(USAF) T.O. 1C-46A-3
(Formerly 01-25LA-3)

(Navy) AN 01-25LA-3

HANDBOOK
STRUCTURAL REPAIR INSTRUCTIONS

USAF SERIES
C-46, ZC-46A, C-46D, C-46F
NAVY MODEL
R5C-1
AIRCRAFT

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE
AND THE CHIEF OF THE BUREAU OF AERONAUTICS

GOODWAY PRINTING CO., PHILA., PA. REPRINT 600-12-23-55

25 MARCH 1944
REVISED 28 APRIL 1955

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25	30 August 1945	70	5 May 1945	131	15 June 1945
31	15 January 1945	76	5 May 1945	132	5 May 1945
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34A	15 January 1945	78	15 January 1945	134	5 May 1945
35	15 January 1945	80	15 January 1945	136	30 August 1945
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C-46A	5-CU	47-50	AF41-12280 –AF41-12283
C-46A	5-CU	51-100	AF41-12284 –AF41-12333
C-46A	10-CU	101-150	AF41-12334 –AF41-12383
C-46A	15-CU	151-200	AF41-12384 –AF41-12433
C-46A	20-CU	201-250	AF41-24640 –AF41-24689
C-46A	25-CU	251-300	AF41-24690 –AF41-24739
C-46A	30-CU	301-350	AF41-24740 –AF42-3577
C-46A	35-CU	351-456	AF42-3578 –AF42-3683
C-46A	40-CU	457-700	AF42-60942 –AF42-107373
C-46A	45-CU	701-905	AF42-107374–AF42-96707
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C-46A	45-CU	909-919	AF42-96711 –AF42-96721
C-46D	1-CU	920	AF42-96722
C-46A	45-CU	921-925	AF42-96723 –AF42-96727
C-46D	1-CU	926	AF42-96728
C-46A	45-CU	927-948	AF42-96729 –AF42-96750
C-46D	1-CU	949	AF42-96751
C-46A	45-CU	950-962	AF42-96752 –AF42-96764
C-46D	1-CU	963	AF42-96765
C-46A	45-CU	964-977	AF42-96766 –AF42-96779
C-46D	1-CU	978	AF42-96780
C-46A	45-CU	979	AF42-96781
C-46D	1-CU	980-982	AF42-96782 –AF42-96784
C-46A	45-CU	983	AF42-96785
C-46D	1-CU	984-985	AF42-96786 – AF42-96787
C-46A	45-CU	986-1000	AF42-96788 –AF42-96802
C-46A	45-CU	1001-1003	AF42-96803 –AF42-96805
C-46D	5-CU	10004	AF42-96806

Series	Block No.	Factory Sequence	AF Serial Number
C-46A	45-CU	1005	AF42-96807
C-46D	5-CU	1006-1010	AF42-96808 —AF42-96812
C-46A	45-CU	1011	AF42-96813
C-46D	5-CU	1012-1017	AF42-96814 —AF42-96819
C-46A	45-CU	1018-1020	AF42-96820 —AF42-96822
C-46D	5-CU	1021-1024	AF42-96823 —AF42-96826
C-46A	45-CU	1025-1026	AF42-96827 —AF42-96828
C-46D	5-CU	1027	AF42-101036
C-46A	50-CU	1028	AF42-101037
C-46D	5-CU	1029-1032	AF42-101038—AF42-101041
C-46A	50-CU	1033	AF42-101042
C-46D	5-CU	1034	AF42-101043
C-46A	50-CU	1035-1036	AF42-101044—AF42-101045
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C-46A	50-CU	1040	AF42-101049
C-46D	5-CU	1041	AF42-101050
C-46A	50-CU	1042-1045	AF42-101051—AF42-101054
C-46D	5-CU	1046	AF42-101055
C-46A	50-CU	1047-1048	AF42-101056—AF42-101057
C-46D	5-CU	1049	AF42-101058
C-46A	50-CU	1050	AF42-101059
C-46D	5-CU	1051	AF42-101060
C-46A	50-CU	1052-1057	AF42-101061—AF42-101066
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C-46A	50-CU	1072	AF42-101081
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C-46A	50-CU	1075-1077	AF42-101084—AF42-101086
C-46D	5-CU	1078	AF42-101087
C-46A	50-CU	1079	AF42-101088
C-46D	5-CU	1080-1083	AF42-101089—AF42-101092
C-46A	50-CU	1084-1097	AF42-101093—AF42-101106
C-46D	5-CU	1098	AF42-101107
C-46A	50-CU	1099-1104	AF42-101108—AF42-101113
C-46D	5-CU	1105	AF42-101114
C-46A	50-CU	1106-1112	AF42-101115—AF42-101121
C-46D	5-CU	1113-1115	AF42-101122—AF42-101124
C-46A	50-CU	1116-1117	AF42-101125—AF42-101126
C-46D	5-CU	1118-1119	AF42-101127—AF42-101128
C-46A	50-CU	1120-1122	AF42-101129—AF42-101131
C-46D	5-CU	1123-1142	AF42-101132—AF42-101151
C-46A	50-CU	1143-1144	AF42-101152—AF42-101153
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C-46A	50-CU	1192	AF42-101201
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C-46A	55-CU	1376 & 1378	AF44-77444 & AF44-77446
C-46D	10-CU	1377 & 1379	AF44-77445 & AF44-77447
C-46D	10-CU	1380-1825	AF44-77448 —AF44-77893
C-46D	15-CU	1826-2276	AF44-77894 —AF44-78344
C-46D	20-CU	2277-2476	AF44-78345 —AF44-78544
C-46F	1-CU	2477-2726	AF44-78545 —AF44-78794
C-46F	5-CU	2727-2876	AF44-78795 —AF44-78944

ST. LOUIS-LOUISVILLE

Series	*Block No.*	*Factory Sequence*	*AF Serial Number*
C-46A	1-CK	1-20	AF43-46953 —AF43-46972
C-46A	5-CK	21-80	AF43-46973 —AF43-47032
C-46A	55-CK	81-250	AF43-47033 —AF43-47202
C-46A	60-CK	251-450	AF43-47203 —AF43-47402

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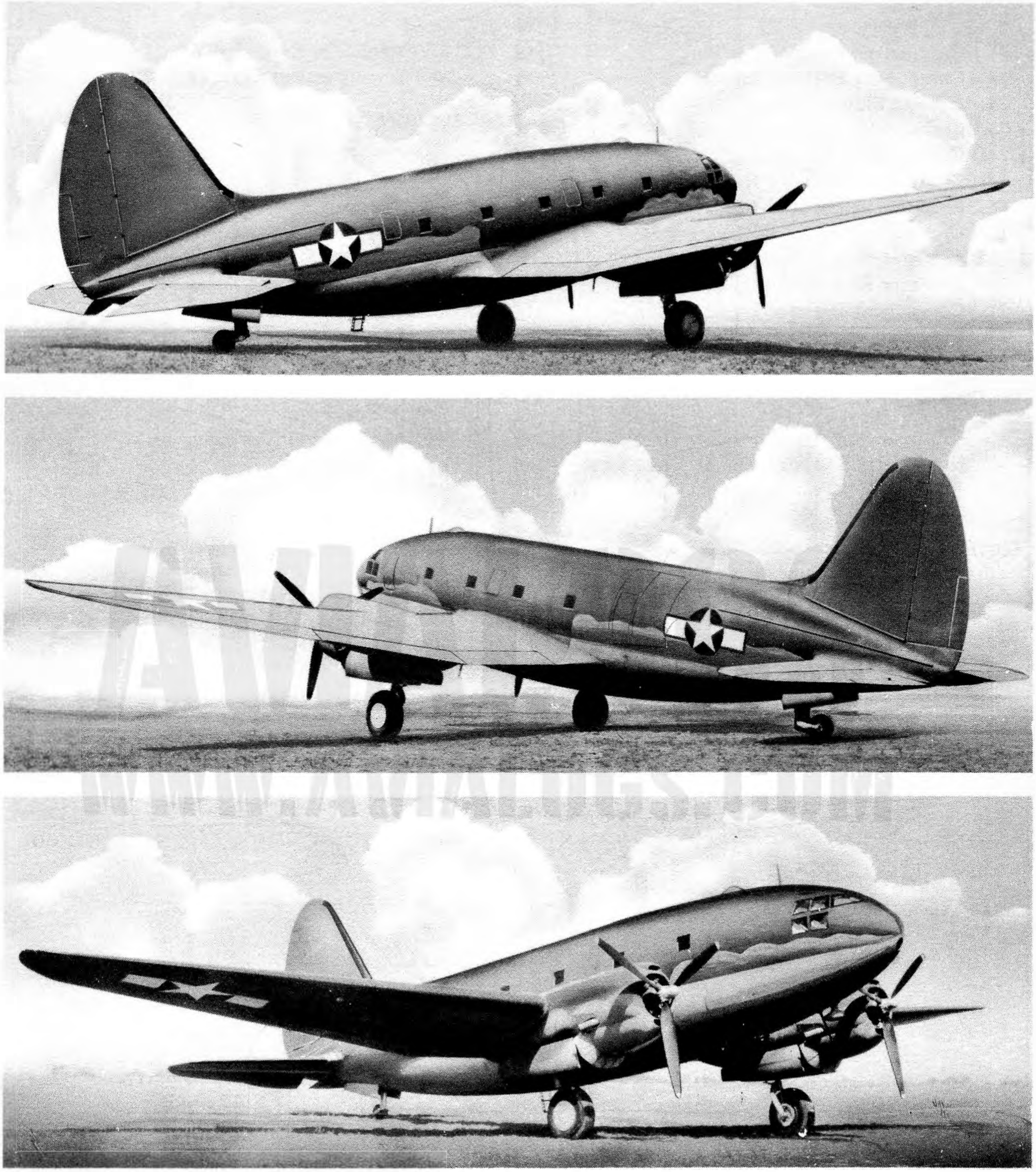

C-46 AND C-46A AIRPLANE—NAVY MODEL R5C-1

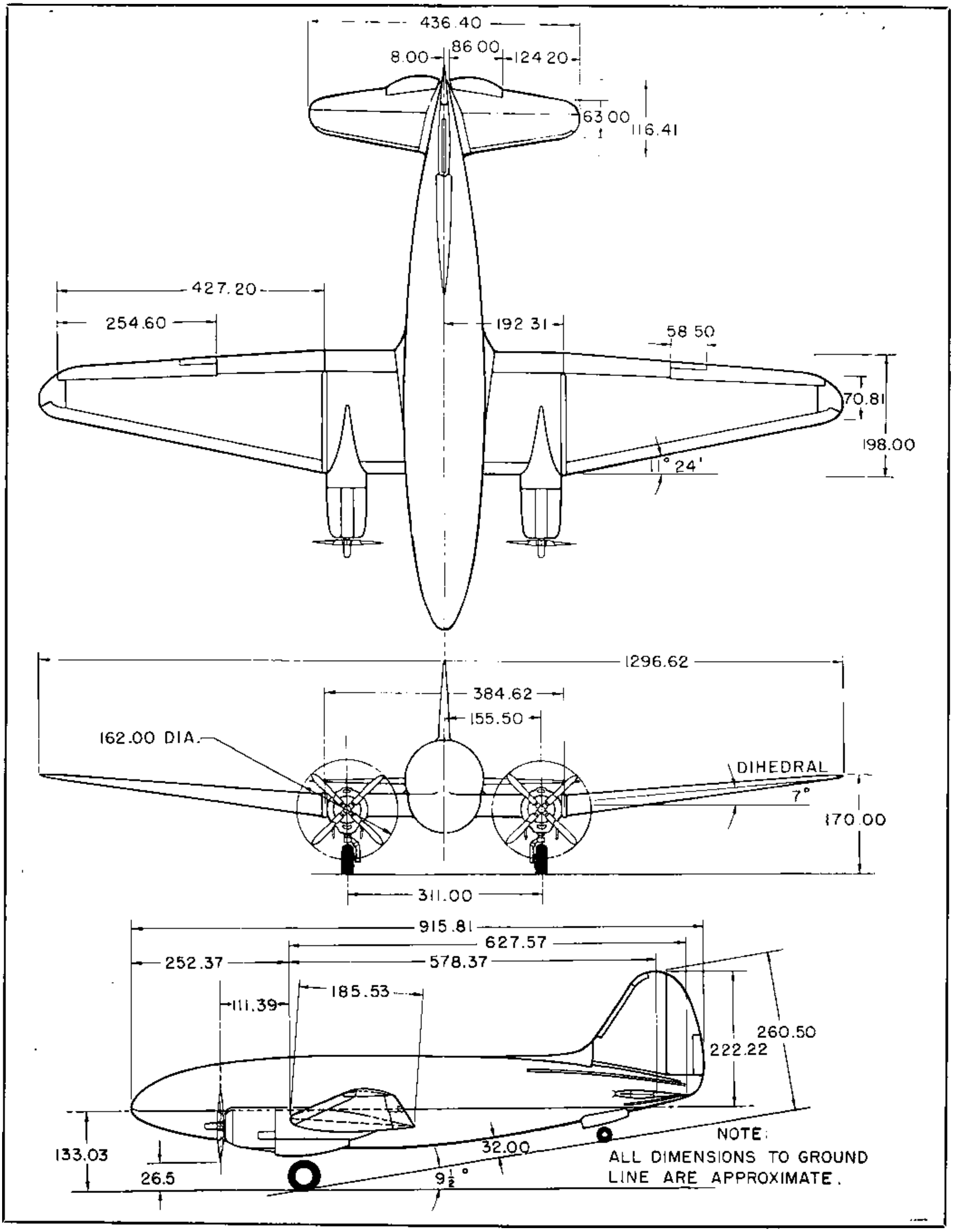

FIGURE 1 — THREE VIEW DIMENSION DIAGRAM

SECTION I
INTRODUCTION

1. GENERAL.

a. This Handbook comprises instructions for the repair of the C-46, C-46A, C-46D, C-46F and Navy Designation R5C-1 Airplanes manufactured by the Curtiss-Wright Corporation, Airplane Division.

b. Except as specifically stated in the text, the various repairs given are applicable to all models of the airplane.

2. SCOPE OF HANDBOOK.

Although the Handbook is written primarily for use in the field where major overhaul facilities are not available, the use of mobile repair units and the possibility of effecting a repair at a depot warrant the inclusion of data of a more complex nature. With this in view, the present Handbook covers every structural item in the airplane keeping simplicity of repair always uppermost. Together with segregated individual repairs are shown those entailing several units simultaneously. This is done in order to clarify the procedure to be followed when damage occurs to members in close proximity.

No attempt is made to associate the repairs with any specific type of damage (enemy action, landing, handling, etc.) since they may be combined in any manner.

In many cases, several alternate repairs are given so that advantage may be taken of the specific conditions under which the work is done. In all cases sufficient data are given to effect a repair but as damage to a certain member may vary in size and location, it is up to the repair personnel to maintain the strength and dimensions as given for the member under consideration.

An added section gives the procedure for disassembly of the center panel from the fuselage. Since the wing forms an integral part of the fuselage, it is necessary prior to its removal, to jig the fuselage so that it will not sag or collapse under its own weight.

3. TYPE OF CONSTRUCTION.

The C-46, C-46A, C-46D, C-46F and Navy designation R5C-1 is a twin-engine low-wing monoplane whose overall dimensions are given in figure 1. The wing is of full cantilever construction and is composed of three main sections: the two outer panels which bolt onto the center panel, and the center panel which is structurally integral with the fuselage and contains the engine nacelles and main gear. Both the main gear and the tail wheel are fully retractable, the former into the nacelles and the latter into the tail cone. The main structure is a network of bulkheads, spars and stringers which is covered with a thin, stressed aluminum alloy skin. The ailerons have a metal framework covered with fabric. The ailerons on Airplanes AF44-78545 and subsequent are covered with 24ST alclad skin. With the exception of a few items, the airplane is of 24ST alclad construction with 24ST extrusions and 14ST forgings. The power plant, including the engine mount and the firewall, can be removed as a unit, being fastened to the nacelle by four bolts. The major disassembly of the airplane is shown in figure 3.

4. TYPES OF REPAIR.

a. GENERAL.—Due to the type of construction used, it is important that any repair to the skin, stringers and bulkheads be given careful consideration. Simple operations, such as repairs to dents, small skin holes and exterior injuries may be accomplished readily and easily. However, internal structures must be repaired by means of patches, inserts, or by splicing to reinforce the damaged section or areas before the outer skin is attached. Caution must be exercised to maintain the original contour and to eliminate excessive increases in weight.

b. CLASSIFICATION OF DAMAGE.—Damages have been divided into four groups to facilitate the classification of repair methods. The classification and general description of the various damage is as follows:

(1) NEGLIGIBLE DAMAGE.—Small dents, holes or cracks in the sheet material requiring no addition of structural material or reinforcements. The dents must be bumped out, cracks stopped by a 1/8 inch hole (No. 40 drill) at each end, and small holes rounded out to a .25 inch radius to prevent the formation of cracks.

(2) DAMAGE REPAIRABLE BY PATCHING.—Holes and cracks which impair the strength of the structure but which may be repaired by the use of sheet reinforcements attached by a specified number and arrangement of rivets or bolts. Patches must be shaped and arranged in such a manner as to permit the required rivet or bolt pattern to extend completely around the damage or to the edges of the original stock. Where a fitting or other structure is

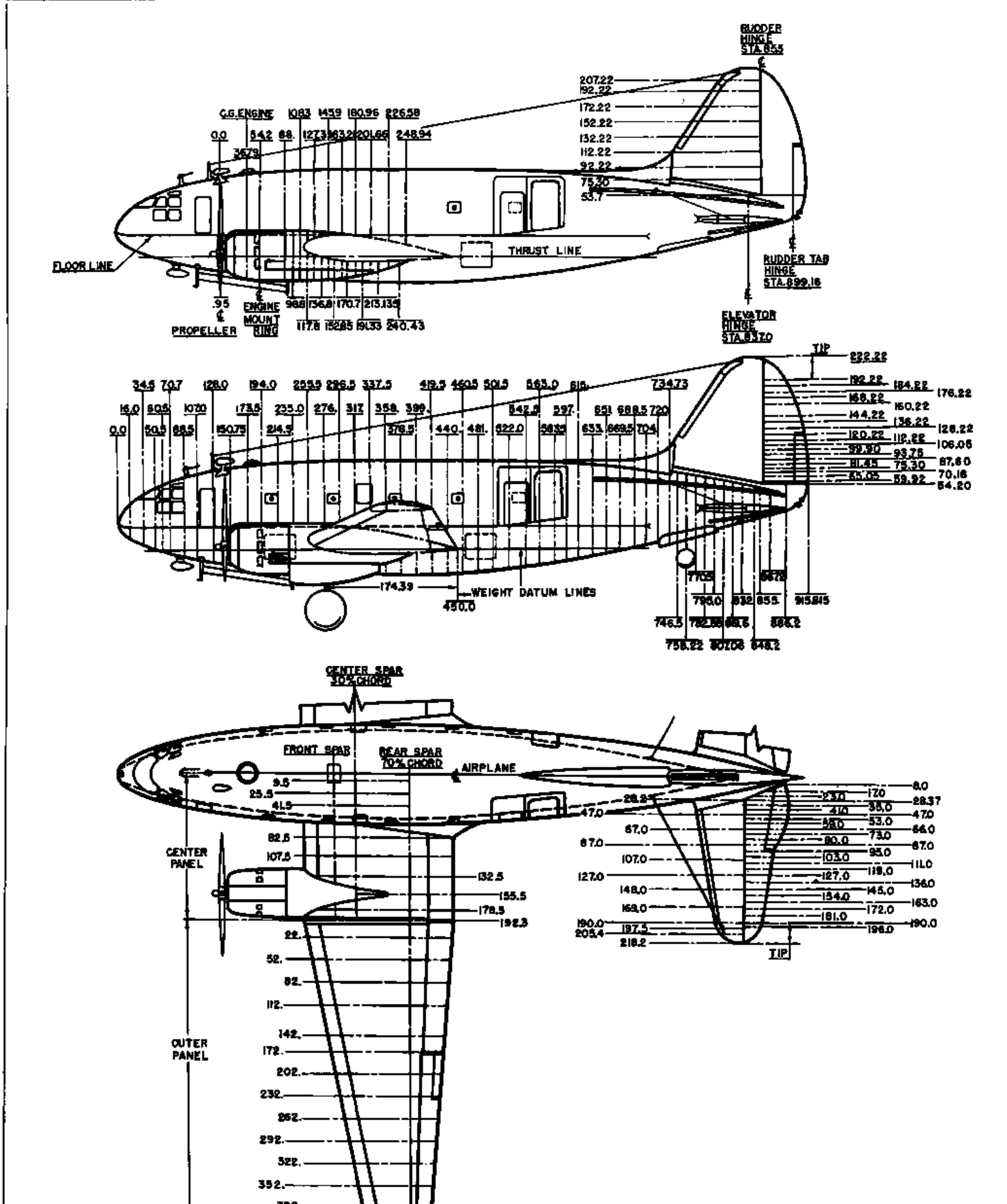

FIGURE 2 — STATION DIAGRAM

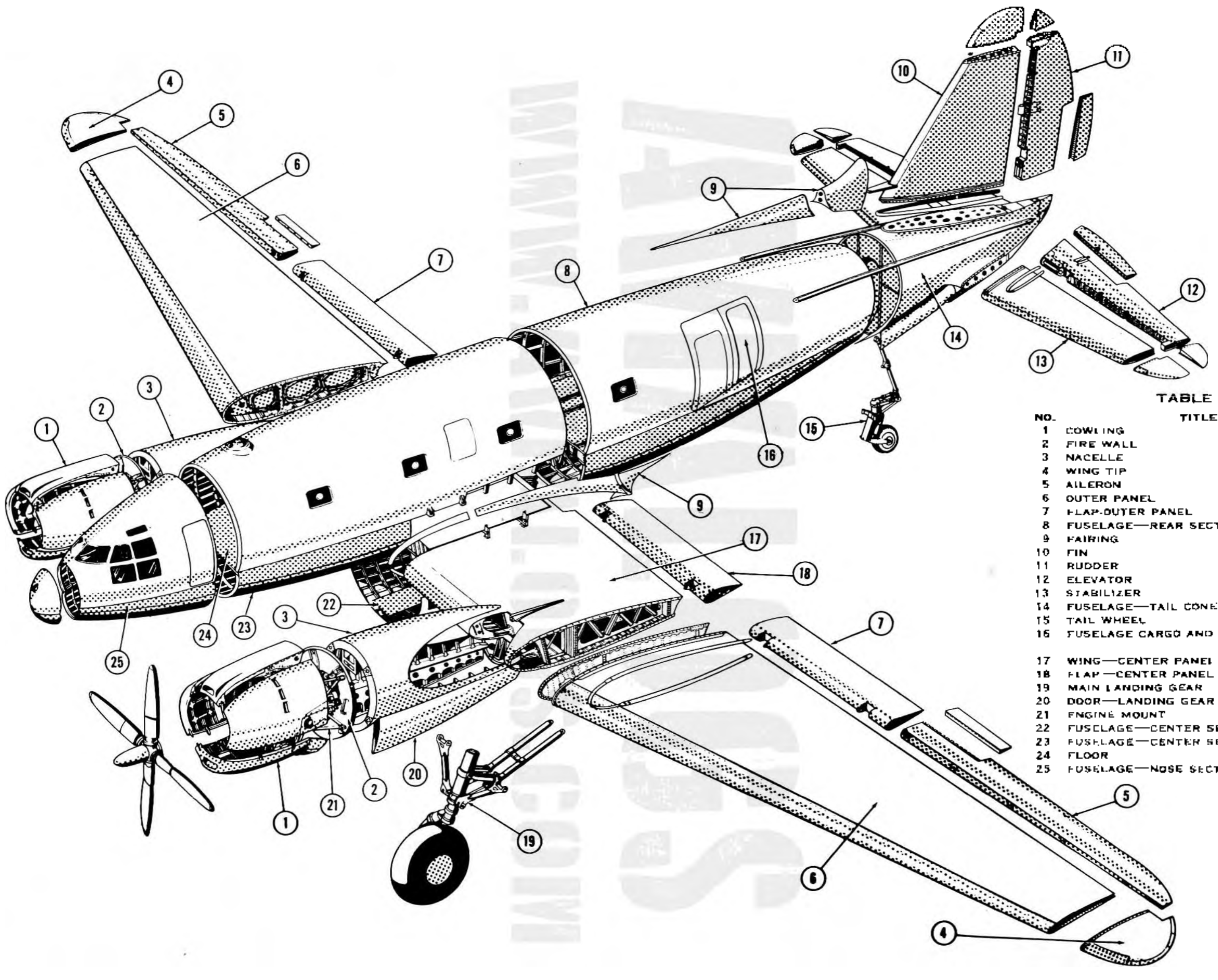

TABLE 1

NO.	TITLE	FIG.
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5	AILERON	164
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16	FUSELAGE CARGO AND JUMP DOORS	78, 83A, 83B
17	WING—CENTER PANEL	100
18	FLAP—CENTER PANEL	171
19	MAIN LANDING GEAR	97
20	DOOR—LANDING GEAR	225
21	ENGINE MOUNT	15
22	FUSELAGE—CENTER SECTION—LOWER	20
23	FUSELAGE—CENTER SECTION	20
24	FLOOR	84
25	FUSELAGE—NOSE SECTION	20

FIGURE 3 — MAJOR DISASSEMBLY

TABLE 2
MAIN ASSEMBLY WEIGHT BREAKDOWN
CALCULATED WEIGHTS
PER DRAWING NUMBER ASSEMBLIES

Drawing Name	*Drawing No.*	*Weight of Unit*
Outer Panel Assembly	20-030-3311-2	1726
Outer Panel Leading Edge	20-030-607-11	534
Outer Panel Trailing Edge Aft 70%	20-030-5040-21	128
Wing Tip	20-031-5701-55	22
Aileron Assembly Covered	20-050-5701-31	111
Flap Assembly—Outer Panel	20-070-1001-168	101
Panel Assembly—Center Panel	20-020-3200	4663
Center Panel Leading Edge	20-020-1010-15	1529
Floor Assembly Wing Section Main Cabin	20-260-1002-200	163
Closure Assembly—Center Panel	20-020-1009-1	221
Center Panel Wing Flap	20-070-1101-125	98
Skin Assembly Upper Center Panel Aft 30%	20-020-1132-1	302
Skin Assembly Lower Center Panel Aft 30%	20-020-1137-4	270
Rib Assembly Station 192 Center Panel	20-020-1112-1	47
Installation—Fuselage and Center Panel	20-230-1000-25	12604
Fuselage Assembly	20-210-3050-19	7397
Shell Assembly—Nose Section	20-210-1001-15	1277
Fuselage Assembly—Shell Center Section	20-210-3051-15	3733
Frame Assembly—Fuselage Center Section	20-210-3053-647	1906
Frame Assembly—Fuselage Center Section Sub Assembly	20-210-3053-2	98
Frame Assembly—Fuselage Center Section Sub Assembly	20-210-3053-3	336
Frame Assembly—Fuselage Center Section Sub Assembly	20-210-3053-4	360
Frame Assembly—Fuselage Center Section Sub Assembly	20-210-3053-5	184
Floor Assembly—Forward Section Main Cabin	20-260-1001-95	275
Floor Assembly—Center Section Main Cabin	20-260-3009-92	508
Floor Assembly—Rear Section Main Cabin	20-260-1004-21	89
Plating Assembly—Fuselage Center Section	20-210-3052-490	856
Dorsal Fin Assembly	20-150-1002-1	12
Shell Assembly—Fuselage Tail Section	20-210-1300-6	595
Frame Assembly—Tail Section	20-210-1301-81,-505	181, 121
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Installation—Power Plant	20-400-1000-10	5981
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Assembly—Stabilizer Horizontal	20-110-5001-70	159
Assembly—Fin	20-120-5110-65	184
Assembly—Elevator	20-130-5701-50	135
Assembly—Rudder	20-140-5110-25	162
Installation—Engine Cowl	20-730-1001-3	215

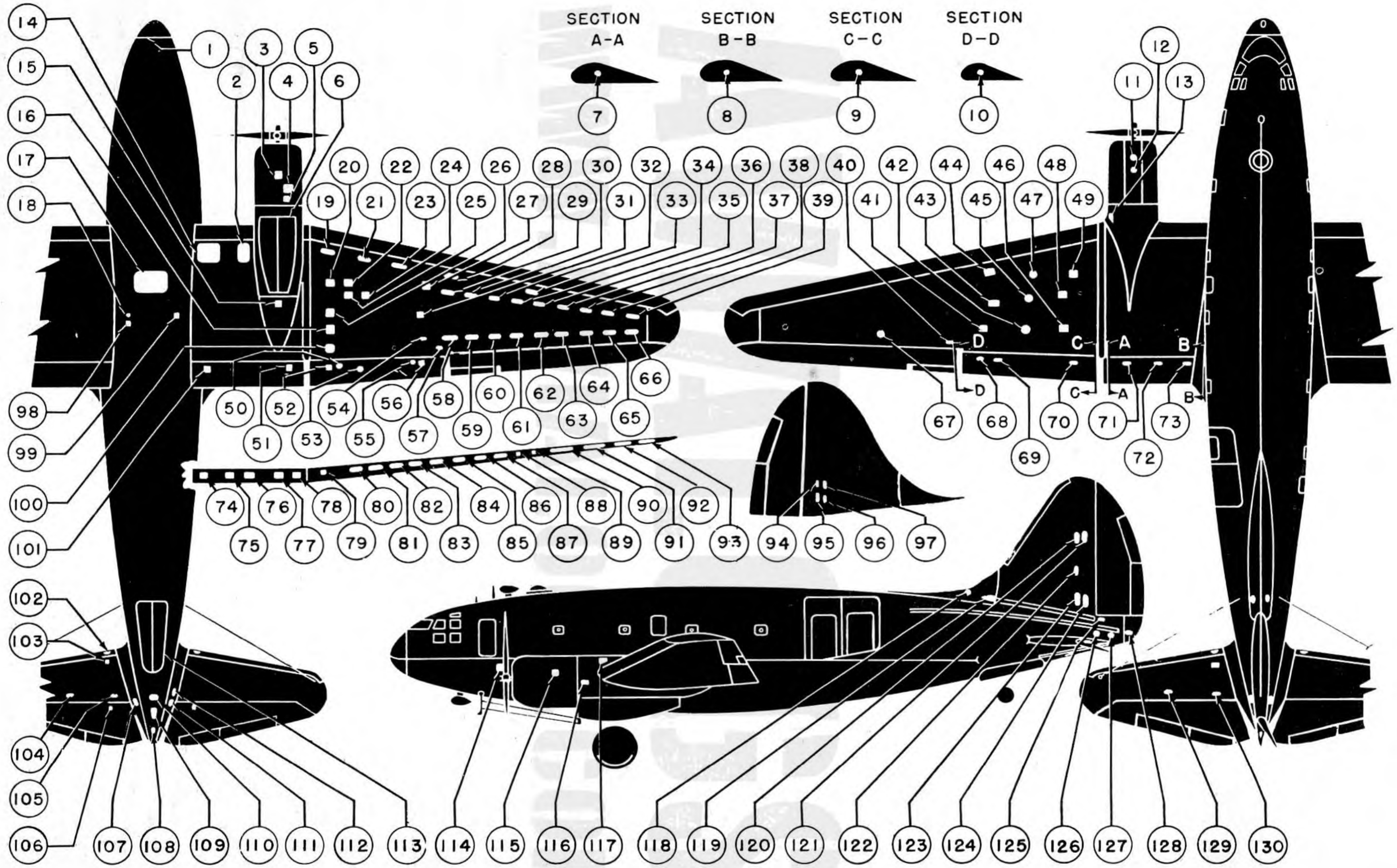


FIGURE 3A—ACCESS DOOR DIAGRAM

KEY TO ACCESS DOOR DIAGRAM

1. Nose Access Door
2. Service and Inspection Access Door
3. No. 10 Spark Plug Access Door
4. Ground Heater Duct Opening
5. Oil Drain
6. Wheel Well Doors and Inspection Door
7. Hangar Installation
8. Hangar Installation
9. Hangar Installation
10. Hangar Installation
11. No. 1 Spark Plug Access Door
12. Motor Lifting Eye Access Door
13. Oil Tank Filler Access Door
14. Service and Inspection Access Door
15. Fuel Strainer Access Door
16. Fuel System Access Door
17. Ground Access Door
18. Telephone Connection
19. De-Icer Access Door
20. Sump Drain
21. De-Icer Access Door
22. Fuel System Access Door
23. De-Icer Access Door
24. Fuel System Access Door
25. Fuel System Access Door
26. Fuel Tank Sump Drain
27. Inspection Access Door
28. De-Icer Access Door
29. Inspection Access Door
30. Inspection Access Door
31. Inspection Access Door
32. Inspection Access Door
33. De-Icer Access Door
34. Inspection Access Door
35. Inspection Access Door
36. Inspection Access Door
37. Inspection Access Door
38. Inspection Access Door
39. Wing Tip Light Junction Box Inspection Door
40. Aileron Tab Motor Access Door
41. Vent Line Connections Inspection Door
42. Fuel Tank Filler Access Door
43. Vent Line Connections Inspection Door
44. Vent Line Connections Inspection Door
45. Fuel Tank Filler Access Door
46. Liquid Level Transmitter Inspection Door
47. Fuel Tank Filler Access Door
48. Liquid Level Transmitter Inspection Door
49. Liquid Level Transmitter Inspection Door
50. Inspection Access Door
51. Inspection Access Door
52. Inspection Access Door
53. Inspection Access Door
54. Aileron Control Cable Inspection Door
55. Inspection Access Door
56. Outer Flap Bellcrank Inspection Door
57. Aileron Control Cable Inspection Door
58. Aileron Control Cable Inspection Door
59. Aileron Tab Control Inspection Door
60. Aileron Control Cable Inspection Door
61. Aileron Control Cable Inspection Door
62. Aileron Bellcrank Inspection Door
63. Inspection Access Door
64. Magnesyn Compass Transmitter Access Door
65. Inspection Access Door
66. Inspection Access Door
67. Aileron Bellcrank Bolt Access Door
68. Inspection Access Door
69. Inspection Access Door
70. Inspection Access Door
71. Inspection Access Door
72. Inspection Access Door
73. Inspection Access Door
74. Aileron and Tab Cable Inspection Door
75. Aileron and Tab Cable Inspection Door
76. Aileron and Tab Cable Inspection Door
77. Aileron and Tab Cable Inspection Door
78. Aileron and Tab Cable Inspection Door
79. Aileron and Tab Cable Inspection Door
80. Aileron and Tab Cable Inspection Door
81. Aileron and Tab Cable Inspection Door
82. Aileron and Tab Cable Inspection Door
83. Aileron and Tab Cable Inspection Door
84. Aileron and Tab Cable Inspection Door
85. Aileron and Tab Cable Inspection Door
86. Aileron and Tab Cable Inspection Door
87. Aileron and Tab Cable Inspection Door
88. Aileron and Tab Cable Inspection Door
89. Inspection Access Door
90. Inspection Access Door
91. Inspection Access Door
92. Inspection Access Door
93. Inspection Access Door
94. Rudder Bellcrank Access Door
95. Rudder Bellcrank Access Door
96. Rudder Bellcrank Access Door
97. Rudder Bellcrank Access Door
98. External Electric Power Cart
99. Low Pressure Oxygen Filler Valve
100. Fuel Tank Sump Pump Drain
101. Inspection Access Door
102. Inspection Access Door
103. De-Icer Inspection Door
104. Elevator Tab Control Inspection Door
105. Elevator Tab Control Inspection Door
106. Spring Tab Bellcrank Door
107. Elevator Torque Tube Inspection Door
108. Inspection Access Door
109. Yoke Assembly Access Door
110. Elevator Bellcrank Inspection Door
111. Elevator Torque Tube Inspection Door
112. Elevator Tab-Pulley Bracket Access Door
113. Tail Wheel Doors
114. Inspection Access Doors
115. Carburetor Access Doors
116. Fire Wall Shut-Off Valve Access Door
117. Oil Tank Access Door
118. De-Icer Access Door
119. Fairing Tie Down Bolt Access Door
120. Stabilizer Trim Tab Control Inspection Door
121. Stabilizer Trim Tab Control Inspection Door
122. Stabilizer Trim Tab Control Inspection Door
123. Stabilizer Trim Tab Control Inspection Door
124. Stabilizer Trim Tab Control Inspection Door
125. Rudder Bellcrank Inspection Door
126. Rudder Bellcrank Inspection Door
127. Rudder Bellcrank Inspection Door
128. Inspection Access Door
129. Tail Light, Towing Mech. Inspection Door
130. Inspection Access Door

near the damaged area, the patches may have to be extended beyond these in order to obtain the required attachment. In many cases the damaged material must be replaced to give support to the patch and to other parts of the structure, or to obtain continuity, as in the fuselage skin. This added material is designated as a filler or insert.

(3) DAMAGE REPAIRABLE BY INSERTION.—Extensive damage requiring large inserts which may be attached by means of splices. When the damage is extensive or the presence of fittings and other structure make it difficult to use patches, the damaged material must be removed and replaced by formed inserts of the same or equivalent material, gage, and shape. Where practical, the inserts should be made to extend to the edges of the original sheet and should be attached by using the original rivet or bolt pattern. In cases where complete replacements are impractical, splices may be effected by using patches. Patches used in splicing must be continuous along the length of the splice and of sufficient width to take the rivet or bolt pattern specified for patching on each side of the cut. Continuous patches for splices that are not straight, that is, for angles, rectangles or circles, are designated as frames. Frames are frequently used in repairing small sections of skins. Where continuity is not essential, splices may be effected by overlapping the insert and the undamaged material. The attachment for an overlap should be the same in pattern as that used on one side of a patch splice.

(4) DAMAGE NECESSITATING REPLACEMENT.—Damage to fittings, highly stressed material, and small pieces such as clips and gussets which may be easily replaced. Fittings which are cracked, sprung or nicked must be replaced. Small sheet fittings, gussets, clips, brackets, etc. are easily duplicated and should be replaced if damaged or stretched out of shape.

c. EXTENT OF DAMAGE.—The extent of the damage must be carefully ascertained. If the damage is due to gun fire, the path of the bullet is determined and an examination made of all damaged members and their attachments.

Look for damage caused by the travel of shock loads along large members. If necessary, the skin may be rolled back or cut away to facilitate inspection. The skin may then be repaired as described under that item in the various sections that follow. Check particularly for the following: dents and cracks in extrusions and fittings; elongated rivet and bolt holes; cracks and sharp cornered dents or wrinkles, corrosion in sheet material; and rivets which have stretched or sheared leaving their heads intact. After the extent of damage has been determined, devise a method for its repair by combining the repairs given in the text and illustrations for the various individual members.

5. SUPPORT OF STRUCTURE DURING REPAIR.

When repair operations are being performed which necessitate the removal of structural material, care must be taken not to overload other parts of the structure. A fixture of some type must be used to brace or hold that portion of the structure being worked upon. It is essential that the damaged structure be suitably and firmly supported against distortion.

Section XI gives data on the most important wing and fuselage jigs necessary for disassembly of wing from fuselage. Holding jigs are also shown for extensive work on the outer panel and control surfaces. These jigs serve primarily to keep deflections and twisting down to a minimum.

6. USE OF BOLTS.

No aluminum alloy bolts less than ¼ inch or steel bolts less than 3/16 inch in diameter shall be used. No commercial machine screws or bolts shall be substituted for aircraft bolts. The condition, to be obtained with standard bolts employing washers under the nuts where necessary, is that the threaded portion of a bolt must not be used to take a shear or bearing load: that is, there should not be any thread in the bolt hole. When replacing a bolt, the plain portion of the shank of the new bolt must be identical in length with that of the original. All bolts must be suitably locked. Wherever lockwire is used, the wire must fit the hole. Care must be taken to ensure that the nuts are locked in the same manner as the original. Elastic stop nuts shall be inspected for usability and reused wherever possible. Table 3 gives the various drill and ream sizes. Allowable loads for bolts are given in table 17 at the end of this section.

7. DETECTING THE PRESENCE OF CRACKS.

When effecting repairs, great care must be exercised at all times to ensure that no cracks in the immediate structure remain undetected. Fine hairsize cracks in fractured sheets if undetected will open and spread under vibration. Minute cracks caused by bullet impacts should be cut away when cleaning up fractured areas for repair. However, if any doubt exists as to the presence of a crack, the part or area should be soaked in paraffin and thoroughly dried. The application of a whiting water or whiting-methylated spirit paste to the surface will, on drying, disclose the presence of a crack by a discolored mark.

TABLE 3
STANDARD DRILL AND REAMED HOLE SIZES
TWIST DRILL TABLES
DECIMAL EQUIVALENTS OF LETTER SIZE DRILLS

Letter	*Size of Drill Inches*	*Letter*	*Size of Drill Inches*	*Letter*	*Size of Drill Inches*	*Letter*	*Size of Drill Inches*
Z	.413	S	.348	L	.290	E	.250
Y	.404	R	.339	K	.281	D	.246
X	.397	Q	.332	J	.277	C	.242
W	.386	P	.323	I	.272	B	.238
V	.377	O	.316	H	.266	A	.234
U	.368	N	.302	G	.261	—	—
T	.358	M	.295	F	.257	—	—

Drilled Holes Tolerances shall be as follows:

Drill Size	*Tolerances*
#60 to #31	+.002 −.000
#30 to #11	+.004 −.000
#10 to 15/64	+.005 −.000
1/4 to 31/64	+.007 −.000
1/2 to 47/64	+.010 −.000
3/4 to 63/64	+.013 −.000
1″ to 2″	+.015 −.000

TWIST DRILL AND STEEL WIRE GAGE
MANUFACTURERS STANDARD

No.	*Size of Drill Inches*	*No.*	*Size of Drill Inches*	*No.*	*Size of Drill Inches*	*No.*	*Size of Drill Inches*
1	.228	16	.177	31	.120	46	.081
2	.221	17	.173	32	.116	47	.0785
3	.213	18	.1695	33	.113	48	.076
4	.209	19	.166	34	.111	49	.073
5	.2055	20	.161	35	.110	50	.070
6	.204	21	.159	36	.1065	51	.067
7	.201	22	.157	37	.104	52	.0635
8	.199	23	.154	38	.1015	53	.0595
9	.196	24	.152	39	.0995	54	.055
10	.1935	25	.1495	40	.098	55	.052
11	.191	26	.147	41	.096	56	.0465
12	.189	27	.144	42	.0935	57	.043
13	.185	28	.1405	43	.089	58	.042
14	.182	29	.136	44	.086	59	.041
15	.180	30	.1285	45	.082	60	.040

TABLE 3 (CONTINUED)

STANDARD DRILL AND REAMED HOLE SIZES
REAMED BOLT HOLE—SIZES AND TOLERANCES

Bolt Size	*(AN-) Hex-Head Bolt* — *Hole Size* — *Single Hole (Std. Reamer)*		*Multi-Holes (Spec. Reamer)*		*(AN-) Clevis Head Bolt* — *Hole Size* — *Single, or Multi-Holes*		*Tight Fit (Spec. Reamer)*		*Special Fit—Ground Bolt* — **Ground Bolt Diam.*		*Reamed Hole Diam.*	
10-32	.190	+.001 -.000	.191	+.001 -.000	.1875	+.001 -.000	.186	±.0005	.1860	+.0000 -.0005	.1865	+.0005 -.0000
¼	.250	+.001 -.000	.251	+.001 -.000	.250	+.001 -.000	.248	±.0005	.2495	+.0000 -.0005	.250	+.0005 -.0000
5/16	.3125	+.001 -.000	.314	+.001 -.000	.3125	+.001 -.000	.311	±.0005	.3120	+.0000 -.0005	.3125	+.0005 -.0000
⅜	.375	+.001 -.000	.3765	+.001 -.000	.375	+.001 -.000	.373	±.0005	.3745	+.0000 -.0005	.375	+.0005 -.0000
7/16	.4375	+.001 -.000	.439	+.001 -.000	.4375	+.001 -.000	.436	±.0005	.4370	+.0000 -.0005	.4375	+.0005 -.0000
½	.500	+.0015 -.0000	.502	+.0015 -.0000	.500	+.0015 -.0000	.497	±.0005	.4995	+.0000 -.0005	.500	+.0005 -.0000
9/16	.5625	+.0015 -.0000	.564	+.0015 -.0000	.5625	+.0015 -.0000			.5620	+.0000 -.0005	.5625	+.00075 -.00000
⅝	.625	+.0015 -.0000	.627	+.0015 -.0000	.625	+.0015 -.0000			.6245	+.0000 -.0005	.625	+.00075 -.00000
¾	.750	+.0015 -.0000	.752	+.0015 -.0000	.750	+.0015 -.0000			.7495	+.0000 -.0005	.750	+.00075 -.00000
⅞	.875	+.0015 -.0000	.877	+.0015 -.0000	.875	+.0015 -.0000			.8745	+.0000 -.0005	.875	+.00075 -.00000
1	1.000	+.0015 -.0000	1.002	+.0015 -.0000	1.000	+.0015 -.0000			.9995	+.0000 -.0005	1.000	+.001 -.000
											1″ to 2″	+.0015 -.0000

*If chrome plated, also give diameter before plating.

DEFINITION OF BOLT USES AND CONDITION OF FIT:

Multi-Holes: Multiple bolted joints having reamed holes jigged to ±.002 inch Center Distance.

Tight Fit: Air control system trim tab connections. Where no perceptible shake is allowed.

Special Fit Ground Bolt: Suitable for *special* lubricated joints having a slight rotation under load and minimum shake. Also, suitable for *special* fixed joints having reversal of stress and minimum shake.

TABLE 4

STANDARD CLEARANCE AND COUNTERSUNK HOLES
MINIMUM CLEARANCE DRILL SIZES IN METAL

BOLTS, CLEVIS BOLTS, CLEVIS PINS, MACHINE SCREWS

Nominal Size	*Clearance Drill*	*Nominal Size*	*Clearance Drill*	*Nominal Size*	*Clearance Drill*
#3	#38 (.1015)	1/8	1/8	1/2	1/2
#4	#32 (.116)	3/16	3/16	9/16	9/16
#5	#30 (.1285)	1/4	1/4	5/8	5/8
#6	#28 (.1405)	5/16	5/16	3/4	3/4
#8	#18 (.1695)	3/8	3/8	7/8	7/8
#10	#10 (.1935)	7/16	7/16	1	1

PLATE NUT—SCREW CLEARANCE

Nominal Size	*Clearance Drill*	*Nominal Size*	*Clearance Drill*
#6	#18 (.169)	#10	7/32
#8	#10 (.1935)	1/4	9/32

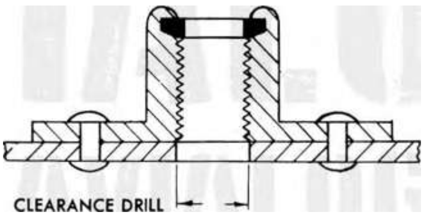


FIGURE 4—CLEARANCE FOR NUT PLATES

Inspection Holes: Should be #50 (.070) drill where it is only necessary to check the depth of engagement of parts.

MINIMUM CLEARANCE DRILL SIZES—IN METAL

Rivets		*Cotter Pins*		*Lock Wire*	
Rivet Size	*Drill Size*	*Pin Size*	*Drill Size*	*Wire Size*	*Drill Size*
1/16	#51 (.167)	1/16	#50 (.070)	.040	#56 (.0465)
3/32	#41 (.096)	3/32	#36 (.1065)	.051	#52 (.0635)
1/8	#30 (.1285)	1/8	#28 (.1405)	.064	#48 (.076)
5/32	#21 (.159)	5/32	#16 (.177)		
3/16	#11 (.191)	3/16	# 4 (.209)		
1/4	1/4	1/4	I (.272)		
5/16	O (.316)				
3/8	V (.377)				

TABLE 4 (CONTINUED)

STANDARD CLEARANCE AND COUNTERSUNK HOLES

COMBINATION CENTER DRILL

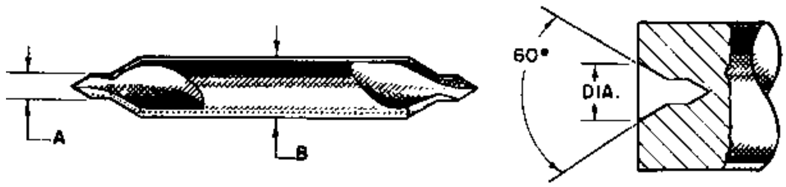


FIGURE 5—COMBINATION CENTER DRILL

No.	A	B	No.	A	B
A1	3/64	1/8	F2	3/16	7/16
C2	1/16	13/64	J1	7/32	1/2
D1	5/64	15/64	J2	9/32	1/2
E1	3/32	.300	M1	7/32	5/8
E2	1/8	.300	M2	9/32	5/8
F1	5/32	7/16	N1	1/4	3/4

INSPECTION HOLES: Should be No. 50 (.070) drill where it is only necessary to check the depth of engagement of parts.

8. DRILLING OUT SPOTWELDS.

Sheets spotwelded together may be disassembled by drilling through the center of the spot with a No. 30 drill and inserting a chisel between the sheets. The chisel may be made from approximately .025 sheet steel beveled at one end.

9. HEAT TREATMENT.

a. GENERAL.—This section covers the direction for the heat treatment of both aluminum alloys and X4130 steel based on Specification Nos. AN-QQ-H-186 and AN-QQ-H-201.

b. ALUMINUM ALLOY.—The material used in the construction of the airplane is almost entirely aluminum alloy. High strength rolled sheet is used for the stressed skin; formed sheet is used for the webs, bulkheads, ribs and most of the stringers; and extrusions are used for some stringers, web stiffeners, and all spar capstrips.

In cases where the required bend radius for a piece of bent-up repair stock is smaller than the allowable for 24ST material the piece must be formed from 24SO stock and heat treated as outlined below in order to have the required structural strength. (See table No. 7 for minimum bend radii.)

TABLE 5
TEMPER DESIGNATION

HEAT-TREATABLE ALLOYS			
Class	*Description*	*Designation*	*Example*
Wrought	Annealed Condition	"O"	24SO
(Designated "S")	Fully Heat-Treated	"T"	24ST
	Quenched, but not Completely Aged	"W"	61SW
	Heat-Treated and Cold Worked	"RT"	24SRT
Cast	Specific Heat-Treatment Indicated by Number	"T4" "T6", etc.	195-T4 195-T6
NON-HEAT-TREATABLE ALLOYS			
Class	*Description*	*Designation*	*Example*
Wrought	Annealed Condition	"O"	3SO
(Designated "S")	Intermediate Cold Worked	"¼H"	52S-¼H
		"½H"	52S-½H
		"¾H"	52S-¾H
	Maximum Commercial Degree of Work Hardening	"H"	2SH
Cast	No Temper Designation	—	43

(1) HEATING.—The 24SO parts are heated in a salt bath that is in turn heated by gas, oil, or electricity; or in an electric air furnace. The salt bath is composed of fused sodium nitrate, or a mixture of 50 per cent sodium nitrate and 50 per cent potassium nitrate U. S. Army specification No. 50-11-26-B. The most important point in connection with the furnace selected is that it must maintain an even temperature throughout its interior. The temperature of the furnace at the time the 24SO material is inserted shall be 488-500 degrees C. (910-930 degrees F.). If the heating is done in a salt bath, the parts should be raised and lowered, always keeping the work submerged, to insure an even temperature and to circulate the liquid.

(2) SOAKING.—The length of time for the material to remain in the furnace will depend upon several factors, namely: the nature of the material, the thickness of the material, and the condition of the heat-treating unit. If an air furnace is used, the time required for soaking is longer than that required if a salt bath is used. The following table gives the required time for soaking of different thickness of stock in both types of furnaces.

TABLE 6

TIME REQUIRED FOR SOAKING OF 24SO MATERIAL

Thickness (Inches)	*Salt Bath*	*Air Furnace*
0.020 and less	15 minutes	20 minutes
Over 0.020 to 0.032	20 minutes	25 minutes
Over 0.032 to 0.063	25 minutes	30 minutes
Over 0.063 to 0.125	30 minutes	45 minutes
Over 0.125 to 0.250	45 minutes	60 minutes
Over 0.250 to 0.500	60 minutes	90 minutes

TABLE 7

STANDARD BEND RADII

FOR SHEET METAL

Material	*Aluminum Alloys*		
Thickness	*24ST and Alclad*	*24SO and Alclad*	*2S ½ Hard 3S ½ Hard 52S ½ Hard*
Up to .015	.06	.06	.03
.016	.06	.06	.03
.020	.09	.09	.03
.025	.12	.09	.03
.032	.12	.09	.06
.040	.12	.09	.09
.051	.19	.09	.09
.064	.19	.09	.12
.072	.25	.12	.16
.081	.31	.12	.19
.091	.38	.16	.19
.102	.44	.19	.19
.125	.50	.19	.19
.156	.69	.28	.28
3/16	.81	.38	.38
1/4	1.00	.50	.50

Material	*Stainless Steel*		*Low Carbon & X-4130***
Thickness	*Annealed*	**½ Hard*	*Annealed*
Up to .015	.03	.03	
.016			.03
.020	.03	.06	.03
.025	.03	.06	.03
.030	.03	.06	.03
.035	.06	.09	.06
.042	.06	.09	.06
.050	.06	.12	.06
.062	.09	.12	.06
.078	.09		.09
.093	.12		.09
.109	.16		.12
.125	.19		.12
.156	.19		.19
3/16	.25		.19
1/4			.25

*For bends up to 90° only.

**These radii also apply to 8639 and similar steels.

When there are several parts in the bath or furnace that have different gages, the time allowed for soaking shall be equal to that required for the thickest part. 24S aluminum alloy can stand prolonged soaking without harming the metal; but 24S alclad aluminum must not be allowed to soak longer than the allotted time or it will lose its corrosion resistant properties.

(3) QUENCHING.—The quenching medium shall be cold water at a temperature as low as practicable and not over 29 degrees C. (85 degrees F.). The bath in which the material is to be quenched shall be large enough so that the temperature of the water will not exceed 37 degrees C. (100 degrees F.). The temperature of the parts should be 482 degrees C. (900 degrees F.) when they are put into the quenching bath. The material must be quenched immediately after it is taken out of the heating unit as metal will lose its corrosion resistant properties if allowed to remain in the open air for any length of time. The best results may be obtained by having the quenching bath close to the heating unit.

(4) WASHING.—Material that is heated in a salt bath must be washed to remove all of the salt as salt remaining on the part will hasten corrosion. Warm water is used for washing but it must not exceed 65 degrees C. (150 degrees F.) because water above this temperature will hasten the hardening of the metal.

(5) WORKING OF METAL.—Heat-treated parts must be worked within one hour after heat-treatment.

c. X4130 STEEL.

(1) The type of heat-treatment given to the steel will depend upon the required tensile strength. If an ultimate tensile strength of approximately 90,000 pounds per square inch is needed, the steel part shall be normalized. If an ultimate tensile strength of 125,000 pounds per square inch is needed, the heat treatment shall consist of hardening and tempering.

(2) NORMALIZING.—The temperature of the furnace in which the material is to be inserted shall not be above 650 degrees C. (1200 degrees F.). The temperature of the furnace should be gradually increased to 870-925 degrees C. (1600-1700 degrees F.) over a period of approximately 45 minutes. After the furnace has reached this temperature, it should be held constant for a period of 30 minutes to insure uniform heating throughout the material. Remove the work from the furnace and allow it to cool slowly in still air.

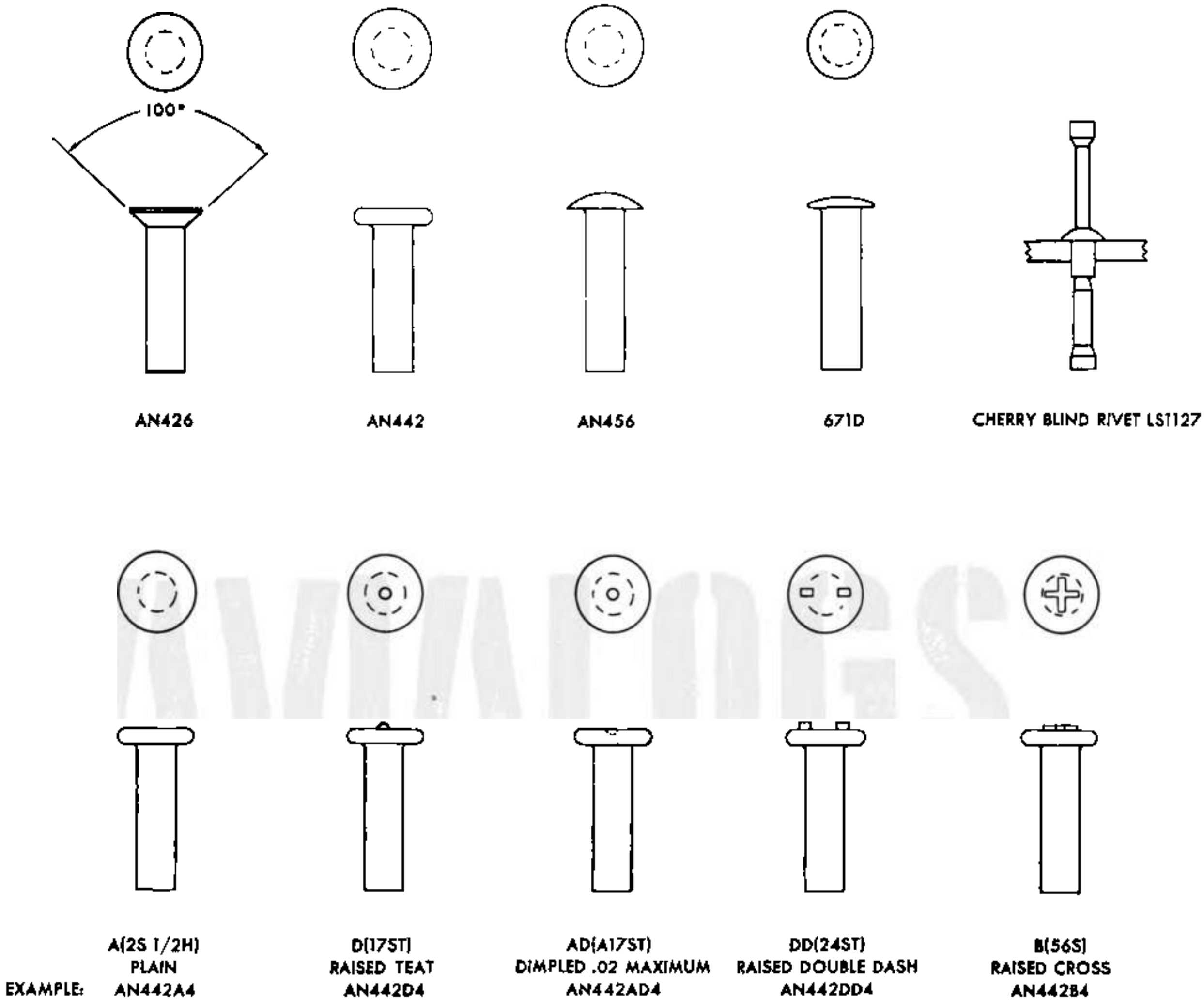
(3) HARDENING.—The temperature of the furnace in which the material is to be inserted shall not be above 590 degrees C. (1100 degrees F.). The temperature of the furnace should be gradually increased to 850-885 degrees C. (1575-1625 degrees F.) over a period of approximately 45 minutes. After the furnace has reached this temperature, hold constant for a period of 30 minutes. Remove the work from the furnace and quench in oil at a temperature of 27-65 degrees C. (80-150 degrees F.).

(4) TEMPERING.—The hardened material shall be put in a furnace whose temperature is below the desired tempering temperature. Raise the temperature of the furnace to 555 degrees C. (1050 degrees F.) and allow to remain at this temperature approximately 45 minutes. Remove the work from the furnace and allow to cool in still air or quench in oil at a temperature of 18 degrees C. (65 degrees F.).

d. REPAIRS REQUIRING FORMED STOCK.—Since a large number of repairs requiring formed stock are those using angles of various flange widths, efforts have been made to have repair stock in the field which will include the following gages of heat treated SO aluminum alloy material: .032, .040, .051, .064, and .081. These angles are supplied with one 3-inch leg and 1.5 inch leg. The flanges may be trimmed down to the necessary width using left over stock for fillers, etc. This is done in order to avoid the problem of heat treatment in the field and to maintain the small bend radii required. If the damaged material is of smaller gage than the stock angles, the nearest larger gage angle may be used providing the bend radius of the angle does not interfere with the proper riveting of the repair.

10. RIVETING.

a. GENERAL.—Except where specifically noted in the text and in the figures, rivets used in repair should be of the same type as those which existed in the original undamaged region. The skin riveting tables give the type, size and spacing of all rivets used in skin splices. In all but a few cases, these rivets are of modified brazier head type 671D and the 100 degree countersunk type AN426AD. Rivets inside the structure are of the AN442AD flat head type. Any variation from this in making the repairs is with the



NOTE:

1. LAST NUMBER IN EXAMPLES INDICATES DIAMETER OF SHANK IN 32NDS OF AN INCH.
2. WHEN 671D TYPE RIVETS ARE CALLED FOR IN THIS MANUAL, AN456 RIVETS MAY BE SUBSTITUTED.
3. SEE TABLES 20, 21, AND 22 FOR ALLOWABLE LOADS FOR RIVETS.

FIGURE 6—RIVET TYPES & MATERIALS

aim toward simplification of the work. If the Curtiss rivet type 671-D is not available, AN456 type rivets may be used.

b. DESCRIPTION OF RIVETS.—Four types of rivets are used in effecting repairs. These are shown in figure 6. The permissible loads for these rivets are given in tables 20, 21, and 22.

(1) AN426AD 100 degree countersunk rivets are employed when it is necessary to maintain a flush outer surface on the airplane.

(2) AN442AD flat head rivets should be used in repairing all internal structure except in isolated cases where interferences require the use of the countersunk rivets.

(3) 671D-AD modified brazier head rivets are used in skin repairs where a smooth contour is desired but a flush surface is not required. This is a Curtiss Standard; if not available, the AN456AD rivets may be used.

(4) LS1127 Cherry blind rivets may be used for any of the above rivets where it is difficult or impossible to set a solid rivet. It must be noted, however, that unless otherwise noted, a joint of adequate strength requires twice as many Cherry blind rivets as solid rivets.

(5) Figure 6 also gives the identification coding for the various rivet material.

c. DETERMINATION OF RIVET SIZE.—The rivet diameter may be determined from the dimensions of the manufactured head. The head diameters for various rivets are given below.

d. REMOVAL OF RIVETS.—Great care should be exercised in removing rivets so that the holes are not enlarged and the sheet not damaged. The following table gives the correct drill size to be used in drilling out various size rivets.

TABLE 8

RIVET HEAD DIAMETERS

Rivet Dia.	*AN426*	*AN442*	*671D*	*AN456*
3/32	.170	.187	.188	.156
1/8	.216	.250	.218	.235
5/32	.278	.312	.266	.312
3/16	.344	.375	.312	.390

TABLE 9

DRILL SIZE FOR RIVET REMOVAL

Rivet Diameter	*Drill Size*
3/32 inch	No. 40
1/8 inch	No. 30
5/32 inch	No. 21
3/16 inch	No. 11

With the drill centered exactly on the manufactured head, drill to a depth equal to the depth of the rivet head. A slight side motion of the drill should cause the head to come free of the shank. If for any reason the head does not fall free, it may be removed by gently tapping the head with a small pin punch. When the head is removed, the shank may be driven out with a flat-end pin punch whose diameter is equal to the rivet diameter.

CAUTION

THE PUNCH MUST BE SQUARELY ALIGNED WITH THE RIVET BEFORE DRIVING.

If the proper drill has been used, and the head drilled directly in the center, no difficulty should be experienced in removing the rivet. A center mark should be put on the rivet before drilling.

e. REPLACEMENT OF BRAZIER AND FLAT HEAD RIVETS.

(1) DRILLING OF NEW HOLES.—All rivets should have a close fit in their holes. Where rivets are replaced in existing holes, it is assumed that the original rivets have been removed as in paragraph *d* above, and that the holes have not been enlarged during the operation. When new holes are to be drilled they should be started with a pilot drill and then drilled to final size. The various size drills are given below:

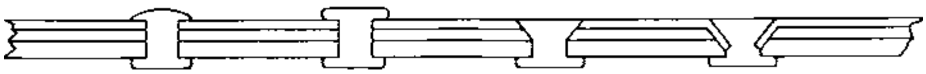
TABLE 10—RIVET DRILL SIZE

Rivet Diameter	3/32	1/8	5/32	3/16
Pilot Drill No.	50	40	40	40
Finish Drill No.	40	30	21	11

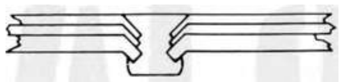
Rivets through the outside skin should be inserted from the outside. All burrs should be removed from the sheets prior to riveting.

(2) DETERMINING RIVET LENGTHS.—The proper length of rivet may be determined from the following table.

TABLE 11—RIVET GRIP LENGTHS



SHOP HEADS FORMED AGAINST FLAT SURFACE



SHOP HEAD FORMED AGAINST DIMPLE

When sheet thickness falls between table values, select the longer rivet.

	3/32 Diameter		*1/8 Diameter*		*5/32 Diameter*		*3/16 Diameter*	
Rivet Dash No. Lengths in 16ths.	*Maximum Thickness of Sheets*		*Maximum Thickness of Sheets*		*Maximum Thickness of Sheets*		*Maximum Thickness of Sheets*	
	Flat	*Dimple*	*Flat*	*Dimple*	*Flat*	*Dimple*	*Flat*	*Dimple*
−2	.018							
−3	.075	.040	.040					
−4	.130	.095	.100	.060	.065		.035	
−5	.190	.155	.155	.115	.125	.075	.090	.030
−6	.245	.210	.210	.170	.180	.130	.150	.090
−7	.300	.265	.265	.225	.235	.185	.205	.145
−8	.355	.320	.325	.285	.290	.240	.260	.200
−9	.410		.380	.340	.350	.300	.315	.255
−10	.470		.435		.405	.355	.370	.310
−11	.525		.490		.460		.430	.370
−12	.580		.550		.515		.485	
−13	.640		.605		.570		.540	
−14	.695		.660		.630		.595	
−15	.750		.715		.685		.655	
−16	.805		.775		.740		.710	

The correct length must be chosen in order to obtain a shop head of the required diameter and thickness.

(3) SHOP - FORMED HEADS. — The shop - formed heads should conform with the following dimensions with a maximum tolerance of $+\frac{1}{32}$ inch. This holds for all types of driven rivets.

TABLE 12—SHOP-FORMED HEADS

Rivet Dia.	*Head Dia.*	*Head Height*
3/32	9/64	3/64
1/8	3/16	1/16
5/32	15/64	5/64
3/16	9/32	3/32

(4) DRIVING RIVETS BY HAND.—Although compressed air operated rivet guns are desirable, the rivets may be hand driven with a 6 ounce ball peen hammer against the necessary bucking bar. The proper force must be applied or else strain hardening will occur before the rivet is set and the joint will be unsatisfactory. Figure 14 shows various types of bucking bars.

f FLUSH RIVETING PROCEDURE.

(1) REMOVAL OF OLD RIVETS.—Rivets are removed as in paragraph *d* above.

(2) COUNTERSINKING OF SHEETS.

(*a*) GENERAL.—The procedure is divided into "Machine Countersink" and "Dimple Countersink", and the thickness of the sheet in question automatically determines which process will be used. Tools and countersink diameters are tabulated by the position of the sheet in the riveted assembly, and dimple countersink tools are also listed for various sheet thickness in each position. The machine countersink or dimple diameter is larger for the underneath sheet than for the top sheet. See figure 7 for typical flush riveted joint.

(*b*) SIMULTANEOUS DIMPLING.—(Dimpling Two or more Sheets at One Time.) When using the following instructions for dimpling simultaneously, thickness "T" denoted by heavy outline, represents the total thickness of sheets being dimpled together, and tools must be used as if "T" were a single sheet, throughout all operations.

The total thickness "T" cannot exceed the maximum set for "T" as a single sheet, and no single sheet can be smaller than the thinnest sheet specified. The sheets shown by light outline are for reference only, to indicate additional sheets of the assembly, above those simultaneously dimpled.

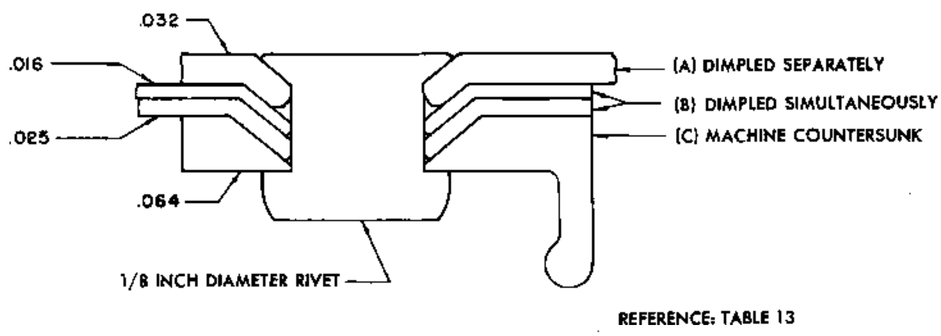


FIGURE 7—TYPICAL FLUSH RIVETED JOINT

TABLE 13—SIMULTANEOUS DIMPLING

Sheet	*Thickness*	*Method*	*Tools (Select from Tables)* *Drill*	*Punch*	*Die*
A	.032	Dimple Countersink— "Outer Sheet"	#30 (.129)	10	12
B	.041 Total	Dimple (Simultaneously)— "Second Sheet"	#30 (.129)	13	15
C	.064	Machine Countersink— 105° x .268″	#30 (.129)		

CAUTION

WHEN THE DRILL WILL NOT PRODUCE A CLEAN ROUND HOLE, IT SHOULD BE SHARPENED. AVOID CHATTER MARKS ON MACHINE COUNTERSINKS, AS THIS IS AN INDICATION THAT THE TOOL WAS SHARPENED POORLY, OR IS BEING HELD INCORRECTLY. DIES SPECIFIED WERE SPECIALLY DEVELOPED FOR SHEET COMBINATIONS SHOWN. ANY DEVIATION MAY PRODUCE DIMPLES APPARENTLY SOUND, BUT WITH A TENDENCY TO CRACK IN THE AIRPLANE WHEN SUBJECTED TO STRESS AND VIBRATION.

(c) MACHINE COUNTERSINKING. Procedure, see figure 8.

1. Drill pilot hole (third column, below)

2. Burr under side.

3. Machine countersink to required diameter as given in last three columns of the following table.

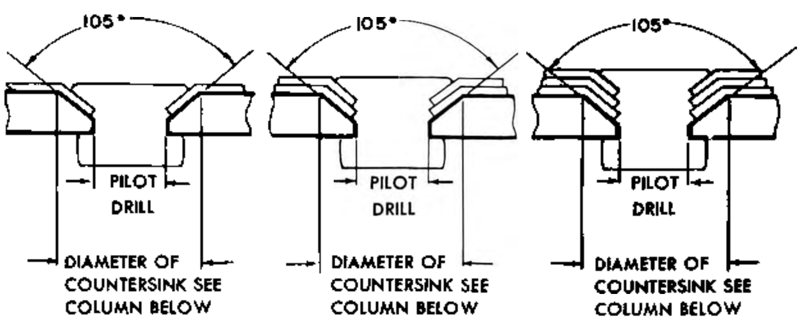


FIGURE 8—MACHINE COUNTERSINKING

TABLE 14—MACHINE COUNTERSINK DIMENSIONS

Rivet	Minm. Gage of Sheet	Pilot Drill	Diameter of Countersink 1 Sheet	2 Sheets	3 Sheets
3/32	.051	#41 (.096)	.214	.228	.242
1/8	.064	#30 (.1285)	.254	.268	.282
5/32	.072	#21 (.159)	.344	.358	.372
3/16	.081	#11 (.191)	.404	.418	.432

(*d*) Dimple Countersinking. — Procedures.

1. Drill pilot hole.
2. Burr under side.
3. Dimple with punch and die as specified below.
4. Redrill on assembly (if necessary).

TABLE 15—DIMPLE COUNTERSINK DIMENSIONS AND TOOLS

(See Table 16 for dimpling tools)

Rivet	Pilot Drill	Maximum Gage of Sheet	Outer Sheet Gage "T_1"	Outer Sheet Punch No.	Outer Sheet Die No.	Second Sheet Gage "T_2"	Second Sheet Punch No.	Second Sheet Die No.	Third Sheet Gage "T_3"	Third Sheet Punch No.	Third Sheet Die No.	Redrill Size
3/32	#41 (.096)	.045	.016-.031	1	2	.020-.031	4	5	.025-.031	7	8	#41 (.096)
			.032-.045	1	3	.032-.045	4	6	.032-.045	7	9	
4/32	#30 (.1285)	.051	.016-.031	10	11	.016-.031	13	14	.016-.031	16	17	#30 (.1285)
			.032-.051	10	12	.032-.051	13	15	.032-.051	16	18	
5/32	#26 (.147)	.064	.020-.031	19	20	.025-.031	23	24	.032-.064	26	27	#21 (.159)
			.032-.051	19	21	.032-.064	23	25				
			.052-.064	19	22							
3/16	#18 (.169)		.025-.031	28	29	.032-.072	32	33	.040-.072	34	35	#11 (.191)
			.032-.051	28	30							
			.052-.072	28	31							

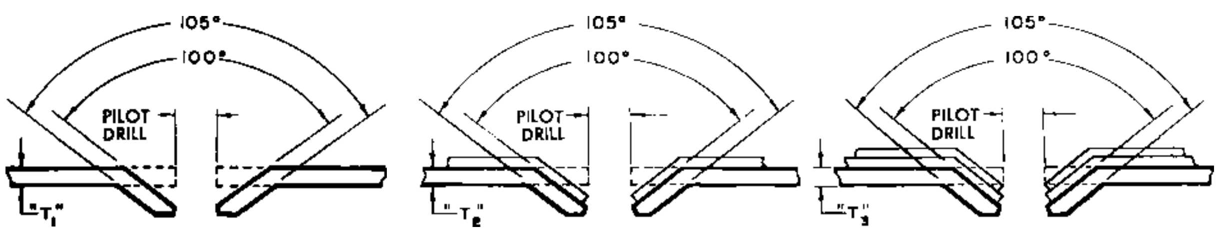


FIGURE 9—DIMPLE COUNTERSINKING

Heavy outlines represent sheet being dimpled and light outlines are reference sheets to locate sheet "T" in an assembly. For simultaneous dimpling, see paragraph *f* (2) (*b*) above.

(e) Dimpling Tools (See figure 10).

TABLE 16—DIMPLING TOOLS

Rivet Dia.	*Punch*				*Die*			
	Tool No.	*A*	*B*	*C*	*Tool No.*	*D*	*E*	*F*
3/32	1	.200	100°	.094	2	.096	.202	105°
					3	.096	.212	105°
	4	.214	105°	.094	5	.096	.216	105°
					6	.096	.226	105°
	7	.228	105°	.094	8	.096	.230	105°
					9	.096	.240	105°
1/8	10	.240	100°	.126	11	.128	.242	105°
					12	.128	.252	105°
	13	.254	105°	.126	14	.128	.256	105°
					15	.128	.266	105°
	16	.268	105°	.126	17	.128	.270	105°
					18	.128	.280	105°
5/32	19	.320	100°	.145	20	.147	.322	105°
					21	.147	.332	105°
					22	.147	.342	105°
	23	.344	105°	.145	24	.147	.346	105°
					25	.147	.356	105°
	26	.358	105°	.145	27	.147	.370	105°
3/16	28	.280	100°	.167	29	.169	.380	105°
					30	.169	.392	105°
					31	.169	.402	105°
	32	.404	105°	.167	33	.169	.416	105°
	34	.418	105°	.167	35	.169	.430	105°

(3) DRIVING OF RIVETS.—The setting of the rivet will be the same as for brazier and flat head rivets (see paragraph e. above). The driving set should be slightly convex and about two or three times the diameter of the rivet head. Care should be taken to keep the peen of the bucking bar centered on the head.

g. CHERRY BLIND RIVETS.

(1) DESCRIPTION.—Only one type of Cherry blind rivet will be used for repair; namely: the self-plugging brazier head type LS1127.

(2) Preparation of Sheets for Riveting.

(a) Drill Sizes.

Rivet Diameter	1/8	5/32	3/16
Pilot Drill No.	40	40	40
Finish Drill No.	1/8	23	13

Keep fit as tight as possible.

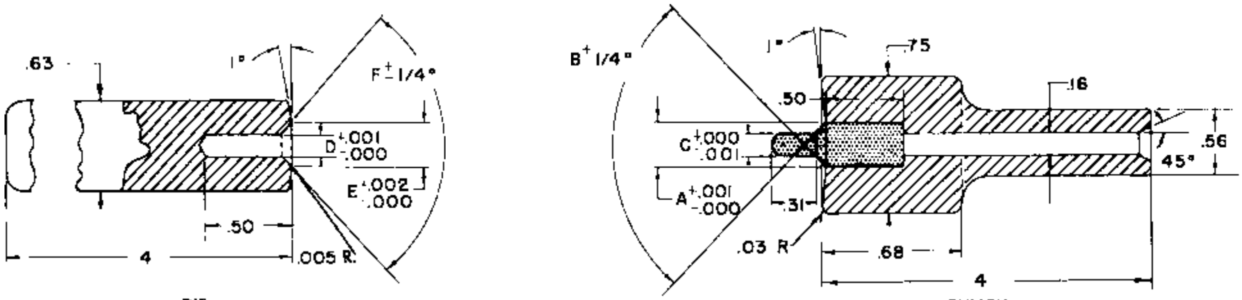
(b) GRIP RANGE.

Rivet Dash No.	*Grip Range*
−2	.030-.077
−4	.078-.140
−6	.141-.202
−8	.203-.266

If drilling is blind, allow .020 for chips between sheets, and burr on blind side.

In all questionable cases, use the longer rivet.

(c) CLAMPING OF SHEETS.—Some form of fasteners, such as cleco pins, should be placed at closer intervals than is required for solid rivets, since the rivet has very little drawing action on the sheets. Any gap between sheets exceeding .005 inches should be avoided. Clean out between sheets with more care than usual because of the smaller squeezing action on the sheets by these rivets.



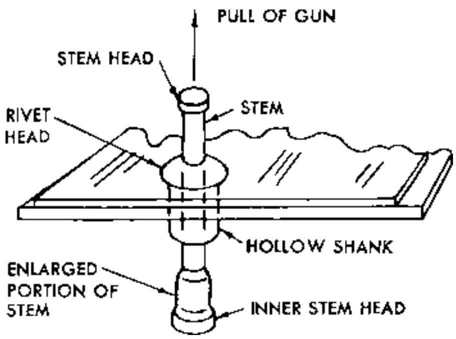
DIE

PUNCH

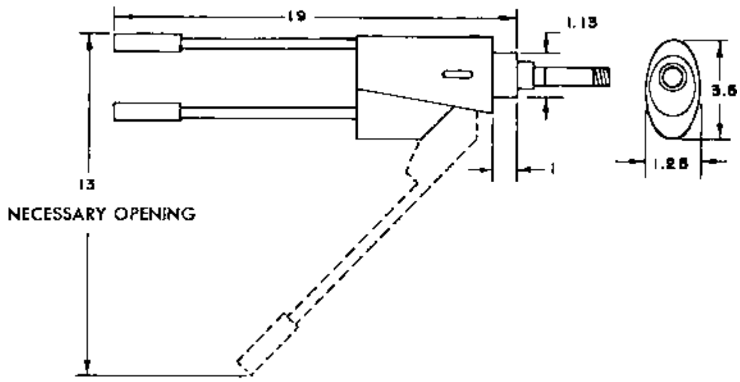
NOTE: BLEND AND POLISH FACE OF TOOL

NOTE: BLEND AND POLISH FACE OF TOOL

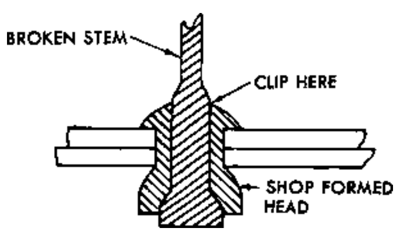
FIGURE 10—DIMPLING TOOLS



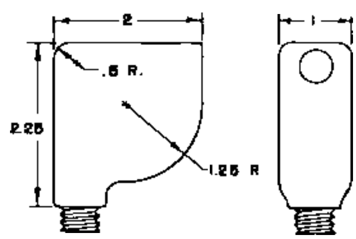
LS1127 BRAZIER HEAD RIVET



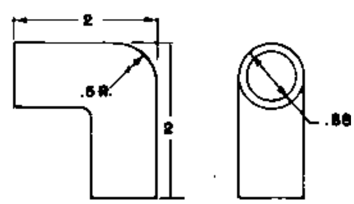
CHERRY G-10 HAND TOOL



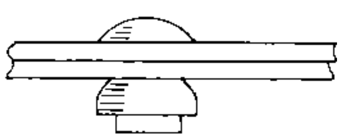
SECTION VIEW AFTER PULLING



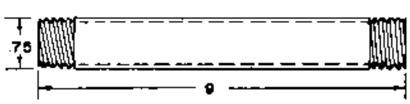
CHERRY RIGHT ANGLE G-6-AA



CURTISS RIGHT ANGLE



SIDE VIEW OF FINISHED RIVET



STRAIGHT EXTENSION

FIGURE 11—CHERRY BLIND RIVETING PROCEDURE

(3) RIVETING PROCEDURE, (figure 11).

(*a*) USE OF G-10 HAND OPERATED GUN.

1. The pulling head of these guns is similar to the air gun, but the rivet is headed by squeezing the handles together. This is done with two or three short squeezes, each one pulling the head a bit further back, in a manner similar to a ratchet auto jack. The one stationary handle should be held against the body, and pressure toward the rivet maintained until rivet stem breaks. This operates a clutch and keeps the gun pulling head from slipping back between strokes.

2. Much greater skill and care is required to operate the hand tool than an air gun, as the stationary arm must be held absolutely in line with rivet stem while operating, and steady pressure on rivet head maintained through this arm.

3. If the clutch should fail to operate, unscrew retaining cap below pulling head, and inspect washers and shaft for wear.

(*b*) GENERAL INFORMATION.

1. Do not operate the gun loaded with a rivet not inserted through proper sheet, or the stem will always pull through the rivet and jam badly in the pulling head.

2. Be sure stem head is at bottom of slot in gun pulling head as shown in figure 12-A, not as shown in figure 12-B, or stem head will be supported only on two sides and will shear off, instead of breaking stem.

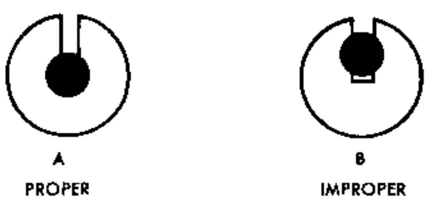


FIGURE 12—RIVET GUN POSITION

3. The stem must break off to form a good rivet. If stem head shears off, drill out rivet carefully and insert another rivet.

4. If by drilling out a bad rivet, or for any reason, the hole is oversize, the stem may be pulled entirely through the shank, leaving a hollow rivet. In this case the rivet must be removed and the hole redrilled for the next larger diameter rivet.

5. When pulling rivet be sure gun is directly in line or stem will be pulled through the shank "around a corner", tending to make the hole egg-shaped and giving the stem a loose fit so that it may vibrate out.

6. Press gun firmly on rivet head while pulling rivet, or gun will "cup" a brazier rivet head on the sheet, or fail to clamp sheets together.

7. If rivets are placed in a row of holes before heading, be careful not to bend rivet stem when sliding the pulling head over the rivet.

(*c*) CLEANING OF STEM.—After pulling, the stem is cleaned up by filing close to the head of the rivet.

(4) RIVET SUBSTITUTION.—Except as otherwise specified in the text, Cherry blind rivets may be substituted for solid rivets in inaccessible places provided two Cherry blind rivets are used for each solid rivet of the same size.

h. DU PONT AND CHOBERT RIVETS.—These rivets are not recommended for repairs because of their high deflections and the possibility of not obtaining a good joint.

i. ENLARGED HOLES.—If the procedure under paragraph 4 above is followed, no difficulty will be experienced in maintaining the original rivet hole diameter when removing rivets. If, however, the holes have been enlarged or elongated, they may be repaired in one of the following manners:

(1) REDRILLING FOR NEXT LARGER RIVET.—If sufficient pitch, edge distance, and row spacing exists, the holes may be redrilled for next larger rivet.

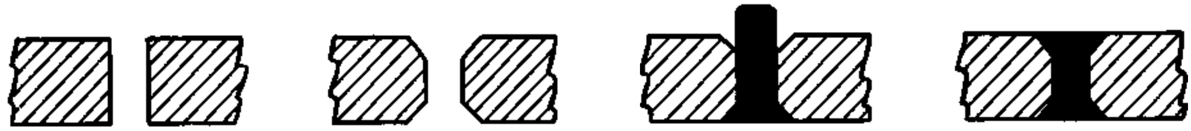


FIGURE 13—PROCEDURE FOR PLUGGING RIVET HOLES

(2) DRILLING BETWEEN EXISTING RIVET HOLES.—If the rivet spacing is great enough, new rivets may be placed between existing rivet holes, the existing holes being plugged as shown in figure 13.

(3) SLIGHTLY ELONGATED HOLES.—Holes that are only slightly elongated can in some cases be filled by using a longer rivet of the original diameter.

(4) RIVET HOLES THAT CANNOT BE REPAIRED.—Holes that cannot be repaired by the above methods should be treated as a break and repaired accordingly.

j. NOMINAL EDGE DISTANCE.—Unless otherwise specified in the text and figures, a minimum edge distance of two times the diameter of the rivet should be maintained.

11. FINISH SPECIFICATIONS.

a. GENERAL.—This specification covers the methods and materials to be used in the preparation for and the application of protective coatings to the airplane and its component parts.

b. MATERIALS.

(1) MATERIALS AND COMPOUNDS.—All materials and compounds specified shall be equivalent in quality to U. S. Army Air Force standards, except where specifically stated otherwise.

(2) COCKPIT COATING FORMULA.—The compound referred to as "Cockpit Coating" shall be prepared as follows.

The use of Aluminum Paste shall be optional. A tinted primer may be used in lieu of the foregoing cockpit coating.

(3) PRIMER.—The material referred to as "Primer" shall correspond to AN Specification No. AN-TT-P-656.

(4) LUBRICANTS.

(*a*) AN Specification No. AN-C-53 to be used on adjustable fittings and removable aluminum threads.

(*b*) Paralketone, type B, or corrosion preventive compound, Specification No. AN-C-52 to be used on control cables.

c. GENERAL REQUIREMENTS.

(1) CLEANING PARTS PRIOR TO FINISHING.

(*a*) ALUMINUM PARTS.—Parts heavily coated with grease or forming compound shall be degreased in a vapor degreaser.

The parts shall be dipped in a solution of 6 ounces per gallon of approved alkaline cleaner at 74 degrees C. (165 degrees F.) for five minutes and thoroughly rinsed in hot water.

Aluminum parts which do not receive anodizing (Alclad, 2S, 3S, 4S, 51S, 52S, 53S) shall be immersed in a 5 percent chromic acid solution at 60 degrees C. (140 degrees F.) for one to two minutes after cleaning in alkaline cleaner, rinsed and dried. Care should be taken to avoid touching the parts with dirty or greasy hands. This process is the chromic acid dip.

Material	*Specification*	*Quantity*
Zinc Chromate Primer	(AN-TT-P-656)	1.0 U.S. gal (.833 Imp. gal)
Black Enamel	(AN-E-3)	0.1 U.S. gal (.083 Imp. gal)
Toluene	(AN-R-T-541)	2.0 U.S. gal (1.666 Imp. gal)
Aluminum Paste	(AN-TT-A-461)	4.0 ounces

(*b*) STEEL PARTS.—Parts to be Cadmium Plated shall be cleaned as follows:

1. Sand blast or use descaler if necessary.

2. Rinse if descaler is used.

3. Clean in alkaline cleaner and rinse.

4. If stained, give short hydrochloric acid dip and rinse.

5. Dip in cyanide cleaner, rinse, and place in plating bath.

6. Parts not to be cadmium plated shall be cleaned by sand blasting and then painted.

(2) WELDED ALUMINUM PARTS.—These parts shall be immersed for one hour in a 10 percent solution of sulfuric acid, Federal Specification No. O-A-111, to remove the welding flux, thoroughly washed in clean water and dried.

(3) STAINLESS STEEL PARTS.—These parts which have become scaled shall be immersed in a 15 to 17 percent solution of commercial nitric acid, Federal Specification No. O-A-88, at a temperature of 49 degrees C. (120 degrees F.) for 20 minutes, rinsed in clean water, and dried. If the acid does not remove the scale, sand blasting with flint shall be used.

(4) DISSIMILAR METALS.—When dissimilar metals are in contact, they shall be protected in the following manner. The primer shall form a slight fillet at edges of faying surfaces. This fillet may be applied by brushing.

(*a*) ALUMINUM AND STEEL.—17ST and 24ST aluminum alloy sheet shall be anodized and coated with one coat of zinc chromate primer AN-TT-P-656. The steel should be cadmium plated and given one coat of primer. Alclad, forgings, and castings shall be given chromic acid dip and one coat of primer. All parts shall be primed in detail prior to assembly.

(5) SHOP COATING.—24ST alclad sheets shall be coated on both sides with zinc chromate primer as soon after receiving as possible.

24SO alclad, and other forming materials receive no shop coating until after forming or heat treating. After fabrication and prior to assembly they shall be given one coat of zinc chromate primer.

The shop coating shall be used as the priming coat on all assemblies.

The rivet heads and minor scratches shall receive no touch-up prior to final coat. Where large amounts of shop coating have been removed, the spots shall be primed before finishing.

(6) WEARING SURFACES, HOLES, ETC.—Care shall be exercised to prevent the application of paint materials to wearing surfaces, threads, and all holes. Care should be exercised to see that such parts are properly lubricated.

d. DETAIL REQUIREMENTS.

(1) ANODIC TREATMENT.—The following aluminum or aluminum alloy parts shall be treated in accordance with Specification No. AN-QQ-A-696. As much forming, drilling, and cutting as possible shall be performed on the parts before surface treatment in order to obtain maximum protection. With the exception of parts assembled by welding and parts which are not under stress, all parts shall be treated in detail before assembly.

(*a*) All 24ST and 17ST aluminum alloy.

(*b*) Parts in contact with dissimilar metals.

(2) PARTS NOT TO BE ANODIZED OR GIVEN THE ALROK PROCESS.

(*a*) All 24ST and 17ST alclad, 2S, 3S, 51S, 52S, and 53S shall be given the chromic acid dip in lieu of anodizing.

(*b*) All castings and forgings shall be given the chromic acid dip.

(*c*) FUEL AND OIL TANKS.—The exterior surfaces of all fuel and oil tanks shall be treated with the chromic acid dip prior to final finishing.

(3) CADMIUM PLATING.—Prior to the normal organic finish, all steel parts shall be cadmium plated in accordance with Specification No. AN-QQ-P-421 with the following exceptions.

(*a*) Corrosion resistant and stainless steel.

(*b*) Welded structures too large for the available plating equipment.

(*c*) Parts which are welded to unplated structures.

(*d*) Parts which are to be soldered.

e. DETAIL REQUIREMENTS FOR SPECIFIC PARTS.

(1) FUSELAGE FINISH REQUIREMENTS.

(*a*) EXTERIOR SURFACES.—If finish is required, exterior surfaces may receive one coat of camouflage enamel, Specification No. AN-E-7.

(*b*) INTERIOR SURFACES.—The cargo and passenger compartments shall be finished with one coat of primer and one coat of cockpit coating.

(*c*) RADIO RACK AND OXYGEN BOTTLE SUPPORTS.—These shall be furnished with one coat of primer and one coat of cockpit coating.

(*d*) FLOORS.—The upper surface of all floors shall receive no finish. The underneath shall receive one coat of primer and one coat of cockpit coating.

(*e*) COCKPIT.—The cockpit shall be finished with one coat of primer and one coat of cockpit coating. Any sound proofing or cockpit lining shall have cockpit coating for the final finish.

(2) DOOR FINISH REQUIREMENTS.

(*a*) CARGO AND LANDING GEAR DOORS.—These doors shall be given one coat of primer and one cockpit coating on the internal surfaces. One coat camouflage enamel may be applied to external surfaces if finish is required.

(*b*) PLYWOOD PILOT COMPARTMENT DOOR.—Finish over with two coats of phenolic spar varnish and two coats of cockpit green to match the adjacent surfaces. Extreme caution shall be used to thoroughly apply the phenolic spar varnish to the cut edges of the door. All parts shall be put on the door after the application of the varnish.

(3) SEAT FINISH REQUIREMENTS.

(*a*) PILOTS' SEATS.—These seats shall be finished and upholstered.

(*b*) TROOP BENCHES.—The bottom side shall receive one coat of primer and one coat of cockpit coating. The top side shall receive no finish.

(*c*) LITTER SUPPORTS.—These shall receive a chromic acid dip, one coat of primer and one coat of cockpit coating.

(4) LANDING GEAR AND TAIL WHEEL REQUIREMENTS.—All steel parts shall require no finish other than cadmium plating. All aluminum alloy parts shall receive one coat of primer and one coat of cockpit coating.

(5) WING FINISH REQUIREMENTS.

(*a*) EXTERIOR AND INTERIOR SURFACES.—The external surface may be finished with one coat of camouflage enamel if finish is required. The internal finish shall be one coat of primer and one coat of cockpit coating.

(*b*) LEADING EDGE.—The leading edge may be finished externally with one coat of camouflage enamel if finish is required. The internal finish shall be one coat of primer and one coat of cockpit coating.

(*c*) TIPS.—The external surface of the wing tip may be finished with one coat of camouflage enamel if finish is required. The internal finish shall be one coat of primer and one coat of cockpit coating.

(*d*) FLAPS.—The internal finish of the flaps shall be one coat of primer and one coat of cockpit coating. The external finish may be one coat of camouflage enamel if finish is required. The actuating mechanism shall be finished with one coat of cockpit coating.

(6) AILERON FINISH REQUIREMENTS (for airplanes up to AF44-78545).

(*a*) EXTERNAL SURFACE.—The external finish shall consist of three brush coats of dope, three spray coats of dope with the coat containing at least $\frac{1}{3}$ thinner and applied heavy enough to smooth out the roughness of the underneath coats; and last two coats of pigmented dope.

(*b*) INTERNAL DETAIL PARTS.—The internal parts shall be finished with one coat of primer and one coat of cockpit coating.

(*c*) TRIM TABS.—The external finish may be one coat of camouflage enamel if finish is required, and the internal finish shall be one coat of primer and one coat of cockpit coating.

(*d*) DOPE PROOFING.—All parts in contact with doped surfaces shall be primed followed by one coat of cockpit coating.

(*e*) METAL COVERED AILERON (airplanes AF44-78545 and subsequent) shall be finished in a manner similar to that outlined in paragraph 11 *e*. (7).

(7) ELEVATOR, RUDDER, STABILIZER AND FIN FINISH REQUIREMENTS.

(*a*) EXTERNAL FINISH.—If finish is required, one coat of camouflage enamel may be used.

(*b*) INTERNAL FINISH.—This shall consist of one coat of primer and one coat of cockpit coating.

(*c*) TRIM TABS.—External finish: one coat of camouflage enamel may be used if finish is required. Internal finish: one coat of primer and one coat of cockpit coating.

(8) COWLING AND FAIRING FINISH REQUIREMENTS.

(*a*) COWLING FINISH.—External finish: one coat of camouflage enamel may be used if finish is required. No internal finish is required.

(*b*) NACELLE FAIRING.—The external finish may be one coat of camouflage enamel if finish is required. The internal finish consists of one coat of primer and one coat of cockpit coating.

(9) FIREWALL FINISH REQUIREMENTS.—The stainless steel firewall liner or disc shall receive no finish.

Asbestos for firewall filler shall be installed as received.

The alclad firewall liner or disc shall receive one coat of primer and one coat of cockpit coating on both sides.

The internal sections of the firewall shall receive one coat of primer and one coat of cockpit coating.

Firewall radius edging shall receive one coat of primer and one coat of cockpit coating on internal surface.

(10) MOTOR MOUNT FINISH REQUIREMENT.—The motor mounts shall be sandblasted after welding and given one coat of primer and one coat of cockpit coating.

(11) TUBING FINISH REQUIREMENT.—All tubing and hollow parts shall be treated as outlined below.

(*a*) OPEN END OR HOLLOW PARTS.—The interior surfaces of all steel and aluminum hollow and tubular parts except liquid carrying lines, conduit tubing and junction boxes which receive no internal treatment shall be given one coat of primer. This shall be applied by filling and draining or by dipping.

(*b*) CLOSED OR SEALED STEEL TUBULAR MEMBERS OR HOLLOW PARTS.—All steel tubing except 3/8 inch outside diameter or smaller shall be protected on the internal surface with a coating of Paralketone or hot linseed oil. The material shall be applied by forcing it into the hollow member under pressure or by immersion in a bath of the liquid. Parts which are immersed shall be manipulated so as to insure the absence of air pockets and shall remain in the bath until all bubbling has ceased. In case of a large structure, interconnecting holes may be drilled so that the liquid will circulate. The members shall be thoroughly drained after treatment and wiped free of oil on all exterior surfaces. All accessible holes drilled in the members shall be closed with cadmium plated Parker self tapping screws.

(*c*) SEALED TUBULAR OR CLOSED HOLLOW ALUMINUM PARTS.—These parts shall receive no internal finish.

f. SCREWS, THREADS, AND THREADED PARTS.—Standard parts such as bolts, nuts, pins, shackles, etc., and fasteners such as rivets, screws, etc., shall not be painted prior to assembly. Bolts used in highly stressed fittings shall be freely coated with Paralketone prior to assembly. Threads on adjustable parts which are to be disconnected or disassembled shall be lubricated with anti-seize compound, Specification No. AN-C-53.

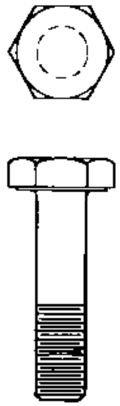
Corrosion resistant steel threads shall be lubricated with anti-seize compound, Specification No. AN-C-53.

The threads of adjustable aluminum alloy parts shall be lubricated with anti-seize compound, Specification No. AN-C-53.

Threads of fittings in fuel, oil, hydraulic, coolant and instrument lines shall be treated as follows:

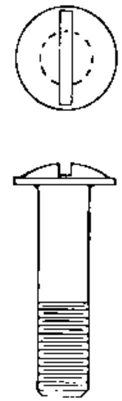
ALUMINUM ALLOY.—Lubricate tapered pipe threads with anti-seize compound Specification No. AN-C-53.

TABLE 17—AN STANDARD HEX-HEAD AND CLEVIS BOLTS AND PINS

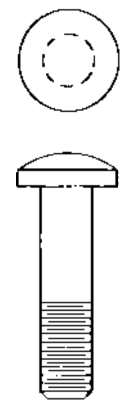


TYPE: HEX HEAD
EXAMPLE: AN4

CLEVIS HEAD
AN29



WASHER HEAD
AN525



FILLISTER HEAD DRIVE PIN
SS152

Size	*AN Part Numbers*			*Alum. Alloy 24ST*				*Steel*	*125,000 Ult. Tension*		
Nominal Diameter	*Hex-Head Bolt*	*Clevis-Head Bolt*	*Clevis Pin*	*Shear*	*Tension*		*Clevis Bolt*	*Shear Bolts and Pins*	*Tension Hex-Head Bolt*		*Clevis Bolt*
				Ult.	*Yield*	*Ult.*	*Ult.*	*Ult.*	*Yield*	*Ult.*	*Ult.*
1/8			AN 392					920			
3/16			AN 393					2070			
10-32	AN 3	AN 23						2126	1709	2136	1068
1/4-28	AN 4	AN 24	AN 394	1717	1274	1975	986	3681	3186	3982	1991
5/16-24	AN 5	AN 25	AN 395	2684	2057	3189	1595	5751	5143	6429	3214
3/8-24	AN 6	AN 26	AN 396	3868	3185	4937	2469	8287	7962	9953	4976
7/16-20	AN 7	AN 27	AN 397	5261	4299	6663	3332	11272	10746	13433	6716
1/2-20	AN 8	AN 28	AN 398	6871	5874	9104	4552	14722	14685	18356	9178
9/16-18	AN 9	AN 29	AN 399	8697	7460	11563	5782	18637	18650	23313	11656
5/8-18	AN 10	AN 30	AN 400	10738	9496	14719	7360	23010	23741	29676	14838
3/4-16	AN 12	AN 32	AN 402	15463	13918	21573	10287	33135	34795	43494	21747
7/8-14	AN 14	AN 34	AN 404	21046	19045	29520	14260	45097	47612	59515	29757
1-14	AN 16	AN 36	AN 406	27489	25651	39759	19880	58905	64127	80159	40079

NOTE 1. SHEAR STRENGTHS ARE BASED ON AREA OF SHANK AT FULL DIAMETER. TENSION STRENGTHS ARE BASED ON AREA OF SHANK AT ROOT DIAMETER.

NOTE 2. AN 525 (WASHER HEAD SCREWS) TO BE USED ONLY IN THE FOLLOWING SIZES: NO. 10 (AN 525-10) AND 1/4 (AN 525-416). ALLOWABLE TO BE THE SAME AS FOR CLEVIS BOLTS.

NOTE 3. FILLISTER HEAD BOLTS TO HAVE THE SAME ALLOWABLES AS AN HEX-HEAD BOLTS.

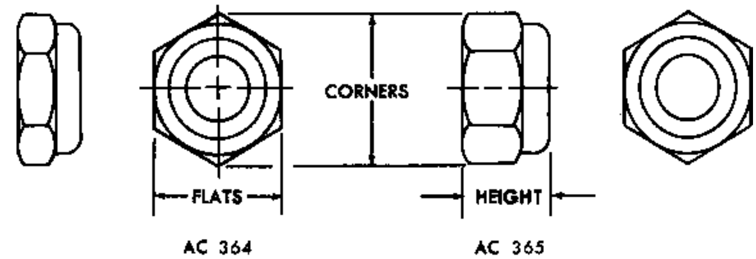


TABLE 18
SELF-LOCKING FIBER INSERT NUTS

Thread		Pitch Dia.		Flats	Corners	Height	Part Numbers Steel	Part Numbers Aluminum
4-40	NC2	.0958	+.0024 —.0000	1/4	9/32	9/64	AN365-400	AN365D440
4-48	NF2	.0985	+.0022 —.0000	1/4	9/32	9/64	AN365-448	
6-32	NC2	.1177	+.0027 —.0000	5/16	23/64	1/8		
6-32	NC2	.1177	+.0027 —.0000	5/16	23/64	11/64	AN365-632	AN365D632
6-40	NF2	.1218	+.0024 —.0000	5/16	23/64	1/8	AN364-640	
6-40	NF2	.1218	+.0024 —.0000	5/16	23/64	11/64	AN365-640	
8-32	NC2	.1437	+.0027 —.0000	3/8	7/16	11/64		
8-32	NC2	.1437	+.0027 —.0000	3/8	7/16	15/64	AN365-832	AN365D832
8-36	NF2	.1460	+.0025 —.0000	11/32	25/64	11/64	AN364-836	
8-36	NF2	.1460	+.0025 —.0000	11/32	25/64	15/64	AN365-836	AN365D836
10-24	NC3	.1629	+.0024 —.0000	3/8	7/16	15/64	AN365-1024	AN365D1024
10-32	NF3	.1697	+.0019 —.0000	3/8	7/16	11/64	AN364-1032	AN364D1032
10-32	NF3	.1697	+.0019 —.0000	3/8	7/16	15/64	AN365-1032	AN365D1032
1/4-20	NC3	.2175	+.0026 —.0000	1/2	37/64	3/8	AN365-420	AN365D420
1/4-28	NF3	.2268	+.0022 —.0000	7/16	31/64	13/64	AN364-428	AN364D428
1/4-28	NF3	.2268	+.0022 —.0000	7/16	31/64	5/16	AN365-428	AN365D428
5/16-18	NC3	.2764	+.003 —.000	9/16	21/32	29/64	AN365-518	AN365D518
5/16-24	NF3	.2854	+.0024 —.0000	1/2	37/64	1/4	AN364-524	AN364D524
5/16-24	NF3	.2854	+.0024 —.0000	1/2	37/64	11/32	AN365-524	AN365D524
3/8-16	NC3	.3344	+.0032 —.0000	11/16	51/64	35/64	AN365-616	AN365D616

TABLE 18—Continued
SELF-LOCKING FIBER INSERT NUTS

Thread		Pitch Dia.		Flats	Corners	Height	Part Numbers Steel	Part Numbers Aluminum
3/8-24	NF3	.3479	+.0024 —.0000	9/16	21/32	17/64	AN364-624	AN364D624
3/8-24	NF3	.3479	+.0024 —.0000	9/16	21/32	29/64	AN365-624	AN365D624
7/16-14	NC3	.3911	+.0036 —.0000	3/4	7/8	39/64	AN365-714	
7/16-20	NF3	.4050	+.0026 —.0000	5/8	23/32	5/16	AN364-720	AN364D720
7/16-20	NF3	.4050	+.0026 —.0000	5/8	23/32	29/64	AN365-720	AN365D720
1/2-13	NC3	.4500	+.0037 —.0000	7/8	1 1/64	45/64	AN365-813	
1/2-20	NF3	.4675	+.0026 —.0000	3/4	7/8	5/16	AN364-820	AN364D820
1/2-20	NF3	.4675	+.0026 —.0000	3/4	7/8	19/32	AN365-820	AN365D820
9/16-18	NF3	.5264	+.003 —.000	7/8	1 1/64	23/64	AN364-918	AN364D918
5/8-18	NF3	.5889	+.003 —.000	15/16	1 1/16	25/64	AN364-1018	AN364D1018
3/4-16	NF3	.7094	+.003 —.000	1 1/16	1 15/64	13/32	AN364-1218	AN364D1216
7/8-14	NF3	.8286	+.0036 —.0000	1 1/4	1 7/16	15/32	AN364-1414	AN364D1414
1-14	NF3	.9536	+.0036 —.0000	1 7/16	1 21/32	9/16	AN364-1614	AN364D1614

Engineering Information

Material: Elastic Stop Nut Corp. or equivalent. Manufacturing Specification: 2527 Limits: Standard Commercial 2330 steel Specification AN-00-S-689, for LS894 only.

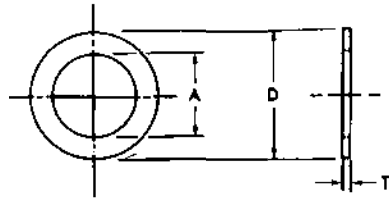
Note: 1. Nuts must fit A.S.A. wrench openings.

2. Round or chamfered end bolts or screws must extend at least the full round or chamfer through the nut. Flat end bolts or screws must extend at least 1/32 through the nut.

3. Must not be used where temperature exceeds 121° C, (250° F).

Examples: AC364 = No. 10-32 steel self-locking nut.
AC364D1032 = No. 10-32 aluminum self-locking nut.

TABLE 19
PLAIN WASHERS



Dash Numbers Light Series	Steel Regular Series	Alum. Alloy	Bolt Size	A	D	T
	3	D3	#3	7/64	1/4	1/32
	4	D4	#4	1/8	5/16	1/32
	6	D6	#6	9/64	3/8	1/32
	8	D8	#8	11/64	3/8	1/32
10L			#10	13/64	7/16	1/32
	10	D10	#10	13/64	7/16	1/16
416L			1/4	17/64	1/2	1/32
	416	D416	1/4	17/64	1/2	1/16
516L			5/16	21/64	9/16	1/32
	516	D516	5/16	21/64	9/16	1/16
	616	D616	3/8	25/64	5/8	1/16
	716	D716	7/16	29/64	3/4	1/16
	816	D816	1/2	33/64	7/8	1/16
	916	D916	9/16	37/64	1 1/16	1/16
	1016	D1016	5/8	41/64	1 3/16	1/16
	1216	D1216	3/4	49/64	1 5/16	3/32
	1416	D1416	7/8	57/64	1 1/2	3/32
	1616	D1616	1	1 1/64	1 3/4	3/32

NOTE: 1. Either aluminum or steel washers may be used in the following applications:
A. With bolts up to and including 5/16 diameter; B. With all screws;
C. With all clevis bolts.
2. Only steel washers may be used in the following applications:
A. With bolts over 5/16 diameter.
B. With all internal hex bolts,
3. All washers must be flat and free from burrs.

MATERIAL:
STEEL—Specification AN-QQ-S-651, or SAE 1010 steel (hard finished SAE 1010 steel optional) or Specification AN-QQ-S-685
ALUMINUM ALLOY—Specification QQ-A-353, or 24ST alclad—Specification 11067

FINISH:
Steel—Cadmium plate, Specification AN-QQ-P-421
Aluminum alloy—Anodize—Specification AN-QQ-A-696
24ST Alclad—none

PACKING SPECIFICATION 40560

LIMITS: ± .010

TABLE 20—ALLOWABLE LOADS FOR RAISED HEAD RIVETS.

ALLOWABLE SINGLE SHEAR STRENGTH OF ALUMINUM ALLOY RIVETS (LB.)

Dia. of Rivet or Pin, in.	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8
A17ST & 56SH (F_{su} = 27,000 lb/sq in.)	83	186	351	518	745	1325	2071	2984
17ST (F_{su} = 30,000 lb/sq in.)	92	206	368	573	828	1472	2300	3313
24ST (F_{su} = 35,000 lb/sq in.)	107	241	429	670	966	1718	2684	3865

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

(F_{br} = 90,000 lb/sq in.)

Dia. of Rivet or Pin, in. / SHEET THICKNESS	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8
.014	78							
.016	90							
.018	101	151						
.020	112	168						
.025	140	210	281					
.032	180	269	360	449				
.036	202	303	405	506	607			
.040	225	337	450	562	675			
.045	253	379	506	632	759			
.051	286	430	573	716	860	1147		
.064	360	539	720	899	1080	1440	1800	
.072	405	607	810	1012	1215	1620	2025	2430
.081	455	683	910	1138	1366	1822	2278	2733
.091	511	767	1023	1279	1535	2047	2559	3071
.102	573	860	1147	1434	1721	2295	2868	3442
.128	720	1079	1440	1799	2160	2880	3600	4320
5/32	878	1317	1757	2195	2635	3514	4393	5271
3/16	1054	1581	2109	2635	3164	4218	5273	6328
1/4	1406	2108	2812	3514	4218	5625	7031	8437

TABLE 20—ALLOWABLE LOADS FOR RAISED HEAD RIVETS (Cont'd)

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

(F_{br} – 82,000 lb/sq in.)

SHEET THICKNESS	*Dia. of Rivet or Pin, in.* $\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{32}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$
.014	71							
.016	82							
.018	92	138						
.020	102	153						
.025	128	192	256					
.032	164	245	328	409				
.036	184	276	369	461	553			
.040	205	307	410	512	615			
.045	230	345	461	576	691			
.051	261	391	522	653	784	1045		
.064	328	491	656	819	984	1312	1640	
.072	369	553	738	922	1107	1476	1845	2214
.081	415	622	830	1037	1245	1660	2075	2490
.091	466	699	932	1165	1399	1865	2331	2798
.102	522	783	1045	1306	1568	2091	2613	3136
.128	656	983	1312	1639	1968	2624	3280	3936
$\frac{5}{32}$	800	1200	1601	2000	2401	3202	4002	4803
$\frac{3}{16}$	960	1440	1921	2401	2882	3843	4804	5765
$\frac{1}{4}$	1281	1920	2562	3202	3843	5125	6406	7687

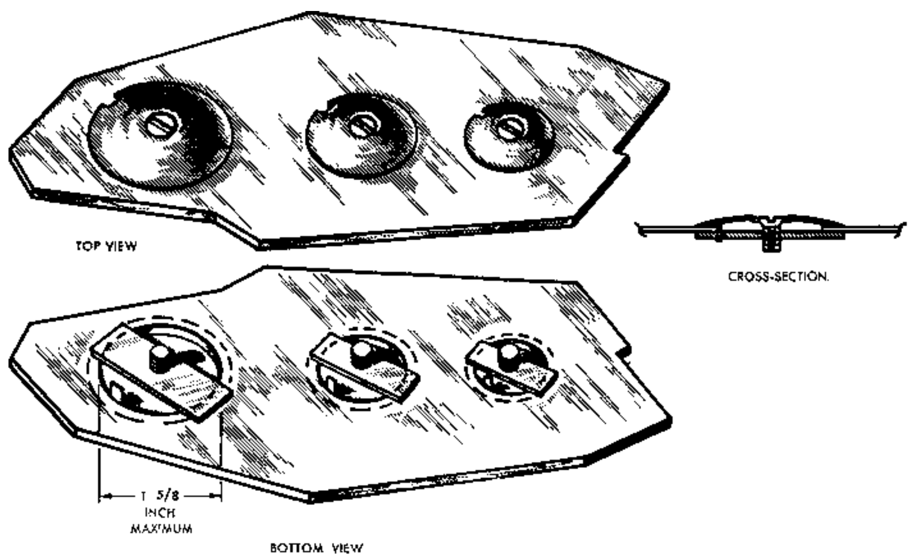


FIGURE 13A—RIVETLESS SKIN PATCH

TABLE 21
ALLOWABLE LOADS FOR MACHINE COUNTERSUNK RIVETS

ALLOWABLE SHEAR STRENGTH—LB. PER RIVET

Rivet Alloy / *Rivet Dia.*	3/32	1/8	5/32	3/16
A17ST	186	331	518	745
17ST	206	368	574	828
24ST	241	429	670	966

ALLOWABLE BEARING STRENGTH—LB. PER RIVET

Sheet Alloy	*24ST Alclad*				*24ST*			
Thickness of Thinnest Sheet / *Dia. of Rivet*	3/32	1/8	5/32	3/16	3/32	1/8	5/32	3/16
.020	122	150			131	162		
.025	138	175			149	189		
.032	160	210	280		172	226	302	
.036	173	231	303		186	249	327	
.040	185	251	327	460	199	271	353	496
.045	201	277	357	545	217	299	385	589
.051	220	308	393	600	237	332	424	648
.064	241	376	470	717	241	405	507	775
.072	241	417	518	788	241	429	558	850
.081	241	429	557	870	241	429	600	940
.091	241	429	602	966	241	429	650	966
.102		429	652	966		429	670	966
.128			670	966			670	966

TABLE 22
ALLOWABLE LOADS FOR PRESS COUNTERSUNK RIVETS

ALLOWABLE SHEAR STRENGTH—LB. PER RIVET

Rivet Alloy / *Rivet Dia.*	3/32	1/8	5/32	3/16
A17ST	276	480	735	1020
17ST	300	530	810	1130
24ST	350	620	950	1325

ALLOWABLE BEARING STRENGTH—LB. PER RIVET

Sheet Alloy	*24ST Alclad*				*24ST*			
Thickness of Thinnest Sheet / *Rivet Dia.*	3/32	1/8	5/32	3/16	3/32	1/8	5/32	3/16
.020	225	270			243	291		
.025	246	315	450		265	340	485	
.032	276	380	500	800	276	410	540	864
.036	293	398	530	875	316	430	570	945
.040	310	420	560	905	334	453	604	975
.045	332	446	596	970	350	480	643	1045
.051	350	480	640	1050	350	518	690	1130
.064	350	550	735	1220	350	593	793	1315
.072		593	795	1325		620	858	1325
.081			860	1325			929	1325
.091				1325				1325
.102				1325				1325
.128								

TABLE 23—ALLOWABLE LOADS FOR CHERRY BLIND RIVETS

t = Sheet Thickness* Inches	Allowable Ultimate Shear or Bearing Load—Lbs.					
	24ST ALUM. ALLOY SHEET			24ST ALCLAD SHEET		
	F_{tu} = 62000 lb./sq in., F_{br} = 90000 lb/sq in.			F_{tu} = 56000 lb/sq in., F_{br} = 82000 lb/sq in.		
	d — 1/8	5/32	3/16	1/8	5/32	3/16
0	0	0	0	0	0	0
.010	60	86	100	54	78	91
.016	96	136	159	87	124	144
.020	119	170	197	108	155	180
.025	147	210	245	136	193	223
.028	164	234	274	150	214	250
.030	175	249	293	161	228	268
.032	186	265	312	170	243	286
.036	207	296	350	191	272	320
.040	228	325	386	210	299	354
.045	253	360	431	233	332	395
.050	276	391	475	256	363	436
.051	280	397	483	260	369	444
.057	302	431	533	284	402	491
.060	311	445	556	294	418	514
.064	321	462	586	306	437	544
.070	329	483	626	321	461	584
.072	330	488	638	324	468	597
.080	331	506	680	331	490	643
.081	331	508	684	331	493	648
.090	331	517	715	331	510	689
.091	331	518	717	331	511	692
.094	331	518	725	331	514	702
.100	331	518	736	331	518	718
.102	331	518	739	331	518	722
.110	331	518	745	331	518	737
.120	331	518	745	331	518	745
.125	331	518	745	331	518	745

*t = Total thickness of loaded sheets outside of shear plane (t_1), or total thickness of loaded sheets inside of shear plane (t_2), whichever is smaller.

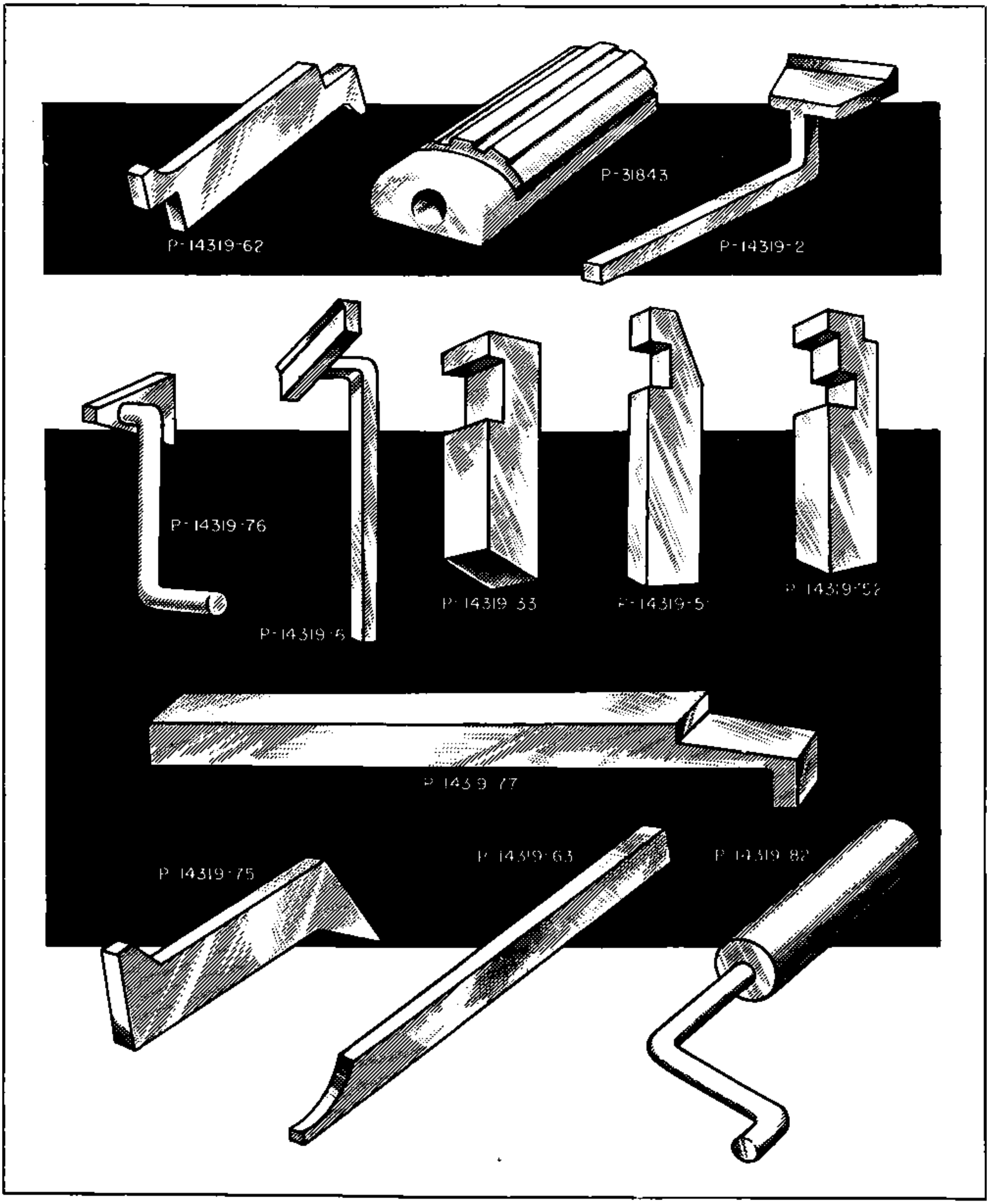


FIGURE 14 (SHEET 1 of 4 SHEETS)—SPECIAL TOOLS—BUCKING BARS

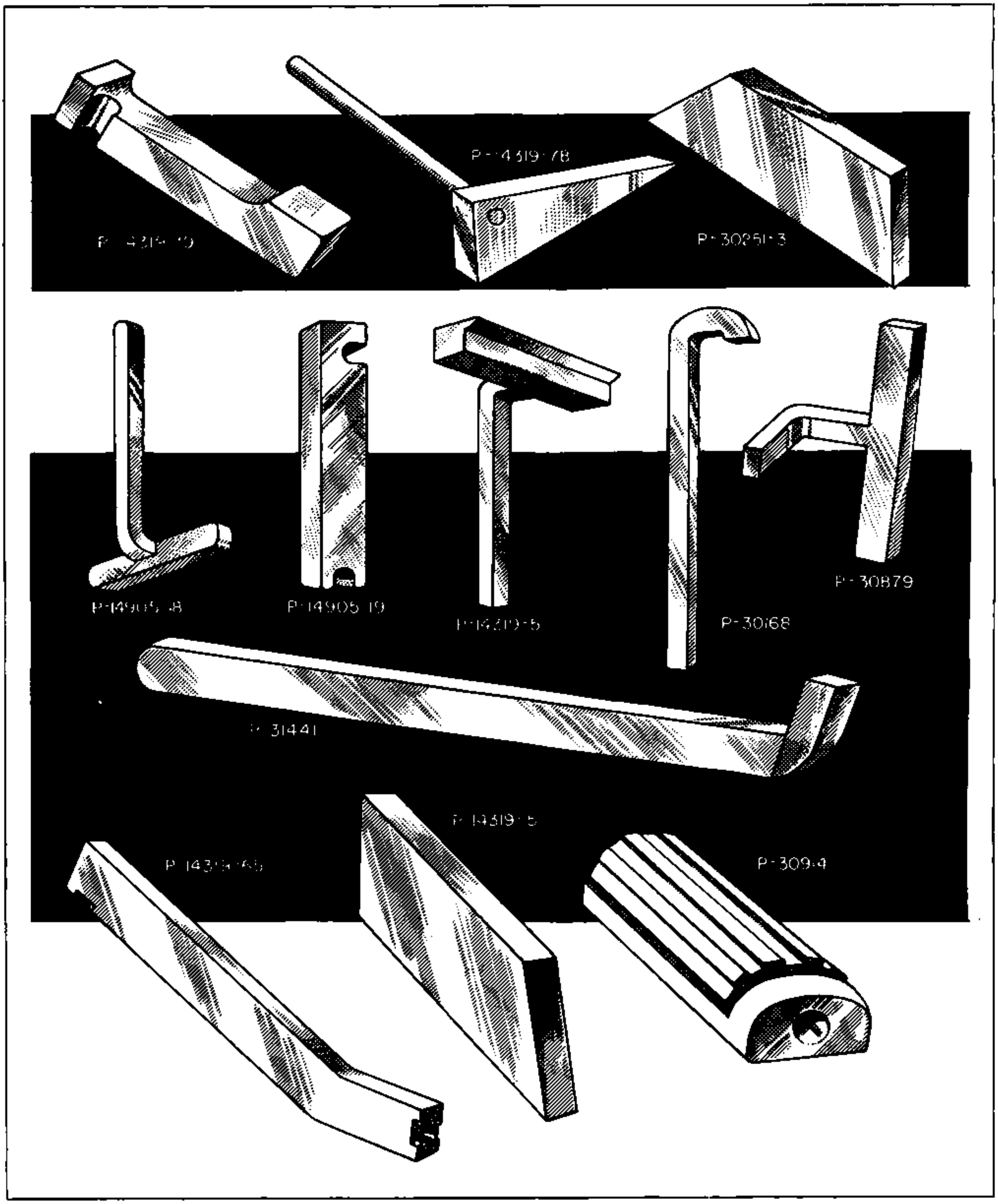


FIGURE 14 (SHEET 2 of 4 SHEETS)—SPECIAL TOOLS—BUCKING BARS

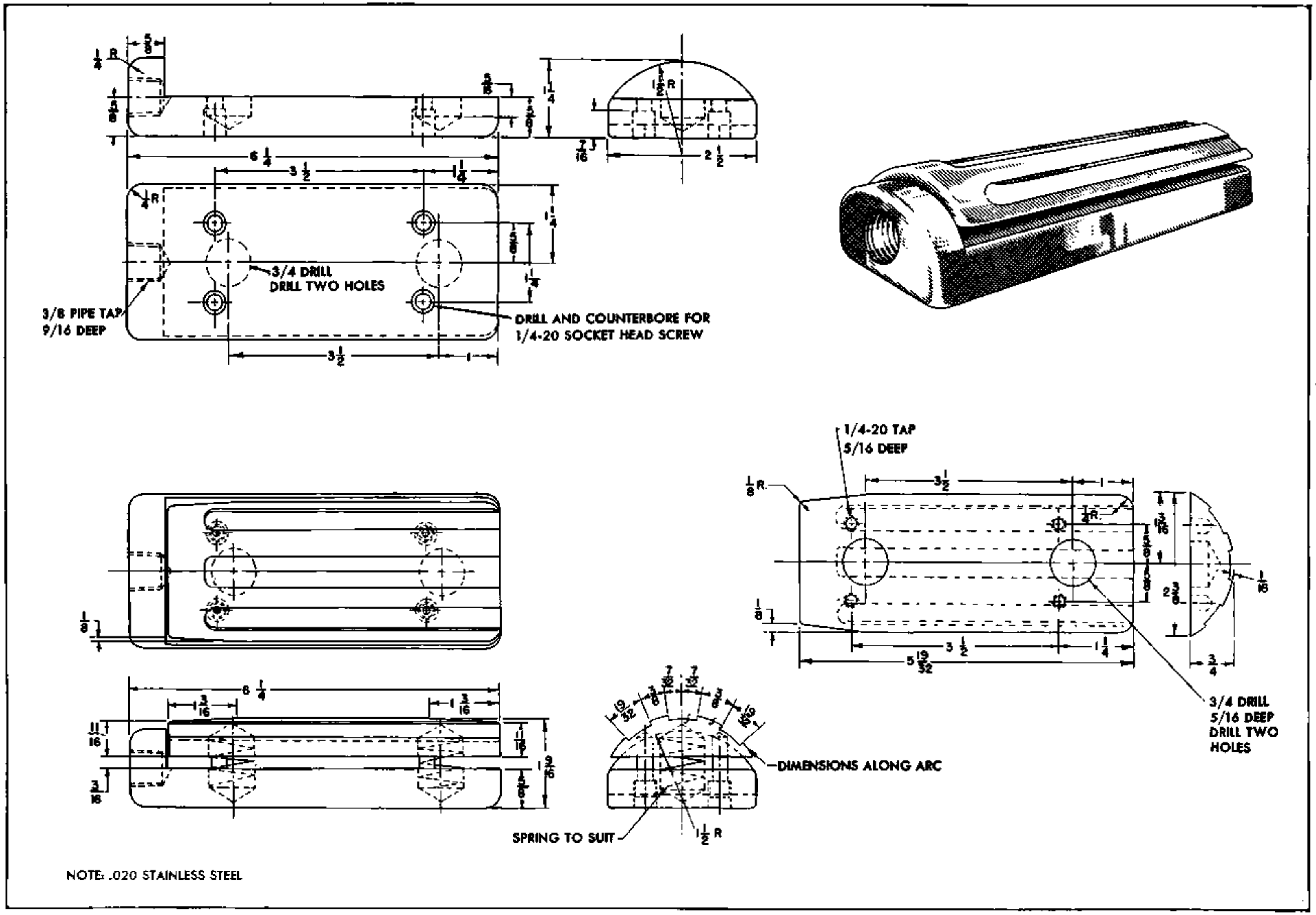


FIGURE 14 (SHEET 3 OF 4 SHEETS)—SPECIAL TOOLS—RIVETING MOUSE

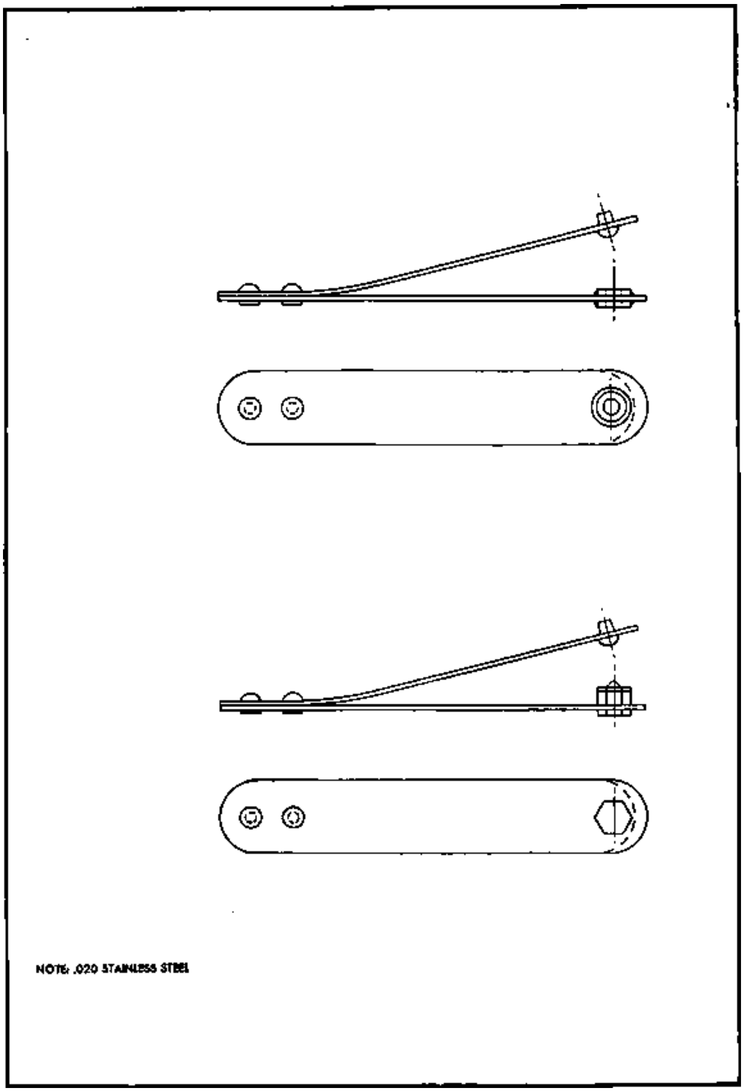


FIGURE 14 (SHEET 4 OF 4 SHEETS)—SPECIAL TOOLS—RIVET HOLE LOCATOR

SECTION II

ENGINE MOUNT AND FIREWALL REPAIR

1. ENGINE MOUNT.

a. GENERAL.

The engine mount is an arc-welded structure using air-hardening X-4130 steel tubing. The various sub-assemblies are normalized after welding but the completed mount does not receive any heat treatment. Figure 15 and table 24 give the engine mount dimensions and tube sizes.

b. NEGLIGIBLE DAMAGE.

(1) Smooth dents in all the members except the mounting ring may be considered negligible if their maximum depth is equal to or less than .08 inches. Only one dent will be allowed for each tube.

(2) Smooth bows in all tubes may be neglected provided the maximum bow is equal to or less than .18 inch. Only one bow will be allowed for each tube.

(3) Members described under paragraph (1) above may also have a single bow as described under paragraph (2).

c. REPAIR TO ENGINE MOUNT.

(1) REPAIR OF DENTS.

(*a*) Smooth dents greater than that specified in paragraph 1 *b* (1) of this section, and having no sharp corners or cracks may be repaired as follows. If any doubt exists as to the presence of cracks, refer to section I, paragraph 7 for the method used to disclose any cracks. Drill and tap a hole not to exceed ¼ inch in diameter in the opposite side of the damaged tube. Screw a short length of pipe into the hole to which an air hose may be attached. Heat the bent section of the tube evenly with an acetylene torch and at the same time apply air pressure to the tube. A welding rod tack welded to the dent may be used as a further aid to pull the tube into shape. After the tube has been repaired, allow to cool in still air. Remove the section of pipe and close the hole by welding. Clean the tube by sand blasting and apply corrosion resistant finish as per section I, paragraph 11.

(b) An alternate repair for dents is shown in figure 16. In this figure, the repair is effected by wrapping two semi-circular sleeves around the tube and bolting them in place as shown. Two lengths of dent are shown with the corresponding size sleeve for each. The requirements of the figure should be carefully adhered to.

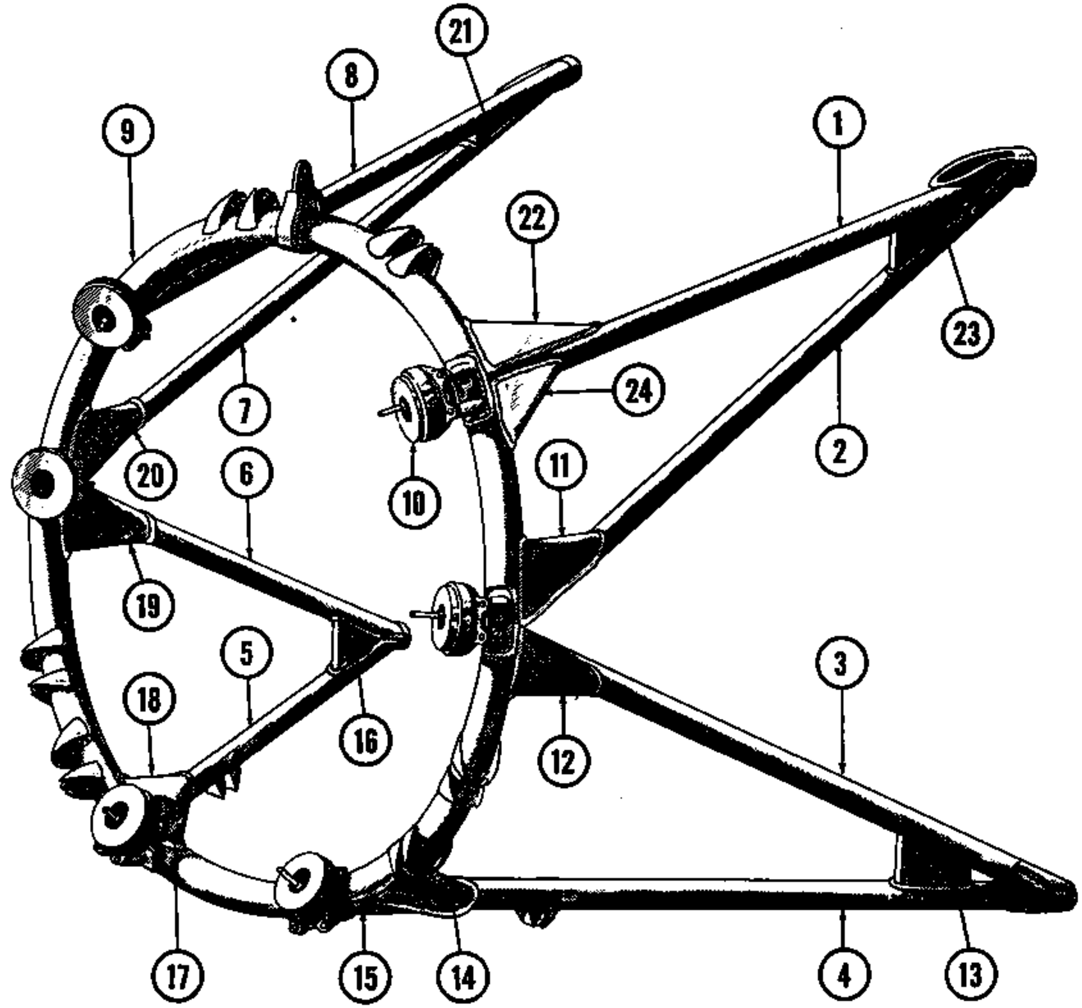
(2) REPAIR OF CRACKS.—Cracks running parallel to the axis of the tube and having a maximum length of 1.5 inches may be repaired as follows: drill a hole at each end of the crack with a No. 40 drill (⅛ inch). Cut a diamond shaped patch of X4130 steel one gage higher than that of the tube being repaired. Weld the crack together and, centering the diamond patch over the crack, weld it to the tube. See figure 16. Only one such repair is allowed per tube. Cracks in the mounting ring cannot be repaired.

d. DAMAGE NECESSITATING REPLACEMENT.

(1) Individual members may be cut out and new ones welded in. It is necessary that the length of the weld be kept the same as in the original structure. Care must be taken not to introduce any eccentricity at the tube ends.

(2) Cracks or dents in the mounting ring require replacement.

(3) Tubes which cannot be straightened to within the limit specified in paragraph 1 *b* (2) of this section shall be replaced.



REFERENCE: (1) SECTION II, PARAGRAPH 1a
(2) TABLE 24

FIGURE 15—ENGINE MOUNT STRUCTURE

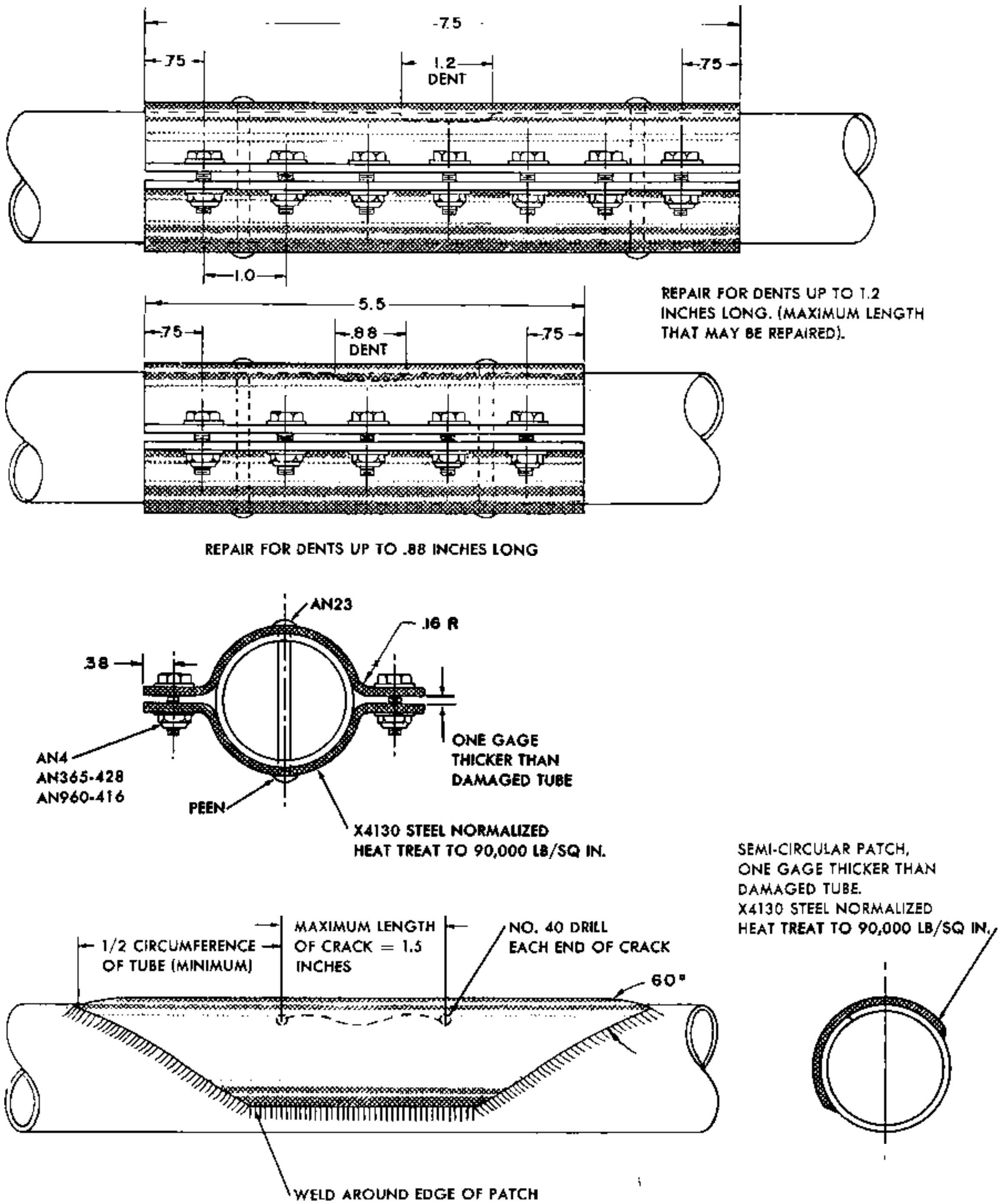
TABLE 24

ENGINE MOUNT STRUCTURE
MATERIAL X4130 STEEL

Item No.	*O.D. (Inches)*	*Wall Thickness*	*Length*
1	1.50	.065	36.00
2	1.50	.065	40.00
3	1.50	.065	40.00
4	1.50	.083	38.00
5	1.50	.083	38.00
6	1.50	.065	40.00
7	1.50	.065	40.00
8	1.50	.065	36.00
9	2.25	.095	124.00
10	TYPICAL MOUNT, PRATT & WHITNEY DRAWING E-48806		

GAGE OF GUSSETS

11	.063
12	.063
13	.125
14	.063
15	.063
16	.125
17	.063
18	.063
19	.063
20	.063
21	.125
22	.063
23	.125
24	.063



REFERENCE: SECTION II, PARAGRAPH 1c

FIGURE 16—ENGINE MOUNT REPAIR

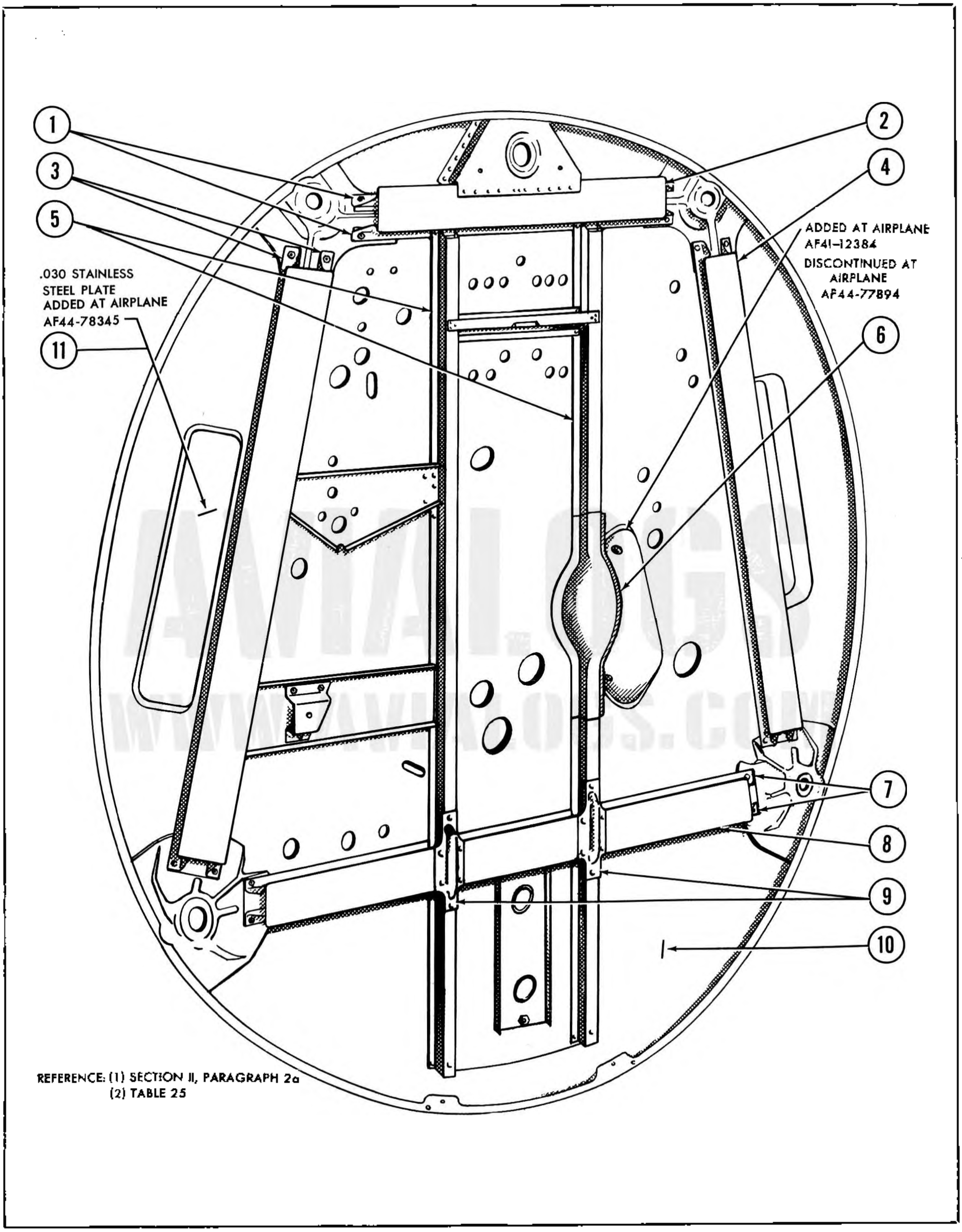


FIGURE 17 — FIREWALL ASSEMBLY

TABLE 25
FIREWALL STRUCTURE

Item No.	*Part*	*Gage*	*Material*
1.	Channel	.064	24ST Alclad
2.	Plate (FWD.)	.102	24ST Alclad
	Plate (AFT)	.051	24ST Alclad
3.	Channel	.081	24ST Alclad
4.	Plate (FWD.)	.102	24ST Alclad
	Plate (AFT)	.093	24ST Alclad
5.	Hat Section	.040	24SO Alclad
6. Added at Airplane AF41-12384 Discontinued At Airplane AF44-77894	Pan Reinforcement	.040	24SO Alclad
7.	Channel	.081	24SO Alclad
8.	Plate (FWD.)	.081	24ST Alclad
	Plate (AFT)	.081	24ST Alclad
9.	Joint	.051	24SO Alclad
10.	Skin (Type 302)	.010	Stainless Steel
	Millboard	.062	Asbestos
	Skin	.016	24ST Alclad
11. Added at Airplane AF44-78345	Cover Plate	.030	Stainless Steel

2. FIREWALL.

a. GENERAL.

The firewall consists of an .010 stainless steel and an .016 aluminum alloy bulkhead separated by an .062 sheet of asbestos. On the aft side of the firewall are stiffening box and hat section beams. Figure 17 shows the firewall assembly and table 25 gives the component parts.

b. REPAIR TO FIREWALL.

Figure 18 shows a combined repair to the bulkhead, hat section and box beam. It is seen that the repair to the side of the beam against the bulkhead must be made on the forward face of the bulkhead. Any repair material added on the engine compartment side of the firewall must be of stainless steel. The box beam repair is given in greater detail in figure 19.

TABLE 26

MATERIALS FOR ENGINE MOUNT AND FIREWALL REPAIR

Spec. No.	*Stock*	*Size*
18-8, ½ H-Type 308	Stainless steel sheet	.010
101-S	Asbestos millboard	.062
24ST	Sheet, aluminum alclad	.016
24ST	Sheet, aluminum alclad	.091
24ST	Sheet, aluminum alclad	.081
24SO	Sheet, aluminum alclad	.102
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.065
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.083
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.095
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.125
AN442-AD4	Rivet, flat head	⅛
AN442-AD5	Rivet, flat head	5/32
AN3	Bolt	
AC364	Nut	
AN960-10	Washer	

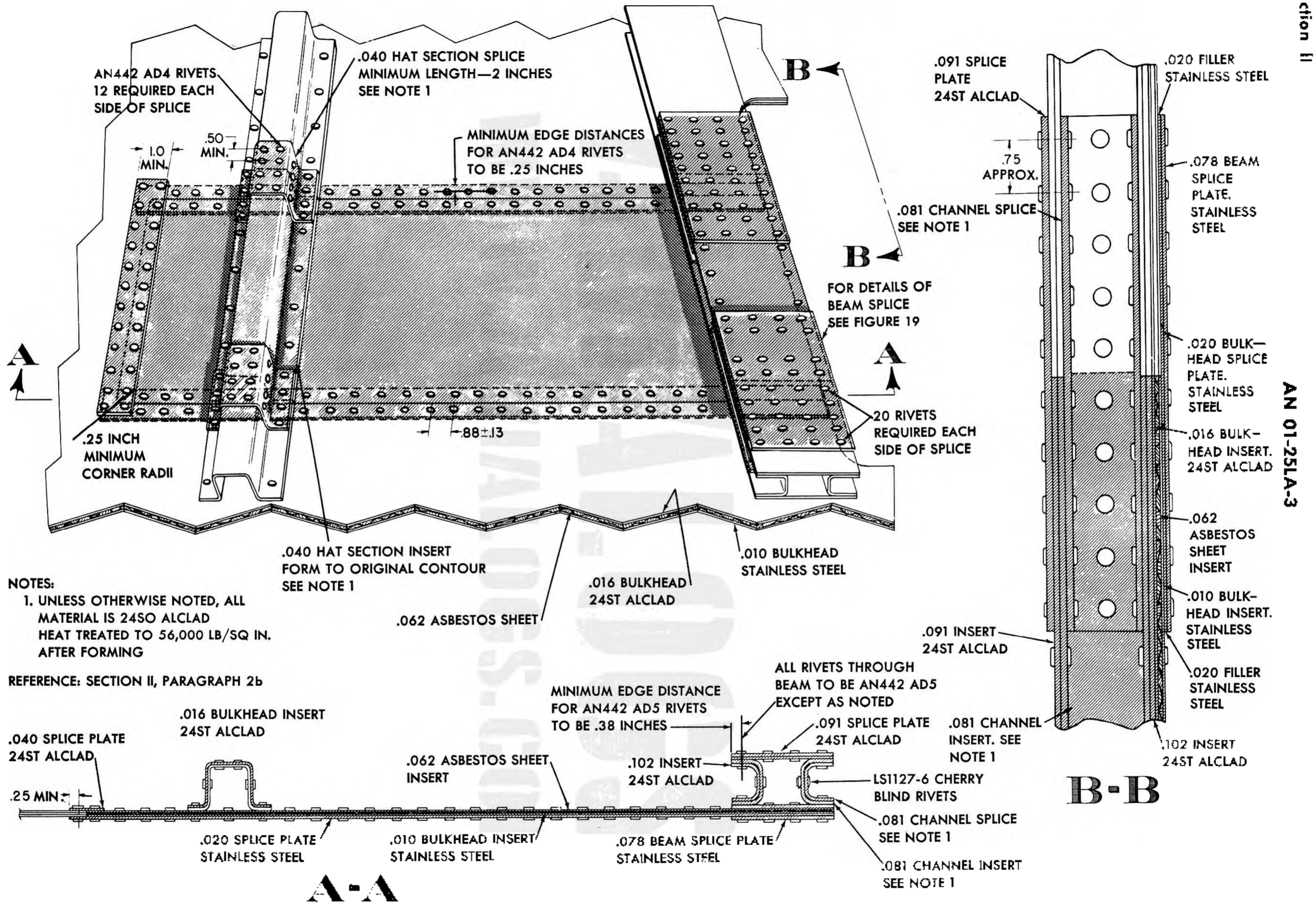
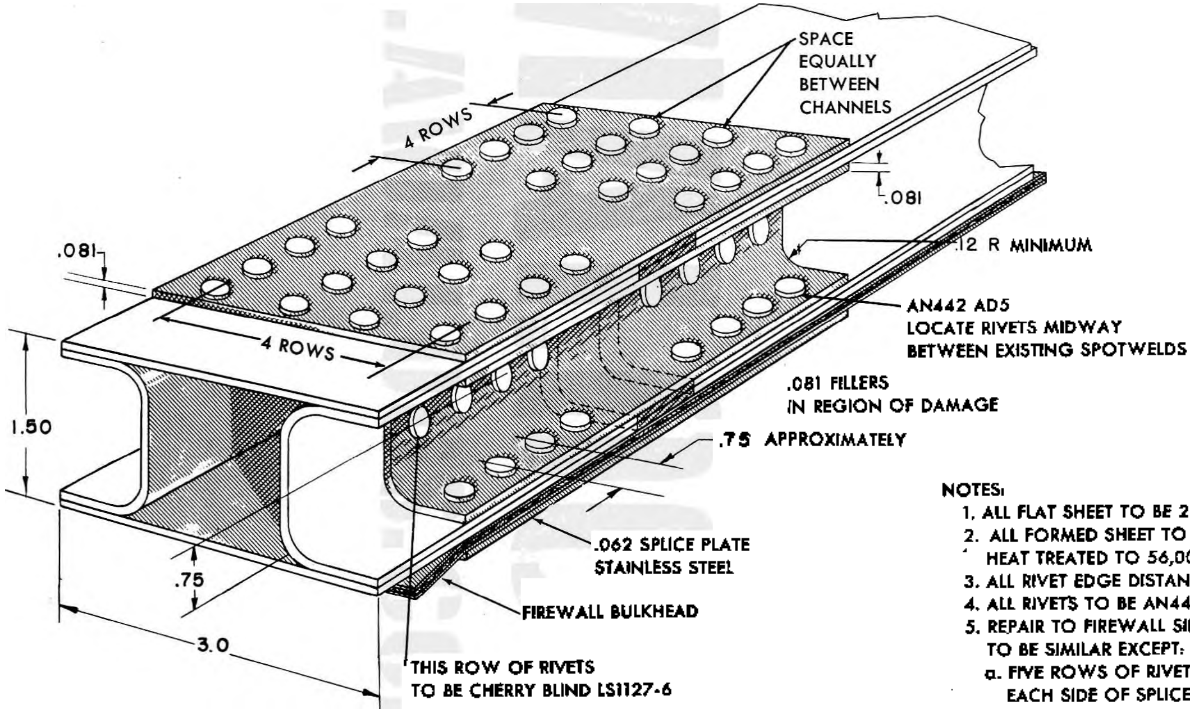


FIGURE 18—FIREWALL REPAIR



NOTES:

1. ALL FLAT SHEET TO BE 24ST ALCLAD
2. ALL FORMED SHEET TO BE 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
3. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM
4. ALL RIVETS TO BE AN442 AD5
5. REPAIR TO FIREWALL SIDE STIFFENER TO BE SIMILAR EXCEPT:
   a. FIVE ROWS OF RIVETS TO BE USED EACH SIDE OF SPLICE (LENGTHWISE)
   b. GAGE OF STAINLESS STEEL SHEET TO BE .078
   c. GAGE OF SHEET FARTHEST FROM FIREWALL TO BE .091

LOWER BEAM SHOWN.
FOR SIDE BEAMS
SEE NOTE 5 AND FIGURE 18

REFERENCE: SECTION II, PARAGRAPH 2b

FIGURE 19—FIREWALL BEAM REPAIR

SECTION III

FUSELAGE REPAIR

1. GENERAL.

a. The fuselage is a semi-monocoque structure consisting of 24ST aluminum alloy stressed skin reinforced longitudinally by formed Zee section stringers and laterally by traverse bulkhead rings. See figures 20 and 22. In the region of the fuselage where the cargo floor exists, the bulkheads are built from two semi-circular sections spliced near the floor line. Each of these semi-circular sections is built in three component parts which are spliced together. The bulkheads in the tail cone are of different construction and are heavily reinforced. See figure 21.

b. The wing beams are continuous through the fuselage. The wing skin ties into the fuselage skin through attach angles on the upper and lower surfaces of the wing. At the attachments of the wing beams to the fuselage, there are three stub rings that extend between the tops of the front, 30 percent, and 70 percent spars to the intercostal support that runs lengthwise in the fuselage below the windows as shown in figure 20. These stub rings transfer the wing beam loads into the fuselage.

CAUTION

ALL THE 24SO MATERIAL MUST BE HEAT TREATED.

2. SKIN.

a. GENERAL.—The fuselage skin is supported by bulkheads and longitudinal stringers. All of the skin panels are formed from 24ST alclad sheet and for their repair, the same or heavier skin gage must be used. Figure 22 and table 28 show the various panel gages and the riveting at all skin splices. No attempt is made to maintain flush surfaces though provisions are given to effect flush repairs. Rivets used in the repair should be of the same type as those used in the surrounding region. However, provisions are given for the use of Cherry blind rivets; reference section I, paragraph 10 *g*.

b. NEGLIGIBLE DAMAGE.

(1) Skin dents free from cracks, abrasions and sharp corners may be neglected. These dents should be bumped out wherever possible to prevent their developing into cracks. Care must be taken to have the skin well backed up and not to stretch or crack the skin while this is being accomplished. Otherwise, it will be necessary to reinforce the skin with a patch of the same gage. (See paragraph 2 *c*. below). Inspect the rivets near the damage to see that they have not been loosened or sheared.

(2) Holes and cracks in skin of .051 or smaller gage which when cleaned up can be circumscribed by a circle whose diameter is 1.25 inches or less may be considered negligible providing it is at least 3.0 inches from the nearest skin splice. Two such holes within 10 inches of each other cannot be neglected. In all cases the holes must be cleaned up and cracks should be stopped by drilling 1/8 inch diameter holes at the ends.

c. DAMAGE REPAIRABLE BY PATCHING.—Damage not considered negligible may be patched as follows:

(1) Cut away the damaged area in the form of a rectangular hole, maintaining a .5 inch or greater radius in each corner. Cut it so that its longitudinal sides are parallel to the stringers and its vertical sides are parallel to the bulkheads.

(2) Refer to figures 20 and 22 to determine the location and the gage of the damaged skin.

(3) The skin is patched with a 24ST alclad sheet of the same gage as the damaged section. Its longitudinal sides are attached with the same rivet pattern as the nearest parallel longitudinal splice; its vertical sides are attached with the same rivet pattern as the nearest vertical skin splice. The types of rivets and rivet patterns can be determined from table 28.

(*a*) Figure 24-a shows the application of the above procedure to a specific skin repair.

(*b*) Figure 24-b shows the method of making a flush skin patch.

(4) It should also be noted that the general repair given in section IX and figure 229 may be satisfactorily used for skin patching.

d. DAMAGE REPAIRABLE BY INSERTION.—When effecting an extensive repair to the skin necessitating the insertion of a new panel, the fuselage in the vicinity of the damage must be so supported that the removal of the skin will not strain the adjoining structure. When removing the necessary rivets, take care not to elongate the rivet holes, see section I, paragraph 10 *d*.

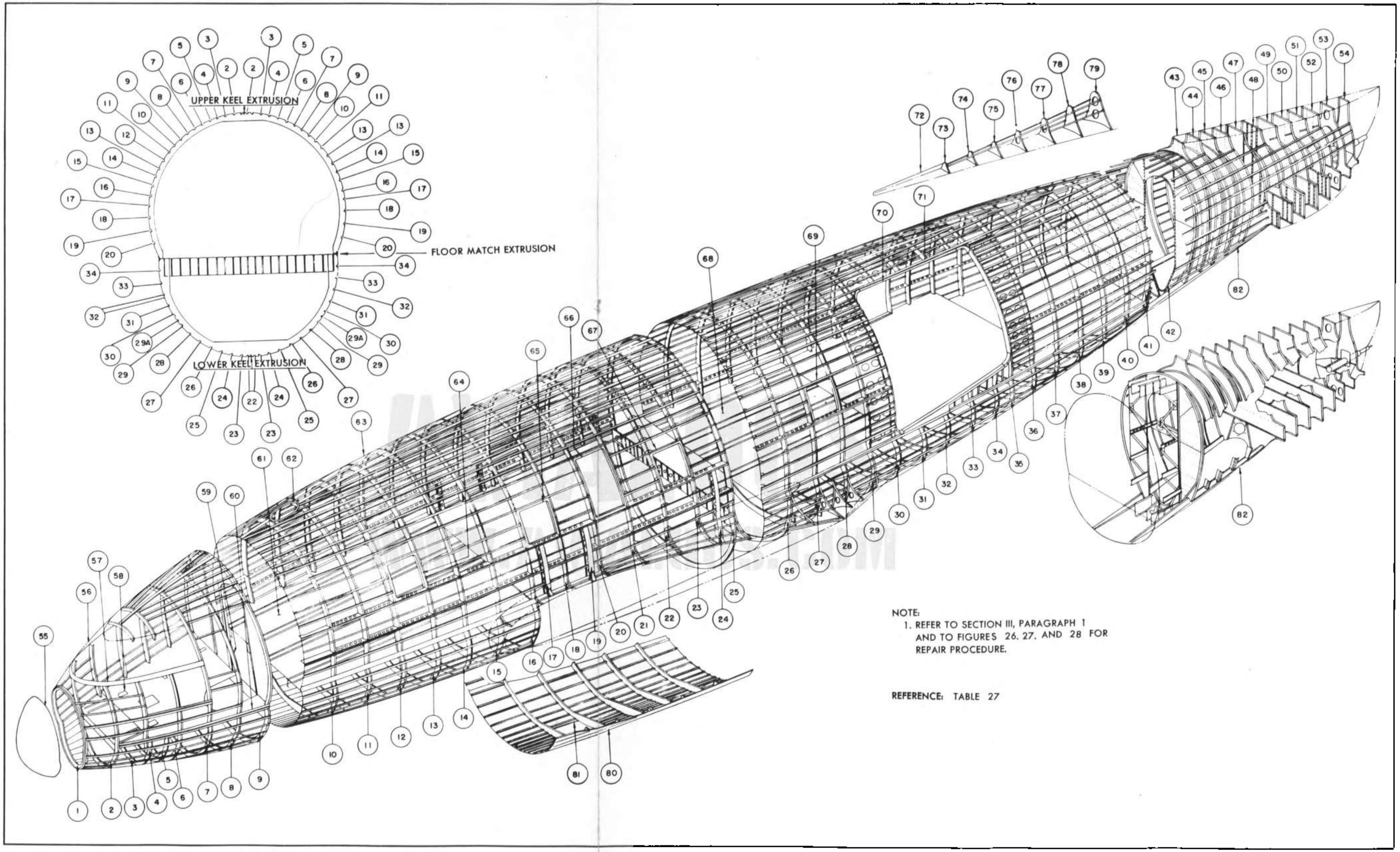
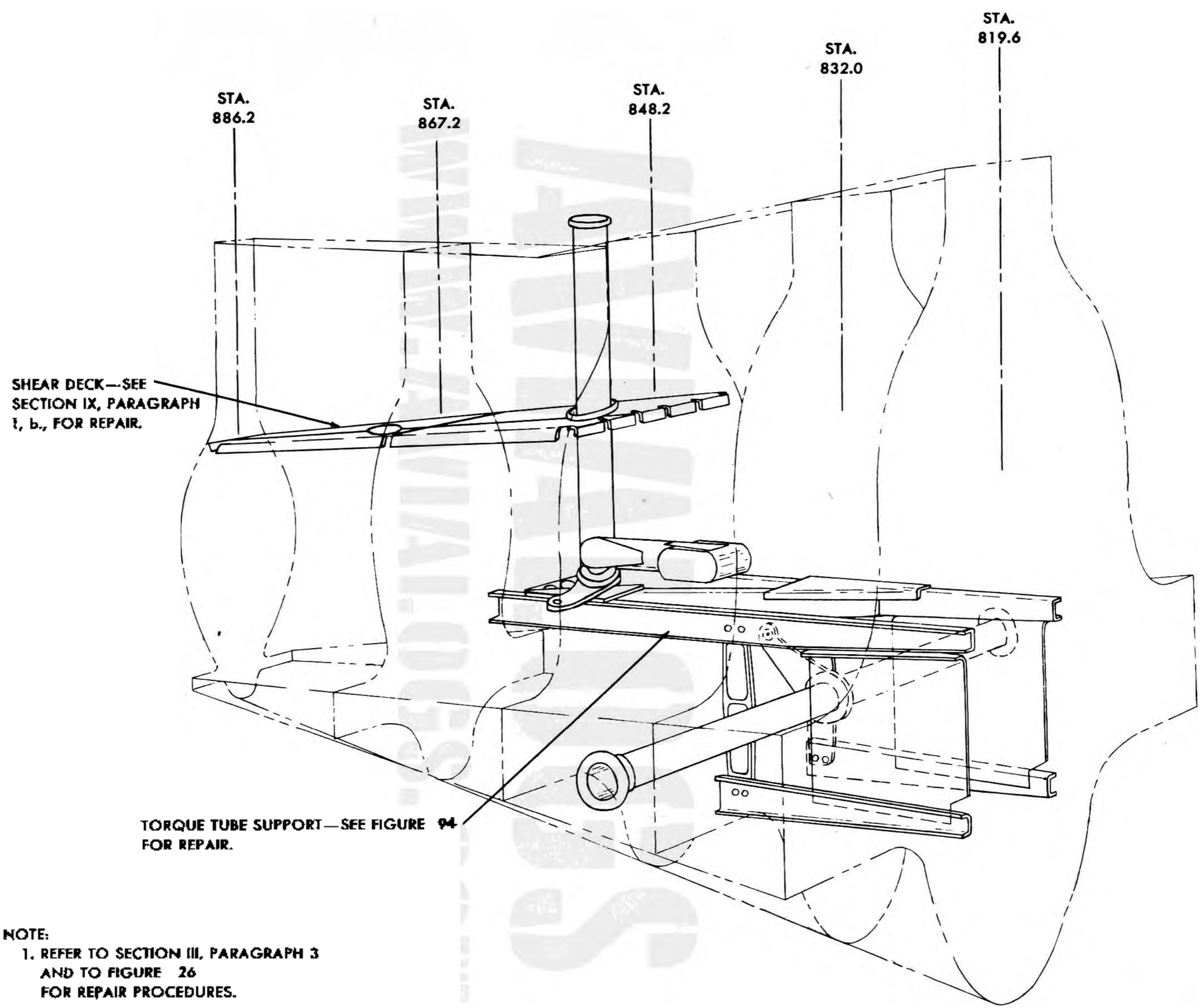


FIGURE 20 — FUSELAGE STRUCTURE

TABLE 27—COMPONENT PARTS OF FUSELAGE

Item	Designation	Sta. No.	Part No.
1.	Bulkhead	16.0	20-210-1060
2.	Bulkhead	34.5	20-210-1061
3.	Bulkhead	50.50	20-210-1062
4.	Bulkhead	53.75	20-210-1063
5.	Bulkhead	60.5	20-210-1073
6.	Bulkhead	70.70	20-210-1082
7.	Bulkhead	88.5	*20-210-1089, -1066
8.	Bulkhead	107.0	20-210-1091
9.	Bulkhead	128.0	20-210-1092
10.	Bulkhead	150.75	20-210-1065
11.	Bulkhead	173.5	20-210-1071
12.	Bulkhead	194.0	20-210-1090
13.	Bulkhead	214.5	20-210-1113
14.	Bulkhead	235.0	20-210-1086
15.	Bulkhead	255.5	20-210-1111
16.	Bulkhead	276.0	20-210-1117
17.	Stub Ring	285	20-210-1140
18.	Bulkhead	296.5	*20-210-1139, -1164
19.	Stub Ring	312.0	20-210-1222
20.	Bulkhead	317.0	*20-210-1125, -1165
21.	Bulkhead	337.5	*20-210-1126, -1166
22.	Bulkhead	358.0	*20-210-1127, -1167
23.	Bulkhead	378.5	*20-210-1128, -1168
24.	Stub Ring	392.2	20-210-1141
25.	Bulkhead	399.0	20-210-1123
26.	Bulkhead	419.5	20-210-1114
27.	Bulkhead	440.0	20-210-1112
28.	Bulkhead	460.5	*20-210-1116, -3043
29.	Bulkhead	481.0	*20-210-1115, -3044
30.	Bulkhead	501.5	*20-210-1129, -3045
31.	Bulkhead	522.0	*20-210-1130, -3046
32.	Bulkhead	542.5	*20-210-1131, -3047
33.	Bulkhead	563.0	*20-210-1132, -3048
34.	Bulkhead	583.5	*20-210-1133, -3049
35.	Bulkhead	597.0	*20-210-1134, -3054
36.	Bulkhead	615.0	*20-210-1135, -3055
37.	Bulkhead	633.0	20-210-1118
38.	Bulkhead	651.0	20-210-1119
39.	Bulkhead	664.5	20-210-1120
40.	Bulkhead	688.5	20-210-1127
41.	Bulkhead	704.0	20-210-1136
42.	Bulkhead	720.0	20-210-1022
43.	Bulkhead	734.73	20-210-1023
44.	Bulkhead	746.5	20-210-1024
45.	Bulkhead	758.22	20-210-1025
46.	Bulkhead	770.5	20-210-1026
47.	Bulkhead	782.88	20-210-1027
48.	Bulkhead	795.0	20-210-1028
49.	Bulkhead	807.06	20-210-1029
50.	Bulkhead	819.6	20-210-1030
51.	Bulkhead	832.0	20-210-1031
52.	Bulkhead	848.2	20-210-1032
53.	Bulkhead	867.2	20-210-1033
54.	Bulkhead	886.2	20-210-1034
55.	Nose Section	0-16.0	20-210-1157
56.	Nose Section Frame Assem.	0-128.0	20-210-1006
57.	Windshield Assem.	16.0-88.5	20-250-1000
58.	Floor Assem.		20-260-1000
59.	Door Frame.	107-128	20-210-1095
60.	Pilot's Door	107-128	20-210-1054
61.	Fwd. Floor Assem.	128-150.75	20-260-1001
62.	Navigation Dome Frame Assem.	150.75-173.5	20-682-3014
63.	Center Section	128-720	20-210-1101
64.	Window Instal.	194-214.5	20-210-1110
65.	Window Instal.	276-296.5	20-210-1110
66.	Emergency Door	317-337.5	20-210-1500-2
67.	Window Instal.	358-378.5	20-210-1110
68.	Center Floor Assem.	399-615	20-260-1003
69.	Window Instal.	440-460.5	20-210-1110
70.	Main Cargo Door	508.75-590.5	20-210-1400
71.	Cargo Door Frame	508.75-590.5	20-210-1085
72.	Fin Assem. Dorsal	583.5-704	20-150-1002
73.	Dorsal Bulkhead	597	20-150-1012-9
74.	Dorsal Bulkhead	615	20-150-1012-8
75.	Dorsal Bulkhead	633	20-150-1012-7
76.	Dorsal Bulkhead	651	20-150-1012-6
77.	Dorsal Bulkhead	669.50	20-150-1012-5
78.	Dorsal Bulkhead	668.50	20-150-1012-4
79.	Dorsal Bulkhead	704	20-150-1012-2
80.	Frame Assem. Fus. Underwing	276-399	20-210-1201
81.	Accessory Door	296.5-317	
82.	Tail Sec. Frame Assembly	Bet. 704 and 886.2	20-210-1301

*Apply to Airplanes No. AF41-5159 to AF41-5183 only. The Dash Number Following Applies to Succeeding Airplanes.



NOTE:
1. REFER TO SECTION III, PARAGRAPH 3 AND TO FIGURE 26 FOR REPAIR PROCEDURES.

REFERENCE: SECTION VI, PARAGRAPH 3

FIGURE 21 — TAIL CONE STRUCTURE

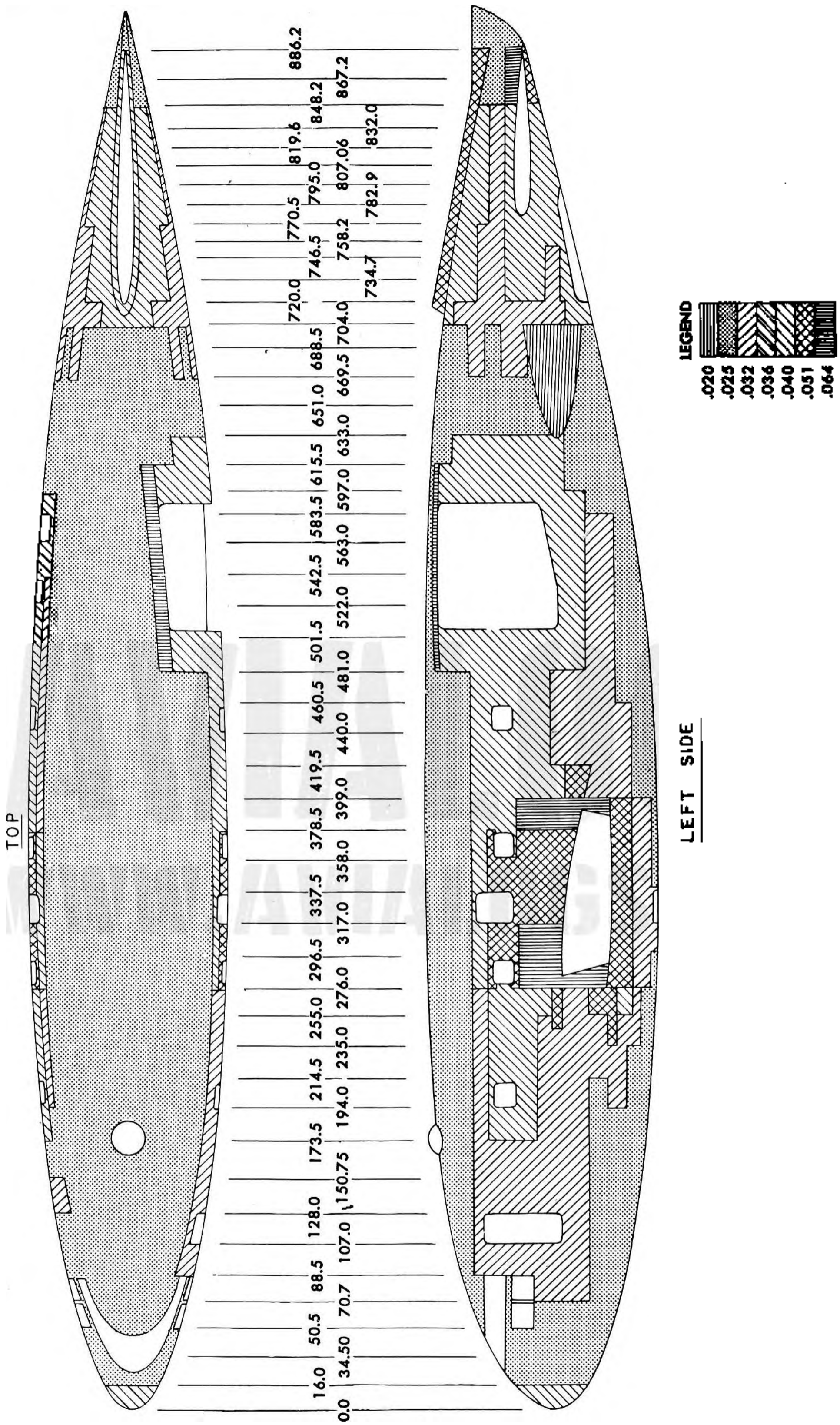
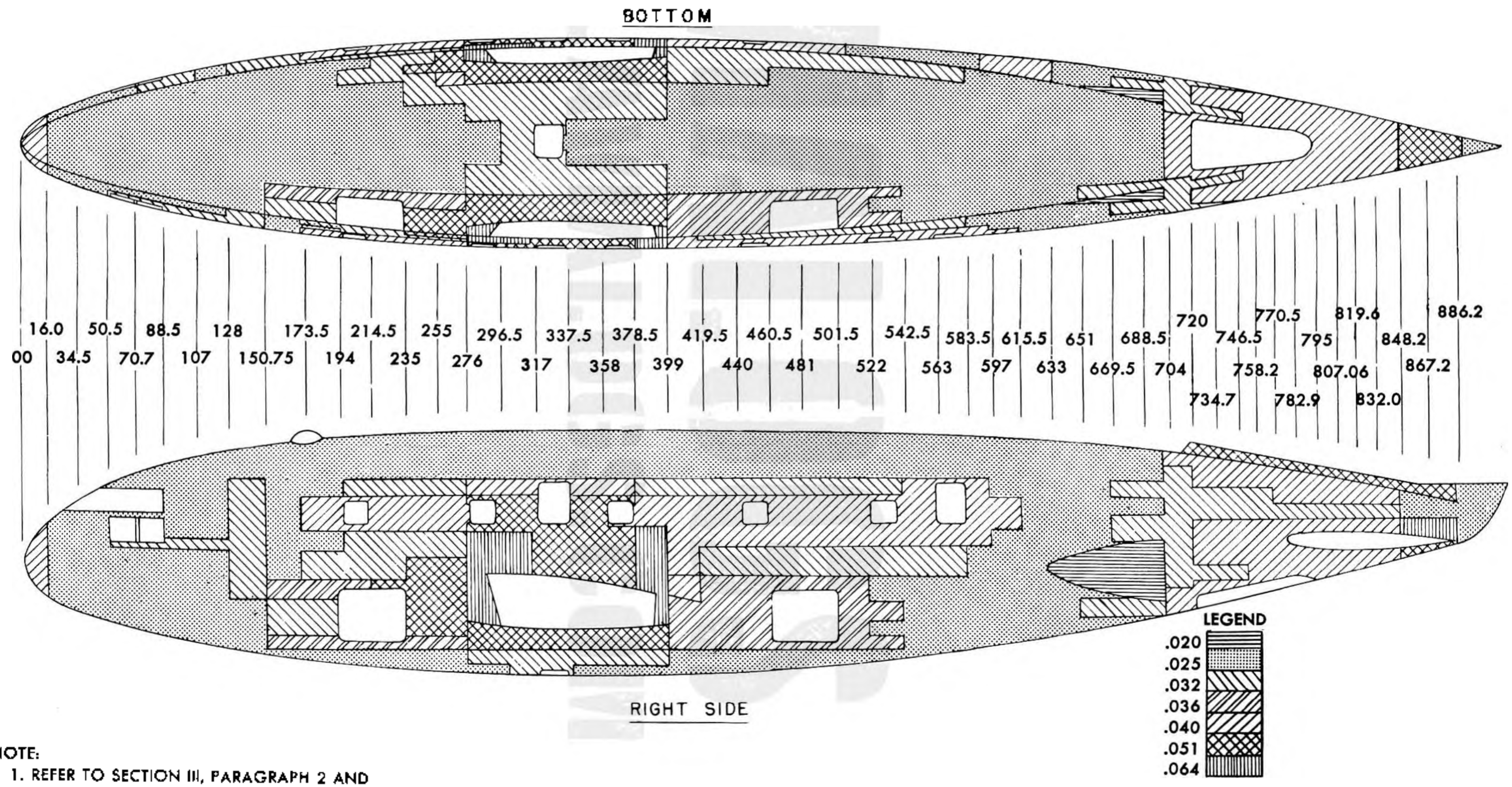
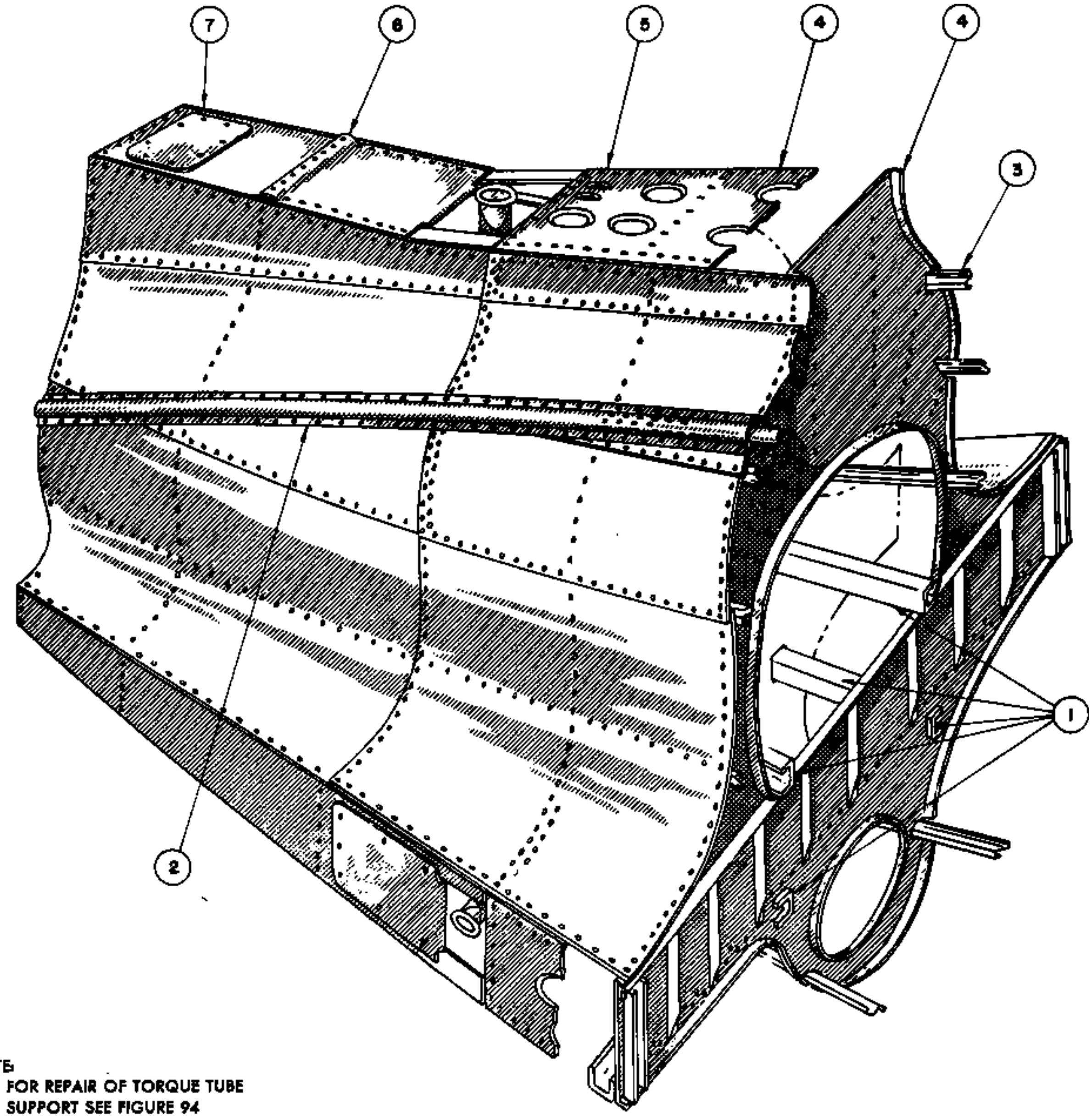


FIGURE 22—FUSELAGE SKIN DIAGRAM SHEET 1 OF 2



NOTE:
1. REFER TO SECTION III, PARAGRAPH 2 AND TO FIGURE 24 FOR SKIN REPAIR PROCEDURE.

