OVERHAUL SPECIFICATION 7007

SHEET METAL REPAIRS

1. SCOPE

1.1 Purpose.- The purpose of this specification is to provide instructions for making repairs of a general nature to sheet metal parts and minor structural members and to authorize their use in the reconditioning and overhauling of aircraft parts.

1.2 Application.- All repairs covered by this specification may be accomplished where required without further authorization provided that the use of this specification is authorized by the detail overhaul specification for the part or assembly involved. Repairs not authorized by this specification cannot be performed without further authorization.

1.3 List of Pages and Revisions.- This specification consists of the pages listed below. An asterisk (*) denotes pages revised at the current revision.

Page	Date	Description of Revision	Serial Effectivity
1	4-7-53		
2	4-7-53		
3	4-7-53		
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APPROVED:

Kenneth O'Connor
USAF Quality Control

WRITTEN BY R. B. Taylor	DATE ISSUED 4-7-53	OVERHAUL SPECIFICATION SHEET METAL REPAIRS		
PROJECT ENGINEER R. B. Taylor				
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2. APPLICABLE PUBLICATIONS

2.1 Technical Orders.- Compliance with this specification constitutes compliance with the technical orders listed below insofar as the repairs authorized herein are concerned.

AN01-1A-1	General Manual for Structural Repair, dated April 21, 1952
01-90CDB-3	Handbook - Structural Repair Instructions, dated August 15, 1952

3. REQUIREMENTS

3.1 Parts Involved.- The parts involved consist of each sheet metal part and assembly for which the use of this specification has been authorized by the detail overhaul specification for that specific part or assembly.

3.2 Cause for Rejection.- Damage or wear which cannot be corrected by one or more of the authorized repairs listed in Paragraph 3.3 of this specification or in Paragraph 3.4 of the detail overhaul specification for the specific part or assembly involved is cause for rejection.

3.3 Authorized Repairs:

3.3.1 Sheet Metal Repairs:

3.3.1.1 Flush Type Patches.- Flush type patches will be used in repairing damage to skin surfaces and in repairing damage to sheet metal parts, bulkhead webbing, etc., inside the cabin and cockpit which is visible to the occupants of the airplane. Three types of flush patches are authorized and the one chosen for use will be determined by the location and extent of damage.

3.3.1.1.1 Type I.- This type of repair employs a round plug riveted or spotwelded to a doubler. It will be used to repair small cracks and deep scratches not to exceed 2-1/2 inches in length and punctures and bad dents not to exceed 2-1/2 inches in diameter. The diameter of the plug may vary from 1/2-inch to 2-1/2-inches, in increments of 1/2 inch, depending upon the size of the damaged area. The diameter of the doubler will be eight rivet diameters greater than the diameter of the plug. See Figure 1. Accomplish the repair as follows:

(a) Cut a round hole of sufficient size to completely remove the damaged area. The hole may vary from 1/2 inch to 2-1/2 inches in diameter in increments of 1/2 inch.

(b) Make a round plug of the same diameter as the hole. Make the plug from the same type and gauge material as that being repaired.

(c) Make a round doubler having a diameter eight rivet diameters greater than that of the plug. Make the doubler of the same type material as that being repaired and one gauge heavier.

(d) Center the plug on the doubler and secure the plug to the doubler, using rivets of the same size and type as those in the surrounding skin joints. Space the rivets approximately 3/4-inch apart and maintain approximately 2D edge distance from the edge of the plug.

(e) Place the plug in the hole to be patched with the doubler contacting the inside surface and secure the doubler, using rivets of the same size and type as those used in adjacent skin joints. Space the rivets approximately three rivet diameters apart and maintain approximately 2 rivet diameters edge distance from the edge of the hole and from the edge of the doubler.

3.3.1.1.2 Type II.- Damaged areas exceeding 2-1/2 inches in length in locations in which it is possible to buck rivets will be repaired as illustrated in Figure 2. The size of the patch will be determined by the size of the damaged area but in no case will it exceed the limitations established in Figure 2. Accomplish the repair as follows:

(a) Cut a hole of sufficient size to completely remove the damaged area in accordance with Figure 2. Do not exceed the limitations established in Figure 2. The sides of the cut must parallel adjacent structural or supporting members.

