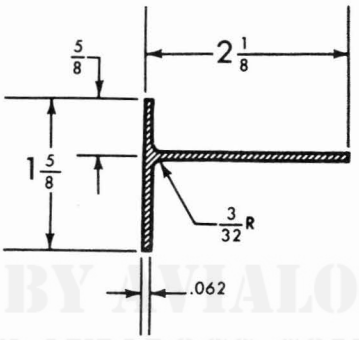


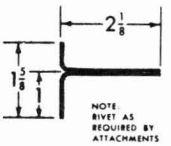
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .1164 Sq. In.

S-1075769 ALCOA DIE NUMBER K-16692

AREA .097 SQ. IN. MATERIAL 24S



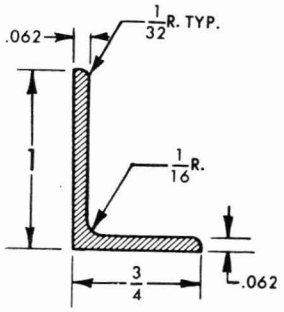


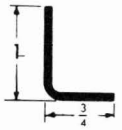
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .360 Sq. In.

S-1082271 ALCOA DIE NUMBER 22519

AREA .232 SQ. IN. MATERIAL 24S



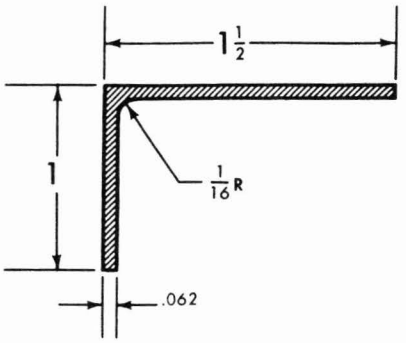


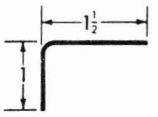
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1154 Sq. In.

S-1081111 ALCOA DIE NUMBER K-22385

AREA .105 SQ. IN. MATERIAL 24S





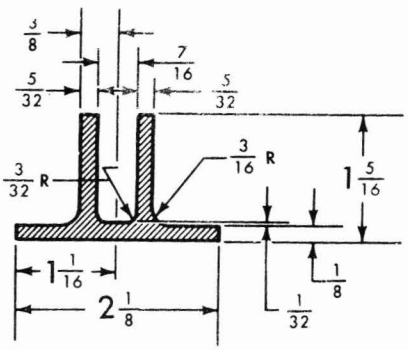
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1693 Sq. In.

S-1093719 ALCOA DIE NUMBER 30934

AREA .152 SQ. IN. MATERIAL 24S

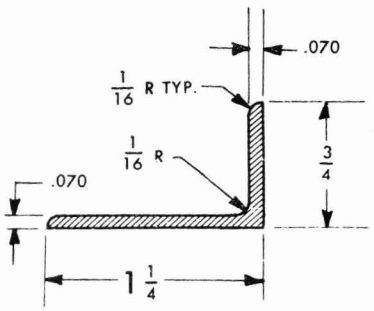
Figure 81 (Sheet 13 of 21) — Extrusion Charts

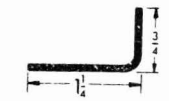


NO ALTERNATE FOR THIS EXTRUSION

S-1093731 ALCOA DIE NUMBER L-29125

AREA .669 SQ. IN. MATERIAL 24S



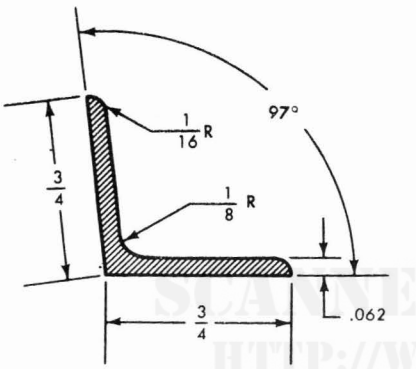


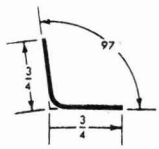
ALTERNATE

Material 24SO
H.T. to 24S
Gage .081
Min. Radii 1/8
Area .149 Sq. In.