FIGURE 22—FUSELAGE SKIN DIAGRAM SHEET 2 OF 2



NOTE:
1. FOR REPAIR OF TORQUE TUBE SUPPORT SEE FIGURE 94
2. FOR REPAIR TO HAT SECTION REINFORCEMENT SEE FIGURE 93
3. FOR REPAIR TO ZEE STRINGERS SEE FIGURE 25
4. STATION 819.6 AND STATION 832.0, SEE FIGURE 58
5. STATION 848.2—SEE FIGURE 59
6. STATION 867.2—SEE FIGURE 60
7. STATION 886.2—SEE FIGURE 61

REFERENCE: SECTION III, PARAGRAPH 4 a

FIGURE 23—TAIL CONE SKIN

TABLE 28

FUSELAGE SKIN PANELS AND SKIN SPLICES

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
Top Keel	Sta. 128-Sta. 317	1.02	2.04	.025	.025	2	.38	.62	1.25	AN426-AD4
	Sta. 317-Sta. 720	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
4 L	Sta. 481-Sta. 501.5	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 501.5-Sta. 563	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
5 L/R	Sta. 150.75-Sta. 317	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 317-Sta. 378.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 481	.64	1.28	.025	.025	1		.62		671-D-4AD
5 R	Sta. 481-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
6 L	Sta. 481-Sta. 615	1.25	2.50	.040	.064	2	.61	.62	.62	671-D-4AD
8 L/R	Sta. 107-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 150.75-Sta. 317	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 317-Sta. 378.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 460	.64	1.28	.025	.025	1		.62		671-D-4AD
8 L	Sta. 460-Sta. 481	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.064	.040	2	.61	.62	.62	671-D-4AD
	Sta. 597-Sta. 615	1.25	2.50	.064	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
8 R	Sta. 460-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
9 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
10 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 150.75-Sta. 317	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 317-Sta. 337.5	.64	1.28	.025	.025	1		.62		671-D-4AD
10 R	Sta. 460.5-Sta. 563	.64	1.28	.025	.025	1		.62		671-D-4AD

TABLE 28 (Continued)

FUSELAGE SKIN PANELS AND SKIN SPLICES

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longi-tudinal Overlap W_v See Fig. 24*	*Width of Longi-tudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longi-tudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
11 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 633-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 720-Sta. 746.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
11 L	Sta. 590-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
11 R	Sta. 563-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
12 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.040	1		.62		AN426-AD4
	Sta. 128-Sta. 276	.64	1.28	.025	.032	1		.62		AN426-AD4
	Sta. 276-Sta. 317	1.25	2.50	.025	.040	2	.61	.62	1.25	AN426-AD4
	Sta. 317-Sta. 378.5	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 378.5-Sta. 399	.64	1.28	.025	.040	1		.62		671-D-4AD
	Sta. 399-Sta. 460.5	.64	1.28	.025	.032	1		.62		671-D-4AD
12 L	Sta. 460.5-Sta. 481	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
12 R	Sta. 460.5-Sta. 542.5	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 542.5-Sta. 597	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
13 L/R	Sta. 720-Sta. 807.06	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
13 L	Sta. 590-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 633-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
13 R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 597-Sta. 669	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669-Sta. 704	.64	1.28	.025	.032	1		.62		671-D-4AD

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap* W_v *See Fig. 24*	*Width of Longitudinal Frame For Flush Patch* $2W_h$ *See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
14 L/R	Sta. 88.5-Sta. 128	.64	1.28	.032	.032	1		.62		AN426-AD4
	Sta. 150.75-Sta. 173	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 173-Sta. 276	1.25	2.50	.032	.040	2	.61	.62	1.25	AN426-AD4
	Sta. 276-Sta. 317	1.25	2.50	.040	.051	2	.61	.62	.62	AN426-AD4
	Sta. 337.5-Sta. 387.5	1.25	2.50	.040	.051	2	.61	.62	.62	671-D-4AD
	Sta. 339-Sta. 481	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
14 L	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
14 R	Sta. 481-Sta. 542.5	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 542.5-Sta. 563	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 583.5-Sta. 597	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
15 L/R	Sta. 720-Sta. 746.5	1.25	2.50	.032	.032	2	.61	.62	.62	671-D-4AD
	Sta. 746.5-Sta. 770.5	1.25	2.50	.032	.040	2	.61	.62	.62	671-D-4AD
	Sta. 770.5-Sta. 782	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 782-Sta. 848	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
15 L	Sta. 590-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 633-Sta. 669	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669-Sta. 704	.64	1.28	.032	.025	1		.62		671-D-4AD
15 R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 583.5-Sta. 597	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 597-Sta. 615	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 615-Sta. 669	1.25	2.50	.025	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 669-Sta. 704	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
15a L/R	Sta. 296.5-Sta. 317	1.25	2.50	.051	.051	2	.59	.62	1.25	AN426-AD5
	Sta. 337.5-Sta. 358	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-5AD
	Sta. 399-Sta. 440	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 460.5-Sta. 522	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
15a R	Sta. 542-Sta. 563	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
16 L/R	Sta. 173.5-Sta. 194	1.25	2.50	.040	.040	2	.61	.62	.62	AN426-AD4
	Sta. 214.5-Sta. 276	1.25	2.50	.040	.040	2	.61	.62	.62	AN426-AD4
	Sta. 720-Sta. 746	1.25	2.50	.032	.040	2	.61	.62	.62	671-D-4AD
	Sta. 746-Sta. 782	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 782-Sta. 848	1.25	2.50	.032	.040	2	.61	.62	.62	671-D-4AD
	Sta. 848-Sta. 886	1.25	2.50	.025	.064	2	.61	.62	.62	671-D-4AD
16 R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
17 L/R	Sta. 16-Sta. 50.5	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 276-Sta. 317	1.60	3.20	.051	.064	2	.82	.62	.62	AN426-AD5
	Sta. 317-Sta. 378.5	1.60	3.20	.051	.051	2	.82	.62	.62	671-D-5AD
	Sta. 378.5-Sta. 399	1.60	3.20	.040	.064	2	.82	.62	.62	671-D-5AD
	Sta. 399-Sta. 522	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 633-Sta. 669	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669-Sta. 704	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
17 L	Sta. 590-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.040	.025	2	.61	.62	.62	671-D-4AD
17 R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 522-Sta. 597	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 597-Sta. 615	1.25	2.50	.040	.025	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
18 L/R	Sta. 16-Sta. 50.5	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 88.5-Sta. 107	.64	1.28	.032	.032	1		.62		AN426-AD4
	Sta. 128-Sta. 150	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 720-Sta. 782	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
18 L	Sta. 150.75-Sta. 173	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 173-Sta. 255	1.25	2.50	.040	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 255-Sta. 276	1.25	2.50	.040	.040	2	.61	.62	.62	AN426-AD4
18 R	Sta. 107-Sta. 128	.64	1.28	.025	.032	1		.62		AN426-AD4
	Sta. 150-Sta. 173	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 173-Sta. 194	1.25	2.50	.040	.025	2	.61	.62	1.25	AN426-AD4
	Sta. 194-Sta. 276	1.25	2.50	.040	.032	2	.61	.62	1.25	AN426-AD4
19 L/R	Sta. 16-Sta. 88.5	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 317-Sta. 378	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-5AD
	Sta. 399-Sta. 419	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 419-Sta. 481	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
19 L	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 590-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 633-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
19 R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 481-Sta. 597	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 597-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
20 L/R	Sta. 16-Sta. 70.7	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 720-Sta. 758	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
	Sta. 758-Sta. 848	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
20 L	Sta. 150.75-Sta. 235	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 235-Sta. 255.5	1.25	2.50	.032	.051	2	.61	.62	1.25	AN426-AD4
	Sta. 255.5-Sta. 276	1.25	2.50	.040	.051	2	.61	.62	.62	AN426-AD4
	Sta. 70.7-Sta. 107	.64	1.28	.032	.032	1		.62		AN426-AD4
	Sta. 633-Sta. 669	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.032	.025	1		.62		671-D-4AD
20 R	Sta. 150.75-Sta. 194	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 194-Sta. 235	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 235-Sta. 276	1.25	2.50	.032	.051	2	.61	.62	1.25	AN426-AD4
	Sta. 669-Sta. 704	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD
34 L/R	Sta. 16-Sta. 88.5	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 704-Sta. 720	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
35 L/R	Sta. 720-Sta. 758	1.25	2.50	.032	.040	2	.61	.62	.62	671-D-4AD
33 L/R	Sta. 16-Sta. 88.5	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 128-Sta. 150.75	.64	1.28	.032	.040	1		.62		AN426-AD4
33 L	Sta. 88.5-Sta. 128	.64	1.28	.032	.025	1		.62		AN426-AD4
	Sta. 150.75-Sta. 214	.64	1.28	.032	.025	1		.62		AN426-AD4
	Sta. 214-Sta. 235	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 235-Sta. 255.5	1.25	2.50	.051	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 255.5-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 419-Sta. 481	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 583.5	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 583.5-Sta. 597	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 597-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
33R	Sta. 150.75-Sta. 194	1.25	2.50	.036	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 235-Sta. 242	1.25	2.50	.051	.051	2	.59	.62	1.25	AN426-AD5
	Sta. 242-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-5AD
	Sta. 419-Sta. 460.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 522	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 522-Sta. 542.5	.64	1.28	.025	.036	1		.62		671-D-4AD
	Sta. 542.5-Sta. 651	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 651-Sta. 688.5	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.025	.040	1		.62		671-D-4AD
32 L/R	Sta. 16-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
31 L/R	Sta. 16-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
31 L	Sta. 150.75-Sta. 214.5	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 214.5-Sta. 255.5	1.25	2.50	.032	.051	2	.61	.62	1.25	AN426-AD4
	Sta. 255.5-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-5AD
	Sta. 419-Sta. 460.5	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 460.5-Sta. 583.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 583.5-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
31 R	Sta. 150.5-Sta. 194	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 235-Sta. 255	1.25	2.50	.051	.051	2	.61	.62	1.25	AN426-AD5
	Sta. 255.5-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-5AD
	Sta. 419.5-Sta. 460.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 522	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 522-Sta. 542.5	.64	1.28	.036	.025	1		.62		671-D-4AD
	Sta. 542.5-Sta. 651	.64	1.28	.025	.025	1		.62		671-D-4AD

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
	Sta. 651-Sta. 688.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.040	.025	1		.62		671-D-4AD
30 L/R	Sta. 34.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
30 L	Sta. 235-Sta. 255	1.25	2.50	.051	.032	2	.61	.62	.62	AN426-AD4
	Sta. 255-Sta. 276	1.25	2.50	.051	.040	2	.61	.62	.62	AN426-AD4
29 L/R	Sta. 53.75-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
29 L	Sta. 150.75-Sta. 194	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 194-Sta. 235	.64	1.28	.032	.025	1		.62		AN426-AD4
	Sta. 399-Sta. 419.5	1.25	2.50	.051	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 440	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 440-Sta. 460	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 460-Sta. 669	.64	1.28	.025	.025	1		.62		671-D-4AD
29 R	Sta. 150.75-Sta. 194	1.25	2.50	.032	.036	2	.61	.62	1.25	AN426-AD4
	Sta. 235-Sta. 276	1.25	2.50	.051	.036	2	.61	.62	.62	AN426-AD4
	Sta. 399-Sta. 419.5	1.25	2.50	.051	.036	2	.61	.62	.62	671-D-4AD
	Sta. 419.5-Sta. 469.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 522	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 522-Sta. 542.5	.64	1.28	.025	.036	1		.62		671-D-4AD
	Sta. 542.5-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
28 L/R	Sta. 60.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 276-Sta. 399	1.25	2.50	.051	.032	2	.61	.62	1.25	AN426-AD4
28 L	Sta. 235-Sta. 255	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
	Sta. 255-Sta. 276	1.25	2.50	.040	.032	2	.61	.62	1.25	AN426-AD4
27 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		AN426-AD4

TABLE 28 (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
27 L	Sta. 235-Sta. 276	.64	1.28	.032	.025	1		.62		AN426-AD4
	Sta. 339-Sta. 440	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 440-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 150.75-Sta. 235	.64	1.28	.025	.025	1		.62		AN426-AD4
27 R	Sta. 150.75-Sta. 276	.64	1.28	.036	.025	1		.62		AN426-AD4
	Sta. 399-Sta. 542	.64	1.28	.036	.025	1		.62		671-D-4AD
	Sta. 542-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
26 L/R	Sta. 276-Sta. 399	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
25 L/R	Sta. 150.75-Sta. 276	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 399-Sta. 583.5	.64	1.28	.025	.025	1		.62		671-D-4AD
24 L/R	Sta. 276-Sta. 399	.64	1.28	.032	.025	1		.62		AN426-AD4
23 L/R	Sta. 214.5-Sta. 276	.64	1.28	.025	.025	1		.62		AN426-AD4
	Sta. 399-Sta. 501	.64	1.28	.025	.025	1		.62		671-D-4AD
Bottom-Keel	Sta. 128-Sta. 150.75	1.02	2.04	.025	.025	2	.38	.62	1.25	AN426-AD4
	Sta. 150.75-Sta. 276	1.02	2.04	.025	.025	2	.38	.62	1.25	AN426-AD4
	Sta. 276-Sta. 296	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 296-Sta. 317	1.02	2.04	.032	.032	2	.38	.62	1.25	671-D-4AD
	Sta. 337-Sta. 358	1.02	2.04	.032	.032	2	.38	.62	1.25	671-D-4AD
	Sta. 358-Sta. 704	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD

TABLE 28 (CONTINUED)
FUSELAGE SKIN PANELS AND SKIN SPLICES

B. VERTICAL SKIN SPLICES

Bulk-head Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
16	Between All Str.	.75	1.50	.040	.025	1		.62		AN426-AD4
50.5L/R	Str. 16-Str. 19	.75	1.50	.025		1		.62		AN426-AD4
70.7L/R	Str. 30-Str. 33	.62	1.25	.025	.025	1		.62		AN426-AD4
	Str. 19-Floor-Line	.62	1.25	.025	.025	1		.62		AN426-AD4
88.5	Str. 28-Str. 30	.65	1.30	.025	.025	1		.62		AN426-AD4
	Str. 33-Floor-Line	.65	1.30	.025	.032	1		.62		AN426-AD4
	Str. 13L-Str. 19L	.65	1.30		.032	1		.62		AN426-AD4
	Str. 1-Str. 13	.65	1.30		.025	1		.62		AN426-AD4
	Str. 13R-Str. 19R	.65	1.30		.025	1		.62		AN426-AD4
107	Str. 14R-Floor-Line	.65	1.30	.032		1		.62		AN426-AD4
128	Str. 1-Str. 12	1.25	2.50	.025	.025	2	.61	.62	1.25	AN426-AD4
	Str. 33-Bottom Keel	1.25	2.50	.025	.025	2	.61	.62	1.25	AN426-AD4
	Str. 12R-Str. 33R	1.25	2.50	.025	.032	2	.61	.62	1.25	AN426-AD4
	Str. 12L-Str. 33L	1.25	2.50	.032	.032	2	.61	.62	1.25	AN426-AD4
150.75	Top Keel-Str. 12	1.38	2.76	.025	.025	2	.63	.62	1.25	AN426-AD4
	Str. 27-Bottom Keel	1.38	2.76	.025	.025	2	.63	.62	1.25	AN426-AD4
	Str. 12L-Str. 33L	1.38	2.76	.032	.032	2	.63	.62	1.25	AN426-AD4
	Str. 27L-Str. 33L	1.38	2.76	.025	.025	2	.63	.62	1.25	AN426-AD4
	Str. 27R-Str. 29R	1.38	2.76	.025	.036	2	.63	.62	1.25	AN426-AD4
	Str. 29R-Str. 33R	1.38	2.76	.025	.032	2	.63	.62	1.25	AN426-AD4
	Str. 33R-Floor-Line	1.38	2.76	.025	.036	2	.63	.62	1.25	AN426-AD4
	Str. 12R-Floor-Line	1.38	2.76	.025	.025	2	.63	.62	1.25	AN426-AD4
173.5	Str. 20R-Floor-Line	1.38	2.76	.025	.032	2	.74	.62	1.88	AN426-AD4
194.0	Str. 29L-Str. 31L	1.38	2.76	.025	.032	2	.74	.62	1.25	AN426-AD4
	Str. 29R-Str. 33R	.64	1.28	.032		1		.62		AN426-AD4
	Str. 25R-Str. 27R	1.38	2.76	.025	.025	2	.74	.62	1.25	AN426-AD4

TABLE 28 (CONTINUED)
FUSELAGE SKIN PANELS AND SKIN SPLICES
B. VERTICAL SKIN SPLICES

Bulkhead Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulkhead*	*Gage of Skin Aft of Bulkhead*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
214.5	Str. 5-Str. 8	1.38	2.76	.025	.025	2	.74	.62	1.88	AN426-AD4
	Str. 25-Bottom-Keel	1.38	2.76	.025	.025	2	.74	.62	1.88	AN426-AD4
	Str. 31L-Str. 33L	1.38	2.76	.025	.032	2	.74	.62	1.88	AN426-AD4
	Str. 12L-Str. 14L			.032	.032					AN426-AD4
	Str. 34R-Floor-Line	1.38	2.76	.036	.051	2	.74	.62	.62	AN426-AD4
	Str. 27R-Str. 29R	1.38	2.76	.036	.036	2	.74	.62	.62	AN426-AD4
235.0	Str. 8-Str. 12	1.38	2.76	.025	.025	2	.74	.62	1.88	AN426-AD4
	Str. 20-Floor-Line			.032	.051					AN426-AD4
	Str. 33L-Floor-Line	1.38	2.76	.032	.051	2	.74	.62	.62	AN426-AD4
	Str. 27L-Str. 29L	1.38	2.76	.025	.032	2	.74	.62	.62	AN426-AD4
	Str. 29L-Str. 30L	1.38	2.76	.032	.032	2	.74	.62	.62	AN426-AD4
	Str. 30L-Str. 31L	1.38	2.76	.032	.051	2	.74	.62	.62	AN426-AD4
255.5	Str. 5-Top Keel	1.38	2.76	.025	.025	2	.74	.62	1.88	AN426-AD4
	Str. 27L-Str. 30L	1.38	2.76	.032	.040	2	.74	.62	.62	AN426-AD4
	Str. 31L-Str. 33L	1.38	2.76	.032	.051	2	.74	.62	.62	671-D-4AD
296.5	Str. 24-Bottom Keel	1.38	2.76	.025	.032	2	.74	.62	1.25	AN426-AD4
337.5	Str. 8-Str. 12	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
358.0	Str. 24-Bottom Keel	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
378.5	Str. 24-Str. 26	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
419.5	Str. 29L-Floor-Line	1.38	2.76	.051	.032	2	.74	.62	1.25	671-D-4AD
	Str. 29R-Floor-Line	1.38	2.76	.051	.036	2	.74	.62	1.25	671-D-4AD
440.0	Str. 27L-Str. 29L	1.38	2.76	.032	.025	2	.74	.62	1.88	671-D-4AD
460.5	Str. 8L-Str. 12L	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 8R-Str. 12R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 27L-Str. 29L	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
481.0	Str. 6L-Top Keel	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 6L-Str. 8L	1.38	2.76	.025	.064	2	.74	.62	1.25	671-D-4AD

TABLE 28 (CONTINUED)
FUSELAGE SKIN PANELS AND SKIN SPLICES

B. VERTICAL SKIN SPLICES

Bulkhead Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulkhead*	*Gage of Skin Aft of Bulkhead*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
	Str. 8R-Top-Keel	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 12L-Str. 14L	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 19L-Str. 33L	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 27R-Str. 29R	1.38	2.76	.036	.036	2	.74	.62	1.25	671-D-4AD
501.5	Str. 25-Bottom Keel	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 4L-Top-Keel	1.60	3.20	.025	.040	2	.96	.62	1.25	671-D-5AD
522.0	Str. 25-Str. 27	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 29R-Str. 31R	1.38	2.76	.036	.025	2	.74	.62	1.25	671-D-4AD
542.5	Str. 27L-Str. 31L	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 5R-Top-Keel	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 27R-Str. 29R	1.38	2.76	.036	.025	2	.74	.62	1.25	671-D-4AD
563.0	Str. 6L-Top-Keel	1.38	2.76	.040	.040	2	.74	.62	1.25	671-D-4AD
	Str. 29R-Str. 31R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
583.5	Str. 27-Bottom Keel	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 5R-Str. 8R	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
597.0	Str. 33L-Floor-Line	1.75	3.50	.032	.025	2	.86	.62	.62	671-D-4AD
	Str. 33R-Floor-Line	1.75	3.50	.025	.025	2	.86	.62	.62	671-D-4AD
	Str. 17R-Str. 19R	1.75	3.50	.040	.025	2	.86	.62	.62	671-D-4AD
	Str. 11R-Str. 15R	1.75	3.50	.040	.025	2	.86	.62	1.25	671-D-4AD
615.0	Str. 6L-Top-Keel	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 6L-Str. 8L	1.38	2.76	.064	.025	2	.74	.62	1.25	671-D-4AD
	Str. 8L-Str. 11L	1.38	2.76	.040	.025	2	.74	.62	1.25	671-D-4AD
	Str. 8R-Str. 11R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 29L-Str. 31L	1.38	2.76	025	.025	2	.74	.62	1.25	671-D-4AD
633.0	Str. 29-Bottom Keel	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 11L-Str. 13L	1.38	2.76	.040	.025	2	.74	.62	1.25	671-D-4AD

TABLE 28 (CONTINUED)
FUSELAGE SKIN PANELS AND SKIN SPLICES
B. VERTICAL SKIN SPLICES

Bulk-head Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
	Str. 8R-Top-Keel	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 11R-Str. 13R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
651.0	Str. 8L-Top-Keel	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 31R-Str. 33R	1.38	2.76	.025	.032	2	.74	.62	1.25	671-D-4AD
669.5	Str. 33-Bottom Keel	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
688.5	Str. 31-Str. 33	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
704.0	Top Keel-Str. 11	1.38	2.76	.025	.040	2	.63	.62	1.25	671-D-4AD
	Str. 11-Str. 13	1.38	2.76	.025	.032	2	.63	.62	1.25	671-D-4AD
	Str. 13-Floor-Line	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Str. 33-Str. 31	.75	1.50	.040	.040	1		.62		671-D-4AD
	Str. 31-Bottom Keel	.75	1.50	.025	.040	1		.62		671-D-4AD
720.0	Top Keel-Str. 11	1.38	2.76	.040	.040	2	.74	.62	1.25	671-D-4AD
	Str. 11-Str. 13	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 13-Str. 16	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
	Str. 16-Str. 34	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 34-Bottom Keel	1.38	2.76	.040		2	.74	.62	1.25	671-D-4AD
746.5	Str. 15-Str. 16	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
758.22	Str. 16-Str. 18	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
	Str. 20-Str. 34	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
770.5	Str. 13-Str. 15	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
782.88	Str. 15-Str. 16	1.38	2.76	.040	.032	2	.74	.62	.62	671-D-4AD
	Str. 16-Str. 20	1.38	2.76	.040	.040	2	.74	.62	.62	671-D-4AD
819.6	Str. 20-Bottom Keel	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
848.2	Top Keel-Str. 16	1.38	2.76	.032	.025	2	.74	.62	.62	671-D-4AD
	Str. 16-Str. 20	1.38	2.76	.040	.064	2	.74	.62	.62	671-D-4AD
	Str. 20-Bottom Keel	1.38	2.76	.032	.051	2	.74	.62	.62	671-D-4AD
867.2	Str. 17-Bottom Keel	1.38	2.76	.051	.051	2	.74	.62	.62	671-D-4AD
886.2	Str. 16-Str. 19	1.25	2.50	.064	.025	2	.59	.62	1.25	AN426-AD4
	Str. 19-Bottom Keel	1.25	2.50	.051	.025	2	.59	.62	1.25	AN426-AD4

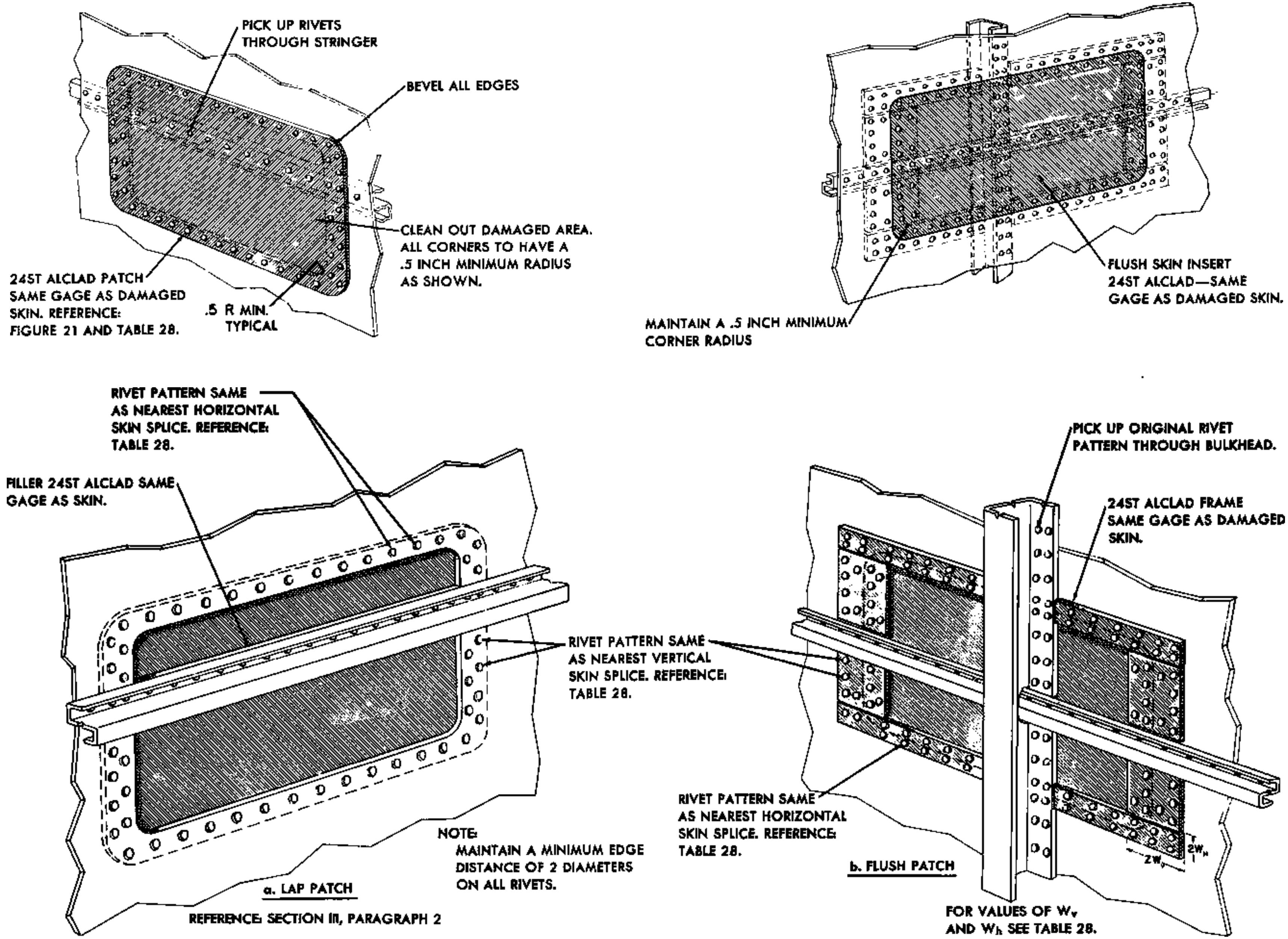
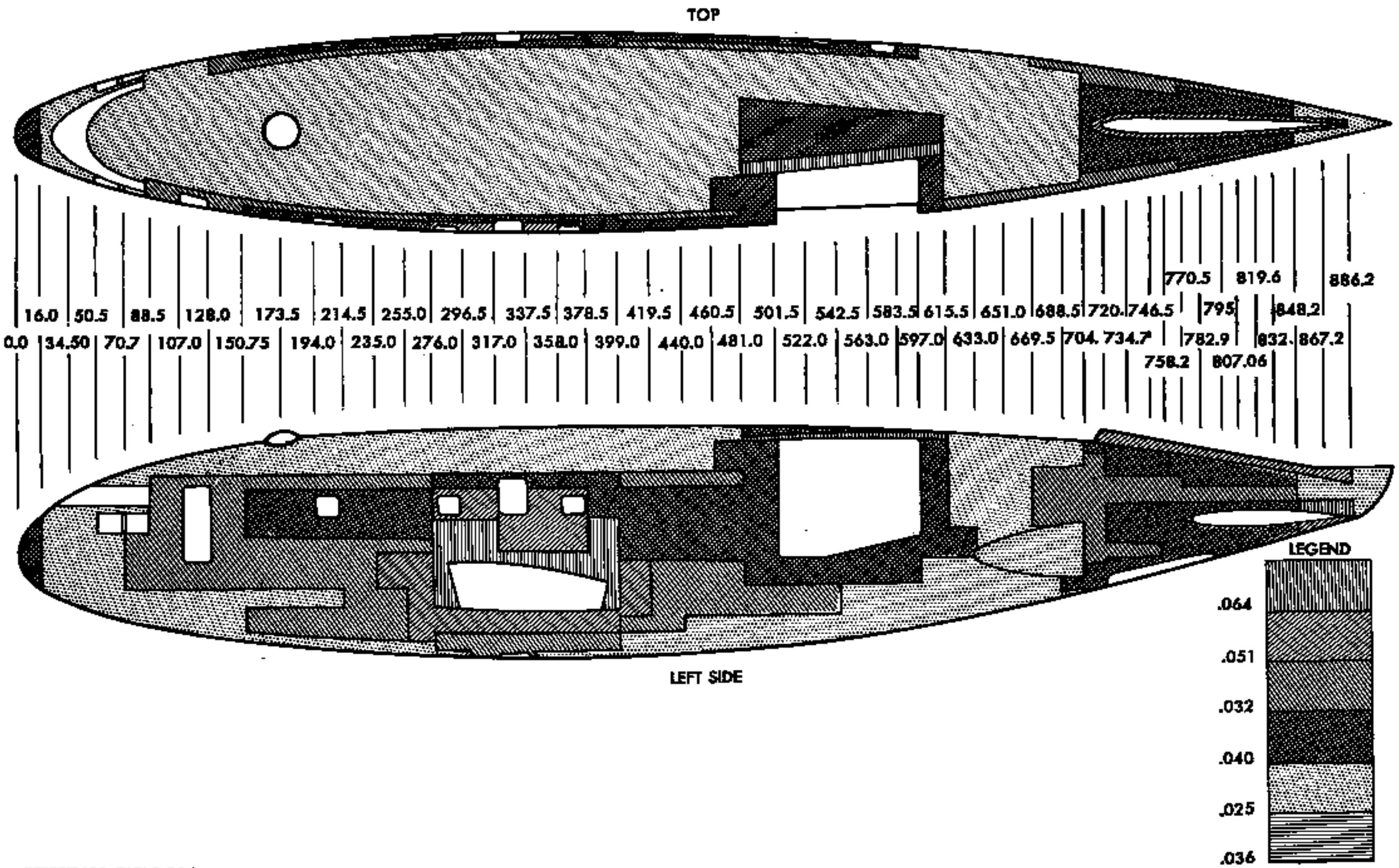
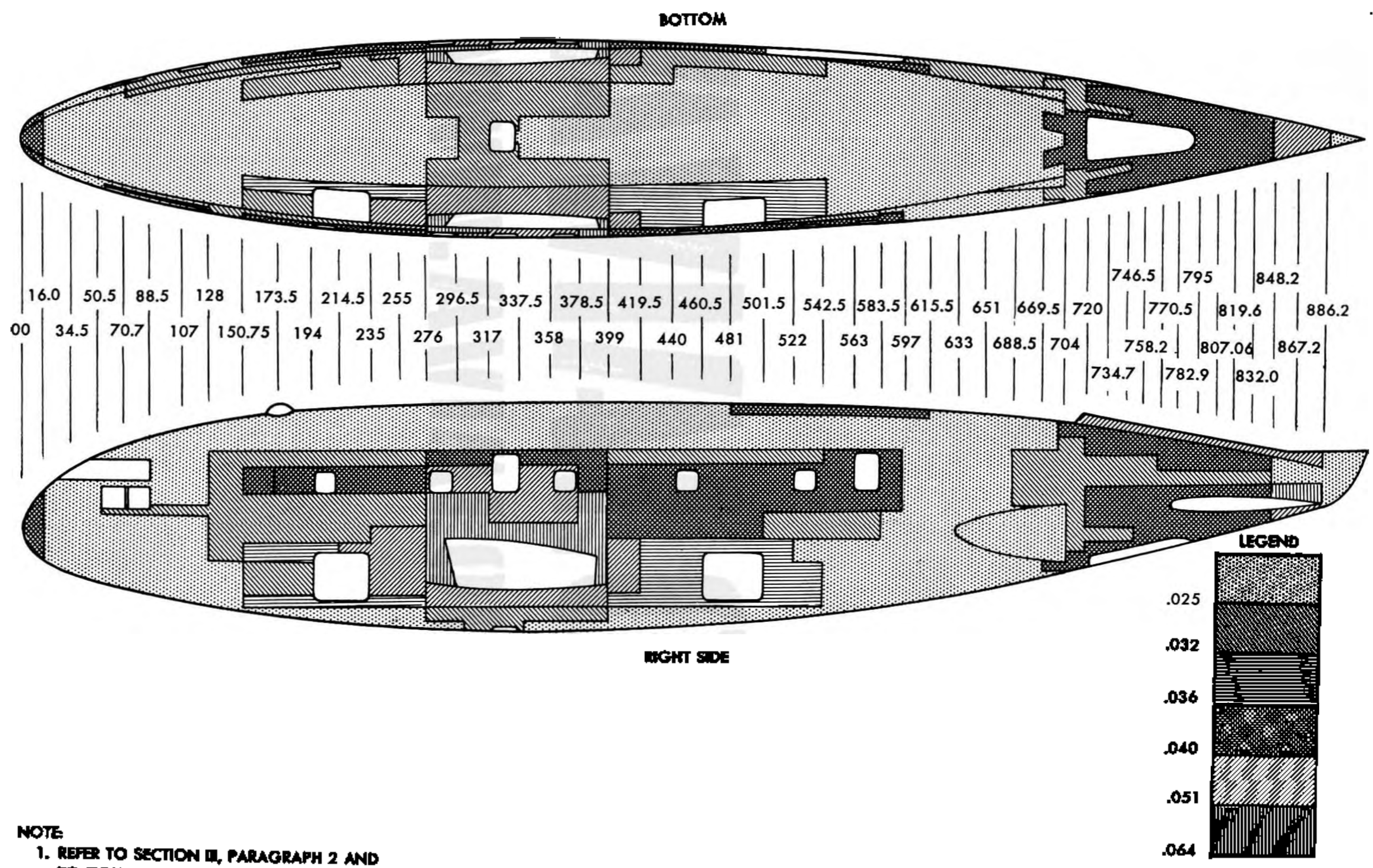


FIGURE 24—FUSELAGE SKIN REPAIR



REFERENCE: TABLE 28A

FIGURE 24A (SHEET 1 of 2 SHEETS)—FUSELAGE SKIN DIAGRAM (AIRPLANES AF42-60942 AND SUBSEQUENT)



NOTE:
1. REFER TO SECTION III, PARAGRAPH 2 AND TO FIGURE 24 FOR SKIN REPAIR PROCEDURE.

REFERENCE: TABLE 28A

FIGURE 24A (SHEET 2 of 2 SHEETS)—FUSELAGE SKIN DIAGRAM (AIRPLANES AF42-60942 AND SUBSEQUENT)

TABLE 28A
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
Top Keel	Sta. 128-Sta. 150.75	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 378.5-Sta. 399	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 704-Sta. 720	1.02	2.04	.040	.040	2	.38	.62	1.25	671-D-4AD
5 L/R	Sta. 150.75-Sta. 378.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 481	.64	1.28	.025	.025	1		.62		671-D-4AD
5 R	Sta. 481-Sta. 615	.64	1.28	.040	.025	1		.62		671-D-4AD
6 L	Sta. 481-Sta. 615	1.25	2.50	.040	.064	2	.61	.62	.62	671-D-4AD
8 L/R	Sta. 107-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 150.75-Sta. 378.5	.64	1.28	.025	.025	1		.62		671-D-4AD
8 L	Sta. 399-Sta. 460.5	1.25	2.50	.025	.025	2	.61	.62	.62	671-D-4AD
	Sta. 460.5-Sta. 481	1.25	2.50	.025	.040	2	.61	.62	.62	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.064	.040	2	.61	.62	.62	671-D-4AD
	Sta. 597-Sta. 615	1.25	2.50	.064	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
8 R	Sta. 399-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
9 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
10 L	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 150-Sta. 235	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
10 R	Sta. 460.5 Sta. 563	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
11 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 720-Sta. 746.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
11 L	Sta. 615-Sta. 704	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
11 R	Sta. 563-Sta. 704	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
12 L/R	Sta. 88.5-Sta. 128	.64	1.28	.025	.040	1		.62		671-D-4AD
	Sta. 128-Sta. 276	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 276-Sta. 317	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 317-Sta. 378.5	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 378.5-Sta. 399	.64	1.28	.025	.040	1		.62		671-D-4AD
	Sta. 399-Sta. 460.5	.64	1.28	.025	.032	1		.62		671-D-4AD
12 L	Sta. 460.5-Sta. 481	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
12 R	Sta. 460-Sta. 542.5	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 542.5-Sta. 597	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
13 L/R	Sta. 720-Sta. 807.06	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
13 L	Sta. 597-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 669.5	1.25	2.50	.025	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.025	.032	1		.62		671-D-4AD
13 R	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 597-Sta. 669	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669-Sta. 704	.64	1.28	.025	.032	1		.62		671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longi-tudinal Overlap W_v See Fig. 24*	*Width of Longi-tudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longi-tudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
14 L/R	Sta. 88.5-Sta. 128	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 150.75-Sta. 276	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 276-Sta. 317	1.25	2.50	.040	.051	2	.61	.62	.62	671-D-4AD
	Sta. 337.5-Sta. 378.5	1.25	2.50	.040	.051	2	.61	.62	.62	671-D-4AD
	Sta. 399-Sta. 481	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
14 L	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
14 R	Sta. 481-Sta. 542.5	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
15 L/R	Sta. 720-Sta. 746.5	1.25	2.50	.032	.032	2	.61	.62	.62	671-D-4AD
	Sta. 746.5-Sta. 770.5	1.25	2.50	.032	.040	2	.61	.62	.62	671-D-4AD
	Sta. 770.5-Sta. 782	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 782-Sta. 848	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
17 L/R	Sta. 16-Sta. 50.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 276-Sta. 317	1.70	3.40	.051	.064	2	1.00	.62	.62	671-D-4AD
	Sta. 317-Sta. 378.5	1.70	3.40	.051	.051	2	1.00	.62	.62	671-D-4AD
	Sta. 378.5-Sta. 399	1.70	3.40	.040	.064	2	1.00	.62	.62	671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
17 L	Sta. 88.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 150.75-Sta. 276	1.70	3.40	.040	.032	2	1.00	.62	.62	671-D-4AD
17 R	Sta. 150.75-Sta. 276	1.70	3.40	.040	.040	2	1.00	.62	.62	671-D-4AD
	Sta. 597-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
18 L/R	Sta. 16-Sta. 50.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 88.5-Sta. 107	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 720-Sta. 782	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 128-Sta. 150.75	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
18 R	Sta. 150.75-Sta. 2.76	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 107-Sta. 128	.64	1.28	.025	.032	1		.62		671-D-4AD
19 L/R	Sta. 16-Sta. 88.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
19 L	Sta. 597-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 633-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
19 R	Sta. 501.5-Sta. 583.5	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 583.5-Sta. 597	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 597-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.032	.025	1		.62		671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
20 L/R	Sta. 16-Sta. 70.7	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 720-Sta. 758	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
	Sta. 758-Sta. 848	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 150.75-Sta. 255.5	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 255.5-Sta. 276	1.25	2.50	.032	.051	2	.61	.62	.62	671-D-4AD
	Sta. 317.0-Sta. 378.5	1.25	2.50	.051	.064	2	.61	.62	.62	AN426-AD4
34 L/R	Sta. 16-Sta. 88.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
35 L/R	Sta. 720-Sta. 758	1.25	2.50	.032	.040	2	.61	.62	.62	671-D-4AD
33 L	Sta. 128-Sta. 214.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 214.5-Sta. 235	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 235-Sta. 255.5	.64	1.28	.051	.032	1		.62		671-D-4AD
	Sta. 255.5-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 481.0	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 481.0-Sta. 542.5	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 542.5-Sta. 583.5	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 583.5-Sta. 597	.64	1.28	.040	.025	1		.62		671-D-4AD
	Sta. 597-Sta. 688.5	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
33 R	Sta. 128-Sta. 150.75	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 150.75-Sta. 194	1.25	2.50	.036	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 235-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 460.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 522	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 522-Sta. 542.5	.64	1.28	.025	.036	1		.62		671-D-4AD
	Sta. 542.5-Sta. 688.5	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.025	.040	1		.62		671-D-4AD
32 L/R	Sta. 16-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
31 L/R	Sta. 16-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
31 L	Sta. 150.75-Sta. 214.5	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 214.5-Sta. 255.5	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 542.5	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 542.5-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.040	.025	1		.62		671-D-4AD
31 R	Sta. 542.5-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.040	.025	1		.62		671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
30 L/R	Sta. 34.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
29 L/R	Sta. 53.75-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
29 L	Sta. 399-Sta. 419.5	1.25	2.50	.051	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 440	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 440-Sta. 542.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 542.5-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
29 R	Sta. 150.75-Sta. 194	1.25	2.50	.032	.036	2	.61	.62	1.25	671-D-4AD
	Sta. 235-Sta. 276	1.25	2.50	.051	.036	2	.61	.62	.62	671-D-4AD
	Sta. 399-Sta. 419.5	1.25	2.50	.051	.036	2	.61	.62	.62	671-D-4AD
	Sta. 419.5-Sta. 460.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 542.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 542.5-Sta. 633.0	.64	1.28	.025	.025	1		.62		671-D-4AD
28 L/R	Sta. 60.5-Sta. 128	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 276-Sta. 399	1.25	2.50	.051	.032	2	.61	.62	1.25	671-D-4AD
27 L	Sta. 150.75-Sta. 255.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 255.5-Sta. 276	.64	1.28	.051	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 440	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 440-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
27 R	Sta. 150.75-Sta. 276	.64	1.28	.036	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 542.5	.64	1.28	.036	.025	1		.62		671-D-4AD
	Sta. 542.5-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
26 L/R	Sta. 276-Sta. 399	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
25 L/R	Sta. 150.75-Sta. 276	.64	1.28	.025	.025					671-D-4AD
	Sta. 399-Sta. 583.5	.64	1.28	.025	.025	1		.62		671-D-4AD
24 L/R	Sta. 276-Sta. 399	.64	1.28	.032	.025	1		.62		671-D-4AD
23 L/R	Sta. 214.5-Sta. 276	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 501.5	.64	1.28	.025	.025	1		.62		671-D-4AD
Keel	Sta. 128-Sta. 150.75	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 276-Sta. 296	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 296-Sta. 317	1.02	2.04	.032	.032	2	.38	.62	1.25	671-D-4AD
	Sta. 337-Sta. 358	1.02	2.04	.032	.032	2	.38	.62	1.25	671-D-4AD
	Sta. 358-Sta. 399	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
B. VERTICAL SKIN SPLICES

Bulkhead Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap* W_v *See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulkhead*	*Gage of Skin Aft of Bulkhead*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
16	Between All Str.	.75	1.50	.040	.025	1		.62		671-D-4AD
50.5 L/R	Str. 16-Str. 19	.75	1.50	.025		1		.62		671-D-4AD
70.7 L/R	Str. 30-Str. 33	.62	1.25	.025	.025	1		.62		671-D-4AD
	Str. 19-Floor-Line	.62	1.25	.025	.025	1		.62		671-D-4AD
88.5	Str. 28-Str. 30	.65	1.30	.025	.025	1		.62		671-D-4AD
	Str. 33-Floor-Line	.65	1.30	.025	.032	1		.62		671-D-4AD
	Str. 13L-Str. 19L	.65	1.30		.032	1		.62		671-D-4AD
	Str. 1-Str. 13	.65	1.30		.025	1		.62		671-D-4AD
	Str. 13R-Str. 19R	.65	1.30		.025	1		.62		671-D-4AD
107	Str. 14R-Floor-Line	.65	1.30	.032		1		.62		671-D-4AD
128	Str. 1-Str. 12	1.25	2.50	.025	.025	2	.61	.62	1.25	671-D-4AD
	Str. 33-Bottom Keel	1.25	2.50	.025	.025	2	.61	.62	1.25	671-D-4AD
	Str. 12R-Str. 33R	1.25	2.50	.025	.032	2	.61	.62	1.25	671-D-4AD
	Str. 12L-Str. 33L	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
150.75	Top Keel-Str. 12	1.38	2.76	.025	.025	2	.63	.62	1.25	671-D-4AD
	Str. 27-Bottom Keel	1.38	2.76	.025	.025	2	.63	.62	1.25	671-D-4AD
	Str. 12-Str. 14	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Str. 14L-Str. 17L	1.38	2.76	.032	.040	2	.63	.62	1.25	671-D-4AD
	Str. 17L-Str. 33L	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Str. 33L-Str. 31L	1.38	2.76	.025	.025	2	.63	.62	1.25	671-D-4AD
	Str. 31L-Str. 27L	1.38	2.76	.025	.032	2	.63	.62	1.25	671-D-4AD
	Str. 12R-Str. 14R	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Str. 14R-Str. 18R	1.38	2.76	.032	.040	2	.63	.62	1.25	671-D-4AD
	Str. 18R-Floor Line	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Floor Line-Str. 33R	1.38	2.76	.032	.036	2	.63	.62	1.25	671-D-4AD
	Str. 33R-Str. 29R	1.38	2.76	.025	.032	2	.63	.62	1.25	671-D-4AD
	Str. 29R-Str. 27R	1.38	2.76	.025	.040	2	.63	.62	1.25	671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
B. VERTICAL SKIN SPLICES

Bulk-head Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
194	Str. 27L-Str. 31L	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
	Str. 29R-Str. 34R	.64	1.28	.032		1		.62		671-D-4AD
214.5	Str. 8R-Str. 12R	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 25L-Str. 25R	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 31L-Str. 33L	1.38	2.76	.025	.032	2	.74	.62	1.88	671-D-4AD
	Str. 34R-Floor Line	1.38	2.76	.036	.051	2	.74	.62	.62	671-D-4AD
235	Str. 8L-Str. 12L	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 20L-Floor Line	1.38	2.76	.032	.051	2	.74	.62	1.25	671-D-4AD
	Floor Line-Str. 33L	1.38	2.76	.032	.051	2	.74	.62	.62	671-D-4AD
	Str. 20R-Floor Line	1.75	3.50	.032	.051	2	1.11	.62	1.25	671-D-4AD
255.5	Str. 5L-Str. 5R	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
	Str. 27L-Str. 33L	1.38	2.76	.032	.051	2	.74	.62	.62	671-D-4AD
296.5	Str. 24-Bottom Keel	1.38	2.76	.025	.032	2	.74	.62	1.25	671-D-4AD
337.5	Str. 8R-Str. 12R	1.38	2.76	.025	.025	2	.74	.62	1.88	671-D-4AD
358.0	Str. 24-Bottom Keel	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
378.5	Str. 24-Str. 26	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
419.5	Str. 29L-Floor Line	1.38	2.76	.051	.032	2	.74	.62	1.25	671-D-4AD
	Str. 29R-Floor Line	1.38	2.76	.051	.036	2	.74	.62	1.25	671-D-4AD
440	Str. 27L-Str. 29L	1.38	2.76	.032	.025	2	.74	.62	1.88	671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
B. VERTICAL SKIN SPLICES

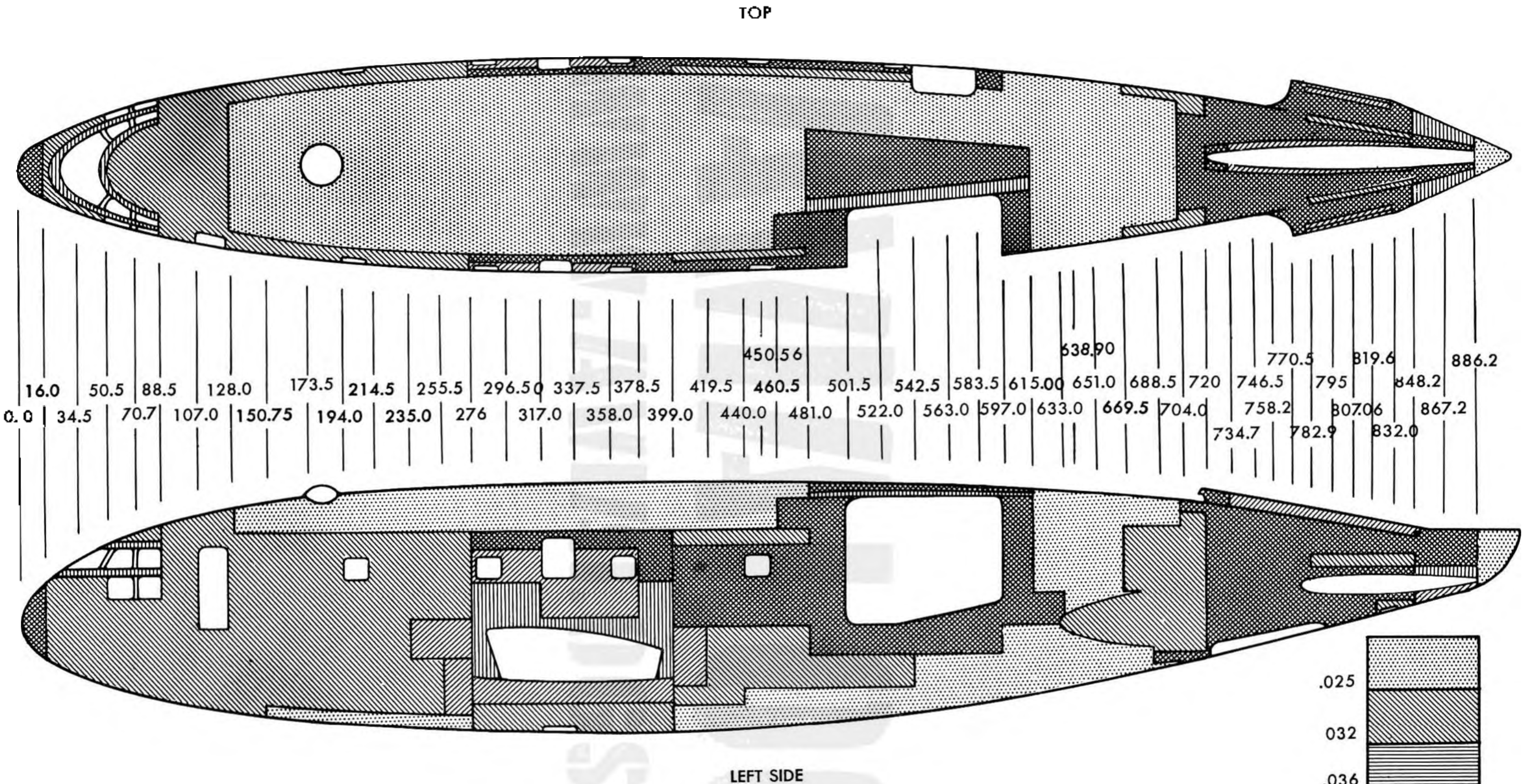
Bulk-head Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between* Rivet Rows	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
460.5	Str. 8L-Str. 12L	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 8R-Str. 12R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
481.0	Str. 6L-Str. 5R	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 8L-Str. 6L	1.38	2.76	.025	.064	2	.74	.62	1.25	671-D-4AD
	Str. 5R-Str. 8R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 12L-Str. 14L	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 33L-Floor Line	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
501.5	Str. 27L-Str. 25L	1.75	3.50	.025	.025	2	1.11	.62	1.25	671-D-4AD
	Str. 25L-Str. 25R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 27R-Str. 25R	1.75	3.50	.025	.025	2	1.11	.62	1.25	671-D-4AD
522	Str. 14R- Str. 19R	1.38	2.76	.040	.040	2	.74	.62	.62	671-D-4AD
	Str. 33R-Floor Line	1.38	2.76	.036	.025	2	.74	.62	1.25	671-D-4AD
542.5	Str. 27L-Str. 29L	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 29L-Str. 33L	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
563.0	Str. 8R-Str. 12R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
583.5	Str. 31-Str. 33	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
	Str. 19R-Floor Line	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
597	Str. 33L-Floor Line	1.75	3.50	.032	.025	2	.86	.62	.62	671-D-4AD
	Str. 33R-Floor Line	1.75	3.50	0.25	.025	2	.86	.62	.62	671-D-4AD
	Str. 11R-Str. 12R	1.75	3.50	.025	.025	2	.86	.62	.62	671-D-4AD
	Str. 12R-Str. 19R	1.75	3.50	.040	.025	2	.86	.62	.62	671-D-4AD

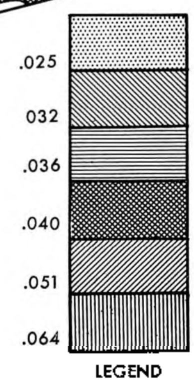
TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
B. VERTICAL SKIN SPLICES

Bulk-head Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
615	Str. 5R-Str. 11R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 6L-Str. 5R	1.38	2.76	.064	.025	2	.74	.62	1.25	671-D-4AD
	Str. 8L-Str. 6L	1.75	3.50	.040	.025	2	.86	.62	1.25	671-D-4AD
	Str. 19L-Str. 8L	1.75	3.50	.040	.032	2	.86	.62	1.25	671-D-4AD
633	Str. 19L-Floor Line	1.75	3.50	.040	.025	2	.86	.62	1.25	671-D-4AD
	Str. 31L-Str. 31R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 13R-Str. 19R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
651	Str. 8L-Str. 8R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
669.5	Str. 19-Str. 13	1.75	3.50	.025	.032	2	.86	.62	1.25	671-D-4AD
688.5	Str. 31-Str. 33	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
704	Str. 11L-Str. 11R	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 11-Str. 13	1.38	2.76	.025	.032	2	.74	.62	1.25	671-D-4AD
	Str. 13-Str. 19	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
	Str. 19-Str. 34	1.38	2.76	.025	.032	2	.74	.62	1.25	671-D-4AD
	Str. 34-Str. 33	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 33-Str. 31	.75	1.50	.040	.040	1		.62		671-D-4AD
	Str. 31L-Str. 31R	.75	1.50	.025	.040	1		.62		671-D-4AD

TABLE 28A (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24A
B. VERTICAL SKIN SPLICES

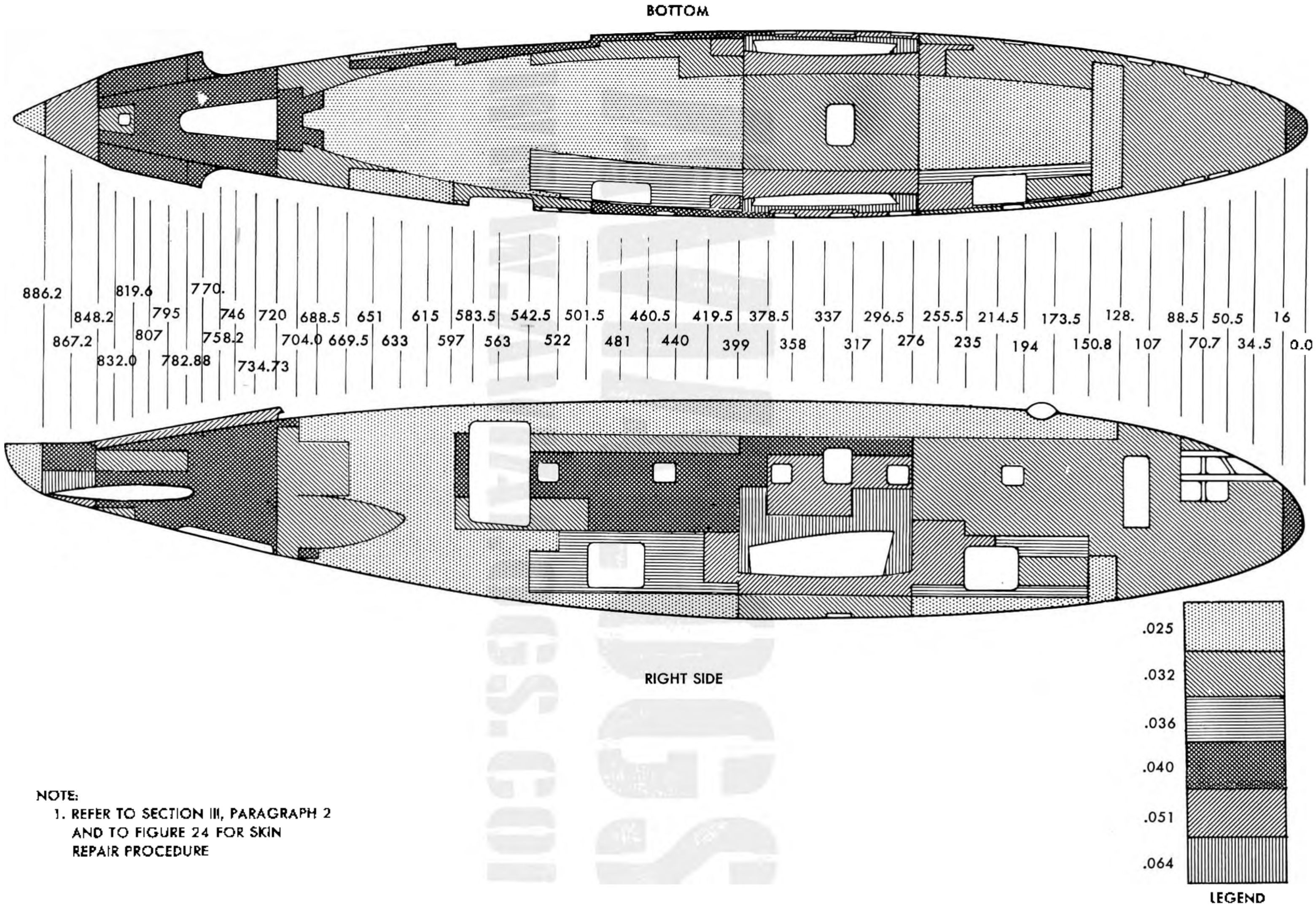
Bulk-head Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24*	*Width of Vertical Frame For Flush Patch See Fig. 24*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row-1*	*Spacing of Rivets in Row-2*	*Type of Rivets*
720.0	Top Keel-Str. 11	1.38	2.76	.040	.040	2	.74	.62	1.25	671-D-4AD
	Str. 11-Str. 13	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 13-Str. 16	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
	Str. 16-Str. 34	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 34-Bottom Keel	1.38	2.76	.040		2	.74	.62	1.25	671-D-4AD
746.5	Str. 15-Str. 16	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
758.22	Str. 16-Str. 18	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
	Str. 20-Str. 34	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
770.5	Str. 13-Str. 15	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
782.88	Str. 15-Str. 16	1.38	2.76	.040	.032	2	.74	.62	.62	671-D-4AD
	Str. 16-Str. 20	1.38	2.76	.040	.040	2	.74	.62	.62	671-D-4AD
819.6	Str. 20-Bottom Keel	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
848.2	Top Keel-Str. 16	1.38	2.76	.032	.025	2	.74	.62	.62	671-D-4AD
	Str. 16-Str. 20	1.38	2.76	.040	.064	2	.74	.62	.62	671-D-4AD
	Str. 20-Bottom Keel	1.38	2.76	.032	.051	2	.74	.62	.62	671-D-4AD
867.2	Str. 17-Bottom Keel	1.38	2.76	.051	.051	2	.74	.62	.62	671-D-4AD
886.2	Str. 16-Str. 19	1.25	2.50	.064	.025	2	.59	.62	1.25	AN426-AD4
	Str. 19-Bottom Keel	1.25	2.50	.051	.025	2	.59	.62	1.25	AN426-AD4





NOTE:
1. REFER TO SECTION III, PARAGRAPH 2 AND TO FIGURE 24 FOR SKIN REPAIR PROCEDURE.

FIGURE 24B (SHEET 1 OF 2 SHEETS) — FUSELAGE SKIN DIAGRAM (AIRPLANES AF44-77445 AND SUBSEQUENT)



NOTE:
1. REFER TO SECTION III, PARAGRAPH 2 AND TO FIGURE 24 FOR SKIN REPAIR PROCEDURE

FIGURE 24B — (SHEET 2 OF 2 SHEETS) — FUSELAGE SKIN DIAGRAM (AIRPLANES AF44-77445 AND SUBSEQUENT)

TABLE 28B
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24B
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24B*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24B*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
Top Keel	Sta. 128-Sta. 150	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 378.5-Sta. 399	1.02	2.04	.025	.025	2	.38	.62	1.25	671-D-4AD
	Sta. 704-Sta. 720	1.02	2.04	.040	.040	2	.38	.62	1.25	671-D-4AD
5 L/R	Sta. 150.75-Sta. 378.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 481	.64	1.28	.025	.025	1		.62		671-D-4AD
5 R	Sta. 481-Sta. 597	.64	1.28	.040	.025	1		.62		671-D-4AD
	Sta. 597-Sta. 615	.64	1.28	.040	.025	1		.62		AN442-4AD
6 L	Sta. 481-Sta. 615	1.60	3.20	.040	.064	2	.96	.62	.62	671-D-4AD
8 L/R	Sta. 150.75-Sta. 378.5	.64	1.28	.025	.025	1		.62		671-D-4AD
8 L	Sta. 399-Sta. 460.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 460.5-Sta. 481	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.064	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 597-Sta. 615	1.25	2.50	.064	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 615-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.025	.025	1		.62		AN442-4AD
8 R	Sta. 399-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.025	.025	1		.62		AN442-4AD
10 L/R	Sta. 150.75-Sta. 235	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 460.5-Sta. 563	.64	1.28	.025	.025	1		.62		671-D-4AD
11 L/R	Sta. 88.5-Sta. 128	.50	1.00	.032	.032	1		.62		671-D-4AD
	Sta. 720-Sta. 746.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
11 L	Sta. 615-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24B
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24B*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24B*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
11 R	Sta. 597-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 704-Sta. 720	1.25	2.50	.040	.032	2	.61	.62	.62	671-D-4AD
12 L/R	Sta. 128-Sta. 276	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 276-Sta. 378.5	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 378.5-Sta. 399	.64	1.28	.040	.040	1		.62		671-D-4AD
12 L	Sta. 399-Sta. 460.5	.64	1.28	.025	.032	1		.62		671-D-4AD
	Sta. 460.5-Sta. 481	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
12 R	Sta. 399-Sta. 542.5	.64	1.28	.025	.032	1		.62		671-D-4AD
13 L	Sta. 597-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.025	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 633-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.025	.025	1		.62		671-D-4AD
13 R	Sta. 583.5-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.025	.032	1		.62		671-D-4AD
14 L/R	Sta. 150.75-Sta. 276	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 276-Sta. 317	1.25	2.50	.040	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 337.5-Sta. 378.5	1.25	2.50	.040	.051	2	.61	.62	1.25	671-D-4AD
14 L	Sta. 399-Sta. 481	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
14 R	Sta. 399-Sta. 440	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 440-Sta. 542-5	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24B

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24B*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24B*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
15 L/R	Sta. 720-Sta. 782.88	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 782.88-Sta. 848.2	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
15 L	Sta. 88.5-Sta. 107	.50	1.00	.032	.032	1		.62		671-D-4AD
16 L/R	Sta. 720-Sta. 782.88	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 782.88-Sta. 848.2	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 848.2-Sta. 886.2	1.38	2.76	.040	.064	2	.74	.62	.62	671-D-5AD
17 L/R	Sta. 150.75-Sta. 276	1.25	2.50	.032	.032	2	.61	.62	.62	671-D-5AD
	Sta. 276-Sta. 317	1.25	2.50	.051	.064	2	.61	.62	.62	671-D-5AD
	Sta. 317-Sta. 378.5	1.25	2.50	.051	.051	2	.61	.62	.62	671-D-5AD
	Sta. 378.5-Sta. 399	1.25	2.50	.040	.064	2	.61	.62	.62	671-D-5AD
	Sta. 704-Sta. 720	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-5AD
18 L/R	Sta. 128-Sta. 150.75	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 720-Sta. 782.88	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
18 L/R	Sta. 16-Sta. 50.5	.50	1.00	.032	.032	1		.62		671-D-4AD
18 R	Sta. 88.5-Sta. 128	.50	1.00	.032	.032	1		.62		671-D-4AD
19 L	Sta. 399-Sta. 419.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 419.5-Sta. 481	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 597-Sta. 615	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 615-Sta. 633	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 633-Sta. 669.5	.64	1.28	.025	.040	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.032	.040	1		.62		671-D-4AD

TABLE 28B (Continued)

FUSELAGE SKIN PANELS AND SKIN SPLICES

See Figure 24B

A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24B*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24B*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
19 R	Sta. 399-Sta. 501.5	1.25	2.50	.040	.040	2	.61	.62	1.25	671-D-4AD
	Sta. 501.5-Sta. 542.5	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 583.5-Sta. 597	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 597-Sta. 669.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 669.5-Sta. 704	.64	1.28	.032	.025	1		.62		671-D-4AD
20 L/R	Sta. 150.75-Sta. 235	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 235-Sta. 255.5	1.25	2.50	.032	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 255.5-Sta. 276	1.25	2.50	.032	.051	2	.61	.62	.62	671-D-4AD
	Sta. 317-Sta. 378.5	1.25	2.50	.051	.064	2	.61	.62	.62	671-D-4AD
	Sta. 782.88-Sta. 819.6	1.25	2.50	.040	.040	2	.61	.62	.62	671-D-4AD
	Sta. 819.6-Sta. 848.2	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
34 L/R	Sta. 704-Sta. 720	1.25	2.50	.032	.040	2	.61	.62	1.25	671-D-4AD
33 L	Sta. 150.75-Sta. 214.5	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 214.5-Sta. 235	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 235-Sta. 255.5	1.25	2.50	.051	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 255.5-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 481	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 583.5	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 583.5-Sta. 597	.64	1.28	.040	.025	1		.62		671-D-4AD
	Sta. 597-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	1.25	2.50	.025	.040	2	.61	.62	1.25	671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24B
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longi-tudinal Over-lap W_v See Fig. 24B*	*Width of Longi-tudinal Frame For Flush Patch $2W_h$ See Fig. 24B*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longi-tudinal Over-lap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
33 R	Sta. 128-Sta. 150.75	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD
	Sta. 150.75-Sta. 194	1.25	2.50	.036	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 235-Sta. 276	1.25	2.50	.051	.051	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 460.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 522	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 522-Sta. 542.5	.64	1.28	.025	.036	1		.62		671-D-4AD
	Sta. 542.5-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	.64	1.28	.025	.040	1		.62		671-D-4AD
32 L/R	Sta. 16-Sta. 128	.50	1.00	.032	.032	1		.62		671-D-4AD
31 L/R	Sta. 542.5-Sta. 688.5	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 688.5-Sta. 704	1.25	2.50	.040	.025	2	.61	.62	1.25	671-D-4AD
31 L	Sta. 150.75-Sta. 194	.64	1.28	.032	.032	1		.62		671-D-4AD
	Sta. 194-Sta. 255.5	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 481	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 481-Sta. 542.5	1.25	2.50	032	.032	2	.61	.62	1.25	671-D-4AD
29 L/R	Keel-Sta. 128	.50	1.00	.032	.032	1		.62		671-D-4AD
29 L	Sta. 399-Sta. 419.5	1.25	2.50	.051	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 419.5-Sta. 440	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Sta. 440-Sta. 542.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 542.5-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24B
A. HORIZONTAL SKIN SPLICES

Stringer to be Spliced Through	*Length Between Stations to be Spliced*	*Width of Longitudinal Overlap W_v See Fig. 24B*	*Width of Longitudinal Frame For Flush Patch $2W_h$ See Fig. 24B*	*Gage of Skin Above Stringer*	*Gage of Skin Below Stringer*	*No. of Rivet Rows Through Longitudinal Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
29 R	Sta. 150.75-Sta. 194	1.25	2.50	.032	.036	2	.61	.62	1.25	671-D-4AD
	Sta. 235-Sta. 276	1.25	2.50	.051	.036	2	.61	.62	.62	671-D-4AD
	Sta. 399-Sta. 419.5	1.25	2.50	.051	.036	2	.61	.62	.62	671-D-4AD
	Sta. 419.5-Sta. 460.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
	Sta. 501.5-Sta. 542.5	1.25	2.50	.036	.036	2	.61	.62	.62	671-D-4AD
28 L/R	Sta. 276-Sta. 399	1.25	2.50	.051	.032	2	.61	.62	1.25	671-D-4AD
27 L	Sta. 150.75-Sta. 255.5	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 255.5-Sta. 276	.64	1.28	.051	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 440	.64	1.28	.032	.025	1		.62		671-D-4AD
	Sta. 440-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
27 R	Sta. 150.75-Sta. 276	.64	1.28	.036	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 542.5	.64	1.28	.036	.025	1		.62		671-D-4AD
	Sta. 542.5-Sta. 633	.64	1.28	.025	.025	1		.62		671-D-4AD
25 L/R	Sta. 150.75-Sta. 276	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 583.5	.64	1.28	.025	.025	1		.62		671-D-4AD
24 L/R	Sta. 378.5-Sta. 296.5	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
23 L/R	Sta. 214.5-Sta. 276	.64	1.28	.025	.025	1		.62		671-D-4AD
	Sta. 399-Sta. 501.5	.64	1.28	.025	.025	1		.62		671-D-4AD
KEEL	Sta. 16-Sta. 128	1.75	3.50	.032	.032	2	1.1	.75	.75	671-D-4AD
	Sta. 128-Sta. 150.75	1.25	2.50	.025	.025	2	.61	.62	1.25	671-D-4AD

TABLE 28B
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24 B
B. VERTICAL SKIN SPLICES

Bulkhead Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Over-lap W_v See Fig. 24B*	*Width of Vertical Frame For Flush Patch See Fig. 24B*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Over-lap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
16	Between all Stringers	.75	1.50	.040	.032	1		.62		671-D-4AD
50.5	Str. 16 L/R-Str. 19 L/R	.75	1.50	.032		1		.62		671-D-4AD
88.5	Str. 18 R-Floor (Left Side)	.62	1.25	.032	.032	1		.62		671-D-4AD
107	Str. 14 L-Floor (Left Side)	.65	1.30	.032		1		.62		671-D-4AD
128	Top Keel-Str. 12 L/R	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD
	Str. 12 L/R-Str. 33 L/R	1.25	2.50	.032	.032	2	.61	.62	1.25	671-D-4AD
	Str. 33 L/R-Bottom Keel	1.25	2.50	.032	.025	2	.61	.62	1.25	671-D-4AD
150.75	Top Keel-Str. 12 L/R	1.38	2.76	.025	.025	2	.63	.62	1.25	671-D-4AD
	Str. 12 L/R-Floor	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Floor-Str. 33 L	1.38	2.76	.032	.032	2	.63	.62	1.25	671-D-4AD
	Str. 33L-Str. 27 L	1.38	2.76	.025	.032	2	.63	.62	1.25	671-D-4AD
	Str. 27 L-Bottom Keel	1.38	2.76	.025	.025	2	.63	.62	1.25	671-D-4AD
	Floor-Str. 33 R	1.38	2.76	.032	.036	2	.63	.62	1.25	671-D-4AD
	Str. 33 R-Str. 29 R	1.38	2.76	.025	.032	2	.63	.62	1.25	671-D-4AD
	Str. 29 R-Str. 27 R	1.38	2.76	.025	.036	2	.63	.62	1.25	671-D-4AD
	Str. 27 R-Bottom Keel	1.38	2.76	.025	.025	2	.63	.62	1.25	671-D-4AD
214.5	Str. 33 L-Str. 31 L	1.38	2.76	.032	.032	2	.63	.62	1.88	671-D-4AD
	Str. 34 R-Floor	1.38	2.76	.032	.051	2	.63	.62	.62	671-D-4AD
	Str. 28 R-Str. 27 R	1.38	2.76	.032	.051	2	.63	.62	.62	671-D-4AD
	Str. 25 L-Str. 25 R	1.38	2.76	.025	.025	2	.63	.62	1.88	671-D-4AD
235	Str. 20 L-Floor	1.38	2.76	.032	.051	2	.63	.62	1.25	671-D-4AD
	Floor-Str. 33 L	1.38	2.76	.032	.051	2	.63	.62	.62	671-D-4AD
	Str. 8 L/R-Str. 12 L/R	1.38	2.76	.025	.025	2	.63	.62	1.88	671-D-4AD
	Str. 20 R-Floor	1.38	2.76	.032	.051	2	.63	.62	1.25	671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24 B
B. VERTICAL SKIN SPLICES

Bulkhead Station Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Overlap W_v See Fig. 24B*	*Width of Vertical Frame For Flush Patch See Fig. 24B*	*Gage of Skin Forward of Bulkhead*	*Gage of Skin Aft of Bulkhead*	*No. of Rivet Rows Through Vertical Overlap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
255.5	Str. 5 L-Str. 5 R	1.38	2.76	.025	.025	2	.63	.62	1.88	671-D-4AD
	Str. 27 L-Str. 33 L	1.38	2.76	.032	.051	2	.63	.62	.62	671-D-4AD
296.5	Str. 28 L-Str. 28 R	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
317	Str. 8 L/R-Str. 12 L/R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
378.5	Str. 12 L-Str. 12 R	1.38	2.76	.025	.025	2	.74	.62	.62	671-D-5AD
	Str. 12 L/R-Str. 14 L/R	1.38	2.76	.040	.040	2	.74	.62	.62	671-D-5AD
	Str. 14 L/R-Str. 17 L/R	1.38	2.76	.051	.040	2	.74	.62	.62	671-D-5AD
	Str. 17 L/R-Str. 20 L/R	1.38	2.76	.051	.064	2	.74	.62	.62	671-D-5AD
	Str. 20 L/R-Wing	1.38	2.76	.064	.064	2	.74	.62	.62	671-D-5AD
	Str. 28 L-28 R	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
399	Str. 12 L-Str. 12R	1.38	2.76	.025	.025	2	.74	.62	.62	671-D-5AD
	Str. 12 L/R-Str. 14 L/R	1.38	2.76	.040	.032	2	.74	.62	.62	671-D-5AD
	Str. 14 L/R-Str. 17 L/R	1.38	2.76	.040	.040	2	.74	.62	.62	671-D-5AD
	Str. 17 L/R-Floor	1.38	2.76	.064	.040	2	.74	.62	.62	671-D-4AD
	Floor-Wing	1.38	2.76	.064	.051	2	.74	.62	.62	671-D-4AD
419.5	Floor-Str. 29 L/R	1.38	2.76	.051	.032	2	.74	.62	1.25	671-D-4AD
440	Str. 27 L-Str. 29 L	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
	Str. 12 R-Str. 14 R	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
460.5	Str. 8 L-Str. 12 L	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 8 R-Str. 12 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
481	Str. 6 L-Str. 5R	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 8 L-Str. 6 L	1.38	2.76	.025	.064	2	.74	.62	1.25	671-D-4AD
	Str. 5 R-Str. 8 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 12 L-Str. 14 L	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 27 R-Str. 29 R	1.38	2.76	.036	.036	2	.74	.62	1.25	671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES
See Figure 24 B
B. VERTICAL SKIN SPLICES

Bulkhead Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Over-lap W_v See Fig. 24B*	*Width of Vertical Frame For Flush Patch See Fig. 24B*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Over-lap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
501.5	Str. 27 L-Str. 27 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 19 R-Floor	1.38	2.76	.040	.032	2	.74	.62	.62	671-D-4AD
	Str. 8 R-Str. 12 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
542.5	Str. 27 R-Str. 33 R	1.38	2.76	.036	.025	2	.74	.62	1.25	671-D-4AD
	Str. 29 L-Str. 33 L	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
	Str. 29 L-Str. 27 L	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
583.5	Str. 33 L/R-Str. 31 L/R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 27 L-Str. 27 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 19 R-Floor	1.38	2.76	.032	.025	2	.74	.62	1.25	671-D-4AD
597	Str. 33 L-Floor	1.38	2.76	.040	.025	2	.74	.62	1.25	671-D-4AD
	Str. 33 R-Floor	1.38	2.76	.025	.025	2	.74	.62	.62	671-D-4AD
	Str. 11 R-Str. 12 R	1.38	2.76	.025	.025	2	.74	.62	.62	671-D-4AD
	Str. 12 R-Str. 19 R	1.38	2.76	.040	.025	2	.74	.62	.62	671-D-4AD
615	Str. 5 R-Str. 11 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 6 L-Str. 5 R	1.38	2.76	.040	.025	2	.74	.62	1.25	671-D-4AD
	Str. 8 L-Str. 6 L	1.38	2.76	.064	.025	2	.74	.62	1.25	671-D-4AD
	Str. 19 L-Str. 8 L	1.38	2.76	.040	.025	2	.74	.62	1.25	671-D-4AD
633	Str. 31 L-Str. 31 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
	Str. 19 L-Floor	1.38	2.76	.040	.025	2	.74	.62	1.25	671-D-4AD
	Str. 13 R-Str. 19 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
651	Str. 81-Str. 8R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD

TABLE 28B (Continued)
FUSELAGE SKIN PANELS AND SKIN SPLICES

See Figure 24 B

B. VERTICAL SKIN SPLICES

Bulkhead Station-Locating Splice	*Length Between Stringers to be Spliced*	*Width of Vertical Over-lap W_v See Fig. 24B*	*Width of Vertical Frame For Flush Patch See Fig. 24B*	*Gage of Skin Forward of Bulk-head*	*Gage of Skin Aft of Bulk-head*	*No. of Rivet Rows Through Vertical Over-lap*	*Spacing Between Rivet Rows*	*Spacing of Rivets in Row 1*	*Spacing of Rivets in Row 2*	*Type of Rivets*
669.5	Str. 19 L/R-Str. 13 L/R	1.75	3.50	.025	.032	2	.86	.62	1.25	671-D-4AD
	Str. 31 L-Str. 31 R	1.38	2.76	.025	.025	2	.74	.62	1.25	671-D-4AD
688.5	Str. 31 L/R-Str. 33 L/R	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
704	Str. 11 L-Str. 11 R	1.38	2.76	.025	.040	2	.74	.62	1.25	671-D-4AD
	Str. 11 L/R-Str.13 L/R	1.38	2.76	.025	.032	2	.74	.62	1.25	671-D-4AD
	Str. 13 L/R-Str. 19 L/R	1.38	2.76	.032	.032	2	.74	.62	1.25	671-D-4AD
	Str. 19 L/R-Str. 33 L/R	1.38	2.76	.025	.032	2	.74	.62	1.25	671-D-4AD
	Str. 31-Str. 33	1.38	2.76	0.25	.032	2	.74	.62	1.25	671-D-4AD
	Str. 31 L-Str. 31 R	1.38	2.76	0.25	.032	2	.74	.62	1.25	671-D-4AD
720	Str. 11 L-Str. 11 R	1.38	2.76	.040	.040	2	.74	.62	1.25	671-D-4AD
	Str. 11-Str. 32	1.38	2.76	.032	.040	2	.74	.62	1.25	671-D-4AD
	Str. 32 L-Str. 32 R	1.38	2.76	.040	.040	2	.74	.62	1.25	671-D-4AD
782.88	Str. 15-Str. 16	1.38	2.76	.040	.032	2	.74	.62	.62	671-D-4AD
	Str. 16-Door	1.38	2.76	.040	.040	2	.74	.62	.62	671-D-4AD
819.6	Str. 20 L-Str. 20 R	1.25	2.50	.040	.032	2	.61	.62	1.25	671-D-4AD
848.2	Str. 15-Shear Deck	1.38	2.76	.051	.040	2	.74	.62	.62	671-D-4AD
	Str. 15-Str. 16	1.38	2.76	.032	.040	2	.74	.62	.62	671-D-4AD
	Str. 16-Elevator	1.38	2.76	.040	.064	2	.74	.62	.62	671-D-4AD
	Elevator-Str. 20	1.38	2.76	.040	.051	2	.74	.62	.62	671-D-4AD
	Str. 20 L-Str. 20 R	1.38	2.76	.032	.051	2	.74	.62	.62	671-D-4AD
867.2	Splice under Elevator	1.38	2.76	.051	.051	2	.74	.62	.62	671-D-4AD

Determine the gage from figure 22 and form an insert from the same gage 24ST alclad sheet. Drill the rivet holes to match the original holes in the fuselage and the fittings. Remove all burrs caused by drilling and rivet the insert in place picking up the original rivet patterns. The rivet patterns can be determined from table 28, 28A and 28B.

3. STRINGERS.

a. GENERAL.—Figures 20 and 26 show the locations and the types of the stringers used on the fuselage. The fuselage stringers are spliced at several sections along the fuselage. These are of three basic types:

(1) Zee sections formed from 24ST stock of various gages.

(2) The lower keel and upper center stringer are extrusions Alcoa Die No. K-15263.

(3) The extrusions at the floor are Alcoa Die No. L-29085.

(4) All other extrusions are to be repaired in accordance with section IX, paragraph 2.

b. ZEE SECTION STRINGERS.

(1) NEGLIGIBLE DAMAGE.—Small isolated dents, free from cracks, abrasions, and sharp corners may be neglected. Damage to the flat of the stringer that is not in contact with the skin and that can be cleaned up to a hole of .19 inch diameter may be neglected. Nicks in the edge of the leg of the stringer should not exceed .25 inch after clean-up. Clean up all nicks in the stringer with a .25 radius file until smooth.

(2) DAMAGE REPAIRABLE BY PATCHING.—Use the methods shown in figure 25-b provided that the damage is confined to one leg. Smooth out the damage with a file maintaining .13 inch corner radii. If a complete splice is required, use the same splice as the nearest forward stringer splice on the member damaged. (See figure 25-a.) Use the same gage stock for the splice plate as that of the members being repaired. For these gages, see figure 26.

(3) DAMAGE REPAIRABLE BY INSERTION.—If the damaged area is of greater length than that required to form a splice, an insert of original stringer stock is used and spliced in as shown in figure 25-a. Make the insertion of such a length that the maximum clearance on each end is .03 inch.

c. KEELS AND UPPER CENTER STRINGERS.

(1) NEGLIGIBLE DAMAGE.—These stringers are extrusion K-15263. Smooth isolated dents free from cracks, abrasions and sharp corners may be neglected. File all nicks until smooth. Nicks in the edge of the free leg (the leg with the bulb) should not exceed .13 inch in depth after clean up. Nicks in the edge of the supported legs should not exceed .25 inch in depth after clean up. Cracks running longitudinally in the free leg, that are not more than one inch long may be stopped by drilling 1/8 inch diameter holes in the ends. If two of these damages occur on one stringer within 10 inches of one another, they should not be neglected.

(2) DAMAGE REPAIRABLE BY PATCHING.—If the damaged area after clean up is confined to one leg, use the methods shown in figure 27-b. If a complete splice is required, use the same splice as that at the nearest forward member splice. A typical splice is shown in figure 27-a.

(3) DAMAGE REPAIRABLE BY INSERTION.—If the damaged area is greater in length than that required to form a splice, use an insert of original stringer making the insertion of such length that the maximum clearance at each end is .03 inch, and splice as shown in figure 27-a.

d. FLOOR MATCH EXTRUSIONS—FUSELAGE FLOOR STRINGERS.

(1) NEGLIGIBLE DAMAGE.—These stringers are extrusion Alcoa Die No. L-29085 and are used at the intersection of the upper and lower rings, see figures 20 and 26. Smooth isolated dents, free from cracks, abrasions, and sharp corners may be neglected. Nicks in the edge of any of the three legs, which when rounded off with a file do not exceed .25 inch in depth, are negligible. If two such damages occur on one stringer within 10 inches of one another, they should not be neglected.

(2) DAMAGE REPAIRABLE BY PATCHING AND BY INSERTION.—Information in this section, paragraph 3 *c* (2) and (3) applies to these extrusions. Refer to figure 28 for the repair.

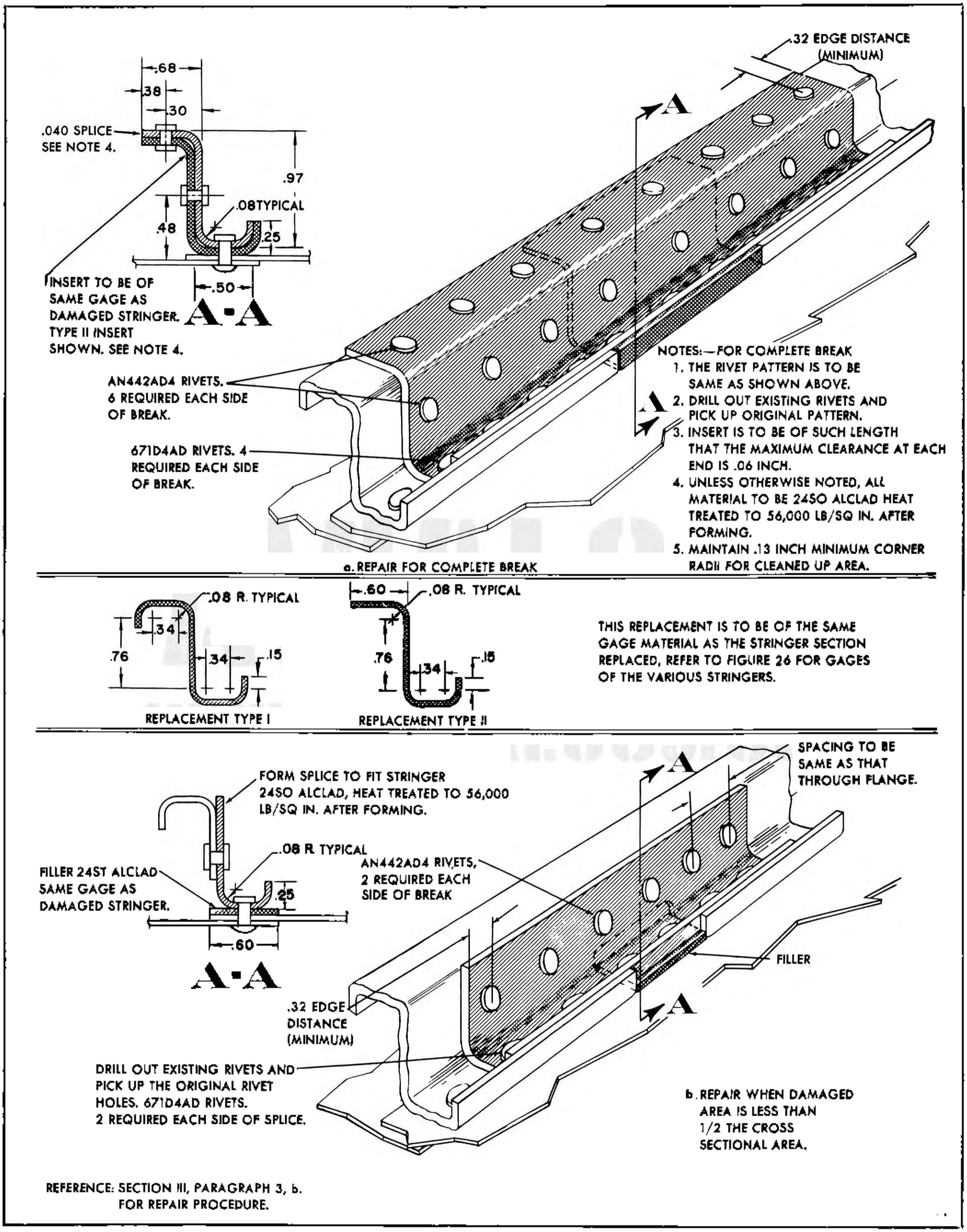


FIGURE 25 — FUSELAGE ZEE STRINGER REPAIR

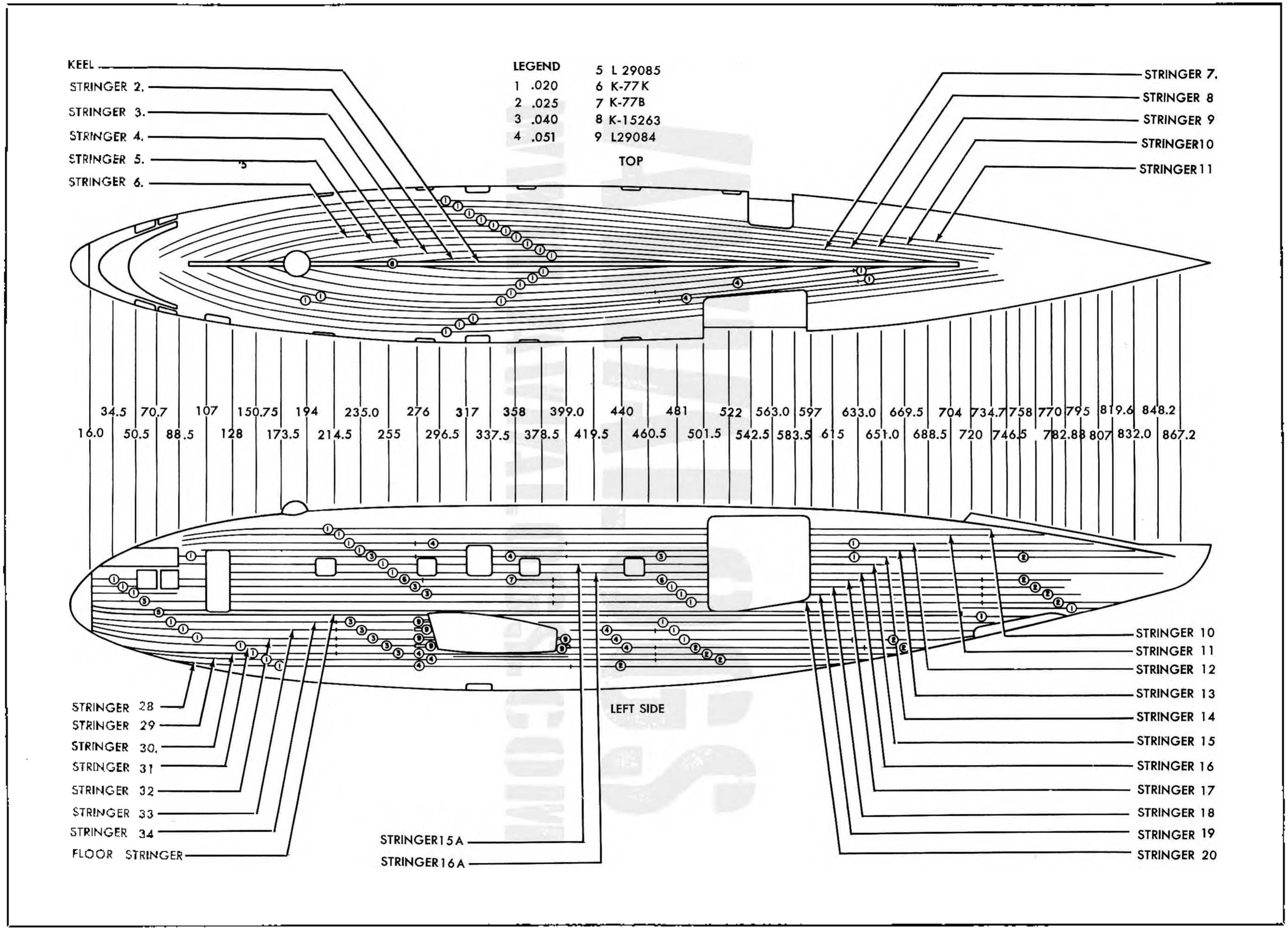
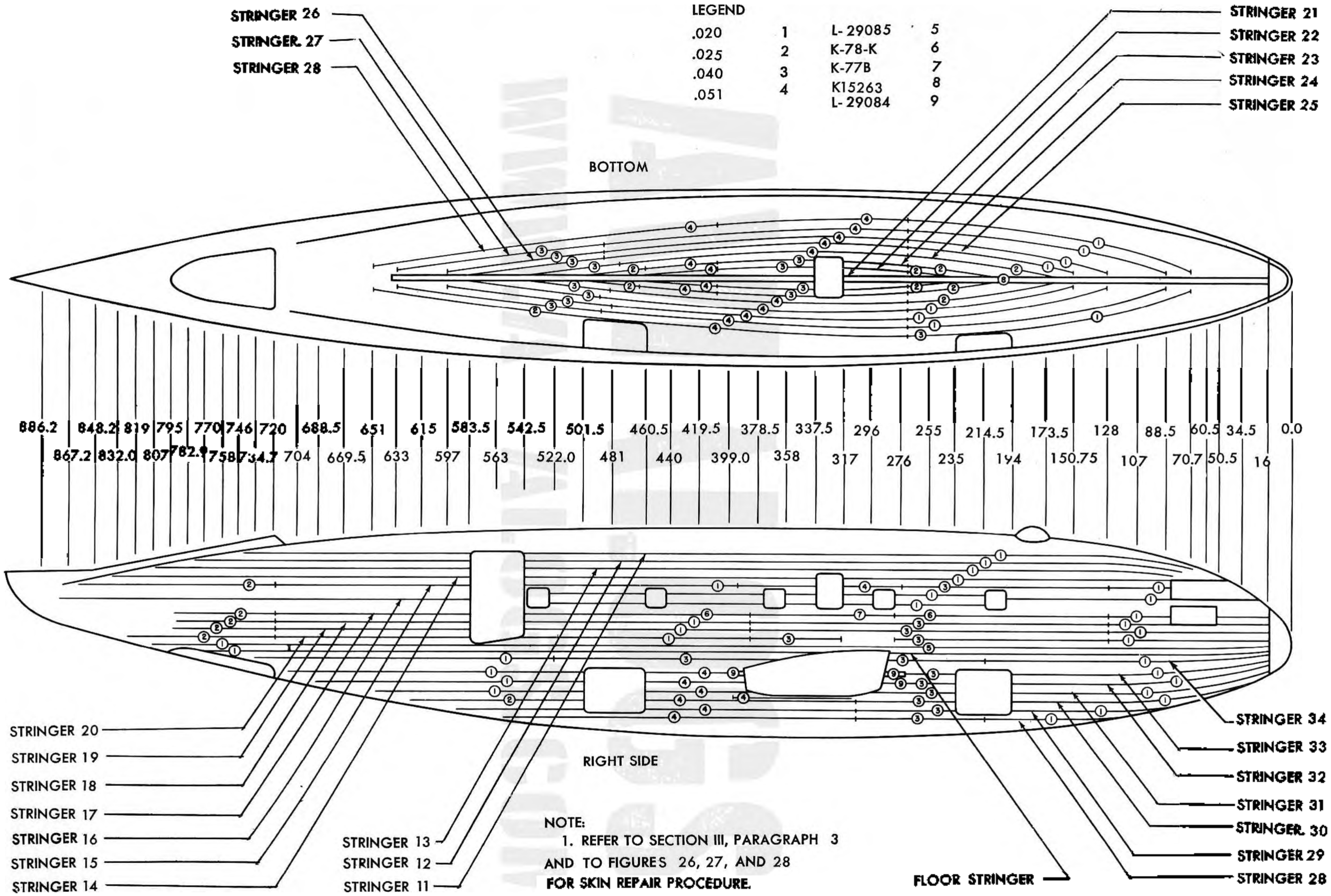
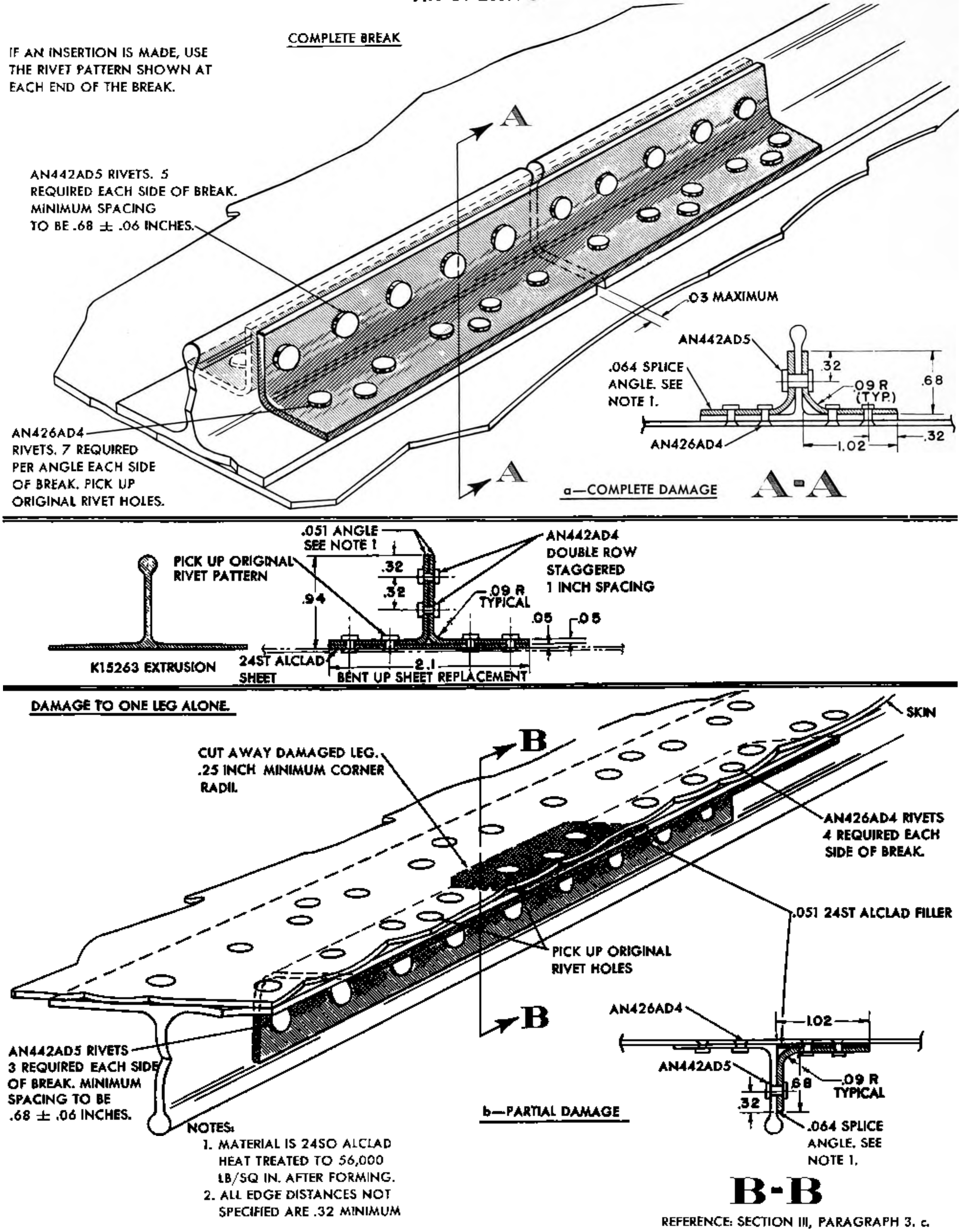


FIGURE 26 (SHEET 1 OF 2 SHEETS) — FUSELAGE STRINGER DIAGRAM



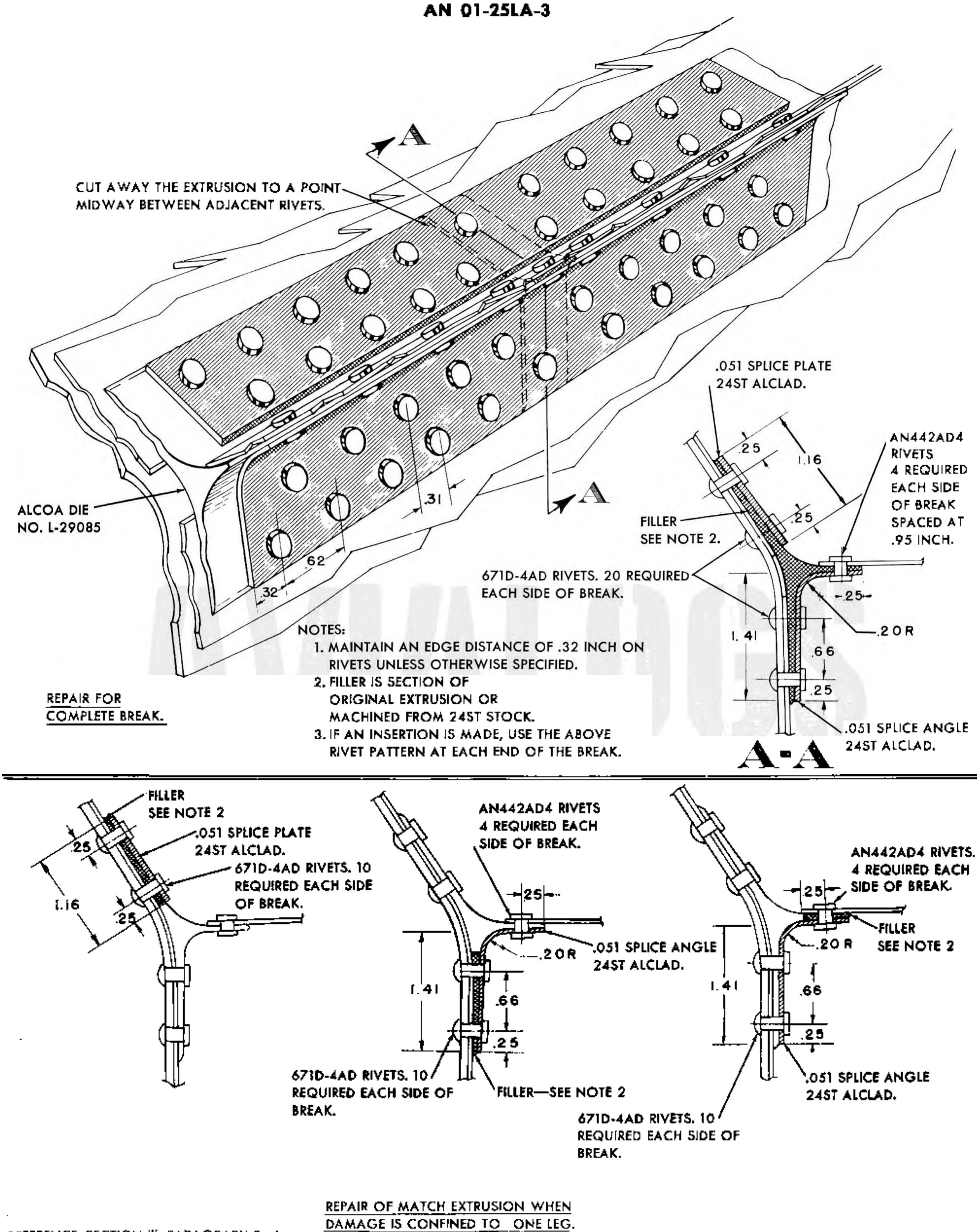
NOTE:
1. REFER TO SECTION III, PARAGRAPH 3 AND TO FIGURES 26, 27, AND 28 FOR SKIN REPAIR PROCEDURE.

FIGURE 26 (SHEET 2 OF 2 SHEETS) — FUSELAGE STRINGER DIAGRAM



REFERENCE: SECTION III, PARAGRAPH 3. c.

FIGURE 27—UPPER CENTER AND LOWER KEEL EXTRUSION REPAIR



REFERENCE: SECTION III, PARAGRAPH 3, d FOR REPAIR PROCEDURE.

FIGURE 28 —FLOOR MATCH EXTRUSION REPAIR

4. BULKHEADS.

a. GENERAL.—The fuselage bulkhead station numbers denote their respective distances in inches aft from the nose of the airplane. In the region of the fuselage where the cargo floor exists the bulkheads are built from two semi-circular sections spliced at the floor line. Each of these sections is built in three component parts which are spliced together. In the repairs to these bulkheads, the splices called for are stronger than those that already exist on the bulkhead. This is because the bulkhead is originally spliced at points where the loading is at a minimum.

WARNING

FOR SPLICES AND REPAIRS ON THESE BULKHEADS, THOSE SHOWN MUST BE USED. THE SPLICES THAT ALREADY EXIST ON THE BULKHEADS CANNOT BE USED AS PATTERNS UNLESS THE DAMAGE OCCURS AT THE ORIGINAL SPLICE. IF IT IS NECESSARY TO REPLACE A SECTION OF THE BULKHEAD, IT IS PERMISSIBLE TO USE THE ORIGINAL RIVET PATTERN AT THE SPLICE.

(1) If a replacement of a frame is required, a duplicate part should be utilized. Table 27 contains the part numbers for the bulkheads used in the original airplane. Where replacement is necessary and a spare part is not available, replacement sections may be fabricated from 24SO alclad stock, heat treated after forming. The damaged frame may be used as a template.

(2) A number of the bulkhead frames have similar physical characteristics such that they may be divided into groups. These groups are designated "A", "B", "C" and "D" and are shown in table 29. From each of these groups are selected individual bulkheads and sections as being typical, and their respective repairs are shown. Locate the damaged bulkhead by referring to figure 20. Having determined its location, refer to table 29 to determine its type and physical characteristics. Having determined its type, refer to the following pages which describe in detail the repairs for the various types of bulkheads.

(3) With the exception of those in the tail cone, all bulkheads are accessible. However, in some cases the location of the damage may necessitate dismantling of the fittings and the stripping of the structure. In the tail cone, it may be necessary to cut away skin to effect a repair. When effecting these repairs, the fuselage must be so supported that the removal of a section does not seriously strain the adjoining members or cause deflections.

(4) All damaged fittings, clips, gussets, etc., must be replaced.

b. GENERAL REPAIRS.—Figure 62 shows the means of repair for damages of minor nature to bulkheads, such as damages that are confined to the web or to the flange. The procedure is to locate the damaged bulkhead on the fuselage skeleton, figure 20, and then from the layout of the bulkheads (figures 29 to 61) and table 29, to determine the gage or extrusion die number of the damaged part. The repair is then made in accordance with the general repair, refer to section IX.

c. GROUP "A" BULKHEADS STATION 276, 296.5, 378.5, 399.

(1) GENERAL.—These bulkheads are located above the wing center section. The upper sections of these bulkheads are essentially the same, see figures 42 and 44. There are variations on the lower halves as shown in these figures.

(2) NEGLIGIBLE DAMAGE.

(*a*) Dents which when restored to shape are free from cracks, abrasions, and sharp corners may be neglected. The dents must be restored to shape to prevent their developing into cracks.

(*b*) Nicks in the edge of the outstanding legs of flanges which, when rounded off to a .25 inch radius with a file, are less than 1/5 the depth of the leg, are negligible. All sharp corners must be rounded off.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) UPPER RINGS.—The upper halves of these bulkheads have an L-29088 extrusion for an inner flange. The outstanding leg of this extrusion varies in thickness along the bulkheads. The bulkheads are, for the sake of convenience, split into two zones—zone A and zone B (see figures 63 to 66). For each of these sections a splice is shown. For repair to the extrusions alone see figures 65 and 66 (details A and B).

(*b*) LOWER RINGS.—With the exception of stations 296.5, and 378.5 the lower rings consist of an .064 formed sheet with an L-29088 extrusion for an inner flange, see table 29. These lower rings may be repaired as shown in figure 64. The lower rings of stations 296.5 and 378.5 are formed channel sections and are patched as shown in figure 67. Use fillers where required.

(4) DAMAGE REPAIRABLE BY REPLACEMENT.

(*a*) Since the upper and lower half rings are each built in three sections, it is advised that if a section is extensively damaged to replace the section picking up the original rivet attachments to the skin and employing the original bulkhead splices. Replace all damaged gussets and clips.

d. GROUP "B"—BULKHEADS.—Stations 128-255.5, 317, 337. 5, 358, 419.5-688.5.

(1) GENERAL.

(*a*) This group includes all the continuous rings subject to either floor or baggage compartment loads or both. Rings 615 to 688.5 are aft of the cargo door. Bulkhead 128 serves to separate the pilots' compartment from the cargo compartment and is treated separately in paragraph 4 *d* (6).

(2) NEGLIGIBLE DAMAGE.

(*a*) Dents which when restored to shape are free from cracks and sharp corners may be negelcted. The dents must be restored to shape to prevent their developing into cracks.

(*b*) Nicks in the edges of the outstanding legs of flanges which, when cleaned up with a file, maintaining .25 inch corner radii, are less than 1/5 the length of the leg in question are negligible. All sharp corners must be rounded off.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage not considered negligible must be patched as follows:

(*a*) If the bulkhead suffers a major damage, that is, if more than one-half the cross sectional area of the bulkhead is destroyed:

1. Locate the damaged bulkhead on figure 20 (fuselage skeleton).

2. Having located the bulkhead on the fuselage skeleton, refer to table 29. By means of this table, the figure which shows the bulkhead layout is determined.

3. There are typical sections located on these bulkheads and they are designated as detail A, B, C, D, etc.

4. Determine the detail that corresponds to the location of the damage on the bulkhead.

5. Repair the bulkhead as shown in the detail (figures 65-67, 69-71) which has been determined in step (4).

(*b*) If the bulkhead suffers damage of a minor nature:

1. Locate the damaged bulkhead on figure 20 (fuselage skeleton).

2. Having located the bulkhead on the fuselage skeleton, refer to table 29. By means of this table, the figure which shows the bulkhead layout is determined.

3. Locate the damage on the layout of the bulkhead. Determine what part (that is, (−1), (−2), (−3), etc.) of the bulkhead is damaged.

4. By referring back to table 29 the gage or extrusion die number of the damaged part is determined.

5. Having determined the characteristics, (that is, its gage, or die number if an extrusion) and the extent of the damage, refer to section IX for its repair.

6. Use fillers where required.

(*4*) DAMAGE REPAIRABLE BY INSERTION.

(*a*) If the extent of the damage after clean-up is greater than twice the length of a full splice at each end, splice in an insert using the rivet pattern determined by the method described in paragraph *d* (3) (*a*) above.

(5) DAMAGE REPAIRABLE BY REPLACEMENT.

(*a*) Since the upper and lower halves of these rings are each built in three sections, it is advised that if extensive damage occurs to one of these, to replace the section picking up the original splices.

(6) BULKHEAD STATION NO. 128.—This bulkhead serves to separate the pilots' compartment from the main cabin and embodies the frame for the connecting door, see figure 37. The bulkhead wall is

.032 gage 24ST alclad reinforced by angle stiffeners. Damage to fittings or attachments requires their replacement.

Holes in the flat of the .032 web which when cleaned up, can be circumscribed by a circle whose diameter is two inches or less and whose edge is not within two inches of a flange, stiffener, or edge of sheet, may be neglected. If the damage to the .032 wall is not negligible, refer to the general repair. Figure 229. Damage to the extrusions may be repaired by referring to figures 231 and 232. The bulkhead itself is made up of an .040 formed channel and repaired as shown in figure 67 (detail C repair). Rep[illegible] to the door frame may be made in accordance with figure 68 (detail D). In this repair, the splice for the channel serves as a filler for the angle repair. The channel surface in contact with the door must be maintained flush.

e. GROUP "C" BULKHEADS—STATIONS 16.0 THRU 107.0.

(1) GENERAL.—These bulkheads consist essentially of formed channels of 24ST alclad. Some of these bulkheads are reinforced locally with formed angles. Refer to figures 29 through 36.

(2) NEGLIGIBLE DAMAGE.

(*a*) Dents which when restored to shape are free from cracks, abrasions, and sharp corners may be neglected. The dents must be restored to shape.

(*b*) Nicks in the edges of the outstanding legs of the flanges, which when cleaned up with a file, maintaining .25 inch corner radii, are less than .19 inch deep may be neglected.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) The method employed for repairing these bulkheads is the same as that for Group "B" bulkheads, see paragraph 4., *d*. above.

f. GROUP "D" BULKHEADS—STATIONS 704—886.2

(1) GENERAL.

(*a*) This group includes all the bulkheads in the tail cone; refer to figures 53 to 61. These bulkheads are in general inaccessible and in most cases it will be necessary to peel away the skin to effect the repairs. These bulkheads receive heavy tail wheel loads and support the channels holding the fin and rudder torque tubes. It is, therefore, imperative to inspect the damages in these regions very thoroughly. Replace all damaged clips, brackets, and fittings.

(2) NEGLIGIBLE DAMAGE.

(*a*) Small holes or cracks through the flats of bulkheads cannot be neglected. Bumps and dents must be restored to shape carefully and may be considered negligible if, after having been restored to shape, they are free from holes or cracks.

(*b*) Nicks in the edges of the outstanding legs of flanges which, when cleaned up with a file, maintaining .25 inch corner radii, are less than 1/5 the length of the leg in question, are negligible. All sharp corners must be rounded off.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) Damage not considered negligible must be patched as follows:

1. Locate the damaged bulkhead on figure 31 (fuselage skeleton).

2. Having located the bulkhead on the fuselage skeleton, refer to table 29. By means of this table, the figure that shows the bulkhead layout is determined.

3. Locate the damage on the layout of the bulkhead. Determine which part (that is (−1), (−2), or (−3), etc.) of the bulkhead is damaged.

4. By referring back to table 29, the gage or extrusion die number of the damaged part is determined.

5. Having determined the characteristics (that is, its gage, or its die number if an extrusion) and the extent of the damage, refer to section IX for its repair.

6. A typical repair, making use of the general repair procedure is shown in the figure 76.

(4) DAMAGE REPAIRABLE BY INSERTION.

(*a*) If the extent of the damaged section after cleanup is greater than twice the length of the full splice at each end, splice in an insert using the rivet pattern determined in paragraph 4 *f* (3) above.

g. STUB RINGS

(1) GENERAL.—The stub rings occur at the attachments of the front, 30 percent, and 70 percent wing spars to the fuselage. They extend between the tops of the spars and the intercostal support running longitudinally below the windows. Figure 20. These stub rings transfer the wing beam loads into the fuselage and are highly stressed.

(2) NEGLIGIBLE DAMAGE.

(*a*) Dents, which when restored to shape, are free from cracks, abrasions, and sharp corners, may be neglected. These dents must be bumped out, and care must be taken that no stretching or cracking takes place.

(*b*) Nicks in the edges of the outstanding legs of angles which when cleaned up with a file, maintaining .25 inch corner radii, are less than 1/5 the length of the leg may be neglected. It must be emphasized that no sharp corners may exist.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) Damage to the extrusions alone may be repaired by referring to figure 231.

(*b*) Figure 77 shows a repair to the web alone and a repair to the stub ring if completely broken through. The fore and aft webs of the stub rings at the 30 percent and 70 percent spars are .064 and the fore and aft webs of the stub ring at the front spar are .081. The repairs shown in figure 77 are for the stub ring at the front spar. The notes on this figure indicate the differences in the repairs that are allowed for the .064 webs. In repairs to the webs alone when either or both of the extrusions are not damaged, AN-442AD6 rivets may be used, in place of the AN-23 bolts shown. For combined repairs to the angles and frames, the AN-23 bolts shown must be used.

(4) DAMAGE REPAIRABLE BY INSERTION.

(*a*) Insertions are not recommended for extensive repairs. The splice plates extend across the damaged area and an insert is not necessary. Use fillers wherever required.

(5) DAMAGE REPAIRABLE BY REPLACEMENT.

(*a*) If the stub ring is extensively damaged, replace it. If the inside web (see figure 77) has a damage that extends more than half its length replace this web picking up the original rivet pattern.

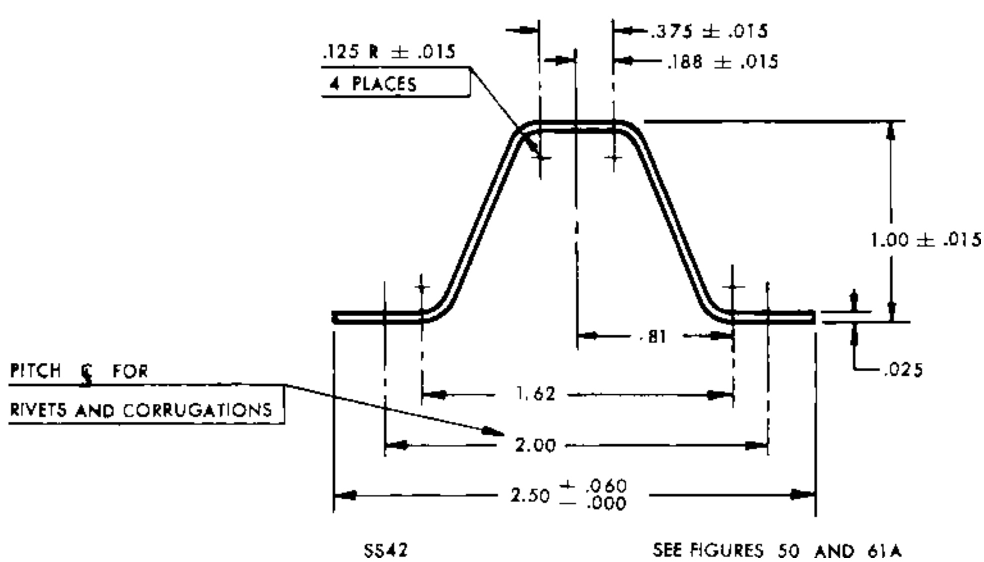


FIGURE 28A — SEMI-STANDARD STIFFENER

FOR DETAIL REPAIR, SEE FIGURE 72

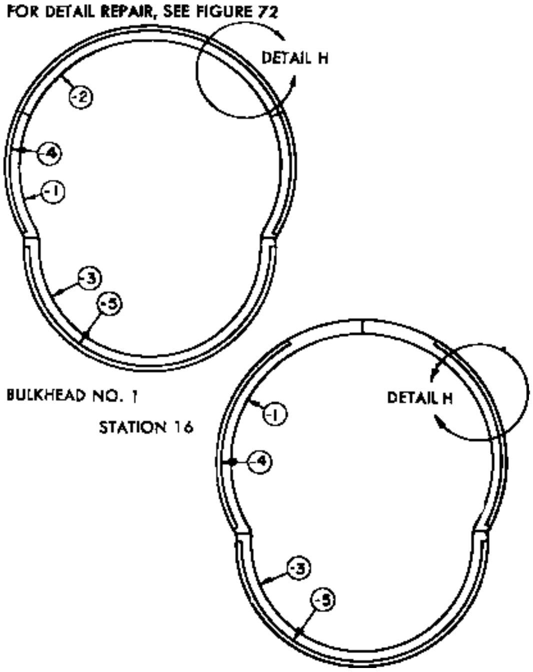
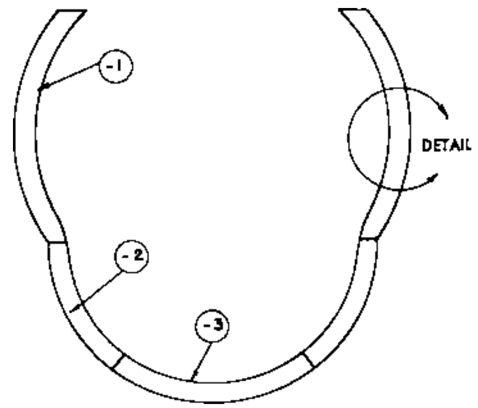


FIGURE 29—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURE 73

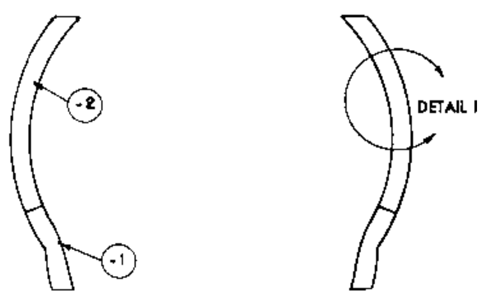


BULKHEAD NO. 2

STATION 34.5

FIGURE 30—FUSELAGE BULKHEAD DIAGRAM

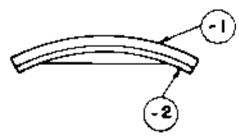
FOR DETAIL REPAIR, SEE FIGURE 73



BULKHEAD NO. 3

STATION 50.5

FIGURE 31—FUSELAGE BULKHEAD DIAGRAM

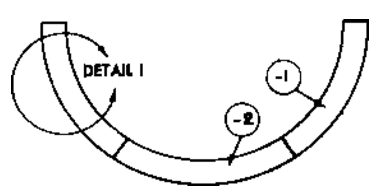


BULKHEAD NO. 5

STATION 60.5

FIGURE 33—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURE 73

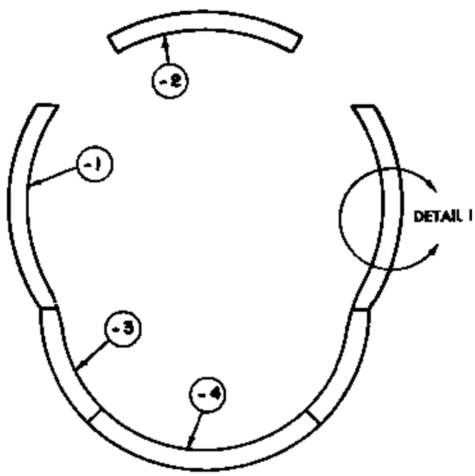


BULKHEAD NO. 4

STATION. 53.5

FIGURE 32—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURE 73

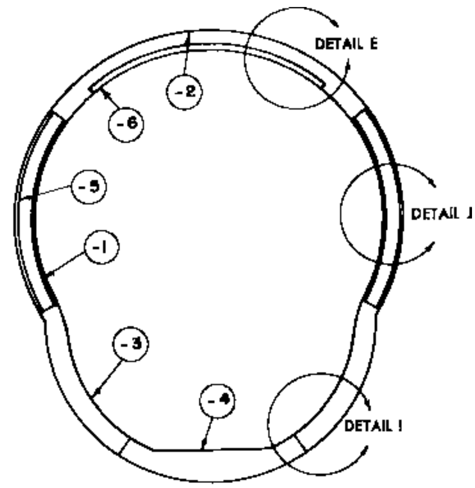


BULKHEAD NO. 6

STATION 70.7

FIGURE 34—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURES 69, 73 AND 74

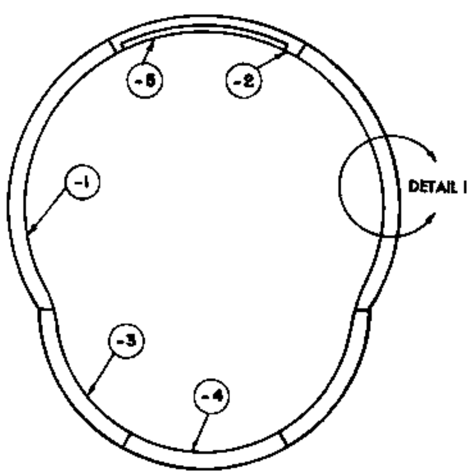


BULKHEAD NO. 7

STATION 88.5

FIGURE 35—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURE 73

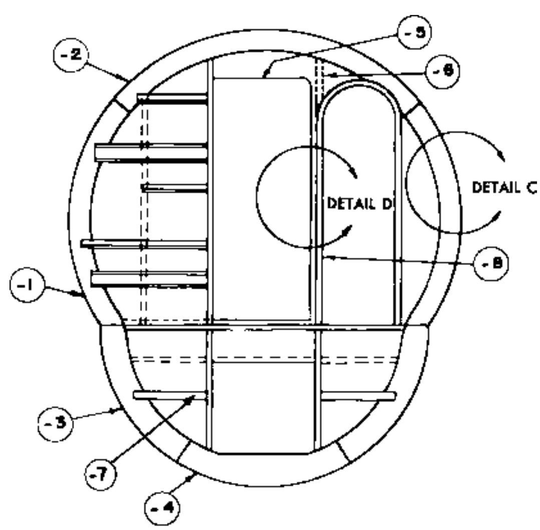


BULKHEAD NO. 8

STATION 107.0

FIGURE 36—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURES 67 AND 68

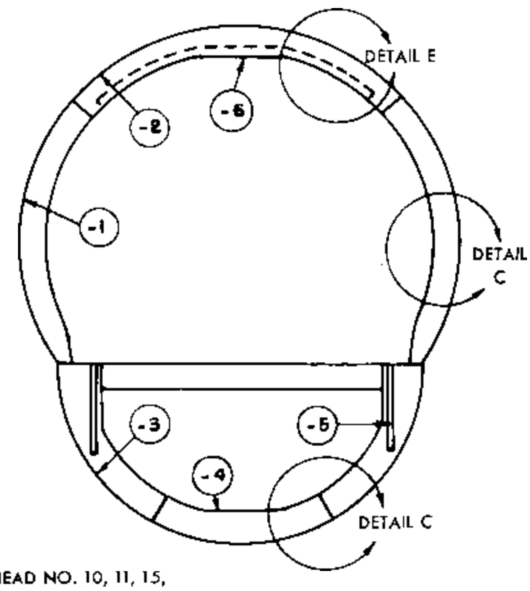


BULKHEAD NO. 9

STATION 128.0

FIGURE 37—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 and 69

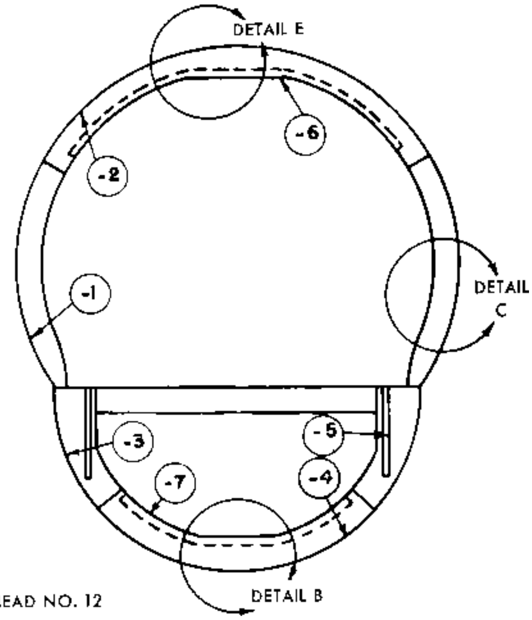


BULKHEAD NO. 10, 11, 15, 26, 27, 37, 38, 39, 40

STATION 150.8, 173.5, 255.5, 419.5
440.0, 633.0, 651.0, 664.5, 688.5

FIGURE 38—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67, 69 and 70

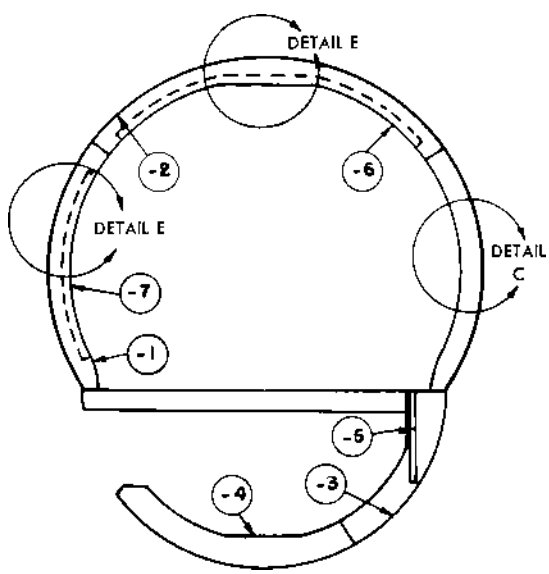


BULKHEAD NO. 12

STATION 194.0

FIGURE 39—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 and 69

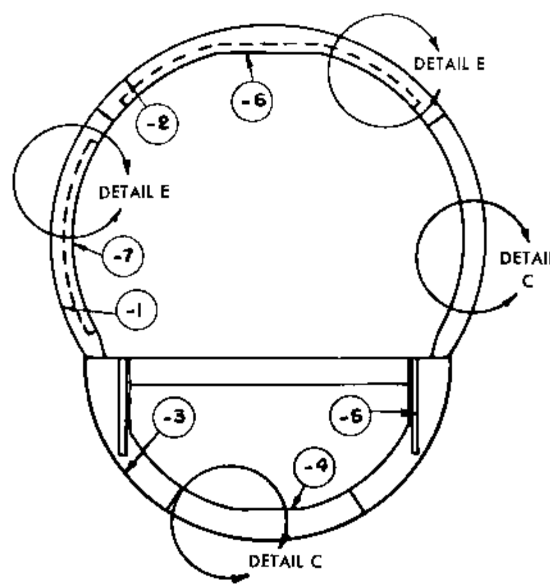


BULKHEAD NO. 13

STATION 214.5

FIGURE 40—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 and 69

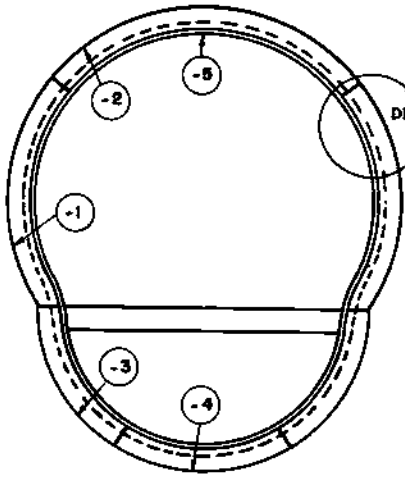


BULKHEAD NO. 14, 28

STATION 235, 460.5

FIGURE 41—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURE 64 and 65

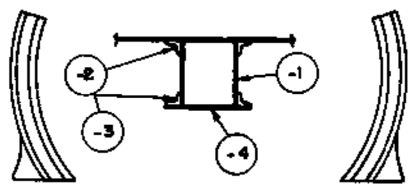


BULKHEAD NO. 16, 25

STATION 276, 399.0

FIGURE 42—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURE 77

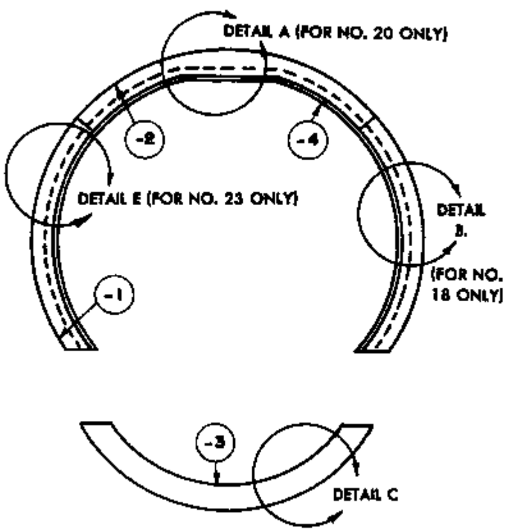


BULKHEAD NO. 17

STATION 285.0

FIGURE 43—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 65, 66, 67, and 69

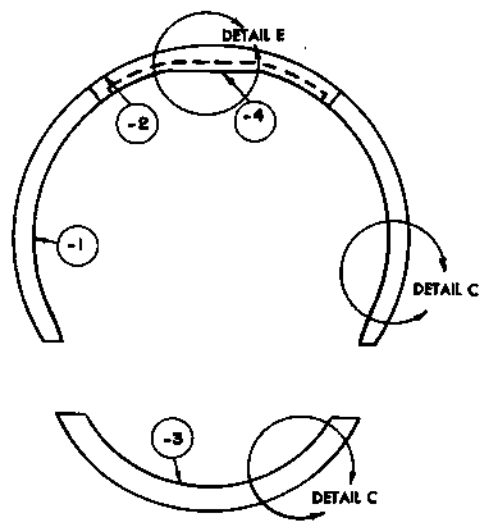


BULKHEAD NO. 18, 20, 23

STATION 296.5, 378.5

FIGURE 44—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 and 69

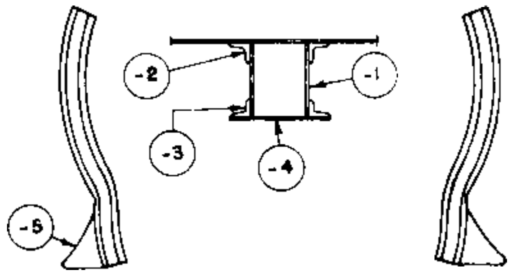


BULKHEAD NO. 21, 22

STATION 317, 337.5, 358.0

FIGURE 45—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURE 77

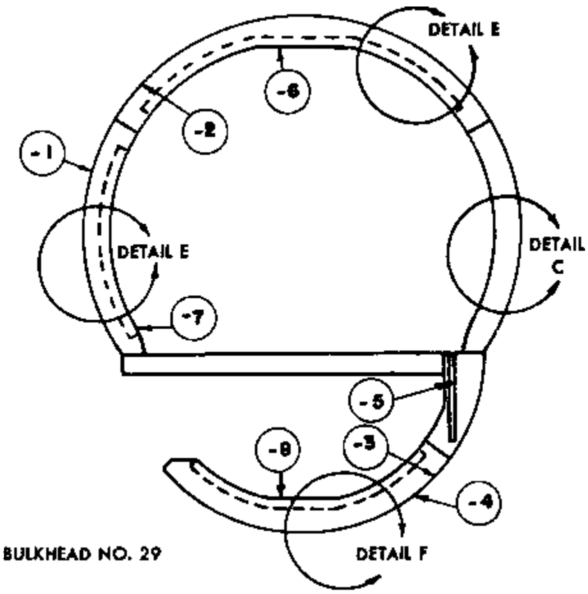


BULKHEAD NO. 19, 24

STATIONS 312 AND 392.2

FIGURE 46—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67, 69 and 70

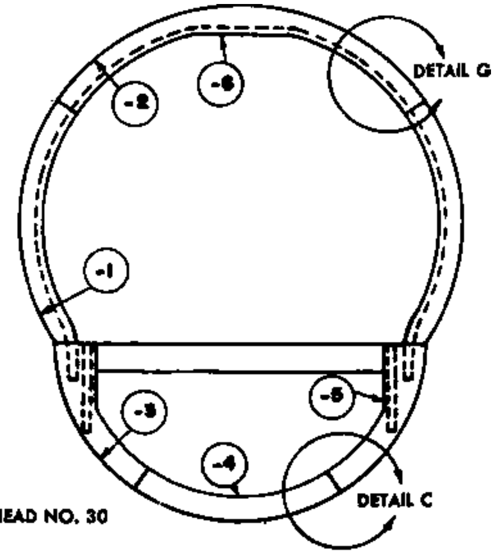


BULKHEAD NO. 29

STATION 481.0

FIGURE 47—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 and 71

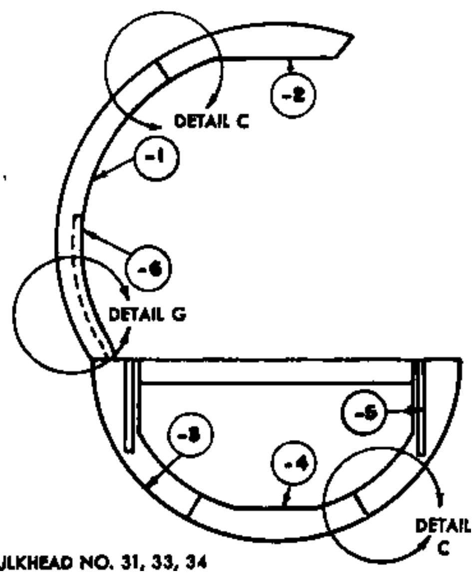


BULKHEAD NO. 30

STATION 501.5

FIGURE 48—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 and 71



BULKHEAD NO. 31, 33, 34

STATION 522.0, 563.0, 583.5

FIGURE 49—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 AND 71

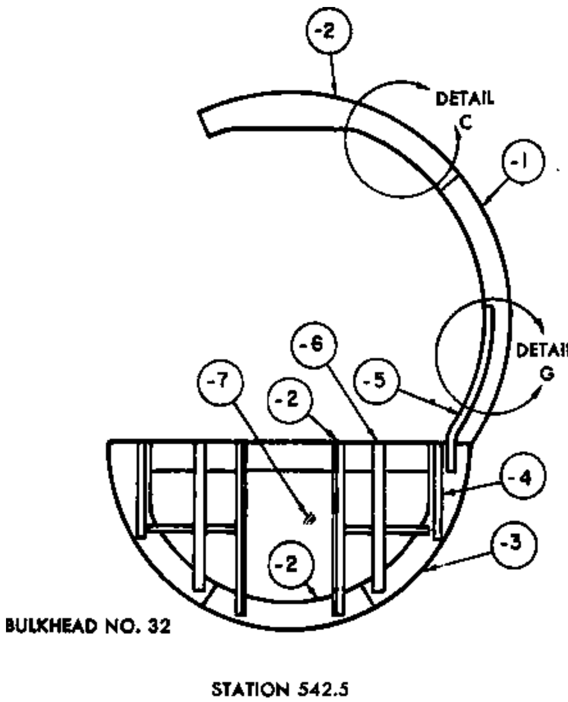


FIGURE 50 — FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 AND 69

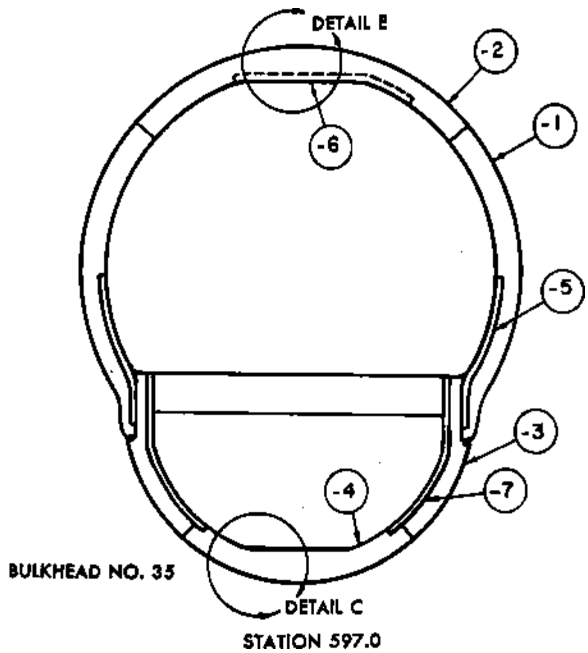


FIGURE 51 — FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURES 67 AND 69

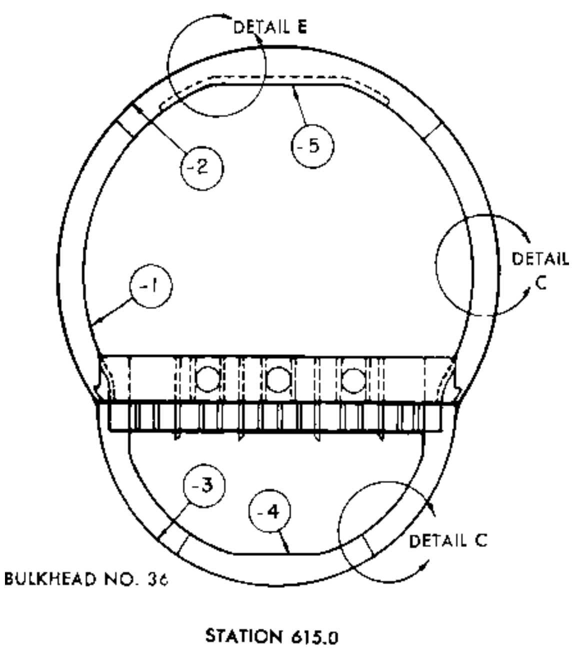


FIGURE 52 — FUSELAGE BULKHEAD DIAGRAM

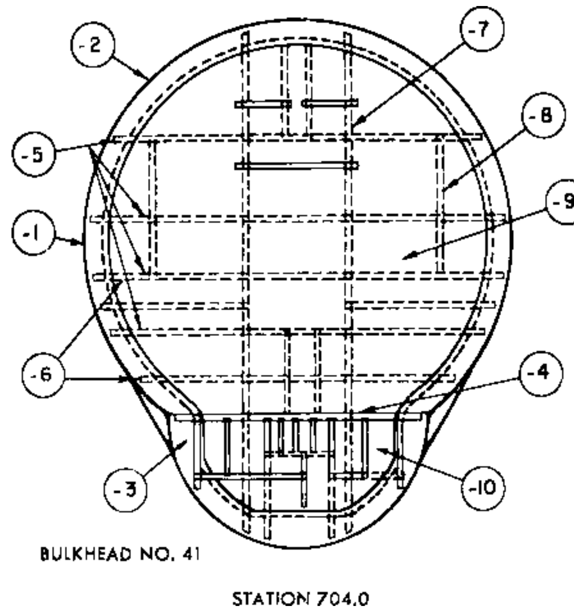
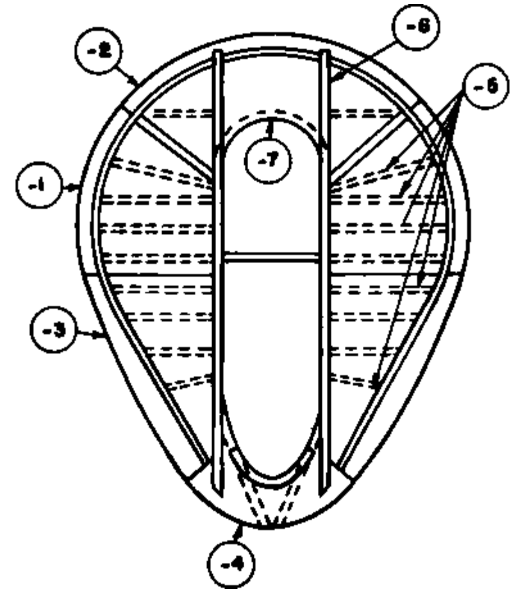


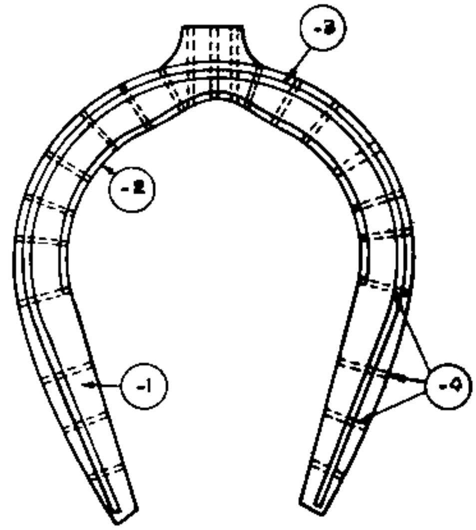
FIGURE 53 — FUSELAGE BULKHEAD DIAGRAM



BULKHEAD NO. 42

STATION 720

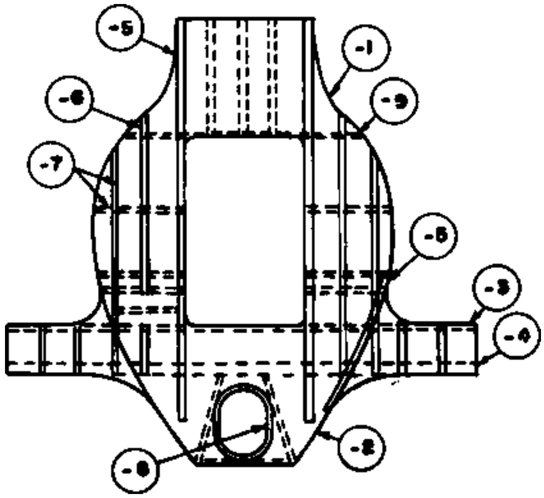
FIGURE 54—FUSELAGE BULKHEAD DIAGRAM



BULKHEAD NO. 43, 44, 45, 46

STATION 734.7, 746.5, 758.2, 770.5

FIGURE 55—FUSELAGE BULKHEAD DIAGRAM

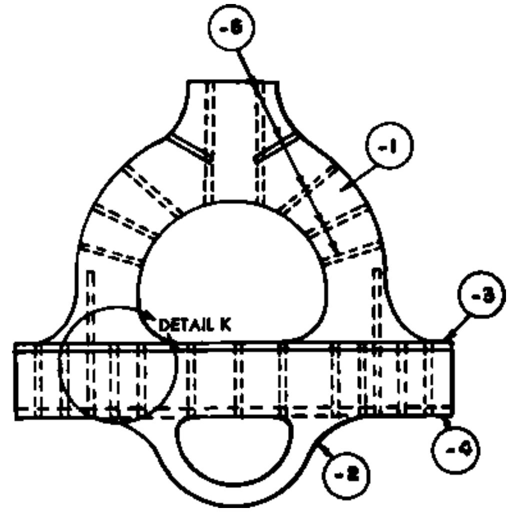


BULKHEAD NO. 47

STATION 782.9

FIGURE 56—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURE 75

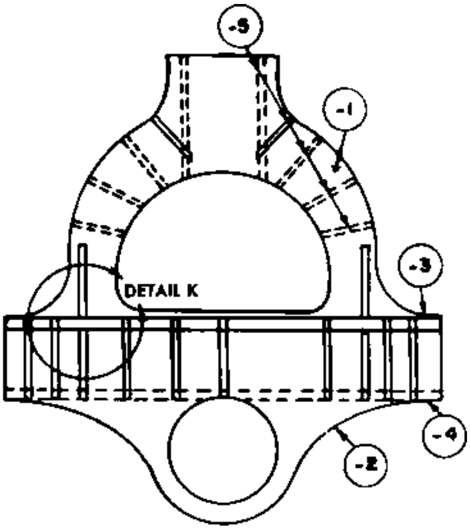


BULKHEAD NO. 48, 49

STATION 795, 807

FIGURE 57—FUSELAGE BULKHEAD DIAGRAM

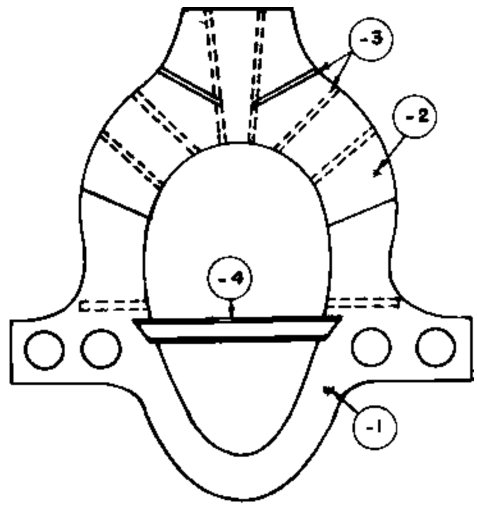
FOR DETAIL REPAIR SEE FIGURE 75



BULKHEAD NO. 50, 51

STATION 819.6, 832.0

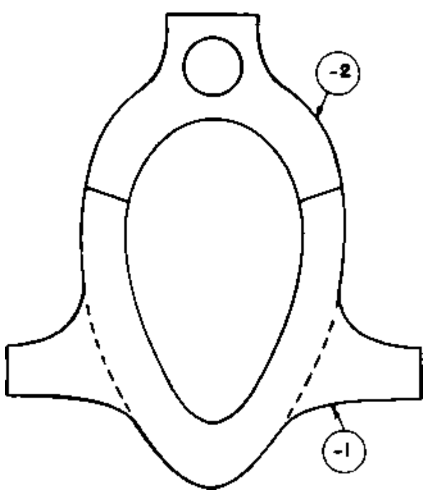
FIGURE 58—FUSELAGE BULKHEAD DIAGRAM



BULKHEAD NO. 52

STATION 848.2

FIGURE 59—FUSELAGE BULKHEAD DIAGRAM

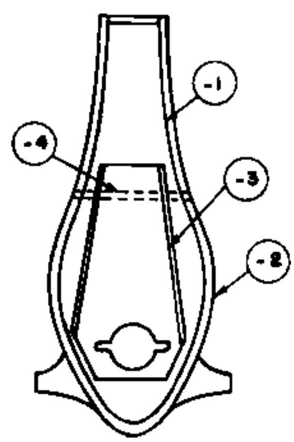


BULKHEAD NO. 53

STATION 867.2

FIGURE 60—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR SEE FIGURE 76

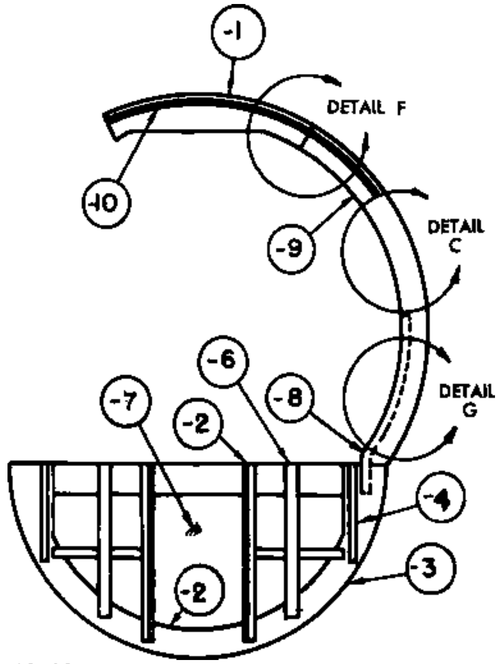


BULKHEAD NO. 54

STATION 886.2

FIGURE 61—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURES 62 67 70 AND 71



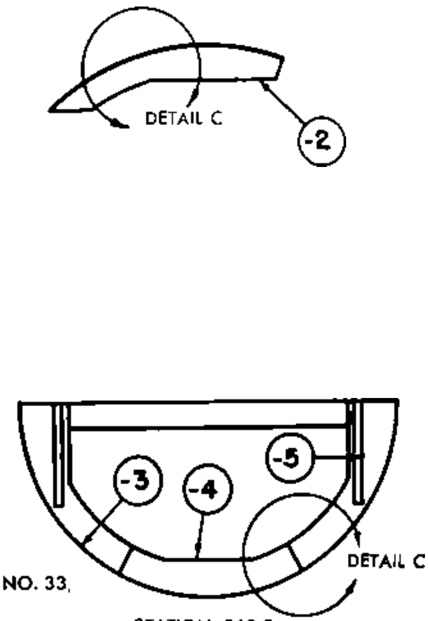
BULKHEAD NO. 32

STATION 542.5

FOR AIRPLANES AF 44-77445 AND SUBSEQUENT

FIGURE 61A—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURE 62 AND 67



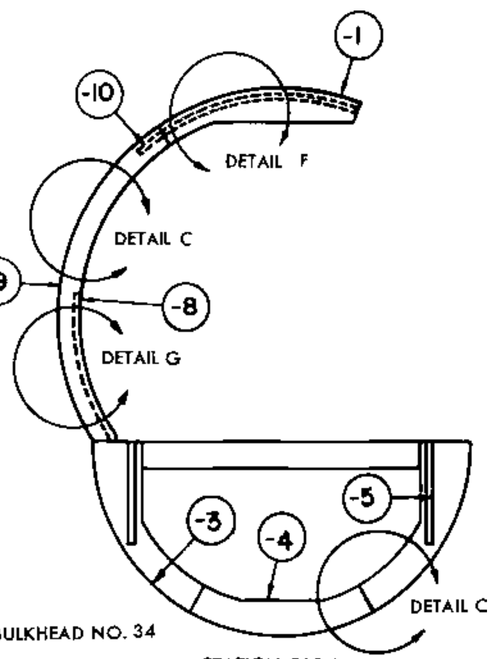
BULKHEAD NO. 33

STATION 563.0

FOR AIRPLANES AF 44-77445 AND SUBSEQUENT

FIGURE 61B—FUSELAGE BULKHEAD DIAGRAM

FOR DETAIL REPAIR, SEE FIGURE 62 67, 70 AND 71



BULKHEAD NO. 34

STATION 583.5

FOR AIRPLANES AF 44-77445 AND SUBSEQUENT

FIGURE 61C—FUSELAGE BULKHEAD DIAGRAM

TABLE 29

BULKHEAD GROUPING AND COMPONENT PARTS

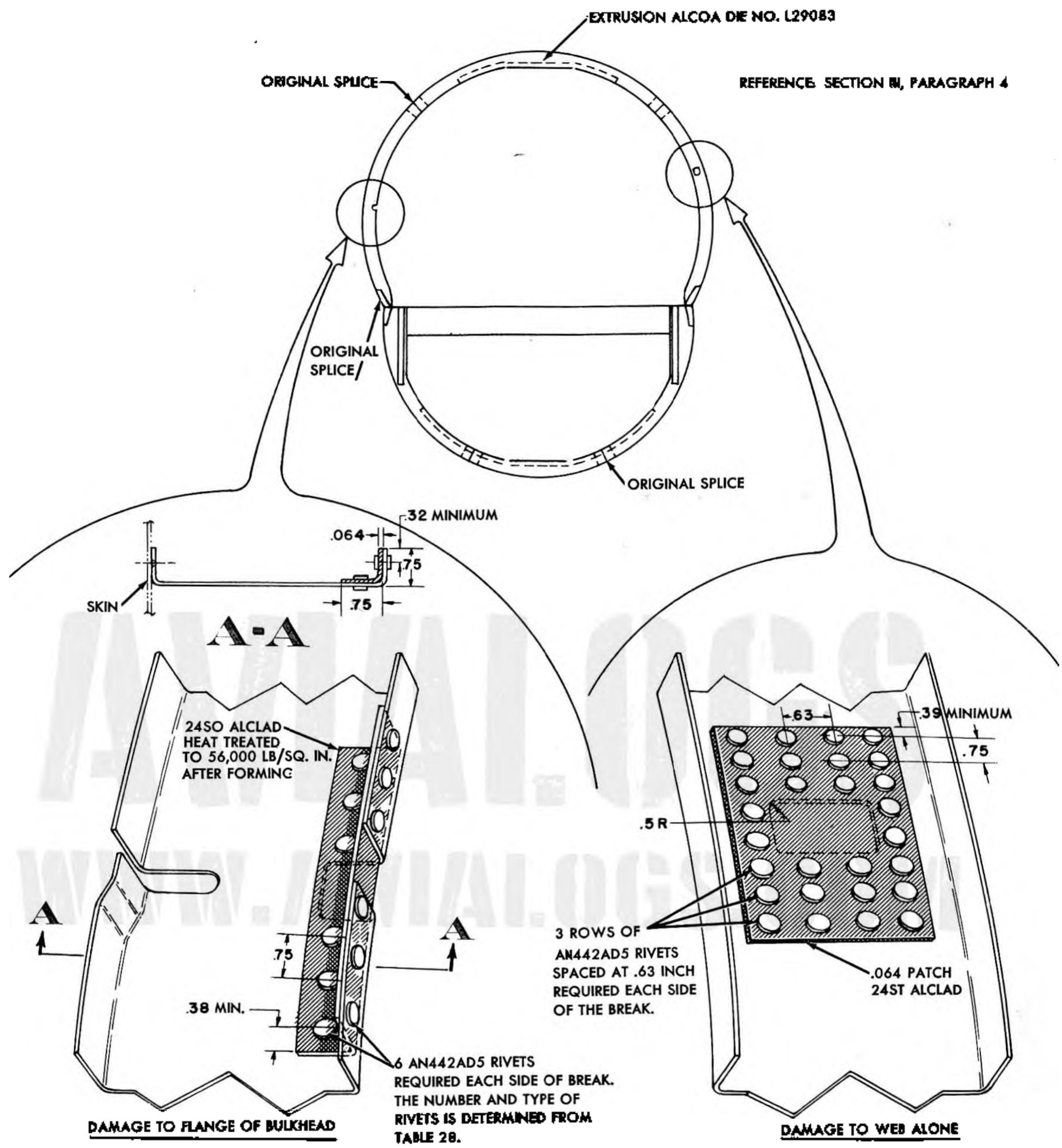
This table gives the physical characteristics of the fuselage bulkheads. Their various component parts are called out such as (-1), (-2), etc. and their locations shown on the bulkhead diagrams (figures 29-61). The group under which each bulkhead is classified is indicated.

No.	*Sta.*	*Group*	*For Layout of Bulkhead See Figure*	*(-1)*	*(-2)*	*(-3)*	*(-4)*	*(-5)*	*(-6)*	*(-7)*	*(-8)*
1	16	C	29	.051	.051	.051	.051 angle	.051 angle			
2	34.5	C	30	.040	.040	.032					
3	50.5	C	31	.051	.051						
4	53.5	C	32	.051	.040						
5	60.5	C	33	.040	.032 angle						
6	70.7	C	34	.040	.040	.040	.040				
7	88.5	C	35	.040	.040	.032	.032	.040	K14256		
8	107.0	C	36	.040	.040	.040	.040	K14256			
9	128.0	B	37	.040	.040	.040	.040	.032	K15276	L29083	.040
10	150.75	B	38	.064	.040	.040	.040	K4200	L29083		
11	173.50	B	38	.064	.040	.040	.040	K-77A	L29083		
12	194.0	B	39	.040	.040	.064	.051	K4200	L29083	.040 angle	
13	214.5	B	40	.064	.051	.040	.040	K4200	L29083	L29084	
14	235.0	B	41	.064	.051	.040	.040	K4200	L29083	L29084	
15	255.5	B	38	.064	.040	.040	.040	K4200	L29083		
16	276.0	A	42	.040	.040	.064	.064	L29088			
17	285.0	Stub Ring	43								
18	296.5	A	44	.040	.040	.040	L29088				
19	312.0	Stub Ring	46								
20	317.0	A	45	.064	.051	.040	K-78M				
21	337.5	B	45	.040	.040	.040	L29083				
22	358.0	B	45	.040	.040	.040	L29083				
23	378.5	A	44	.064	.064	.040	L29088				
24	392.2	Stub Ring	46								
25	399.0	A	42	.051	.051	.064	.064	L29088			
26	419.5	B	38	.064	.040	.040	.051	K4200	L29083		
27	440.0	B	38	.040	.064	.040	.040	K4200	L29083		
28	460.5	B	41	.064	.040	.040	.040	K4200	L29083	L29084	
29	481.0	B	47	.064	.051	.040	.040	K4200	L29083	L29084	.040 angle
30	501.5	B	48	.064	.051	.051	.051	K4200	K-77A		

TABLE 29 (Continued)
BULKHEAD GROUPING AND COMPONENT PARTS

No.	*Sta.*	*Group*	*For Layout of Bulkhead See Figure*	*(-1)*	*(-2)*	*(-3)*	*(-4)*	*(-5)*	*(-6)*	*(-7)*	*(-8)*	*(-9)*	*(-10)*
31	522.0	B	49	.064	.040	.051	.040	K4200	K-77A				
32	542.5	B	50, 61A	.064	.040	.051	K4200	K-77A	*SS-42	.020	K-77B	.091	.081
33	563.0	B	49, 61B	.064	.040	.051	.040	K4200	K-77A				
34	583.5	B	49, 61C	.064	.040	.051	.040	K4200	K-77A		K-77B	.091	.081
35	597.0	B	51	.064	.064	.064	.051	K-77Q	L29083	K-77Q			
36	615.0	B	52	.064	.040	.040	.040	L29083					
37	633.0	B	38	.040	.040	.032	.032	K4200	L29083				
38	651.0	B	38	.040	.040	.032	.032	K4200	L29083				
39	664.5	B	38	.040	.040	.032	.032	K4200	L29083				
40	688.5	B	38	.040	.040	.032	.032	K4200	L29083				
41	704.0	D	53	.040	.040	.040	K-77K	.032 channel	.040 channel	.064 channel	.040 channel	.020	.040
42	720.0	D	54	.051	.051	.051	.081	L29084	L29092	K-77A			
43	734.7	D	55	.051	K4200	L29084	L29084						
44	746.5	D	55	.051	K4200	L29084	L29084						
45	758.2	D	55	.051	K4200	L29084	L29084						
46	770.5	D	55	.051	K-78U	K4200	L29084						
47	782.9	D	56	.051	.040	.040 angle	.125 channel	SK194	SK192	SK191	.040 angle	K-78K	
48	795.0	D	57	.051	.040	.064 angle	.125 channel	L29084					
49	807.0	D	57	.051	.040	.064 angle	.125 channel	L29084					
50	819.6	D	58	.051	.040	.064 angle	.125 channel	L29084					
51	832.0	D	58	.051	.040	.064 angle	.125 channel	L29084					
52	848.2	D	59	.040	.051	L29084	.040 channel						
53	867.2	D	60	.025	.025								
54	886.2	D	61	.064	.051 angle	.102 reinf.	.064 angle						

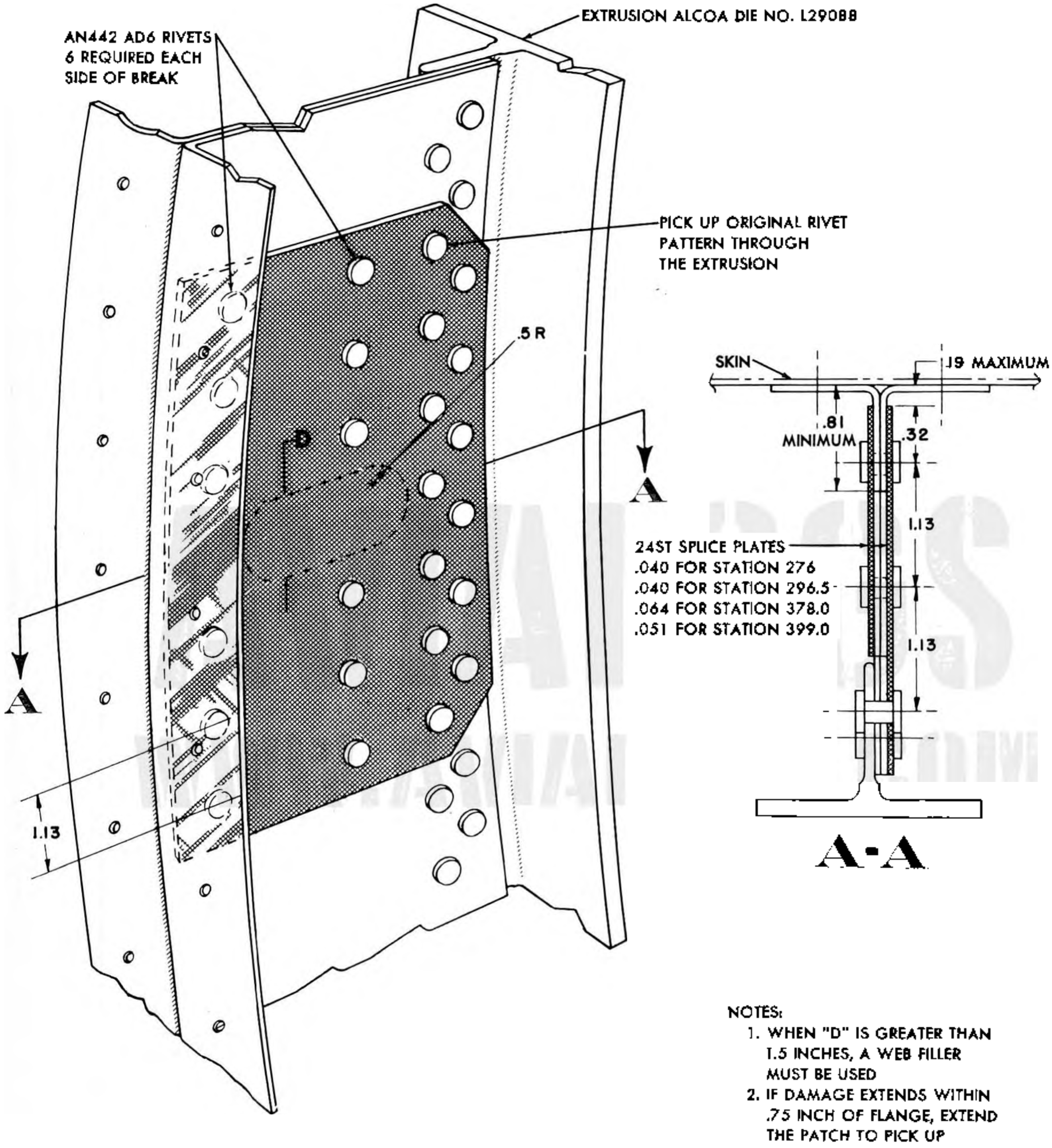
* See Figure 28A



NOTES:

1. THE COMPONENT PARTS OF A BULKHEAD ARE DETERMINED BY REFERRING TO TABLE 29 AND TO THE DESIGNATED FIGURE.
2. FOR A SPLICE TO A COMPLETE BREAK THAT IS NOT WITHIN 5 INCHES OF THE ORIGINAL SPLICE, DETERMINE THE DETAIL REPAIR FROM THE DIAGRAM OF THE BULKHEAD (FIGURES 29 TO 61) AND REPAIR AS SHOWN IN THE DESIGNATED DETAIL.
3. IF A BULKHEAD IS BROKEN AT A POINT WITHIN 5 INCHES OF THE ORIGINAL SPLICE, THIS ORIGINAL PATTERN MAY BE USED FOR REPAIR AT THE BREAK.
4. WHEN REPLACING A SECTION, PICK UP THE ORIGINAL SPLICES AND ATTACHMENTS.
5. THE APPLICATION AS SHOWN IS TO THE .064 FRAME SECTION OF BULKHEAD STATION 194.
6. 24ST STOCK FOR REPAIR ANGLES MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

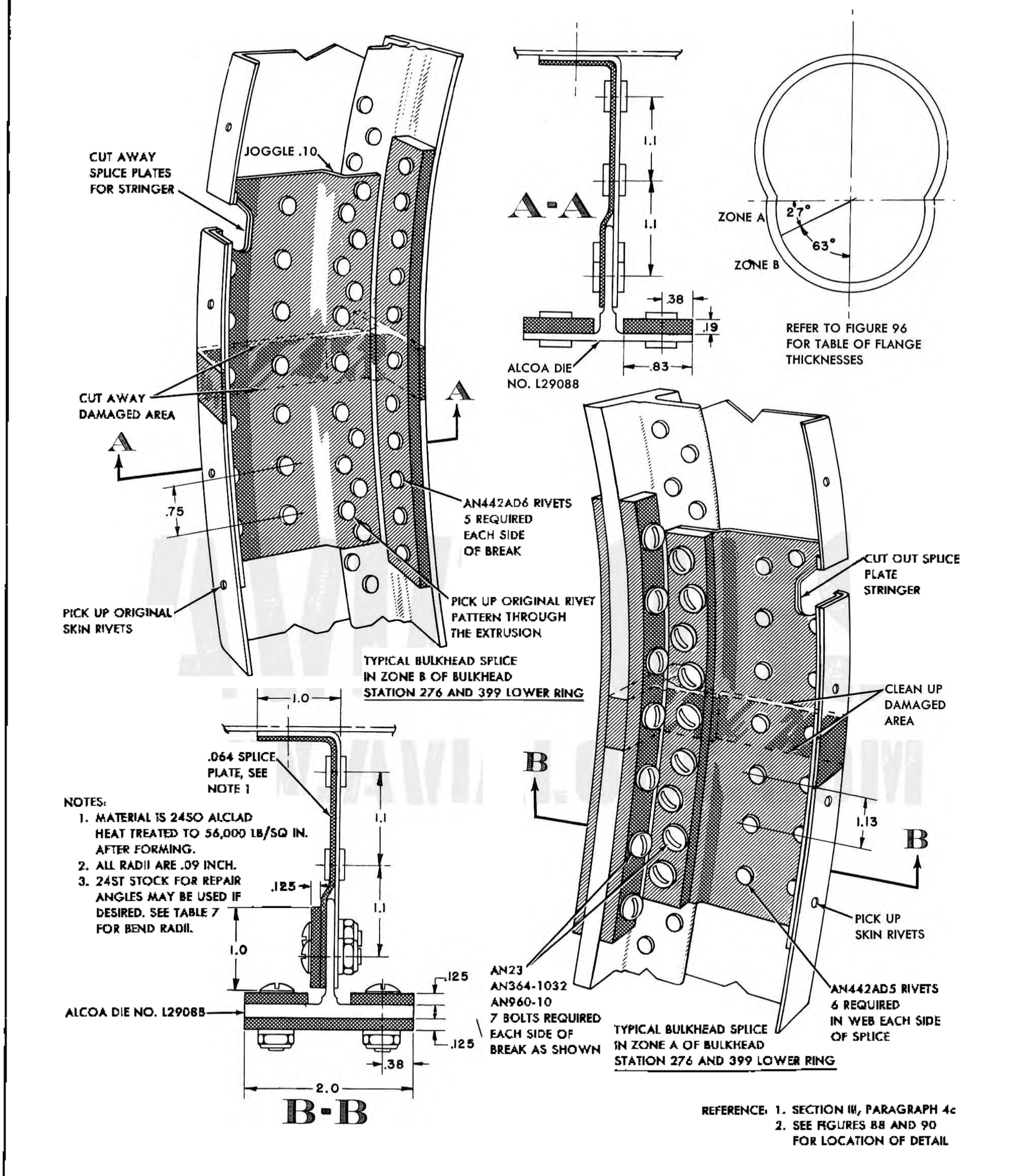
FIGURE 62 — GENERAL BULKHEAD REPAIR FOR MINOR DAMAGE



NOTES:
1. WHEN "D" IS GREATER THAN 1.5 INCHES, A WEB FILLER MUST BE USED
2. IF DAMAGE EXTENDS WITHIN .75 INCH OF FLANGE, EXTEND THE PATCH TO PICK UP FLANGE USING ORIGINAL SKIN RIVET PATTERN
3. ALL RIVET SPACING IS ± .13 INCH

REFERENCE: SECTION III, PARAGRAPH 4., c.

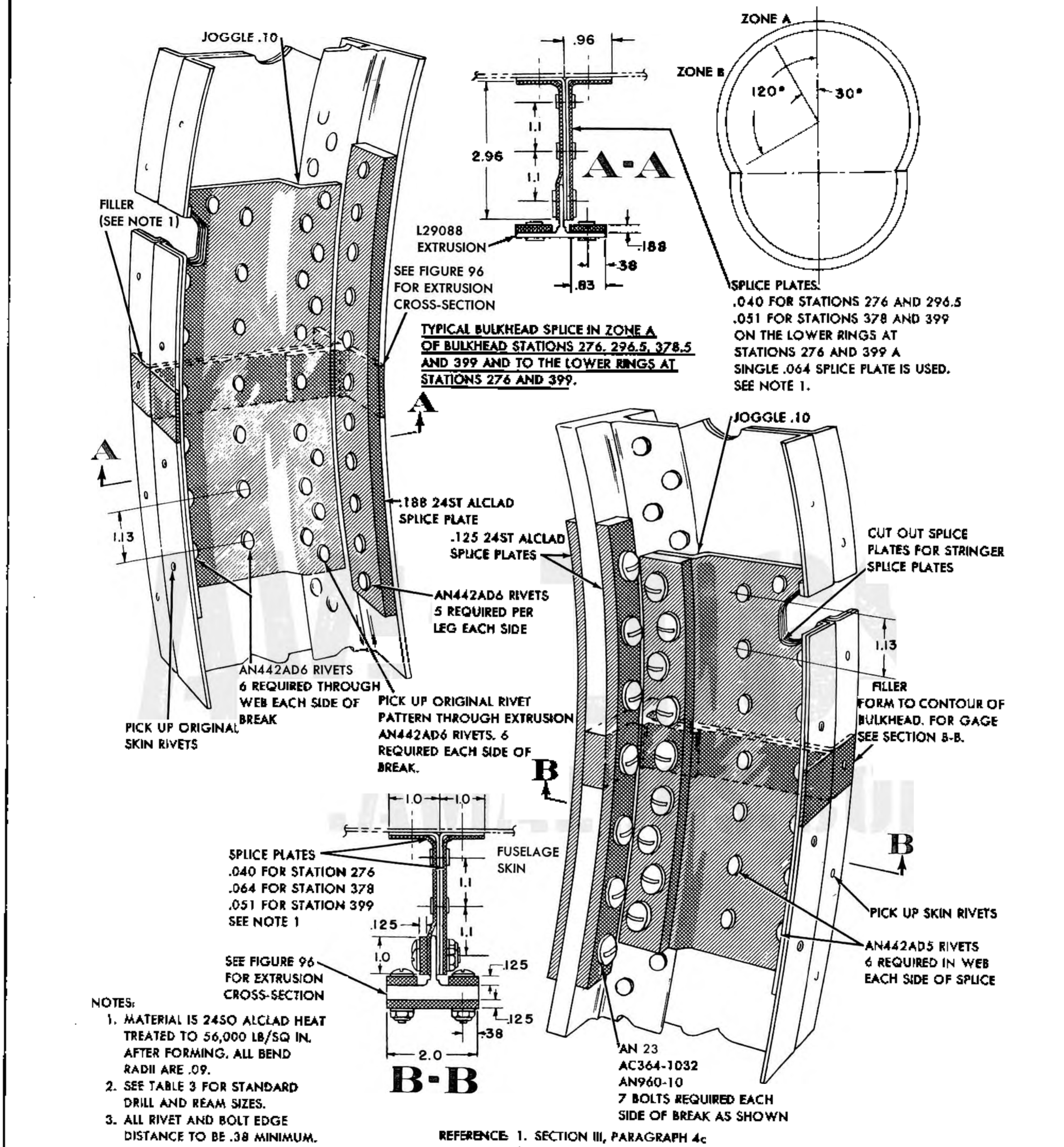
FIGURE 63—REPAIR TO GROUP "A" BULKHEADS—DAMAGE CONFINED TO WEB



NOTES:
1. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
2. ALL RADII ARE .09 INCH.
3. 24ST STOCK FOR REPAIR ANGLES MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4c
2. SEE FIGURES 88 AND 90 FOR LOCATION OF DETAIL

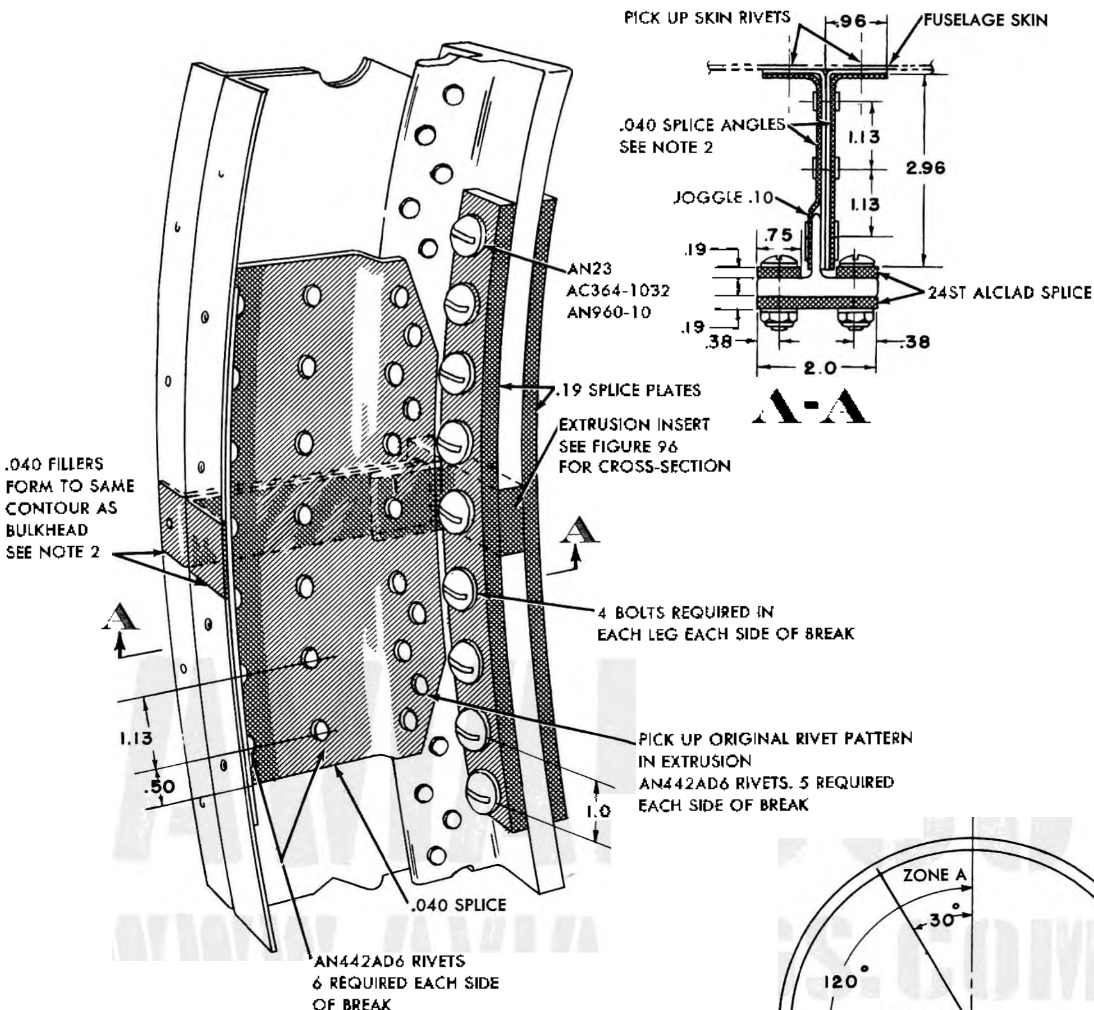
FIGURE 64—REPAIR TO GROUP "A" BULKHEADS 276 AND 399 LOWER RING

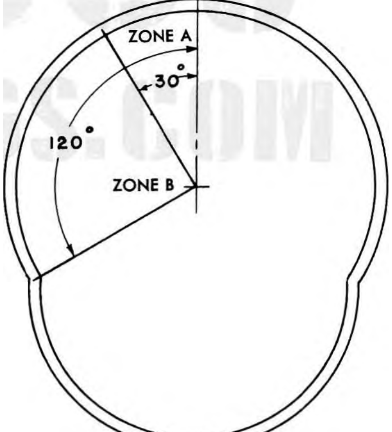


NOTES:
1. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING. ALL BEND RADII ARE .09.
2. SEE TABLE 3 FOR STANDARD DRILL AND REAM SIZES.
3. ALL RIVET AND BOLT EDGE DISTANCE TO BE .38 MINIMUM.
4. 24ST ALCLAD STOCK FOR REPAIR ANGLES MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4c
2. FIGURE 42 AND 44

FIGURE 65 — DETAIL A REPAIR



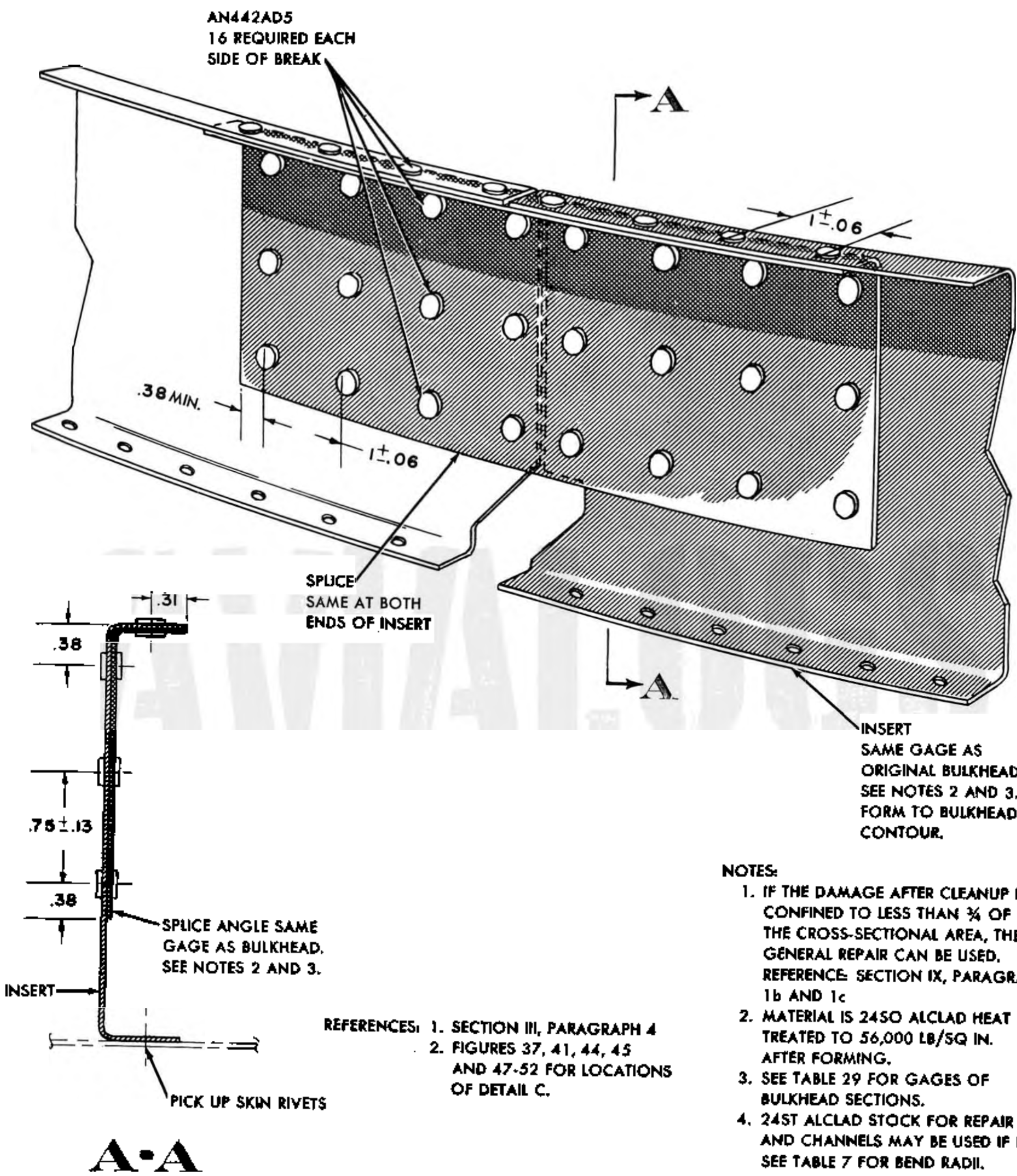


TYPICAL BULKHEAD REPAIR IN ZONE B
FOR BULKHEAD STATION 296.5

NOTES:
1. FOR REPAIR OF THE UPPER RING, ZONE 0-30°, SEE FIGURE 65.
2. MATERIAL IS 24SO ALCLAD HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING.
3. 24ST ALCLAD STOCK FOR REPAIR ANGLES MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4c
2. FIGURE 39 AND 44

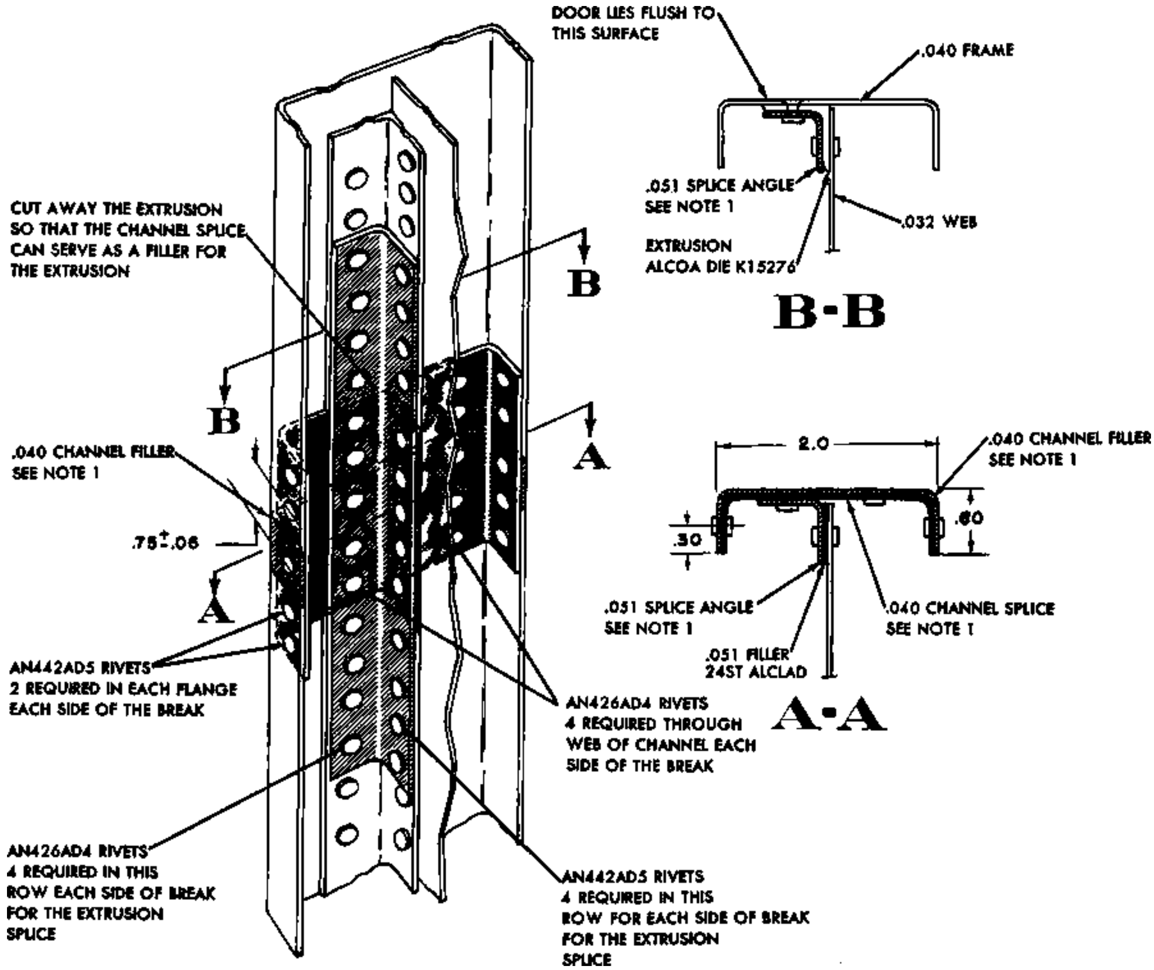
FIGURE 66 — DETAIL B REPAIR



REFERENCES: 1. SECTION III, PARAGRAPH 4
2. FIGURES 37, 41, 44, 45 AND 47-52 FOR LOCATIONS OF DETAIL C.

NOTES:
1. IF THE DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL REPAIR CAN BE USED. REFERENCE: SECTION IX, PARAGRAPH 1b AND 1c
2. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
3. SEE TABLE 29 FOR GAGES OF BULKHEAD SECTIONS.
4. 24ST ALCLAD STOCK FOR REPAIR ANGLES AND CHANNELS MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

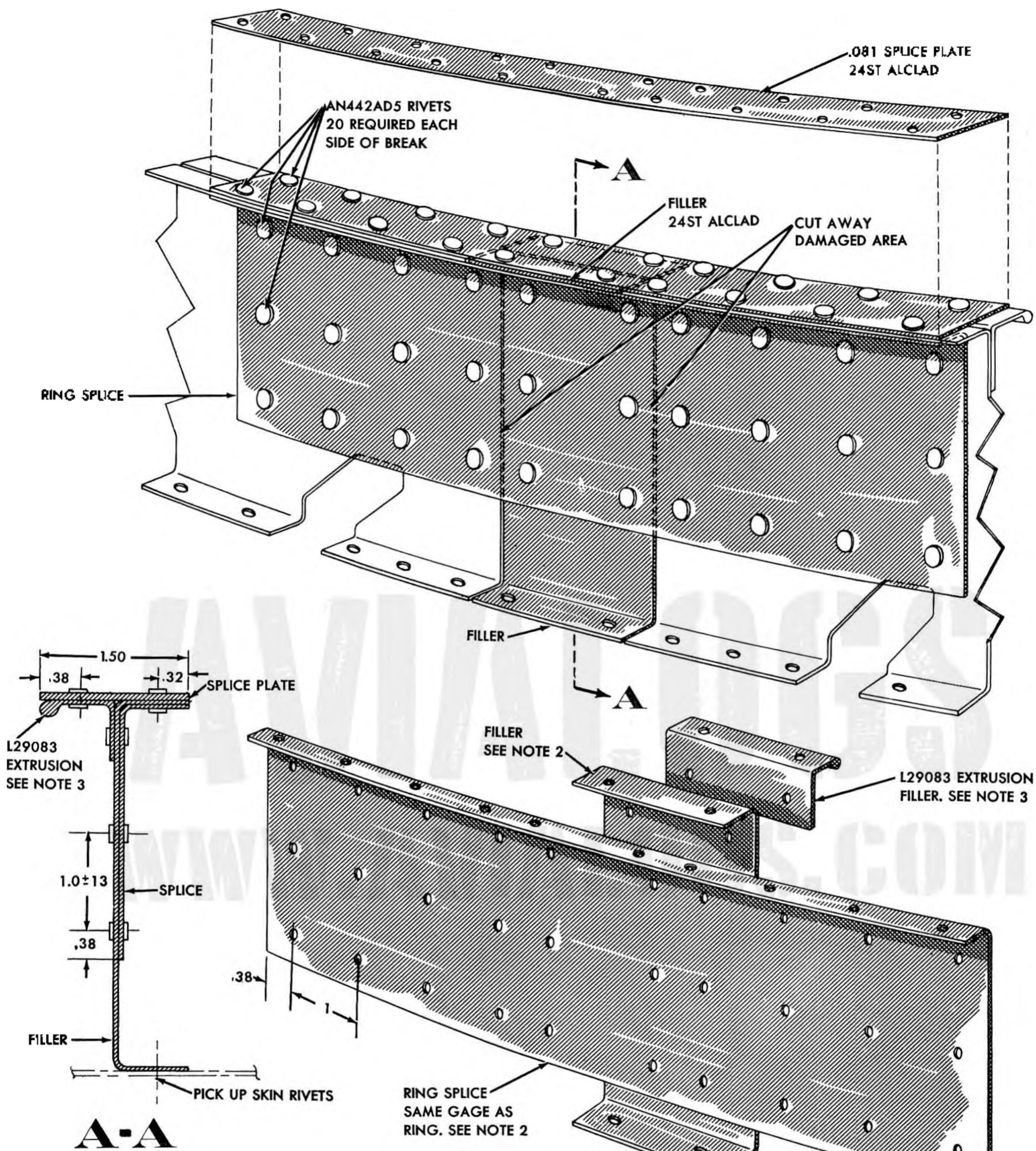
FIGURE 67 — DETAIL C REPAIR



NOTES:
1. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. IN REPAIR OF EXTRUSION, PICK UP EXISTING RIVET PATTERN
3. UNLESS OTHERWISE SPECIFIED, MINIMUM EDGE DISTANCE ON RIVETS TO BE .32 INCH
4. 24ST ALCLAD STOCK FOR REPAIR ANGLES AND CHANNELS MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCES: 1. SECTION III, PARAGRAPH 4d(6)
2. FIGURE 37 FOR LOCATION OF THE DETAIL

FIGURE 68 — DETAIL D REPAIR

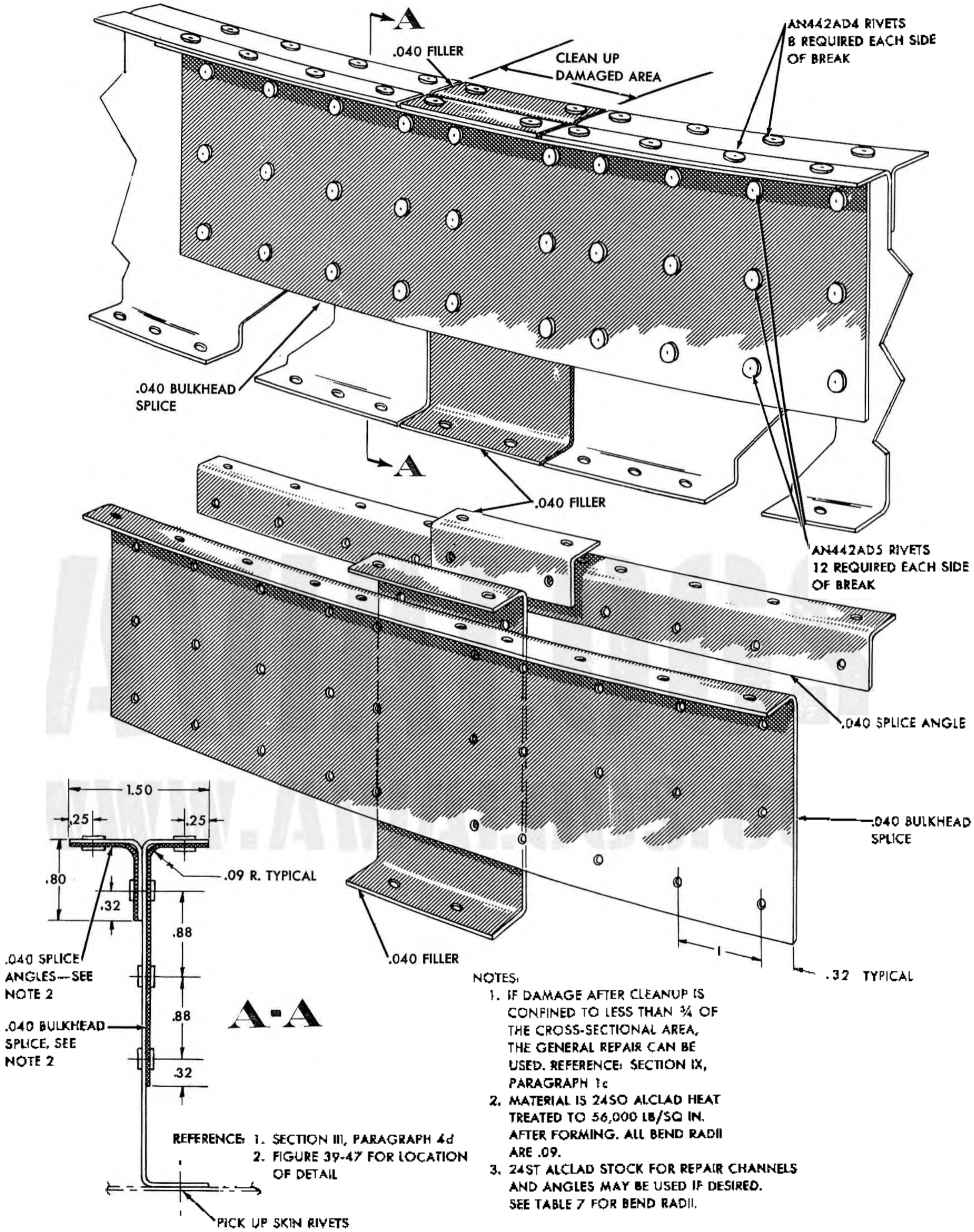


NOTES:

1. IF DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL REPAIR CAN BE USED. REFERENCE: SECTION IX, PARAGRAPH 1c.
2. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING. ALL BEND RADII ARE .09
3. FOR REPAIR OF L29083 EXTRUSION ALONE, SEE SECTION IX, PARAGRAPH 2.
4. 24ST ALCLAD STOCK FOR REPAIR CHANNELS AND ANGLES MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4d
2. FIGURES 35, 38-41, 44, 45, 47, 51, 52 FOR LOCATION OF DETAIL

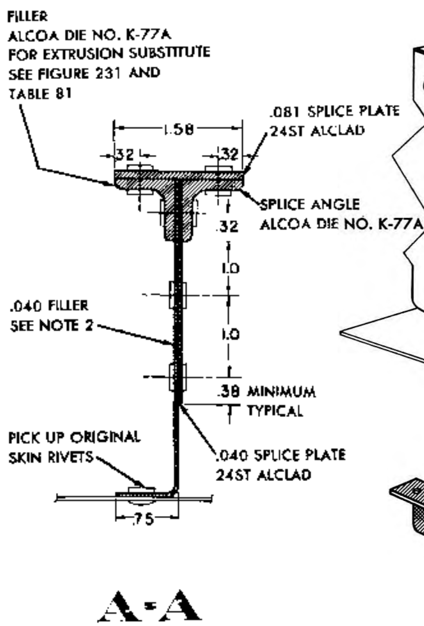
FIGURE 69 — DETAIL E REPAIR

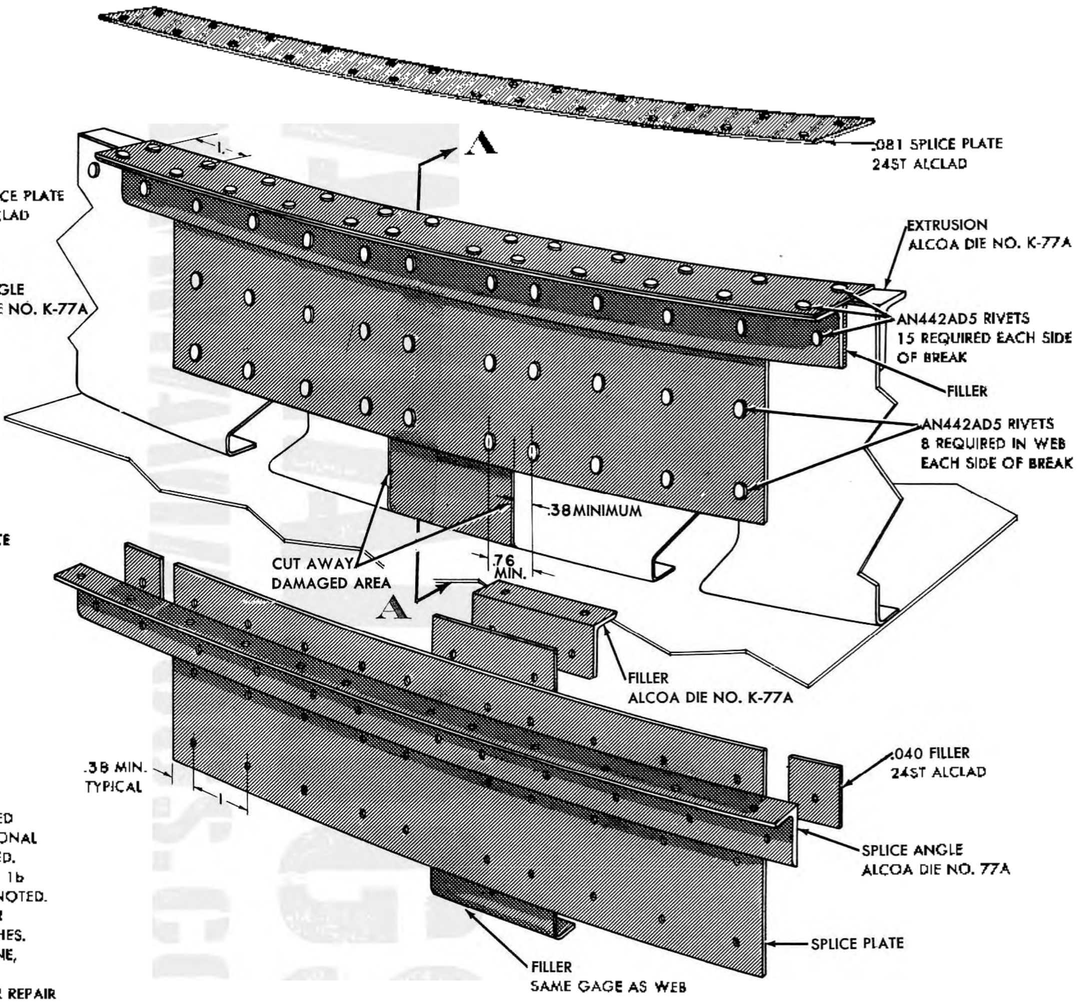


REFERENCE: 1. SECTION III, PARAGRAPH 4d
2. FIGURE 39-47 FOR LOCATION OF DETAIL

NOTES:
1. IF DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL REPAIR CAN BE USED. REFERENCE: SECTION IX, PARAGRAPH 1c
2. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING. ALL BEND RADII ARE .09.
3. 24ST ALCLAD STOCK FOR REPAIR CHANNELS AND ANGLES MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

FIGURE 70 — DETAIL F REPAIR





NOTES.