3.3.1.1.2 Type II.- (Continued)

(b) Make a plug to fit the hole of the same type and gauge material as that being repaired.

(c) Make a doubler as shown in Figure 2 of the same type and next heavier gauge material as that being repaired.

(d) Secure the plug to the doubler using one row of rivets of the same type and size as those used in adjacent skin joints and spaced approximately 3/4-inch with two times rivet diameter edge distance from the edge of the plug.

(e) Secure the doubler to the inside surface of the skin using a staggered, double row of rivets of the same type and size as those used in adjacent skin joints. Space the rivets three times rivet diameter with four times rivet diameter between the rows. Maintain two times rivet diameter edge distance from the edge of the hole and the edge of the doubler.

3.3.1.1.3 Type III.- Damaged areas exceeding 2-1/2 inches in length in locations in which it is impossible to buck rivets will be repaired as illustrated in Figure 3. The size of the patch will be determined by the size of the damaged area but in no case will it exceed the limitations established in Figure 3. Accomplish the repair as follows:

(a) Cut a hole of sufficient size to completely remove the damaged area in accordance with Figure 3. Do not exceed the limitations established in Figure 3. The sides of the cut must parallel adjacent structural or supporting members.

(b) Make a plug to fit the hole of the same type and gauge material as that being repaired.

(c) Make a doubler as shown in Figure 3 of the same type and next heavier gauge material as that being repaired.

(d) Secure the doubler to the inside surface of the skin using two staggered rows of rivets of the same size and type as those used in adjacent skin joints. Space the rivets three times rivet diameter and four times rivet diameter between rows. Maintain two times rivet diameter edge distance from the edge of the hole and the edge of the doubler.

3.3.1.1.3 Type III.- (Continued)

(d) Install AN366-P832 nut plates on the inside surface of the doubler and spaced approximately 1-1/4 inches as shown in Figure 3.

(f) Drill the patch to match the nut plate locations and install it with NAS220-7 screws.

3.3.1.2 Rib Repairs.- Two types of rib repairs are authorized. Type I repairs are for comparitively minor damage such as small cracks or breaks not to exceed four inches in length. Type II repair is for extensive damage requiring removal and replacement of the damaged portion of the rib.

3.3.1.2.1 Type I.- Perform repair of minor damage to ribs as follows:

(a) Fabricate a patch plate of the same type material and one gauge heavier than that to be repaired. The size of the patch will be determined by the extent of damage. On small ribs it will be desirable to let the patch plate extend across the full width of the rib as shown in Figure 5. On large ribs it will be desirable to reinforce only the damaged area as shown in Figure 4.

(b) Stop drill the crack. Trim and smooth the edges of breaks and tears.

(c) Form the patch to fit rib or lightening hole flanges over which it should fall.

(d) Install the patch using the same type and size of rivets as those used to attach the rib to the supporting structure. If the patch falls on a rib flange, pick up existing rivets through the rib flange and add additional rivets of the same size and type as required to obtain approximately three times rivet diameter spacing.

(e) Maintain approximately two times rivet diameter edge distance from the edge of the crack and from radii at rib flanges and lightening hole flanges. Maintain approximately three times rivet diameter spacing between rivets. Stagger rivet rows and maintain approximately three times rivet diameter spacing between rows.

3.3.1.2.2 Type II.- Perform repair of extensive damage to ribs as follows:

(a) Remove the damaged section of the rib by making a straight cut across the width of the rib perpendicular to the horizontal centerline of the rib.

(b) Fabricate a new section of the same type and gauge material as that of the rib.

(c) Install the new section as shown in Figure 6 with splice plates made of the same type material and one gauge heavier than that of the rib.

(d) Pick up existing rivets through the rib and splice plate flanges. Add rivets through the splice plate flanges of the same type and size as existing rivets to obtain approximately three times rivet diameter spacing.

(e) Install three staggered rows or rivets through the splice plates and rib on each side of cut. Maintain approximately three times rivet diameter spacing between rivets and three times rivet diameter spacing between rivet rows. Maintain approximately two times rivet diameter edge distance from radii, edge of splice plates, and edge of cut.