S-1109685 ALCOA DIE NUMBER K-13689

AREA .134 SQ. IN. MATERIAL 24S



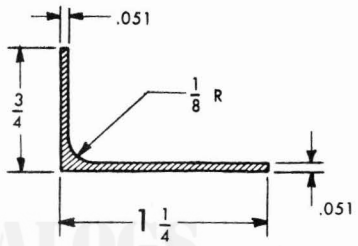


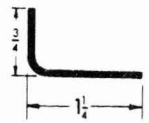
ALTERNATE

Material 24SO
H.T. to 24S
Gage .072
Min. Radii 1/8
Area .0993 Sq. In.

S-1104497 ALCOA DIE NUMBER L-28556

AREA .091 SQ. IN. MATERIAL 24S



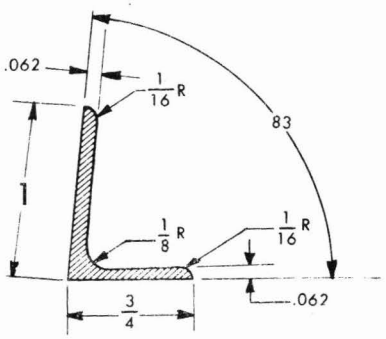


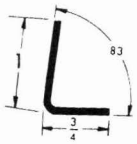
ALTERNATE

Material 24SO
H.T. to 24ST
Gage .064
Min. Radii 3/32
Area .121 Sq. In.

S-1111225 ALCOA DIE NUMBER L-28827

AREA .0995 SQ. IN. MATERIAL 24S



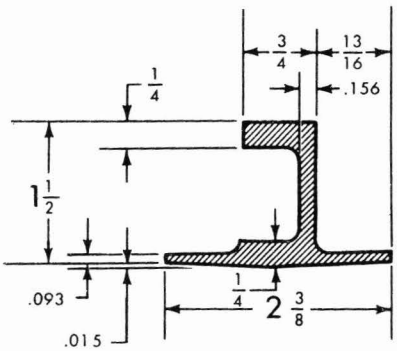


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .113 Sq. In.

S-1104751 ALCOA DIE NUMBER L-28557

AREA .107 SQ. IN. MATERIAL 24S

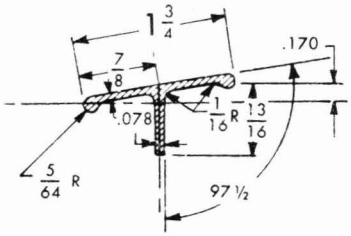


NO ALTERNATE FOR THIS EXTRUSION

S-1111709 ALCOA DIE NUMBER L-28876

AREA .690 SQ. IN. MATERIAL 24S

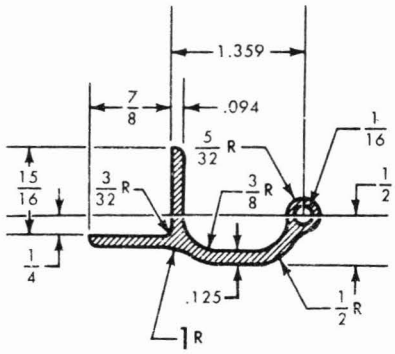
Figure 81 (Sheet 14 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-1111710 ALCOA DIE NUMBER L-28877

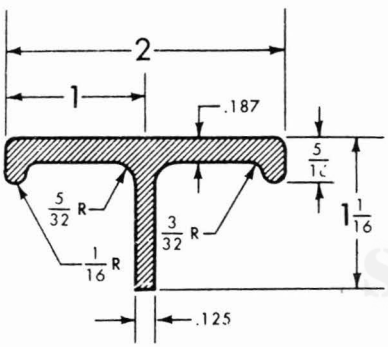
AREA .213 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1113240 BOHN DIE NUMBER 8776