1. IF DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL REPAIR CAN BE USED. REFERENCE: SECTIONAL IX, PARAGRAPH 1b
2. MATERIAL IS 24SO ALCLAD EXCEPT AS NOTED. HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING. ALL BEND RADII ARE .09 INCHES.
3. FOR REPAIR OF K-77A EXTRUSION ALONE, SEE SECTION IX, PARAGRAPH 2.
4. 24ST ALCLAD STOCK MAY BE USED FOR REPAIR ANGLES IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4d
2. FIGURE 48, 49 AND 50 FOR LOCATION OF DETAIL

FIGURE 71 — DETAIL G REPAIR

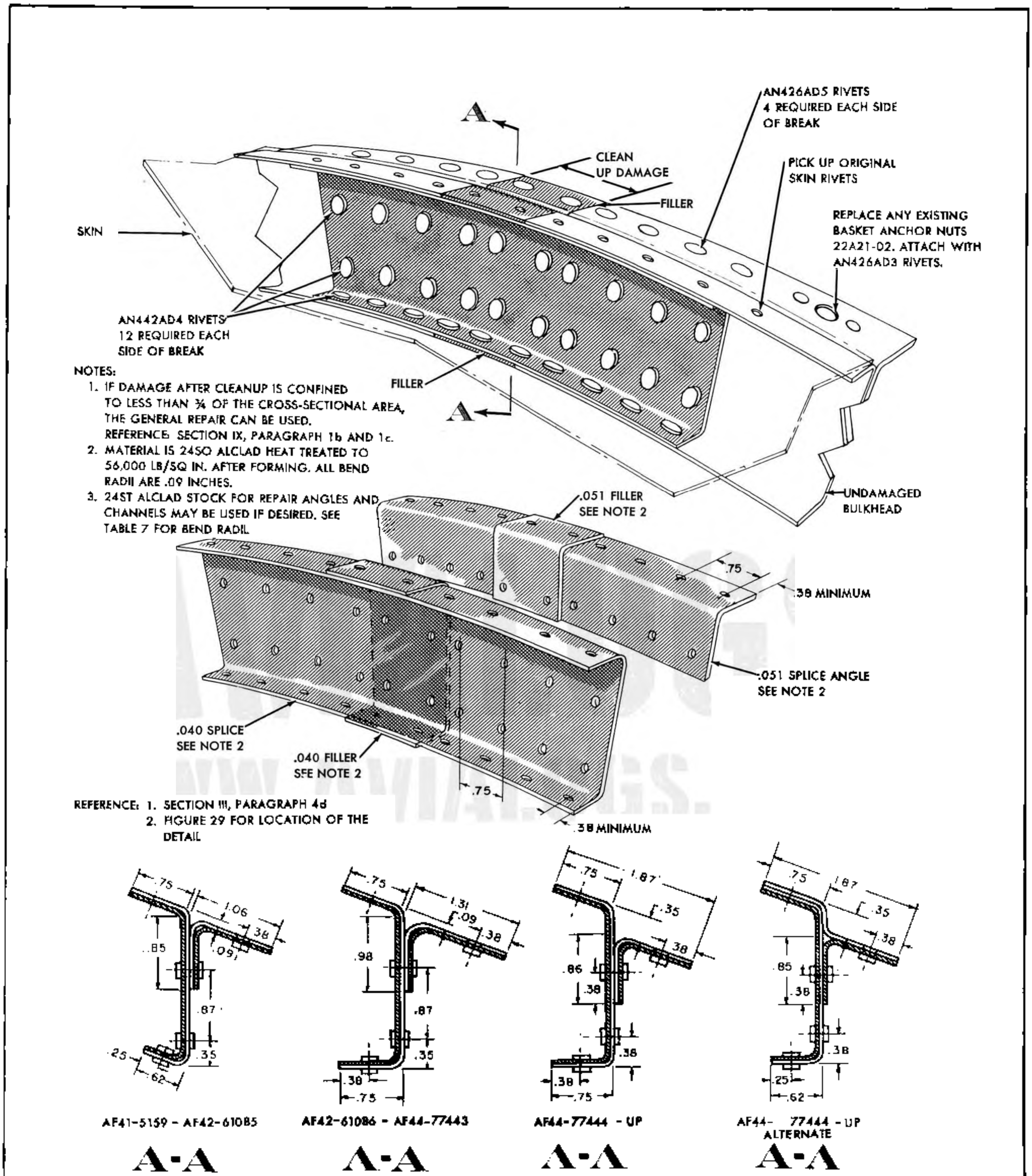
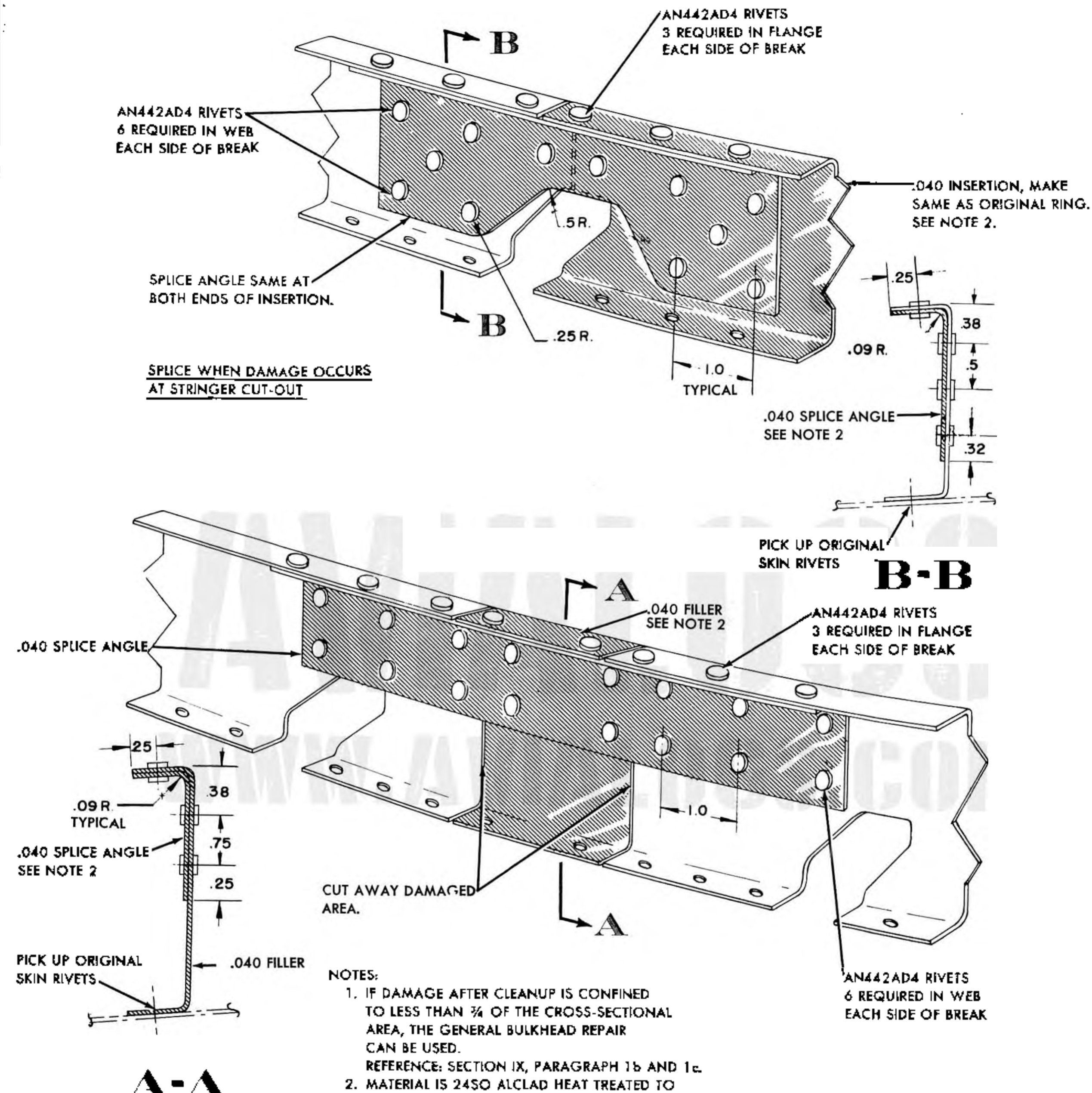


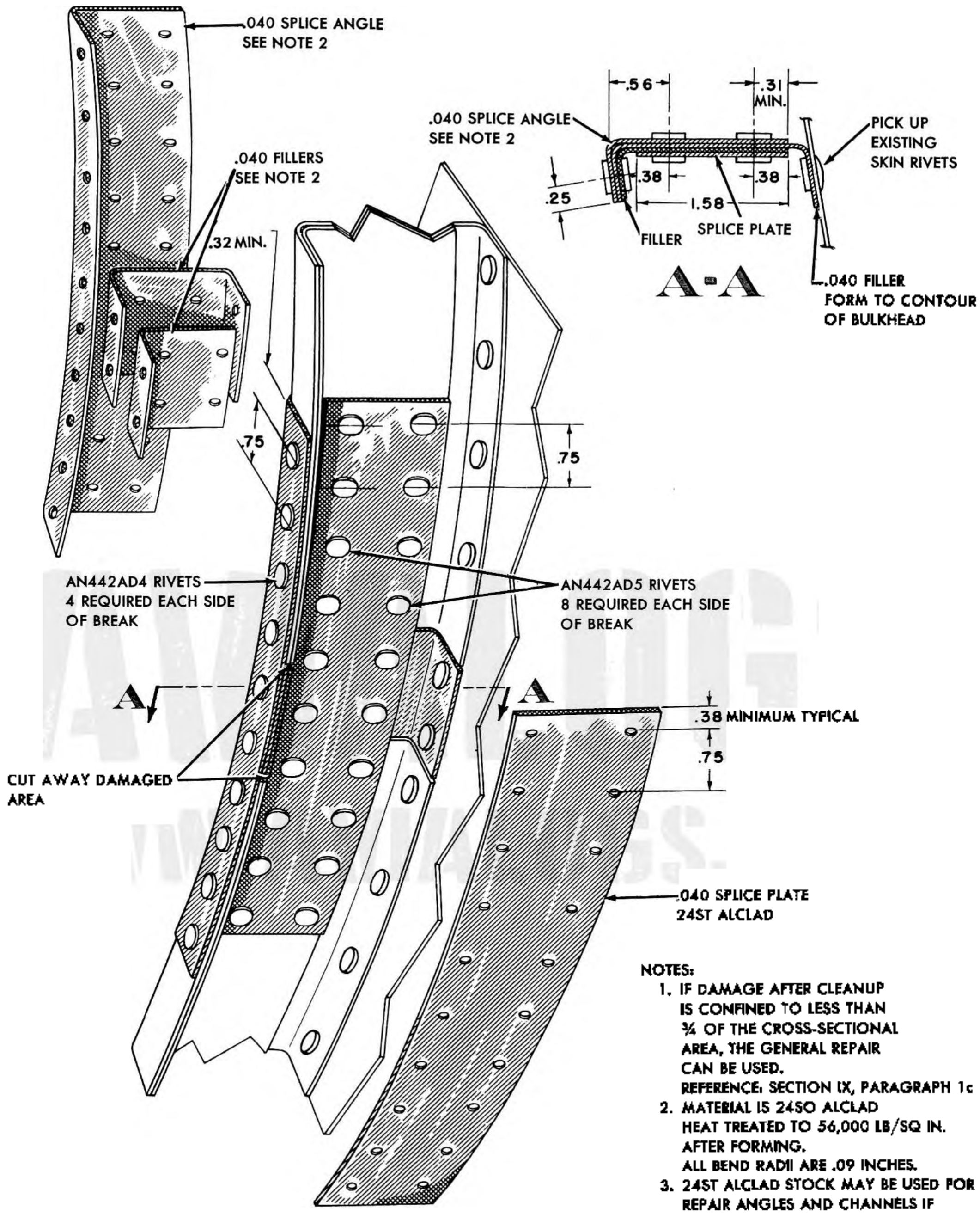
FIGURE 72 — DETAIL H REPAIR



NOTES:
1. IF DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL BULKHEAD REPAIR CAN BE USED.
   REFERENCE: SECTION IX, PARAGRAPH 1b AND 1c.
2. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING. ALL BEND RADII ARE .09 INCHES.
3. ALL RIVET EDGE DISTANCE TO BE .25 UNLESS OTHERWISE NOTED.
4. 24ST ALCLAD STOCK MAY BE USED FOR REPAIR ANGLES AND CHANNELS IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4e
2. FIGURE 30-32, 34-36 FOR LOCATION OF DETAIL

FIGURE 73 — DETAIL I REPAIR

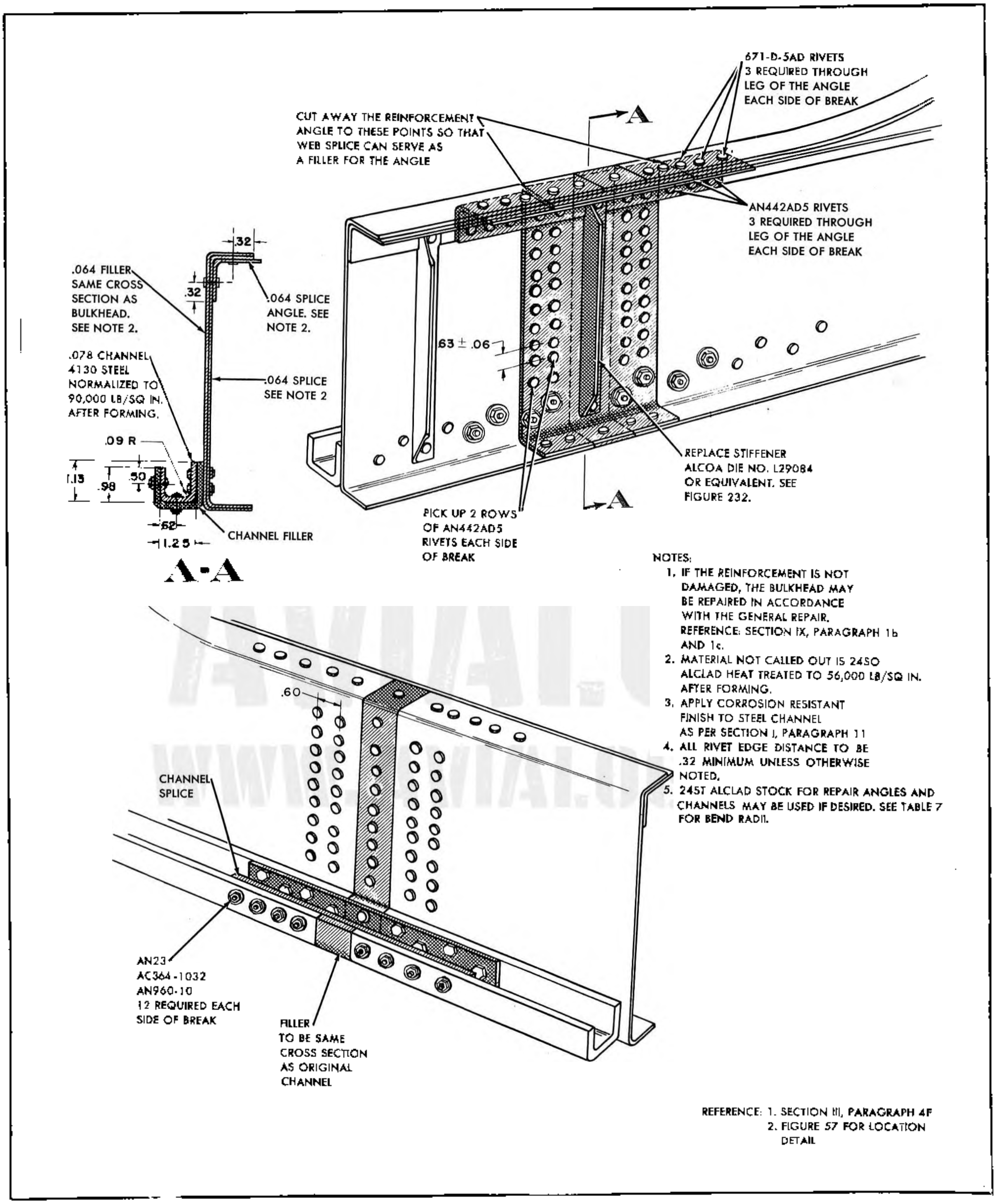


NOTES:

1. IF DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL REPAIR CAN BE USED. REFERENCE: SECTION IX, PARAGRAPH 1c
2. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING. ALL BEND RADII ARE .09 INCHES.
3. 24ST ALCLAD STOCK MAY BE USED FOR REPAIR ANGLES AND CHANNELS IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SEE FIGURE 35 FOR LOCATION OF THE DETAIL
2. SECTION III, PARAGRAPH 4e

FIGURE 74 — DETAIL J REPAIR

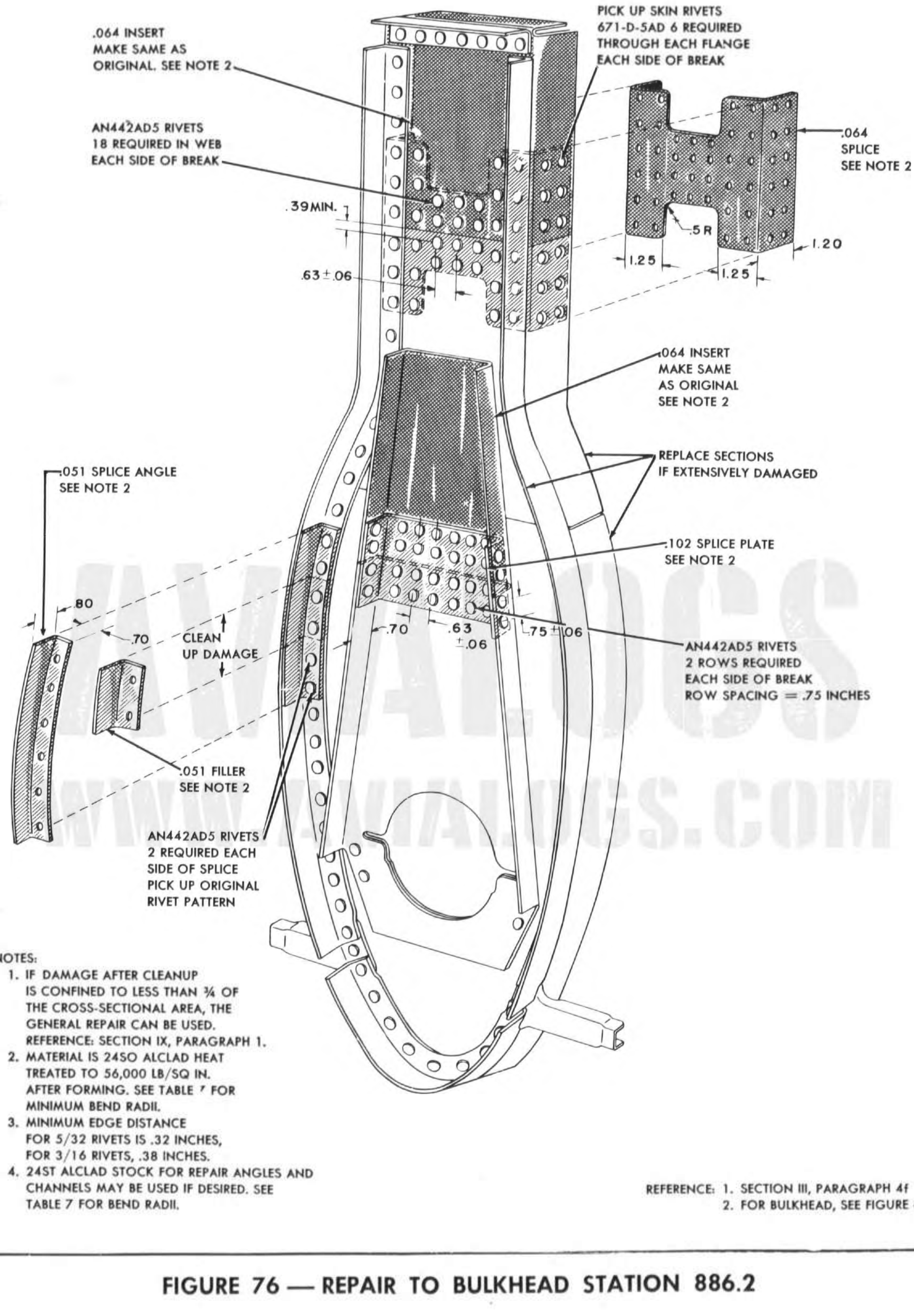


NOTES:

1. IF THE REINFORCEMENT IS NOT DAMAGED, THE BULKHEAD MAY BE REPAIRED IN ACCORDANCE WITH THE GENERAL REPAIR. REFERENCE: SECTION IX, PARAGRAPH 1b AND 1c.
2. MATERIAL NOT CALLED OUT IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
3. APPLY CORROSION RESISTANT FINISH TO STEEL CHANNEL AS PER SECTION I, PARAGRAPH 11
4. ALL RIVET EDGE DISTANCE TO BE .32 MINIMUM UNLESS OTHERWISE NOTED.
5. 24ST ALCLAD STOCK FOR REPAIR ANGLES AND CHANNELS MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4F
2. FIGURE 57 FOR LOCATION DETAIL

FIGURE 75 — DETAIL K REPAIR



NOTES:
1. IF DAMAGE AFTER CLEANUP IS CONFINED TO LESS THAN ¾ OF THE CROSS-SECTIONAL AREA, THE GENERAL REPAIR CAN BE USED. REFERENCE: SECTION IX, PARAGRAPH 1.
2. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING. SEE TABLE 7 FOR MINIMUM BEND RADII.
3. MINIMUM EDGE DISTANCE FOR 5/32 RIVETS IS .32 INCHES, FOR 3/16 RIVETS, .38 INCHES.
4. 24ST ALCLAD STOCK FOR REPAIR ANGLES AND CHANNELS MAY BE USED IF DESIRED. SEE TABLE 7 FOR BEND RADII.

REFERENCE: 1. SECTION III, PARAGRAPH 4f
2. FOR BULKHEAD, SEE FIGURE 61

FIGURE 76 — REPAIR TO BULKHEAD STATION 886.2

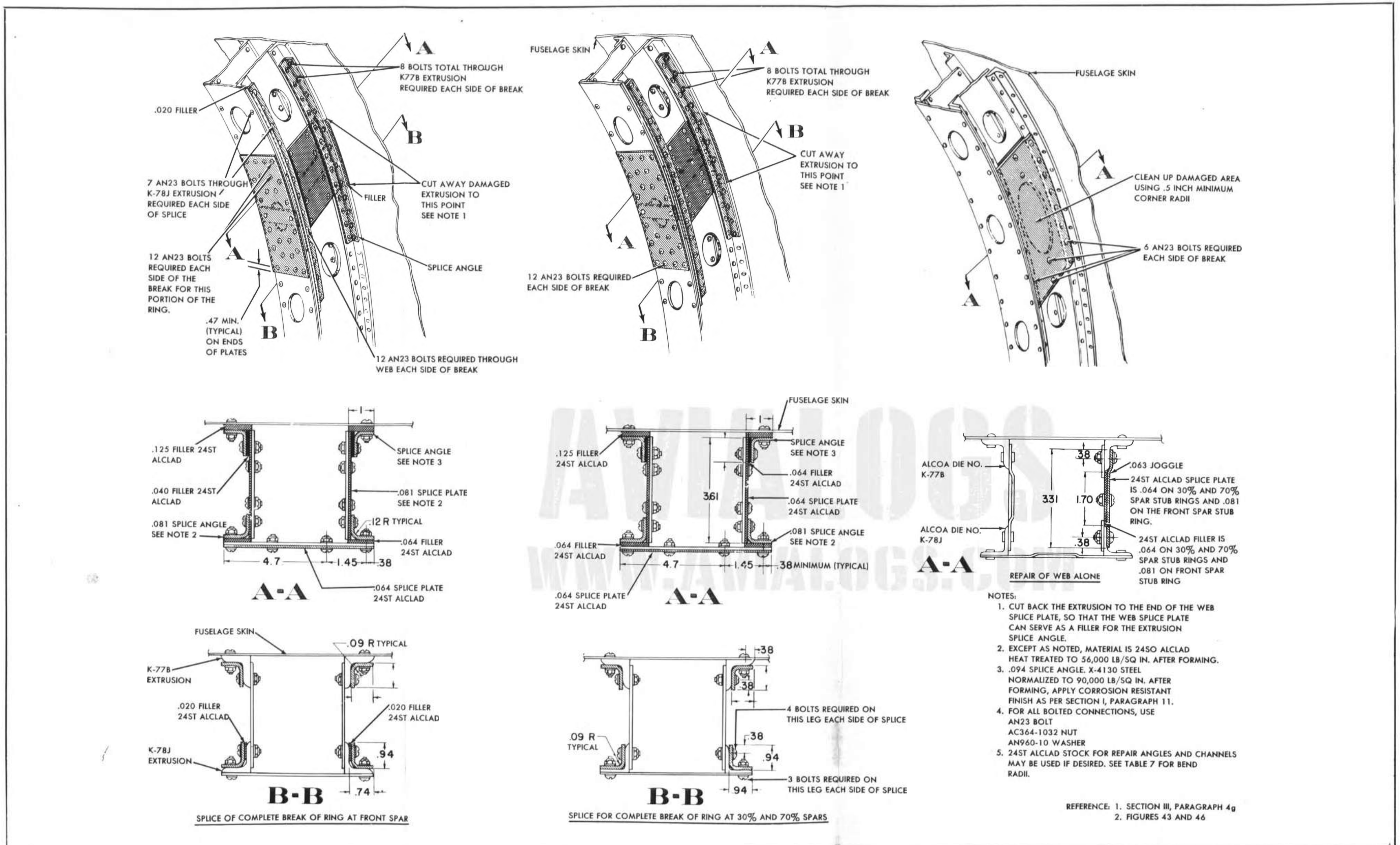


FIGURE 77 — REPAIR OF STUB RINGS

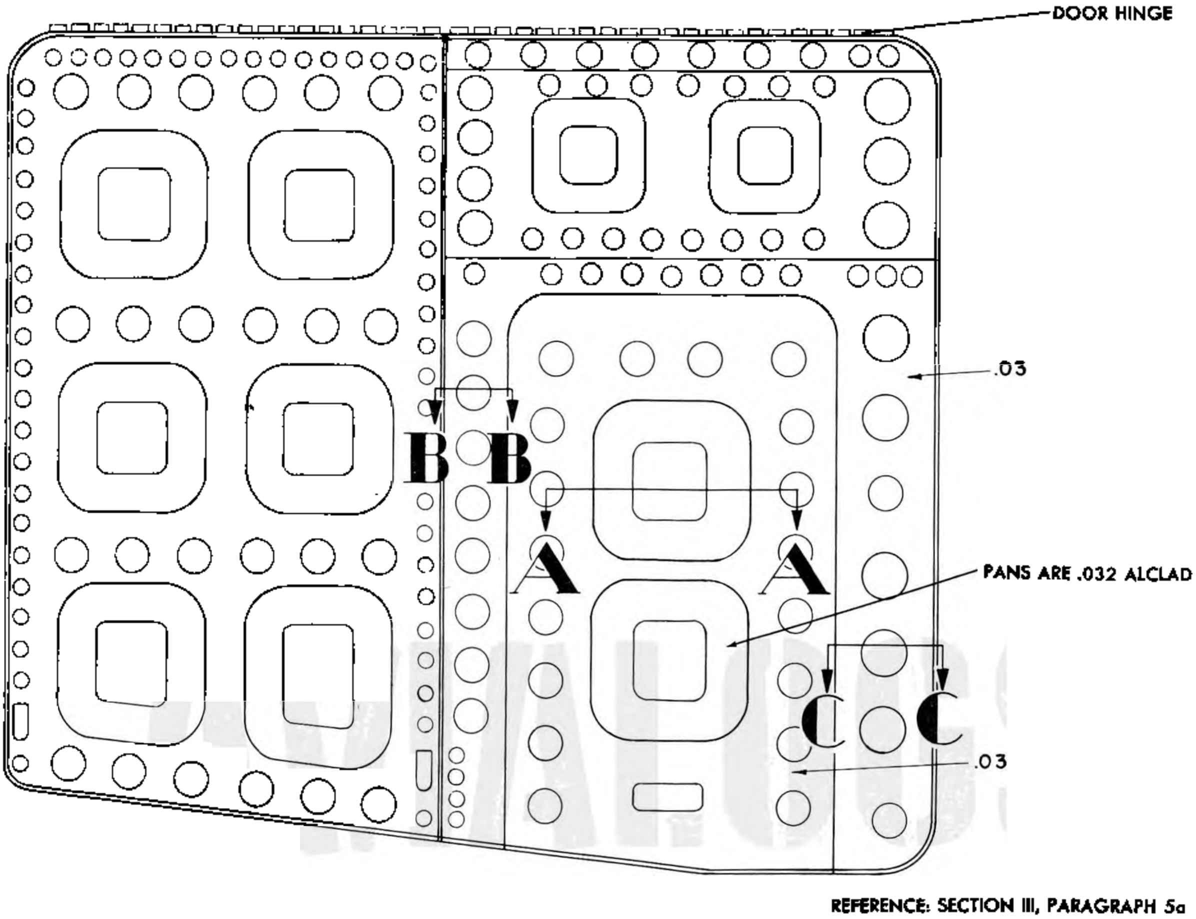


FIGURE 78—MAIN CARGO DOOR DIAGRAM

5. CARGO, TROOP, AND JUMP DOORS.

a. GENERAL.—The main cargo door is built in two sections—one forward and one aft, both of which open outward. The troop door, hinged at the top and opening inward is built into the forward half of the main cargo door, see figure 78. Two jump doors, added at airplane number AF44-77445 are of the same general type of construction but are designed to be quickly removable, see figures 83A and 83B. The left hand jump door is located within the aft section of the main cargo door, and the right hand jump door is located directly opposite. Each supporting structure is composed of webs, channels, and bulkheads. The frame is stiffened and the skin supported by pans formed from .032 sheet. The right hand jump door frame is reinforced by external fuselage doublers, see figure 92A, and by external hat section stiffeners, see figure 93.

The main cargo door frame is composed of webs and bulkheads, see figure 80. The sill consists essentially of an .081 angle, a .064 zee section, and an angle extrusion. There is a .019 stainless steel scuff guard on the sill.

b. NEGLIGIBLE DAMAGE.—Smooth isolated dents, free from cracks, abrasions, and sharp corners are negligible. Small holes and cracks in the pans that can be circumscribed by a .5 diameter circle may be neglected. Nicks in the edges of the flanges of the bulkheads, lightening holes, and sill members that do not exceed a depth of .19 inch when cleaned up with a file, may be neglected.

c. DAMAGE REPAIRABLE BY PATCHING.—Small holes and cracks in the .032 skin and in the flats of the bulkheads and webs should be patched as

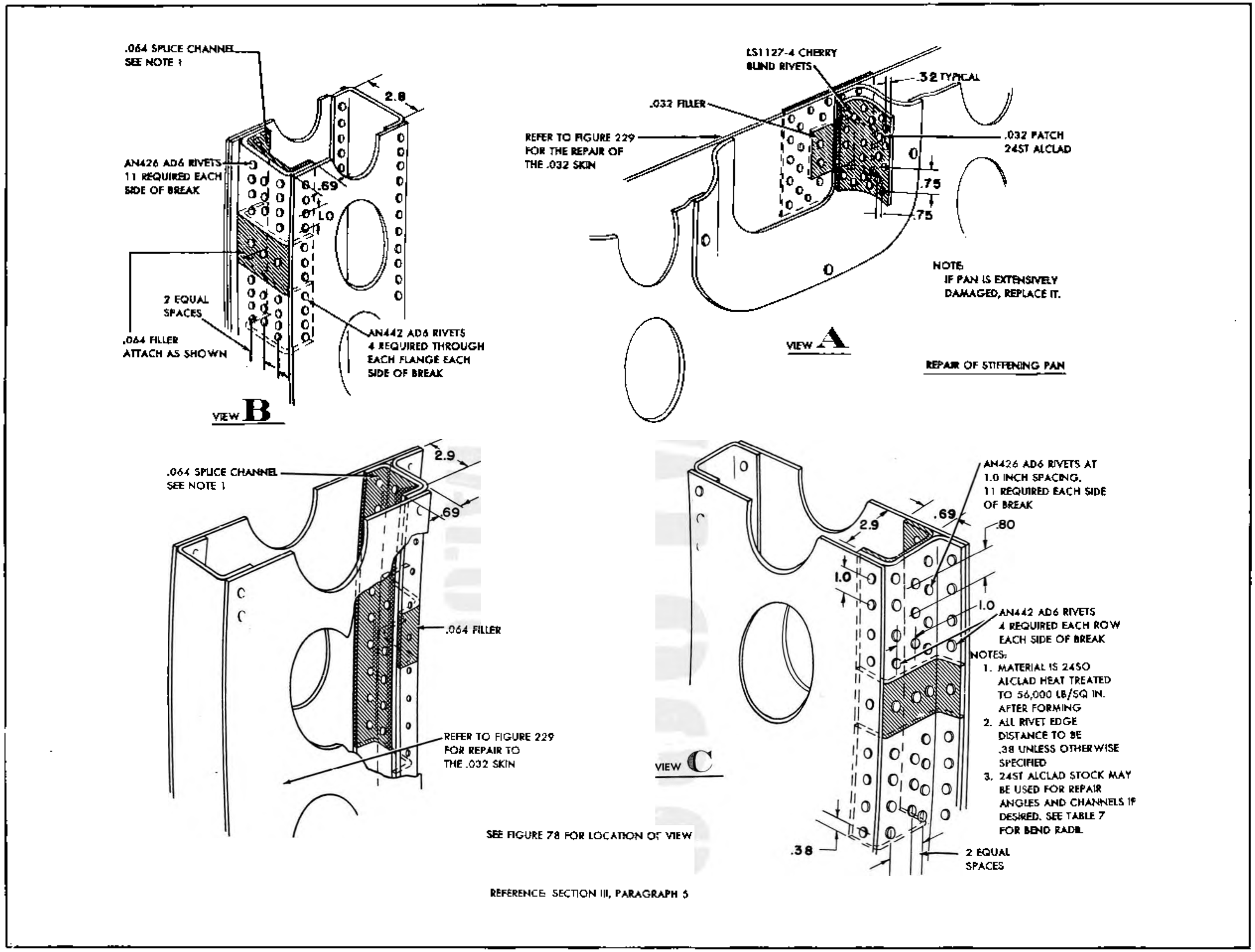
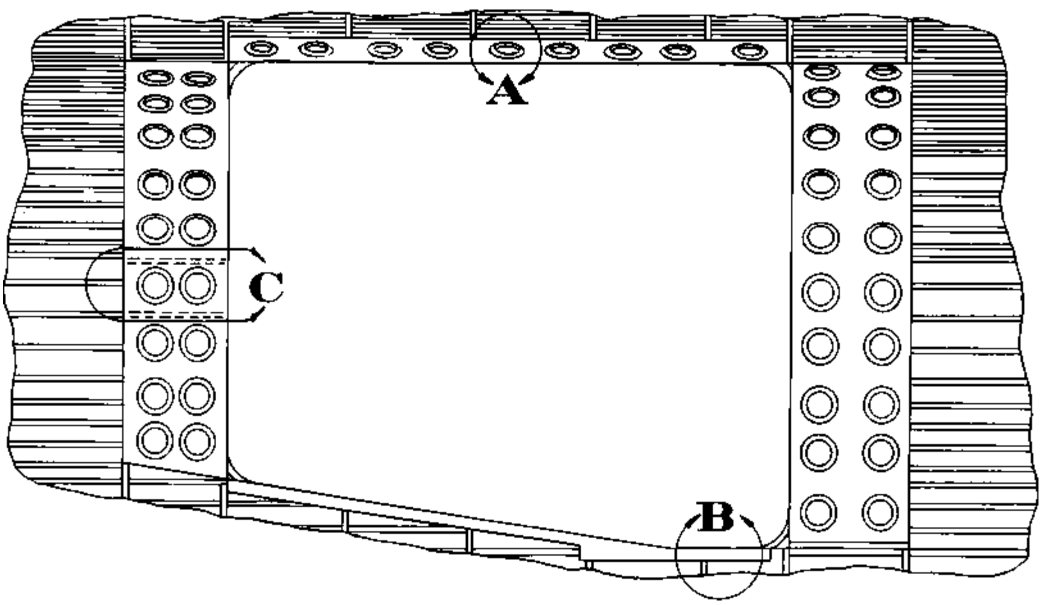


FIGURE 79 — MAIN CARGO DOOR AND PAN REPAIRS

FOR REPAIR TO VIEW A, SEE FIGURE 83.
FOR REPAIR TO VIEW B, SEE FIGURE 82.
FOR REPAIR TO VIEW C, SEE FIGURE 81.



REFERENCE: SECTION II, PARAGRAPH 5

FIGURE 80 —MAIN CARGO DOOR FRAME DIAGRAM

shown in the general repair, figure 229. Stop all cracks with a 1/8 inch hole at each end. Damage to the pans may be repaired as shown in figure 79. Use a .032 patch with two rows of LS-1127-5 blind rivets at .75 inch spacing. Other damages to sections of the doors and door frames may be patched as shown in figures 79 and 81. The sill is built from a formed angle, a zee section and an angle extrusion. These sections may be patched according to figure 82.

d. DAMAGE REPAIRABLE BY INSERTION.

It is not necessary to splice the stainless steel guard on the sill—see figure 82. If the guard is extensively damaged insert a new section. Damages to areas which cannot be effectively patched due either to their extent or to their locations may be repaired by use of inserts, see figure 83.

e. DAMAGE REQUIRING REPLACEMENT.—Replace all damaged clips, gussets and short channels. If the transverse stiffening ribs are extensively damaged, they should be replaced.

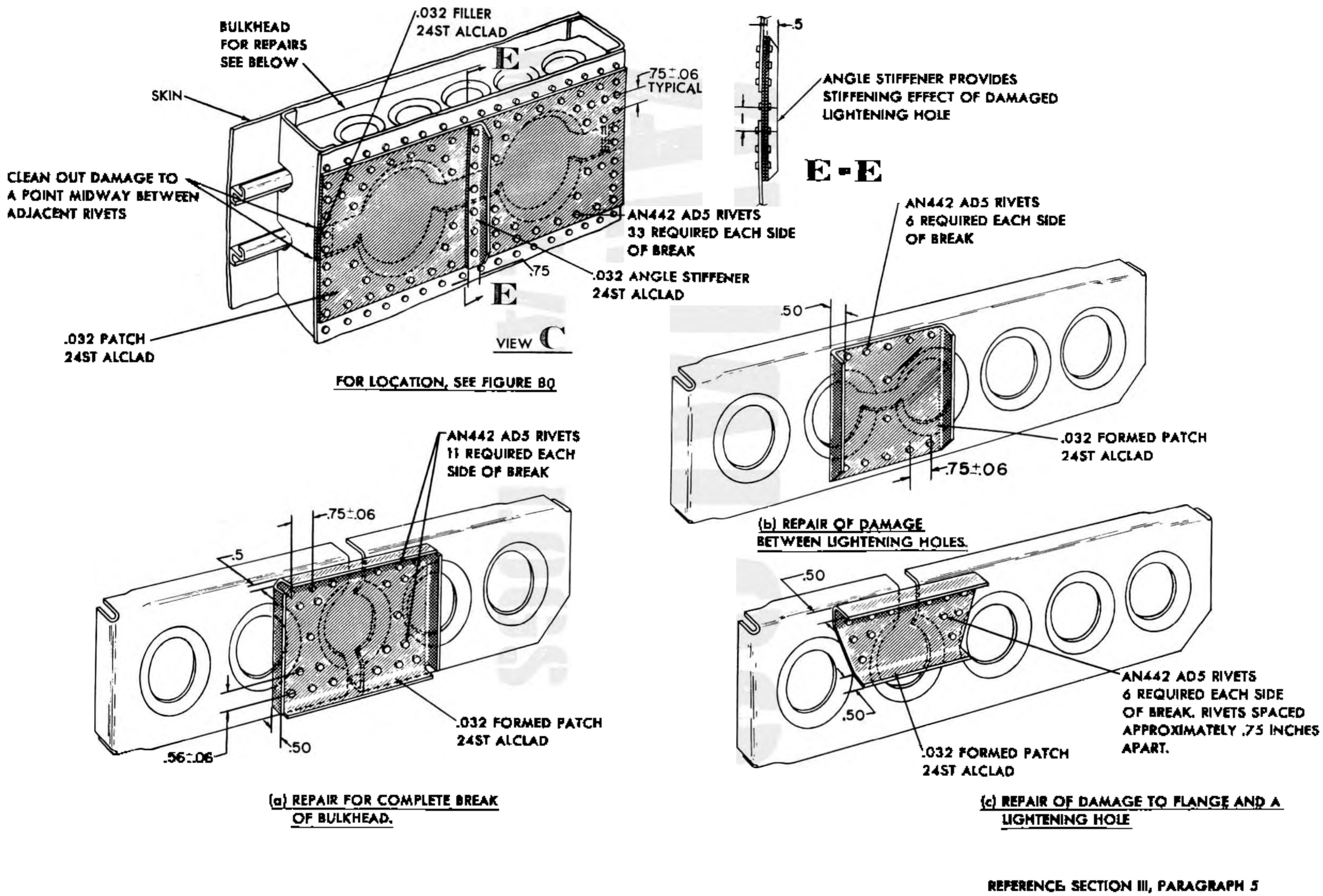


FIGURE 81 — MAIN CARGO DOOR FRAME REPAIRS

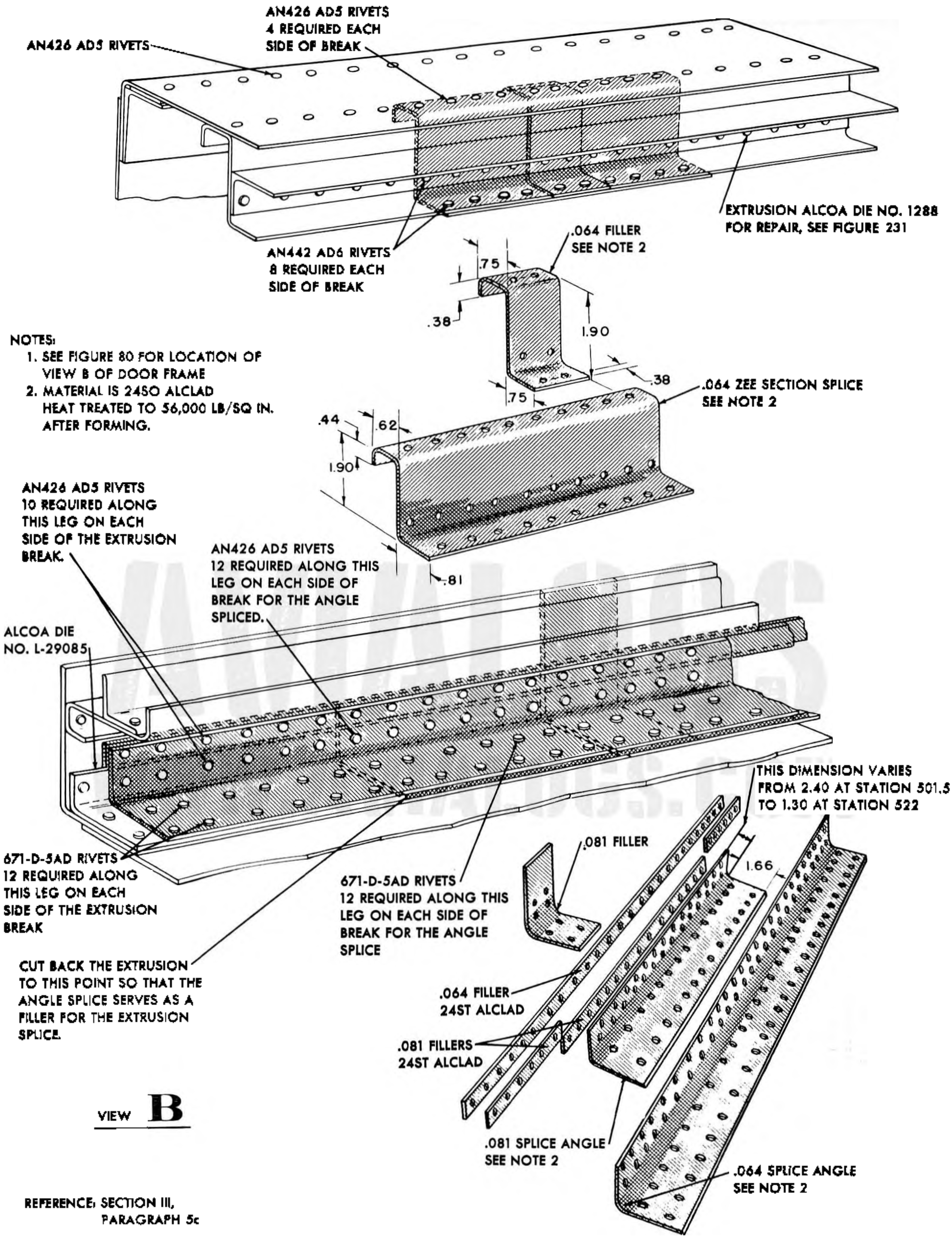


FIGURE 82—MAIN CARGO DOOR SILL SPLICE

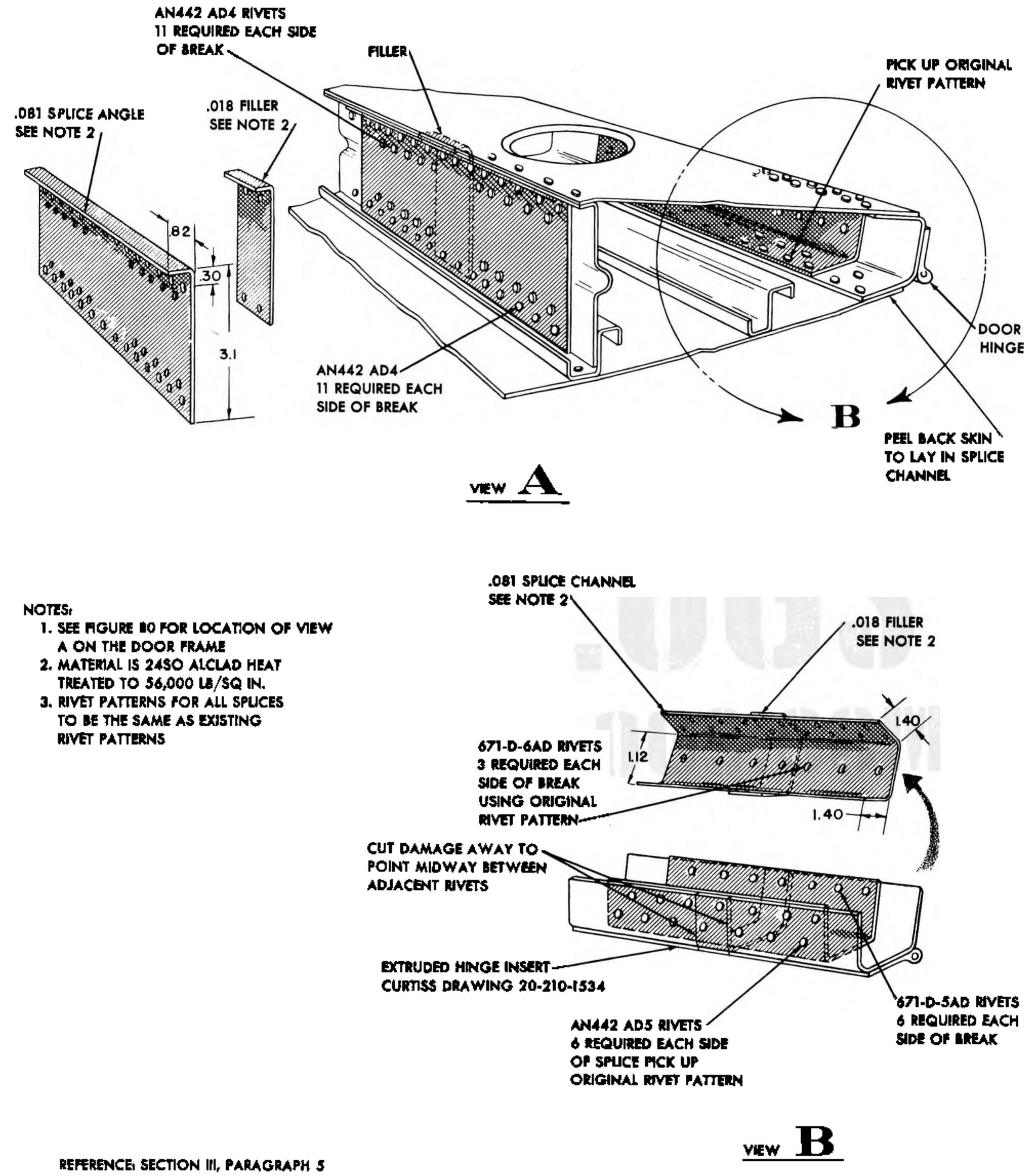


FIGURE 83 —MAIN CARGO DOOR HINGE INSERT

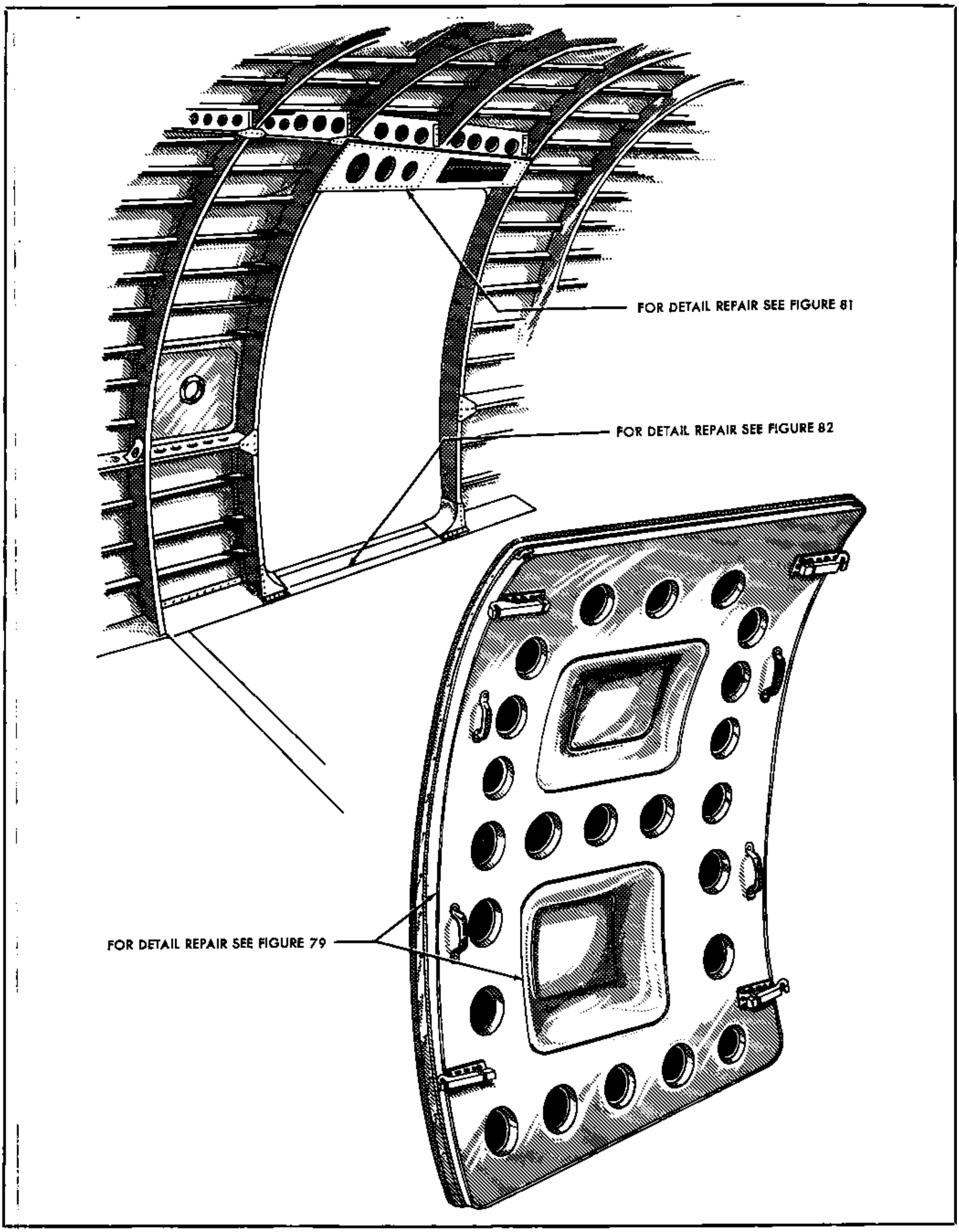


FIGURE 83A — RIGHT HAND JUMP DOOR

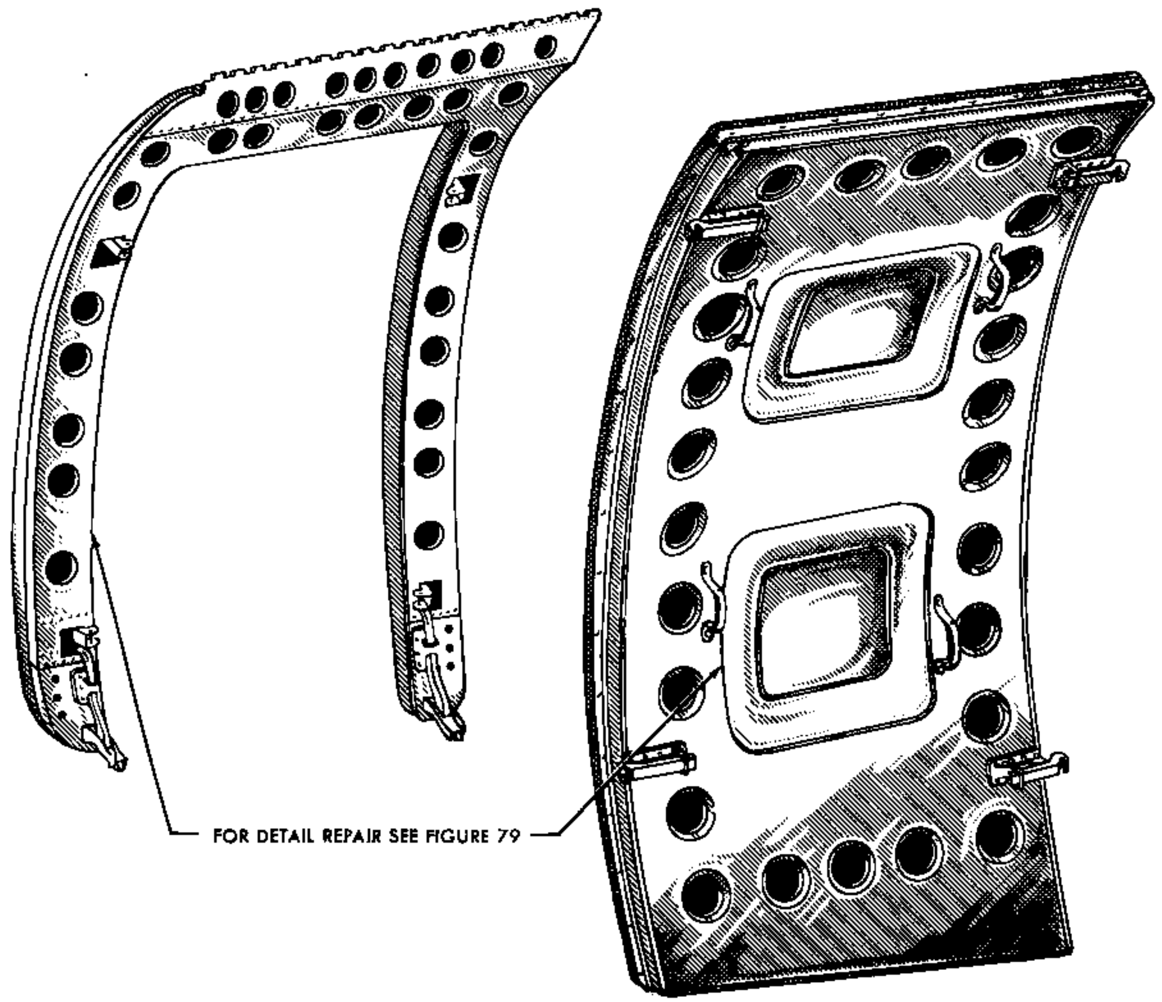
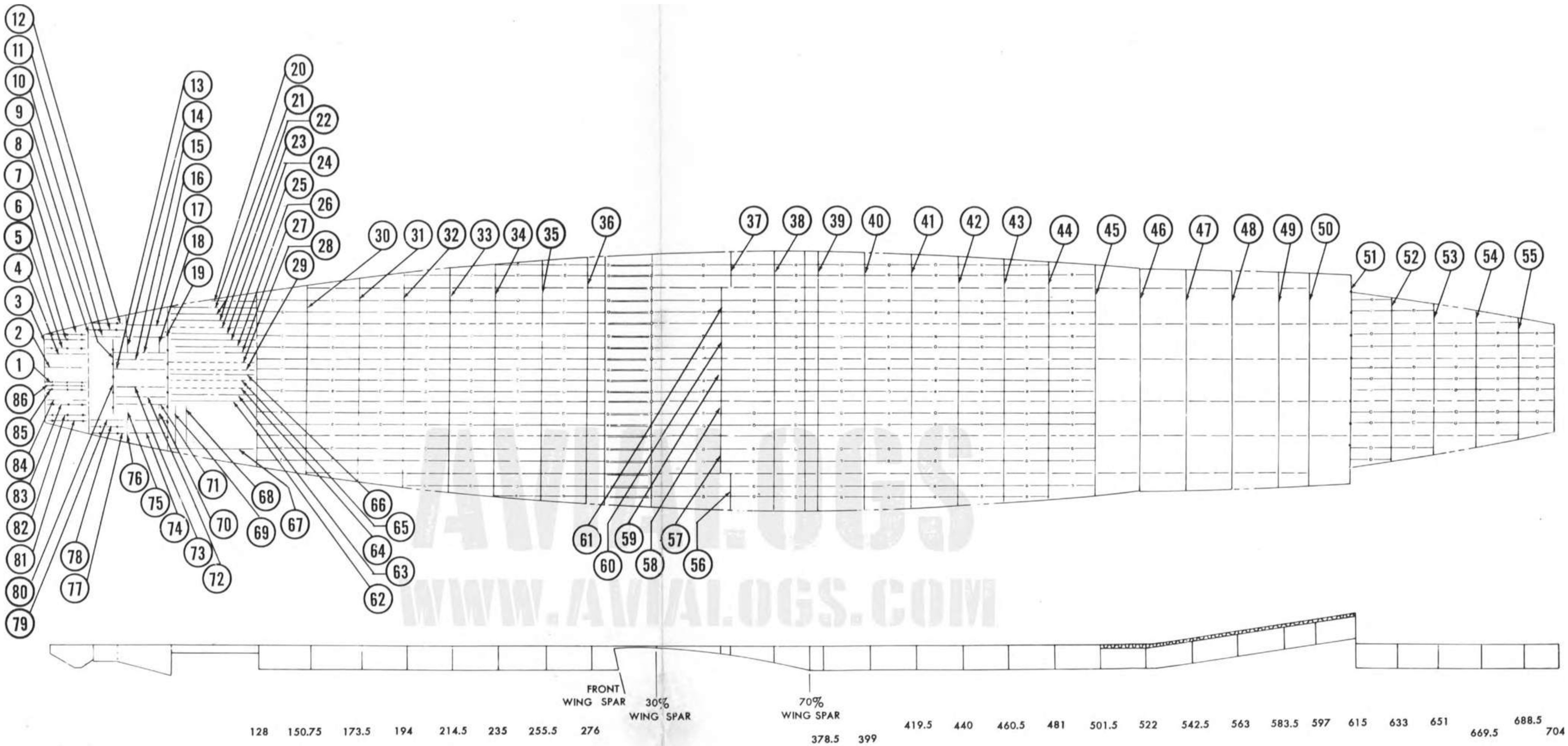


FIGURE 83B — LEFT HAND JUMP DOOR

NOTE

Early C-46D airplanes (see airplane designation chart following Table of Contents) incorporate formed plywood panel jump doors in lieu of the later all-metal doors. Damage to these doors is structurally negligible since the adjacent fuselage structure is designed to carry all loads; however, maintenance of a smooth outside contour by standard woodworking methods is essential.



LEGEND

.025
.032
.036
.040
.051

REFERENCE: 1. SECTION III, PARAGRAPH 6.
2. TABLE 30

FIGURE 84—FUSELAGE FLOORING DIAGRAM

TABLE 30
COMPONENT PARTS OF FLOOR

Item No	Part No.	Item No.	Part No.	Item No.	Part No.
1	20-260-1060-2R	30	20-210-1065-3	59	20-260-1002-86
2	20-260-1059-1	31	20-210-1071-3	60	20-260-1002-85
3	20-260-1062	32	20-210-1090-3	61	20-260-1002-84
4	20-260-1135-1	33	20-210-1113-3	62	20-260-1073-1
5	20-260-1057-2R	34	20-210-1086-3	63	20-260-1041-2
6	20-260-1057-2L	35	20-210-1111-3	64	20-260-1042-2L
7	20-260-1056-2R	36	20-210-1117-3	65	20-260-1042-2L
8	20-260-1055-1	37	20-260-1002-83	66	20-260-1041-2
9	20-260-1178-1	38	20-260-1002-83	67	20-260-1074-1
10	20-260-1049-1R	39	20-210-1128-3	68	20-260-1072-3
11	20-260-1040-2R	40	20-210-1123-3	69	20-260-1072-2
12	20-260-1039-2R	41	20-210-1114-3	70	20-260-1038-2
13	20-260-1183-1	42	20-210-1112-3	71	20-260-1051-1
14	20-260-1147-2	43	20-210-1116-3	72	20-260-1052-2L
15	20-260-1052-2R	44	20-210-1115-3	73	20-260-1053-1
16	20-260-1182-1	45	20-210-1129-3	74	20-260-1034-2L
17	20-260-1134-2R	46	20-210-1130-3	75	20-260-1147-2
18	20-260-1038-2	47	20-210-1131-3	76	20-260-1148-1L
19	20-260-1045-1	48	20-210-1132-3	77	20-260-1039-2L
20	20-260-1041-3	49	20-210-1133-3	78	20-260-1040-2L
21	20-260-1037-2	50	20-210-1134-3	79	20-260-1049-1L
22	20-260-1144-2R	51	20-210-1135-3	80	20-260-1050-1
23	20-260-1043-1	52	20-210-1118-3	81	20-260-1056-2L
24	20-260-1042-3	53	20-210-1119-3	82	20-260-1057-2R
25	20-260-1144-2L	54	20-210-1120-3	83	20-260-1057-2L
26	20-260-1036-2	55	20-210-1121-3	84	20-260-1058-1
27	20-260-1036-2	56	20-260-1002-83	85	20-260-1061-2
28	20-260-1042-5	57	20-260-1002-84	86	20-260-1060-2L
29	20-260-1042-4	58	20-260-1002-85		

6. FLOOR.

a. GENERAL.—The fuselage floor consists of longitudinal and transverse beams covered with a .032 24ST alclad sheet. The transverse beams are spaced about every 20 inches apart and are continuous. There are six longitudinal beams spaced approximately 16 inches apart. The flanges of the longitudinal beams are continuous and the webs are spliced at each intersection. In addition the floor is stiffened by means of longitudinal tee sections spaced about every 5.25 inches. Figure 84.

b. SKIN AND TRACKS.—Holes in the floor skin should not be neglected. The floor skin that is inaccessible in the region of the wing should be patched with .032 sheet with two rows of LS1127-4 rivets, spaced at one inch. For repair of the floor skin in the vicinity of the corrugations see figure 85.

Figure 86 shows a combined repair to the floor skin and track in a region in which the skin is accessible. The skin is patched with .032 24ST alclad and a single row of AN442 AD4 rivets at one inch. This skin patch is typical for all of the floor skin that is accessible. The damaged track is repaired by an insertion, end plugs being used to align the track sections. The original rivet pattern is used.

c. REPAIR OF LONGITUDINAL AND TRANSVERSE BEAMS.

(1) GENERAL.—The webs of the longitudinal beams are .036 except for the bays where the tie down fittings are located. At these bays the gages are .051. See figure 84. The vertical stiffeners are formed .5 x .5 x .040 angles, except:—the stiffeners on bays with tie down fittings and the two stiffeners under the litter post. These are extrusions, Alcoa Die No. 29084. If the formed angles are damaged extensively they should

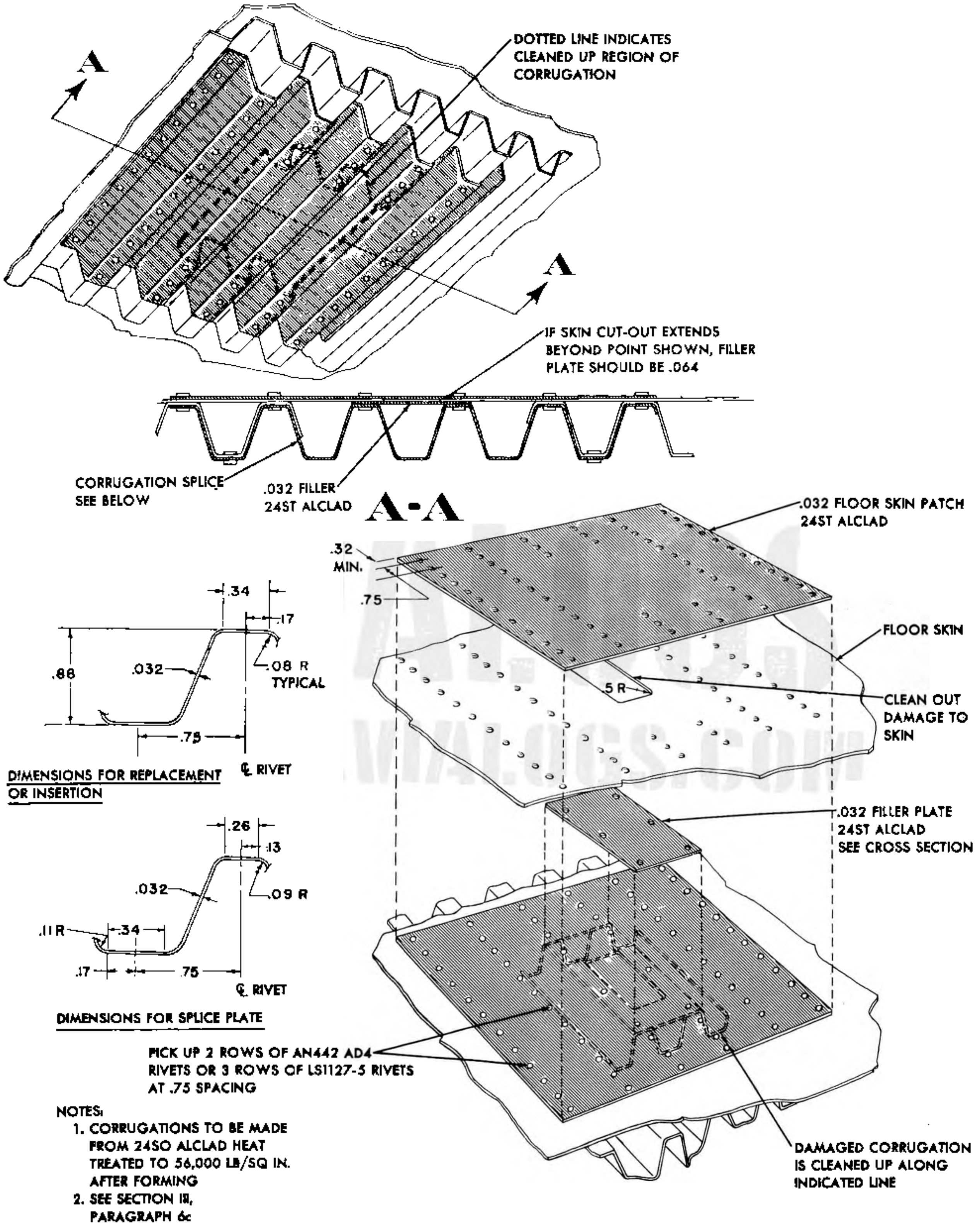


FIGURE 85—REPAIR TO FUSELAGE FLOOR IN REGION OF CORRUGATIONS

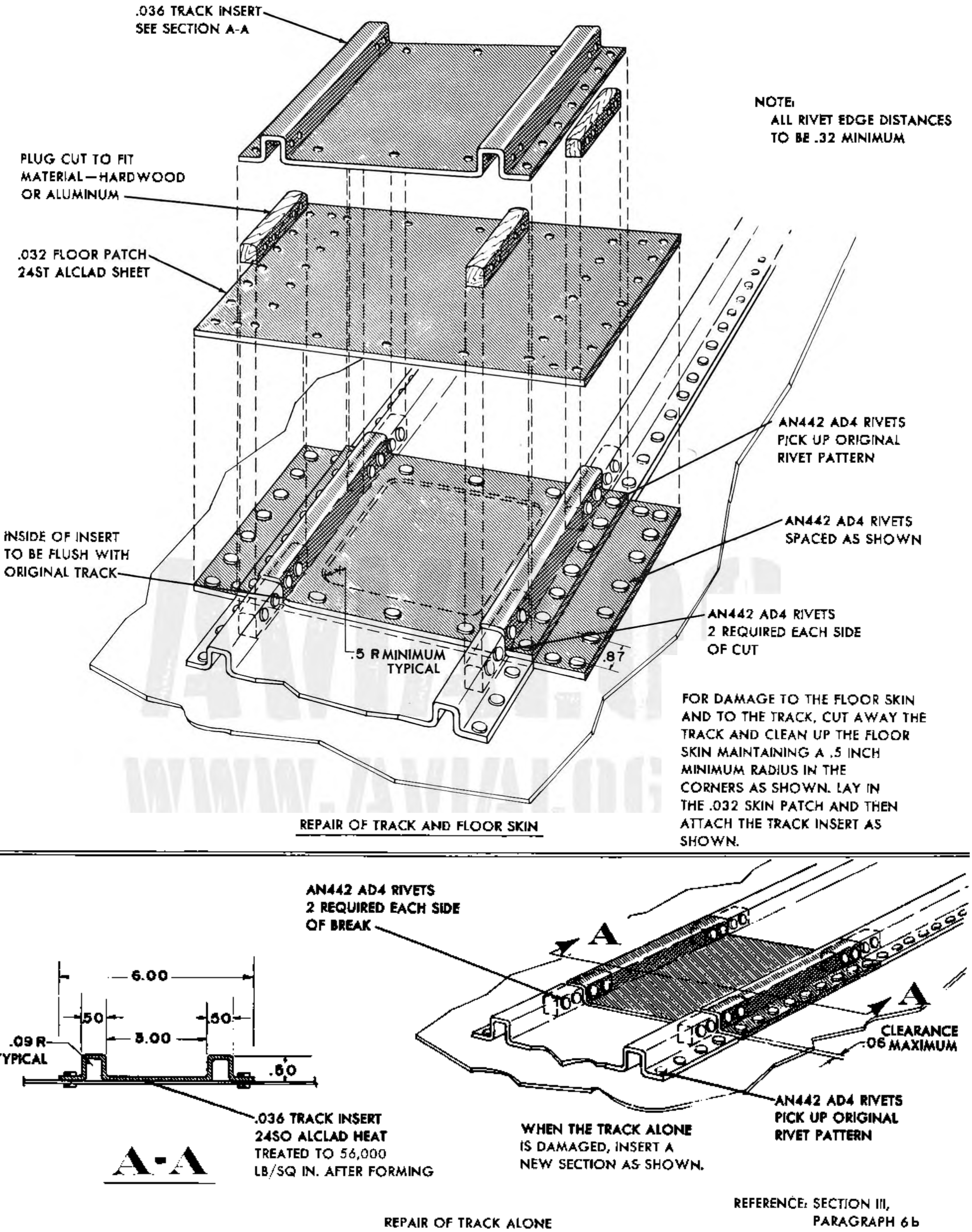


FIGURE 86—REPAIR TO CARGO FLOOR TRACKS

TABLE 31—FLOOR BEAM RIVETING

This table shows the required rivet patterns for the repair of the webs of the floor beams. The patch must be of sufficient size to cover the cleaned up damage and pick up the required rivet pattern, maintaining an edge distance of two rivet diameters on all rivets.

Gage of Beam	*Required Rivet Patterns**		
	AN442 AD4	*AN442 AD5*	*AN442 AD6*
.025	2 rows at 1 in.		
.032	2 rows at 1 in.		
.036	2 rows at .75 in.	2 rows at 1 in.	
.040	2 rows at .75 in.	2 rows at 1 in.	
.051		3 rows at .88 in.	2 rows at .88 in.

*The rows must be staggered

be replaced picking up original rivet holes using AN-442 AD4 rivets. See figure 87 for the repair of these stiffeners.

The webs of the transverse beams are made of .040 alclad sheet with extruded bulb angles, Alcoa Die No. 29090 as spar caps. The vertical stiffeners are .051 formed sections. Treat the stiffeners in the same fashion as mentioned above.

(2) CAPSTRIPS.

(*a*) NEGLIGIBLE DAMAGE.—Smooth isolated dents, free from cracks, abrasions, and sharp corners may be neglected. Small cracks running longitudinally and not more than one inch long should have 1/8 inch diameter holes drilled at each end to prevent spreading. File all nicks on the legs of the stringer until smooth. These nicks in the edges of the legs of the capstrips are not negligible if their depth exceeds .25 inch after clean-up.

(*b*) DAMAGE REPAIRABLE BY PATCHING.—When the damage is so localized that the cleaned up area is confined to one leg, use the methods shown in figure 90. Clean up the damage with a file, maintaining .13 inch minimum corner radii. Remove interfering rivets and pick up these holes in the patch. A filler plate is unnecessary unless the damage after clean up exceeds two inches in length.

(*c*) DAMAGE REPAIRABLE BY INSERTION.—If the damage to a longitudinal beam occurs at a transverse beam or destroys more than one leg of the extrusion, remove the rivets that attach the damaged section of the member. Remove the damaged portion of the member by cutting it off at each end at a point midway between two of the existing rivet holes and splice in a new section picking up the rivet pattern shown in figure 87. The length of the insert should be such that the maximum clearance at each end is .03 inch.

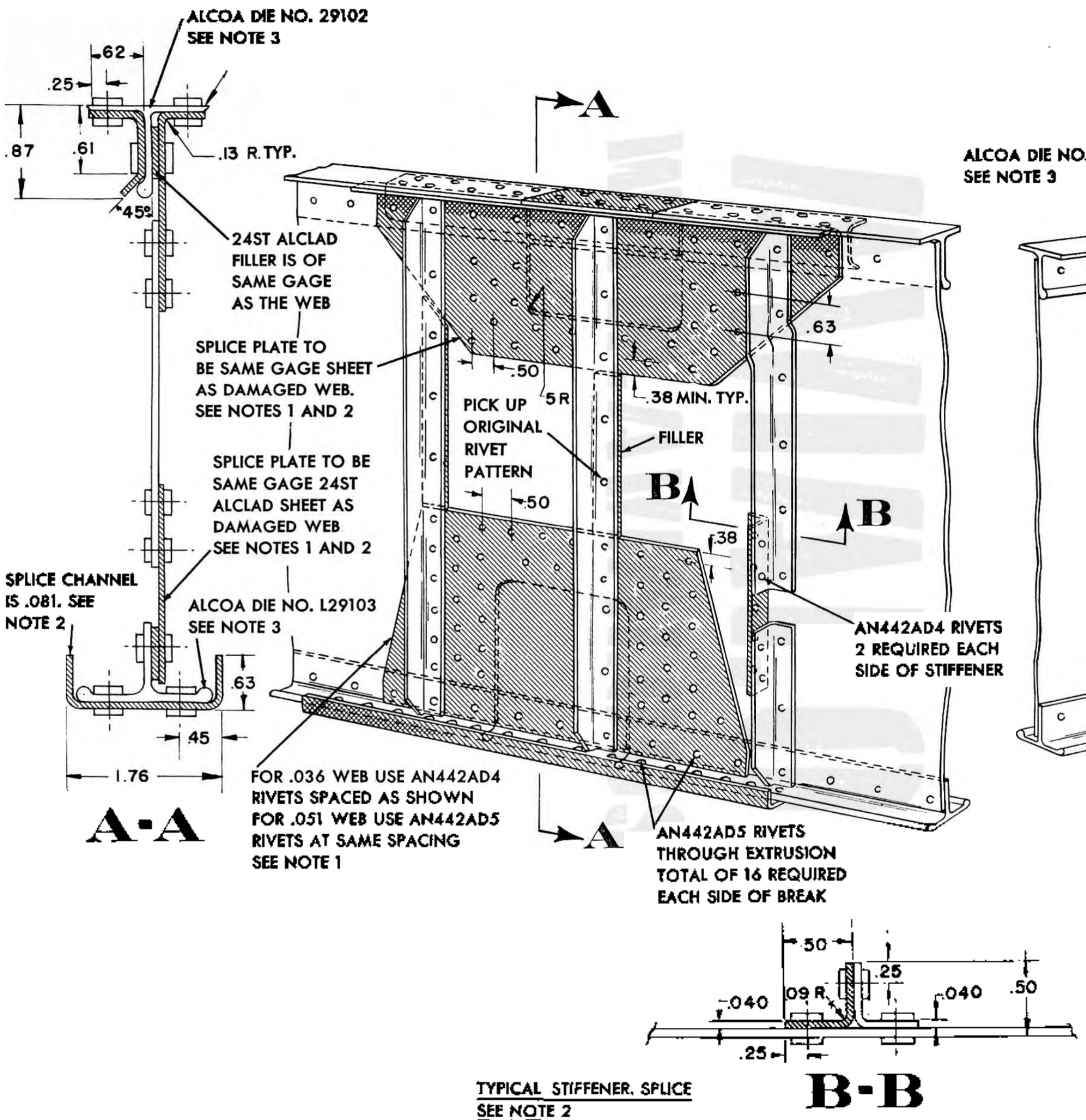
(3) WEBS.

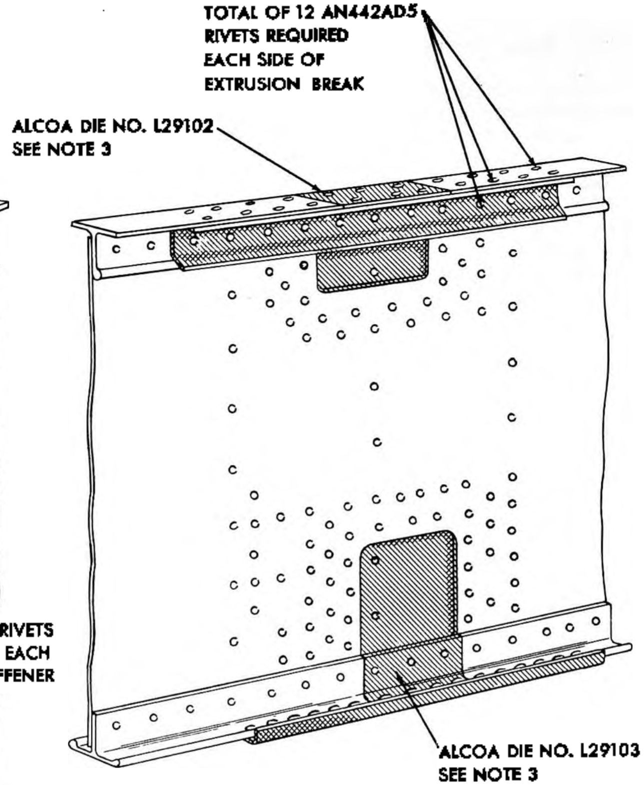
(*a*) NEGLIGIBLE DAMAGE.—Smooth isolated dents free from cracks, abrasions and sharp corners may be neglected providing no adjacent rivets or bolts are disturbed. No holes or cracks through the webs can be neglected.

(*b*) DAMAGE REPAIRABLE BY PATCHING.—Damage to the web which after clean up is at least 2.0 inches from the edge of the web may be patched with a 24ST alclad sheet of the same gage. Table 31 gives the required rivets and rivet spacing for the beams. If the damage is within 2.0 inches of the edge of the web the patch must be altered to pick up additional rivets. See figures 87, 88 and 89. If the damage runs across the web stiffener, the patch is placed on the opposite side of the web from the stiffener, using a filler as required.

(*c*) DAMAGE REPAIRABLE BY INSERTION.—If the damage occurs in the region of a fitting or near the intersection of a transverse and longitudinal beam, an insert should be made and spliced to the web on either side. The damaged portion of the web must be cut away, such that the splice can be made with no interference. The insert and the splice plates are to be of the same gage as the damaged web. The rivet pattern is given in figures 88 and 89.

(*d*) DAMAGE REPAIRABLE BY REPLACEMENT.—If the web of a longitudinal beam is damaged extensively the intercostal web between the transverse beams should be replaced.



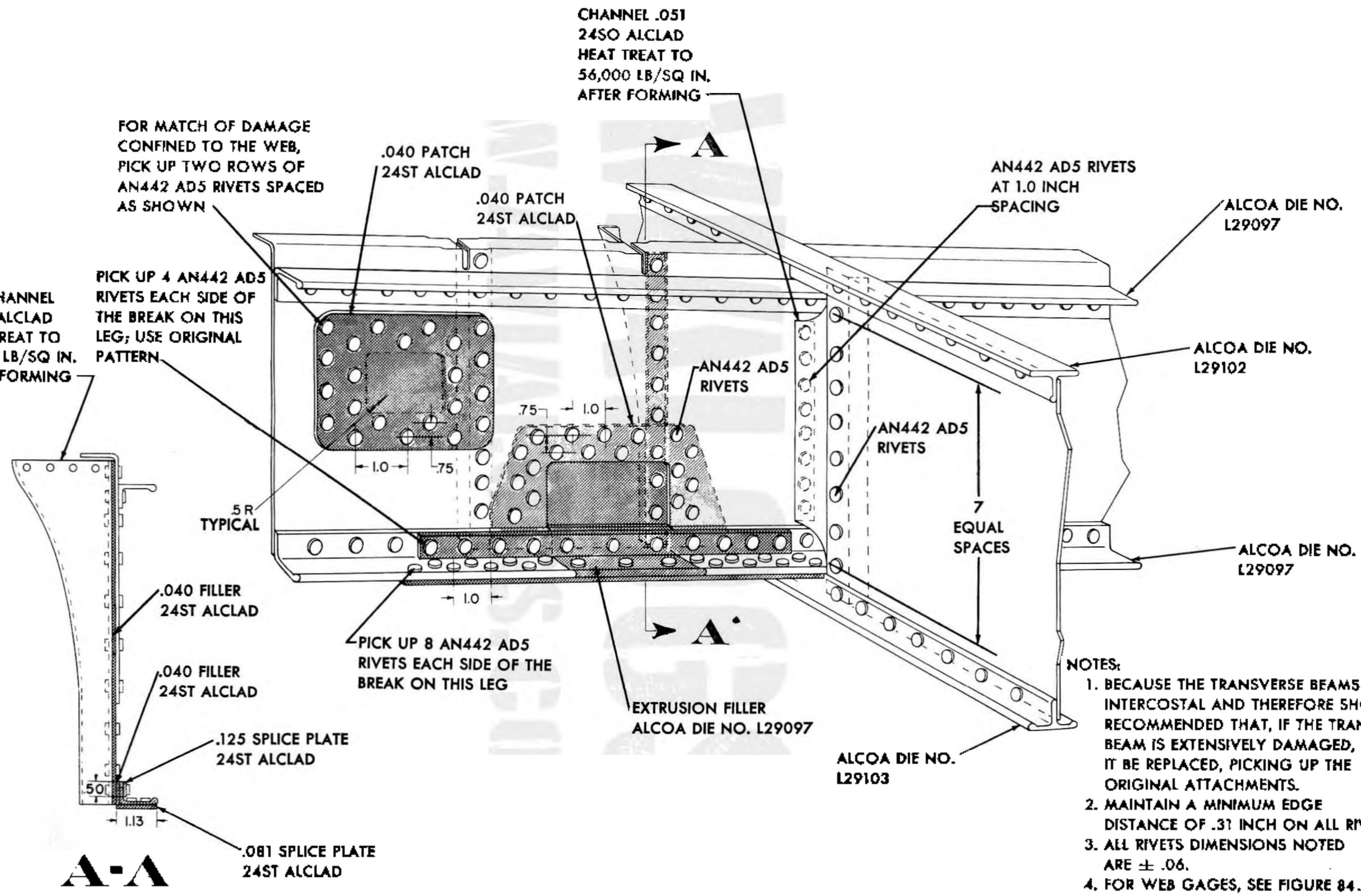


NOTES:

1. REFER TO FIGURE 84 TO DETERMINE GAGE OF DAMAGED WEB.
2. BENT UP SECTIONS ARE FORMED FROM 24SO ALCLAD TO 56,000 LB/SQ IN. AFTER FORMING.
3. FOR CROSS SECTION AND FULL STRENGTH REPAIR OF EXTRUSION, SEE FIGURE 90

REFERENCE: SECTION III, PARAGRAPH 6c FOR REPAIR PROCEDURE

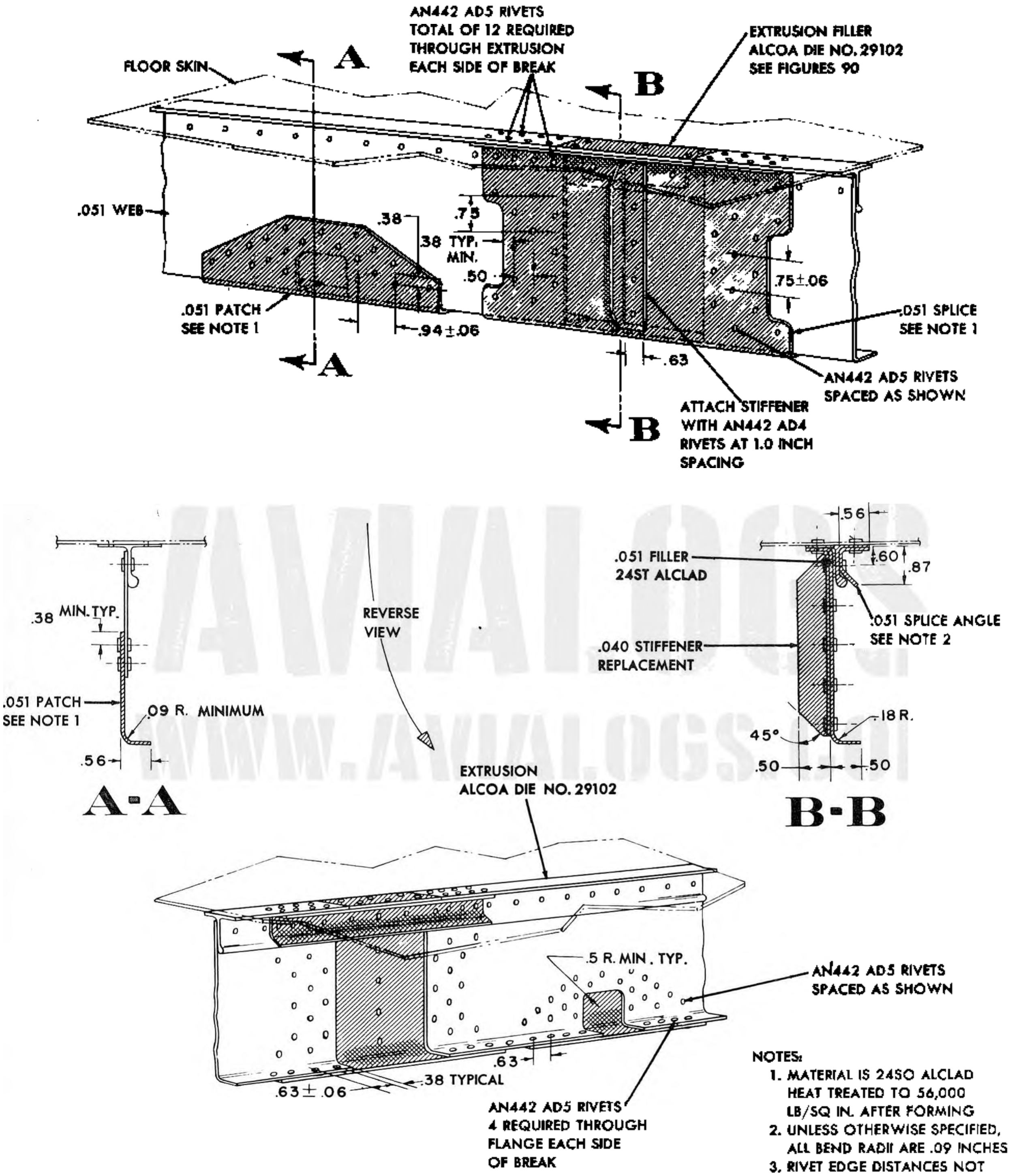
FIGURE 87—REPAIR TO LONGITUDINAL FLOOR BEAM



NOTES:
1. BECAUSE THE TRANSVERSE BEAMS ARE INTERCOSTAL AND THEREFORE SHORT, IT IS RECOMMENDED THAT, IF THE TRANSVERSE BEAM IS EXTENSIVELY DAMAGED, IT BE REPLACED, PICKING UP THE ORIGINAL ATTACHMENTS.
2. MAINTAIN A MINIMUM EDGE DISTANCE OF .31 INCH ON ALL RIVETS.
3. ALL RIVETS DIMENSIONS NOTED ARE ± .06.
4. FOR WEB GAGES, SEE FIGURE 84.

REFERENCE: SECTION III, PARAGRAPH 6.

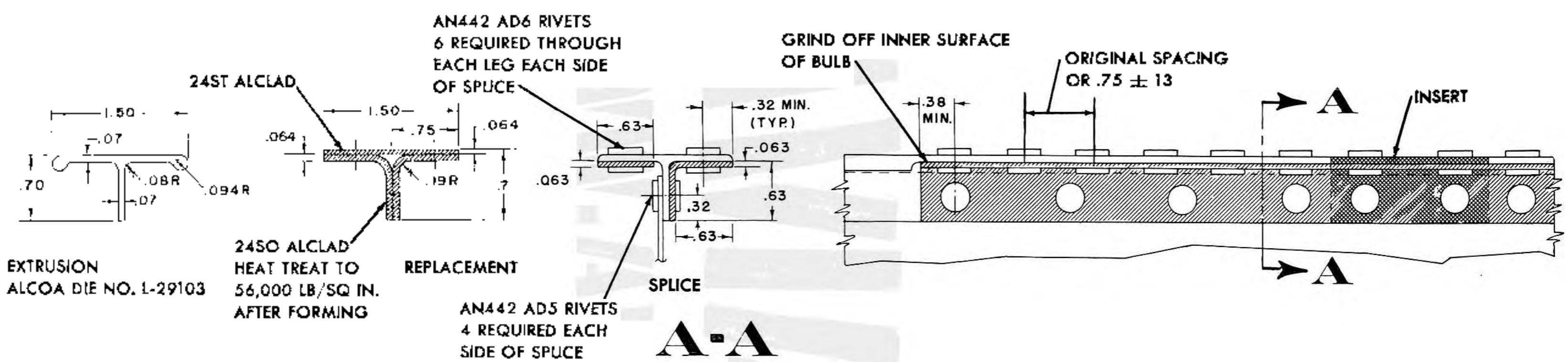
FIGURE 88 —REPAIR TO TRANSVERSE FLOOR BEAM



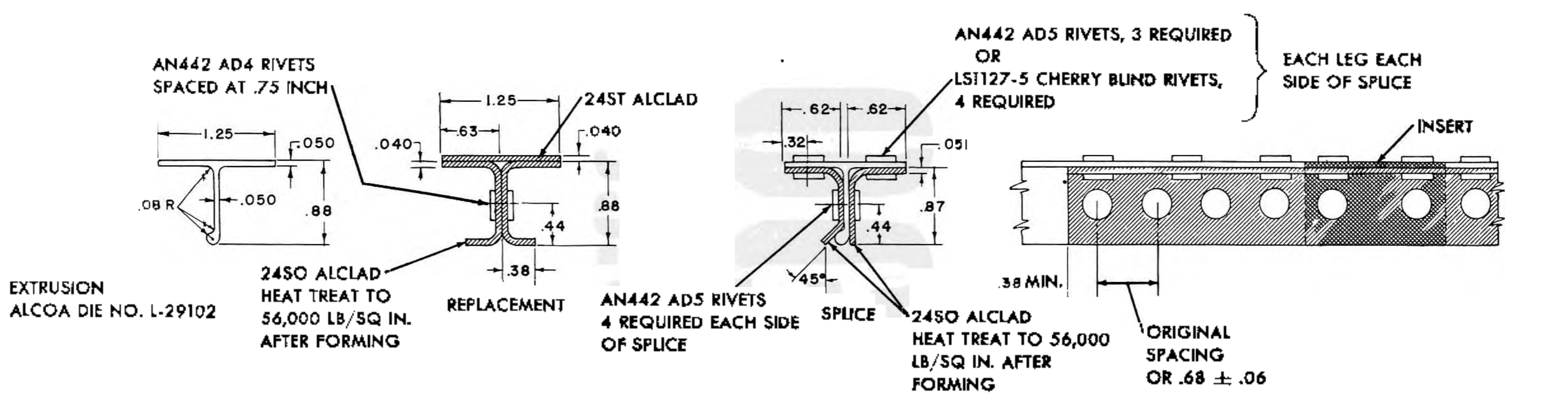
NOTES:
1. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. UNLESS OTHERWISE SPECIFIED, ALL BEND RADII ARE .09 INCHES
3. RIVET EDGE DISTANCES NOT GIVEN ARE .38 INCHES

REFERENCES: 1. SEE FIGURE 84 FOR LOCATION OF BEAMS.
2. SECTION III, PARAGRAPH 6b

FIGURE 89—REPAIR TO INTERMEDIATE FLOOR BEAM



L29103 = SK-221



L29102 = SK-220

NOTES:
1. THESE EXTRUSIONS ARE THE CAPSTRIPS OF THE FLOOR BEAMS
2. SPLICES HERE SHOWN ARE FULL STRENGTH AND MAY BE USED INSTEAD OF THOSE IN FIGURE 87

FIGURE 90—REPAIR TO FLOOR BEAM CAPSTRIPS

7. DOUBLERS.

a. GENERAL.—Figure 91 shows the location and gages of the various doublers. Table 32 contains the sizes of the doublers located on figure 91. In general, the doublers are accessible for repair purposes and repair is made to their outside surfaces. These doublers are heavily loaded and in many cases serve as splices. If damage occurs in the region of any doublers they must be carefully inspected to ascertain any possibility of damage to them.

b. NEGLIGIBLE DAMAGE.—Dents free from cracks, abrasions, and sharp corners may be neglected. These dents should be restored to shape whenever possible to prevent their developing into cracks. Care must be taken not to stretch or crack the doubler in the process. Inspect all rivets in the vicinity of the damage to be sure that they have not been sheared or loosened. See section I, paragraph 10 *i*.

c. DAMAGE REPAIRABLE BY PATCHING.—Holes through the doubler cannot be neglected. Damage not considered negligible may in general be cleaned up and patched as follows:

1. Where the doubler is on the outside of the fuselage, it may be patched by cleaning up the damage, putting in a filler of the same gage 24ST alclad sheet and laying on an exterior patch of 24ST alclad sheet that is long enough to pick up the required number of rivets each side of the break. To determine the required number of rivets and the dimensions of the patch plate, refer to figure 91 which locates the doubler and to table 32 which gives their various gages and the required number of rivets each side of the break. In all cases, the original rivet pattern must be used.

2. Damage to a doubler that lies between the skin and a bulkhead may be patched as shown in figure 92. The doubler is located and its gage and size determined by referring to figure 91 and table 32. The skin is cut away and the damaged doubler cleaned up. A filler of the same gage as the doubler is used, and a patch is laid over the filler and over sufficient length of the doubler (on each side of the break) so that the required number of rivets can be picked up. Refer to table 32 to determine the number of rivets required each side of the break. Pick up the original rivet pattern along the doubler. The skin is repaired by the method described in the skin repairs, see paragraph 2 of this section.

8. REPAIR AT WING INTERSECTION.

Figure 95 shows a combined repair for a damage in the region of the wing—fuselage intersection and gives repairs to the wing skin and stringers and the fuselage skin, doubler, floor, bulkhead, attach angle, and match angle. The repair procedure is as follows:

a. Clean up all damaged areas as shown, in figure 95. The skin cut-outs are made using the inserts as templates, maintaining .5 inch minimum corner radii.

b. Repair wing hat section stringer as per figure 107.

c. Repair fuselage bulkhead as shown by splicing in a new section.

d. Repair floor beam as shown in Section B-B. A new section of web is inserted and spliced to the original web. The outboard end is riveted to the bulkhead. The extrusion splice is carried to the end using fillers as required. The splice size is found in figure 95.

e. Cut out the wing skin patch and rivet as shown, using fillers in the region of the hat section. The skin and attach angle must be cut at the same point.

f. The match angle, fuselage skin splice, and doubler must be riveted at the same time.

g. Refer to figure 95 for match angle repair.

h. The fuselage doubler splice should have a filler between it and the skin patch. Thus, for an .064 skin patch, and .020 filler should be used since the doubler is .081.

i. Fillers in the region of the attach angle are used to bring the total thickness to approximately .094. In the case shown, .032 fillers together with the .064 patches give a thickness of .096.

j. A formed .094 angle is spliced with 25 AN442 AD5 rivets for the attach angle repair.

k. Rivets inside the structure are type AN442, those through the skins are 671D-AD except those which go through the skin in the region of the hat sections. These are LS1127-6 Cherry blind rivets.

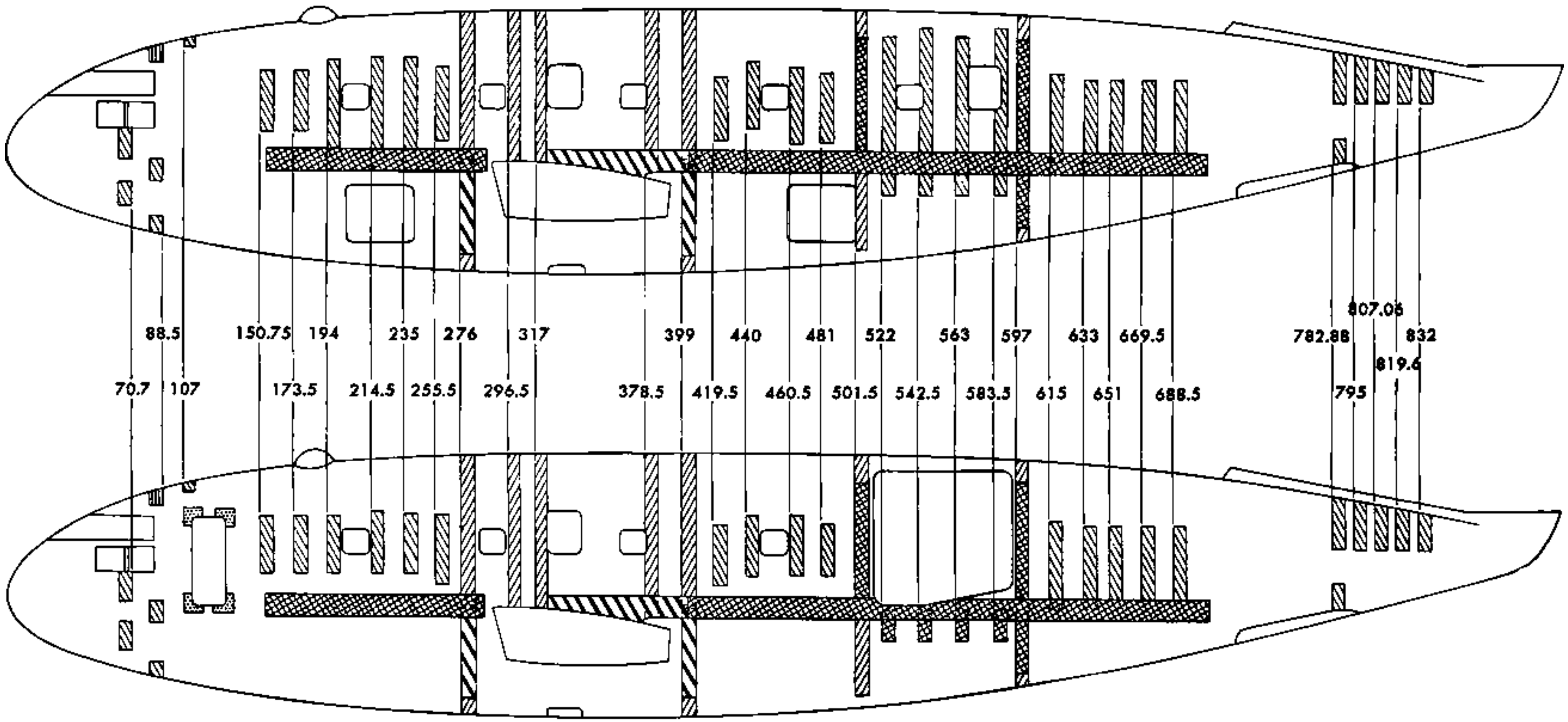
l. The floor is repaired in accordance with figure 86 and paragraph 6 *b* of this section.

9. MISCELLANEOUS.

a. Figure 93 shows a repair to the glider tow support, that has suffered a complete break.

b. Figure 94 shows a repair to the torque tube support in the aft end of the fuselage.

c. There are other miscellaneous items (such as the frame for the navigation dome) not treated specifically in the text. These may be repaired in accordance with section IX.



LEGEND

.016
.025
.032
.040
.064
.061

NOTE:
1. REFER TO SECTION III, PARAGRAPH 7 AND TO FIGURE 92 FOR THE DOUBLER REPAIR PROCEDURE.

FIGURE 91 —FUSELAGE DOUBLER DIAGRAM

TABLE 32

SIZES, LOCATIONS, AND SPLICES OF FUSELAGE DOUBLERS (AIRPLANES UP TO AF44-78545)

VERTICAL DOUBLER LOCATIONS
(See Figures 91A and 92A)

Bulkhead Station	*Extent of Doubler*	*Doubler Type*	*Bulkhead Station*	*Extent of Doubler*	*Doubler Type*
Sta. 70.7	Str. 19-Floor	V	Sta. 399	Str. 10-Floor Line	H
	Str. 30-Str. 32	V		Floor Line-Str. 26	M
Sta. 88.5	Top Keel-Str. 14	U		Str. 26-Bottom Keel	E
	Floor Line-Str. 33	V		Top Keel-Str. 10	H
Sta. 107	Str. 28-Str. 30	V	Sta. 522	Floor Line-Str. 33	A
	Str. 9-Top Keel	V		Str. 11R-Str. 33R	A
Sta. 150.75	Str. 14-Str. 18	O	Sta. 542.5	Floor Line-Str. 33	A
Sta. 173.5	Str. 14-Str. 18	A			A
Sta. 194	Str. 14L-Str. 18L	A	Sta. 563	Floor Line-Str. 33L	A
	Str. 12R-Str. 20R	A			B
Sta. 214.5	Str. 13L-Str. 18L	A	Sta. 583.5	Floor Line-Str. 33	A
	Str. 12R-Str. 20R	A		Str. 10R-Str. 33R	B
Sta. 235	Str. 14L-Str. 18L	A	Sta. 597	Top Keel-Str. 9	C
	Str. 12R-Str. 20R	A		Str. 9-Str. 29	J
Sta. 255.5	Str. 14-Str. 20	A		Str. 29-Bottom Keel	C
Sta. 276	Top Keel-Floor Line	I	Sta. 615	Str. 13-Floor Line	A
	Floor Line-Str. 26	L	Sta. 633	Str. 14-Floor Line	A
	Str. 26-Bottom Keel	D	Sta. 651	Str. 14-Str. 20	A
Sta. 296.5	Top Keel-Str. 11	G	Sta. 669.5	Str. 14-Str. 20	A
	Str. 11-Floor Line	G	Sta. 688.5	Str. 14-Str. 20	A
Sta. 317	Top Keel-Str. 11	H	Sta. 782	Str. 12-Str. 16	W
	Str. 11-Floor Line	H		Str. 36-Bottom Keel	W
Sta. 378.5	Top Keel-Str. 10	H	Sta. 795	Str. 12-Str. 16	W
	Str. 10-Floor Line	H	Sta. 807	Str. 13-Str. 16	W
	Floor Line-Str. 34	F	Sta. 819	Str. 13-Str. 16	W
			Sta. 832	Str. 14-Str. 16	W

HORIZONTAL DOUBLER LOCATIONS
(See Figures 91A and 92A)

Location	*Extent of Doubler*	*Doubler Type*
Floor Line	Sta. 150-Sta. 276	K
	Sta. 317-Sta. 399	N
	Sta. 399-Sta. 704	K

TABLE 32 (Continued)
SIZES, LOCATIONS, AND SPLICES OF FUSELAGE DOUBLERS
(AIRPLANES UP TO NO. AF44-78545)

This table includes the types and locations of the various doublers. Because many of the doublers are identical they are classified as types. The number and the type of rivets required for the splices of these respective types are given. It is necessary to maintain a minimum edge distance of two rivet diameters on all rivets.

Doubler Type	*Gauge*	*Width*	*Number Rivet Rows*	*Total Number of Rivets Required Each Side of Break*	*Type of Rivets**
A	.032	2	2	8	AN442AD-4
B	.032	3	2	10	AN442AD-4
C	.040	2	2	8	AN442AD-5
D	.040	2.20	1	8	AN442AD-5
E	.040	2.32	1	8	AN442AD-5
F	.040	3.20	4	12	AN442AD-5
G	.040	3.30	4	12	AN442AD-5
H	.040	4.16	4	16	AN442AD-5
I	.040	4.26	4	16	AN442AD-5
J	.064	2	2	10	AN442AD-5
K	.064	7.50	8	24	AN442AD-5
L	.081	2.20	1	10	AN442AD-5
M	.031	2.32	1	12	AN442AD-5
N	.081	10.50	8	34	AN442AD-5
O	.032	1.38	2	6	AN442AD-4
P	.091	14			
Q	.051	15			
R	.051	42			
S	.051	16			
T	.051	17			
U	.016	1.30	1	3	AN442AD-4
V	.032	1.25	2	4	AN442AD-4
W	.032	1.50	2	6	AN442AD-4
X	.040	3	2	10	AN442AD-5

* Rivets may be 671D, or AN456 Rivets of the same size.

EXTERNAL FUSELAGE DOUBLERS IN REGION OF RIGHT HAND JUMP DOOR

(See Figures 91A, 92A, 229 and Refer to Section III, Paragraph 5. a.)

Location	*Extent of Doubler*	*Doubler Type*
Str. 9-Str. 12	Sta. 597-Sta. 516	P
Str. 12-Str. 19	Sta. 597-Sta. 583	Q
Str. 12-Str. 19	Sta. 542-Sta. 501.5	R
Str. 19-Floor Line	Sta. 597-Sta. 506	S
Floor Line-Str. 33	Sta. 597-Sta. 511	T

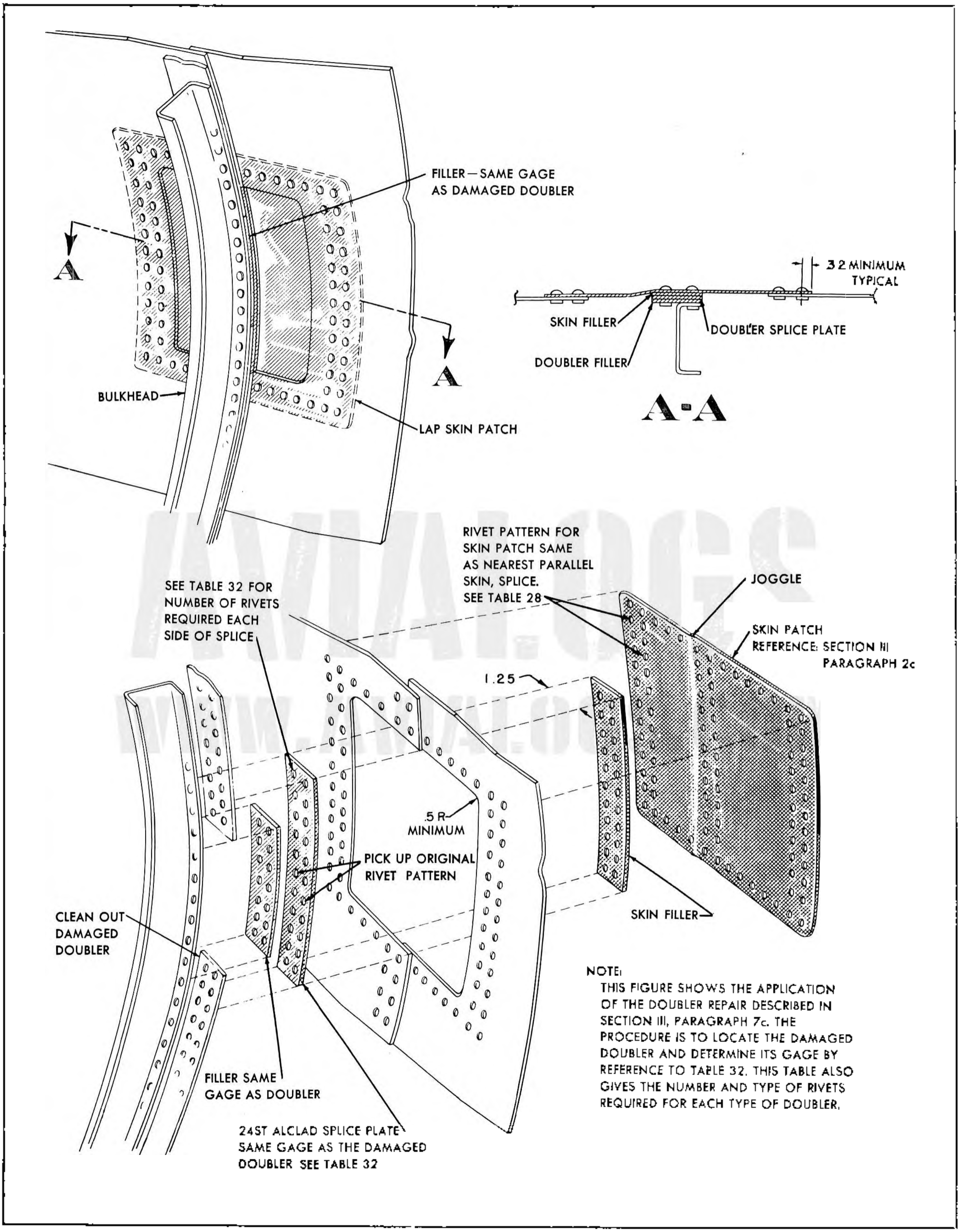
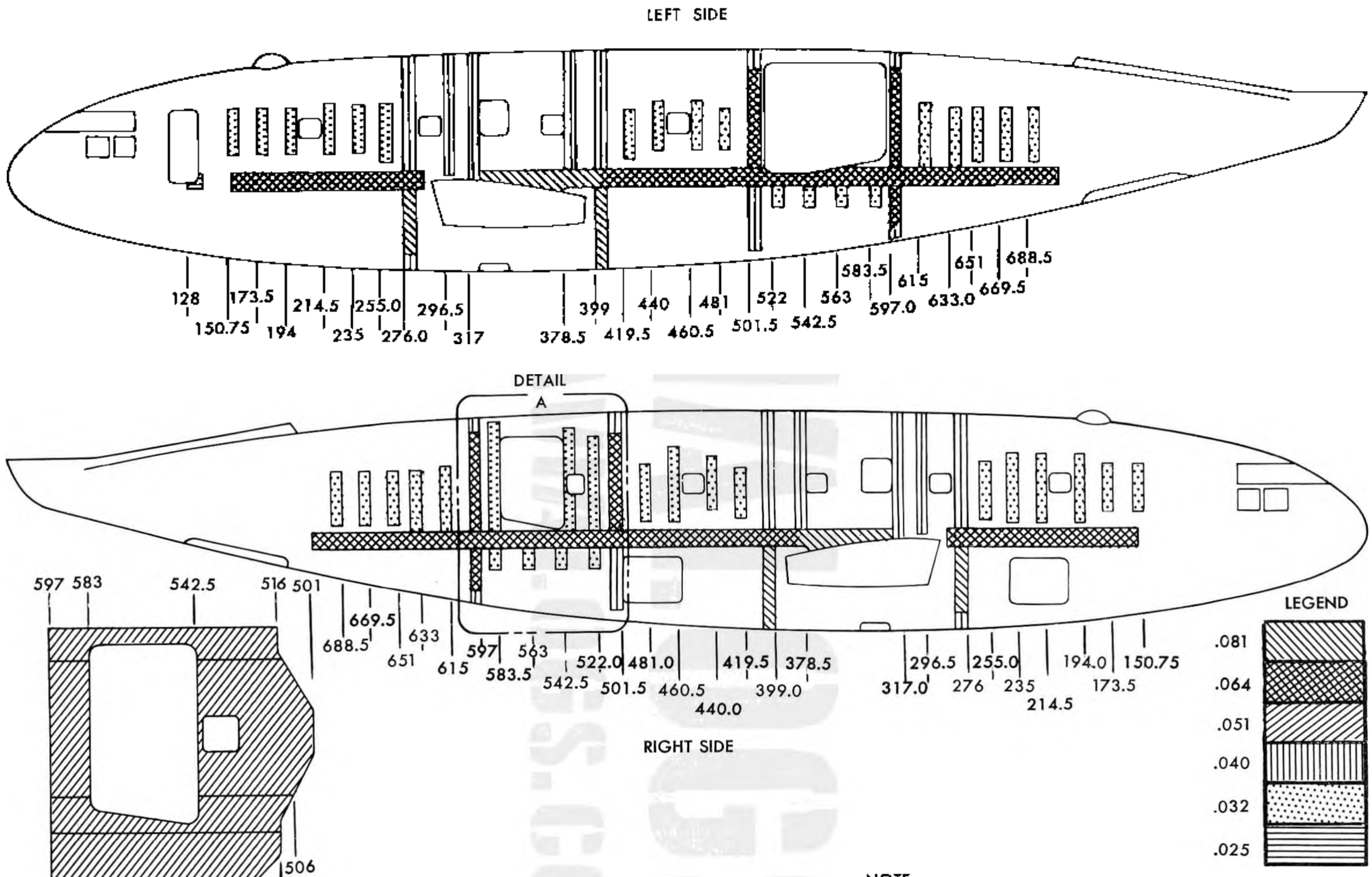


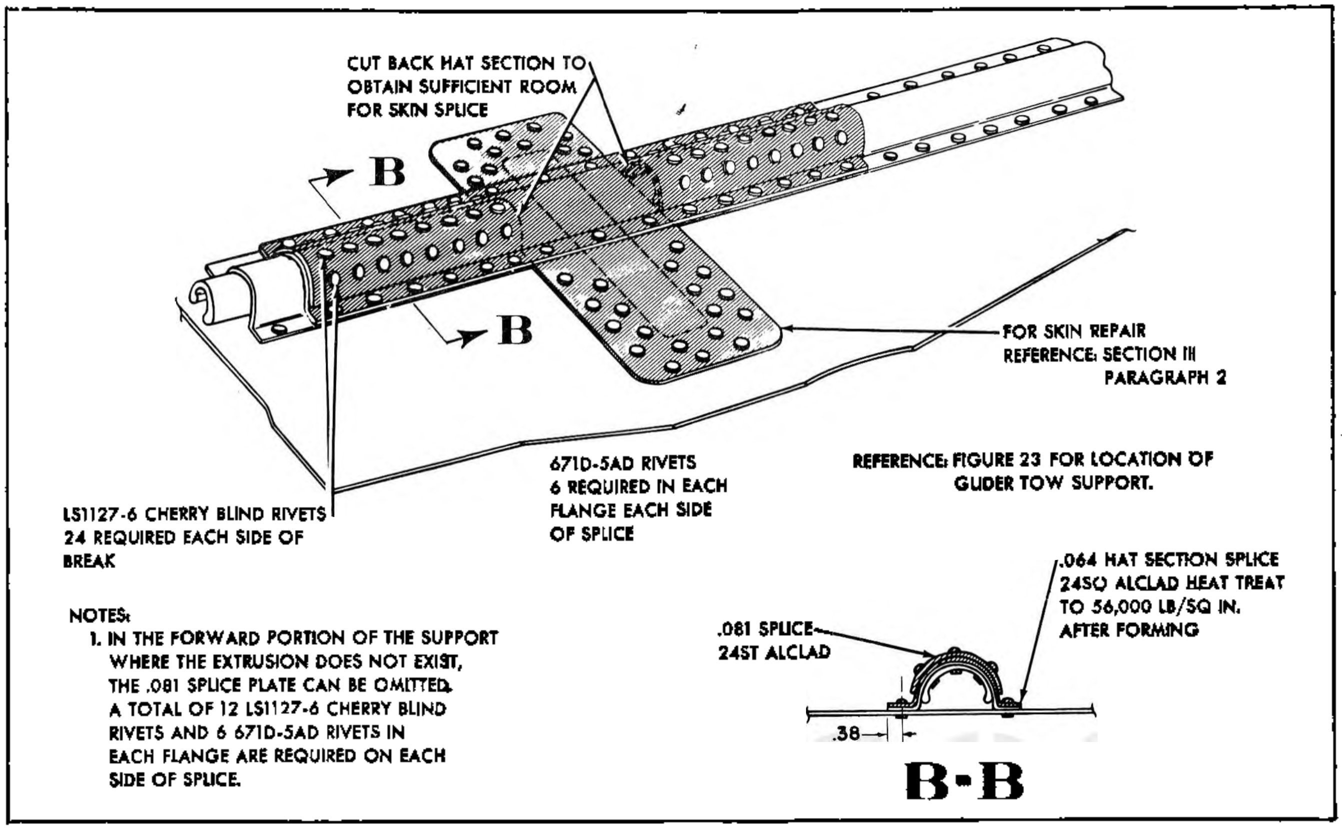
FIGURE 92 — FUSELAGE DOUBLER REPAIR



DETAIL A
EXTERNAL DOUBLERS
IN REGION OF
RIGHT HAND JUMP DOOR

NOTE:
1. REFER TO SECTION III, PARAGRAPH 7 AND TO FIGURE 92 FOR THE DOUBLER REPAIR PROCEDURE.

FIGURE 92A—FUSELAGE DOUBLER DIAGRAM



NOTES:
1. IN THE FORWARD PORTION OF THE SUPPORT WHERE THE EXTRUSION DOES NOT EXIST, THE .081 SPLICE PLATE CAN BE OMITTED. A TOTAL OF 12 LS1127-6 CHERRY BLIND RIVETS AND 6 671D-5AD RIVETS IN EACH FLANGE ARE REQUIRED ON EACH SIDE OF SPLICE.

FIGURE 93 — GLIDER TOW LONGERON AND JUMP DOOR STIFFENER

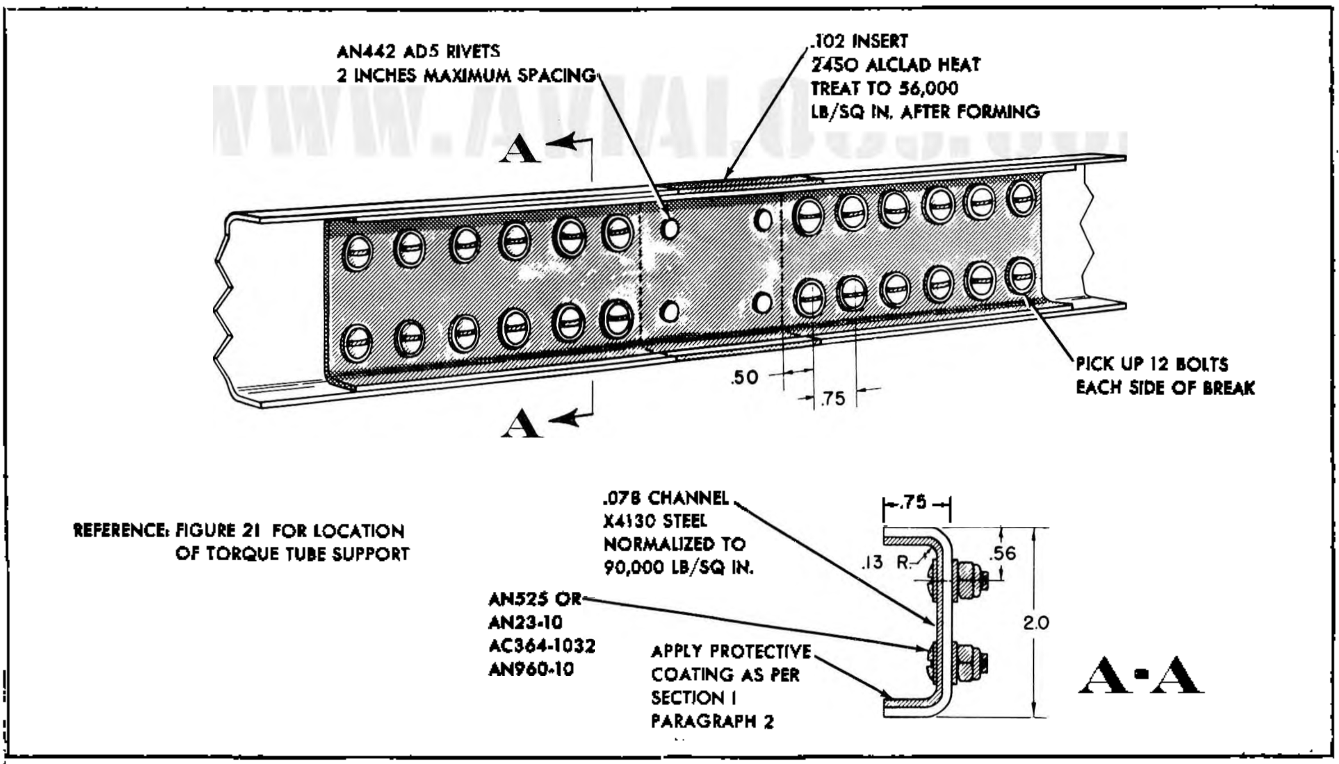


FIGURE 94 — EMPENNAGE TORQUE TUBE SUPPORT REPAIR

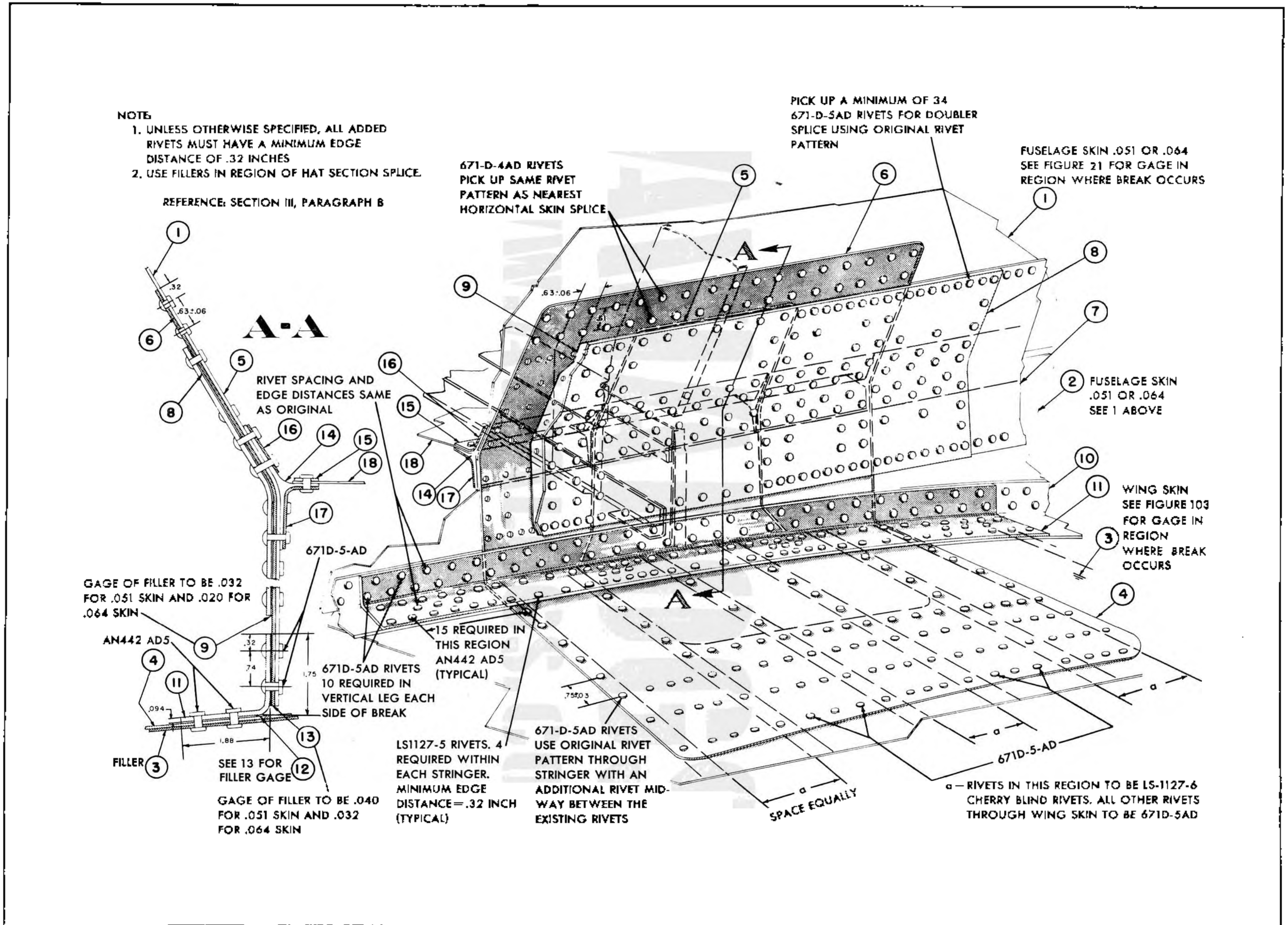


FIGURE 95 (SHEET 1 OF 2 SHEETS) — REPAIR IN REGION OF WING-FUSELAGE INTERSECTION

LEGEND TO FIGURE 95

1. FUSELAGE SKIN ABOVE FLOOR LINE
2. FUSELAGE SKIN BELOW FLOOR LINE
3. WING SKIN
4. WING SKIN PATCH—SAME GAGE AS SKIN—24ST ALCLAD
5. FUSELAGE INSERT—24ST ALCLAD, SAME GAGE AS SKIN
6. FUSELAGE SKIN PATCH—24ST ALCLAD—SAME GAGE AS SKIN
7. FUSELAGE DOUBLER—.081
8. FUSELAGE DOUBLER SPLICE .081 24ST ALCLAD
9. FILLER PLATE BETWEEN DOUBLER SPLICE, 8, AND SKIN PATCH, 6, 24ST ALCLAD
10. WING—FUSELAGE ATTACH ANGLE
11. ATTACH ANGLE SPLICE—24SO ALCLAD, HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING
12. FILLER PLATES BETWEEN ANGLE SPLICE
13. AND SKIN SPLICES—24ST ALCLAD
14. MATCH ANGLE EXTRUSION L-29085
15.
16. SPLICE FOR MATCH ANGLE EXTRUSION—SEE FIGURE 28
17.
18. FLOOR SKIN
19. CLEANED UP AREA OF FUSELAGE
20. CLEANED UP AREA OF WING
21. WING AT STRINGER SPLICE, SEE FIGURE 107
22. FLOOR BEAM INSERT—SAME GAGE AS WEB
23. FLOOR BEAM SPLICE—24SO ALCLAD HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING GAGE SAME AS WEB.
24. FLOOR BEAM BULB ANGLE UPPER—EXTRUSION ALCOA DIE NO. 29097
25. FLOOR BEAM BULB ANGLE SPLICE, UPPER. SEE FIGURE 232 FOR REPAIR
26. FLOOR BEAM BULB ANGLE, LOWER—EXTRUSION ALCOA DIE NO. 29097
27. FLOOR BEAM BULB ANGLE SPLICE, LOWER. SEE FIGURE 232 FOR REPAIR
28. ANGLE, SIMILAR TO ORIGINAL
29. BULKHEAD INSERT—FORM TO SAME CONTOUR AS ORIGINAL
30. BULKHEAD SPLICE—SAME AS ORIGINAL

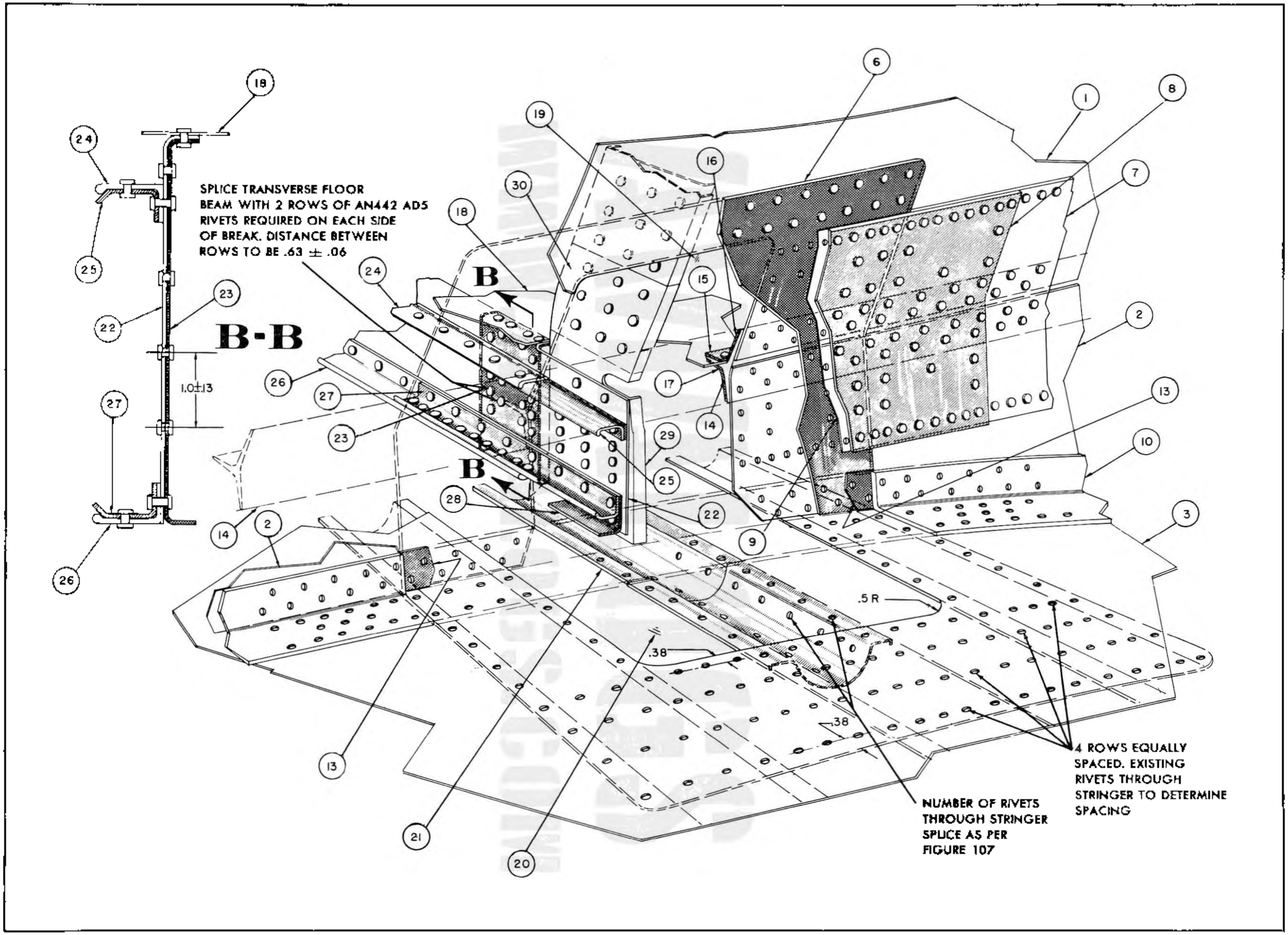
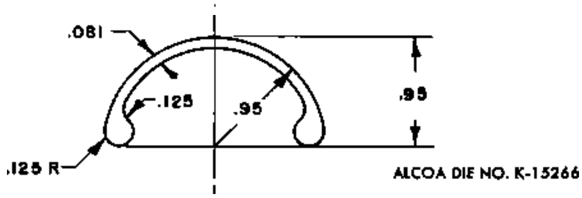


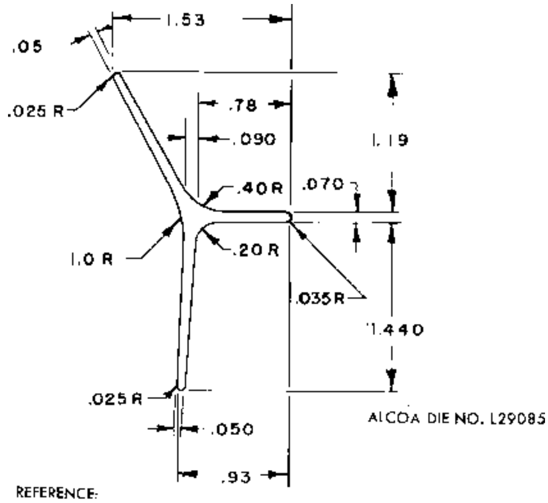
FIGURE 95 (SHEET 2 OF 2 SHEETS) — REPAIR IN REGION OF WING-FUSELAGE INTERSECTION

LEGEND TO FIGURE 95

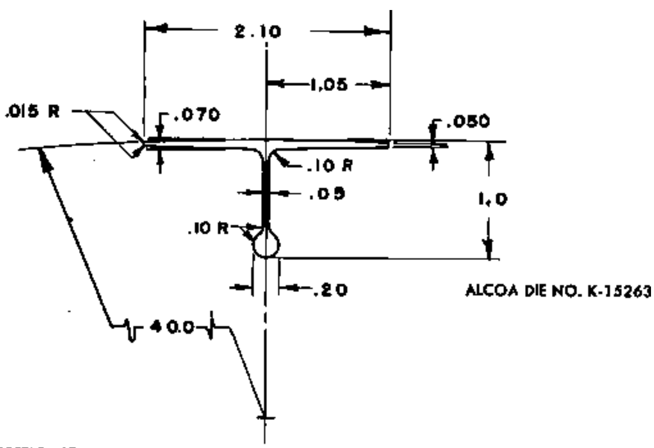
1. FUSELAGE SKIN ABOVE FLOOR LINE
2. FUSELAGE SKIN BELOW FLOOR LINE
3. WING SKIN
4. WING SKIN PATCH—SAME GAGE AS SKIN—24ST ALCLAD
5. FUSELAGE INSERT—24ST ALCLAD, SAME GAGE AS SKIN
6. FUSELAGE SKIN PATCH—24ST ALCLAD—SAME GAGE AS SKIN
7. FUSELAGE DOUBLER—.081
8. FUSELAGE DOUBLER SPLICE .081 24ST ALCLAD
9. FILLER PLATE BETWEEN DOUBLER SPLICE, 8, AND SKIN PATCH, 6, 24ST ALCLAD
10. WING—FUSELAGE ATTACH ANGLE
11. ATTACH ANGLE SPLICE—24SO ALCLAD, HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING
12. FILLER PLATES BETWEEN ANGLE SPLICE
13. AND SKIN SPLICES—24ST ALCLAD
14. MATCH ANGLE EXTRUSION L-29085
15. }
16. } SPLICE FOR MATCH ANGLE EXTRUSION—SEE FIGURE 28
17. }
18. FLOOR SKIN
19. CLEANED UP AREA OF FUSELAGE
20. CLEANED UP AREA OF WING
21. WING AT STRINGER SPLICE, SEE FIGURE 107
22. FLOOR BEAM INSERT—SAME GAGE AS WEB
23. FLOOR BEAM SPLICE—24SO ALCLAD HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING GAGE SAME AS WEB.
24. FLOOR BEAM BULB ANGLE UPPER—EXTRUSION ALCOA DIE NO. 29097
25. FLOOR BEAM BULB ANGLE SPLICE, UPPER. SEE FIGURE 232 FOR REPAIR
26. FLOOR BEAM BULB ANGLE, LOWER—EXTRUSION ALCOA DIE NO. 29097
27. FLOOR BEAM BULB ANGLE SPLICE, LOWER. SEE FIGURE 232 FOR REPAIR
28. ANGLE, SIMILAR TO ORIGINAL
29. BULKHEAD INSERT—FORM TO SAME CONTOUR AS ORIGINAL
30. BULKHEAD SPLICE—SAME AS ORIGINAL



REFERENCE:
FIGURE 93 GLIDER TOW SUPPORT

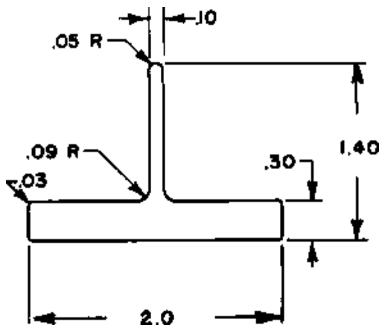


REFERENCE:
FIGURE 28 FLOOR MATCH EXTRUSION REPAIR

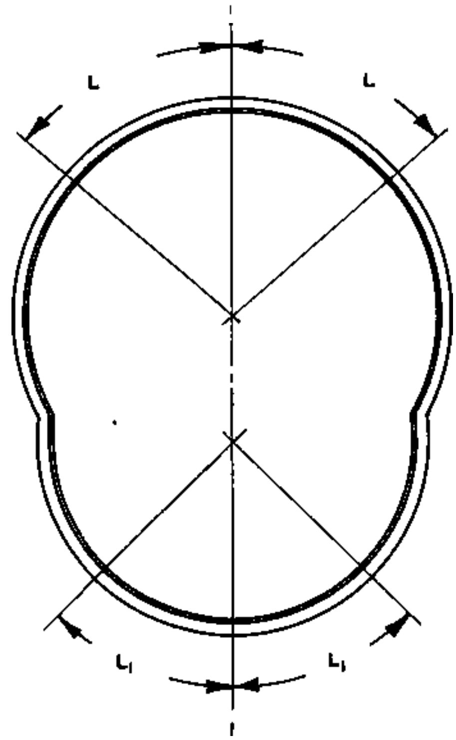


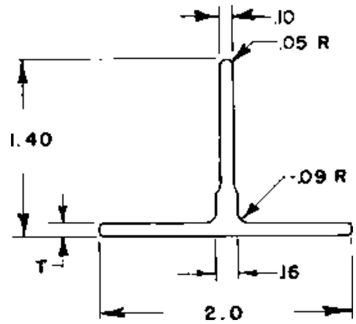
REFERENCE:
FIGURE 27 UPPER CENTER AND LOWER KEEL EXTRUSION REPAIR

FIGURE 96 — SPECIAL FUSELAGE EXTRUSIONS SHEET 1 OF 2



ALCOA DIE NO. L-29088
BASIC EXTRUSION





MACHINING—MATERIAL REMOVED FROM INNER SURFACE OF HORIZONTAL FLANGE.

Bulkhead Station 276				*Bulkhead Station 296.5*				*Bulkhead Station 378.5*				*Bulkhead Station 397*			
Upper		*Lower*		*Upper*		*Lower*		*Upper*		*Lower*		*Upper*		*Lower*	
L	t	L_1	t	L	t	L_1	t	L	t	L_1	t	L	t	L_1	t
0	.15	0	.075	0	.15		—	26	.15	—		0	.15	0	.075
20	.15	62	.075	25	.15			46	.10			21	.15	59	.075
36	.10			40	.10			48	.10			35	.10	75	.25
50	.10			62	.30			127	.25			108	.25		
100	.20			89	.30										
				113	.10										

NOTE: Where thickness varies along extrusion, this variation is uniform.

FIGURE 96 —SPECIAL FUSELAGE EXTRUSIONS SHEET 2 OF 2 SHEETS

TABLE 33

MATERIALS FOR FUSELAGE REPAIR

Spec. No.	*Stock*	*Size*
24ST	Sheet, aluminum alclad	.020
24ST	Sheet, aluminum alclad	.025
24ST	Sheet, aluminum alclad	.032
24ST	Sheet, aluminum alclad	.036
24ST	Sheet, aluminum alclad	.040
24ST	Sheet, aluminum alclad	.051
24ST	Sheet, aluminum alclad	.064
24ST	Sheet, aluminum alclad	.081
24ST	Sheet, aluminum alclad	.091
AN426-AD3	Rivet, countersunk head	3/32
AN426-AD4	Rivet, countersunk head	1/8
AN426-AD5	Rivet, countersunk head	5/32
671-D-4AD	Rivet, brazier head	1/8
671-D-5AD	Rivet, brazier head	5/32
AN442-AD4	Rivet, flathead	1/8
AN442-AD5	Rivet, flathead	5/32
AN442-AD6	Rivet, flathead	3/16
LS1127-4	Blind rivet, cherry	1/8
LS1127-5	Blind rivet, cherry	5/32
AN525-10	Screw washer head	
AN365-1032	Nut	
AN960-10	Washer	

FUSELAGE EXTRUSION LIST

78-A	77-A	15262	29083	29096	29107
78-F	77-Q	15276	29084	29097	29193
78-K	472	4200	29085	29102	3094
78-M	5263	12224	29088	29103	29387
78-U	1288	14256	29092	29105	29388

SECTION IV
LANDING GEAR REPAIR

1. GENERAL.

The landing gear on the C-46 series airplane is a fully retractable, hydraulically operated conventional type installation. The main gear consists of two separate but identical left and right components, each equipped with an air-oil shock strut and mounted in the engine nacelle. The oleo struts are braced fore and aft by tubular drag struts which are aligned by forged upper and lower drag links. Extension and retraction are accomplished by hydraulic struts which actuate the linkage system. Latches lock the landing gear units in the retracted or extended position. Hydraulically operated fairing doors installed at the bottom of each nacelle fully enclose the landing gear in the retracted position. On airplanes AF44-78345 and subsequent, the landing gear doors are operated by mechanical linkage. The tail wheel assembly incorporates a swiveling shimmy-dampened shock strut suspended by a linkage mechanism. Two mechanically operated fairing doors completely enclose the retracted gear.

2. NEGLIGIBLE DAMAGE.

Due to unpredictable loading conditions applied to the landing gear, there is no basis upon which to design repairs that will guarantee maintenance of the original strength. All components are highly stressed and are heat treated to tensile strengths as high as 190,000 pounds per square inch, prohibiting subsequent welding.

Damage which in a certain area might be considered negligible under certain conditions might, in case of a change in those conditions, (cargo overload, poor runways) lead to failure. In brief, no damage may be considered negligible.

3. MINOR REPAIRS.

a. ABRASION.—Abrasions or fine scratches caused by sand or grit on surfaces subject to friction may be removed by the following method. Smear the surface with a fine grade of diluted lapping compound. Initial lapping may be done with Clover A, diluted in the ratio of two parts of kerosene to one part of compound followed by Clover 2A similarly diluted for finish lapping. The lapping may be accomplished by use of a soft cloth wrapped once around the member and pulled alternately at the ends causing the cloth to rotate. When the lapping has been completed, remove the compound and polish with crocus cloth and oil. This operation may be used on shock strut and retracting strut cylinders to prevent deeper scoring, but must not reduce the diameter of the member by more than three one-thousandths of an inch. Care must be exercised to prevent out of roundness. Dust covers should be kept in position and in good repair.

b. NICKS AND DENTS.—Repair of landing gear forgings or tubular structure is not recommended. Repair suggestions are given on the basis that, if the airplane MUST be flown with any landing gear damage, it is better that the resultant stresses be reduced by some degree than allowed to exist. These suggestions are not to be construed as repairs of more than emergency nature. Further use of the repaired airplane will be at the discretion of the officer in charge on the basis of frequent inspection.

(1) Nicks and dents may be relieved by careful filing and polishing. The abrupt change in contour at the edge of a dent must be removed by filing or scraping to attain a smooth filletting. The area should then be polished with a fine grade of emery cloth.

(2) To insure that no crack exists which would further weaken the structure, the following method of crack detection should be employed. Coat the area thinly with paraffin and allow it to dry thoroughly. The application of a whiting water or whiting methylated spirit paste to the paraffin surface will, on drying, show the presence of a crack by a discolored mark. If these materials are not available, clear varnish or other transparent solution should be applied after cleaning as an aid in detecting any subsequent development of the discontinuity.

(3) Marking dimensions on repair stock or on new part replacements should be done with crayon or pencil rather than a scriber, as the scratches may develop into cracks when subjected to vibration.

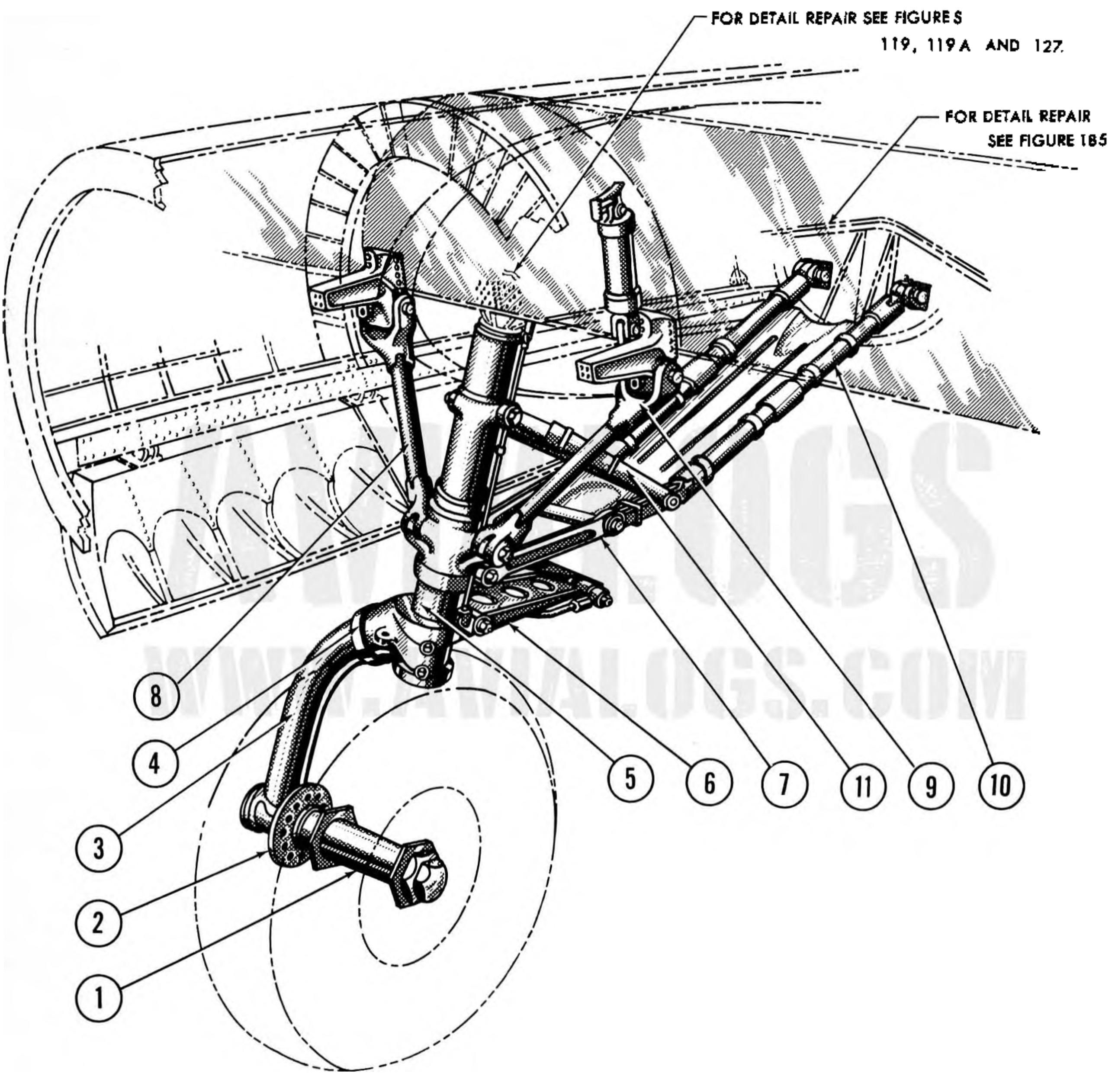


FIGURE 97 — LANDING GEAR ASSEMBLY

TABLE 34

COMPONENT PARTS OF LANDING GEAR

1	Axle	20-311-1000-4
2	Axle Elbow	20-311-1000-4
3	Fork Tube	20-311-1000-4
4	Top Socket	20-311-1000-4
5	Oleo Strut Assembly	20-311-1000-4
6	Torque Arms Assembly	20-311-1000-4
7	Lower Drag Link Assembly	20-310-1024-1
8	Inboard Side Brace Strut Assembly	20-310-1029-1
9	Outboard Side Brace Strut Assembly	20-310-1028-1
10	Rear Drag Strut Assembly	20-310-1017-1
11	Upper Drag Link Assembly	20-310-1015-1

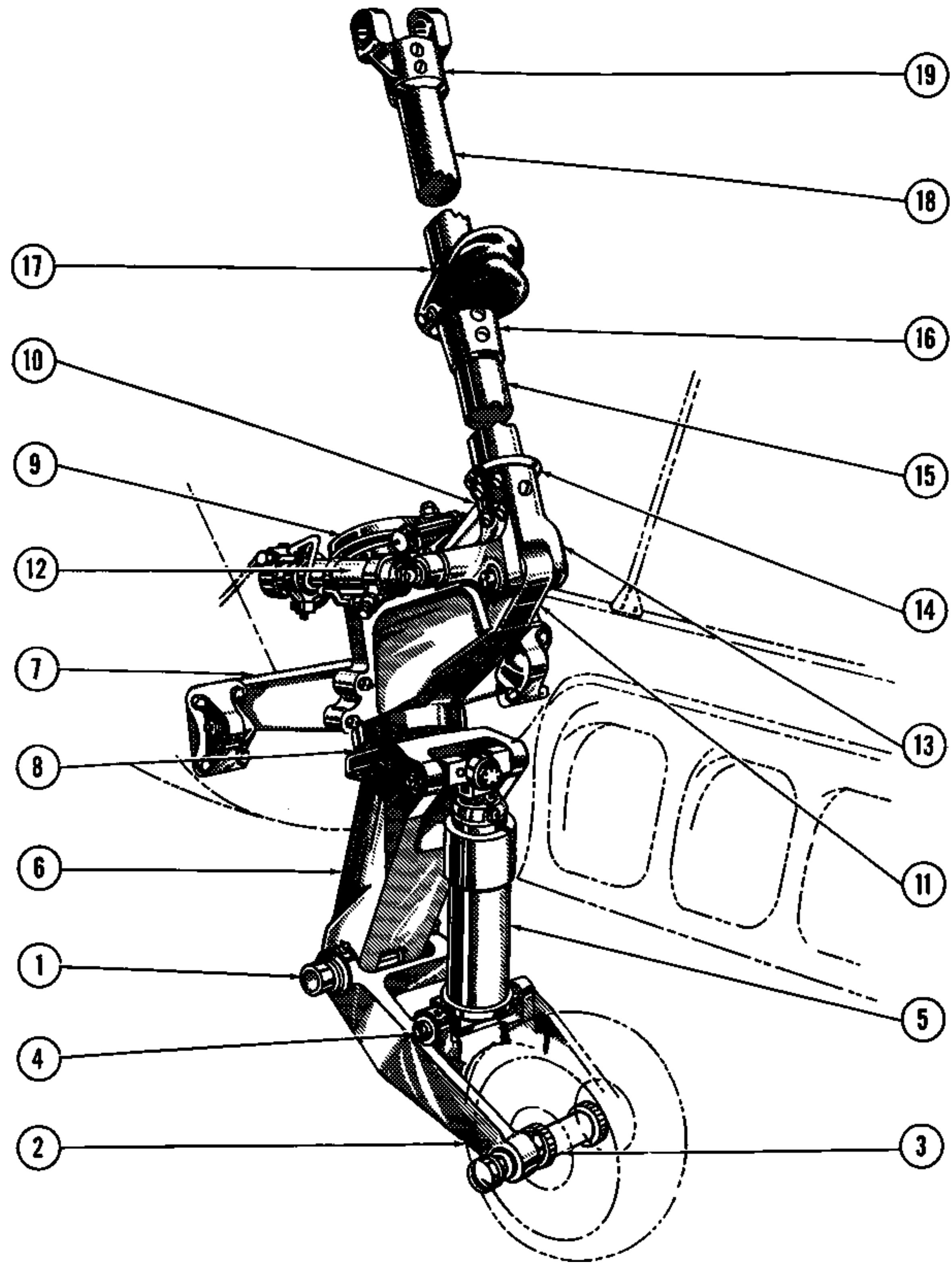


FIGURE 98 — TAIL WHEEL ASSEMBLY

TABLE 35
COMPONENT PARTS OF TAIL WHEEL

1	Pin	20-360-1078-1
2	Link	20-360-1011-1
3	Axle	20-360-1042-2
4	Pin	20-360-1077-2
5	Shock Strut	20-361-1000-1
6	Knuckle	20-360-1063-1
7	Front Support	20-360-1041-1
8	Caster Spindle	20-360-1055-2
9	Disc	20-360-1127-1
10	Damper	20-360-1168-1
11	Rear Support	20-360-1040-1
12	Retracting Strut	20-363-1000-1
13	Pin	20-360-1070-1
14	Socket	20-360-1061-1
15	Strut	20-360-1064-1
16	Hinge	20-360-1025-2
17	Hinge	20-360-1049-2
18	Strut	20-360-1065-1
19	Clevis	20-360-1044-1

SECTION V
WING REPAIR

1. GENERAL.

The wing consists of the following assemblies which are bolted together at station 192 (inches from center line of airplane) and at station 412 (inches from station 192) as shown in figures 1 and 2.

2. CENTER AND OUTER PANELS.

CENTER PANEL.—The center panel, extending 192 inches either side of the airplane center line, is of constant section throughout with no dihedral or twist. It is composed of three spars (front, 30 percent and 70 percent), diagonally trussed ribs, and hat section stringers. The metal skin is of highly stressed aluminum alloy construction. The wing-fuselage attachment is effected by upper and lower attach angles and fittings on each of the three beams. (See figure 95).

OUTER PANEL.—The outer panels extending from station 192 to 412 are of varying section and have both dihedral and twist built into them. Only the 30 percent and 70 percent spars continue into the outer panel. The ribs are of two types: those in the region of the fuel tanks have large reinforced cut-outs to receive the tanks; and those outboard have full bulkheads with flanged lightening holes. The hat section stringers and the skin are similar in design to those of the center panel. A bolted attachment to the center panel is made by match angles around the contour of the wing. (See figure 157).

a. SKIN.

(1) GENERAL.—The wing skins are supported by the spars and spanwise stiffeners. Figures 103, 104 and 105 show the various wing skins and stringers. The riveting for all skin splices is given in table 38. No attempt is made to maintain a flush surface except in the nose region forward of the 30 percent spar. Aft of this flush portion of the wing, skins are lapped and brazier head rivets are used. On the flush portion, the skins are lapped in a chordwise direction and butt-joined spanwise, attachments being made with 100 degree countersunk rivets. Rivets used for repair should be, as far as possible, of the same type as those used in the surrounding region. In many cases, however, in order to eliminate the construction of access doors, brazier head Cherry blind rivets are used.

(*a*) Between beams, the stringers are so close together that any appreciable damage to the skin will also affect the stringers. Therefore, such repairs should be combined with stringer repairs.

(*b*) In general, all patches and splices are made on the outside of the skin. In certain regions, this is not possible. In such cases, at the panel ends and at the fuselage, modifications are made as shown in figures 95 and 157. Alternate spar cap repairs designed to avoid interference of repair material with outside contour are shown in figures 119A, 122A and 122B.

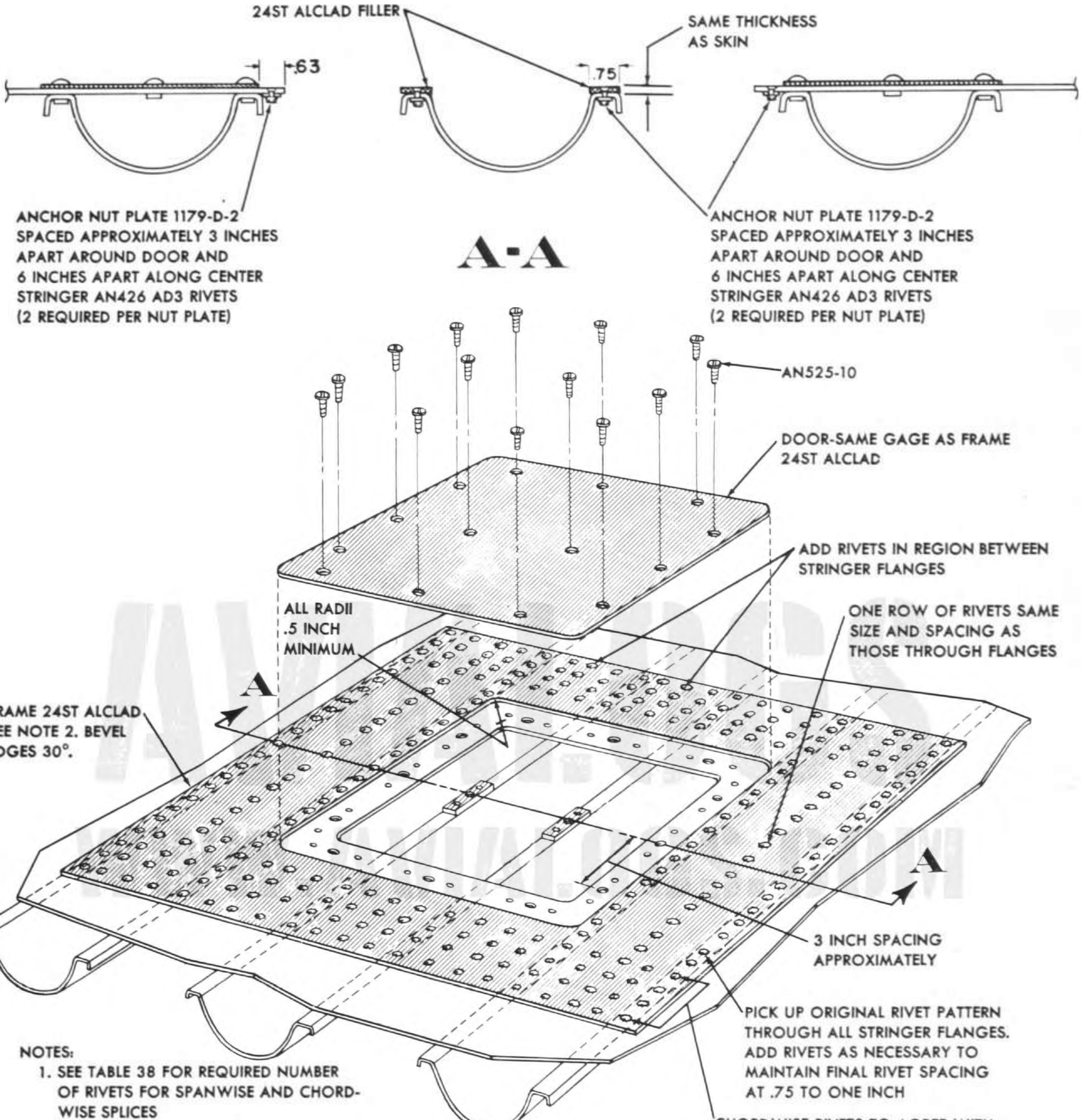
(*c*) Semi-structural doors may be formed in the wing skin to facilitate repair to both the skin and the stringers. Such a door is shown in figure 99. This requires a frame around the hole. The frame is cut so that its inside dimensions are .44 inch greater all around than the skin cut-out and is placed on the outer surface of the wing. For a center panel access door, the spanwise width of the frame should be equal to ½ the width of the hole; and the chordwise width should be such as to take the required number of rivets given in table 38. The outer panel access door frames will have a spanwise width the same as above. The chordwise width should be sufficient to take three rows of rivets. The gage of the frame is given in table 36. Self-locking anchor nut plates at approximately three inch spacing, are attached to the underside of the skin between the edge of the sheet and the edge of the frame. These nut plates are attached with

TABLE 36

SEMI-STRUCTURAL DOOR FRAME GAGES

Gage of Skin	*Gage of Frame*
.020	.032
.025	.032
.032	.040
.036	.051
.040	.051
.045	.064
.051	.064
.064	.081
.072	.081

AN426AD3 rivets which require countersinking of the skin. See section I, paragraph 10, for countersink riveting procedure. When dimpling is used, the nut plate spacer 1088-D-2 should be placed between the skin and the nut plate. Use 1179-D-2 nut plates. The washer head type of bolt AN525-10 which is not countersunk, fastens the door to the skin. The door itself is an unreinforced sheet of the same gage as the frame. The maximum width of cut-out is the distance between three adjacent stringers as shown



NOTES:
1. SEE TABLE 38 FOR REQUIRED NUMBER OF RIVETS FOR SPANWISE AND CHORDWISE SPLICES
2. SEE TABLE 36 FOR FRAME AND DOOR GAGE.
3. FOR REPAIR TO STRINGER, SEE FIGURE 107
4. THE RIVET PATTERN SHOWN IS THAT FOR THE CENTER PANEL USING SOLID RIVETS. CHERRY BLIND RIVETS, LS1127, MAY BE USED PROVIDED THE NEXT LARGER SIZE IS USED AND AN EXTRA ROW IS ADDED IN THE CHORDWISE DIRECTION. OUTER PANEL RIVET PATTERN IS SIMILAR EXCEPT FOR RIVETS BETWEEN STRINGERS. MAINTAIN EQUAL SPACING OF RIVETS AT APPROXIMATELY THAT GIVEN IN TABLE 38.

FIGURE 99 —SEMI-STRUCTURAL DOOR—WING SKIN

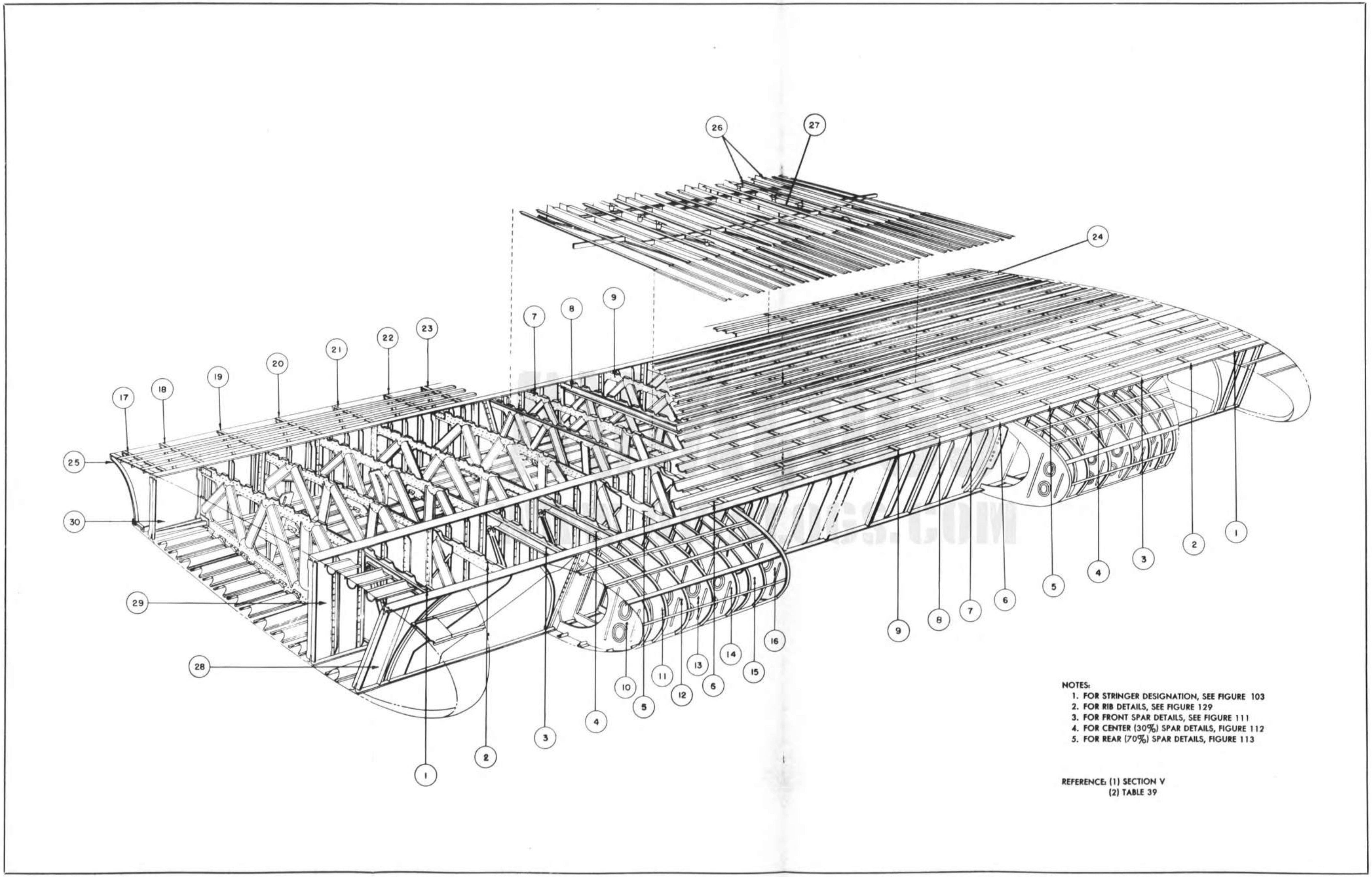


FIGURE 100 — WING CENTER PANEL STRUCTURE

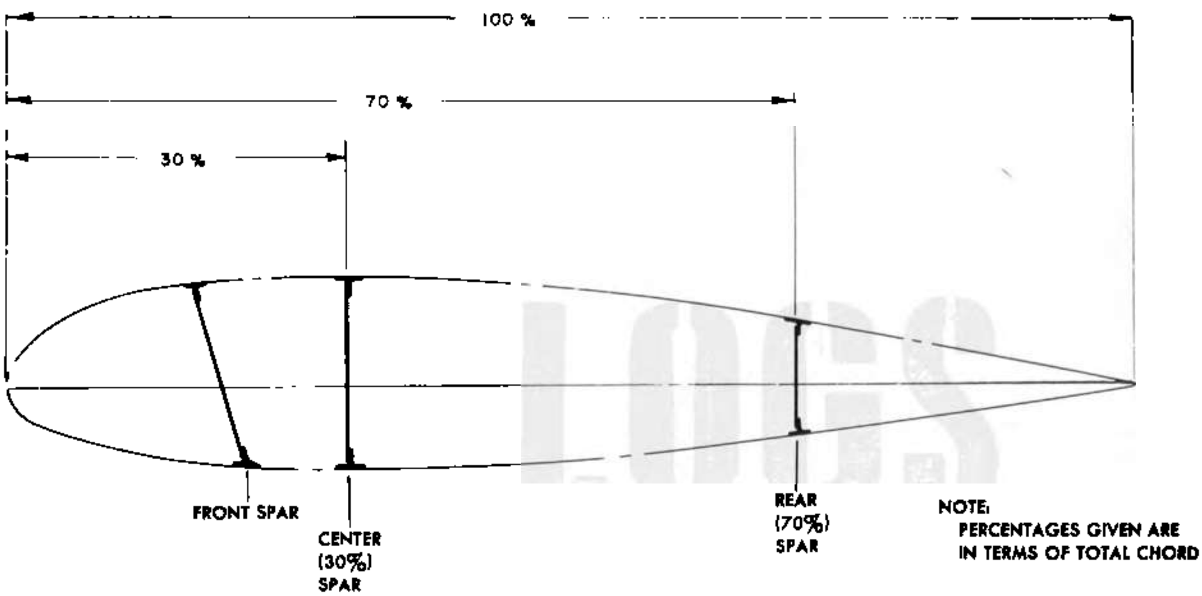
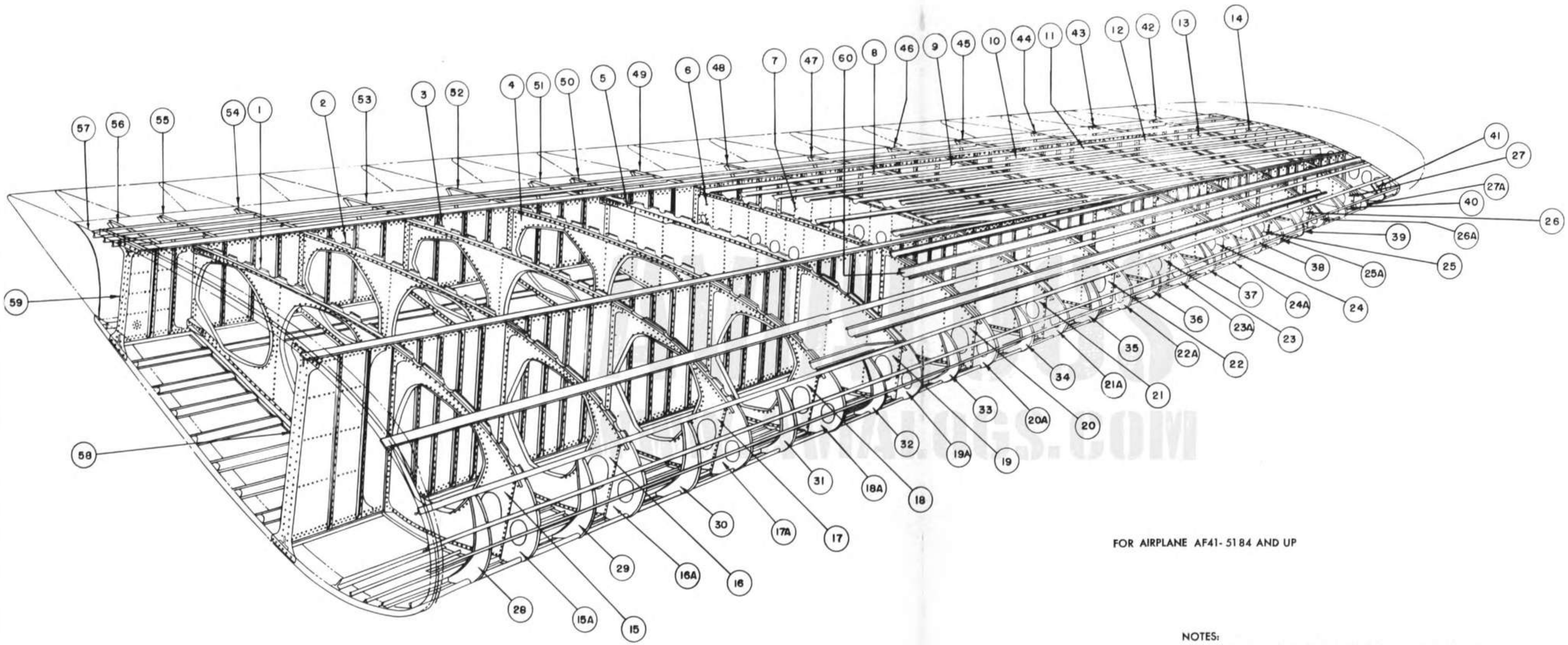


FIGURE 101—CROSS-SECTION OF WING—CENTER PANEL



FOR AIRPLANE AF41-5184 AND UP

NOTES:
1. FOR STRINGER DESIGNATION, SEE FIGURE 104 AND 105
2. FOR RIB DETAILS, SEE FIGURE 138, 139 AND 144
3. FOR CENTER (30%) SPAR DETAILS, SEE FIGURE 114
4. FOR REAR (70%) SPAR DETAILS, SEE FIGURE 115

REFERENCE 1. SECTION V, PARAGRAPH 2
2. TABLE 37

FIGURE 102 — WING OUTER PANEL STRUCTURE

TABLE 37
COMPONENT PARTS OF WING OUTER PANEL

Item	Designation	Station No.	Part No.
1.	Tank Rib Assembly	22	20-030-455
2.	Tank Rib Assembly	52	20-030-456
3.	Tank Rib Assembly	82	20-030-457
4.	Tank Rib Assembly	112	20-030-458
5.	Rib Assembly	142	20-030-459
6.	Rib Assembly	172	20-030-460
7.	Rib Assembly	202	20-030-461
8.	Rib Assembly	232	20-030-462
9.	Rib Assembly	262	20-030-463
10.	Rib Assembly	292	20-030-464
11.	Rib Assembly	322	20-030-465
12.	Rib Assembly	352	20-030-466
13.	Rib Assembly	382	20-030-467
14.	Rib Assembly	412	20-030-487
15.	Nose Rib	22	20-030-622
15A.	Nose Rib	22	20-030-609
16.	Nose Rib	52	20-030-623
16A.	Nose Rib	52	20-030-610
17.	Nose Rib	82	20-030-624
17A.	Nose Rib	82	20-030-611
18.	Nose Rib	112	20-030-625
18A.	Nose Rib	112	20-030-612
19.	Nose Rib	142	20-030-626
19A.	Nose Rib	142	20-030-613
20.	Nose Rib	172	20-030-627
20A.	Nose Rib	172	20-030-614
21.	Nose Rib	202	20-030-628
21A.	Nose Rib	202	20-030-615
22.	Nose Rib	232	20-030-629
22A.	Nose Rib	232	20-030-616
23.	Nose Rib	262	20-030-630
23A.	Nose Rib	262	20-030-617
24.	Nose Rib	292	20-030-631
24A.	Nose Rib	292	20-030-618
25.	Nose Rib	322	20-030-632
25A.	Nose Rib	322	20-030-619
26.	Nose Rib	352	20-030-633
26A.	Nose Rib	352	20-030-620
27.	Nose Rib	382	20-030-634
27A.	Nose Rib	382	20-030-621
28.	Intermediate Nose Rib	11	20-030-500
29.	Intermediate Nose Rib	37	20-030-500
30.	Intermediate Nose Rib	67	20-030-500
31.	Intermediate Nose Rib	97	20-030-593
32.	Intermediate Nose Rib	127	20-030-500

TABLE 37 (CONTINUED)
COMPONENT PARTS OF WING OUTER PANEL

Item	*Designation*	*Station No.*	*Part No.*
33.	Intermediate Nose Rib	157	20-030-592
34.	Intermediate Nose Rib	187	20-030-500
35.	Intermediate Nose Rib	217	20-030-500
36.	Intermediate Nose Rib	247	20-030-500
37.	Intermediate Nose Rib	277	20-030-500
38.	Intermediate Nose Rib	307	20-030-500
39.	Intermediate Nose Rib	337	20-030-500
40.	Intermediate Nose Rib	367	20-030-500
41.	Intermediate Nose Rib	397	20-030-500
42.	Closure Rib	382	20-030-522
43.	Closure Rib	352	20-030-516
44.	Closure Rib	322	20-030-515
45.	Closure Rib	292	20-030-514
46.	Closure Rib	262	20-030-513
47.	Closure Rib	232	20-030-512
48.	Closure Rib	202	20-030-511
49.	Closure Rib	172	20-030-510
50.	Closure Rib	148.95	20-030-584
51.	Closure Rib	137.75	20-030-509
52.	Closure Rib	112	20-030-508
53.	Closure Rib	82	20-030-507
54.	Closure Rib	52	20-030-506
55.	Closure Rib	26.25	20-030-505
56.	Closure Rib	14.40	20-030-584
57.	Closure Rib	0	20-030-554
58.	30% Spar		20-030-410
59.	70% Spar		20-030-411
60.	Stringer Hat Section (Typical)		SS112 & SS113

in figure 105. These doors should not be used on the leading edge forward of the front spar on the center panel or the front spar extension on the outer panel.

(2) NEGLIGIBLE DAMAGE.

(*a*) SKIN DENTS.—Skin dents, free from cracks, abrasions, and sharp corners may be neglected. These dents should be restored to shape wherever possible to prevent their developing into cracks. Care must be taken, however, not to stretch or crack the skin in the process. Inspect all rivets near the damage to see that they have not been loosened or sheared.

(*b*) HOLES AND CRACKS.—Holes and cracks which can be cleaned up to a ¾ inch diameter circle may be considered negligible if:

1. Occurring in a sheet of .040 or lighter.

2. Edge of hole is at least 1 inch from any rivet or cut-out.

3. Occurring at least 2 inches from any skin splice rivet.

4. Not closer than 10 inches chordwise or 5 inches spanwise to another such hole.

5. Negligible holes must be cleaned up to prevent the spread of cracks and should be patched with a sheet of .020 gage and attached with four LS1127-4 rivets spaced equally around the hole. See figure 106.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage not considered negligible may in general be cleaned up and patched by placing a 24ST alclad sheet of the same gage as the skin on the outer surface, using the required number of rivets and rivet spacing as given in table 38. Fillers of a gage equal to that of original skin in this region should be placed between the patch and any stringers over which the patch lies. Such a repair is shown in figure 107. In the region of flush riveting on the nose, patches must lie on the inner surface of the skin provided the patch can be made in a region between ribs and stringers. For aerodynamic reasons, the damaged skin which was

NOTES:

1. STRINGERS GIVEN "SS" NUMBERS ARE CURTISS SEMI-STANDARDS; FOR CROSS SECTIONS AND DIMENSIONS, SEE FIGURE 108.
2. ALL OTHER STRINGERS ARE STANDARD EXTRUSIONS, THE ALCOA DIE NUMBER BEING GIVEN.
3. FOR MACHINING OF 30% SPAR CAPSTRIPS, SEE FIGURE 117.
4. STATION LOCATIONS ARE IN INCHES FROM CENTER LINE OF AIRPLANE.

REFERENCE: 1. SECTION V, PARAGRAPH 2a
2. TABLE 38

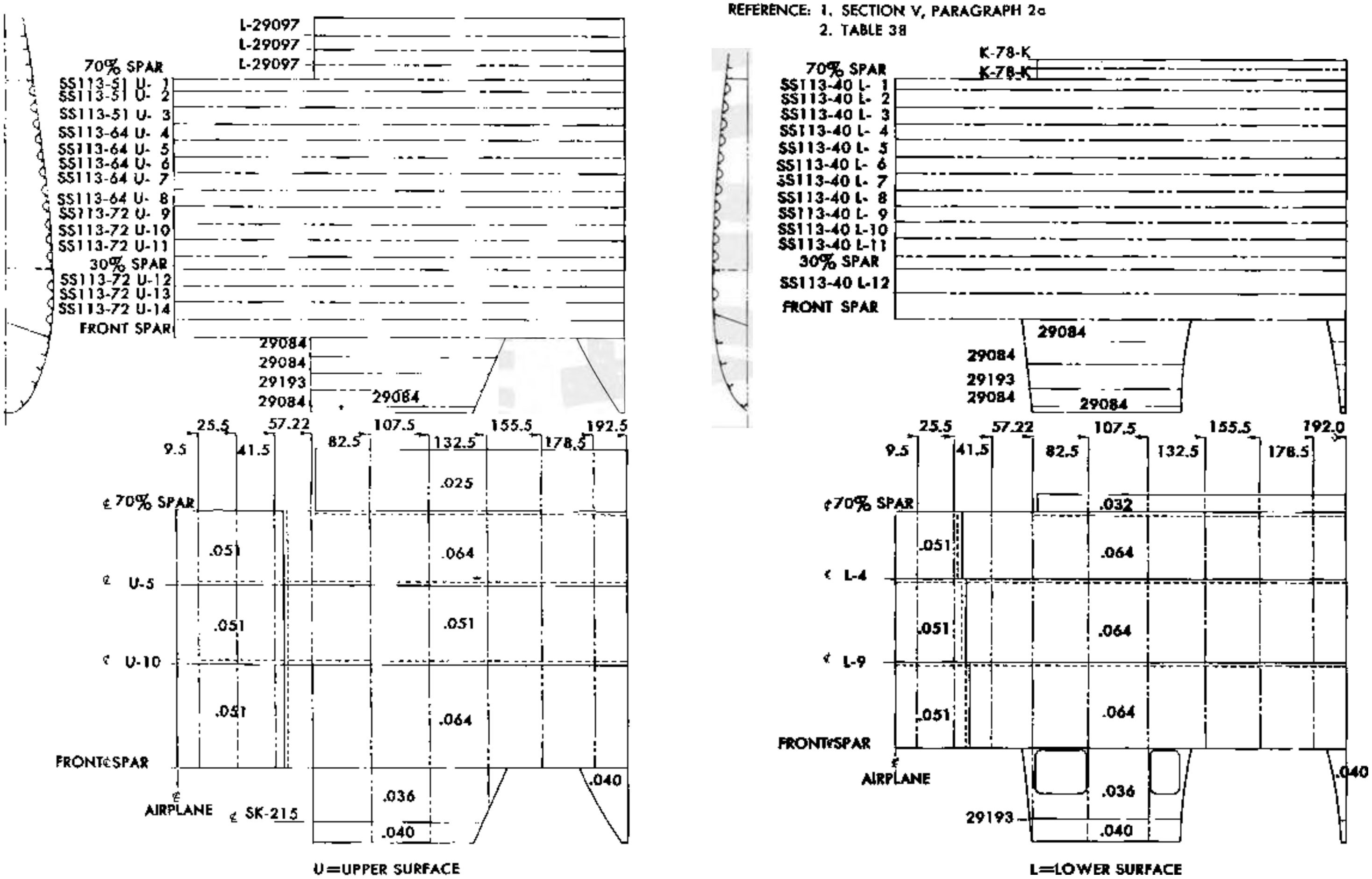
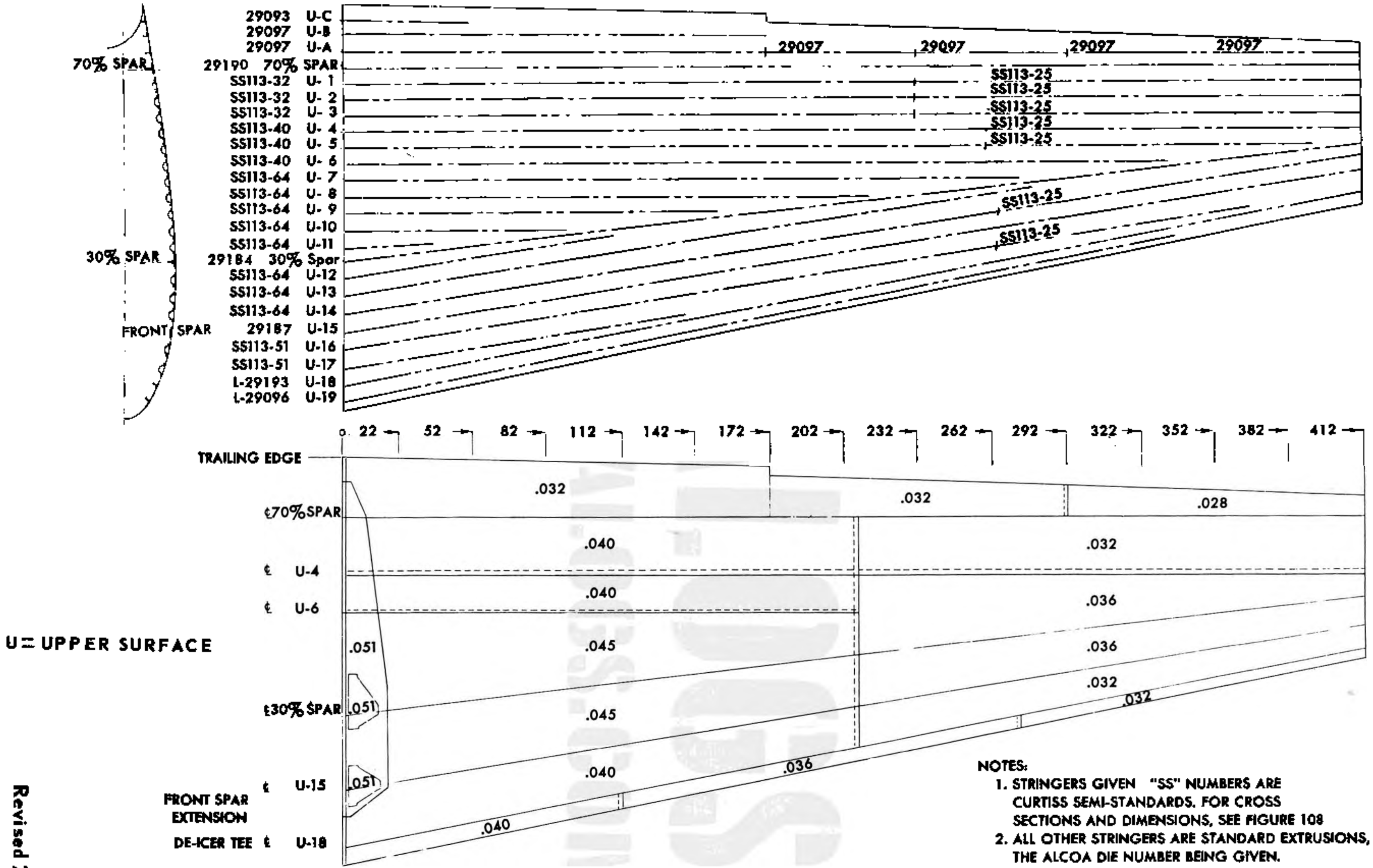


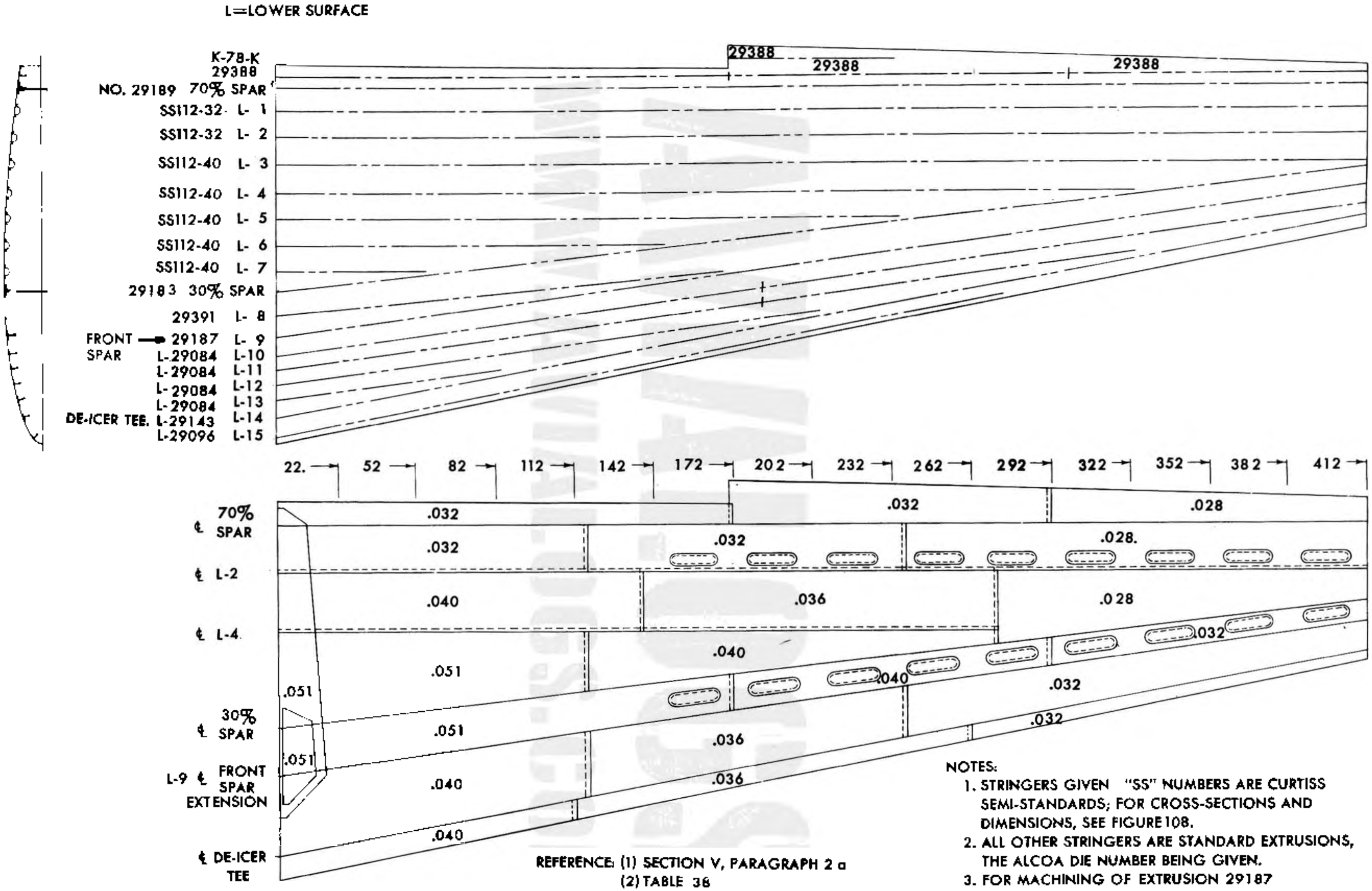
FIGURE 103 — WING SKIN AND STRINGER DIAGRAM — CENTER PANEL



REFERENCE: (1) SECTION V, PARAGRAPH 2a
(2) TABLE 38

NOTES:
1. STRINGERS GIVEN "SS" NUMBERS ARE CURTISS SEMI-STANDARDS. FOR CROSS SECTIONS AND DIMENSIONS, SEE FIGURE 108
2. ALL OTHER STRINGERS ARE STANDARD EXTRUSIONS, THE ALCOA DIE NUMBER BEING GIVEN.
3. STATION LOCATIONS ARE IN INCHES FROM CENTER LINE OF AIRPLANE.
4. FOR MACHINING OF EXTRUSION 29187, SEE FIGURE 118

FIGURE 104 —WING SKIN AND STRINGER DIAGRAM—OUTER PANEL UPPER



REFERENCE: (1) SECTION V, PARAGRAPH 2 a
(2) TABLE 36

NOTES:
1. STRINGERS GIVEN "SS" NUMBERS ARE CURTISS SEMI-STANDARDS; FOR CROSS-SECTIONS AND DIMENSIONS, SEE FIGURE 108.
2. ALL OTHER STRINGERS ARE STANDARD EXTRUSIONS, THE ALCOA DIE NUMBER BEING GIVEN.
3. FOR MACHINING OF EXTRUSION 29187 SEE FIGURE 118
4. STATION LOCATIONS ARE IN INCHES FROM CENTERLINE OF AIRPLANE

FIGURE 105 — WING SKIN AND STRINGER DIAGRAM — OUTER PANEL LOWER

TABLE 38
WING SKIN RIVETING
CHORDWISE SKIN CONNECTIONS—OUTER PANEL

Location	*Extent*	*Gage of Inb'd*	*Gage of Outb'd*	*Type of Rivet*	*Rivet Spacing*	*Rivet Rows*	*Rivet Row Spacing*
Sta. 112-Nose Section	Str. U-18 to Str. L-14	.040	.036	AN426AD	.12	3	.75
Sta. 262-Nose Section	Str. U-18 to Str. L-14	.036	.032	AN426AD	.90	3	.75
Sta. 202-Top	Str. U-18 to Str. U-15	.040	.032	AN426AD	.68	3	.75
Sta. 202-Top	Str. U-15 to 30% Spar	.045	.036	AN426AD	.66	2	.74
Sta. 202-Top	30% Spar to Str. U-6	.045	.036	671D	.70	2	.74
Sta. 202-Top	Str. U-6 to Str. U-4	.040	.036	671D	.70	2	.74
Sta. 202-Top	Str. U-4 to 70% Spar	.040	.032	671D	.70	2	.74
Sta. 172-Top	70% Spar to T.E.	.032	.032	671D	.50	1	--
Sta. 292-Top	70% Spar to T.E.	.032	.028	671D	.50	1	--
Sta. 112-Bottom	Str. L-14 to Str. L-9	.040	.036	AN426AD	.90	3	.75
Sta. 232-Bottom	Str. L-14 to Str. L-9	.036	.032	AN426AD	1.00	3	.75
Sta. 172-Bottom	Str. L-9 to 30% Spar	.051	.040	AN426AD	.66	2	.52
Sta. 292-Bottom	Str. L-9 to 30% Spar	.040	.032	AN426AD	.70	2	.60
Sta. 112-Bottom	30% Spar to Str. L-4	.051	.040	671D	.80	3	.75
Sta. 262-Bottom	30% Spar to Str. L-4	.040	.028	671D	.54	2	.60
Sta. 142-Bottom	Str. L-4 to Str. L-2	.040	.036	AN426AD	.60	2	.75
Sta. 262-Bottom	Str. L-4 to Str. L-2	.036	.028	AN426AD	.50	2	.65
Sta. 112-Bottom	Str. L-2 to 70% Spar	.032	.032	AN426AD	.50	2	.70
Sta. 232-Bottom	Str. L-2 to 70% Spar	.032	.028	AN426AD	.60	2	.65
Sta. 172-Bottom	70% Spar to T.E.	.032	.032	AN426AD	.50	1	--
Sta. 292-Bottom	70% Spar to T.E.	.032	.028	AN426AD	.50	1	--

CHORDWISE SKIN CONNECTIONS—CENTER PANEL

Location	*Extent*	*Gage of Inb'd*	*Gage of Outb'd*	*Type of Rivet*	*Rivet Spacing*	*Rivet Rows*	*Rivet Row Spacing*
Sta. 41.5-Top	F. Spar to Str. 9	.051	.064	AN442AD-5	1.15	4	.32
Sta. 41.5-Top	Str. 9 to Str. 4	.051	.051	AN442AD-5	1.15	4	.32
Sta. 41.5-Top	Str. 4 to 70% Spar	.051	.064	AN442AD-5	1.15	4	.32
Sta. 32 -Bottom	F. Spar to Str. 9	.051	.064	AN442AD-5	.75	4	.32
Sta. 25.5-Bottom	Str. 9 to Str. 4	.051	.064	AN442AD-5	.75	4	.32
Sta. 25.5-Bottom	Str. 4 to 70% Spar	.051	.064	AN442AD-5	.75	4	.32

TABLE 38 (Continued) WING SKIN RIVETING
SPANWISE SKIN CONNECTIONS—OUTER PANEL

Location	*Extent*	*Gage of Fw'd*	*Gage of Aft*	*Type of Rivet*	*Rivet Spacing*	*Rivet Rows*	*Rivet Row Spacing*
Str. U-18-Top	Sta. 0 to Sta. 112	.040	---	AN426AD	.90	2	.23
Str. U-18-Top	Sta. 112 to Sta. 262	.036	---	AN426AD	.90	2	.23
Str. U-18-Top	Sta. 262 to Sta. 412	.032	---	AN426AD	1.00	2	.23
Str. U-18-Top	Sta. 0 to Sta. 202	---	.040	AN426AD	1.00	2	.23
Str. U-18-Top	Sta. 202 to Sta. 412	---	.032	AN426AD	1.50	2	.23
Str. U-15-Top	Sta. 0 to Sta. 202	.040	---	AN426AD	1.00	2	.40
Str. U-15-Top	Sta. 202 to Sta. 412	.032	---	AN426AD	1.25	2	.20
Str. U-15-Top	Sta. 0 to Sta. 202	---	.045	AN426AD	1.00	2	.40
Str. U-15-Top	Sta. 202 to Sta. 412	---	.036	AN426AD	1.00	2	.20
30% Spar-Top	Sta. 0 to Sta. 202	.045	---	AN426AD	1.00	2	.36
30% Spar-Top	Sta. 202 to Sta. 412	.036	---	AN426AD	1.20	2	.36
30% Spar-Top	Sta. 0 to Sta. 202	---	.045	671D	1.00	2	.36
30% Spar-Top	Sta. 202 to Sta. 412	---	.036	671D	1.25	2	.36
Str. U-6-Top	Sta. 0 to Sta. 202	.045	.040	671D	1.00	2	.70
Str. U-4-Top	Sta. 0 to Sta. 202	.040	.040	671D	1.00	2	.70
Str. U-4-Top	Sta. 202 to Sta. 412	.036	.032	671D	1.00	1	--
70% Spar-Top	Sta. 0 to Sta. 202	.040	---	671D	1.25	2	.54
70% Spar-Top	Sta. 202 to Sta. 412	.032	---	671D	1.25	2	.54
70% Spar-Top	Sta. 0 to Sta. 172	---	.032	671D	1.25	2	.60
70% Spar-Top	Sta. 172 to Sta. 292	---	.032	671D	1.25	2	.60
70% Spar-Top	Sta. 292 to Sta. 412	---	.028	671D	1.25	2	.60
Str. L-14-Bottom	Sta. 0 to Sta. 112	.040	---	AN426AD	.90	2	.23
Str. L-14-Bottom	Sta. 112 to Sta. 262	.036	---	AN426AD	.90	2	.23
Str. L-14-Bottom	Sta. 262 to Sta. 412	.032	---	AN426AD	1.00	2	.23
Str. L-14-Bottom	Sta. 0 to Sta. 112	---	.040	AN426AD	1.10	2	.23
Str. L-14-Bottom	Sta. 112 to Sta. 232	---	.036	AN426AD	1.10	2	.23
Str. L-14-Bottom	Sta. 232 to Sta. 412	---	.032	AN426AD	1.52	2	.23
Str. L-9-Bottom	Sta. 0 to Sta. 112	.040	---	AN426AD	1.25	2	.40
Str. L-9-Bottom	Sta. 112 to Sta. 232	.036	---	AN426AD	1.50	2	.40
Str. L-9-Bottom	Sta. 232 to Sta. 412	.032	---	AN426AD	1.50	2	.20
Str. L-9-Bottom	Sta. 0 to Sta. 172	---	.051	AN426AD	1.00	2	.40
Str. L-9-Bottom	Sta. 172 to Sta. 292	---	.040	NA426AD	1.25	2	.40
Str. L-9-Bottom	Sta. 292 to Sta. 412	---	.032	AN426AD	1.25	2	.20
30% Spar-Bottom	Sta. 0 to Sta. 172	.051	---	AN426AD	1.00	2	.35
30% Spar-Bottom	Sta. 172 to Sta. 292	.040	---	AN426AD	1.25	2	.35
30% Spar-Bottom	Sta. 292 to Sta. 412	.032	---	AN426AD	1.25	2	.35
30% Spar-Bottom	Sta. 0 to Sta. 112	---	.051	671D	1.00	2	.35
30% Spar-Bottom	Sta. 112 to Sta. 262	---	.040	671D	1.25	2	.35
30% Spar-Bottom	Sta. 262 to Sta. 412	---	.028	671D	1.25	2	.45
Str. L-4-Bottom	Sta. 0 to Sta. 112	.051	.040	671D	.62	1	--
Str. L-4-Bottom	Sta. 112 to Sta. 262	.040	.036	671D	.75	1	--
Str. L-2-Bottom	Sta. 0 to Sta. 142	.040	.032	671D	.62	1	--
Str. L-2-Bottom	Sta. 142 to Sta. 262	.036	.032	671D	.62	1	--
Str. L-2-Bottom	Sta. 262 to Sta. 412	.028	.028	671D	.75	1	--
70% Spar-Bottom	Sta. 0 to Sta. 112	.032	---	671D	1.25	2	.58
70% Spar-Bottom	Sta. 112 to Sta. 232	.032	---	671D	1.25	2	.58
70% Spar-Bottom	Sta. 232 to Sta. 412	.028	---	671D	1.50	2	.58
70% Spar-Bottom	Sta. 0 to Sta. 172	---	.032	671D	1.25	2	.60
70% Spar-Bottom	Sta. 172 to Sta. 292	---	.032	671D	1.50	2	.60
70% Spar-Bottom	Sta. 292 to Sta. 412	---	.028	671D	1.50	2	.60

TABLE 38 (Continued)
WING SKIN RIVETING

SPANWISE SKIN CONNECTIONS—CENTER PANEL

Location	*Extent*	*Fw'd*	*Aft*	*Type of Rivet*	*Rivet Spacing*	*Rivet Rows*	*Rivet Row Spacing*
Str. U-17-Top	Sta. 57.2 to Sta. 124	.040	---	AN426AD	1.20	2	.25
Str. U-17-Top	Sta. 57.2 to Sta. 124	---	.036	AN426AD	1.20	2	.25
F. Spar-Top	Sta. 57.2 to Sta. 140	.036	---	AN426AD	.80	1	--
F. Spar-Top	Sta. 169 to Sta. 192	.040	---	AN426AD	1.00	1	--
F. Spar-Top	Sta. 0 to Sta. 41.5	---	.051	AN442AD	.60	3	.30
F. Spar-Top	Sta. 41.5 to Sta. 192	---	.064	AN426AD	1.00	3	.30
Str. U-9-Top	Sta. 0 to Sta. 41.5	.051	.051	AN442AD	1.00	2	.40
Str. U-9-Top	Sta. 41.5 to Sta. 192	.064	.051	671D	.75	2	.40
Str. U-4-Top	Sta. 0 to Sta. 41.5	.051	.051	AN442AD	1.00	2	.70
Str. U-4-Top	Sta. 41.5 to Sta. 192	.051	.064	671D	.75	2	.70
70% Spar-Top	Sta. 0 to Sta. 41.5	.051	---	AN442AD	1.00	3	.60
70% Spar-Top	Sta. 41.5 to Sta. 57	.064	---	671D	1.15	3	.60
70% Spar-Top	Sta. 57 to Sta. 192	.064	.025	671D	1.00	3	.60
Str. L-15-Bottom	Sta. 57.2 to Sta. 124	.040	---	AN426AD	1.20	2	.25
Str. L-15-Bottom	Sta. 57.2 to Sta. 124	---	.036	AN426AD	1.20	2	.25
F. Spar-Bottom	Sta. 57.2 to Sta. 124	.036	---	AN426AD	.80	1	--
F. Spar-Bottom	Sta. 184 to Sta. 192	.040	---	AN426AD	1.00	1	--
F. Spar-Bottom	Sta. 0 to Sta. 32	---	.051	AN426AD	1.00	3	.75
F. Spar-Bottom	Sta. 32 to Sta. 192	---	.064	AN442AD and AN426AD	1.00	3	.75
Str. L-9-Bottom	Sta. 0 to Sta. 32	.051	.051	AN442AD	.75	2	.65
Str. L-9-Bottom	Sta. 32 to Sta. 192	.064	.064	AN442AD and 671D	.75	2	.65
Str. L-4-Bottom	Sta. 0 to Sta. 25.5	.051	.051	AN442AD	.75	2	.65
Str. L-4-Bottom	Sta. 25.5 to Sta. 192	.064	.064	AN442AD and 671D	.75	2	.65
70% Spar-Bottom	Sta. 0 to Sta. 25.5	.051	---	AN442AD	1.00	3	.60
70% Spar-Bottom	Sta. 25.5 to Sta. 57	.064	---	AN442AD	1.00	3	.60
70% Spar-Bottom	Sta. 57 to Sta. 192	.064	.032	AN442AD	1.00	3	.60

TABLE 39 (See figure 100)
COMPONENT PARTS OF WING CENTER PANEL

Item	*Designation*	*Station*	*Part No.*	*Ref. Fig. No.*
1	Rib Assembly	178.5	20-020-1065-2L/R	131-137
2	Rib Assembly	155.5	20-020-1073-2L/R	131-137
3	Rib Assembly	132.5	20-020-1065-3L/R	131-137
4	Rib Assembly	107.5	20-020-1008-2L/R	131-137
5	Rib Assembly	82.5	20-020-1061-2L/R	131-137
6	Rib Assembly	Canted	20-020-1068-2L/R	131-137
7	Rib Assembly	41.5	20-020-1060-2L/R	131-137
8	Rib Assembly	25.5	20-020-1059-2L/R	131-137
9	Rib Assembly	9.5	20-020-1060-4L/R	131-137
10	Nose Rib	124.0	20-020-1020-2L/R	150-154
11	Nose Rib	115.75	20-020-1021-1L/R	150-154
12	Nose Rib	107.5	20-020-1020-7L/R	150-154
13	Nose Rib	95.0	20-020-1020-8L/R	150-154
14	Nose Rib	82.5	20-020-1020-7L/R	150-154
15	Nose Rib	70.75	20-020-1180-1L/R	150-154
16	Nose Rib	57.22	20-020-1020-6L/R	150-154
17	Closure Rib	185.95	20-020-1128-11L/R	156
18	Closure Rib	174.25	20-020-1134-1L/R	156
19	Closure Rib	155.5	20-020-1128-9L/R	156
20	Closure Rib	132.5	20-020-1128-7L/R	156
21	Closure Rib	107.5	20-020-1128-2L/R	156
22	Closure Rib	86.75	20-020-1126-1L/R	156
23	Closure Rib	70.75	20-020-1128-5L/R	156
24	Stringer		L29097	88
25	Closure Rib	190.8	20-020-3042-1L/R	156
26	Floor Beam Flange		L29102	95
27	Floor Beam Flange		L29103	95
28	Front Spar		20-020-1005	119
29	30% Spar		20-020-1004	120
30	70% Spar		20-020-1006	121

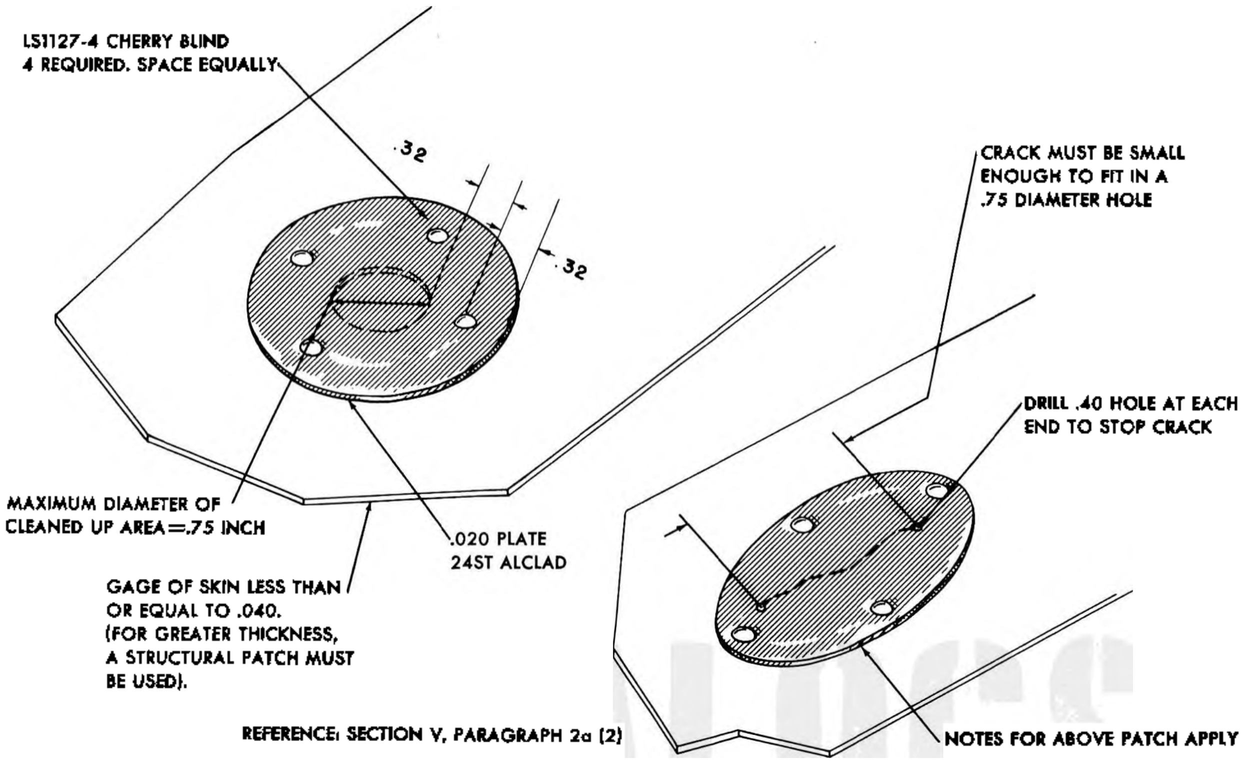


FIGURE 106—COVER PLATE FOR NEGLIGIBLE DAMAGE

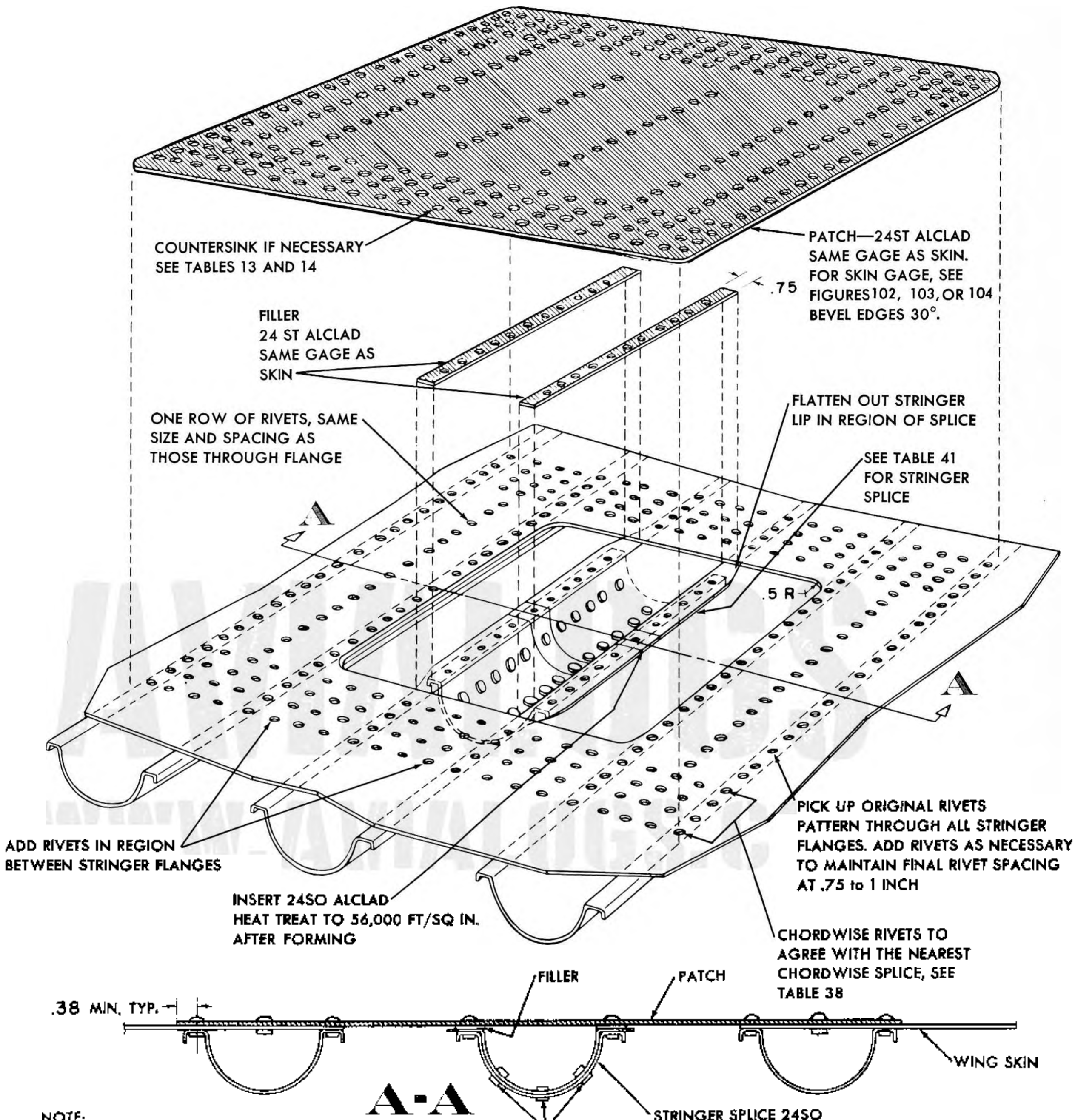
cleaned away should be replaced with a filler sheet to preserve the original contour. See figure 110. Existing rivets which interfere with the attachment of a patch should be carefully drilled out and the resulting holes used in arranging the new required rivet pattern.