3.3.2 Stringer Repairs.- The following repair applies to extrusions as well as formed sheet metal stringers. Repair cracks in stringers by installing a reinforcing angle as described below. Repair extensive damage by cutting out the damaged section and splicing in a new section made of the same type and gauge material as the damaged stringer. Install the new section with splice angles identical to the reinforcing angles described below. A maximum of two reinforcing angles or two splice angles may be installed on any one stringer. No adjacent stringers may be spliced in the same bay.

(a) Stop drill crack.

(b) Install a reinforcing angle of the same type and gauge material as the damaged stringer. See Figure 7.

(c) Pick up existing skin rivets through stringer and add rivets of the same type and size to obtain approximately three times rivet diameter spacing.

(d) Add rivets through the opposite flange of the stringer and reinforcing angle of the same type and size found in the supporting structure. Space rivets approximately three rivet diameters apart and maintain two rivet diameters edge distance from the radius, edge of stringer, and edge of crack.

4. INSPECTION

4.1 General.- Repairs will be inspected to the general acceptable quality standards of Overhaul Specification 7008 and the specific quality standards listed below.

(a) Rivets one size larger than those called for on engineering drawings may be used when necessary to fill oversize rivet holes in reconditioned parts with the exception of castings and forgings, provided a minimum of two times rivet diameter edge distance is maintained.