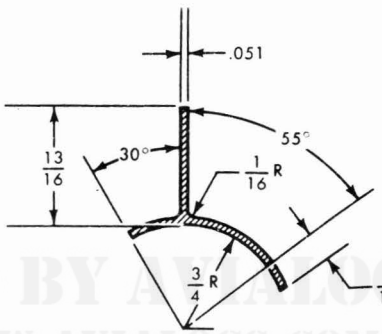
MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1111827 ALCOA DIE NUMBER L-28878

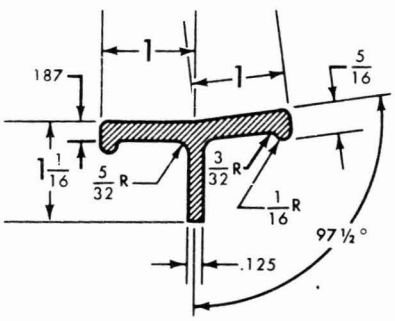
AREA .523 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1113243 BOHN DIE NUMBER 8773

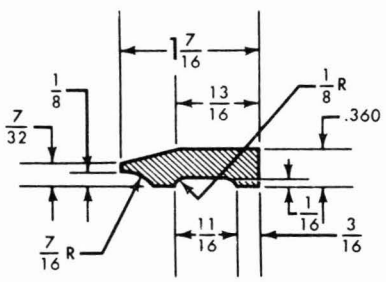
AREA .110 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1111828 ALCOA DIE NUMBER L-28879

AREA .523 SQ. IN. MATERIAL 24S

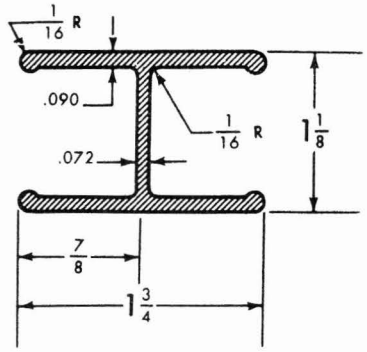


NO ALTERNATE THIS THIS EXTRUSION

S-1113476 BOHN DIE NUMBER 8774

AREA .425 SQ. IN. MATERIAL 24S

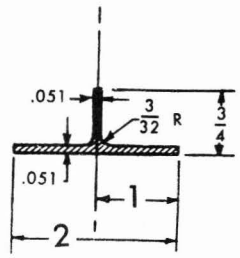
Figure 81 (Sheet 15 of 21) — Extrusion Charts

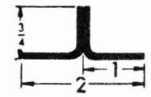


NO ALTERNATE FOR THIS EXTRUSION

S-1113848 BOHN DIE NUMBER 8777

AREA .375 SQ. IN. MATERIAL 24S



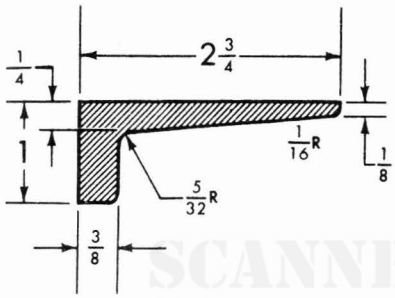


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .051
Min. Radii 1/16
Area .169 Sq. In.

S-1114110 ALCOA DIE NUMBER 30674

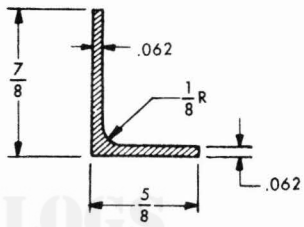
AREA .141 SQ. IN. MATERIAL 24S

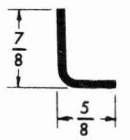


NO ALTERNATE FOR THIS EXTRUSION

S-1113882 BOHN DIE NUMBER 8775

AREA .900 SQ. IN. MATERIAL 24S



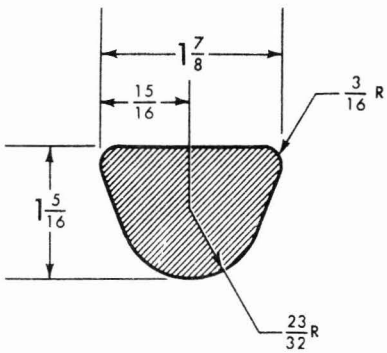


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .0974 Sq. In.