(4) DAMAGE REPAIRABLE BY INSERTION.

(*a*) SPECIAL REPAIRS.—Damages to areas which cannot effectively be patched due either to their extent or their location may be repaired by the use of inserts. The required insert should be cut from 24ST alclad stock of the same gage as the skin. The insert should be sufficiently large to extend to the edges of the damaged sheet or to areas in which the necessary splice plates or frames may be used and its corners should be rounded off to a half inch or larger radius. (See figures 95 and 157). Use the insert as a template in cutting away the damaged material. Make up the necessary splice plates or frames and rivet these to the skin using the data in figure 105.

(*b*) LOCATION OF SPECIAL REPAIRS.—Such inserts are to be used in the region of the wing splice, the wing fuselage intersection, under the cabin floor and the flush portion of the wing nose. The splice plates or frames are of the same gage as the skin. Spanwise splice plates should be placed on the inner surface of the skin at all times. Chordwise plates, except on the flush portion of the nose, may be either on the inner or outer surface depending on the relative ease of installation. In the nose section, the chordwise splice plates are on the inner surface of the skin and are made discontinuous at the stringers. (See figure 110).

Although large areas other than those in the preceding paragraph, may be repaired by patching as discussed in paragraph 2., *a*., (3) above, inserts may also be used if the cleaned up damage is greater than 15 inches spanwise and 12 inches chordwise.



NOTE:
THE RIVET PATTERN SHOWN IS THAT FOR CENTER PANEL USING SOLID RIVETS. CHERRY BLIND RIVETS LS1127 MAY BE USED INSTEAD PROVIDED THE NEXT LARGER SIZE IS USED. OUTER PANEL RIVET PATTERN IS SIMILAR EXCEPT FOR RIVETS BETWEEN STRINGERS. MAINTAIN EQUAL SPACING OF RIVETS AT APPROXIMATELY THAT GIVEN IN TABLE 38

REFERENCE: SECTION V, PARAGRAPH 2a(3)

FIGURE 107—HAT SECTION REPAIR AND SKIN PATCH

TABLE 40

STANDARD HAT SECTION STRINGERS

Dash No.	*Thickness T*	*SS112 Developed Width*	*SS113 Developed Width*	*Bend Rad. R_1*	*SS112 C*	*SS113 C*
25	.025	5.062	6.500	.050±.015	.224	.265
32	.032	5.062	6.500	.064±.015	.255	.297
40	.040	5.062	6.500	.080±.015	.283	.329
51	.051	5.062	6.500	.102±.015	.326	.376
64	.064	5.062	6.500	.128±.015	.377	.423
72	.072	5.062	6.500	.144±.015	.408	.455

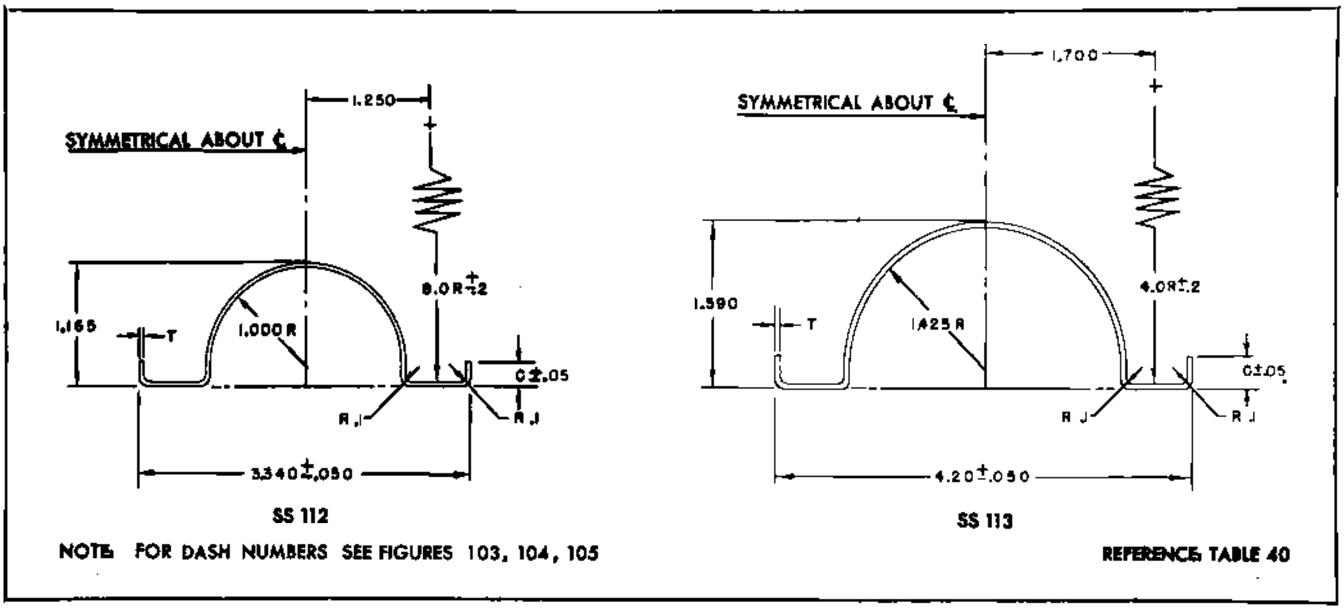
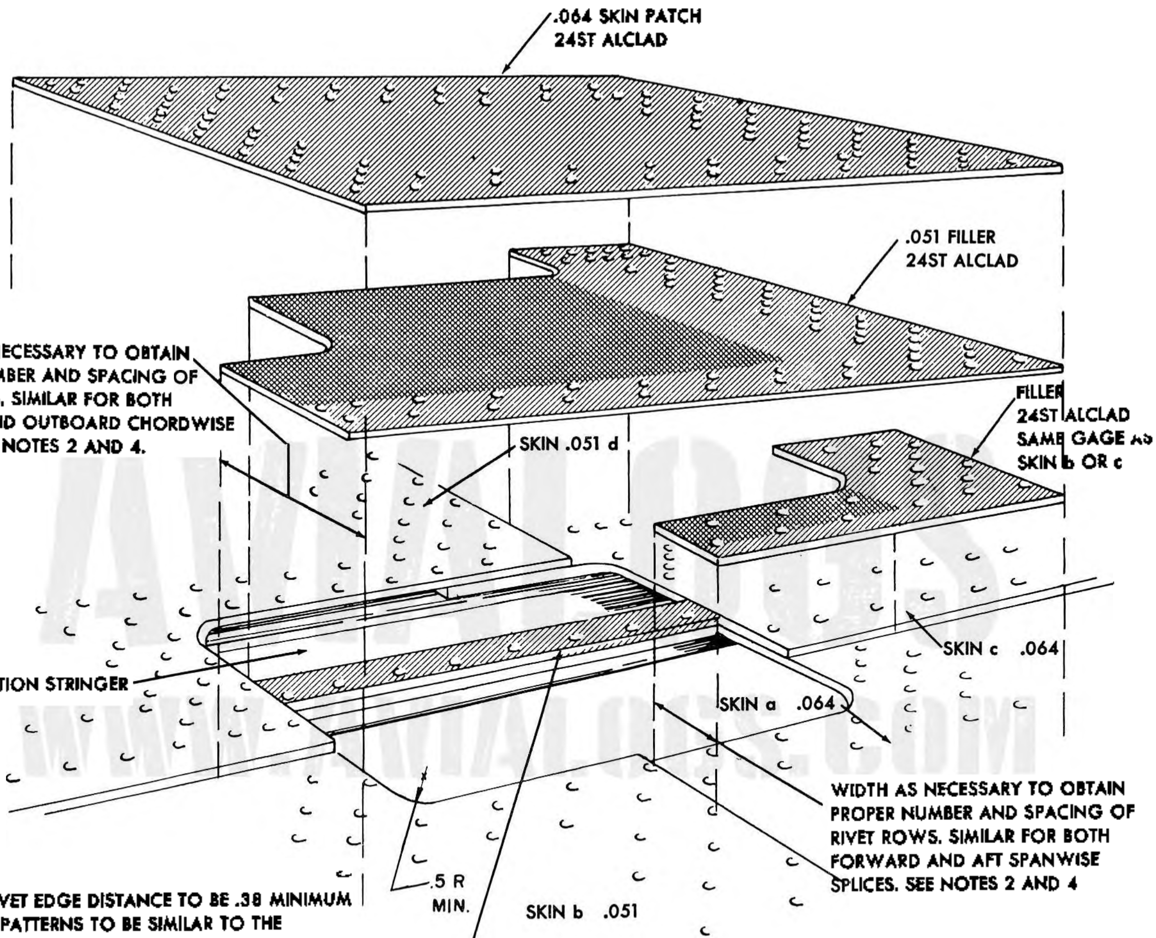
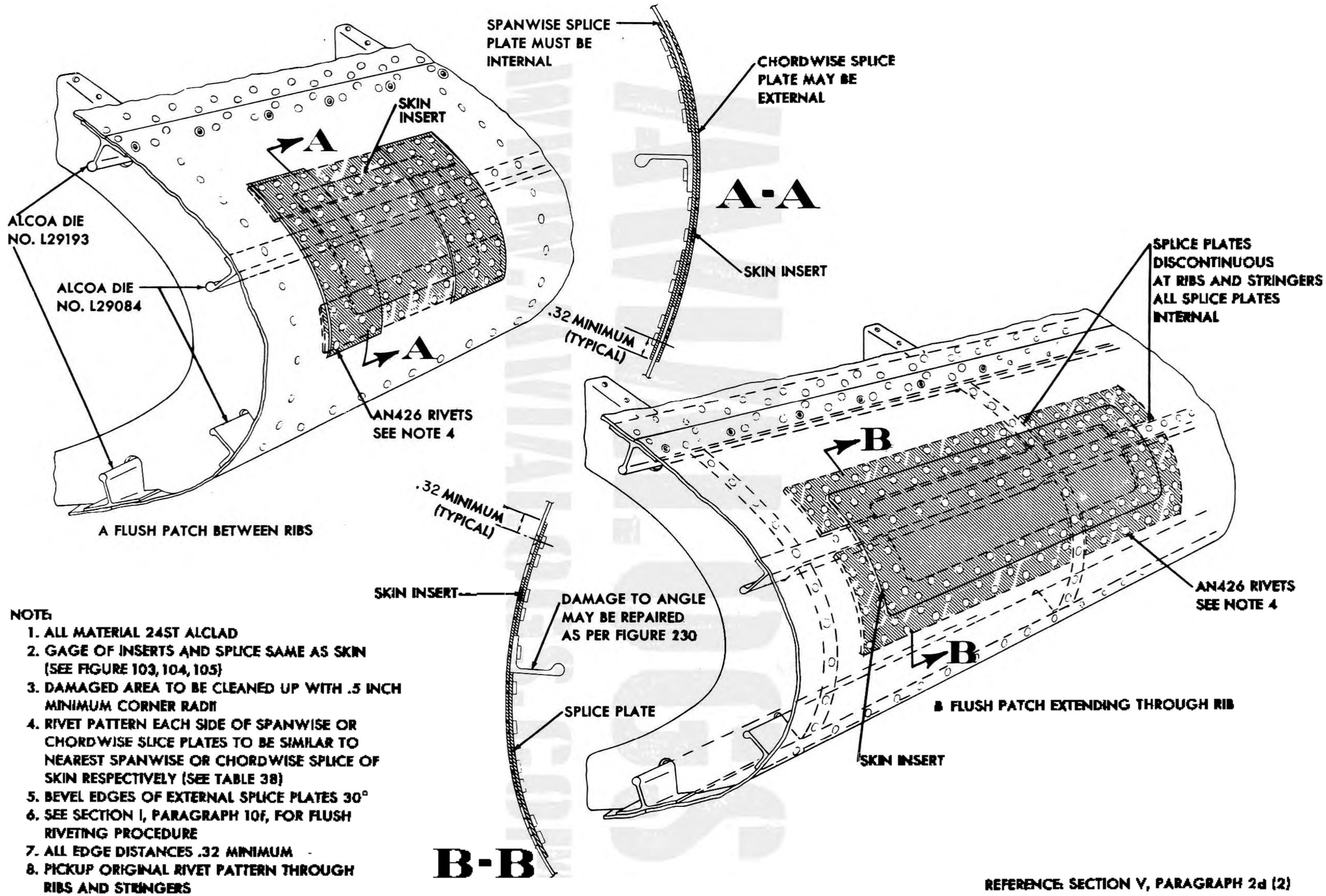


FIGURE 108—STANDARD WING HAT SECTION STRINGERS



NOTES:
1. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM
2. RIVET PATTERNS TO BE SIMILAR TO THE EXISTING CHORDWISE AND SPANWISE SPLICES. SEE FIGURE 103 AND TABLE 38
3. WHERE EXISTING RIVET PATTERN IS PICKED UP BY SPLICE, DRILL OUT RIVETS AND REPLACE WITH IDENTICAL RIVETS
4. IF SOLID RIVETS CANNOT BE BUCKED, USE LS1127-6 CHERRY BLIND RIVETS ADDING AN ADDITIONAL ROW ON ALL SIDES.

FIGURE 109 — REPAIR AT SKIN INTERSECTION — LOWER CENTER PANEL



NOTE:
1. ALL MATERIAL 24ST ALCLAD
2. GAGE OF INSERTS AND SPLICE SAME AS SKIN (SEE FIGURE 103, 104, 105)
3. DAMAGED AREA TO BE CLEANED UP WITH .5 INCH MINIMUM CORNER RADII
4. RIVET PATTERN EACH SIDE OF SPANWISE OR CHORDWISE SLICE PLATES TO BE SIMILAR TO NEAREST SPANWISE OR CHORDWISE SPLICE OF SKIN RESPECTIVELY (SEE TABLE 38)
5. BEVEL EDGES OF EXTERNAL SPLICE PLATES 30°
6. SEE SECTION I, PARAGRAPH 10f, FOR FLUSH RIVETING PROCEDURE
7. ALL EDGE DISTANCES .32 MINIMUM
8. PICKUP ORIGINAL RIVET PATTERN THROUGH RIBS AND STRINGERS

REFERENCE: SECTION V, PARAGRAPH 2d (2)

FIGURE 110 — WING NOSE SKIN REPAIR

(c) TYPE OF ATTACHING RIVETS.—All splice plates placed on the inner surface of the skin should be attached with either 671-D or AN426 rivets depending on the region of the skin being repaired. Inner surface chordwise plates should be attached with the same type of rivets. The insert proper and outer surface chordwise plates should be attached with LS-1127 Cherry blind rivets unless the damage can be reached from an existing hole in the wing, in which case standard rivets should be used.

(5) DAMAGE NECESSITATING REPLACEMENT.—Damaged reinforcing plates and gussets except those in figure 157 should be replaced.

Use care in drilling out existing rivets and use new rivets of the same type and size.

b. STRINGERS.

(1) GENERAL.—There are several types of stringers used in reinforcing the wing skin. Those between spars are all of a curved hat cross-section as shown in figure 108. In the nose and trailing edge portions of the wing, bulb angle extrusions are used almost exclusively. The only deviation from this is the front spar extension and the de-icer tee (both in the outer panel) which are bulb tee-section extrusions. All center panel stringers are continuous for the entire length, whereas some outer panel stringers are spliced.

(2) HAT SECTION STRINGERS.

(a) NEGLIGIBLE DAMAGE.—Small isolated dents, free from cracks, abrasions, and sharp corners, may be neglected provided no two adjacent stringers are damaged at the same chordwise station and that the skin to which the stringers are attached is not affected.

Holes, which when cleaned up to a maximum diameter of .38 inch and which are a minimum of .5 inch from any flange, may be neglected. Such holes should not occur within 10 inches of each other.

(b) DAMAGE REPAIRABLE BY PATCHING.

1. Damage covering a greater area than that specified above must be patched. Figure 107 gives the required splice and the accompanying table (table 41) contains the necessary gage, riveting, etc., for full strength patches.

TABLE 41—WING STRINGER SPLICES

Stringer No.	*Gage*	*No. Solid Rivets Required Each Side of Splice*			*No. Cherry Blind Rivets Required Each Side of Break*	
		1/8	5/32	3/16	*LS1127-5*	*LS1127-6*
SS-112-25	.025	28	23	—	37	32
SS-112-32	.032	30	23	19	38	32
SS-112-40	.040	35	23	19	38	32
SS-112-51	.051	44	28	20	40	33
SS-112-64	.064	55	35	25	42	34
SS-112-72	.072	—	40	28	44	35
SS-113-25	.025	36	29	—	48	41
SS-113-32	.032	36	29	19	48	41
SS-113-40	.040	44	29	19	49	41
SS-113-51	.051	56	36	25	50	42
SS-113-64	.064	70	45	32	53	43
SS-113-72	.072	79	51	36	56	44

Note: To Locate Stringer Number, See Figure 103-105.

2. The damaged area is cleaned up with .5 inch minimum corner radii. If the damage requires cutting through the complete stringer, this cut should be made perpendicular to the stringer axis.

3. Flatten out the lips of the hat section on either side of the damage for a distance necessary to obtain the attachment for the splice.

4. Form a patch to the same section as the original stringer of a length necessary to obtain the required attachment on either side of the damaged area. This may be formed from flat sheet or from a piece of stock stringer of the same section as the damaged member.

5. Depending upon whether or not the inside of the stringer is accessible for bucking, standard rivets or Cherry blind rivets should be used. The number and size of rivets is specified in table 41

6. Where a skin damage occurs in the same region, repair as in figure 107 or 109.

7. Fillers between stringer and skin are to be used as necessary.

(*c*) DAMAGE REPAIRABLE BY INSERTION.—If the damaged area is greater in length than that required to form a splice, an insert of original stringer stock is used and spliced into the undamaged stringer as per figure 107.

Modified stringers as in the outer panel in the region of the fuel tank access doors should, if damaged, be cut out back to an unmodified section. A new modified portion of the stringer is inserted and spliced to the undamaged stringer using the same number of rivets on each side of the splice as given in table 41.

(*d*) DAMAGE REQUIRING REPLACEMENT.—Stringer end fittings on the outer panel should be replaced if damaged.

(3) EXTRUDED STRINGERS.

(*a*) NEGLIGIBLE DAMAGE.

1. Small isolated dents, free from cracks, abrasions and sharp corners, may be neglected provided no two adjacent stringers are damaged at the same chordwise station and that the skin to which the stringers are attached is not affected.

2. Nicks, which when cleaned up with a round file have a maximum depth of 1/10 the length of the leg, may be neglected provided such nicks do not occur within .32 inch from any rivet and no two adjacent stringers are damaged at the same spanwise station. Such nicks should not be considered negligible if they occur less than 10 inches apart.

(*b*) DAMAGE REPAIRABLE BY PATCHING.—Local damage to a leg of the stringer may be patched by a plate or bent up section as shown in figures 231-233 which give the gage and the required rivets. Small cracks of 1 inch maximum length running along the length of the stringer are repaired by stopping the crack with a 1/8 inch diameter hole at either end and then patching the member as above. Use fillers as necessary.

(*c*) DAMAGE REPAIRABLE BY INSERTION.—Damage covering more than one leg will be repaired by an insert. The damaged area is cut out and a new piece of extrusion is fitted in. The splice is as per figures 231-233 for the particular member.

Existing rivets in the region of the splice are carefully drilled out and the holes used in the new rivet pattern. If the length of damage after clean up does not exceed the length of the splice as determined by the number of rivets and rivet spacing, a single splice may be used. If, however, the length of damage is greater, a separate splice should be used at each end.

(4) FRONT SPAR EXTENSION.—The required repairs are similar to those of the spar capstrips and are shown in figure 128. (See paragraph *c.* (2) of this section.)

c. SPARS.

(1) GENERAL.—The spars of the C-46 are built up of heavy extruded captstrips and shear webs. Vertical stiffeners, placed at intervals along the web, break up the size of the panels. Although repairs are given for each component of the spars, limitations are imposed as to where these repairs may be made. These limitations are based on the locations of various fittings and brackets whose exact position must be maintained. For example, the landing gear forgings on the front spar must be kept at their exact location. If a break occurs in this region, it will be necessary to insert a new piece of capstrip in the region of the fitting and splice on either side. Figures 111 to 115 give the component parts of all spars.

(2) CAPSTRIPS.

(*a*) GENERAL.—The capstrips are spliced with X4130 steel heat treated to 125,000 pounds per square inch and bolted to the capstrip with AN23 bolts. If there are any fittings or brackets tying into the capstrip in the region of the damage, a section of the capstrip should be cut away and a new splice inserted. This insertion is to be of such a length that splices may be made at either end to the existing capstrip flange.

1. Care must be exercised to use the correct drill sizes when enlarging rivet holes to take the required bolts. Any looseness of the bolts will throw excessive loads on the nearby rivets, thus loosening the rivets and making them ineffective. All bolt and rivet patterns should be arranged to make use of the original holes. Do not drill new holes or change the pattern except as specifically noted.

2. Due to the fact that reinforcements bolted to a capstrip cannot be made as efficient as the original continuous material, any partially damaged section will take its ultimate allowable load before the splices are loaded up. This action will inevitably cause complete failure of the capstrip at the damaged section during service. To avoid a failure of this nature, all capstrip reinforcements and their attachments at each end of the damage must, therefore, be made equal to the strength of the original undamaged section.

(*b*) NEGLIGIBLE DAMAGE.—Nicks and cracks which, when cleaned up with a spherical radius cutter, do not have a depth greater than one quarter the thickness of the damaged leg and which do not interfere with any rivets, may be neglected. It is necessary that the damage be free from all sharp corners and that a one quarter inch radius be the smallest used.

(*c*) DAMAGE REPAIRABLE BY PATCHING.—Because of the nature of the capstrip cross-sections and the high axial loads that are carried, repair by patching will not be adequate.

(*d*) DAMAGE REPAIRABLE BY INSERTION.

1. The splicing of the various spar capstrips is shown in figures 119 through 123. Any damage not considered negligible should be repaired in this manner. It is necessary that great care be taken in effecting these repairs in order that the original strength be fully realized.

2. Clean up the region by cutting out the damaged material on a line normal to the axis of the capstrip. If the damage is so localized that the cleaned up area is confined to one leg, figure 124, merely clean up this region using a round file. If the damage goes beyond that point, the entire capstrip should be cut through. Again it is emphasized that the cleaned up surface be 90 degrees to the beam axis.

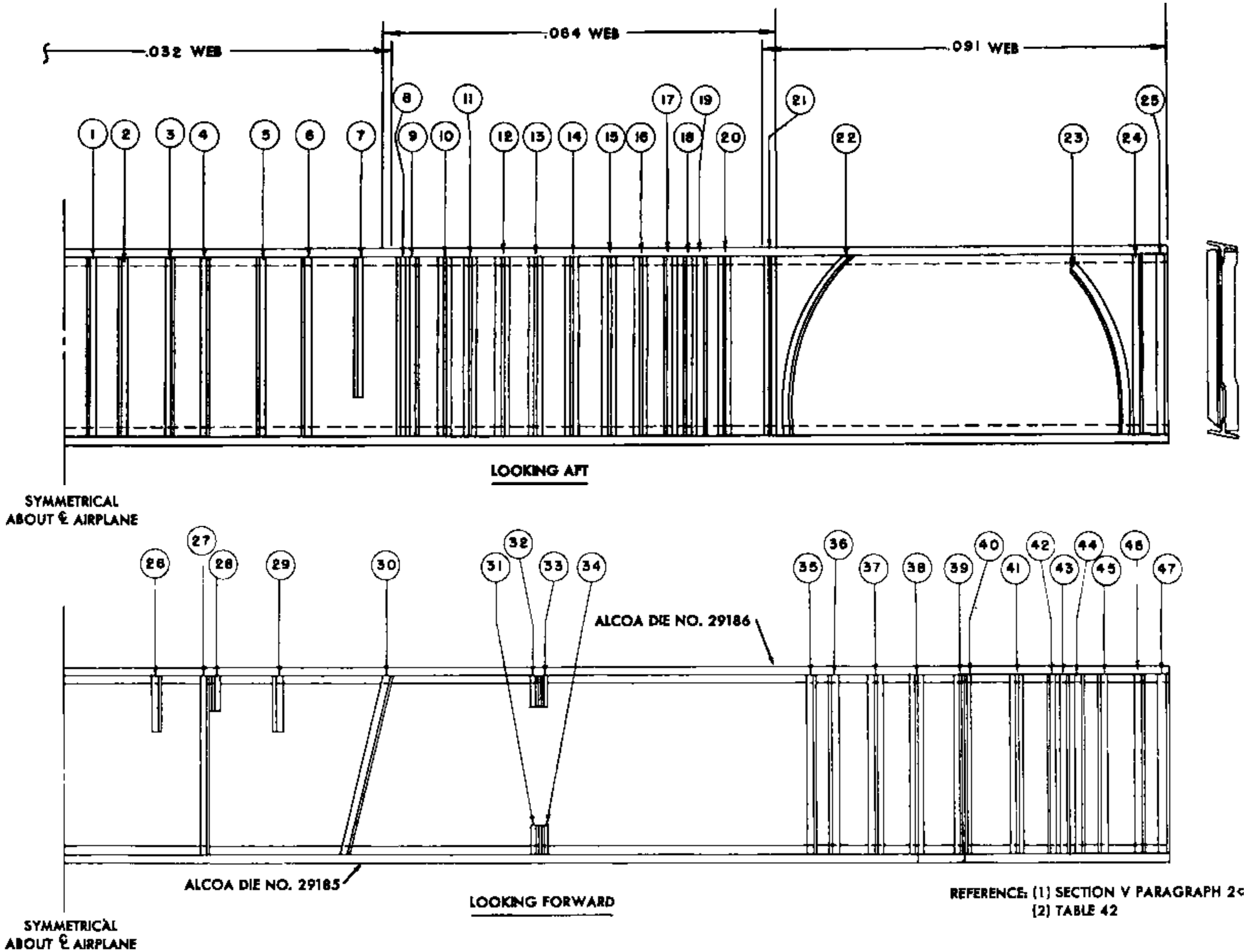
3. Insert a new piece of capstrip of the same cross-section as the original. This insertion should preferably be cut from extrusion stock but may be machined from 24ST bar. Maintain a tolerance on the length of the insert of +0, −.005 inch. Shim if necessary to give a butt joint.

4. Remove all existing rivets and bolts from capstrip in the region that will be covered by the splice plates.

5. Cut splice plates (X4130 steel or 24ST as noted in the above figures) to length necessary to pick up the required number of bolts or rivets on either side of the insertion and machine to the cross-sections shown in the figures. The plates are then heat treated to 125,000 pounds per square inch in the case of the steel splices. *Using the existing rivet holes in the capstrip* as a template, drill holes in the splice plates. Holes in the insertion and splice plates should have the same spacing as existed originally. In those capstrips which are spliced by bolts, the holes must be reamed on assembly. (See table 3).

(e) DAMAGE REPAIRABLE BY WELDING.

(Ref. figures 119, 119A, 122A and 122B) - Repairs to spar cap (Ref. figure 119) should have reinforcing plates on the inner side of spar cap and the spar cap web flanges welded together forming nesting angles. Flanges should extend the depth of the spar cap web flange on both faces of spar. The principle of nesting angles should apply, where possible, to all spar cap repairs. Figures 119A, 122A and 122B, which do not give gage of material used, should have following notes inserted: Compute area of spar cap body. Compute area of reinforcement and multiply by the tensile strength of the material used. Select gages of material such that this figure is 25% greater than that arrived at in computing tension load in cap. If heat-treated steel is used, then 150,000 - 180,000 psi heat-treat range is more desirable than the 125,000 psi range. The method of determining the proper gage is simple and adequately accurate for field repair purposes. The 25% increase in strength required is adequate to compensate for the inaccuracies inherent in this type of simple computation.



REFERENCE: (1) SECTION V PARAGRAPH 2c
(2) TABLE 42

FIGURE 111—WING SPAR ASSEMBLY—CENTER PANEL FRONT

TABLE 42
FRONT SPAR CENTER PANEL—COMPONENT PARTS

No.	*Alcoa Die No.*	*No.*	*Alcoa Die No.*
1.	K-77-L	26.	K-77-A
2.	K-5920	27.	K-77-F
3.	29096	28.	K-77-A
4.	K-78-Y	29.	K-77-A
5.	29096	30.	K-78-J
6.	K-5920	31.	K-15276
7.	29096	32.	K-15276
8.	K-77-V	33.	K-15276
9.	K-77-V	34.	K-15276
10.	29089	35.	K-77-W
11.	29089	36.	K-77-W
12.	29089	37.	29091
13.	29089	38.	29091
14.	29089	39.	K-78-K
15.	29089	40.	K-78-K
16.	29089	41.	29091
17.	K-77-L	42.	K-77-F
18.	K-15623	43.	K-77-F
19.	K-77-L	44.	K-77-W
20.	29089	45.	K-77-W
21.	29390	46.	K-77-L
22.	K-78-J	47.	K-77-L
23.	K-78-J		
24.	K-77-L		
25.	K-77-L		

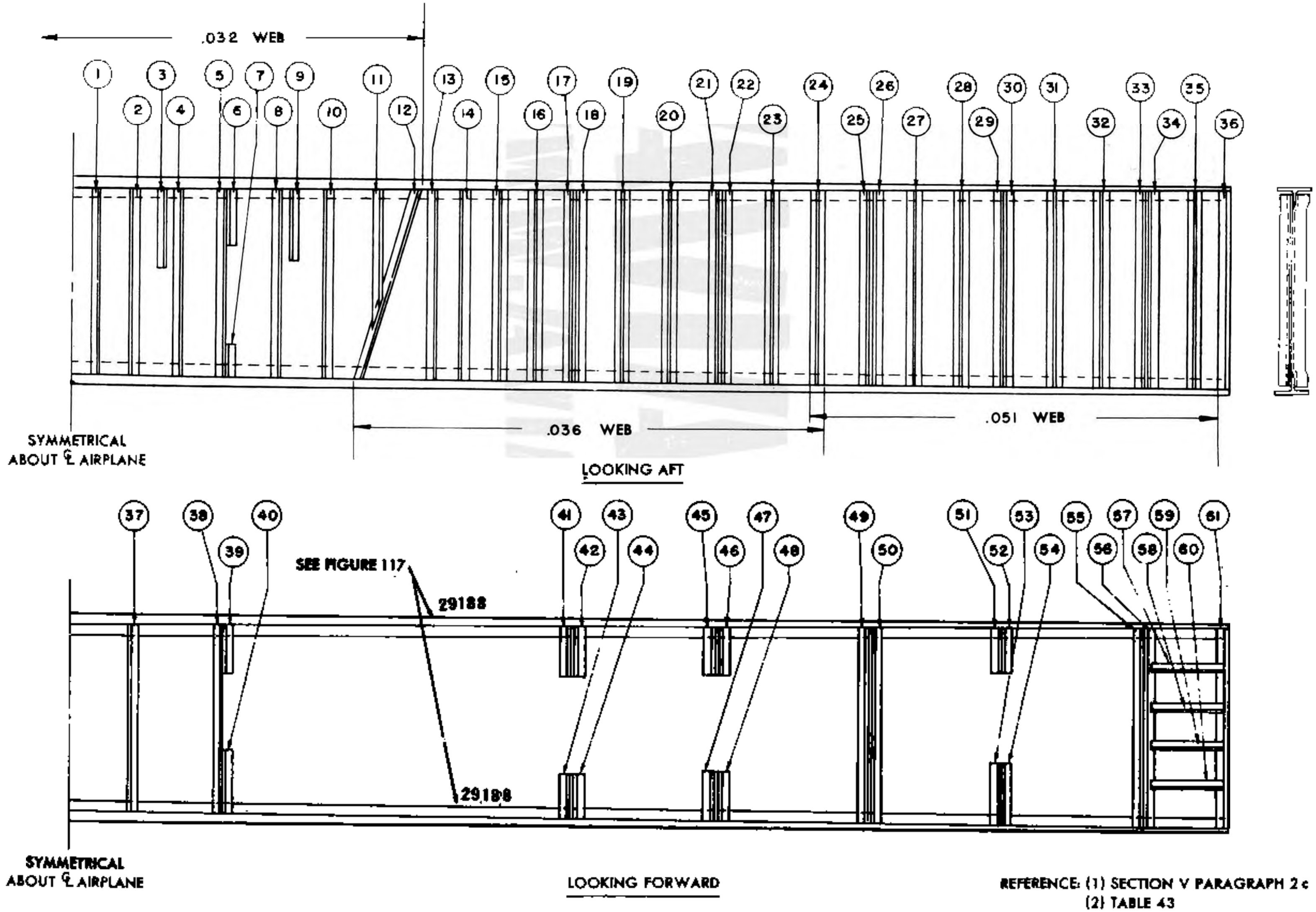


FIGURE 112—WING SPAR ASSEMBLY—CENTER PANEL 30%

TABLE 43

30% SPAR, CENTER PANEL—COMPONENT PARTS

No.	*Alcoa Die No.*	*No.*	*Alcoa Die No.*
1.	K-1288	31.	29089
2.	K-77-F	32.	29089
3.	K-77-F	33.	K-77-F
4.	K-1288	34.	K-77-F
5.	K-77-F	35.	29089
6.	K-77-F	36.	K-77-F
7.	K-77-F	37.	K-77-F
8.	K-1288	38.	K-77-F
9.	K-77-F	39.	K-77-F
10.	K-77-F	40.	K-77-F
11.	K-1288	41.	K-1288
12.	K-78-J	42.	K-1288
13.	K-77-R	43.	K-77-R
14.	K-77-R	44.	K-77-R
15.	29089	45.	K-77-R
16.	29089	46.	K-77-R
17.	K-1288	47.	K-77-E
18.	K-1288	48.	K-77-E
19.	29089	49.	K-77-E
20.	29089	50.	K-77-E
21.	K-77-F	51.	K-78-F
22.	K-77-F	52.	K-78-F
23.	29089	53.	K-78-F
24.	29089	54.	K-78-F
25.	K-77-F	55.	K-77-E
26.	K-77-F	56.	K-77-E
27.	29089	57.	K-78-F
28.	29089	58. and 59.	K-78-F
29.	K-78-F	60.	K-78-F
30.	K-78-J	61.	K-77-F

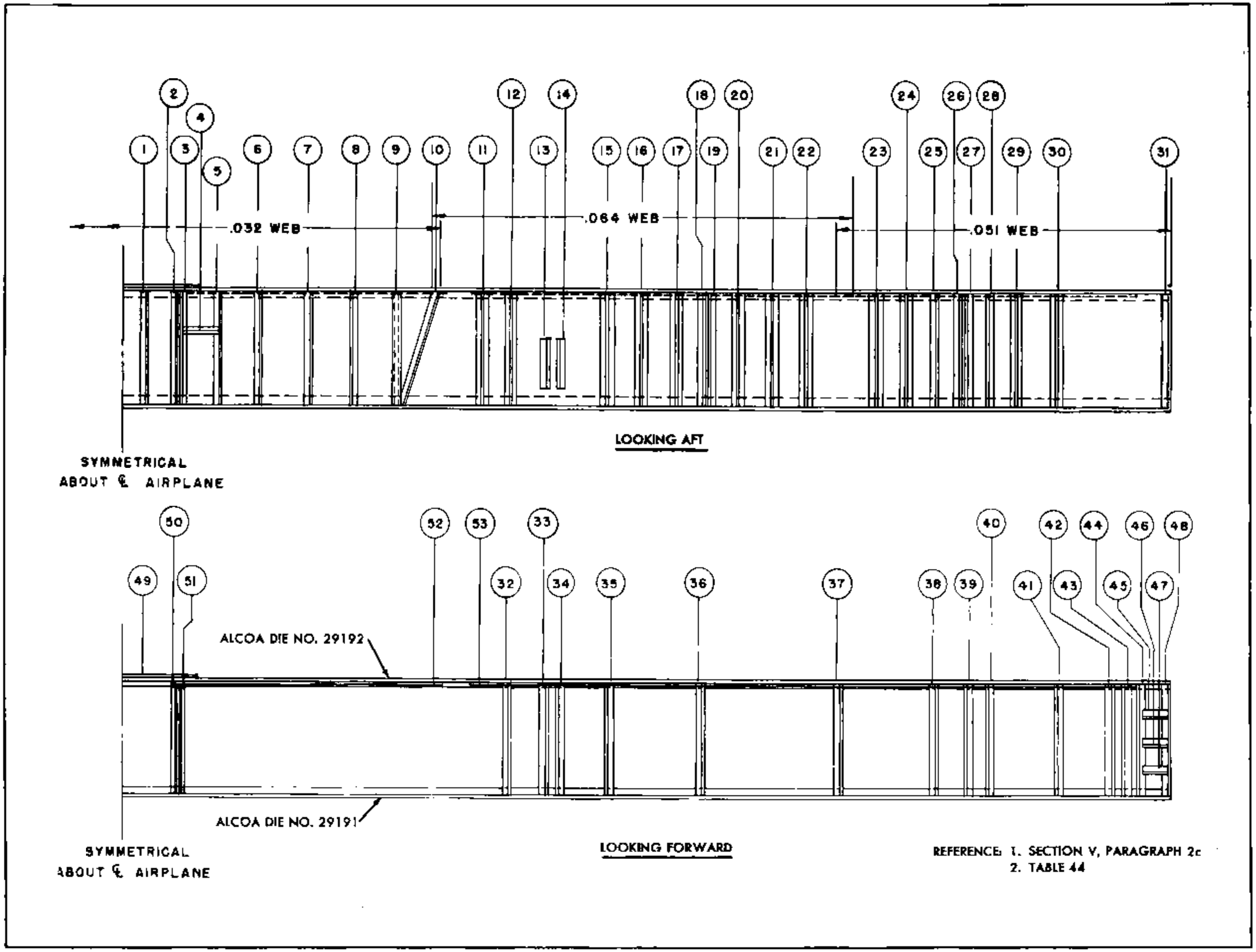
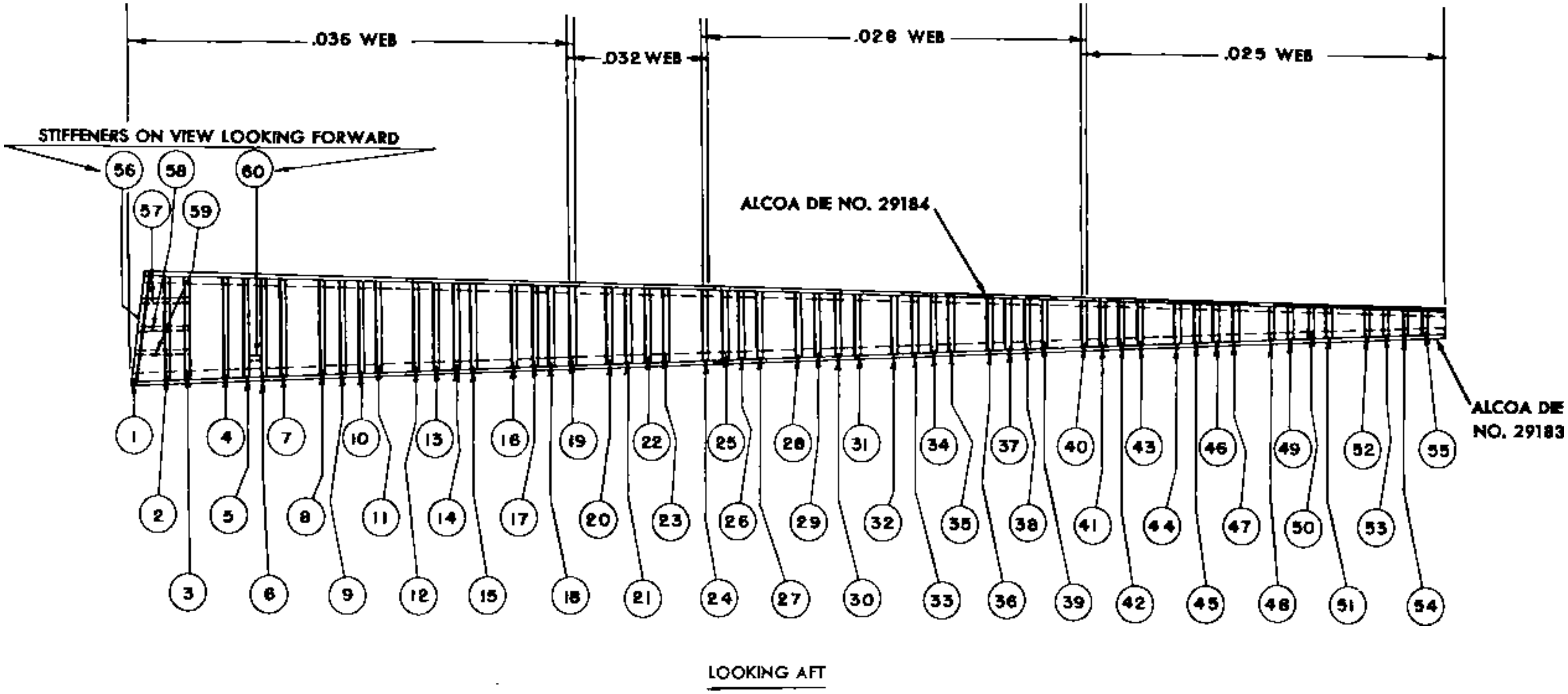


FIGURE 113 — WING SPAR ASSEMBLY CENTER PANEL 70%

TABLE 44
70% SPAR—CENTER PANEL

No.	*Alcoa Die No.*	*No.*	*Alcoa Die No.*
1.	K-1288	28.	K-78-J
2.	K-78-Y	29.	29089
3.	K-78-Y	30.	29089
4.	K-78-K	31.	K-77-B
5.	K-1288	32.	K-78-J
6.	K-77-F	33.	734-MM
7.	K-1288	34.	734-MM
8.	K-77-F	35.	K-78-J
9.	K-1288	36.	K-78-J
10.	K-78-J	37.	K-78-J
11.	29089	38.	K-78-J
12.	29089	39.	K-78-J
13.	K-77-B	40.	K-78-J
14.	K-77-B	41.	K-78-J
15.	29089	42.	734-T
16.	29089	43.	734-T
17.	29089	44.	K-78-J
18.	K-78-F	45.	K-78-F
19.	K-78-F	46.	K-78-F
20.	29089	47.	K-78-F
21.	29089	48.	K-77-B
22.	29089	49.	29083
23.	29089	50.	14089
24.	29089	51.	K-16849
25.	K-78-J	52.	29083
26.	29098	53.	29083
27.	29098		

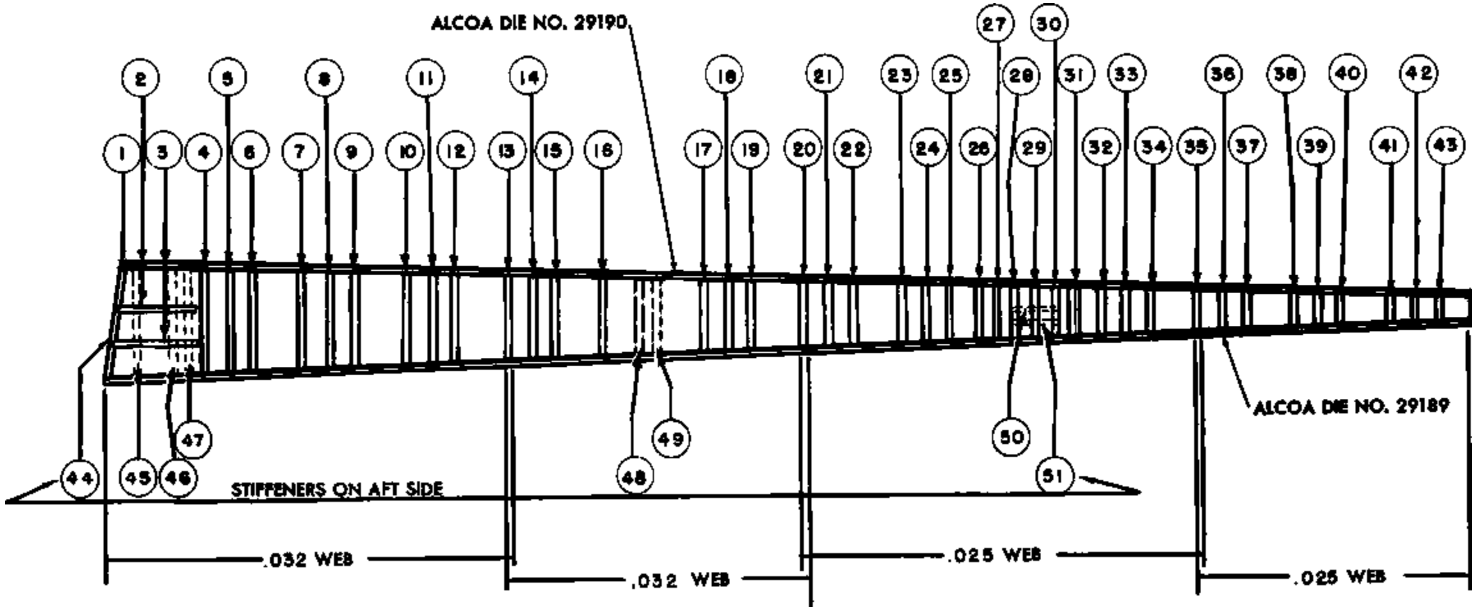


REFERENCE: (1) SECTION V PARAGRAPH 2c
(2) TABLE 45

FIGURE 114—WING SPAR ASSEMBLY—OUTER PANEL 30%

TABLE 45
30% SPAR—OUTER PANEL

No.	*Alcoa Die No.*	*No.*	*Alcoa Die No.*
1.	K-78-F	31.	29095
2.	29095	32.	29083
3.	29095	33.	29083
4.	29095	34.	29083
5.	29095	35.	29083
6.	29095	36.	29083
7.	29095	37.	29083
8.	29095	38.	29083
9.	29095	39.	29083
10.	29095	40.	29083
11.	29095	41.	29083
12.	29095	42.	29083
13.	29095	43.	29083
14.	29095	44.	29083
15.	29095	45.	29083
16.	29095	46.	29083
17.	29095	47.	29083
18.	29095	48.	29083
19.	29095	49.	29083
20.	29095	50.	29083
21.	29095	51.	29083
22.	29095	52.	29083
23.	29095	53.	29083
24.	29095	54.	29083
25.	29095	55.	29083
26.	29095	56.	K-78-F
27.	29095	57.	29095
28.	29095	58.	29095
29.	29095	59.	29095
30.	29095	60.	K-12037



LOOKING AFT

REFERENCE: (1) SECTION V PARAGRAPH 2c
(2) TABLE 46

FIGURE 115—WING SPAR ASSEMBLY—OUTER PANEL 70%

TABLE 46
70% SPAR—OUTER PANEL

No.	*Alcoa Die No.*	*No.*	*Alcoa Die No.*
1.	K-78-F	26.	29571
2.	15643	27.	13641
3.	15643	28.	L-29095
4.	L-29095	29.	L-29095
5.	L-29095	30.	13641
6.	L-29095	31.	29571
7.	L-29095	32.	L-29095
8.	L-29095	33.	L-29095
9.	L-29095	34.	L-29095
10.	L-29095	35.	L-29095
11.	L-29095	36.	L-29095
12.	L-29095	37.	L-29095
13.	L-29095	38.	L-29095
14.	L-29095	39.	L-29095
15.	L-29095	40.	L-29095
16.	734-LL	41.	L-29095
17.	L-29095	42.	L-29095
18.	L-29095	43.	L-29095
19.	L-29095	44.	K-78-F
20.	L-29095	45.	L-29095
21.	L-29095	46.	K-77-L
22.	L-29095	47.	K-77-L
23.	L-29095	48.	L-29095
24.	L-29095	49.	L-29095
25.	L-29095	50.	L-29095
		51.	L-29095

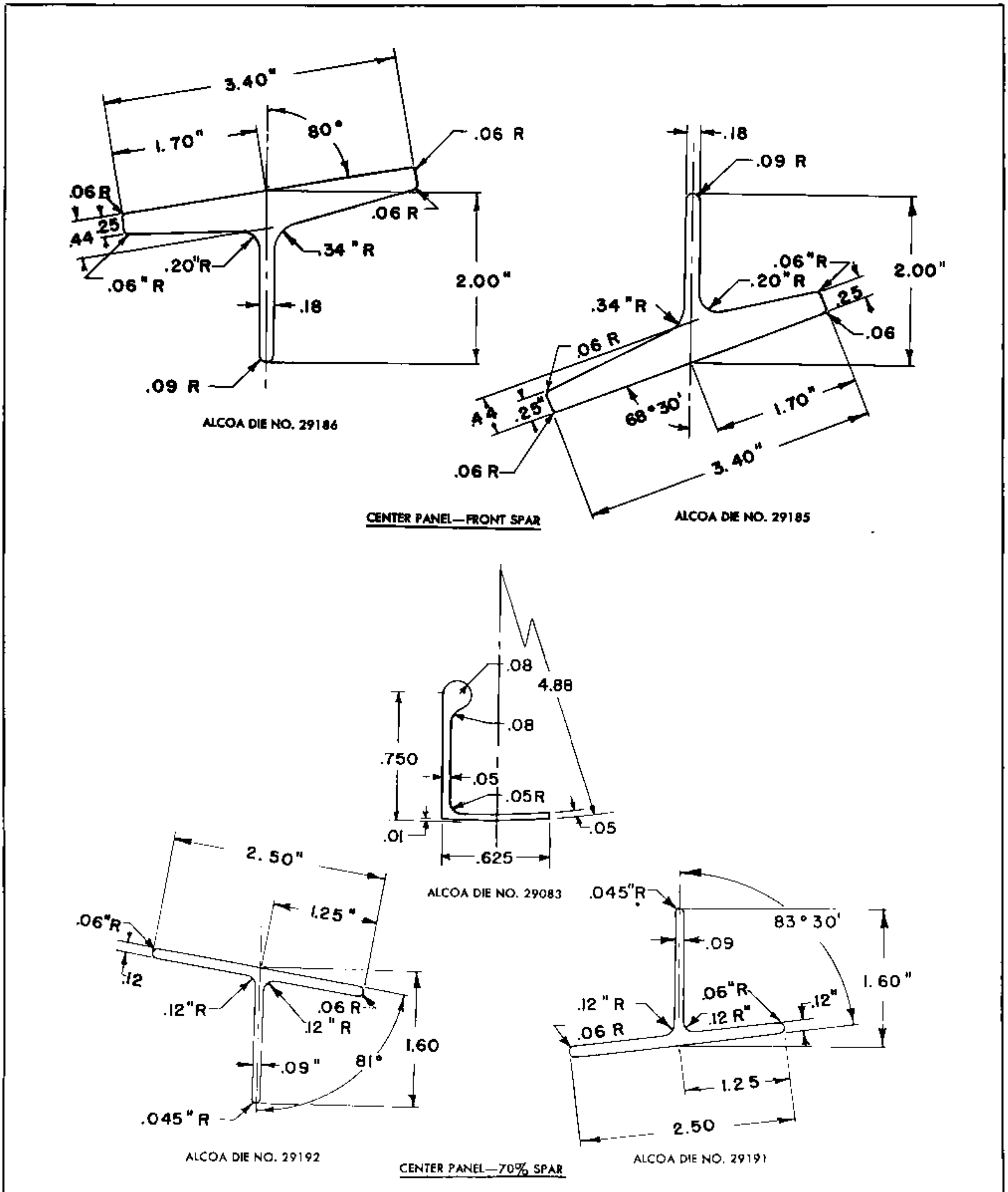
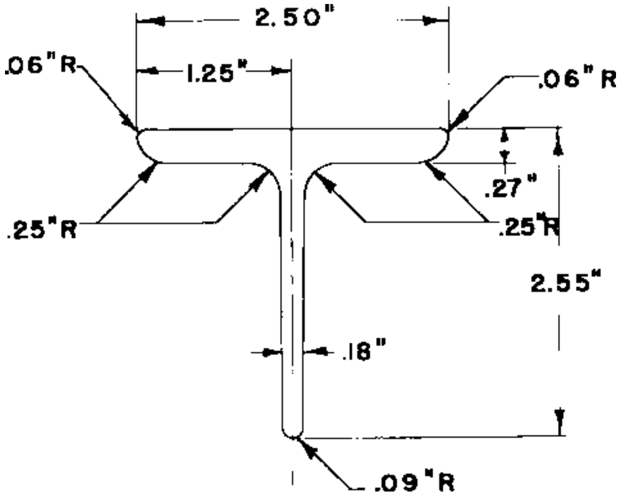
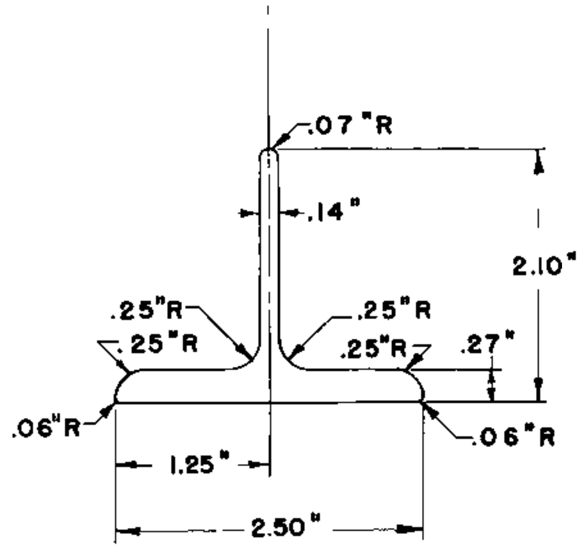


FIGURE 116 (SHEET 1 of 2 SHEETS) — WING SPAR CAPSTRIP EXTRUSIONS

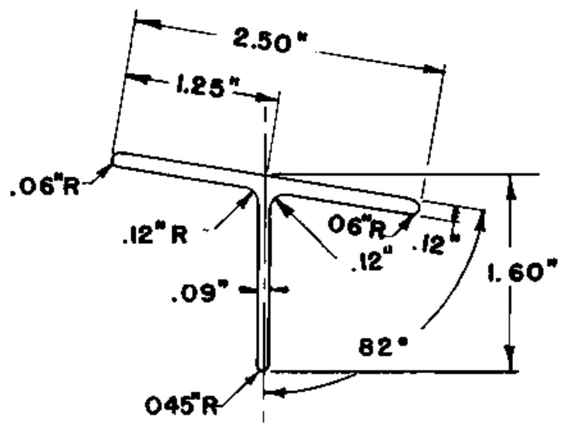


ALCOA DIE NO. 29184



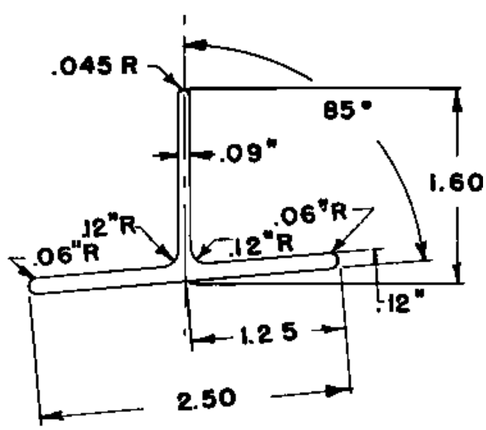
ALCOA DIE NO. 29183

OUTER PANEL —30% SPAR



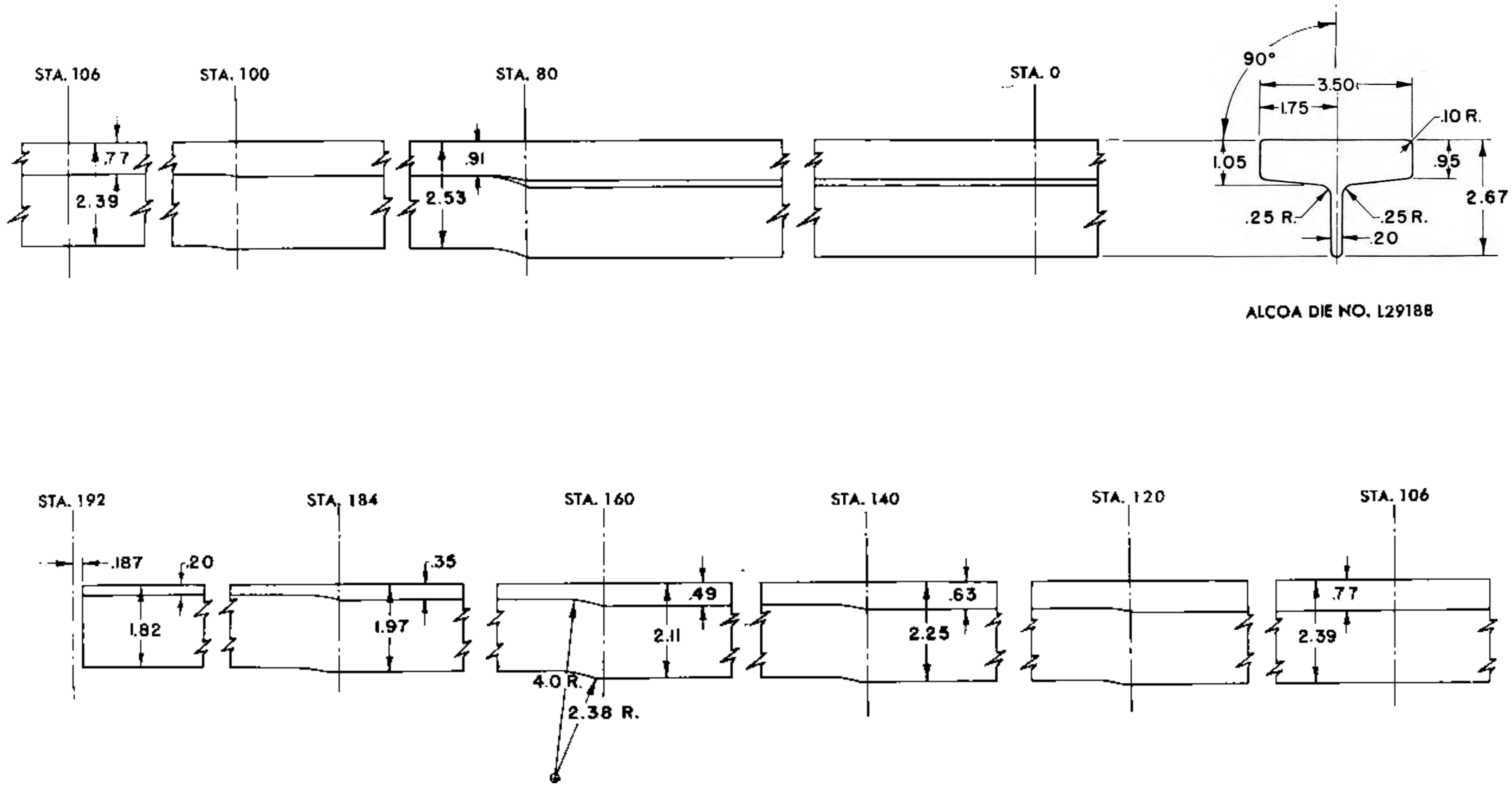
ALCOA DIE NO. 29190

ALCOA DIE NO. 29189



OUTER PANEL —70% SPAR

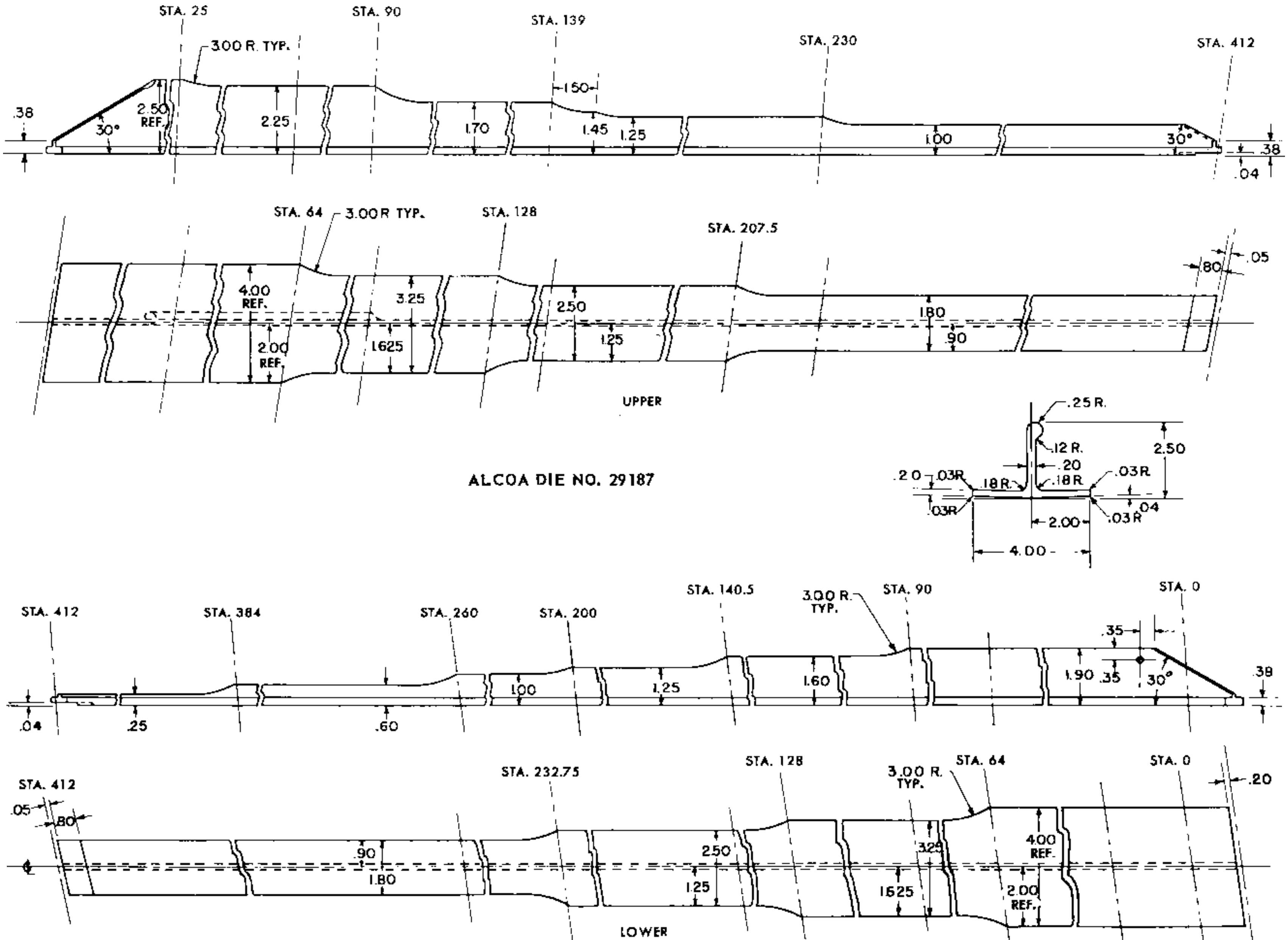
FIGURE 116—WING SPAR CAPSTRIP EXTRUSIONS SHEET 2 OF 2



CENTER PANEL 30% UPPER AND LOWER SPAR CAPS

REFERENCE: SECTION V PARAGRAPH 2c

FIGURE 117 —WING SPAR CAPSTRIP EXTRUSION—CENTER PANEL 30%



REFERENCE: SECTION V PARAGRAPH 2c

FIGURE 118—WING SPAR CAPSTRIP EXTRUSION—OUTER PANEL FRONT

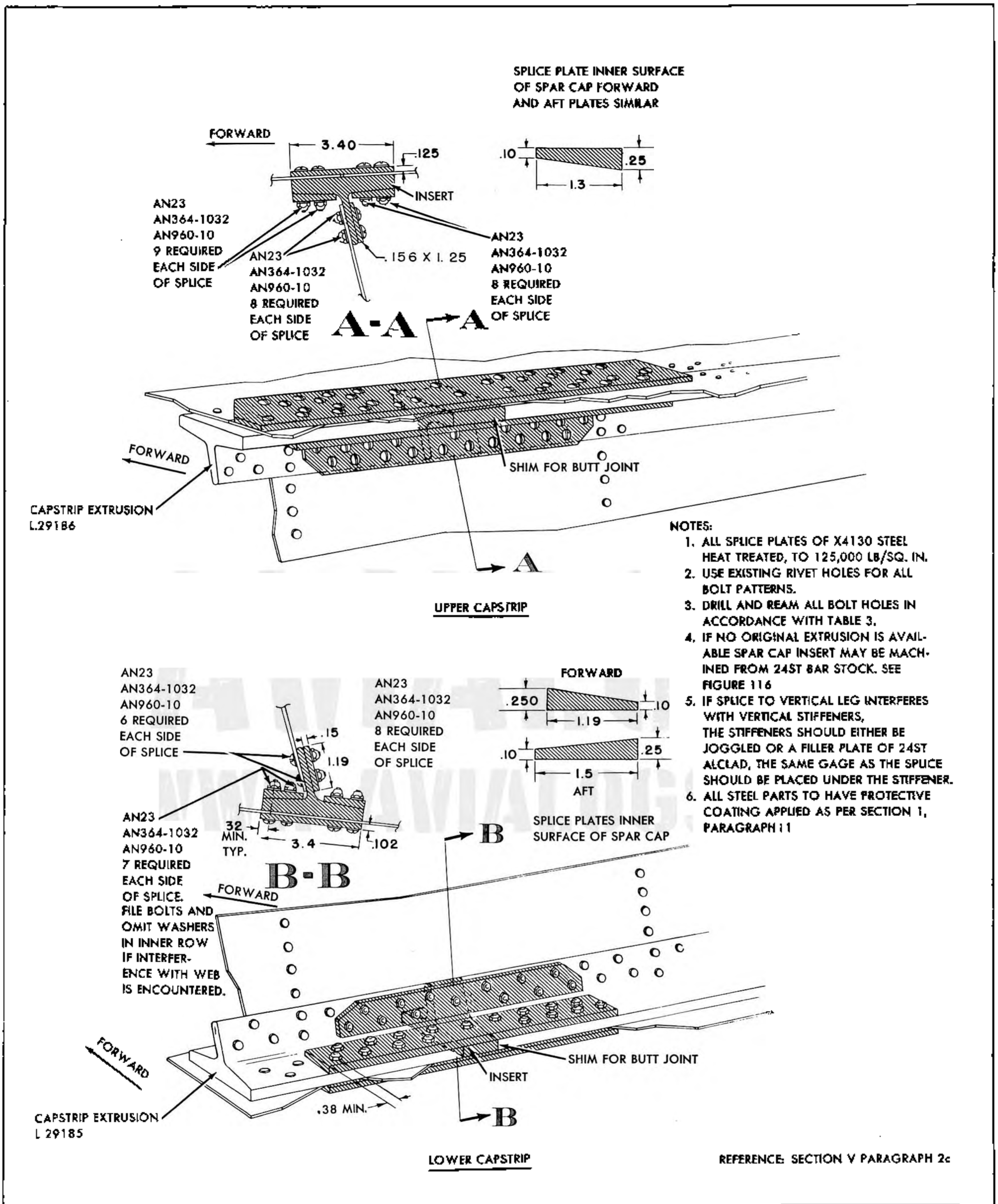
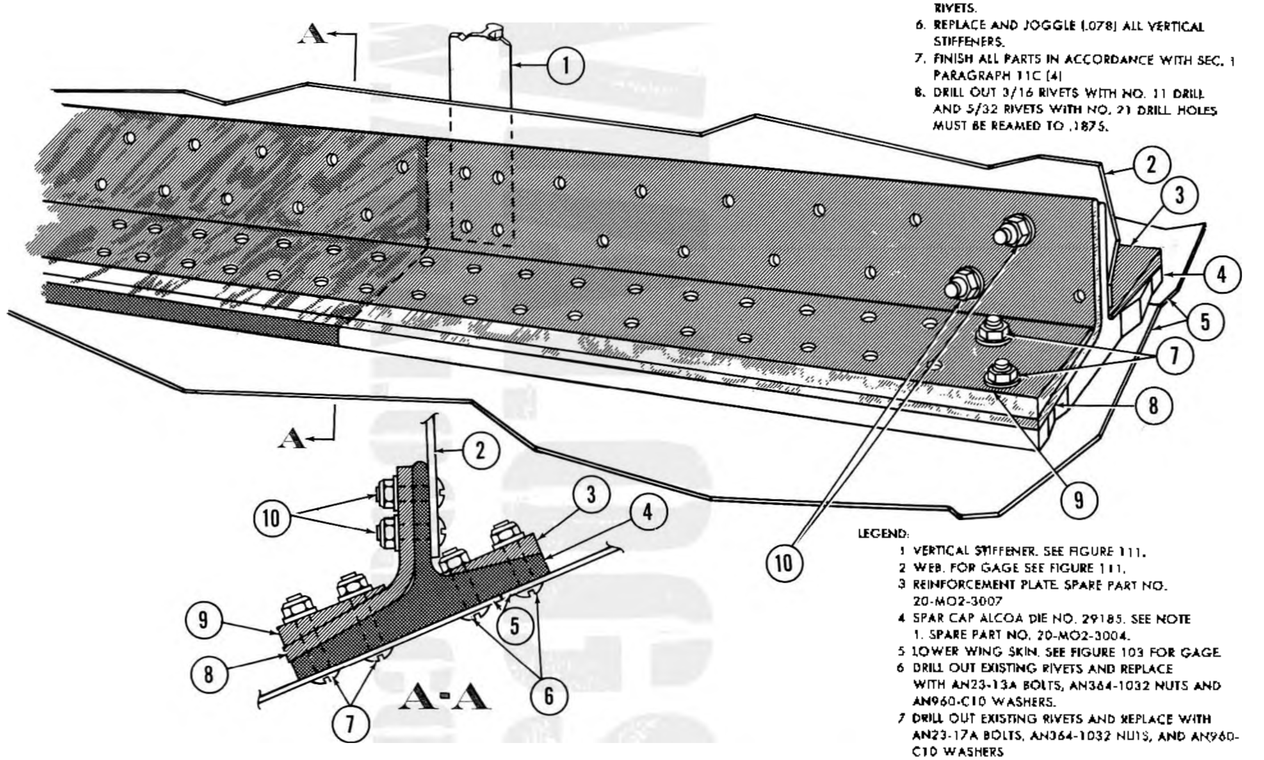


FIGURE 119 — FRONT SPAR CAPSTRIP SPLICE — CENTER PANEL

NOTES:
1. CUT THE CAPSTRIP WITHIN ONE INCH OF A VERTICAL STIFFENER.
2. OUTBOARD AND INBOARD ENDS OF PART NO. 20-MO2-3005, 20-MO2-3006 AND 20-MO2-3007 MUST BE WITHIN ONE INCH OF A VERTICAL STIFFENER. SEE AND
3. AT LEAST 42 SPLICE BOLTS MUST BE USED EACH SIDE OF BREAK. A TOTAL OF 84 BOLTS IS REQUIRED FOR THIS SPLICE.
4. ORIGINAL RIVET HOLES IN SPAR CAP SHOULD BE PLUGGED IF EDGE DISTANCE IS LESS THAN 2 RIVET DIAMETERS.
5. ANGLE 20-MO2-3005 AND SPLICE PLATES 20-MO2-3006 AND 20-MO2-3007 MAY BE CUT AT OUTER ENDS TO AVOID INTERFERENCE WITH RIVETS.
6. REPLACE AND JOGGLE (.078) ALL VERTICAL STIFFENERS.
7. FINISH ALL PARTS IN ACCORDANCE WITH SEC. 1 PARAGRAPH 11C (4)
8. DRILL OUT 3/16 RIVETS WITH NO. 11 DRILL AND 5/32 RIVETS WITH NO. 21 DRILL. HOLES MUST BE REAMED TO .1875.



LEGEND:
1 VERTICAL STIFFENER. SEE FIGURE 111.
2 WEB. FOR GAGE SEE FIGURE 111.
3 REINFORCEMENT PLATE. SPARE PART NO. 20-MO2-3007
4 SPAR CAP ALCOA DIE NO. 29185. SEE NOTE 1. SPARE PART NO. 20-MO2-3004.
5 LOWER WING SKIN. SEE FIGURE 103 FOR GAGE.
6 DRILL OUT EXISTING RIVETS AND REPLACE WITH AN23-13A BOLTS, AN364-1032 NUTS AND AN960-C10 WASHERS.
7 DRILL OUT EXISTING RIVETS AND REPLACE WITH AN23-17A BOLTS, AN364-1032 NUTS, AND AN960-C10 WASHERS
8 REINFORCEMENT ANGLE. SPARE PART NO. 20-MO2-3005
9 REINFORCEMENT PLATE. SPARE PART NO. 20-MO2-3006
10 DRILL OUT EXISTING RIVETS AND REPLACE WITH AN23-13A BOLTS, AN364-1032 NUTS AND AN960-C10 WASHERS

FIGURE 119A — LOWER FRONT SPAR CAPSPLICE — ALTERNATE

TABLE 46 A

CENTER AND OUTER PANEL SPAR
CAPSTRIP ALCOA DIE NUMBERS

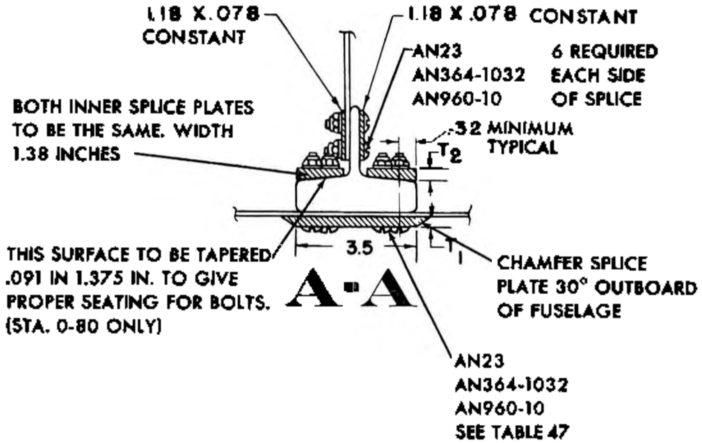
SPAR	PANEL	POSITION	SPAR CAP DIE NO.	FIGURE
30 Per cent	Outer	Upper	29184	114
30 Per cent	Outer	Lower	29183	114
70 Per cent	Outer	Upper	29190	115
70 Per cent	Outer	Lower	29189	115
Front	Outer	Upper	29187	118 - 128
Front	Outer	Lower	29187	118 - 128
30 Per cent	Center	Upper	29188	112 - 117
30 Per cent	Center	Lower	29188	112 - 117
70 Per cent	Center	Upper	29192	113
70 Per cent	Center	Lower	29191	113
Front	Center	Upper	29186	111
Front	Center	Lower	29185	111

TABLE 47

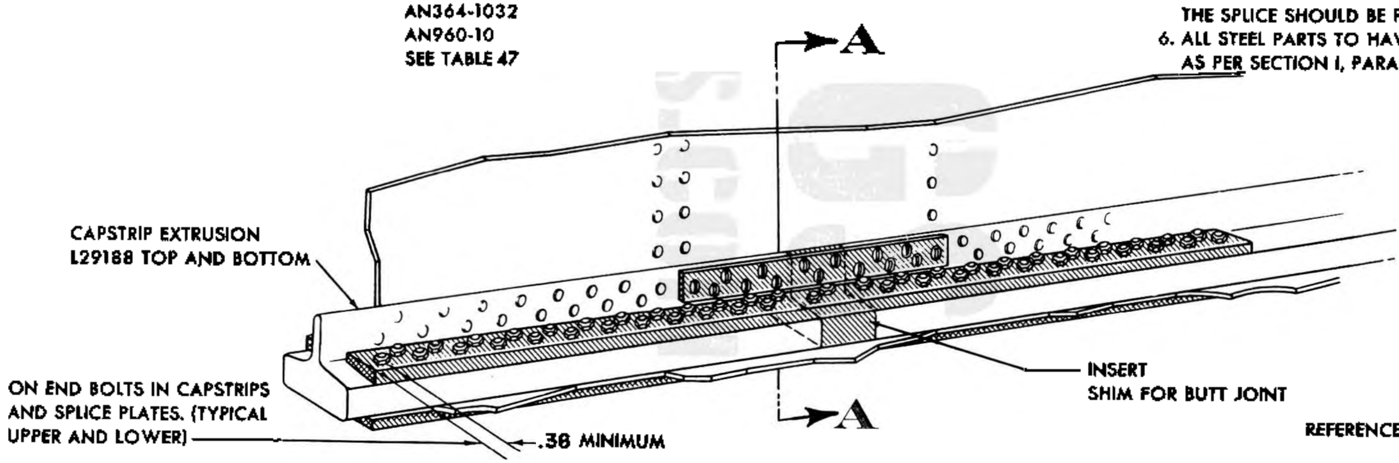
30% SPAR CAP SPLICE—CENTER PANEL

Distance From Centerline *Airplane*	*0-80*	*80-100*	*100-120*	*120-140*	*140-160*	*160-184*	*184-192*
T_1	.318	.259	.220	.180	.140	.100	.081
T_2	.381	.376	.326	.274	.224	.173	.173
Number of Bolts Through Horizontal Leg	24	22	19	15	12	9	5

Number of bolts are for each side of splice for each flange. Thus, the total number of bolts through the horizontal flange each side of splice is double that given in the table.



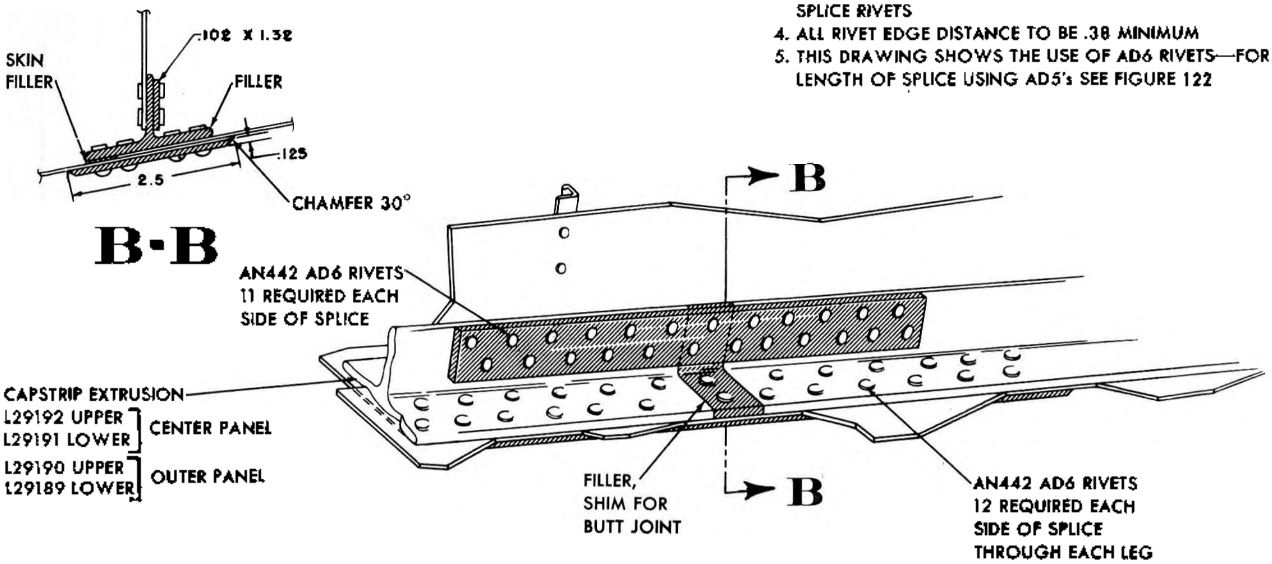
NOTES:
1. ALL SPLICE PLATES OF X4130 STEEL HEAT TREATED TO 125,000 LB/SQ IN.
2. USE EXISTING RIVET HOLES FOR ALL BOLT PATTERNS
3. DRILL AND REAM ALL BOLT HOLES IN ACCORDANCE WITH TABLE 3
4. IF NO ORIGINAL EXTRUSION IS AVAILABLE, SPAR CAP INSERTS MAY BE MACHINED FROM 24ST BAR STOCK. SEE FIGURE 117
5. IF SPLICE TO VERTICAL LEG INTERFERES WITH VERTICAL STIFFENERS, THE STIFFENERS SHOULD EITHER BE JOGGLED OR A FILLER PLATE OF 24ST ALCLAD THE SAME GAGE AS THE SPLICE SHOULD BE PLACED UNDER THE STIFFENER
6. ALL STEEL PARTS TO HAVE PROTECTIVE COATING APPLIED AS PER SECTION I, PARAGRAPH 11



REFERENCE: SECTION V, PARAGRAPH 2c

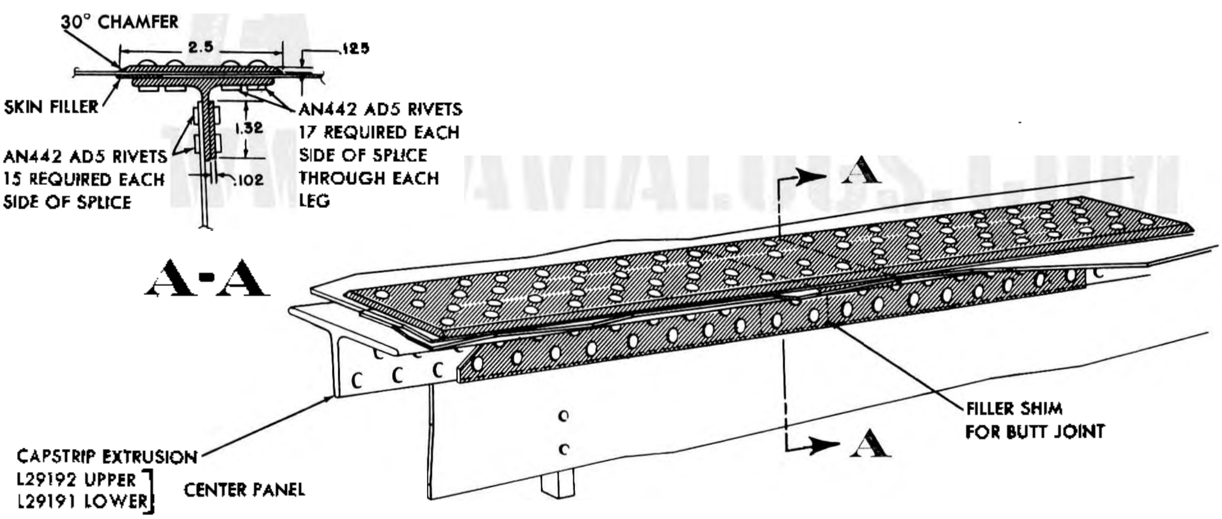
FIGURE 120—30 PERCENT SPAR CAPSTRIP SPLICE—CENTER PANEL

NOTES:
1. ALL SPLICE MATERIAL TO BE 24ST ALCLAD
2. CAPSTRIP FILLER TO BE MADE FROM ORIGINAL EXTRUSTION STOCK OR MACHINED FROM 24ST BAR. SEE FIGURE 116
3. USE OF ORIGINAL RIVET PATTERN IN LOCATING SPLICE RIVETS
4. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM
5. THIS DRAWING SHOWS THE USE OF AD6 RIVETS—FOR LENGTH OF SPLICE USING AD5's SEE FIGURE 122



REFERENCE: SECTION V, PARAGRAPH 2c

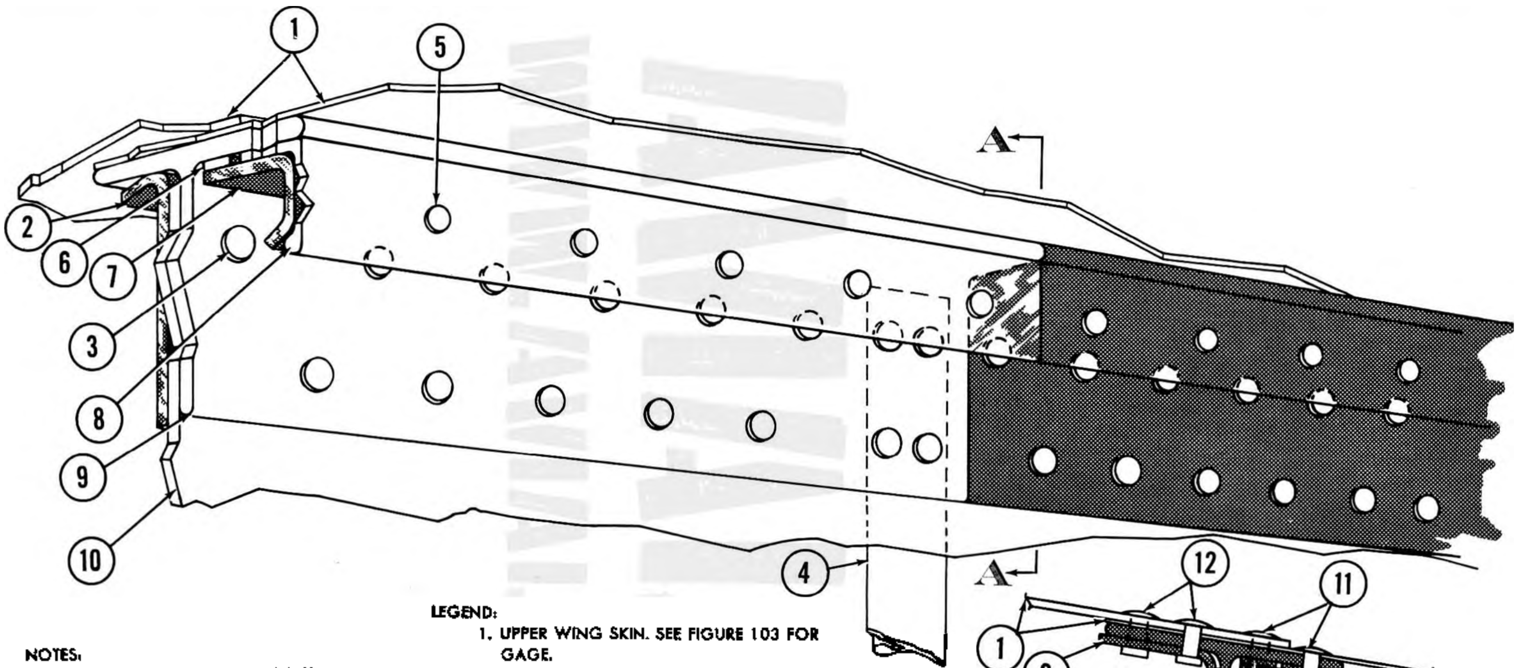
FIGURE 121—70% SPAR CAPSTRIP SPLICE—CENTER OR OUTER PANEL



NOTES:
1. ALL SPLICE MATERIAL TO BE 24ST ALCLAD
2. CAPSTRIP FILLER TO BE MADE FROM ORIGINAL EXTRUSTION STOCK OR MACHINED FROM 24ST BAR. SEE FIGURE 116
3. USE ORIGINAL RIVET PATTERN IN LOCATING SPLICE RIVETS
4. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM
5. THIS DRAWING SHOWS THE USE OF AD5 RIVETS. FOR LENGTH OF SPLICE USING AD6's, SEE FIGURE 121

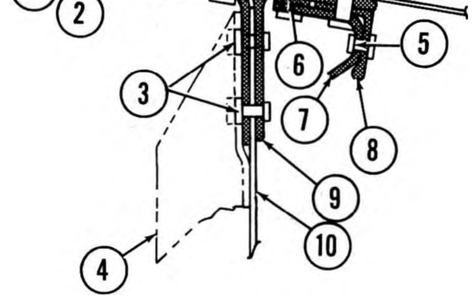
REFERENCE: SECTION V, PARAGRAPH 2c

FIGURE 122—70% SPAR CAPSTRIP SPLICE—CENTER OR OUTER PANEL



NOTES:
1. CUT THE CAPSTRIP WITHIN 1 INCH OF A VERTICAL STIFFENER.
2. OUTBOARD AND INBOARD ENDS OF 20-MO2-3012 MUST BE WITHIN 1 INCH OF A VERTICAL STIFFENER, SEE
3. AT LEAST 36 3/16 DIAMETER RIVETS MINIMUM EACH SIDE OF BREAK. EXCLUSIVE OF NUMBER REQUIRED TO REATTACH VERTICAL STIFFENERS TO SPAR CAP.
4. ORIGINAL RIVET HOLES IN SPAR CAP SHOULD BE PLUGGED IF EDGE DISTANCE IS LESS THAN 2 RIVET DIAMETERS.
5. CUT AWAY REINFORCEMENT ANGLE 20-MO2-3013 AT OUTER ENDS TO AVOID RIVETS.
6. REPLACE AND JOGGLE (.078) ALL VERTICAL STIFFENERS
7. FINISH ALL PARTS IN ACCORDANCE WITH SECTION 1, PARAGRAPH 11C (4)

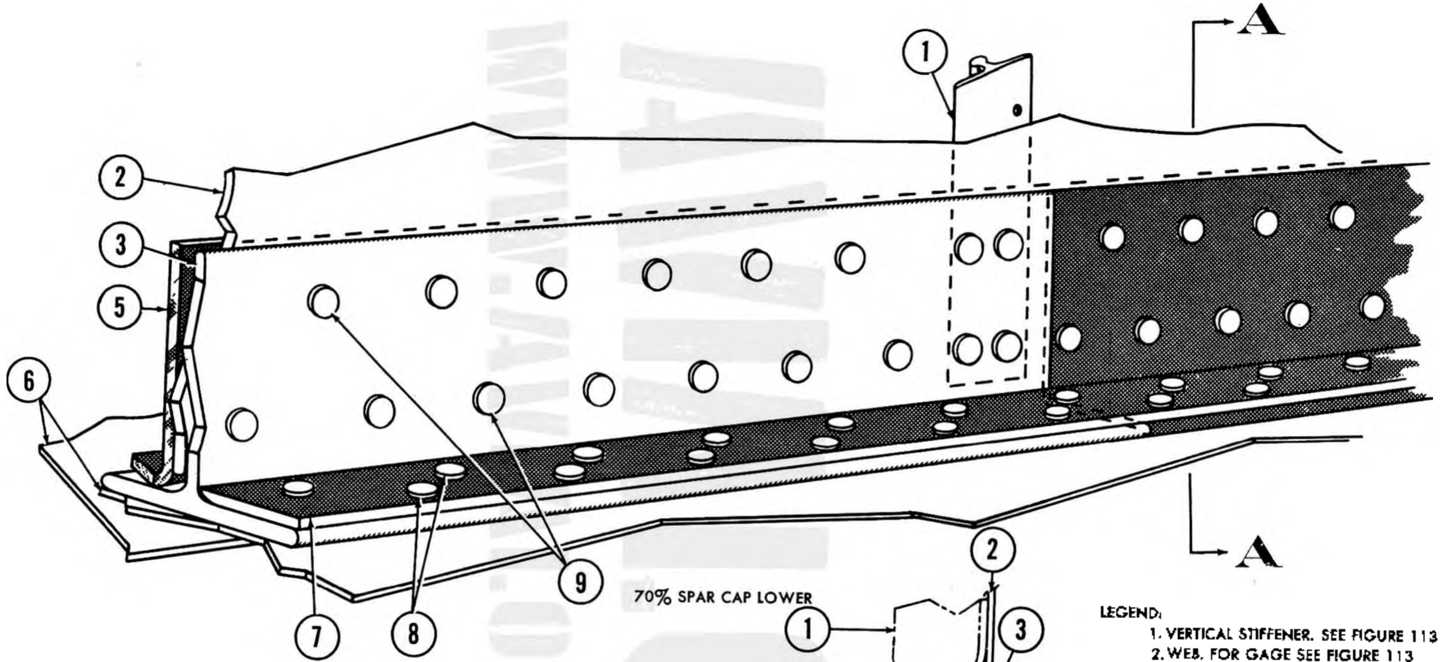
LEGEND:
1. UPPER WING SKIN. SEE FIGURE 103 FOR GAGE.
2. REINFORCEMENT ANGLE. SPARE PART NO. 20-MO2-3013.
3. DRILL OUT EXISTING RIVETS WITH #11 DRILL. REPLACE WITH AN442 RIVETS.
4. VERTICAL STIFFENER. SEE FIGURE 113.
5. 1 ROW OF AN442 RIVETS SPACED 3/4 INCH ON CENTERS.
6. FILLER. SPARE PART NO. 20-MO2-3014.
7. REINFORCEMENT ANGLE. SPARE PART NO. 20-MO2-3012. SEE NOTE 2.
8. REINFORCEMENT ANGLE. ALCOA DIE NO. 29083. SPARE PART NO. 20-MO2-3015.
9. SPAR CAP ALCOA DIE NO. 29192. SEE NOTE 1. SPARE PART NO. 20-MO2-3011.
10. WEB. FOR GAGE SEE FIGURE 113.
11. DRILL OUT EXISTING RIVETS WITH NO. 11 DRILL. REPLACE WITH 671D RIVETS.
12. DRILL OUT EXISTING RIVETS WITH NO. 11 DRILL. REPLACE WITH 671D RIVETS.

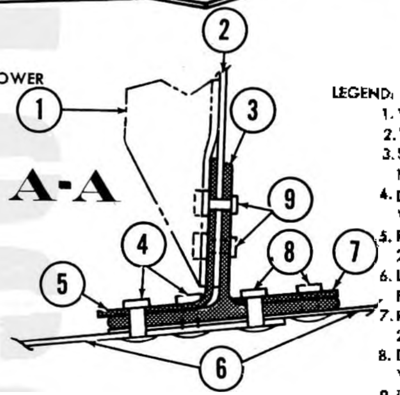


70% SPAR CAP UPPER.

A-A

FIGURE 122A—UPPER 70% SPAR CAPSTRIP SPLICE—CENTER PANEL



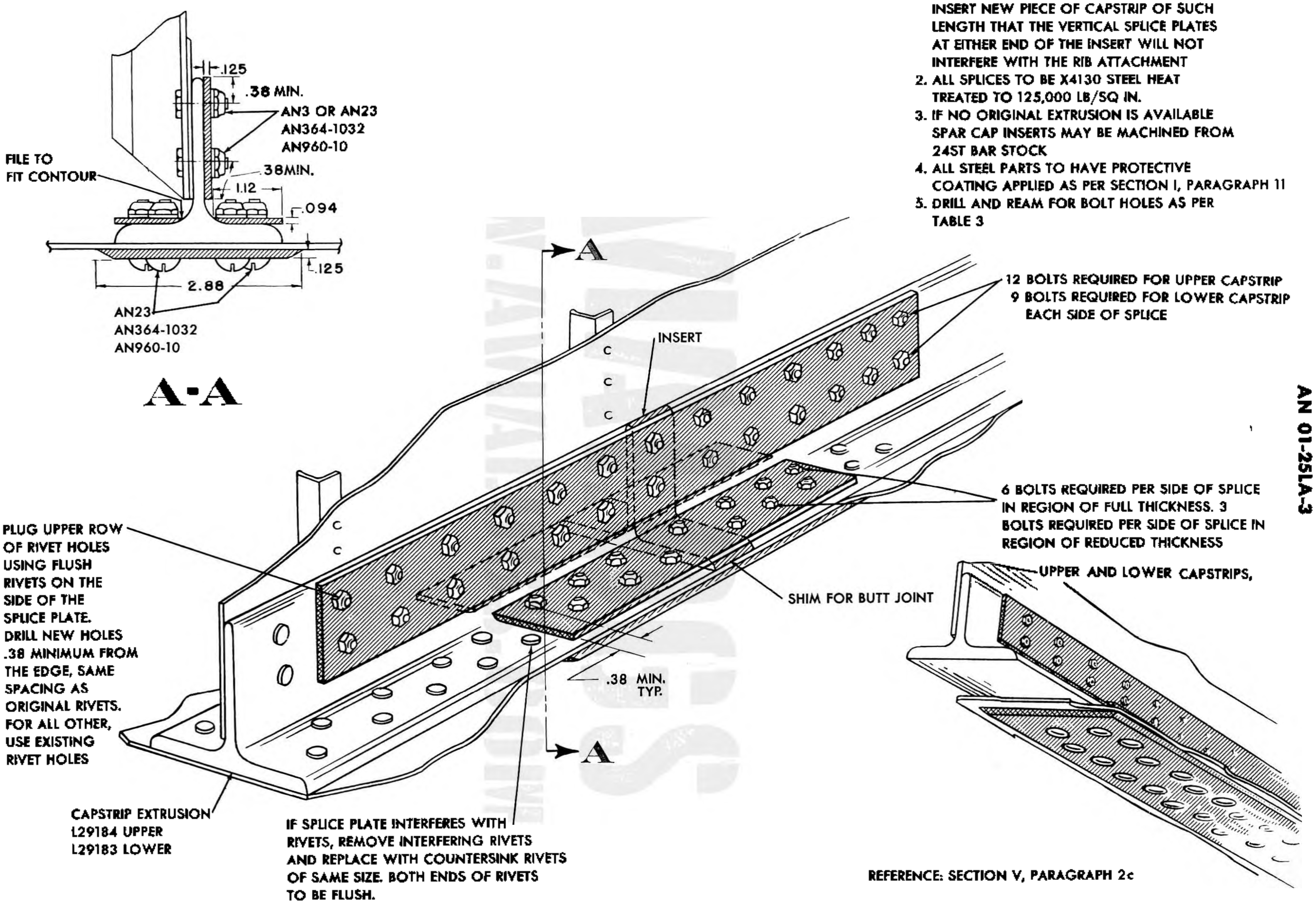


NOTES:
1. CUT THE CAPSTRIP WITHIN 1 INCH OF A VERTICAL STIFFENER
2. OUTBOARD AND INBOARD ENDS OF 20-MO2-3009 AND 20-MO2-3010 MUST BE WITHIN ONE INCH OF A VERTICAL STIFFENER.
3. AT LEAST 36 RIVETS ARE REQUIRED EACH SIDE OF BREAK THROUGH ANGLE 20-MO2-3009 AND PLATE 20-MO2-3010.
4. ORIGINAL RIVET HOLES IN SPAR CAP SHOULD BE PLUGGED IF EDGE DISTANCE IS LESS THAN 2 RIVET DIAMETERS.
5. ANGLE 20-MO2-3009 MAY BE CUT AT OUTER ENDS TO AVOID INTERFERENCE WITH RIVETS.
6. REPLACE AND JOGGLE (.078) ALL VERTICAL STIFFENERS.
7. FINISH ALL PARTS IN ACCORDANCE WITH SEC. 1 PARAGRAPH 11C (4)
8. DRILL OUT 3/16 RIVETS WITH #11 DRILL AND 5/32 RIVETS WITH A #21 DRILL

LEGEND:
1. VERTICAL STIFFENER. SEE FIGURE 113
2. WEB. FOR GAGE SEE FIGURE 113
3. SPAR CAP. ALCOA DIE NO. 29191. SEE NOTE 1. SPARE PART NO. 20-MO2-3008.
4. DRILL OUT EXISTING RIVETS. REPLACE WITH 671D RIVETS.
5. REINFORCEMENT ANGLE. SPARE PART NO. 20-MO2-3009. SEE NOTE 2.
6. LOWER WING SKIN. SEE FIGURE 103 FOR GAGE.
7. REINFORCEMENT PLATE. SPARE PART NO. 20-MO2-3010 SEE NOTE 2.
8. DRILL OUT EXISTING RIVETS. REPLACE WITH 671D RIVETS.
9. DRILL OUT EXISTING RIVETS. REPLACE WITH AN442 RIVETS.

FIGURE 122B - LOWER 70% SPAR CAPSTRIP SPLICE - CENTER PANEL

NOTES:
1. IF DAMAGE OCCURS IN VICINITY OF RIBS, INSERT NEW PIECE OF CAPSTRIP OF SUCH LENGTH THAT THE VERTICAL SPLICE PLATES AT EITHER END OF THE INSERT WILL NOT INTERFERE WITH THE RIB ATTACHMENT
2. ALL SPLICES TO BE X4130 STEEL HEAT TREATED TO 125,000 LB/SQ IN.
3. IF NO ORIGINAL EXTRUSION IS AVAILABLE SPAR CAP INSERTS MAY BE MACHINED FROM 24ST BAR STOCK
4. ALL STEEL PARTS TO HAVE PROTECTIVE COATING APPLIED AS PER SECTION I, PARAGRAPH 11
5. DRILL AND REAM FOR BOLT HOLES AS PER TABLE 3



REFERENCE: SECTION V, PARAGRAPH 2c

FIGURE 123—30 PERCENT SPAR CAPSTRIP SPLICE—OUTER PANEL

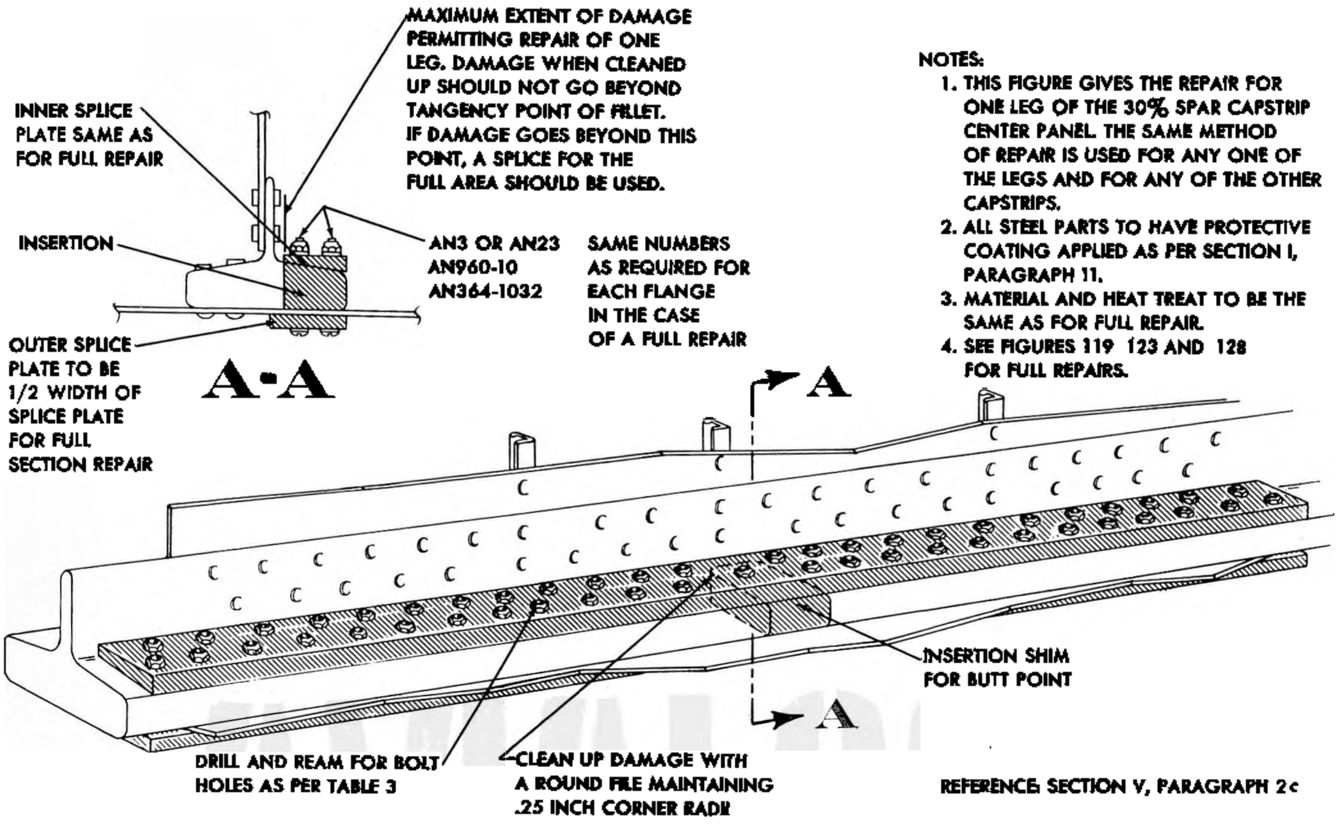


FIGURE 124—REPAIR TO ONE LEG OF CAPSTRIP

6. See section I for corrosion resistance coating for steel and aluminum alloy. All bolts are to be AN23 cadmium plated. Where the taper of the flange legs are such as to interfere with the seating of the bolts, it is necessary to use a tapered shim. (See figure 119).

7. Plates used on the outer contour of the wing for splicing the spar flanges should be chamfered or filletted with a cement to smooth the sharp spanwise break.

8. Damage to front spar capstrip in region of fuselage floor is repaired as in figure 125. This drawing is self-explanatory.

9. Damage in the region of the fuselage floor to the 30 percent spar capstrip is repaired as in figure 126. The floor is so close to the wing that a repair cannot be made to the spar cap without modifying the floor. The rib tie to the beam is such as to make a splice to the vertical leg in the region of the rib impractical. Therefore, any upper capstrip insertion should be so placed that the vertical leg splices fall between floor beams. The splice plates of X4130 steel heat treated to 125,000 pounds per square inch are cut as shown in the cross sections, the length being dependent on the extent and position of the damage. In the region of the four bolts through the floor skin, a tapered shim is added to give proper seating for these bolts.

PROCEDURE FOR REPAIR

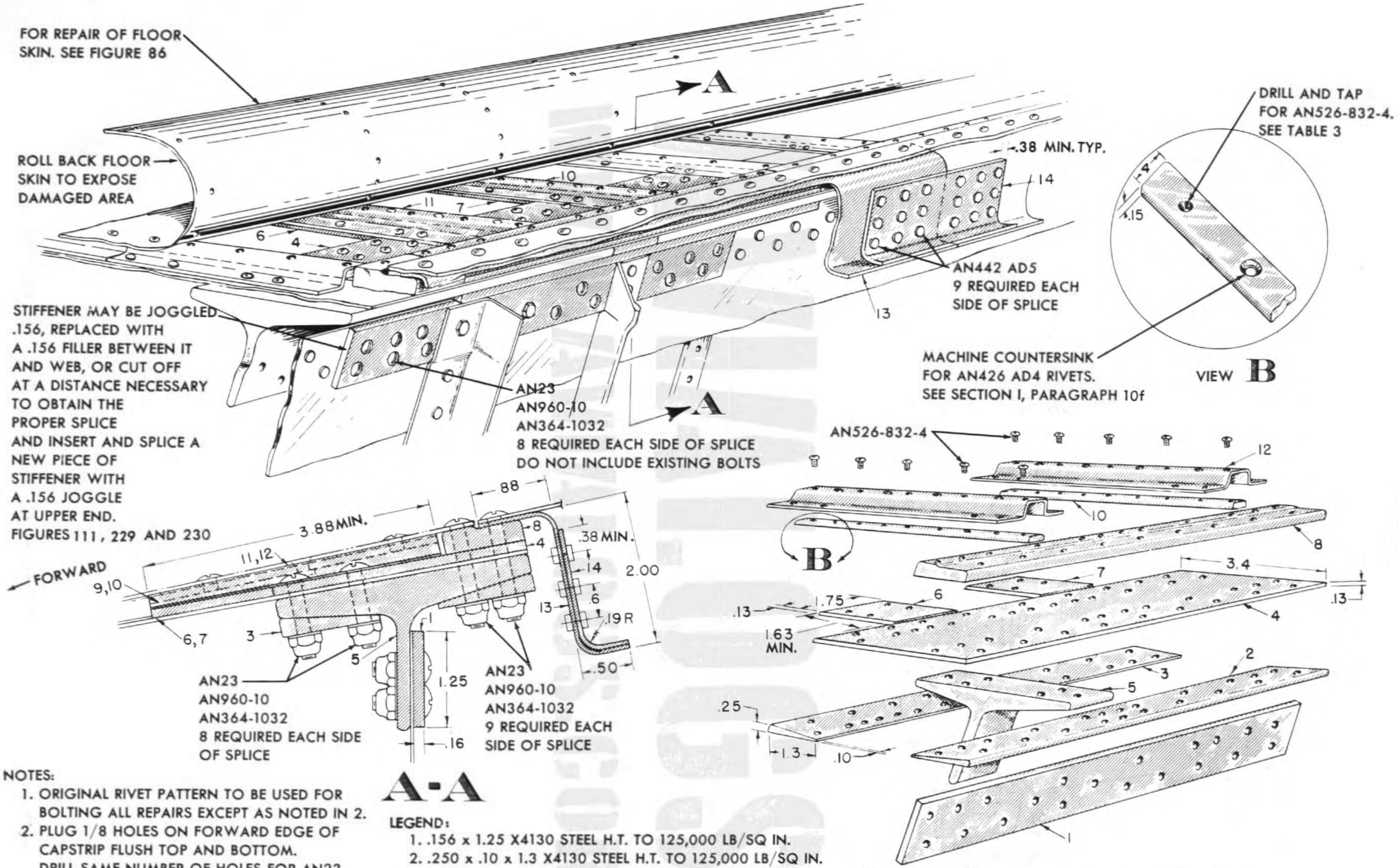
a. Roll back the floor skin and clean up the damaged area.

b. Remove the necessary rivets and bolts in the region of the capstrip splice.

c. Cut the aft vertical stiffener down to take only the lower capstrip bolt; cut the forward vertical stiffener to clear the bolts.

d. Cut the bulb angle on the rib web as shown to clear the splice bolts.

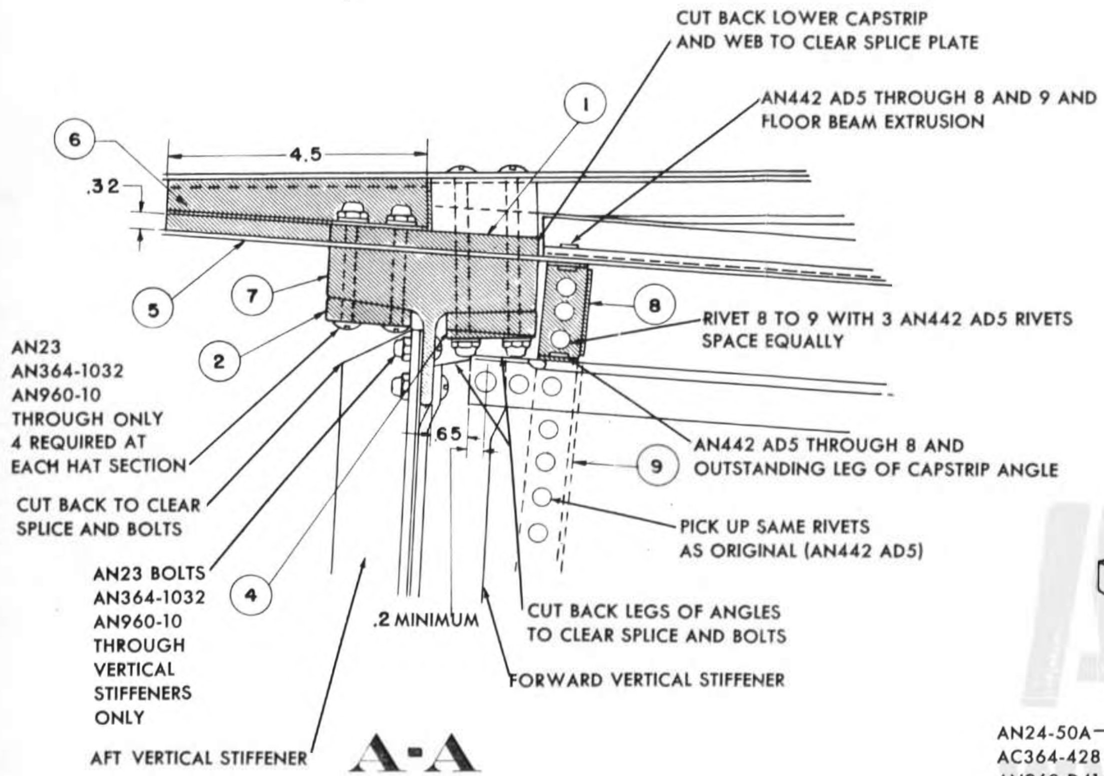
e. Cut the floor beam spacer blocks (10) to allow for the upper splice plate. (Remove .381 inches.).

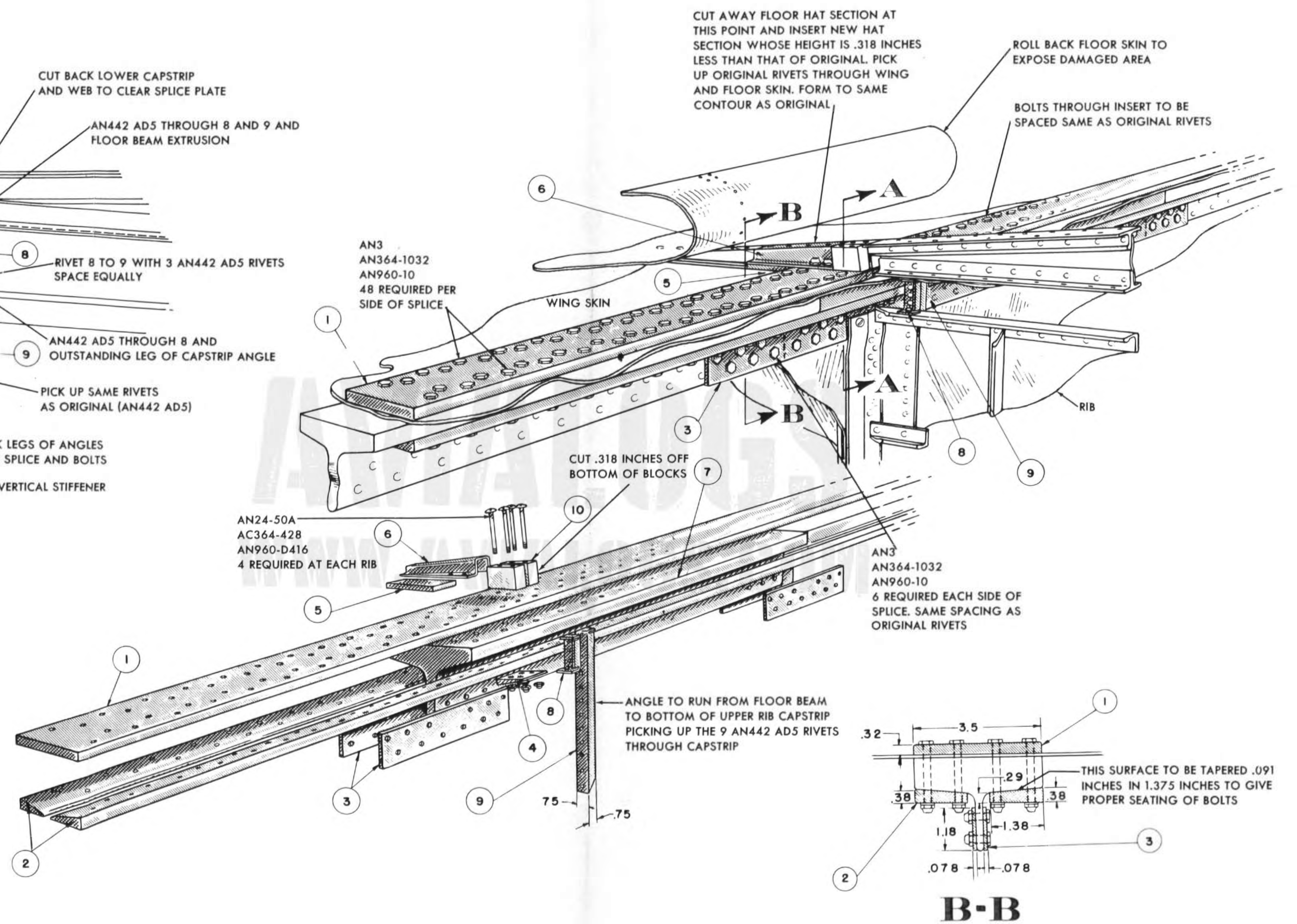


NOTES:
1. ORIGINAL RIVET PATTERN TO BE USED FOR BOLTING ALL REPAIRS EXCEPT AS NOTED IN 2.
2. PLUG 1/8 HOLES ON FORWARD EDGE OF CAPSTRIP FLUSH TOP AND BOTTOM. DRILL SAME NUMBER OF HOLES FOR AN23 BOLTS AT .35 EDGE DISTANCE.
3. DRILL AND REAM ALL BOLT HOLES IN ACCORDANCE WITH TABLE 3.
4. ALL 24SO ALCLAD TO BE HEAT-TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
5. ALL STEEL PARTS TO HAVE PROTECTIVE COATING AS PER SECTION I, PARAGRAPH 11.

LEGEND:
1. .156 x 1.25 X4130 STEEL H.T. TO 125,000 LB/SQ IN.
2. .250 x .10 x 1.3 X4130 STEEL H.T. TO 125,000 LB/SQ IN.
3. .250 x .10 x 1.3 X4130 STEEL H.T. TO 125,000 LB/SQ IN.
4. .125 x 3.4 X4130 STEEL H.T. TO 125,000 LB/SQ IN.
5. CAPSTRIP INSERT ALCOA DIE NO. L29186 OR MACHINE FROM 24ST BAR STOCK. SHIM INSERT FOR BUTT JOINT
6,7. .125 x 1.75 x 1.63 MINIMUM 24ST ALCLAD SHEET
8. EXTRUSION INSERT ALCOA DIE NO. L29107 MACHINE .125 OFF LOWER SURFACE. LENGTH SAME AS (4)
9,10. TAPPING STRIP 24ST ALUMINUM ALLOY (SEE VIEW B)
11,12. FLOOR HAT SECTION-24SO ALCLAD HEAT TREAT. SEE NOTE 4 SAME CROSS-SECTION AS ORIGINAL LENGTH=3.88 MINIMUM
13. ZEE-INSERT 24SO ALCLAD HEAT-TREAT GAGE—.051. SEE NOTE 4
14. ZEE-INSERT SPLICE 24SO ALCLAD HEAT-TREAT GAGE—.051. SEE NOTE 4

FIGURE 125—REPAIR TO FRONT SPAR CAPSTRIP IN REGION OF FUSELAGE FLOOR





NOTES:
1. ALL WING SPAR CAPSTRIP SPLICES MADE OF X4130 STEEL HEAT TREATED TO 125,000 LB/SQ IN.
2. SPLICE OF VERTICAL LEG TO BE PLACED BETWEEN RIBS. IF VERTICAL STIFFENER INTERFERES, IT MAY BE MOVED OUT THE THICKNESS OF THE SPLICE PLATE, USING AN .081 24ST ALCLAD FILTER OR THE UPPER END MAY BE JOGGLED .078 INCHES
3. MINIMUM EDGE DISTANCE FOR ALL RIVETS .32 INCHES UNLESS NOTED
4. MINIMUM EDGE DISTANCE FOR ALL BOLTS .38 INCHES UNLESS NOTED
5. DRILL AND REAM ALL BOLT HOLES IN ACCORDANCE WITH TABLE 3
6. ALL STEEL PARTS TO HAVE PROTECTIVE COATING APPLIED AS PER SECTION I, PARAGRAPH 11

REFERENCE: SECTION V, PARAGRAPH 2c

FIGURE 126—REPAIR TO 30 PERCENT SPAR CAPSTRIP IN REGION OF FUSELAGE FLOOR

LEGEND FOR FIGURE 126

1. **Outer Splice Plate—X4130 Steel.**
2. **Inner Splice Plates—X4130 Steel.**
3. **Splice Plates for Vertical Leg—X4130 Steel.**
4. **Filler Plate for Proper Seating of Nuts—X4130 Steel.**
5. **Filler Block under Floor Hat—24ST Alclad.**
6. **Floor Hat Section Insertion—24SO Alclad Heat Treat to 56,000 Lb./Sq. In. After Forming.**
7. **Spar Cap Insert—Make from Original Extrusion or Machine from 24ST Bar.**
8. **Support—24SO Alclad Heat Treat to 56,000 Lb./Sq. In. After Forming. Gage = .081.**
9. **Support—24SO Alclad Heat Treat to 56,000 Lb./Sq. In. After Forming. Gage = .081. Station 25.5 Only.**
10. **Beam Spacer Blocks.**

f. Cut away the web and lower capstrip of the floor beam in the region of the spacer blocks to clear the upper splice plate.

g. Cut away the floor hat section forward of the beam for 4.5 to 5 inches. Form a new hat (6) that will rest on the splice plate, and use a .318 inch aluminum alloy filler (5) forward of the splice plate.

h. Form two .081 clips to support the floor beam, one running from the floor beam to the lower edge of the rib web, picking up the existing row of rivets (9) and the other fitting between the lower capstrip of the floor beam and the bulb angle rib capstrip (8). Rivets through these clips are AN442-AD5, and the flanges are .75 inch wide.

i. Repair beam as above and make any other necessary repairs.

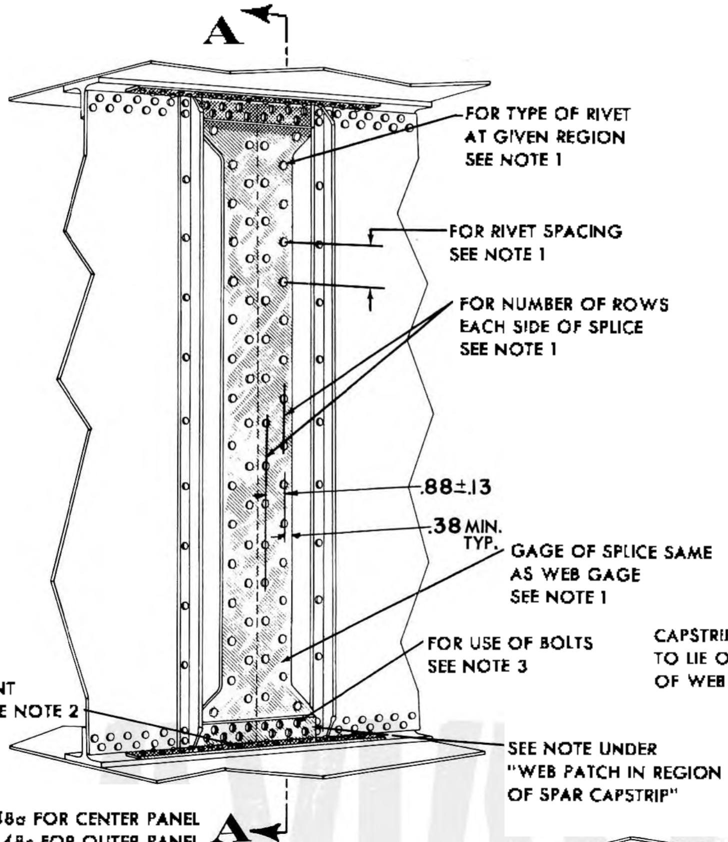
(3) WEBS.

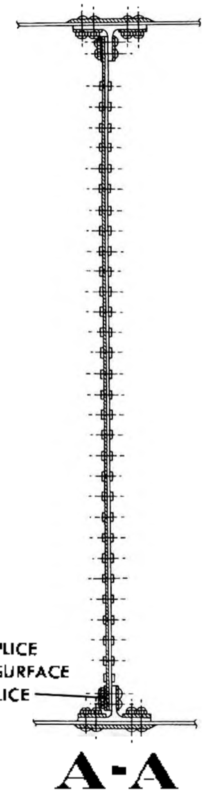
(*a*) GENERAL.—The spar webs are made of 24ST alclad with vertical stiffeners at close intervals to break up the panel size. All rivets through the web are AN442; but in the repairs, the required number of Cherry blind LS1127 rivets is also given. In regions where ribs or fittings tie into the spar web, insertions must be used. It is most satisfactory in all cases to make the web splices between stiffeners.

(*b*) NEGLIGIBLE DAMAGE. — Small holes in webs whose gage is .051 or less which can be circumscribed by a .75 inch diameter circle, need not be patched provided the edge of the circle is not less than 2 inches from any capstrip, web splice, or fitting. The hole should be cleaned up by filing or reaming to make the edge smooth.

(*c*) DAMAGE REPAIRABLE BY PATCHING.

1. Damage to the web, which when cleaned up is included between two adjacent ribs with the edge at least 3 inches from the center line of rib, may be patched with 24ST alclad sheet of the same gage as the damaged web. (See figure 127). Table 48 gives the required rivets and spacing for various zones on each beam. Table 48 B and D gives the additional rivets required on each side of the splice through the capstrips. If existing rivets interfere with the patch, they should be carefully drilled out and the holes used in laying out the new rivet pattern. If the patch ties into the capstrip, a filler of the same gage as the web should be inserted in the

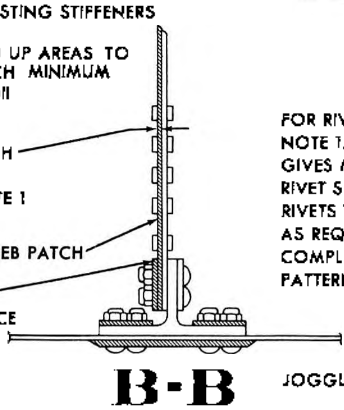


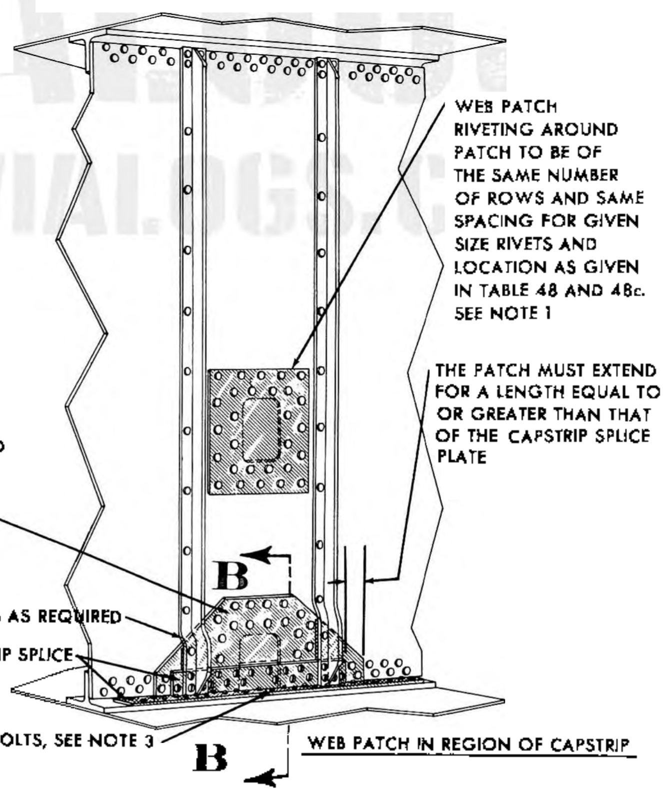


NOTES:

1. SEE TABLE 48a FOR CENTER PANEL AND TABLE 48c FOR OUTER PANEL
2. SEE TABLE 48b FOR CENTER PANEL AND TABLE 48d FOR OUTER PANEL
3. TABLE 48 GIVES NUMBER OF RIVETS REQUIRED. IF BOLTS ARE USED, THE MINIMUM NUMBER SHALL BE THE SAME AS THE NUMBER OF AN442 AD6 RIVETS
4. FOR CAPSTRIP SPLICES, SEE FIGURE 119-123
5. WEB SPLICES TO BE MADE BETWEEN EXISTING STIFFENERS OR RIBS
6. ALL CLEANED UP AREAS TO HAVE .5 INCH MINIMUM CORNER RADII

COMPLETE BREAK





WEB PATCH IN REGION OF CAPSTRIP

REFERENCE: SECTION V, PARAGRAPH 2b(3)

FIGURE 127—WING SPAR WEB REPAIR

TABLE 48
WING SPAR WEB SPLICES

A. ATTACHMENT OF PATCHES TO SPAR BETWEEN CAPSTRIPS—CENTER PANEL

	Station	*0-57*		*57-132.5*		*132.5-192*	
Spar	*Rivet Type*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*
Center	Gage of Splice	.032		.064		.091	
Panel	AN442AD5	1.5	2	.88	2	–	–
Front	AN442AD6	–	–	1	2	1	3
	LS1127-6	1.0	2	.88	2	–	–
Center	Gage of Splice	.032		.036		.051	
Panel	AN442AD5	1.5	2	1	2	.75	2
30%	AN442AD6	–	–	–	–	1	2
	LS1127-6	1.0	2	.63	2	1	3
Center	Gage of Splice	.032		.064		.051	
Panel	AN442AD5	1.5	2	.75	2	1	2
70%	AN442AD6	–	–	1	2	.75	2
	LS1127-6	1	2	.75	2	.63	2

B. ATTACHMENT OF PATCHES OR SPLICE PLATES TO CAPSTRIPS—NUMBER OF RIVETS REQUIRED AT EACH SIDE OF DAMAGE. USE SAME SPACING AS IN CAPSTRIP—CENTER PANEL.

Spar	*Station*	*0-57*	*57-132.5*	*132.5-192*
	Rivet Type	*No. of Rivets*	*No. of Rivets*	*No. of Rivets*
Center	AN442AD5	4	7	—
Panel	AN442AD6	3	5	13
Front	LS1127-6	5	8	—
Center	AN442AD5	4	4	5
Panel	AN442AD6	3	3	4
30%	LS1127-6	5	5	6
Center	AN442AD5	5	8	6
Panel	AN442AD6	4	6	5
70%	LS1127-6	7	9	7

TABLE 48 (Continued)
WING SPAR WEB SPLICES

C. ATTACHMENT OF PATCHES TO SPAR BETWEEN CAPSTRIPS—OUTER PANEL

	Station	*0-52*		*52-136*		*136-177*		*177-232*		*232-292*		*292-412*	
Spar	*Gage and Rivet Type*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*	*Rivet Spacing*	*No. of Rows*
Outer	Gage of Splice	.036		.036		.032		.028		.028		.025	
Panel	AN442AD4	.88	2	.88	2	.88	2	.88	2	1	2	1	2
30%	AN442AD5	1	2	1	2	1	2	-					-
	LS1127-5	.75	2	.75	2	.75	2	.75	2	.88	2	.88	2
Outer	Gage of Splice	.032		.032		.032*		.025*		.025		.025	
Panel	AN442AD4	.88	2	.88	2	.88	2	.88	2	.88	2	1	2
70%	AN442AD5	1	2	1	2	1	2					-	-
	LS1127-5	.75	2	.75	2	.75	2	.63	2	.63	2	.875	2

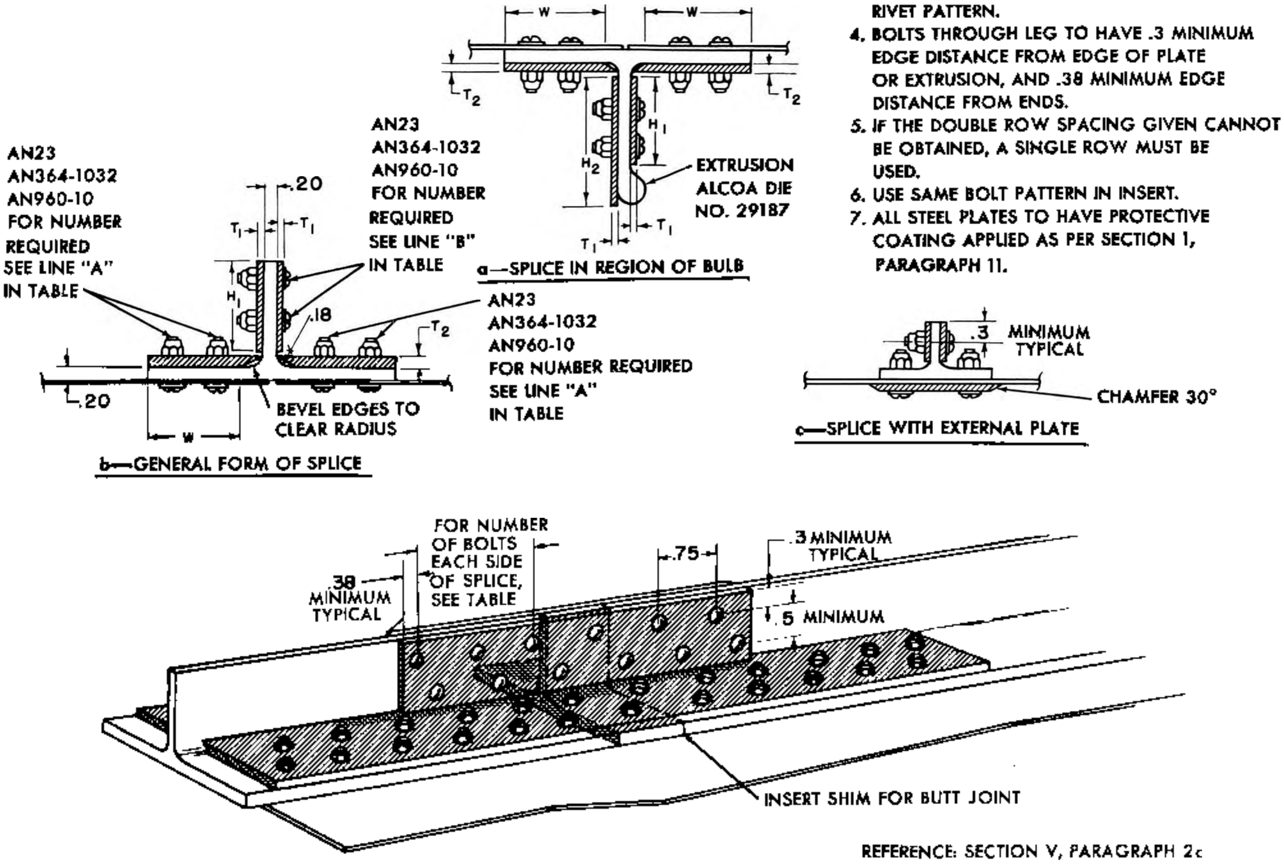
*.032 to be used to station 210; .025 to be used from station 210 outboard

D. ATTACHMENT OF PATCHES OR SPLICE TO CAPSTRIPS– NUMBER OF RIVETS REQUIRED AT EACH SIDE OF DAMAGE. USE SAME SPACING AS IN CAPSTRIP -OUTER PANEL.

	Station	*0-52*	*52-136*	*136-177*	*177-232*	*232-292*	*292-412*
Spar	*Rivet Type*	*No. of Rivets*	*No. of Rivets*	*No. of Rivets*	*No. of Rivets*	*No. of Rivets*	*No. of Rivets*
Outer	AN442AD4	5	5	4	4	3	3
Panel	AN442AD5	4	4	4	3	3	3
30%	LS1127-5	6	6	5	5	4	4
Outer	AN442AD4	4	4	4	4	4	4
Panel	AN442AD5	3	3	3	3	3	3
70%	LS1127-5	5	5	5	5	5	5

NOTE: Vertical rivet rows to be spaced at $\frac{7}{8} \pm \frac{1}{8}$

NOTES:
1. ALL BOLTS TO BE AN23
2. ALL SPLICE PLATES TO BE OF X4130 STEEL, HEAT TREATED TO 125,000 LB/SQ IN.
3. BOLTS THROUGH SKIN TO USE EXISTING RIVET PATTERN.
4. BOLTS THROUGH LEG TO HAVE .3 MINIMUM EDGE DISTANCE FROM EDGE OF PLATE OR EXTRUSION, AND .38 MINIMUM EDGE DISTANCE FROM ENDS.
5. IF THE DOUBLE ROW SPACING GIVEN CANNOT BE OBTAINED, A SINGLE ROW MUST BE USED.
6. USE SAME BOLT PATTERN IN INSERT.
7. ALL STEEL PLATES TO HAVE PROTECTIVE COATING APPLIED AS PER SECTION 1, PARAGRAPH 11.



REFERENCE: SECTION V, PARAGRAPH 2c

FIGURE 128—FRONT SPAR CAPSTRIP EXTENSION SPLICE—OUTER PANEL

TABLE 49

OUTER PANEL FRONT SPAR EXTENSION REPAIR

UPPER FRONT SPAR EXTENSION (U-15)

Distance In Inches From Inboard End of Outer Panel

	0-25	25-64	64-90	90-128	128-139	139-207.5	207.5-230	230-412
W	1.72	1.72	1.34	1.34	.97	.97	.62	.62
H_1	1.50	1.50	1.50	1.321	.32	.87	.87	.62
H_2	2.12	1.87	1.87	1.321	.32	.87	.87	.62
T_1	.125	.125	1.25	.125	.125	.125	.125	.125
T_2	.156	.156	.156	.156	.156	.156	.156[1]	.156[1]
A[2]	11	11	9	9	7	7	5	5
B[3]	11	9	9	6	6	4	4	3

(1) If external plate is used in "C" above, T2 should be .125.

LOWER FRONT SPAR EXTENSION (L-9)

Distance In Inches From Inboard End of Outer Panel

	0-64	64-90	90-128	128-140.5	140.5-200	200-232.8	232.8-260	260-384	384-412
W	1.72	1.34	1.34	.97	.97	.97	.62	.62	.62
H_1H_2 =	1.52	1.52	1.22	1.22	.87	.62	.62	--	--
T_1	.093	.093	.093	.093	.093	.093	.093	--	--
T_2	.156	.156	.156	.156	.156	.156	.156[1]	.156[1]	.156[1]
A[2]	11	9	9	9	7	7	5	8	6
B[3]	7	7	6	6	4	4	4	--	--

(2) No. of AN23 bolts required each side of splice for each horizontal leg.

(3) No. of AN23 bolts required each side of splice for each vertical leg.

region of the capstrip. If the patch extends across a spar stiffener, and the stiffener is not damaged, the stiffener may be removed by drilling out all the rivets and replaced on top of the splice using the necessary fillers or joggling.

2. When damage occurs near the center of the web, use a patch plate the same gage as the web. The horizontal and vertical rivet patterns are given in table 48. If the damage runs across a web stiffener the patch is placed on the opposite side of the web from the stiffener and the stiffener rivets are picked up. Fillers should be used under the stiffener as required. If a stiffener exists on either side of the web at this point, it is necessary to remove one and replace it over the patch using fillers under the remainder of the member.

3. Web damage occurring near a capstrip, thus preventing placing the required rivet pattern around the damage, requires a patch as shown in figure 127. The patch is extended to the edge of the web and the required number of rivets as given in table 48 B and D are used for the attachment of the patch to the capstrip on either side of the damage. Run the required rivet pattern around the damage and up to the capstrip. This figure shows the relation between the capstrip and web repairs.

(*d*) DAMAGE REPAIRABLE BY INSERTION. If the damage occurs in the region of any fittings, brackets, or rib connections, an insert should be spliced to the existing web on either side. The damaged portion of the web should be cut away sufficiently to make the splice at points where no interference will be found. The insert and the splice plates are to be of the same gage as the damaged web. The rivet pattern is given in table 48.

(*e*) STIFFENER REPAIR.—Figures 231 through 233 give complete information for the repair or replacement of all extrusion type of stiffeners. If only one leg of a stiffener is damaged, the repair by use of splice plates may be made being careful to use the splice given for the damaged leg. Nicks which, when cleaned up with a round file, have a maximum depth of 1/10 the length of the leg may be neglected provided such nicks do not occur adjacent to a rivet, and are not less than 6 inches apart. Various repairs are given for each extrusion: the use of any specific one being dependent on available materials, clearances rivet locations, etc. Repair of bent up angle stiffeners is given in figure 229.

(4) MISCELLANEOUS. — Damaged fittings, gussets, brackets, and reinforcements should be replaced.

d. RIBS.

(1) GENERAL.—There are three types of ribs used in the center panel, the ribs of which figure 129 is typical, are diagonally trussed; in the other panel, all ribs are of the full web type except the tank ribs which have large reinforced cut-outs. These are shown in figures 138, 139, and 144. The nose and trailing edge ribs are full reinforced webs with or without flanged lightening holes. Typical repairs are given for all regions of the various kinds of ribs. A repair given for any part of a rib may be used for all ribs of the same group. All riveting, except through the skin, is to be done with AN442 type rivets. In the outer panel, however, if there is access to only one side of the rib, Cherry blind rivets may be used. (See section I, paragraph 10*g*. for rivet substitution).

(2) CENTER PANEL RIBS.

(*a*) GENERAL.—All diagonals are made up of one or two curved hat sections of the same type as the skin stringers. These diagonals tie into the capstrip webs at points where the web increases in depth to give sufficient attachment area. The capstrips are made up of one or more extruded angles and a scalloped sheet web. Rib ties to the skin between stringers are made either with an extra scalloped sheet or with the main web cut and flanged to meet the skin.

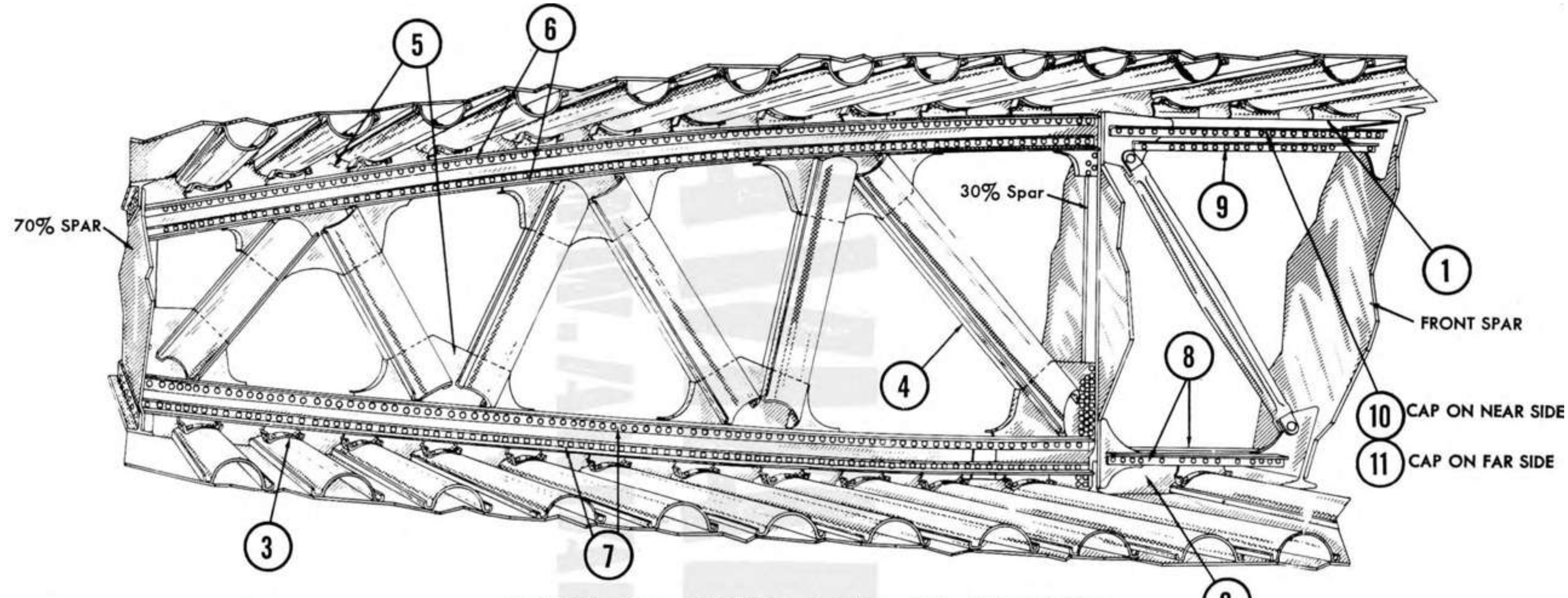
(*b*) DIAGONALS.

1. NEGLIGIBLE DAMAGE.—Small isolated dents, free from cracks, abrasions and sharp corners may be neglected. Holes, which when cleaned up to a maximum diameter of .5 inch and which are a minimum of .5 inch from any flange, may be neglected. Such holes should be a minimum of 6 inches apart.

2. DAMAGE REPAIRABLE BY PATCHING.

a. Damage covering a greater area than that specified above must be patched. Figure 130 gives the required splice and the accompanying table contains all necessary gage, riveting, etc., for the patches of all diagonals.

b. Items *2.*, *3.*, and *4.* under paragraph *b.* (2) (*b*) of this section also pertain to diagonal repair.

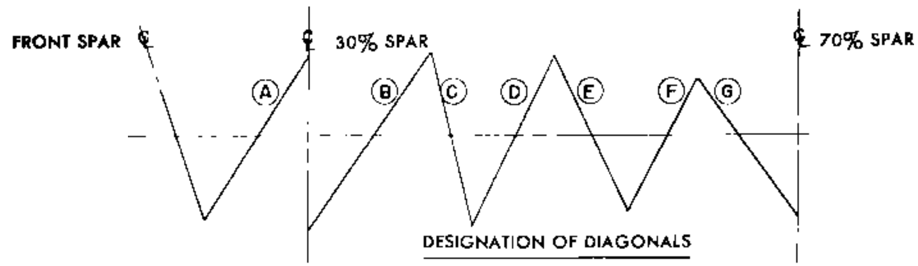


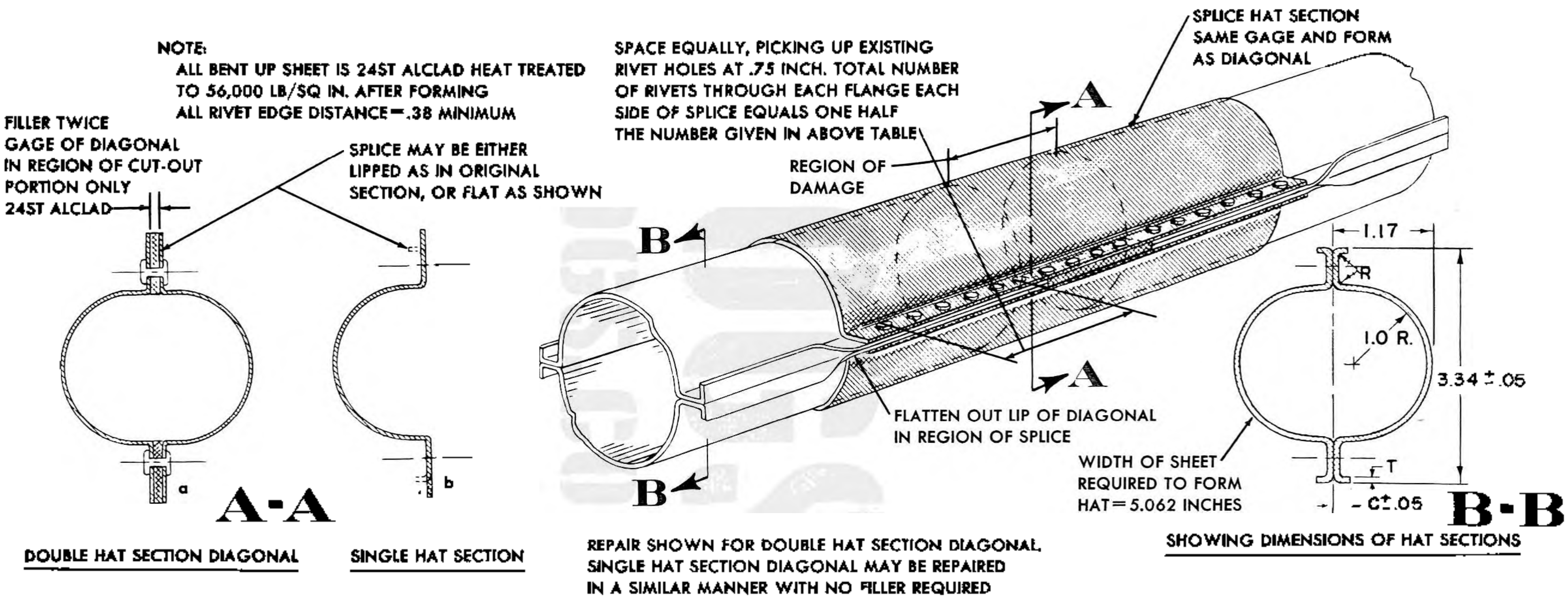
REFERENCE: SECTION V, PARAGRAPH 2d
TABLE 50

FIGURE 129—CENTER PANEL RIB STRUCTURE

TABLE 50

Item	*Member*	*Sta. 9.5*	*Sta. 25.5*	*Sta. 41.5*	*Canted Rib*	*Sta. 82.5*	*Sta. 107.5*	*Sta. 132.5*	*Sta. 155.5*	*Sta. 178.5*
1	Cap Strip Web	.081 24ST-ALC	.081 24SO-ALC	.081 24ST-ALC	.064 24ST-ALC	.040 24ST-ALC	.060 24SO-ALC	.072 24ST-ALC	.040 24ST-ALC	.072 24ST-ALC
2	Cap Strip Web	.036 24ST-ALC	.051 24ST-ALC	.036 24ST-ALC	.064 24ST-ALC	.040 24ST-ALC	.064 24SO-ALC	.032 24ST-ALC	.040 24ST-ALC	.032 24ST-ALC
3	See Fig. 132									
4	Diagonals	SS-112-32 SS-112-40	SS-112-32 SS-112-40	SS-112-32 SS-112-40	SS-112-32	SS-112-32	SS-112-40	SS-112-40	SS-112-40 SS-112-51	SS-112-40
5	Cap Strip Web	.051ST T. .040SO B.	.051 24SO-ALC	.051ST T. .040SO B.	.064 24SO-ALC	.064 24SO-ALC	.064 24SO-ALC	.072 24SO-ALC	.072 24SO-ALC	.072 24SO-ALC
6	Cap	29388	29388	29388	29387	K-78-F	L-29083	K-78-F	K-78-F	K-78-F
7	Cap	29388	29388	29388	29387	K-78-F	K-778	K-78-F	K-78-F	K-78-F
8	Cap	29388	29388	29388	29387	K-78-C	K-77-L	K-78-A	K-78-J	K-78-A
9	Cap	K12224	K-78-A	K12224	29387	K-78-C	----	K-78-M	K-78-J	K-78-M
10	Cap	----	----	----	----	----	K-78-Y	K-78-F	----	K-78-F
11	Cap	----	----	----	----	----	K-78-Y	K-78-A	----	K-78-A





REFERENCE: SECTION V, PARAGRAPH 2d(2)(b)

FIGURE 130—CENTER PANEL RIB REPAIR—DIAGONALS

TABLE 51—CENTER PANEL RIB REPAIR—DIAGONALS

Station	*A*				*B*			
	No. of Members	*Stock*	*No. Rivets AN442 AD5*	*Side AN442 AD6*	*No. of Members*	*Stock*	*No. Rivets AN442 AD5*	*Side AN442 AD6*
9.5	1	SS-112-40	6	6	2	SS-112-32	6	6
25.5	2	SS-112-32	6	4	2	SS-112-40	10	8
41.5	1	SS-112-40	6	6	2	SS-112-32	6	6
Canted	2	SS-112-32	6	6	2	SS-112-32	6	6
82.5	1	SS-112-32	4	4	1	SS-112-32	4	4
107.5					2	SS-112-40	8	8
132.5					2	SS-112-40	12	10
155.5	2	SS-112-32	4	4	2	SS-112-51	18	12
178.5					2	SS-112-40	12	10
	C				*D*			
9.5	1	SS-112-32	6	6	1	SS-112-32	6	6
25.5	2	SS-112-32	8	6	2	SS-112-32	10	8
41.5	1	SS-112-32	6	6	1	SS-112-32	6	6
Canted	2	SS-112-32	6	6	2	SS-112-32	6	6
82.5	1	SS-112-32	4	4	2	SS-112-32	4	4
107.5	2	SS-112-32	8	8	2	SS-112-40	8	8
132.5	2	SS-112-40	10	8	2	SS-112-40	12	10
155.5	2	SS-112-40	14	12	2	SS-112-51	18	12
178.5	2	SS-112-40	10	8	2	SS-112-40	12	10
	E				*F*			
9.5	1	SS-112-32	6	4	1	SS-112-32	6	6
25.5	2	SS-112-32	6	6	2	SS-112-32	6	6
41.5	1	SS-112-32	6	4	1	SS-112-32	6	6
Canted	2	SS-112-32	8	6	2	SS-112-32	8	6
82.5	2	SS-112-32	4	4	2	SS-112-32	4	4
107.5	2	SS-112-32	10	10	2	SS-112-40	10	8
132.5	2	SS-112-40	6	6	2	SS-112-40	8	6
155.5	2	SS-112-32	16	12	2	SS-112-40	6	6
178.5	2	SS-112-40	6	6	2	SS-112-40	8	6
	G							
9.5	1	SS-112-40	6	6				
25.5	2	SS-112-32	8	8				
41.5	1	SS-112-40	6	6				
Canted	2	SS-112-40	12	10				
82.5	2	SS-112-32	4	4				
107.5	2	SS-112-40	14	12				
132.5	2	SS-112-40	10	8				
155.5	2	SS-112-40	10	8				
178.5	2	SS-112-40	10	8				

c. When the hat sections occur in pairs, fillers are used as required between the flanges in the region of the cutaway material, as shown in figure 130-a. When hat sections occur singly, as in figure 130-b, no filler is required.

d. Pick up original rivet holes through diagonals and equally space additional rivets to give a spacing of $.75 \pm .13$ inch.

e. Flatten out the lips of the hat section on either side of the damage for a distance necessary to obtain the attachment for the splice.

3. DAMAGE REPAIRABLE BY INSERTION.—If the damage occurs close to the end in such a manner that, when cleaned up, there is insufficient distance between the end attachment and the edge of the cleaned up area for the required splice rivets, it will be necessary to remove the short end of the diagonal and insert a new piece sufficiently long to take the splice to the remaining original diagonal. Splice the insert to the diagonal as per figure 130.

(*c*) CAPSTRIPS.

1. GENERAL.—The capstrip is taken to include all angles and webs running fore and aft along the upper and lower contours of the rib. These members, being riveted to each other, act as a single unit in carrying load.

2. NEGLIGIBLE DAMAGE.

a. Small isolated dents, free from cracks, abrasions or sharp corners may be neglected.

b. Holes in webs which, when cleaned up, are 1 inch or less in diameter and are a minimum of .38 inch from any edge, flange or rivet, need not be patched provided these holes do not occur in the region between capstrip angles.

3. DAMAGE REPAIRABLE BY PATCHING.

a. Webs between angles may be patched as shown in figures 131 and 132. The first of these figures gives a riveted attachment for the upper capstrip web which may be used on ribs at station 9.5, 25, and 41.5 except in the region between the front and 30 percent spars at station 25.5. This latter is shown in figure 132. Drill out existing rivets which interfere with patch and use the resulting holes in arranging the new pattern. Rivets should be carefully drilled out in order not to enlarge the holes. See section I, paragraph 10. *i.* for methods of repair for enlarged or elongated holes. Shim stringer clips, etc., if necessary.

b. When the main webs tie into the wing skin, they may be patched as shown in figure 133. The damaged portion is cleaned up with .5 inch minimum corner radii and a patch cut to extend along the capstrip between the center lines of adjacent stringers. If a sheet cut in this manner gives less than a .32 inch edge distance on the last rivet, or if the total number of rivets required on one side of the cleaned up area requires a greater length, the sheet should be extended to obtain a .32 inch minimum edge distance on the end rivets. Existing rivets in the region of the patch should be carefully drilled out in order not to enlarge the holes. Filler plates should be placed between the patch and the angles in the area of the cleaned up damage. If the damage is between the skin and the first angle, it may be repaired as in figure 133-b, cleaning up the damage so that the web remains continuous between angles.

If the damage goes beyond the first angle, it should be repaired as in figure 133-a, using the number of rivets specified in column 6 of table 52.

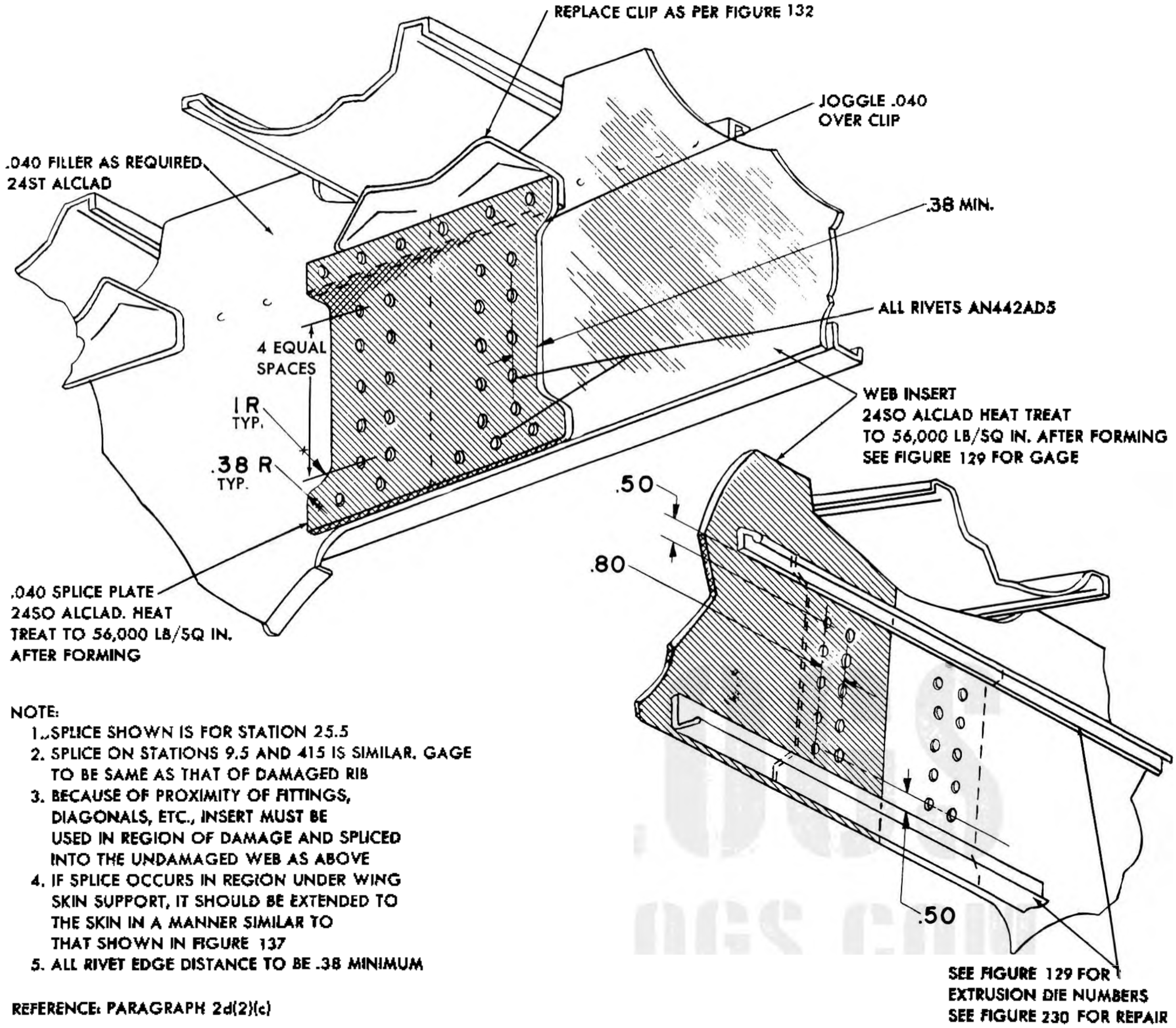
c. Local damage to a leg of the angles may be patched by a plate or bent up section. The gage of the patch and the required rivets are given in figures 231 through 233. It is necessary in referring to these figures to be certain of the correct die number for the damaged member. This may be found in figure 129 and table 50. Small cracks of 1 inch maximum length running along the length of the angle, are repaired by rounding out sharp corners and stopping the cracks with a 1/8 inch diameter hole at either end and then patch as above. Use fillers as necessary.

d. Webs of capstrips which have only one angle may be patched as in figure 134. Clean up damage with .5 inch minimum corner radii. Riveting is similar for all like ribs. Gages and flange widths are given in table 53. Figure 135 shows a complete break.

4. DAMAGE REPAIRABLE BY INSERTION.

a. See paragraph 2. *d.* (2) (*c*) *3.* c. above for angle repair.

b. If the web is damaged near its end in the region of a fitting, or in the flared portion to which the diagonals attach, a new piece of web should be inserted and spliced as per figure 136. Also, if the length of damage after clean up is greater than 7 inches, a repair should be made in a similar manner.



NOTE:
1. SPLICE SHOWN IS FOR STATION 25.5
2. SPLICE ON STATIONS 9.5 AND 415 IS SIMILAR. GAGE TO BE SAME AS THAT OF DAMAGED RIB
3. BECAUSE OF PROXIMITY OF FITTINGS, DIAGONALS, ETC., INSERT MUST BE USED IN REGION OF DAMAGE AND SPLICED INTO THE UNDAMAGED WEB AS ABOVE
4. IF SPLICE OCCURS IN REGION UNDER WING SKIN SUPPORT, IT SHOULD BE EXTENDED TO THE SKIN IN A MANNER SIMILAR TO THAT SHOWN IN FIGURE 137
5. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM

REFERENCE: PARAGRAPH 2d(2)(c)

FIGURE 131—CENTER PANEL RIB REPAIR—UPPER CAPSTRIP (STA. 9.5, 25.5, 41.5 BETWEEN 30% AND 70% SPARS AND STA. 9.5 AND 41.5 BETWEEN FRONT AND 30% SPARS)

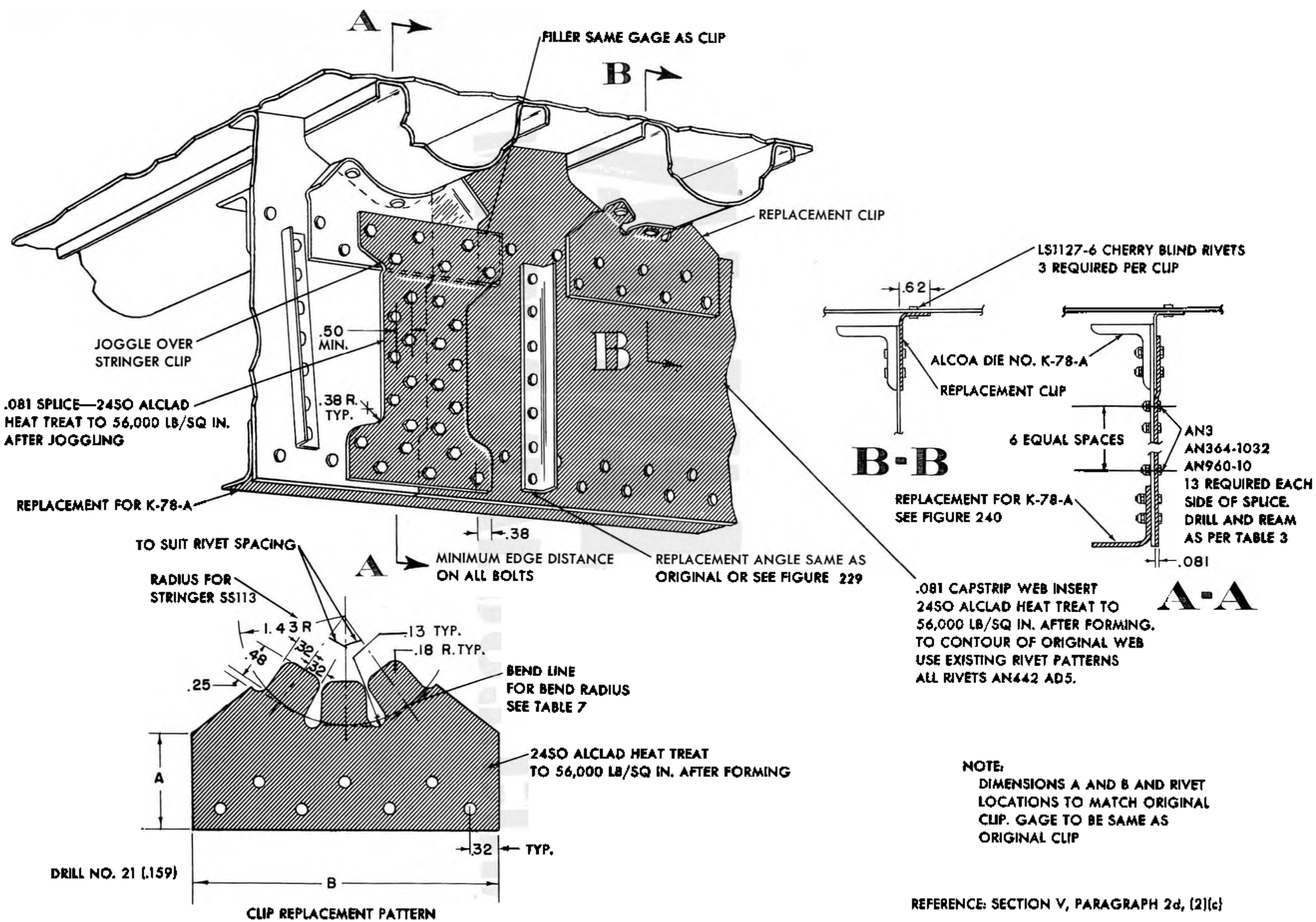


FIGURE 132—CENTER PANEL RIB REPAIR—UPPER CAPSTRIP (STA. 25.5 BETWEEN FRONT AND 30% SPARS)

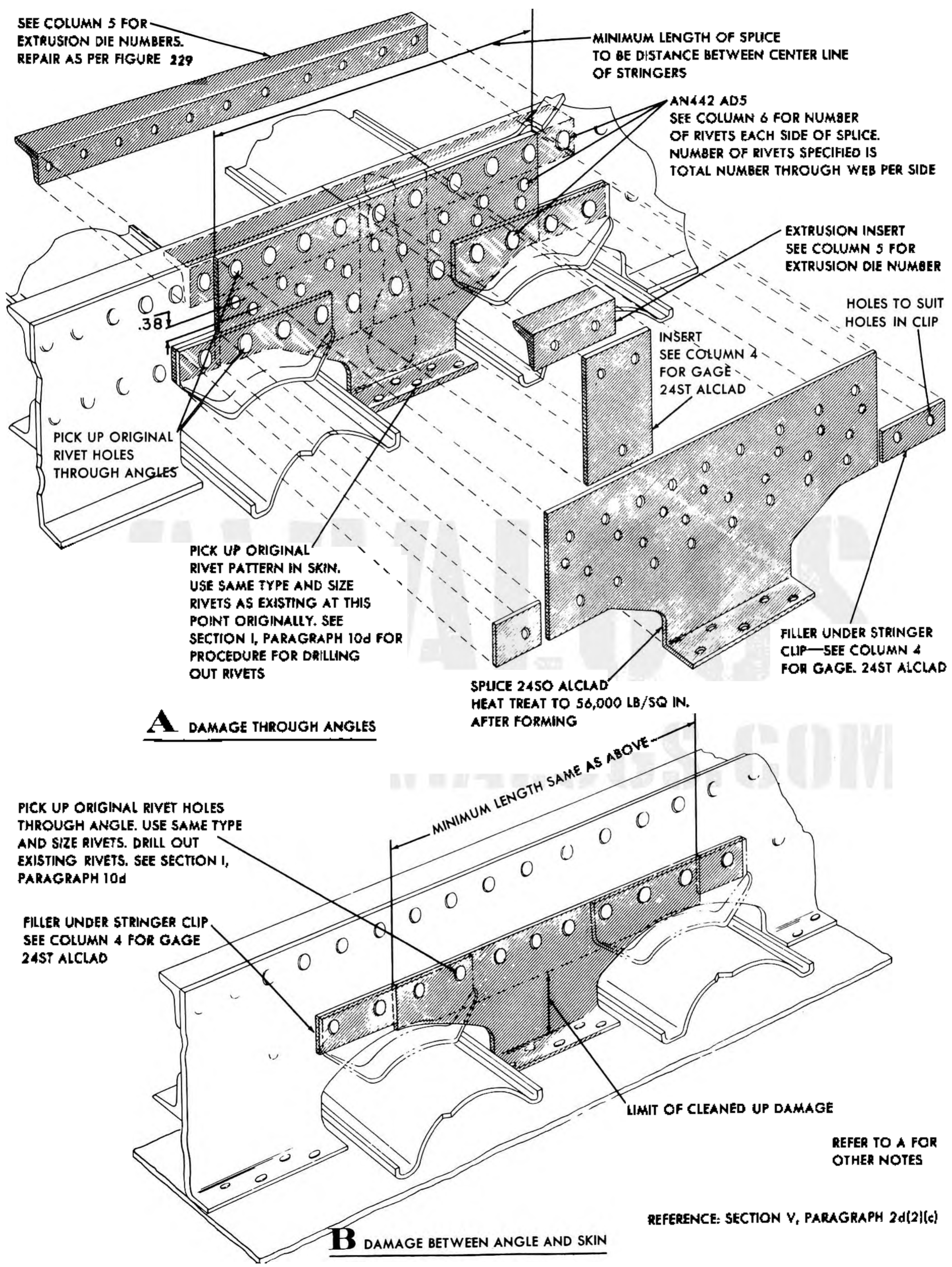


FIGURE 133 — CENTER PANEL RIB REPAIR — MAIN WEB TO SKIN

TABLE 52
CENTER PANEL RIB REPAIR — MAIN WEB TO SKIN

1 Part Number	2 Station	3 Surface	4 Gage of Sheet	5 Alcoa Die No.	6 Number Rivets Through Web Per Side
20-020-1060	9.5	Lower	.040	29388	5
20-020-1059	25.5	Lower	.051	29388	8
20-020-1060	41.5	Lower	.040	29388	5
		Upper		K78F	
20-020-1061	82.5	Lower	.064	K78F	10
		Upper		L-29083	
20-020-1008	107.5	Lower	.064	K-778	10
20-020-1065	132.5	Lower	.072	K78F	14
		Upper		K78F	
20-020-1073	155.5	Lower	.072	K78F	14
20-020-1065	178.5	Lower	.072	K78F	14

c. In the case where the web tying into the wing skin is separate from the main web, any damage may be repaired by cutting away the web at or beyond the center lines of adjacent stringers and inserting a new piece. This insert should pick up the original rivet holes through the rib and wing skin. Every attempt should be made not to enlarge the holes when drilling out the rivets and to replace all rivets with the same size as the original. (See figure 137).

5. DAMAGE REQUIRING REPLACEMENT.—Because of the relatively short distance between the front and 30 percent spars, the damaged capstrip members in this region may be replaced. However, the upper capstrip angles on rib station 25.5 and the lower capstrip angles on rib stations 132.5 and 178.5 between the above two spars, should be replaced if damaged.

(*3*) OUTER PANEL TANK RIBS.

(*a*) GENERAL.—The tank ribs have heavy sheet webs which are cut out and reinforced with tee-section extrusions to support the fuel tanks. Heavy extruded angles whose legs are machined off along their length form the rib capstrips. An added sheet scalloped to clear the stringers serves to tie the wing skin to the rib. Figures 140 through 143 show individual splices for each member except the scalloped skin tie which was treated in paragraph 2. *d*. (2) (c) *4*. c. of this section. These individual repairs may be combined in any manner required by the damage. It should be observed that the tee-section splice given is of greater strength than the one existing. This is because the original splice is made where the loads are least.

(*b*) NEGLIGIBLE DAMAGE. Small isolated dents, free from cracks, abrasions, and sharp corners may be neglected. Holes in webs, which when cleaned up to a maximum diameter of 1 inch and which are a minimum of .5 inch from the edge of any other member, may be neglected. Such holes should be a minimum of 5 inches apart. Nicks in extrusions which, when cleaned up with a round file, have a maximum depth of 1/10 the length of the leg may be neglected, provided such nicks do not occur within .38 inch from any rivet.

(*c*) DAMAGE REPAIRABLE BY PATCHING.

1. The web may be patched as shown in figure 140 using a double row of AN442AD5 rivets. Web patching should not be used in any region where there is less than 3 inches of clear web vertically between the tee and the angle extrusions. The edge of the cleaned up area should not come closer than 1.5 inches from any vertical member.

2. For the patching of one leg of the extrusions, see paragraph 2. *d*. (2) (*c*) *3*. c. of this section.

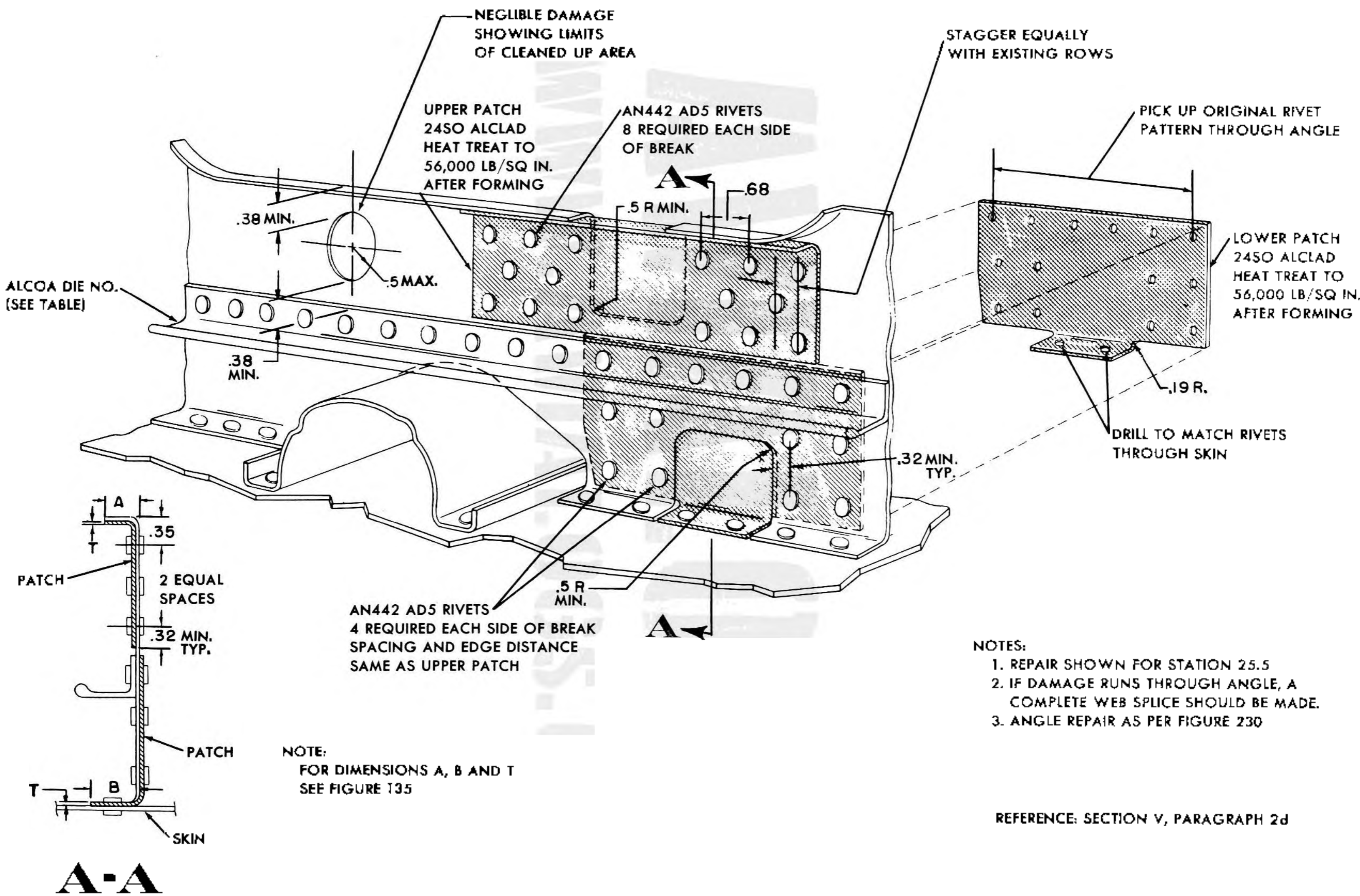
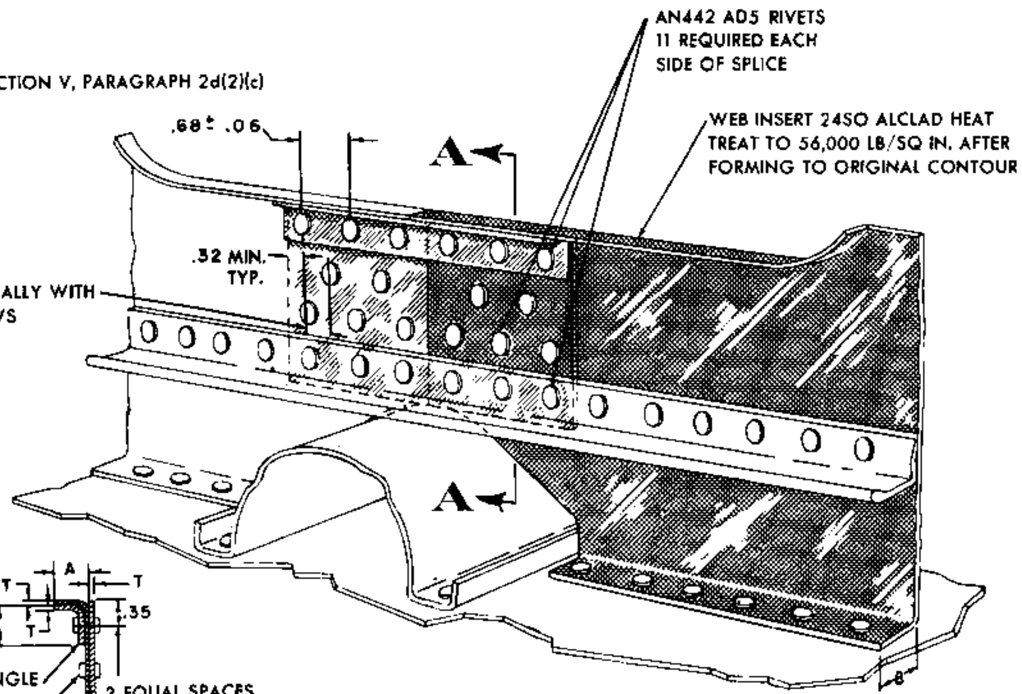


FIGURE 134 — CENTER PANEL RIB REPAIR — WEB WITH SINGLE ANGLE



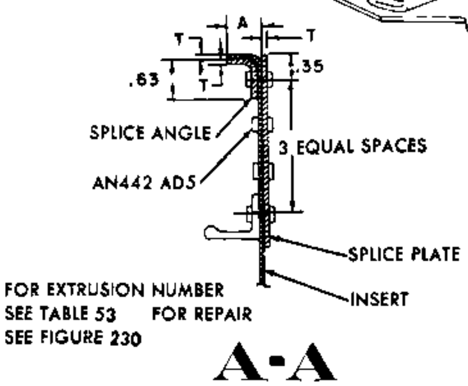


TABLE 53

Station	*Part No.*	*A*	*B*	*T*	*Alcoa Die No.*
9.5	20-020-1060	.38	.66	.036	29095
25.5	20-020-1059	.38	.70	.051	29387
41.5	20-020-1060	.38	.66	.036	29388
canted	20-020-1068	.50	.70	.064	29387

FIGURE 135 — CENTER PANEL RIB REPAIR — WEB WITH SINGLE ANGLE (COMPLETE BREAK)

(*d*) DAMAGE REPAIRABLE BY INSERTION.

1. Damage more extensive than that discussed under paragraph (*c*) *1.* immediately above requires an insertion. Such parts of the web must be removed so that vertical splices may be made in the above region and horizontal splices across the center stiffener and at the ends as shown in figures 142 and 143.

2. Tee and angle damage when more than one leg is affected may be repaired as shown in figures 140 and 141. Inserts of the same material as the damaged member are used and the splice plates attached with AN23 and AN 3 bolts.

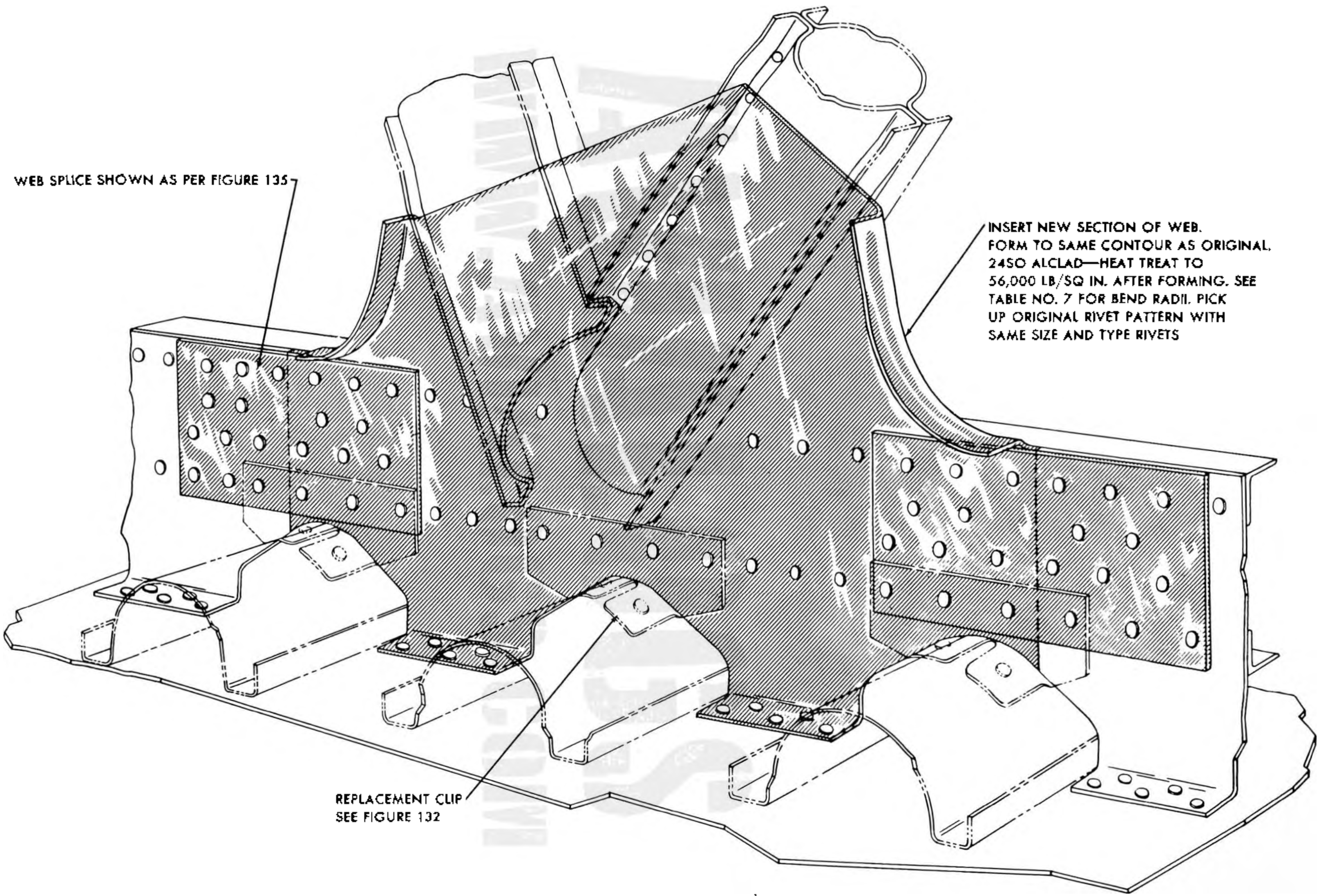
3. Splices at the beams should be made as per figure 143. Original rivets in the region of the splice should be drilled out and the holes used for the new rivet pattern which employs AN442AD6 rivets. Splice angles on the tee section should be similar to the original ones but extended to pick up an additional rivet in each leg at both ends. The overlap of splices must be carefully followed, using a minimum of six rivets each side of splice in the plane of the web and five rivets each side of splice along the beam tie.

(4) OUTER PANEL FLANGED WEB RIBS.

(*a*) GENERAL.

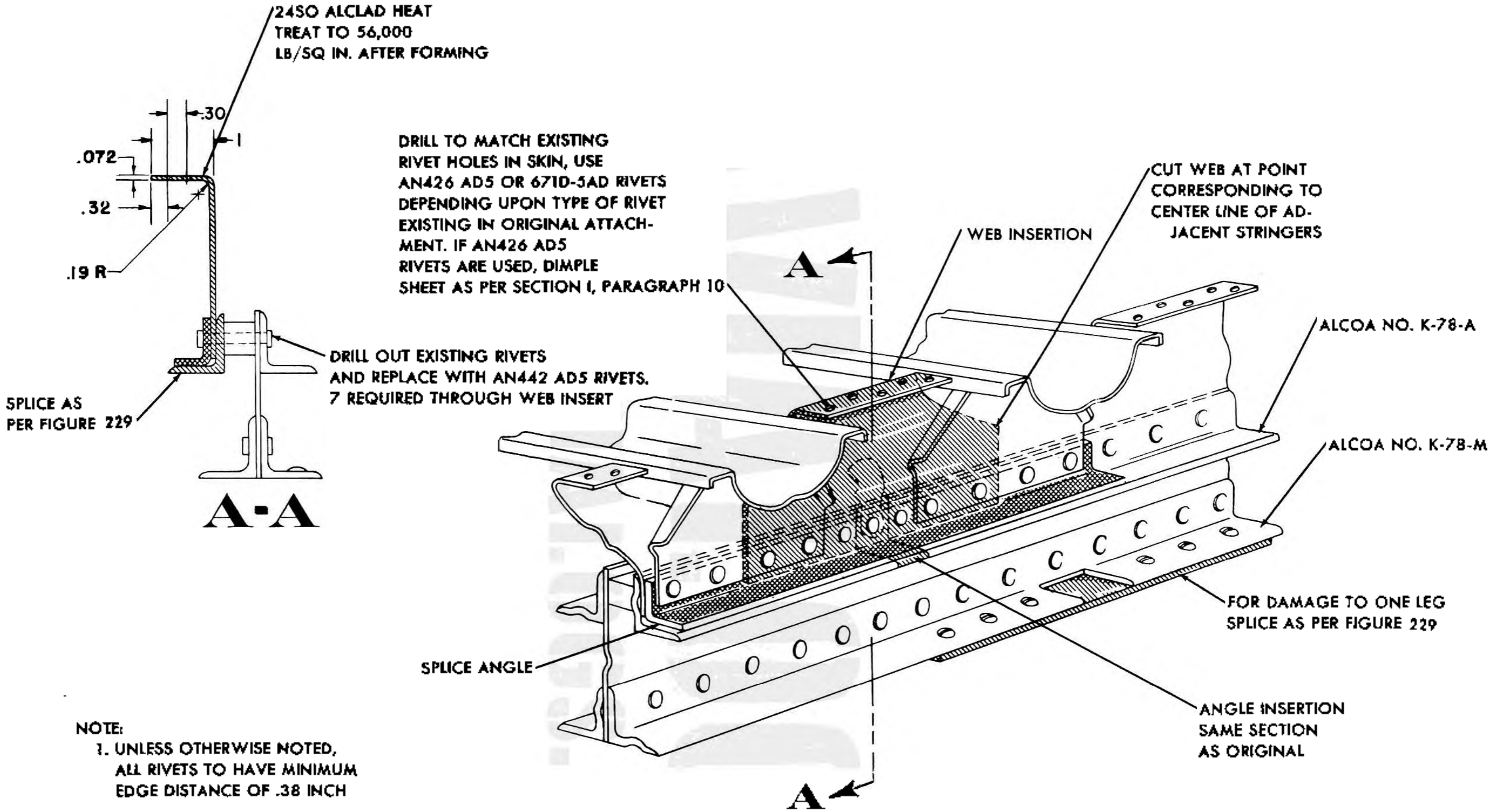
1. These ribs are used outboard of the tank ribs and start at station 142 (inches from the inboard end of the outer panel). See figure 144.