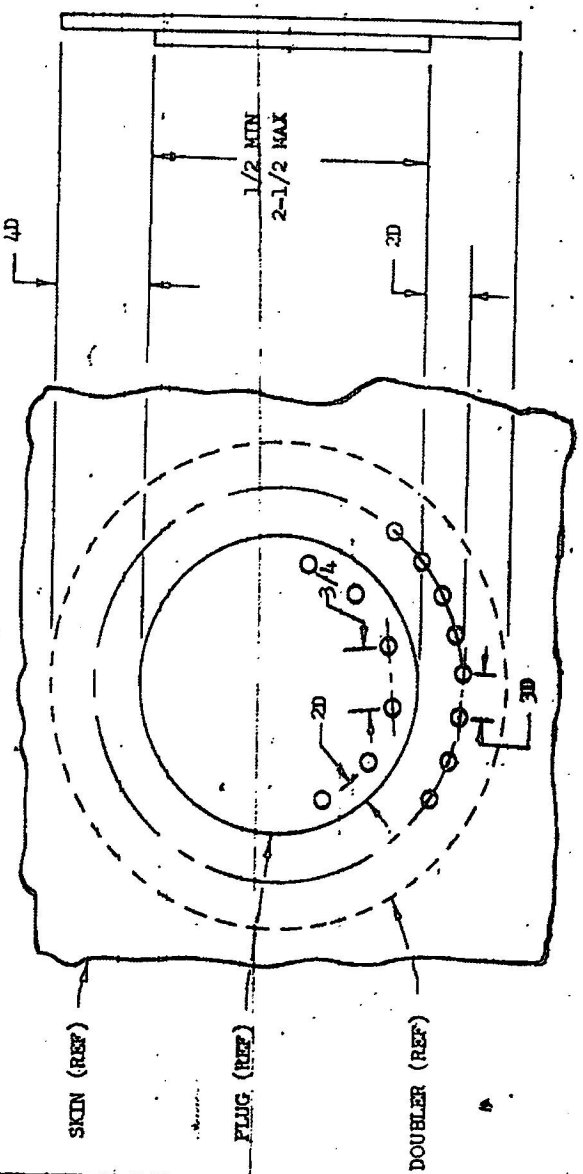

FIGURE 1

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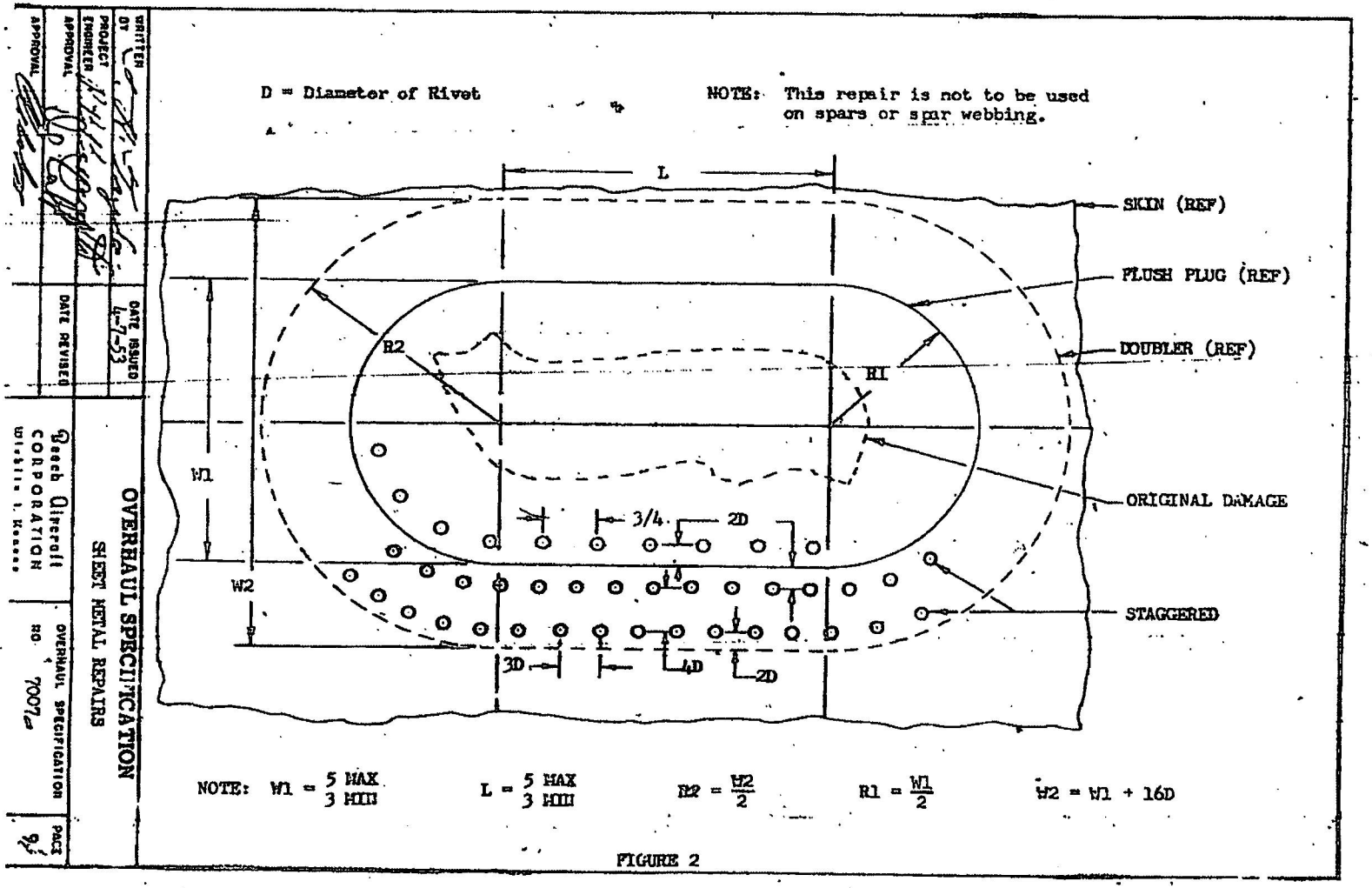
D = Diameter of Rivet
NOTE: This repair is not to be used on spars or spar webbing.
L
SKIN (REF)
FLUSH PLUG (REF)
DOUBLER (REF)
R2
R1
W1
ORIGINAL DAMAGE
3/4
2D
W2
STAGGERED
3D
4D
2D
NOTE: W1 = 5 MAX / 3 MIN
L = 5 MAX / 3 MIN
R2 = W2/2
R1 = W1/2
W2 = W1 + 16D
FIGURE 2
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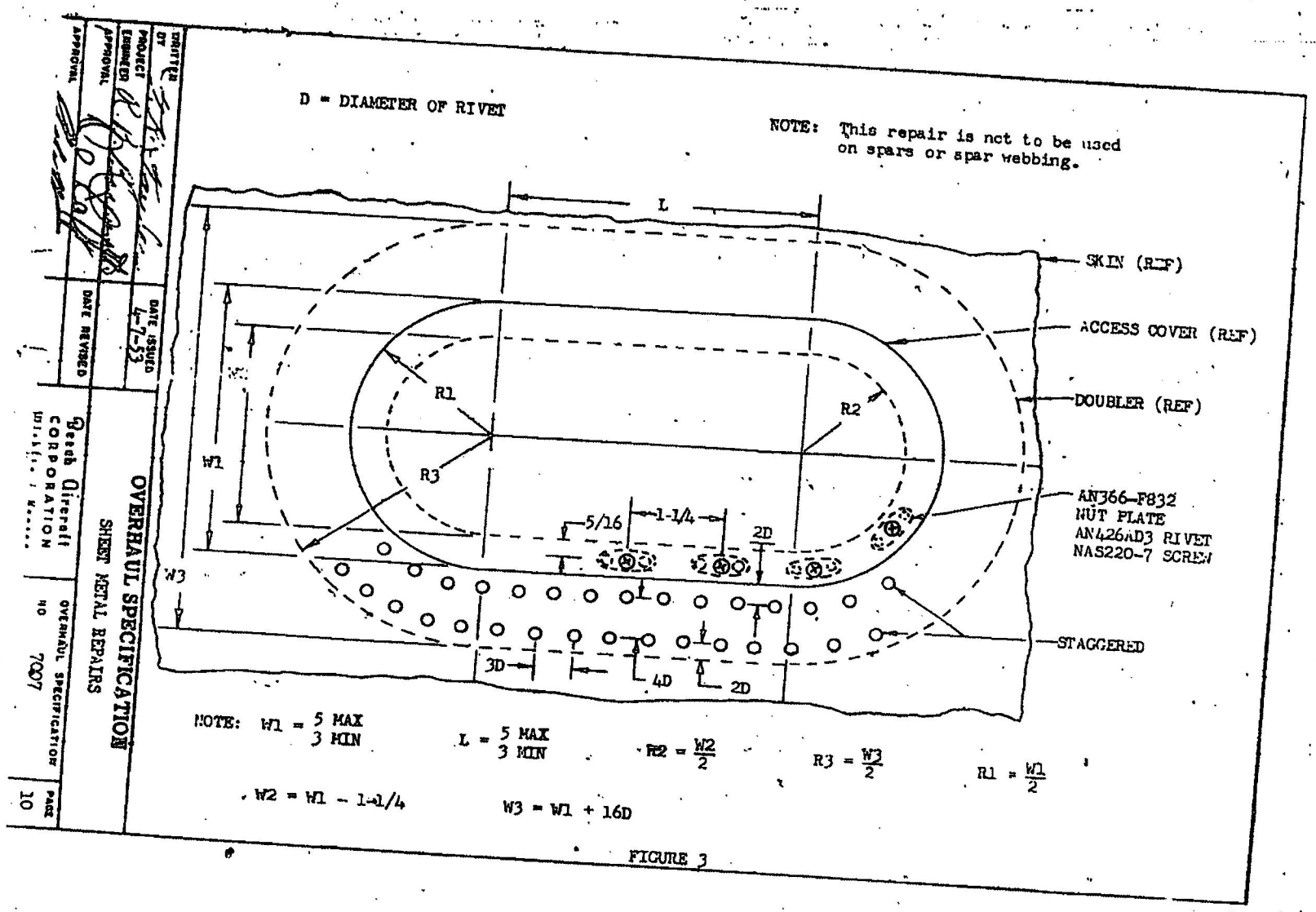