S-1114111 ALCOA DIE NUMBER 22891

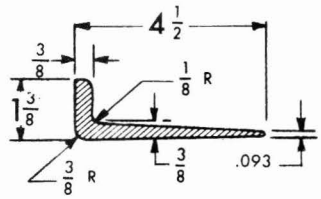
AREA .089 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1114107 BOHN DIE NUMBER 8790

AREA 1.750 SQ. IN. MATERIAL 24S

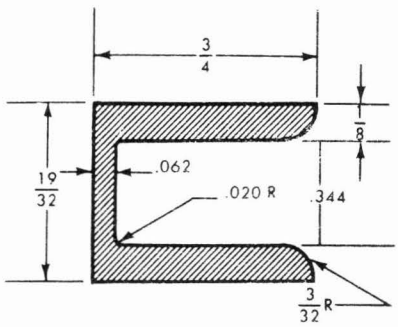


NO ALTERNATE FOR THIS EXTRUSION

S-1114163 ALCOA DIE NUMBER 30924

AREA 1.445 SQ. IN. MATERIAL 24S

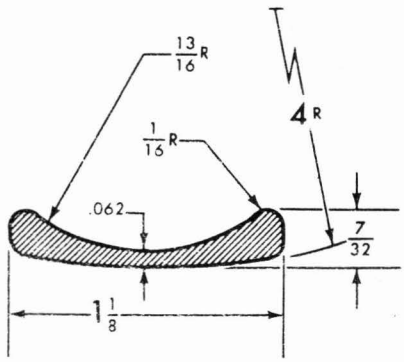
Figure 81 (Sheet 16 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-1114438 ALCOA DIE NUMBER 30046

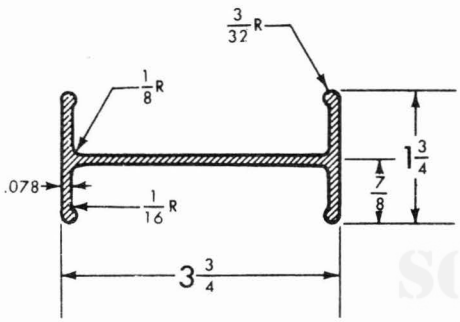
AREA .205 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1117317 ALCOA DIE NUMBER 30050

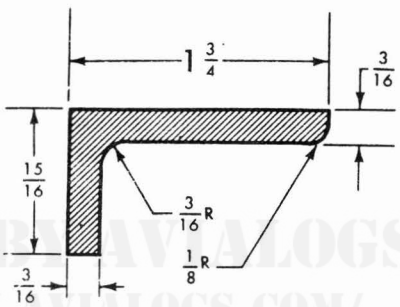
AREA .123 SQ. IN. MATERIAL 24S



NO ALTERNATE THIS THIS EXTRUSION

S-1114603 ALCOA DIE NUMBER 29003

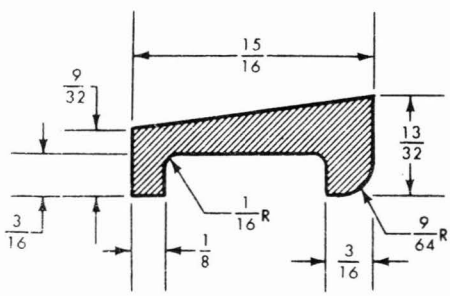
AREA .629 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1117543 ALCOA DIE NUMBER 30760