2. Rib 142 has a full web with no holes in it and capstrips of Alcoa K77 type extrusion whose



REFERENCE: SECTION V, PARAGRAPH 2d(2)(c)

FIGURE 136—CENTER PANEL RIB WEB SHOWING INSERT



NOTE:
1. UNLESS OTHERWISE NOTED, ALL RIVETS TO HAVE MINIMUM EDGE DISTANCE OF .38 INCH

FORWARD OF 30% SPAR STATION 132.5 AND 178.5

REFERENCE: SECTION V, PARAGRAPH 2d(2)(c)

FIGURE 137—CENTER PANEL RIB REPAIR—AUXILIARY WEB TO SKIN

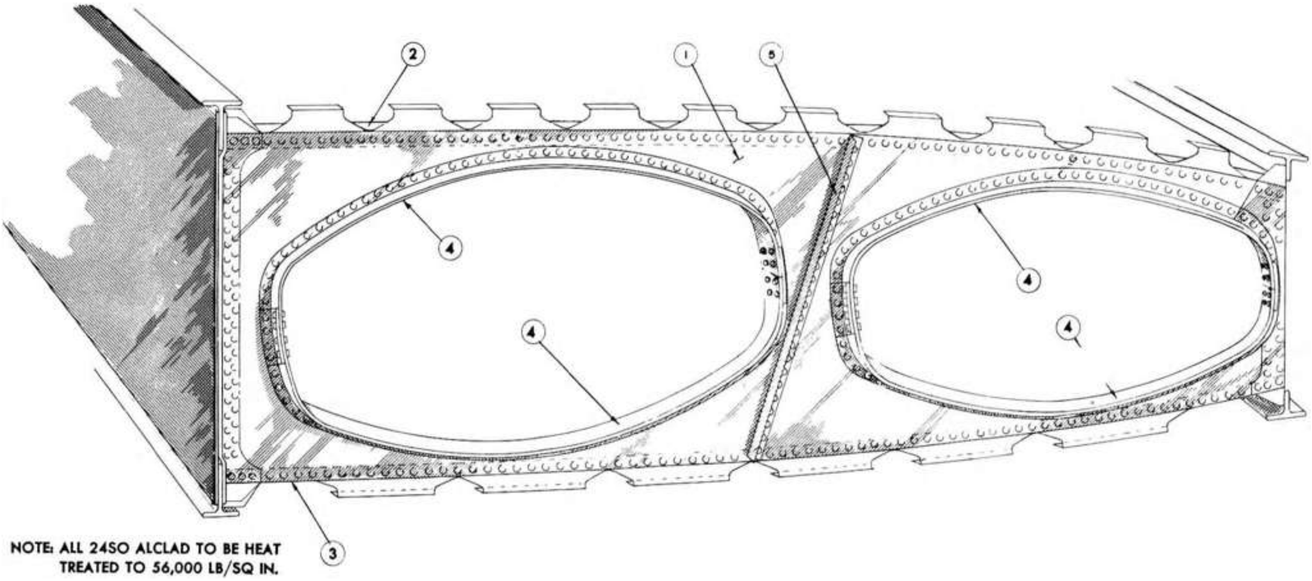
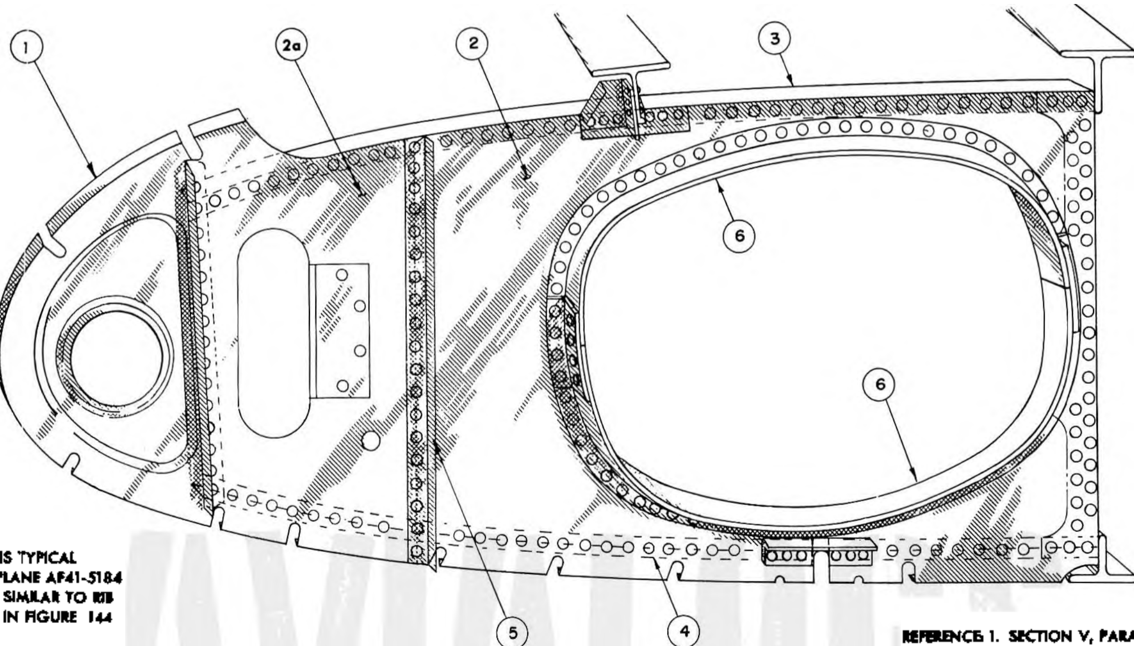


FIGURE 138 - 'ERMEDIATE TANK RIB STRUCTURE

TABLE 54
OUTER PANEL INTERMEDIATE TANK RIB—COMPONENT PARTS

	Item	*Station 22*	*Station 52*	*Station 82*	*Station 112*
1.	Web	.081	.040	.040	.081
2.	Upper Capstrip	K-77	K-77A	K-77A	K-77A
3.	Lower Capstrip	K-77S	K-78C	K-78C	K-78C
4.	Tank Support	K-1287	K-1287	K-1287	K-1287
5.	Stiffener	29388	29388	29388	29388

NOTE: Extrusions are designated by Alcoa die number.



NOTE:
THIS RIB IS TYPICAL
FOR AIRPLANE AF41-5184
AND UP. SIMILAR TO RIB
SHOWN IN FIGURE 144

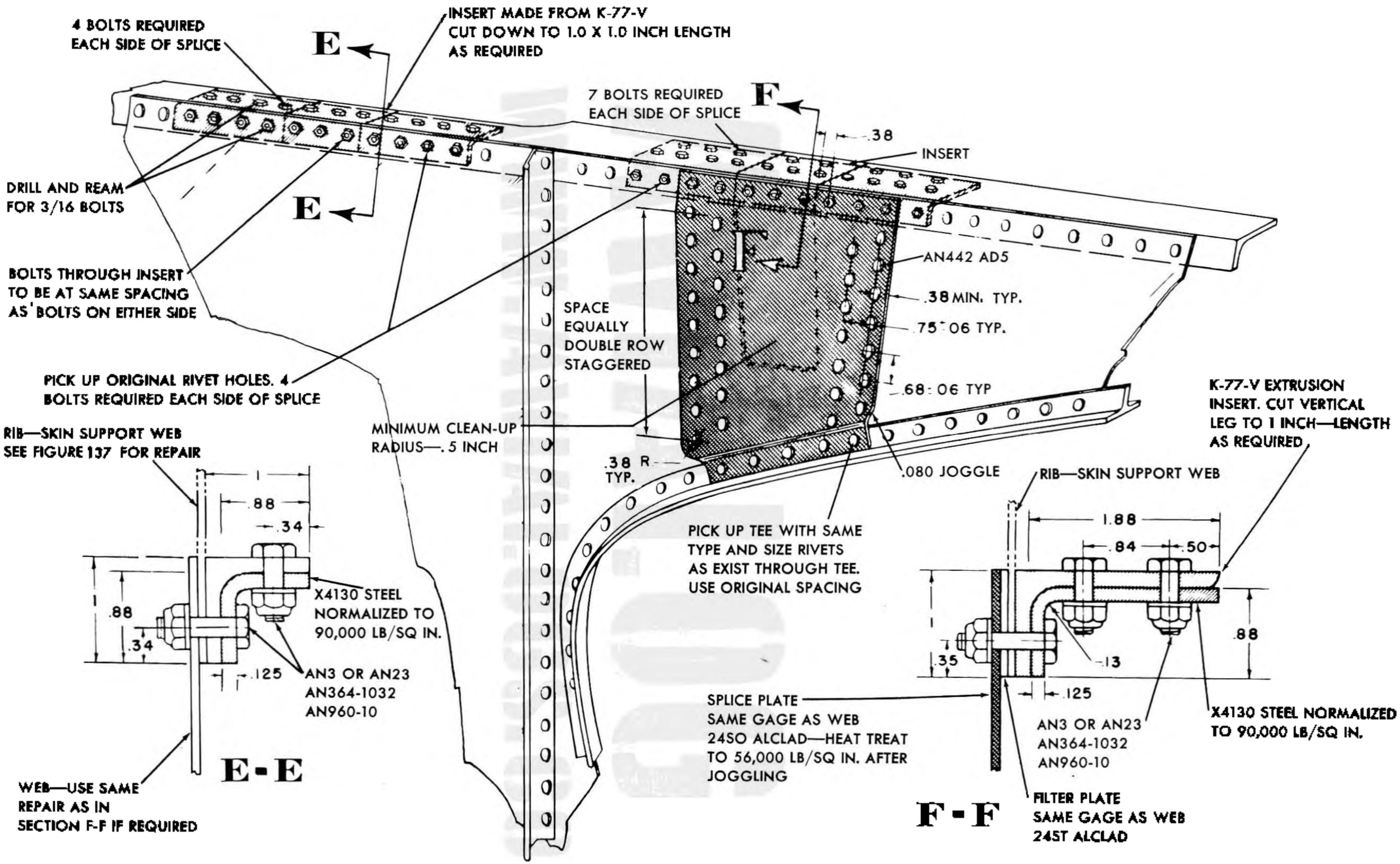
REFERENCE: 1. SECTION V, PARAGRAPH 2d
2. TABLE 55

FIGURE 139—NOSE TANK RIB STRUCTURE

TABLE 55
OUTER PANEL NOSE TANK RIB—COMPONENT PARTS

Item	*Part*	*Station 22*	*Station 52*	*Station 82*	*Station 112*
1	Web	.032	.032	.032	.032
2	Web	.032	.032	.032	.064
2a	Web				.032
3	Upper Cap	K-77A	K-77A	K-77A	K-77A
4	Lower Cap	K-78C	K-78C	K-78C	K-78C
5	Stiffener	29388	29388	29388	29388
6	Tank Support	K-1287	K-1287	K-1287	K-1287

NOTES: Extrusions are designated by Alcoa die number. At all stations except 112, web 2 extends forward to web 1.



NOTE:
MINIMUM DEPTH OF WEB IN WHICH SPLICE MAY BE MADE IS 3 INCHES. IF DAMAGE OCCURS IN SHALLOWER REGION, INSERT NEW SECTION OF WEB AND SPLICE WITH DOUBLE ROW OF RIVETS AS SHOWN.
ALL EDGE DISTANCES ON RIVETS OR BOLTS TO BE .38 INCH MINIMUM. DRILL AND REAM FOR BOLTS AS PER TABLE 3.

REPAIRS SHOWN FOR STATION 22
OTHER RIBS SIMILAR

REFERENCE: SECTION V, PARAGRAPH 2d(3)

FIGURE 140—REPAIR TO TANK RIBS—UPPER

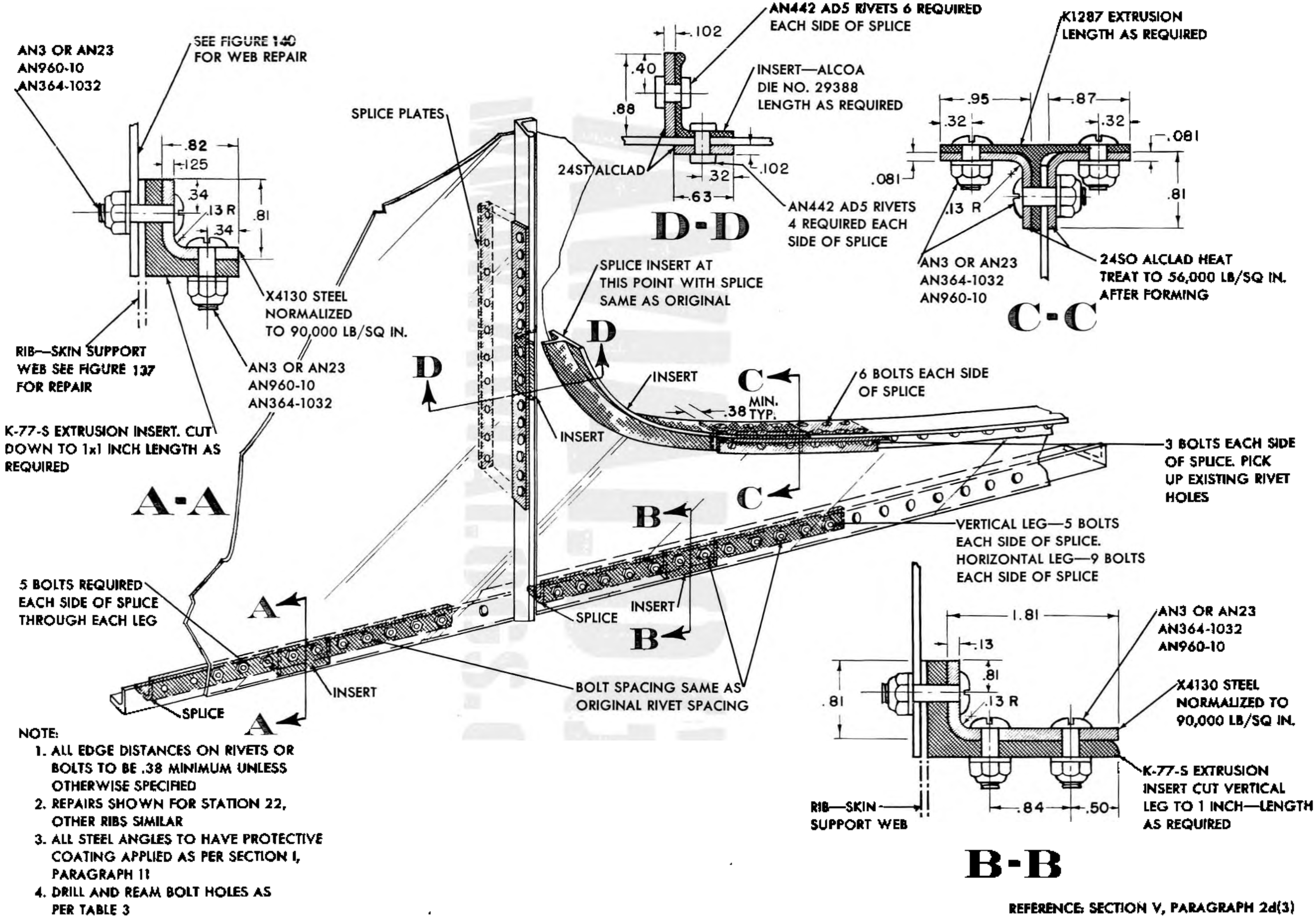
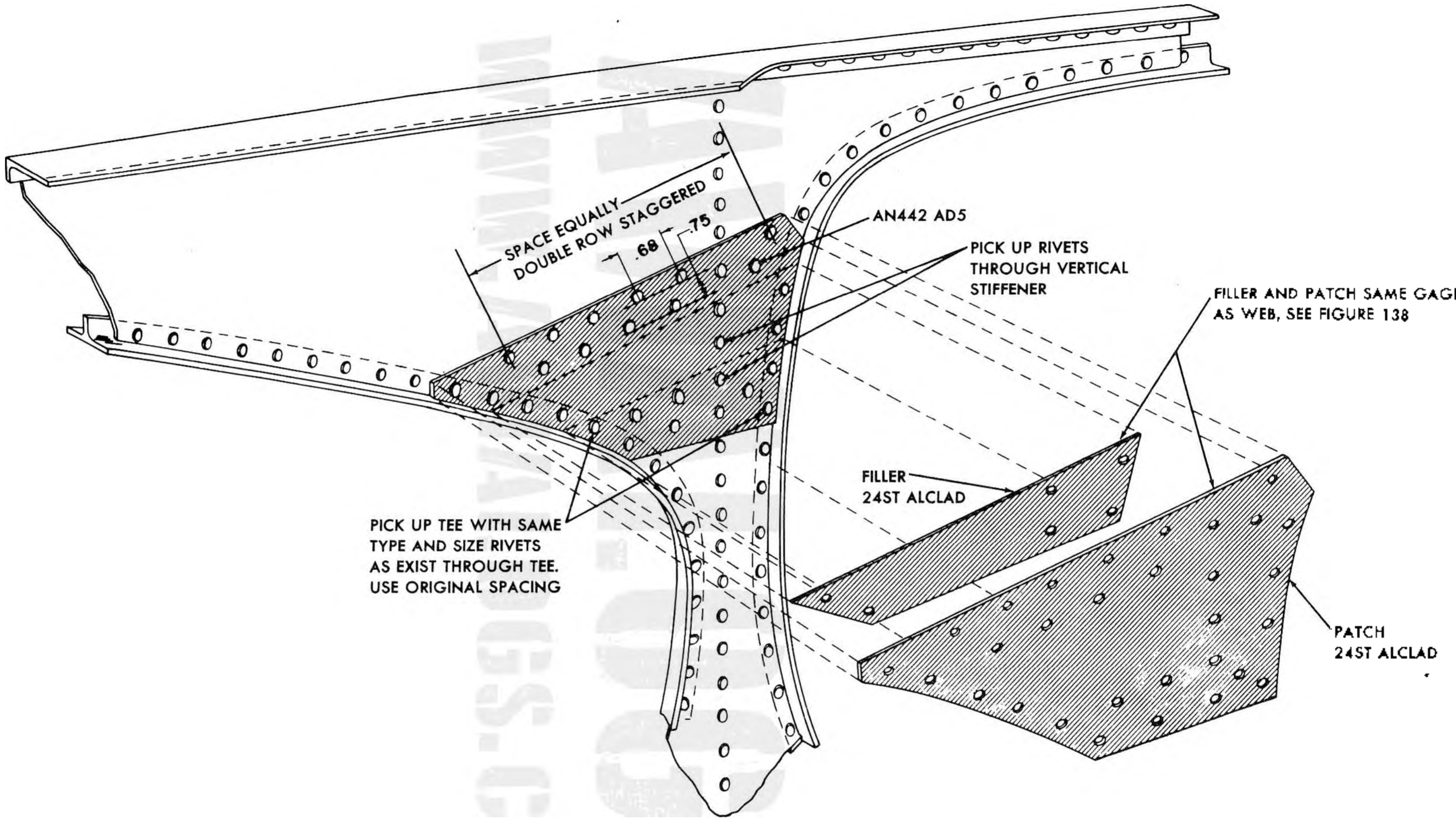
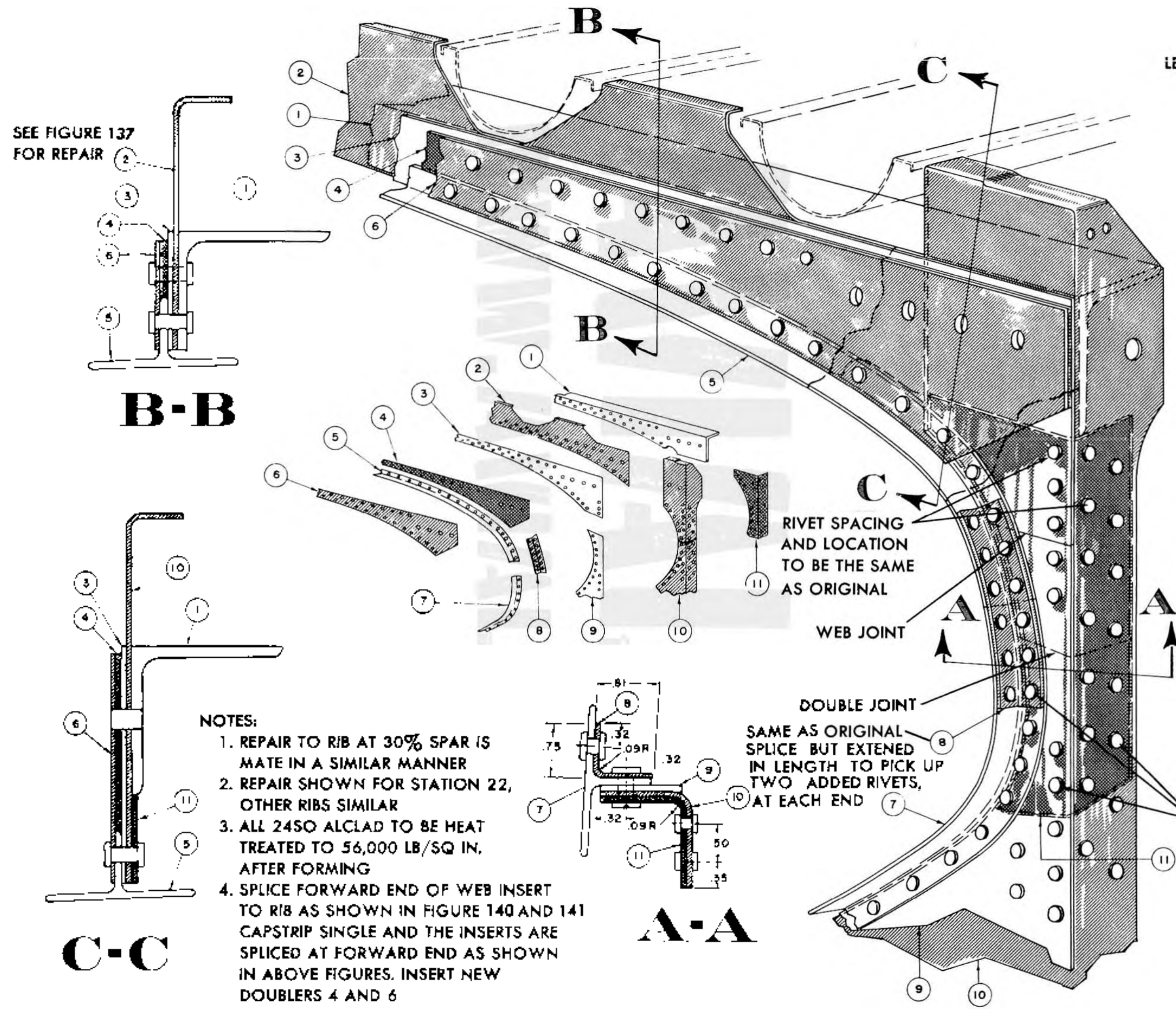


FIGURE 141—REPAIR TO TANK RIBS—LOWER



REFERENCE: SECTION V, PARAGRAPH 2d(3)

FIGURE 142—REPAIR TO TANK RIBS—HORIZONTAL SPLICE



LEGEND:

1. CAPSTRIP ANGLE INSERTION. MAKE FROM K77V
2. RIB SKIN SUPPORT WEB. 24SO ALCLAD
3. WEB INSERT SAME GAGE AS RIB WEB. 24ST ALCLAD
4. DOUBLE FILLER PLATE. .094ST ALCLAD
5. TEE SECTION INSERT. ALCOA DIE NO. 1287
6. DOUBLER .064 24ST ALCLAD
7. TEE SECTION. ALCOA DIE NO. 1287. UNDAMAGED PORTION
8. TEE SECTION SPLICE .064 24SO ALCLAD
9. WEB—UNDAMAGED PORTION
10. DOUBLER AND DOUBLER INSERT .064 24SO ALCLAD
11. SPLICE ANGLE .064 24SO ALCLAD

NOTES:

1. REPAIR TO RIB AT 30% SPAR IS MATE IN A SIMILAR MANNER
2. REPAIR SHOWN FOR STATION 22, OTHER RIBS SIMILAR
3. ALL 24SO ALCLAD TO BE HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
4. SPLICE FORWARD END OF WEB INSERT TO RIB AS SHOWN IN FIGURE 140 AND 141 CAPSTRIP SINGLE AND THE INSERTS ARE SPLICED AT FORWARD END AS SHOWN IN ABOVE FIGURES. INSERT NEW DOUBLERS 4 AND 6

REFERENCE: SEATION V, PARAGRAPH 2d(3)

FIGURE 143—REPAIR TO TANK RIBS—AFT END

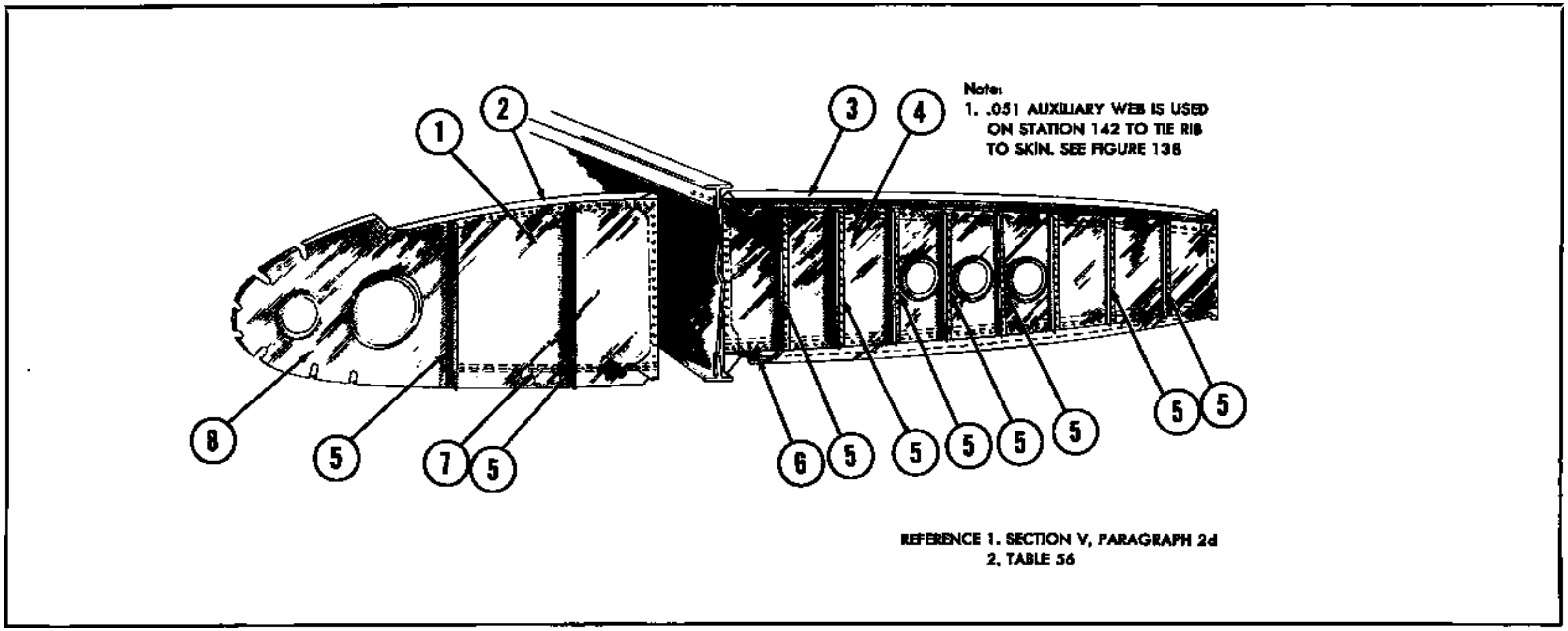


FIGURE 144—OUTER PANEL FLANGED WEB RIB STRUCTURE

TABLE 56
OUTER PANEL FLANGED WEB RIB—COMPONENT PARTS

Item	*Member*	*Station 142*	*Station 172*	*Station 202*	*Station 232*	*Station 262*	*Station 292*	*Station 322*	*Station 352*	*Station 382*
1	Web	.032	.032	.032	.032	.032	.032	.032	.032	.032
2	Upper Cap	29084	29084	29084	29084	29084	29084	29084	29084	29084
3	Upper Cap	K-77V	.032	.032	.032	.032	.032	.032	.032	.032
4	Web	.020	.020	.020	.020	.020	.020	.020	.020	.032
5	Stiffener	29099	29084	29084	29084	29084	29084	29084	29084	29084
6	Lower Cap	K-77S	.032	.032	.032	.032	.032	.032	.032	
7	Lower Cap	29084	29084	29084	29084	29084	29084	29084	29084	29084
8	Web	.032	.032	.032	.032	.032	.032	.032	.032	.032

NOTE: Extrusions are designated by Alcoa die numbers.

legs are machined off in steps. Deep .051 inch flanges tie the rib to the wing skin between stringers. The rib web is stiffened by vertical bulb angles.

3. Ribs 172 and 352 are built up with flat sheet webs with lightening holes, upper and lower bent up channel capstrips, and vertical bulb angle stiffeners.

4. Rib 382 has a flanged web with one lightening hole. Three bulb angles serve to stiffen the web.

5. Rib 412 is the end rib of the outer panel. Its flanges take gang channels to which the wing tip is bolted. This is the only rib whose main web extends to the wing skin.

6. Typical repairs given may be used on any of these ribs except as noted in the figures and below.

(*b*) NEGLIGIBLE DAMAGE.—Due to the type of loading on these ribs, the only negligible damage will be that occurring in the rib skin tie at station 142. Damage to the tie which, when cleaned up, is 1 inch or less in diameter and is a minimum of .38 inch from any edge, flange or rivet, need not be patched. Repair is similar to that in the center panel. (See figure 137.) Small isolated dents, free from cracks, abrasions and sharp corners may be neglected.

(*c*) DAMAGE REPAIRABLE BY PATCHING.

1. All web patches may be effected by a sheet of the same gage as the web, riveted with AN442AD4 or LS1127-5 rivets. If the damage runs into the capstrip, the capstrip rivets should be carefully drilled out in the region of the patch and the holes used in setting up the new rivet pattern.

2. Damage to the bent up sheet channels may be repaired by nesting a new channel in the capstrip and using 7 AN442AD5 or 11 AN442AD4 rivets each side of splice. If the damage runs into the web, patch the web as in figure 156 and use a filler the thickness of the combined web and channel. Damage to the flange alone may be repaired by nesting an .032 x .5 x .63 inch angle on either side of the channel and riveting along the longer leg.

3. Damage occurring within 1 inch of the flange of rib station 382 should be patched with a bent up sheet nested within the rib. This sheet, which should extend a minimum of .63 inch beyond the cleaned up area, is riveted to the rib with AN442AD4 rivets as in figure 146.

4. Rib station 412 may be patched as shown in figures 147 and 148. Clean up damage and cut off gang channel allowing .75 inch minimum between center line of nut and end of channel. Individual anchor nut plates are located in the repaired region to line up with the wing tip attachment holes. The skin doubler is cut away on either side of the damage far enough to allow seven rivets as indicated in the figures. The patch is so cut out that the web attachment will fall between the flanged holes. Relief holes (.19 inch radius) are drilled at the point where the patch is flanged. This flange should be in the same plane as the original rib flange and riveted to the skin and doubler with the same type and size rivets and spacing as is used through the .064 doubler on either side. Unless the patch is flanged around existing lightening holes, vertical stiffeners must be used, so placed that the center line of rivets lie along the vertical center line of the lightening holes. (See figure 159).

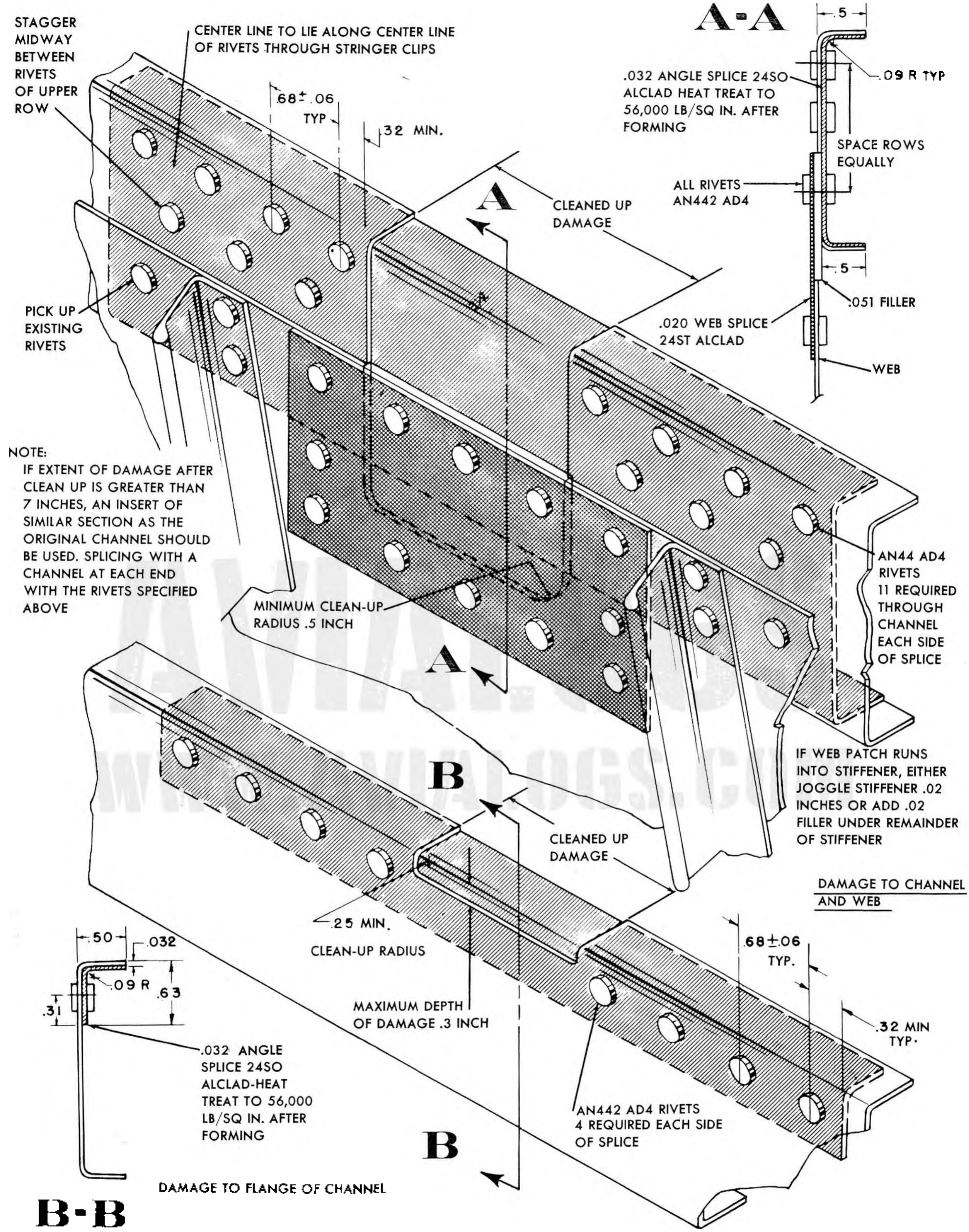
5. Rib station 142 has extruded angle capstrips which, in their full section, may be spliced as in figure 231. Damage which, when cleaned up, is localized in one leg only may be patched with steel or dural plates of the gage given in the above figure and whose width is the width of the angle. The leg widths vary from 2 inches to 1.5 inches to 1 inch. For the upper capstrip, seven, five and three bolts respectively should be used, depending on the width. These may be AN3 or AN23 bolts. For the lower capstrip, nine, seven, and five bolts respectively are used. These are of the same type as above.

(*d*) DAMAGE REPAIRABLE BY INSERTION.

1. Damage to webs which, when cleaned up, extend for 5 inches or more in length may be repaired by insertion with splice plates at each end. When the damage occurs in the region of lightening holes, the web should be cut away so that the splice may be made between holes. If a solid web replaces a lightening hole, add a vertical stiffener as shown in figure 149. Carefully drill out all existing rivets which interfere with the repair and use the resulting holes in arranging the new rivet pattern. If rivet holes are enlarged, see section I, paragraph 10. *i*. for procedure. Inserts and splices should be of the same gage as the damaged webs.

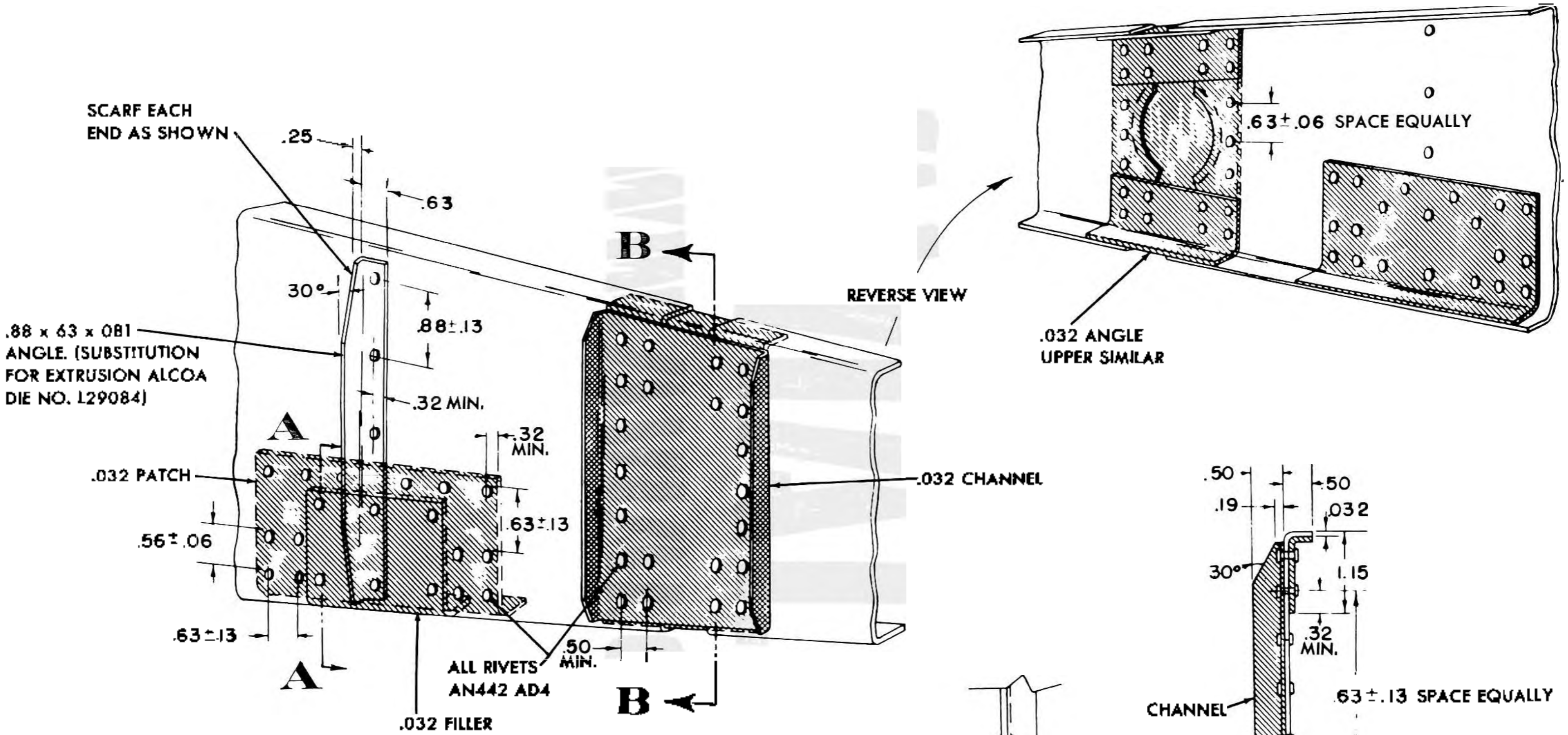
2. Stiffeners may be repaired by insertion as per figures 231 and 232.

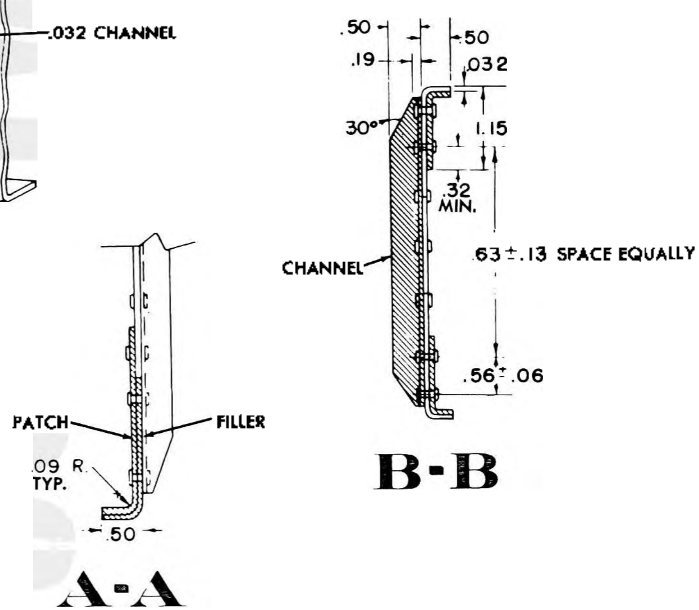
3. Channel type capstrips may be repaired by an insertion of the same cross-section as the



REFERENCE: SECTION V, PARAGRAPH 2d(4)

FIGURE 145—OUTER PANEL RIB—CHANNEL AND WEB REPAIR

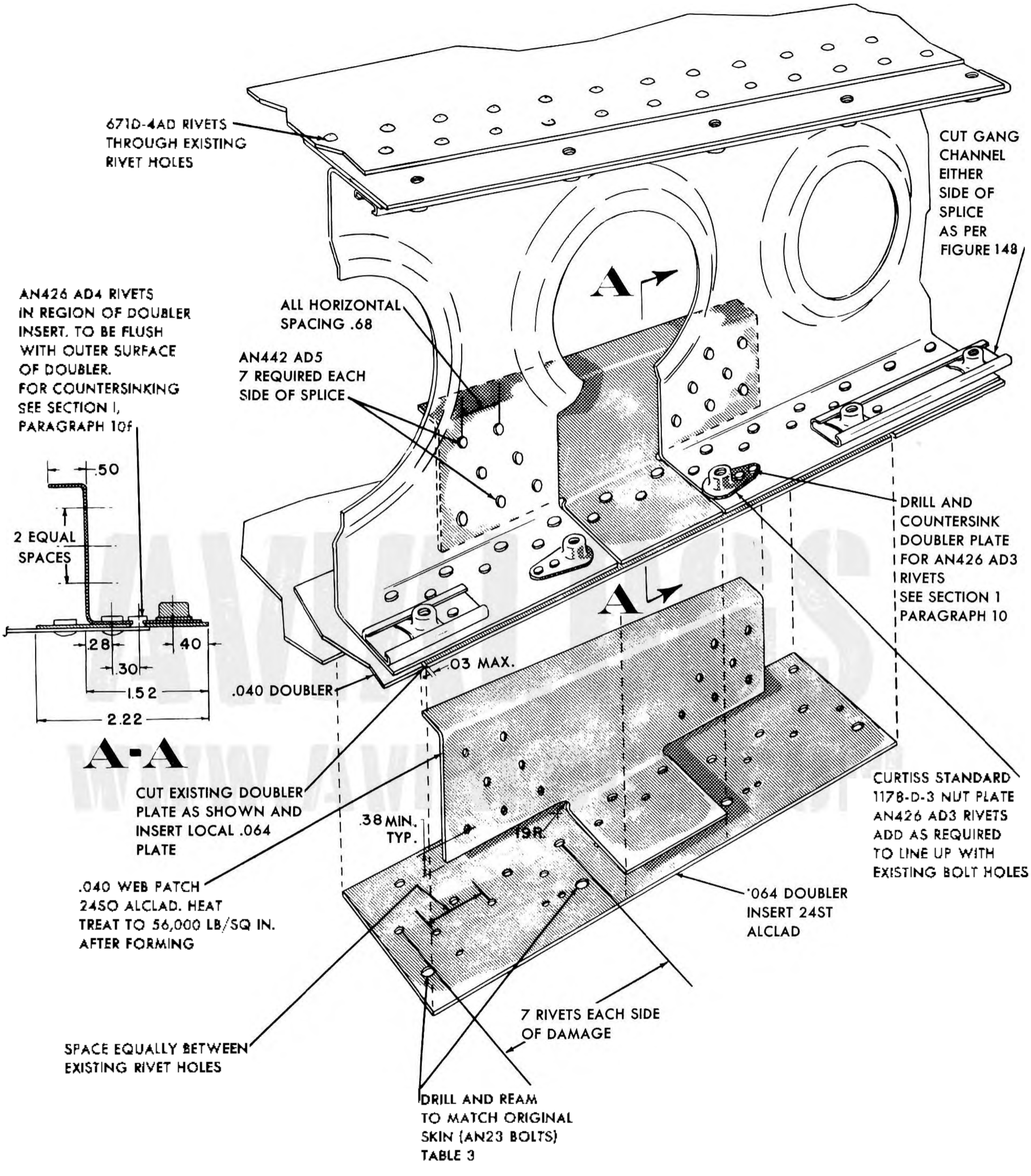




NOTES:
1. ALL RIVET EDGE DISTANCE .32 MINIMUM
2. ALL SHEET 24SO ALCLAD HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING
3. ALL BEND RADII TO BE .09

REFERENCE: SECTION V, PARAGRAPH 2d(4)

FIGURE 146—REPAIR TO OUTER PANEL RIB STA. 382



REFERENCE: SECTION V, PARAGRAPH 2d(4)

FIGURE 147—REPAIR TO OUTER PANEL RIB STA. 412 (PARTIAL DAMAGE)

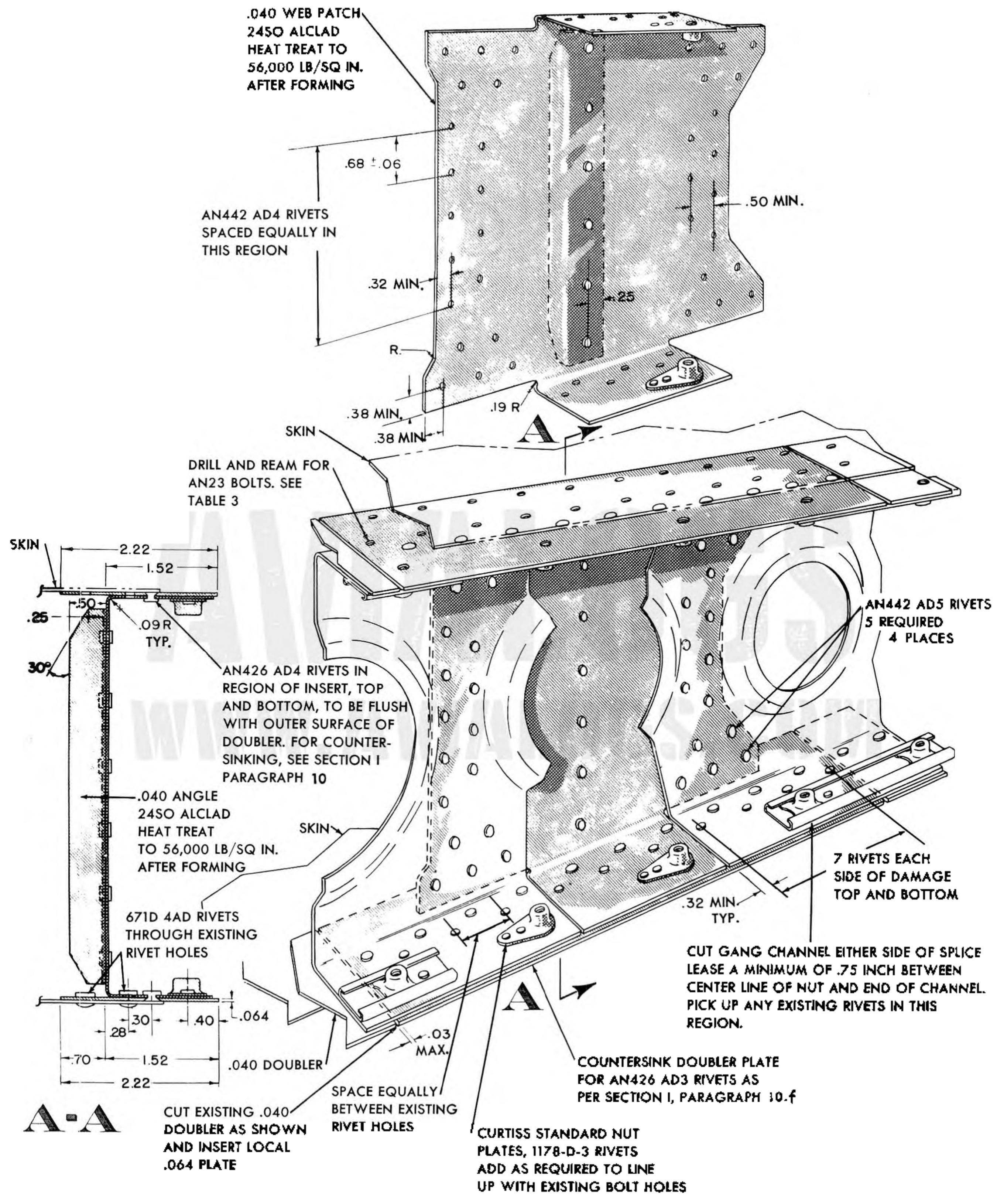
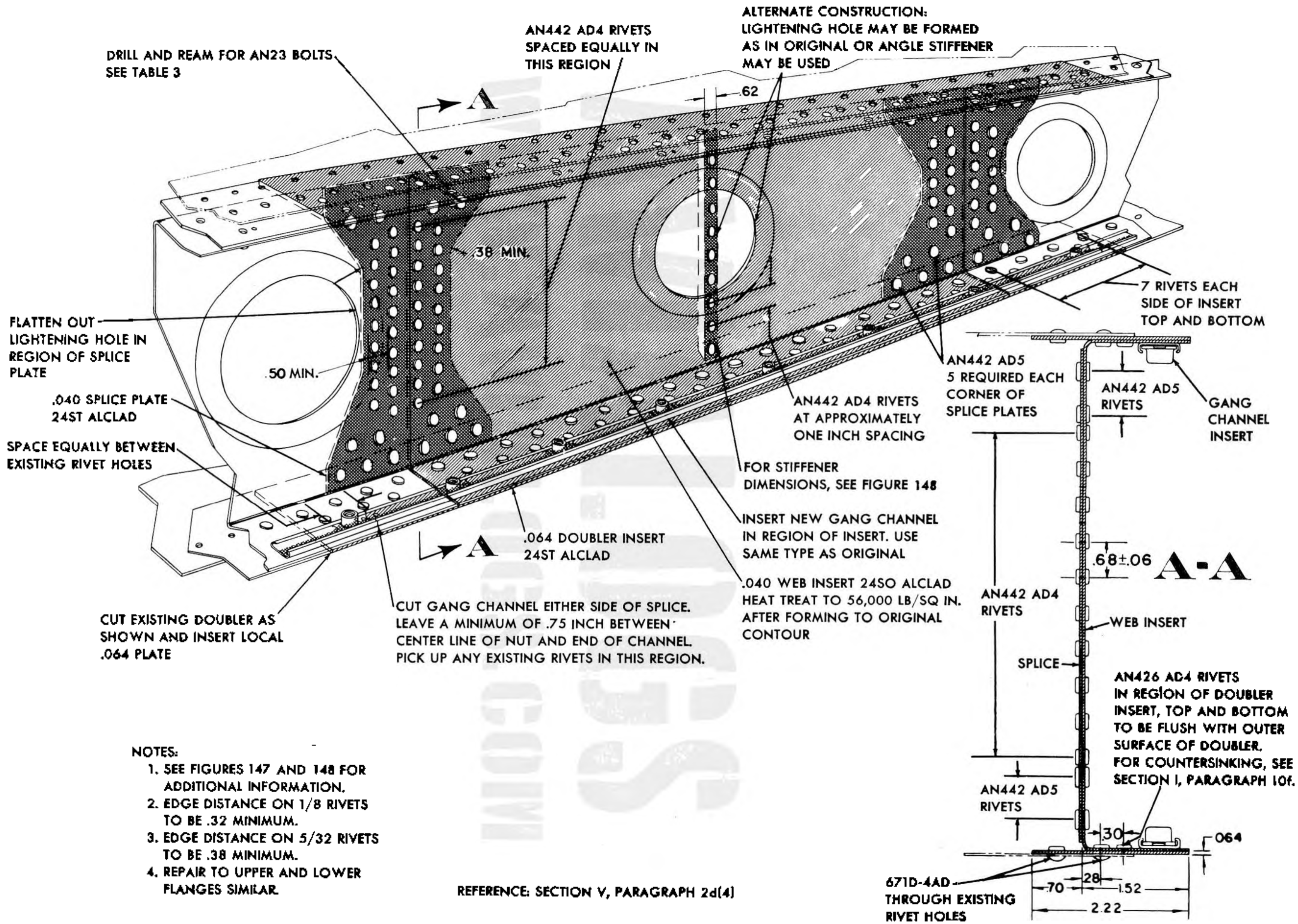


FIGURE 148—REPAIR TO OUTER PANEL RIB STATION 412—COMPLETE DAMAGE



NOTES:

1. SEE FIGURES 147 AND 148 FOR ADDITIONAL INFORMATION.
2. EDGE DISTANCE ON 1/8 RIVETS TO BE .32 MINIMUM.
3. EDGE DISTANCE ON 5/32 RIVETS TO BE .38 MINIMUM.
4. REPAIR TO UPPER AND LOWER FLANGES SIMILAR.

REFERENCE: SECTION V, PARAGRAPH 2d(4)

FIGURE 149—OUTER PANEL RIB STA. 412—INSERT

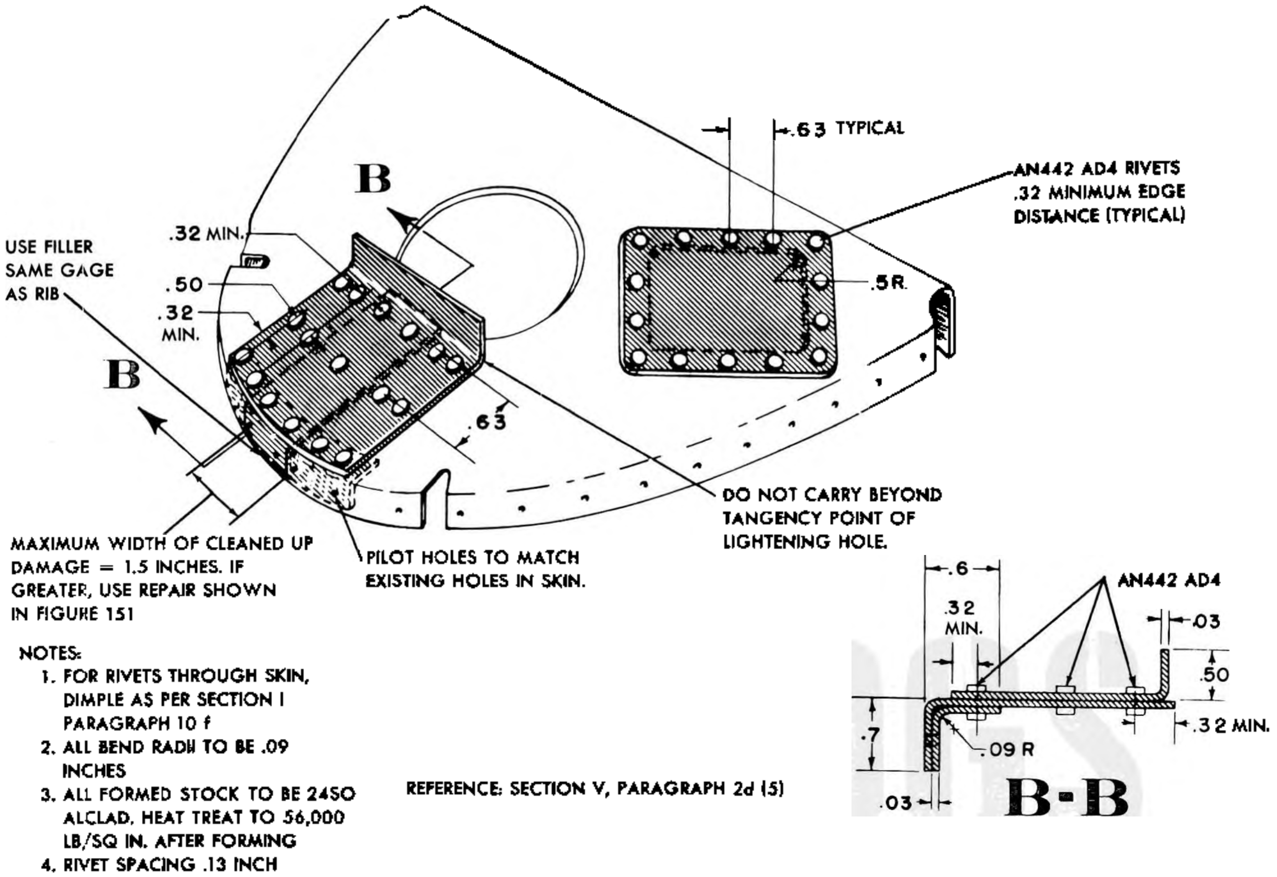


FIGURE 150—NOSE RIB REPAIR—DAMAGE FROM FLANGE TO LIGHTENING HOLE

original channel and the splice plates of the same gage channel section nested into the basic channel. Riveting is as per figure 145.

4. Extruded angle capstrips on rib station 142 should be repaired by insertion if the damage covers more than one leg. The length of splice and insert legs is determined from the angle size and the number of bolts is determined as under paragraph 2. *d.* (4) (*c*) of this section.

(*e*) DAMAGE REQUIRING REPLACEMENT.

1. All vertical stiffeners should be replaced if the material is available.

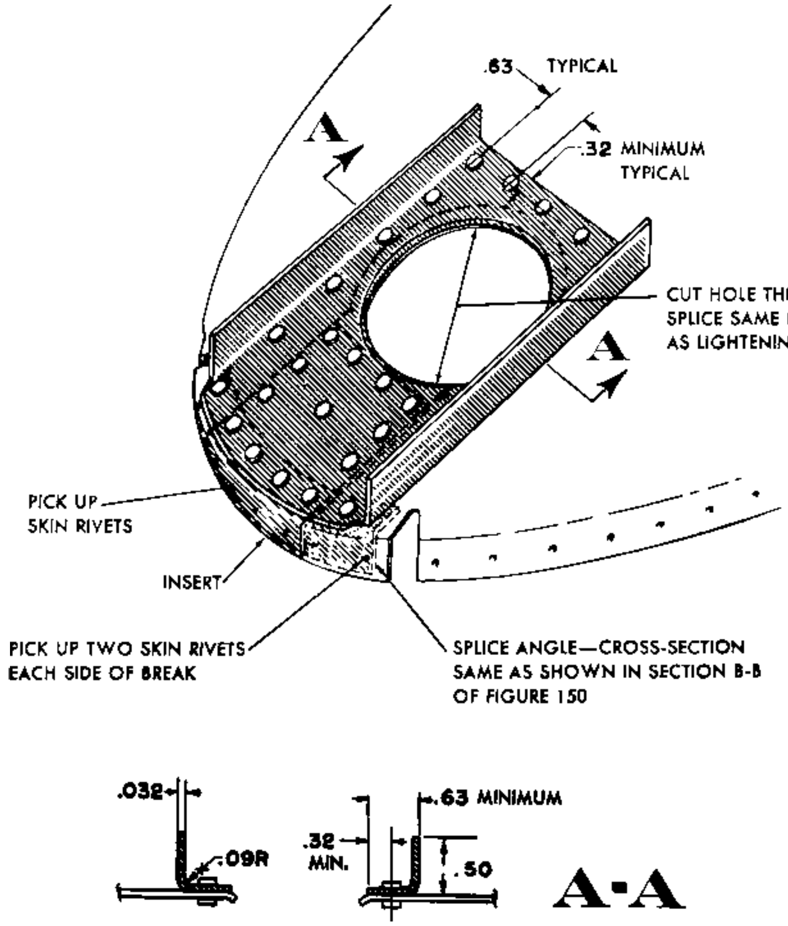
2. Ribs and capstrips that are extensively damaged may be replaced.

3. All fittings, clips, etc. are to be replaced.

(5) NOSE RIBS.

(*a*) GENERAL.

1. The nose ribs of the center and outer panel are of the press formed type with lightening holes and beads. The center panel nose ribs are essentially skin stiffeners, there being no tie to the web of the front beam. Outer panel nose ribs are of two types of construction. Air Force Nos. 41-5159 to 41-5183 have ribs extending from the 30 percent spar forward, whereas all subsequent ships have these ribs divided into two parts: One section from the 30 percent spar forward to the de-icer tee, and one from the de-icer tee forward. The type of construction is similar for all these ribs, therefore, the repairs in figures 150 and 151 are typical.



NOTES:
1. FOR RIVETS THROUGH SKIN, DIMPLE AS PER SECTION I PARAGRAPH 10 f
2. ALL BEND RADII TO BE .09 INCHES
3. ALL FORMED STOCK TO BE 24SO ALCLAD. HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING
4. RIVET SPACING .13 INCH

REFERENCE: SECTION V PARAGRAPH 2 d (5)

FIGURE 151—NOSE RIB REPAIR—DAMAGE FROM FLANGE THROUGH LIGHTENING HOLE

2. Lightening holes which do not carry conduits may be covered with a sheet of the same gage as the rib, provided a vertical stiffener is attached to the plate in such a manner that the rivet line coincides with the vertical center line of the hole.

3. Beads may be either flattened out with a mallet and block of wood or may be repaired on the surface opposite to the bead.

4. All riveting through the skin should be countersunk. Refer to section I, paragraph 10.*f*.(2) for information on dimpling and machine counter-sinking. Access may be had through the many doors in the nose sections.

(*b*) NEGLIGIBLE DAMAGE.

1. Dents free from cracks, abrasions and sharp corners may be neglected. These dents should be restored to shape to prevent their developing into cracks, using care, however, not to stretch or crank the sheet in the process. Inspect all rivets near the damage to see that they have not been loosened or sheared, or the holes elongated.

2. Holes and cracks which can be cleaned up to a 1 inch circle may be neglected, providing the edge of the hole is at least .75 inches from the nearest flange or rivet, and 1 inch from any edge or stringer cut-out. Such holes should be a minimum of 4 inches apart between centers.

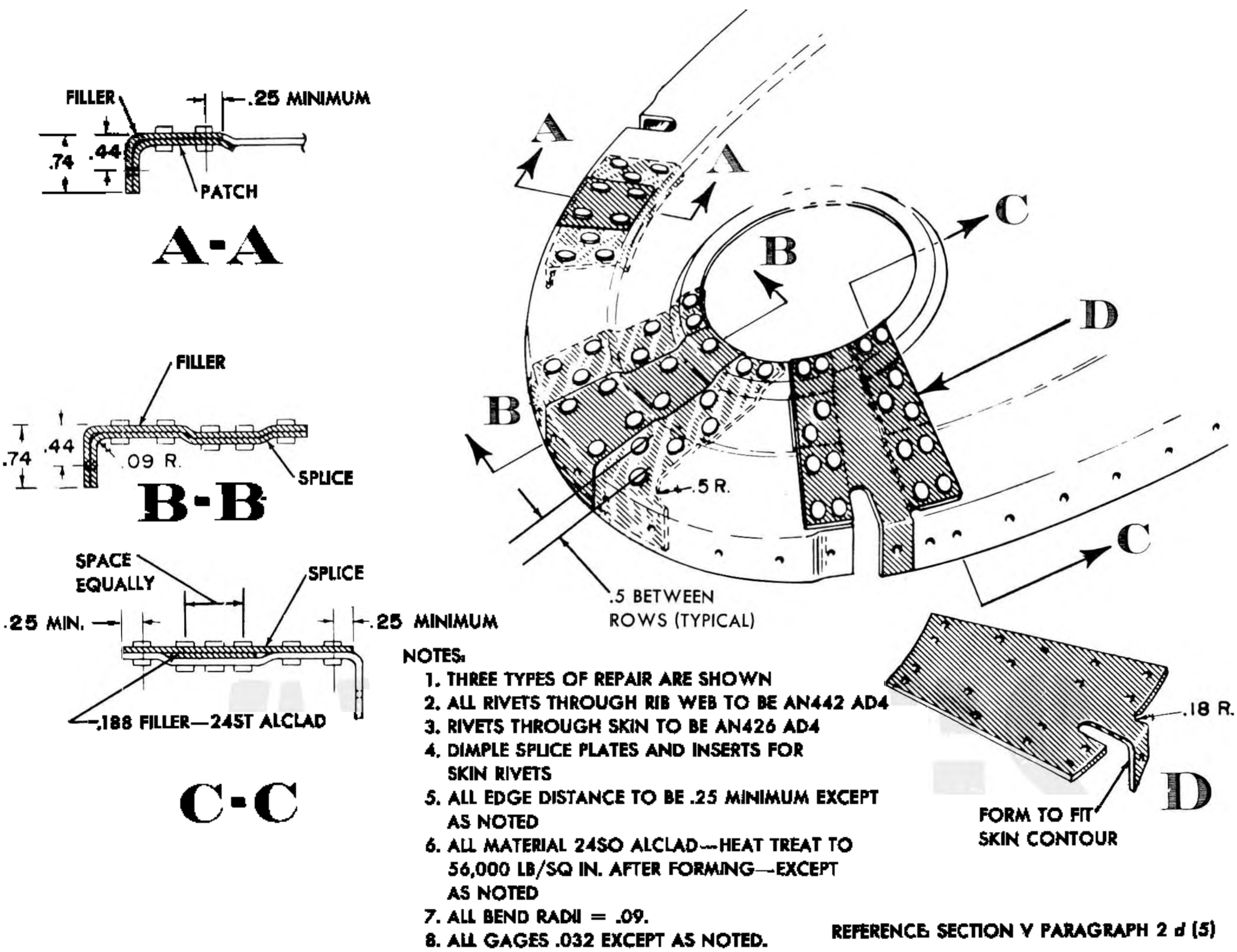


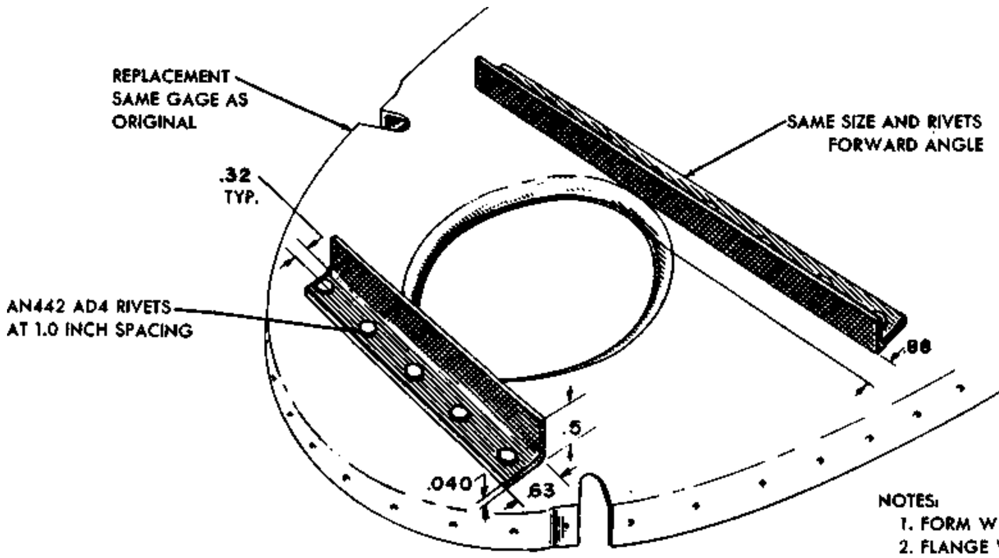
FIGURE 152—NOSE RIB REPAIR—FORMED WEB TYPE

(c) DAMAGE REPAIRABLE BY PATCHING.

1. Damage occurring between a lightening hole and the leading edge may be repaired as in figure 150. The damage is cleaned up maintaining .5 inch corner radii and the rivets through the skin in the region of the patch carefully drilled out. The patch is formed of the same gage sheet as the rib and scalloped in the same manner as the original rib. If the break is horizontal and, when cleaned up, is a maximum of 1.5 inches wide, a vertical .5 inch flange is turned up at the edge of the hole as in figure 150. Any other break may be repaired as shown in figure 151. The sheet is cut out around the hole if it is necessary to maintain an opening for conduits, etc. and flanged horizontally above and below the hole. AN442AD4 rivets are used through the web and AN-426 rivets through the skin. The patch may have a flanged hole formed in it to match the damaged hole in the rib. In this case, the flange discussed above is not required.

2. Damage to a rib between the upper or lower surface and a lightening hole may be repaired with a bent up sheet of the same gage as the rib. If the damaged area after cleaning up is more than .75 inch from a lightening hole, a flat plate flanged against the skin is used in patching; if the damaged area comes closer to the hole, the patch is turned up to form a .5 inch flange tangent to the hole. Damage running beyond the tangency point of the hole should be patched by a sheet that reaches to the other side and riveted as in figure 151. Fillers are used as necessary.

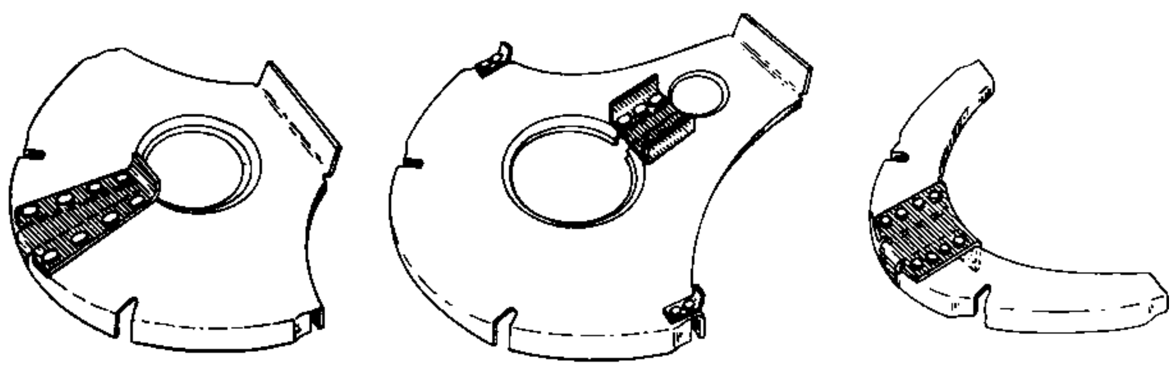
3. Damage which extends the full depth of the rib may be patched with a sheet whose flanges



NOTES:
1. FORM WEB TO CONTOUR OF WING
2. FLANGE WIDTH TO BE .75 INCHES
3. FORM LIGHTENING HOLE AS IN ORIGINAL RIB
4. ATTACH .040 ANGLES AS SHOWN
5. PICK UP ORIGINAL SKIN RIVETS
6. ALL PARTS TO BE OF 24SO ALCLAD HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING
7. ALL BEND RADII TO BE .09 INCHES

REFERENCE: SECTION V PARAGRAPH 2 *d* (5)

FIGURE 153—NOSE RIB—FORMED WEB TYPE REPLACEMENT



NOTES:
1. FOR RIVETS THROUGH SKIN, DIMPLE AS PER SECTION I PARAGRAPH 10 *f*
2. RIVETS, RIVET SPACING AND EDGE DISTANCE, GAGE OF MATERIAL AND FLANGE SIZES FOR REPAIR OF INTERMEDIATE RIBS SAME AS SHOWN ABOVE
3. ALL BEND RADII TO BE .09 INCHES
4. ALL FORMED STOCK TO BE 24SO ALCLAD—HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING
5. RIVET SPACING IS .63 ± .06 INCHES

FIGURE 154—REPAIR TO INTERMEDIATE NOSE RIBS

are the same width as the rib flange against the skin. Use a filler between the patch and the skin as necessary. The patch may have a flanged lightening hole to match that in the rib, or, if no hole is made, a formed angle is used. The line of rivets should lie along the vertical center line of the hole. Repairs will be similar to that for rib station 384. (See paragraph 2. *d.* (4) (c) *3.* of this section).

4. Damage to the one leg of any angle may be patched with a plate riveted on either side of the damage. See figure 232 for size of plate and number of rivets.

5. Leading edge ribs on the outer panel on airplanes numbered AF41-5184 and up, are repaired as in figure 152. The patch may either be bent to follow the contour of the rib or .188 inch filler plates may be used to build up the rib to a level surface.

6. Damage to beads may be patched with a sheet of the same gage as the web placed on the side opposite the bead with a line of rivets on either side of the bead. A half-inch vertical flange should be turned up on the sheet.

7. Intermediate nose ribs, figure 154, are repaired in a similar manner.

(*d*) DAMAGE REPAIRABLE BY INSERTION.

1. If the damage occurs near the point of attachment of the rib to another rib or to a spar, the region at the attachment should be cut away and a new section inserted. The insert is spliced to the rib with a sheet of the same gage, the riveting being the same as existed in the original attachment.

2. For any other damage which, when cleaned up, is 6 inches or more in length, an insert may be used, splicing each end with similar rivet patterns to that used in the above patches.

3. If the damage to an angle is greater than that specified in this section, paragraph 2. *d.* (5) (c) *4.*, repair as per figure 232.

(e) DAMAGE REQUIRING REPLACEMENT.

1. The nose ribs, especially those in the outer panel, are fairly small and may be replaced if the damage is extensive.

2. The outer panel leading edge ribs whose webs are pressed formed in two levels should be replaced when necessary with a flat web maintaining the necessary flanged lightening hole. Two vertical stiffeners are attached to the web on either side of hole with their outstanding leg .88 inch from the inside edge of the hole. The angle is .040 x .5 x .63 inch, the shorter leg being the outstanding one. Rivet the angle to the web with AN442AD4 rivets at 1 ± .1 inch spacing. (See figure 153.)

3. All angles are short and may be easily replaced. Figure 232 gives the various replacements.

4. All brackets, clips, etc. are to be replaced.

(6) TRAILING EDGE RIBS.

(*a*) GENERAL.

1. The trailing or closure ribs are those which extend from the 70 percent spar to the flaps or aileron. The aft contour of the rib is such as to fit the leading edges of the control surfaces. Some of these ribs have added stiffness built into them in the form of channels, doublers, etc.

2. There are a number of doors which make the interior of this region accessible for repair. These doors are fastened by screws and are easily removable.

3. All patches on the curved closure skin are to be placed on the inside of the skin to prevent any interference with the movable surfaces.

4. Aileron hinge supports occur on stations 172, 232, 275, 292, and 352 (outer panel). These ribs are strengthened by various combinations of channels, angles and doublers. The rib at station 275 is made up of two supports attached to the 70 percent spar at 8.65 inches either side of station 275 and converging at the aft end at the hinge. Figure 155 shows this rib and a typical aileron rib.

5. Flap closure ribs have stiffeners in the form of flared channel sections.

(*b*) NEGLIGIBLE DAMAGE.

1. Dents, free from cracks, abrasions, and sharp corners may be neglected. These dents should be restored to shape wherever possible to prevent their developing into cracks. Inspect all rivets near the damage to see that they have not been loosened or sheared.

2. Holes and cracks, which when cleaned up to a 1 inch diameter circle, may be considered negligible provided the edge of the hole is at least .75 inches from any flange cut-out or rivet.

(c) DAMAGE REPAIRABLE BY PATCHING.

1. Damage to flat of web may be repaired with a sheet of the same gage as the rib and riveted with AN442AD4 rivets .68 ± .06 inch spacing as per figure 156.

2. If web damage occurs in region of existing rivet holes or in region of a channel splice, the rivet pattern through the patch should include all other existing and added rivets.

3. Damage which comes closer to a flange than .75 inch is patched in the same manner as described above except that a flange should be turned up and riveted to the rib with three AN442AD4 rivets either side of the cleaned up area.

4. All damaged areas should be cleaned up with minimum corner radii of .5 inch.

5. Straight sections of channels may be patched by nesting a section of similar form and gage in the damaged portion. If the complete section is damaged, the patch should be a channel. If only a flange is damaged, patch with an angle of the same gage and same width of outstanding leg. Riveting for these patches is given in figures 229 and 230. It is necessary to read the explanation accompanying these figures to apply the results properly.

6. Damage to the flared region of the channels may be patched only if such damage occurs to the flanges alone and can be repaired by the use of an angle. Greater damage calls for replacement.

7. Damage around an unreinforced cut-out should be patched with a plate of the same gage as the rib. This plate has a similar hole in it. Riveting is as paragraph *1.* above, and overall dimensions 1 inch greater than the hole.

(*d*) DAMAGE REPAIRABLE BY INSERTION.

1. Damage to the aft end of the rib should be cleaned up by cutting off the damaged portion and splicing in a new trailing edge as shown in figure 156. The rib is cut off at a point through the rear stringer cut-out, and the splice plate is a sheet of the same gage as the rib with a single flange. The riveting is shown in the figure, the number of rivets in a line normal to the flange depends on the depth of the web. Always maintain the specified rivet spacing.

2. If the damage to the flared part of channels extends to the back, a new flared portion should be inserted and spliced to the remaining channel as in paragraph 2. *d.* (6) (*c*) *5.*. of this section.

3. Sections of the rib, which tie into the 70 percent spar or to any fittings, are to be repaired by insertion if damaged. The damaged portion is cut away maintaining .5 inch minimum corner radii. The insertion and splice plate are of the same gage as the rib and the riveting as per paragraph 2. *d.* (6) (*c*) *1.* of this section.

4. Angles over 10 inches in length may be repaired in accordance with figures 231 and 232.

(*e*) DAMAGE REQUIRING REPLACEMENT.

1. All clips, gussets, short bent up angles, and cut-out reinforcements are to be replaced if damaged.

2. Extruded angles may be replaced with the same type of extrusion or with the equivalent bent up section. (See figures 231 and 232.)

3. Channel sections which are not constant and which have cut-outs are best replaced.

4. All forgings to be replaced.

5. Since these ribs are relatively small, any extensive damage may most efficiently be taken care of by putting in a new rib.

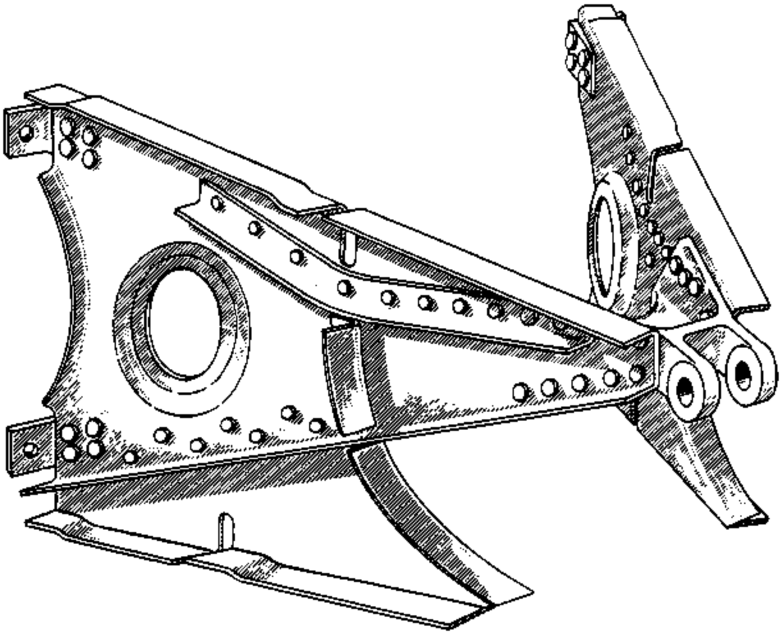
e. CENTER PANEL TO OUTER PANEL ATTACHMENT.

(1) GENERAL.—The two panels are attached by a row of bolts through heavy extruded angles running along the outer surface of the wing. These bolts are of the Allen head type, heat treated to 160,000 pounds per square inch.

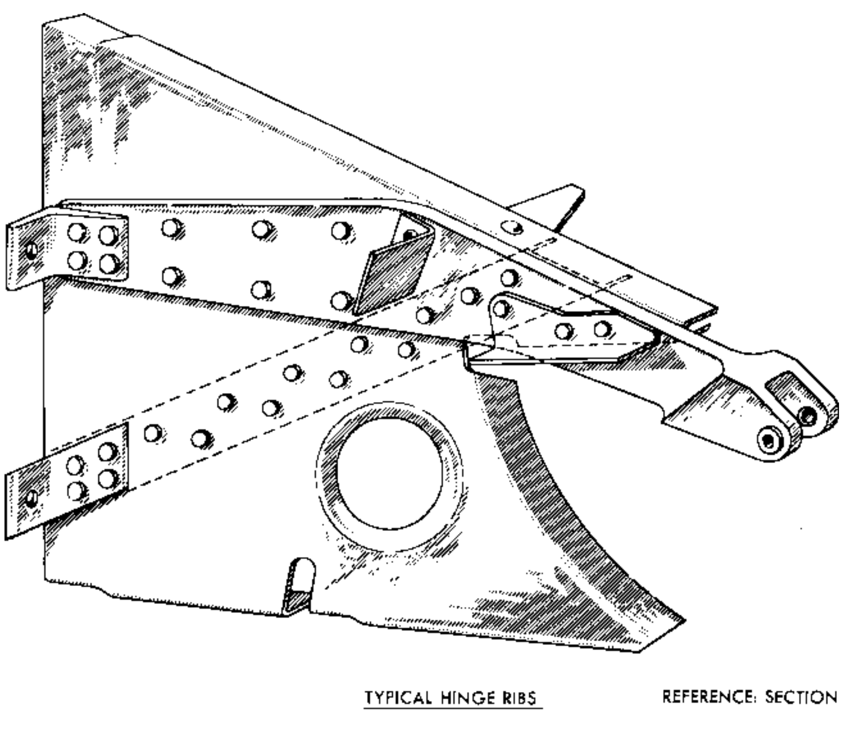
WARNING

THESE BOLTS ARE SPECIAL AND CARE MUST BE OBSERVED IN THEIR REPLACEMENT TO GET MATERIAL OF THE SAME HEAT TREAT.

(a) Large doublers tie the skin and stringers into the match angles. Since the structure is such that patching cannot be resorted to and splices can be used only on the skin, damaged members may be repaired only by insertion, with each insert overlapping the adjacent insert as in figure 157. This figure gives a complete repair to the surface assuming all the members in this region to be damaged. Figures 159 and 160 give the repair of the floating rib at



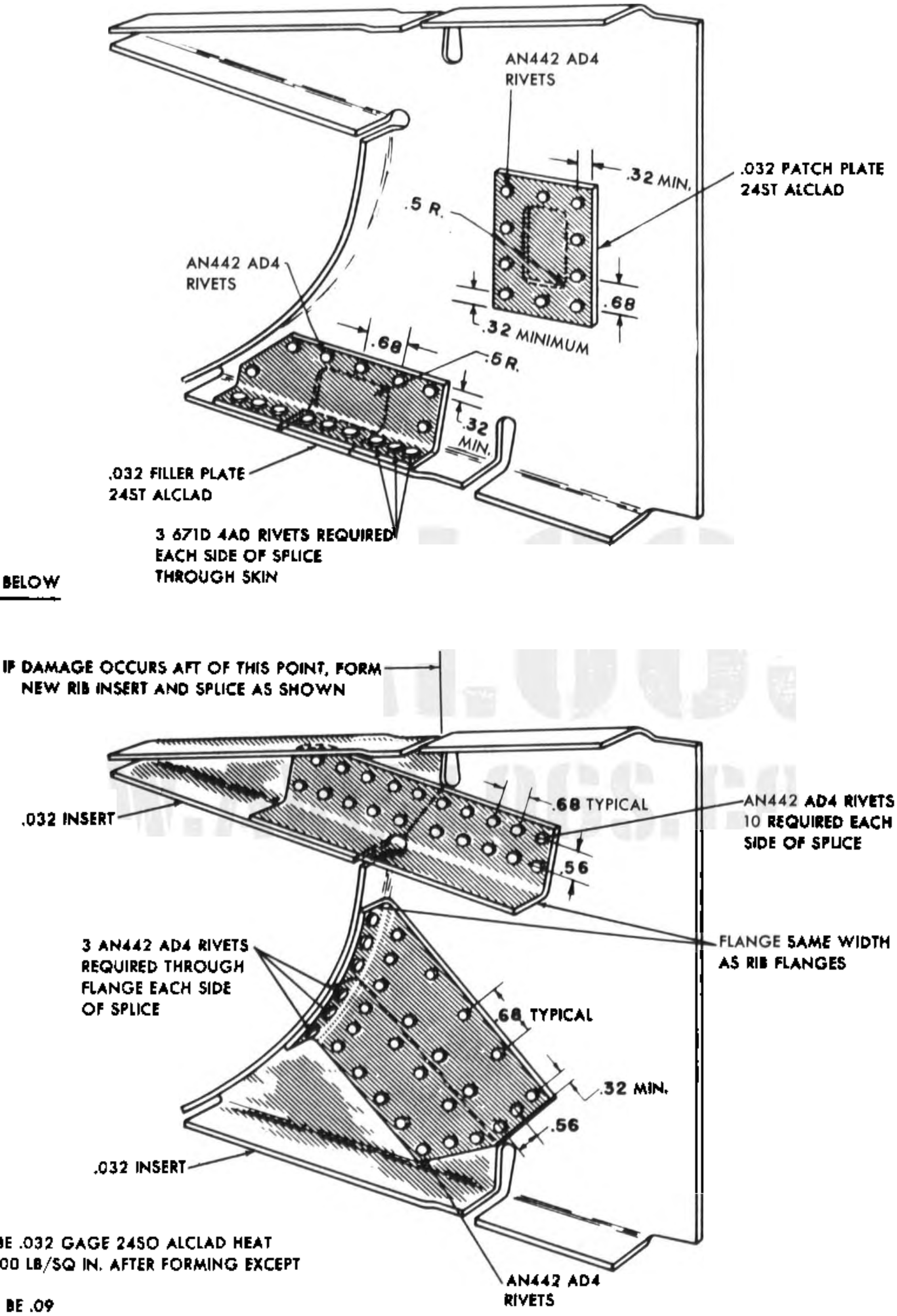
AILERON HINGE RIB STATION 275



TYPICAL HINGE RIBS

REFERENCE: SECTION V PARAGRAPH 2 d (6)

FIGURE 155—AILERON HINGE RIB STRUCTURE

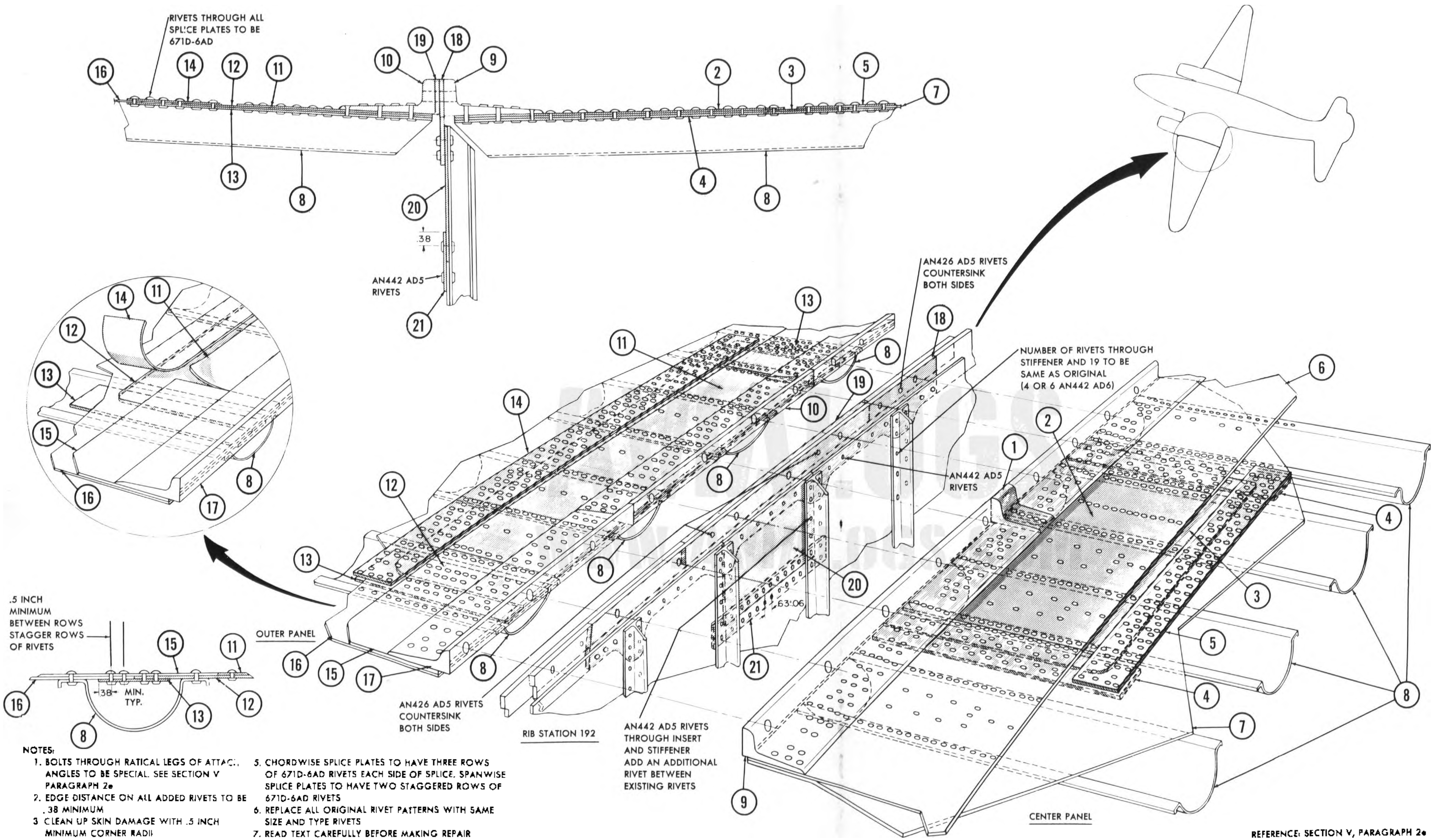


SEE NOTES BELOW

NOTES:
1. ALL SHEET TO BE .032 GAGE 24SO ALCLAD HEAT TREAT TO 56,000 LB/SQ IN. AFTER FORMING EXCEPT AS NOTED
2. BEND RADII TO BE .09
3. ALL RIVET EDGE DISTANCE = .32 MINIMUM
4. ALL RIVET SPACING .06 EXCEPT AS NOTED

REFERENCE: SECTION V PARAGRAPH 2 d (6)

FIGURE 156—REPAIR TO TRAILING EDGE RIBS



NOTES:

1. BOLTS THROUGH RATICAL LEGS OF ATTACH. ANGLES TO BE SPECIAL. SEE SECTION V PARAGRAPH 2e
2. EDGE DISTANCE ON ALL ADDED RIVETS TO BE .38 MINIMUM
3. CLEAN UP SKIN DAMAGE WITH .5 INCH MINIMUM CORNER RADII
4. SHIM 1 AND 10, FOR BUTT JOINTS
5. CHORDWISE SPLICE PLATES TO HAVE THREE ROWS OF 671D-6AD RIVETS EACH SIDE OF SPLICE. SPANWISE SPLICE PLATES TO HAVE TWO STAGGERED ROWS OF 671D-6AD RIVETS
6. REPLACE ALL ORIGINAL RIVET PATTERNS WITH SAME SIZE AND TYPE RIVETS
7. READ TEXT CAREFULLY BEFORE MAKING REPAIR

REFERENCE: SECTION V, PARAGRAPH 2e

FIGURE 157—CENTER PANEL—OUTER PANEL JUNCTION REPAIR (STA. 192)

LEGEND FOR FIGURE 157

1 Attach angle insert—make from original extrusion or machine from 24ST bar stock.

2 .051 Doubler insert—24ST Alclad. To extend a minimum of 3 inches beyond the ends of 1.

3 Skin insert—24ST Alclad. Same gage as skin being repaired. To extend a minimum of 2 inches beyond the doubler insert 2, the chordwise length being such that the splice occurs between stiffeners.

4 Spanwise splice plates for skin—24ST Alclad. Same gage as skin. Place on inner surface.

5 Chordwise splice plate for skin—24ST Alclad. Same gage as skin. Place on outer surface.

6 .051 wing skin doubler—24ST Alclad.

7 Wing skin—See figure 102 for gage.

8 Wing stringers—See figure 107 for repair.

9 Attach angle—Alcoa Die No. 29086 (for upper and lower surfaces).

10 Attach angle insert. See 1 above.

11 .051 Doubler insert—24ST Alclad. To extend same distance or greater than 2 above.

12 Skin insert—24ST Alclad. Same gage as skin being repaired. To extend a minimum of 2 inches beyond the doubler insert 11.

13 Spanwise splice plates for skin—24ST Alclad. Same gage as skin. Place on inner surface.

14 Chordwise splice plate for skin—24ST Alclad. Same gage as skin. Place on outer surface.

15 .051 Wing skin doubler—24ST Alclad.

16 Wing skin. See figures 103 and 104 for gage.

17 Attach angle—Alcoa Die No. 29576 (29575 for lower surface).

18 .156 Reinforcement insert—24ST Alclad. Rib Station 192. Pick up a minimum of 3 bolts each side of the angle insert 1.

19 .156 Skin insert—24ST Alclad. Rib Station 192. Pick up a minimum of 2 bolts each side of angle insert 1.

20 Rib web insert—24ST Alclad. Same gage as web (.032 in nose section and .036 in intermediate region—see figure 158). To extend each side of damage to pick up one row of rivets through the vertical web stiffeners.

21 .040 Web insert splice plate—24ST Alclad. Pick up one row of rivets through the insert and the web.

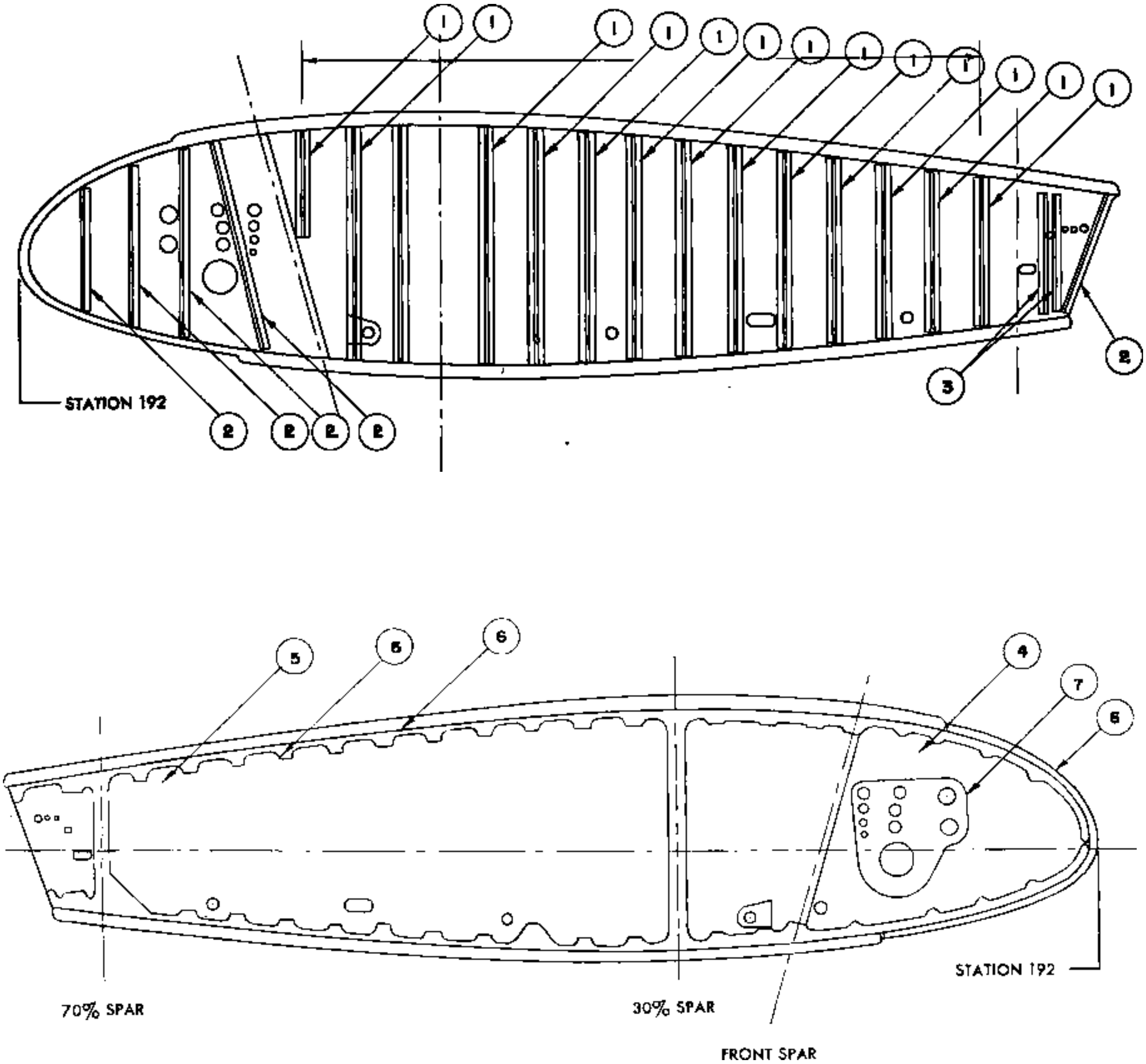


TABLE 57
1. ALCOA DIE NO. 29089
2. ALCOA DIE NO. 29083
3. ALCOA DIE NO. D-79-0
4. .032 WEB 24ST ALCLAD
5. .036 WEB 24ST ALCLAD
6. .156 CAPSTRIP 24ST ALCLAD
7. .040 REINFORCEMENT 24ST ALCLAD

REFERENCE: SECTION V, PARAGRAPH 2a(1)

FIGURE 158 — FLOATING RIB STRUCTURE

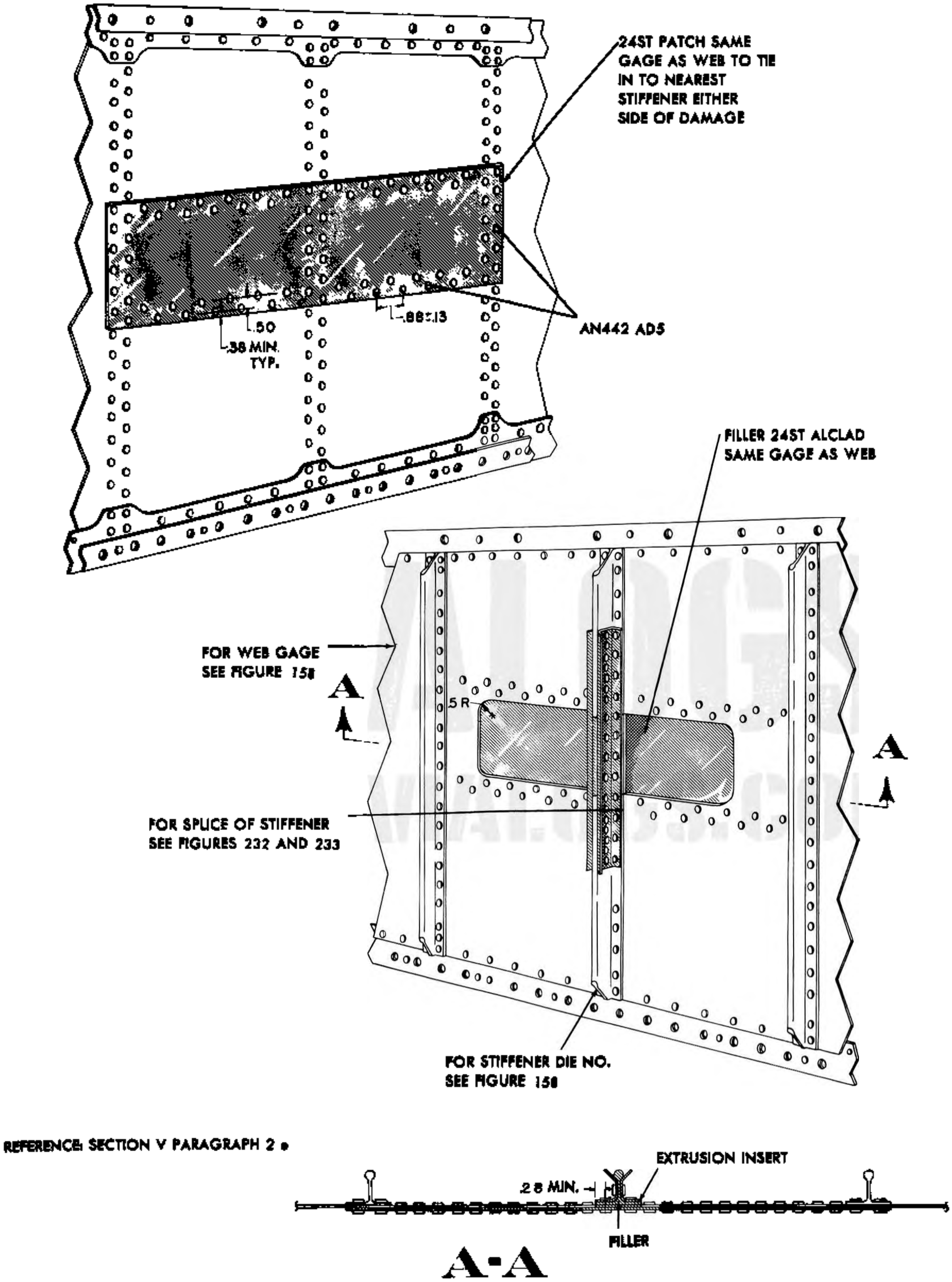
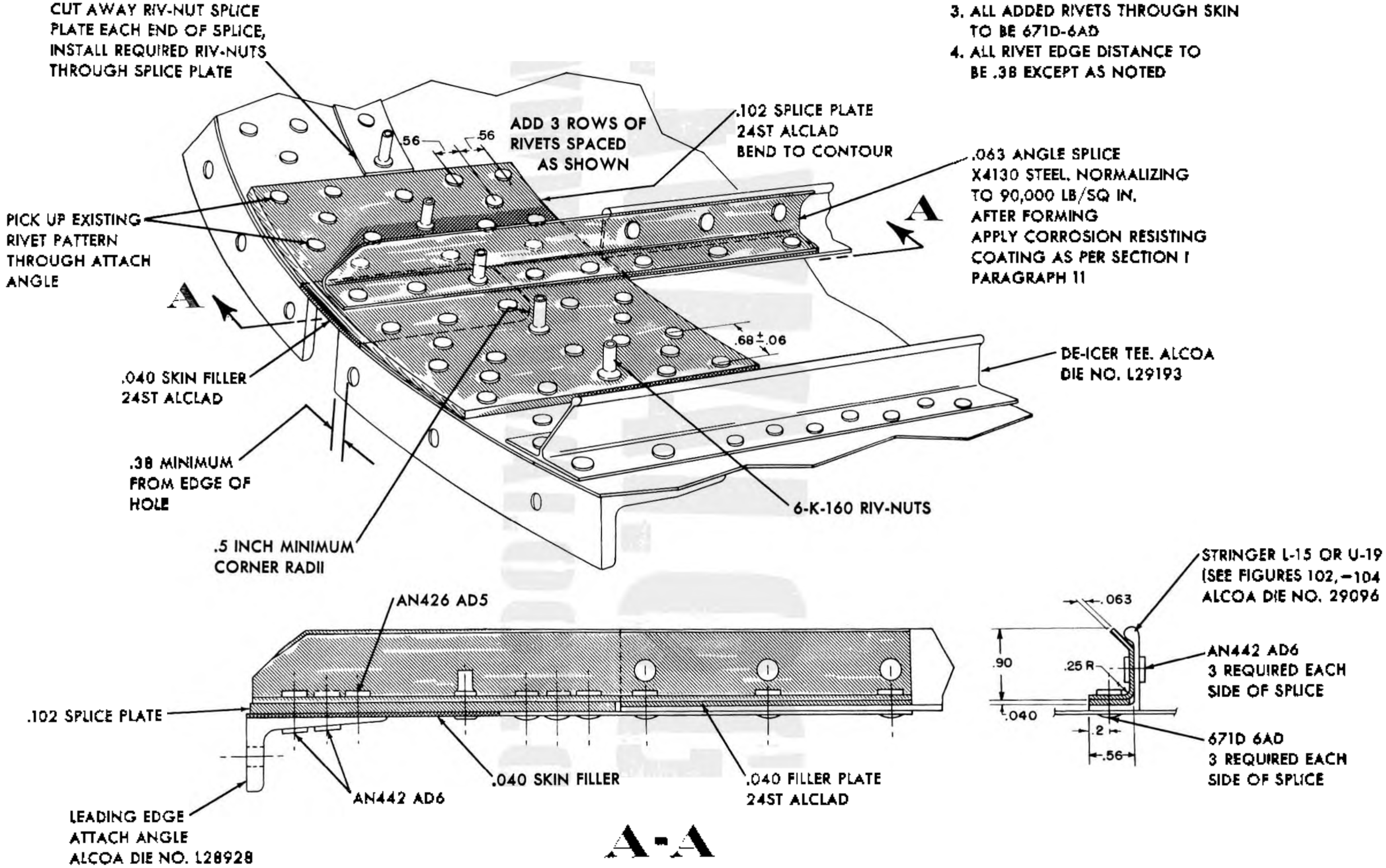


FIGURE 159—FLOATING RIB WEB REPAIR (STA. 192)

NOTES:
1. SPLICE AFT OF DE-ICER TEE TO BE SIMILAR TO EXISTING SPLICE
2. SPLICE SHOWN TO BE USED FORWARD OF DE-ICER FOR BOTH CENTER AND OUTER PANELS
3. ALL ADDED RIVETS THROUGH SKIN TO BE 671D-6AD
4. ALL RIVET EDGE DISTANCE TO BE .38 EXCEPT AS NOTED



REFERENCE: SECTION V PARAGRAPH 2 •

FIGURE 160—LEADING EDGE MATCH ANGLE REPAIR (STA. 192)

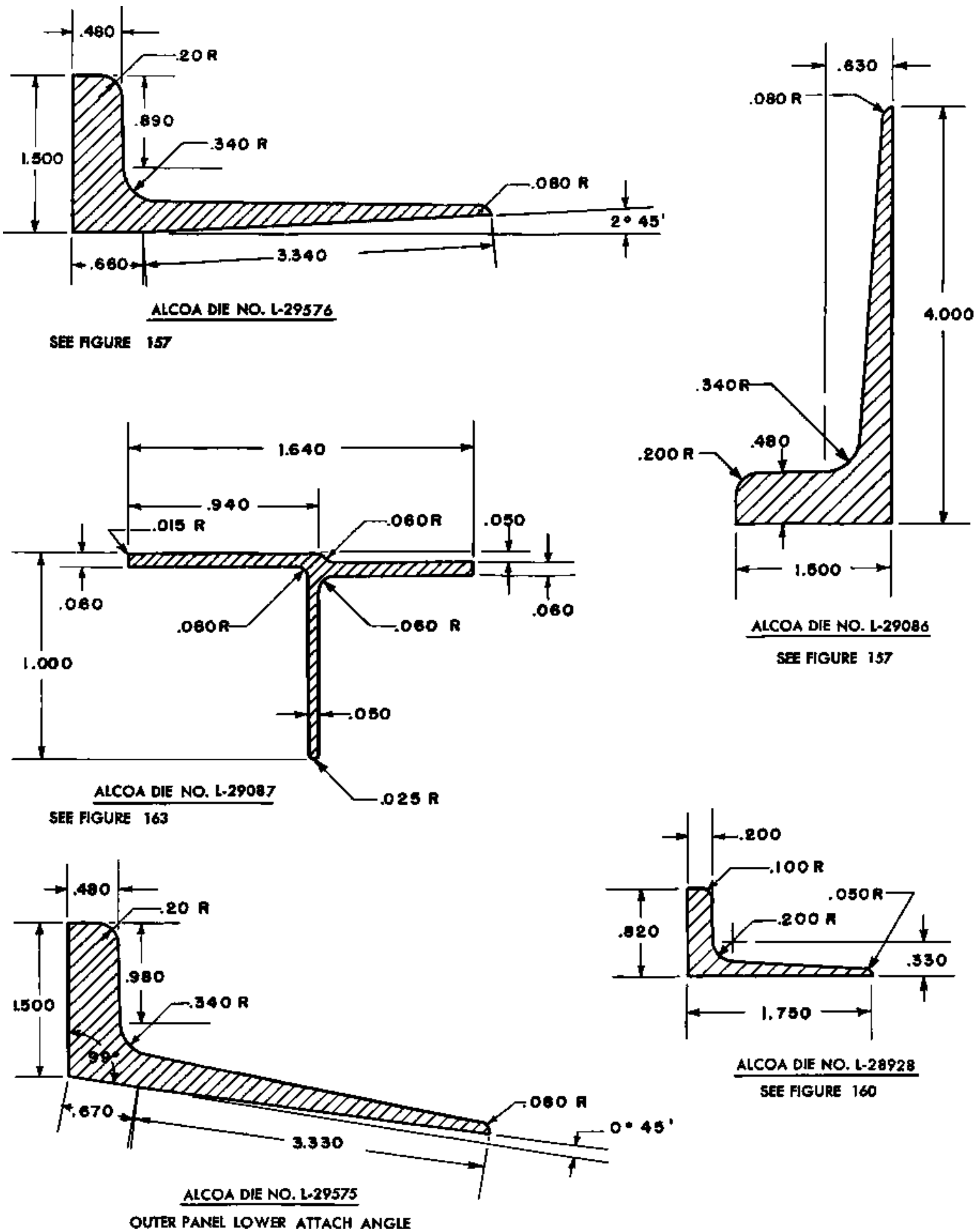


FIGURE 161—WING ATTACH ANGLE EXTRUSIONS

station 192, showing the repair to the web and to the leading edge match angle. Figure 158 shows the rib assembly, and the accompanying table (table 57) gives the component parts. The following torques should be applied to the various attachment bolts:

Bolt Diameter	*Torque in Inch-Pounds (no lubrication)*
1/4	50 to 70
3/8	160 to 190
7/16	450 to 500

(2) NEGLIGIBLE DAMAGE.—No damage in this region will be negligible except for the rib web. Holes in the web which, when cleaned up, are .75 inch diameter or less may be neglected, provided such holes are a minimum of 2 inches from any rivet, and at least 5 inches apart.

(3) DAMAGE REPAIRABLE BY PATCHING.—If the damage to the rib, when cleaned up, is more than 2 inches from the rib capstrip, it may be patched as in figure 159. The patch should run to the nearest vertical stiffener each side of the damage. The patch is of the same gage as the web. Damaged stiffeners are repaired as per figures 232 and 233.

(4) DAMAGE REPAIRABLE BY INSERTION.—Cut out the match angle on the panel where the chordwise extent of damage is least. Cut out other match angle so that the overlap of angles will be two bolts as shown. The doubler insert on panel with the shorter match angle cut-out should be at least 2 inches longer than the angle cut-out and should extend the entire width of the doubler. The doubler insert on the other panel should be the same length as the angle insert and extend the width of the doubler. The skins on each panel should be cut back far enough beyond the doublers to allow for the necessary splice plates. Rivets in the region of the inserts should be carefully drilled out and replaced by the same size and type rivet. Every attempt should be made not to increase the size of the rivet holes. If the holes are enlarged, see section I, paragraph 10. *i.* for procedure. The skin corners should be rounded off with a .5 inch radius. Spanwise splices should be placed on the inner surface parallel to the stringers whereas the chordwise splice plates are placed along the outer surface of the wing. The stringers, if damaged, should be repaired as in figure 107. The rib at station 192 will require reinforcement and shim inserts as shown in figure 157, keeping the number of bolts picked up by each insert as shown. The web insert runs from center line to center line of stiffeners. An .040 splice plate ties the horizontal edge of the web insert to the web.

(*a*) The attach angle over the nose section may be repaired by insertion with splice plates similar to those existing at the aft end of the leading edge attach angle if the break occurs aft of the de-icer tee. (See figures 102 through 104.) If the break is forward of this point, the splice plate is similar except that it has no flange and is of .102 gage.

(*b*) If no extruded stock is available for the match angles, they may be machined out of 24ST bar stock with the grain running along the length of the angle.

(5) DAMAGE REQUIRING REPLACEMENT.—Small gussets over the spar ends, the vertical .156 gage plates running the height of the 30 percent and 70 percent spars both on the outer panel and on rib station 192, and all small clips, brackets, etc. should be replaced if damaged.

3. WINGTIPS.

a. GENERAL.—The wing tip is attached to the outer panel at outer panel station 412 by means of a row of screws. The tip is of all metal construction consisting of two beams, three ribs, stiffeners, and skin, (see figure 162 and table 58). Since the tip is fairly small, it should be replaced if any extensive damage occurs. Figure 162A and table 58A show the structure and component parts of the wing tip installed on airplanes AF44-78545 and subsequent.

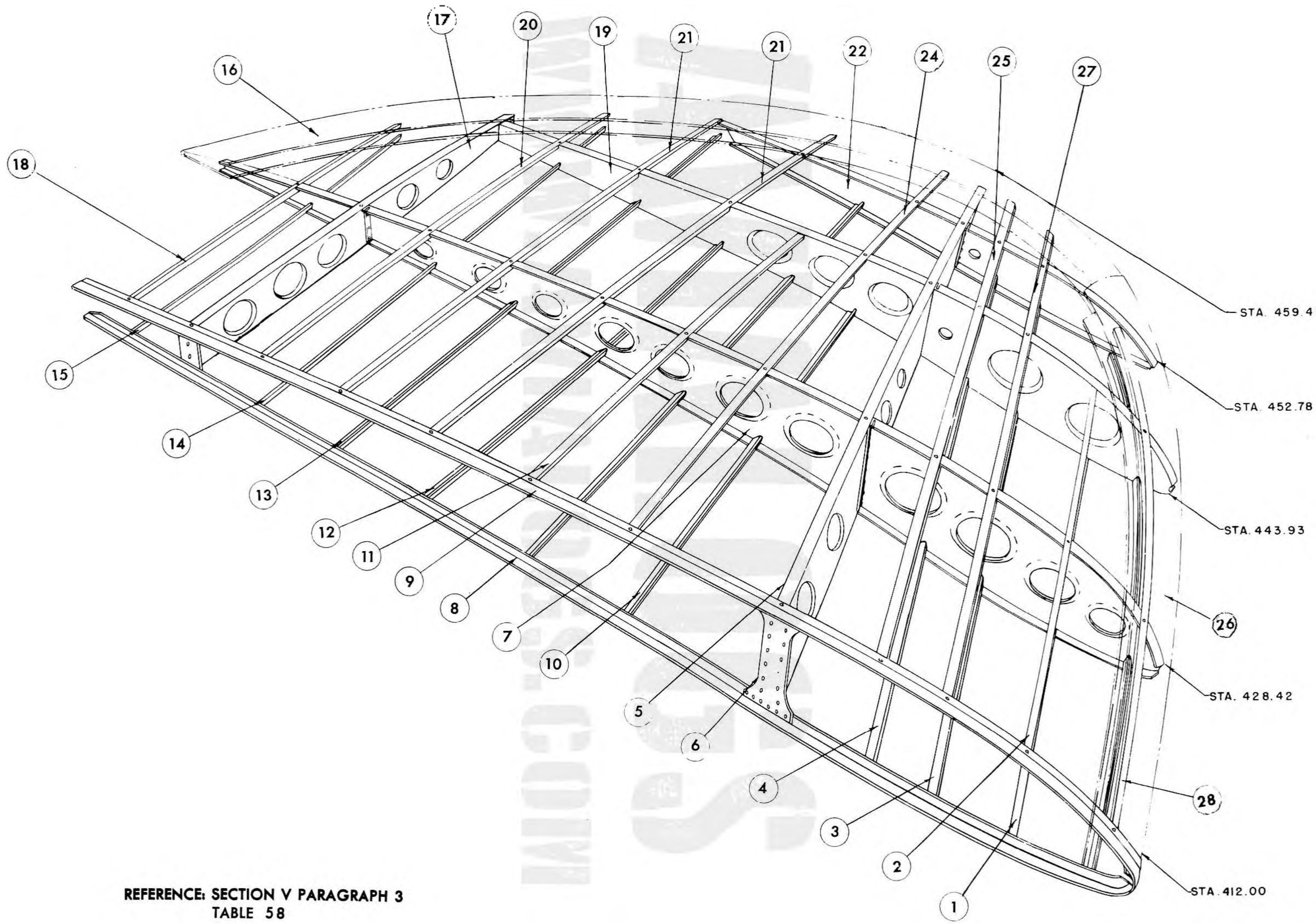
b. SKIN.

(1) GENERAL.—The skins are of .020 and .025 gage and are fastened to the structure with AN-426AD4 rivets forward of the 30 percent spar and with 671D-4AD rivets aft of the 30 percent spar. The leading and trailing edges are of formed .032 sheet.

(2) NEGLIGIBLE DAMAGE.—Skin dents free from cracks and abrasions may be restored to the original shape. Care should be taken not to crack the skin in the process.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage not considered negligible should be cleaned up with .5 inch corner radii and patched with a similar gage sheet using a double row of 671D-4AD or AN426AD4 rivets at .88 ± .1 inch spacing or a double row of LS1127-5 rivets at .68 ± .06 inch spacing.

(*a*) The edges may be repaired with an .032 gage patch using a double row of rivets spanwise and a single row chordwise for the leading edge. The trail-



REFERENCE: SECTION V PARAGRAPH 3
TABLE 58

FIGURE 162—WING TIP STRUCTURE

ing edge requires a single row of rivets around the patch. AN426AD4 rivets should be used on the leading edge and 671D-4AD on the trailing edge. (See figure 163.)

b. Repair by insertion or replacement will depend on the materials available and the discretion of the repair personnel.

c. STRINGERS.—The stringers are all .040 gage bent up sheet and may be spliced with an angle of the same gage. Three 671D-4AD or AN426AD4 rivets are required per leg each side of splice, the countersunk head rivets being used through the skin flange forward of the 30 percent spar.

d. RIBS—All the ribs are flanged .025 gage bulkheads with flanged lightening holes and may be repaired in a manner similar to outer panel rib station 382. (See figure 146.)

e. SPARS.—The spars are flanged .032 gage sheet with flanged lightening holes. The repairs are similar to those to the ribs but .032 gage stock must be used.

f. REPAIR OF ATTACH ANGLE.—This member is made from Alcoa Die L-29087. Damage to this section should be repaired by inserting a new piece of extrusion in the damaged area and splicing with an .064 gage angle on the outboard side of the vertical leg. Use four 671D-5AD rivets through each leg each side of the break. (See figure 163.)

TABLE 58
COMPONENT PARTS OF WING TIP

Item	*Designation*	*Station*	*Part No.*	*Gage*
1.	Stiffener		20-031-1001-22	.040
2.	Stiffener		20-031-1001- 5	.040
3.	Stiffener		20-031-1001-23	.040
4.	Stiffener		20-031-1001-24	.040
5.	Spar Assembly		20-031-1014	.032
6.	Stiffener		20-031-1001-25	.040
7.	Rib	428.42	20-031-1015	.025
8.	Attach Angle	412.00	20-031-1001-33	*
9.	Attach Angle	412.00	20-031-1001-19	*
10.	Stiffener		20-031-1001- 9	.040
11.	Stiffener		20-031-1001-27	.040
12.	Stiffener		20-031-1001-41	.040
13.	Stiffener		20-031-1001-28	.040
14.	Stiffener		20-031-1001-29	.040
15.	Stiffener		20-031-1001-16	.040
16.	Edge		20-031-1001-17	.032
17.	Spar Assembly		20-031-1013	.032
18.	Stiffener		20-031-1001-12	.040
19.	Rib	443.9	20-031-1012	.025
20.	Stiffener		20-031-1001-11	.040
21.	Stiffener		20-031-1001-10	.040
22.	Rib	452.8	20-031-1011	.025
23.	Stiffener		20-031-1001- 8	.040
24.	Stiffener		20-031-1001- 7	.040
25.	Stiffener		20-031-1001- 6	.040
26.	Leading Edge		20-031-1001- 3	.032
27.	Stiffener		20-031-1001-20	.040
28.	Stiffener		20-031-1001-37	.040

*Alcoa Die No. L29087

TABLE 58A
COMPONENT PARTS OF WING TIP

Item	*Designation*	*Station*	*Part No.*	*Gage*
1.	Stiffener		20-031-5701- 7	.040
2.	Stiffener		20-031-5701- 6	.040
3.	Stiffener		20-031-5701-21	.040
4.	Stiffener		20-031-5701-22	.040
5.	Stiffener		20-031-5701-23	.040
6.	Splice Angle	412.00	20-031-5701-50	CE 4199-1
7.	Stiffener		20-031-5701-16	.040
8.	Stiffener		20-031-5701-17	.040
9.	Stiffener		20-031-5701-18	.040
10.	Stiffener		20-031-5701-19	.040
11.	Stiffener		20-031-5701-20	.040
12.	Splice Angle		20-031-5701-49	CE-4199-1
13.	Rib		20-031-1015-39	.025
14.	Beam		20-031-5701-40	.032
15.	Rib		20-031-1015- 3	.025
16.	Stiffener		20-031-5701-15	.040
17.	Stiffener		20-031-5701-14	.040
18.	Rib		20-031-1012- 3	.025
19.	Stiffener		20-031-5701-12	.040
20.	Stiffener		20-031-5701-13	.040
21.	Rib		20-031-1011-37	.025
22.	Stiffener		20-031-5701-11	.040
23.	Spar		20-031-1014- 1	.032
24.	Edge	459.42	20-031-5701-36	.032
25.	Stiffener		20-031-5701-10	.040
26.	Stiffener		20-031-5701- 9	.040
27.	Rib	452.78	20-031-1011- 2	.025
28.	Rib	443.93	20-031-1012- 2	.025
29.	Stiffener		20-031-5701- 8	.040
30.	Rib	428.42	20-031-1015- 2	.025
31.	Edge		20-031-5701-34	.032

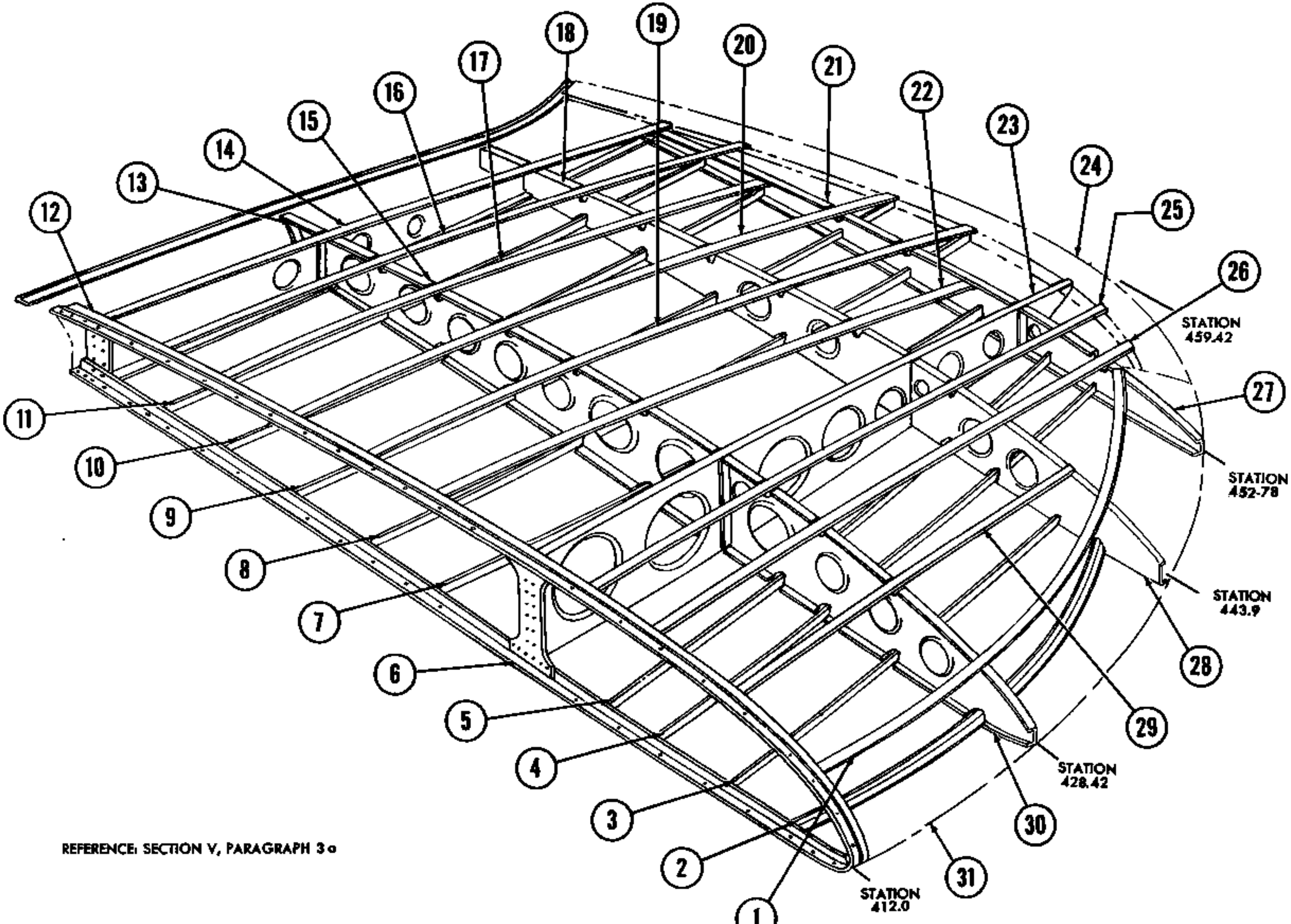
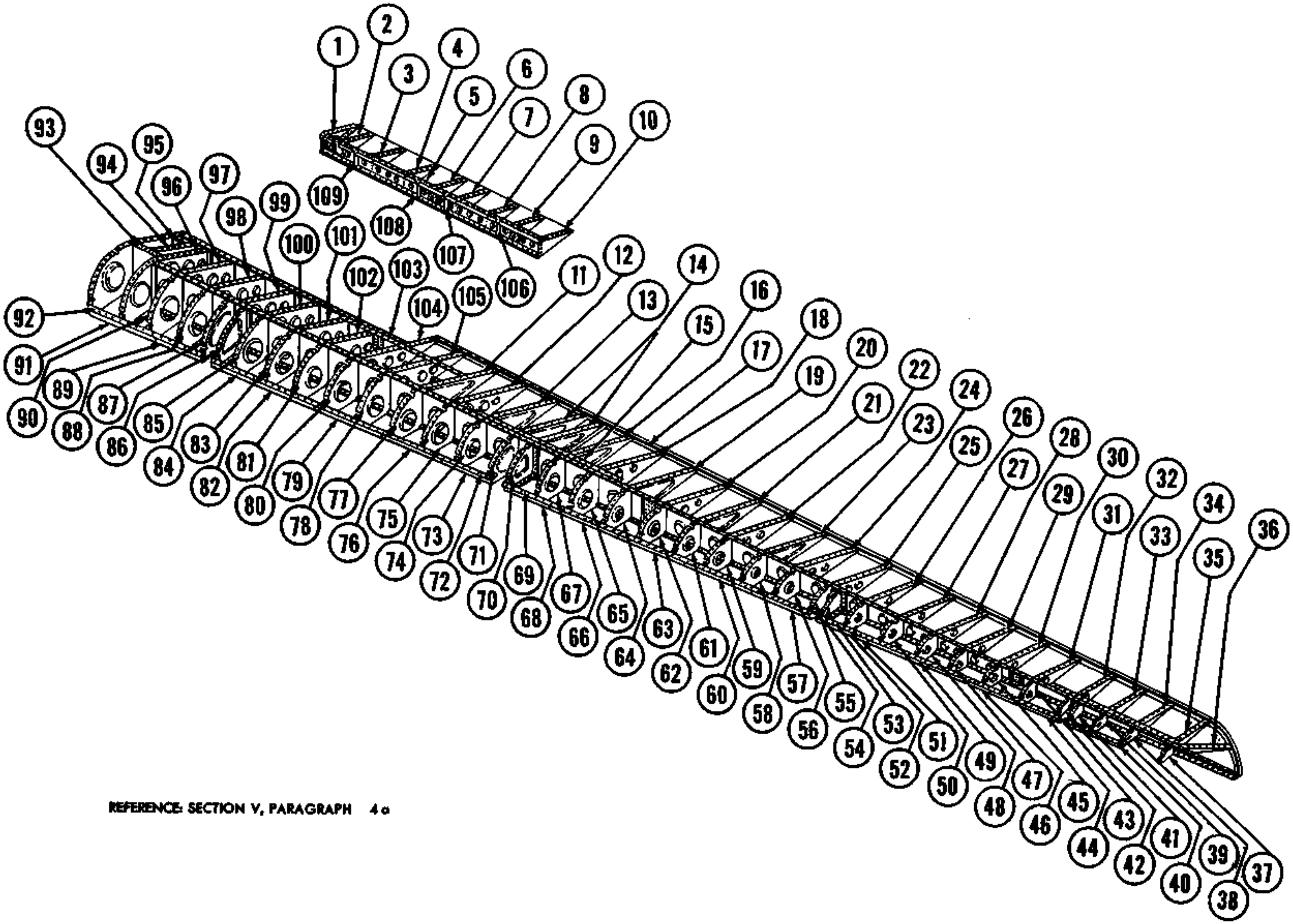


FIGURE 162A — WING TIP STRUCTURE (AIRPLANES AF44-78545 AND SUBSEQUENT)



REFERENCE: SECTION V, PARAGRAPH 4 a

FIGURE 162B — AILERON STRUCTURE (AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 58B

AILERON AND TAB COMPONENT PARTS (AIRPLANES AF44-78545 AND SUBSEQUENT)

Item	*Designation*	*Part No.*	*Web*	*Gage*	*Sta.*
1	Rib	20-050-5702-3	.016	24SO	173.20
2	Rib	20-050-5744-1	.032	24ST	178.38
3	Rib	20-050-5702-4	.016	24ST	186.29
4	Rib	20-050-5702-5	.016	24ST	194.22
5	Tab Spar	20-050-5702-13	.016	24ST	....
6	Rib	20-050-5745-1	.016	24ST	202.567
7	Rib	20-050-5702-6	.016	24ST	209.66
8	Rib	20-050-5702-7	.016	24ST	217.17
9	Rib	20-050-5745-2	.016	24ST	224.69
10	Rib	20-050-5702-8	.016	24SO	230.40
11	Rib	20-050-5731-6	.020	24ST	248.04
12	Rib	20-050-5729-11	.020	24ST	256.06
13	Fib	20-050-5731-5	.020	24ST	264.09
14	Rib	20-050-5721-1	.020	24SO	276.35
15	Main Spar	20-050-5711-1	.032	24ST	....
16	Rib	20-050-5731-4	.020	24ST	284.18
17	Trailing Edge	20-050-5714-1	.025	24ST	....
18	Rib	20-050-5729-10	.020	24ST	292.65
19	Rib	20-050-5731-3	.020	24ST	301.12
20	Rib	20-050-5729-9	.020	24ST	309.59
21	Rib	20-050-5731-2	.020	24ST	318.06
22	Rib	20-050-5729-8	.020	24ST	326.53
23	Rib	20-050-5731-7	.020	24ST	335.00
24	Rib	20-050-5729-7	.020	24ST	343.47
25	Rib	20-050-5722-1	.020	24ST	352.00
26	Rib	20-050-5729-6	.020	24ST	360.44
27	Rib	20-050-5729-5	.020	24ST	368.93
28	Rib	20-050-5729-4	.020	24ST	377.43
29	Rib	20-050-5729-3	.020	24ST	385.92
30	Rib	20-050-5729-2	.020	24ST	394.42
31	Rib	20-050-5729-15	.020	24ST	402.91
32	Rib	20-050-5723-1	.020	24ST	412.00
33	Rib	20-050-5729-13	.020	24ST	420.18
34	Rib	20-050-5729-12	.020	24ST	428.42
35	Rib	20-050-5729-14	.020	24ST	437.00
36	Rib	20-050-5733-2	.020	24ST	....
37	Nose Ribs	20-050-5750-2	.020	24SO	437.00
38	Nose Ribs	20-050-5730-25	.020	24SO	428.42
39	Nose Ribs	20-050-5730-27	.020	24SO	420.18
40	Front Spar	20-050-5749-2	.032	24ST	....
41	Nose Ribs	20-050-5732-4	.020	24SO	414.50
42	Nose Ribs	20-050-5732-8	.020	24SO	409.50
43	Nose Ribs	20-050-5730-26	.020	24SO	402.91
44	C. Balance	20-050-5751-17	....	.....	....
45	Rib	20-050-5730-2	.020	24SO	....
46	C. Balance	20-050-5751-2	....	.....	....
47	Nose Rib	20-050-5730-3	.020	24SO	385.92
48	Nose Rib	20-050-5730-4	.020	24SO	377.43
49	C. Balance	20-050-5751-3	....	.....	....
50	Rib	20-050-5730-5	.020	24SO	368.93
51	C. Balance	20-050-5751-4	....	.....	....
52	Rib	20-050-5730-6	.020	24SO	360.44
53	Front Spar	20-050-5739-1	.032	24ST	....
54	Rib	20-050-5732-2	.020	24SO	354.50
55	Rib	20-050-5732-3	.020	24SO	349.50
56	Rib	20-050-5730-7	.020	24SO	343.47
57	C. Balance	20-050-5751-5	....	.....	....
58	Rib	20-050-5730-8	.020	24SO	335.00
59	Rib	20-050-5730-9	.020	24SO	326.53
60	C. Balance	20-050-5751-6	....	.....	....
61	Rib	20-050-5730-10	.020	24SO	318.06
62	Rib	20-050-5730-11	.020	24SO	309.59
63	C. Balance	20-050-5751-7	....	.....	....
64	Rib	20-050-5730-12	.020	24SO	301.12
65	Rib	20-050-5730-13	.020	24SO	292.65
66	C. Balance	20-050-5751-8	....	.....	....
67	Rib	20-050-5730-14	.020	24SO	284.18
68	C. Balance	20-050-5751-9	....	.....	....
69	Front Spar	20-050-5738-1	.032	24ST	....
70	Nose Ribs	20-050-5754-2	.020	24SO	276.35
71	Nose Ribs	20-050-5732-5	.020	24SO	271.45
72	Front Spar	20-050-5737-1	.032	24ST	....
73	C. Balance	20-050-5751-10	....	.....	....
74	Rib	20-050-5730-15	.020	24SO	264.09
75	Rib	20-050-5730-16	.020	24SO	256.06
76	C. Balance	20-050-5751-11	....	.....	....
77	Rib	20-050-5730-17	.020	24SO	248.04
78	Rib	20-050-5730-18	.020	24SO	240.02
79	C. Balance	20-050-5751-12	....	.....	....
80	Rib	20-050-5730-19	.020	24SO	232.10
81	Rib	20-050-5730-20	.020	24SO	224.48
82	C. Balance	20-050-5751-13	....	.....	....
83	Rib	20-050-5730-21	.020	24SO	216.97
84	C. Balance	20-050-5751-14	....	.....	....
85	Rib	20-050-5730-22	.020	24SO	209.46
86	Rib	20-050-5732-6	.020	24SO	204.50
87	Rib	20-050-5732-7	.020	24SO	199.50
88	Rib	20-050-5730-23	.020	24SO	194.75
89	C. Balance	20-050-5751-15	....	.....	....
90	Rib	20-050-5730-24	.020	24SO	187.35
91	C. Balance	20-050-5751-16	....	.....	....
92	Front Spar	20-050-5712-1	.032	24ST	....
93	Spar	20-050-5742-1	.020	24SO	....
94	Rib	20-050-5725-1	.020	24ST	176.80
95	Stiffener	20-050-5701-27	.020	24ST	178.360
96	Rib	20-050-5726-1	.020	24SO	179.57
97	Rib	20-050-5728-5	.020	24ST	187.35
98	Rib	20-050-5728-3	.020	24ST	194.75
99	Rib	20-050-5720-1	.020	24SO	202.00
100	Rib	20-050-5728-2	.020	24ST	209.46
101	Rib	20-050-5728-4	.020	24ST	216.97
102	Rib	20-050-5747-1	.020	24ST	224.48
103	Rear Spar	20-050-5713-1	.020	24SO	....
104	Rib	20-050-5727-2	.020	24ST	232.10
105	Rib	20-050-5748-2	.020	24ST	240.02
106	Rib	20-050-5702-12	.016	24SO	220.62
107	Rib	20-050-5702-11	.016	24SO	205.84
108	Rib	20-050-5702-10	.016	24SO	197.64
109	Rib	20-050-5702-9	.016	24SO	182.36

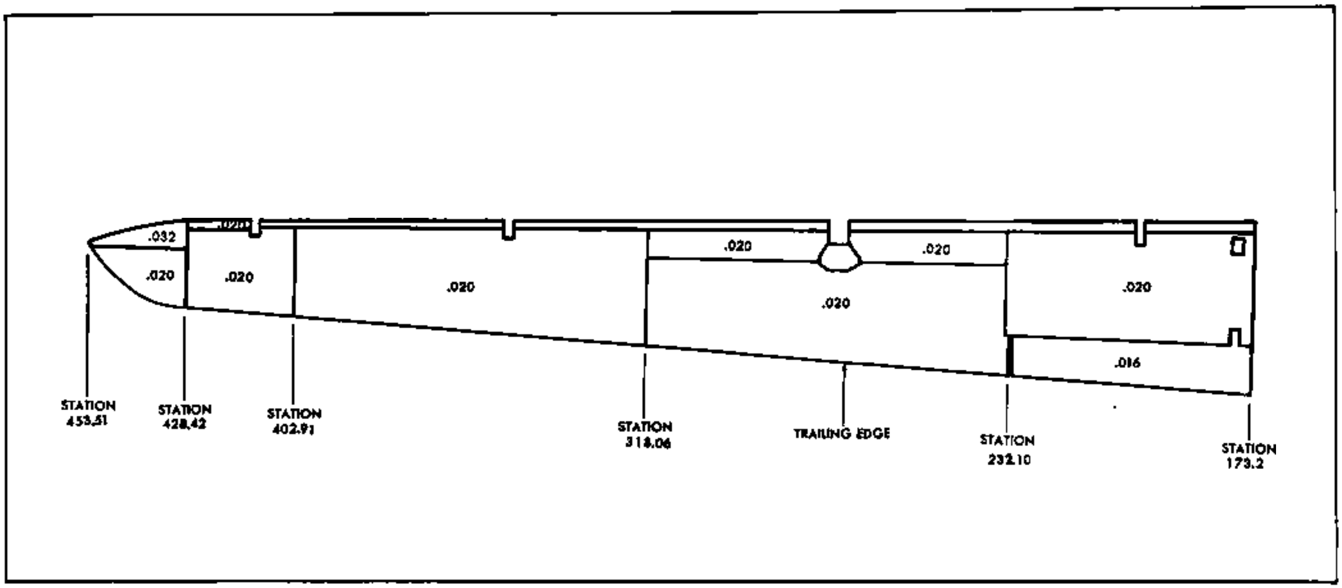


FIGURE 162C — AILERON SKIN DIAGRAM (AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 58C—AILERON SKIN RIVETING (AIRPLANES AF44-78545 AND SUBSEQUENT)

CHORDWISE SKIN CONNECTIONS—AILERON

Location	*Extent*	*Gage of Outboard Skin*	*Gage of Inboard Skin*	*Rivet Types*	*Rivet Spacing*	*Rivet Rows*
Station 428.42	Trailing Edge To Main Spar	.020	.020	671D-3AD	1.25	1
Station 428.42	Main Spar To Leading Edge	.032	.020	671D-3AD	1.25	1
Station 402.91	Trailing Edge to Leading Edge	.020	.020	671D-3AD	1.25	1
Station 318.06	Trailing Edge to Leading Edge	.020	.020	671D-3AD	1.25	1
Station 232.1	Trailing Edge to Main Spar	.020	.020	671D-3AD	1.08	1
Station 232.1	Main Spar to Leading Edge	.020	.020	671D-3AD	1.25	1

SPANWISE SKIN CONNECTIONS—AILERON

Location	*Extent*	*Gage of Forward Skin*	*Gage of Aft Skin*	*Type of Rivets*	*Rivet Spacing*	*No. of Rivet Rows*
Main Spar	Sta. 453.5 to Sta. 428.4	.032	.020	NAF1195-5A	1.03	1
Front Spar	Sta. 428.4 to Sta. 412.5	.020	.020	NAF1195-5A	1.2	1
Main Spar	Sta. 318 to Sta. 232	.020	.020	671D-4AD	.90	1

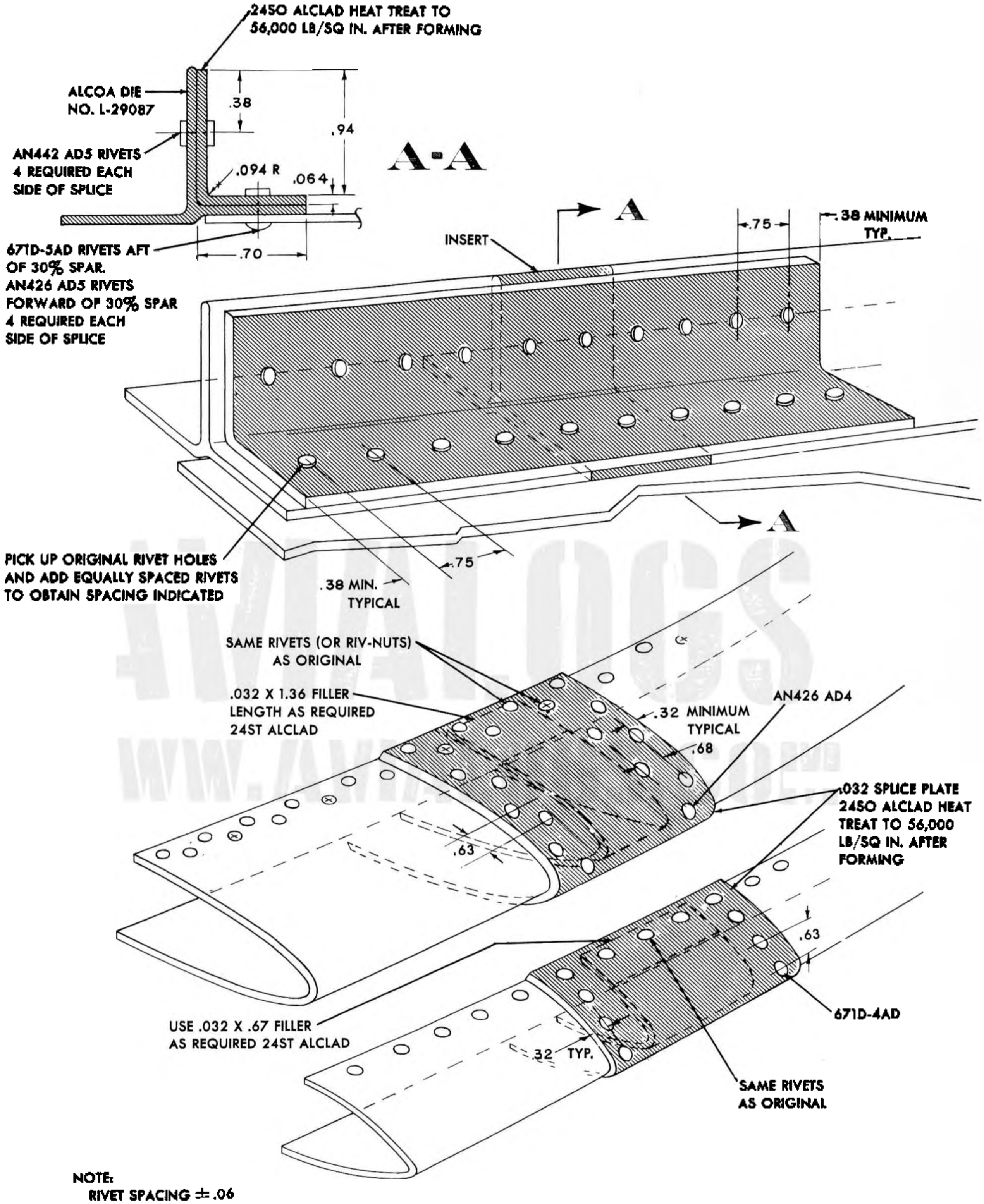


FIGURE 163—REPAIR TO WING TIP MATCH ANGLE AND MOLDING

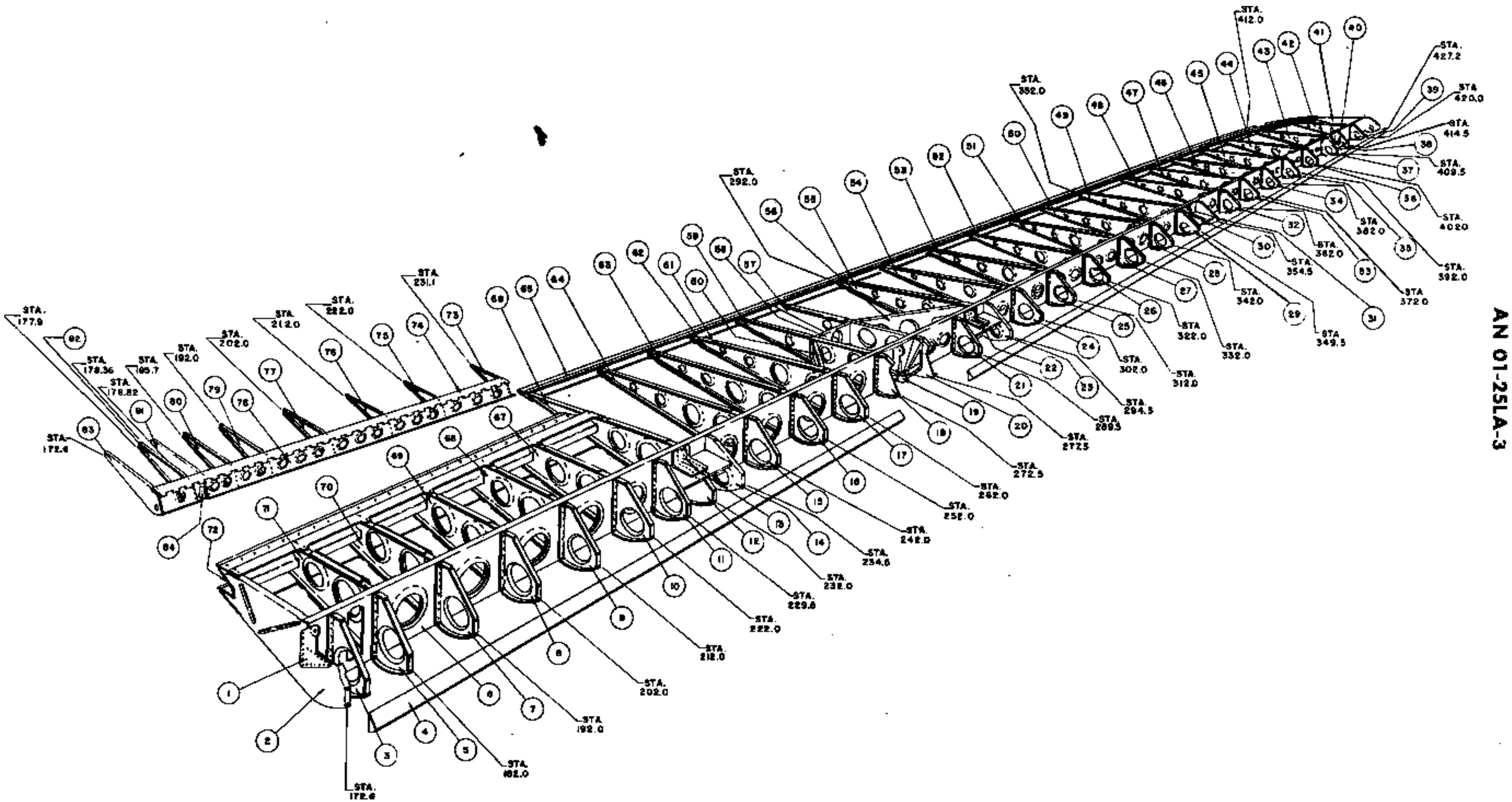


FIGURE 164—AILERON STRUCTURE

TABLE 59
AILERON AND TAB COMPONENT PARTS

No.	Item	Part No.	Web Gage	Station
1	Hinge	20-050-207		172.6
2	Rib	20-050-1012-2	.032	172.6
3	Rib	20-050-1030-2	.032	
4	Balance	20-050-1018		
5	Rib	20-050-1028-1	.032	182.0
6	Spar	20-050-1011-1	.040	
7	Rib	20-050-1029-2	.032	192.0
8	Rib	20-050-1029-3	.032	202.0
9	Rib	20-050-1029-4	.032	212.0
10	Rib	20-050-1029-5	.032	222.0
11	Rib	20-050-1030-3	.032	229.5
12	Rib	20-050-1019-1	.032	232.0
13	Hinge	20-050-209-1		232.0
14	Rib	20-050-1030-4	.032	234.5
15	Rib	20-050-1029-6	.032	242.0
16	Rib	20-050-1029-7	.032	252.0
17	Rib	20-050-1029-8	.032	262.0
18	Rib	20-050-1031-2	.032	272.0
19	Hinge	20-050-210-1		272.0
20	Rib	20-050-1031-3	.032	277.5
21	Rib	20-050-1030-5	.032	289.5
22	Hinge	20-050-209-1		292.0
23	Rib	20-050-1030-6	.032	294.5
24	Rib	20-050-1029-6	.032	302.0
25	Rib	20-050-1029-10	.032	312.0
26	Rib	20-050-1029-11	.032	322.0
27	Rib	20-050-1029-12	.032	332.0
28	Rib	20-050-1029-13	.032	342.0
29	Rib	20-050-1030-7	.032	349.5
30	Hinge	20-050-209-1		352.0
31	Rib	20-050-1030-8	.032	354.5
32	Rib	20-050-1029-52	.032	362.0
33	Rib	20-050-1029-53	.032	372.0
34	Rib	20-050-1029-54	.032	382.0
35	Rib	20-050-1029-55	.032	392.0
36	Rib	20-050-1029-56	.032	402.0
37	Rib	20-050-1030-9	.032	409.5
38	Rib	20-050-1030-16	.032	414.5
39	Rib	20-050-1029-57	.032	420.0
40	Hinge	20-050-208-1		412.0
41	Rib	20-050-1017-2	.020	427.2
42	Rib	20-050-1015-35	.020	420.0
43	Rib	20-050-1015-34	.020	412.0
44	Rib	20-050-1015-33	.020	402.0
45	Rib	20-050-1015-32	.020	392.0
46	Rib	20-050-1015-31	.020	382.0
47	Rib	20-050-1015-30	.020	372.0
48	Rib	20-050-1015-29	.020	362.0
49	Rib	20-050-1015-28	.020	352.0
50	Rib	20-050-1015-27	.020	342.0
51	Rib	20-050-1015-26	.020	332.0
52	Rib	20-050-1015-25	.020	322.0
53	Rib	20-050-1015-24	.020	312.0
54	Rib	20-050-1015-23	.020	302.0
55	Rib	20-050-1015-22	.020	292.0
56	Rib	20-050-1040-2	.040	
57	Rib	20-050-1016-7	.020	277.5
58	Rib	20-050-1040-3	.040	
59	Rib	20-050-1016-4	.020	272.5
60	Rib	20-050-1040-4	.040	
61	Fabric Slot			
62	Rib	20-050-1015-21	.020	262.0
63	Rib	20-050-1015-20	.020	252.0
64	Rib	20-050-1015-19	.020	242.0
65	Trailing Edge	20-050-1010-01		
66	Rib	20-050-1014-1	.020	232.0
67	Rib	20-050-1013-11	.020	222.0
68	Rib	20-050-1013-10	.020	212.0
69	Rib	20-050-1013-9	.020	202.0
70	Rib	20-050-1013-8	.020	192.0
71	Rib	20-050-1013-7	.020	182.0
72	Closure Skin	20-050-1041		
73	Rib	20-050-180-6	.020	231.1
74	Hinge	SS-160-3		
75	Rib	20-050-180-5	.020	222.0
76	Rib	20-050-180-4	.020	212.0
77	Rib	20-050-180-3	.020	202.0
78	Tab Spar	20-050-1047	.016	
79	Rib	20-050-180-2	.020	192.0
80	Rib	20-050-180-1	.020	185.7
81	Rib	20-050-181	.032	178.8
82	Rib	20-050-178	.032	177.9
83	Rib	20-050-179	.020	172.6
84	Horn	20-050-182		178.4

4. AILERONS.

a. GENERAL.—The aileron on airplanes up to AF44-78545 differs from the other control surfaces in that it is not a stressed skin structure.

The structure consists of a spanwise beam to which is attached the ribs and hinges. The section forward of the main beam is covered with a metal skin and then the entire structure is covered with fabric. See figure 164 and table 59.

On airplanes AF44-78545 and subsequent the metal-covered aileron may be repaired in accordance with the instructions and limitations given in paragraphs b, c, and d following. Repairs to skin aft of the main beam may be accomplished by the methods outlined for nose skin repair. For aileron structure see figure 162B and table 58B. For aileron skin diagram see figure 162C and table 58C.

b. NOSE SKIN.

(1) NEGLIGIBLE DAMAGE.—Smooth dents free from cracks and abrasions may be neglected but should be restored to shape to prevent further damage developing.

Holes not over .5 inch in diameter when cleaned up may be neglected but should be covered with an .020 patch attached with LS1127-4 rivets through each corner. See figure 106.

(2) DAMAGE REPAIRABLE BY PATCHING.—Any damage not extending over an entire panel of skin may be repaired by patching.

Clean up the damaged area by rounding all sharp corners to a .5 inch radius and stopping all cracks with a 1/8 inch hole at each end. Cover the damaged area with a patch of the same gage as the skin and attach with two rows of LS1127-5 rivets at a .68 ± .06 inch spacing. See figure 165.

(3) DAMAGE REPAIRABLE BY INSERTION.—Due to the small cross-section of the aileron, repair by insertion will be very difficult and impractical. Therefore, it will be omitted from this part of the text.

c. BEAM.

(1) GENERAL.—This beam, running the entire length of the aileron is a formed channel section. The web is stiffened by flanged lightening holes while the flanges are not reinforced.

(2) NEGLIGIBLE DAMAGE.—Smooth dents free from cracks or abrasions may be neglected but should be restored to shape to prevent further damage from developing.

Nicks or cracks in the edge of the flange not over .13 inch deep when cleaned up with a round file maintaining .25 inch corner radii and not closer than 3 inches to a similar nick or crack may be neglected.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage extending through the flange and not over .5 inch down the web may be repaired by patching.

Nest a 1.15 x .7 angle the same gage as the web into the flange, extending it far enough each side of the damage to pick up four AN442AD4 rivets. If a lightening hole flange interferes with the angle it may be flattened out to allow the angle to fit properly. See figure 166.

A filler should be inserted between the skin and repair angle to eliminate the necessity of joggling.

(4) DAMAGE REPAIRABLE BY INSERTION.—Damage extending into a rib connection or a lightening hole should be repaired by insertion.

Make a square cut across the beam each side of the damaged area, leaving as much room as possible between the edge of the cut and the next lightening hole.

Form an insert from the same gage material and of the same section as the original beam. Splice in place using plates 2.5 inches wide picking up two rows of AN442AD4 rivets at .68± .06 inch spacing each side of splice. Splice the flanges following the same procedure as outlined by patching. If the cutout is less than 9 inches in length the splice angle should be continuous and if the cutout is greater than 9 inches in length, a separate splice angle may be used at each end of the cut.

(5) DAMAGE NECESSITATING REPLACEMENT.—Replace all clips, brackets, hinges, and angles (if less than 10 inches in length) that may be damaged.

d. RIBS.—The ribs aft of the beam may be repaired in the same fashion as the stabilizer ribs and, therefore, refer to section VII, paragraph *1. d.* when making these repairs.

When the fabric slot is damaged that portion should be removed and a new section inserted.

The nose ribs are small and consequently will be difficult to repair. Therefore, when damage is too extensive to be neglected the part should be replaced.

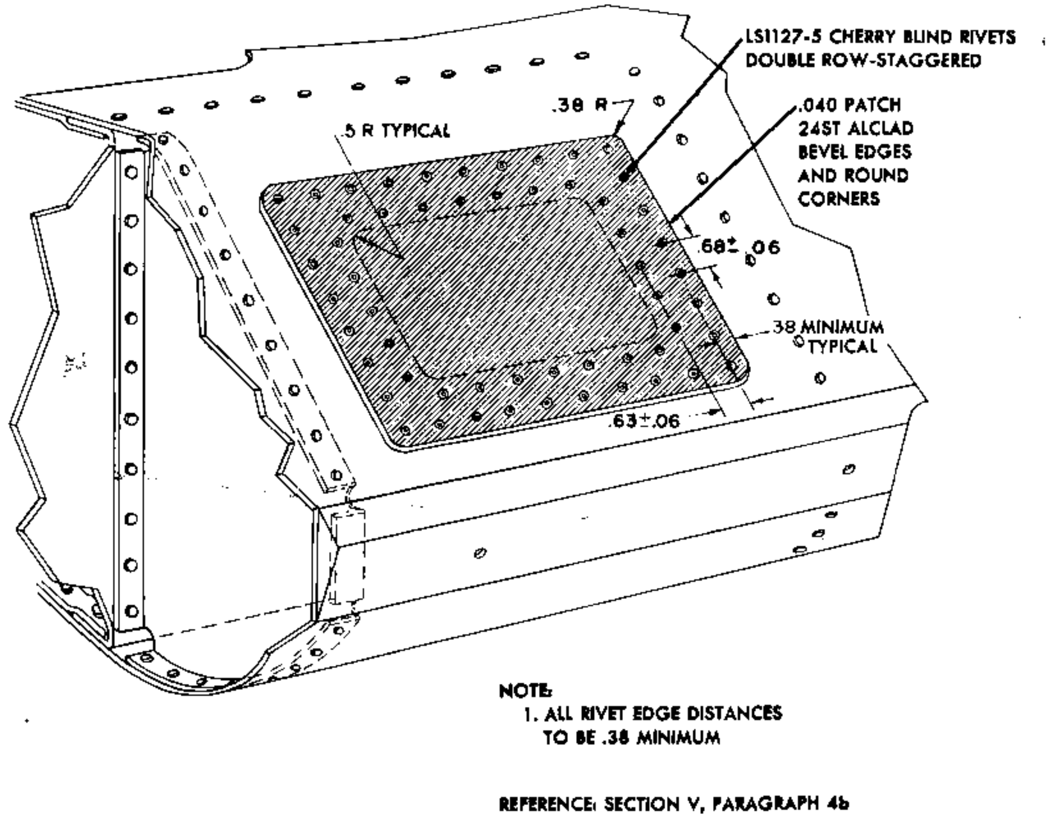


FIGURE 165—AILERON NOSE SKIN REPAIR

(1) NEGLIGIBLE DAMAGE. — Smooth dents free from cracks or abrasions may be neglected but should be restored to the original shape to prevent further damage from developing.

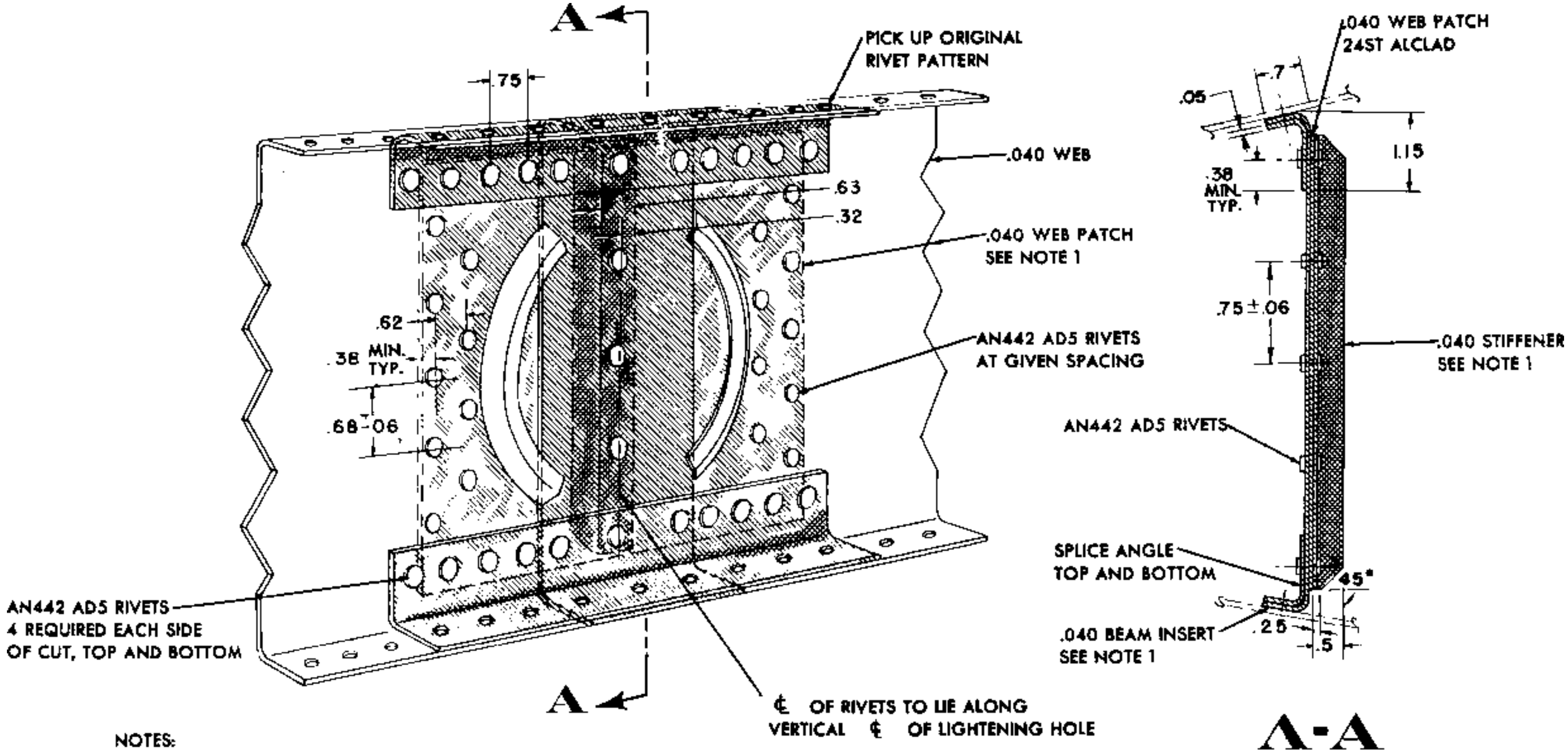
Nicks or cracks in the edges of the flanges not over .13 inch deep when cleaned up with a round file maintaining .25 inch radii and no nearer than 3 inches to a similar nick or crack may be neglected.

(2) DAMAGE NECESSITATING REPLACEMENT.—If a hinge is damaged it should be replaced.

e. FABRIC REPAIR.—The fabric used on C-46 ailerons is made according to Specification No. AN-C-121. Repairs may be divided into three groups.

(1) DAMAGE REPAIRABLE BY PATCHING.—A sandwich patch should be used to repair a straight, vee shaped or three-sided tear which occurs between two ribs. If a quick repair is absolutely essential, damage of any size may be repaired by the sandwich patch method.

(*a*) SMALL TEARS.—Cut the tear so that a square flap is formed, one or more sides of which is formed by the original tear. Apply a coat of dope to the under side of the flap and over an area 1.5 inches on all sides. Dope a pinked fabric patch and insert it under the flap. The patch should be large enough to extend 1 inch beyond all three open sides of the hole. See figure 167. Press the flap down on the patch and apply another coat of dope. See figure 167. Another pinked patch is then laid on top of the first and extends at least one inch beyond it on all sides. After this patch has had two coats of dope and allowed to dry, it is ready for a final light sanding and finish. See figure 167.



NOTES:

1. EXCEPT AS NOTED, PARTS TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
2. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM EXCEPT AS NOTED.
3. ALL BEND RADII TO BE MINIMUM FOR SPECIFIED MATERIAL. SEE TABLE 7.
4. STIFFENER AND PATCH TO LIE ON OPPOSITE SIDE OF BEAM FROM LIGHTENING HOTE FLANGE

REFERENCE: SECTION V, PARAGRAPH 4c

FIGURE 166—AILERON NOSE BEAM REPAIR

(*b*) PREPARATION OF THE AILERON COVER.—The fabric covering of the aileron shall be so applied that the warp threads are parallel to the line of flight. Sew together enough fabric widths to equal the span of the aileron and of sufficient length to reach from the trailing edge, around the nose section and back to the trailing edge. The seams should be machine stitched with a fell seam sewing attachment. Place the cover around the frame and pull the ends together at the outboard end and along the trailing edge. Pin the ends together by starting at the outboard end and working along the trailing edge as far as the trim tab cutout. Draw a line on the cloth with a soft pencil along the outboard end and around the trailing edge to the trim tab cutout to mark the seam. Remove the cover from the frame and machine sew the edges together along the pencil line, removing the pins as the sewing progresses. Trim off the excess fabric to within ¼ inch of the seam. Turn the covering inside out and slip over the frame of the aileron.

(*c*) ATTACHMENT OF COVERING TO AILERON FRAME.—The first step is to make the fabric-to-rib attaching wires. Measure the lengths of the attaching channels on the ailerons ribs and cut the wires 1½ inch longer than the length of the channels. File two nicks on each of the wires so the extra 1½ inch can be broken off after assembly. Turn up the short end of the wires to a 90 degree bend. Hold the bend over an anvil and flatten out the wire with a hammer. See figure 169 for the finished wire. The flattened part will enable the wire to be slipped through the channel without spreading the neck.

Start attaching the covering to the frame at the trim tab cut-out by pushing the fabric down into the attaching channel. Slip the flat section of the wire into the neck of the channel and pull the wire through the full length of the channel, see figure 169. Break off the bent up end of the wire at the filed nicks. Attach the top and bottom surfaces of the covering to all of the ribs by the same method.

Pull the edges of the covering together at the inboard end of the aileron and sew together using a roll or overthrow stitch. Apply a brush coat of dope to the aft edge of the aileron at the trim tab cut-out. Allow the dope to dry and then attach the trim tab half-hinge to the upper surface and the metal strip to the lower surface. Apply a brush coat of clear dope to the covering around all cut-outs so that fabric will hold its position upon cutting out the opening.

The final doping process is outlined in paragraph (4) (*d*) below.

(*d*) DOPING PROCEDURES.—This consists of removal of old dope; and application of three brush coats of clear nitrate dope, two spray coats of clear nitrate dope, and two spray coats of pigmented camouflage dope.

1. REMOVAL OF OLD DOPE.—Apply a brush coat of clear dope or dope thinner to the surface of the covering. Allow enough time for the old dope to become soft before attempting to remove it. The old dope may best be removed by scraping with a dull knife or some similar tool. Do not bear too hard while scraping as the fabric may be stretched beyond repair. Several applications of dope or dope thinner may be necessary before all of the old dope can be removed. Smooth and clean up the fabric with steel wool after removal of the old dope.

2. DOPING.—The first coat of clear dope should be brushed on as soon as possible after the completion of the repair or recovering of the aileron. This first coat of clear dope should be brushed on the fabric uniformly at full body. Allow at least 30 minutes for drying.

Apply the second brush coat of clear dope. Press on the required amount of finishing tape to the aileron. Exercise care in applying the finishing tape by having the pinked edges firmly doped down. Place the drain grommets in the proper position on the lower surface of the aileron. Dope the circular pieces of pinked finishing tape in place over the grommets. Allow at least 30 minutes for drying.

Brush on the third coat of clear dope and allow at least 30 minutes for drying.

Apply two spray coats of clear dope at the covering. Use two to four parts of dope to one part of thinner depending upon the spray equipment. Allow at least 30 minutes for drying. Smooth the surface of the aileron by rubbing very lightly with No. 7/0 or No. 320 sandpaper. Do not use any other rubbing material.

(*e*) LARGE TEARS.—Where the damage is extensive but confined to one bay, that is, beween two ribs, a patch for the whole bay should be used. Cut out the fabric covering one bay leaving a .75 inch margin between the cutout and the ribs. Remove the trailing edge tape and the upper leading edge tape for a distance of 2 inches on each side of the cutout. Also remove the tape covering the ribs. Dope the fabric around the cutout. Dope one end of the patch and press it down over the rib allowing a 1.5 inch overlap from the edge of the cutout. After this has dried

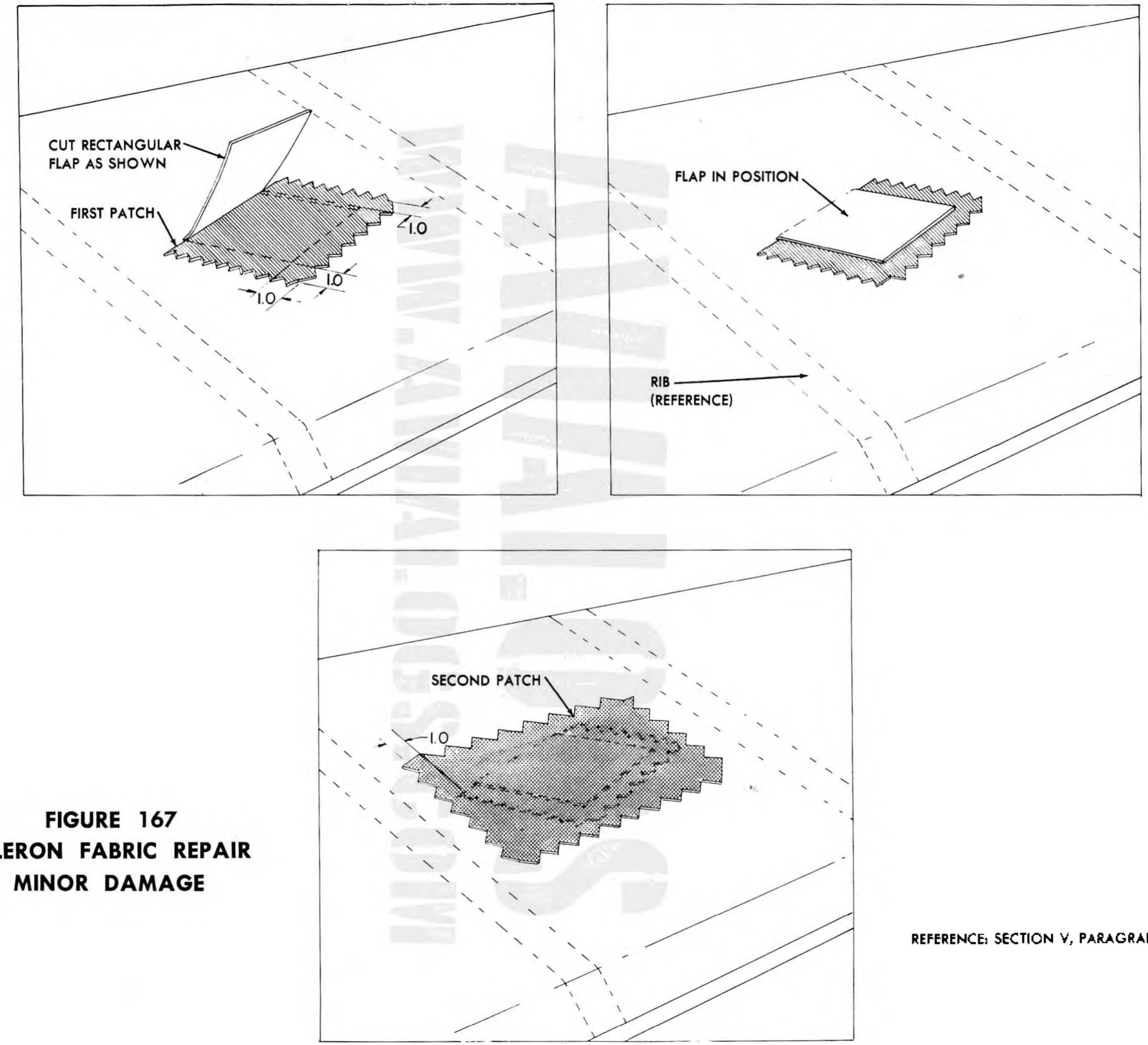
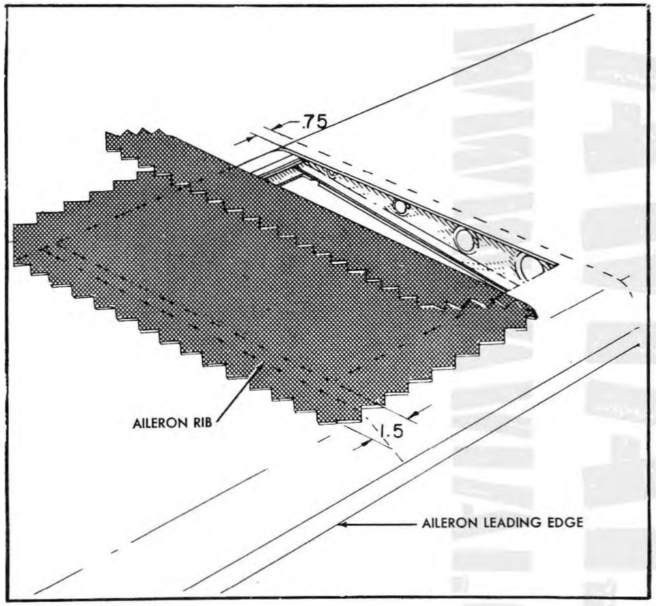
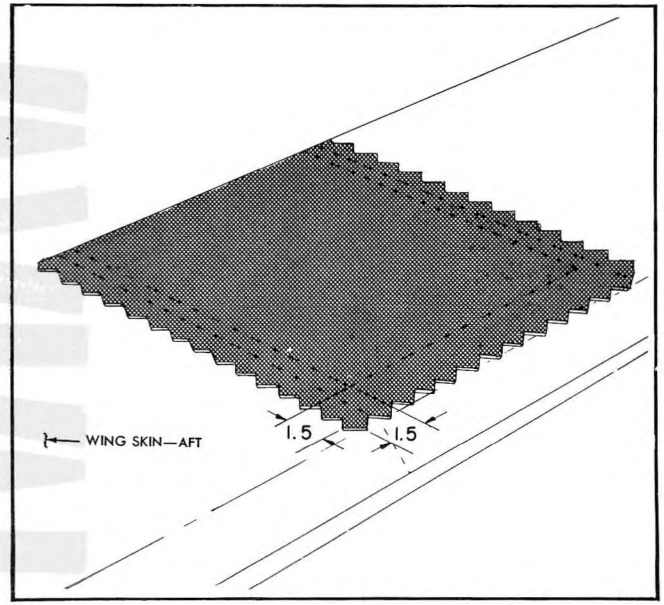


FIGURE 167
AILERON FABRIC REPAIR
MINOR DAMAGE

REFERENCE: SECTION V, PARAGRAPH 4e





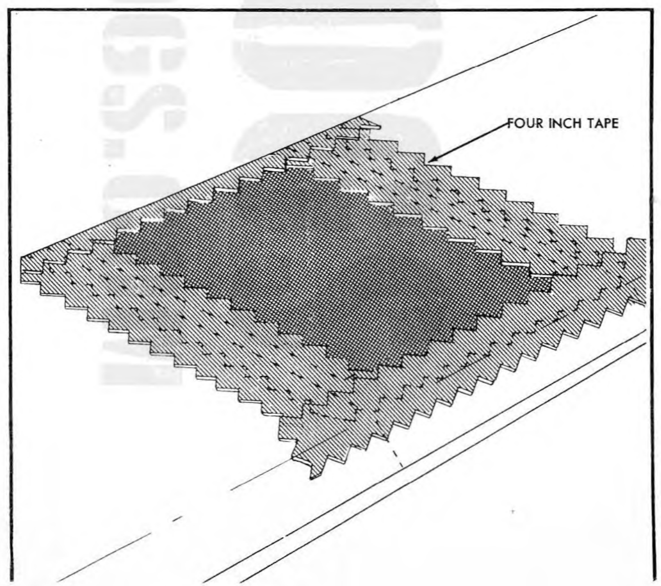


FIGURE 168
AILERON FABRIC REPAIR
MAJOR DAMAGE

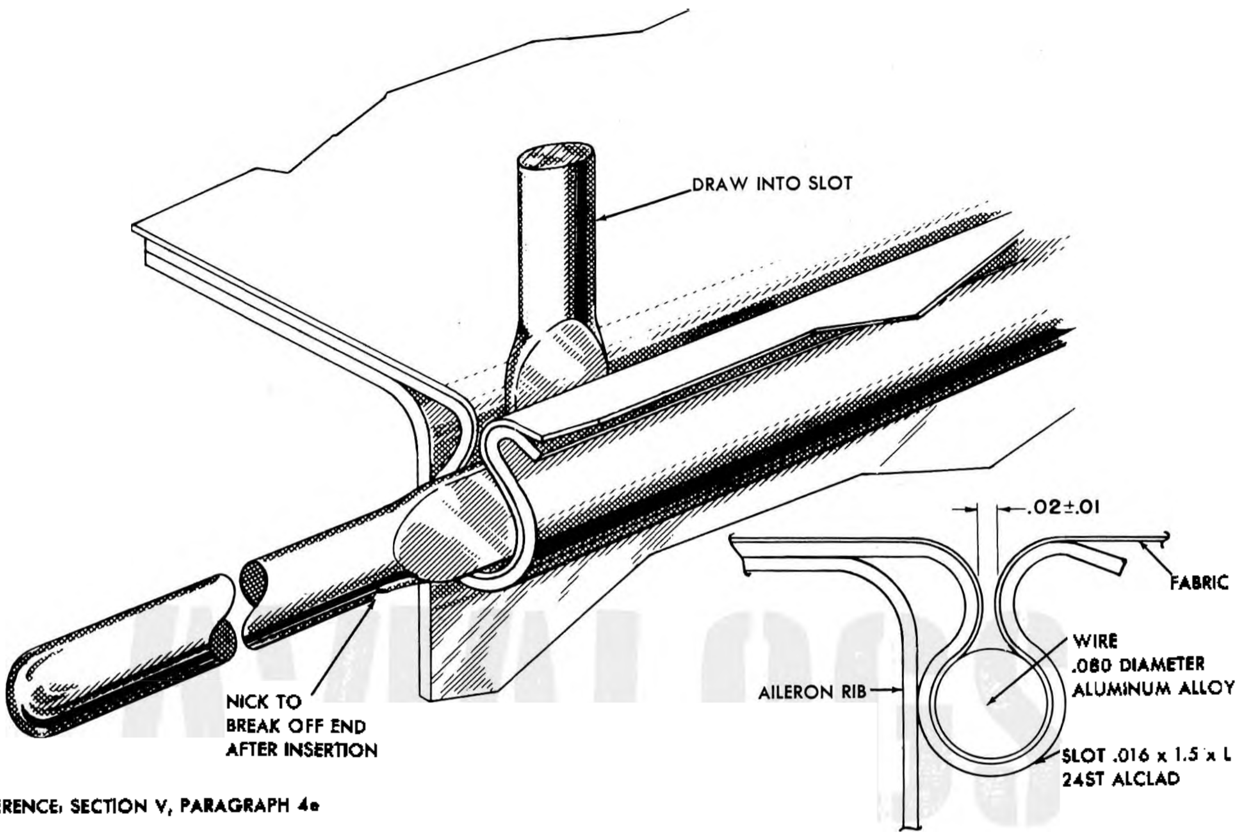


FIGURE 169—AILERON FABRIC ATTACHING PIN

thoroughly, pull the patch sheet taut over the cutout and dope it down over the other rib. Repeat the procedure at the forward edge of the cutout allowing the same 1.5 inch margin. Lap the patch around the trailing edge for at least .5 inch. See figure 168. Trim off the loose edges of the patch and give it two coats of dope. After a light sanding, apply four inch tape at the chordwise edges and two inch tape at the spanwise edges, with half the tape overlapping the patch in each case. The repair is then ready for the final camouflage coat.

(2) DAMAGE REPAIRABLE BY REPLACEMENT.—If a large section of fabric is damaged on both sides of the aileron, or if it has been necessary to remove a large section on both sides in order to make rib or skin repairs, the following method may be used.

Remove the counter-weight on the leading edge of the aileron. Cut away the damaged section of fabric about an inch from the bordering rib. Use a new sheet of fabric of sufficient length to reach from the trailing edge, around the nose section and back to the trailing edge. Pull the fabric taut and sew along the trailing edge, using a baseball or overthrow stitch. Knot the sewing every six inches to prevent raveling in case of a broken thread. Chordwise attachment of the replaced section should be made as indicated in paragraph 4.*e*.(1)*(b)*, preceding.

(3) DAMAGE THAT NECESSITATES THE COMPLETE RECOVERING OF THE AILERON. —This type of repair is necessary when the damage is throughout the span of the aileron; or after a long period of time, the fabric loses its life and has to be replaced.

(a) STRIPPING OF THE AILERON FRAME.—Remove all of the sections of the aileron balance weight along the leading edge. Remove the aileron trim tab half-hinge from the upper surface and the metal strip on the lower surface. Rip off all of the old fabric and finishing tape from the frame. Rub off any dirt or foreign matter that may have collected on the frame. Soften the old dope that is in the attaching channels by brushing on dope thinner. Spread the channels slightly apart at one end with a screw driver and work the ends of the attaching wires out. Remove each wire from the channel by grasping the free end with a pair of pliers and pulling straight back. Push the spreaded end of the channels back into position. Clean all of the old fabric and dope out of the channels with steel wool.

Apply two spray coats of pigmented camouflage dope to the surface. Apply these coats wet and very heavy so as to wet all previous coats, thereby giving a smooth uniform surface.

(4) DOPING PRECAUTIONS.

(a) VENTILATION. — Doping should be carried on only in a room that is well ventilated. Prolonged breathing of dope is dangerous due to its severe toxic effect.

(b) TEMPERATURE AND HUMIDITY.— To prevent blushing of the surface, doping should be carried on at temperatures from 20 degrees to 23 degrees C. (68 degrees to 73 degrees F.) The relative humidity should not be under 60 per cent. Blushing of dope is flat or milky looking spots appearing on the surface.

(c) FIRE PRECAUTION.—Nitrate dope is very inflammable. Exercise fire precaution measures to the fullest extent. Ground all surfaces while sanding with clamps and cables to prevent the accumulation of static electricity.

(d) BLUSHING.—The addition of 4 ounces of blush retarding thinner per gallon of dope will have a tendency toward preventing blushing.

(e) THINNING AND HANDLING OF DOPES.—It is very important that the proper viscosity of the dope be maintained while handling. Do not use dope that has been left open to the air for more than an hour without being returned to the central container. Dope in the central container should be checked and thinned to the proper viscosity once per hour.

f. MASS BALANCING.

(1) CONTROL SURFACE MASS BALANCE TOLERANCES.

(a) Movable control surfaces ordinarily possess an inherent tail heavy characteristic that is compensated for by the addition of counterbalance weights forward of the hinge line of the surface. In order to prevent flutter during flight, the mass balancing of the C-46 ailerons, elevators and rudder must be maintained within the following tolerances:

Surface	Static Unbalance Tolerances (C-46, C-46A, C-46D)	Static Unbalance Tolerances (C-46E, C-46F)
Aileron (each)	+ 5 ± 20 in-lb	+ 5 ± 20 in-lb
Elevator (each)	+ 750 ± 70 in-lb	+ 410 ± 70 in-lb
Rudder	+ 700 ± 70 in-lb	+ 700 ± 70 in-lb

(Note + (plus) unbalance indicates that the center of gravity of the control surface is aft of the hinge line.)

(2) BALANCING PROCEDURE FOR CONTROL SURFACES.

(a) GENERAL.—Following the repair of damage or the rework of the ailerons, rudder or elevator, the unbalance should be checked to see if the specified tolerance has been exceeded. If the specified tolerances are not met, lead balance weights must be either added to or removed from the leading edge of the control surface. (All control surfaces must be complete with tab assembly before a mass balance check is performed.) The balancing procedure to be used is as follows:

1. Mount the control surface on a stand, using the two-end hinge brackets to fasten the surface. Make certain that the hinge line is parallel to the ground and that the surface is free to pivot with a minimum of restraint about its hinge line.

2. If the control surface is tail heavy (center of gravity aft of hinge line) suspend a container from the leading edge and add weight until the control surface is balanced. (Chord line is parallel to the ground.) If the control surface is nose heavy (center of gravity ahead of hinge line) place a small weight on the top surface and slide it fore or aft until the surface is balanced.

3. Measure the distance from the point of suspension of the container or the weight to the control surface hinge line. This distance is designated as "X." For distances forward of the hinge line indicate "+X" and for distances aft of the hinge line indicate "—X." Remove the container or weight and weigh it. This weight is designated as "W."

4. To determine the static unbalance of the control surface use the following equation.

Static Unbalance = (W)(X) inch-pounds.
As an example:

An elevator mounted on a stand requires 52 pounds of weight to balance it. The container weighing 52 pounds is suspended 10 inches forward of the hinge line. The static unbalance therefore, is given as WX = (52 lb) (+10 in.) = +520 inch-pounds. This unbalance value is not within the specified tolerance of 410 ±70 inch-pounds and, therefore, sufficient balance weight must be added to the leading edge of the elevator until static unbalance comes within the range of 410 ±70 inch-pounds.

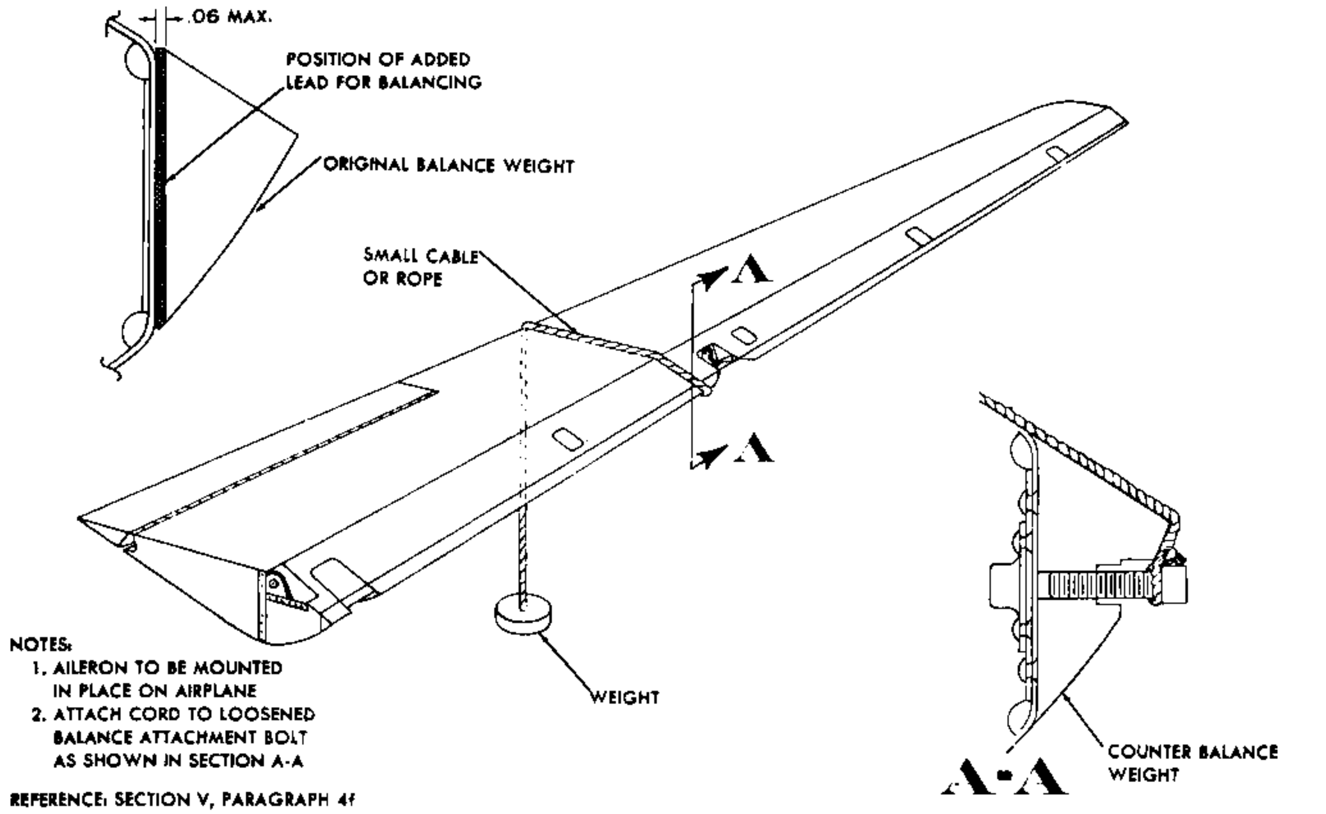
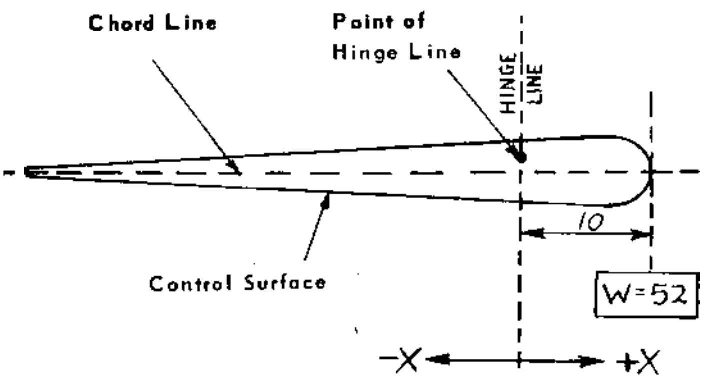


FIGURE 170—AILERON MASS BALANCING



Unbalance = WX inch-pounds
W = 52 pounds
X = 10 inch
Unbalance = 52 x 10 = 520-in-lb

5. After the addition (or removal) of lead weight, the unbalance of the control surfaces will be rechecked to insure that the control meets the specified tolerances of mass balance.

5. FLAPS.

a. GENERAL.—The flaps are of the conventional type located on the trailing edge of the wing. There are two flaps on each side of the airplane, one attached to the center panel and one to the outer panel.

The construction consists of ribs interconnected by spanwise stringers with stub beams at the hinge points to support the hinges and actuating controls. The entire structure is covered by a thin stressed kin. Figures 171 and 172 show the construcion.

b. SKIN.

(1) NEGLIGIBLE DAMAGE.—Dents free from cracks or abrasions may be neglected. However, they should be restored to the original contour to prevent further damage from developing.

(2) DAMAGE REPAIRABLE BY PATCHING.—Any damage not classed as negligible may be repaired by patching.

Clean up the damaged area rounding all sharp corners to a .5 inch radius and stopping all cracks with a ⅛ inch hole at each end.

Cover the damage with a patch the same gage as the skin attached with two rows of LS1127-5 rivets a .63 ± .06 inch spacing.

(3) DAMAGE REPAIRABLE BY INSERTION.—Damage which, when cleaned up, is 6 inches across the narrowest dimension may, if so desired, be repaired by insertion.

Cut the damage to a rectangular pattern using the insert which is the same gage as the skin as a template. Rivet the insert to the stringers and ribs with the same size rivets and spacing as existed originally. The insertion is connected to the undamaged skin on all sides by means of splice plates 2.5 inches wide and the same gage as the skin. For riveting refer to the attachment of the patch above and to figure 174. Figure 173 shows the flap skin gages.

c. BEAMS.—The stub beams located at the hinge points have flat sheet webs with extruded angles for flanges. The web is made up in three sections each being approximately 10 inches in length. If a section is damaged remove and replace with an identical piece. If a lightening hole is not formed in the new web, a .5 x .63 stiffener of the same gage as the web extending from the upper to the lower flange and riveted through the .63 leg along the centerline of the original hole, should be added. Figure 175 shows the flap beam structure.

If a flange is damaged, it will be necessary to replace it with a similar extrusion or a substitute chosen from figures 231 and 232.

All damaged fittings etc., should be replaced.

d. RIBS.

(1) GENERAL.—The construction of all the ribs with one exception is the same as that of the stabilizer ribs and should, therefore, be repaired in the same manner. See section VII, paragraph *1* d.

The one exception is the addition of the extruded stiffeners to the ribs in the region of the hinge attachment. If the damage to these ribs does not include the stiffeners, the repairs will be the same as above. If, however, the stiffeners are included, repair or replace according to figures 231 and 232. If more than one-half of the stiffener is damaged, it will be necessary to make a replacement and if less than one-half of stiffener is damaged it may be repaired by splicing in an insertion.

e. TRAILING EDGE CHANNEL.—This channel is similar in construction to the outboard portion of the stabilizer beam and may be repaired in the same manner (see section VII, paragraph *1. c.*) with the exception of the following item:

To splice the flanges use an .040 nested angle picking up four AN442AD5 rivets each side of the damage. See figure 176.

If the damage extends into a rib or fitting connection, repair should be made by insertion and if the fitting is damaged it should be replaced.

All clips, brackets or angles (less than 10 inches in length) should be replaced when damaged.