D = DIAMETER OF RIVET
NOTE: This repair is not to be used on spars or spar webbing.
L
SKIN (REF)
ACCESS COVER (REF)
DOUBLER (REF)
AN366-F832 NUT PLATE
AN426AD3 RIVET
NAS220-7 SCREW
STAGGERED
R1
R2
R3
W1
W3
5/16
1-1/4
2D
3D
4D
2D
NOTE: W1 = 5 MAX 3 MIN
L = 5 MAX 3 MIN
R2 = W2/2
R3 = W3/2
R1 = W1/2
W2 = W1 - 1-1/4
W3 = W1 + 16D
FIGURE 3
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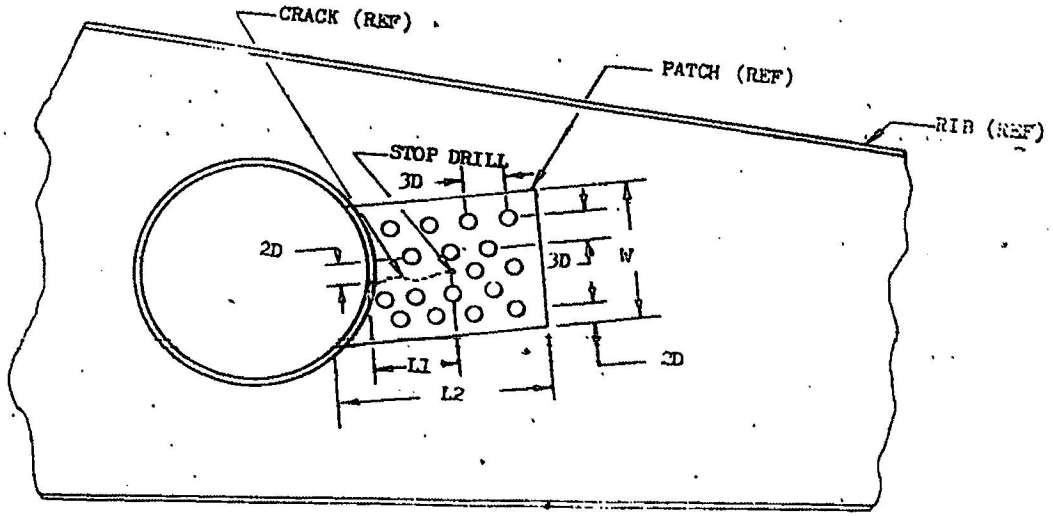