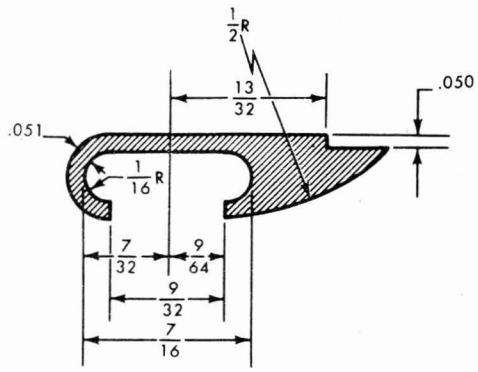
AREA .473 SQ. IN MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1116276 ALCOA DIE NUMBER 30048

AREA .202 SQ. IN. MATERIAL 24S

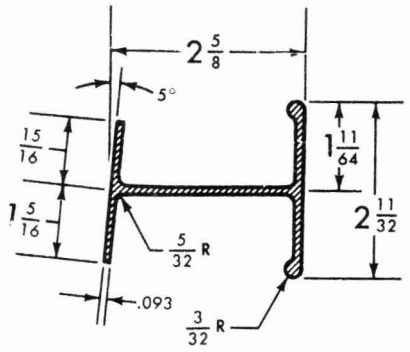


NO ALTERNATE FOR THIS EXTRUSION

S-1118078 ALCOA DIE NUMBER L-29150

AREA .082 SQ. IN. MATERIAL 24S

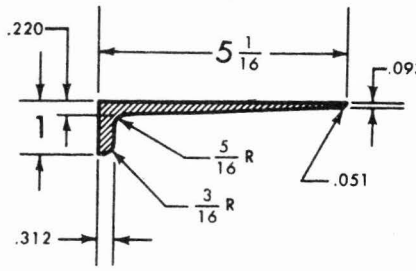
Figure 81 (Sheet 17 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-1118650 ALCOA DIE NUMBER L-29130

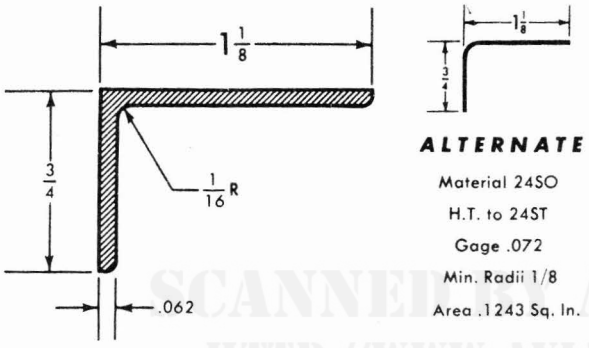
AREA .700 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1139121 ALCOA DIE NUMBER 30625

AREA 1.065 SQ. IN. MATERIAL 24S

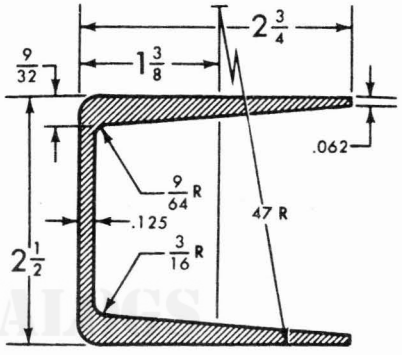


ALTERNATE

Material 24SO
H.T. to 24ST
Gage .072
Min. Radii 1/8
Area .1243 Sq. In.

S-1119206 ALCOA DIE NUMBER C-30022

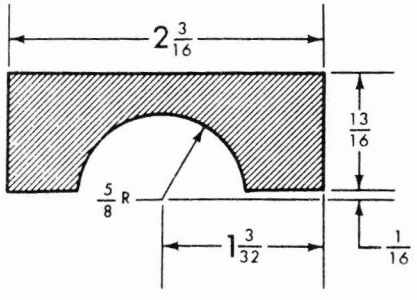
AREA .113 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1139159 ALCOA DIE NUMBER 30386