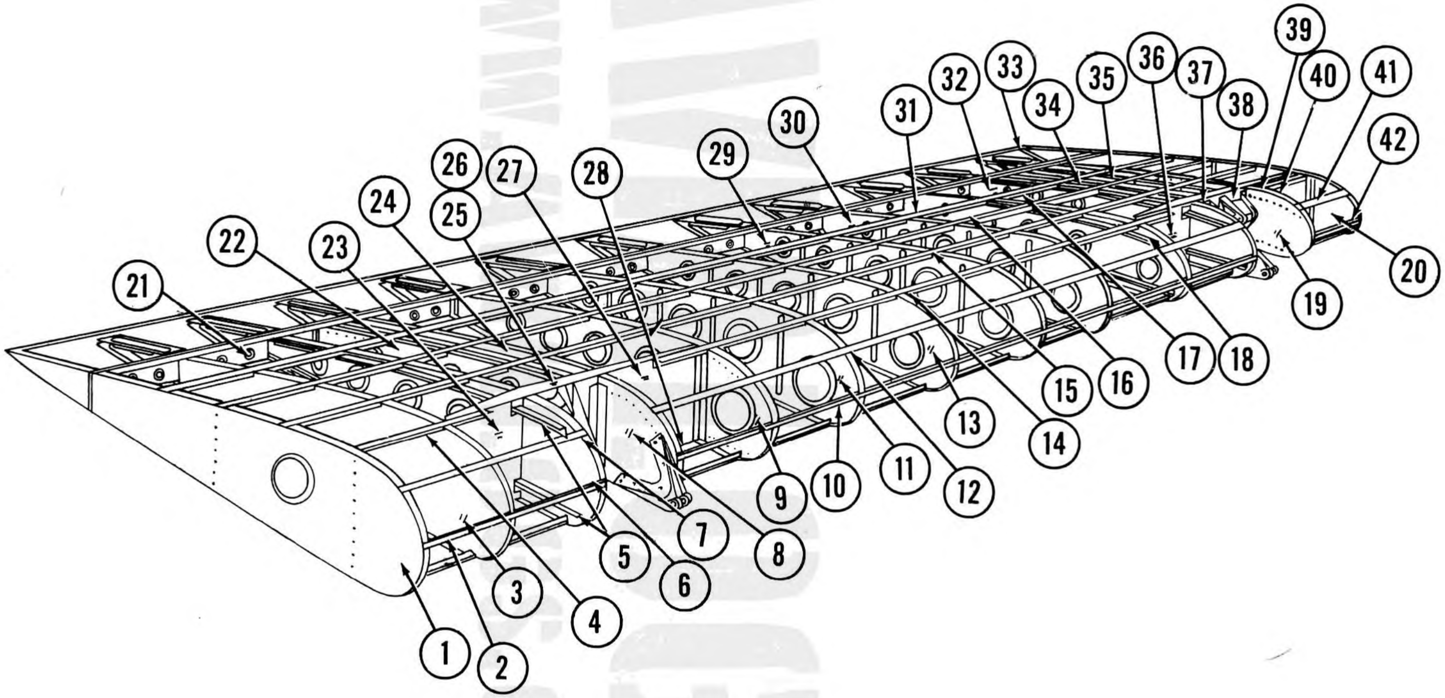


FIGURE 171 — FLAP STRUCTURE — CENTER PANEL

TABLE 60
COMPONENT PARTS OF FLAP — CENTER PANEL

Item	*Designation*	*Station No.*	*Part No.*
1	Rib Assembly	0	
2	Stringer		Alcoa Die No. 29093
3	Rib Assembly	10.20	20-070-1101-3
4	Stringer		Alcoa Die No. 15262
5	Stringers		Alcoa Die No. 29096
6	Rib Assembly	20.41	20-070-1101-4
7	Stringer		Alcoa Die No. 29093
8	Rib Assembly	29.58	20-070-1101-89
9	Rib Assembly	42.23	20-070-1101-8
10	Stringer		Alcoa Die No. 29093
11	Rib Assembly	54.89	20-070-1015-1
12	Stringer		Alcoa Die No. 29093
13	Rib Assembly	67.55	20-070-1015-1
14	Stringer		Alcoa Die No. 15262
15	Stringer		Alcoa Die No. 29093
16	Stringer		Alcoa Die No. 29093
17	Stringer		Alcoa Die No. 29093
18	Stringer		Alcoa Die No. 29096
19	Rib Assembly	127.35	20-070-1101-30
20	Rib Assembly	134.63	20-070-1101-10
21	Channel Assembly		20-070-1102-1
22	Rib Assembly	24.98	20-070-1101-87
23	Web		.040
24	Rib Assembly	27.54	20-070-1101-88
25	Stringer (Top)		Alcoa Die No. 77F
26	Web		.064
27	Web		.040
28	Stringer (Bottom)		Alcoa Die No. 77R
29	Rib Assembly	80.21	20-070-1015-1
30	Rib Assembly	92.86	20-070-1015-1
31	Rib Assembly	105.52	20-070-1101-9
32	Rib Assembly	118.18	20-070-1101-7
33	Trailing Edge		Alcoa Die No. 29659
34	Rib Assembly	120.22	20-070-1101-6
35	Rib Assembly	122.78	20-070-1101-5
36	Web		.040
37	Stringer		Alcoa Die No. 77F
38	Web		.064
39	Stringer		Alcoa Die No. 29093
40	Web		.032
41	Stringer		Alcoa Die No. 29093
42	Stringer		Alcoa Die No. 29093

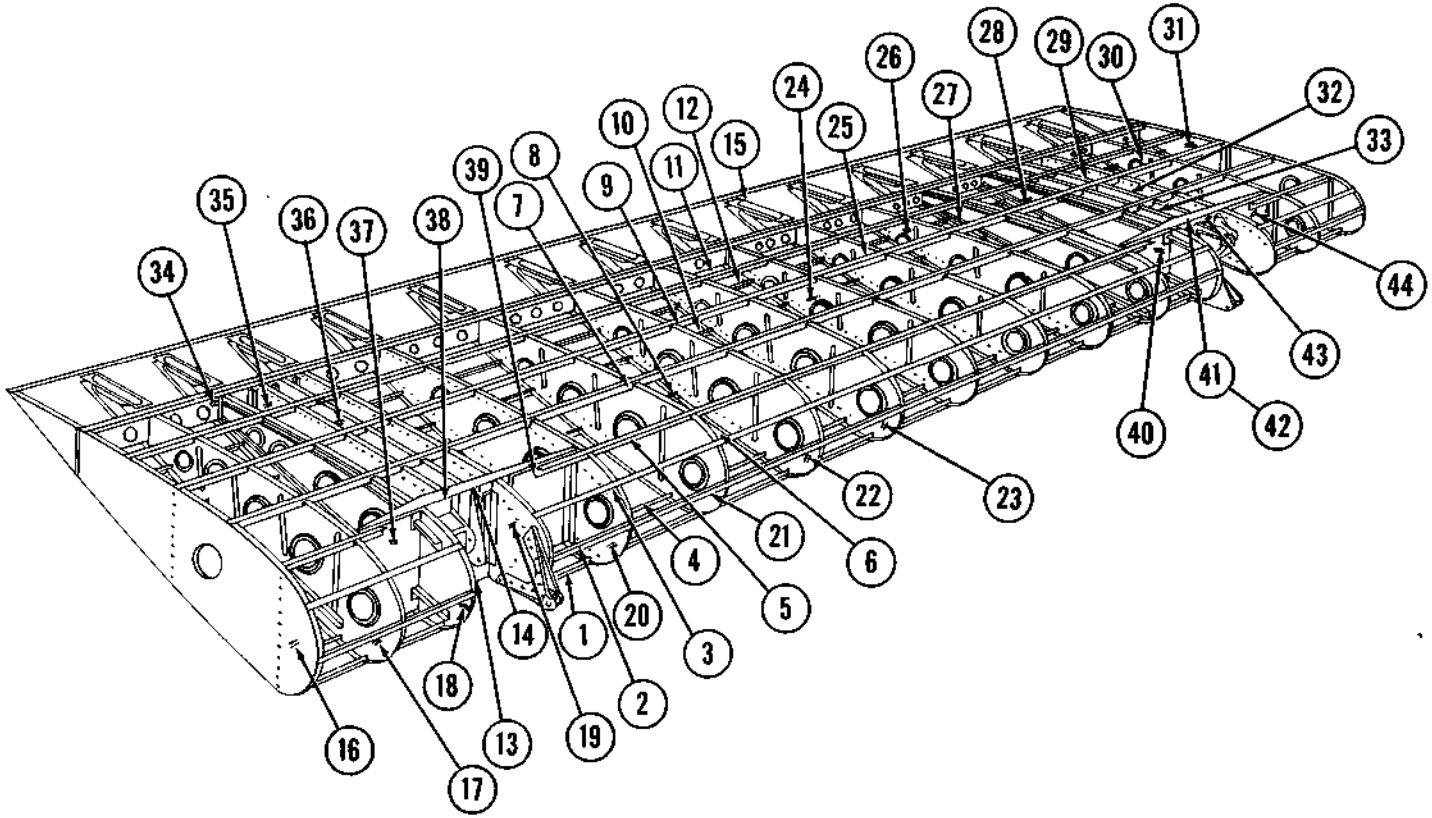
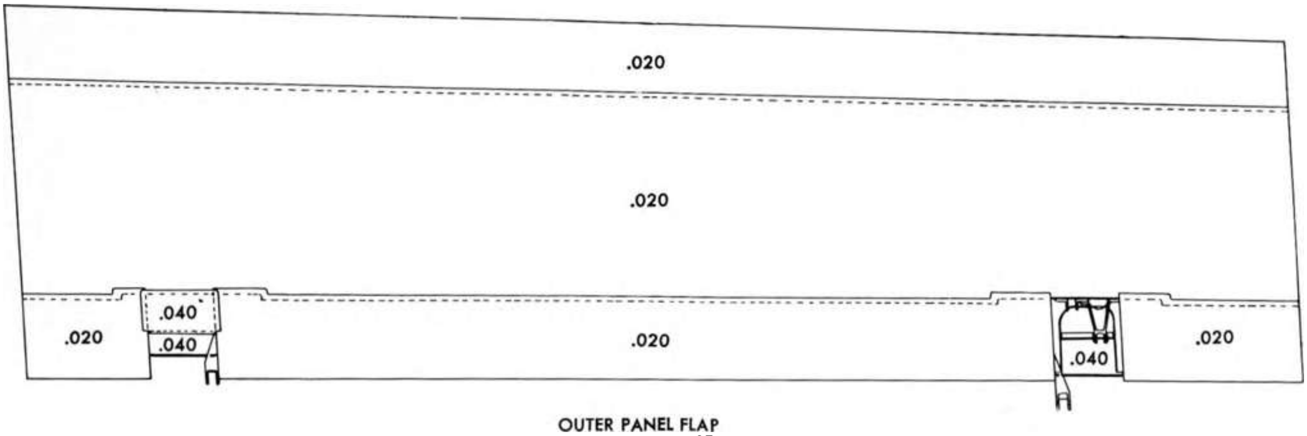


FIGURE 172 — FLAP STRUCTURE — OUTER PANEL

TABLE 61
COMPONENT PARTS OF FLAP—OUTER PANEL

Item	*Designation*	*Station No.*	*Part No.*	*Gage*
1	Stringer		Alcoa Die No. 29093	
2	Stringer		Alcoa Die No. 29093	
3	Stringer		Alcoa Die No. 29093	
4	Stringer		Alcoa Die No. 29093	
5	Stringer		Alcoa Die No. 15262	
6	Stringer		Alcoa Die No. 15262	
7	Stringer		Alcoa Die No. 29093	
8	Stringer		Alcoa Die No. 29093	
9	Stringer		Alcoa Die No. 29093	
10	Stringer		Alcoa Die No. 29093	
11	Stringer		Alcoa Die No. 29093	
12	Stringer		Alcoa Die No. 29093	
13	Lower Stringer		Alcoa Die No. 77R	
14	Upper Stringer		Alcoa Die No. 77F	
15	Trailing Edge		Alcoa Die No. 29659	
16	Rib Assembly	0	20-070-1001-2	.032
17	Rib Assembly	8.42	20-070-1020-1	.032
18	Rib Assembly	16.53	20-070-1001-4	.045
19	Rib Assembly	25.7	20-070-1001-7	.045
20	Rib Assembly	38.51	20-070-1001-8	.032
21	Rib Assembly	51.02	20-070-1021-2	.020
22	Rib Assembly	63.53	20-070-1021-5	.020
23	Rib Assembly	76.03	20-070-1021-7	.020
24	Rib Assembly	88.54	20-070-1018-2	.020
25	Rib Assembly	101.04	20-070-1018-5	.020
26	Rib Assembly	113.55	20-070-1018-7	.020
27	Rib Assembly	126.06	20-070-1028-1	.032
28	Rib Assembly	138.3	20-070-1001-10	.045
29	Rib Assembly	147.47	20-070-1001-13	.045
30	Rib Assembly	159.31	20-070-1019-1	.032
31	Rib Assembly	171.58	20-070-1001-15	.032
32	Rib Assembly	142.9	20-070-1001-12	.045
33	Rib Assembly	140.34	20-070-1001-11	.045
34	Channel Assembly		20-070-1024-1	.032
35	Rib Assembly	21.10	20-070-1001-5	.045
36	Rib Assembly	23.66	20-070-1001-6	.045
37	Web		20-070-1001-47	.032
38	Web		20-070-1001-48	.064
39	Web		20-070-1001-49	.040
40	Web		20-070-1001-50	.040
41	Upper Stringer		Alcoa Die No. 77F	
42	Lower Stringer		Alcoa Die No. 77R	
43	Web		20-070-1001-51	.064
44	Web		20-070-1001-52	.032



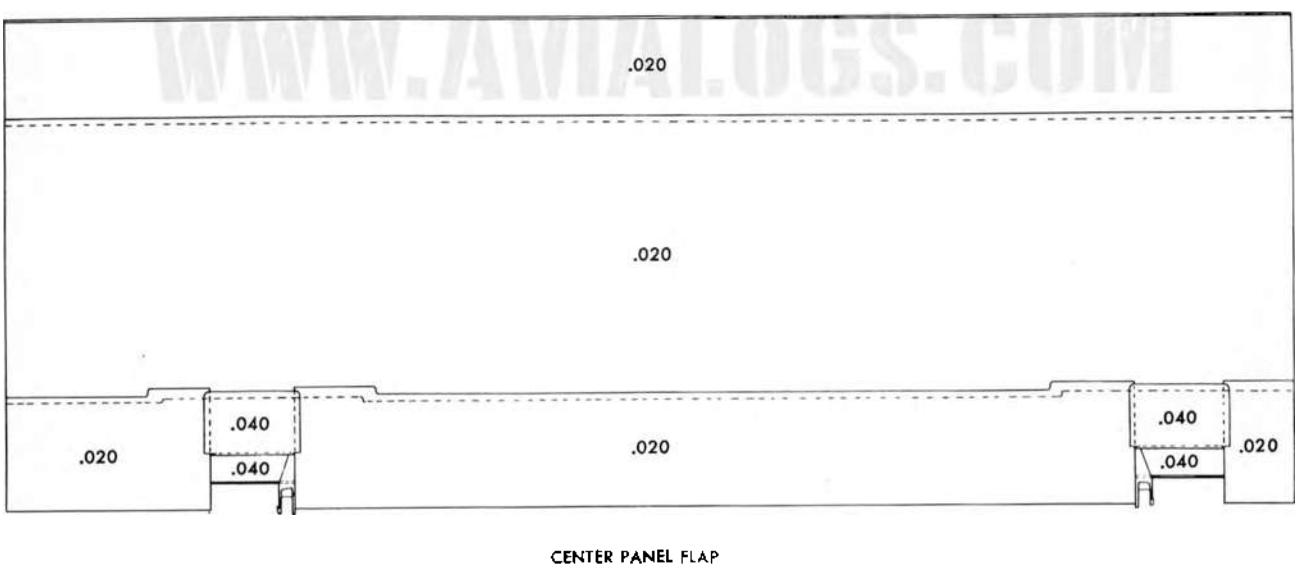
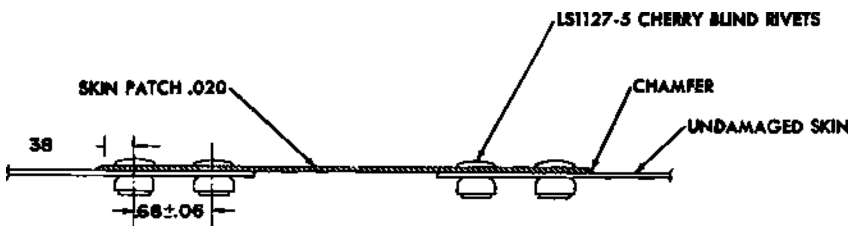


FIGURE 173—FLAP SKIN DIAGRAM



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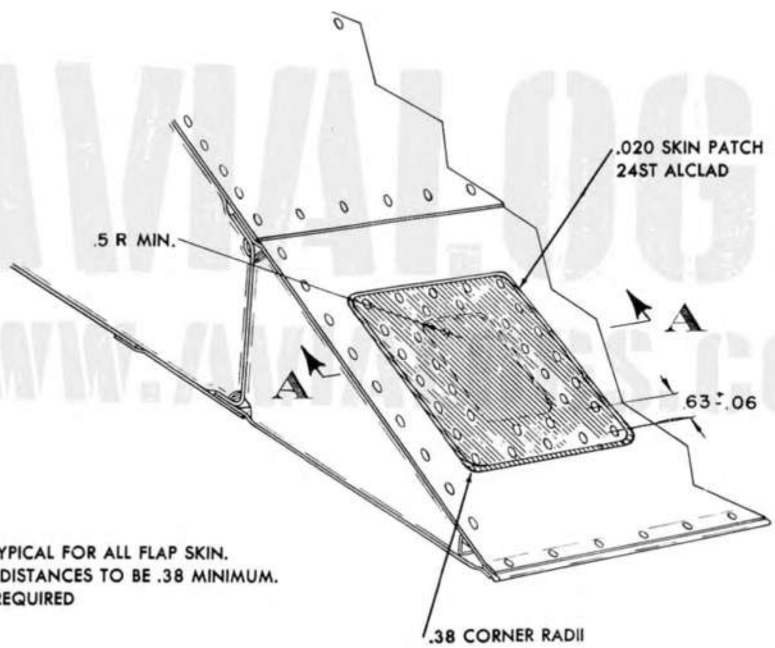


NOTES:
1. THIS REPAIR IS TYPICAL FOR ALL FLAP SKIN.
2. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM.
3. USE FILLERS AS REQUIRED

REFERENCE: SECTION V, PARAGRAPH 5b

FIGURE 174—FLAP SKIN REPAIR

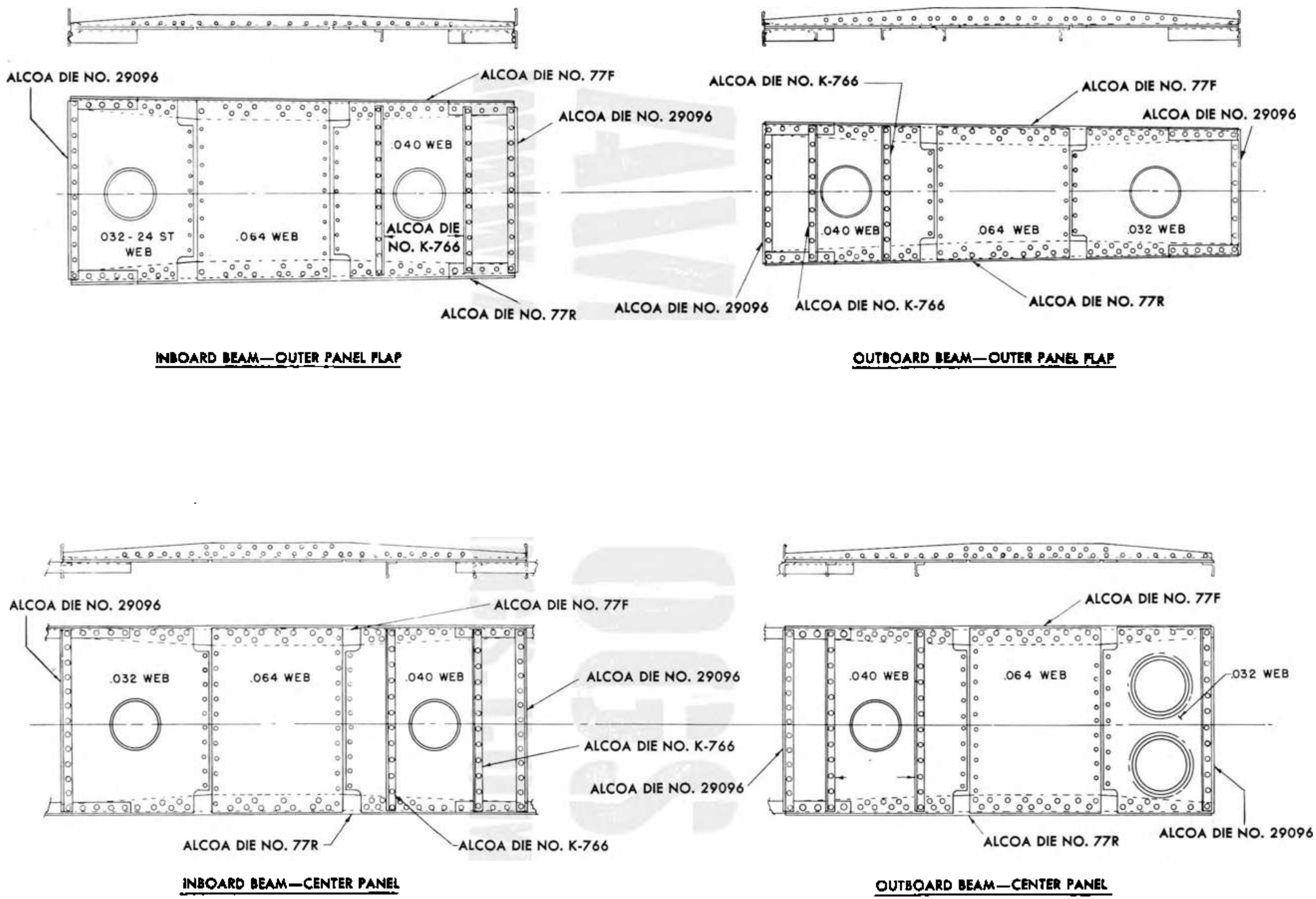
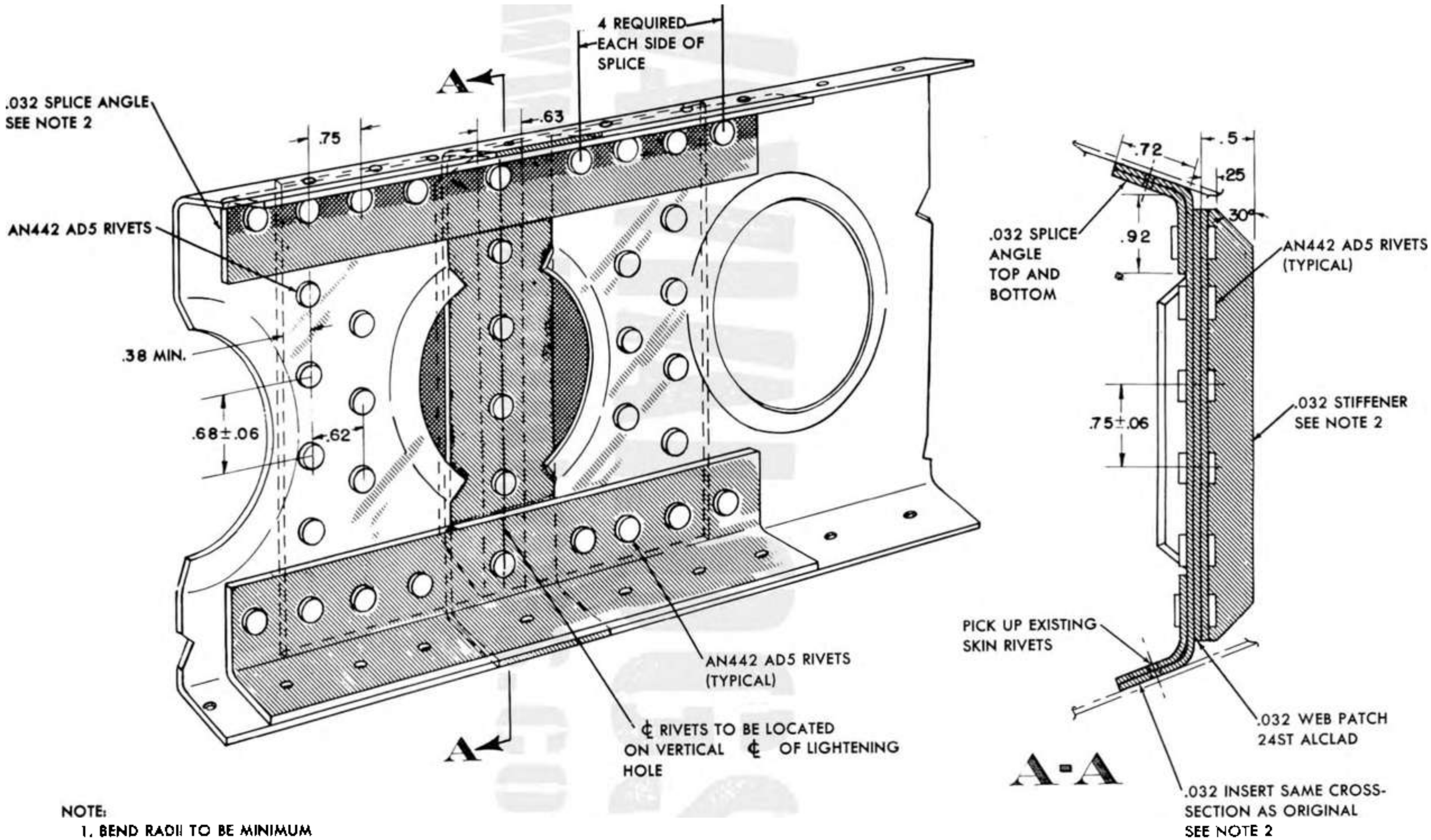


FIGURE 175—COMPONENT PARTS OF FLAP BEAMS



NOTE:
1. BEND RADII TO BE MINIMUM FOR MATERIAL USED
2. ALL FORMED PARTS TO BE 24SO ALCLAD HEAT TREATED
3. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM

REFERENCE: SECTION V, PARAGRAPH 5e

FIGURE 176—FLAP TRAILING EDGE CHANNEL REPAIR

TABLE 62
MATERIALS FOR WING REPAIR

Material	*Stock*	*Size*
24ST	Sheet, aluminum alclad	.020
24ST	Sheet, aluminum alclad	.025
24ST	Sheet, aluminum alclad	.028
24ST	Sheet, aluminum alclad	.032
24ST	Sheet, aluminum alclad	.036
24ST	Sheet, aluminum alclad	.040
24ST	Sheet, aluminum alclad	.045
24ST	Sheet, aluminum alclad	.051
24ST	Sheet, aluminum alclad	.064
24ST	Sheet, aluminum alclad	.102
24ST	Sheet, aluminum alclad	.156
24ST	Sheet, aluminum alclad	.188
X4130*	Sheet, steel	.063
X4130*	Sheet, steel	.078
X4130*	Sheet, steel	.102
X4130*	Sheet, steel	.125
1179-D-2	Nut Plate	10-32
1178-D-3	Nut Plate	8-32
1088-D-1	Nut Plate Spacer	
671-D-4AD	Rivet, brazier head	1/8
671-D-5AD	Rivet, brazier head	5/32
671-D-6AD	Rivet, brazier head	3/16
AN426 AD3	Rivet, 100° countersunk	3/32
AN426 AD4	Rivet, 100° countersunk	1/8
AN426 AD5	Rivet, 100° countersunk	5/32
AN426 AD6	Rivet, 100° countersunk	3/16
AN442 AD4	Rivet, flathead	1/8
AN442 AD5	Rivet, flathead	5/32
AN442 AD6	Rivet, flathead	3/16
6-K-160	Rivnut	
LS-1127-4	Blind Rivet	1/8
LS-1127-5	Blind Rivet	5/32
LS-1127-6	Blind Rivet	3/16
AN525-10	Washer Head Bolt	
AN3-	Bolt, aircraft	
AN23-	Bolt, clevis	
AN365-1032	Nut, self-locking	
AC364-1032	Nut, self-locking	
AN960-10	Washer, plain	
Commercial	Sheet Lead	

*All Steel Sheet to be Normalized to 90000 LB/SQ IN. for X4130 Steel Plate, See Figures for Wing Spar Cap Repairs.

Wing Extrusion List

Alcoa Die No.		
77-A	778	29091
77-B	1287	29093
77-E	1288	29095
77-F	5290	29096
77-L	9823	29097
77-P	11026	29098
77-R	12037	29099
77-S	12679	29183
77-T	13641	29184
77-U	13839	29185
77-V	14089	29186
77-W	15262	29187
77-Y	15263	29188
78-A	15276	29189
78-C	15614	29190
78-F	15643	29191
78-J	16849	29192
78-K	24383	29193
78-M	24596	29387
78-Y	26659	29388
79-O	28928	29390
734-MM	29083	29391
734-T	29084	29571
766	29089	29572
	29090	

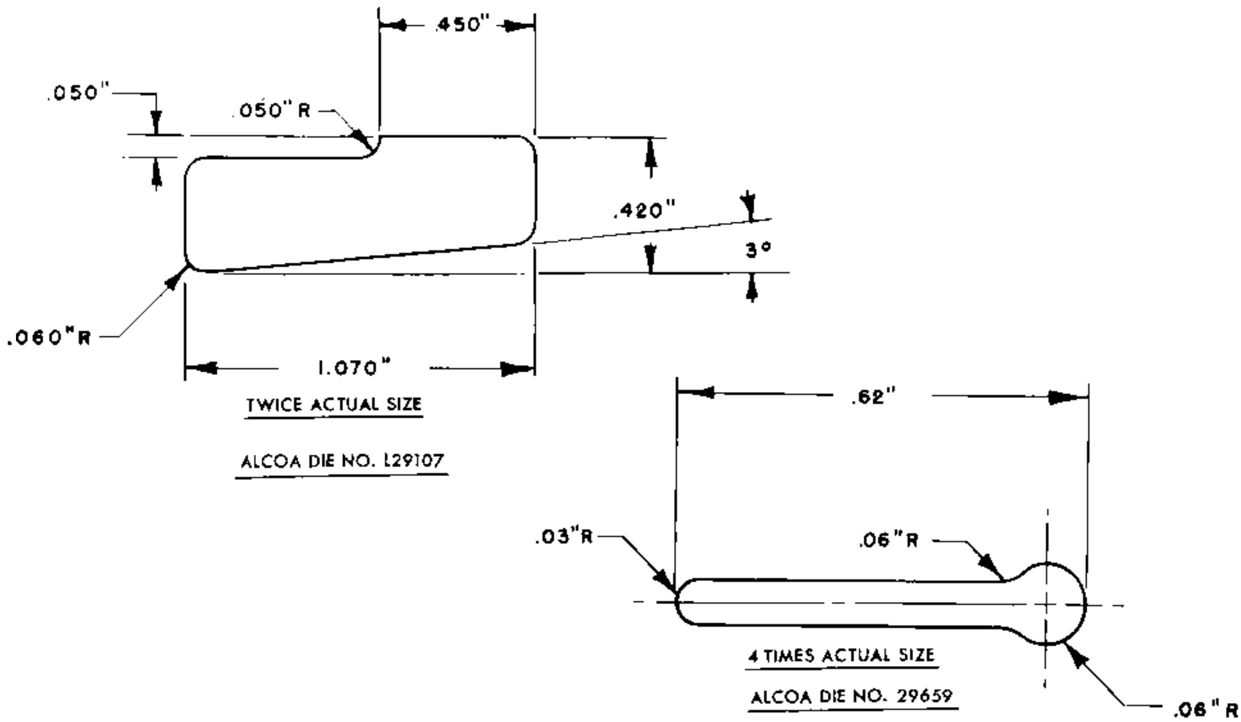


FIGURE 177—WING—SPECIAL EXTRUSIONS

SECTION VI
NACELLE REPAIR

1. GENERAL.

a. The nacelle is of the same type of construction as the fuselage, employing ring bulkheads, stringers, and stressed skin. To the forward end is attached the power plant assembly which includes the firewall and engine mount. The aft end fairs into the upper and lower surfaces of the wing. Right and left hand nacelles are essentially the same except for the location and size of the holes in the skin. See figure 178 and table 63.

b. The bottom of the nacelle is open with provision for the attachment of the landing gear doors. The existence of these doors makes it possible to gain easy access to any part of the nacelle.

c. Since the landing gear ties into the wing and the nacelle, it is advisable to jack the wing before any extensive repairs are made. If any of the skins tying into the wing are to be replaced, the front end of the nacelle should be supported to prevent deflections.

2. SKIN.

a. GENERAL.

(1) The skinning diagram is given in figure 179. All skins are 24ST alclad except the lower forward sections which are of stainless steel.

(2) All skin joints are lapped, the forward skins lying over the aft skins and the upper skins lapping over the lower skins.

(3) All rivets are 671D-5AD except in a few isolated places where flathead or countersunk rivets are used.

b. NEGLIGIBLE DAMAGE.

(1) Skin dents, free from cracks, abrasions, and sharp corners may be neglected. These dents should be restored to shape wherever possible to prevent their developing into cracks. Care must be taken, however, not to stretch or crack the skin in the process. Inspect all rivets near the damage to see that they have not been loosened or sheared.

(2) Holes and cracks which can be cleaned up to a 1 inch diameter circle may be considered negligible provided the edge of the hole is a minimum of .75 inch from any rivet and 2 inches from any bulkhead. Such holes are covered with an .032 sheet using four 671D-4AD rivets equally spaced around the hole.

c. DAMAGE REPAIRABLE BY PATCHING.

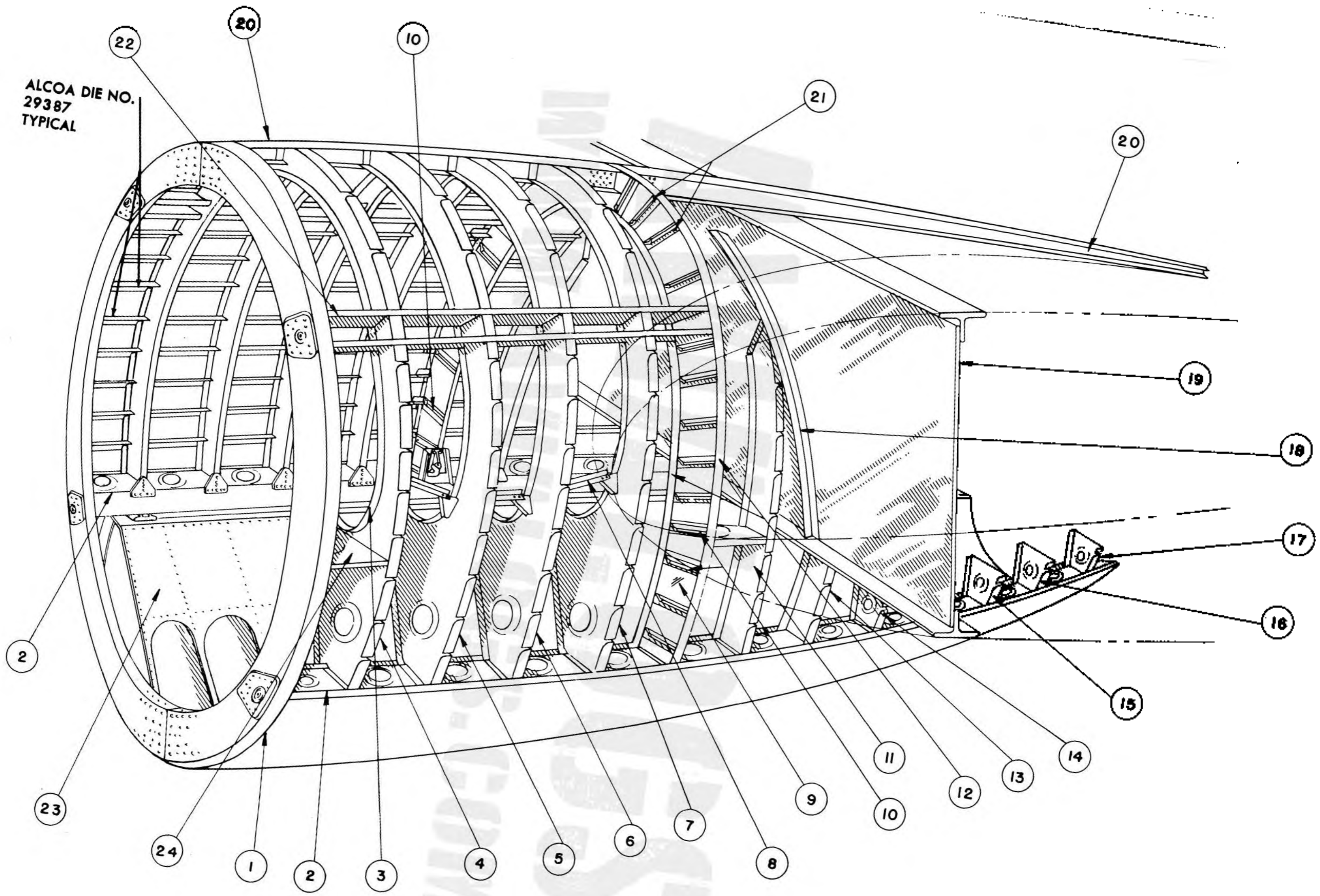
(1) The damaged skin is cleaned up, using .5 inch minimum corner radii. The rivets in the adjacent stringers and bulkheads are carefully drilled out and a sheet of similar gage to that of the damaged member is laid over the region and attached with a double row of 671D-5AD rivets. The rivet pattern should be similar to that of skin lap of the damaged skin that has the closest rivet spacing, and should include the rivet holes through the stringers and bulkheads. Figure 179 and table 64 give the rivet spacing of the various lap joints in the skin.

(2) When the damage is more extensive than that discussed above, the type of repair is similar except that fillers are used between the patch and any structure that is riveted to the skin.

(3) Damage that runs into the edge of the skin is patched as in paragraph (1) above except that the rivet pattern along the edge should be the same as the original pattern at that point. Use fillers as necessary.

(4) Damage running into a hole in a region such as on the inboard side just forward of the front beam, should be repaired as in figure 180. Where the skin has a doubler, use a .102 sheet for the patch using a rivet attachment as in paragraph (1) above.

d. DAMAGE REPAIRABLE BY INSERTION.—Damage covering more than two bays in any direction may be repaired by insertion. The damage is cut out in the form of a rectangle using the insertion as a template. Remove all rivets that will interfere with the repair and, using the necessary fillers, put the insertion in place, reriveting through the various stringers and bulkheads. Splice plates of the same gage as the skin are used on all four sides. The rivet pattern is as per paragraph (1) above.



REFERENCE: (1) SECTION VI, PARAGRAPH 1
(2) TABLE 63

FIGURE 178—NACELLE STRUCTURE

TABLE 63
COMPONENT PARTS OF NACELLE

	Item	*Station*	*Part No.*	*Gage*
1	Bulkhead	88	20-720-1004	.125 24SO Alclad
2	Lower Longeron		20-720-1001	.091 24SO Alclad
3	Flange		20-720-1005-11	.040 24SO Alclad
4	Bulkhead	98.8	20-720-1005	.040 24SO Alclad
5	Bulkhead	108.3	20-720-1006	.040 24SO Alclad
6	Bulkhead	117.8	20-720-1007	.040 24SO Alclad
7	Bulkhead	127.3	20-720-1008	.040 24SO Alclad
8	Extrusion		Alcoa No. 29101	
9	Bulkhead	136.8	20-720-1009	.064 24SO Alclad
10	Stiffeners	136.8	Alcoa No. 29390	
11	Bulkhead	145.9	20-720-1022	.040 24SO Alclad
12	Extrusions	136.8	Alcoa No. 77-R	
13	Bulkhead	152.85	20-720-1010	.072 24SO Alclad
14	Bulkhead	163.21	20-720-1011	.051 24SO Alclad
15	Bulkhead	180.96	20-720-1013	.051 24SO Alclad
16	Bulkhead	191.33	20-720-1014	.051 24SO Alclad
17	Bulkhead	201.66	20-720-1015	.051 24SO Alclad
18	Stiffeners		Alcoa No. K-78J	
19	Front Wing Spar		20-020-1005	
20	Top-Center Longeron		20-020-1003	.091 24SO Alclad
21	Stiffeners	136.8	Alcoa No. 77-B	
22	Upper Longeron		20-720-1002	.081 24SO Alclad
23	Landing Gear Door Assembly		20-720-1019	
24	Gusset		20-720-1053	.051 24SO Alclad

e. DAMAGE REQUIRING REPLACEMENT.——Since the various skins are fairly small, skin extensively damaged may be more easily replaced.

3. BULKHEADS

a. BULKHEAD STATION 88.—This ring bulkhead is a 1/8 inch thick channel of constant section. The existing splices do not occur at points of maximum load and *should not be used to make repairs at any other point*. Figure 181 gives the required splice for any damaged region of the ring. If the bulkhead cannot be straightened after damage (assuming no breaks), the damaged portion should be cut out and a new section installed, splicing each end in accordance with the above figure and the existing splices if a new section of ring is inserted to that point. Replace all clips, brackets, and fittings if damaged.

b. BULKHEADS STATIONS 98.8, 108.3, 117.8, AND 127.3.

(1) GENERAL.—These four bulkheads occur immediately aft of the forward ring bulkhead and serve primarily to support the oil tank and stiffen the stringers. They are open at the bottom to permit the gear to enter the nacelle. The bulkheads are intercostal between longerons and are of bent up channel section. Various channels and angles serve to stiffen the bulkhead locally.

(2) NEGLIGIBLE DAMAGE.

(*a*) Dents, free from cracks, abrasions, and sharp corners may be neglected. These dents should be restored to shape wherever possible to prevent their developing into cracks. Care must be taken, however, not to stretch or crack the material in the process.

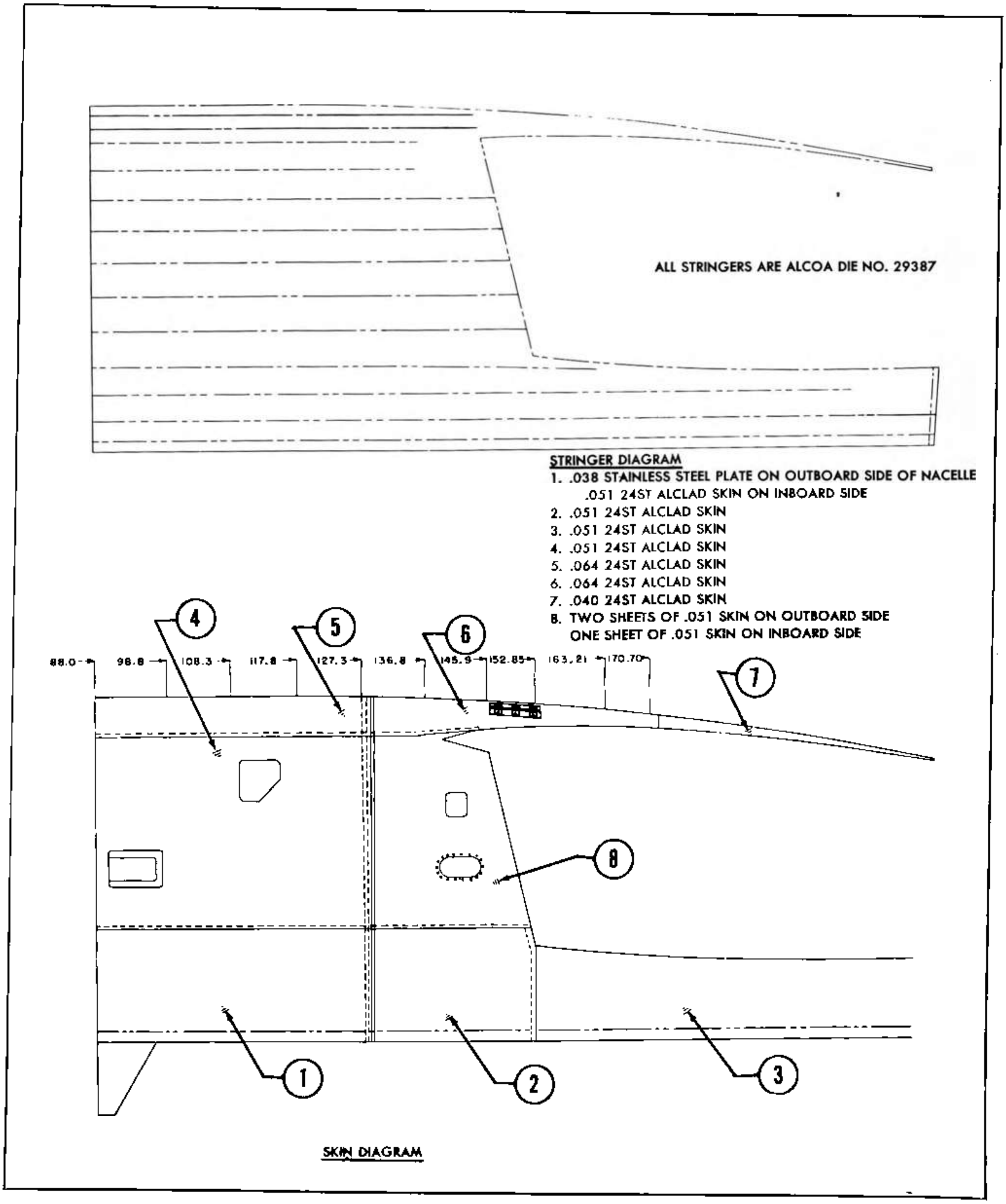


FIGURE 179 — NACELLE SKIN AND STRINGER DIAGRAM

TABLE 64
NACELLE SKIN RIVETING

HORIZONTAL SPLICES

Location	*Extent*	*Rivet Type*	*Number of Rows*	*Rivet Spacing*	*Row Spacing*
Upper Engine Mount Longeron	Station 88-136.8	671D-5AD	2	.63	1.0
Stringer No. 8	Station 88-152.9	671D-5AD	2	1.25	.63
Lower Longeron	Station 88-213	671D-5AD	2	2.00	.50
Upper Wing	Station 136.8-230	671D-5AD	1	2.00	—
Lower Wing	Station 152.9-213	AN442AD5	1	1.88	—

VERTICAL SPLICES

Location	*Extent*	*Rivet or Screw Type*	*Number of Rows*	*Rivet Spacing*	*Row Spacing*
Station 88	Lower Longeron to Upper Engine Mount Longeron	671D-5AD	2	1.25	.75
Station 127.3	Lower Longeron to Upper Engine Mount Longeron	671D-5AD	2	.88	.62
Front Beam	Upper Engine Mount Longeron to Stringer No. 8	AN442-AD5	2	1.25	.38
Station 152.9	Stringer No. 8 to Lower Longeron	671D-AD5	2	.68	.63
Station 170.7	Top	AN526-832	1	.88	—
Station 213.2	Bottom	671D-5AD	2	1.00	1.00

(*b*) Nicks in the edges of the outstanding legs of angles which, when cleaned up with a round file, are less than 1/5 the length of the leg, may be neglected. Be sure that no sharp corners exist.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) Damage to a web flange alone may be repaired by nesting an .040 angle in the damaged region. Six 5/32 rivets per side of damage are required. Rivets through the skin are to be 671D-5AD and all other rivets AN442AD5. Figure 182 shows the rivet locations and general view of the patch.

(*b*) Damage including more than the flange is repaired by an .040 channel nested into the bulkhead. Use four AN442AD5 rivets through the back of the channel and two through the flanges per side of damage. Rivet spacing should be .63 $\pm$ .13 inches. Rivets through skin are 671D-5AD.

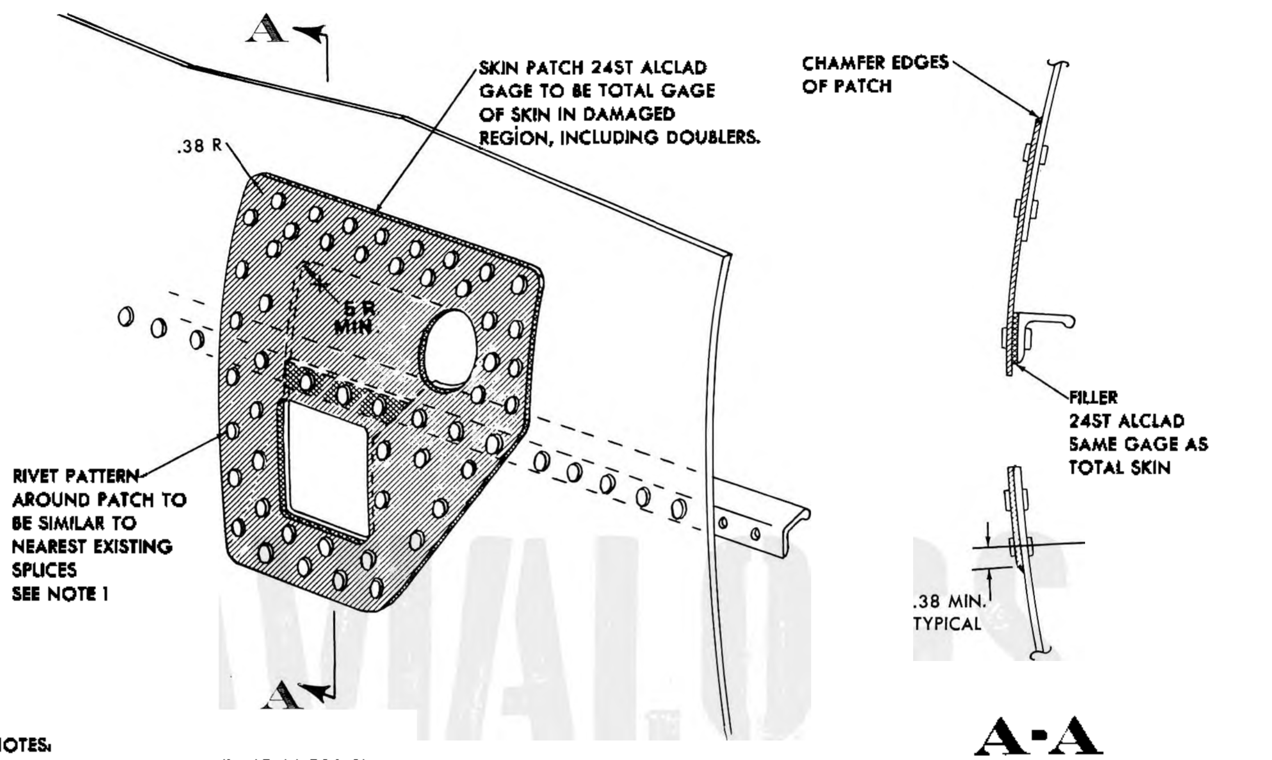
(*c*) The angle adjacent to the oil tank is repaired by nesting an .040 angle of the same leg dimensions into the damaged region and picking up three AN442AD4 rivets each side of the damage. The original rivet holes may be used with added rivets midway between. (See figure 183.)

(*d*) The region below the tank may be patched with .040 sheet using AN442AD5 rivets at .68 $\pm$ .06 inch spacing. If the break runs into a hole, carry the patch around the hole with the same spacing.

(*e*) Fillers are to be used in the above cases whenever necessary.

(*4*) DAMAGE REPAIRABLE BY INSERTION.

(*a*) Damage occurring within 3 inches of a longeron is repaired by cutting out the end of the bulkhead and splicing in a new section using the same attachment as is used for patches. (See figure 182.)



NOTES:
1. SEE FIGURE 179 AND TABLE 64 FOR SKIN GAGES AND RIVET PATTERN
2. FOR REPAIR TO STRINGERS IN THIS REGION, REFER TO FIGURE 179 FOR DIE NO. AND FIGURE 232 FOR REPAIR
3. MINIMUM RIVET EDGE DISTANCE TO BE .38
4. CARRY PATCH AROUND HOLE AS SHOWN

REFERENCE: SECTION VI, PARAGRAPH 2c

FIGURE 180—NACELLE SKIN PATCH ADJACENT TO FRONT SPAR

(*b*) If the extent of damage after cleanup is more than 5 inches, an insert of the same section as the bulkhead is fitted in place and spliced at each end as in paragraph (*a*) above.

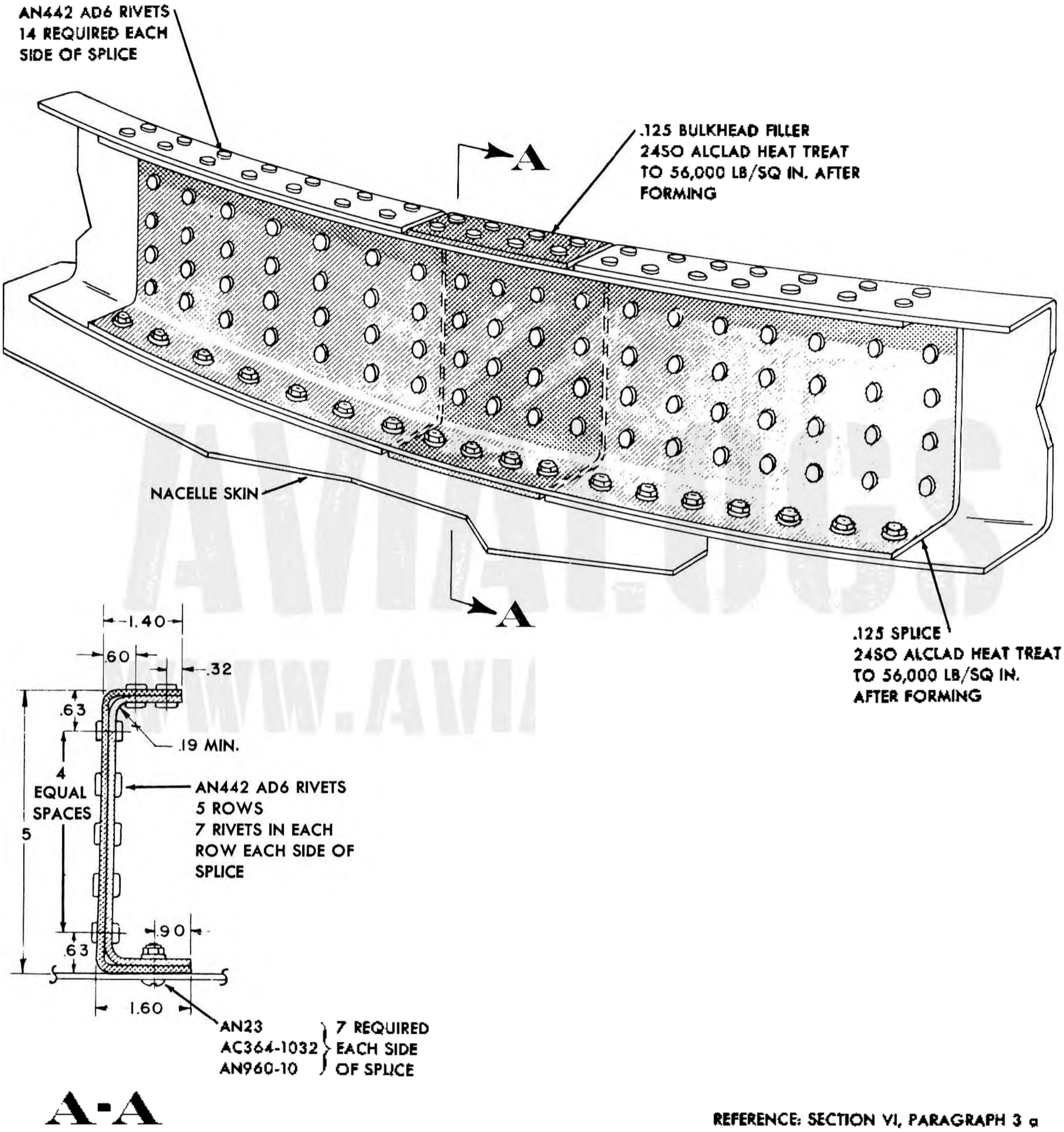
(5) DAMAGE REQUIRING REPLACEMENT.

(*a*) All clips, gussets, brackets, and short angles should be replaced.

(*b*) Extruded shapes may have the substitutions given in figures 231 through 233.

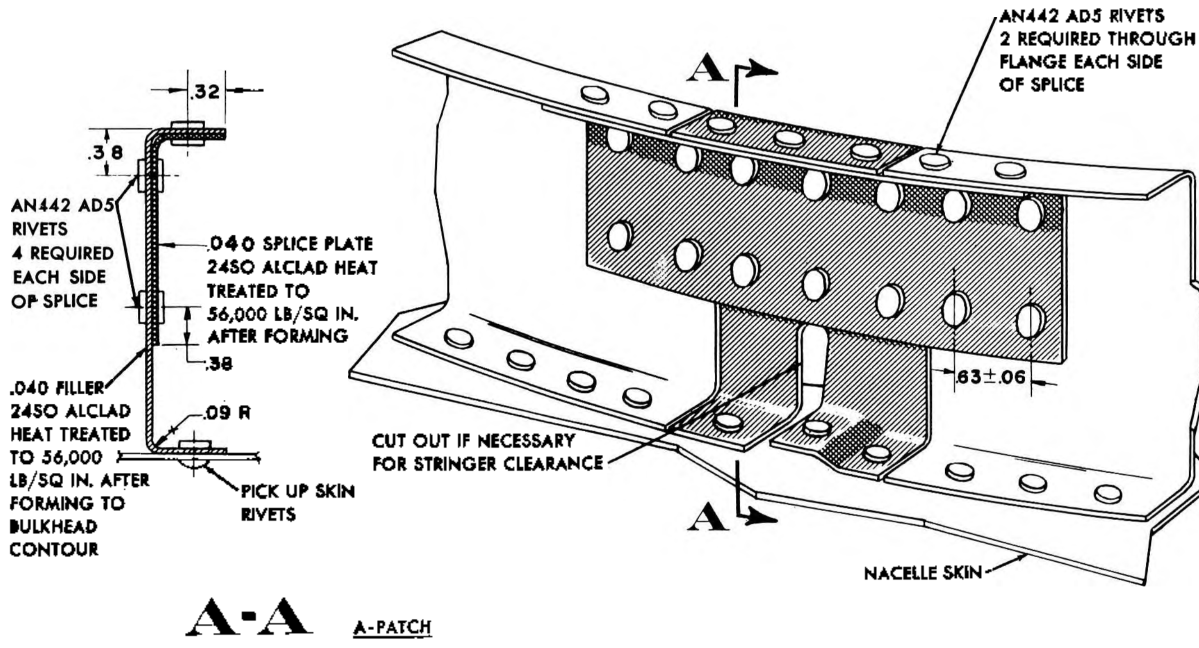
c. BULKHEAD STATION 136.8.

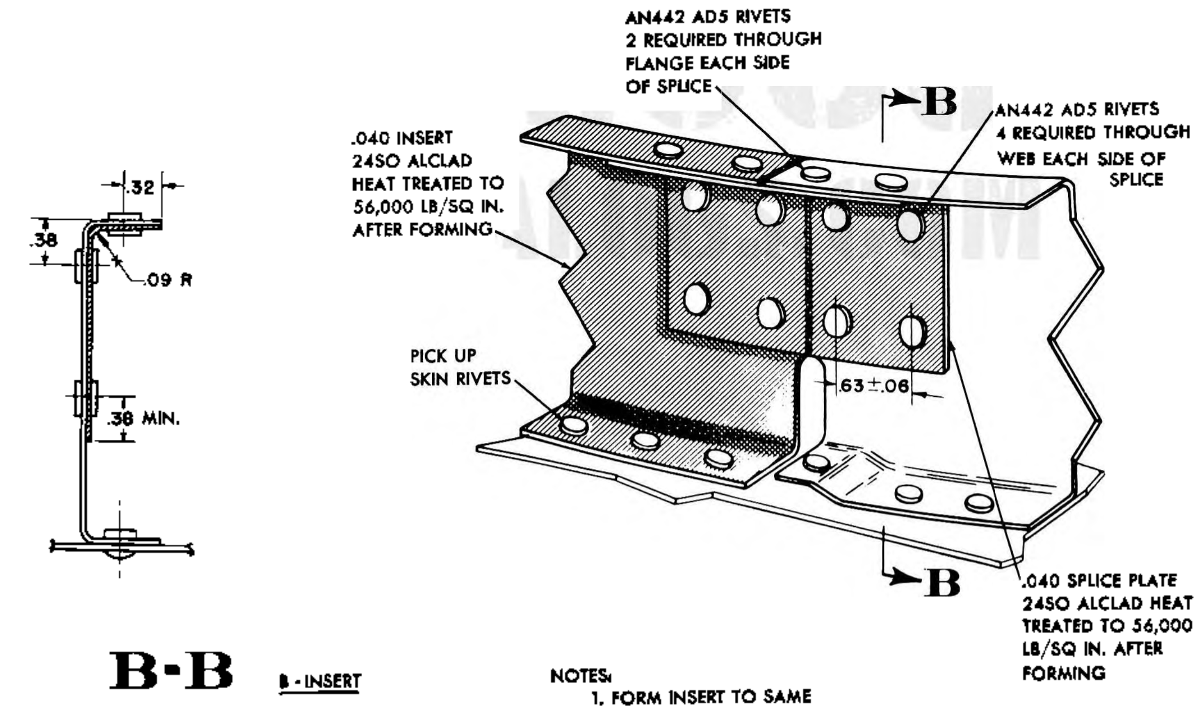
(*1*) GENERAL.—This bulkhead takes primarily landing gear loads. It is constructed in the form of a curved beam with inner and outer flanges and an .064 web stiffened by radially extending extrusions. Since the flanges are curved, it will be necessary to bend the splices or inserts to fit the contour.



REFERENCE: SECTION VI, PARAGRAPH 3 a

FIGURE 181—NACELLE BULKHEAD REPAIR—STA. 88





NOTES:
1. FORM INSERT TO SAME CONTOUR AS ORIGINAL
2. SPLICE TO BE SIMILAR TO THAT SHOWN IN A

REFERENCE: SECTION VI, PARAGRAPH 3b

FIGURE 182—NACELLE BULKHEAD REPAIR—STA. 98.8 TO 127.3

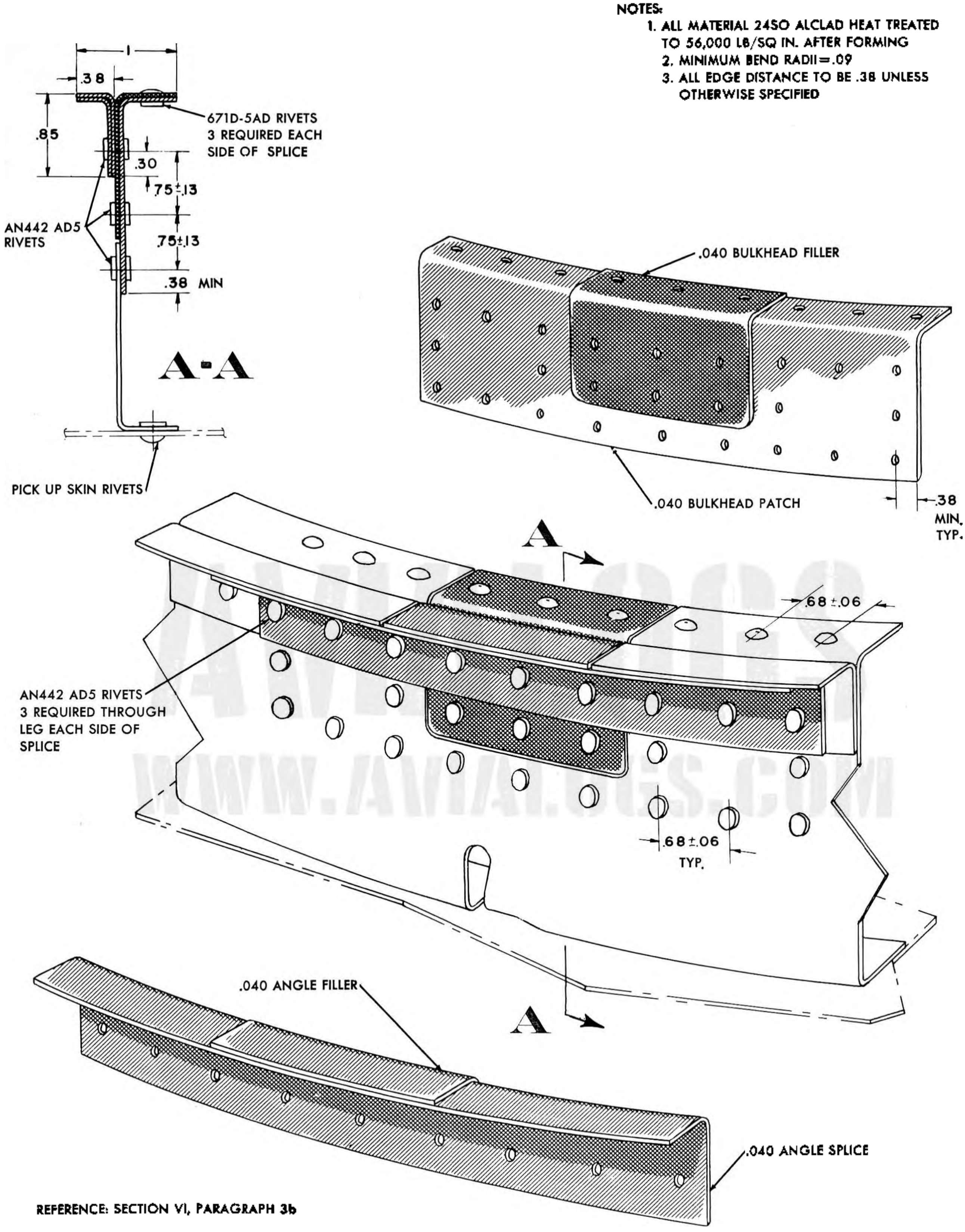
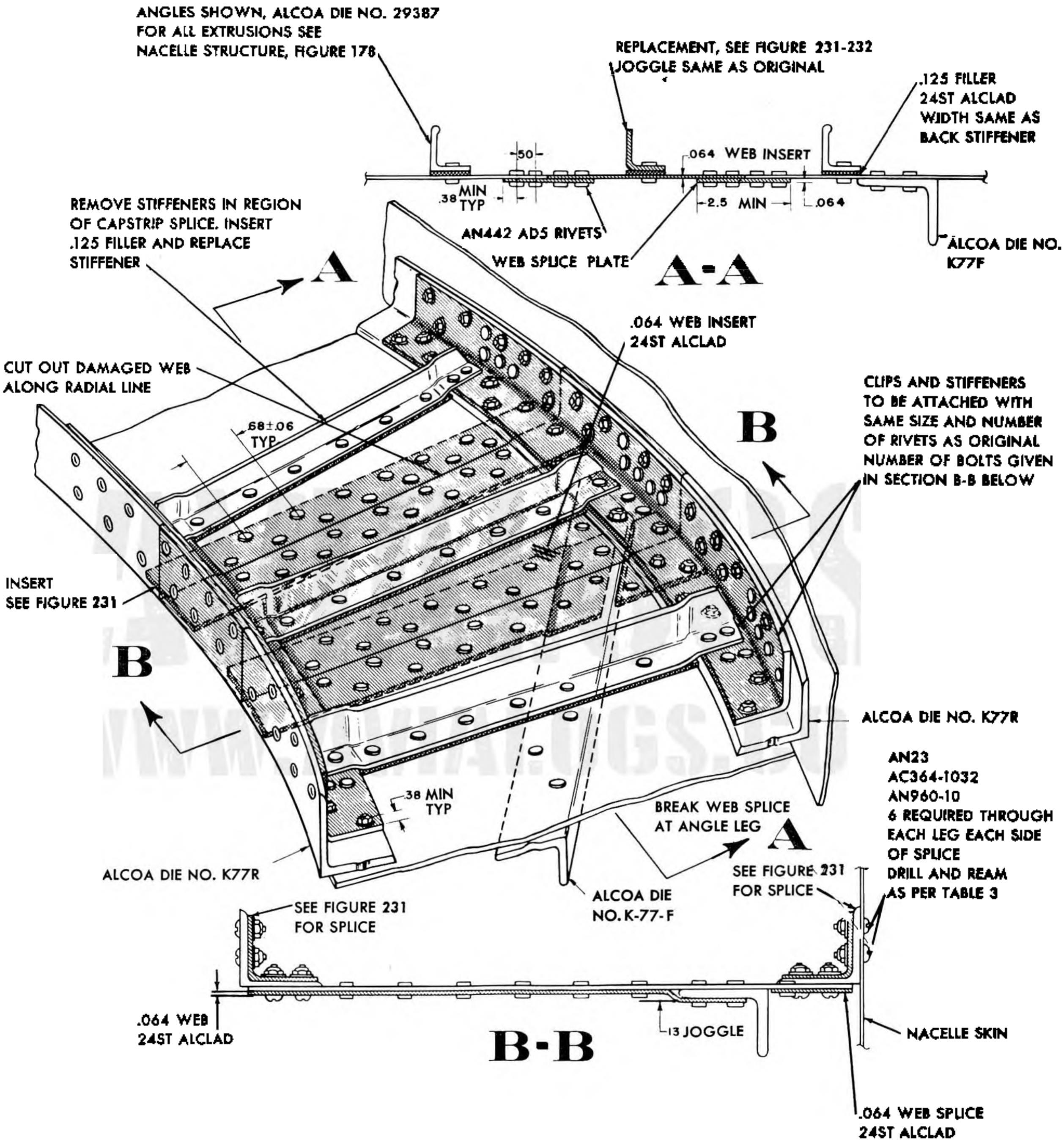


FIGURE 183—NACELLE BULKHEAD REPAIR IN REGION OF OIL TANK



REFERENCE: SECTION VI, PARAGRAPH 3c

FIGURE 184—NACELLE BULKHEAD REPAIR—STA. 136.8

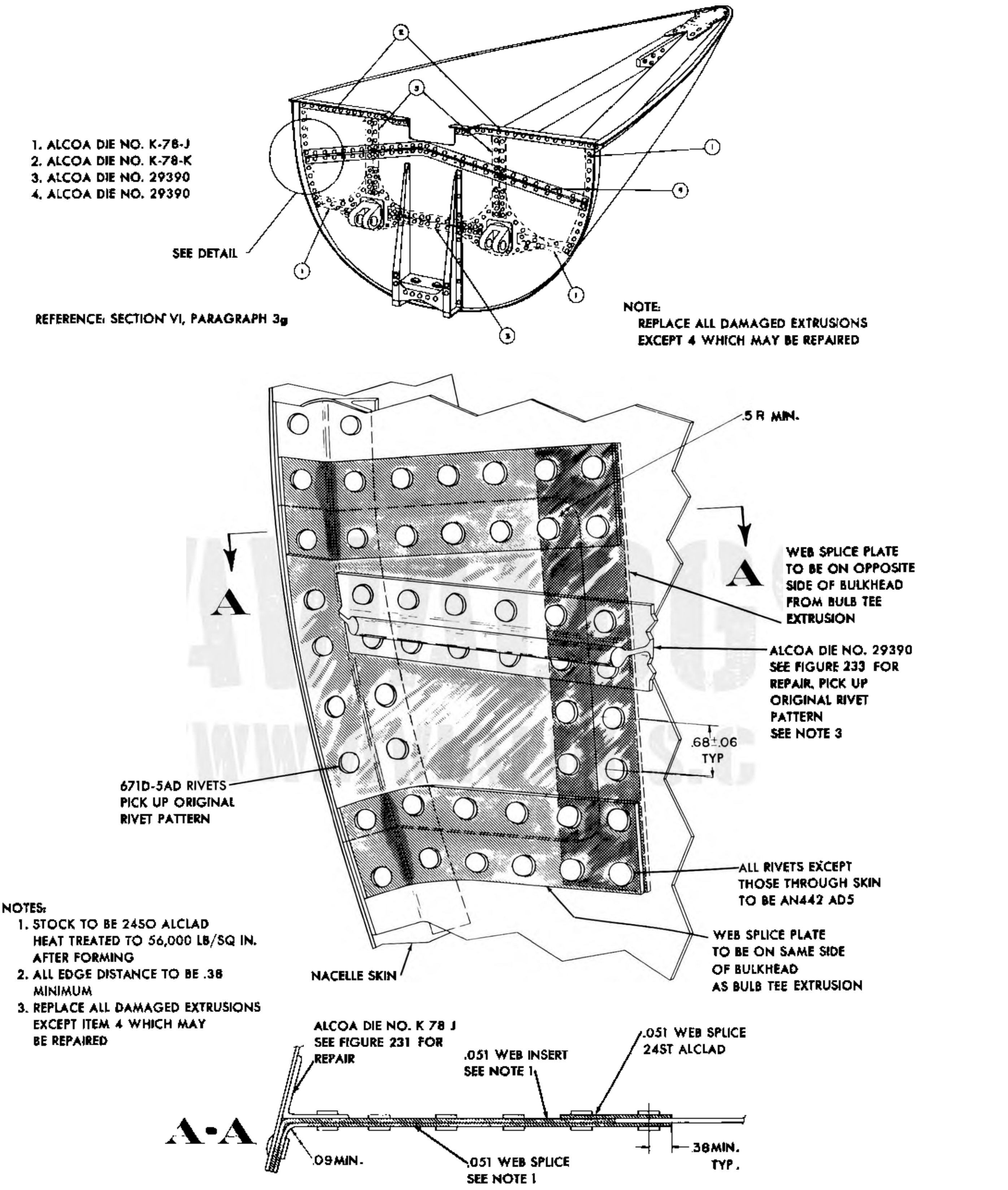


FIGURE 185—NACELLE BULKHEAD REPAIR—STA. 213

(2) NEGLIGIBLE DAMAGE.

(*a*) Repair dents as in same section under paragraph 3. *b*. (2) (*a*) above.

(*b*) Nicks in outstanding legs of radial web stiffeners may be repaired as in the same section under paragraph 3. *b*. (2) (*b*) above.

(*c*) Holes and cracks in the web which can be cleaned up to a .75 inch diameter circle, may be considered negligible provided the edge of the hole is a minimum of .75 inch from any rivet. Such holes should not be closer than 4 inches between centers.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) A full web repair may be effected by cutting away the damaged portion along a radial line and patching with an .064 sheet using a double row of AN442AD5 rivets per side. These rivets should be at .68 ± .06 inch spacing. (See figure 184.)

(*b*) The inner and outer flanges may be repaired as per figure 231 for extrusion Alcoa Die No. K77R.

(*c*) Use fillers as required.

(4) DAMAGE REPAIRABLE BY INSERTION.

(*a*) Web damage which, when cleaned up as under paragraph (3) immediately above, extends over more than one bay, should have an insert fitted and spliced at each end with .064 material using a double row of AN442AD5 rivets per side of splice. The rivet pattern is as in figure 184.

(*b*) If the damage occurs within 5 inches of a fitting, a new section of web should be inserted, extending 5 inches either side of the fitting and spliced as in the preceding paragraph.

(*c*) If the damage occurs in the region of the vertical stiffeners on the aft face of the bulkhead, .064 fillers should be used as necessary to obviate the use of joggles.

(*d*) Extensive damage to the flanges may be repaired by inserting a new piece of extrusion and splicing at each end as per figure 231.

(5) DAMAGE REQUIRING REPLACEMENT.—All members of the bulkhead other than the web and the flanges should be replaced if damaged.

d. BULKHEAD 145.9.—Clips and brackets to be replaced as required. The bulkhead should be repaired as per figures 229 and 230, using any one of the four types of repair given. The text accompanying this figure should be carefully read. Splices for .040 stock should be used.

e. BULKHEADS STATIONS 152.9 AND 170.7.—Since the gages are .072 and the size of the members relatively small, damaged parts should be replaced.

f. BULKHEADS STATIONS 163.2, 181, AND 201.7.—All gages are .051 and the maximum member sizes are small. Replace all damaged members.

g. BULKHEAD 213.—This bulkhead carries loads from the landing gear drag strut and, therefore, requires special attention in repair. All rivets which require drilling out should be done so with extreme care so as not to elongate or enlarge the holes. All angles and stiffeners should be replaced as per figures 231 through 233, except the long transverse bulb angle tee running from side to side of the bulkhead which may be repaired or replaced in accordance with figure 233. The web may be repaired by patching or insertion, using .051 sheet riveted to the web with two rows of AN442AD5 rivets at .75 inch spacing. If the edge of the cleaned up damage is closer than 1.5 inches from any stiffener or fitting, a new piece of web should be inserted and spliced on either side of the member. This repair is shown in figure 185.

h. BULKHEAD STATIONS 226.6 AND 240.—Repairs to this bulkhead are made as per figures 229 and 230. Gage is .051. See paragraph *d*. immediately preceding.

i. BULKHEAD STATION 249.—Replace if damaged.

4. LONGERONS.

a. UPPER NACELLE ENGINE MOUNT LONGERON.

(1) GENERAL.—The longeron consists of two .081 channels which taper from a maximum section at the forward end to a minimum at station 136.8.

(2) NEGLIGIBLE DAMAGE.—Small dents, free from cracks, abrasions and sharp corners may be neglected. These dents should be restored to shape to prevent their developing into cracks.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage to the upper flange and the lower flange, where sufficient width is present (see below), may be repaired by nesting an .081 angle in the channel and attaching it with three 671D-6AD rivets each leg each side of splice. (See figure 186.)

Damage to complete section should be repaired by a nested .081 channel as in figure 186. A splice for the maximum load consists of five rows of rivets each side of splice, using three rivets per row. Locate three rows of AN442AD6 rivets in web and one row each of 671D-6AD rivets in the flanges. Minimum spacing of rows to be .63 inches. Where taper decreases width of web below that required to maintain above spacing, decrease number of rows to two and finally to one. When the width of the lower flange becomes such that a .38 inch edge distance on the rivets cannot be obtained, this row should be dropped in making a repair.

(4) DAMAGE REPAIRABLE BY INSERTION.—If the damage, when cleaned up, extends more than 8 inches in length or if the damage occurs within 7 inches from either end, a new section of channel is inserted and spliced as in paragraph (3) above.

(5) DAMAGE REQUIRING REPLACEMENT.—All clips, fittings, and brackets must be replaced if damaged.

b. TOP CENTER LONGERON.

(1) The top center longeron consists of two .091 channels, each of which is made in two sections and spliced together by fittings at station 136.8. The channels are tapered as in paragraph *a.* above.

(2) NEGLIGIBLE DAMAGE.—Same as item (2) under paragraph *a.* above.

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) If the upper flange forward of station 136.8 or the lower flange at any point is damaged, patch with an .091 angle using five AN442AD6 rivets in each leg each side of break. Rivets through upper flange should be 671D-6AD. These rivets should pick up the original rivet holes through the flange.

(b) The upper flange aft of station 136.8 is too narrow to nest an angle within it. Repair to this flange will be made by riveting an .091 angle to the back of the channel with its outstanding leg against the nacelle skin. Either ten 671D-6AD, ten AN442-AD6, or 12 LS1127-6 rivets are used through the vertical leg each side of the damage. (See figure 187.)

(c) Complete damage to the channel should be repaired by means of a channel patch of the same gage forward of station 136.8, and by an upper angle as in paragraph (*b*) above, together with a lower angle whose vertical leg extends the height of the channel web aft of station 136.8. Figure 187 shows the arrangement of such a patch. In order to determine the number of rivets required through the web, measure the distance in inches between flanges and multiply by 6.25. For example, a 3 inch gap between flanges will require 3 x 6.25 = 18.75 or 19 rivets. The rivet pattern is so arranged to be symmetrical about the center line of the web with a minimum of .63 inch between horizontal rows. The rivets should be staggered as shown and the number of rivets per row increase as the flange is approached.

(4) DAMAGE REPAIRABLE BY INSERTION.—If the damage is extensive, an .091 insertion may be used splicing as per paragraph (3) above.

(5) DAMAGE REQUIRING REPLACEMENT.—All fittings, clips, brackets, etc. to be replaced.

c. LOWER LONGERON.

(1) The lower longeron consists of two .091 channels and an .091 flat sheet. It is riveted to the skin thus forming a box section. In order to repair this member, it is necessary to remove a section of nacelle skin. Any damage to individual parts of the longeron requires a repair to the entire part.

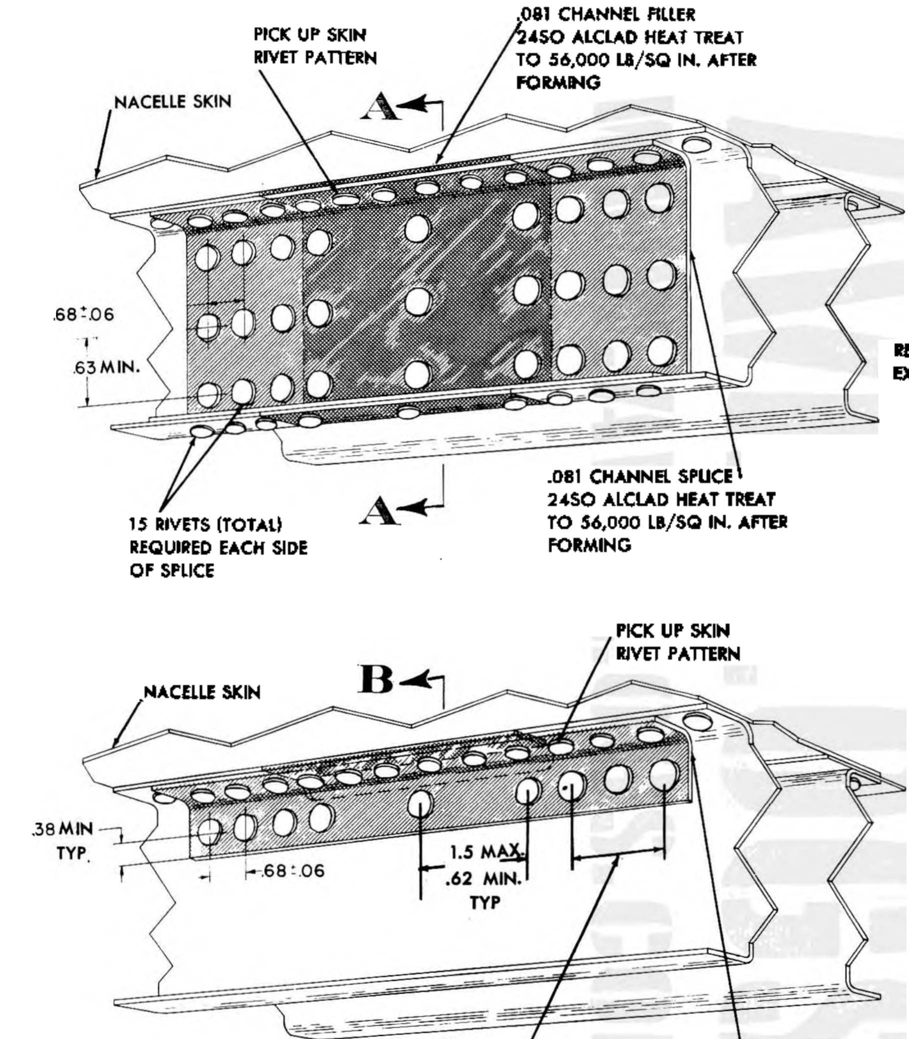
(2) To repair the upper channel, nest an .091 channel in the original member and attach it with a minimum of nine AN23 bolts.

(3) To repair the lower channel, insert an .091 channel through the skin opening and bolt it with its flanges turned up, to the original member. Use a minimum of eight bolts through the back.

(4) The inner flat plate is repaired with an .091 sheet using six AN23 bolts.

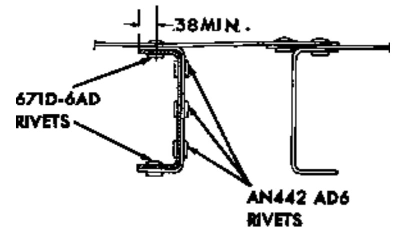
(5) Use fillers as required.

(6) Upon completion of the longeron repair, the skin is repaired as per paragraph (2) above. The patch should have its upper and lower horizontal rivet



REPAIR FOR DAMAGE TO FLANGE ALONE. DAMAGE WHEN CLEANED UP SHOULD NOT GO BEYOND RADIUS.

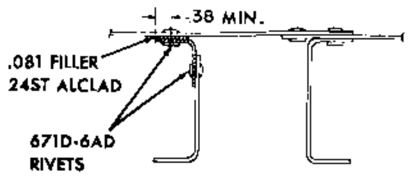
REFERENCE: SECTION VI, PARAGRAPH 4a



A-A

NOTES:
1. SIMILAR REPAIR TO LOWER FLANGE IN REGION WHERE .38 EDGE DISTANCE CAN BE MAINTAINED
2. MINIMUM BEND RADII TO BE .38 INCH

REPAIR FOR DAMAGE OF GREATER EXTENT THAN THAT SHOWN BELOW



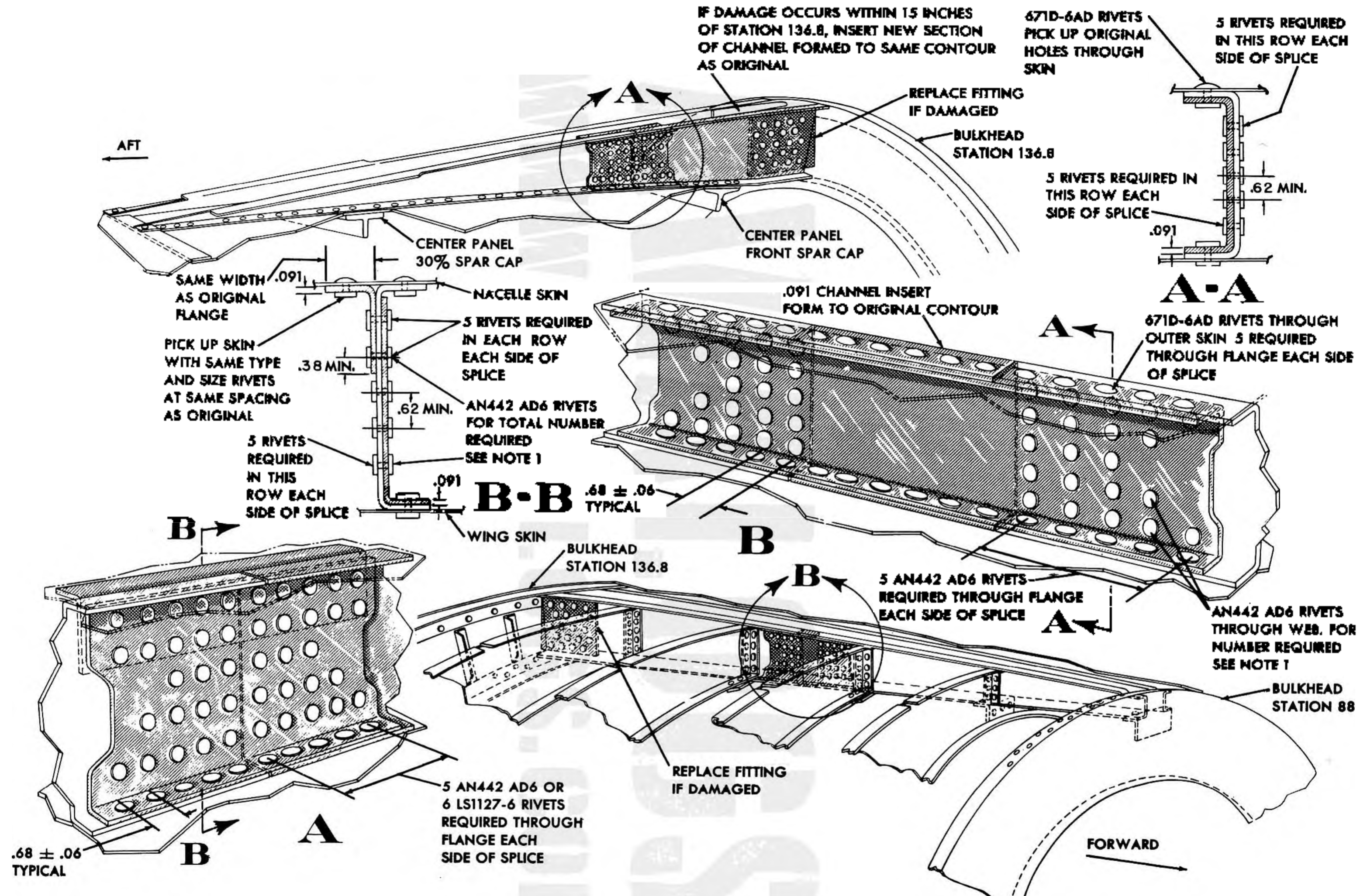
B-B

FIGURE 186

NACELLE UPPER ENGINE MOUNT LONGERON REPAIR

NOTES FOR FIGURE 187

1. For Required Number of Rivets for Web Repair, Measure the Height of the Web in Inches and Multiply by 6.25. Arrange in a Symmetrical Pattern as Shown. See Sec. VI Para. 4b.
2. All Repair Material to be .091 Gage 24SO Alclad Heat Treated to 56,000 Lb./Sq. In. After Forming.
3. For Damage to the Upper or Lower Flange of the Forward Channel or to the Lower Flange of the Aft Channel, Nest an Equal Leg .091 Angle and Splice with Ten 671D-6AD or AN442 AD6 Rivets or with 12 LS1127-6 Cherry Blind Rivets Each Side of Break.
4. For Damage to the Upper Flange of the Aft Channel, Splice with an Angle as Shown in Sec. B-B.
5. All Rivet Edge Distance to be .38 Min.
6. All Bend Radii to be .13 Inch.



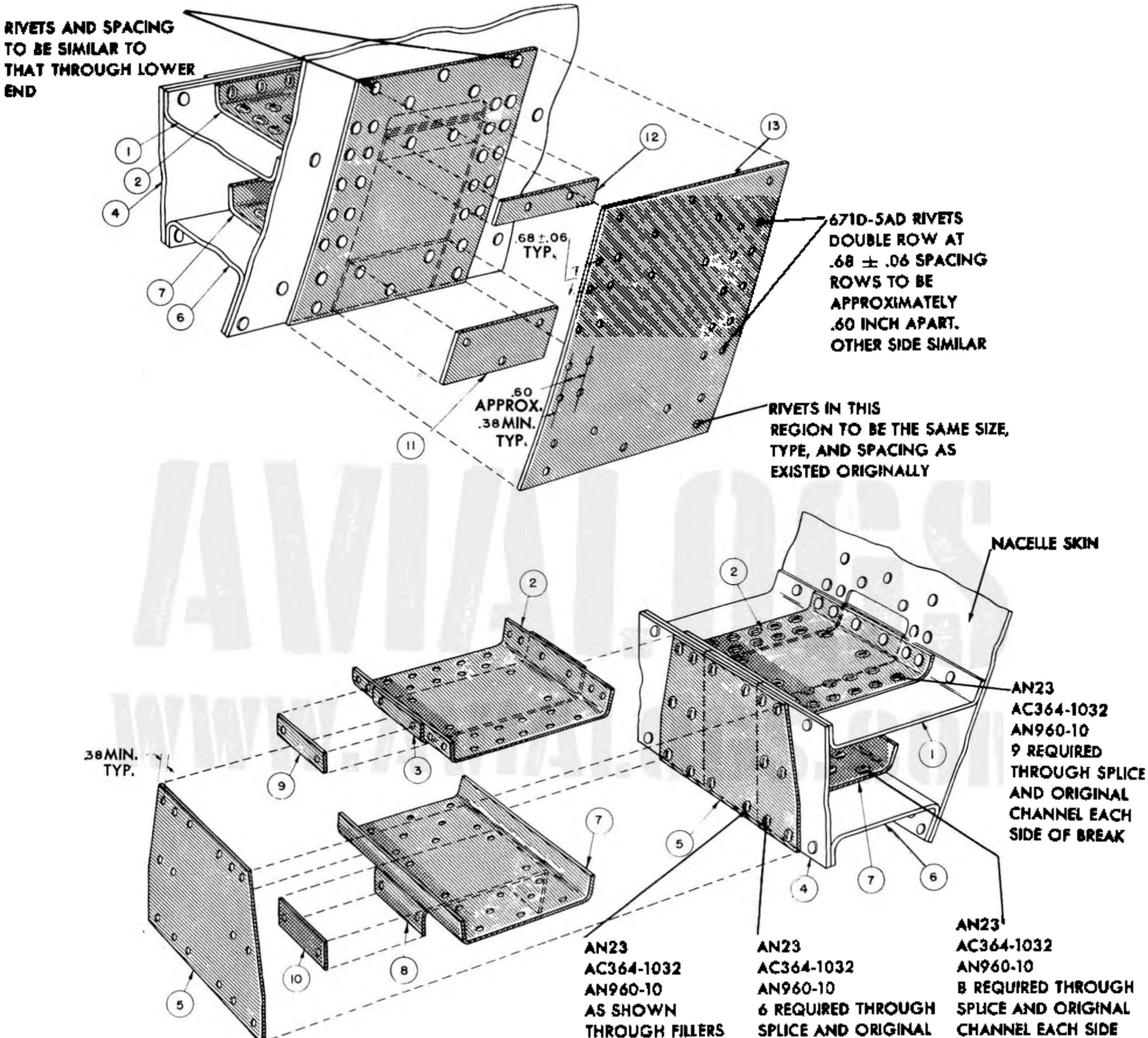
REFERENCE SECTION VI, PARAGRAPH 4b

FOR NOTES SEE REVERSE PAGE

FIGURE 187 — NACELLE TOP CENTER LONGERON REPAIR

LEGEND

1 UPPER CHANNEL
2 UPPER CHANNEL SPLICE
3 UPPER CHANNEL INSERT
4 INNER PLATE
5 INNER PLATE SPLICE
6 LOWER CHANNEL
7 LOWER CHANNEL SPLICE
8 LOWER CHANNEL INSERT
9 FILLER FOR INNER PLATE (UPPER), 24ST ALCLAD
10 FILLER FOR INNER PLATE (LOWER), 24ST ALCLAD
11 FILLER FOR SKIN (LOWER), 24ST ALCLAD GAGE TO BE SAME AS SKIN. SEE FIGURE 179.
12 FILLER FOR SKIN (UPPER), 24ST ALCLAD GAGE TO BE SAME AS SKIN. SEE FIGURE 179
13 SKIN PATCH, SAME GAGE AS ORIGINAL SKIN AT THIS POINT. SEE FIGURE 179



NOTES:
1. ALL BENT UP MATERIAL TO BE 24ST ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. SEE TABLE 7 FOR BEND RADII
3. ALL MATERIAL TO BE .091 EXCEPT ITEMS 11, 12, AND 13
4. ALL BOLT AND RIVET EDGE DISTANCE TO BE .38 INCH
5. FOR DRILLING OUT RIVETS, SEE SECTION I, PARAGRAPH 10d
6. FILLERS TO BE THE SAME WIDTH AS CORRESPONDING FLANGES OF CHANNELS

REFERENCE: SECTION VI, PARAGRAPH 4c

FIGURE 188—NACELLE LOWER LONGERON REPAIR

patterns the same as that existing originally through the lower skin longeron splice, using the existing rivet holes in this region. The vertical pattern should be the same as the nearest parallel skin splice containing the largest number of rivets per inch.

(7) Figure 188 gives the repair to the total longeron with the added skin repair. These may be used in any combination dependent upon the type of damage.

(8) All clips, bulkheads, stiffeners, brackets, fittings, etc. are to be replaced. The bulkhead repair will necessitate a hole in the skin as described above.

5. MISCELLANEOUS.

a. Large gussets with flanged lightening holes may be repaired in the same manner as the wing ribs. (See figure 146.)

b. Various extrusions are repaired as per figures 231 through 233.

c. Various channels are repaired as per figures 229 and 230.

TABLE 65
MATERIALS FOR NACELLE REPAIR

Material	*Stock*	*Size*
24ST	Sheet, aluminum alclad	.032
24ST	Sheet, aluminum alclad	.038
24ST	Sheet, aluminum alclad	.040
24ST	Sheet, aluminum alclad	.051
24ST	Sheet, aluminum alclad	.064
24ST	Sheet, aluminum alclad	.091
24ST	Sheet, aluminum alclad	.125
18-8 ½ H type 302	Sheet, stainless steel	.038
671-D-4AD	Rivet, brazier head	
671-D-5AD	Rivet, brazier head	
671-D-6AD	Rivet, brazier head	
LS1127-6	Blind rivet, cherry	
AN442 AD6	Rivet, flathead	
AN23-	Bolt, clevis	
AN364-1032	Nut, self-locking	
AN960-10	Washer, plain	

NACELLE EXTRUSION LIST

Alcoa Die No.

77-B	78-A	78-K	29390
77-F	78-F	78-Y	29179
77-R	78-J	22999	29387

SECTION VII
EMPENNAGE REPAIR

1. STABILIZERS.

a. GENERAL.—The stabilizer is of the conventional highly stressed skin type of construction consisting of three beams with intercostal bulkhead type ribs extending from the leading edge to the elevator hinge line and covered with alclad sheet. Figure 189 and table 66 give the component parts. Figure 190A and Table 67A indicate the component parts of the stabilizer installed on airplanes **AF44-78545** and subsequent.

The stabilizer assembly is attached to the fuselage by means of standard AN bolts and match angles around the outside contour. The stabilizer tip is attached at station 190 by means of standard AN bolts and gang channel nuts on the inside surface of the stabilizer.

b. SKIN.

(1) GENERAL.—Figures 190 and 190B and tables 67 and 67B show the various skins and skin splices used on the stabilizer.

Flush riveting is used forward of the front beam, but for repairs this procedure would necessitate the installation of a structural door. This requires more time than the advantages warrant; therefore, for repairs Cherry blind brazier head rivets will be used in conjunction with either external or flush patches.

For repairs in the region of the de-icer shoe, either the external or flush patch may be used. If external patch is used all edges, corners, and rivet heads should be well rounded to prevent damage to the shoe.

(2) NEGLIGIBLE DAMAGE.—Dents free from cracks, abrasions, or sharp corners may be neglected, but should be restored to the original contour. During this procedure, care should be taken not to stretch or crack the skin.

Holes or cracks .75 inch in diameter or less, when cleaned up and located at a minimum of 2 inches from a skin splice and spaced at a minimum of 5 inches between centers, may be neglected provided they are covered by an .020 patch with four LS1127-4 rivets equally spaced around the hole. These holes should be a minimum of 5 inches apart. (See figure 106.)

(3) DAMAGE REPAIRABLE BY PATCHING.

(*a*) EXTERNAL PATCHES. — Holes of greater size than .75 inch in diameter, and whose largest dimension is less than 5 inches, may be patched with an alclad sheet of the same gage as the skin and two rows of LS1127-5 rivets at .68 ± .06 inch spacing center to center in the same row. If patch covers existing rivets, drill out carefully and replace with Cherry blind rivets of the same size as above.

(*b*) FLUSH PATCHES.—See paragraph 1. *b* (4) immediately below.

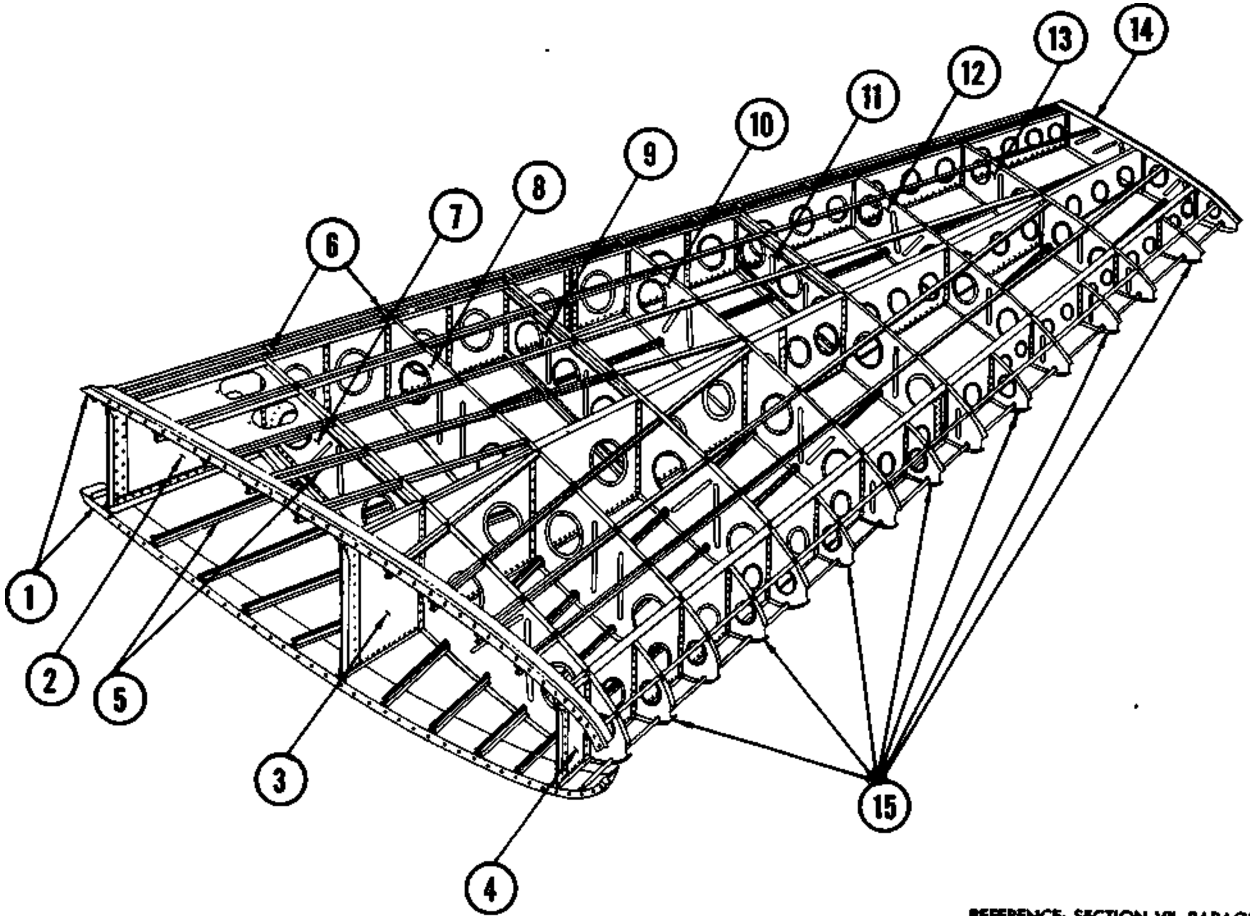
(4) DAMAGE REPAIRABLE BY INSERTION.—Damage 5 inches or more across the narrowest dimension may be repaired by insertion.

Cut a rectangular insertion of the same gage as the skin large enough to entirely cover the damage. Using this as a template, clean up the area. Attachment is accomplished by splice plates of the same gage as the skin and 2.5 inches wide. The spanwise plates should be on the inside surface and the chordwise plates may be either inside or outside depending on the ease of installation. However, if they are on the inside, they should be discontinuous at the stringers. Two rows of LS1127-5 rivets at .68 ± .06 inch spacing should be used.

Any damage in the region of the de-icer shoe may be repaired by insertion.

Damaged areas, which when cleaned up do not cross a stringer or rib, may be patched by a sheet of the same gage as the skin, placed on the inner surface using the same rivet pattern as for an external patch. (See figure 191.) Rivet a filler plate of the same gage as the skin to the internal patch with LS1127-5 rivets to bring the surface of the repair flush with the undamaged skin.

For holes crossing nose ribs, and/or stringers, follow the procedure outlined above provided such holes are 5 inches or more across. If the hole is smaller than 5 inches across, it should be enlarged to that size if a flush patch is to be used. If a flush patch is not to be used, clean up hole and install a patch as shown in figure 110.



REFERENCE: SECTION VII, PARAGRAPH 1a
TABLE 66

FIGURE 189—STABILIZER STRUCTURE

TABLE 66
COMPONENT PARTS OF STABILIZER

Item	Member	Stock	Part No.
1	Match Angle	Alcoa Die No. 28928	20-110-1003
2	55% Beam	—	20-110-1003
	Web	.051-24ST Alclad	20-110-1003-2
	Web	.040-24ST Alclad	20-110-1003-3
	Flange Angles		20-110-1012-2
3	32½% Beam	—	20-110-1002
	Web	.040-24ST Alclad	20-110-1002-2
	Web	.032-24ST Alclad	20-110-1002-3
	Flange Angles		20-110-1009-2
4	10% Beam	—	20-110-1001
	Web	.051-24ST Alclad	20-110-1001-2
	Web	.040-24ST Alclad	20-101-1001-3
	Flange Angles		20-101-1006-2
5	Stringers	Alcoa Die No. 29083	—Typical
6	Closure Ribs—		—
	Station 34.30	.020-24SO Alclad	20-110 1034-2
	Station 48.62	.020-24SO Alclad	20-110-1034-3
	Station 67.00	.020-24SO Alclad	20-110-1034-4
	Station 88.62	.020-24SO Alclad	20-110-1034-5
	Station 107.00	.020-24SO Alclad	20-110-1034-6
	Station 128.62	.020-24SO Alclad	20-110-1034-7
	Station 140.75	.020-24SO Alclad	20-110-1034-10
	Station 148.00	.020-24SO Alclad	20-110-1034-8
	Station 161.25	.020-24SO Alclad	20.110-1034-11
	Station 169.00	.020-24SO Alclad	20-110-1034-9
	Station 179.50	.020-24SO Alclad	20-110-1034-12
7	Rib	—	20-110-1017
	Bulkhead (Front)	.020-24SO Alclad	20-110-1017-2
	Bulkhead (Center)	.025-24SO Alclad	20-110-1017-3
	Bulkhead (Rear)	.025-24SO Alclad	20-110-1017-6
	Stiffeners	29083—Extrusion	20-110-1017-5
8	Rib	—	20-110-1018
	Bulkhead (Front)	.020-24SO Alclad	20-110-1018-2
	Bulkhead (Center)	.020-24SO Alclad	20-110-1018-3
	Bulkhead (Rear)	.020-24SO Alclad	20-110-1018-4
9	Rib	—	20-110-1019
	Bulkhead (Front)	.020-24SO Alclad	20-110-1019-2
	Bulkhead (Center)	.025-24SO Alclad	20-110-1019-3
	Bulkhead (Rear)	.025-24SO Alclad	20-110-1019-6
	Stiffeners	29083—Extrusion	—
10	Rib	—	20-110-1020
	Bulkhead (Front)	.020-24SO Alclad	20-110-1020-2
	Bulkhead (Center)	.020-24SO Alclad	20-110-1020-3
	Bulkhead (Rear)	.020-24SO Alclad	20-110-1020-4
11	Rib	—	20-110-1021
	Bulkhead (Front)	.020-24SO Alclad	20-110-1021-2
	Bulkhead (Center)	.025-24SO Alclad	20-110-1021-3
	Bulkhead (Rear)	.025-24SO Alclad	20-110-1021-5
	Stiffeners	29083—Extrusion	—
12	Rib	—	20-110-1022
	Bulkhead (Front)	.020-24SO Alclad	20-110-1022-2
	Bulkhead (Center)	.020-24SO Alclad	20-110-1022-3
	Bulkhead (Rear)	.020-24SO Alclad	20-110-1022-4
13	Rib	—	20-110-1023
	Bulkhead (Front)	.020-24SO Alclad	20-110-1023-2
	Bulkhead (Center)	.020-24SO Alclad	20-110-1023-3
	Bulkhead (Rear)	.020-24SO Alclad	20-110-1023-4
14	Rib	.032-24SO Alclad	20-110-1024
15	Nose Ribs—	—	20-110-1016
	Station 57	.020-24SO Alclad	20-110-1016-4
	Station 77	.020-24SO Alclad	20-110-1016-7
	Station 97	.020-24SO Alclad	20-110-1016-3
	Station 117	.020-24SO Alclad	20-110-1016-6
	Station 137.5	.020-24SO Alclad	20-110-1016-2
	Station 158.5	.020-24SO Alclad	20-110-1016-5
	Station 179.5	.020-24SO Alclad	20-110-1016-8

STABILIZER SKIN RIVETING TABLE 67

SPANWISE SKIN CONNECTIONS—STABILIZER

Location	*Extent*	*Gage of Forward Skin*	*Gage of Aft Skin*	*Type of Rivets*	*Rivet Spacing*	*Number of Rivet Rows*	*Rivet Row Spacing*
Beam 1	Root to Station 87	.025	.032	AN426AD4	1.26	2	.50
Beam 1	Station 87 to Station 148	.025	.025	AN426AD4	1.26	2	.50
Beam 1	Station 148 to Station 190	.025	.020	AN426AD4	1.00	1	
Beam 2	Root to Station 87	.032	.032	671D-4AD	1.50	2	.50
Beam 2	Station 87 to Station 107	.025	.032	671D-4AD	1.50	2	.50
Beam 2	Station 107 to Station 148	.025	.025	671D-4AD	1.50	2	.50
Beam 2	Station 148 to Station 169	.020	.025	671D-4AD	1.50	1	
Beam 2	Station 169 to Station 190	.020	.020	671D-4AD	1.50	1	

CHORDWISE SKIN CONNECTIONS—STABILIZER

Location	*Extent*	*Gage of Inboard Skin*	*Gage of Outboard Skin*	*Type of Rivets*	*Rivet Spacing*	*Number of Rivet Rows*	*Rivet Row Spacing*
Station 107	Leading Edge to Beam 1	.025	.025	AN426AD	1.00	2	.60
Station 87	Beam 1 to Beam 2	.032	.025	671D-4AD	.76	2	.55
Station 148	Beam 1 to Beam 2	.025	.020	671D-4AD	1.00	2	.55
Station 107	Beam 2 to Trailing Edge	.032	.025	671D-4AD	.76	2	.55
Station 169	Beam 2 to Trailing Edge	.025	.020	671D-4AD	1.00	2	.55

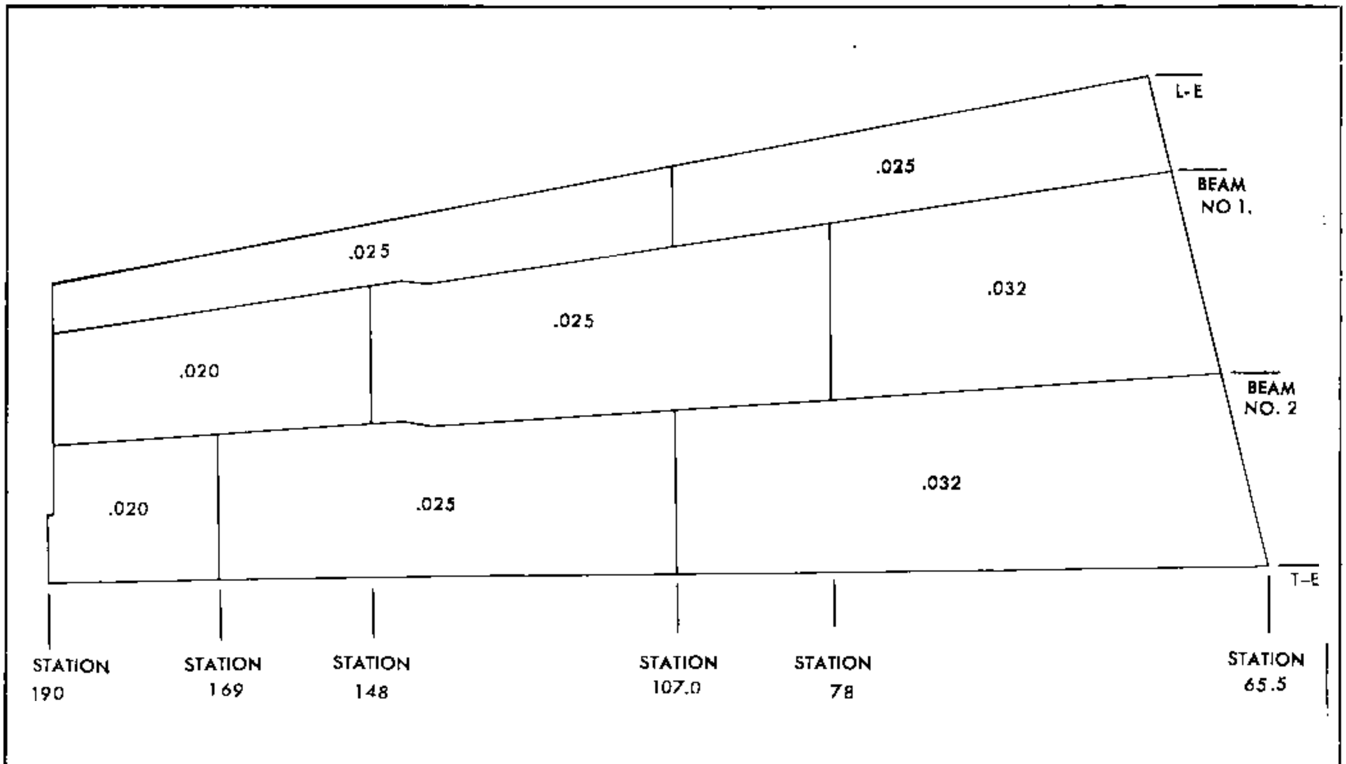


FIGURE 190 — STABILIZER SKIN DIAGRAM

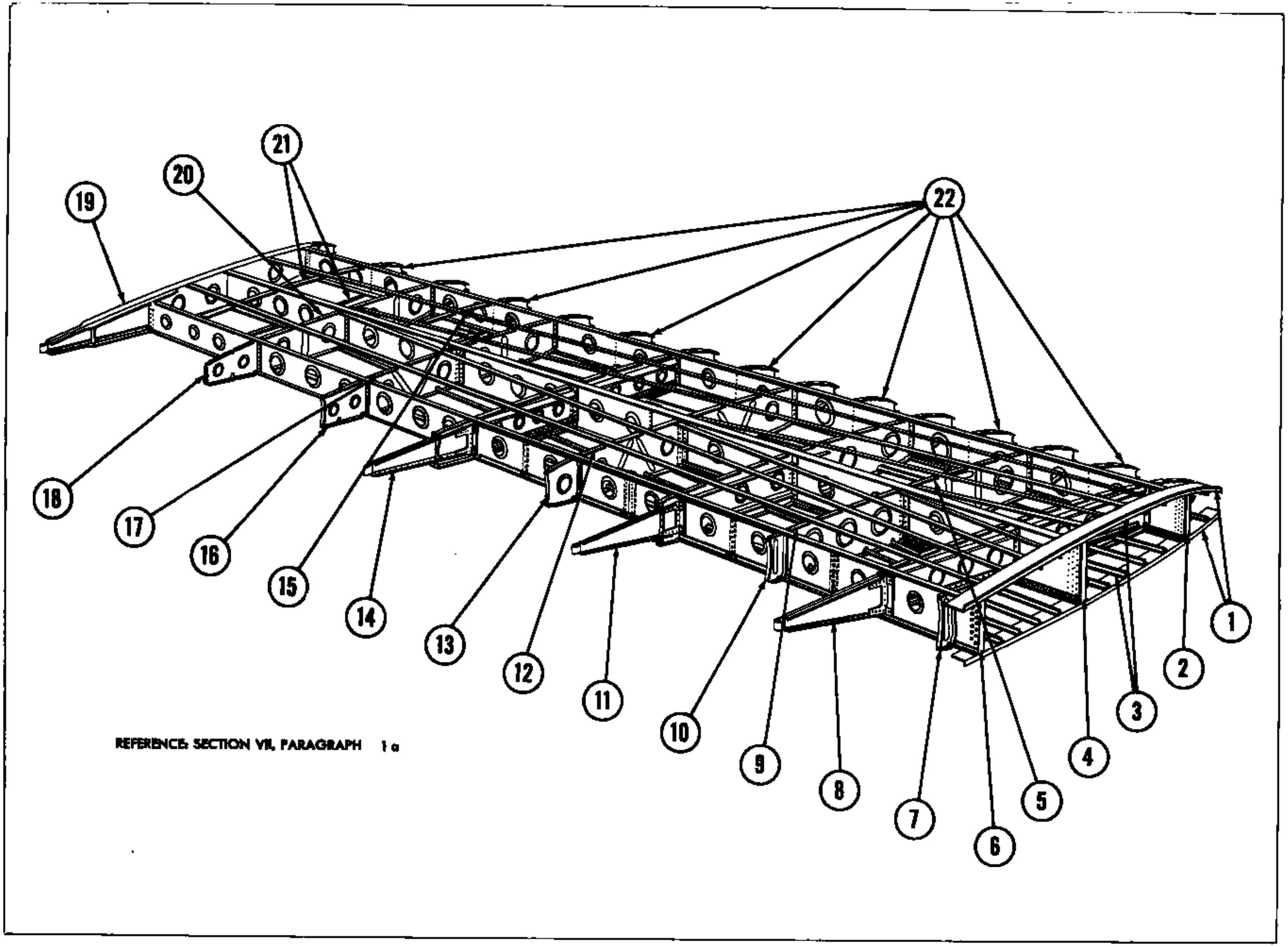


FIGURE 190A — STABILIZER STRUCTURE (AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 67A

COMPONENT PARTS OF STABILIZER

(AIRPLANES AF44-78545 AND SUBSEQUENT)

Item	Member	Stock	Part No.
1	Match Angle	CE 4193-1	20-110-5001-37 L-R
2	Beam		20-110-1001
	Channel	.040 24ST Alc.	20-110-1001-3
	Channel	.051 24ST Alc.	20-110-1001-2
3	Stiffeners	.051 Formed Sec. Typical	
4	Beam		20-110-5002
	Beam	.032 24ST Alc.	20-110-5002-3
	Beam	.040 24ST Alc.	20-110-5002-2
5	Rib		20-110-1018
	Rib Assembly	.020 24SO Alc.	20-110-1018-5
	Rib Assembly	.020 24SO Alc.	20-110-1018-6
6	Beam		20-110-5003
	Web	.040 24ST Alc.	20-110-5003-3
		.051 24ST Alc.	20-110-5003-2
7	Rib	.020 24SO Alc.	20-110-5015-2
8	Rib		20-110-5011
	Bulkhead	.025 24SO Alc.	20-110-5011-1
	Bulkhead	.025 24SO Alc.	20-110-5011-2
	Bulkhead	.025 24SO Alc.	20-110-5011-502
	Web	.025 24SO Alc.	20-110-5011-4
9	Rib	.040 24ST Alc.	20-110-5023
10	Rib	.020 24SO Alc.	20-110-5016
11	Rib		20-110-5012
	Bulkhead	.020 24SO Alc.	20-110-5012-2
	Bulkhead	.025 24SO Alc.	20-110-5012-3
	Bulkhead	.025 24SO Alc.	20-110-5012-503
	Bulkhead	.025 24SO Alc.	20-110-5012-1
12	Rib		20-110-1020
	Rib	.020 24SO Alc.	20-110-1020-6
	Rib	.020 24SO Alc.	20-110-1020-7
13	Rib	.020 24SO Alc.	20-110-5017-2
14	Rib		20-110-5013
	Rib	.025 24SO Alc.	20-110-5013-1
	Rib	.025 24SO Alc.	20-110-5013-4
	Rib	.025 24SO Alc.	20-110-5013-508
	Rib	.025 24SO Alc.	20-110-5013-507
15	Stiffener		20-110-3114
	Stiffener	.040 24ST Alc.	20-110-3114-6
	Stiffener	.040 24ST Alc.	20-110-3114-7
16	Stiffener	.020-24SO Alc.	20-110-5018-1
17	Rib		20-110-1022
	Rib Assembly	.020 24SO Alc.	20-110-1022-5
	Rib Assembly	.020 24SO Alc.	20-110-1022-6
	Rib Assembly	.020 24SO Alc.	20-110-1022-7
18	Rib	.020 24SO Alc.	20-110-5019-1
19	Rib	.032 24SO Alc.	20-110-5014-1
20	Rib		20-110-1023
	Rib	.020 24SO Alc.	20-110-1023-5
	Rib	.020 24SO Alc.	20-110-1023-6
	Rib	.020 24SO Alc.	20-110-1023-7
21	Stiffener		20-110-3114
	Stiffener	.040 24ST Alc.	20-110-3114-2
	Stiffener	.040 24ST Alc.	20-110-3114-3
22	Nose Ribs		20-110-1016
	Rib Assembly	.020 24SO Alc.	20-110-1016-11
	Rib Assembly	.020 24SO Alc.	20-110-1016-14
	Rib Assembly	.020 24SO Alc.	20-110-1016-10
	Rib Assembly	.020 24SO Alc.	20-110-1016-13
	Rib Assembly	.020 24SO Alc.	20-110-1016-9
	Rib Assembly	.020 24SO Alc.	20-110-1016-12
	Rib Assembly	.020 24SO Alc.	20-110-1016-15

TABLE 67B—STABILIZER SKIN RIVETING (AIRPLANES AF44-78545 AND SUBSEQUENT)

CHORDWISE SKIN CONNECTIONS—STABILIZER

Location	*Extent*	*Gage of Outboard Skin*	*Gage of Inboard Skin*	*Rivet Types*	*Spacing Between Rivets*	*Spacing Between Rows*	*Rivet Rows*
Station 87	Beam No. 2 to Beam No. 1	.025	.032	AN426AD4	.76	.55	2
Station 107	Beam No. 3 to Beam No. 2	.025	.032	671D-4AD	.76	.55	2
Station 107	Beam No. 1 to Leading Edge	.025	.025	AN426AD4	1.00	.55	2
Station 148	Beam No. 2 to Beam No. 1	.020	.025	AN426AD4	1.00	.55	2

SPANWISE SKIN CONNECTIONS—STABILIZER

Location	*Extent*	*Gage of Forward Skin*	*Gage of Aft Skin*	*Rivet Types*	*Spacing Between Rivets*	*Spacing Between Rows*	*Rivet Rows*
Beam No. 1	Root-Sta. 87	.025	.032	AN426AD4	1.26	.50	2
Beam No. 1	Sta. 87-Sta. 107	.025	.025	AN426AD4	1.26	.50	2
Beam No. 1	Sta. 107-Sta. 143.5	.025	.025	AN426AD4	1.26	.50	2
Beam No. 1	Sta. 143.5-Sta. 148	.025	.025	AN426AD4	1.00		1
Beam No. 1	Sta. 148-Sta. 190	.025	.020	AN426AD4	1.00		1
Beam No. 2	Root-Sta. 87	.032	.032	671D-4AD	1.50	.50	2
Beam No. 2	Sta. 87-Sta. 107	.025	.032	671D-4AD	1.50	.50	2
Beam No. 2	Sta. 107-Sta. 145	.025	.025	671D-4AD	1.50	.50	2
Beam No. 2	Sta. 145-Sta. 148	.025	.025	671D-4AD	1.50		1
Beam No. 2	Sta. 148-Sta. 190	.020	.025	671D-4AD	1.50		1
Beam No. 3	Root-Sta. 47	.032	.025	671D-4AD	1.00	.50	2
Beam No. 3	Sta. 47-Sta. 107	.032	.025	671D-4AD	1.00	.50	2
Beam No. 3	Sta. 107-Sta. 130	.025	.025	671D-4AD	1.00	.50	2
Beam No. 3	Sta. 130-Sta. 190	.025	.025	671D-4AD	1.00		1
Closure Skin Attachment at Trailing Edge	Root-Sta. 47	.025	.025	671D-4AD	1.00		1

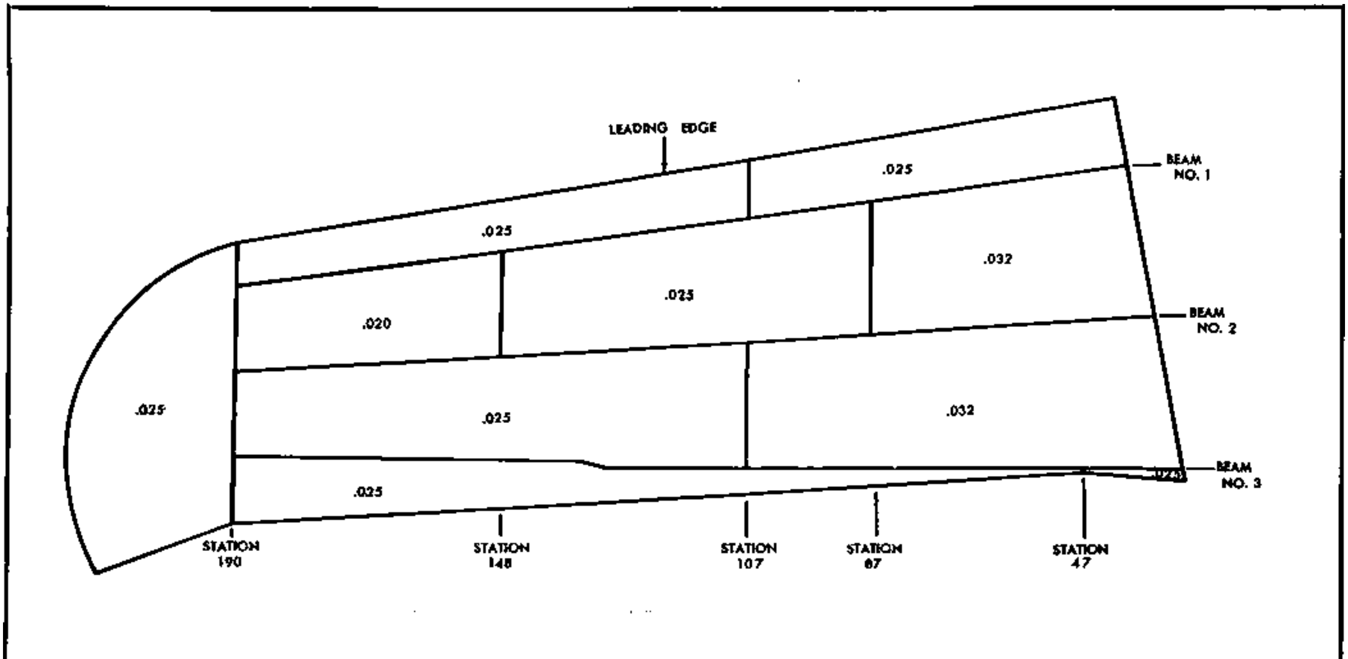


FIG. 190B — STABILIZER SKIN DIAGRAM (AIRPLANES AF44-78545 AND SUBSEQUENT)

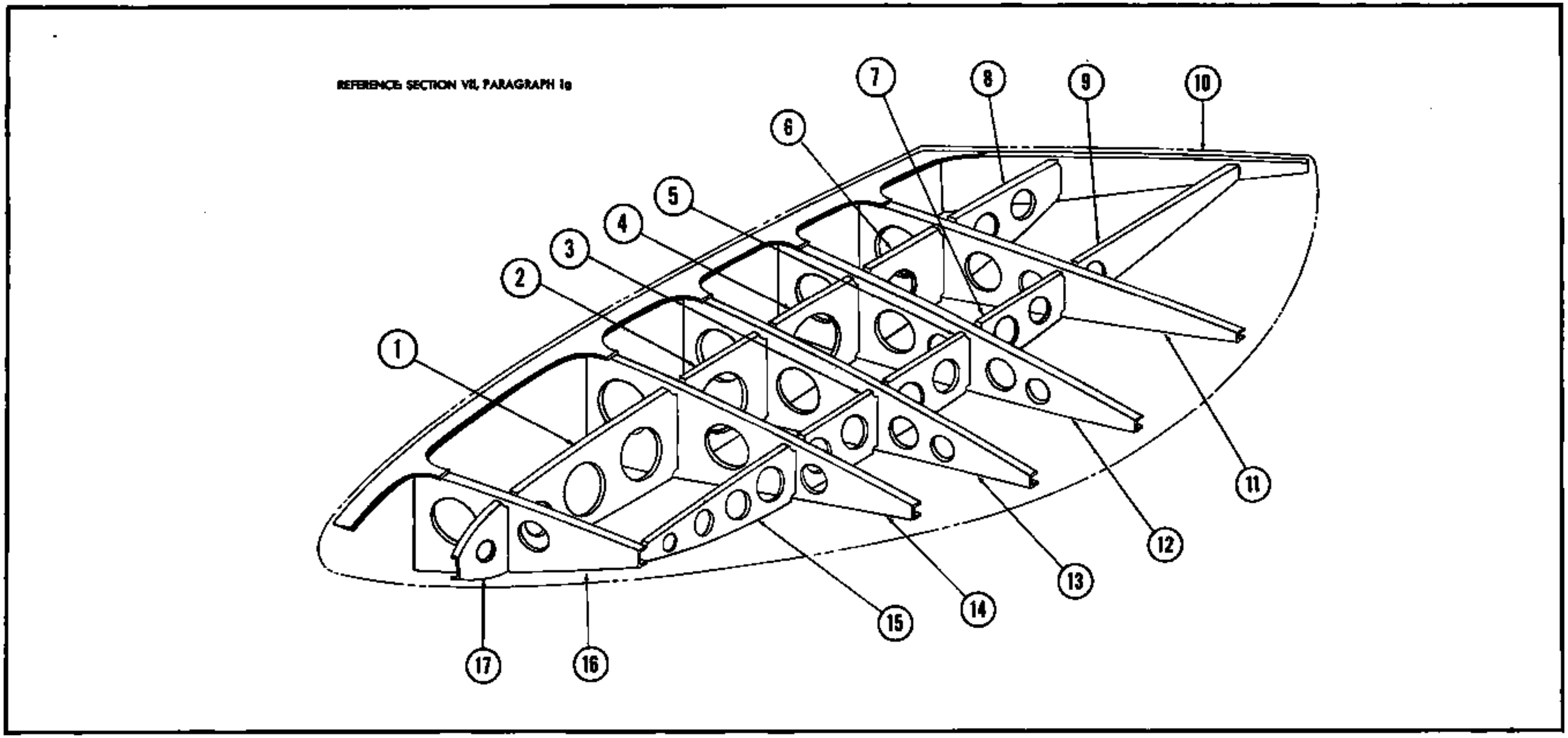
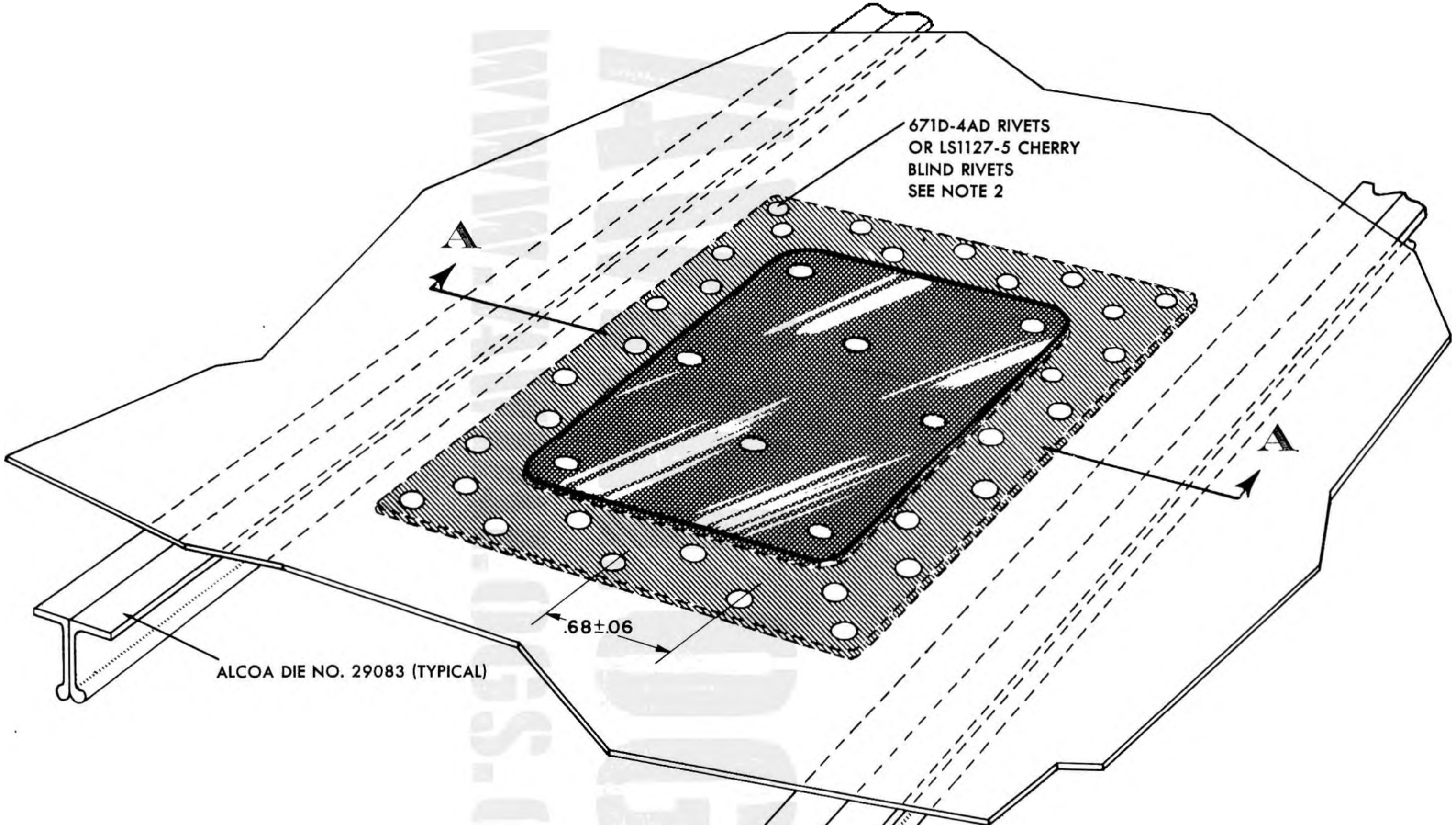
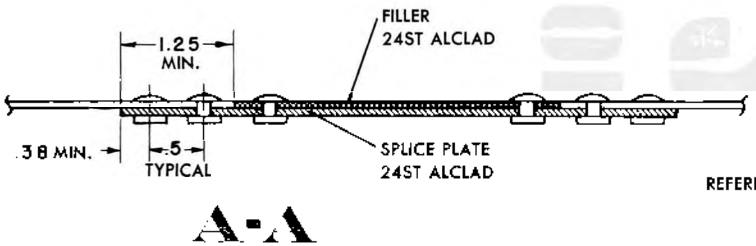


FIGURE 190C — STABILIZER TIP STRUCTURE—(AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 67C—COMPONENT PARTS OF STABILIZER TIP

Item	*Designation*	*Gage*	*Part Number*
1	Rib	.020	20-111-5011- 3
2	Rib	.020	20-111-5011- 4
3	Rib	.020	20-111-5011- 9
4	Rib	.020	20-111-5011- 5
5	Rib	.020	20-111-5011-10
6	Rib	.020	20-111-5011- 6
7	Rib	.020	20-111-5011-11
8	Rib	.020	20-111-5011- 7
9	Rib	.020	20-111-5011-12
10	Beam	.020	20-111-5012- 7
11	Beam	.020	20-111-5012- 6
12	Beam	.020	20-111-5012- 5
13	Beam	.020	20-111-5012- 4
14	Beam	.020	20-111-5012- 3
15	Rib	.020	20-111-5011- 8
16	Beam	.020	20-111-5012- 2
17	Rib	.020	20-111-5011- 2





NOTES:
1. GAGE OF SPLICE PLATE AND FILLER PLATE SAME AS GAGE OF DAMAGED SKIN SEE FIGURE 190
2. RIVETS SHOWN ARE 671D-4AD LS1127-5 RIVETS MAY BE USED INSTEAD

REFERENCE: SECTION VII, PARAGRAPH 1b(4)

FIGURE 191—STABILIZER—FLUSH SKIN REPAIR

c. BEAMS.

(1) GENERAL.—The beams are made up of flat sheet stiffened by flanged lightening holes and flanged at the top and bottom. From the root to station 137.5, the flange is reinforced by a bent up angle nested into the flange. From this station to the tip, the flange is not reinforced.

It is necessary for structural reasons to maintain a snug fit at the rib beam attachment; therefore, special consideration should be given to repairs in this region.

(2) NEGLIGIBLE DAMAGE.—Holes or cracks .5 inch or less in diameter, when cleaned up and located at a minimum of 2 inches from the nearest lightening hole, cut-out, or flange, may be neglected. If more than one such crack or hole occurs between adjacent lightening holes, patch both as shown in figure 192.

Nicks or cracks in the flanges not over .13 inch deep, when cleaned up and not adjacent to any rivet hole or closer together than 4 inches, may be neglected provided they are cleaned up with .25 inch corner radii.

(3) DAMAGE REPAIRABLE BY PATCHING.—Web or flange damage less than 5 inches in length in the region of the reinforcing angle or 4 inches in length in any other region, may be repaired by patching.

Clean up the damaged area, rounding off all sharp corners with a .5 inch radius. Cut a patch the same gage as the web and rivet to the opposite side of the web from the lightening hole flanges with two rows of AN442-AD5 rivets at .68 ± .06 inch spacing.

There are two methods of repair for the flange in the region of the reinforcing angle. Either method may be used.

The first step in either method is to roll back the skin sufficiently far to expose the damage for repair.

The first method consists of nesting an angle in the flange, extending it far enough each side of the break to pick up six AN442-AD5 rivets through the web. An angle of the same gage and dimensions as the original reinforcing angle, should be used for this purpose. To build the repaired section of the beam up flush with the undamaged portion, a filler should be inserted between the skin and flange. On the surface of the skin, attach an .051 x 1.5 inch alclad strip with the same rivets as are used for the skin and filler. This strip should extend at least 2 inches past the ends of the splice angle. (See figure 193.)

The second method consists of nesting an X-4130 steel angle .094 x .85 x 1.1 in the original reinforcing angle and extending it far enough each side of the damage to pick up six AN442-AD5 rivets through the beam web. Use a filler to build up the repaired section flush with the original section. (See figure 194.)

To repair the flange beyond the region of the reinforcing angle, use the following procedure. Nest in an angle the gage of which should be that of the original flange. The horizontal leg should be the same width as the inside of the original, and the vertical leg should be 1 inch long. Extend the angle far enough each side of the damage to pick up six AN442-AD5 rivets. Build the repaired section up flush with the original section, using a filler of the same gage as the flange. (See figure 195.)

(4) DAMAGE REPAIRABLE BY INSERTION.—Damage extending over more than 5 inches of the beam should be repaired by insertion.

Remove the damaged area by making a square cut across the beam on each side and insert a section of beam of the same gage and build up in the same manner as the original.

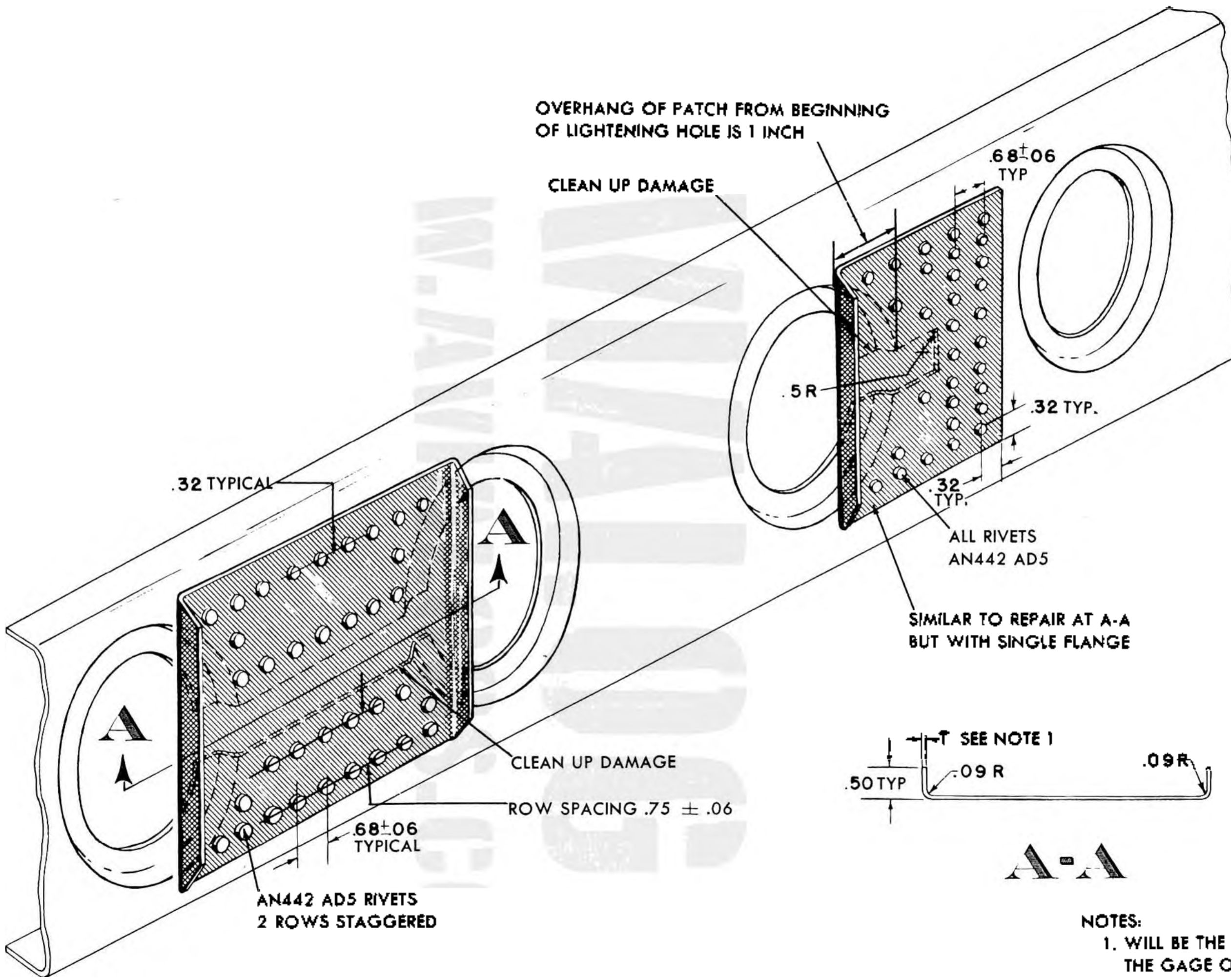
For repair in the region of the reinforcing angle, the following method is used:

Splice the web with plates 2.39 inches wide and the same gage as the web, using two rows of AN442-AD5 rivets at .68 ± .06 inch spacing. The splice plates should extend from flange to flange.

Splice the flanges with an angle of the same section as used in figure 194 extending the angle far enough either side of the cut to pick up six AN442-AD6 rivets. If the damage is less than 14 inches long, make the splice angle continuous, but if the damage is of greater length, the splice angle should be discontinuous.

For the region beyond the reinforcing angle, make an insertion as described above and cut an I-shaped splice plate as shown in figure 195. Flanges are turned up to form splice angles for the flanges. Pick up three AN442-AD5 rivets.

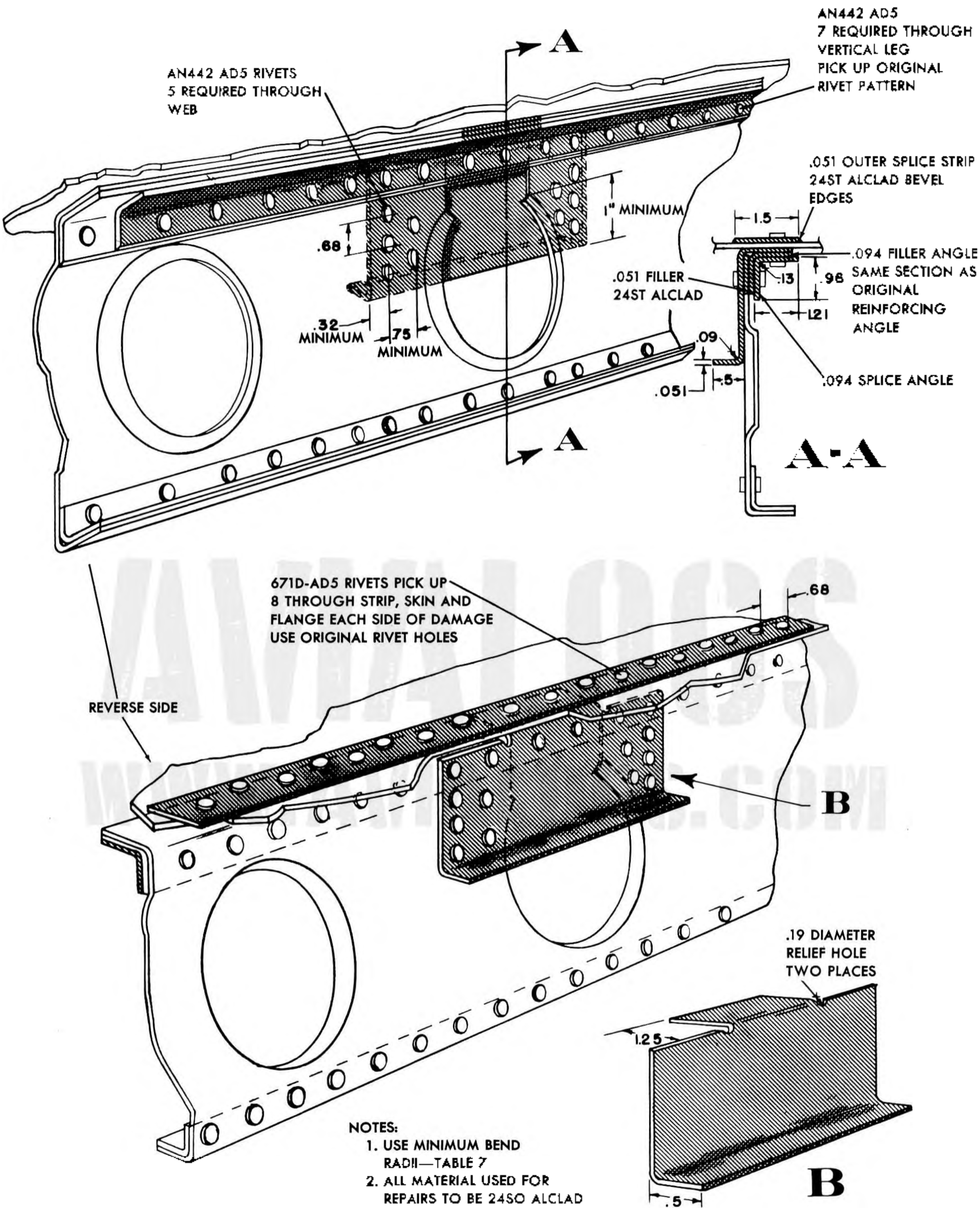
If a lightening hole existed in the damaged region and none is formed in the insertion, add a vertical angle stiffener with the attachment rivets



NOTES:
1. WILL BE THE SAME AS THE GAGE OF THE DAMAGED PART
2. ALL REPAIR PARTS TO BE 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING

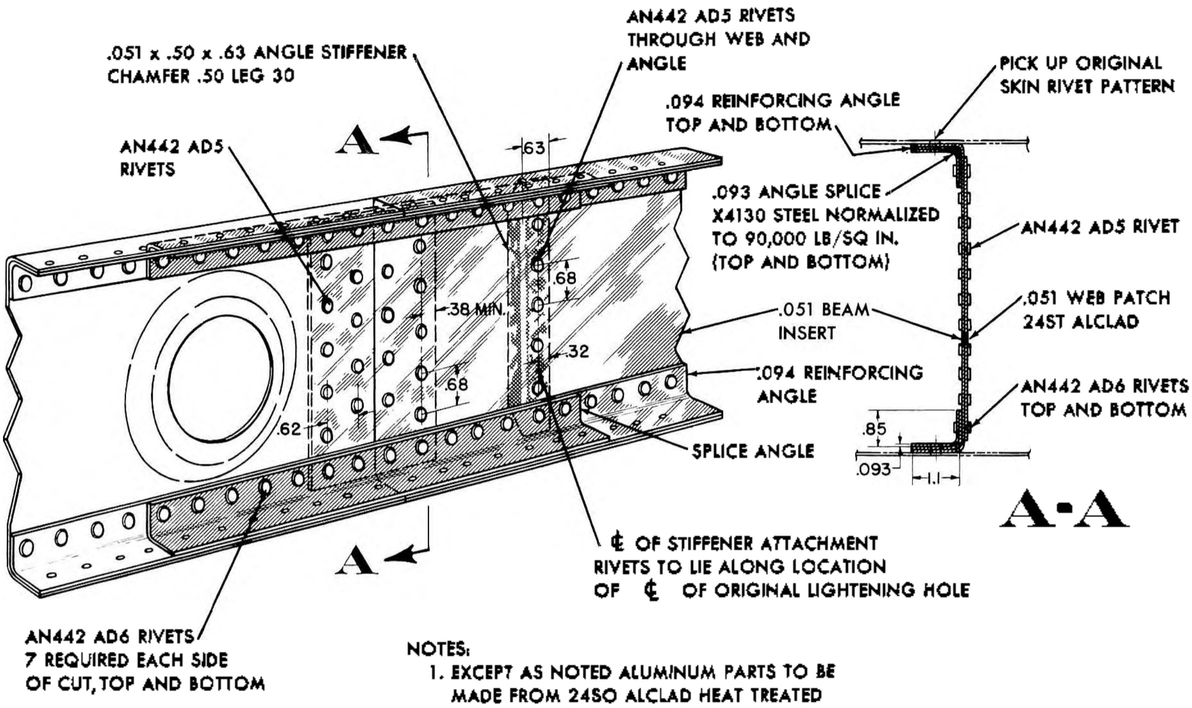
REFERENCE: SECTION VII, PARAGRAPH 1c

FIGURE 192—STABILIZER—REPAIR OF BEAM WEB



REFERENCE: SECTION VII, PARAGRAPH 1c

FIGURE 193—STABILIZER—BEAM FLANGE REPAIR IN REINFORCED REGION



NOTES:
1. EXCEPT AS NOTED ALUMINUM PARTS TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM
3. ALL BEND RADII TO BE MINIMUM FOR SPECIFIED MATERIAL. SEE TABLE 7.
4. ALL RIVET SPACING TO BE ± .06 INCH

REFERENCE: SECTION VII, PARAGRAPH 1c

FIGURE 194—STABILIZER—BEAM FLANGE REPAIR IN REINFORCED REGION

lying along the center line of the original hole. The angle is .5 x .62 inch, the same gage as the web.

(5) DAMAGE NECESSITATING REPLACEMENT.—Any damage to clips, brackets or fittings will necessitate a replacement.

d. REPAIRS TO RIBS.

(1) GENERAL.—The ribs are formed from flat sheet and stiffened by means of beads and flanged lightening holes. The ribs to which are attached the elevator hinges are reinforced at the hinge attachments by 24ST extruded angles. Due to the similarity of construction of all ribs, the repairs for all will be the same except for a few special cases which will be discussed later.

(2) NEGLIGIBLE DAMAGE.—Holes or cracks, .5 inch in diameter or less when cleaned up and are located 1 inch from any bead or 2 inches from any flange or lightening hole, may be neglected.

Cracks or nicks .13 inch deep or less in the edge of the flanges may be neglected provided they are cleaned up with a round file maintaining a .25 inch minimum radius and are not located within .38 inch of a rivet hole or within 3 inches of a similar nick or crack.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage up to 5 inches in length to the rib web or flange may be repaired by patching.

Remove all sharp corners by filing to a .5 inch radius and stop all cracks by drilling a 1/8 inch hole at each end. Patch web, on opposite side from lightening hole flanges, with a patch of the same gage and material as the original rib and two rows of AN442-AD5 rivets spaced at .68 ± .06 inch.

To repair the flange, nest an angle of the same gage and flange width as original into the rib flange making the vertical leg 1 inch long. Extend flange splice angle far enough either side of the damaged area to pick up four AN442-AD5 rivets. In the damaged area, it will be necessary to sandwich a filler the same gage as the skin between the angle and web patch to insure a snug fit. (See figure 195.)

If damage occurs in region of extruded stiffeners, they may be either repaired or replaced in accordance with figures 231 through 232.

(4) DAMAGE REPAIRABLE BY INSERTION.—Any damage 5 inches or more in length may be repaired by insertion. Make a square cut across the rib on each side of the damaged area as shown in figure 195.

From an insertion of the same cross-section as the rib, flange the top and bottom to the same contour as the stabilizer at that point. This insertion should be the same length as the cut-out with a tolerance of .03 inch overall. Splice the insert with a plate at each end the same gage as the rib. Two rows of AN442-AD5 rivets spaced at .68 ± .06 inch are used for the splice attachment each side of the cut.

Splice the flanges with an angle of the same gage as the rib nested into the original flange. Extend the angle far enough to each side of the cut to pick up four AN442-AD5 rivets. If the cut-out is less than 8 inches long, make the angle continuous over the insertion; and if longer, make the angle discon-continuous. If the section removed contains lightening holes or beads and they are not formed in the insertion, a .5 x .62 angle the same gage as the web should be attached along the location of the center lines of the lightening holes or beads with AN442-AD4 rivets at .68 ± .06 inch spacing.

(5) DAMAGE NECESSITATING REPLACEMENT.—Replace all fittings, brackets, clips, etc. that may be damaged.

(6) DAMAGE TO RIB AT REINFORCED HINGE AT STATION 190.—If cracks are found in angle, part No. 20-110-5014-4 replace with similar serviceable angle fabricated locally from 24 SO aluminum alloy sheet, .040 inch thick, specification No. AN-A-13, condition A, Stock No. 6800-141850, and heat treated in accordance with AN 01-1A-1. The angle removed may be used as a pattern.

If cracks are found in rib, part No. 20-110-5014-2, fabricate four angles, part No. 20-110-5014-1201, from .051 sheet aluminum alloy 24ST, 15 inches long with .62 x .71 inch legs, and four angles. Part No. 20-110-5014-1202, from .051 sheet aluminum alloy 24ST, 8.80 inches long with .62 x .71 inch legs. Alternate material. Stock No. 6800-065900 aluminum alloy extruded shape Alcoa Die No. 12883 may be used if available locally.

Install angles, —1201, top and bottom on outboard side of rib starting at forward edge of block assembly, part no. 20-110-5112-3 or 20-110-5020-502, and running forward. Pick up existing rivets in rib and skin. Install angles —1202 on inboard side of rib top and bottom picking up the six bolts in block assembly, part no. 20-110-5112-3 or 20-110-5020-502, and running forward 8.80 inches from end of rib. Pick up existing rivets and add three rivets top and bottom between existing rivets in web of rib assembly, add eight rivets top and bottom to flange of rib, part no. 20-110-5014-2, and leg of angle, part no. 20-110-5014-4, as shown in figure 194A.

(a) Cut clip, part no. 20-110-5033-1, to clear angles —1201 and install.

(b) Cut angle, part no. 20-110-5014-5, to clear angles —1202 and install.

(c) Cut skin, part no. 20-110-5001-66, to clear angles —1202 and replace rivets.

e. DAMAGE TO MATCH ANGLE.—Any damage extending through the skin, doubler and match angle must be repaired by insertion.

Clean up the damaged area and round off all sharp corners to a .5 inch radius as shown in figure 197. Make the doubler cut 2 inches inside the skin cut-out and cut the splice angle 3 inches inside the doubler cut. The skin cut-out should be made at least 3 inches from the nearest stringer. Make an insert for the doubler and skin from material of the same respective gages and an insert for the match angle from a similar extrusion. If no extrusion is available, a section must be machined from 24ST bar stock with the grain running the length of the angle.

Splice plates the same gage as the skin and 2.5 inches wide are used with two rows of 671D-5AD rivets at .68 ± .06 inch spacing to attach the skin insert. The spanwise plates should be under the skin and the chordwise plates on the surface.

f. STRINGERS.—Figure 189 gives the various stringers used on the stabilizer. All extruded sections may be repaired in accordance with figures 231 through 233. The doubler and extrusion inserts should be attached using the same size rivets and same pattern as original.

g. STABILIZER TIP.

(1) GENERAL.—The stabilizer tip is of the same general construction as the main assembly and, therefore, the repairs will be similar. Figure 198 shows the major structure, and table 68 gives the component parts. Figure 190C and Table 67C show the structure and component parts of the stabilizer tip installed on airplanes AF44-78545 and subsequent.

(2) The beams and ribs are of the same construction as the main assembly ribs and, therefore, the repairs will be the same.

(3) If the doubler at the attachment rib is damaged, cut away the damaged portion and insert a new section picking up the same rivet pattern as the original.

(4) Replace all channel reinforcements that are partially damaged and all ribs and beams that are totally damaged.

(5) The skin should be repaired in accordance with the text for the main assembly skin.

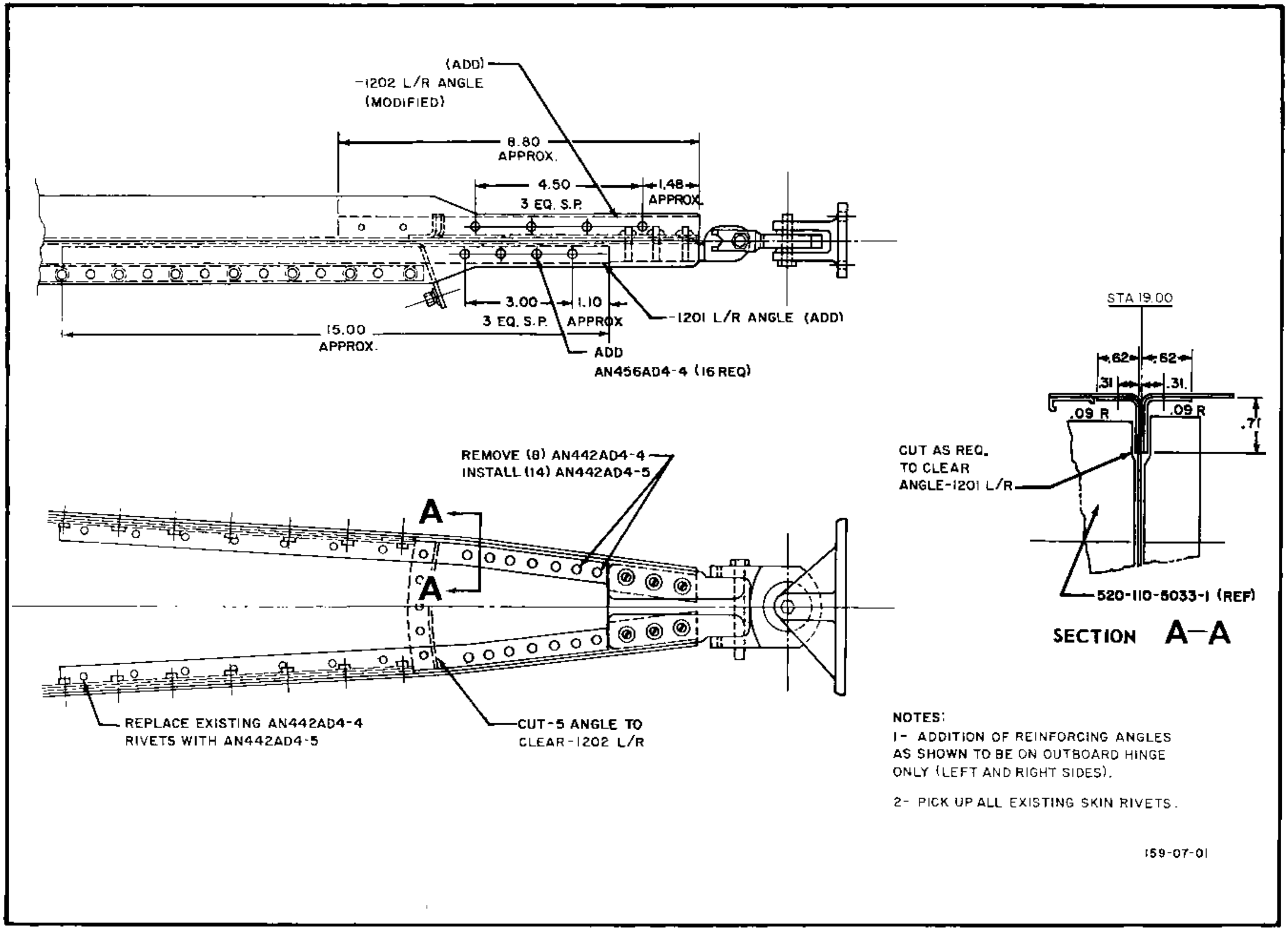
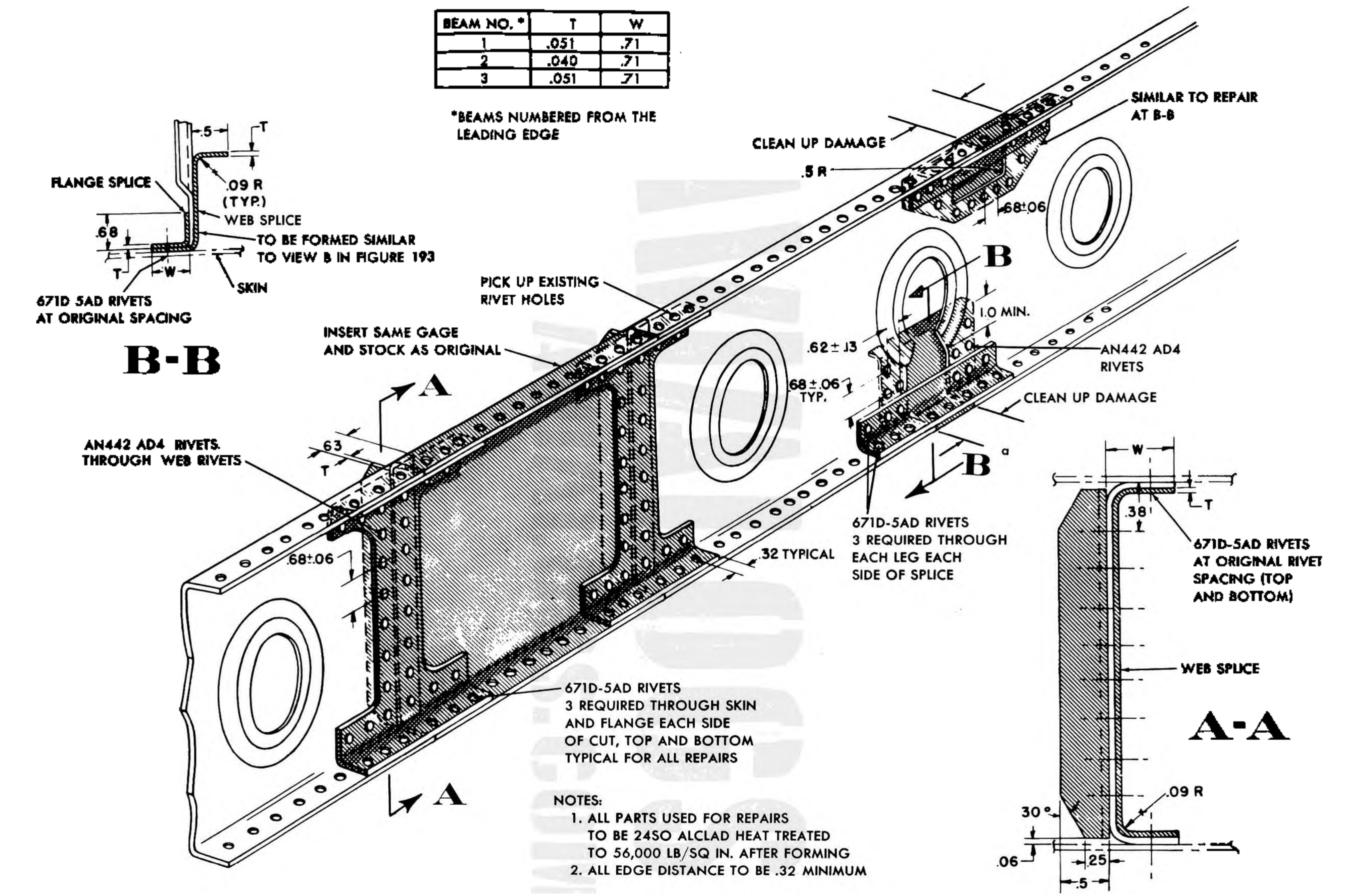


FIGURE 194A–STABILIZER RIB REPAIR



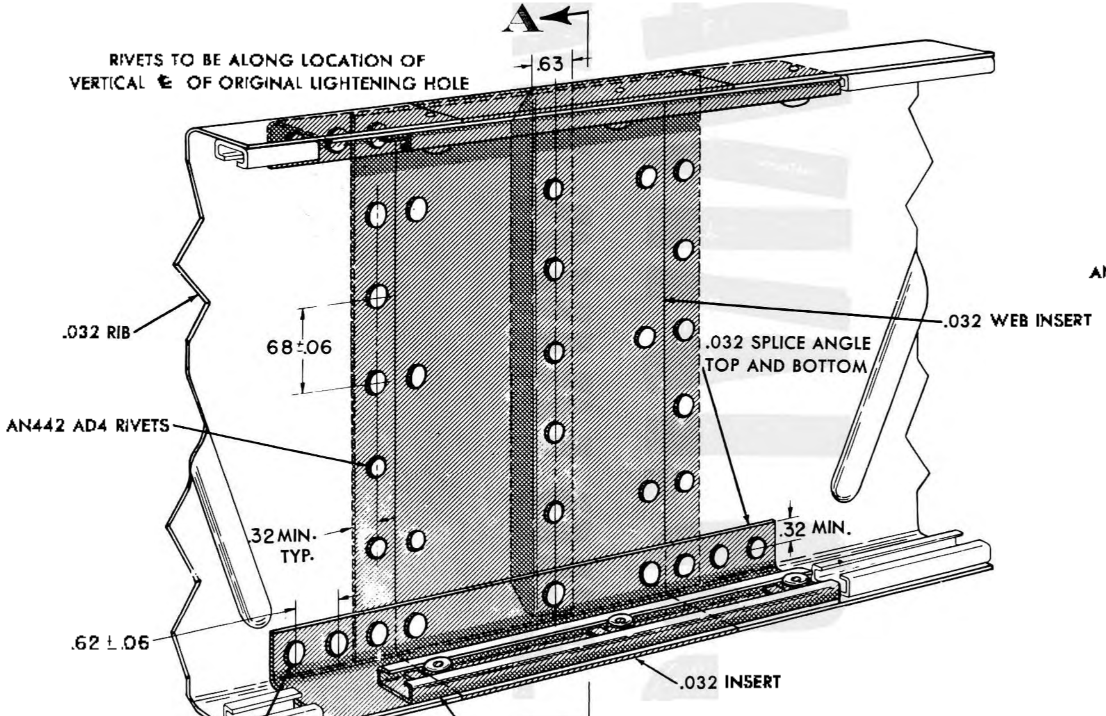
BEAM NO.*	T	W
1	.051	.71
2	.040	.71
3	.051	.71

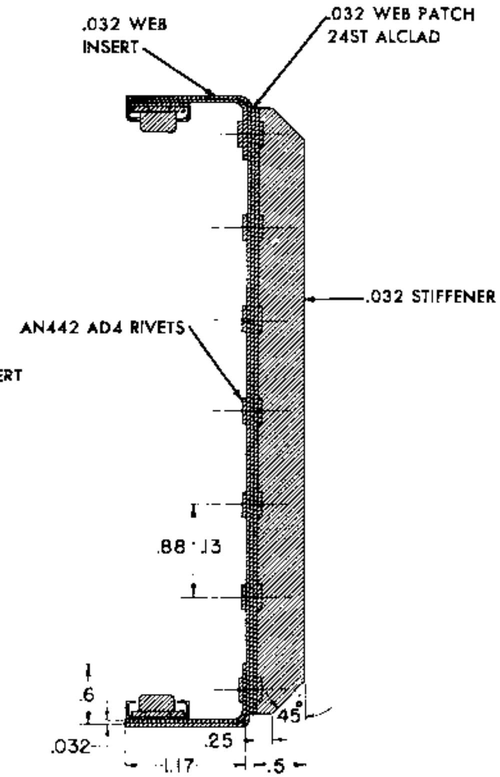
*BEAMS NUMBERED FROM THE LEADING EDGE

NOTES:
1. ALL PARTS USED FOR REPAIRS TO BE 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. ALL EDGE DISTANCE TO BE .32 MINIMUM

REFERENCE: SECTION VII, PARAGRAPH 1c

FIGURE 195 — STABILIZER — RIB AND BEAM FLANGE REPAIR





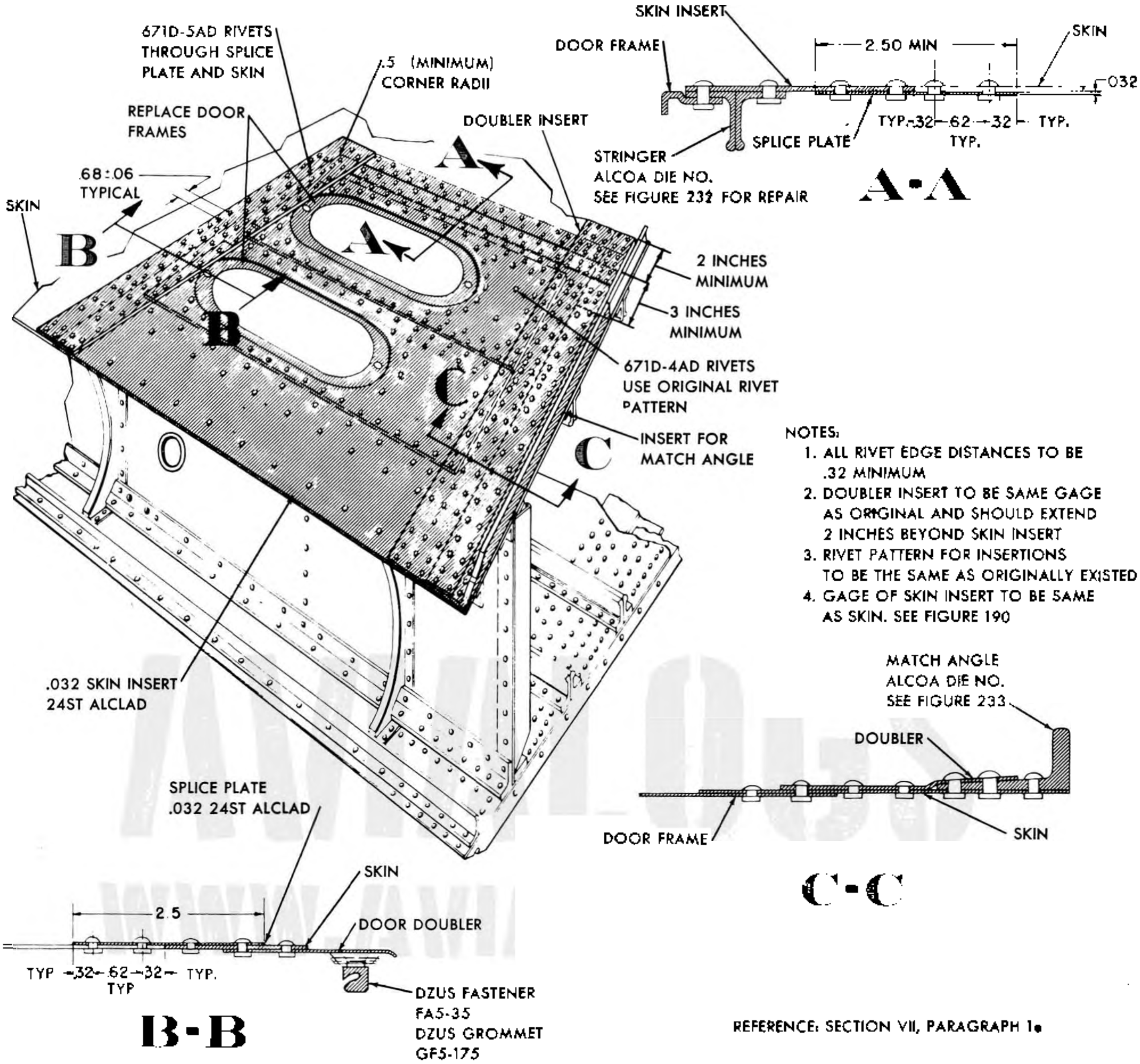
A-A

NOTES:

1. EXCEPT AS NOTED, ALL PARTS TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
2. ALL RIVET EDGE DISTANCES TO BE .32 MINIMUM
3. ALL BEND RADII TO BE .09 INCH MINIMUM FOR SPECIFIED MATERIAL. SEE TABLE 7.
4. IF TWO OR LESS GANG CHANNEL NUTS ARE REMOVED, REPLACE WITH NUT PLATES. IF MORE THAN TWO ARE REMOVED, REPLACE WITH SECTION OF GANG CHANNEL NUTS.

REFERENCE: SECTION VII, PARAGRAPH 1g

FIGURE 196—STABILIZER—TIP ATTACHMENT RIB REPAIR



NOTES:
1. ALL RIVET EDGE DISTANCES TO BE .32 MINIMUM
2. DOUBLER INSERT TO BE SAME GAGE AS ORIGINAL AND SHOULD EXTEND 2 INCHES BEYOND SKIN INSERT
3. RIVET PATTERN FOR INSERTIONS TO BE THE SAME AS ORIGINALLY EXISTED
4. GAGE OF SKIN INSERT TO BE SAME AS SKIN. SEE FIGURE 190

REFERENCE: SECTION VII, PARAGRAPH 1e

FIGURE 197—STABILIZER—REPAIR IN REGION OF ATTACH ANGLES

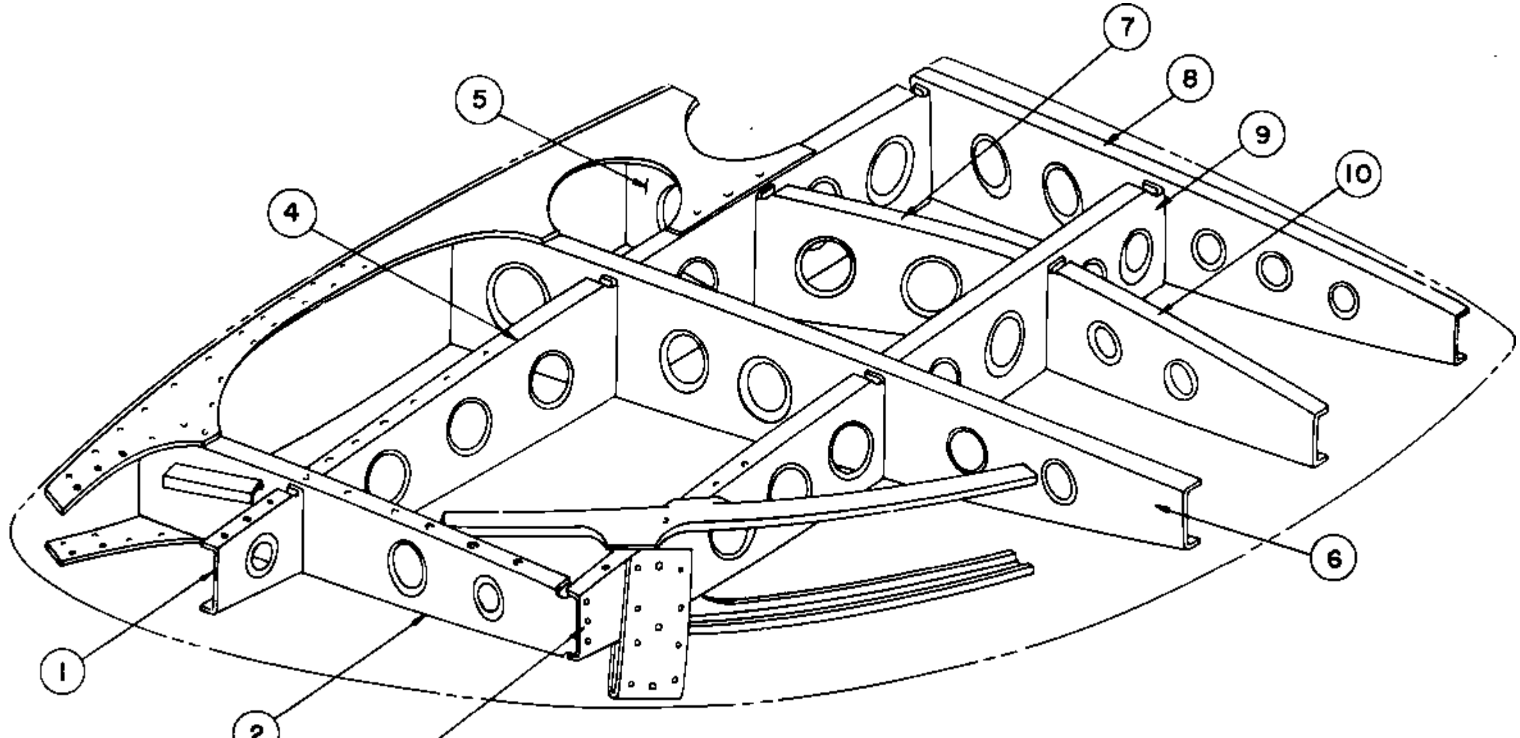


FIGURE 198—STABILIZER TIP STRUCTURE

TABLE 68
COMPONENT PARTS OF STABILIZER TIP

Item	*Designation*	*Gage*	*Part Number*
1	Rib Assembly	.020	20-111-1018-2
2	Beam Assembly	.020	20-111-1013-2
3	Rib Assembly	.020	20-111-1019-2
4	Rib Assembly	.020	20-111-1018-2
5	Bulkhead	.040	20-111-1015-2
6	Beam	.020	20-111-1014-2
7	Bulkhead	.020	20-111-1016-2
8	Beam	.020	20-111-1017-2
9	Rib	.020	20-111-1019-3
10	Bulkhead	.020	20-111-1020-2

2. FIN.

a. GENERAL.—The fin is of the same general construction as the stabilizer, having six beams supporting formed sheet bulkhead ribs and covered by highly stressed skin. The structure and component parts are given in figure 199 and table 70.

The attachment of the fin to the fuselage is made in the same manner as the stabilizer. The fin tip is attached at station 192 by means of gang channel nuts and standard AN bolts.

As on the stabilizer, flush riveting is used over the forward portion of the assembly. Here again this procedure is regarded as too awkward and time absorbing for repairs and will, therefore, not be used.

b. SKIN.—The repair procedure for the fin skin is the same as for the stabilizer skin and, therefore, that portion of the text may be used in conjunction with figure 200 and table 69.

c. BEAMS.

(1) GENERAL.—The beams are made up of a flat sheet web, stiffened by flanged lightening holes and extruded angles, to which are riveted bent up channel flanges.

It is essential that a snug fit between rib and beam be maintained; therefore, repairs in this region should receive special consideration.

(2) NEGLIGIBLE DAMAGE.—Holes or cracks in the web which, when cleaned up, do not exceed .5 inch in diameter may be neglected. Smooth dents free from cracks or abrasions may be neglected but should be restored to the original contour to prevent cracks from developing.

Nicks or cracks less than .13 inch deep in the edge of the flanges or stiffeners may be neglected provided they are cleaned up with a round file to a .25 inch radius and are not located within .38 inch of rivet holes or are not less than 3 inches apart.

(3) DAMAGE REPAIRABLE BY PATCHING.—Damage to the web and flange less than 5 inches in length may be repaired by patching.

Clean up damaged area by rounding all sharp corners to a .25 inch radius and stopping all cracks with a 1/8 inch drill. Cut a patch of the same gage as the skin to cover the damaged area and attach to the opposite side of the beam from the lightening hole flanges with two rows of AN442-AD5 rivets at .68 ± .06 inch spacing. If the damage extends into a lightening hole, a .5 inch flange should be bent up on the patch over the covered portion of the hole. (See figure 201.)

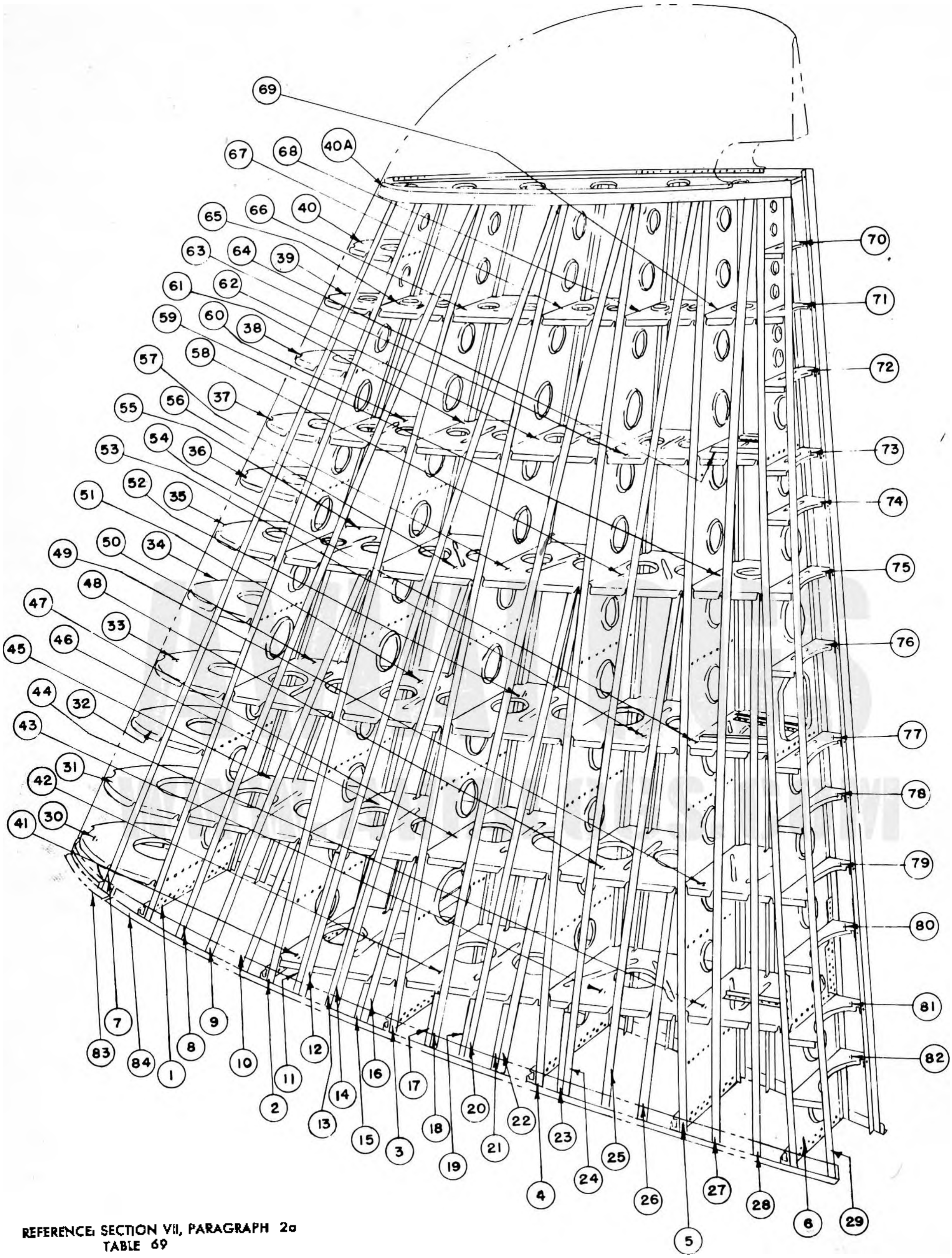
From a sheet of X-4130 steel .031 thick, make a bent up channel to be nested into the original flange. Extend the splice channel far enough each side of the damage to pick up four AN442-AD5 rivets through the web. A filler the same gage as the skin should be inserted between the splice channel and skin to maintain the contour of the fin surface and to eliminate the necessity of joggling.

Damage in the region of ribs and fittings cannot be repaired by patching.

(4) DAMAGE REPAIRABLE BY INSERTION.—Damage 5 inches or over in length may be repaired by insertion. If the damage occurs near a a fitting or rib attachment, insert a new section of beam in the region and splice it on either side to the

TABLE 69
FIN SKIN RIVETING

Location	*Extent*	*Gage of Fwd. Skin*	*Gage of Aft Skin*	*Type of Rivets*	*Rivet Spacing*	*No. of Rivet Rows*
Beam 1	Root to 92.22	.020	.020	AN426AD4-5	1.00	1
Beam 2	Root to 92.22	.020	.020	AN426AD4-4	1.50	1
Beam 3	Root to 92.22	.020	.020	671-D-4AD3	1.50	1
Beam 4	Root to 92.22	.020	.020	671-D-4AD3	1.50	1
Beam 5	Root to 92.22	.020	.020	671-D-4AD3	1.50	1



REFERENCE: SECTION VII, PARAGRAPH 2a
TABLE 69

FIGURE 199—FIN STRUCTURE

TABLE 70

COMPONENT PARTS OF FIN

Item	*Designation*	*Sta. No.*	*Part*
1	Beam Assembly No. 1		20-120-1001-1
2	Beam Assembly No. 2		20-120-1002-1
3	Beam Assembly No. 3		20-120-1003-1
4	Beam Assembly No. 4		20-120-1004-1
5	Beam Assembly No. 5		20-120-1005-1
6	Beam Assembly No. 6		20-120-1006-1
7			
thru			Alcoa Die No
29	Stringer		29083
30	Nose Rib Assembly	84.50	20-120-1015-2
31	Nose Rib Assembly	92.22	20-120-1019-7
32	Nose Rib Assembly	102.22	20-120-1015-3
33	Nose Rib Assembly	112.22	20-120-1020-2
34	Nose Rib Assembly	122.22	20-120-1015-5
35	Nose Rib Assembly	132.22	20-120-1021-2
36	Nose Rib Assembly	142.22	20-120-1015-4
37	Nose Rib Assembly	152.22	20-120-1022-2
38	Nose Rib Assembly	162.22	20-120-1015-6
39	Nose Rib Assembly	172.22	20-120-1023-2
40	Nose Rib Assembly	182.22	20-120-1015-7
40-A	Rib Assembly	192.22	20-120-1024-1
41	Rib Assembly	75.30	20-120-1018-2
42	Rib Assembly	75.30	20-120-1018-3
43	Rib Assembly	75.30	20-120-1018-4
44	Rib Assembly	75.30	20-120-1018-1
45	Rib Assembly	92.22	20-120-1019-2
46	Rib Assembly	92.22	20-120-1019-3
47	Rib Assembly	92.22	20-120-1019-4
48	Rib Assembly	92.22	20-120-1019-5
49	Rib Assembly	92.22	20-120-1019-6
50	Rib Assembly	112.22	20-120-1020-3
51	Rib Assembly	112.22	20-120-1020-4
52	Rib Assembly	112.22	20-120-1020-5
53	Rib Assembly	112.22	20-120-1020-6
54	Rib Assembly	112.22	20-120-1020-9
55	Rib Assembly	132.22	20-120-1021-3
56	Rib Assembly	132.22	20-120-1021-4
57	Rib Assembly	132.22	20-120-1021-5
58	Rib Assembly	132.22	20-120-1021-6
59	Rib Assembly	132.22	20-120-1021-7
60	Rib Assembly	152.22	20-120-1022-3
61	Rib Assembly	152.22	20-120-1022-4
62	Rib Assembly	152.22	20-120-1022-5
63	Rib Assembly	152.22	20-120-1022-6
64	Rib Assembly	152.22	20-120-1022-7
65	Rib Assembly	172.22	20-120-1023-3
66	Rib Assembly	172.22	20-120-1023-4
67	Rib Assembly	172.22	20-120-1023-5
68	Rib Assembly	172.22	20-120-1023-6
69	Rib Assembly	172.22	20-120-1023-7
70	Rib Assembly	182.22	20-120-1017-9
71	Rib Assembly	172.22	20-120-1017-8
72	Rib Assembly	162.22	20-120-1017-7
73	Rib Assembly	151.22	20-120-1017-6
74	Rib Assembly	142.22	20-120-1017-5
75	Rib Assembly	132.22	20-120-1017-4
76	Rib Assembly	122.22	20-120-1044-2
77	Rib Assembly	112.22	20-120-1017-2
78	Rib Assembly	102.22	20-120-1016-6
79	Rib Assembly	92.22	20-120-1016-5
80	Rib Assembly	84.22	20-120-1016-4
81	Rib Assembly	74.30	20-120-1016-3
82	Rib Assembly	65.30	20-120-1016-2
83	Match Angle		Alcoa Die No
			L-28928
84	Match Angle		.051

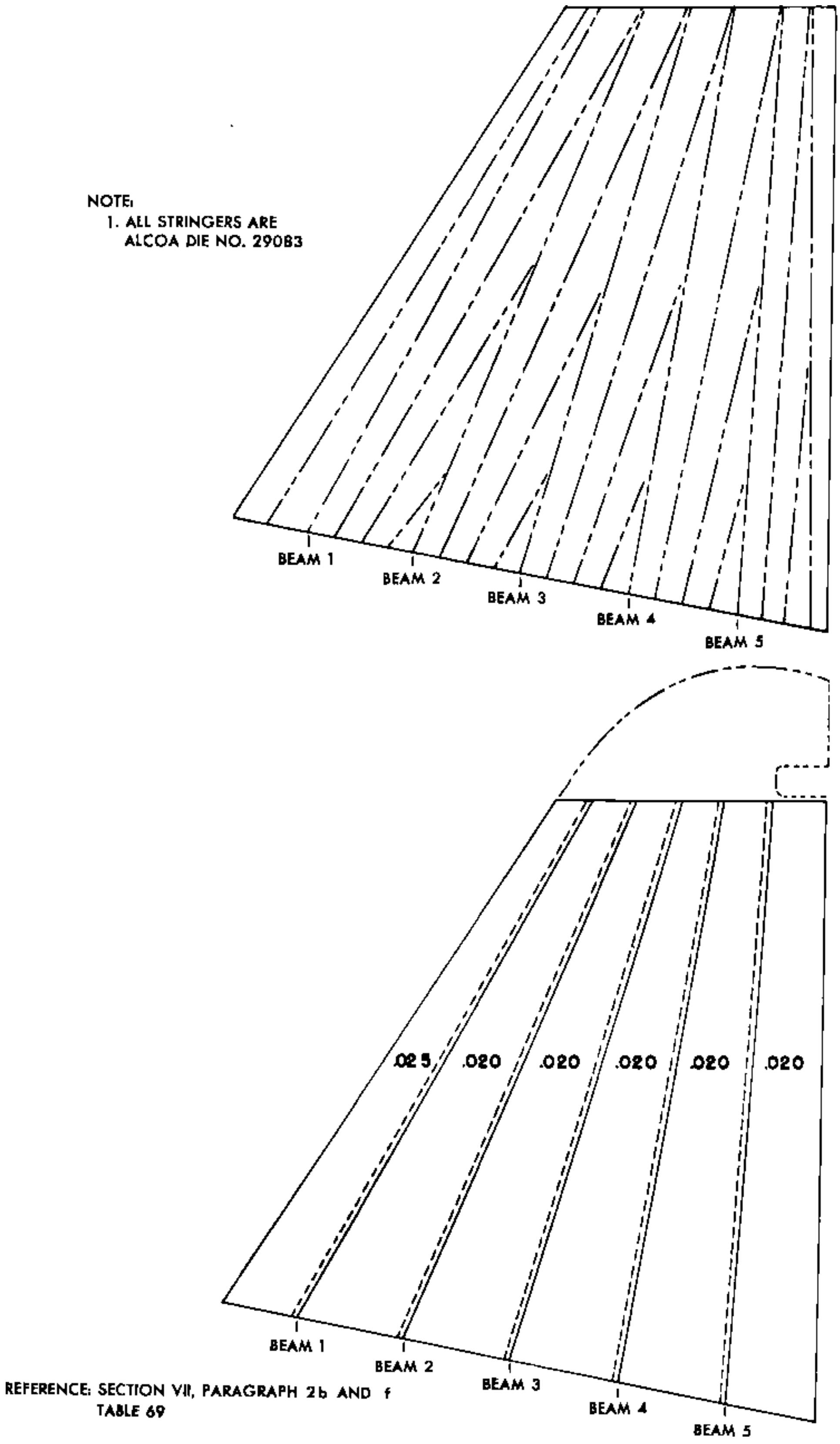
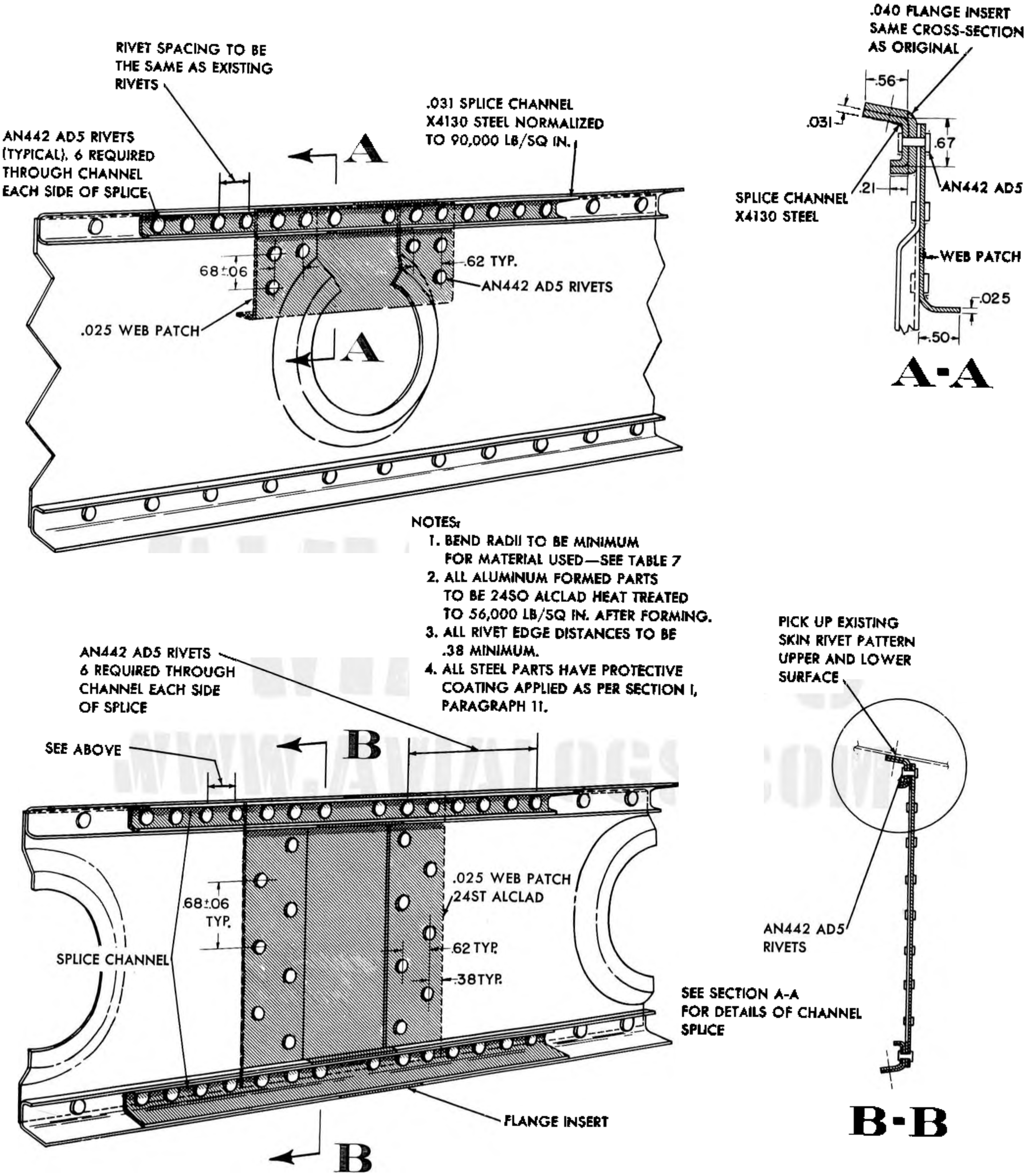
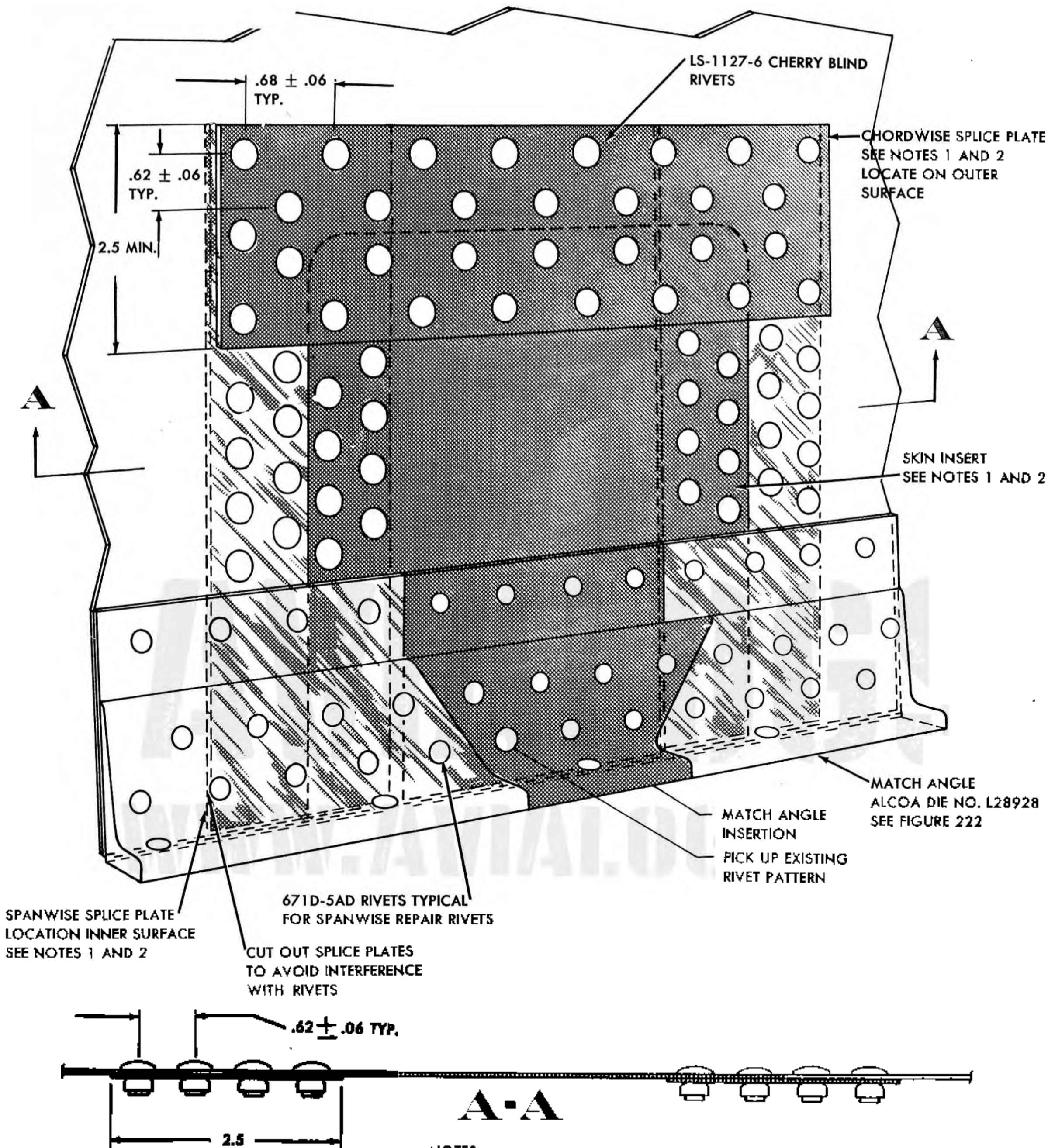


FIGURE 200 — FIN SKIN AND STRINGER DIAGRAM



REFERENCE: SECTION VII, PARAGRAPH 2c

FIGURE 201—FIN—REPAIR OF BEAM



NOTES:
1. REPAIR STOCK TO BE THE SAME GAGE AS ORIGINAL. SEE FIGURE 200
2. ALL PARTS TO BE 24ST ALCLAD
3. ALL RIVET EDGE DISTANCE .38 MINIMUM
4. CLEAN UP DAMAGED AREA WITH .5 INCH MINIMUM CORNER RADII

REFERENCE: SECTION VII, PARAGRAPH 2e

FIGURE 202—FIN REPAIR IN REGION OF ATTACH ANGLE

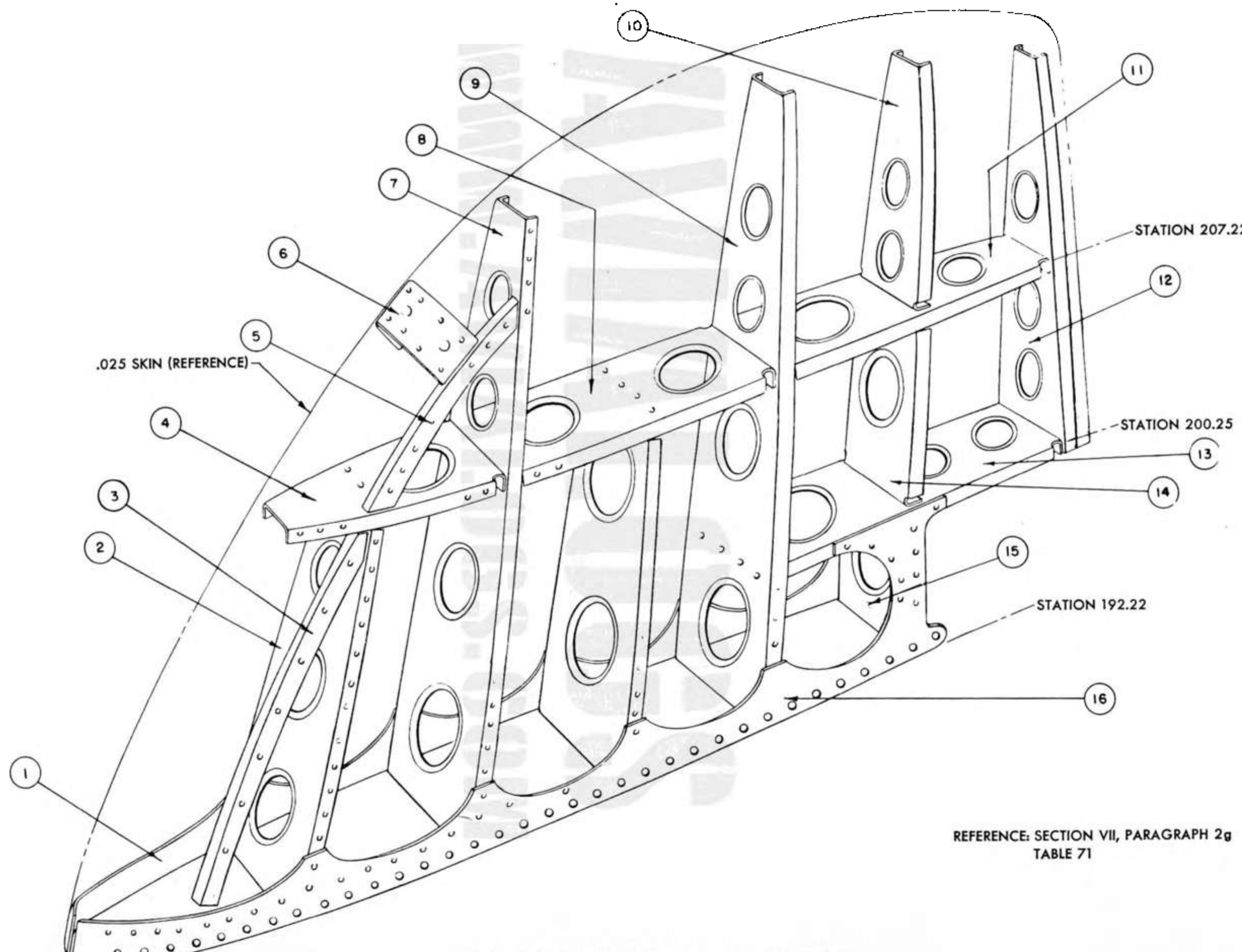


FIGURE 203—FIN TIP STRUCTURE

undamaged portion of the beam. The procedure will be the same as for the stabilizer except for the items discussed below and will, therefore, not be outlined again in detail. In conjunction with the text for the stabilizer beam, figure 201 should be used.