NOTE: D = DIAMETER OF RIVET

L1 = 4 MAX
3/16 MIN

L2 = L1 + 7D

W = AS REQUIRED TO MEET THE ABOVE REQUIREMENTS

FIGURE 4

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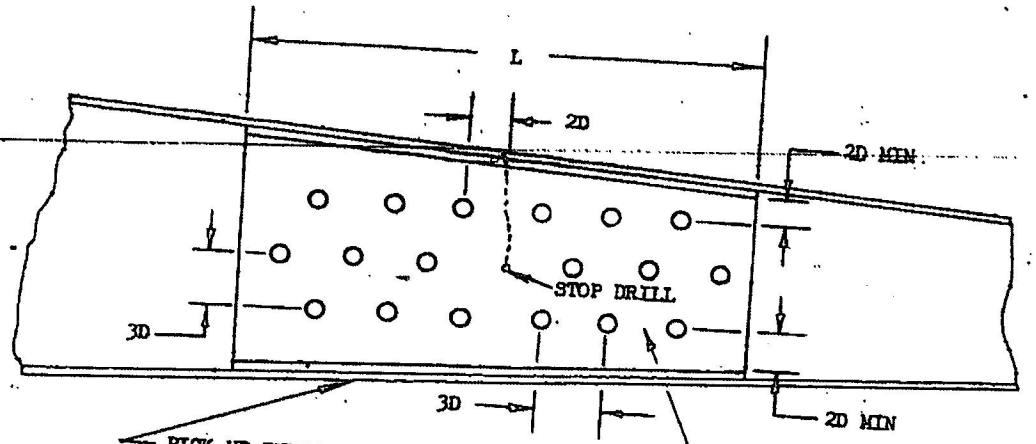
D = DIAMETER OF RIVET



PICK UP EXISTING RIVETS THROUGH FLANGE. ADD RIVETS SPACED APPROXIMATELY 3D BETWEEN EXISTING RIVETS. IF NO RIVETS EXIST IN FLANGE, ADD RIVETS SPACED 3D WITH 1-1/2D EDGE DISTANCE FROM EDGE OF FLANGE AND 1D FROM TANGENT POINT OF RADIUS.

PATCH - FORM TO MATCH RIB FLANGES. ADD THREE VERTICAL ROWS OF AN470AD OR AN430AD RIVETS ON EACH SIDE OF DAMAGE. MAINTAIN A MINIMUM 2D EDGE DISTANCE FROM ALL EDGES, CRACKS, AND RADIUS OF FLANGE.