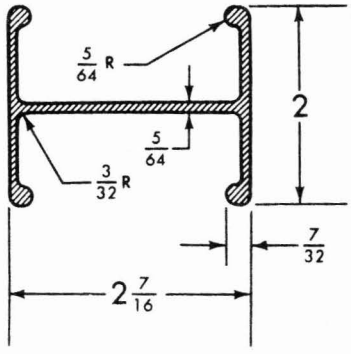
AREA 1.21 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1131637 ALCOA DIE NUMBER 30864

AREA 1.242 SQ. IN. MATERIAL 24S

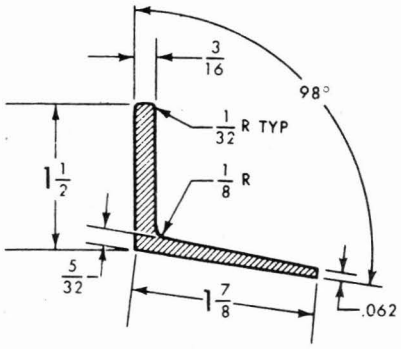


NO ALTERNATE FOR THIS EXTRUSION

S-1141061 DOW DIE NUMBER 541

AREA .575 SQ. IN. MATERIAL MAG. ALLOY

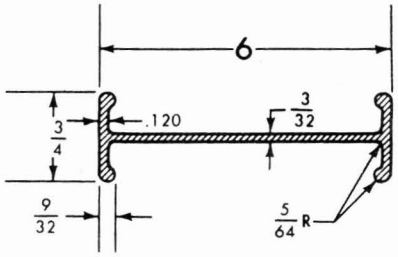
Figure 81 (Sheet 18 of 21) — Extrusion Charts



NO ALTERNATE FOR THIS EXTRUSION

S-1141921

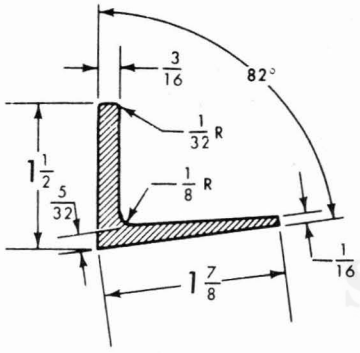
AREA .478 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-2130802

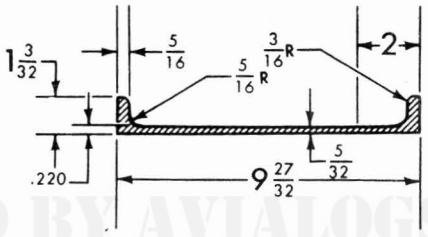
AREA 1.05 SQ. IN. MATERIAL MAG. ALLOY



NO ALTERNATE FOR THIS EXTRUSION

S-1141922

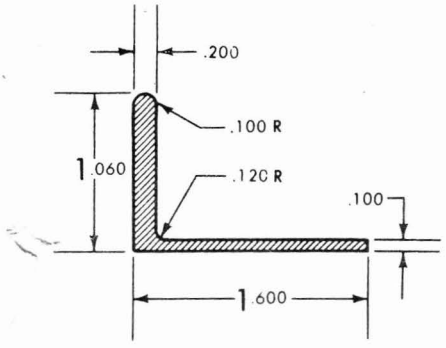
AREA .478 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-2139120 ALCOA DIE NUMBER 29909

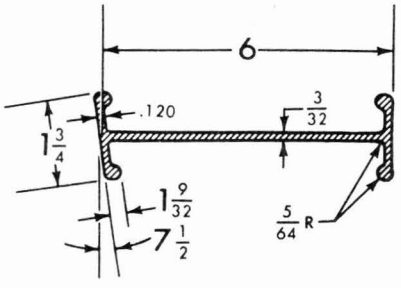
AREA 2.256 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-1141933 ALCOA DIE NUMBER 29370

AREA .351 SQ. IN. MATERIAL 24S



NO ALTERNATE FOR THIS EXTRUSION

S-2140204 DOW DIE NUMBER 466

AREA 1.05 SQ. IN. MATERIAL MAG. ALLOY

Figure 81 (Sheet 19 of 21) — Extrusion Chart