In this case, if the cut-out is less than 10 inches long, the flange splice should be continuous across the cut-out, and if greater than 10 inches, it may be discontinuous.

The flange splice should be the same as used for patching and should pick up four rivets each side of cut.

(5) DAMAGE NECESSITATING REPLACEMENT.—Replace all stiffeners, fittings, etc. that may be damaged. If extruded stiffeners are damaged and no extrusion is available, replace with a bent up section as shown in figures 231 through 233.

d. RIBS.—Due to the similarity of construction between these ribs and the stabilizer ribs, the repairs will be the same. Therefore, for the repair of the fin ribs, refer to the text of the stabilizer ribs.

e. MATCH ANGLE.—The similarity between the fin and stabilizer match angles makes it possible to use the method of repair described in paragraph 1. *e.* of this section. The region of the doublers, however, require special treatment. This is shown in figure 202.

f. STRINGERS.—Figure 200 gives the various stringers used on the fin. All extruded sections may be repaired in accordance with figures 231 and 233.

g. FIN TIP.—The major structure of the tip is shown in figure 203. The repairs will be similar to that of the stabilizer tips. (See paragraph 1. *g.*)

3. RUDDER.

a. GENERAL.—The rudder installation is made up of the rudder assembly, the tab assembly and the tip assembly. (See figures 204 and 213, and tables 72 and 74.)

All assemblies are made up of a single beam supporting bulkhead type ribs and covered by a highly stressed alclad skin.

The tip is attached to the rudder at station 198.76 by standard AN bolts and gang channel nuts.

A piano hinge attaches the tab to the rudder.

The rudder installation on airplanes AF44-78545 and subsequent consists of the rudder assembly, a trim tab assembly, a spring balance tab assembly and a tip assembly. Repairs to this rudder installation may be accomplished in the manner outlined in this paragraph. (See Figures 205A, 205B, and Tables 73A and 73B.)

b. SKIN.—The repairs for the rudder and tab skins are the same as for the stabilizer skin and, therefore, their repairs will be made in accordance with the text on the stabilizer skin and figure 205, table 73.

TABLE 71
COMPONENT PARTS OF FIN TIP

Item	*Member*	*Gage*	*Station*	*Part No.*
1	Scallop	.032	192.22	20-121-1000-4
2	Beam	.020		20-121-1013-2
3	Reinforcement	.032		20-121-1019-3
4	Rib	.020	207.22	20-121-1016-2
5	Reinforcement	.032		20-121-1019-2
6	Doubler	.032		20-121-1000-5
7	Beam	.020		20-121-1020-1
8	Rib	.020	207.22	20-121-1016-3
9	Beam	.020		20-121-1012-3
10	Bulkhead	.020		20-121-1021-3
11	Rib	.020	207.22	20-121-1016-4
12	Beam	.020		20-121-1011-3
13	Rib	.020	200.25	20-121-1015-2
14	Bulkhead	.020		20-121-1018-2
15	Bulkhead	.020		20-121-1017-2
16	Scallop	.032	192.22	20-121-1000-4

c. BEAMS.

(1) MAIN BEAM.

(*a*) GENERAL. This beam is made up of a flat sheet web, flanged at the top and bottom and stiffened by flanged lightening holes. Between stations 75.3 and 81.45 there is a cut-out reinforced by an extruded stiffener on each side and a reinforcing angle nested in the flange at top and bottom.

(*b*) NEGLIGIBLE DAMAGE. - Smooth dents in the web free from cracks or abrasions may be neglected but should, however, be restored to the original contour taking care not to stretch or otherwise damage the web.

No flange damage may be neglected.

(*c*) DAMAGE REPAIRABLE BY PATCHING.—Damage to the web and/or flange may be repaired by the following procedure. Clean up the damaged area by rounding out all corners to a radius of .5 inch and stopping all cracks with a 1/8 inch drill. Cover the damaged area with a patch of the same gage as the web and attach to the opposite side of the beam from the lightening holes with two rows of AN442-AD5 rivets at .68 ± .06 inch spacing.

To repair the flange, use the splice channel shown in figure 206. Extend the channel far enough to each side of damage to pick up seven AN442AD6 rivets through the beam web. Where the channel extends over the patch, a filler of the same gage as the web should be inserted between them.

If the patch extends through a rib attachment, the length of the rib on the side of the patch should be decreased by the thickness of the patch and the length of the rib on the opposite side should be correspondingly increased.

To shorten the rib, remove the beam attachment flange and replace it with an angle of the same gage as the rib and attached to it with two rows of AN442AD5 rivets at .68 ± .06 inch spacing. The flange of this angle should be the same width as the original flange. (See figure 207.)

To lengthen the rib, place a filler the same gage as the web between the rib and patch.

If the patch covers only a portion of the depth of the beam, it will be necessary to use a filler on both sides of the web to avoid joggling.

(*d*) DAMAGE REPAIRABLE BY INSERTION.--Any damage 5 inches or more in length may be repaired by insertion. (See figure 206.)

Clean up the damage by making a square cut across the beam on each side of the damaged area. The cut should be made so that at least 2 inches of material remain between the cut and the nearest lightening hole in the undamaged portion.

Make an insertion from the same stock and formed into the same section as the original beam. This insertion should be the same length as the cut-out with a tolerance of + 0, − .03 inch overall.

To fasten the insert, use two plates the same gage as the web and 2.38 inches wide, and two rows of AN442AD5 rivets at .68 ± .06 inch spacing each side of the splice.

Repair the flange with the same channel as used for a patch repair, picking up seven AN442AD6 rivets each side of the cut. If the cut is less than 16 inches long, make the splice channel continuous across the insertion. However, if cut is greater than 16 inches in length, a channel at each end of the insert may be used. If the section removed contains lightening holes and none are to be formed in the insert, a .5 x .63 inch stiffener the same gage as the beam and with a length equal to the beam depth should be riveted to the web along the location of the center line of the original holes.

(*e*) DAMAGE NECESSITATING REPLACEMENT. Replace all extruded stiffeners, clips, brackets, or short angles that may be damaged. See figures 231 through 233 for extrusion replacements.

(2) RUDDER TAB HINGE BEAM.

(*a*) GENERAL. - The rudder tab hinge beam is an .032 channel section. The continuous hinge is sandwiched between two extruded angles which are riveted to the beam web.

(*b*) NEGLIGIBLE DAMAGE. Smooth dents free from cracks or abrasions may be neglected but should be restored to the original contour to prevent further damage from developing. Care should be taken during this procedure not to stretch or crack the metal.

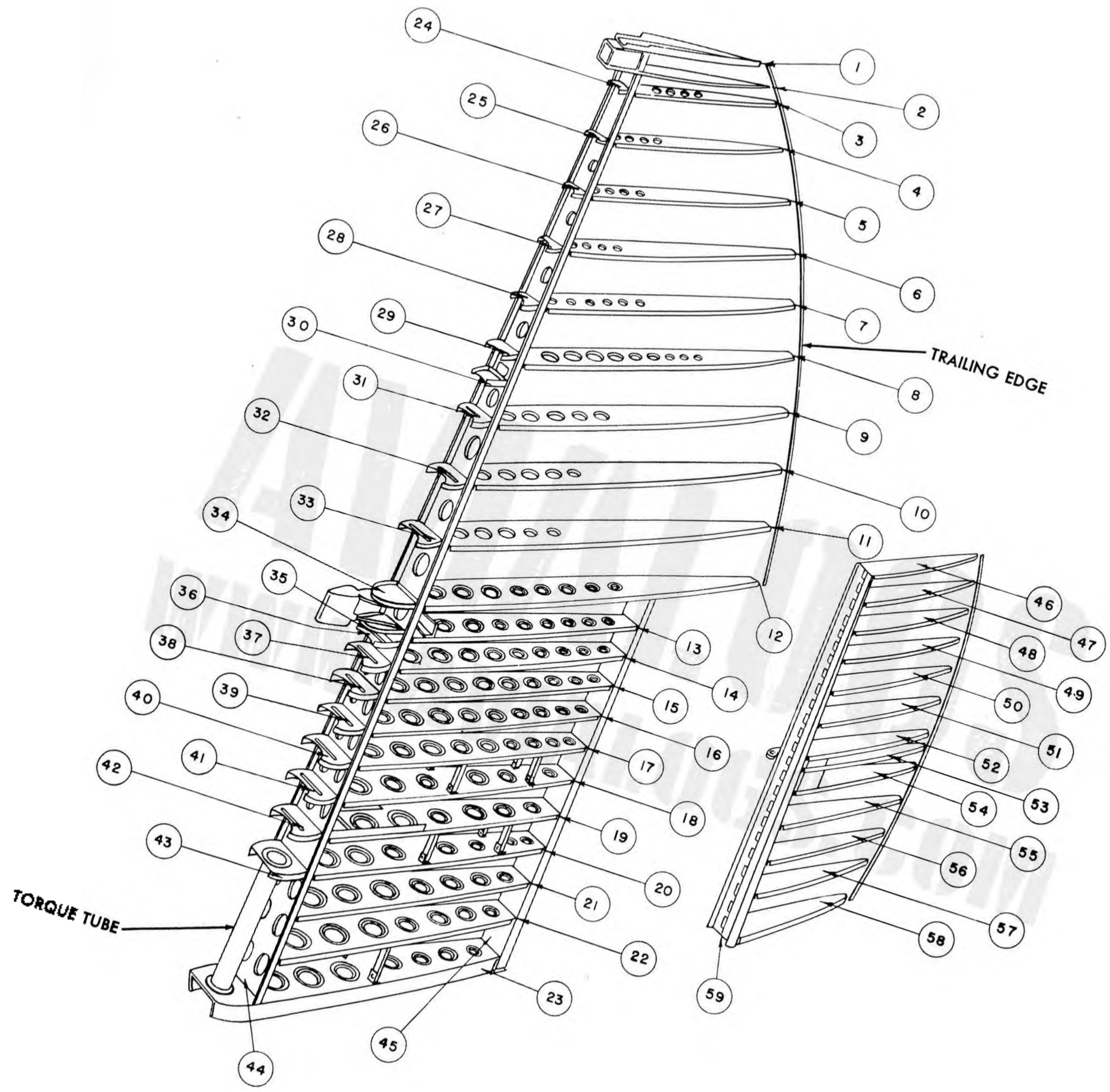


FIGURE 204—RUDDER AND TAB STRUCTURE

REFERENCE: SECTION VII, PARAGRAPH 3 a
TABLE 72

TABLE 72
COMPONENT PARTS OF RUDDER

No.	Item	Part No.	Gage	Station
1	Rib	20-140-1023-1	.051	
2	Rib	20-140-1022-1	.040	
3	Rib	20-140-1021-1	.040	192.22
4	Rib	20-140-1020-7	.020	184.22
5	Rib	20-140-1020-6	.020	176.22
6	Rib	20-140-1020-5	.020	168.22
7	Rib	20-140-1019-1	.020	160.22
8	Rib	20-140-1018-1	.032	152.22
9	Rib	20-140-1017-5	.032	144.22
10	Rib	20-140-1017-6	.032	136.22
11	Rib	20-140-1017-7	.032	128.22
12	Rib	20-140-1016-2	.020	120.22
13	Rib	20-140-1015-1	.032	112.22
14	Rib	20-140-1014-8	.020	106.05
15	Rib	20-140-1014-7	.020	99.90
16	Rib	20-140-1014-6	.020	93.75
17	Rib	20-140-1014-1	.025	87.60
18	Rib	20-140-1013-2	.032	81.45
19	Rib	20-140-1012-1	.040	75.30
20	Rib	20-140-1011-6	.025	70.18
21	Rib	20-140-1011-5	.020	65.05
22	Rib	20-140-1011-1	.020	59.92
23	Rib	20-140-1010-1	.040	55.80
24	Nose Rib	20-140-1008-2	.020	190.78
25	Nose Rib	20-140-1008-3	.020	184.22
26	Nose Rib	20-140-1008-4	.020	176.22
27	Nose Rib	20-140-1008-5	.020	168.22
28	Nose Rib	20-140-1007-2	.020	160.22
29	Nose Rib	20-140-1007-3	.020	153.66
30	Nose Rib	20-140-1007-4	.020	150.78
31	Nose Rib	20-140-1007-5	.020	144.22
32	Nose Rib	20-140-1007-6	.020	136.22
33	Nose Rib	20-140-1007-7	.020	128.22
34	Nose Rib	20-140-1036-2	.051	120.22
35	Nose Rib	20-140-1036-3	.051	113.66
36	Nose Rib	20-140-1007-10	.020	111.78
37	Nose Rib	20-140-1007-11	.020	106.05
38	Nose Rib	20-140-1007-12	.020	99.90
39	Nose Rib	20-140-1007-13	.020	93.75
40	Nose Rib	20-140-1007-14	.020	87.60
41	Nose Rib	20-140-1007-15	.020	81.45
42	Nose Rib	20-140-1007-16	.051	73.86
43	Nose Rib	20-140-1006-1	.040	70.18
44	Beam	20-140-1002-1	.040	
45	Beam	20-140-1003-1	.032	
46	Tab Rib	20-140-1028-15	.016	119.32
47	Tab Rib	20-140-1028-14	.016	112.22
48	Tab Rib	20-140-1028-13	.016	106.05
49	Tab Rib	20-140-1028-12	.016	99.90
50	Tab Rib	20-140-1028-11	.016	93.75
51	Tab Rib	20-140-1028-10	.016	87.60
52	Tab Rib	20-140-1028-9	.025	81.45
53	Tab Rib	20-140-1028-7	.040	78.20
54	Tab Rib	20-140-1028-6	.025	75.30
55	Tab Rib	20-140-1028-5	.016	70.18
56	Tab Rib	20-140-1028-4	.016	65.05
57	Tab Rib	20-140-1028-3	.016	59.92
58	Tab Rib	20-140-1028-2	.016	54.20
59	Beam	20-140-1026-1	.032	

TABLE 73
RUDDER SKIN RIVETING

Station	Gage of Upper Skin	Gage of Lower Skin	Type of Rivets	Rivet Spacing
199.35	.025	.032	AN526-1032-8 Screws	1.5 in.
144.22	.020	.020	671D-4AD	.75 in.
112.22	.020	.020	671D-4AD	.75 in.
81.45	.020	.020	671D-4AD	.75 in.
75.30	.020	.020	671D-4AD	.75 in.

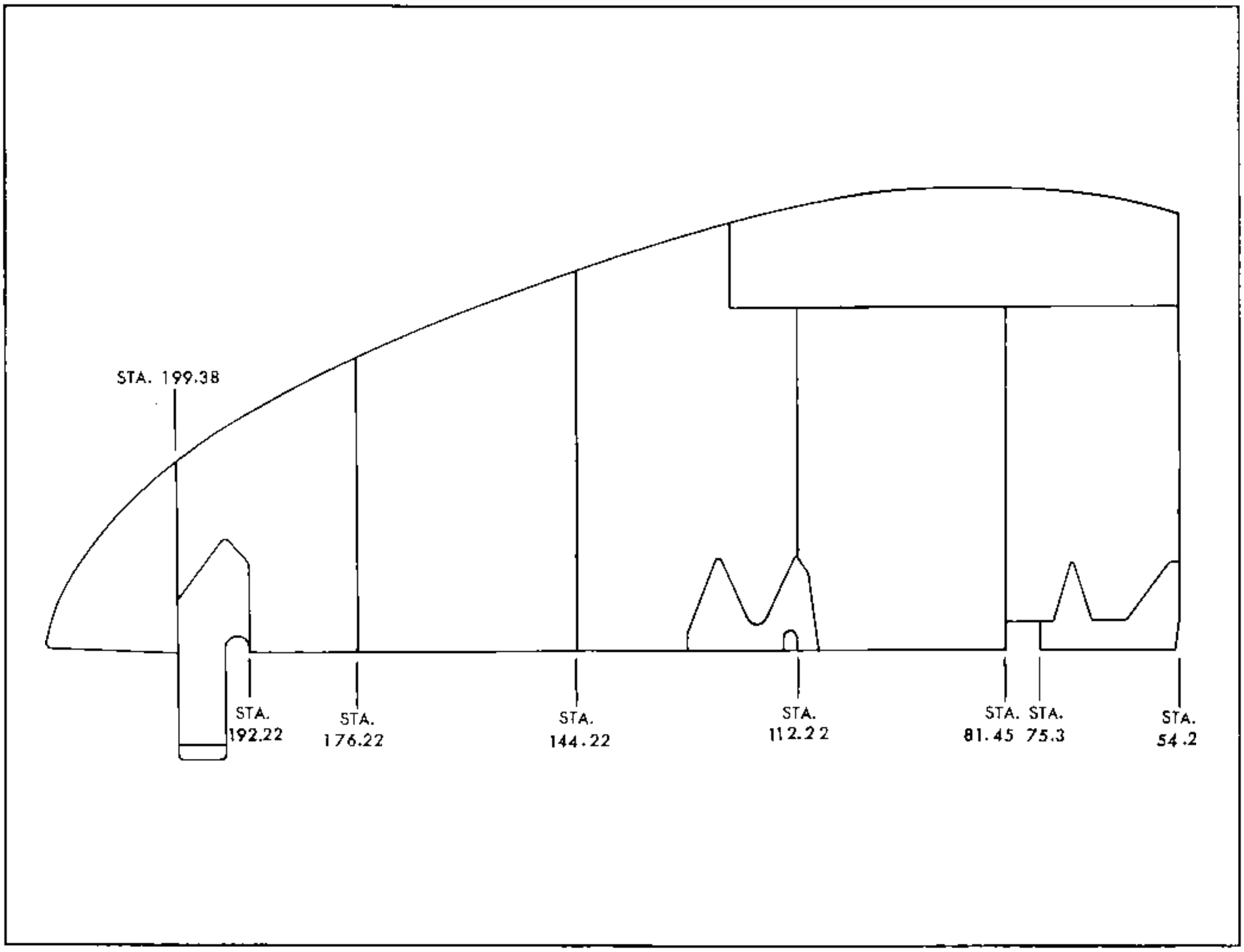


FIGURE 205 — RUDDER SKIN DIAGRAM

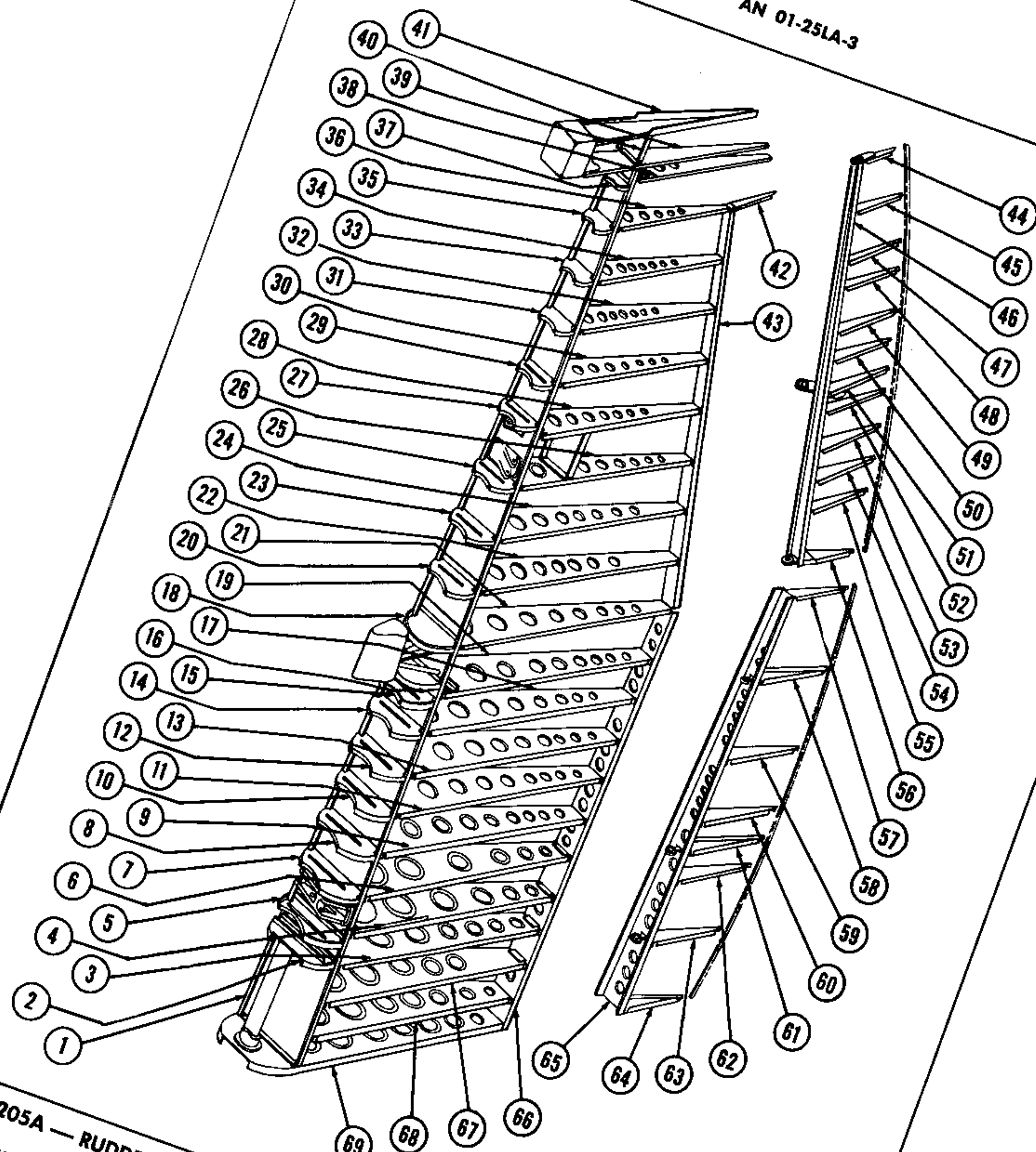


FIGURE 205A — RUDDER AND TAB STRUCTURE (AIRPLANES AF44-78545 AND SUBSEQUENT)

REFERENCE SECTION VII, PARAGRAPH 3a

TABLE 73A

COMPONENT PARTS OF RUDDER

(AIRPLANES AF44-78545 AND SUBSEQUENT)

Item	*Designation*	*Part No.*	*Gage*	*Station*
1	Beam	20-140-5112-1	.040	......
2	Rib	20-140-1006-1	.040	70.18
3	Rib	20-140-1011-6	.025	70.18
4	Rib	20-140-5140-1	.040	75.30
5	Rib	20-140-1007-16	.051	73.80
6	Rib	20-140-5141-1	.032	81.45
7	Rib	20-140-1007-15	.020	81.45
8	Rib	20-140-1007-14	.020	87.60
9	Rib	20-140-1014-1	.025	87.60
10	Rib	20-140-1007-13	.020	93.75
11	Rib	20-140-1014-6	.020	93.75
12	Rib	20-140-1007-12	.020	99.90
13	Rib	20-140-1014-7	.020	99.90
14	Rib	20-140-1007-11	.020	106.05
15	Rib	20-140-1007-10	.020	110.78
16	Rib	20-140-1036-3	.051	113.66
17	Rib	20-140-5144-1	.020	106.05
18	Rib	20-140-1036-2	.051	120.22
19	Rib	20-140-1015-1	.032	112.22
20	Rib	20-140-1007-7	.020	128.22
21	Rib	20-140-5122-1	.020	120.22
22	Rib	20-140-5123-2	.020	128.22
23	Rib	20-140-1007-6	.020	136.22
24	Rib	20-140-5123-3	.020	136.22
25	Rib	20-140-1007-5	.020	144.22
26	Rib	20-140-5125-1	.020	144.22
27	Rib	20-140-1007-3	.020	153.66
28	Rib	20-140-5126-1	.032	152.22
29	Rib	20-140-1007-2	.020	160.22
30	Rib	20-140-5127-2	.020	160.22
31	Rib	20-140-1008-5	.020	168.22
32	Rib	20-140-5128-2	.020	168.22
33	Rib	20-140-1008-4	.020	176.22
34	Rib	20-140-5128-3	.020	176.22
35	Rib	20-140-1008-3	.020	184.22
36	Rib	20-140-5130-2	.020	184.22
37	Rib	20-140-1008-2	.020	190.78
38	Rib	20-140-1021-1	.040	192.22
39	Bulkhead	20-140-1035-2	.064	......
40	Rib	20-140-1022-1	.040	194.24
41	Rib	20-140-1023-1	.051	198.76
42	Rib	20-140-5131-1	.040	184.22
43	Beam	20-140-5118-1	.032	......
44	Rib	20-140-5184-1	.025	184.19
45	Rib	20-140-5174-10	.016	176.22
46	Beam	20-140-5178-2	.025	......
47	Rib	20-140-5174-9	.016	168.22
48	Rib	20-140-5174-8	.016	162.22
49	Rib	20-140-5174-7	.016	157.22
50	Rib	20-140-5174-6	.016	152.22
51	Rib	20-140-5172-1	.032	148.22
52	Rib	20-140-5174-5	.016	144.22
53	Rib	20-140-5174-4	.016	139.22
54	Rib	20-140-5174-3	.016	134.22
55	Rib	20-140-5174-2	.016	128.22
56	Rib	20-140-5179-1	.020	119.53
57	Rib	20-140-5154-3	.016	119.32
58	Rib	20-140-5168-1	.020	106.32
59	Rib	20-140-5154-7	.016	94.05
60	Rib	20-140-5154-6	.016	83.69
61	Rib	20-140-5152-1	.032	78.51
62	Rib	20-140-5154-4	.016	74.13
63	Rib	20-140-5166-1	.020	64.16
64	Rib	20-140-5154-2	.016	54.20
65	Beam	20-140-5158-2	.025	......
66	Beam	20-140-5114-1	.032	......
67	Rib	20-140-5139-1	.020	65.05
68	Rib	20-140-1011-1	.020	59.92
69	Rib	20-140-1010-1	.040	55.80

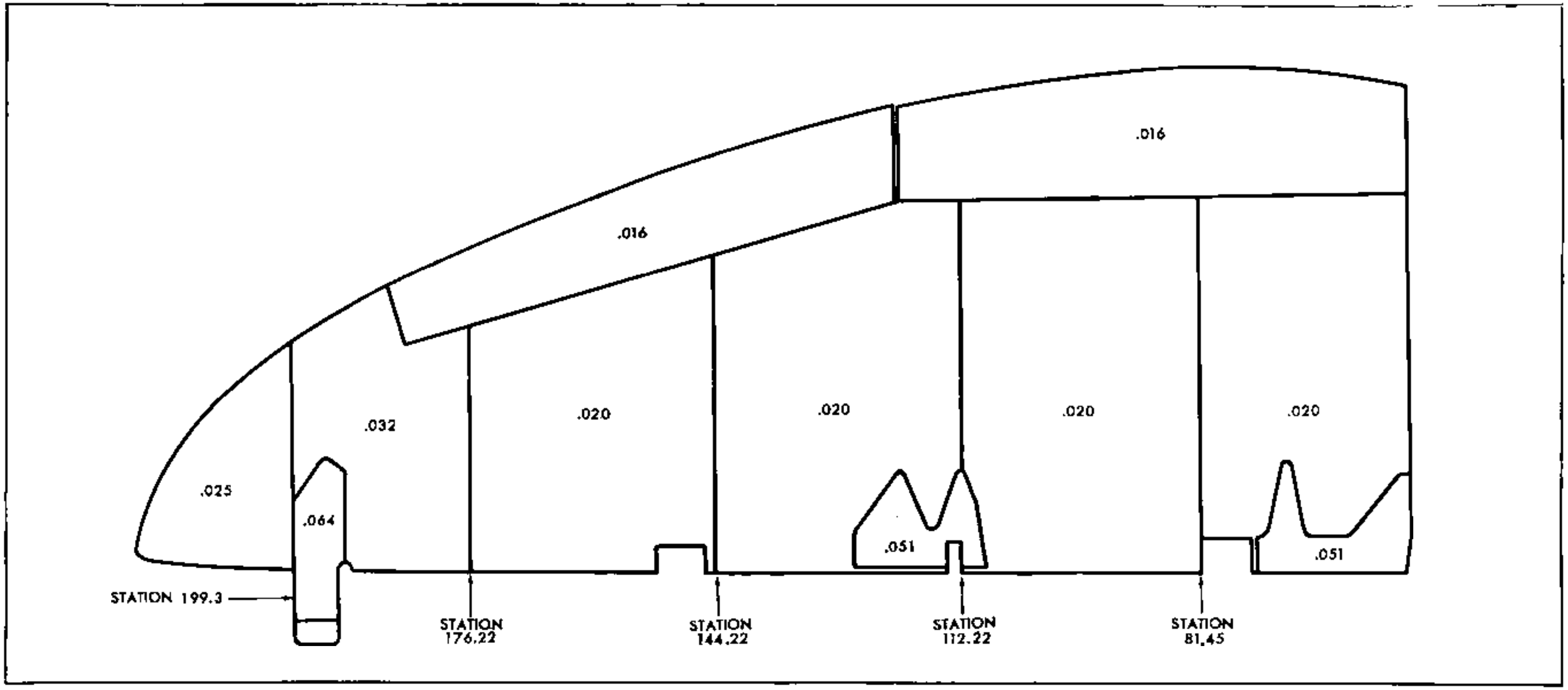
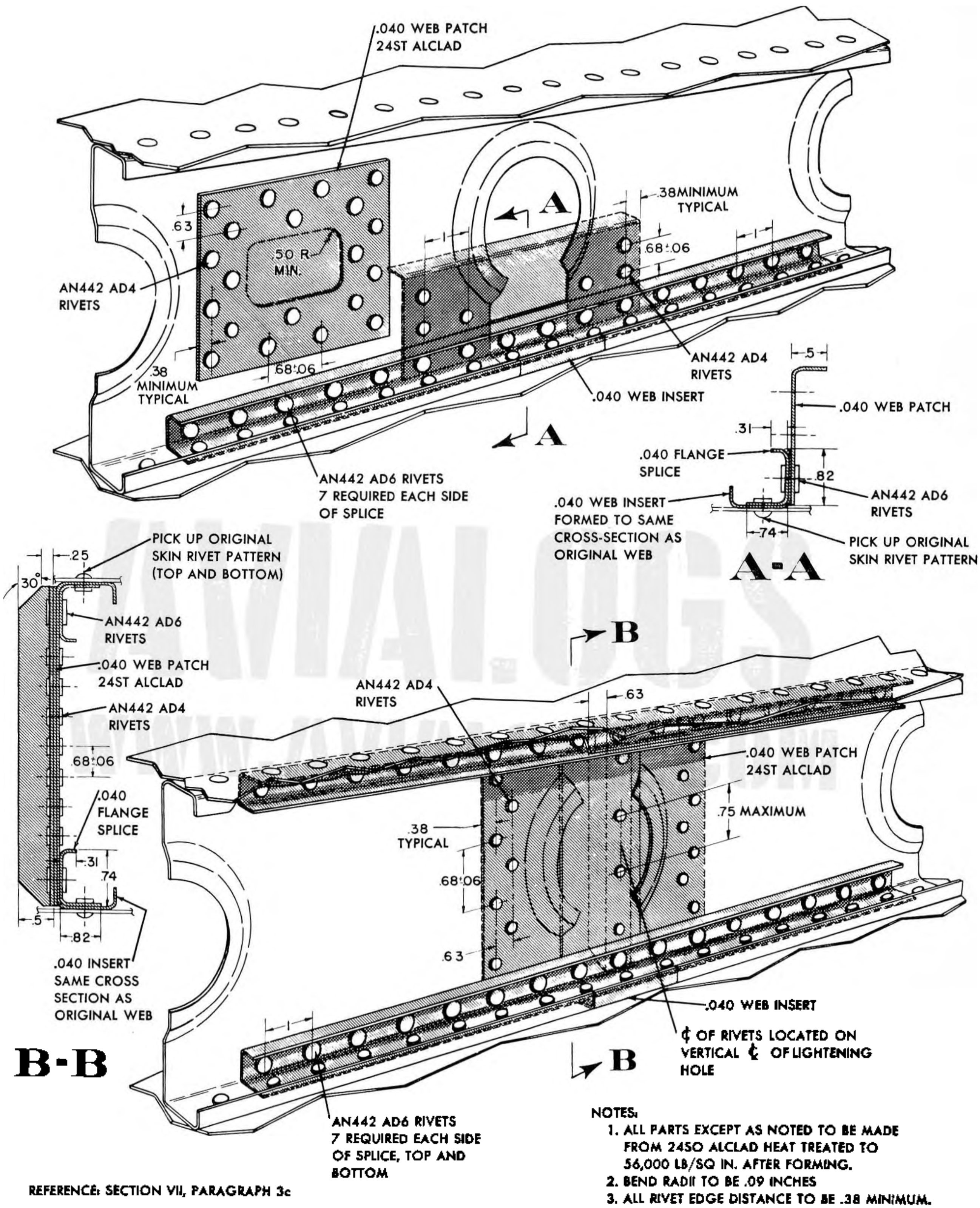


FIGURE 205B — RUDDER SKIN DIAGRAM (AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 73B—RUDDER SKIN RIVETING (AIRPLANES AF44-78545 AND SUBSEQUENT)

Station	*Gage of Upper Skin*	*Gage of Lower Skin*	*Type of Rivets*	*Rivet Spacing*	*Rivet Rows*
81.45	.020	.020	671D-4AD	.75	1
112.22	.020	.020	671D-4AD	.75	1
144.22	.020	.020	671D-4AD	.75	1
176.22	.032	.020	671D-4AD	.75	1
199.3	.025	.032	671D-4AD	.75	1



NOTES:
1. ALL PARTS EXCEPT AS NOTED TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
2. BEND RADII TO BE .09 INCHES
3. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM.

REFERENCE: SECTION VII, PARAGRAPH 3c

FIGURE 206—RUDDER BEAM REPAIR

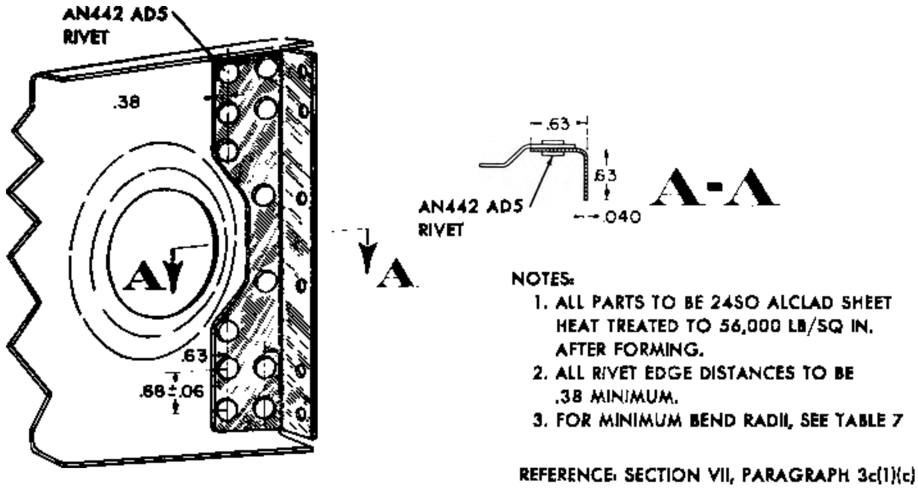


FIGURE 207—RUDDER—METHOD OF SHORTENING RIB

Small holes .5 inch or less in diameter when cleaned up, and cracks .5 inch or less in length when stopped with a ⅛ inch drill, may be neglected.

(c) DAMAGE REPAIRABLE BY PATCHING.—Damage located 3 inches or more from a rib attachment may be repaired by patching.

Clean up the damaged area rounding all sharp corners to .5 inch radius and stopping all cracks with a ⅛ inch drill at each end. Cut a patch from material the same gage as the beam and rivet it to the opposite side of the beam from the flanges using two rows of AN442AD5 rivets at .68 ± .06 inch spacing. If the extruded angles and hinge are damaged, cut out the damaged portion and build up an insert from a new section of hinge and a similar extruded angle. This should be riveted in place but need not be tied in with the undamaged portion. It will be necessary that the new section of hinge be carefully aligned with the remaining portion. Fillers and shims may be used where necessary.

The flanges should be patched in accordance with figure 208. The nested angle should be of the same gage as the original flange and long enough to pick up four AN442AD5 rivets through the web each side of the damage.

In the damaged area, a filler the same gage as the flange should be inserted between the skin and nested angle, thus eliminating the necessity of joggling the skin.

(*d*) DAMAGE REPAIRABLE BY INSERTION.—Damage at the rib attachments must be repaired by insertion.

Any damage over 5 inches in length may be repaired by insertion.

Make a square cut across the beam on each side of the damage so that cut-out is at least 5 inches long and the edges are 2.5 inches or more from the nearest rib.

Make an insert from the same stock as the original beam and formed into the same section. Attach the hinge in the same fashion as the original, using either a similar extrusion or a substitute from figures 231 through 233. Here again the new section of hinge should be carefully aligned with the original.

d. RIBS.

(1) GENERAL.—The repairs for the rudder ribs will be in most cases the same as for the stabilizer ribs and, therefore, that portion of the text may be used. The only special cases will be those for the ribs supporting the counter balance weight and the bottom rib at station 54.2 inches from center line of the airplane to which is attached the torque tube.

(2) COUNTER BALANCE RIBS.

(*a*) GENERAL.—These ribs are formed channels reinforced by a 1.25 inch 24ST alclad plate. The counter balance weight is bolted between the ribs by standard AN bolts and elastic stop nuts.

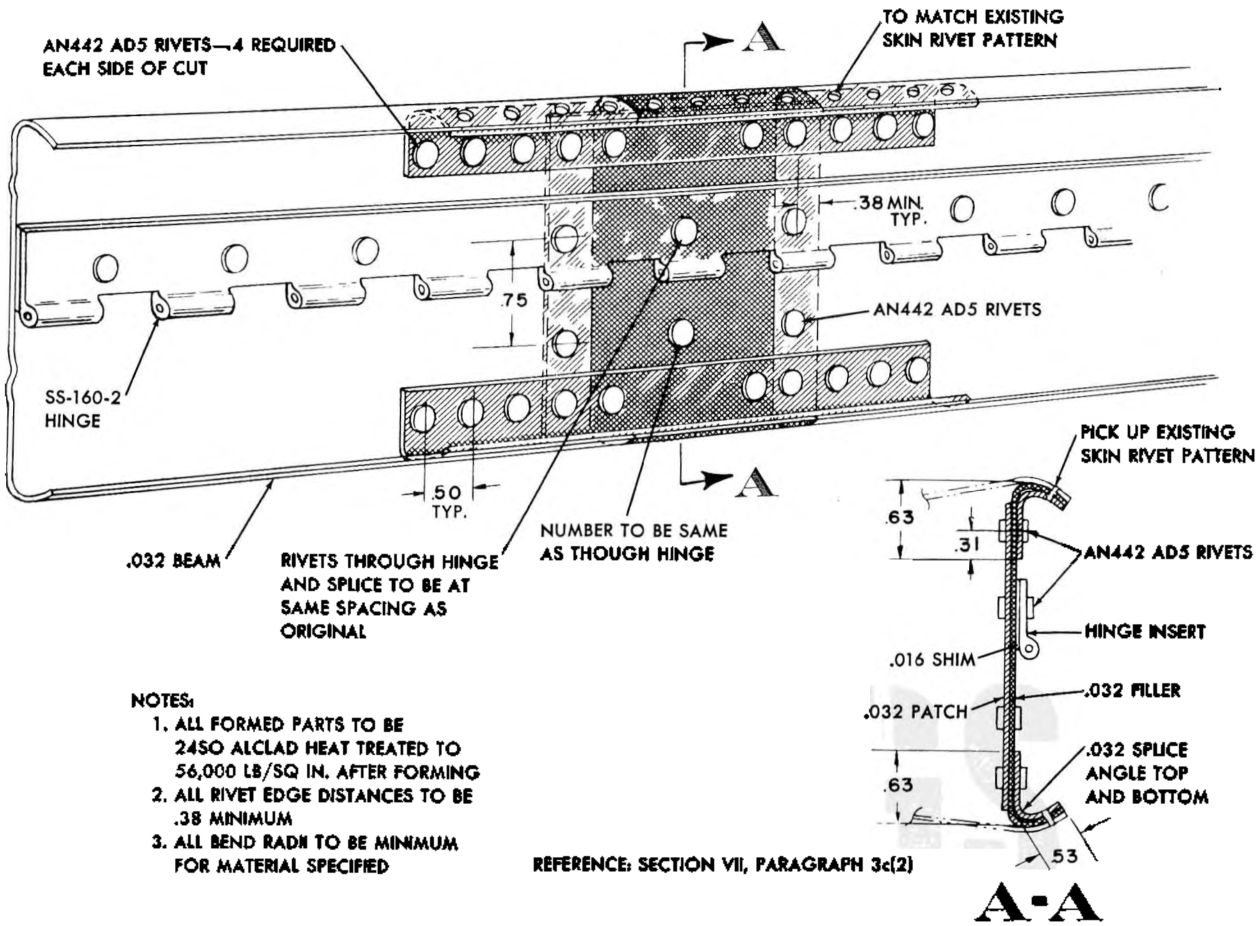


FIGURE 208—RUDDER TAB HINGE BEAM AND TAB BEAM REPAIR

(*b*) NEGLIGIBLE DAMAGE. Smooth dents free from cracks and abrasions may be neglected but should be restored to the original contour to prevent further damage.

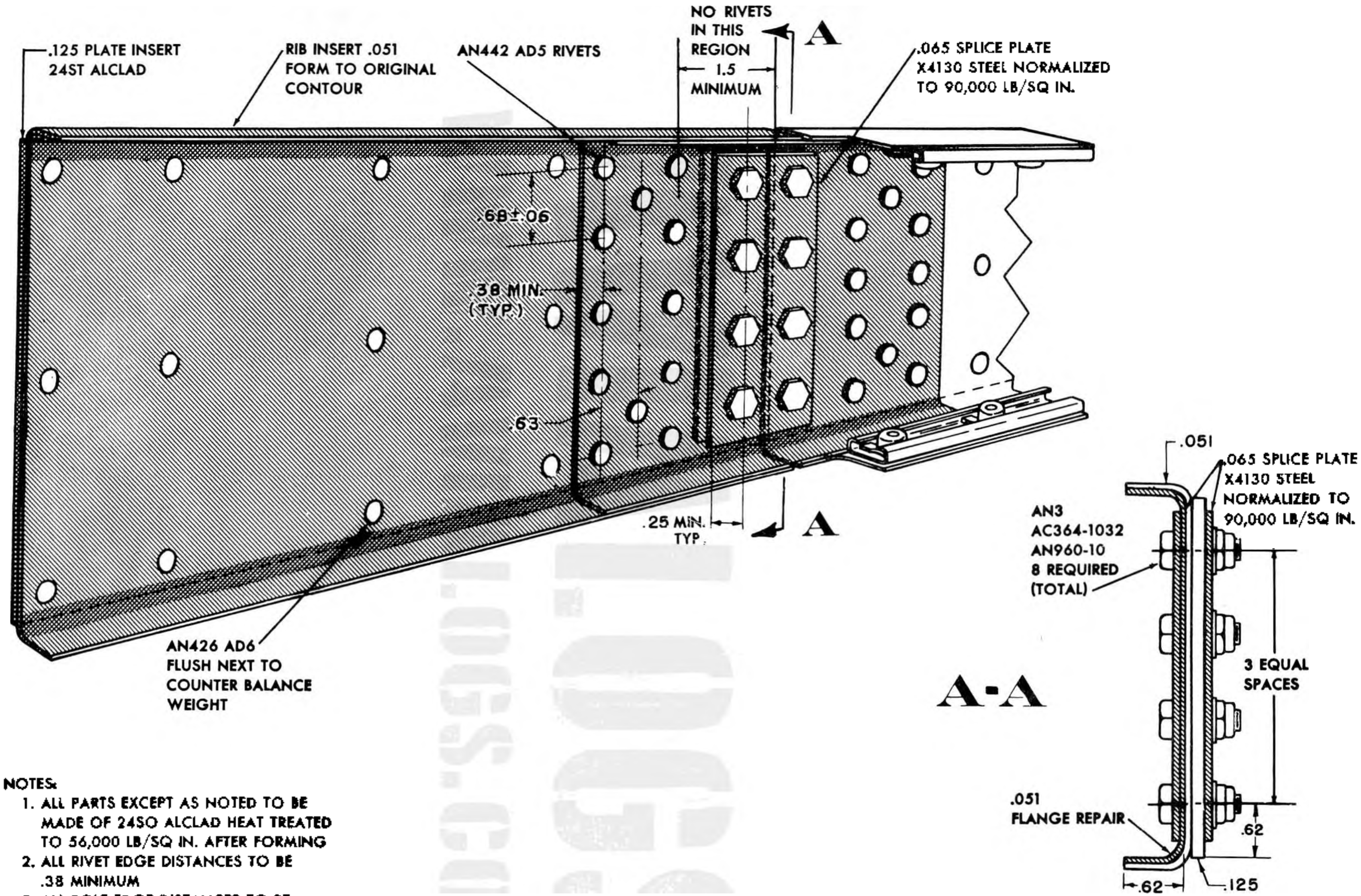
(*c*) DAMAGE REPAIRABLE BY PATCHING.—Damage outside of the region of the plate may be repaired by patching.

Clean up damaged area using a .5 inch radius on all sharp corners and stopping all cracks with a 1/8 inch hole at each end. Cut a patch the same gage as the web and rivet it with two rows at .68 ± .06 inch spacing to the opposite side of the beam from the flanges.

If the rib is less than 2 inches in depth at point of damage, nest a channel section formed from the same gage material, into the original channel and pick up six AN442AD5 rivets through the rib each side of the damage. (See figure 209.) If only the flange is damaged, nest in an angle of the same gage extending it far enough to either side of the damaged area to pick up four AN442AD5 rivets through the web. In the case of a flange damage, insert a filler between the skin and repair angle to maintain a smooth contour when the skin is applied.

(*d*) DAMAGE REPAIRABLE BY INSERTION. Any damage in the region of the 1/8 inch plate should be repaired by insertion.

Make a square cut across the rib on each side of the damage. To eliminate any interference with the counter balance weight or beam, the cuts will be limited to the following locations: 1.4 inches forward and or 2.5 inches or more aft of the hinge line. Build up a new section to replace the section removed, from material of the same gage and formed to the same shape. Attach the plate using the same rivets and rivet



NOTES:
1. ALL PARTS EXCEPT AS NOTED TO BE MADE OF 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM
3. ALL BOLT EDGE DISTANCES TO BE .25 MINIMUM
4. ALL BEND RADII TO BE MINIMUM FOR MATERIAL SPECIFIED. SEE TABLE 7.

REFERENCE: SECTION VII, PARAGRAPH 3d(2)

FIGURE 209—RUDDER—REPAIR OF COUNTERBALANCE RIB

pattern as on original except within 1.5 inches of the cut. In this region, the rivets are omitted. Also drill out any rivets within 1 inch of the cut in the original section. To repair the flange, nest a full depth channel formed from .051 sheet into the rib, and attach with 14 AN442AD5 rivets on each side of the cut. Use the rivet pattern shown in figure 209, starting the rivets as close to the flange as possible. Splice the web with an .065 sheet of X-4130 normalized steel on each side of the rib using four AN3 bolts either side of the cut.

(3) RIBS AT HINGE ATTACHMENTS.

(*a*) GENERAL. These ribs are flanged next to the skin and are stiffened by flanged lightening holes. At the hinge attachments the webs are reinforced by extruded and formed angles. From the beam aft approximately 20 inches, the flange is reinforced by a formed angle riveted to the web and flanged in the opposite direction from the rib.

(*b*) NEGLIGIBLE DAMAGE. — Smooth dents in the web free from cracks and abrasions may be neglected if carefully restored to the original contour. Nicks or cracks in the edge of the flanges that are not more than .13 inch deep when cleaned up with a round file to a .25 inch radius and not within .38 inch from a rivet hole or closer than 3 inches to a similar nick or crack, may be neglected.

(*c*) DAMAGE REPAIRABLE BY PATCHING.- Damage aft of the first lightening hole may be repaired by patching.

Clean up the damage by rounding all sharp corners to a .5 inch radius and stopping all cracks with a 1/8 inch hole at each end. Cover the damage with a patch of the same gage as the web and attach with two rows of AN442AD5 rivets at .68 ± .06 inch spacing. If the flange is damaged in the region of the reinforcing angle, cut a patch as shown in figure 210 and extend the web flange repair angle far enough each side of the damage to pick up four AN442AD5 rivets through the web.

To repair the reinforcing angle, nest an angle of the same gage and dimensions into the original, extending the nested angle far enough each side of the damage to pick up three AN442AD5 rivets through the web. A filler should be used between the flange repair angles to insure a snug fit.

If the damage occurs outside of the region of the reinforcing angle, the repair may be made in accordance with the procedure outlined for the stabilizer ribs.

(*d*) DAMAGE REPAIRABLE BY INSERTION. If damage occurs forward of the first lightening hole, it should be repaired by insertion. If it is desired, any damage over 5 inches long may be repaired by insertion, but it is not required.

Make a square cut across the rib on each side of the damage, keeping the cut at least 1.5 inches from the nearest lightening hole flange. If the damage is confined to the portion forward of the first lightening hole, only one cut need be made.

Remove the portion of the reinforced angle remaining on the undamaged section of the rib and replace entire angle when repair is completed.

Form a new section to the same shape as the original from material of the same gage to replace portion removed.

The web and flange are spliced with the plate shown in figure 210, extending the flange splice angle far enough each side of cut to pick up three AN442-AD5 rivets through the web.

(*e*) DAMAGE NECESSITATING REPLACEMENT. All short (under 10 inches in length) formed angles should be replaced by identical parts and all extruded angles should be replaced per figures 231 through 233.

(4) RIB AT TORQUE TUBE ATTACHMENT.

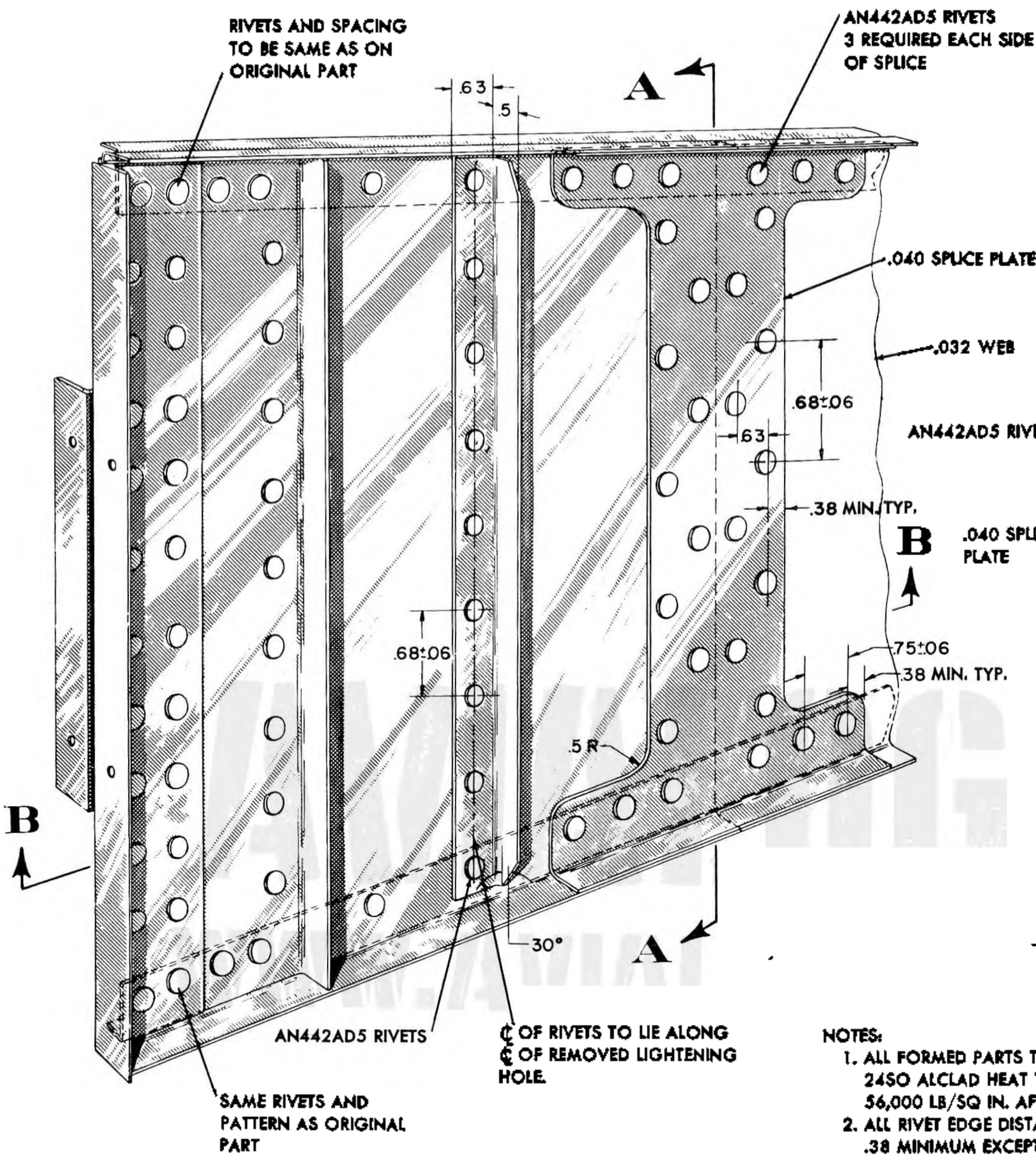
(*a*) GENERAL. — This rib, which is located at the bottom of the rudder, is flanged against the skin and stiffened by flanged lightening holes. The rib web is reinforced at the torque tube attachment by a heavy 24ST Alclad doubler and the flange is reinforced by a nested, bent-up channel section extending the entire length of the rib.

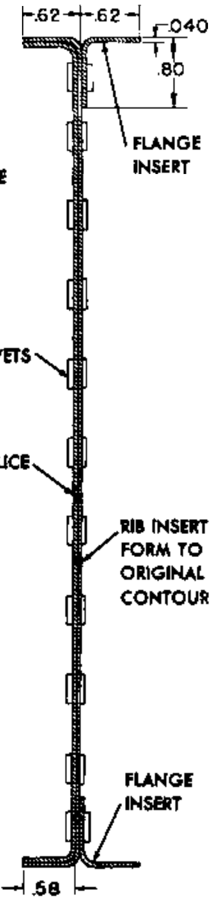
(*b*) NEGLIGIBLE DAMAGE. — Smooth dents free from cracks and abrasions may be neglected provided they are restored to the original contour of the surrounding area.

Nicks and cracks in the edge of the flange not over .13 inch deep when cleaned up with a round file to a .25 inch radius and not within .38 inch from a rivet hole or within 3 inches of a similar nick or crack may be neglected.

(*c*) DAMAGE REPAIRABLE BY PATCHING.

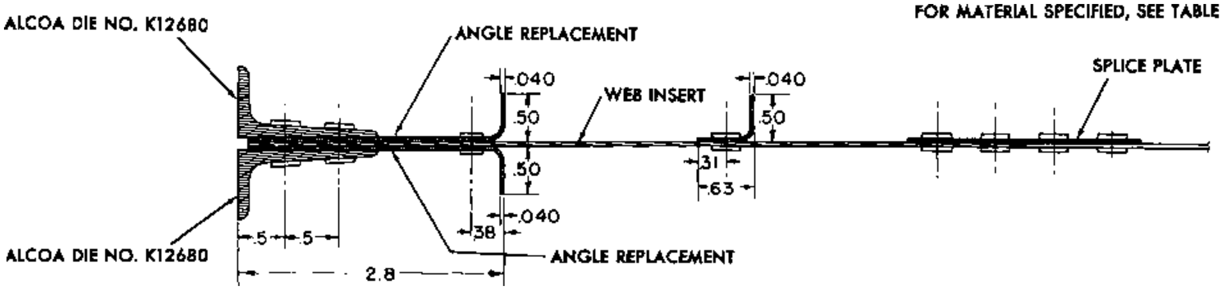
1. DAMAGE IN REGION OF DOUBLER. If the damage does not extend into the flange or into the beam attachment when cleaned up, it may be repaired by patching. (See figure 211.)





A-A

NOTES:
1. ALL FORMED PARTS TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING.
2. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM EXCEPT AS NOTED.
3. ALL BEND RADII TO BE MINIMUM FOR MATERIAL SPECIFIED, SEE TABLE 7



B-B

REFERENCE: SECTION VII, PARAGRAPH 3d(3)

FIGURE 210—RUDDER—REPAIR OF HINGE ATTACHMENT RIB

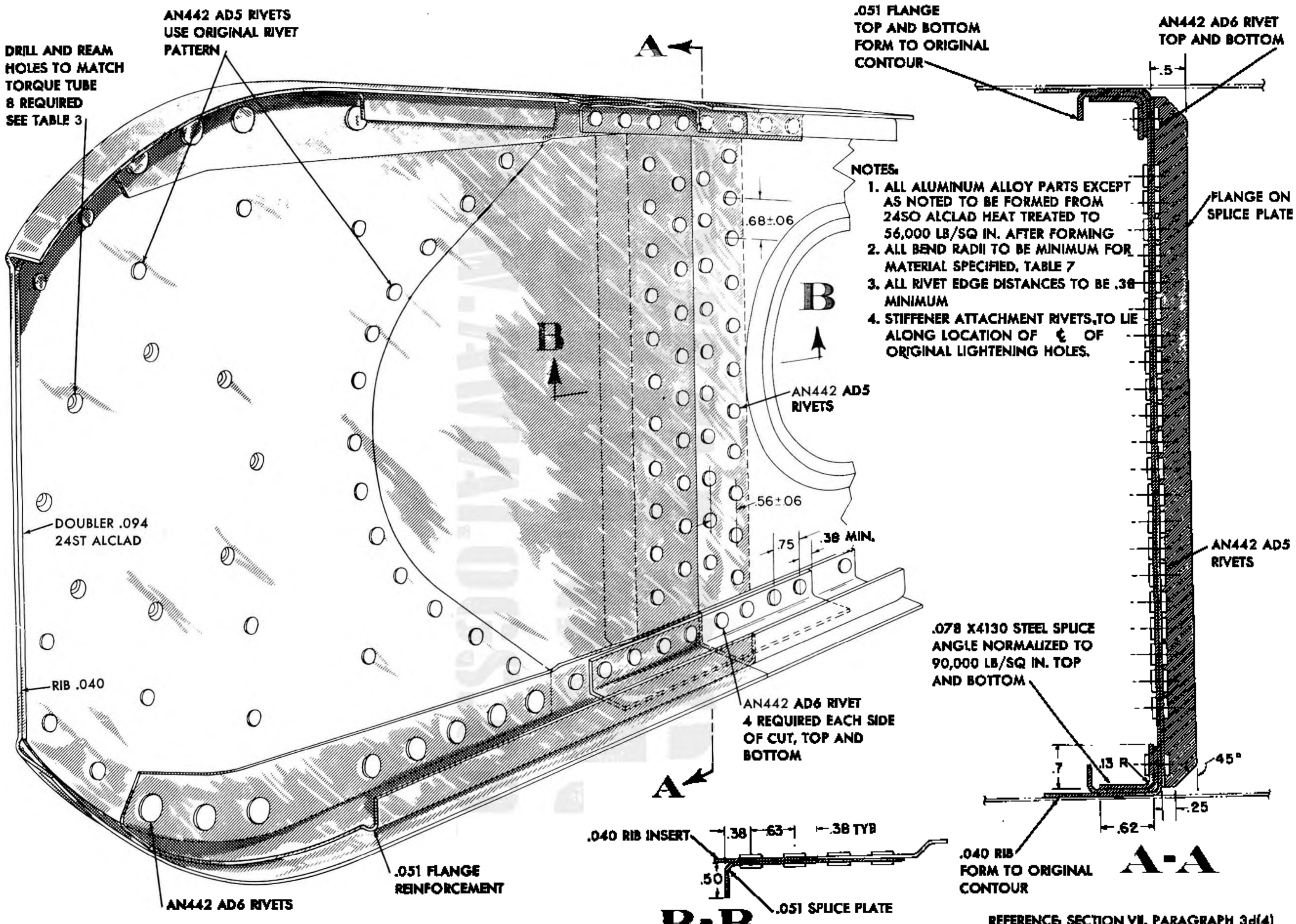


FIGURE 211—RUDDER—REPAIR OF TORQUE TUBE ATTACHMENT RIB

Remove the doubler and clean up the damaged area by rounding all sharp corners to a .5 inch radius and stopping all cracks with a 1/8 inch hole at each end. Cover the damaged area with a patch the same gage as the skin and attach with two rows of AN442AD5 rivets at .68 ± .06 inch spacing, replacing the doubler if it is damaged, with a new one.

2. DAMAGE EXTENDING INTO THE FLANGE.—If the damage extends into the flange forward of a point 1.26 inches aft of the rudder hinge repair as follows:

Follow the same procedure outlined above to repair the web. The patch should be attached to the opposite side of the web from the lightening hole flanges.

Build up a section of flange identical with that removed and insert in place. Splice in inserted portion with an .078 angle of X-4130 normalized steel, using six AN442AD5 rivets each side of the cut.

CAUTION

IF THE DAMAGE EXTENDS INTO THE REGION OF THE TORQUE TUBE ATTACHMENT, CARE MUST BE TAKEN TO SPACE THE RIVETS SO THERE WILL BE NO INTERFERENCE WITH THE TORQUE TUBE COLLAR.

3. DAMAGE AFT OF DOUBLER.—The web in this region may be patched according to the previous discussions. If the damage extends into a lightening hole making it necessary to cover a portion thereof, flange the patch to a .5 inch width over the hole, or attach a .63 x .5 stiffener the same gage as the web along the edge of the patch in the region of the hole as per figure 211.

The capstrip should be patched with an .094 gage X-4130 normalized steel nested angle picking up seven AN442AD5 rivets on each side of the damage. Before replacing the skin over the damage, insert a filler to eliminate the necessity of joggling.

If an entire lightening hole is covered, a .63 x .5 stiffener the same gage as the web and extending the entire depth of the rib, should be attached with AN442AD5 rivets at .68 ± .06 inch spacing along the center line of the lightening hole.

(*d*) DAMAGE REPAIRABLE BY INSERTION.—Damage in the region of the beam attachment should be repaired by insertion. Any damage over 5 inches in length may be repaired by insertion but such a repair is not required.

Make a square cut across the beam on each side of the damage, thus removing that area. Build up a new section to replace portion removed using materials of the same gages and formed into the same shape.

Splice the web with plates 2.5 inches wide and of the same gage as the web picking up two rows of AN442AD5 rivets at .68 ± .06 inch spacing.

Splice the flange with the same angle as is used for patching (paragraph (4) (c) *2.* above), picking up seven AN442AD5 rivets each side of the cut. If the cut is less than 14 inches long, the splice angle should be continuous across the insertion but if the cut is longer than 14 inches in length, an angle at each end of the insert may be used.

If the damage is in region of the beam attachment, make one cut aft of the first lightening hole and follow the procedure outlined in the previous paragraph.

If the section removed contains lightening holes and none are to be formed in the insertion, replace them with stiffeners as discussed in patching repairs unless the hole is necessary for the passage of controls, etc. In this case, it will be necessary to form a new lightening hole.

e. RUDDER TAB.

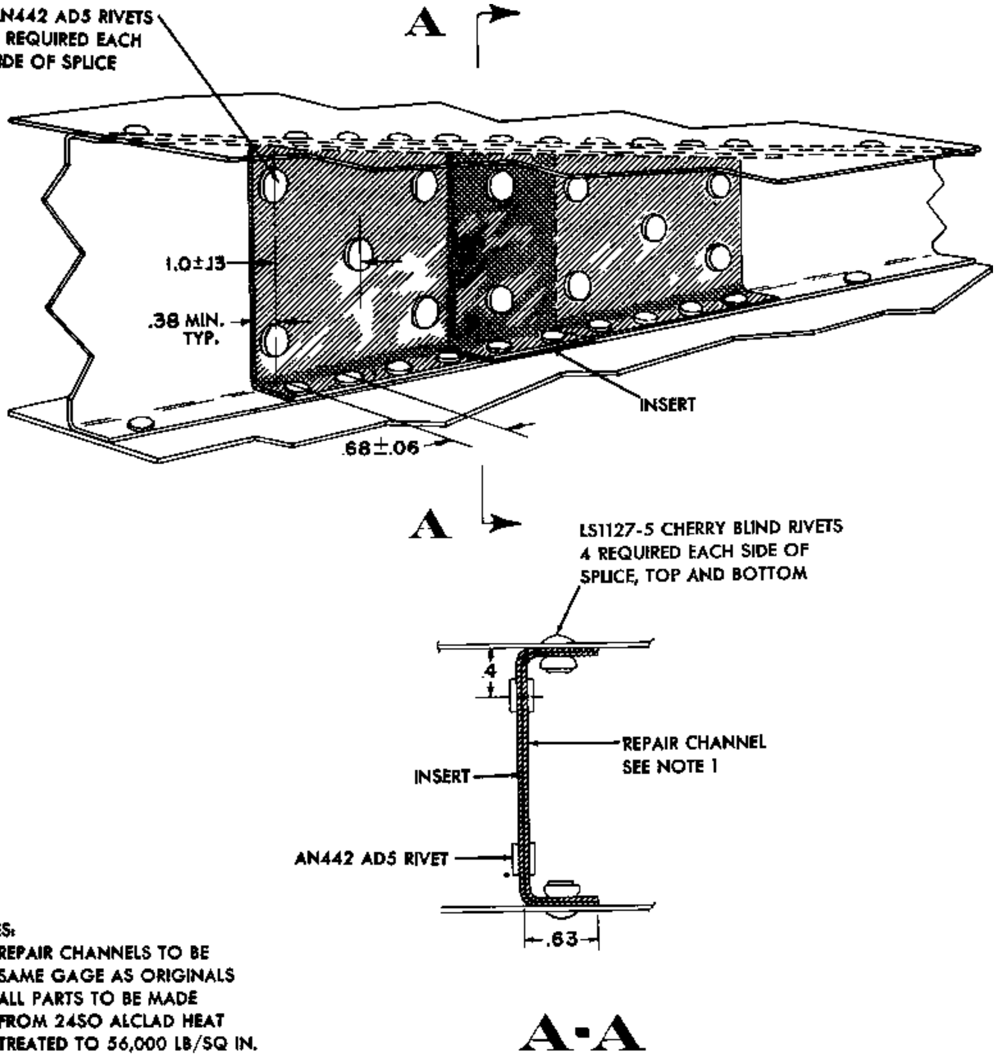
(1) SKIN.—The procedure for repairing the tab skin is identical with that for the stabilizer skin and, therefore, follow the text for the latter.

(2) BEAM.

(*a*) GENERAL.—The rudder tab beam is a channel section formed from .032 stock to which is attached the continuous piano hinge. The web is not stiffened by lightening holes or vertical stiffeners and the flanges are not reinforced in any way.

(*b*) NEGLIGIBLE DAMAGE.—Small dents free from cracks and abrasions may be neglected but should be restored to the original shape to prevent further damage from developing.

Cracks and nicks in the edges of the flanges not more than .13 inch deep, when cleaned up with a round file to a .25 inch radius and not within .38 inch of a rivet hole or nearer than 3 inches to a similar crack or nick, may be neglected.



NOTES:
1. REPAIR CHANNELS TO BE SAME GAGE AS ORIGINALS
2. ALL PARTS TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN.
3. ALL RIVET EDGE DISTANCES TO BE .38 MINIMUM

REFERENCE: SECTION VII, PARAGRAPH 3a(3)

FIGURE 212—RUDDER TAB RIB REPAIR

(c) DAMAGE REPAIRABLE BY PATCHING.—Damage not extending into a rib attachment may be repaired by patching. (See figure 208.)

Clean up the damaged area rounding all sharp corners with a .5 inch radius and stopping all cracks with a 1/8 inch hole at each end.

Cover the damaged area with a patch the same gage as the beam and attach with one row of AN442AD5 rivets at .68 ± .06 inch spacing. This patch should be placed on the opposite side of the beam from the hinge.

Repair the flange with a nested angle of the same gage as the original and extending far enough each side of the damaged area to pick up four AN-442AD5 rivets through the web.

If the damage extends into the hinge, a new section should be inserted. The section to be inserted should be attached to the patch, using a similar rivet pattern as existed originally. Care should be taken when inserting the new section to insure alignment of the new and original portions of the hinge. The required fillers are used between the hinge and patch.

Before covering the damaged area, it will be necessary to place a filler over the splice angle to eliminate the necessity of joggling the skin.

(*d*) DAMAGE REPAIRABLE BY INSERTION.—Damage at a rib connection should be repaired by insertion. To make this type of repair, it will be necessary that the section removed be at least 5 inches in length.

Form a section of the same shape and material as the original, including the required length of shim and hinge. The assembled insert is attached to the undamaged web with splice plates of the same gage as the web and 2.5 inches wide. Use two rows of AN442AD5 rivets at .68 ± .06 inch spacing.

Splice the flanges with the same nested angle as is used for a patch repair picking up four AN442AD5 rivets each side of the cut. If the cut is less than 9 inches in length, make the splice angle continuous, and if cut is greater than 9 inches in length, a separate angle may be used at each end of the cut.

Here again it will be necessary to carefully align the new section of the hinge with the original.

(3) RIBS.

(*a*) GENERAL.—The ribs are simple in construction being made up of flat sheet flanged over to support the skin. Due to the simple construction and small size, only one repair will be given.

(*b*) NEGLIGIBLE DAMAGE. — Smooth dents free from cracks and abrasions may be neglected provided they are restored to the original shape of the rib.

Nicks and cracks .13 inch deep or less when cleaned up with a round file to a .25 inch radius and not within .38 inch of a rivet hole or within 3 inches of a similar nick or crack, may be neglected.

(c) REPAIR.—If damage, when cleaned up, covers only a portion of the depth of the rib, nest an angle into the flange and rivet in place with one row of AN442AD4 rivets around the damage as shown in figure 212. Near the flange an extra rivet should be inserted to insure the continuity of the structure. Insert a filler between the repair angle and skin to eliminate the necessity of joggling.

If the damage, when cleaned up, extends across entire web, nest a channel into the original rib and rivet in place with a row of AN442AD4 rivets down each side of the damage. The spacing is left to the repair personnel; however, there must be a minimum of three rivets at 1/2 inch minimum spacing each side of the damage.

f. RUDDER TIP.

(1) GENERAL.—The tip is constructed in the same manner as the remainder of the rudder structure and, therefore, the repairs will be similar. (See figure 213.)

(2) RIBS AND BEAMS.—The ribs and beam of the rudder tip are of the same construction as the stabilizer ribs and may, therefore, be repaired in the same manner.

(3) SKIN.—The skin repairs should be made in accordance with the procedure given for the stabilizer skin.

g. SPECIAL REPAIRS.

(1) COUNTER BALANCE SKIN DOUBLER STATION 192.22.

(*a*) NEGLIGIBLE DAMAGE. — Smooth dents free from cracks or abrasions may be neglected but should be restored to the original shape to prevent further damage from developing.

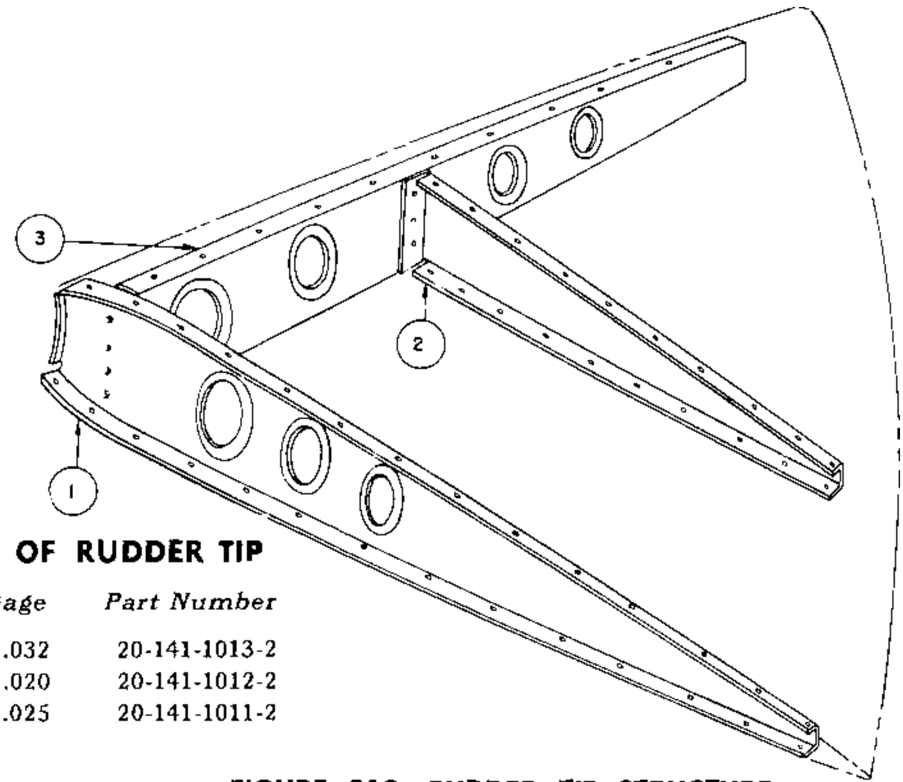


TABLE 74

COMPONENT PARTS OF RUDDER TIP

Item	*Designation*	*Gage*	*Part Number*
1.	Rib Assembly	.032	20-141-1013-2
2.	Rib Assembly	.020	20-141-1012-2
3.	Rib Assembly	.025	20-141-1011-2

FIGURE 213—RUDDER TIP STRUCTURE

(*b*) DAMAGE REPAIRABLE BY PATCHING.—Any damage not extending over the entire doubler or across the hinge line may be repaired by patching.

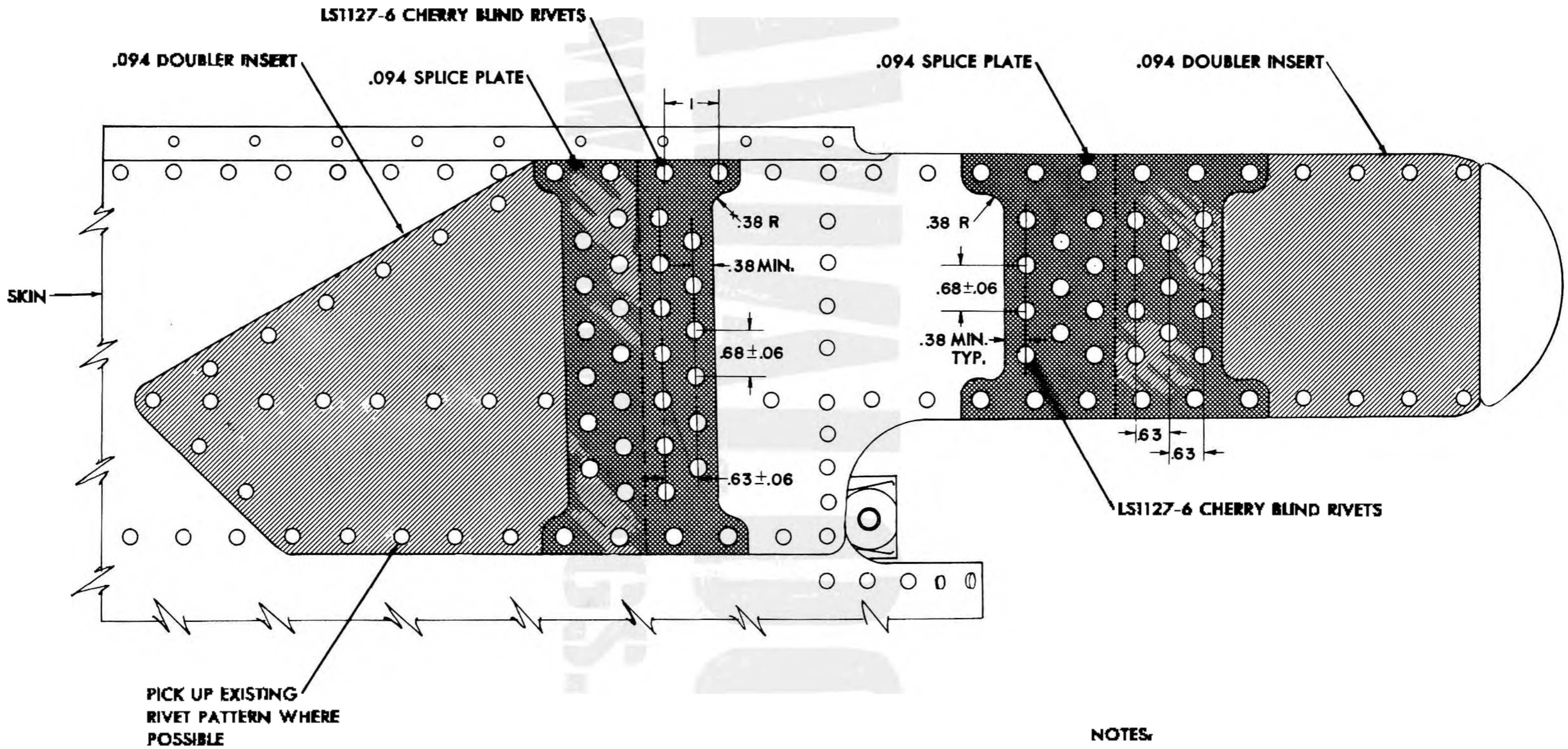
Clean up the damaged area, rounding all sharp corners with a .5 inch radius and stopping all cracks with a ⅛ inch at each end.

For damage to be repaired by patching, it will not be necessary to repair the skin if an .094 patch is used for the doubler. Cut the patch to a rectangular pattern and attach with three rows of LS1127-5 rivets on the fore and aft sides and one row of LS1127-5 rivets on the top and bottom sides, all at .68 ± .06 inch spacing. (See figure 214.)

(c) DAMAGE NECESSITATING REPLACEMENT.—Damage extending to the hinge line or over the entire doubler will necessitate a replacement.

(2) COUNTER BALANCE SKIN DOUBLER STATION 112.22.—This doubler is scalloped having two prongs extending out over the rudder skin. If damage occurs to one prong, cut the doubler at the bottom of the scallop. Repair the skin as outlined in the skin repairs and replace the damaged section of doubler with one of the same gage material and shape. Splice the two sections of the doubler with a plate 2.5 inches wide and the same gage as the doubler using two rows of 671D-AD5 rivets each side of the cut.

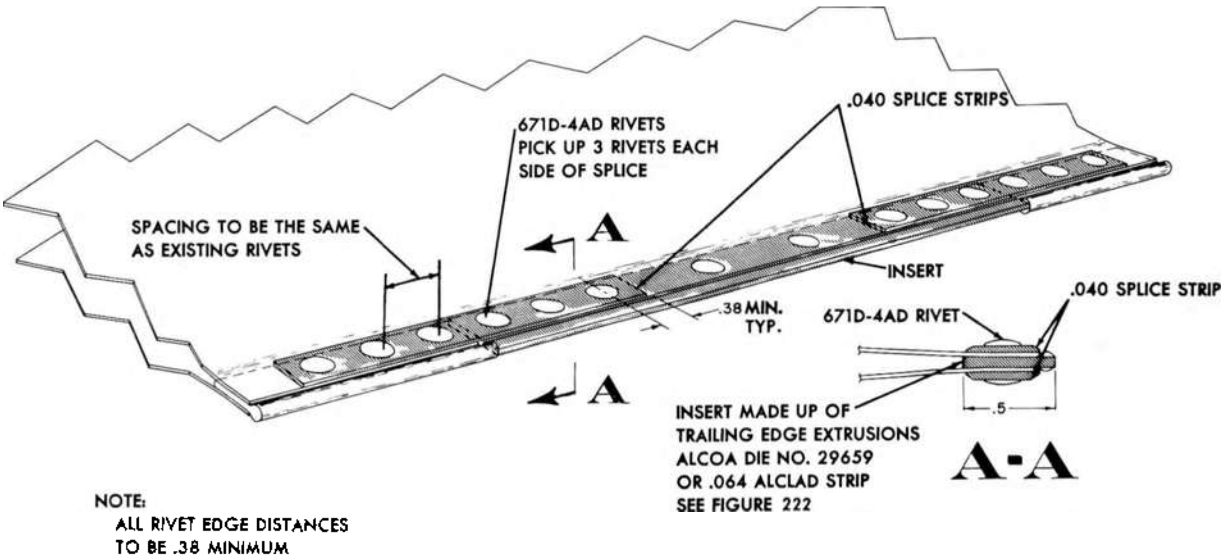
(3) TORQUE TUBE SKIN DOUBLER. This doubler is the same shape as the doubler at station 112.22 above and, therefore, the repairs will be the same. Reference should be made to that text when attempting a repair to this doubler.



NOTES:
1. ALL PARTS TO BE MADE UP OF 24ST ALCLAD SHEET
2. MINIMUM RIVET EDGE DISTANCE TO BE .38 INCHES
3. ALL RIVET SPACINGS ± .06 INCHES

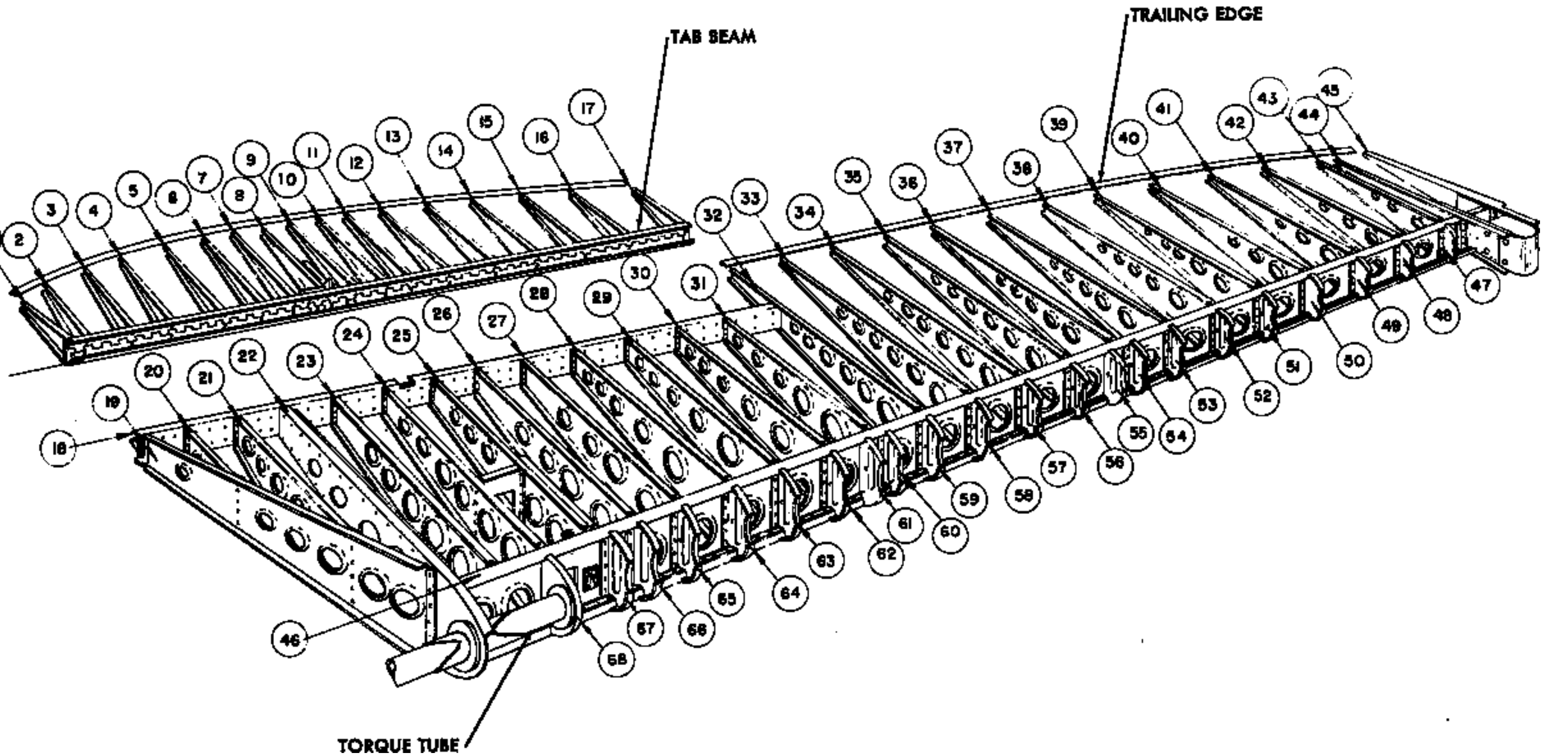
REFERENCE: SECTION VII, PARAGRAPH 3g(1)

FIGURE 214—RUDDER COUNTERBALANCE SKIN DOUBLER REPAIR



REFERENCE: SECTION VII, PARAGRAPH 3g (4)

FIGURE 215—RUDDER TRAILING EDGE REPAIR



REFERENCE: SECTION VII, PARAGRAPH 4
TABLE 75

FIGURE 216—ELEVATOR STRUCTURE

TABLE 75
COMPONENT PARTS OF ELEVATOR

No.	*Item*	*Part No.*	*Gage*	*Station*
1	Rib	20-130-1027-2	.016	
2	Rib	20-130-1027-5	.016	12.875
3	Rib	20-130-1027-6	.016	18.5
4	Rib	20-130-1027-7	.016	24.5
5	Rib	20-130-1027-8	.016	30.5
6	Rib	20-130-1027-9	.016	35.5
7	Rib	20-130-1027-10	.032	40.0
8	Rib	20-130-1027-11	.051	43.90
9	Rib	20-130-1027-13	.040	48.0
10	Rib	20-130-1027-14	.016	52.0
11	Rib	20-130-1027-15	.016	56.0
12	Rib	20-130-1027-16	.016	61.0
13	Rib	20-130-1027-17	.016	67 0
14	Rib	20-130-1027-18	.016	73.0
15	Rib	20-130-1027-19	.016	80.0
16	Rib	20-130-1027-20	.016	87.0
17	Rib	20-130-1027-21	.020	94.0
	Tab Beam	20-130-1026-1	.032	..
18	Rear Beam	20-130-1003-1	.032	..
19	Rib	20-130-1011-1	.025	..
20	Rib	20-130-1012-1	.025	17.0
21	Rib	20-130-1013-1	.025	23.0
22	Rib	20-130-1010-1	.040	28.375
23	Rib	20-130-1014-1	.025	35.0
24	Rib	20-130-1015-1	.036	41.0
25	Rib	20-130-1017-1	.032	47.0
26	Rib	20-130-1016-1	.025	53.0
27	Rib	20-130-1016-4	.025	59.0
28	Rib	20-130-1018-6	.020	66.0
29	Rib	20-130-1018-5	.020	73.0
30	Rib	20-130-1018-1	.020	80.0
31	Rib	20-130-1019-1	.032	87.0
32	Rib	20-130-1020-2	.020	95.0
33	Rib	20-130-1020-6	.020	103.0
34	Rib	20-130-1020-7	.020	111.0
35	Rib	20-130-1020-8	.020	111.0
36	Rib	20-130-1021-1	.032	127.0
37	Rib	20-130-1022-7	.020	136.0
38	Rib	20-130-1022-5	.020	145.0
39	Rib	20-130-1022-6	.020	154.0
40	Rib	20-130-1023-7	.020	163.0
41	Rib	20-130-1023-5	.020	172.0
42	Rib	20-130-1023-6	.020	181.0
43	Rib	20-130-1024-1	.032	190.0
44	Rib	20-130-1037-1	.040	192.49
45	Rib	20-130-1036-1	.051	196.01
46	Front Beam	20-130-1002-1	.032	.
47	Nose Rib	20-130-1009-5	.020	119.0
48	Nose Rib	20-130-1009-4	.020	127.0
49	Nose Rib	20-130-1009-3	.020	136.0
50	Nose Rib	20-130-1009-2	.020	145.0
51	Nose Rib	20-130-1008-16	.020	154.0
52	Nose Rib	20-130-1008-15	.020	145.0
53	Nose Rib	20-130-1008-14	.020	136.0
54	Nose Rib	20-130-1008-13	.020	128.435
55	Nose Rib	20-130-1008-12	.032	125.565
56	Nose Rib	20-130-1008-11	.020	119.0
57	Nose Rib	20-130 1008-10	.020	111.0
58	Nose Rib	20-130-1008-9	.020	103.0
59	Nose Rib	20-130-1008-8	.020	95.0
60	Nose Rib	20-130-1008-7	.032	88.435
61	Nose Rib	20-130-1008-6	.020	88.565
62	Nose Rib	20-130-1008-5	.020	80.0
63	Nose Rib	20-130-1008-4	.020	73.0
64	Nose Rib	20-130-1008-3	.020	66.0
65	Nose Rib	20-130-1008-2	.020	59.0
66	Nose Rib	20-130-1007-3	.020	48.875
67	Nose Rib	20-130-1007-2	.020	53.0
68	Nose Rib	20-130-1006-2	.046	40.38
	Torque Tube	20-130 1004-1	.065 x 3.0-O.D.	..

(4) TRAILING EDGE.—To repair the trailing edge, which is a bulb extrusion, cut away the damaged section and insert a new section of a similar extrusion or, if none is available, substitute a .064 strip of 24ST Alclad sheet .5 inch wide. Splice the insertion in place with .040 strips .5 inch wide on each side of the rudder. These strips should pick up three AN442AD4 rivets each side of the cut. (See figure 215.)

4. ELEVATORS

a. GENERAL.—The elevator is very similar to the rudder in construction, therefore, a description of the structure will be omitted. Figure 216 shows the structure, and table 75 lists the component parts. Figure 216A shows the structure, and table 75A lists the component parts of the elevator installation for airplanes AF44-78545 and subsequent.

b. SKIN.—The skin repairs will be the same as for the other surfaces. Therefore, refer to the text for the stabilizer skin repairs and to figure 191 for the procedure to be used in repairing the elevator skin. Figures 217 and 216B and tables 76 and 75B give the skins and skin splices.

c. BEAMS.

(1) ELEVATOR MAIN BEAMS.

(*a*) GENERAL.—The elevator main beam is flanged at the top and bottom and stiffened by flanged lightening holes. There is a cut-out in the web between stations 41 and 47 to allow for the passage of controls. The web is reinforced on each side of the cut-out by extruded stiffeners and the flange is reinforced by a nested channel of bent up flat stock.

(*b*) NEGLIGIBLE DAMAGE.—Due to the similarity between the construction of this beam and the rudder beam, the negligible damage will be the same for both. Therefore, see the text for the rudder to determine the damage which may be neglected.

(*c*) DAMAGE REPAIRABLE BY PATCHING.—Any damage not in the region of hinge or bracket attachments may be repaired by patching.

Clean up the damaged area, rounding all sharp corners to a .5 inch radius and stopping all cracks with a 1/8 inch hole at each end. Cover the damaged area on the opposite side of the beam from the lightening hole flanges with a patch of the same gage as the web and attach with one row of AN442-AD5 rivets at .68 ± .06 inch spacing. If a damaged lightening hole is covered by the patch, a .5 x .63 x .032 stiffener angle should be attached to the web. The attaching rivets should lie along the center line of the damaged hole. (See figure 218.)

To repair the flange outboard of station 165.5, nest a .051 channel in the flange and pick up six AN442AD5 rivets through the web on each side of the damage. Where the angle extends over a web patch, a filler the same gage as the web should be inserted between the patch and channel.

To repair the flange inboard of station 165.5, follow the above procedure, picking up five AN442-AD5 rivets each side of the damage.

If flange is damaged at the cut-out between stations 41 and 47, replace the existing channel with an .063 channel of the same dimensions, formed from X-4130 steel (normalized). Pick up the existing rivets outboard of the cut-out and six AN442AD5 rivets inboard of the cut-out.

Fillers should be used between repair angles and skins to eliminate the necessity of joggling the skin over the damaged flange.

(*d*) DAMAGE REPAIRABLE BY INSERTION.—Any damage extending into the hinge attachments or the splice at station 165.5, should be repaired by insertion or, if it is so desired, any damage over 5 inches in length may be repaired in this manner.

Make a square cut across the beam on each side of the damaged area, making it tangent to the far side of the nearest lightening hole. Making the cut this way will leave a small amount of a lightening hole flange on the undamaged portion which should be flattened flush with the remainder of the web. Form an insert from the same gage material and the same section as the original. The lightening holes need not be replaced unless necessary for the passage of controls, conduits, etc. In place of the lightening holes, substitute a stiffener angle .5 x .63 the same gage as the web and extending from flange to flange, attached with AN442AD5 rivets at .68 ± .06 inch spacing along the center line of the original hole. Splice the web with plates 2 inches wide and the same gage as the beam web. These plates should extend the depth of the beam and pick up two rows of AN442-AD5 rivets at .68 ± .06 inch spacing on each side of the cut.

Splice the flanges with the same angle as is used for patching, picking up six 1/8 inch rivets

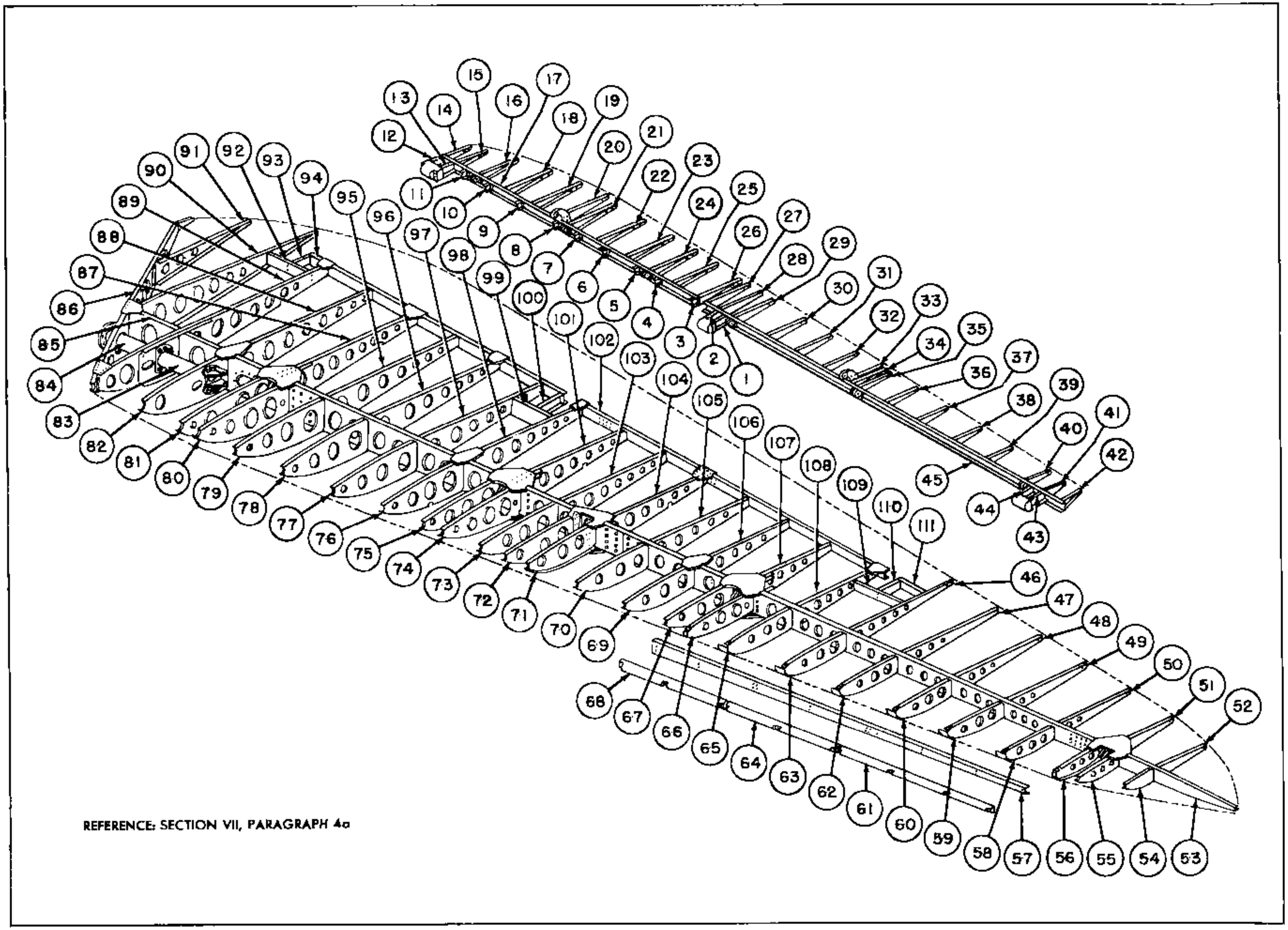


FIGURE 216A — ELEVATOR AND TIP STRUCTURE (AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 75A
COMPONENT PARTS OF ELEVATOR
(AIRPLANES AF44-78545 AND SUBSEQUENT)

No.	Item	Part No.	Gage	Station
1	Rib	20-130-5703-513	.025	77.50
2	Rib	20-130-5703-514	.025	76.00
3	Rib	20-130-5702-13	.020	71.50
4	Rib	20-130-5702-505	.020	64.60
5	Rib	20-130-5702-15	.020	61.70
6	Rib	20-130-5702-16	.020	54.58
7	Rib	20-130-5702-504	.020	48.90
8	Rib	20-130-5702-18	.020	45.80
9	Rib	20-130-5702-19	.020	38.20
10	Rib	20-130-5702-503	.020	32.10
11	Rib	20-130-5702-21	020	27.65
12	Rib	20-130-5702-23	.025	23.24
13	Rib	20-130-5702-25	.025	25.25
14	Rib	20-130-5702-24	.025	23.24
15	Rib Assembly	20-130-5773-1	.025	25.25
16	Rib Assembly	20-130-5773-2	.020	30.00
17	Beam	20-130-5702-6	.032	.....
18	Rib Assembly	20-130-5773-3	.016	35.00
19	Rib Assembly	20-130-5773-4	.016	40.06
20	Rib	20-130-5702-11	.032	44.906
21	Rib Assembly	20-130-5773-5	.025	47.00
22	Rib Assembly	20-130-5773-6	.016	52.33
23	Rib Assembly	20-130-5773-7	.016	57.67
24	Rib Assembly	20-130-5773-8	.020	63.00
25	Rib Assembly	20-130-5773-9	.016	67.25
26	Rib Assembly	20-130-5773-10	.016	71.45
27	Rib Assembly	20-130-5769-11	.016	72.88
28	Rib Assembly	20-130-5769-503	.025	76.00
29	Rib Assembly	20-130-5769-10	.020	79.00
30	Rib Assembly	20-130-5769-9	.016	85.00
31	Rib Assembly	20-130-5769-8	.016	90.50
32	Rib Assembly	20-130-5769-7	.016	96.00
33	Rib	20-130-5703-12	.032	100.90
34	Rib	20-130-5703-11	.032	101.10
35	Rib Assembly	20-130-5769-6	.025	103.00
36	Rib Assembly	20-130-5769-5	.016	108.00
37	Rib Assembly	20-130-5769-4	.016	114.00
38	Rib Assembly	20-130-5769-3	.016	121.00
39	Rib Assembly	20-130-5769-2	.016	128.00
40	Rib Assembly	20-130-5769-1	.020	136.00
41	Rib Assembly	20-130-5164-1	.025	138.88
42	Rib Assembly	20-130-5770-1	.025	143.38
43	Rib	20-130-5703-511	.025	138.88
44	Rib	20-130-5703-512	.025	137.38
45	Channel	20-130-5703-3	.032	......
46	Rib Assembly	20-130-5745-1	.020	145.00
47	Rib Assembly	20-130-5746-1	.020	154.00
48	Rib Assembly	20-130-5746-2	.020	163.00
49	Rib Assembly	20-130-5747-1	.020	172.00
50	Rib Assembly	20-130-5747-2	.020	181.00
51	Rib Assembly	20-130-5748-1	.025	190.00
52	Rib Assembly	20-130-5749-1	.020	198.00
53	Beam Assembly	20-130-5704-1	.040	......
54	Rib	20-130-5732-2	.020	198.00
55	Rib	20-130-5731-2	.020	191.82
56	Rib	20-130-5730-2	.020	188.18
57	Beam Assembly	20-130-5750-1	.032	......
58	Rib	20-130-5729-7	.020	181.00
59	Rib	20-130-5729-6	.020	172.00
60	Rib	20-130-5729-5	.020	163.00
61	Counter Balance	20-130-5712-4	....	.....
62	Rib	20-130-5729-4	.020	154.00
63	Rib	20-130-5729-3	.020	145.00
64	Counter Balance	20-130-5712-3	....	.....
65	Rib	20-130-5729-2	.020	136.00
66	Rib	20-130-5728-2	.020	128.82
67	Rib	20-130-5727-2	.032	125.18
68	Counter Balance	20-130-5712-2	....	.....
69	Rib	20-130-5724-4	.025	119.00
70	Rib	20-130-5724-3	.020	111.00
71	Rib Assembly	20-130-5726-1	.025	102.20
72	Rib Assembly	20-130-5725-1	.025	99.80
73	Rib	20-130-5724-2	.020	95.00
74	Rib	20-130-5723-2	.020	88.82
75	Rib	20-130-5722-2	.032	85.18
76	Rib	20-130-5721-5	.032	79.00
77	Rib	20-130-5721-4	.020	71.00
78	Rib	20-130-5721-3	.020	63.00
79	Rib	20-130-5721-2	.020	55.00
80	Rib	20-130-5720-2	.020	48.82
81	Rib	20-130-5719-2	.025	45.80
82	Rib	20-130-5718-2	.051	38.50
83	Torque Tube Assembly	20-130-5772-1	2.750 O.D.	.....
84	Torque Tube Assembly	20-130-5772-2	2.750 O.D.	.....
85	Beam	20-130-5704-2	.040	.....
86	Rib Assembly	20-130-5711-1	.020	.....
87	Rib Assembly	20-130-5738-1	.032	47.00
88	Rib Assembly	20-130-5737-2	.032	38.50
89	Rib Assembly	20-130-5717-1	.032	30.00
90	Rib Assembly	20-130-5734-1	.020	21.62
91	Rib Assembly	20-130-5733-1	.020	14.50
92	Bulkhead	20-130-5735-2	.020	....
93	Rib	20-130-5736-2	.025	26.74
94	Beam Assembly	20-130-5705-501	.032	.....
95	Rib	20-130-5739-2	.020	55.00
96	Rib	20-130-5739-3	.020	63.00
97	Rib	20-130-5739-4	.020	71.00
98	Rib	20-130-5739-5	.032	79.00
99	Bulkhead	20-130-5172-2	.032	.....
100	Rib	20-130-5173-2	.032	74.50
101	Rib Assembly	20-130-5740-1	.025	87.00
102	Beam Assembly	20-130-5705-503	.032	.....
103	Rib	20-130-5741-2	.020	95.00
104	Rib	20-130-5742-2	.025	103.00
105	Rib	20-130-5743-2	.020	111.00
106	Rib	20-130-5743-3	.025	119.00
107	Rib Assembly	20-130-5744-1	.025	127.00
108	Rib	20-130-5743-4	.020	136.00
109	Bulkhead	20-130-5175-2	.032	.....
110	Rib	20-130-5174-2	.032	140.38
111	Beam	20-130-5705-505	.032	.....

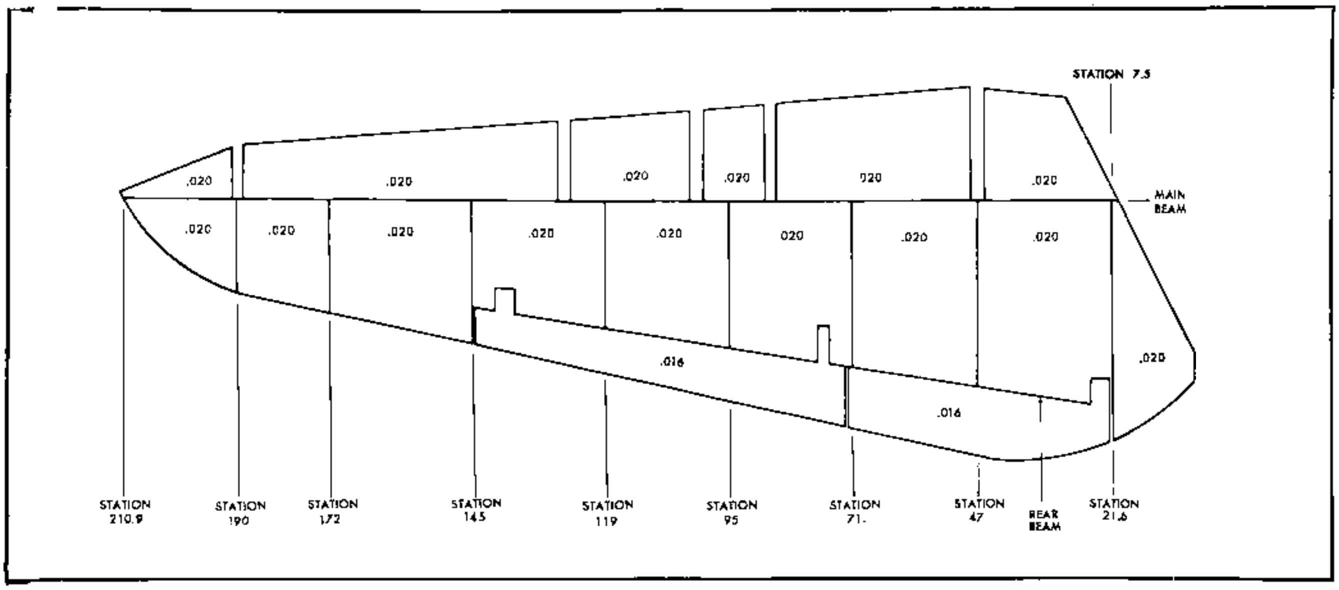


FIG. 216B — ELEVATOR SKIN DIAGRAM — (AIRPLANES AF44-78545 AND SUBSEQUENT)

TABLE 75B—ELEVATOR SKIN RIVETING (AIRPLANES AF44-78545 AND SUBSEQUENT)

CHORDWISE SKIN CONNECTIONS—ELEVATOR

Location	*Extent*	*Gage of Outboard Skin*	*Gage of Inboard Skin*	*Rivet Types*	*Rivet Spacing*	*Rivet Rows*
Station 190	Trailing Edge to Main Beam	.020	.020	671D-AD4	1.20	1
Station 172	Trailing Edge to Main Beam	.020	.020	671D-AD4	1.20	1
Station 145	Trailing Edge to Main Beam	.020	.020	671D-AD4	1.20	1
Station 119	Rear Beam to Main Beam	.020	.020	671D-AD4	1.20	1
Station 95	Rear Beam to Main Beam	.020	.020	671D-AD4	1.20	1
Station 71	Rear Beam to Main Beam	.020	.020	671D-AD4	1.20	1
Station 47	Rear Beam to Main Beam	.020	.020	671D-AD4	1.20	1
Station 21.6	Trailing Edge to Main Beam	.020	.020	671D-AD4	1.20	1

SPANWISE SKIN CONNECTIONS—ELEVATOR

Location	*Extent*	*Gage of Forward Skin*	*Gage of Aft Skin*	*Type of Rivets*	*Rivet Spacing*	*No. of Rivet Rows*
Main Beam	Station 210.9 to 7.5	.020	.020	671D-AD4	1.25	1

TABLE 76

ELEVATOR SKIN RIVETING

Location	*Gage of Skin Outboard*	*Gage of Skin Inboard*	*Type of Rivets*	*Rivet Spacing*	*Number of Rivet Rows*
Sta. 41	.020	.020	671D-4AD	.60	1
Sta. 73	.020	.020	671D-4AD	.62	1
Sta. 95	.020	.020	671D-4AD	.62	1
Sta. 127	.020	.020	671D-4AD	.62	1
Sta. 154	.020	.020	671D-4AD	.62	1
Sta. 181	.032	.020	671D-4AD	.62	1
Sta. 196.6	.025	.032	671D-4AD	1.00	1

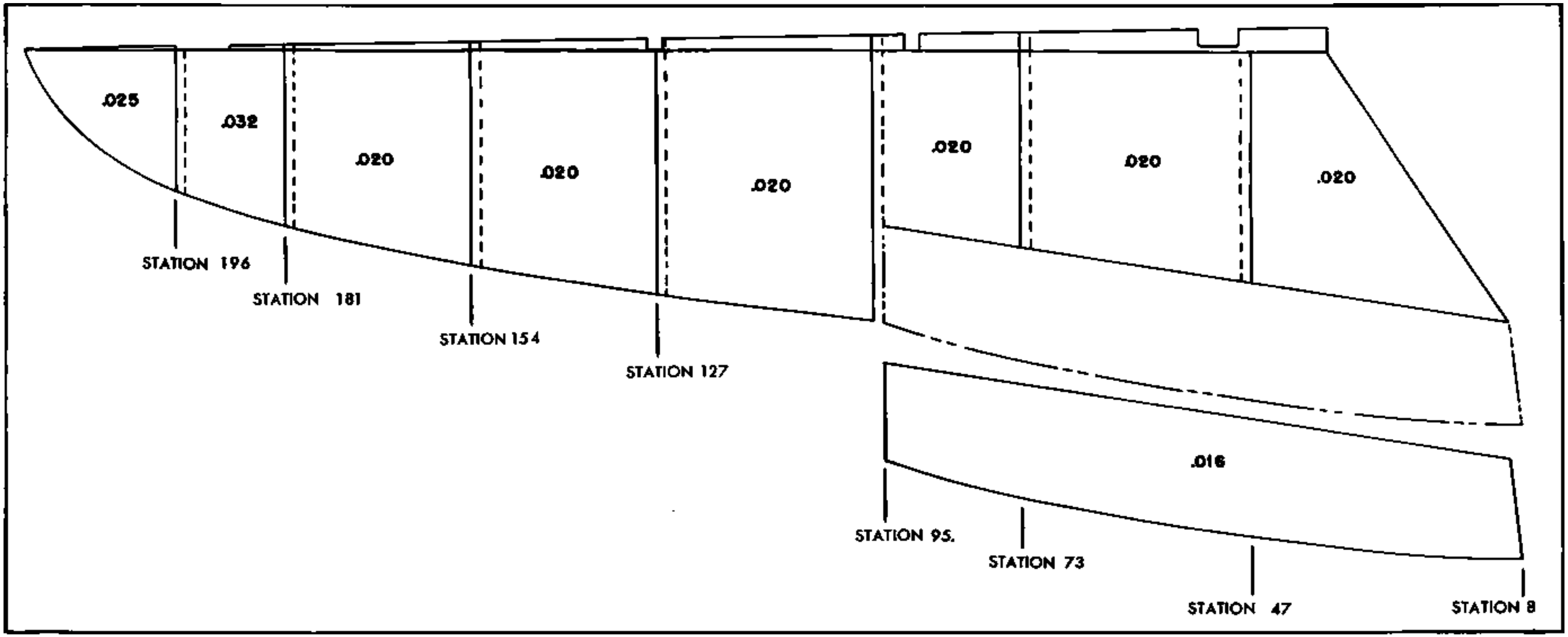


FIGURE 217 — ELEVATOR SKIN DIAGRAM

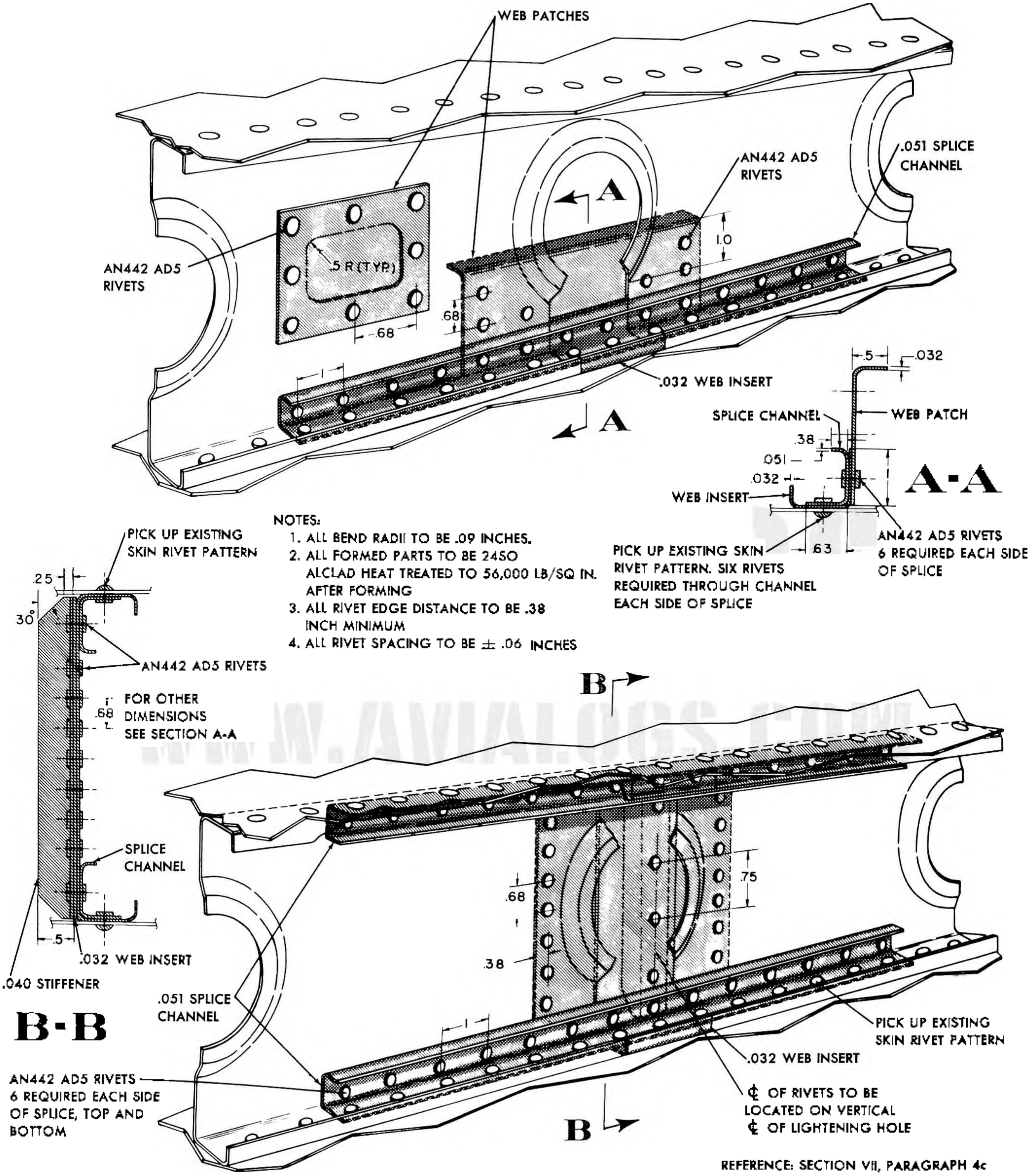


FIGURE 218 —ELEVATOR—REPAIR TO BEAM

each side of the cut. Rivets through the skin to be 671D-4AD while those through the beam web are AN442AD4. If cut-out is less than 13 inches long, the angles should be continuous, and if more than 13 inches long, separate angles may be used at either end of the cut.

(e) DAMAGE NECESSITATING REPLACEMENT. — All clips, brackets, short angles (10 inches long or less), hinges, etc. should be replaced if damaged.

(2) ELEVATOR TAB HINGE BEAM.—This beam is similar in construction to the rudder tab hinge beam and, therefore, the procedure for the repairs for this beam will be found in this section, paragraph 3. c. (2), and figure 208.

d. RIBS.—The elevator ribs are similar in construction to the rudder ribs. Refer to paragraph 3. *d.* of this section.

e. TAB.—The elevator tab is of the same construction as the rudder tab, and, therefore, the repairs will be the same. Refer to paragraph 3. *e.* of this section.

f. TIP.—The elevator tip is similar to the rudder tip and, therefore, the repairs will be the same. The structure and component parts are given in figure 219 and table 77.

g. TRAILING EDGE. — The elevator trailing edge is identical with that of the rudder and may, therefore, be repaired in accordance with paragraph 3. *g.* (4) of this section.

5. Refer to paragraph 4f, for mass balancing instructions.

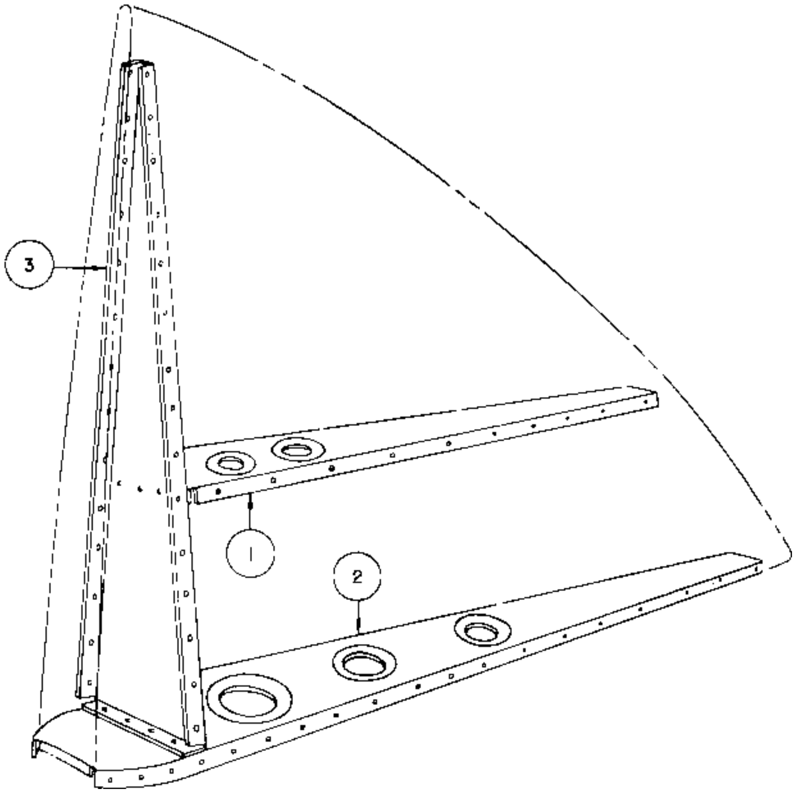


FIGURE 219—ELEVATOR TIP STRUCTURE

TABLE 77
COMPONENT PARTS OF ELEVATOR TIP

Item	*Member*	*Gage*	*Part Number*
1	Rib	.020	20-131-1003-2
2	Rib	.025	20-131-1002-2
3	Beam	.025	20-131-1001-2

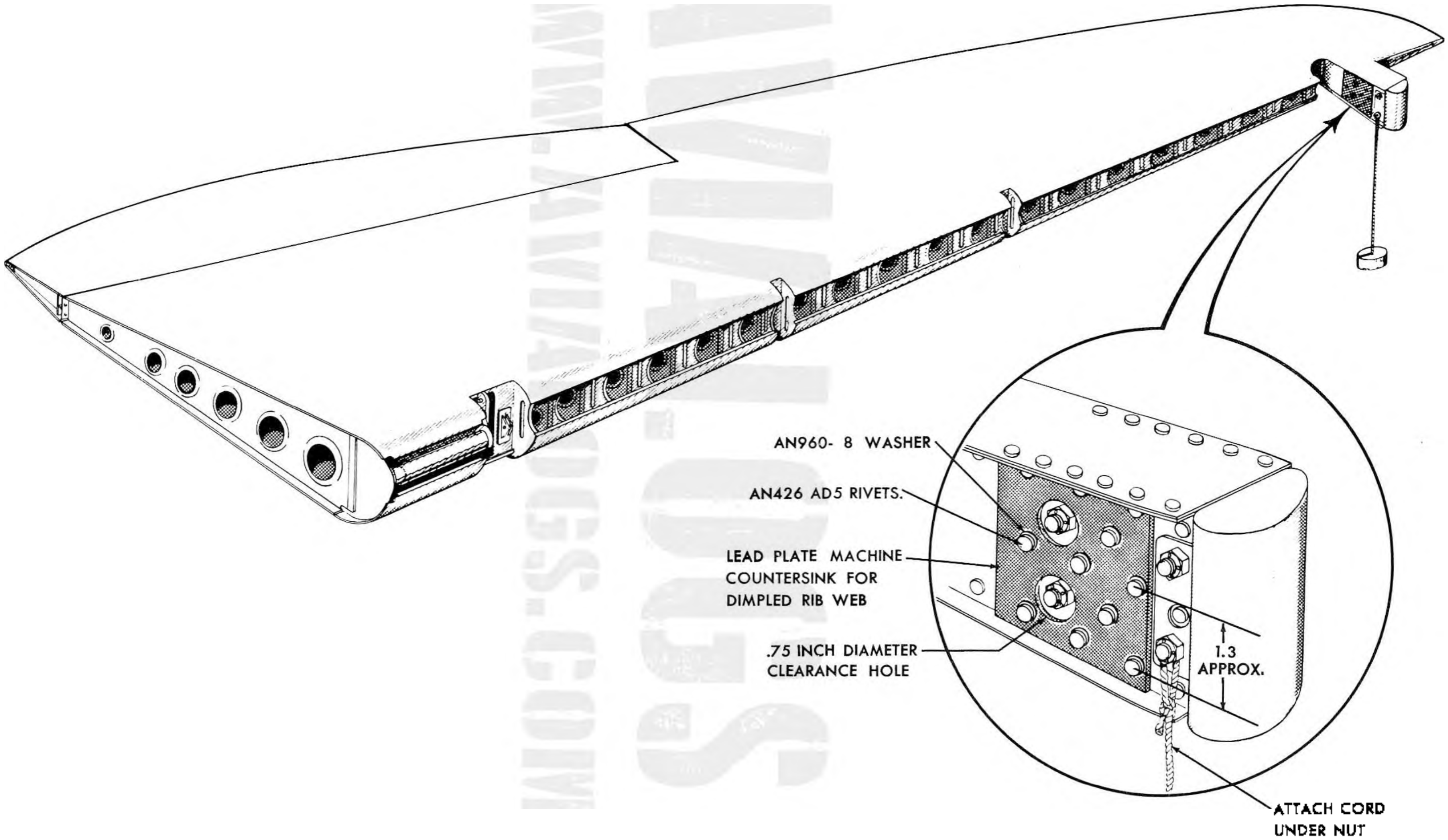


FIGURE 220—ELEVATOR MASS BALANCING

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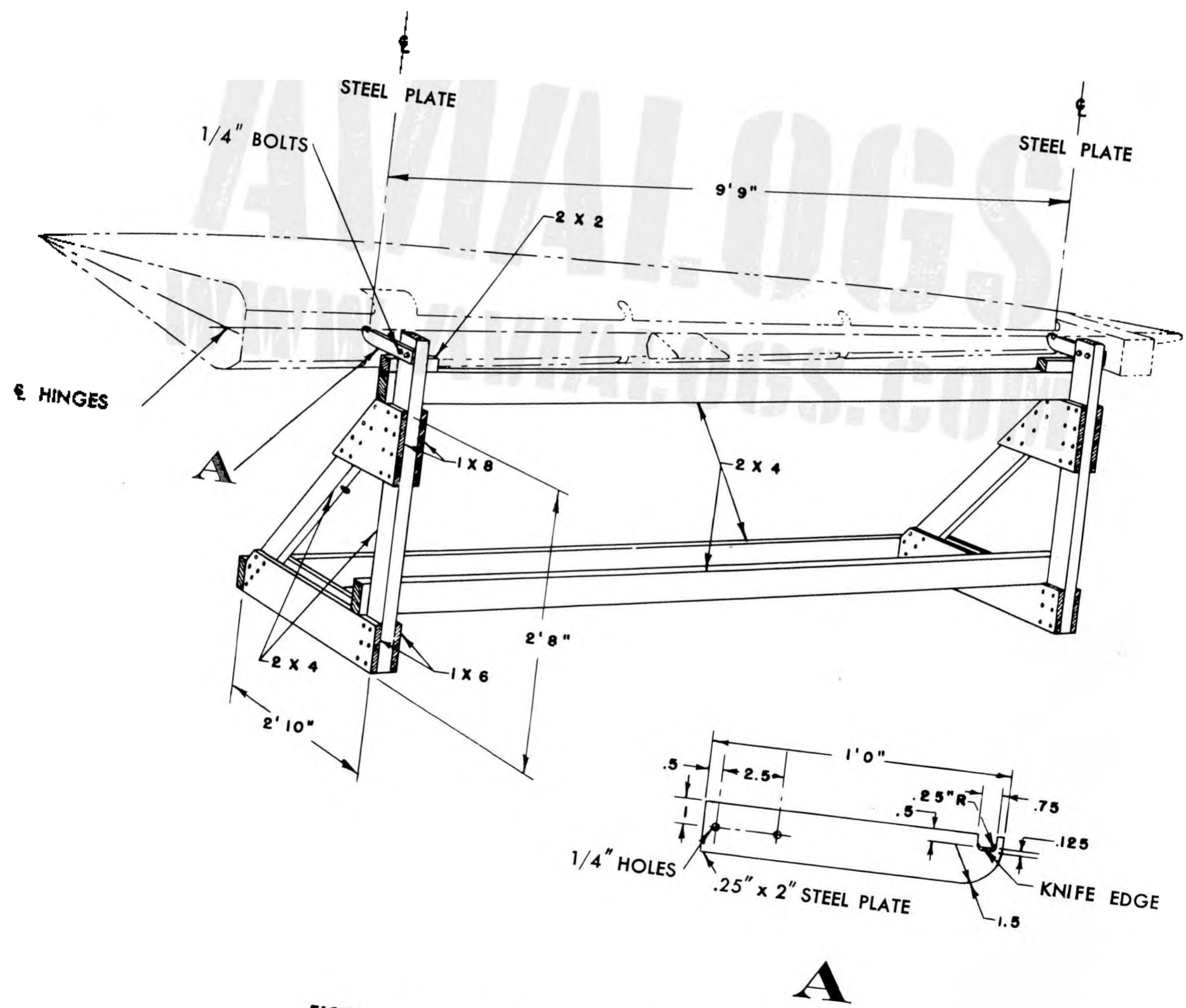


FIGURE 221—RUDDER MASS BALANCING

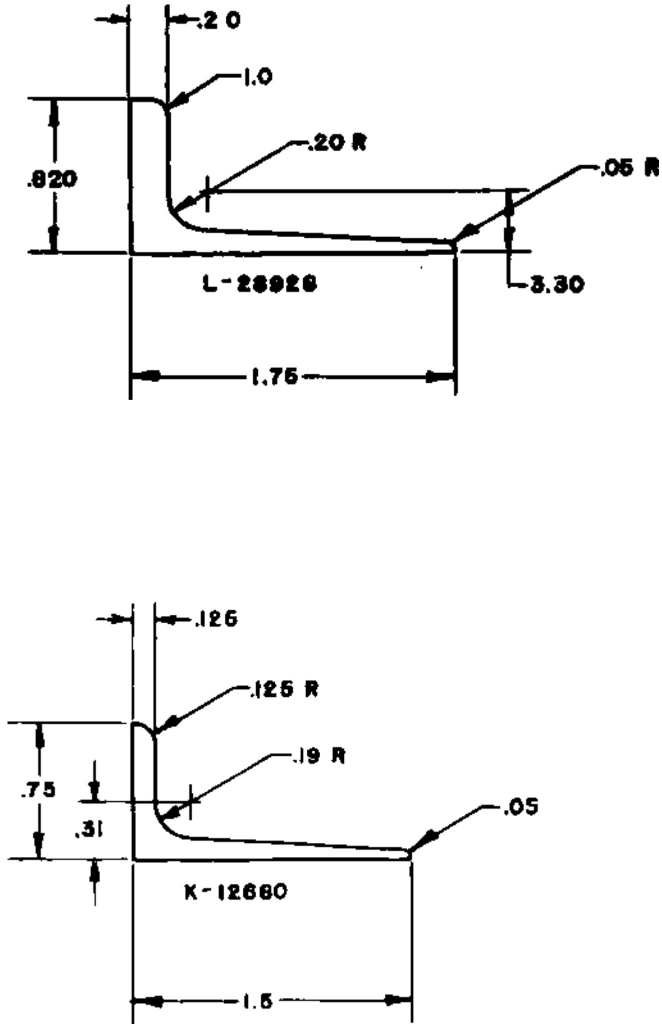


FIGURE 222—SPECIAL EMPENNAGE EXTRUSIONS

TABLE 78

MATERIALS FOR EMPENNAGE REPAIR

Material	*Stock*	*Size*
24ST	Sheet, aluminum alclad	.016
24ST	Sheet, aluminum alclad	.020
24ST	Sheet, aluminum alclad	.025
24ST	Sheet, aluminum alclad	.032
24ST	Sheet, aluminum alclad	.040
24ST	Sheet, aluminum alclad	.051
24ST	Sheet, aluminum alclad	.064
24ST	Sheet, aluminum alclad	.081
24ST	Sheet, aluminum alclad	.125
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.031
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.063
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.065
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.078
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.094
X4130	Sheet, steel 90,000 lb/sq in. Normalized	.125
671D-4AD	Rivet, brazier head	1/8
671D-5AD	Rivet, brazier head	5/32
671D-6AD	Rivet, brazier head	3/16
AN442AD4	Rivet, flathead	1/8
AN442AD5	Rivet, flathead	5/32
AN442AD6	Rivet, flathead	3/16
LS1127-4	Blind rivets	1/8
LS1127-5	Blind rivets	5/32
AN3-	Bolt, aircraft	
AN365-1032	Nut, self locking	
AN960-10	Washer, plain	

EMPENNAGE EXTENSION LIST

Alcoa Die No.

78-C	14256	28928	29096	29389
12680	22893	29083	29387	29659

SECTION VIII

FAIRING AND COWLING REPAIR

1. FIN-FUSELAGE FAIRING.

Remove fairing and make the necessary repairs to the surrounding region.

Repair fairing with an .025 sheet bent to fit the outside contour and rivet with eight 671D-4AD rivets each side of cleaned up damage.

Replace damaged fittings, doublers, clips, etc. Clamp repaired fairing in place by tightening up the screws at the aft end and fastening the nuts with lock wire. The fairing is shown in figure 20.

2. STABILIZER - FUSELAGE FAIRING.

Repairs are made as in paragraph 1. above.

3. WING - FUSELAGE FAIRING.

All 24ST material used is of the following sheet gages: .020, .025, and .032. The fairing assembly consists of several fillets, bulkheads, and stiffeners, and is shown in figure 20. Damage to fillet or bulkhead skins may be repaired by patching a sheet of similar gage to the damaged area, attaching it with a single row of 671D-4AD rivets at .68 ± .06 inch spacing or a double row of LS1127-4 Cherry blind rivets at .75 ± .06 inch spacing. The type of rivet used depends on whether or not the fairing is removed before attempting to repair it.

Flanges and bent up angles may be repaired by nesting an angle of similar gage in the region of the damage and riveting to the damaged member with three 671D-4AD rivets through each leg each side of cut.

The only extrusions used are L29083 and K15614. The former may be repaired in accordance with figure 232. The latter, a trapezoidal shape, is repaired by inserting a new section of the extrusion in the damaged area. The skins should be continuous across the extrusion break.

Damage in the region of lightening holes and beads may be repaired in the same manner as the wing ribs. (See figure 146.)

All non-metallic material may be repaired by inserting a new section in the damaged area.

4. WING SPLICE FAIRING.

Repair will be facilitated if the fairing is removed, otherwise difficulties may be encountered because of the close proximity of the attach angles to the inner fairing contour. The fairing may be patched using a sheet of the same gage as the damaged material, attaching it with sixteen 671D-4AD rivets each side of splice. These rivets are to be equally spaced across the section, using a double row approximately one inch apart. The rivets should have a minimum spacing of .62 inch.

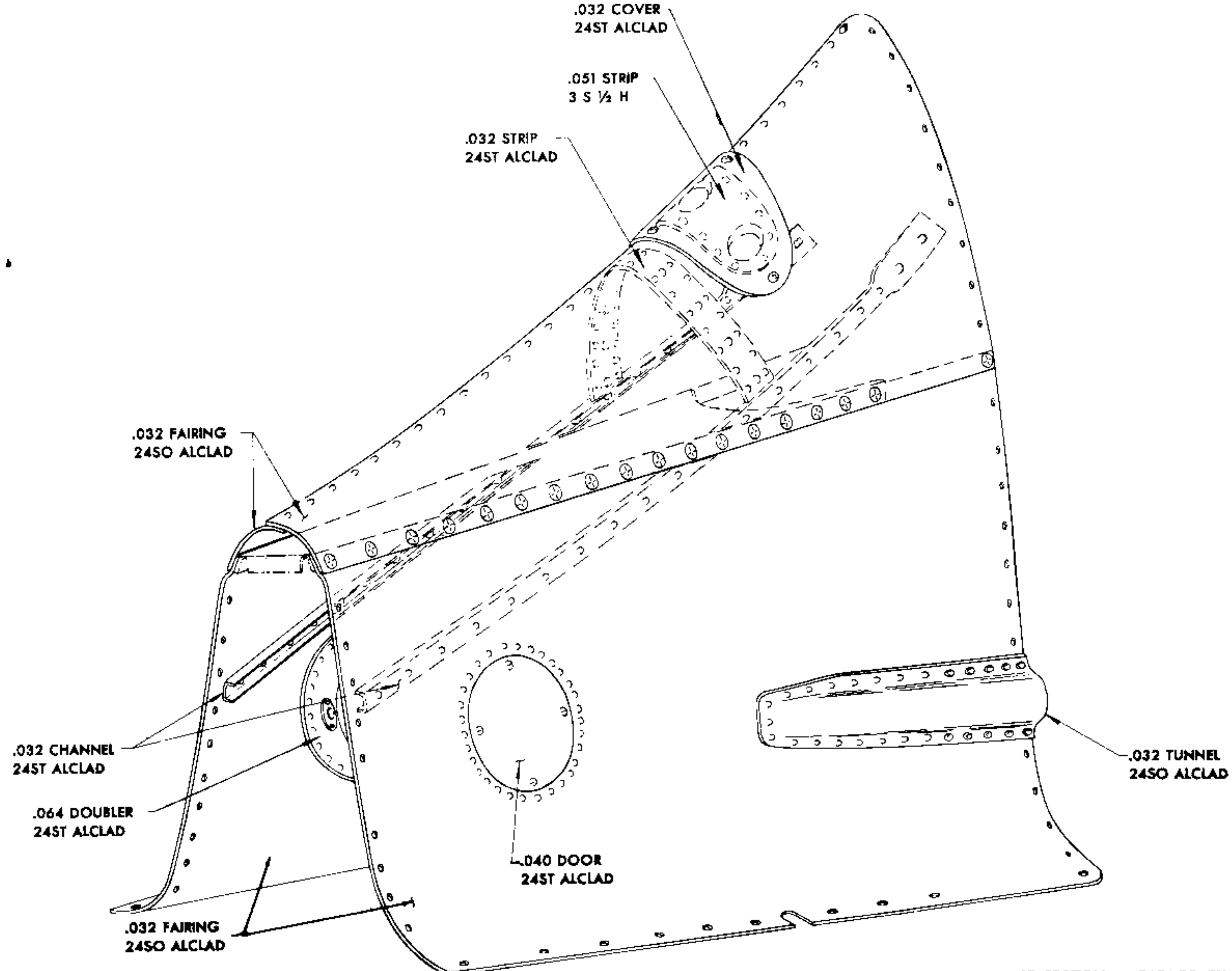
All clips, ties, rods, doublers, etc. are to be replaced if damaged.

5. DORSAL FIN TO FIN FAIRING.

The fairing is all of .032 gage with overlapping splices. (See figure 223.) Patches may be made of the same gage and attached with a single row of 671D-4AD rivets at .75 ± .13 inch spacing, or a double row of LS1127-4 rivets at 1 ± .13 inch spacing. The strip and cover in the region of the de-icer hoses should be replaced if damaged. The channels may be spliced by using a similar section and three 671D-4AD rivets each side of break. Maintain a minimum spacing of .75 inch in channel. Existing de-icer rivnuts and flush rivets may be included in the required number of rivets, referring to section I for countersunk rivet procedure. The strip around the base of the shoe may be spliced with an .032 strip, 2.5 inches wide and attached with six 671D-4AD rivets each side of break. Replace cover plates and doublers if damaged.

6. TAIL WHEEL DOOR.

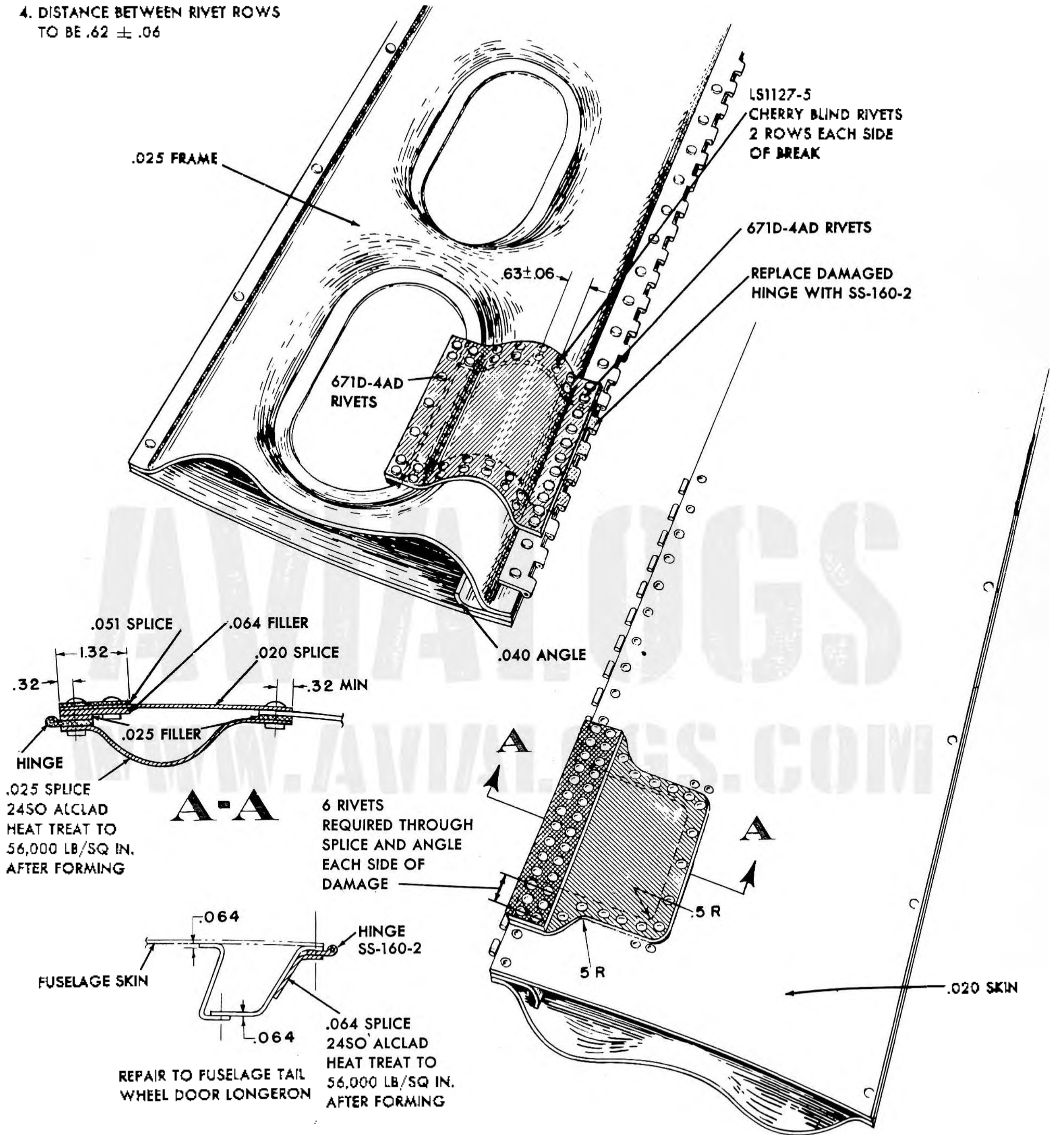
The tail wheel doors consist primarily of an outer .020 sheet and an inner .025 frame. Skin dents free from sharp corners, cracks, or abrasions may be restored to shape. Holes or cracks which when cleaned up are a maximum of 1.5 inches in diameter, may be neglected provided they are not less than 8 inches apart and not closer to any line of rivets than 1 inch. Where the outer sheet is accessible on both sides, a damage after clean-up may be repaired with an .020 sheet using one row of 671D-4AD rivets at .68 ± .06 inch spacing. If both sides of the sheet are not accessible, the patch will be the same but LS1127-5 rivets



REFERENCE: SECTION VIII, PARAGRAPH 5

FIGURE 223—DORSAL FIN

NOTES:
1. ALL MATERIAL 24ST ALCLAD EXCEPT AS NOTED
2. ALL RIVET EDGE DISTANCE TO BE .32 MINIMUM
3. ALL RIVET SPACING TO BE ± .06 UNLESS OTHERWISE NOTED. PICK UP ORIGINAL RIVET PATTERNS WHEN POSSIBLE
4. DISTANCE BETWEEN RIVET ROWS TO BE .62 ± .06



REFERENCE: SECTION VIII, PARAGRAPH 6

FIGURE 224—TAIL WHEEL DOOR REPAIR

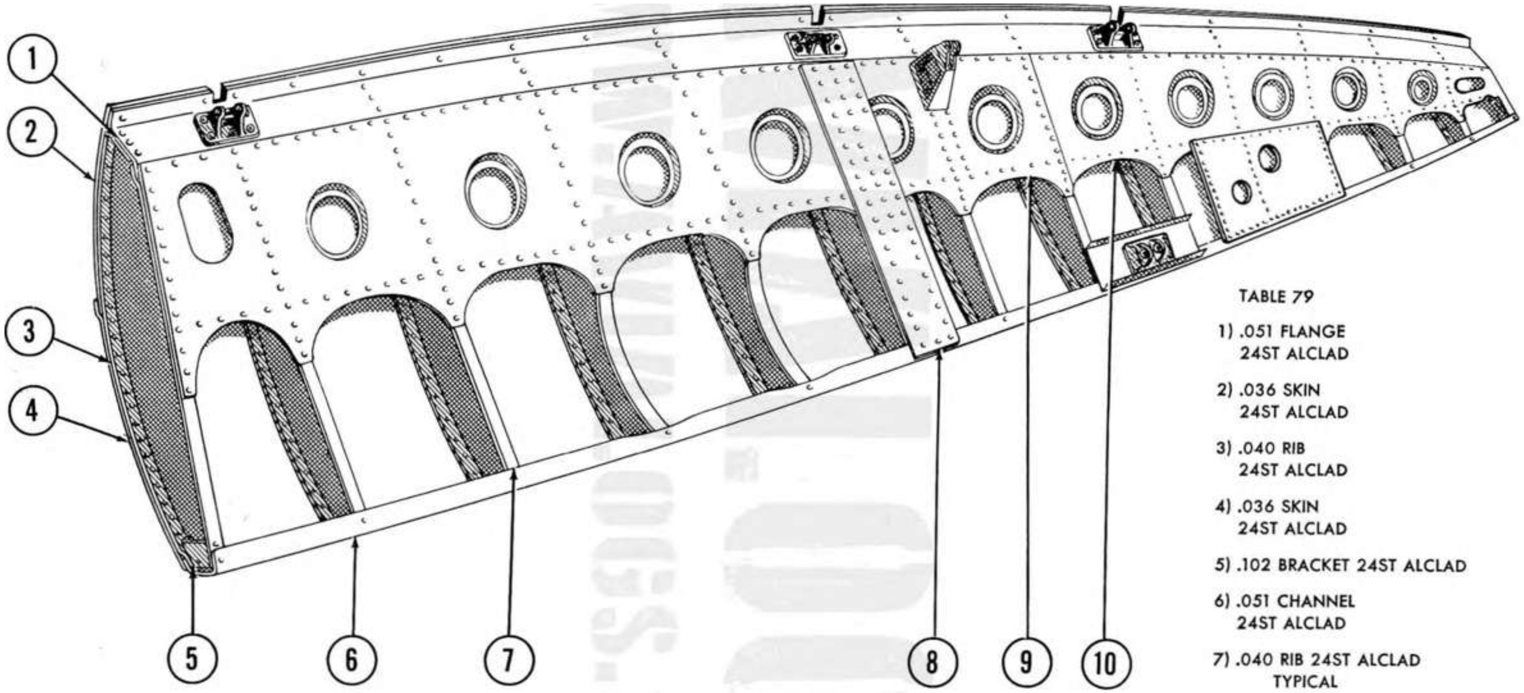


TABLE 79

1) .051 FLANGE 24ST ALCLAD

2) .036 SKIN 24ST ALCLAD

3) .040 RIB 24ST ALCLAD

4) .036 SKIN 24ST ALCLAD

5) .102 BRACKET 24ST ALCLAD

6) .051 CHANNEL 24ST ALCLAD

7) .040 RIB 24ST ALCLAD TYPICAL

8) .032 PLATE (18-8 TYPE 302 STAINLESS STEEL TEMPER ½ H)

9) .036 WEB 24ST ALCLAD

10) .036 WEB 24ST ALCLAD

REFERENCE: SECTION VIII, PARAGRAPH 7

FIGURE 225 — LANDING GEAR DOOR STRUCTURE

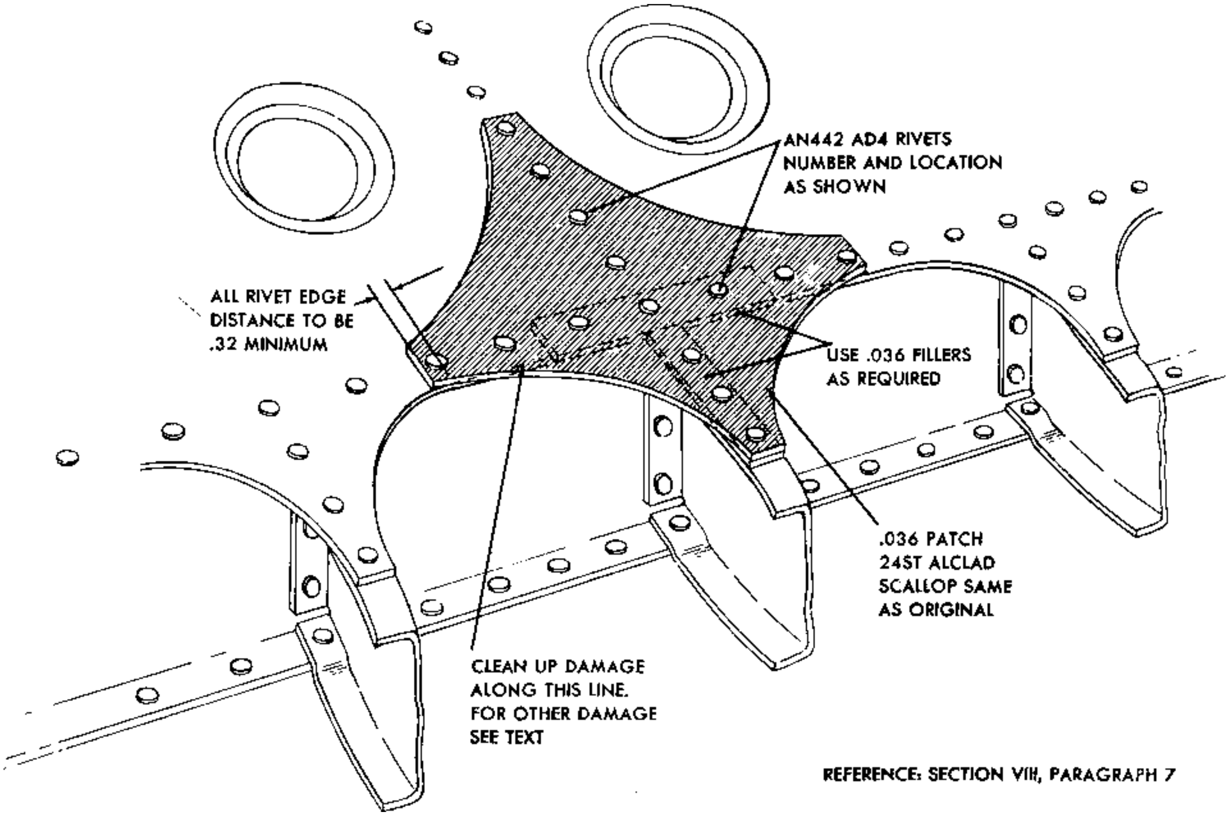


FIGURE 226—LANDING GEAR DOOR REPAIR

at .63 ± .06 inch should be used. The .025 frame is patched with a sheet of similar gage using two rows of LS1127-5 rivets at .68 ± .06 spacing. The patch should be formed to the contour of the frame. The hinge may be repaired by inserting a new piece of stock in the damaged region, making sure that the center line is properly located. The damaged portion should be cut out at a point half way between existing rivets. The angle may be spliced by an .051 sheet 1.32 inches wide and picking up six rivets each side of break. To clean up the damaged angle, it will be necessary to roll back the skin locally. Figure 224 shows these repairs. Replace all damaged fittings and brackets.

7. LANDING GEAR NACELLE DOOR.

These doors have channel and bulkhead stiffened skins (figure 225). Each door is supported by three hinges and is operated from one point. Negligible damage is the same as above. The skin is repaired by patching with an .036 sheet and one row of 671D-4AD rivets at .75 ± .06 spacing around the edges. The repair to the inner sheet is similar to that used on the outer panel wing ribs (figure 146) except that the splice plates should be attached with one row of AN442AD4 rivets at .75 ± .06 spacing around the edges. If the lightening holes are covered over, LS1127-4 rivets at .63 ± .06 spacing must be used. A damage to the scalloped region may be repaired by cutting an .036 patch to the same contour as the scallop and extending it back between the lightening hole to pick up four AN442AD4 rivets as shown in figure 226.

The ribs are all of .040 gage. Damage to a flange alone may be repaired by nesting an .040 angle into the flange and attach with three AN442AD4 rivets through each leg each side of cut. The complete repair of the rib may be effected in accordance with figures 229 and 230.

All channels may be repaired as in figures 229 and 230. Drill out spot welds where required with a ⅛ drill. See section I, paragraph 8 for method.

Replace all fittings, hinges, and small items if damaged. If the damage is extensive, it will be necessary to build a form jig to maintain the shape of the door.

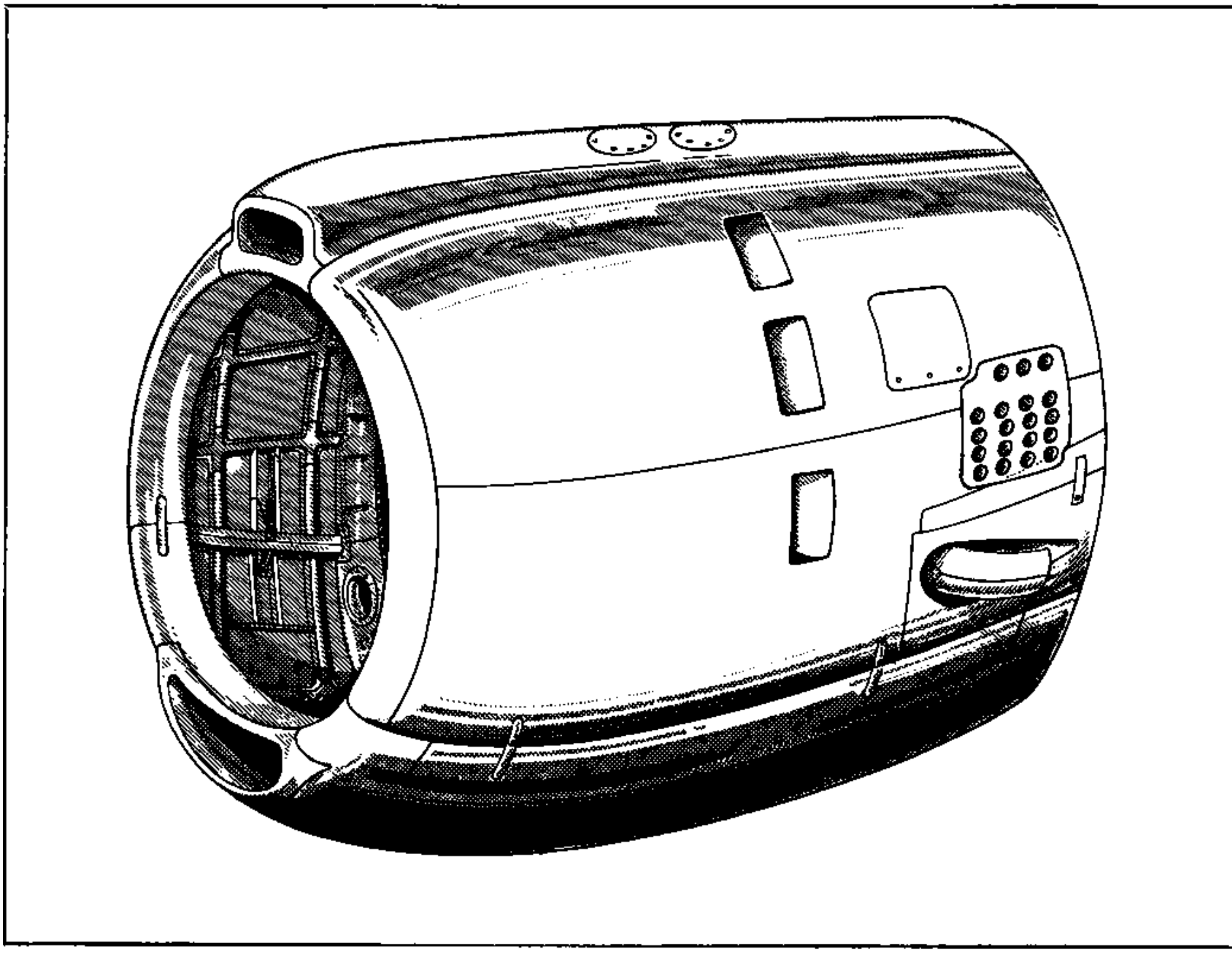


FIGURE 227 (SHEET 1 of 2 SHEETS) — ENGINE COWL STRUCTURE

8. ENGINE COWLING AND DUCTS.

a. Repairs to the cowling and ducting may be effected by the application of the material on general repairs. Those repairs will hold for the outer skin as well as the various bulkheads and angles. See section I, paragraph 8, for method of drilling out spot welds.

b. The hat sections may be repaired by fitting a piece of the same gage stock to the outside contour of the hat and riveting with nine 671D-5AD rivets each side of splice. Damage in the region of hat section intersections is repaired with two gussets. The hats are cut away on each side of the intersection. An .051 gusset, flanged as shown in figure 228, is placed on the crowns of the hats and riveted with four AN442AD5 rivets through each end of the hats. The rivets may be bucked through the skin which has been cut away. An .040 gusset is cut to fit the hole in the skin and this, together with the skin patch, is riveted to the flanges of the hats with three 671D-5AD rivets per flange. The skin patch is then riveted to the skin as shown.

CAUTION

(1) CHERRY BLIND RIVETS SHOULD NOT BE USED IN THE COWLING OR DUCTING.

(2) ALL REPAIRS SHOULD BE VERY RIGID BECAUSE OF VIBRATION.

(3) IN CLEANING UP SECTIONS, BE SURE THAT ALL CORNERS ARE ROUNDED OFF WITH ½ INCH MINIMUM RADII.

(4) THE CONTOUR OF THE DUCTS AND COWL SHOULD BE KEPT AS CLOSE TO THE ORIGINAL AS POSSIBLE.

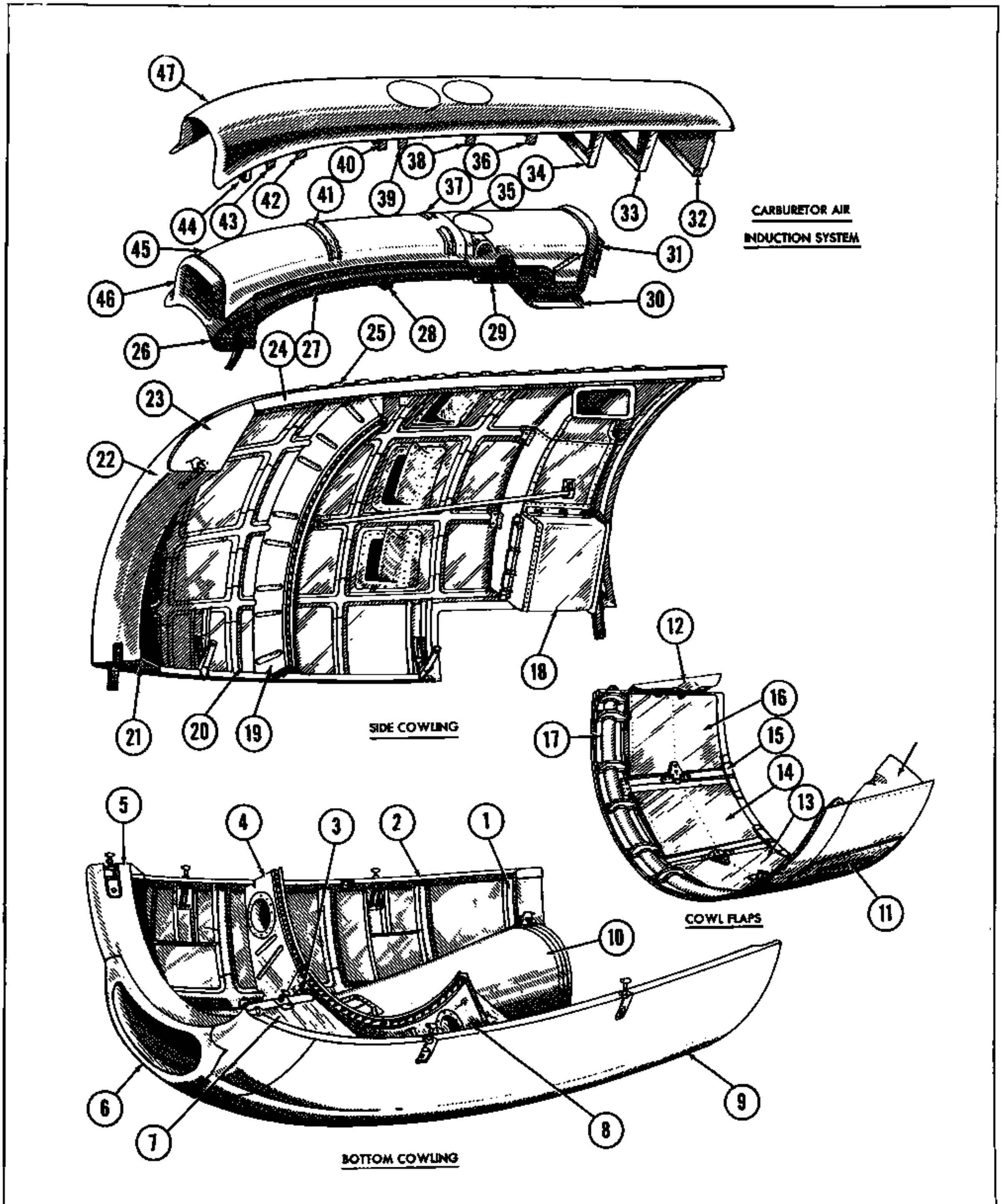


FIGURE 227 (SHEET 2 of 2 SHEETS) — ENGINE COWL STRUCTURE

TABLE 80
COMPONENT PARTS OF ENGINE COWL

BOTTOM COWLING

Item	*Member*	*Station No.*	*Part No.*	*Gage*	***Material*
1	*Hat Sections		20-730-1003	.032	24SO Alclad
2	Channel		20-730-1088	.064	24SO Alclad
3	Bulkhead	34.98	20-730-3055	.032	24SO Alclad
4	Bulkhead	34.98	20-730-1101	.032	24SO Alclad
5	Bulkhead	14.45	20-730-1089	.032	24SO Alclad
6	Casting	10.12	20-730-3019		Alcoa 13 Die Casting /
7	Bulkhead	10.17	20-730-3048	.051	24SO Alclad
8	Bulkhead	34.98	20-730-3008		24SO Alclad
9	Skin		20-730-1003	.040	24SO Alclad
10	Oil Cooler Duct		20-730-1093	.040	24SO Alclad

COWL FLAPS

Item	*Member*	*Station No.*	*Part No.*	*Gage*	***Material*
11	Intermediate Flap		20-730-1129	.040	24SO Alclad
12	Spiller		20-730-3006	.051	24SO Alclad
			20-730-3007	.051	24SO Alclad
13	Pan Cowl Flap		20-730-1155	.051	24SO Alclad
	Sheet No. 3		20-730-1156	.051	24SO Alclad
14	Pan Cowl Flaps		20-730-1158	.051	24ST Alclad
	Sheet Nos. 2 and 4		20-730-1159	.051	24SO Alclad
15	Spring		20-730-3039	.031	S.A.E. 1095
16	Pan Cowl Flaps		20-730-1160	.051	24SO Alclad
	Sheet Nos. 1 and 5		20-730-1157	.051	24ST Alclad
17	Hat Ring	71.74	20-730-1060	.051	Stainless Steel Type 302 Annealed
	Plate Assembly	71.74	20-730-1060	.051	Stainless Steel Type 302½ H.

SIDE COWLING

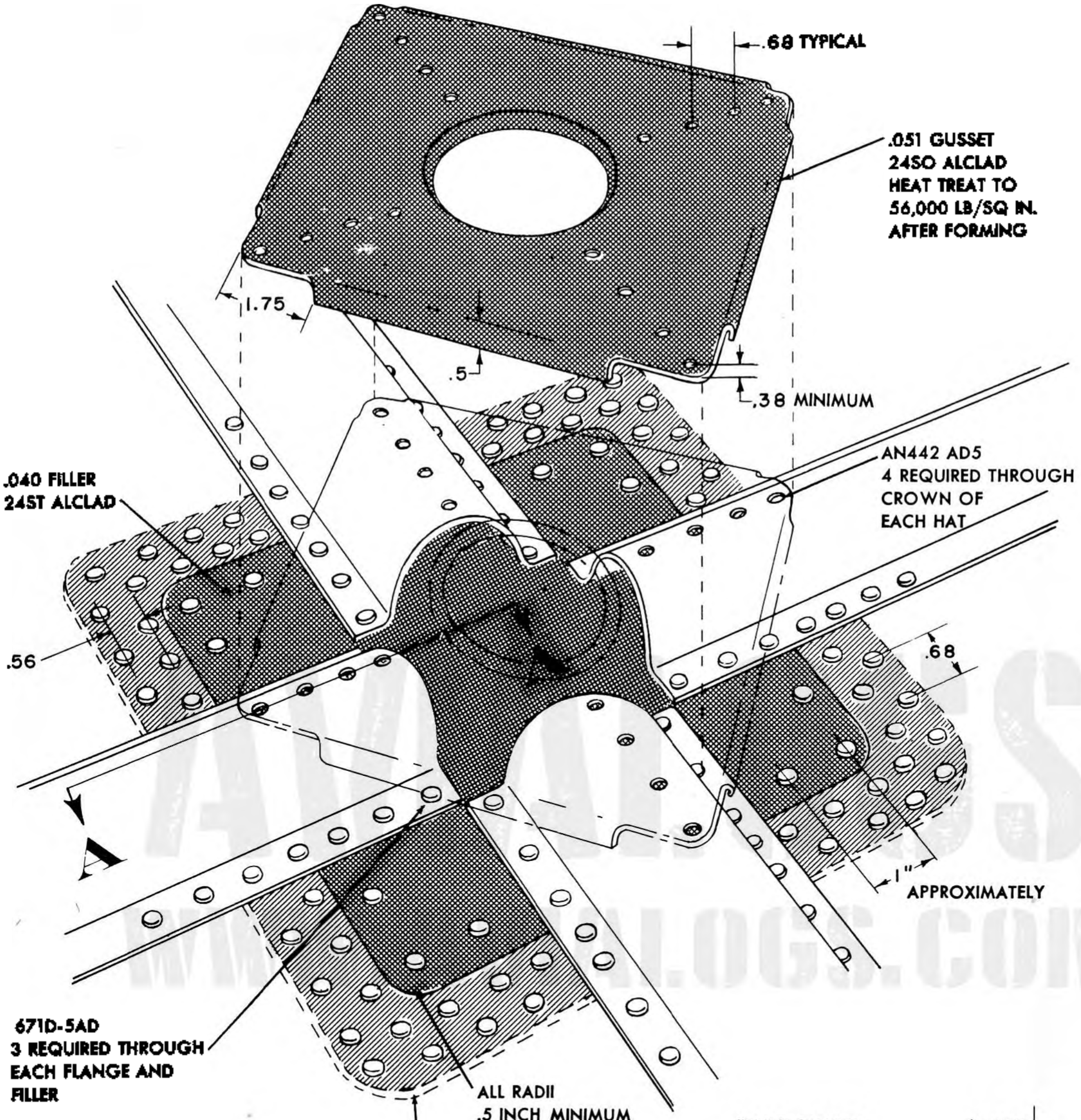
Item	*Member*	*Station No.*	*Part No.*	*Gage*	***Material*
18	Carburetor Air Filter		20-730-3090		
19	Engine Seal	34.98	20-730-1002	.040	24SO Alclad
20	*Hat Sections		20-730-1002	.032	24SO Alclad
21	Bulkhead	14.45	20-730-1002	.040	24SO Alclad
22	Skin		20-730-1002	.040	24SO Alclad
23	Bulkheads	10.17	20-730-3050	.051	24SO Alclad
24	Channel		20-730-1002	.064	24SO Alclad
25	Hinge		20-730-3146	.064	24SO Alclad
	Pin		20-730-3146	.25	Stainless Steel

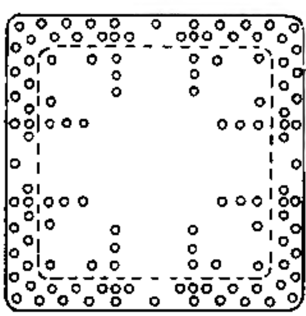
TABLE 80 (CONTINUED)
CARBURETOR AIR INDUCTION SYSTEM

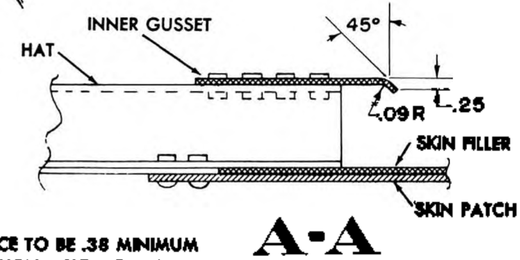
Item	*Member*	*Station No.*	*Part No.*	*Gage*	****Material***
26	Bulkhead Leading Edge—Carburetor Air Scoop	10.27	20-480-1064	.051	24SO Alclad
27	Zee Former	14.45-49	20-480-3002	.064	24SO Alclad
28	Lower Bulkhead	34.98	20-480-1073	.040	24SO Alclad
29	Base		20-480-3033		Alcoa 195-T6 Casting
30	Base		20-480-1059	.081	24SO Alclad
31	Elbow (Rear)		20-480-3025		Alcoa 195-T6 Casting
32	Bulkhead	84.986	20-480-1048	.051	24SO Alclad
33	Bulkhead	75.65	20-480-1043	.051	24SO Alclad
34	Bulkhead	67.0	20-480-1044	.051	24SO Alclad
35	Elbow	48.0-67.0	20-480-3032	.051	24SO Alclad
36	Bulkhead	57.4	20-480-1041	.051	24SO Alclad
37	Stiffener	43.1	20-480-1020	.051	24SO Alclad
38	Bulkhead	49.0	20-480-1077	.051	24SO Alclad
39	Bulkhead	38.0	20-480-1034	.051	24SO Alclad
40	Upper Bulkhead	34.98	20-480-1072	.032	24SO Alclad
41	Stiffener	28.8	20-480-1018	.051	24SO Alclad
42	Bulkhead	23.60	20-480-1026	.051	24SO Alclad
43	Bulkhead	17.75	20-480-1027	.051	24SO Alclad
44	Bulkhead	14.45	20-480-1062	.051	24SO Alclad
45	Duct		20-480-1061	.051	24SO Alclad
46	Leading Edge Carburetor Air Scoop	10.12	20-480-3020		Alcoa 13 Die Casting
47	Skin		20-480-1042	.051	24SO Alclad

* For repairs to hat sections, see figure 107.

** All 24SO to be heat treated to 56,000 pounds per square inch after forming.







NOTES:

1. ALL RIVET EDGE DISTANCE TO BE .38 MINIMUM
2. GUSSETS TO EXTEND BEYOND CLEANED UP REGION OF DAMAGE TO PICK UP REQUIRED NUMBER OF RIVETS
3. ALL RIVET SPACING TO BE .68 ± .06 INCH EXCEPT AS NOTED
4. SEE TABLE NO. 7 FOR BEND RADII
5. RIVET SPACING ± .06

REFERENCE: SECTION VIII, PARAGRAPH 8b

FIGURE 228—ENGINE COWL—HAT SECTION REPAIR

TABLE 81
MATERIALS FOR FAIRING AND COWLING REPAIR

Spec. No.	*Stock*	*Size*
24ST	Sheet, aluminum alclad	.020
24ST	Sheet, aluminum alclad	.025
24ST	Sheet, aluminum alclad	.032
24ST	Sheet, aluminum alclad	.036
24ST	Sheet, aluminum alclad	.040
24ST	Sheet, aluminum alclad	.051
24ST	Sheet, aluminum alclad	.064
671-D-4AD	Rivet, brazier head	1/8
671-D-5AD	Rivet, brazier head	5/32
AN442-AD4	Rivet, flathead	1/8
AN442-AD5	Rivet, flathead	5/32
LS1127-4	Blind rivet, cherry	1/4
LS1127-5	Blind rivet, cherry	5/32

SECTION IX
GENERAL REPAIR

1. REPAIR OF SECTIONS FABRICATED FROM ALCLAD SHEET.

a. GENERAL. Because there are many sections which cannot be covered in the detailed repairs, the following general repairs for sections fabricated from sheet are given. These repairs provide the information necessary for the repair of sections not treated specifically in the text, and are subdivided into three types. It must be realized that all cases could not be covered; however, from the information provided it should be possible to effect repairs for many of the bent up sections of the ship.

CAUTION

THESE REPAIRS ARE TO BE USED ONLY WHEN THE REPAIR FOR THE PARTICULAR DAMAGE IS NOT TREATED ELSEWHERE IN THE TEXT.

b. GENERAL REPAIR -TYPE I.—This type applies to flats of bulkheads, frames, webs, etc., where the damaged area after cleanup is greater than 1 inch from a flange, edge of a lightening hole, stiffener or bead.

(1) NEGLIGIBLE DAMAGE. — Dents free from cracks, abrasions, and sharp corners may be neglected. These dents must be bumped out wherever possible to prevent their developing into cracks. With the exception of the tail cone bulkheads (section III, paragraph 4. *e*.), holes and cracks which, after cleanup, can be circumscribed by a circle whose diameter is 1/8 the web depth and which cannot exceed 1 inch, may be considered negligible providing:

(*a*) They must be at least 1.5 inches from the edge of a sheet, a flange, or a stiffener.

(*b*) After cleanup they must be at least .63 inch from the nearest rivet. Rivets in the vicinity of the damage must be inspected to determine whether they have been loosened or sheared.

(2) DAMAGE REPAIRABLE BY PATCHING. Damage not considered negligible may be patched as follows:

(*a*) Clean up the damage maintaining a .5 radius on all corners using a spiral reamer or a round file.

(*b*) Determine the gage of the damaged material.

(*c*) Having determined the gage of the material, refer to table 82. This table gives the number of rows of rivets, the type of rivets, and the rivet spacing required for the repair of 24ST Alclad sheet for various gages. The specified rivet pattern must extend completely around the patch.

(*d*) Lay on a piece of 24ST Alclad sheet whose gage is the same as, or heavier than, that of the damaged sheet. Attach, picking up the required rivet pattern. Be sure that a minimum edge distance of 2.5 times the rivet diameter is maintained on all rivets.

(*e*) Figure 229 shows the application of the above type of repair to an .040 24ST Alclad sheet.

c. GENERAL REPAIR TYPE II.—This type of repair applies to angles, web flanges, and flanges of lightening holes.

(1) NEGLIGIBLE DAMAGE. — Nicks and cracks in the edge of the flange which, when cleaned up with a round file, do not have a depth greater than 1/5 the length of the damaged leg and which are a minimum of .38 inch from any rivet, may be neglected provided such nicks are at least 4 inches apart. It is necessary that the cleaned up damage be free from all sharp corners and that a minimum radius of .25 inch be used.

(2) DAMAGE REPAIRABLE BY PATCHING. Damage not considered negligible may be patched as follows:

(*a*) Clean up the damage with a .5 inch radius cutter and determine whether or not the damage is confined to more or less than 1/2 the cross sectional area.

(*b*) Determine the dimensions of the damaged material by referring to the various figures throughout the text.

(*c*) Having determined the dimensions of the damage, refer to figure 229 and table 82. These show angles of various dimensions and include the number of rivets required each side of the break, depending on

TABLE 82

RIVET PATTERNS FOR GENERAL REPAIR TO SHEET STOCK

A—TYPE I REPAIR

Type, Spacing and Number of Rivets Required Per Inch of Damaged Area

	AN442 AD4		*AN442 AD5*		*AN442 AD6*		*LS1127AD-4*		*LS1127AD-5*		*LS1127AD-6*	
Gage	*Number of Rows*	*Spacing*	*Number of Rows*	*Spacing*	*Number of Rows*	*Spacing*	*Number of Rows*	*Spacing*	*Number of Rows*	*Spacing*	*Number of Rows*	*Spacing*
.020	3	.63					5	.63				
.025	3	.75					5	.63				
.032	3	.75	2	.63			5	.63	4	.63		
.040	3	.63	2	.63	2	.75	5	.63	4	.63	4	.75
.051	4	.63	3	.75	3	.88	5	.63	4	.63	4	.75
.064			3	.63	3	.88			4	.63	4	.75
.081			4	.63	4	.88					5	.75

B—TYPE II REPAIR

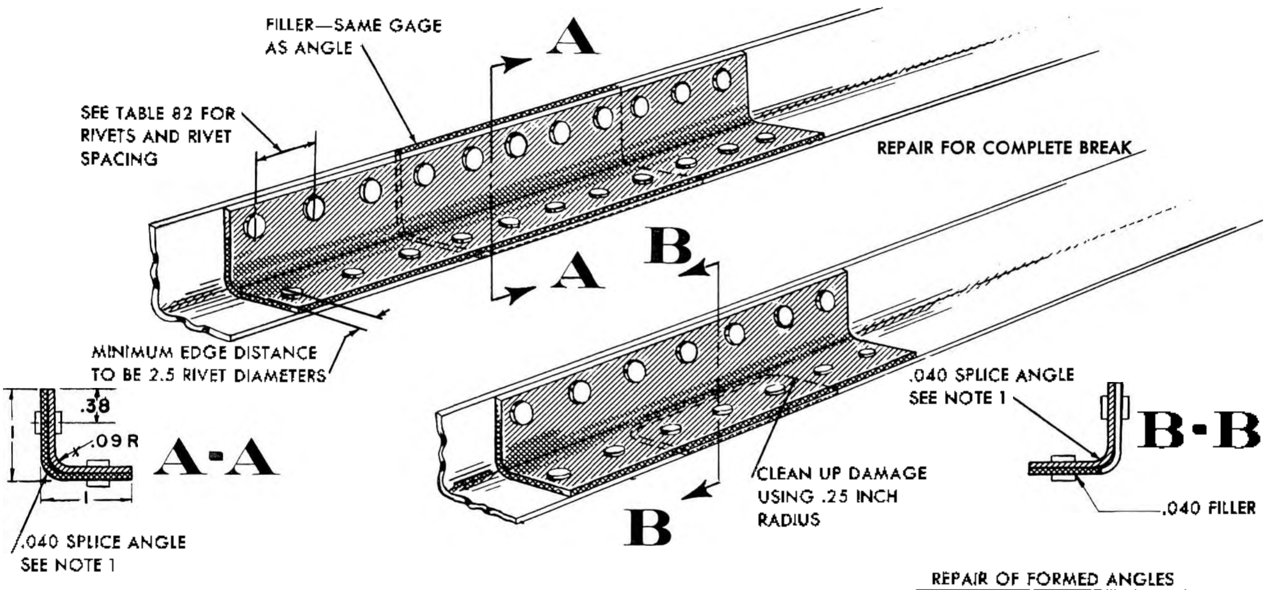
Size		*Number of Rivets Required Each Side of Break*					
		Complete Break			*One Leg Damaged*		
	Gage	*AN442 AD4*	*AN442 AD5*	*AN442 AD6*	*AN442 AD4*	*AN442 AD5*	*AN442 AD6*
	.032	5	4		3	2	
a=.75	.040	6	4	4	3	2	2
b=.75	.051	8	5	4	4	3	2
	.064	10	6	5	5	3	3
	.081	12	8	6	6	4	3
	.032	7	6		4	3	
a=1	.040	9	6	5	5	3	3
b=1	.051	11	7	5	6	4	3
	.064	14	9	6	7	5	3
	.081	17	11	8	8	6	4

whether or not the damage is confined to one or two legs of the angle.

(*d*) Patch or splice the member by laying in the required splice angle. The gage of this splice angle is to be of the same gage as that of the damaged material. This angle is preformed 24ST Alclad sheet or bent up from 24SO Alclad sheet and heat treated to 56,000 pounds per square inch after forming. To determine the bend radius of the patch angle, refer to table 7.

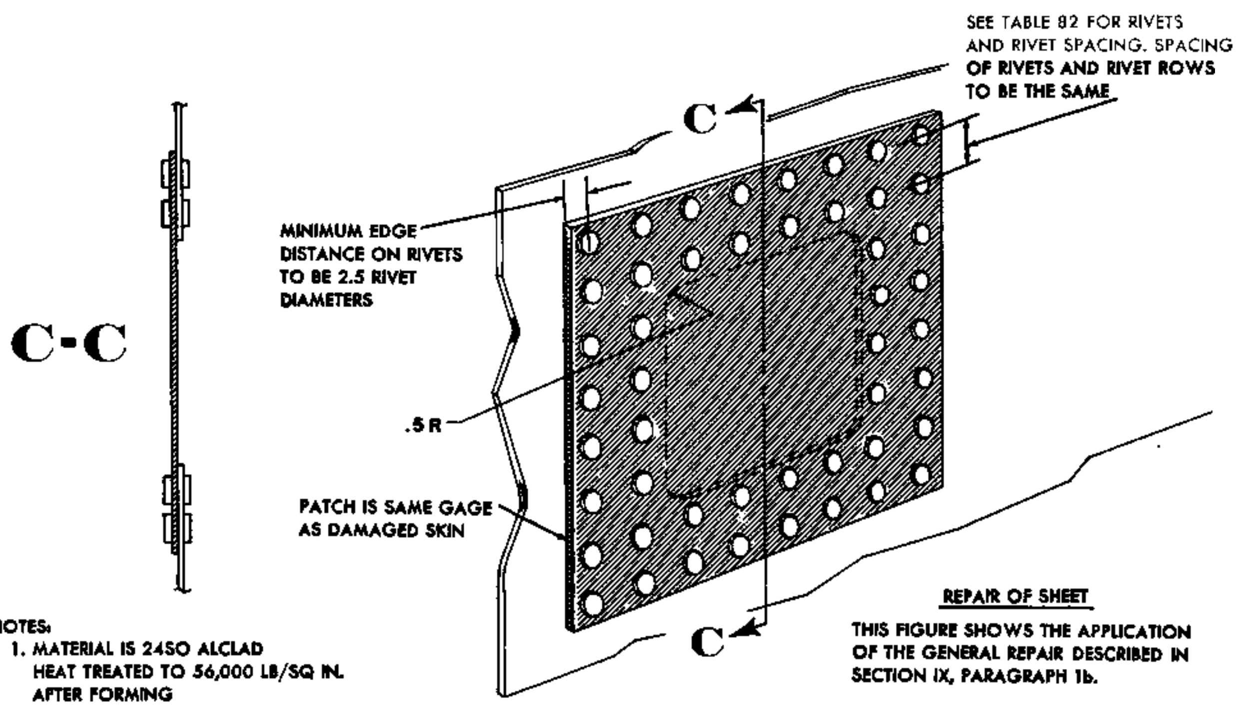
(*e*) Figure 229 indicates how to apply this type of repair to a 1 x 1 x .040 24ST Alclad angle for damage that is confined to one leg and to a complete break.

d. GENERAL REPAIR—TYPE III.—This type of repair applies to flanged webs and to channels.



REPAIR OF FORMED ANGLES

THIS FIGURE SHOWS THE APPLICATION OF THE GENERAL REPAIR DESCRIBED IN SECTION IX, PARAGRAPH 1c TO A 1x1x.040ST ALCLAD ANGLE USING AN442 AD5 RIVETS

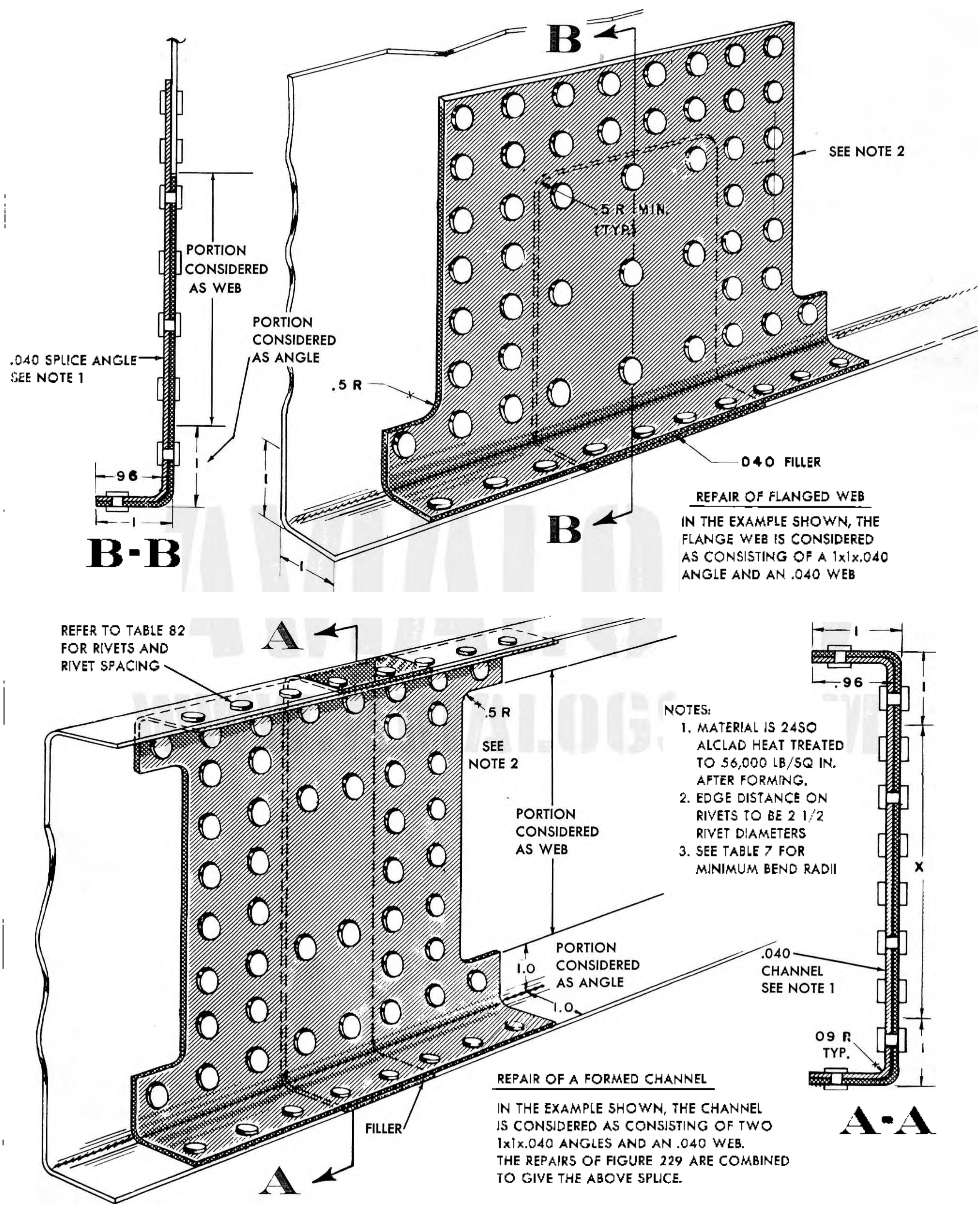


REPAIR OF SHEET

THIS FIGURE SHOWS THE APPLICATION OF THE GENERAL REPAIR DESCRIBED IN SECTION IX, PARAGRAPH 1b.

NOTES:
1. MATERIAL IS 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
2. SPLICE ANGLES SAME GAGE AS ORIGINAL
3. SEE TABLE 7 FOR MINIMUM BEND RADII

FIGURE 229—GENERAL REPAIR—ANGLES AND FLATS



REFERENCE: SECTION IX, PARAGRAPH 1c.

FIGURE 230—GENERAL REPAIR—FLANGED WEBS AND CHANNELS

A flanged web is considered as consisting of a web and an angle.

A channel is considered as consisting of a web and two angles.

(1) NEGLIGIBLE DAMAGE. — Negligible damage is determined by referring to the text of GENERAL REPAIR, TYPES I and II.

(2) DAMAGE REPAIRABLE BY PATCHING. -Damage not considered negligible may be patched as follows:

(*a*) Figure 230 shows how to break down a channel section into its assumed component parts to effect its repair. The particular case shows how to combine the .040 web repair (given in paragraph 1. *b*. (2) (*e*) of section IX), with the two 1 x 1 x .040 angle repairs (given in paragraph 1. c. (2) (*e*) of section IX). By referring to table 82, it is seen that the portions of the channel considered as angles can each be repaired by picking up a total of six AN442-AD5 rivets each side of the break. The section of the channel considered web can be repaired by picking up two rows of AN442AD5 rivets at .63 inch spacing. The three component parts, the web, and the two angles, are then combined to give the composite splice shown in figure 230. The material used is of the same gage as that of the damaged member and is 24SO Alclad heat treated to 56,000 pounds per square inch after forming.

(*b*) Figure 231 shows how to break down a flanged web into its assumed component parts to effect its repair. The particular case shows how to combine the .040 web repair with the 1 x 1 x .040 angle repair. Referring to figure 231, it is seen that the web can be repaired by picking up two rows of AN442-AD5 rivets at .63 inch spacing and the portion considered as an angle can be repaired by picking up six AN442-AD5 rivets each side of the break. The two component parts, the web and the angle, are then combined to give the composite splice shown in the figure. The material used is 24SO Alclad heat treated to 56,000 pounds per square inch after forming and is the same gage as the damaged member.

2. REPAIR OF EXTRUSIONS.

a. Since there are a large number of extrusions, most of which are used in many places in the airplane, their repairs are presented in this section. Based on the form of the cross-section, the repairs fall into three groups: Figure 231 and table 83 give the data for angles; figure 232 and table 84 give the data for bulb angles; and figure 233 and table 85 give the data for "T" sections.

b. The tables refer to the extrusions by their die number, both Alcoa and Curtiss. The particular die number of any damaged extrusion may be determined from the skeleton drawings and from the various figures.

c. The accompanying tables give the dimensions of the extrusions together with the dimensions for replacements and splices. The required number of rivets or bolts for each leg is given and should be used in all cases except where specific deviations are allowed in the text.

d. For a large number of extrusions, both steel and aluminum alloy are given for repairs and replacements. Steel is used for the following reasons:

(1) For equivalent strength, aluminum alloy sheet must be of a heavier gage than the corresponding extrusion.

(2) The bend radii of the heavier sheet stock are greater than that of the corresponding extrusion and, for replacements, difficulty may be experienced in locating the rivets properly.

(3) Splice angles nested in the original extrusion must have small bend radii so that the rivets will seat properly.

e. It is always better structurally to splice an extrusion with angles. Only in cases where this cannot be done should splice plates be used.

f. In figures 231 and 232, two positions of the splice angles are shown. Position "A" is to be favored since it gives greater strength. Position "B" may be used provided the free legs are tied to a member (for example, a web or skin). In this case, the total number of rivets or bolts called for in both legs must be used through one leg only.

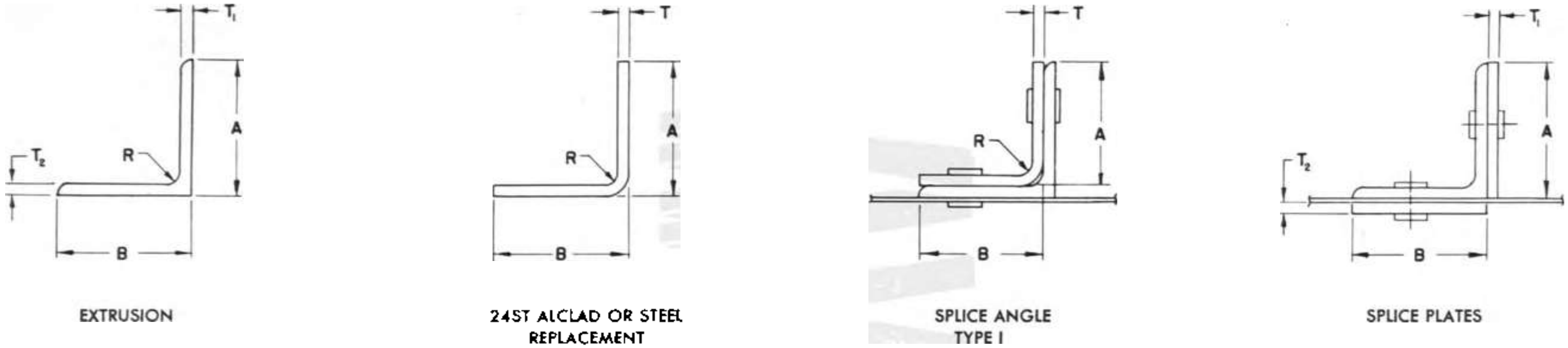
g If original extrusion stock is available, it may be used both for replacements and inserts.

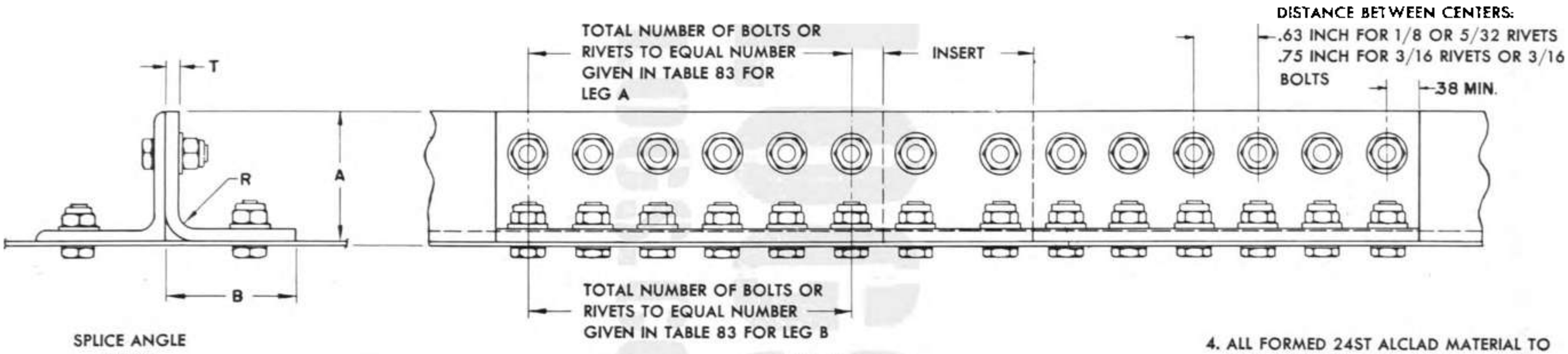
h. All inserts should have a +0, −.03 inch tolerance in length.

i. If formed, heat-treated angle stock is not available, the aluminum alloy sheet must be bent in the annealed condition and then heat treated.

j. All steel stock is X-4130 normalized.

k. See table 7 for bend radii.