NOTE: L = AS REQUIRED TO MEET THE ABOVE REQUIREMENTS.

FIGURE 5

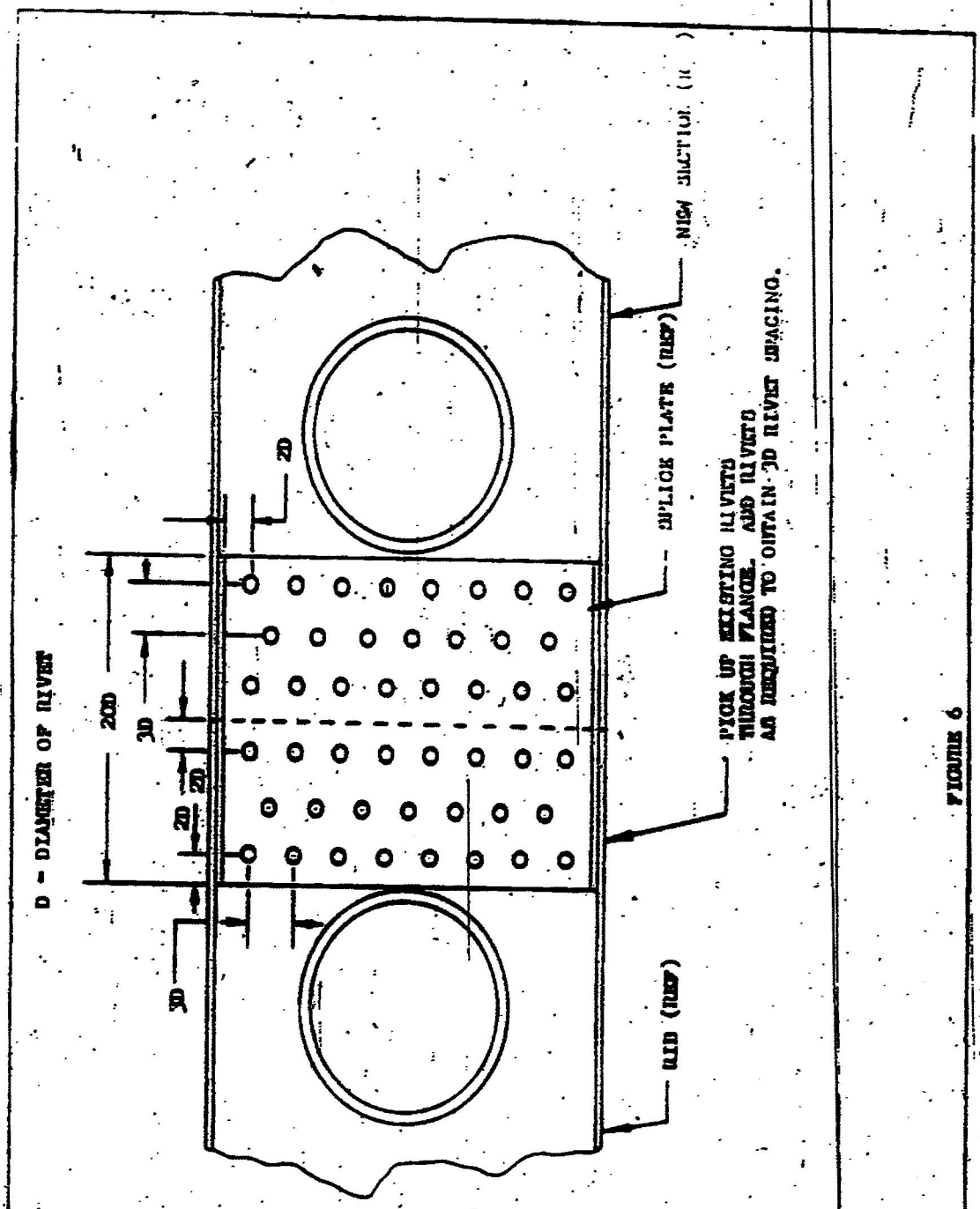


FIGURE 6

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FIGURE 7

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