SPLICE ANGLE
TYPE II

TYPE II SPLICE IS OF THE SAME CROSS-SECTION AND MATERIAL AS REPLACEMENTS

REFERENCE: 1. SECTION IX, PARAGRAPH 2
2. TABLE 83

NOTES:

1. USE WITH TABLE 83
2. WHERE SPLICE EMPLOYS ORIGINAL BOLT OR RIVET PATTERN, ADDITIONAL BOLTS OR RIVETS MAY BE ADDED PROVIDED MINIMUM SPACING IS KEPT
3. NUMBER OF RIVETS OR BOLTS SPECIFIED IS PER LEG PER SIDE OF SPLICE
4. ALL FORMED 24ST ALCLAD MATERIAL TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
5. EDGE DISTANCE ON RIVETS TO BE 2 RIVET DIAMETERS MINIMUM
6. ALL STEEL PARTS TO HAVE PROTECTIVE FINISH AS PER SECTION I PARAGRAPH 11

FIGURE 231—GENERAL REPAIR—EXTRUDED ANGLES

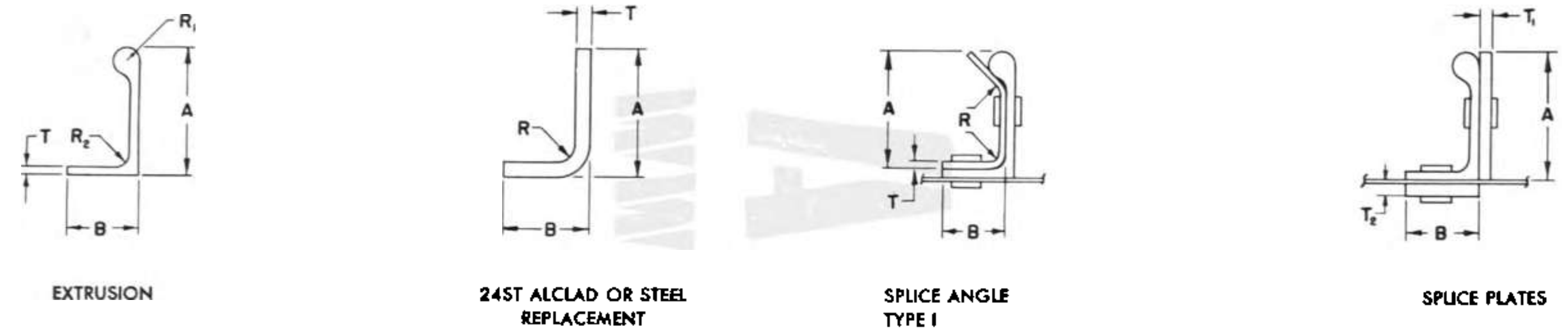
TABLE 83

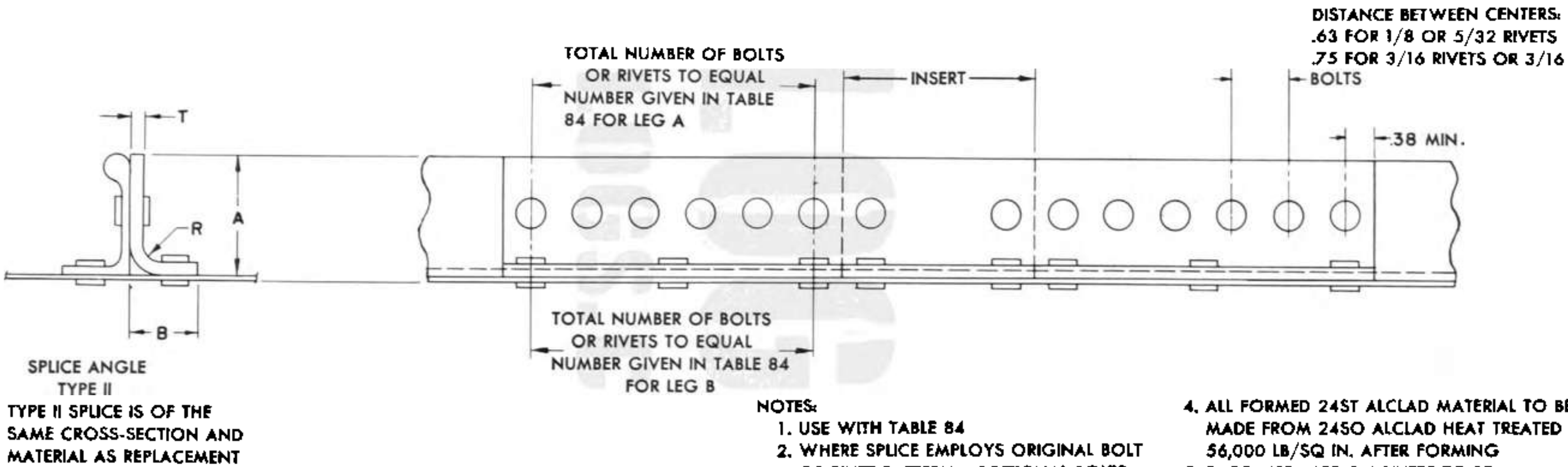
REPAIR TO EXTRUDED ANGLES

Alcoa Die No.	Original Extrusion Dimensions					Replacement Stock Dimensions								Splice Angles				Splice Plates				Attachment					
						X4130 Steel Normalized				24ST Alclad				24ST Alclad Unless Noted				24ST Alclad Unless Noted				Per Leg per Side of Splice					
																						Leg a			Leg b		
	a	b	t_1	t_2	r	a	b	t	r	a	b	t	r	a	b	t	r	a	b	t_1	t_2	AN442 AD5	AN442 AD6	AN3	AN442 AD5	AN442 AD6	AN3
K77A	.75	.75	.125	.125	.125	.75	.75	.094	.094	.75	.75	.125	.188	—	—	—	—	.75	.75	.125	.125	10	7	3	10	7	3
K77B	1.00	1.00	.125	.125	.125	1.00	1.00	.094	.094	—	—	—	—	—	—	—	—	1.00	1.00	.125	.125	13	9	4	13	9	4
K77C	1.25	1.25	.250	.250	.188	—	—	—	—	—	—	—	—	—	—	—	—	1.25 *1.25	1.25 1.25	.250 .156	.250 .156	—	—	7	—	—	7
K77E	1.75	1.75	.125	.125	.188	1.75	1.75	.125	.125	1.75	1.75	.156	.188	*1.625	1.625	.125	.188	1.75	1.75	.125	.125	23	16	6	23	16	6
K77F	1.25	1.25	.125	.125	.188	1.25	1.25	.094	.094	1.25	1.25	.156	.188	*1.125	1.125	.125	.188	1.25	1.25	.125	.125	17	12	5	17	12	5
K77L	1.50	1.50	.188	.188	.188	1.50	1.50	.125	.125	—	—	—	—	*1.375	1.375	.125	.125	1.50 *1.50	1.50 1.50	.188 .125	.188 .125	—	20	7	—	20	7
K77P	2.00	2.00	.250	.250	.250	—	—	—	—	—	—	—	—	—	—	—	—	*2.00	2.00	.156	.156	—	—	11	—	—	11
K77Q	.75	.75	.188	.188	.125	.75	.75	.125	.125	—	—	—	—	—	—	—	—	.75	.75	.188	.188	14	10	4	14	10	4
K77R	1.50	1.50	.125	.125	.188	1.50	1.50	.125	.125	1.50	1.50	.156	.188	*1.375	1.375	.125	.188	*1.50	1.50	.125	.125	20	14	6	20	14	6
K77S	2.00	2.00	.188	.188	.125	2.00	2.00	.125	.125	—	—	—	—	—	—	—	—	2.00 *2.00	2.00 2.00	.188 .125	.188 .125	—	25	9	—	25	9
K77V	2.00	2.00	.125	.125	.250	2.00	2.00	.125	.125	2.00	2.00	.156	.188	*1.875	1.875	.125	.125	2.00	2.00	.156	.156	—	—	7	—	—	7
K77W	1.75	1.75	.250	.250	.188	—	—	—	—	—	—	—	—	—	—	—	—	1.75	1.75	.250	.250	—	—	11	—	—	11
K78A	1.25	1.25	.188	.188	.188	1.25	1.25	.125	.125	—	—	—	—	*1.063	1.063	.125	.125	1.25 *1.25	1.25 1.25	.188 .125	.188 .125	24	17	6	24	17	6
K78C	.75	.75	.094	.094	.125	.75	.75	.078	.094	.75	.75	.125	.188	* .656	.656	.078	.094	.75	.75	.102	.102	7	5	—	7	5	—
K78F	1.00	1.00	.094	.094	.125	1.00	1.00	.078	.094	1.00	1.00	.125	.188	.906 * .906	.906 .906	.094 .078	.125 .094	1.00	1.00	.102	.102	10	7	3	10	7	3
K78J	1.00	1.00	.063	.063	.125	—	—	—	—	1.00	1.00	.081	.125	.938	.938	.064	.094	1.00	1.00	.081	.081	7	5	—	7	5	—
K78K	.75	.75	.063	.063	.125	—	—	—	—	.75	.75	.081	.125	.688	.688	.064	.094	.75	.75	.081	.081	5	4	—	5	4	—
K78M	1.00	1.00	.188	.188	.125	1.00	1.00	.125	.125	—	—	—	—	—	—	—	—	1.00	1.00	.188	.188	19	13	5	19	13	5
K78U	1.125	1.125	.125	.125	.188	1.125	1.125	.094	.125	1.125	1.125	.125	.188	* .875	.875	.094	.094	1.125	1.125	.125	.125	14	10	4	14	10	4
K78Y	1.25	1.25	.094	.094	.094	1.25	1.25	.078	.094	1.25	1.25	.125	.188	1.156	1.156	.094	.125	1.25	1.25	.125	.125	13	9	5	13	9	5
K472	.75	.75	.063	.063	.016	—	—	—	—	.75	.75	.081	.125	.688	.688	.064	.094	.75	.75	.081	.081	5	4		5	4	—
K1288	.75	1.00	.070	.070	.062	—	—	—	—	.75	1.00	.081	.125	.688	.938	.081	.125	.75	1.00	.081	.081	6	4	—	8	6	—
K12037	.625	.625	.063	.063	.063	.625	.625	.063	.063	.625	.625	:081	.081	—	—	—	—	.625	.625	.081	.081	5	3	—	5	3	—
K12680	.75	1.5	.125	.130 .047	.188	.75	1.5	.094	.094	—	—	—	—	—	—	—	—	.75	1.50	.125	.125	10	7	3	15	10	4
K15262	.50	.75	.063	.063	.094	—	—	—	—	.50	.75	.081	.125	—	—	—	—	.50	.75	.081	.081	†5	3	—	5	4	—
K15276	.60	.60	.050	.050	.050	—	—	—	—	.60	.60	.064	.094	.563	.563	.051	.094	.60	.60	.064	.064	†5	—	—	5	—	—
K22893	1.25	.75	.062	.062	.125	—	—	—	—	1.25	.75	.081	.125	1.188	.688	.064	.094	1.25	.75	.081	.081	9	6	—	5	4	—
K22999	.75	.75	.063	.063	.094	—	—	—	—	.75	.75	.081	.125	.688	.688	.064	.094	.75	.75	.064	.064	5	4	3	5	4	3
734L	1.50	3.00	.250	.250	.312	—	—	—	—	—	—	—	—	—	—	—	—	1.50 *1.50	3.00 3.00	.250 .156	.250 .156	—	—	8	—	—	16
734LL	1.25	1.50	.250	.250	.188	—	—	—	—	—	—	—	—	—	—	—	—	1.25 *1.25	1.50 1.50	.250 .156	.250 .156	—	—	8	—	—	9
734MM	1.25	2.25	.250	.250	.250	—	—	—	—	—	—	—	—	—	—	—	—	1.25 *1.25	2.25 2.25	.250 .156	.250 .156	—	—	8	—	—	14
734T	1.50	2.50	.188	.188	.250	1.50	2.50	.156	.188	—	—	—	—	*1.313	2.313	.125	.125	1.50	2.50	.188	.188	—	—	8	—	—	13
D79-0	.625	.625	.125	.125	—	(If the distance between outstanding legs must be held, it is necessary to use the same extrusion for replacements).												.625	.625	.125	.125	6	—	—	6	—	—

* X4130 Normalized Steel, U.T.S. = 90,000 lb./sq. in.

† AN442 AD4





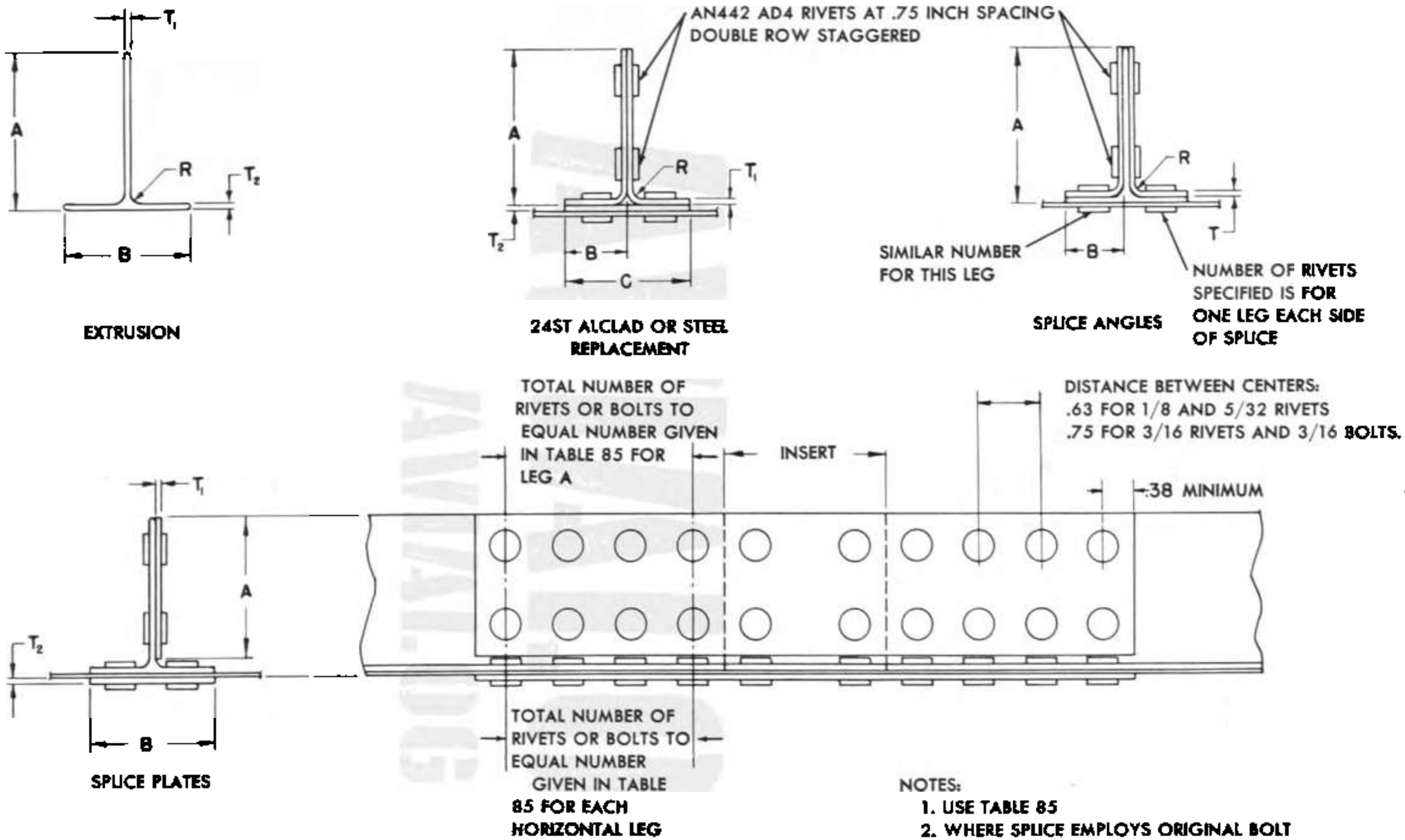
NOTES:
1. USE WITH TABLE 84
2. WHERE SPLICE EMPLOYS ORIGINAL BOLT OR RIVET PATTERN, ADDITIONAL BOLTS OR RIVETS MAY BE ADDED PROVIDED MINIMUM SPACING IS KEPT
3. NUMBER OF RIVETS OR BOLTS SPECIFIED IS PER LEG PER SIDE OF SPLICE
4. ALL FORMED 24ST ALCLAD MATERIAL TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
5. EDGE DISTANCE ON RIVETS TO BE 2 RIVET DIAMETERS MINIMUM
6. ALL STEEL PARTS TO HAVE PROTECTIVE FINISH AS PER SECTION I PARAGRAPH 11

REFERENCE: 1. SECTION IX PARAGRAPH 2
2. TABLE 84

FIGURE 232—GENERAL REPAIR—EXTRUDED BULB ANGLES

TABLE 84
REPAIR TO EXTRUDED BULB ANGLES

Alcoa Die No.	*Original Extrusion Dimensions*					*Replacements*								*Type I Splice Angles*				*Splice Plates*			*Attachment*					
						X4130 Steel Normalized				*24ST Alclad*				*X4130 Steel Normalized*				*24ST Alclad*			*Bolts or Rivets Per Leg Per Side of Splice*					
																					Leg a			*Leg b*		
	a	*b*	*t*	r_1	r_2	*a*	*b*	*t*	*r*	*a*	*b*	*t*	*r*	*a*	*b*	*t*	*r*	*a*	*b*	*t*	*AN442 AD5*	*AN442 AD6*	*AN3*	*AN442 AD5*	*AN442 AD6*	*AN3*
K778	1.313	.750	.094	.141	.141	1.313	.750	.094	.094	1.313	.750	.156	.188	.938	.656	.078	.094	1.313	.750	.125	6	4	—	3	2	—
K4200	1.094	.625	.078	.117	.125	1.094	.625	.078	.094	1.094	.625	.102	.188	—	—	—	—	1.094	.625	.102	12	9	6	5	4	—
K5290	1.000	.688	.063	.094	.094	—	—	—	—	1.000	.688	.102	.188	.75	.625	.063	.063	1.000	.688	.102	5	4	—	4	3	—
K12224	1.094	.625	.109	.125	.125	1.094	.625	.094	.094	1.094	.625	.125	.125	—	—	—	—	1.094	.625	.125	12	8	4	8	5	—
L29083	.750	.625	.050	.080	.050	—	—	—	—	.875	.625	.064	.094	.54	.575	.063	.063	.750	.625	.081	6	4	—	4	3	—
L29084	.875	.625	.050	.080	.050	—	—	—	—	.875	.625	.064	.094	.665	.575	.063	.063	.875	.625	.081	6	5	—	4	3	—
L29095	1.000	.625	.050	.080	.050	—	—	—	—	1.000	.625	.064	.094	.790	.575	.063	.063	1.000	.625	.081	7	5	—	4	3	—
29387	.750	.625	.062	.094	.062	—	—	—	—	.875	.625	.081	.125	—	—	—	—	.750	.625	.102	5	4	—	5	4	—
L29096	1.000	.625	.062	.094	.063	—	—	—	—	1.000	.625	.081	.125	.750	.563	.063	.063	1.000	.625	.102	9	6	—	4	3	—
L29097	1.125	.625	.062	.094	.062	—	—	—	—	1.125	.625	.081	.125	.875	.563	.063	.063	1.125	.625	.102	10	7	—	5	3	—
L29098	1.125	.688	.080	.125	.080	1.125	.688	.078	.094	1.125	.688	.102	.188	.795	.608	.078	.094	1.125	.688	.102	11	8	5	6	5	—
L29099	1.250	.688	.080	.125	.080	1.250	.688	.078	.094	1.125	.688	.102	.188	.920	.608	.078	.094	1.125	.688	.102	14	10	6	6	5	—
L29093	.500	.500	.05	.062	.040	—	—	—	—	.50	.625	.064	.094	—	—	—	—	.500	.500	.081	4	—	—	3	—	—
13641	1.000	.875	.062	.078	.094	—	—	—	—	1.00	.875	.081	.125	.782	.813	.063	.063	1.000	.875	.102	8	6	—	5	3	—
14256	.875	.500	.050	.080	.080	—	—	—	—	.875	.625	.064	.094	—	—	—	—	.875	.500	.081	6	5	—	4	3	—
15643	1.000	.750	.051	.094	.094	—	—	—	—	1.000	.750	.081	.125	.760	.700	.063	.063	1.000	.750	.081	6	5	—	4	3	—
K22422	.770	.563	Leg a .040 Leg b .068	.078	.062	—	—	—	—	.770	.563	.081	.125	—	—	—	—	.750	.563	Leg a .064 Leg b .081	5	4	—	4	3	—
13839	1.000	1.000	.090	.120	.100	1.00	1.00	.094	.094	1.000	1.000	.156	.188	.670	.91	.078	.094	1.000	1.000	.125	12	9	5	10	7	4
K766	.875	.500	.062	.094	.094	—	—	—	—	.875	.625	.081	.125	—	—	—	—	.875	.625	.102	8	6	—	5	3	—



NOTES:
1. USE TABLE 85
2. WHERE SPLICE EMPLOYS ORIGINAL BOLT OR RIVET PATTERN, ADDITIONAL BOLTS OR RIVETS MAY BE ADDED PROVIDED MINIMUM SPACING IS KEPT
3. NUMBER OF RIVETS OR BOLTS SPECIFIED IS PER LEG PER SIDE OF SPLICE
4. ALL FORMED 24ST ALCLAD MATERIAL TO BE MADE FROM 24SO ALCLAD HEAT TREATED TO 56,000 LB/SQ IN. AFTER FORMING
5. EDGE DISTANCE ON RIVETS TO BE 2 RIVET DIAMETERS MINIMUM
6. ALL STEEL PARTS TO HAVE PROTECTIVE FINISH AS PER SECTION I PARAGRAPH 11

REFERENCE: 1. SECTION IX PARAGRAPH 2
2. TABLE 85

FIGURE 233—GENERAL REPAIR—EXTRUDED "T" SECTIONS SHEET 1 OF 2

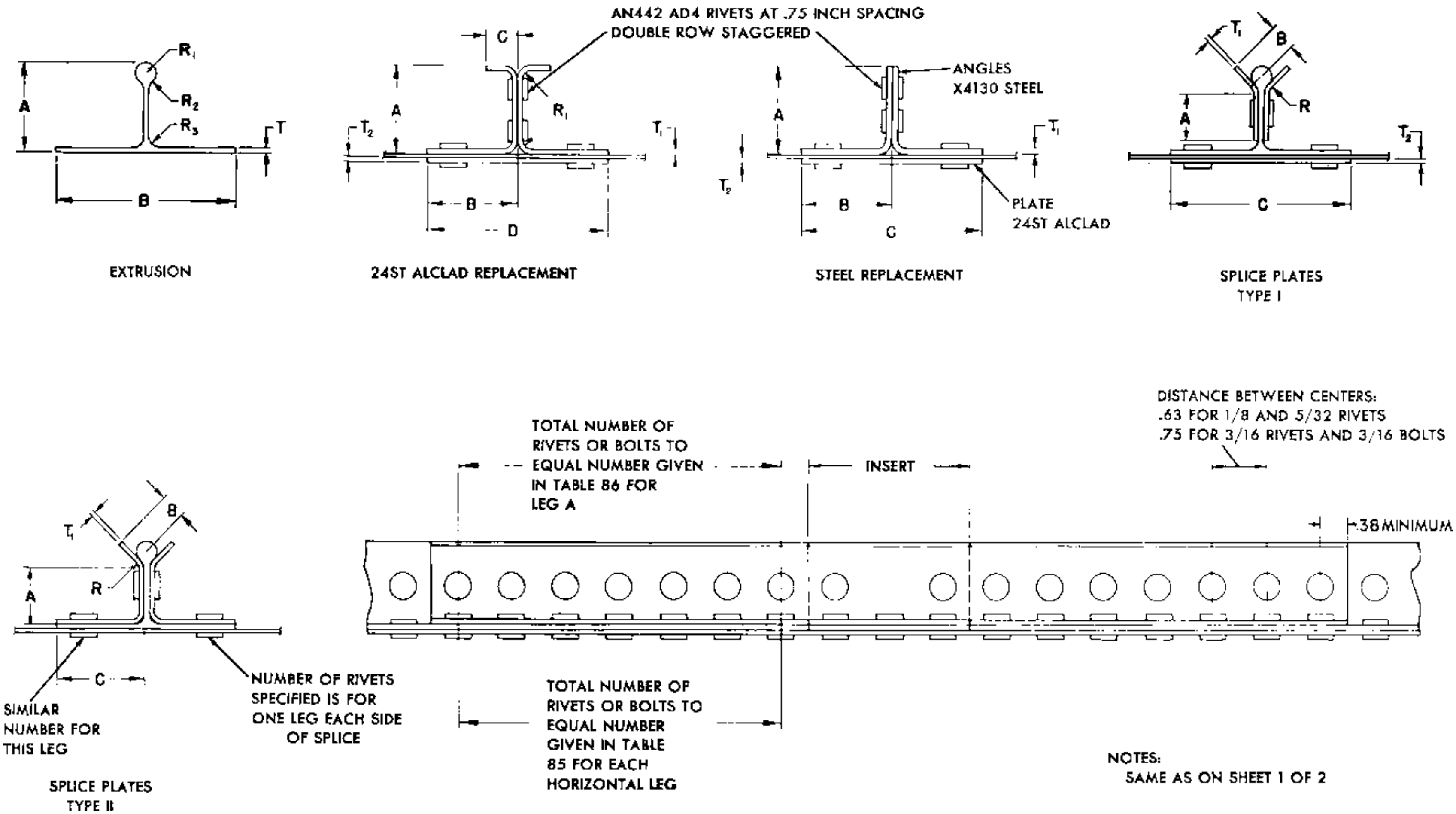
TABLE 85
REPAIR TO EXTRUDED TEES

Alcoa Die No.	Original Extrusion Dimensions					Repair Stock Dimensions (24ST Alclad)																Attachment					
						Replacement						Splice Angles				Splice Plates						Number of Rivets Required Per Leg Per Side of Insert					
						Angle				Plate												Leg a			Flange b		
	a	b	t_1	t_2	r	a	b	t_1	r	c	t_2	a	b	t	r	a	t_1	b	t_2			AN442 AD5	AN442 AD6	AN3	AN442 AD5	AN442 AD6	AN3
K1287	.88	2.0	.09	.07	.09	.875	1.0	.064	.094	2.0	.064	.80	.955	.081	.125	.813	.094	2.0	.081			8	6	—	8	6	—
3094	1.55	1.25	.05	.05	.094	1.55	.625	.040	.094	1.25	.04	1.5	.625	.051	.094	1.4	.064	1.25	.064			7	5	—	4	3	—

TABLE 86
REPAIR TO EXTRUDED BULB TEES

Alcoa Die No.	Original Extrusion Dimensions						Replacement Stock														Repair Stock						Attachment					
							24ST Alclad								X4130 Steel (Normalized)						24ST Alclad						Rivets or Bolts Required Per Leg Per Side of Insert					
																											Leg a			Flange b		
	a	b	t	r_1	r_2	r_3	a	b	c	t_1	r_1	r_2	d	t_2	a	b	t_1	r	**c	**t_2	a	b	t_1	r	c	t_2	AD5	AD6	AN3	AD5	AD6	AN3
15263	1.0	2.1	vert. .050 horiz. .05-.07	.10	.10	.10	1.0	1.05	.38	.051	.094		2.1	.051							.65	.375	.064	.094	1.03		6	5	5	7	6	
29092	1.5	1.38	.09	.185	.19	.09	1.5	1.05	.38	.064	.094	.094	1.38	.064	1.5	.69	.078	.094	1.38	.064	.744	.47	.081	.125	.643		12	9	9	7	5	
29089	1.0	1.25	.06	.125	.125	.06	1.0	.63	.38	.051	.094		1.25	.051							.63	.38	.064	.094	.60		7	6	6	4	3	
29390	1.25	1.38	.08	.155	.155	.08	1.25	.69	.38	.064	.094	.094	1.38	.064	1.25	.69	.063	.063	1.38	.064	*.69	.44	.081	.125	1.38	.081	8	7	7	5	4	
29091	1.25	1.38	.09	.185	.185	.09	1.25	.69	.38	.064	.094	.094	1.38	.064	1.25	.69	.078	.094	1.38	.064	*.59	.47	.081	.125	1.38	.094	10	8	8	7	5	
29193	1.0	1.9	.09	.125	.125	.09	1.0	.95	.38	.064	.094	.094	1.9	.064	1.0	.95	.078	.094	1.9	.064	.59	.31	.081	.125	.906		6	5	5	10	7	
29391	1.25	2.5	vert. 1.0 horiz. .07-.10	.175	.175	.18	1.25	1.25	.38	.064	.094	.094	2.5	.064	1.25	1.25	.078	.094	2.5	.064	.69	.50	.064	.064	1.2		10	7	7	12	8	

* Type I repair. (Remainder are type II).
** 24ST Alclad.



NOTES:
SAME AS ON SHEET 1 OF 2

REFERENCE: 1. SECTION IX PARAGRAPH 2
2. TABLE 85

FIGURE 233 —GENERAL REPAIR—EXTRUDED "T" SECTIONS SHEET 2 OF 2

SECTION X
MISCELLANEOUS

1. FUEL AND OIL TANKS.

a. GENERAL.

(1) FUEL TANKS.—A separate fuel system is provided for each engine. Three welded tanks are installed in each outer wing panel. The skin material along the length of the tank is 52S½ H Aluminum alloy while the ends of the tank are 52SO Aluminum alloy. The No. 1 tank is located forward of the 30 percent spar and has a capacity of 236 US (196.6 IMPERIAL) gallons. The No. 2 tank is located behind the 30 percent spar and has a capacity of 292 US (243-3 IMPERIAL) gallons. The No. 3 tank is located forward of the rear or 70 percent spar and has a capacity of 175 US (145.8 IMPERIAL) gallons. All tanks have an expansion space of 3 percent of tank capacity.

(2) OIL TANKS.—A separate and complete oil system is provided for each engine. The tanks are constructed of formed 3SO and 3S ¼H aluminum alloy, with welded seams. The lateral cross section of each tank is a "tear drop" shape. The total volume of each tank is 44.8 U. S. gallons (37.4 Imperial gallons). but the filler opening is located below the top of the tank so that the oil capacity to which the tank can be filled is 39.8 U. S. gallons (33 Imperial gallons).

The surface of each oil tank is covered with a heat insulating material that is sprayed on. This type of insulation is made by the Minnesota Mining and Mfg. Co. The solvent recommended for use with this material is white or aviation gasoline.

b. CLEANING OF TANKS BEFORE REPAIR. —The cleaning process for the fuel and oil tanks is the same. Remove the damaged tank from the airplane and drain out all of the fuel or oil. Flush the tank for 15 minutes with hot water entering the bottom of the tank and overflowing at the top. Then steam the interior of the tank for a minimum of 30 minutes by entering the steam through the top and allowing the steam and condensate to flow out the bottom. Dry the tank by blowing compressed air through the tank. If steam is not available, the tank should be flushed with hot water as described above for at least one hour.

The tank should be repaired as soon as possible after cleaning and at no time should the tank be allowed to stand longer than 30 minutes before repairing.

c. REPAIR TO CRACKS.—Remove the paint from an area of about 3 inches all around the crack by the use of a solvent or paint remover. In the case of the oil tank the heat insulation material must be first removed. This may best be done by cutting away as much of the material as possible with a knife and then removing the remainder adhering to the tank by dissolving with gasoline or toluol.

The most efficient repair for cracks in welded tanks is accomplished by cutting away the cracked area, leaving a rectangular hole to be filled by a butt welded insert. However since this repair is difficult to make it is recommended that the following method be used.

Drill each end of the crack with a number 40 drill and fill the crack with a full width bead of 43S aluminum alloy welding wire. File or grind the excess weld material flush with the tank surface and apply a welded patch extending at least one inch beyond each end of the filled-in crack. Caution should be exercised to remove excess flux before refinishing.

d. REPAIR TO HOLES.—Remove the paint or heat insulation material from around the damaged as outlined above. If the damage is irregular in shape, clean up the damaged area in the form of a rectangular hole keeping a .5 inch corner radius. Make a patch of the same material used in tank .125 inch thick. Hand fit the patch to fit flush with the surface of the tank, refer to figure 234. Hold in place with cleco clamps and tack weld with 43S Aluminum alloy welding wire. Remove clamps, finish butt weld around patch. Clean off welding flux with 10 percent solution of sulphuric acid. Then flush with water in order to remove all sulphuric acid. Treat welded area with a solution of water 1 gallon, mixed with 6 to 8 ounces of potassium dichromate. Apply with clean cloth swab. Thoroughly dry with heated air. Apply a medium brush coat of fuel tank slushing compound specification No. 3595, to patched and surrounding area. Dry thoroughly with heated air (minimum 1 hour) to remove all solvent in the slushing compound before exposure to fuel. Paint the exterior of the tank with zinc chromate primer, specification No. AN-TT-P-656.

e. REPAIR TO DENTS.—Dents within the limits shown in figure 235A. will not structurally impair a welded fuel tank. Larger dents should be "bumped" out when accessible or the dented area reinforced by patching.

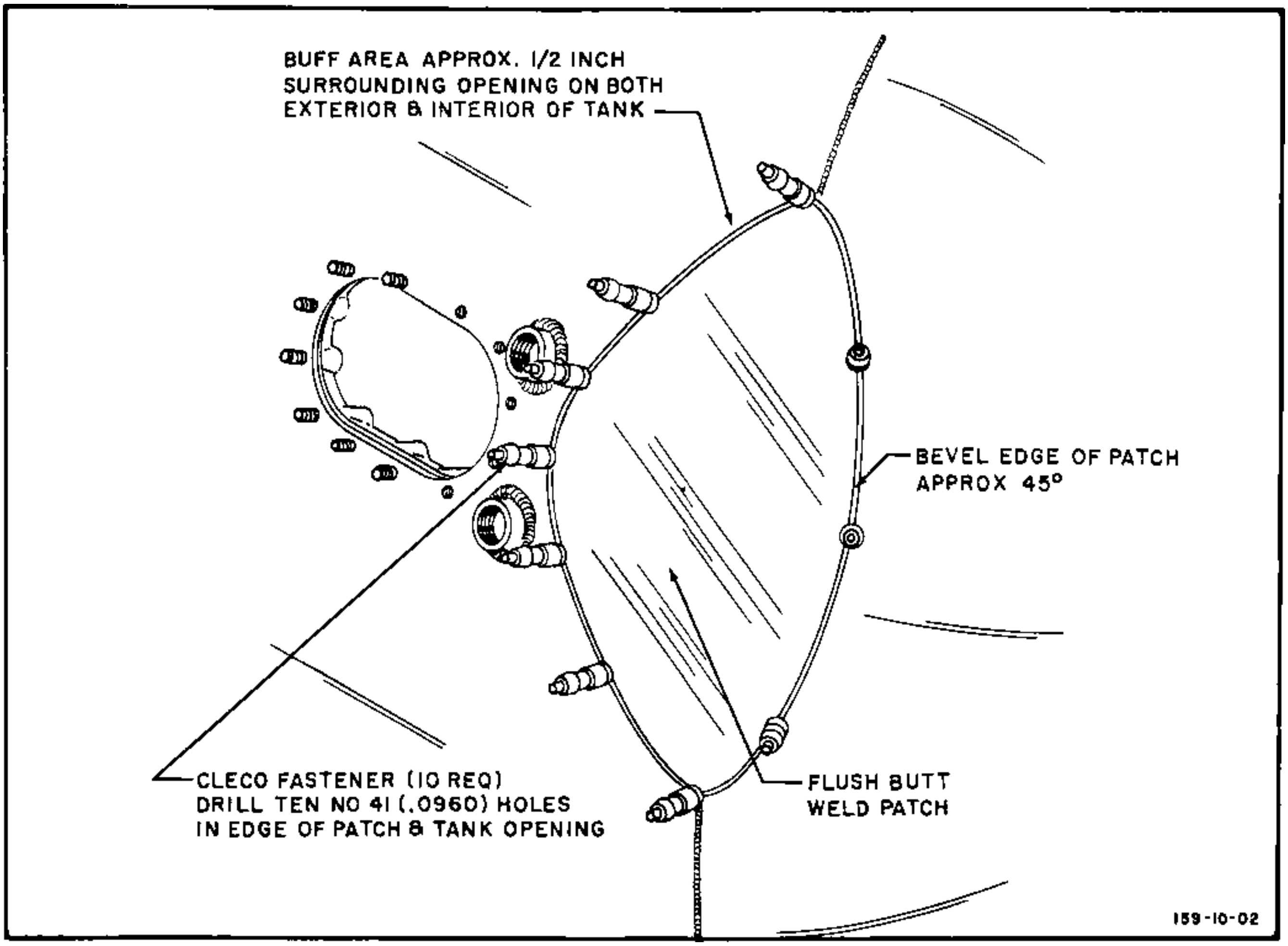


FIGURE 234–BUTT WELD FLAT PATCH FITTED IN PLACE PRIOR TO WELDING

2. OIL COOLANT RADIATOR.

a. GENERAL.—The inner and outer brass shells and the valve flange casting of the oil cooler are assembled by silver soldering. The core tubes are held together, one tube to all its adjacent tubes, and the core assembly complete to the shell, by means of a lead tin solder.

b. CLEANING BEFORE REPAIR.—Before any type of repair work may be done, the oil cooler must first be drained of oil and then thoroughly cleaned. Carbon tetrachloride or trichlorethylene are the best solvents for cleaning oil coolers and should be used approximately at the boiling points of the liquids. The liquid should be pumped through the cooler by a handpump, transfer pump, or a power driven pump. As the liquid leaves the cooler, it should be strained to catch any particles of carbon, metal, etc. If any particles of bearing metal are found, the cooler must be scrapped. After the cooler has been thoroughly cleaned, the interior should be flushed with hot running water and then steamed for a period not less than ½ hour. The steam should pass downward through the cooler and the cooler should be so placed that the condensed steam will drain freely from the bottom.

c. TESTING FOR LEAKS.—After the cooler has been cleaned, close all openings except one to which not more than 75 pounds per square inch of air pressure is to be applied. Submerge the cooler in clean warm water and slowly apply air pressure. Leaking tubes will be disclosed by bubbles of air coming from each end of the tube. Mark the tube with a wire clip. If the leak appears around the jacket or the core face, it can usually be stopped by soldering without disturbing any of the assembled parts. The cooler should be retested for leaks after any repair.

d. DAMAGE TO ONE TUBE.

(1) REMOVAL OF DAMAGED TUBE.—Make up at least two special tube pulling irons as follows:

Square off the end of a plain 3 pound soldering iron. Drill a 3/8 inch hole in the squared end to a depth of 1 1/4 inches. Sweat solder a piece of 7/32 inch diameter copper stock 1½ inches long into the hole. See figure 235 for pulling iron.

Heat the two tube pulling irons in a small gas fired furnace. While the irons are heating, clean the two ends of the tube to be removed with concentrated hydrochloric acid and then swab with zinc chloride flux. The cleaning and fluxing should be done with a small hair brush or swab. Push a small piece of wire of sufficient length to stick out each end of the tube to be removed. This will aid in identifying the corresponding tube ends. After the irons have become hot enough, insert one of the irons into the tube end, removing the wire as the iron is inserted. Remove the wire from the tube and insert the other iron in the end of the tube from which the wire was withdrawn. Apply a pushing pressure with first one iron and then the other until the solder bond has been loosened. Push one end of the tube out from the face of the core and pull the tube out with a pair of pliers.

(2) REPLACING NEW TUBE.—Flux each end of the new tube and tin with a tin lead solder on the hex ends only. Take the tube pulling iron and round out the opening on each face of the core where the old tube was removed so that the new tube may be easily inserted. Then flux the openings in the core where the old tube has been removed and insert the new tube. Use a pair of sharp nose pliers and reform the hexagons of the tubes adjacent to the new tube. After refluxing, use the standard soldering iron and solder over the face of the core with a back and forth motion of the iron.

e. DAMAGE TO LARGE SECTIONS OF THE CORE.—To remove a large section of the core, play an oxyacetylene flame around the damaged tubes on both faces of the core. When the solder bond has been loosened quickly remove the damaged section.

f. REPAIR OF CORE SURFACE LEAKS.—Core surface leaks may be repaired by fluxing the surface of the core at the point of leakage with a zinc chloride flux; and then using a hot soldering iron, apply a back and forth motion and solder over the point of leak.

g. DENTS IN SHELL.—Large dents in the shell may be corrected by applying an air pressure of 30 to 40 pounds per square inch to the inside of the cooler; and using an oxyacteylene flame, apply heat carefully to the dent. The air pressure on the inside will force the shell back into the proper shape. Sharp dents may sometimes be pulled out by soldering the end of the silver solder wire to the dent and pulling the shell into position.

h. HOLES IN SHELL.—Holes that are ¼ inch or less in diameter may be patched by using a piece of .040 or .050 gage brass and soft soldering over the hole. Large holes in the shell may be repaired by silver soldering. The core must be properly protected from excessive heating by the use of wet cloths.

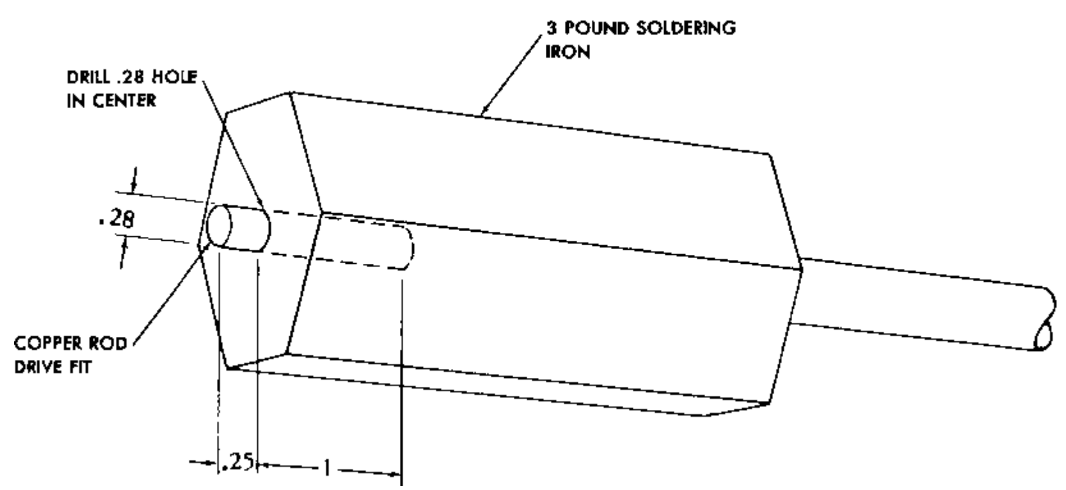


FIGURE 235—TUBING REPAIR—PULLING IRON

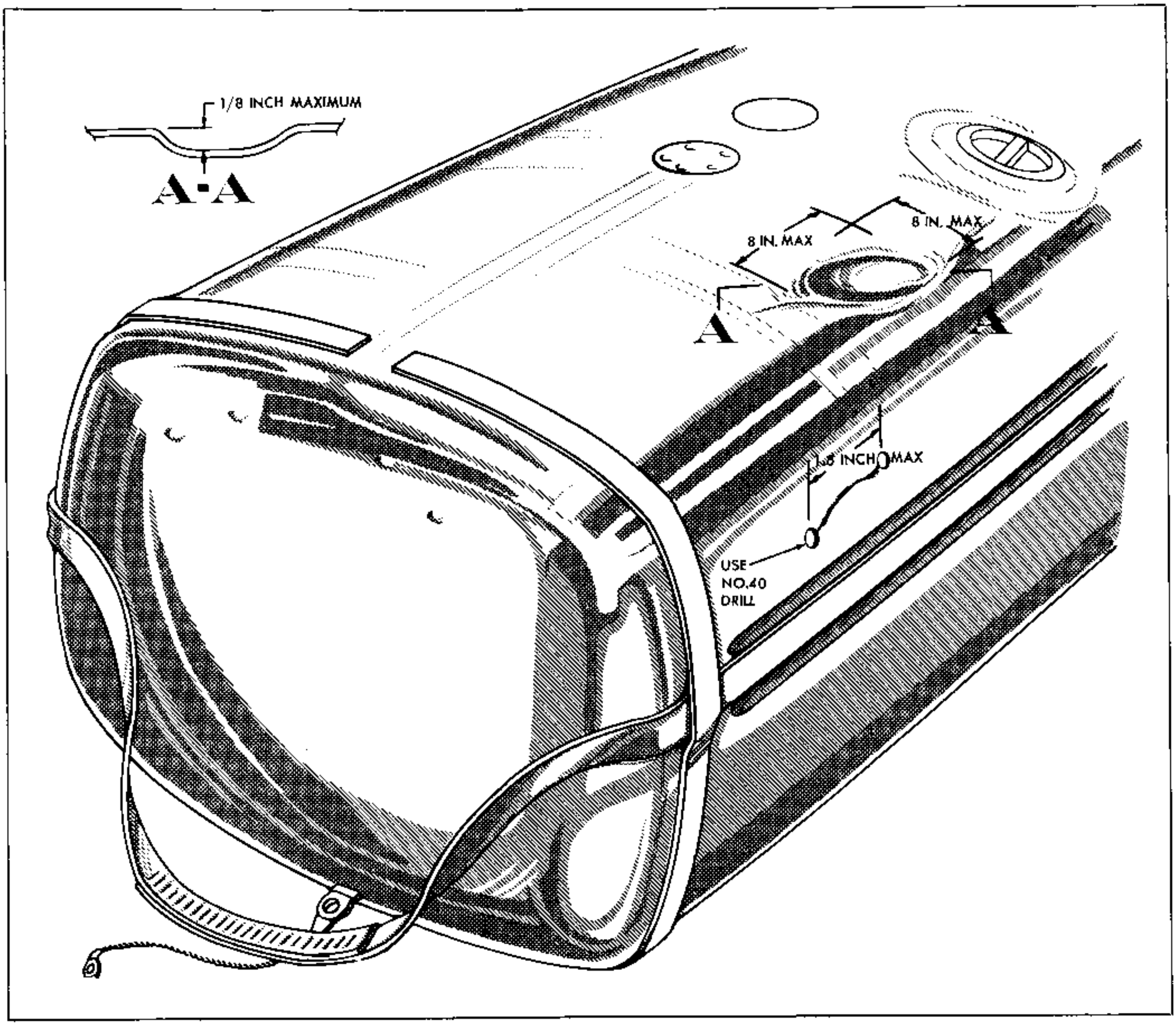


FIGURE 235A — REPAIR TO WELDED FUEL TANK

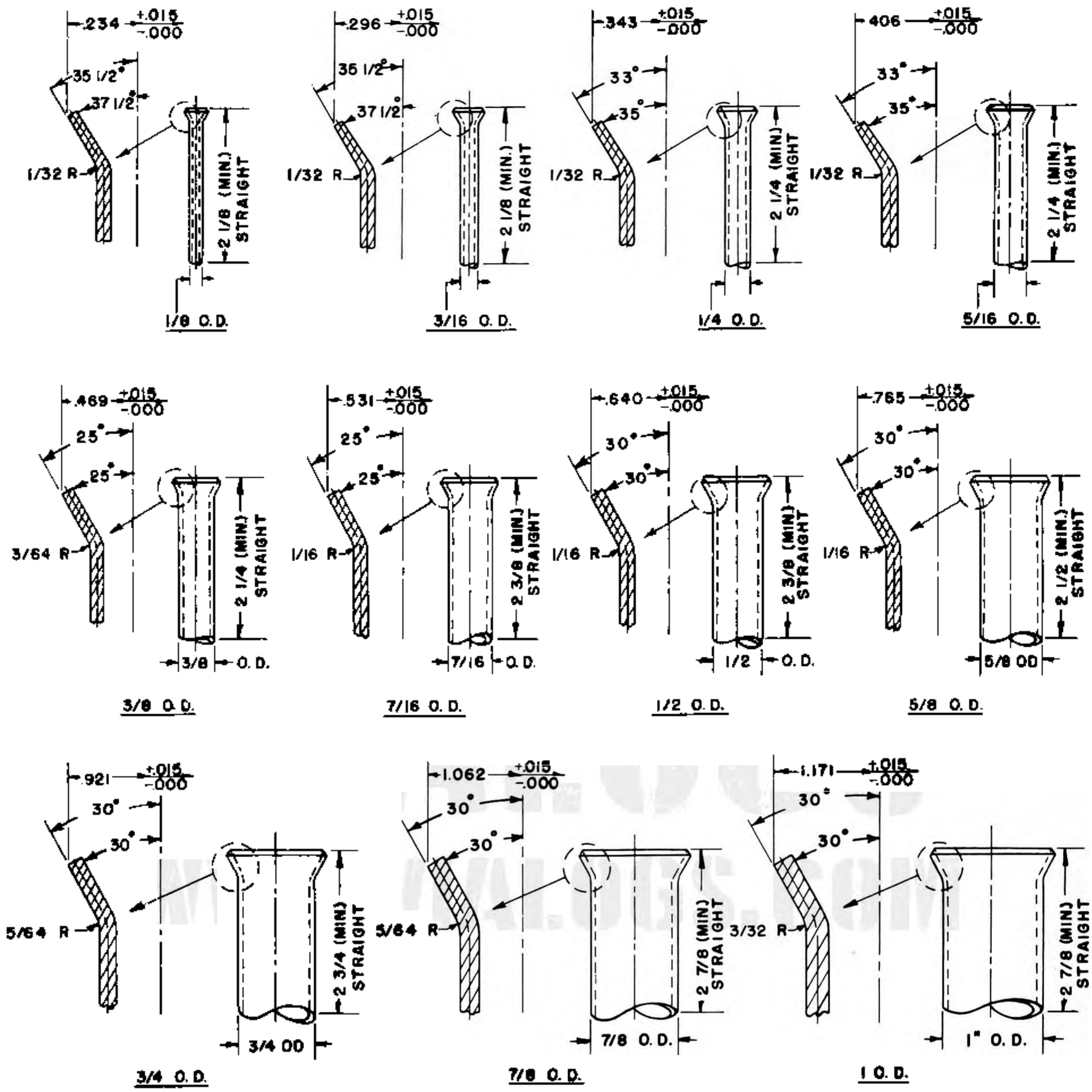


FIGURE 236—FLARED TUBE ENDS—PARKER TRIPLE TYPE FITTING

i. CLEANING OIL COOLER AFTER REPAIR.—Test the repairs by closing all openings except one. To this opening slowly apply a test pressure 10 pounds per square inch and submerge in clean warm water. Any defect in the repair will be disclosed by bubbling. If the repair is acceptable, thoroughly flush the cooler inside and out with hot water. If the cooler is to be stored, it should be steamed as outlined above. The steaming may be omitted if the cooler is to be installed on the airplane for immediate use. Thoroughly dry the cooler by immersing in a tank of clean SAE 20 light engine oil at a temperature of 121 degrees C. (250 degrees F). The cooler should be agitated thoroughly until all bubbling ceases. This will indicate that all the water is evaporated and the interior of the cooler is completely coated with oil. If the cooler is to be stored, it should be drained and all openings closed.

3. TUBES AND TUBING REPAIRS.

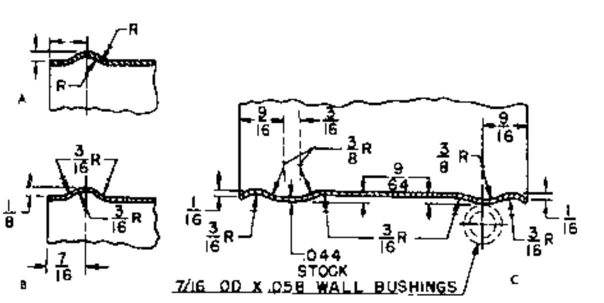
a. GENERAL.—The tubing used in this airplane is made of 52SO aluminum alloy, stainless steel, or copper. Damaged lines should be replaced by new line assemblies if possible, but if total replacement is impossible, the damaged line may be repaired by the use of inserts and standard AN-818 fittings or AN-884 hose.

Lines that have the flared type joints must be repaired by inserts having flared joints. Figure 236 shows the flaring dimensions for various size tubes. Lines that have the beaded type joints should be repaired by inserts having beaded joints. Figure 237 shows the dimensions for beaded tube ends.

b. REPAIR OF FLARED END TUBING.—Cut out the damaged portion of the tube, burr the cut ends of the tube, and clean. Slip the correct size AN-818 nut and AN-819 sleeve over each end of the cut tube. Flare both ends of the tube as outlined in this section, paragraph 3. *d.* Apply Parker Sealube to the threads of both nuts and screw in an AN-815 union to each end. Cut an insert to the required length. Burr and clean both ends of the insert and then slip on an AN-818 nut and AN-819 sleeve over each end. Flare the ends of the insert as outlined in this section, paragraph 3. *d.* Apply sealube to the nuts and screw the insert in the proper position. The repair is shown in figure 238.

c. REPAIR OF BEADED END TUBING.—Cut out the damaged portion of line as shown in figure 239. Burr and clean the two ends of the remaining tube. Cut a piece of tubing ½ inch shorter than the removed section to use as an insert. Burr and clean the two ends of the insert. Bead the ends of the original tube and the insert. Cut two pieces of AN-884 hose to the correct length and slip two clamps over the ends of each of the two pieces of hose. Push the two pieces of hose over the ends of the original tube to a sufficient distance to allow the insert to be slipped in place. Slip the hose connections back over each end of the insert until they are equally divided over the joint.

d. FLARING TUBE ENDS.—The tools used for flaring tube ends are a grip die and a flaring tool. The grip die is composed of two steel blocks held side by side with pilot pins that are pressed into one block and fit corresponding holes in the other blocks. Countersunk holes are drilled into the blocks, each block taking ½ of the drill diameter. The diameter of the holes vary so as to fit all sizes of tubes. See figure 240 for grip die. The flaring tools are made of steel bars that are tapered at one end so as to fit into the countersunk holes of the grip die. Place the tube to be flared into the correct size hole with a length of tube equal to ½ the diameter of the tube extruding through the countersunk side of the die. Place the end of the flaring tool into the end of the tube and tap



C *Beaded Exhaust Manifold Clamps*
Standard dimensions for beaded clamps for use with beaded exhaust stack section ends.

B *Exhaust Stack Sections*

Beaded ends of exhaust stack sections to have dimensions as shown.

Fuel, Oil, Vent and Coolant Lines

A Dimensions to be as specified on Army-Navy Aeronautical Design Drawing No. AND10060 and AND10065.

FIGURE 237—BEADED TUBE ENDS

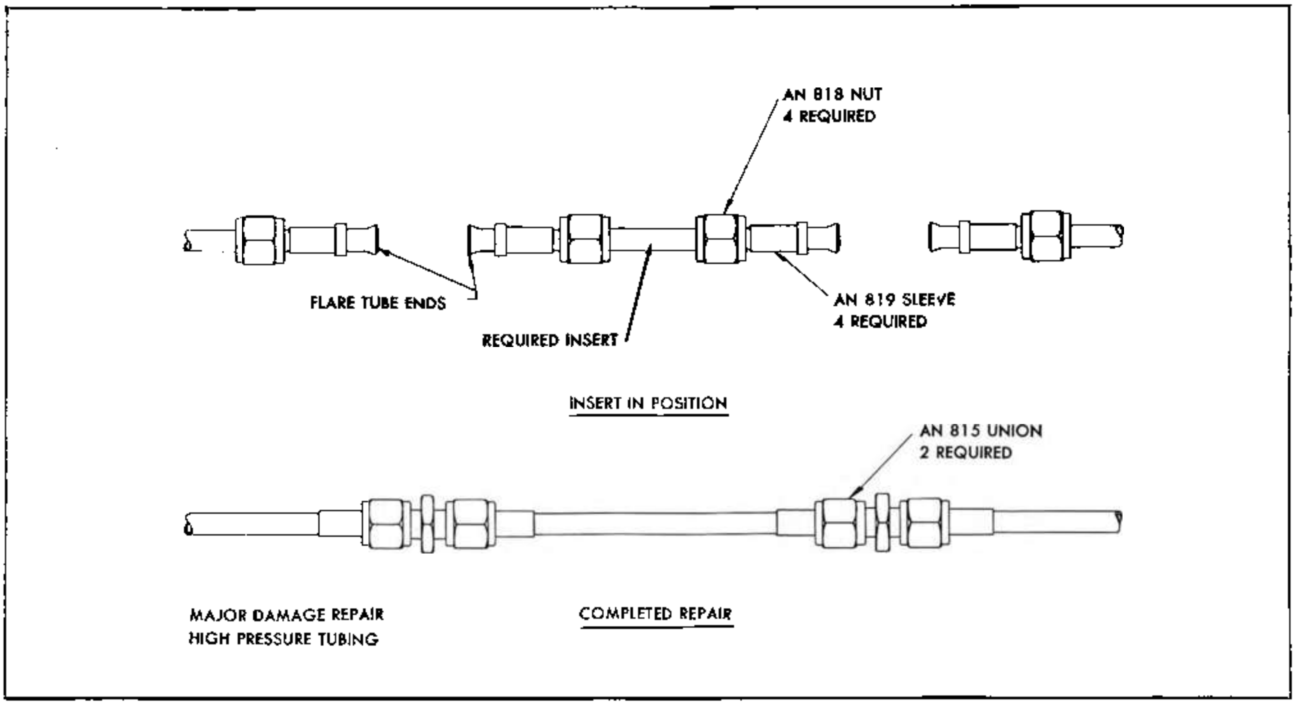


FIGURE 238—REPAIR FOR FLARED END TUBES

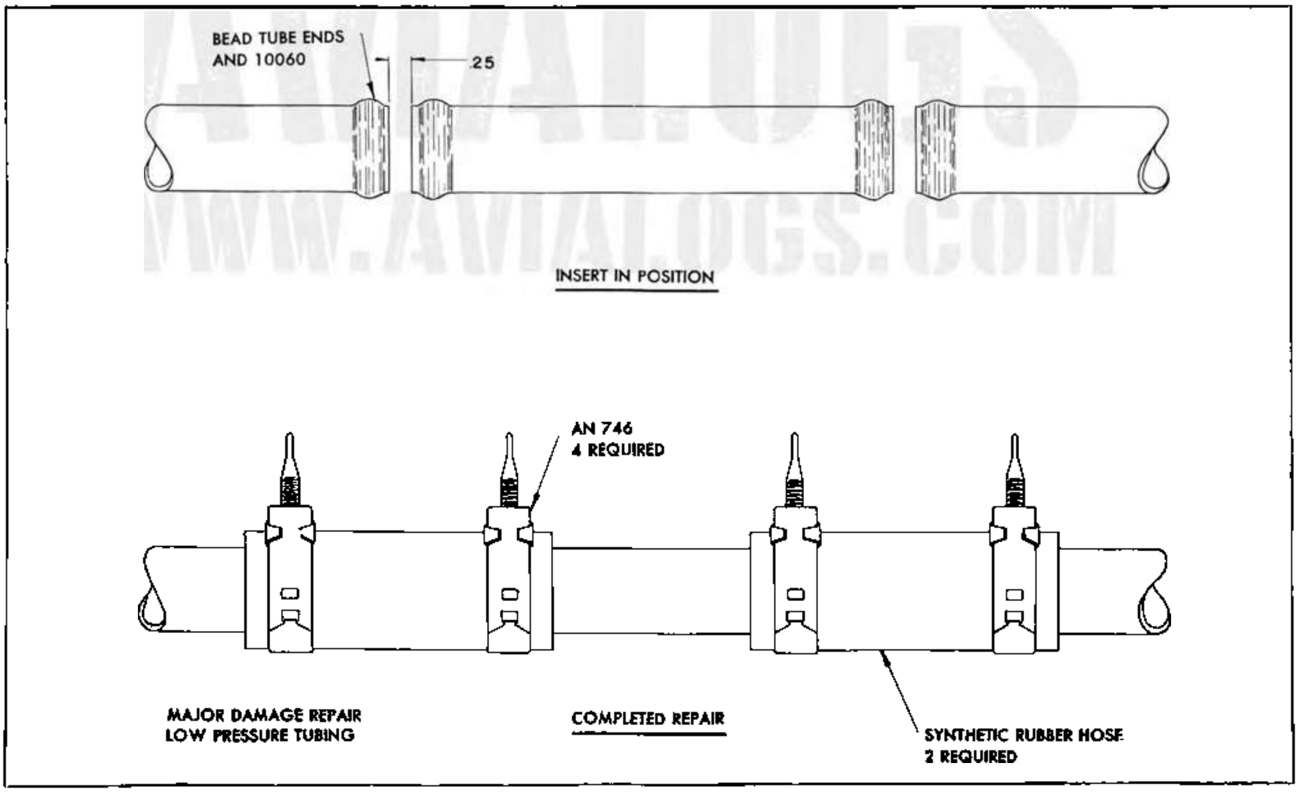


FIGURE 239 — REPAIR FOR BEADED END TUBES

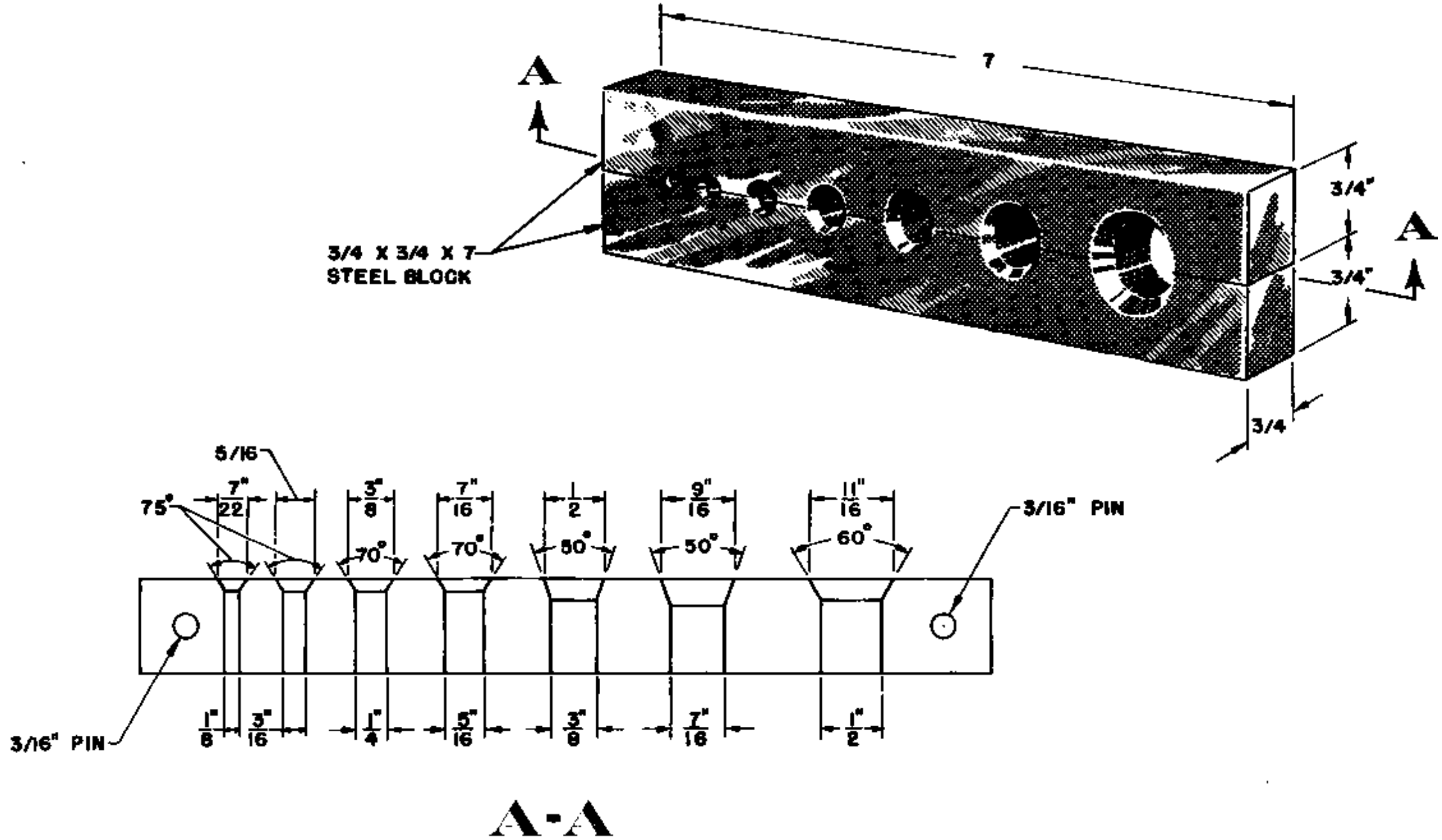


FIGURE 240—GRIP DIE AND FLARING TOOL

on the flat end of the tool with a hammer until the tube is flared out to the shape of the die.

4. CONTROL CABLES.

a. GENERAL.—The control cables are made of corrosion resistant steel. The cables are either 7 x 19 or 7 x 7 extra flexible steel type, and vary from 1/16 inch to 1/4 inch in diameter. The terminals are swaged on to the cables in accordance with Specification No. AN-T-2. The cable chart gives the information needed for the fabrication of replacements of damaged cables. The various types of terminals are shown in figure 241 and the chart is given in table 87.

b. NEGLIGIBLE DAMAGE.—If not more than six wires are broken in any 1-inch length of 7 x 19 cable, the cable may be considered serviceable. If more than six wires are broken in any 1-inch length, the 7 x 19 cable should be replaced. Broken wires are not permitted in 7 x 7 cables. At every 50-hour inspection (Navy, 60-hour), check cables for broken wires.

c. FABRICATION OF REPLACEMENT CABLES.—If possible, all damaged cables should be replaced by prefabricated cables that were sent out as spare parts. But if prefabricated cables are not available, replacements may be made by the use of terminals that are either swaged, spliced, or soldered to the cables. Cables that are 3/32 inch or larger in diameter may be spliced to the terminal by the 5-Tuck method of splicing as outlined in the U. S. Army Specification No. 98-25515. (Navy Specification No. PS-6.) Cables that are less than 3/32 inch in diameter must be attached to the end fittings by wrap soldering as outlined in the U. S. Army Specification No. 98-25513. (Navy Specification No. PS-2.)

(1) SWAGED TERMINALS.—Where facilities permit, damaged cables should be replaced by swaging the correct terminals to the new cables. The correct cable assembly length, together with the type terminals may be found in the cable chart.

(2) AN668 TERMINALS (NAF 310621 CLASS B).—In cases where swaging facilities are impossible, a substitute for this type of terminal may be made as follows: A standard AN-135 turnbuckle assembly consisting of a barrel, a cable eye and a pin eye, and a standard AN-100 thimble will serve satisfactorily for this type terminal.

(3) AN667 TERMINALS (NAF 310621 CLASS C).—A substitute for this type terminal may be fabricated as follows: Use a standard AN-130 turnbuckle assembly consisting of a barrel, cable eye and fork in conjunction with a standard AN-100 thimble.

(4) AN669 TERMINALS (NAF 310621 CLASS D).—This type of terminal may be substituted by using a standard AN-160 or AN-161 fork and a standard AN-111 cable bushing.

5. SOUNDPROOFING REPAIRS.

a. GENERAL.—The soundproofing located in the cabin of the nose section is manufactured by Seamans Paper Company or equivalent. See figure 242 for materials and combinations. The materials are:

(1) Resisto-Hyde, colored cockpit green.

(2) Q-1 ⅛ inch stitched Seapack, both sides covered with flame-proof gauze.

(3) Q-2 ¼ inch stitched Seapack, both sides covered with flame-proof gauze.

(4) No. 5 Kwilko ½ inch stitched, both sides covered with flame-proof gauze.

(5) No. 10 Kwilko 1 inch stitched, both sides covered with flame-proof gauze.

The various combinations of these materials are:

(1) Resisto-Hyde and Q-1 stitched together.

(2) Resisto-Hyde and Q-2 stitched together.

(3) Q-1 covered on both sides with Resisto-Hyde stitched together.

(4) Resisto-Hyde, Q-1 and No. 5 Kwilko stitched together.

(5) Q-1, No. 10 and No. 5 Kwilko stitched together.

(6) Q-1, No. 5 Kwilko stitched together.

The adhesive used is made by Seamans Paper Company, No. 055 or equivalent.

b. APPLICATION OF SOUNDPROOFING.—Clean the inside surface of the cabin and then spray on No. 055 adhesive to the skin, stringers and rings. Allow this to dry approximately 5 minutes and add the insulation. Hold the insulation in place until set; and add lining using adhesive along rings and brackets, and self tapping screws through edges of lining. All lining using Resisto-Hyde must have bound edges. Fastening screws are spaced approximately 3 inches apart on outside edges of lining and 6 inches apart for all inside fastenings. When installing Resisto-Hyde, pull only across the quilted stitching and not along the direction of sewing.

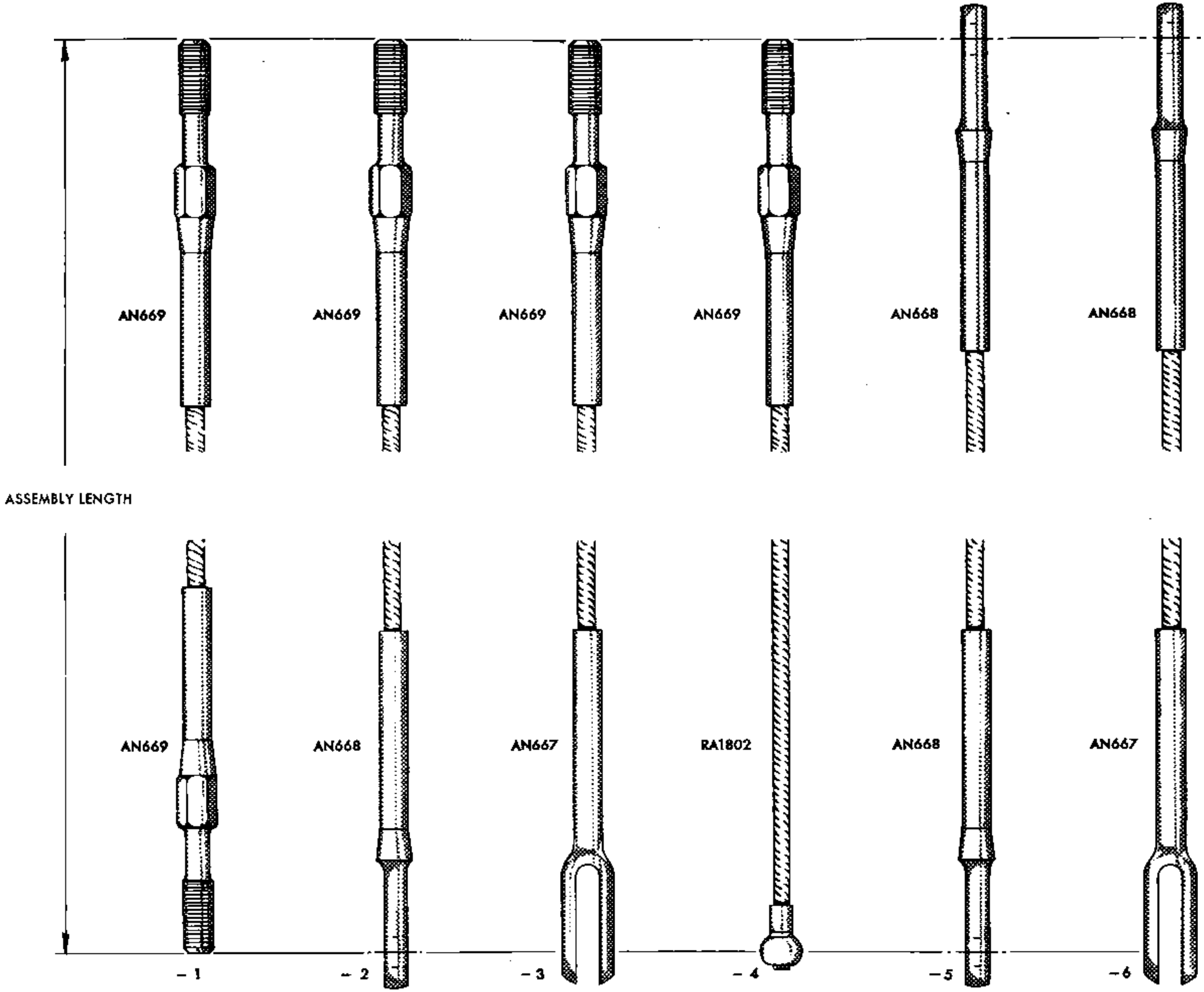


FIGURE 241—CABLE TERMINALS SHEET 1 OF 2

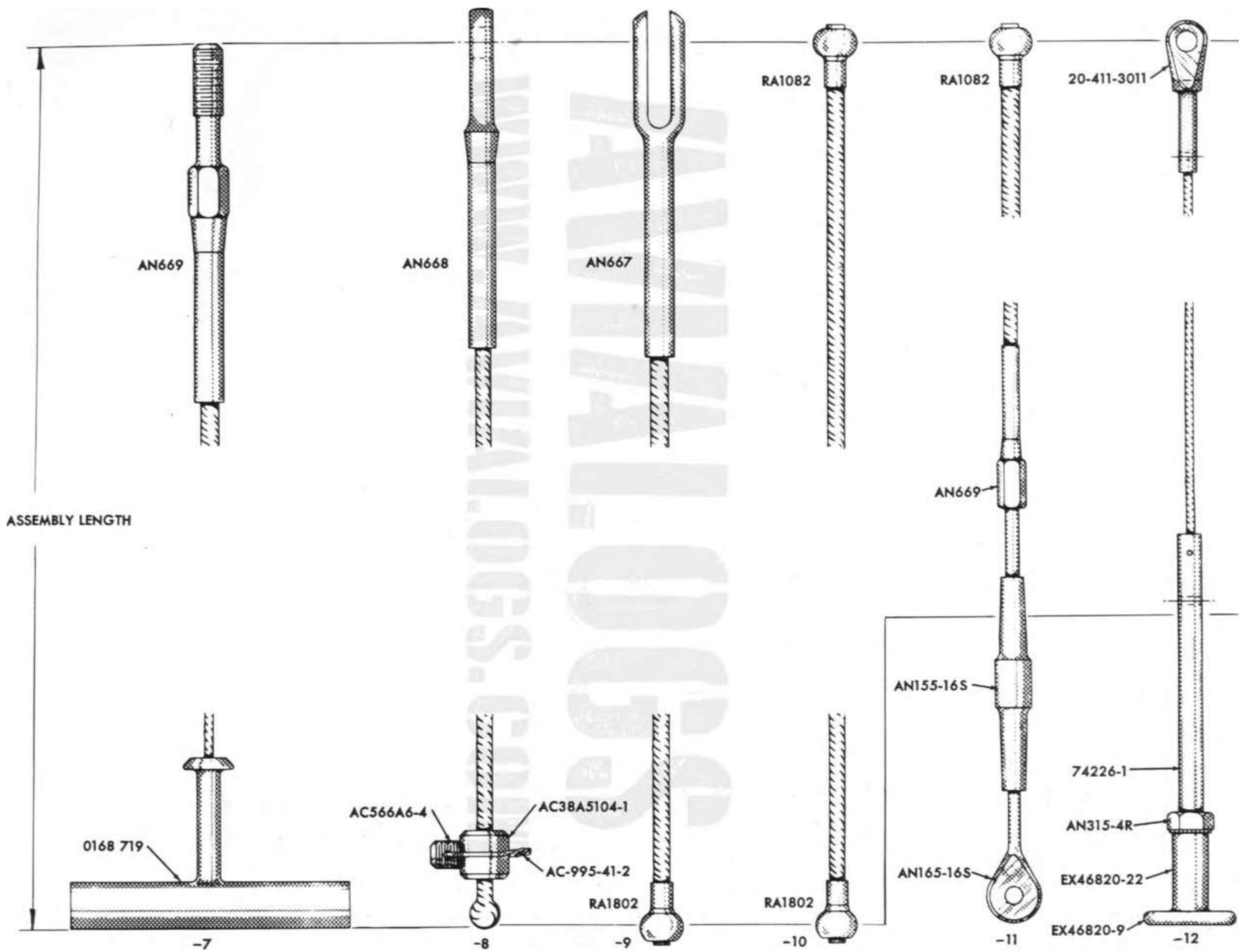


FIGURE 241—CABLE TERMINALS SHEET 2 OF 2

TABLE 87

CABLE CHART

Curtiss-Wright Drawing Numbers	*Function*	*Location*	*Length (Inches)*	*Dia.*	*Material Ex. Flex Cable*	*Tension (Pounds)*	*Fig. No.*	*End Fitting*	*End Fitting*
20-460-1042-5	Ldg. Gear Valve—Down	Nose Section	148.060	.094	7 x 7	20	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-10	Ldg. Gear Valve—Up	Nose Section	154.750	.094	7 x 7	20	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-28	Ldg. Gear Valve—Down	Center Section	96.310	.094	7 x 7	20	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-29	Ldg. Gear Valve—Up	Center Section	83.500	.094	7 x 7	20	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-360-1123-7	Ldg. Gear Uplatch—Left	Center Section—Forward	67.500	.094	7 x 7	20	-3	AN667-3	AN669-L3 L.H.
20-360-1123-8	Ldg. Gear Uplatch—Right	Center Section—Forward	49.000	.094	7 x 7	20	-3	AN667-3	AN669-L3 L.H.
20-360-1124-1	Ldg. Gear Uplatch	Center Section	122.190	.125	7 x 19	20	-6	AN668-4	AN667-4
20-310-1082-2	Ldg. Gear Downlatch—Left	Center Panel	154.630	.094	7 x 7	20	-2	AN669-L3 L.H.	AN668-3
20-310-1082-3	Ldg. Gear Downlatch—Right	Center Panel	147.750	.094	7 x 7	20	-2	AN669-L3 L.H.	AN668-3
20-310-1082-4	Ldg. Gear Uplatch—Right	Center Panel	127.060	.094	7 x 7	20	-2	AN669-L3 L.H.	AN668-3
20-310-1082-5	Ldg. Gear Uplatch—Left	Center Panel	119.380	.094	7 x 7	20	-2	AN669-L3 L.H.	AN668-3
20-360-1123-5	Ldg. Gear Downlatch—Left	Center Panel	50.250	.094	7 x 7	20	-3	AN667-3	AN669-L3 L.H.
20-360-1123-6	Ldg. Gear Downlatch—Right	Center Panel	24.120	.094	7 x 7	20	-3	AN667-3	AN669-L3 L.H.
20-313-3015-3	Ldg. Gear Emergency Control	Center Panel	385.250	.125	7 x 19	20	-5	AN668-4	AN668-4
20-313-3015-5	Ldg. Gear Emergency Control	Center Panel	321.600	.125	7 x 19	20	-5	AN668-4	AN668-4
20-313-3015-8	Ldg. Gear Emergency Control	Center Panel	439.470	.125	7 x 19	20	-5	AN668-4	AN668-4
20-313-3015-10	Ldg. Gear Emergency Control	Center Panel	379.400	.125	7 x 19	20	-5	AN668-4	AN668-4
20-460-1042-2	Tail Wheel Lock	Nose Section	405.125	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-360-1118-2	Tail Wheel Lock	Center Section	271.750	.094	7 x 7	30	-3	AN669-L3 R.H.	AN667-3
20-360-1123-4	Tail Wheel Uplatch	Center Section—Forward	18.500	.094	7 x 7	None Specified	-3	AN667-3	AN669-L3 L.H.
20-310-1082-7	Tail Wheel Uplatch	Center Section	453.560	.094	7 x 7	None Specified	-2	AN669-L3 L.H.	AN668-3
20-360-3006-4	Tail Wheel Uplatch	Tail Section—Aft	22.750	.094	7 x 7	None Specified	-3	AN669-S3 L.H.	AN667-3
20-360-1115-1	Tail Wheel Tie Up	Special Tools	64.000	.250	7 x 19	None Specified	-5	AN668-8	AN668-8
20-687-3014-1	Glider Release Control	Forward	727.62	.063	7 x 7	None Specified	-7	AN669-2 R.H.	066847+0168719
20-687-3015-1	Glider Release Control	Tail Section	137.250	.063	7 x 7	None Specified	-2	AN669-2 L.H.	AN668-2
20-590-1030-1	Lower Parking Brake	Nose Section	46.3125	.094	7 x 7	None Specified	-11	#RA1802 Amer. C. & C.	AN669-S3 L.H.+AN165-16S+AN155-16S
20-590-1031-1	Upper Parking Brake	Nose Section	45.688	.094	7 x 7	15+5%	-4	#RA1802 Amer. C. & C.	AN669-S3 L.H.
20-460-1042-9	Cowl Flap Open—L. & R.	Nose Section	269.750	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-11	Cowl Flap Closed—L. & R.	Nose Section	293.130	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-14	Cowl Flap Open—Right	Center Panel	176.500	.094	7 x 7	30	-4	AN569-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-15	Cowl Flap Closed—Right	Center Panel	152.630	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-16	Cowl Flap Open—Left	Center Panel	186.750	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-17	Cowl Flap Closed—Left	Center Panel	163.000	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-17	Aux. Flaps—Open and Closed	Left and Right Nacelle	64.625	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-750-3045-1	Aux. Cowl Flaps	Left and Right Nacelle	Approx.	.062	7 x 7	None Specified	-10	#RA1802	#RA1802
20-460-1042-12	Oil Cooler Flap—Closed—Left	Nose Section	169.300	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-12	Oil Cooler Flap—Open—Left	Nose Section	169.300	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-13	Oil Cooler Flap—Closed—Right	Nose Section	190.130	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-13	Oil Cooler Flap—Open—Right	Nose Section	190.130	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-30	Oil Cooler Flap—Open—Left	Center Panel	254.750	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-31	Oil Cooler Flap—Open—Right	Center Panel	219.750	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-32	Oil Cooler Flap—Closed—Left	Center Panel	254.000	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-33	Oil Cooler Flap—Closed—Right	Center Panel	220.310	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-6	Prop.—High—Right	Nose Section	267.630	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-14	Prop.—High—Left	Nose Section	265.630	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-10	Prop.—High—Right	Nose Section	186.500	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-12	Prop.—High—Left	Center Panel	177.880	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-8	Prop.—Low—Left and Right	Center Panel	285.250	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-11	Prop.—Low—Right	Center Panel	171.880	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-13	Prop.—Low—Left	Center Panel	160.940	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-15	Ail Filter—Open and Close	Nose Section	107.625	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-3149-1	Air Filter Control	Center Panel—Right Side	245.562	.094	7 x 7	30	-1	AN669-L3 L.H.	AN669-L3 L.H.
20-460-3149-2	Air Filter Control	Center Panel—Left Side	234.250	.094	7 x 7	30	-1	AN669-L3 L.H.	AN669-L3 L.H.
20-460-1042-16	Air Filter	Nacelle—Right Hand	49.875	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-18	Air Filter	Nacelle—Left Hand	50.875	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-570-1344-2	Accum. Valve Shut-Off—F'w'd	Center Section	100.5	.063	7 x 7	30	-2	AN668-2	AN669-2 R.H.
20-570-1344-3	Accum. Valve Shut-Off—F'w'd	Center Section	116.50	.063	7 x 7	30	-2	AN668-2	AN669-2 R.H.
20-570-1345-2	Accum. Valve Shut-Off—Aft	Center Section	120.56	.063	7 x 7	30	-2	AN669-2 L.H.	AN668-2
20-570-1345-3	Accum. Valve Shut-Off—Aft	Center Section	106.56	.063	7 x 7	30	-2	AN669:2 L.H.	AN668-2

CABLE CHART

Curtiss-Wright Drawing Numbers	Function	Location	Length (Inches)	Dia.	Material Ex. Flex Cable	Tension (Pounds)	Fig. No.	End Fitting	End Fitting
20-530-1209-1	Aileron Up—R. & L.	Outer Panel	230.000	.250	7 x 19	180-200	–2	AN688-8	AN669-8 R.H.
20-530-1210-1	Aileron Down—R. & L.	Outer Panel	317.375	.188	7 x 19	180-200	–2	AN668-6	AN669-S 6 R.H.
20-530-1211-1	Aileron Up—R. & L.	Center Section	223.440	.250	7 x 19	180-200	–1	AN669-8 L.H.	AN669-8 L.H.
20-530-1212-1	Aileron Down—R. & L.	Center Section	135.250	.188	7 x 19	180-200	–1	AN669-S6 L.H.	AN669-L6 L.H.
20-530-1266-1	Aileron—Right Bank	Center Section—Pilot and CoPilot	221.313	.156	7 x 19	90-100	–3	AN667-4	AN669-L5 L.H.
20-530-1267-1	Aileron—Left Bank	Center Section—Pilot and CoPilot	221.563	.156	7 x 19	90-100	–1	AN669 S-5 L.H.	AN669-L5 L.H.
20-530-1220-2	Aileron—Left Bank	Nose Section—Pilot	101.375	.156	7 x 19	90-100	–2	AN668-5	AN669-S5 L.H.
20-530-1220-3	Aileron—Left Bank	Nose Section—CoPilot	113.125	.156	7 x 19	90-100	–2	AN668-5	AN669-S5 L.H.
20-530-1220-4	Aileron—Right Bank	Nose Section—Pilot	143.250	.156	7 x 19	90-100	–2	AN668-5	AN669-S5 L.H.
20-530-1220-5	Aileron—Right Bank	Nose Section—CoPilot	141.375	.156	7 x 19	90-100	–2	AN668-5	AN669-S5 L.H.
20-530-1246-2	Aileron Tab—Right Bank	Outer Panel—Right	278.250	.094	7 x 7	20±2	–2	AN668-3	AN669-S3 R.H.
20-530-1246-3	Aileron Tab—Right Bank	Outer Panel—Left	418.875	.094	7 x 7	20±2	–2	AN668-3	AN669-S3 R.H.
20-530-1246-4	Aileron Tab—Left Bank	Outer Panel—Right	306.000	.094	7 x 7	20±2	–2	AN668-3	AN669-S3 R.H.
20-530-1246-5	Aileron Tab—Left Bank	Outer Panel—Left	396.750	.094	7 x 7	20±2	–2	AN668-3	AN669-S3 R.H.
20-530-1236-3	Aileron Tab—Right Bank	Outer Panel	277.620	.094	7 x 7	20±2	–4	AN669-S3 L.H.	#RA1802 Amer. C. & C.
20-530-1236-4	Aileron Tab—Left Bank	Outer Panel	163.750	.094	7 x 7	20±2	–4	AN669-S3 L.H.	#RA1802 Amer. C. & C.
20-530-1226-4	Aileron Tab—R. & L. Bank	Nose Section—Pedestal Aft	236.000	.094	7 x 7	20±2	–4	#RA1802 Amer. C. & C.	AN669-L3 L. H.
20-530-1225-4	Rudder—Right	Nose Section—Pilot	101.813	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1225-5	Rudder—Right	Nose Section—CoPilot	97.813	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1225-6	Rudder—Left	Nose Section—Pilot	86.625	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1225-7	Rudder—Left	Nose Section—CoPilot	84.063	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1152-2	Rudder—Left	Center Section—Inboard	294.250	.125	7 x 19	90-100	–1	AN669-S4 L.H.	AN669-L4 L.H.
20-530-1152-3	Rudder—Left	Center Section—Outboard	306.313	.125	7 x 19	90-100	–1	AN669-S4 L.H.	AN669-L4 L.H.
20-530-1153-2	Rudder—Right	Center Section—Outboard	326.750	.125	7 x 19	90-100	–3	AN667-4	AN669-L4 L.H.
20-530-1153-3	Rudder—Left	Center Section—Inboard	314.938	.125	7 x 19	90-100	–3	AN667-4	AN669-L4 L.H.
20-530-1217-6	Rudder—Right	Tail Section—Inboard	328.438	.125	7 x 19	90-100	–1	AN669-L4 L.H.	AN669-L4 L.H.
20-530-1217-7	Rudder—Right	Tail Section—Outboard	316.375	.125	7 x 19	90-100	–1	AN669-L4 L.H.	AN669-L4 L.H.
20-530-1217-8	Rudder—Left	Tail Section—Inboard	354.563	.125	7 x 19	90-100	–1	AN669-L4 L.H.	AN669-L4 L.H.
20-530-1217-9	Rudder—Left	Tail Section—Inboard	342.625	.125	7 x 19	90-100	–1	AN669-L4 L.H.	AN669-L4 L.H.
20-530-1225-8	Rudder Run Around	Nose Section	56.500	.125	7 x 19	90-100	–2	AN669-S4 L.H.	AN668-4
20-530-1230-1	Rudder Run Around	Nose Section	30.063	.125	7 x 19	90-100	–2	AN669-S4 L.H.	AN668-4
20-530-1226-2	Rudder Tab—R. & L.	Nose Section—Pedestal Aft	202.623	.094	7 x 7	20±2	–4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-530-1247-1	Rudder Tab	Center Section	581.813	.094	7 x 7	20±2	–1	AN669-L3 R.H.	AN669-L3 R.H.
20-530-1236-2	Rudder Tab	Tail Section	151.030	.094	7 x 7	20±2	–4	AN669-S3 L.H.	#RA1802 Amer. C. & C.
20-530-1225-1	Elevator—Up	Nose Section—Outboard	88.875	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1225-2	Elevator—Down	Nose Section	116.875	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1225-3	Elevator—Up	Nose Section—Inboard	107.750	.125	7 x 19	90-100	–2	AN668-4	AN669-S4 L.H.
20-530-1252-2	Elevator—Down	Center Section—Outboard	294.250	.125	7 x 19	90-100	–1	AN669-S4 L.H.	AN669-L4 L.H.
20-530-1252-3	Elevator—Down	Center Section—Inboard	306.313	.125	7 x 19	90-100	–1	AN669-S4 L.H.	AN669-L4 L.H.
20-530-1254-2	Elevator—Up	Center Section—Outboard	307.750	.125	7 x 19	90-100	–1	AN669-S4 R.H.	AN669-L4 L.H.
20-530-1254-3	Elevator—Down	Center Section—Inboard	314.500	.125	7 x 19	90-100	–1	AN669-S4 R.H.	AN669-L4 L.H.
20-530-1217-2	Elevator—Up	Tail Section—Inboard	374.750	.125	7 x 19	90-100	–1	AN669-L4 R.H.	AN669-L4 L.H.
20-530-1217-3	Elevator—Up	Tail Section—Outboard	386.813	.125	7 x 19	90-100	–1	AN669-L4 R.H.	AN669-L4 L.H.
20-530-1217-4	Elevator—Down	Tail Section—Inboard	370.625	.125	7 x 19	90-100	–1	AN669-L4 R.H.	AN669-L4 L.H.
20-530-1217-5	Elevator—Down	Tail Section—Outboard	382.750	.125	7 x 19	90-100	–1	AN669-L4 R.H.	AN669-L4 L.H.
20-530-1226-3	Elevator Tab—Nose Up	Nose Section—Pedestal Aft	260.813	.094	7 x 7	20±2	–4	#RA1802 Amer. C. & C.	AN669-L4 L.H.
20-530-1226-5	Elevator Tab—Nose Down	Nose Section—Pedestal Aft	250.250	.094	7 x 7	20±2	–4	#RA1802 Amer. C. & C.	AN669-L4 L.H.
20-530-1245-2	Elevator Tab—Nose Up	Rear Section	557.750	.094	7 x 7	20±2	–2	AN669-L3 R.H.	AN668-3
20-530-1245-3	Elevator Tab—Nose Down	Rear Section	565.750	.094	7 x 7	20±2	–2	AN669-L3 R.H.	AN668-3
20-530-1236-5	Elevator Tab—Right	Tail Section	161.560	.094	7 x 7	20±2	–4	AN669-S3 L.H.	#RA1802 Amer. C. & C.
20-530-1236-6	Elevator Tab—Left	Tail Section	153.930	.094	7 x 7	20±2	–4	AN669-S3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-3	Flap Valve—Up	Nose Section	199.313	.094	7 x 7	30+0, –5	–4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-4	Flap Valve—Down	Nose Section	214.250	.094	7 x 7	30+0, –5	–4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-2	Flap Valve—Up	Center Panel	171.938	.094	7 x 7	30+0, –5	–4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-3	Flap Valve—Down	Center Panel	154.875	.094	7 x 7	30+0, –5	–4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-540-1111-1	Flap Control	Center Panel	71.500	.094	7 x 7	30+0, –5	–9	AN667-3	#RA1802 Amer. C. & C.

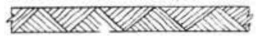
TABLE 87 CABLE CHART

Curtiss-Wright Drawing Numbers	*Function*	*Location*	*Length (Inches)*	*Dia.*	*Material Ex. Flex Cable*	*Tension (Pounds)*	*Fig. No.*	*End Fitting*	*End Fitting*
20-570-1344-4	Heater Fuel Valve Cont.—F'w'd	Center Section	96.680	.063	7 x 7	None Specified	-2	AN668-2	AN669-2 R.H.
20-570-1345-4	Heater Fuel Valve Cont.—Aft.	Center Section	89.320	.125	7 x 19	None Specified	-2	AN669-2 L.H.	AN668-2
20-570-1345-5	Heater Fuel Valve Cont.—Aft	Center Section	88.520	.125	7 x 19	None Specified	-2	AN669-2 L.H.	AN668-2
20-580-3127-1	Heater Duct Valve Cont.	Center Section	115.875	.062	7 x 7	None Specified	-3	AN669-2 R.H.	AN667-2
20-460-1042-6	Supercharger—Low—L. & R.	Nose Section	267.630	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-7	Supercharger—High—L. & R.	Nose Section	249.000	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-22	Supercharger—High—Right	Center Panel	181.940	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-23	Supercharger—Low—Right	Center Panel	167.000	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-24	Supercharger—High—Left	Center Panel	185.560	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-25	Supercharger—Low—Left	Center Panel	170.140	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-6	Mixture—Rich—L. & R.	Nose Section	267.630	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-8	Mixture—Lean—L. & R.	Nose Section	285.250	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-400-1041-4	Mixture—Lean—Left	Center Panel	170.630	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-5	Mixture—Rich—Left	Center Panel	188.750	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-26	Mixture—Lean—Right	Center Panel	162.690	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-27	Mixture—Rich—Right	Center Panel	180.630	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-6	Throttle—Open—L. & R.	Nose Section	267.630	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-8	Throttle—Closed—L. & R.	Nose Section	285.250	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-6	Throttle—Open—Right	Center Panel	187.060	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-7	Throttle—Closed—Right	Center Panel	169.560	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-8	Throttle—Open—Left	Center Panel	181.380	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-9	Throttle—Closed—Left	Center Panel	163.380	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1042-6	Carb. Heat—Hot—L. & R.	Nose Section	267.630	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1042-7	Carb. Heat—Cold—L. & R.	Nose Section	249.000	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-L3 L.H.
20-460-1041-18	Carb. Heat—Hot—Right	Center Panel	162.130	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-19	Carb. Heat—Cold—Right	Center Panel	187.560	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-20	Carb. Heat—Hot—Left	Center Panel	164.750	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1041-21	Carb. Heat—Cold—Left	Center Panel	189.500	.094	7 x 7	30	-4	AN669-L3 L.H.	#RA1802 Amer. C. & C.
20-460-1051-2	Engine Control	Engine—Right and Left	10.750	.094	7 x 7	30	-4	AN669-S3 R.H.	#RA1802 Amer. C. & C.
20-460-1051-2	Engine Controls	Engine—Right and Left	25.120	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-S3 L.H.
20-460-1051-3	Engine Controls	Engine—Right and Left	12.310	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-S3 L.H.
20-460-1051-3	Engine Controls	Engine—Right and Left	24.750	.094	7 x 7	30	-4	AN669-S3 R.H.	#RA1802 Amer. C. & C.
20-460-1051-8	Engine Controls	Engine—Right and Left	11.000	.094	7 x 7	30	-4	AN669-S3 R.H.	#RA1802 Amer. C. & C.
20-460-1051-8	Engine Controls	Engine—Right and Left	11.000	.094	7 x 7	30	-4	#RA1802 Amer. C. & C.	AN669-S3 L.H.
20-460-1051-9	Engine Controls	Engine—Right and Left	23.750	.094	7 x 7	30	-10	#RA1802 Amer. C. & C.	#RA1802 Amer. C. & C.
20-460-3026-25	Fuel Selector Cock Control	Nose Section	137.750	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-27	Fuel Selector Cock Control	Nose Section	177.250	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-29	Fuel Selector Cock Control	Nose Section	158.000	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-31	Fuel Selector Cock Control	Nose Section	153.500	.062	7 x 7	30	-1	AN669-2 L.H.	AN668-2 R.H.
20-460-3026-33	Fuel Selector Cock Control	Nose Section	123.125	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-35	Fuel Selector Cock Control	Nose Section	159.625	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-37	Fuel Selector Cock Control	Nose Section	143.875	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-39	Fuel Selector Cock Control	Nose Section	172.000	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-41	Fuel Selector Cock Control	Nose Section	191.625	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-43	Fuel Selector Cock Control	Nose Section	227.375	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-45	Fuel Selector Cock Control	Nose Section	164.750	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-47	Fuel Selector Cock Control	Nose Section	170.875	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-49	Fuel Selector Cock Control	Nose Section	209.500	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
20-460-3026-51	Fuel Selector Cock Control	Nose Section	161.750	.062	7 x 7	30	-1	AN669-2 L.H.	AN669-2 R.H.
*20-520-1012-1	Auto-Pilot Follow-Up Control	Nose Section	174.0625	.062	7 x 7	None Specified	-8	AN668-2	AC566A6-4+AC38A5104-1+AC995-41-2
20-520-1012-2	Auto-Pilot Follow-Up Control	Nose Section	198.00	.062	7 x 7	None Specified	-8	AN668-2	AC566A6-4+AC38A5104-1+AC995-41-2
20-520-1012-3	Auto-Pilot Follow-Up Control	Nose Section	207.250	.062	7 x 7	None Specified	-8	AN668-2	AC566A6-4+AC38A5104-1+AC995-41-2
20-520-1012-4	Auto-Pilot Follow-Up Control	Nose Section	174.4375	.062	7 x 7	None Specified	-8	AN668-2	AC566A6-4+AC38A5104-1+AC995-41-2
20-520-1012-5	Auto-Pilot Follow-Up Control	Nose Section	200.5625	.062	7 x 7	None Specified	-8	AN668-2	AC566A6-4+AC38A5104-1+AC995-41-2
20-520-1012-6	Auto-Pilot Follow-Up Control	Nose Section	206.8125	.062	7 x 7	None Specified	-8	AN668-2	AC566A6-4+AC38A5104-1+AC995-41-2
20-411-3012-1	Starter-Pull	Nose Section	33.50	.062	7 x 7	None Specified	-12	20-411-3011	87-66-742-14-12+74226-1+AN315-4R+ EX46820-22

*-1, -2, -3 up to AC41-5204
#-4, -5, -6 AC41-12280 and up.

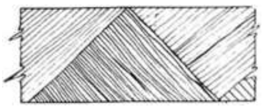
RESISTO—HYDE
COCK-PIT GREEN COLOR

Q—1⅛ INCHES STITCHED SEAPAK
COVERED BOTH SIDES WITH FLAME-PROOF GAUZE.

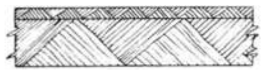


Q—2¼ INCHES STITCHED SEAPAK
COVERED BOTH SIDES WITH FLAME-PROOF GAUZE.

NUMBER FIVE KWILKO
½ INCH STITCHED, COVERED
BOTH SIDES WITH FLAME-PROOF
GAUZE.



NUMBER 10 KWILKO ONE INCH
STITCHED COVERED BOTH SIDES WITH
FLAME-PROOF GAUZE.

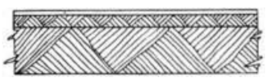


Q-1 AND NUMBER 5 KWILKO
STITCHED TOGETHER

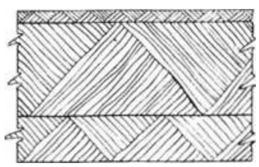
RESISTO-HYDE AND Q-1
STITCHED TOGETHER

RESISTO-HYDE AND Q-2
STITCHED TOGETHER

Q-1 COVERED ON BOTH SIDES
WITH RESISTO-HYDE
STITCHED TOGETHER



RESISTO-HYDE, Q-1 AND
NUMBER FIVE KWILKO
STITCHED TOGETHER



Q-1 NUMBER 10 AND NUMBER
FIVE KWILKO STITCHED TOGETHER

FIGURE 242—SOUND PROOFING

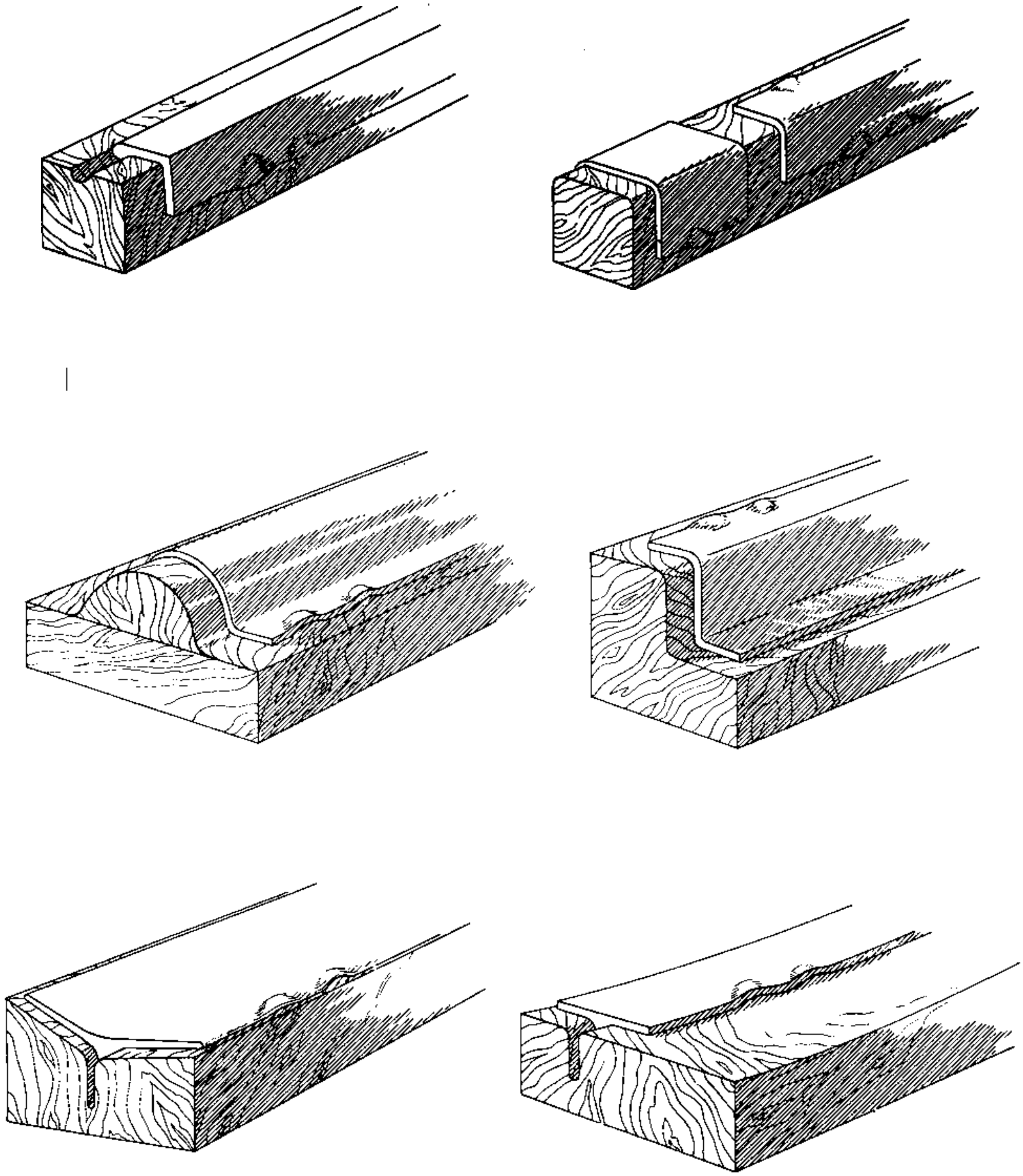


FIGURE 243—METHOD OF STRAIGHTENING ANGLES

SECTION XI
DISASSEMBLY OF THE WING AND FUSELAGE

1. GENERAL.

If the amount of damage to the center panel is such as not to warrant repair or if it is so sprung as to make it too difficult to restore it to its original shape, the panel with floor section should be removed from the fuselage and replaced. To do this it is necessary to remove the portion of the fuselage shell assembly below the center panel, thus leaving a weakened section of fuselage at this point. In order to support the fuselage and restrain it from excessive deflection, a series of contour jigs must be built for both the nose and aft sections of the structure.

2. REQUIRED JIGS.

a. FUSELAGE NOSE JIG. Figure 244.—This jig extends from station 70.7 to station 235 and has three fuselage supports: one at either end and one at station 150.75. The figure gives also two alternate jig positions, one at station 107 and the other at station 194. The table gives the vertical offset from the floor line and the radius of the jig for each of these stations. It is necessary at all times to maintain the end support points but the center support may be moved to one of the alternate jig positions. The detail construction of the jig is shown and should be adhered to as far as possible. Its design is based on a fairly hard wood (such as white oak), and structural steel bolts. If modifications are desired because of material difficulties, appropriate increases in section will be required based on the relative material strengths.

b. FUSELAGE INTERMEDIATE JIG. Figure 245.—The intermediate jig is of the same construction as the nose jig and extends from station 460.5 to station 704 supporting the fuselage at three points. The middle support is shown at station 583.5 but may, if necessary, be located at the alternate points: station 522 or 633. The included table gives the required dimensions for forming the contour boards. All pertinent dimensions and overall lengths of the jig are given but the length of the individual members may easily be determined in the field.

c. FUSELAGE TAIL JIG. Figure 246.—The tail jig differs from the forward jigs in that it supports the fuselage by means of the stabilizer and the glider tow tube. It is necessary that the locations of the supports be held within the following tolerances: fore and aft and outboard, + or − 1/4 inch. Vertically, + or − 1/8 inch.

d. WING CENTER PANEL. Figure 248. The center panel is supported at four points: two just inboard of the nacelle at station 107.5 and two inboard of the fuselage at station 41.5. Contour boards for the lower surface are cut out as indicated and padded with one inch of material. Since the cross-section of the wing is constant, these contour boards are identical. These boards are made integral with the jig. The same jig may be used both for removal and replacement of the center panel.

3. PROCEDURE OF JIGGING FOR DISASSEMBLY.

a. Remove power plant installations.

b. Remove all stowage equipment from fuselage.

c. Remove outer panels as per AN 01-25LA-2, section IV.

d. Remove fuselage plating under wing.

(1) Remove all lines and equipment from the region between the plating and the wing.

(2) Shore up plating by means of wood horses.

(3) Detach all stringer splices in this region.

(4) Drill out rivets along the forward and aft ends of the plating (station 276 and 399). The plating runs to the top surface of the wing.

(5) Drill out rivets at the front and rear beam attachments.

(6) Drill out rivets through lower attach angle and fuselage.

(7) Lower plating from fuselage.

e. Disconnect all lines running from the fuselage to the wing.

f. Set up tail hoist as per AN 01-25LA-2 and hoist airplane to level position.

g. Level off a region sufficiently large to allow the jigs to seat squarely.

h. Jack center panel jig into place making sure the contour board supports line up with their respective ribs. This is done by putting a jack in each of the four corners of the jig, and having the pad of the jack bear against a 4 x 4 beam placed under the cross members. The jack is then raised to its extended position and a series of 4 x 4 blocks are placed under each corner as shown in figure 249. The jig is then lowered onto the blocking and the jacks collapsed. With additional 4 x 4 blocks as necessary for support, laying them on the blocking which supports the jig, move the base of the jacks to a higher level and repeat the process. This is done until the jig rests snugly against the wing.

i. Maintaining the fuselage floor line in a horizontal position, the ship is raised by simultaneous jacking and hoisting until it is a few inches above the floor height given in figure 250.

j. The forward and aft jigs are then moved in from the ends being careful to line up the support points accurately with the corresponding points on the fuselage.

k. Lower the jacks and hoist so that the fuselage jigs carry the entire load then extend the jacks again so that the center panel weight is largely taken off the fuselage attachment.

l. At this point the landing gear should be removed to decrease the loads which must be handled. If this is not feasible, the gear must be retracted in order to drop the panel.

4. REMOVAL OF WING.

a. Remove wing fuselage fairing.

b. Disconnect forward and aft floors from the center panel floor.

c. Drill out any rivets tying the floor above the wing to the fuselage.

d. Drill out rivets through track and fiber aligning blocks at each end of the flooring over the wing and move the blocks so that they will not interfere during removal.

e. Drill out rivets through upper attach angle and fuselage.

f. Remove bolts through wing-fuselage fittings.

g. Lower wing using the reverse of the procedure outlined under 3. *h*. above.

h. The jig and wing are moved out sideways on rollers.

NOTE

TO HELP PREVENT FUSULAGE DEFLECTIONS, THE FUSELAGE PLATING SHOULD BE PUT BACK AND ATTACHED WITH SCREWS. USE ONE SCREW TO EVERY FOUR RIVET HOLES THROUGH THE FUSELAGE.

5. ATTACHMENT OF NEW WING PANEL.

a. Remove fuselage plating.

b. Raise wing into position as under *h*. in "Procedure of Jigging for Disassembly."

c. Prior to raising the wing, plumb lines should be dropped from the attachment fittings to assure the aligning of the parts. When raised, the wing jig may be moved slightly for further alignment by hammering the jig with a sledge.

d. The bolts through the attachment fittings are then inserted. No one bolt should be tightened completely with the others loose but they should all be tightened in small degrees successively so that no wracking of the frame will occur.

e. The upper attach angle is then riveted on using the existing skin holes in the fuselage as a drilling template.

f. Using the standard wing jacks on the jacking pads at station 192, remove the center panel jig.

g. Replace the fuselage plating using the plating as a template to drill the rivet holes in the wing and lower attach angle.

h. Raise the airplane off the jigs by jacking and hoisting and remove the jigs from under the fuselage.

i. Maintaining the horizontal attitude, lower the airplane so that the main gear rests on the ground.

j. Remove the wing jacks and lower the tail.

k. Attach the forward and aft flooring to the wing. If the original track aligning fiber blocks cannot be put back into place, new blocks may be inserted as described in section III, paragraph 6*b*.

6. FUSELAGE DAMAGE.

Any damage to the fuselage in the region of the wing should be repaired in accordance with section III before a new panel is attached.

7. TAIL HOIST.

Methods of hoisting the tail and the wing assume no cranes of the right size to be available. If such is not the case, the problem of hoisting becomes relatively simple using the standard hoisting slings and attachments.

CAUTION

IT IS VERY NECESSARY THAT THERE BE NO DEFLECTION OF THE FUSELAGE DURING THE ENTIRE DISASSEMBLY PROCEDURE. OTHERWISE IT WILL BE IMPOSSIBLE TO ALIGN THE RIVET HOLES IN ASSEMBLY.

8. JIGGING.

Figures 251 through 258 show various holding jigs for the control surfaces and the outer panel. These are so designed as to hold the surfaces in alignment.

9. ALIGNMENT.

The airplane alignment should be checked against figure 259.

STA.	A	R
70.7	3.4"	30.1"
107.0	2.6"	37.2"
150.75	2.5"	44.0"
194.0	3.0"	49.4"
235.0	3.5"	53.3"

NOTE:
USE 1/2" DIA. BOLTS WITH WASHER EACH SIDE-
2" MIN. END DISTANCE-1" MIN. EDGE DISTANCE-
SPACE AT 2" CENTER MIN.

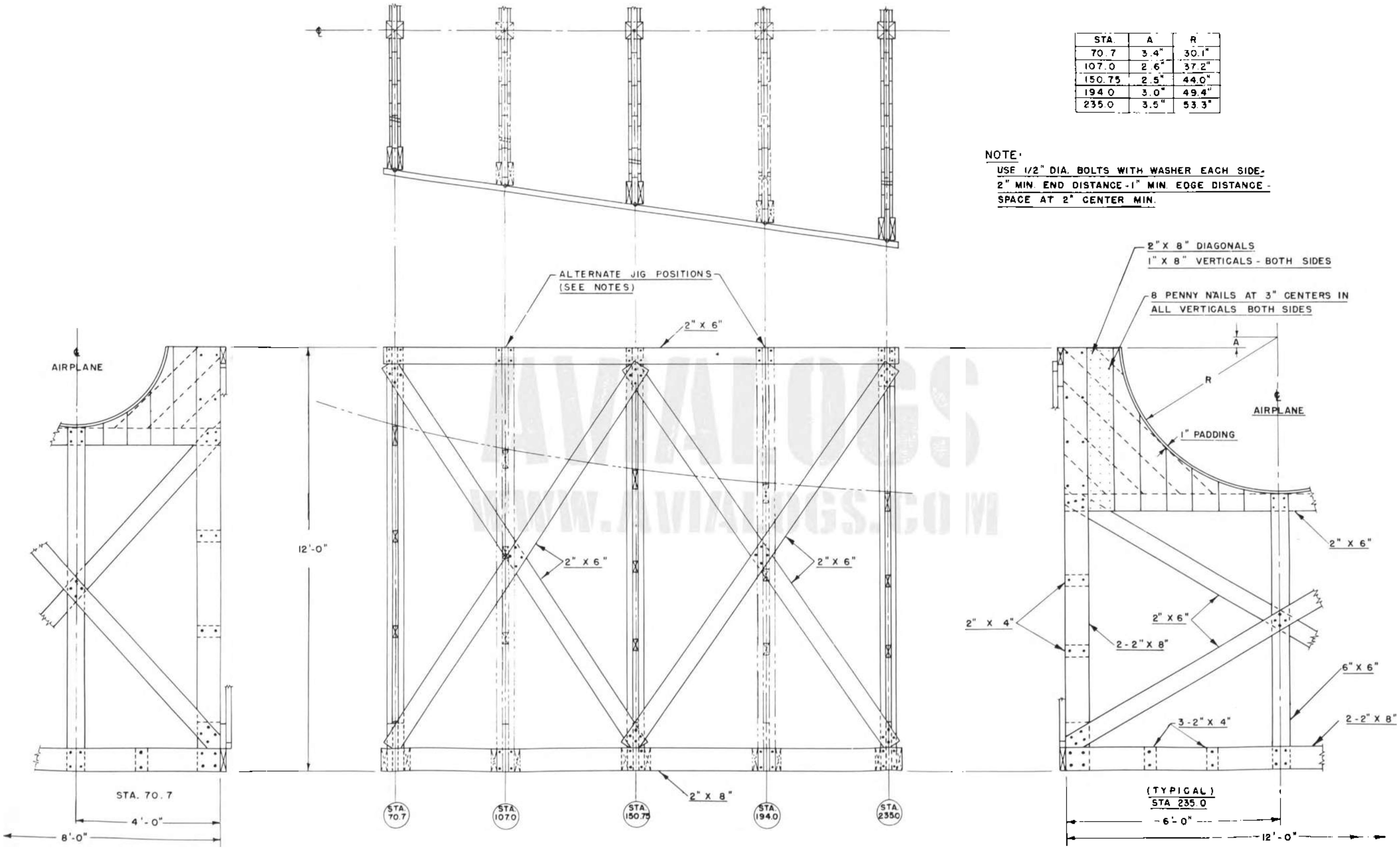


FIGURE 244—FUSELAGE NOSE JIG

TABLE 88
MATERIALS FOR CONSTRUCTION OF FUSELAGE NOSE JIG
(Figure 244)

BOLTS			LUMBER		
Quantity	*Size*		*Quantity*	*Stock*	*Length*
100	½ x 10 in.	machine bolts	4	2 x 4	12 ft. 0 in.
15	½ x 10½ in.	machine bolts	1	2 x 6	8 ft. 0 in.
65	½ x 9 in.	machine bolts	1	2 x 6	10 ft. 0 in.
15	½ x 6½ in.	machine bolts	1	2 x 6	12 ft. 0 in.
50	½ x 7¼ in.	machine bolts	14	2 x 6	14 ft. 0 in.
40	½ x 5¾ in.	machine bolts	2	2 x 6	16 ft. 0 in.
20	½ x 4 in.	machine bolts	2	2 x 8	8 ft. 0 in.
610	½ in.	washers	2	2 x 8	10 ft. 0 in.
			20	2 x 8	12 ft. 0 in.
			2	6 x 6	10 ft. 0 in.
			1	6 x 6	8 ft. 0 in.
			6	1 x 8	14 ft. 0 in.

TABLE 89
MATERIALS FOR CONSTRUCTION OF FUSELAGE INTERMEDIATE JIG
(Figure 245)

BOLTS			LUMBER		
Quantity	*Size*		*Quantity*	*Stock*	*Length*
35	½ x 11½ in.	machine bolts	2	2 x 4	8 ft. 0 in.
65	½ x 10 in.	machine bolts	2	2 x 6	8 ft. 0 in.
15	½ x 9¾ in.	machine bolts	2	2 x 6	10 ft. 0 in.
65	½ x 9 in.	machine bolts	2	2 x 6	12 ft. 0 in.
50	½ x 7¼ in.	machine bolts	10	2 x 6	14 ft. 0 in.
15	½ x 6½ in.	machine bolts	8	2 x 6	16 ft. 0 in.
50	½ x 5¾ in.	machine bolts	14	2 x 8	8 ft. 0 in.
20	½ x 4 in.	machine bolts	6	2 x 8	10 ft. 0 in.
630	½ in.	washers	18	2 x 8	12 ft. 0 in.
			1	6 x 6	8 ft. 0 in.
			1	6 x 6	10 ft. 0 in.
			1	6 x 6	12 ft. 0 in.
			6	1 x 8	8 ft. 0 in.

STA.	A	B
460.5	4.6"	55.7"
522.0	4.9"	50.1"
583.5	5.8"	44.1"
633.0	7.1"	37.2"
704.0	8.5"	24.7

NOTES:
USE 1/2" DIA. BOLTS WITH WASHER EACH SIDE
2" MIN. END DISTANCE—1" MIN. EDGE DISTANCE
SPACE AT 2" CENTERS - MIN.

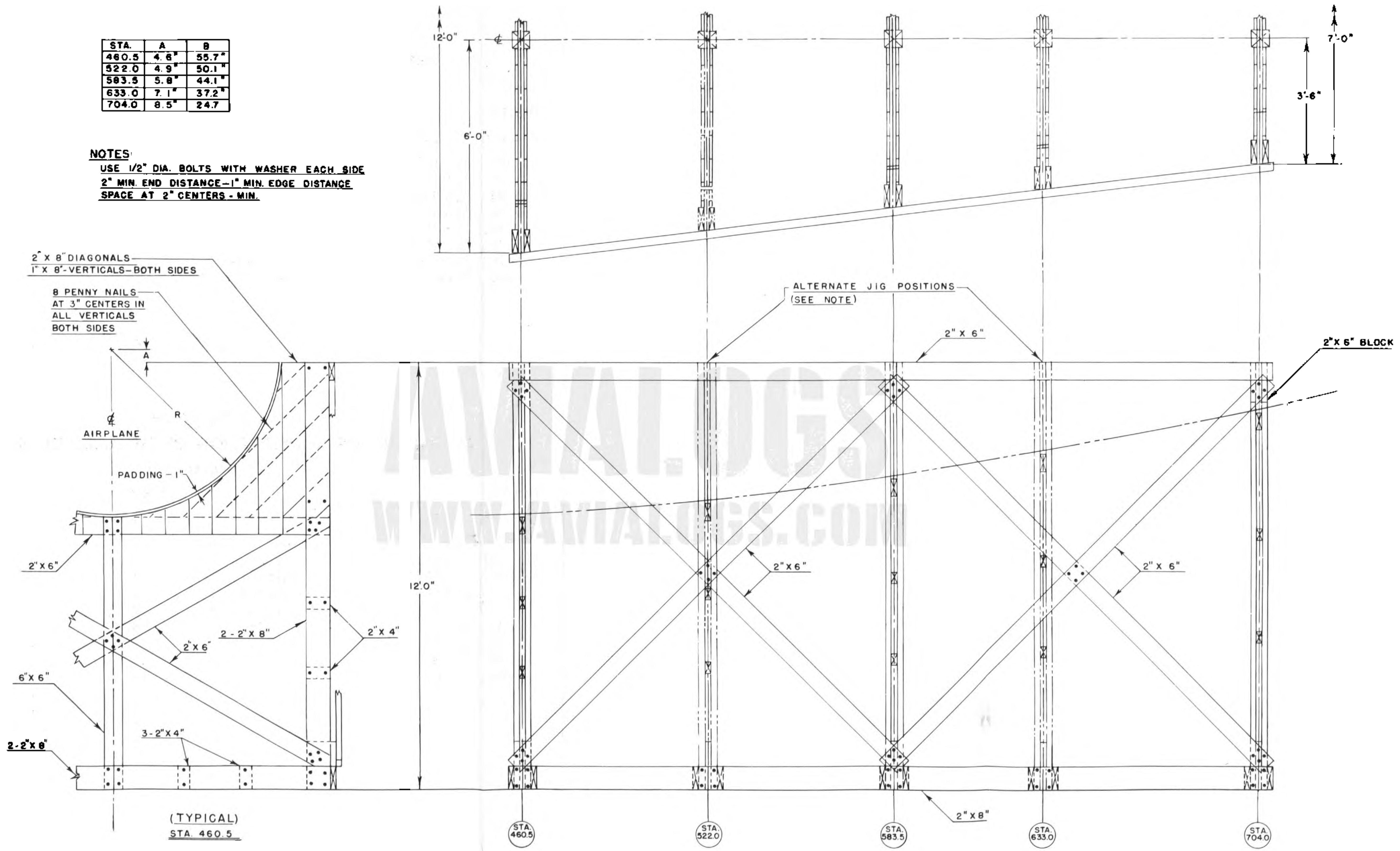
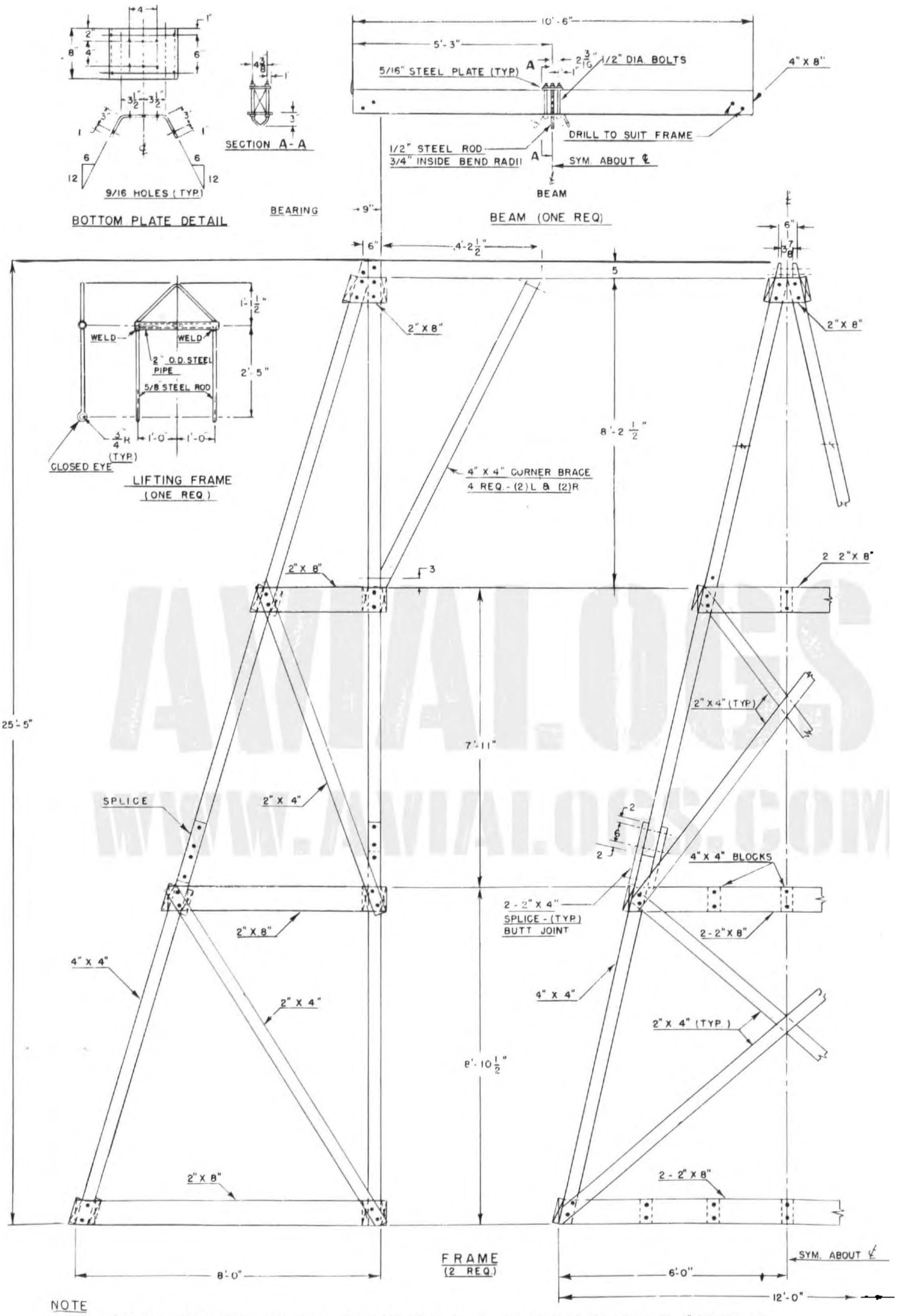


FIGURE 245—FUSELAGE INTERMEDIATE JIG



NOTE
USE 1/2" DIA BOLT WITH WASHER EACH SIDE 2" MIN END DISTANCE 1 MIN EDGE DISTANCE SPACE AT 2" CENTERS MIN.

FIGURE 247—TAIL HOISTING FRAME

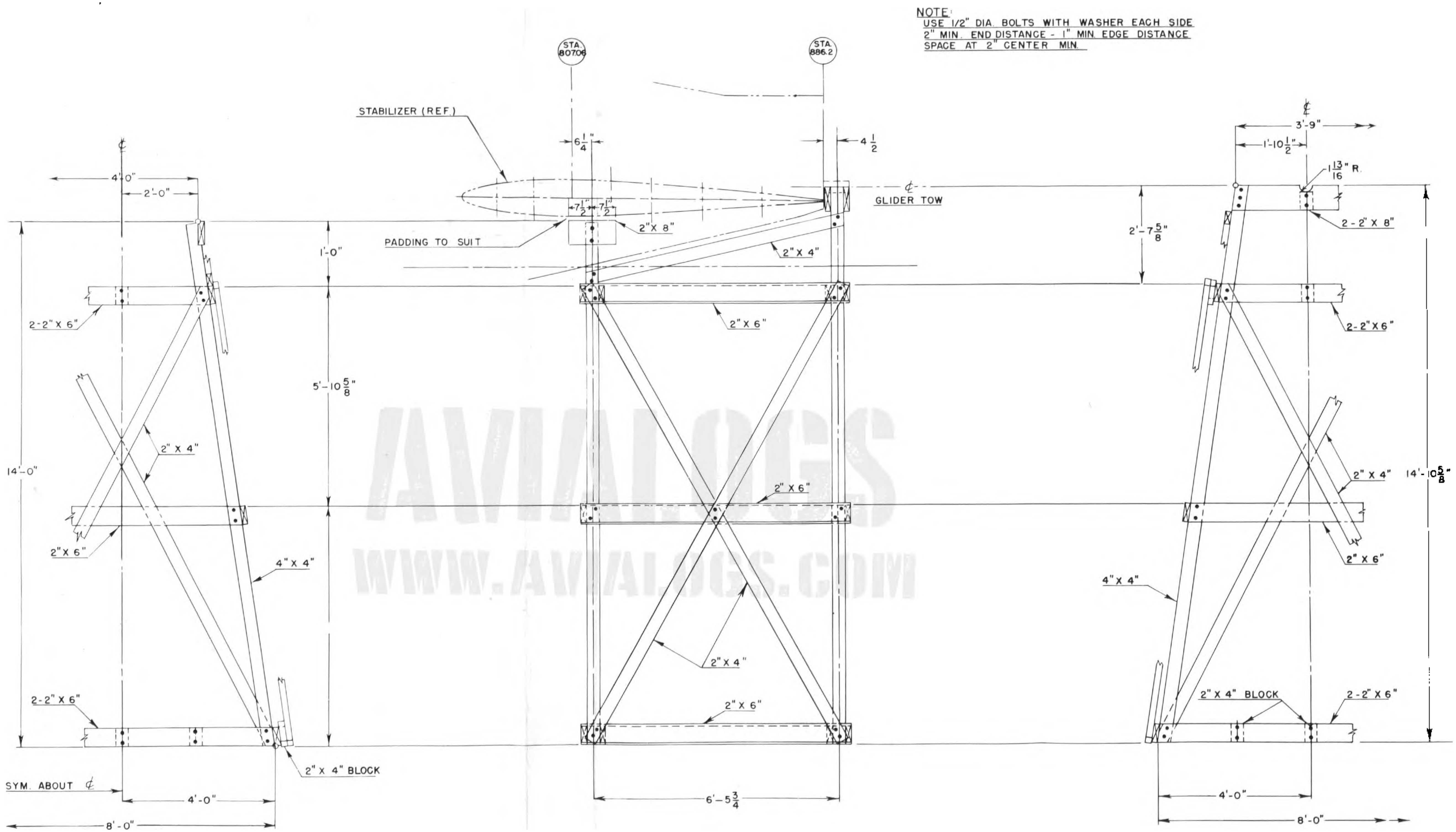


FIGURE 246—FUSELAGE TAIL JIG

TABLE 90
MATERIALS FOR CONSTRUCTION OF FUSELAGE TAIL JIG
(Figure 246)

BOLTS

Quantity	Size	
25	½ x 9¼ in.	machine bolts
30	½ x 7¾ in.	machine bolts
30	½ x 6 in.	machine bolts
5	½ x 5¾ in.	machine bolts
180	½ in.	washers

LUMBER

Quantity	Stock	Length
9	2 x 4	14 ft. 0 in.
4	2 x 6	8 ft. 0 in.
4	2 x 6	14 ft. 0 in.
1	2 x 8	8 ft. 0 in.
2	4 x 4	14 ft. 0 in.
2	4 x 4	16 ft. 0 in.

TABLE 91
MATERIALS FOR CONSTRUCTION OF TAIL HOISTING FRAME
(Figure 247)

BOLTS

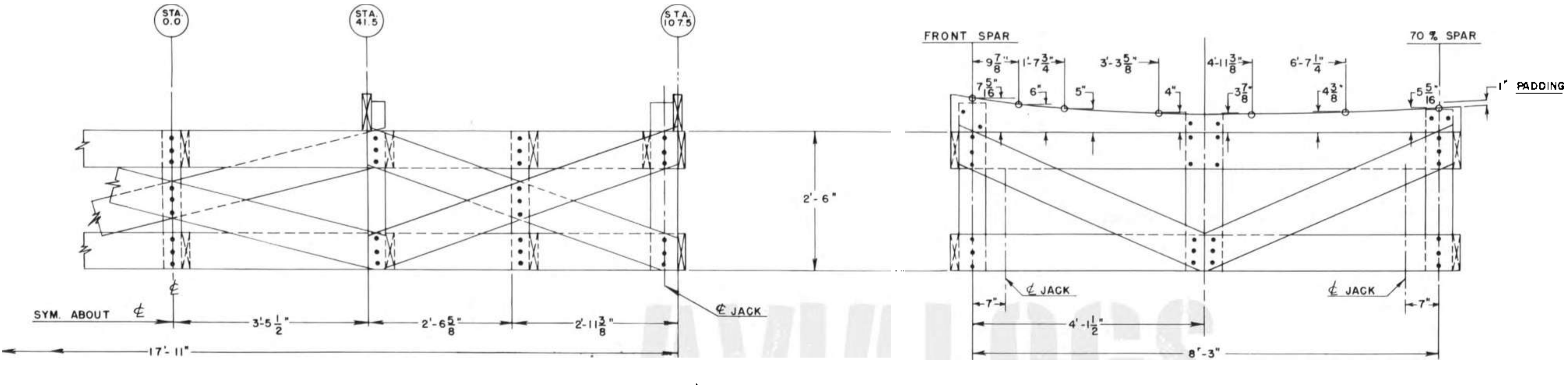
Quantity	Size	
3	½ x 14 in.	machine bolts
5	½ x 13 in.	machine bolts
10	½ x 11 in.	machine bolts
20	½ x 9¼ in.	machine bolts
40	½ x 7¾ in.	machine bolts
5	½ x 4¾ in.	machine bolts
170	½ in.	washers

MISCELLANEOUS

½ in. rod—6 ft. 0 in.
6 x 5/16 x 6⅜ in. steel plate
1 ft. 3 in. x 8 x 5/16 in. steel plate

LUMBER

Quantity	Stock	Length
6	2 x 4	10 ft. 0 in.
2	2 x 4	12 ft. 0 in.
4	2 x 4	14 ft. 0 in.
8	2 x 8	8 ft. 0 in.
2	2 x 8	10 ft. 0 in.
6	2 x 8	12 ft. 0 in.
1	2 x 8	14 ft. 0 in.
8	4 x 4	10 ft. 0 in.
4	4 x 4	16 ft. 0 in.



FRAME -(ONE REQ.)

NOTE:
USE 2" X 8" STOCK EXCEPT 6" X 6" END POSTS & 4" X 4" INTERMEDIATE POSTS
INTERMEDIATE BRACING SIMILAR TO END BRACING SHOWN
BLOCK UNDER ENDS & CENTERS OF BRACING WHERE REQUIRED
USE 1/2" DIA. BOLTS WITH WASHER EACH SIDE
2" MIN. END DISTANCE - 1" MIN. EDGE DISTANCE
SPACE AT 2" CENTERS MIN.

FIGURE 248—WING CENTER PANEL JIG

TABLE 92
MATERIAL FOR CONSTRUCTION OF WING CENTER PANEL JIG
(Figure 248)

BOLTS

Quantity	*Size*	
25	½ x 11¼ in.	machine bolts
25	½ x 11 in.	machine bolts
25	½ x 9¾ in.	machine bolts
20	½ x 9¼ in.	machine bolts
100	½ x 7¾ in.	machine bolts
10	½ x 7¼ in.	machine bolts
30	½ x 6 in.	machine bolts
10	½ x 5¼ in.	machine bolts
45	½ x 4 in.	machine bolts
580	½ in.	washers

LUMBER

Quantity	*Stock*	*Length*
7	2 x 8	10 ft. 0 in.
4	2 x 8	12 ft. 0 in.
2	2 x 8	16 ft. 0 in.
14	2 x 8	18 ft. 0 in.
1	4 x 4	16 ft. 0 in.
1	6 x 6	12 ft. 0 in.

TABLE 93
MATERIAL FOR CONSTRUCTION OF WING OUTER PANEL HOLDING JIG
(Figure 251)

BOLTS

Quantity	*Size*	
135	½ x 4 in.	machine bolts
15	½ x 12 in.	machine bolts
100	½ x 10¼ in.	machine bolts
100	½ x 8¾ in.	machine bolts
75	½ x 6 in.	machine bolts
50	½ x 5¾ in.	machine bolts
30	½ x 4 in.	machine bolts

MISCELLANEOUS

	4 ft. 0 in. x 4 x ¼ in. steel plate
3	⅝ in. rod—20 ft. 0 in.
40	⅝ in. nuts
	2 in. O.D. steel pipe—2 ft. 2 in.

LUMBER

Quantity	*Stock*	*Length*
1	2 x 4	18 ft. 0 in.
6	2 x 8	16 ft. 0 in.
6	2 x 8	18 ft. 0 in.
1	2 x 10	10 ft. 0 in.
2	2 x 10	12 ft. 0 in.
2	2 x 10	16 ft. 0 in.
1	2 x 10	18 ft. 0 in.
6	1 x 8	16 ft. 0 in.
16	2 x 4	10 ft. 0 in.
2	2 x 4	12 ft. 0 in.
12	2 x 6	10 ft. 0 in.
4	2 x 6	12 ft. 0 in.
1	2 x 8	8 ft. 0 in.
5	2 x 8	10 ft. 0 in.
4	2 x 8	12 ft. 0 in.
6	2 x 8	14 ft. 0 in.
9	2 x 8	16 ft. 0 in.
14	2 x 8	18 ft. 0 in.

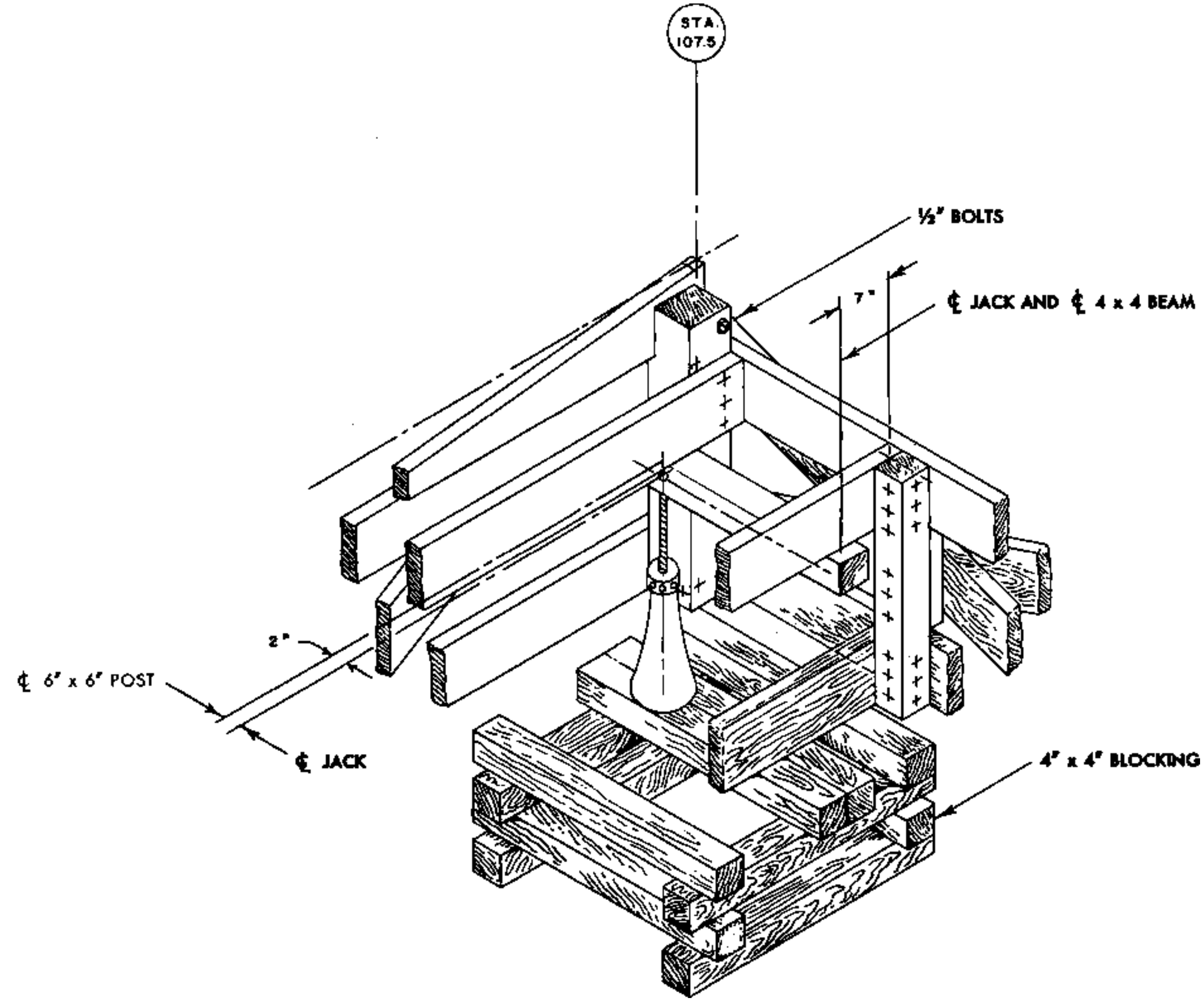


FIGURE 249—METHOD OF JACKING CENTER PANEL

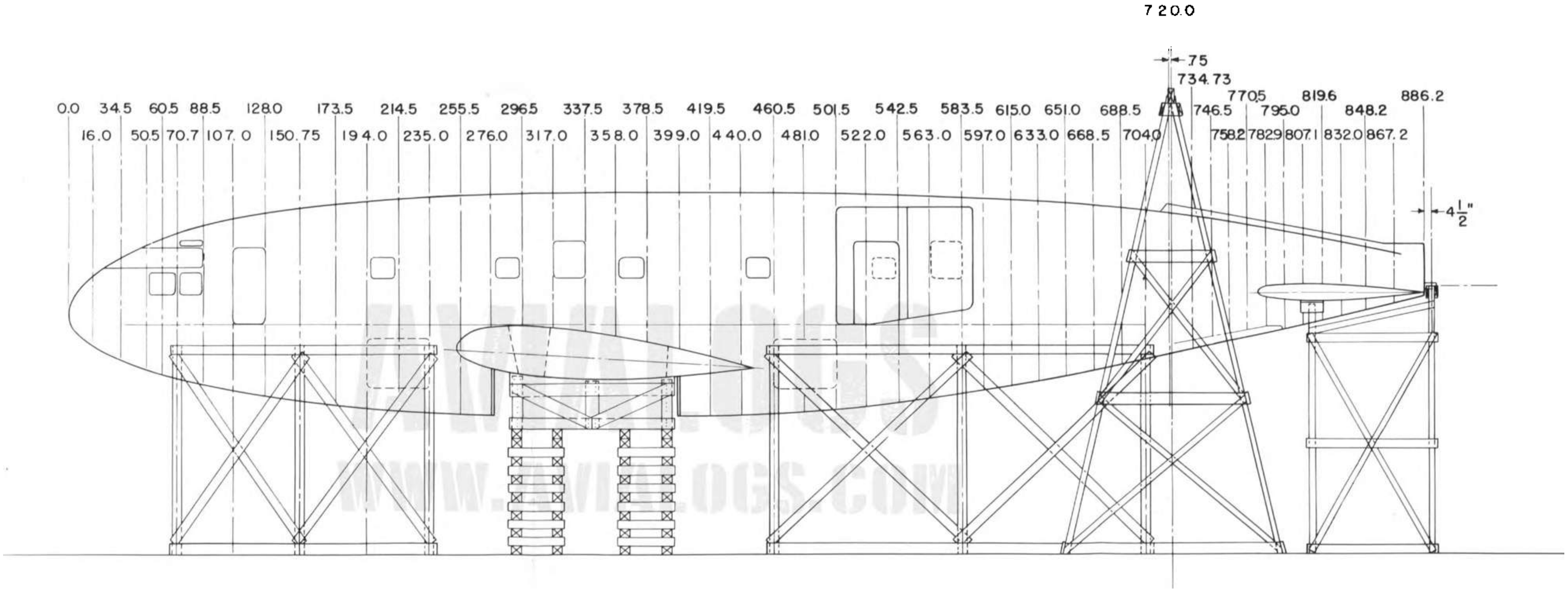
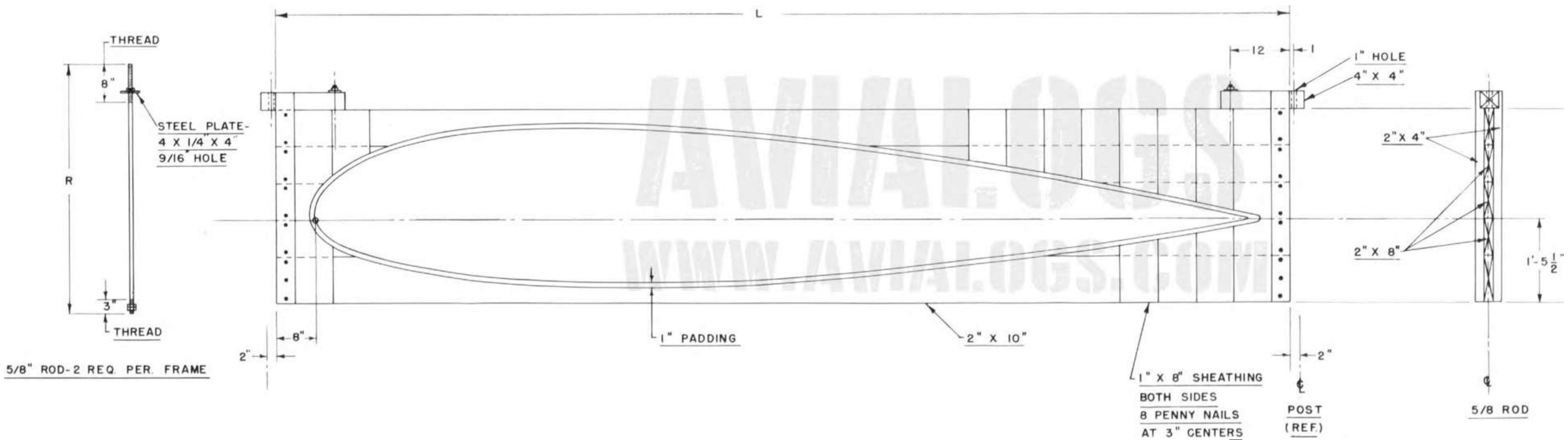


FIGURE 250—DISASSEMBLY JIGS IN POSITION

STA	L	H	R
22	17'-4"	3'-4 3/4"	4'-2"
82	15'-10 3/4"	3'-2 3/4"	4'-0"
142	14'-5 1/2"	3'-0 3/4"	3'-10"
232	12'-3 5/8"	2'-9"	3'-6 1/4"
322	10'-1 7/8"	2'-5 1/4"	3-2 1/2
412	8'-0"	2'-3 1/4"	3-0 1/2

NOTE
USE 1/2" DIA BOLTS WITH WASHER EACH SIDE
2" MIN. END DISTANCE - 1" MIN. EDGE DISTANCE
SPACE AT 2" CENTERS MIN



TYPICAL FRAME

FIGURE 251—WING OUTER PANEL HOLDING JIG—SHEET 1 OF 2 SHEETS

TABLE 94
OUTER PANEL STATION CONTOUR TABLE

Station 22.0			*Station 82.0*			*Station 142.0*			*Station 232.0*			*Station 322.0*			*Station 412.0*		
Dist. Aft	*Upper*	*Lower*	*Dist. Aft*	*Upper*	*Lower*	*Dist. Aft*	*Upper*	*Lower*	*Dist. Aft*	*Upper*	*Lower*	*Dist. Aft*	*Upper*	*Lower*	*Dist. Aft*	*Upper*	*Lower*
0	−.18	− .18	0	−.66	−.66	0	−1.13	−1.13	0	−1.86	−1.86	0	−2.57	−2.57	0	−3.32	−3.32
2.40	7.11	− 3.46	2.18	5.77	− 3.57	1.97	4.43	−3.67	1.64	2.42	−3.83	1.32	0.40	−3.99	1.00	−1.60	−4.15
4.79	9.33	− 5.03	4.36	7.77	− 4.94	3.93	6.19	−4.84	3.28	3.83	−4.69	2.64	1.48	−4.54	1.99	−0.87	−4.39
9.58	12.34	− 6.89	8.72	10.47	− 6.53	7.86	8.60	−6.17	6.57	5.80	−5.63	5.27	3.01	−5.09	3.98	0.21	−4.55
14.37	14.38	− 8.25	13.08	12.34	− 7.68	11.79	10.29	−7.10	9.85	7.21	−6.24	7.91	4.15	−5.37	5.96	1.08	−4.51
19.17	15.91	− 9.30	17.44	13.74	− 8.55	15.72	11.57	−7.79	13.13	8.32	−6.66	10.55	5.07	−5.52	7.96	1.80	−4.38
28.75	17.78	−10.95	26.17	15.51	− 9.89	23.58	13.24	−8.82	19.70	9.84	−7.22	15.82	6.43	−5.62	11.94	3.03	−4.02
38.34	18.73	−12.15	34.89	16.46	−10.83	31.44	14.19	−9.50	26.27	10.79	−7.52	21.10	7.39	−5.53	15.92	3.97	−3.57
47.92	19.12	−12.85	43.61	16.90	−11.34	39.30	14.68	−9.83	32.84	11.36	−7.57	26.37	8.04	−5.30	19.91	4.71	−3.03
57.50	19.10	−13.20	52.33	16.97	−11.57	47.16	14.83	−9.93	39.40	11.63	−7.48	31.65	8.44	−5.02	23.89	5.23	−2.57
76.67	18.22	−13.00	69.78	16.31	−11.27	62.88	14.39	−9.53	52.54	11.53	−6.92	42.20	8.66	−4.32	31.85	5.78	−1.72
95.84	16.44	−11.98	87.22	14.81	−10.29	78.60	13.18	−8.60	65.67	10.73	−6.06	52.74	8.28	−3.52	39.81	5.82	−0.98
115.01	14.11	−10.43	104.66	12.79	− 8.88	94.32	11.48	−7.33	78.81	9.50	−5.00	63.29	7.53	−2.68	47.78	5.48	−0.30
134.18	11.26	− 8.46	122.11	10.29	− 7.12	110.04	9.32	−5.78	91.94	7.86	−3.77	73.84	6.41	−1.76	55.74	4.88	0.26
153.34	8.05	− 6.06	139.55	7.44	− 5.02	125.76	6.83	−3.97	105.39	5.91	−2.41	85.18	5.00	−0.84	63.71	3.95	0.73
172.51	4.33	− 3.16	157.00	4.12	− 2.51	141.48	3.90	−1.86	118.84	3.57	− .88	96.52	3.24	0.11	71.67	2.64	1.13
182.10	2.29	− 1.61	165.72	2.28	− 1.18	149.34	2.27	− .74	125.56	2.56	− .85	102.19	2.24	0.57	75.74	1.88	1.30
191.68	0.07	0.08	174.44	0.28	0.28	157.20	.49	.49	132.29	.80	.80	107.86	1.11	1.11	77.70	1.45	1.45

NOTE: Dimensions given under "UPPER" and "LOWER" are from the chord plane to the inside of padding.

REFERENCE:—Figure 251.

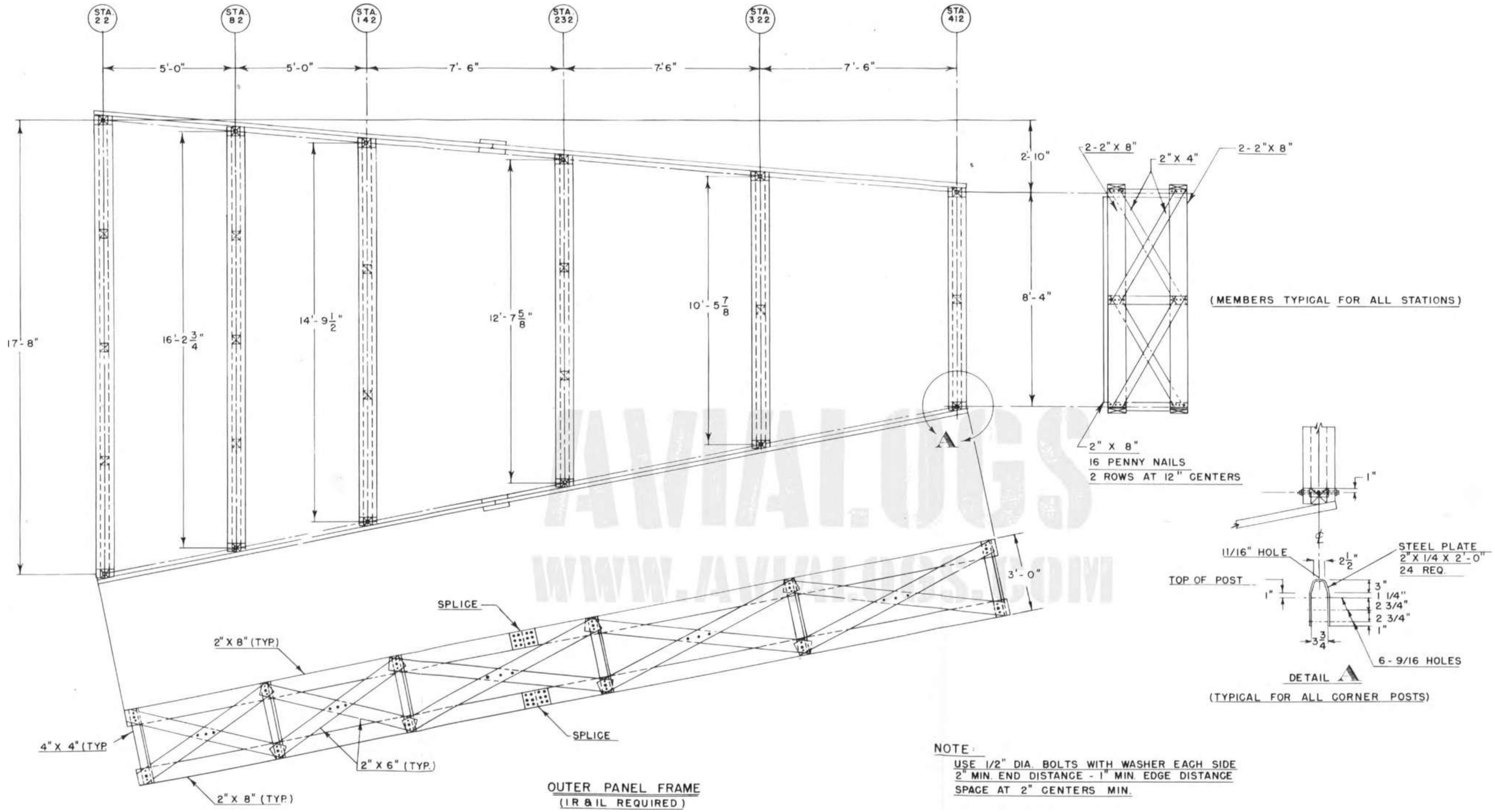
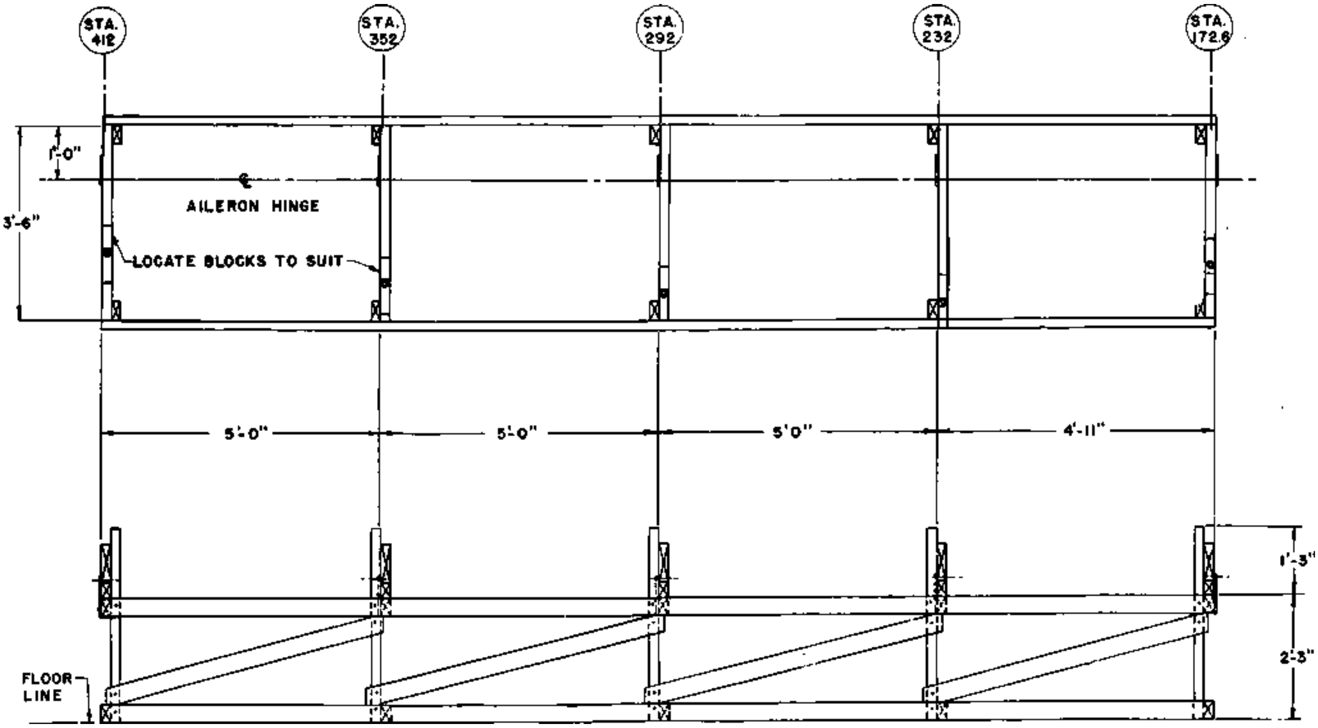
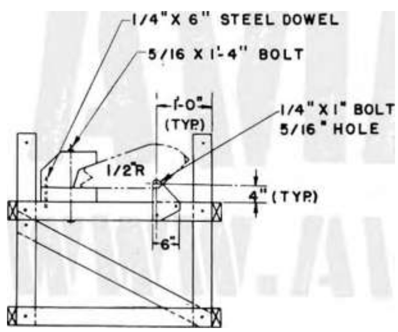


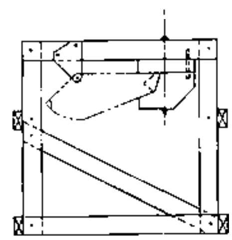
FIGURE 251—WING OUTER PANEL HOLDING JIG—SHEET 2 OF 2 SHEETS





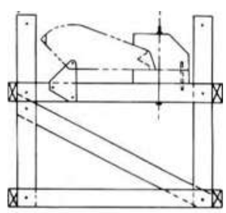
STA. 172.6

END VIEW SHOWING CROSS BEAM POSITION FOR WORK ON LOWER SURFACE OF RIGHT HAND AILERON.



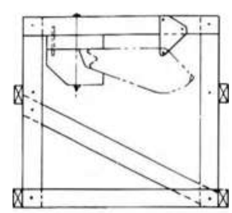
STA. 172.6

END VIEW SHOWING CROSS BEAM POSITION FOR WORK ON UPPER SURFACE OF RIGHT HAND AILERON.



STA. 172.6

END VIEW SHOWING CROSS BEAM POSITION FOR WORK ON LOWER SURFACE OF LEFT HAND AILERON.

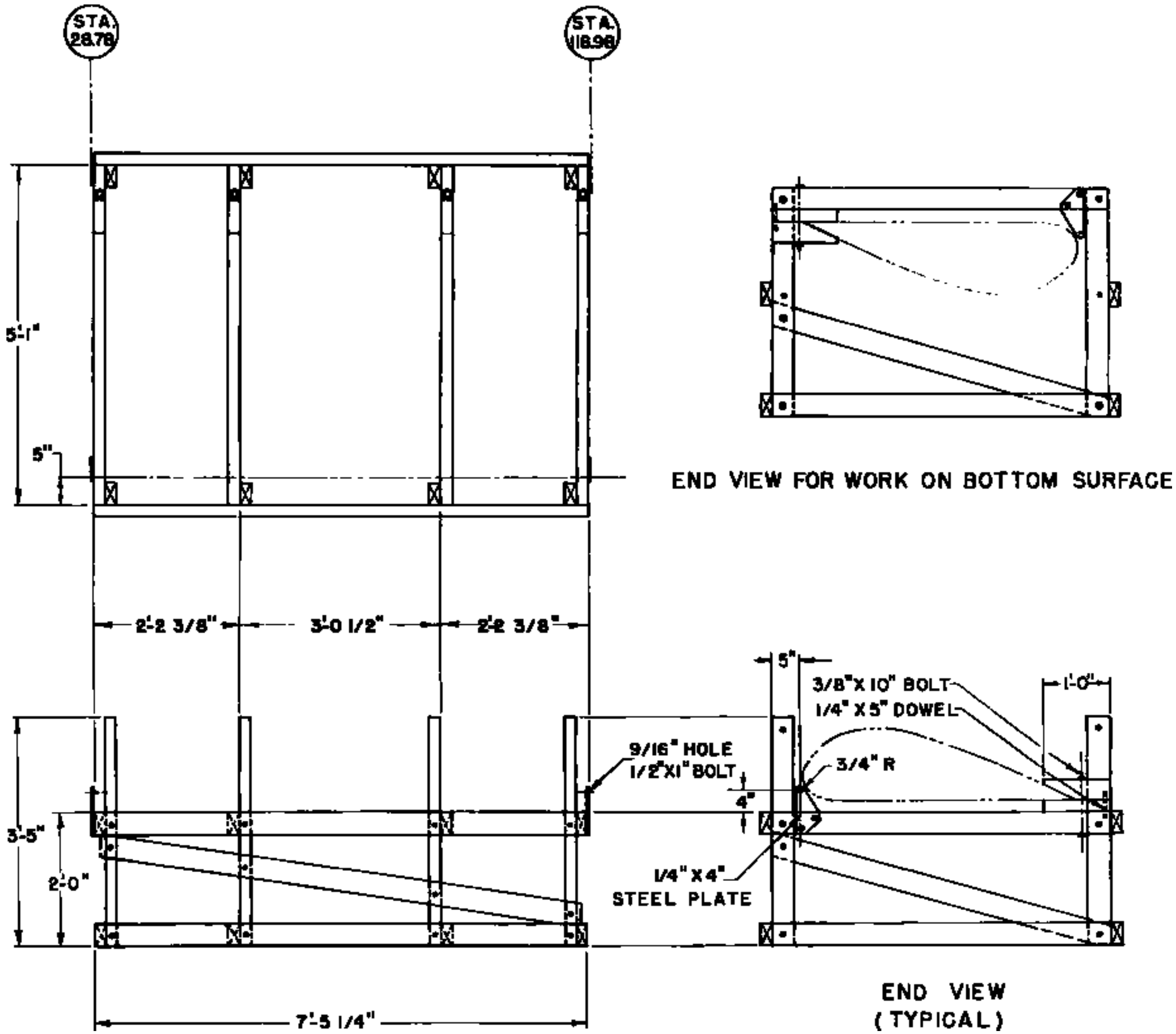


STA. 172.6

END VIEW SHOWING CROSS BEAM POSITION FOR WORK ON UPPER SURFACE OF LEFT HAND AILERON.

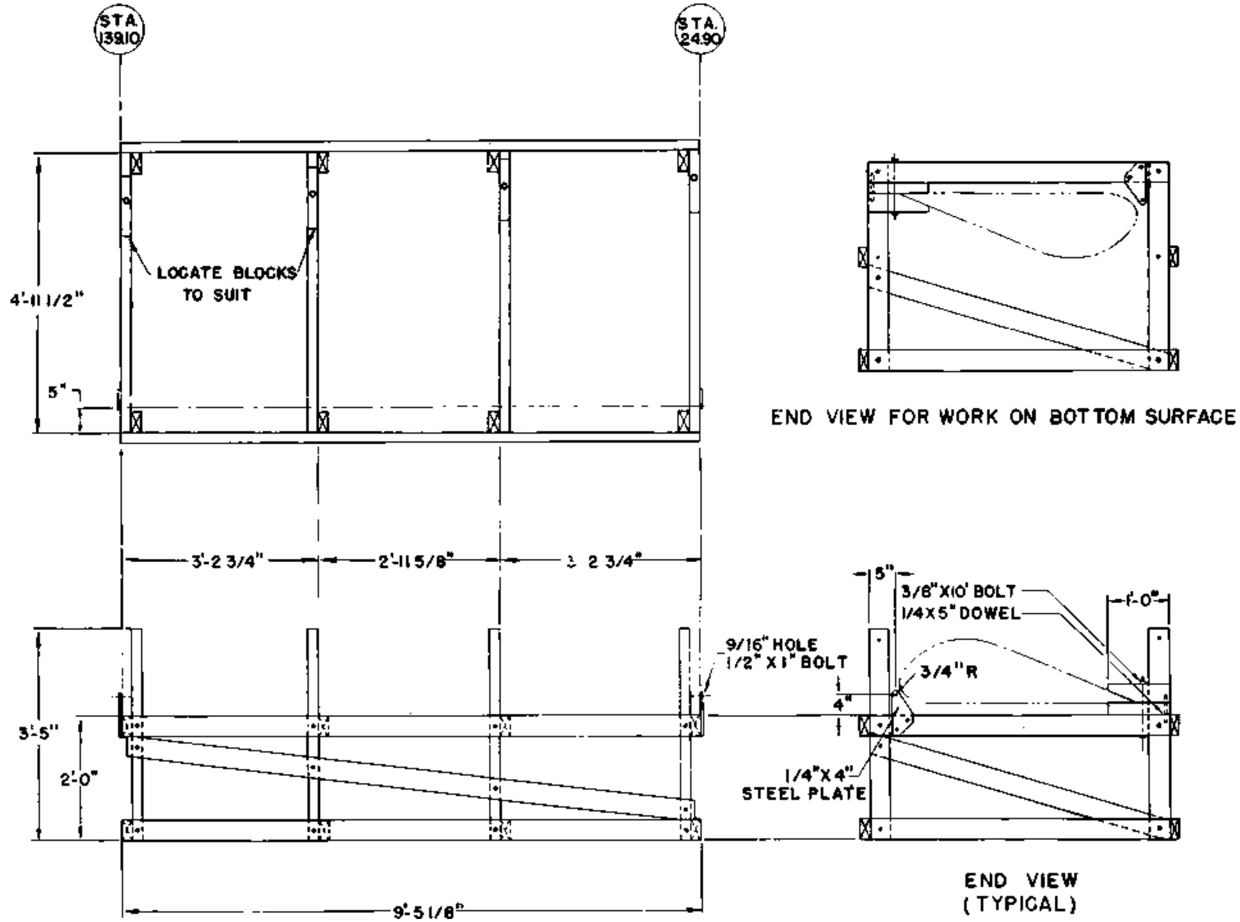
NOTES:
1. ALL MEMBERS ARE 2" X 4" STOCK.
2. USE 1/2" BOLTS WITH WASHER EACH SIDE.
3. CUT NOTCH TO FIT TRAILING EDGE CONTOUR, DEPTH APPROXIMATELY 3"

FIGURE 252—AILERON HOLDING JIG



NOTES:
1. ALL MEMBERS ARE 2"X4" STOCK.
2. USE 1/2" BOLTS WITH WASHER ON EACH SIDE.
3. CUT NOTCH TO FIT TRAILING EDGE CONTOURS AS SHOWN.

FIGURE 253—FLAP HOLDING JIG—CENTER PANEL



NOTE:
1. ALL MEMBERS ARE 2" X 4" STOCK.
2. USE 1/2" BOLTS WITH WASHER EACH SIDE.
3. CUT NOTCH TO FIT TRAILING EDGE CONTOURS AS SHOWN.

FIGURE 254—FLAP HOLDING JIG—OUTER PANEL

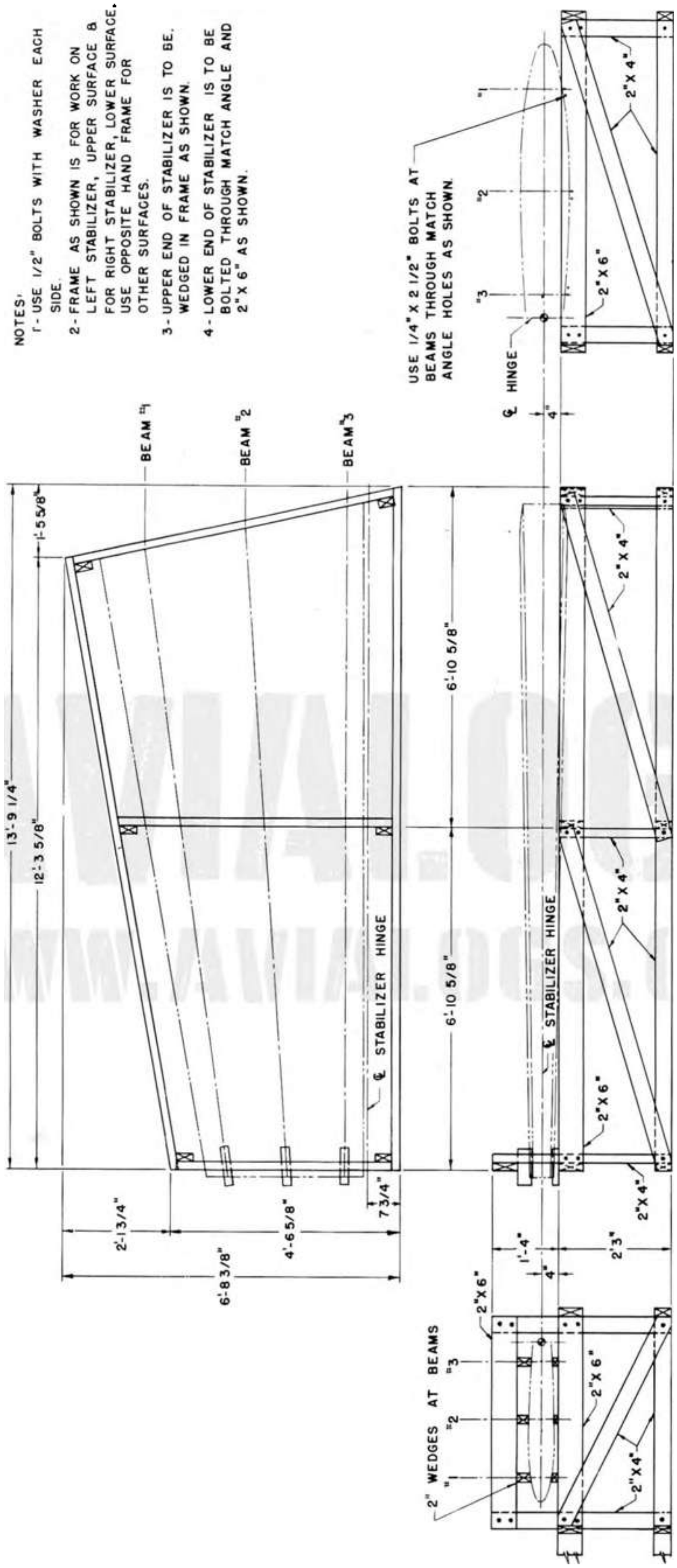


FIGURE 255—STABILIZER HOLDING JIG

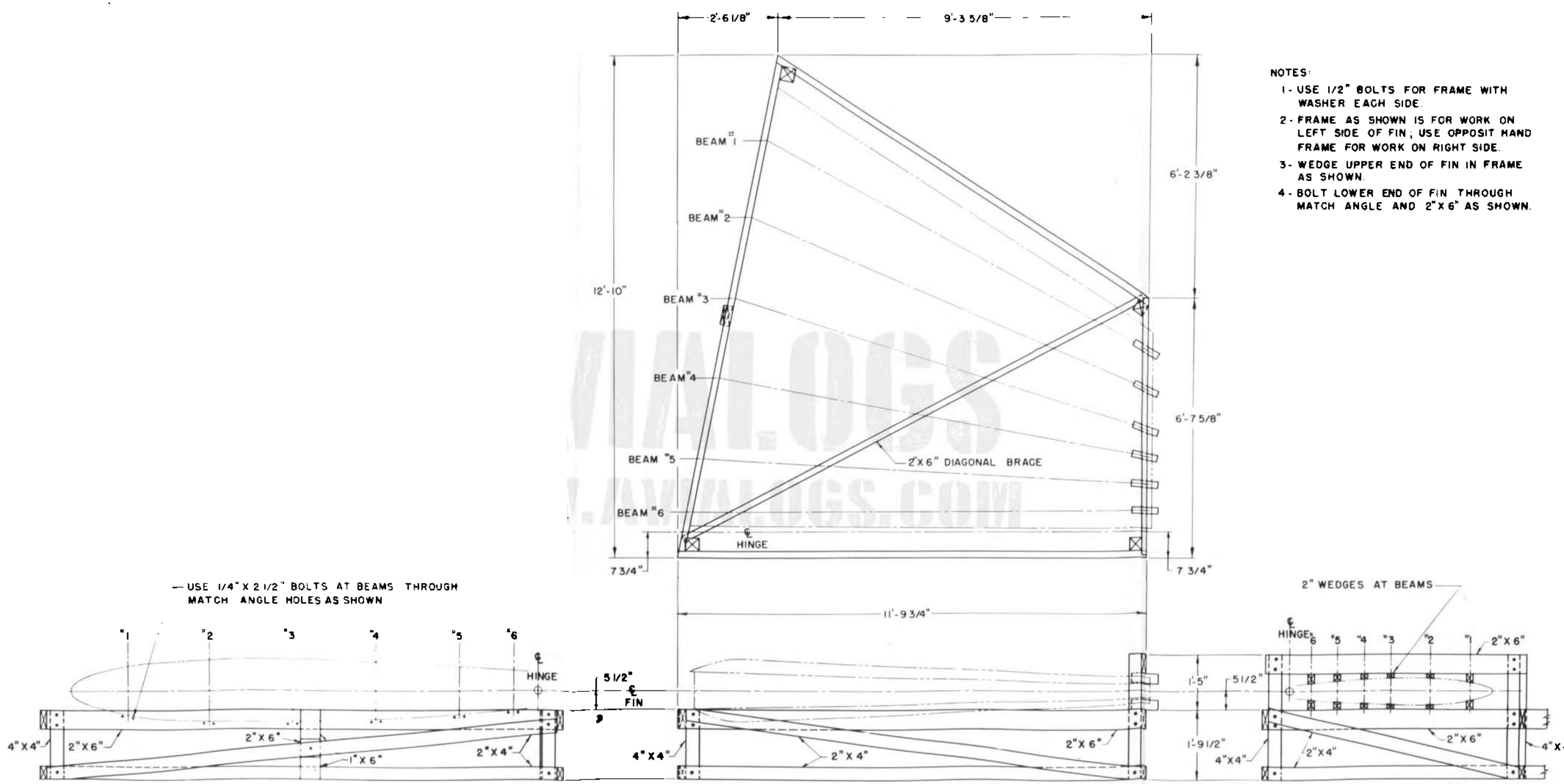
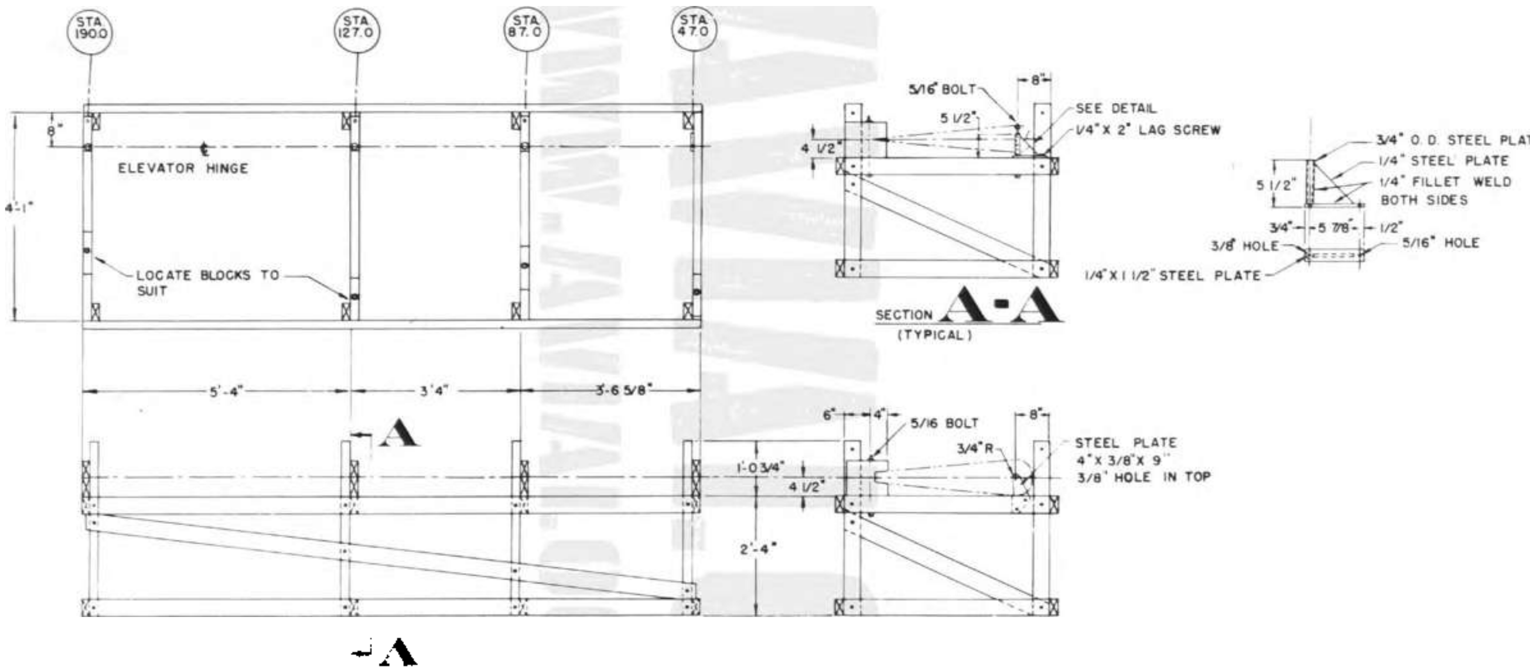


FIGURE 256—FIN HOLDING JIG



TYPICAL SECTION SHOWING ELEVATOR WITH OPPOSITE SIDE IN WORK

NOTES
1 USE 2" X 4" STOCK FOR ALL MEMBERS
2 USE 1/2" BOLTS WITH WASHER EACH SIDE
3 CUT NOTCH TO FIT TRAILING EDGE CONTOUR DEPTH APPROXIMATELY 3"
4 RAISE AND ROTATE BEAMS AS SHOWN FOR WORK ON OPPOSITE SIDE
5 FRAME AS SHOWN IS FOR LEFT ELEVATOR. REVERSE BEAMS FOR RIGHT ELEVATOR

FIGURE 257—ELEVATOR HOLDING JIG

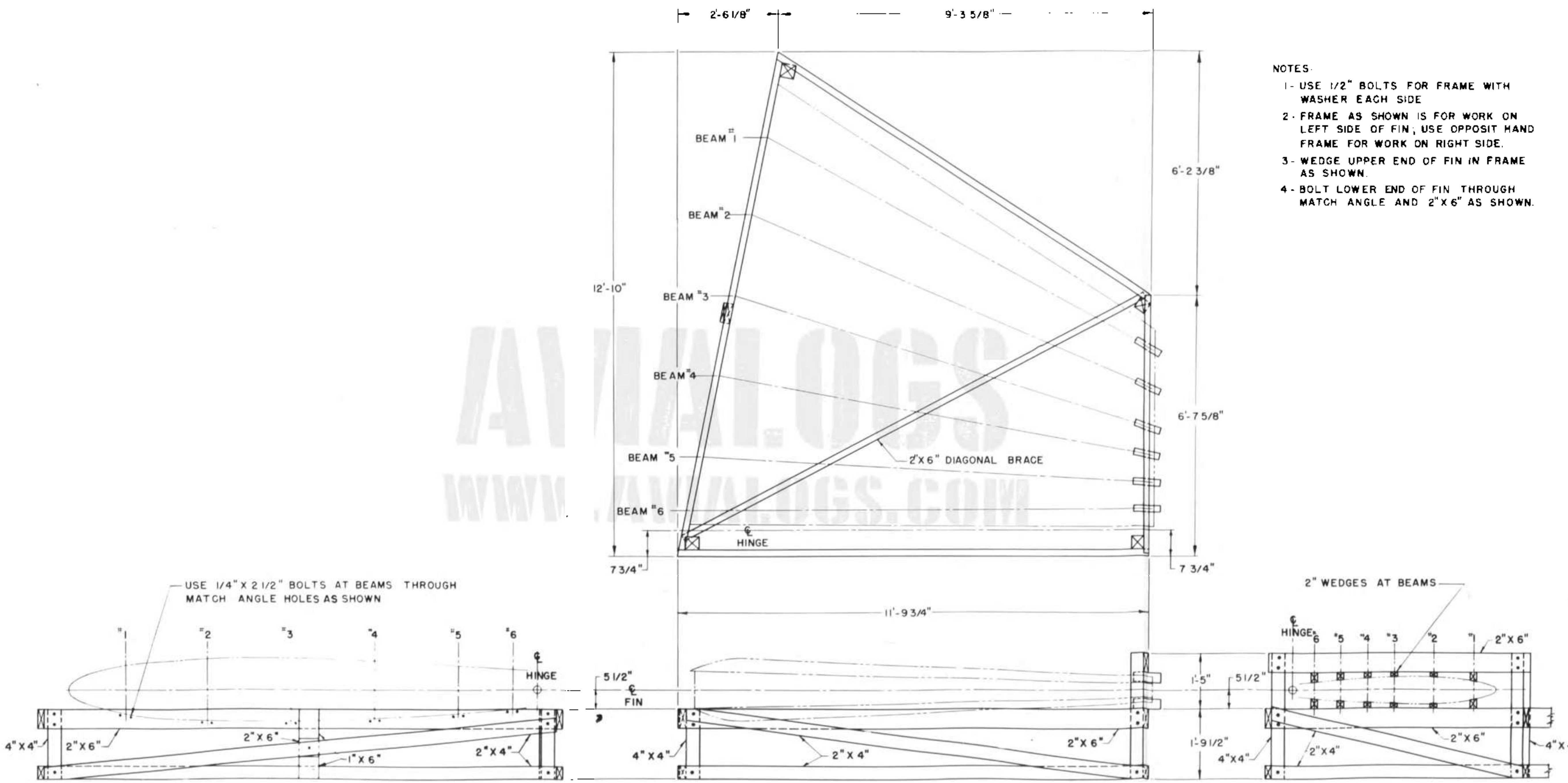
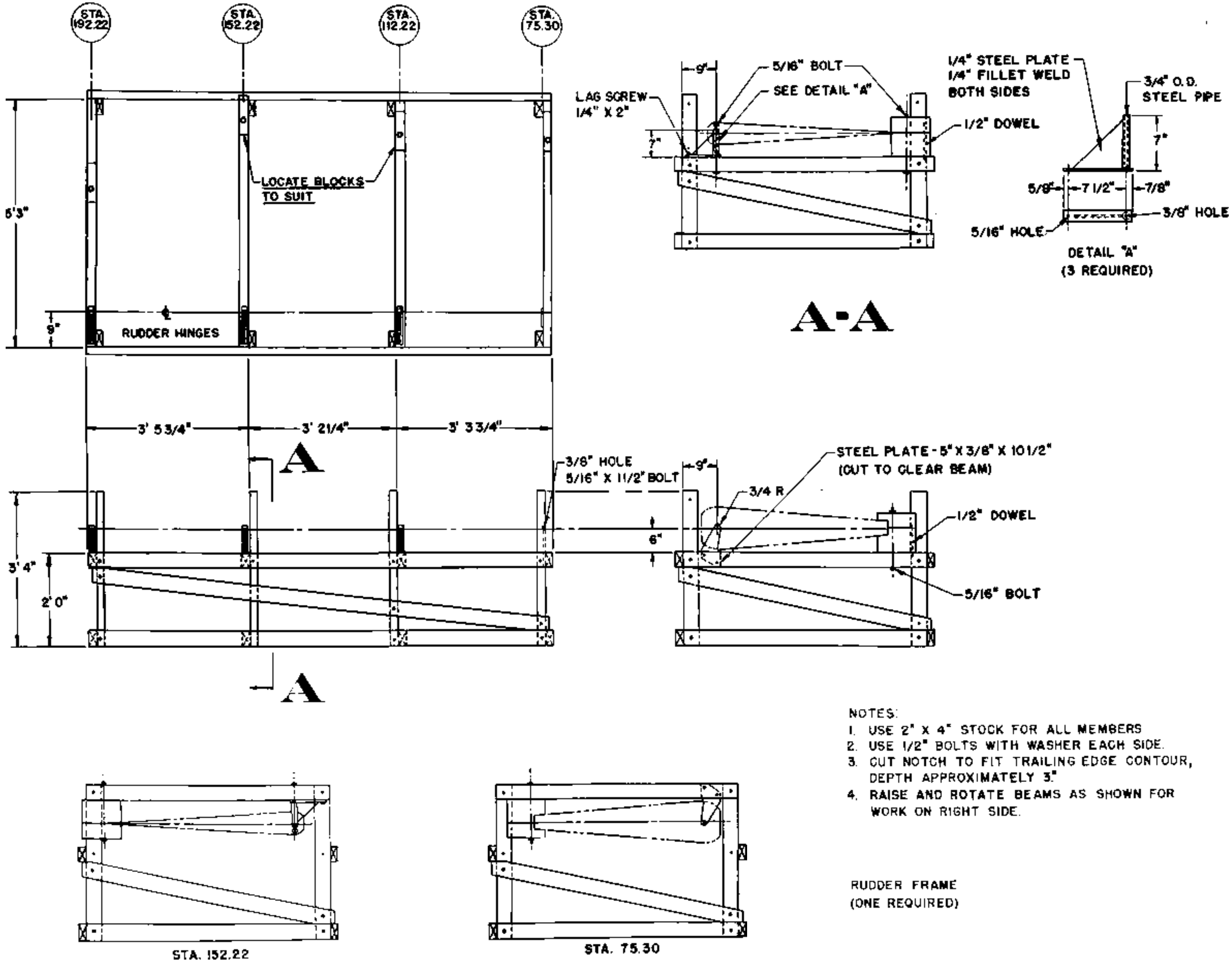


FIGURE 256—FIN HOLDING JIG



NOTES:
1. USE 2" X 4" STOCK FOR ALL MEMBERS
2. USE 1/2" BOLTS WITH WASHER EACH SIDE.
3. CUT NOTCH TO FIT TRAILING EDGE CONTOUR, DEPTH APPROXIMATELY 3"
4. RAISE AND ROTATE BEAMS AS SHOWN FOR WORK ON RIGHT SIDE.

RUDDER FRAME
(ONE REQUIRED)

FIGURE 258—RUDDER HOLDING JIG

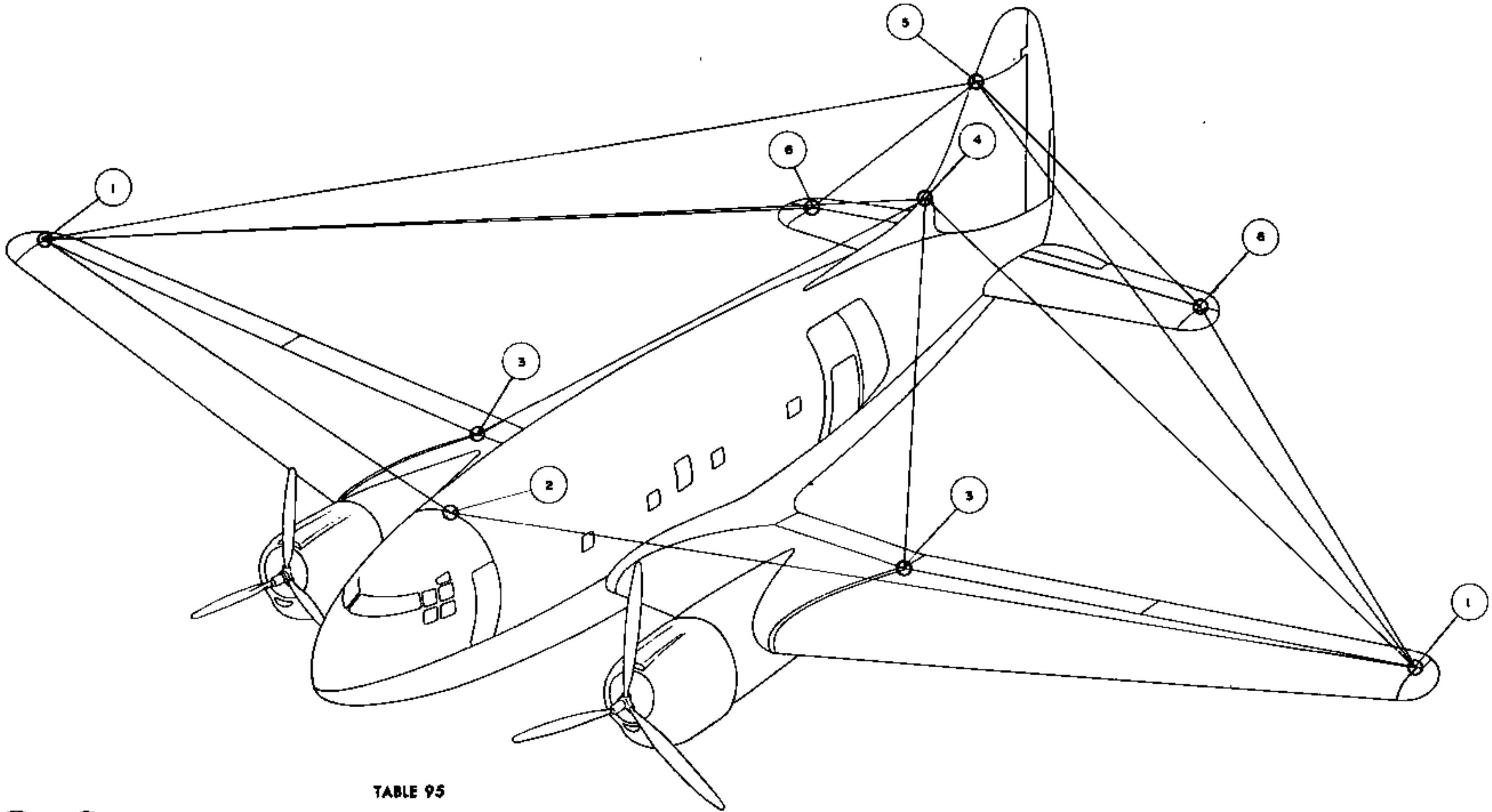


TABLE 95

1 — 2	55'-3"
1 — 4	58'-4 1/2"
1 — 5	61'-4"
1 — 6	49'-9"
3 — 4	30'-4 1/2"
5 — 6	21'-7"

1	AFT OUTBOARD CORNER OF OUTER PANEL SKIN
2	EDGE OF SKIN ABOVE PILOT'S DOOR
3	INTERSECTION OF CENTER AND OUTER PANEL SKINS AT UPPER TRAILING EDGE OF WING.
4	AFT EDGE OF DORSAL FIN FAIRING AT VERTICAL CENTER LINE OF AIRPLANE
5	LEADING EDGE OF FIN TIP ON VERTICAL CENTER LINE OF AIRPLANE
6	AFT OUTBOARD CORNER OF UPPER STABILIZER SKIN.

FIGURE 259—AIRPLANE ALIGNMENT DIAGRAM

TABLE 96
AMERICAN (NATIONAL) STANDARD SCREW THREADS

Diameter of screw, inch	*Threads per inch*	*Diameter at root of thread, inch*	*Double depth of thread, inch*	*Width of flat, inch*	*Area of section at root of thread, square inch*	*Diameter of screw, inch*	*Threads per inch*	*Diameter at root of thread, inch*	*Double depth of thread, inch*	*Width of flat, inch*	*Area of section at root of thread, square inch*
1/4	20	0.1850	0.0650	0.0063	0.027	2	4 1/2	1.7113	0.2887	0.0278	2.302
5/16	18	0.2403	0.0717	0.0069	0.045	2 1/4	4 1/2	1.9613	0.2887	0.0278	3.023
3/8	16	0.2936	0.0814	0.0078	0.068	2 1/2	4	2.1752	0.3248	0.0313	3.719
7/16	14	0.3447	0.0923	0.0089	0.093	2 3/4	4	2.4252	0.3248	0.0313	4.620
1/2	13	0.4001	0.0999	0.0096	0.126	3	3 1/2	2.6288	0.3712	0.0357	5.428
9/16	12	0.4542	0.1078	0.0104	0.162	3 1/4	3 1/2	2.8788	0.3712	0.0357	6.510
5/8	11	0.5069	0.1181	0.0114	0.202	3 1/2	3 1/4	3.1003	0.3997	0.0385	7.548
3/4	10	0.6201	0.1299	0.0125	0.302	3 3/4	3	3.3170	0.4330	0.0417	8.641
7/8	9	0.7307	0.1443	0.0139	0.420	4	3	3.5670	0.4330	0.0417	9.963
1	8	0.8376	0.1624	0.0156	0.550	4 1/4	2 7/8	3.7982	0.4518	0.0435	11.329
1 1/8	7	0.9394	0.1856	0.0179	0.694	4 1/2	2 3/4	4.0276	0.4724	0.0455	12.753
1 1/4	7	1.0644	0.1856	0.0179	0.893	4 3/4	2 5/8	4.2551	0.4949	0.0476	14.226
1 3/8	6	1.1585	0.2165	0.0208	1.057	5	2 1/2	4.4804	0.5196	0.0500	15.763
1 1/2	6	1.2835	0.2165	0.0208	1.295	5 1/4	2 1/2	4.7304	0.5196	0.0500	17.572
1 5/8	5 1/2	1.3888	0.2362	0.0227	1.515	5 1/2	2 3/8	4.9530	0.5470	0.0526	19.267
1 3/4	5	1.4902	0.2598	0.0250	1.746	5 3/4	2 3/8	5.2030	0.5470	0.0526	21.262
1 7/8	5	1.6152	0.2598	0.0250	2.051	6	2 1/4	5.4226	0.5774	0.0556	23.098

TABLE 97
BRITISH ASSOCIATION SCREW THREADS

Number	*Diameter of screw, mm*	*Approximate diameter, inch*	*Pitch, mm*	*Approximate pitch, inch*	*Diameter at root of thread, mm*	*Number*	*Diameter of screw, mm*	*Approximate diameter, inch*	*Pitch mm*	*Approximate Pitch, inch*	*Diameter at root of thread, mm*
0	6.0	0.236	1.00	0.0394	4.8	13	1.20	0.047	0.25	0.0098	0.90
1	5.3	0.209	0.90	0.0354	4.22	14	1.00	0.039	0.23	0.0091	0.72
2	4.7	0.185	0.81	0.0319	3.73	15	0.90	0.035	0.21	0.0083	0.65
3	4.1	0.161	0.73	0.0287	3.22	16	0.79	0.031	0.19	0.0075	0.56
4	3.6	0.142	0.66	0.0260	2.81	17	0.70	0.028	0.17	0.0067	0.50
5	3.2	0.126	0.59	0.0232	2.49	18	0.62	0.024	0.15	0.0059	0.44
6	2.8	0.110	0.53	0.0209	2.16	19	0.54	0.021	0.14	0.0055	0.37
7	2.5	0.098	0.48	0.0189	1.92	20	0.48	0.019	0.12	0.0047	0.34
8	2.2	0.087	0.43	0.0169	1.68	21	0.42	0.017	0.11	0.0043	0.29
9	1.9	0.075	0.39	0.0154	1.43	22	0.37	0.015	0.10	0.0039	0.25
10	1.7	0.067	0.35	0.0138	1.28	23	0.33	0.013	0.09	0.0035	0.22
11	1.5	0.059	0.31	0.0122	1.13	24	0.29	0.011	0.08	0.0031	0.19
12	1.3	0.051	0.28	0.0110	0.96	25	0.25	0.010	0.07	0.0028	0.17

TABLE 98

BRITISH STANDARD FINE SCREW THREADS

Full Diameter In Inches	*Number of Threads Per Inch*	*Pitch in Inches*	*Diameter at Bottom of Thread, Inches*
1/4	25	.0400	.1988
5/16	22	.0455	.2543
3/8	20	.0500	.3110
7/16	18	.0556	.3664
1/2	16	.0625	.4200
9/16	16	.0625	.4825
5/8	14	.0714	.5335
11/16	14	.0714	.5960
3/4	12	.0833	.6433
13/16	12	.0833	.7058
7/8	11	.0909	.7586
1	10	.1000	.8719
1 1/8	9	.1111	.9827
1 1/4	9	.1111	1.1077
1 3/8	8	.1250	1.2149
1 1/2	8	.1250	1.3399
1 5/8	8	.1250	1.4649
1 3/4	7	.1429	1.5670
2	7	.1429	1.8170
2 1/4	6	.1667	2.0366
2 1/2	6	.1667	2.2866
2 3/4	6	.1667	2.5366
3	5	.2000	2.7439
3 1/4	5	.2000	2.9939
3 1/2	4.5	.2222	3.2154
3 3/4	4.5	.2222	3.4654
4	4.5	.2222	3.7154
4 1/2	4	.2500	4.1798
5	4	.2500	4.6798
5 1/2	3.5	.2857	5.1341
6	3.5	.2857	5.6341